

Triumph Thunderbird, Thunderbird Storm, Thunderbird Commander and Thunderbird LT Motorcycle Service Manual

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Introduction

This manual is designed primarily for use by trained technicians in a properly equipped workshop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. The work can only be carried out if the owner has the necessary hand and special service tools to complete the job.

A basic knowledge of mechanics, including the proper use of tools and workshop procedures is necessary in order to carry out maintenance and repair work satisfactorily. Whenever the owner has insufficient experience or doubts regarding his ability to do the work, an authorised Triumph dealer must undertake all adjustments, maintenance, and repair work.

In order to perform the work efficiently and to avoid costly mistakes, read the text and thoroughly familiarise yourself with procedures before starting work.

All work should be performed with great care and in a clean working area with adequate lighting.

Always use the correct special service tools or equipment specified. Under no circumstances use makeshift tools or equipment since the use of substitutes may adversely affect safe operation.

Where accurate measurements are required, they can only be made using calibrated, precision instruments.

For the duration of the warranty period, an authorised Triumph dealer must perform all repairs and scheduled maintenance.

To maximise the life of your motorcycle:

- Accurately follow the maintenance requirements of the periodic maintenance chart in the Service Manual.
- Do not allow problems to develop. Investigate unusual noises and changes in the riding characteristics of the motorcycle. Rectify all problems as soon as possible (immediately if safety related).
- Use only genuine Triumph parts as listed in the electronic parts catalogue (EPC).
- Follow the procedures in this manual carefully and completely. Do not take short cuts.
- Keep complete records of all maintenance and repairs with dates and any new parts installed.
- Use only approved lubricants, as specified in the Owner's Handbook, in the maintenance of the motorcycle.

How to use this manual

To assist in the use of this manual, the section title is given at the top.

Each major section starts with a contents page, listing the information contained in the section.

The individual steps comprising repair operations are to be followed in the sequence in which they appear.

Adjustment and repair operations include reference to service tool numbers and the associated illustration depicts the tool.

Where usage is not obvious, the tool is shown in use.

Adjustment and repair operations also include reference to wear limits, relevant data, torque figures, specialist information and useful assembly details.

Warnings, Cautions and Notes

Particularly important information is presented in the following form:

Warning

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

Caution

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

Note:

- **This note symbol indicates points of particular interest for more efficient and convenient operation.**

Tampering with Noise Control System Prohibited

Owners are warned that the law may prohibit:

- a) The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; and
- b) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

References

References to the left hand or right hand side given in this manual are made when viewing the motorcycle from the rear.

Operations covered in this manual do not always include reference to testing the motorcycle after repair. It is essential that work is inspected and tested after completion and, if necessary, a road test of the motorcycle is carried out particularly where safety related items are concerned.

Dimensions

The dimensions quoted are to design engineering specification with service limits where applicable.

During the period of running-in from new, certain adjustments may vary from the specification figures given in this manual. These will be reset by the dealer at the 500 mile/800 km service, and thereafter should be maintained at the figures specified in this manual.

Repairs and Replacements

Before removal and disassembly, thoroughly clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. Particular attention should be paid when installing a new part, that any dust or metal filings are cleared from the immediate area.

Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Never lever a component as this will cause damage both to the component itself and to the surface being levered against. Whenever tapping to aid removal of an item is necessary, tap lightly using a hide or plastic faced mallet.

Edges

Watch for sharp edges, especially during engine disassembly and assembly. Protect the hands with industrial quality gloves.

When replacement parts are required, it is essential that only genuine Triumph parts are used.

Safety features and corrosion prevention treatments embodied in the motorcycle may be impaired if parts other than genuine Triumph parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification.

Tightening procedure

Generally, when installing a part with several bolts, nuts or screws, they should all be started in their holes and tightened to a snug fit, evenly and in a cross pattern. This is to avoid distortion of the part and/or gas or oil leakage. Conversely, bolts, nuts, or screws, should all be loosened (in sequence if specified) by about a quarter of a turn and then removed.

Where there is a tightening sequence specified in this Service Manual, the bolts, nuts, or screws must be tightened in the order and by the method indicated.

Torque wrench setting figures given in this manual must be observed. The torque tools used must be of accurate calibration.

Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed. This applies particularly to micro-encapsulated fixings which must always be replaced if disturbed. Where necessary, the text in this manual will indicate where such a fixing is used.

Introduction

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1 General Information

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General Information

Ignition System Safety Precautions



Warning

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.

An electric shock caused by contact with the ignition system may lead to illness, injury or death.



Warning

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and or diagnostic equipment.

The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.

Dangerous Substances



Warning

Many liquids and other substances used in motor vehicles are poisonous and should under no circumstances be consumed and should, as far as possible, be kept from contact with the skin. These substances among others include acid, antifreeze, asbestos, brake fluid, fuel, lubricants, and various adhesives. Always pay close attention to the instructions printed on labels and obey the instructions contained within. These instructions are included for your safety and well-being.

NEVER DISREGARD THESE INSTRUCTIONS!

Third Party Products



Warning

Many proprietary products, such as chemicals, solvents and cleaning agents, will cause damage to components if used incorrectly or inappropriately. Always follow the manufacturer's instructions printed on the product container's labels and obey the instructions given. These instructions are included for your safety and well-being.

Damage to the motorcycle components caused by the incorrect or inappropriate use of chemicals, solvents and cleaning agents may reduce the components efficiency, resulting in loss of motorcycle control and an accident.

Fluoroelastomers



Warning

Fluoroelastomer material is used in the manufacture of various seals in Triumph motorcycles.

In fire conditions involving temperatures greater than 315°C this material will decompose and can then be potentially hazardous. Highly toxic and corrosive decomposition products, including hydrogen fluoride, carbonyl fluoride, fluorinated olefins and carbon monoxide can be generated and will be present in fumes from fires.

In the presence of any water or humidity, hydrogen fluoride may dissolve to form extremely corrosive liquid hydrofluoric acid.

If such conditions exist, do not touch the material and avoid all skin contact. Skin contact with liquid or decomposition residues can cause painful and penetrating burns leading to permanent, irreversible skin and tissue damage.

Oils



Warning

The engine oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.

Health Protection Precautions

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Overalls must be cleaned regularly. Discard heavily soiled clothing and oil impregnated footwear.
- First aid treatment should be obtained immediately for open cuts and wounds. Always be aware of who your nearest First Aider is and where the medical facilities are kept.
- Use barrier creams, applying before each work period to protect the skin from the effects of oil and grease and to aid removal of the same after completing work.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practicable, degrease components prior to handling.

Environmental Protection Precautions



Caution

Do not pour oil on the ground, down sewers or drains, or into water courses. To prevent pollution of water courses etc., dispose of used oil sensibly. If in doubt contact your local authority.

Burning of used engine oil in small space heaters or boilers can be recommended only for units of approved design. If in doubt, check with the appropriate local authority and/or manufacturer of the approved appliance.

Dispose of used oil and used filters through authorised waste disposal contractors, to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact your local authority for advice on disposal facilities.



Warning

Any risk of eye injury must be avoided. Always wear eye protection when using a hammer, air line, cleaning agent or where there is ANY risk of flying debris or chemical splashing.

General Information

Brakes



Warning

Brake fluid is hygroscopic which means it will absorb moisture from the air. Any absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the routine maintenance schedule. A dangerous riding condition could result if this important maintenance item is neglected!

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO AN ACCIDENT.



Warning

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in an accident.



Warning

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.



Warning

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer for advice before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle.

Failure to take remedial action may reduce braking efficiency leading to an accident.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident.

Failure to change the brake fluid at the interval specified in the routine maintenance schedule may reduce braking efficiency resulting in an accident.

Safety Instructions

Jacking and Lifting



Warning

Always ensure that any lifting apparatus has adequate load and safety capacity for the weight to be lifted. Ensure the motorcycle is well supported to prevent any possibility of the machine falling prior to lifting or jacking or while repairs and servicing are carried out.

Never rely on a single means of support when working with the motorcycle. Use additional safety supports and straps to prevent toppling.

Do not leave tools, lifting equipment, spilt oil, etc. in a place where they could become a hazard to health. Always work in a clean, tidy area and put all tools away when the work is finished.

Precautions Against Damage

Avoid spilling brake fluid or battery acid on any part of the bodywork. Wash spillages off with water immediately.

Disconnect the battery earth lead before starting work, see **ELECTRICAL PRECAUTIONS**.

Always use the recommended service tool where specified.

Protect exposed bearing and sealing surfaces, and screw threads from damage.

Coolant



Warning

Coolant mixture, which is blended with antifreeze and corrosion inhibitors contains toxic chemicals which are harmful to the human body. Never swallow antifreeze, corrosion inhibitors or any of the motorcycle coolant.



Warning

Do not remove the radiator cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.



Caution

The coolant antifreeze contains a corrosion inhibitor which helps prevent damage to the metal surfaces inside the cooling system. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage. Always use the correct antifreeze as specified in the Owner's Handbook. Never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.



Caution

Distilled water must be used with the antifreeze (see specification for antifreeze) in the cooling system.

If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system. Reduced cooling system efficiency may lead to the engine overheating and engine damage.

Cleaning Components

A high flashpoint solvent is recommended to reduce fire hazard.

Always follow container directions regarding the use of any solvent.

Always use the recommended cleaning agent or equivalent.

Do not use degreasing equipment for components containing items which could be damaged by the use of this process. Whenever possible, clean components and the area surrounding them before removal. Always observe scrupulous cleanliness when cleaning dismantled components.

Lubrication

The majority of engine wear occurs while the engine is warming up and before all the rubbing surfaces have an adequate lubrication film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface, which has lost its lubrication film. Old grease and dirty oil should be cleaned off. This is because used lubricants will have lost some lubrication qualities and may contain abrasive foreign particles.

Use recommended lubricants. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulphide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

General Information

Joints and Joint Faces

Assemble joints dry unless otherwise specified in this manual.

If gaskets and/or jointing compound is recommended for use; remove all traces of old jointing material prior to reassembly. Do not use a tool which will damage the joint faces and smooth out any scratches or burrs on the joint faces using an oil stone. Do not allow dirt or jointing material to enter any tapped holes.

Gaskets, O-rings

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly as excessive amounts of sealer may block engine oil passages and cause serious damage.

Prior to reassembly, blow through any pipes, channels or crevices with compressed air.



Warning

To prevent injury, always use eye, face and ear protection when using compressed air. Always wear protective gloves if the compressed air is to be directed in proximity to the skin.

Screw Threads

Metric threads to ISO standard are used.

Damaged nuts, bolts and screws must always be discarded.

Castellated nuts must not be slackened back to accept a split pin, except in those recommended cases when this forms part of an adjustment.

Do not allow oil or grease to enter blind threaded holes. The hydraulic action on screwing in the bolt or stud could split the housing.

Always tighten a nut or bolt to the recommended torque figure. Damaged or corroded threads can affect the torque reading.

Unless specified, threaded fixings must always be fitted dry (no lubrication).



Warning

Never lubricate a thread unless instructed to do so.

When a thread of a fixing is lubricated, the thread friction is reduced. When the fixing is tightened, reduced friction will cause over tightening and possible fixing failure.

A fixing which fails in service could cause component detachment leading to loss of control and an accident.

Locking Devices

Always release locking tabs and fit new locking washers. Do not reuse locking tabs.

Fitting a Split Pin

Always fit new split pins of the correct size for the hole in the bolt or stud. Do not slacken back castle nuts when fitting a split pin, except in those recommended cases when this forms part of an adjustment.

Always fit new roll pins of an interference fit in the hole.

Circlips, Retaining Rings

Replace any circlips and retaining rings that are removed. Removal weakens and deforms circlips causing looseness in the circlip groove. When installing circlips and retaining rings, take care to compress or expand them only enough to install them.

Always use the correct replacement circlip as recommended in the Triumph parts catalogue.

Self-Locking Nuts

Self-locking nuts can be reused, provided resistance can be felt when the locking portion passes over the thread of the bolt or stud.

DO NOT reuse self-locking nuts in critical locations, e.g. suspension components. Always use the correct replacement self-locking nut.

Encapsulated Bolts

An encapsulated bolt can be identified by a coloured section of thread which is treated with a locking agent.

Unless a specified repair procedure states otherwise, encapsulated bolts cannot be reused and MUST be replaced if disturbed or removed.



Warning

Failure to replace an encapsulated bolt could lead to a dangerous riding condition. Always replace encapsulated bolts.

Oil and Grease Seals

Replace any oil or grease seals that are removed. Removal will cause damage to an oil seal which, if reused, would cause an oil leak.

Ensure the surface on which the new seal is to run is free of burrs or scratches. Renew the component if the original sealing surface cannot be completely restored.

Protect the seal from any surface which could cause damage over which it has to pass when being fitted. Use a protective sleeve or tape to cover the relevant surface and avoid touching the sealing lip.

Lubricate the sealing lips with a recommended lubricant. This will help to prevent damage in initial use. On dual lipped seals, smear the area between the lips with appropriate grease.

When pressing in a seal which has manufacturer's marks, press in with the marks facing out.

Seals must be pressed into place using a suitable driver. Use of improper tools will damage the seal.

Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil or grease on its outer or inner circumference so that it will locate smoothly.

Ball Bearing

When installing a ball bearing, the bearing race which is an interference fit should be pushed by a suitable driver. This prevents severe stress or damage to the load carrying components. Press a ball bearing until it touches the shoulder in the bore or on the shaft.

With the sealing lip facing the lubricant, press or drift a seal to the depth of its housing, if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

Chassis Bearing Lubrication

Note:

- **This information relates only to bearing lubrication. For the procedures necessary to replace a bearing, always refer to the relevant section of this Service Manual.**
- **Bearings installed in engine and transmission applications are not covered by this information. Refer to the Lubrication chapter or the relevant engine chapter for additional information.**

General

For a bearing to be serviceable for its anticipated life span it must be checked, adjusted and lubricated at regular intervals, as specified in the service schedules given in the Owner's Handbook and this Service Manual.

A correctly lubricated bearing will have a film of lubrication that separates the moving parts, disperses heat and protects the bearing surfaces from corrosion.

Note:

- **In all cases, use the lubricant recommended.**
- **Grease the bearing, not the cavity where it is located.**
- **A bearing that is not regularly checked and lubricated will have a reduced life span.**

New Bearings

New bearings are typically protected with an oil preservative to prevent corrosion etc. during storage. This is NOT the lubrication for the bearing but DOES NOT need to be washed off prior to assembly and in-service lubrication.

When lubricating a new bearing with grease the following steps should be taken:

1. Do not clean off the oil preservative.
2. Grease must be forced between the roller elements and the roller cage.
3. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
4. Any excess grease should be smeared on the outside of the rollers.

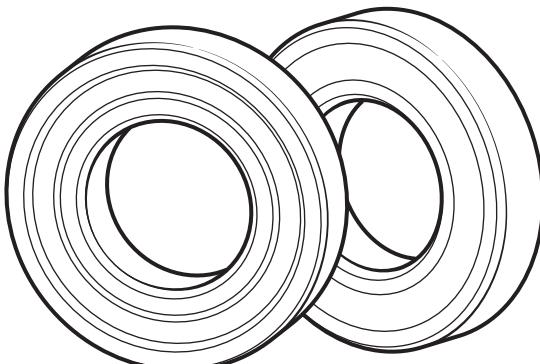
Lubrication and Checks While Servicing a Bearing

1. Disassemble parts as necessary to access the bearing.
2. Inspect the old grease covering the bearing, looking for signs of bearing damage, i.e. flakes or specks of metal.
3. Remove the old grease.

General Information

- Check the bearing for smooth operation and visually check for corrosion, dents and flaking in the bearing race, rollers or cage. Replace if necessary.

Below/overleaf several common bearing types and the lubrication procedures for each are identified:

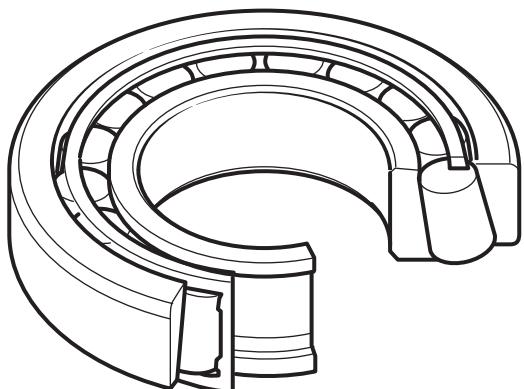


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Sealed Bearings

Note:

- Sealed bearings can be identified by their integrated seals.**
- Sealed bearings are lubricated for life by the manufacturer.**
- Any attempt to change the grease in a sealed bearing will damage the integrated seals. If the seals are damaged, dirt and water will ingress and the life of the bearing will be greatly reduced.**

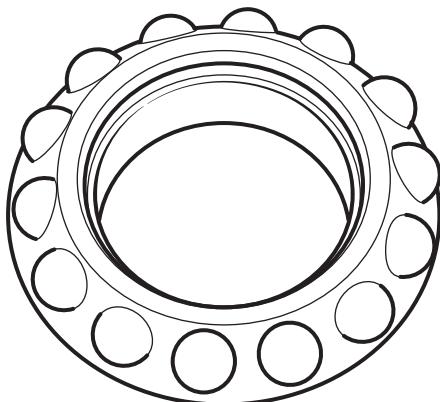


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Taper Bearings

- Grease must be forced between the inner race and the roller carrier.
- Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.

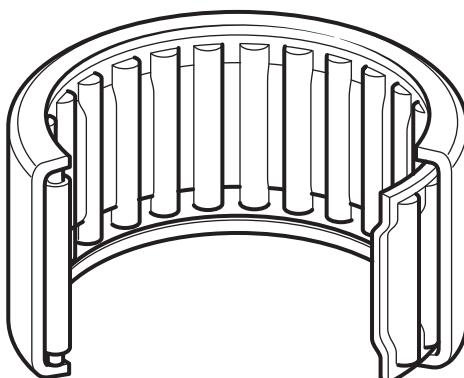
- Any excess grease should be smeared on the outside of the rollers.



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Angular Contact and Ball Bearing

- Grease the bearing races and the ball bearing carrier.
- Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.



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Needle Roller Bearings

- Coat the needle rollers with grease.
- Ensure the needle rollers turn so that the grease is distributed over the entire circumference of the internal parts.
- Assemble the parts, adjust and check as necessary.

Metal Bushes

- Disassemble the parts as necessary to access the bush.
- Remove the old grease.
- Apply fresh grease to the metal bush.

Fuel Handling Precautions

General

The following information provides basic precautions which must be observed if petrol (gasoline) is to be handled safely. It also outlines other areas of risk which must not be ignored. This information is issued for basic guidance only and, if in doubt, appropriate enquiries should be made to your local Fire Officer.

Petrol – Gasoline

When petrol (gasoline) evaporates it produces 150 times its own volume in vapour which when diluted with air becomes a readily ignitable mixture. The vapour is heavier than air and will always fall to the lowest level. It can readily be distributed throughout any indoor environment by air currents, consequently, even a small spillage of petrol (gasoline) is potentially very dangerous.



Warning

Petrol (gasoline) is highly flammable and can be explosive under certain conditions. When opening the fuel tank cap always observe all the following items:

Turn the motorcycle ignition switch OFF.

Do not smoke.

Always have a fire extinguisher containing FOAM, CO₂, HALON or POWDER close at hand when handling or draining fuel or fuel systems. Fire extinguishers must also be present in areas where fuel is stored.

Always disconnect the vehicle battery, negative (black) lead first, before carrying out, dismantling or draining work on a fuel system.

Whenever petrol (gasoline) is being handled, drained, stored or when fuel systems are being dismantled, make sure the area is well ventilated. All potential forms of ignition must be extinguished or removed (this includes any appliance with a pilot light). Any lead-lamps must be flame-proof and kept clear of any fuel spillage.

Warning notices must be posted at a safe distance from the site of the work to warn others that petrol is being openly handled. The notice must instruct the reader of the precautions which must be taken.

Failure to observe any of the above warnings may lead to a fire hazard which could result in personal injury.

Warning

No one should be permitted to repair components associated with petrol/gasoline without first having specialist training on the fire hazards which may be created by incorrect installation and repair of items associated with petrol/gasoline.

Repairs carried out by untrained personnel could bring about a safety hazard leading to a risk of personal injury.



Warning

Draining or extraction of petrol/gasoline from a vehicle fuel tank must be carried out in a well ventilated area.

The receptacle used to contain the petrol/gasoline must be more than adequate for the full amount of fuel to be extracted or drained. The receptacle should be clearly marked with its contents, and placed in a safe storage area which meets the requirements of local authority regulations.

When petrol/gasoline has been extracted or drained from a fuel tank, the precautions governing naked lights and ignition sources should be maintained.

Failure to observe any of the above warnings could bring about a safety hazard leading to a risk of personal injury.

Fuel Tank Removal

Fuel tanks should have a 'PETROL (GASOLINE) VAPOUR' warning label attached to them as soon as they are removed from the vehicle. In all cases, they must be stored in a secured, marked area.

Chassis Repairs



Warning

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for repair or inspection. Any accident can cause damage to the motorcycle, which if not correctly repaired, may cause a second accident which may result in injury or death.

The frame must not be modified as any modification to the frame such as welding or drilling may weaken the frame resulting in an accident.

General Information

Electrical Precautions

The following guidelines are intended to ensure the safety of the operator whilst preventing damage to the electrical and electronic components fitted to the motorcycle. Where necessary, specific precautions are detailed in the relevant sections of this manual which should be referred to prior to commencing repair operations.

Equipment - Prior to commencing any test procedure on the motorcycle ensure that the relevant test equipment is working correctly and any harness or connectors are in good condition, in particular mains leads and plugs.



Warning

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.

An electric shock caused by contact with the ignition system may lead to illness, injury or death.



Warning

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and/or diagnostic equipment.

The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.



Warning

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

Do not jump start the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

High Voltage Circuits - Whenever disconnecting live H.T. circuits always use insulated pliers. Exercise caution when measuring the voltage on the coil terminals while the engine is running. High voltage spikes can occur on these terminals.

Connectors and Harness - The engine of a motorcycle is a particularly hostile environment for electrical components and connectors. Always ensure these items are dry and oil-free before disconnecting and connecting test equipment. Never force connectors apart either by using tools or by pulling on the wiring itself. Always ensure locking mechanisms are disengaged before removal and note the orientation to enable correct reconnection. Ensure that any protective covers and substances are replaced if disturbed.

Having confirmed a component to be faulty, switch off the ignition and disconnect the battery negative (black) lead first. Remove the component and support the disconnected harness. When replacing the component keep oily hands away from electrical connection areas and push connectors home until any locking mechanism becomes fully engaged.

Battery Disconnecting

Before disconnecting the battery, switch off all electrical equipment.



Warning

To prevent the risk of a battery exploding and to prevent damage to electrical components ALWAYS disconnect the battery negative (black) lead first. When reconnecting the battery, always connect the positive (red) lead first, then the negative (black) lead. Always disconnect the battery when working on any part of the electrical system.

Failure to observe the above warnings may lead to electrical damage and a fire hazard which could cause personal injury.

Always ensure that battery leads are routed correctly and are not close to any potential chafing points.

Disciplines

Switch off the ignition prior to making any connection or disconnection in the system. An electrical surge can be caused by disconnecting 'live' connections which can damage electronic components.

Ensure hands and work surfaces are clean and free of grease, swarf, etc. as grease collects dirt which can cause tracking or high-resistance contacts.

Prior to commencing any test, and periodically during any test, touch a good earth to discharge body static. This is because some electronic components are vulnerable to static electricity.

Electrical Wires

All the electrical wires are either single-colour or two-colour and, with only a few exceptions, must be connected to wires of the same colour. On any of the two-colour wires there is a greater amount of one colour and a lesser amount of a second colour. A two-colour wire is identified by first the primary colour and then the secondary colour. For example, a yellow wire with thin red stripes is referred to as a 'yellow/red' wire; it would be a 'red/yellow' wire if the colours were reversed to make red the main colour.

Electrical Testing

For any electrical system to work, electricity must be able to flow in a complete circuit from the power source (the battery) via the components and back to the battery. No circuit means no electrical flow. Once the power has left the positive side of the battery and run through the component it must then return to the battery on its negative side (this is called earth or ground). To save on wiring, connections and space, the negative side of the battery is connected directly to the frame or engine. Around the frame and engine will be various other ground points to which the wiring coming from components will be connected. In the case of the starter motor it bolts directly to the engine, which is bolted to the frame. Therefore the frame and engine also form part of the earth return path.

Ohm's Law

The relationship between voltage, current and resistance is defined by Ohm's Law.

- The potential of a battery is measured in volts (V).
- The flow of current in a circuit (I) is measured in amperes.
- The power rating of a consumer is measured in watts (W).
- The resistance (R) of a circuit is measured in Ohms (Ω).

Ohm's law, for practical work can be described as -

$$\frac{\text{Voltage}}{\text{Current}} = \text{Resistance}$$

Power is calculated by multiplying Volts x Amps -

$$\text{Watts} = \text{Volts} \times \text{Amps}$$

By transposing either of these formulae, the value of any unit can be calculated if the other two values are known.

For example, if a battery of 12 V is connected to a bulb of 60 W:

- the current flowing in the circuit can be calculated by using -

$$\frac{W}{V} = I \quad \frac{60}{12} = 5$$

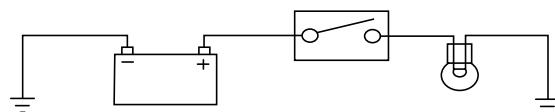
- the bulb resistance can be calculated by using -

$$\frac{V}{I} = R \quad \frac{12}{5} = 2.4$$

To use either of the following triangles, put your finger over the value you want to find. Multiply the remaining values if side by side, or divide if one is over the other.



Basic Electrical Circuits



Basic Circuit Diagram

In the above circuit an electrical reservoir (the battery) is connected via a cable to a terminal on the controlling device (the switch) whose contacts are either open or closed. The other terminal on the switch is connected via a cable to the consumer (the bulb), and the other side of the bulb filament is connected to ground (earth) by another cable. The ground point is usually a part of the frame or engine, to which the battery negative terminal is also connected.

When the switch contacts are open (as shown in the diagram), the circuit is broken and no current flows. When the switch contacts are closed, the circuit is made and current flows from the battery positive terminal through the switch contacts and bulb filament to ground. The frame completes the circuit to the battery negative terminal and the bulb illuminates.

Although some circuits on the circuit diagram may at first seem more complicated, it will generally be found that they can be broken down into sections which do not differ greatly from the basic circuit above.

General Information

Circuit Diagrams

Circuit diagrams are created to provide a 'picture' of the electrical system and to identify the route taken by each individual wire through the system, in order to identify which components it feeds and which connectors the wire runs through. Circuit diagrams are an essential tool for fault finding, as it is possible to locate start and finish points for a circuit without having to manually trace the wire through the motorcycle itself. Circuits diagrams may look confusing at first but when they are studied closely they soon become logical.

Due to the complex circuits and the number of individual wires, Triumph uses two types of circuit diagram in its Service Manuals.

- Within the manual, conventional circuit diagrams are used to show the layout of the main circuits of the motorcycle. These are: Engine management/ignition, Lighting, Starting and Charging and Auxiliary and Accessory. In these diagrams no attempt is made to show the components of the system in any particular order or position in relation to the motorcycle.
- At the back of the Service Manual a full colour layout circuit diagram is used to show the main electrical components in a position similar to the actual position on the motorcycle.

Both of these circuit diagrams use similar symbols to illustrate the various system components and will be accompanied by a key indicating circuit diagram components and wiring colour codes.

Circuit diagrams also depict the inner workings of a switch housing (i.e. which wire connects to which when a switch is turned from one position to another) so that a test of that switch can be made using the wire terminals in the connector instead of disassembling the switch itself.

Glossary of Circuit Diagram Symbols

The following is a description of the symbols found in the circuit diagrams used in all Triumph Service Manuals.

Connector



This illustration is used to show all multiplug type electrical connectors on Triumph circuit diagrams. The numbers in the box relate to the terminal numbers of the connector pins. On ECUs with two connectors, the number would be prefixed with the letters 'A' or 'B' to identify each connector. An additional number outside the box will identify the component.

Diode



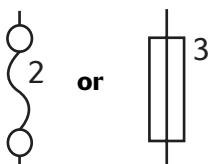
An electrical one-way valve. Diodes allow current to flow in one direction but will not allow it to return. The arrow, which forms part of the diode symbol, indicates the direction of current flow.

Electromagnetic Winding (solenoid)



An electromagnetic winding (or solenoid) is used to convert an electrical current into a lateral movement. This can then be used to operate switches (as used in relays) or other components such as fuel injectors or secondary air injection solenoids.

Fuse



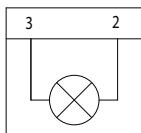
A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' should a short circuit occur, protecting that circuit from further damage. The number next to the fuse on the circuit diagram indicates the position of the fuse in the fuse box.

Ground or Earth Point



This symbol is used to show ground points. This is the negative connection to either the frame or engine, and is a common cause of intermittent faults due to loose or corroded connections.

Lamp or Bulb



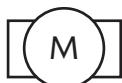
This symbol is used to show all types of light bulbs. The numbers in the box relate to the terminal numbers of the connector pins. An additional number outside the box will identify the component.

LED (Light Emitting Diode)



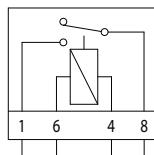
Triumph use LEDs for the alarm warning light, instrument illumination and warning lights, gear change lights and rear light/brake lights on various models.

Motor



An electric motor. This could be the starter motor or a motor within an actuator, for example within the ABS modulator.

Relay



A relay is effectively an electromagnetic switch. To close the relay contacts and complete the circuit, an electromagnet in the relay is energised which causes the relay contacts to close, making the circuit complete.

Relays are used when the electrical current is too great for a mechanical switch, usually when the switching must be done quickly to prevent arcing across the switch contacts. If a mechanical switch were used, the mechanical switch contacts would quickly burn away.

Resistor



A device placed in a cable to reduce a voltage or restrict the maximum current a device can draw.

Splice



A hard cable joint where two or more cables are joined in the wiring harness. A potential source of both open and short circuits.

Switches

Normally Open



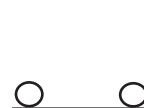
or



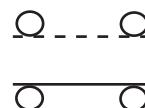
Normally Closed



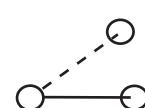
or



Changeover



or



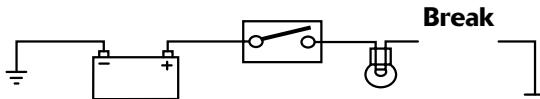
A mechanical device for completing or breaking a circuit. There are three common types of switch: normally open, normally closed and changeover.

General Information

Tracing Circuits

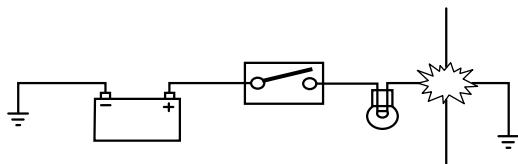
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

Open Circuit



A break in an electrical circuit - current cannot flow. Usually caused by a break in a wire or cable or by a loose connection. Open circuits can often be intermittent, making diagnosis difficult.

Short Circuit



A 'short cut' in an electrical circuit - current bypasses the intended circuit, either to earth or to another, different circuit. Often caused by failure of the cable insulation due to chafing or trapping of the wire. There are two different types of short circuit - short to ground and short to V_{batt}.

A short to ground means that the current is going to earth before it reaches the component it is supposed to feed. These are often caused by chafing of the harness to the frame or wires trapped between a bolted component, and will often blow the fuse on that circuit.

A short to V_{batt} is a short to battery voltage (12 volts) and is caused by a live power supply wire contacting an adjacent cable. Note that it is also possible for a 5 volt sensor reference voltage to short to an adjacent circuit, which can also cause electrical failures and DTCs (Diagnostic Trouble Code) to be stored.

When tracing a wire that is suspect, carefully check the circuit diagram before starting. Remember:

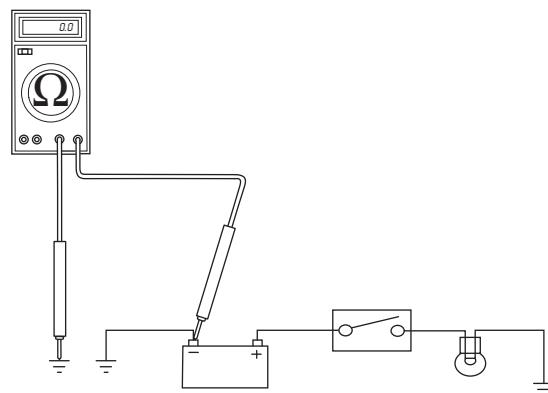
- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the bike. It is a schematic diagram of the circuits.
- particularly where engine management items are concerned, the circuit is only completed by the ECM. If the ECM is not connected, the circuit may register as open.

To Check Continuity:

Caution

Ensure the circuit being tested is switched off before measuring continuity. Damage to the Digital Multi Meter (DMM) may result from testing a 'live' circuit with the meter set to resistance (Ω).

In the example below, the ground circuit continuity is being tested from the battery to the frame.

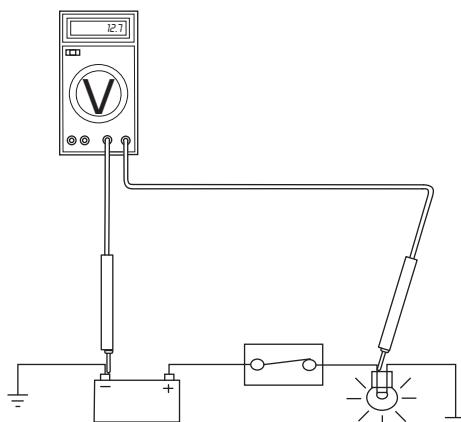


Continuity (Resistance) Check

- Locate each end of the wire.
- Set the Digital Multi Meter (DMM) to resistance check (Ω).
- Probe each end of the wire.
- If there is continuity, the meter will usually beep or register the resistance of the cable.
- A high resistance figure could indicate a dirty or corroded connection.
- If there is a break in the wire, the meter will not beep or register a resistance.
- By probing the wire in various places, the position of a high resistance or break in the wire (open circuit) can be narrowed down until it is found.

To Measure Voltage:

In the example below, the circuit voltage is being measured at the bulb positive (+) terminal.



Voltage Check

- Turn the circuit to be tested 'ON'.
- Set the Digital Multi Meter (DMM) to Voltage Check (V). Ensure the multi meter is set to DC Volts for direct current circuits (most circuits) or AC Volts for alternating current circuits (typically alternator output voltage tests).
- Set the range of the DMM to the range best suited to the voltage of the circuit being tested (typically 20 volts for most DMMs). Refer to the DMM manufacturers instructions.
- Connect the black (ground) lead of the DMM to a reliable ground connection (usually the battery or frame ground).
- Locate the positive terminal of the wire or component to be tested.
- Connect the red (positive) lead of the DMM to the positive terminal.
- Read the voltage from meter.

Splices

Splices are probably the most common cause of wiring faults after connectors. Splices are made where two or more wires come together and diverge in different directions, usually to feed a different circuit.

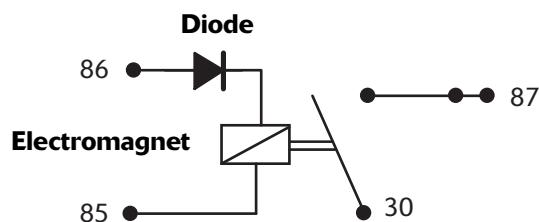
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or earths to become 'dead'.

Switches

To check a switch, set the multimeter to resistance/continuity and probe the two pins that form a closed circuit when the switch is pushed. If the switch is working correctly, the resistance should register or the meter will beep.

Relays

All relay cases have a circuit path engraved on them showing the circuit path across the electromagnet and the switch. Before making any checks, first note the pin designations, current paths, and whether or not there is a diode in either circuit path.



Make continuity checks across the electromagnet first, usually from pin 86 (positive) to pin 85 (negative). If a diode appears in the circuit use the diode check on the multimeter (Volts scale) in the direction of current flow. If there is no diode, use the resistance check facility. An open circuit or unusually high resistance value indicates a faulty relay.

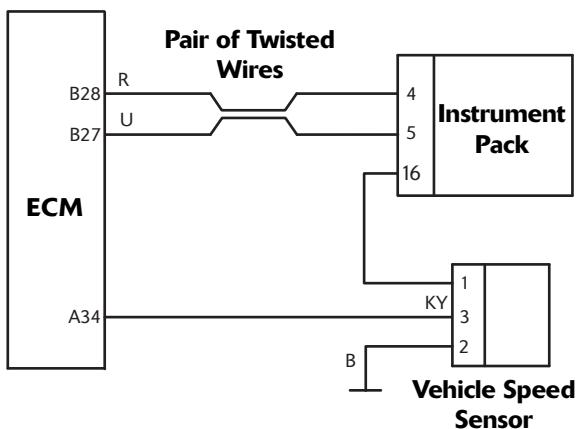
To check the switch side, apply a 12 volt supply between pins 86 and 85. With the supply connected, the relay should be heard to click and there should be continuity between pins 30 and 87. An open circuit indicates a faulty relay.

General Information

CAN (Controller Area Networking)

CAN (sometimes called CANbus) is a protocol for data communication between Electronic Control Modules (ECMs). Each ECM on the network is connected by a single pair of twisted wires (or bus) which are used for the transmission of vehicle sensor data. By using CAN, the overall number of system sensors, and the amount of cabling required to allow ECMS to communicate with each other is greatly reduced.

This saves cost, weight and space, and makes the system more reliable, as the physical number of wires and connections is reduced.



**Extract from the Circuit Diagram showing
CAN Connection between ECMS**

CAN works by each ECM sending out 'packets' of information (such as engine speed or fuel consumption information) on to the network bus (note that the network must be free of data before any ECM is allowed to transmit). This data is given a priority according to its importance (for example 'engine speed' may have a higher priority than 'low fuel level'), so that even if two ECMS send data at the same time, high priority information is always sent first. Lower priority data is then resent after the high priority data has been received by all ECMS on the network.

The receiving ECM confirms the data has been received correctly and that the data is valid, and this information is then used by the ECM as necessary. Specific data not required by an ECM will still be received and acknowledged as correct but then disregarded (for example if an ECM does not require 'clutch switch position' information, this data packet would be ignored).

This allows for a very high speed system of communication, which is also very reliable. Should one ECM fail or transmit corrupted or otherwise incorrect messages, none of the other ECMS on the network will be affected, and after a certain time that ECM will be prevented from transmitting further messages until the fault is rectified. This stops the ECM from clogging the network with incorrect data and preventing other messages from getting through. The fault would then be reported by a DTC (Diagnostic Trouble Code).

Triumph currently uses CAN for communication between the following ECMS:

- Engine control module
- ABS module
- Immobiliser control module
- Diagnostic connector
- Audio system (if fitted).

Alternator/Charging System

The charging system consists of an alternator, a rectifier/regulator assembly and the battery. The alternator is made up of two parts, the stator, which is mounted to the crankcase or the engine cover, and the rotor, mounted to the end of the crankshaft. The stator is an assembly of 18 coils, arranged into 3 phases. The rotor is a series of magnets mounted in the engine flywheel, which are arranged so as to be positioned around the outside of the stator coils. As the engine rotates the alternator produces an AC (alternating current) voltage in each of the three phases of the alternator, typically of around 35 to 40 volts AC at 4,000 - 5,000 rpm, although this figure varies between models. As the battery requires DC (direct current) voltage for correct charging, this AC voltage must be first rectified to DC current, and then regulated to the correct voltage for the battery of

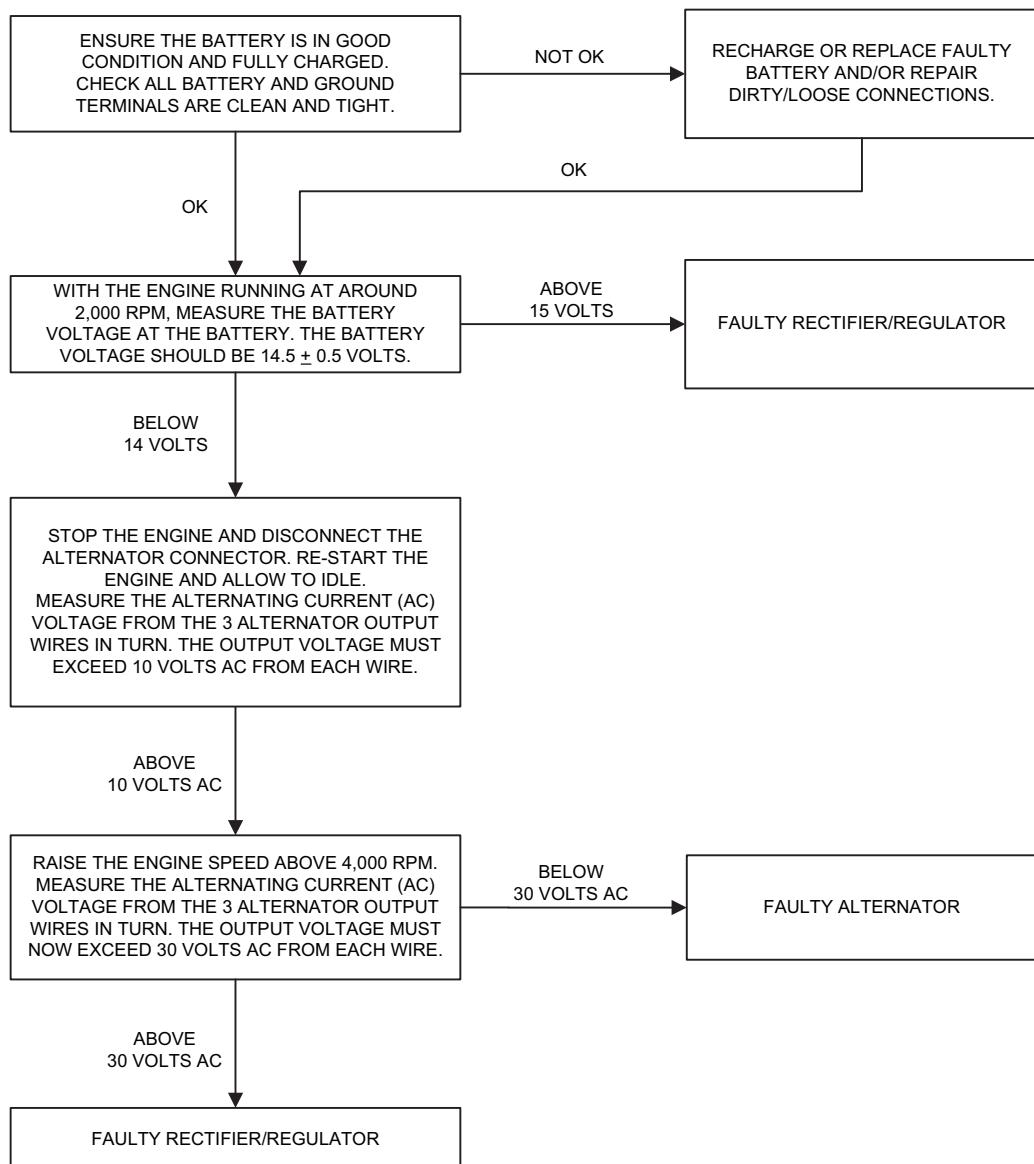
14.5 ± 0.5 volts. This is done by the rectifier/regulator, which uses diodes to convert the alternator output to DC Volts and limits the resulting output to the correct figure required for optimal battery charging.

If the charging circuit does not operate correctly, the following basic checks must be carried out before further diagnosis is performed:

- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating (see page 18-20).

Rectify any defects as necessary.

Diagnosis – Charging Circuit



General Information

Starting Circuit

All Triumph models are equipped with an electric start system. This system consists of a starter relay, starter motor, starter switch, side stand switch, engine stop switch, clutch switch and the sprag clutch. The starter motor is connected to the starter relay and the battery by heavy duty cables in order to supply the large currents required by the motor to start the engine. When the starter button is pressed, the relay is energised, which then allows current to the starter motor. The starter motor will not operate unless the clutch lever is pulled in. Also, the starter will not operate if the side stand is down, unless the transmission is in neutral. If the starter motor does not operate, the following basic checks must be carried out before further diagnosis is performed:

- Check the engine stop switch is in the 'RUN' position.

- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.
- Using the Triumph Diagnostic Tool, check the operation of the neutral switch or gear position sensor (if fitted), side stand and clutch switches.

Note:

- **On all new models from Daytona 675 onwards, which use a CAN connection between the instruments and the ECM, the engine will not crank if the instruments are disconnected.**

Rectify any defects as necessary.

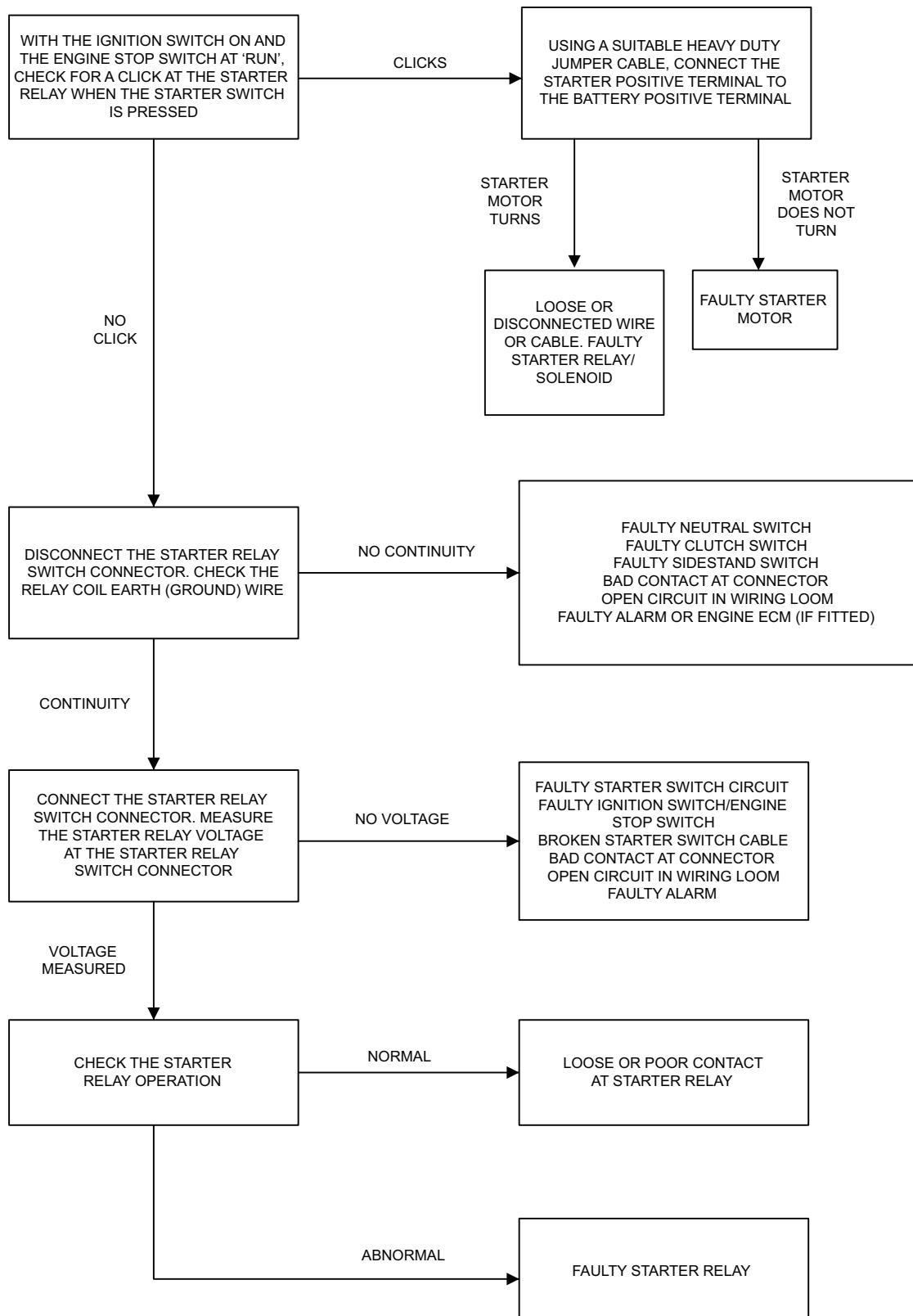
General Fault Finding – Starter Motor and Relay

Symptom	Possible cause(s)
Starter relay does not click, starter motor does not turn	Battery discharged or defective Blown main or starter relay fuse Defective starter relay wiring or starter switch Check that the side stand, transmission and clutch lever are positioned for engine starting i.e. transmission in neutral, clutch lever pulled in and the side stand down Defective alarm system - ensure any alarm fitted is working correctly
Starter motor turns slowly	Battery discharged or defective Loose, corroded or dirty battery connections Loose, corroded or dirty starter motor or starter relay connections Defective starter motor Loose, corroded or dirty battery ground connections
Starter relay clicks but engine does not turn over	Battery discharged or defective Crankshaft does not turn due to engine defect Defective starter motor Starter cable open circuit Defective starter relay
Starter motor turns but engine does not turn over	Starter motor or starter ring gear

Diagnosis – Starter Circuit

Note:

- Prior to carrying out the diagnosis, ensure the battery voltage is 12 - 13.5 V, the immobiliser system (if fitted) is functioning correctly, the transmission is in neutral and the clutch lever is pulled fully to the handlebar.



General Information

Specification

Triumph are constantly seeking to improve the specification, design and production of their motorcycles and alterations take place accordingly.

While every effort has been made to ensure the accuracy of this manual, it should not be regarded as an infallible guide to current specifications of any particular motorcycle.

Authorised Triumph dealers are not agents of Triumph and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

Replacement Parts



Warning

Only Triumph genuine parts should be used to service, repair or convert Triumph motorcycles. To ensure that Triumph genuine parts are used, always order parts, accessories and conversions from an authorised Triumph dealer. The fitting of non-approved parts, accessories or conversions may adversely affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.



Warning

Always have Triumph genuine parts, accessories and conversions fitted by an authorised Triumph dealer. The fitment of parts, accessories and conversions by a dealer who is not an authorised Triumph dealer may affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.



Warning

Always have Triumph approved parts, accessories and conversions fitted by a trained technician. To ensure that a trained technician is used, have an authorised Triumph dealer fit the parts. The fitment of parts, accessories and conversions by personnel other than a trained technician at an authorised Triumph dealer may affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.

Service Data

The service data listed in this manual gives dimensions and specifications for brand new, original parts. Where it is permissible to allow a part to exceed these figures, then the service limit is given.

The terms of the motorcycle warranty will be invalidated by the fitting of other than genuine Triumph parts.

All genuine Triumph parts have the full backing of the motorcycle warranty. Triumph dealers are obliged to supply only genuine Triumph recommended parts.

Inspection

Disassembled parts should be visually inspected and replaced with new ones if there are any signs of the following:

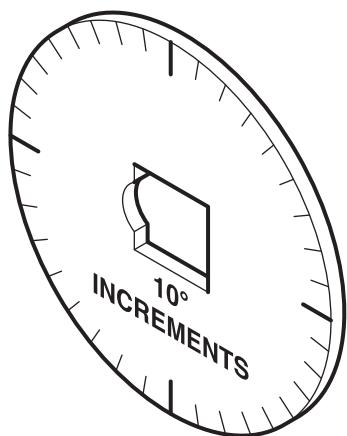
Abrasions, cracks, hardening, warping, bending, dents, scratches, colour changes, deterioration, seizure or damage of any nature.

Service Tools

Special service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this Service Manual cannot be carried out without the aid of the relevant service tools. Where this is the case, the tools required will be described during the procedure.

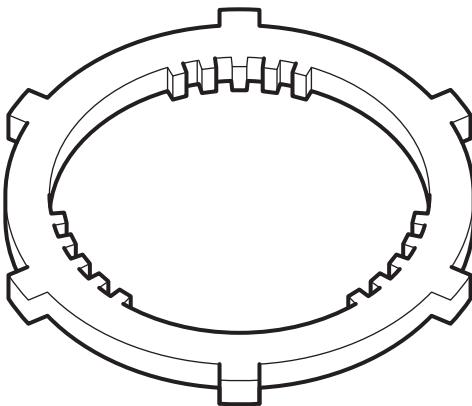
Special Service Tools:

3880105-T0301 - Angular torque gauge



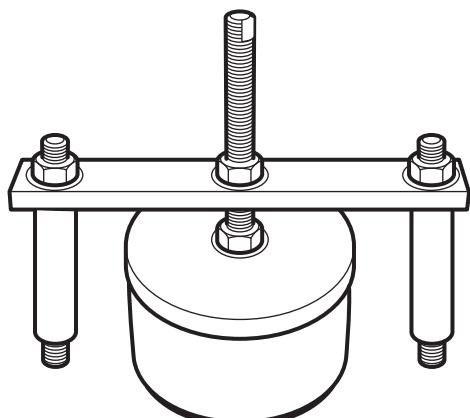
cbxt

T3880038 - Clutch anti-rotation jig



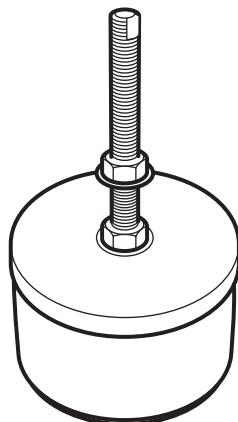
cchd

T3880061 - Extractor, liners - 1,600 cc engine



cchb

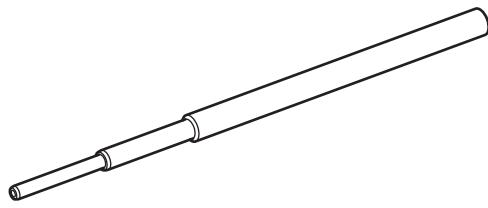
T3880122 - Extractor, liners - 1,700 cc engine



cchb

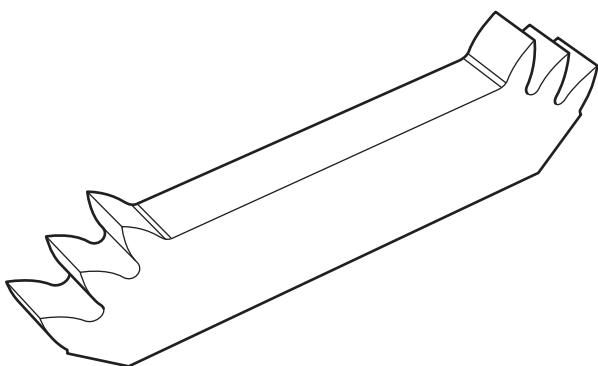
General Information

T3880039 - Timing pin



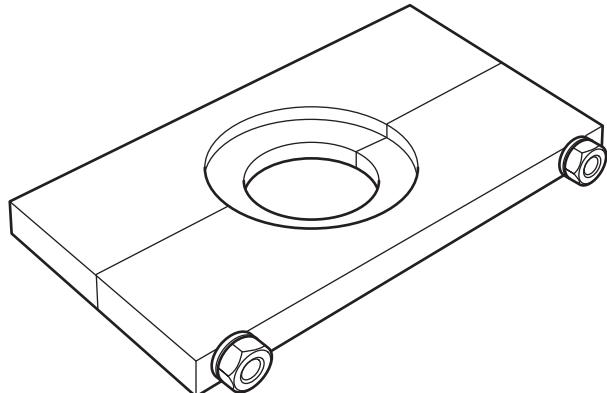
T3880039

T3880043 - Crank lock-up tool



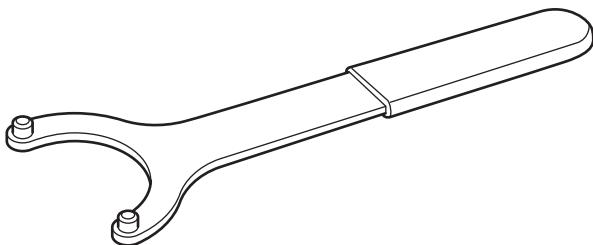
T3880043

T3880133 - Press plate, second gear



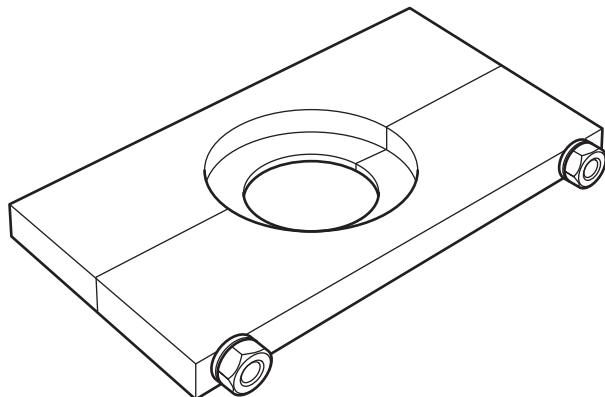
T3880133

T3880041 - Idler gear pin spanner



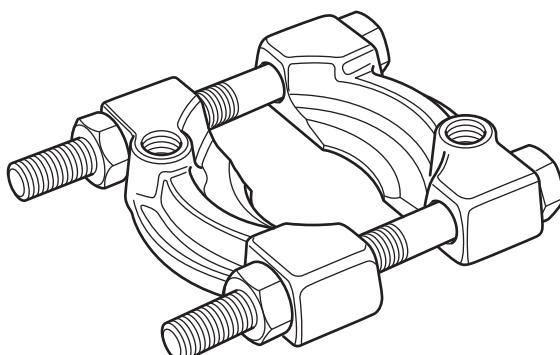
T3880041

T3880108 - Press plate, transmission



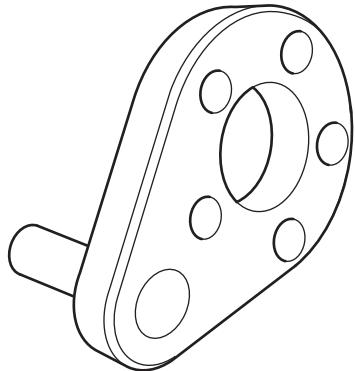
T3880108

T3880109 - Bearing separator



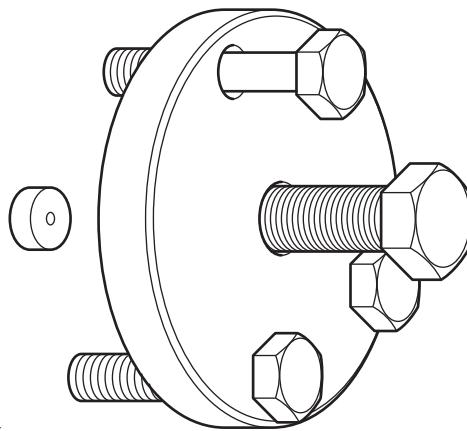
T3880109

T3880152 - Output pulley carrier holding tool



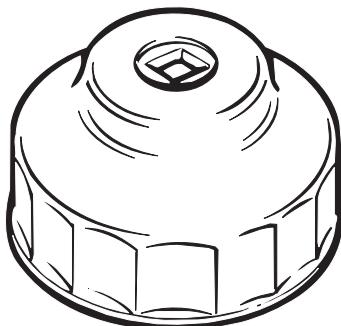
3880152

T3880054 - Output pulley carrier puller



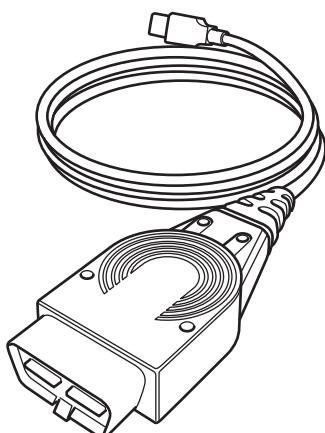
T3880054

T3880313 - Oil filter wrench

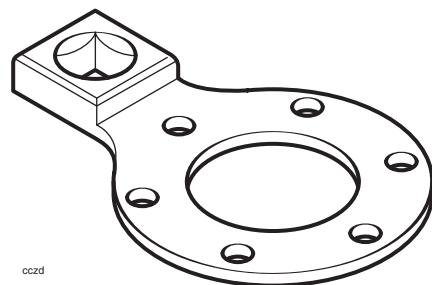


gahc

T3880057 - Triumph Diagnostic Tool

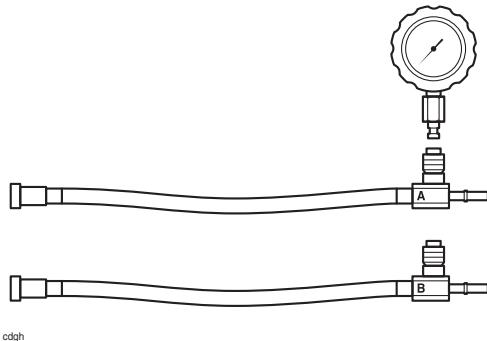


T3880121 - Holder, oil pump drive gear



cczd

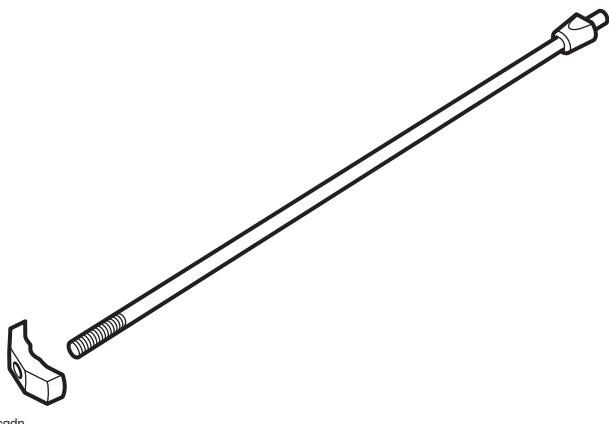
T3880001 - Fuel pressure gauge



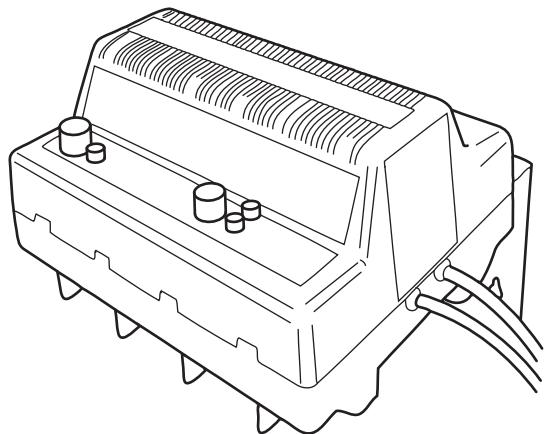
cdgh

General Information

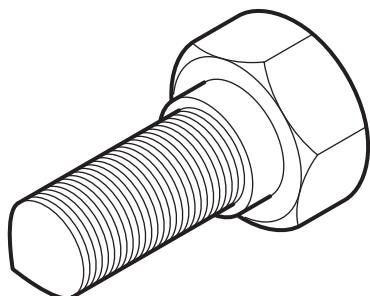
T3880148 - Wheel alignment tool



BatteryMate battery charger - see latest parts catalogue for part number information

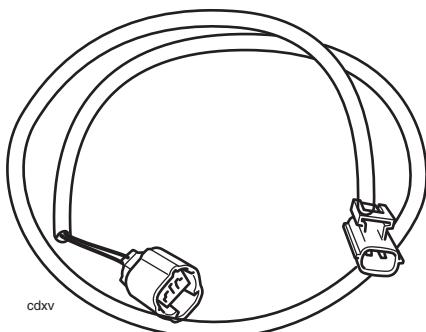


T3880200 - Puller, alternator rotor

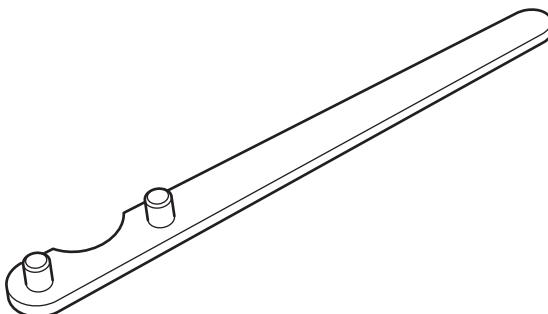


cche

T3880129 - Extension cable

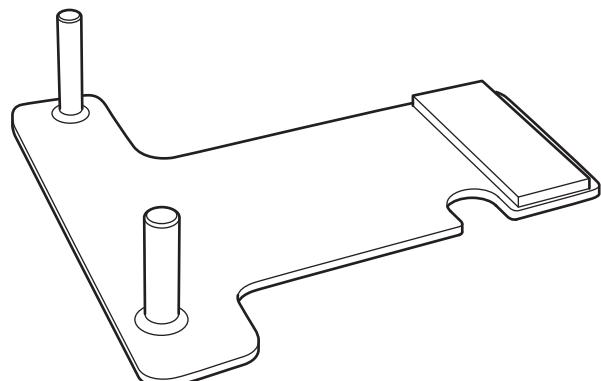


T3880096 - Holding tool, alternator rotor



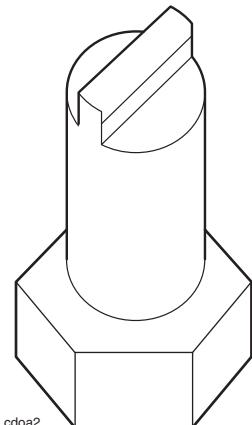
T3880096

T3880134 - Engine support frame - All models except Thunderbird Commander and Thunderbird LT

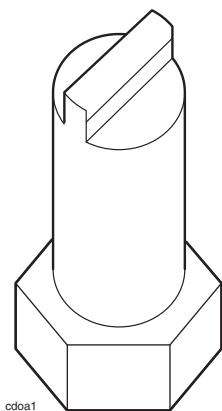


T3880126

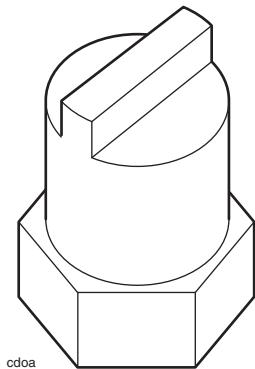
T3880377 - Engine mounting adjuster



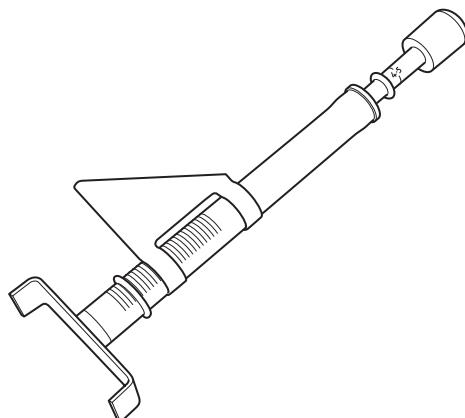
T3880103 - Engine mounting adjuster



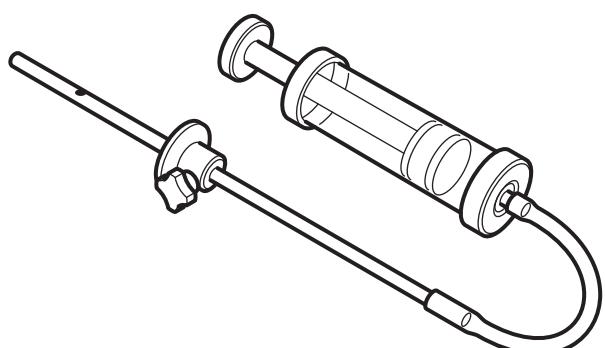
T3880104 - Swinging arm adjuster



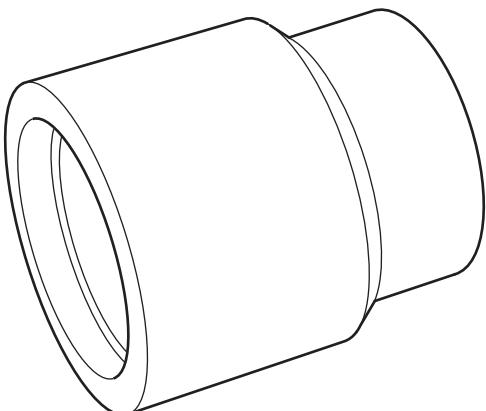
T3880126 - Belt slack measurement tool



3880160-T0301 - Fork filler evacuator

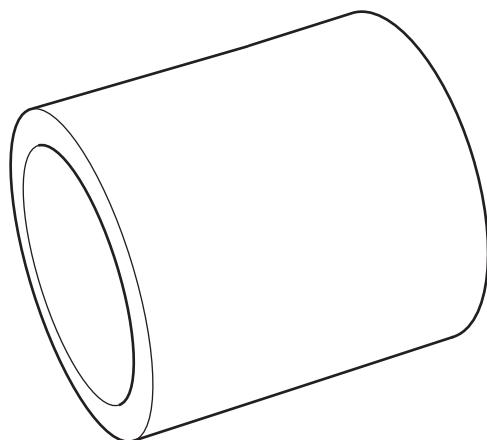


T3880131 - Fork seal & upper bearing installer

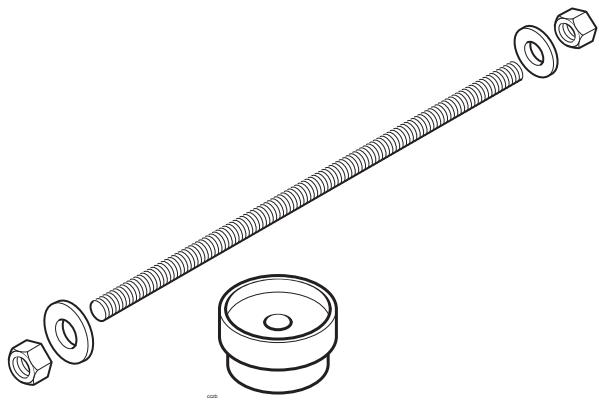


General Information

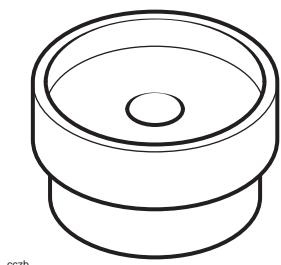
T3880132 - Fork seal chrome cap installer



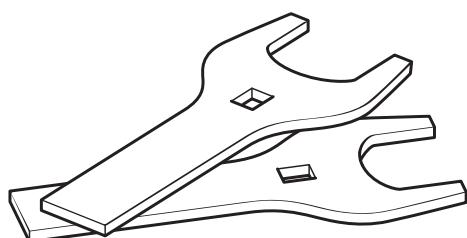
T3880053 - Extraction kit, wheel bearing



T3880075 - Bearing installer

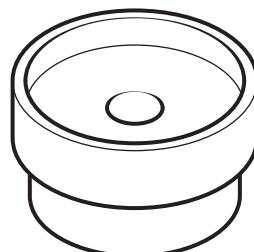


3880140-T0301 - Head race adjusters



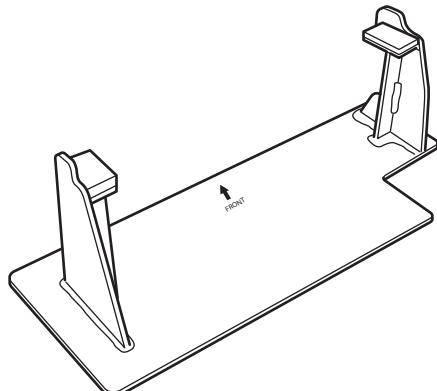
kagf1

T3880070 - Bearing installer



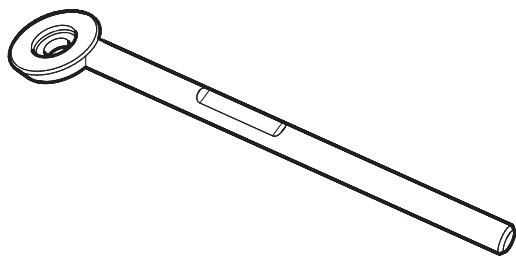
cczb

T3880803 - Motorcycle support frame

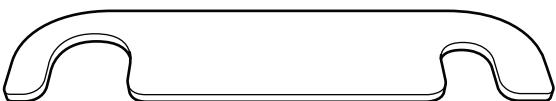


T3880803

T3880007 - Mirror location fixture

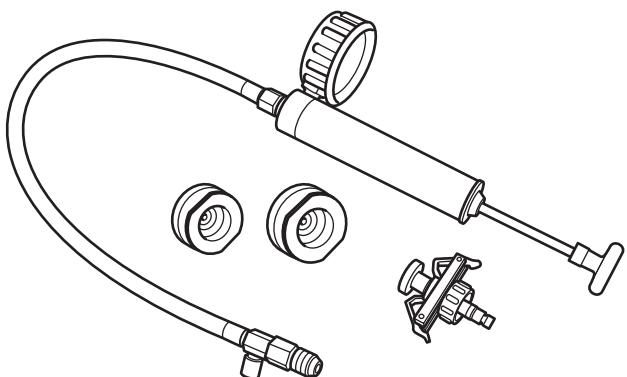


T3880500 - Backrest alignment gauge



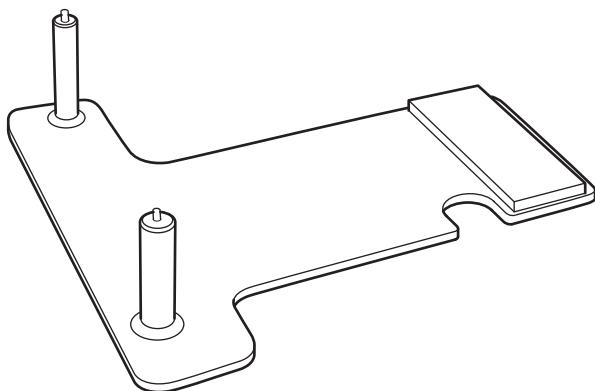
cfrd_2

T3880147 - Radiator and cap tester



cgwp

T3880179 - Engine support frame - All models



T3880126

General Information

Specifications

Full Specification	Thunderbird 1,600 cc	Thunderbird 1,700 cc
Engine	Liquid cooled parallel twin, 270° firing angle	Liquid cooled parallel twin, 270° firing angle
Arrangement	In-line, transverse	In-line, transverse
Displacement	1,596 cc (97.4 cu in)	1,699 cc (103.7 cu in)
Bore x Stroke	103.8 x 94.3 mm (4.08 x 3.73 in)	107.1 x 94.3 mm (4.22 x 3.71 in)
Compression Ratio	9.7:1	9.7:1
Cylinder numbering	Left to right	Left to right
Firing order	1-2	1-2
Max. Power (95/1/EC) - All models except Thunderbird Commander and Thunderbird LT	86 PS at 4,850 rpm (85 bhp at 4,850 rpm)	98 PS at 5,200 rpm (96.7 bhp at 5,200 rpm)
Max. Power (95/1/EC) - Thunderbird Commander and Thunderbird LT	-	93.8 PS at 5,400 rpm (92.5 bhp at 5,400 rpm)
Max. Torque - All models except Thunderbird Commander and Thunderbird LT	146 Nm at 2,750 rpm (108 lb ft at 2,750 rpm)	156 Nm at 2,950 rpm (115 lb ft at 2,950 rpm)
Max. Torque - Thunderbird Commander and Thunderbird LT	-	151 Nm at 3,500 rpm (111 lb ft at 3,500 rpm)

Cylinder Head	Thunderbird 1,600 cc	Thunderbird 1,700 cc
Valve Head Dia	In	37.90 mm
	Ex	32.30 mm
Valve Lift	In	7.77 mm
	Ex	8.08 mm
Valve Stem Dia.	In	5.475 - 5.490 mm (std) 5.465 mm (service limit)
	Ex	5.455 - 5.470 mm (std) 5.445 mm (service limit)
Valve Guide Bore Dia.		5.500 - 5.515 mm (std) 5.543 mm (service limit)
Valve Seat Width (in head)		1.000 - 1.100 mm (std) 1.500 mm (service limit)
Valve Seat Width (valve)		1.98 - 2.26 mm (std)
Valve Seat Angle		90° inclusive
Valve Spring Length		43.2 mm (std)
Valve Spring 'Load at Length'	In	180 N +/- 10 N at 36.2 mm
	Ex	180 N +/- 10 N at 36.2 mm
Valve Clearance	In	0.10 - 0.15 mm
	Ex	0.15 - 0.20 mm
Valve Bucket Bore Dia.	In and Ex	28.015 - 28.035 mm 28.05 mm (service limit)
Valve Bucket Dia.	In and Ex	27.978 - 27.993 mm 27.97 mm (service limit)

General Information

Full Specification

Cylinder Head (continued)		Thunderbird 1,600 cc	Thunderbird 1,700 cc
Valve Timing (at 1 mm lift)			
Inlet	Open	2.5° BTDC	6.5° BTDC
	Close	24.5° ABDC	48.5° ABDC
	Duration	207°	235°
Exhaust	Open	29.5° BBDC	49.5° BBDC
	Close	3.5° ATDC	5.5° ATDC
	Duration	213°	235°
Camshaft Journal Dia.		22.955 - 22.975 mm (std)	22.955 - 22.975 mm (std)
Camshaft Journal Clearance		0.025 - 0.066 mm (std) 0.105 mm (service limit)	0.025 - 0.066 mm (std) 0.105 mm (service limit)
Camshaft Journal Bore Dia.		23.000 - 23.021 mm (std)	23.000 - 23.021 mm (std)
Camshaft End Float		0.03 - 0.13 mm (std)	0.03 - 0.13 mm (std)
Camshaft Run-out		0.015 mm (std)	0.015 mm (std)
Clutch/Primary Drive		Thunderbird 1,600 cc	Thunderbird 1,700 cc
Primary Drive Type		Gear	Gear
Reduction Ratio		1.440:1 (85/59)	1.440:1 (85/59)
Clutch Type		Wet, multiplate	Wet, multiplate
No. of Friction Plates		7	7
Steel Plate Flatness Limit		0.15 mm	0.15 mm
Friction Plate Flatness Limit		0.20 mm	0.20 mm
Friction Plate Thickness (new)		3.3 - 3.5 mm	3.3 - 3.5 mm
Friction Plate Thickness (service limit)		3.2 mm	3.2 mm
Clutch Actuation Method		Cable	Cable
Cable Free Play (at lever)		1 - 2 mm	1 - 2 mm
Piston/Crankshaft		Thunderbird 1,600 cc	Thunderbird 1,700 cc
Cylinder Liner Dia.		103.791 - 103.809 mm (std)	107.091 - 107.109 mm (std)
		103.859 mm (service limit)	107.161 mm (service limit)
Piston Diameter		103.771 - 103.787 mm (std)	107.071 - 107.087 mm (std)
		103.721 mm (service limit)	107.019 mm (service limit)
Piston Ring to Groove Clearance	Top	0.02 - 0.06 mm (std)	0.02 - 0.06 mm (std)
		0.16 mm (service limit)	0.16 mm (service limit)
	Second	0.02 - 0.06 mm (std)	0.02 - 0.06 mm (std)
		0.16 mm (service limit)	0.16 mm (service limit)
Piston Ring Groove Width	Top	1.21 - 1.23 mm (std)	1.21 - 1.23 mm (std)
		1.31 mm (service limit)	1.31 mm (service limit)
	Second	1.21 - 1.23 mm (std)	1.21 - 1.23 mm (std)
		1.31 mm (service limit)	1.31 mm (service limit)
	Oil	2.51 - 2.53 mm (std & service limit)	2.51 - 2.53 mm (std & service limit)

General Information

Full Specification

Piston/Crankshaft (continued)		Thunderbird 1,600 cc	Thunderbird 1,700 cc
Piston Ring End Gap	Top	0.30 - 0.45 mm (std)	0.23 - 0.38 mm (std)
		0.65 mm (service limit)	0.58 mm (service limit)
	Second	0.45 - 0.60 mm (std)	0.33 - 0.53 mm (std)
		0.775 mm (service limit)	0.705 mm (service limit)
	Oil	0.20 - 0.70 mm (std)	0.28 - 0.48 mm (std)
		0.875 mm (service limit)	0.655 mm (service limit)
	Gudgeon Pin Bore Dia. In Piston	23.993 - 24.001 mm (std)	23.993 - 24.001 mm (std)
		24.011 mm (service limit)	24.011 mm (service limit)
Gudgeon Pin Dia.		23.982 - 23.987 mm (std)	23.982 - 23.987 mm (std)
		23.972 mm (service limit)	23.972 mm (service limit)
Connecting Rod Small End Dia.		24.016 - 24.029 mm (std)	24.016 - 24.029 mm (std)
		24.039 mm (service limit)	24.039 mm (service limit)
Connecting Rod Big End Dia		55.500 - 55.018 mm (std)	55.500 - 55.018 mm (std)
Connecting Rod Big End Side Clearance		0.15 - 0.30 mm (std)	0.15 - 0.30 mm (std)
		0.50 mm (service limit)	0.50 mm (service limit)
Crankshaft Big End Journal Dia.		52.476 - 52.490 mm (std)	52.476 - 52.490 mm (std)
		52.452 mm (service limit)	52.452 mm (service limit)
Crankshaft Big End Bearing Clearance		0.035 - 0.066 mm (std)	0.035 - 0.066 mm (std)
		0.100 mm (service limit)	0.100 mm (service limit)
Crankshaft Main Journal Dia.		52.483 - 52.499 mm (std)	52.483 - 52.499 mm (std)
		52.459 mm (service limit)	52.459 mm (service limit)
Crankshaft Main Bearing Clearance		0.021 - 0.045 mm (std)	0.021 - 0.045 mm (std)
		0.10 mm (service limit)	0.10 mm (service limit)
Crankshaft End Float		0.05 - 0.20 mm (std)	0.05 - 0.20 mm (std)
		0.40 mm (service limit)	0.40 mm (service limit)
Crankshaft Run-out		0.02 mm (std)	0.02 mm (std)
		0.05 mm (service limit)	0.05 mm (service limit)

Full Specification

Transmission (All Models)

Type	6 Speed Constant Mesh
Gear Ratios Primary	1.440:1 (85/59)
1st	2.875:1 (46/16)
2nd	1.958:1 (47/24)
3rd	1.536:1 (43/28)
4th	1.219:1 (39/32)
5th	1.029:1 (35/34)
6th	0.909:1 (30/33)
Gear Selector Fork Thickness	4.35 - 4.45 mm (std) 4.25 mm (service limit)
Gear Selector Groove Width	4.50 - 4.60 mm (std) 4.75 mm (service limit)
Gear Selector Fork to Groove Clearance	0.05 - 0.25 mm (std) 0.50 mm (service limit)

Final Drive (All Models)

Final Drive Type	Toothed belt
Final Drive Ratio	2.214:1 (62/28)
Toothed Belt Slack	See Chapter 15

General Information

Full Specification

Lubrication (All Models)

Oil Capacity (incl. filter, dry fill)	4.8 litres
Oil and Filter Change	4.2 litres
Oil Change only	4.0 litres
Recommended Oil Approval Rating	API SH (or higher) and JASO MA
Viscosity	10W/40 or 10W/50
Type	Semi or fully synthetic
Oil Pressure (in main gallery)	3.00 - 3.60 bar at 3,500 rpm
Oil Pump Rotor Tip Clearance	0.15 mm (std)
	0.20 (service limit)
Oil Pump Body Clearance	0.15 - 0.239 mm (std)
	0.369 mm (service limits)
Oil Pump Rotor End Float	0.04 - 0.09 mm (std)
	0.12 mm (service limit)

Ignition System (All Models)

Type	Digital electronic
Electronic Rev-Limiter	6,500 rpm
Pick up Coil Air Gap	Fixed, not adjustable
Pick up Coil Resistance	0.56 KΩ
Ignition Coil Type	Inductive, plug top
Spark Plug Type	NGK DPR6EA-9, 2 per cylinder
Spark Plug Gap	0.9 mm

Fuel System	Thunderbird 1,600 cc	Thunderbird 1,700 cc
Fuel Type	Unleaded, 91 RON (CLC or AKI octane rating (R+M)/2 of 87 or higher)	Unleaded, 91 RON (CLC or AKI octane rating (R+M)/2 of 87 or higher)
Fuel Tank Capacity	21.7 litres	21.7 litres
Low Level Warning Lamp	4.5 litres remaining	4.5 litres remaining
Fuel Pump Type	Submerged, electric	Submerged, electric
Fuel Pressure (nominal)	3.5 bar	3.5 bar
Purge Control System	Modulated, vacuum	Modulated, vacuum

Full Specification

Fuel Injection System

Emissions Controls (All Models)

Type	Multi point sequential
Idle Speed	850 rpm
Injector Type	Multi hole, solenoid operated plate valve
Throttle	Single butterfly
Idle Speed Control	Stepper motor
Control Sensors	Coolant temperature, manifold absolute pressure (both cylinders), intake air temperature, barometric pressure, gear position, road speed, throttle position, heated oxygen sensors
Catalysts	Two in the catalyst box - all models except Thunderbird Commander and Thunderbird LT
	One in each header pipe - Thunderbird Commander and Thunderbird LT
Oxygen Sensor	One per cylinder heated, in header pipe
Secondary Air Injection (up to engine number 452025 only)	Solenoid controlled, reed valve type
Evaporative Control	Activated carbon canister (certain markets only)

Cooling System (All Models)

Coolant Mixture	Premixed
Antifreeze Type	Triumph HD4X Hybrid OAT coolant
Cooling System Capacity	2.55 litres
Radiator Cap Opening Pressure	1.2 bar
Thermostat Opening Temperature	82°C
Cooling Fan Switch On Temperature	103°C
Temperature Gauge Sensor Resistance	187 W at 100°C

Suspension (All Models)

Front Fork Travel	120 mm
Recommended Fork Oil Grade	Showa AHSS8 oil (SAE 10W)
Oil Level (fork fully compressed)	106 mm - all models except Thunderbird Commander and Thunderbird LT
	90 mm - Thunderbird Commander and Thunderbird LT
Oil Volume (dry fill)	677 cm ³ - all models except Thunderbird Commander and Thunderbird LT
	720 cm ³ - Thunderbird Commander and Thunderbird LT
Front Fork Pull Through	0 mm (top of the cap edge flush with top yoke)
Fork Spring Rate	K = 9 N/mm - all models except Thunderbird Commander and Thunderbird LT
	K = 8.5 N/mm - Thunderbird Commander and Thunderbird LT
Rear Wheel Travel	95 mm - all models except Thunderbird Commander and Thunderbird LT
	109 mm - Thunderbird Commander and Thunderbird LT

General Information

Full Specification

Brakes (All Models)

Front Type	Two four piston calipers acting on twin discs
Front Caliper Piston Dia.	33.96 mm/30.23 mm
Front Disc Dia.	310 mm
Front Disc Thickness	5.0 mm standard (4.5 mm service limit)
Front Disc Run-out Max.	0.25 mm
Front Master Cylinder Dia.	15.87 mm
Recommended Fluid	DOT 4
Rear Type	Twin piston sliding caliper acting on single disc
Rear Caliper Piston Dia.	32 mm and 30 mm
Rear Disc Dia.	310 mm
Rear Disc Thickness	6.0 mm standard (5.5 mm service limit)
Rear Disc Run-out Max.	0.25 mm
Rear Master Cylinder Dia.	12.7 mm
Recommended Fluid	DOT 4

Frame	Thunderbird	Thunderbird SE	Thunderbird Storm
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Frame Type	Tubular steel	Tubular steel	Tubular steel
Overall Length	2,340 mm	2,340 mm	2,340 mm
Overall Height	1,120 mm	1,120 mm	1,120 mm
Overall Width	880 mm	880 mm	900 mm
Wheelbase	1,615 mm	1,615 mm	1,615 mm
Seat Height	700 mm	720 mm	700 mm
Rake	31.2°	31.2°	31.2°
Trail	151 mm	151 mm	151 mm
Wet Weight (ready to ride)	339 kg	339 kg	339 kg
Max. Payload (rider, passenger, luggage & accessories)	231 kg	231 kg	231 kg

Frame	Thunderbird Commander	Thunderbird LT
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Frame Type	Tubular steel	Tubular steel
Overall Length	2,442 mm	2,546 mm
Overall Height	1,225 mm	Standard Windscreen - 1,364 mm Tall Windscreen - 1,500 mm
Overall Width	990 mm	956 mm
Wheelbase	1,665 mm	1,665 mm
Seat Height	700 mm	700 mm
Rake	30.1°	29.9°
Trail	135.2 mm	132.7 mm
Wet Weight (ready to ride)	348 kg	380 kg
Max. Payload (rider, passenger, luggage & accessories)	232 kg	220 kg

Full Specification

Wheels and Tyres	All Models Except Thunderbird Commander Thunderbird LT	Thunderbird Commander Thunderbird LT
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Front Wheel Size	MT 3.5 x 19	MT 3.5 x 17 - Thunderbird Commander MT 3.5 x 16 - Thunderbird LT
Front Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Front Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Front Tyre Make and Size		
Option 1	Metzeler ME880 Marathon 120/70 ZR19	Metzeler ME880 Marathon 140/75 ZR 17 - 67W (Thunderbird Commander)
		Avon AV71 Cobra WWW 150/80 R 16 - 71V (Thunderbird LT)
Option 2	Dunlop D208 F 120/70 ZR19	Metzeler ME880 Marathon 150/80 R 16 - 71H (Thunderbird LT)
Front Tyre Pressure (cold)		
Option 1 Tyre	2.48 bar (36 psi)	2.48 bar (36 psi)
Option 2 Tyre		2.68 bar (39 psi) - (Thunderbird LT)
Front Tyre Tread Depth min.	Over 130 km/h - 2 mm (or minimum legal limit, whichever is greater)	
	Under 130 km/h - 2 mm (or minimum legal limit, whichever is greater)	
Rear Wheel Size	MT 6.0 x 17	MT 6.0 x 17 - Thunderbird Commander
		MT 5.5 x 16 - Thunderbird LT
Rear Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Rear Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Rear Tyre Make and Size		
Option 1	Metzeler ME880 Marathon 200/50 ZR17	Metzeler ME880 Marathon 200/50 ZR 17 - 75W (Thunderbird Commander)
		Avon AV72 Cobra WWW 180/70 R 16 - 77V (Thunderbird LT)
Option 2	Dunlop D208 200/50 ZR17	Metzeler ME880 Marathon Steel Radial 180/70 R 16 - 77H (Thunderbird LT)
Rear Tyre Pressure (cold)	2.62 bar (38 psi)	2.62 bar (38 psi) - (Thunderbird Commander)
		2.9 bar (42 psi) - (Thunderbird LT)
Rear Tyre Tread Depth min.	Over 130 km/h - 3 mm (or minimum legal limit, whichever is greater)	
	Under 130 km/h - 2 mm (or minimum legal limit, whichever is greater)	

General Information

Full Specification

Electrical Equipment (All Models)

Battery Rating	12 volt, 18 amp/hour
Alternator Rating	42 amps at 2,000 rpm
	45 amps at 6,000 rpm
Single Headlight	12 volt, 60/55 watt H4 halogen
Twin Headlights	2 x 12 volt, 60/55 watt H4 halogen
Tail/Brake Light	LED - all models except Thunderbird LT
	12 volt, 21/5 watt bulb - Thunderbird LT
Directional Indicator Lights	12 volt, 10 watt
Front Fog Lights (if fitted)	2 x 12 volt, 55 watt H3 halogen
Auxiliary Lights (if fitted)	2 x 12 volt, 35 watt H3 halogen

Torque Wrench Settings

Cylinder Head Area

Application	Torque (Nm)	Notes
Camshaft cover to cylinder head	12	Apply engine oil to seals
Camshaft drive chain tensioner to crankcase	10	
Camshaft ladder to head	*	Refer to section 3
Camshaft drive chain tensioner blade to crankcase	10	Replace fixing(s) if removed
Camshaft drive chain top pad to head	*	Refer to section 3
Cylinder head to crankcase	*	Refer to section 3
Camshaft idler shaft bolt	10	Replace fixing(s) if removed
Cylinder head dry seal plug	22	
Cylinder head exhaust stud	10	Replace if removed
SAI reed valve cover to camshaft cover	9	Replace fixing(s) if removed

Clutch

Application	Torque (Nm)	Notes
Clutch cover to crankcase	12	
Clutch cover embellisher to cover	9	
Clutch centre nut	160	Fit new Belleville washer and plain washer if removed
Clutch pressure plate to basket	10	
Clutch lifter arm bolt	10	Replace fixing(s) if removed
Clutch lever nut	3	
Clutch lever clamp bolts	12	
Switch cube screws (left)	2.5	
Clutch cable bracket	7	All models except Thunderbird Commander and Thunderbird LT
Clutch cable heat shield	7	Thunderbird Commander and Thunderbird LT

General Information

Crankshaft and Crankcases

Application	Torque (Nm)	Notes
Connecting rod big end bolts	*	Refer to section 5
Crankcase to crankcase bolts	*	Refer to section 5
Main bearing ladder bolts	*	Refer to section 5
Torque compensator bolt	130	Replace fixing(s) if removed
Lubrication main gallery threaded inserts left hand	75	Apply ThreeBond 1388B to threads
Lubrication main gallery threaded inserts right hand	60	Apply ThreeBond 1388B to threads
Breather plate to crankcase	12	Replace fixing(s) if removed
Breather drain pipe	12	Replace fixing(s) if removed
Breather hose spout to crankcase	35	
Balancer dead shaft retainer bolt	12	Replace fixing(s) if removed
Coolant manifold to crankcase	*	Refer to section 5

Engine Covers

Application	Torque (Nm)	Notes
Clutch cover to crankcase	12	
Alternator cover to crankcase	12	
Drive belt cover	9	

Transmission

Application	Torque (Nm)	Notes
Detent wheel to selector drum	12	Replace fixing(s) if removed
Selector drum bearing retaining screw	12	Replace fixing(s) if removed
Gear change pedal pinch bolt	8	
Gear change pedal rubber pin	12	Replace if removed
Gear change actuating arm bolt	8	
Gear change rod lock nuts	6	
Gear change pedal bolt	27	Replace fixing(s) if removed all models except Thunderbird Storm
Rear gear lever pinch bolt	8	All models except Thunderbird and Thunderbird Storm
Input shaft bearing retainer to crankcase	12	Replace fixing(s) if removed
Output pulley to output pulley flange bolts	105	Replace fixing(s) if removed
Output pulley flange to output shaft nut	*	Refer to section 7
Drive belt pulley studs	30	

Lubrication System

Application	Torque (Nm)	Notes
Sump to crankcase	12	
Sump plug	25	
Oil pump pipe to crankcase bolt	12	Replace fixing(s) if removed
Alternator spray bar bolt	9	Replace fixing(s) if removed
Oil pressure relief valve to adaptor	15	Apply ThreeBond 1305 to threads
Oil pressure relief valve adaptor to crankcase	15	
Oil filter adapter	10	Apply ThreeBond 1305 to threads
Oil filter	10	
Oil pump to crankcase	12	Replace fixing(s) if removed
Oil pump sprocket to oil pump	10	Replace fixing(s) if removed
Oil pressure switch	13	
Oil cooling jets (balancer shaft thrust faces)	5	Replace if removed

Cooling System

Application	Torque (Nm)	Notes
Water pump to crankcase	12	Replace fixing(s) if removed
Radiator to frame upper fixings	6	
Radiator to frame lower fixings	4	
Thermostat housing to head	9	
Coolant tube bolt (in engine)	9	
Upper coolant tube bolt	7	Replace fixing(s) if removed
Cooling system bleed screw	9	
Radiator cap housing to frame	9	
Fan shroud to radiator	4	
Hose clips	3	
Expansion tank bracket lock nut and bolts	3	
Expansion tank bracket studs	8	Replace fixing(s) if removed
Hose guide (near gear position sensor)	8	

General Information

Fuel System, Exhaust System and Airbox

Application	Torque (Nm)	Notes
Fuel tank to frame (pivot bolt)	8	Replace fixing(s) if removed (lock nut)
Fuel tank to frame (front fixing)	8	
Fuel pump mounting plate to fuel tank	5	Replace fixing(s) if removed
Fuel pump mounting bracket to fuel pump plate	10	
Fuel pump clamp screw	3	
Fuel pressure regulator to pump plate	5	
Fuel filter clamp	3	
Suction filter to pump hose clip	3	
Fuel level sensor to fuel tank	5	
Throttle body transition piece to cylinder head	9	
Throttle body adaptor clip	1.5	
Throttle body to cylinder head	9	
Throttle position switch	3.5	
Left hand throttle to right hand throttle body fixings	3.5	
Idle speed control stepper motor	3.5	
Throttle cable bracket to throttle body	3.5	
Throttle cable to switch housing	3	
Throttle cable lock nuts	8	
Fuel injectors to throttle body	3.5	
Exhaust headers to cylinder head	19	Replace fixing(s) if removed
Exhaust headers to frame	19	Thunderbird Commander and Thunderbird LT
Exhaust butterfly assembly to frame	28	Thunderbird Commander and Thunderbird LT
Exhaust butterfly actuator clip	1.5	Thunderbird Commander and Thunderbird LT
Exhaust headers heat shields	9	Thunderbird Commander and Thunderbird LT
Exhaust headers to catalyst box clamp	15	All models except Thunderbird Commander and Thunderbird LT
Exhaust catalyst box to frame	22	All models except Thunderbird Commander and Thunderbird LT
Silencer to rear footrest hanger	28	
Silencer to catalyst box clamp bolt	15	All models except Thunderbird Commander and Thunderbird LT
Catalyst box heat shield front bolt	9	
Catalyst box heat shield rear bolt	5	
Exhaust rear heat shield clamp	9	Thunderbird Commander and Thunderbird LT
Catalytic converter mounting bracket	12	Thunderbird Commander and Thunderbird LT

General Information

Application	Torque (Nm)	Notes
Catalytic converter mounting bracket to crankcase	8	Thunderbird Commander and Thunderbird LT
Balance pipe clamp	9	All models except Thunderbird Commander Thunderbird LT
	15	Thunderbird Commander and Thunderbird LT
Left hand oxygen sensor cover bolts	27	Thunderbird Commander and Thunderbird LT
Oxygen sensor cover bolts	9	
Oxygen sensor to header pipe	25	
Air filter cover to airbox	3	
Airbox to frame	9	
Air intake hose clips	1.5	
Evaporative canister bracket to ABS cradle	12	
Spark plugs	20	
Crankshaft sensor	6	Replace fixing(s) if removed
Coolant temperature sensor	18	Apply ThreeBond 1374 to threads
Road speed sensor	7.5	Models without ABS
Blanking plug (in place of road speed sensor)	4	Models with ABS
Barometric pressure sensor	7	
MAP sensor	3	Replace fixing(s) if removed
Air temperature sensor	3	Replace fixing(s) if removed
Gear position sensor	5	
Exhaust butterfly valve actuator to bracket	12	Thunderbird Commander and Thunderbird LT
Exhaust butterfly valve actuator bracket to frame	7	Thunderbird Commander and Thunderbird LT
Silencer to exhaust header clamp	15	Thunderbird Commander and Thunderbird LT
Exhaust butterfly assembly clamps	15	Thunderbird Commander and Thunderbird LT
Exhaust butterfly cables	5	Thunderbird Commander and Thunderbird LT
Immobiliser module	5	Thunderbird Commander and Thunderbird LT
Immobiliser bracket	7	Thunderbird Commander and Thunderbird LT

General Information

Rear Suspension

Application	Torque (Nm)	Notes
Swinging arm pivot nut	110	Refer to section 13
Swinging arm pivot bolt adjuster	6	Refer to section 13
Drive belt slack adjuster lock nut	25	
Rear suspension unit upper mounting bolt	28	Replace fixing(s) if removed
Rear suspension unit lower mounting bolt	28	Replace fixing(s) if removed
Lower belt guard fixings	12	
Upper belt guard rear fixing bolt	10	
Upper belt guard front fixing bolt	8	

Front Suspension

Application	Torque (Nm)	Notes
Headstock bearing adjuster and lock nuts	*	Refer to section 12
Upper yoke centre nut	65	
Upper yoke pinch bolt	20	
Lower yoke centre nut	27	Thunderbird Storm
Lower yoke pinch bolt	25	All models except Thunderbird Storm
Upper yoke cable guide bolts	18	Thunderbird and Thunderbird Storm
Fork top cap to inner tube	22.5	
Damping cylinder bolt	45	Replace fixing(s) if removed
Handlebar riser to top yoke bolts	62	Replace fixing(s) if removed
Handlebar riser to top yoke lock nuts	62	Thunderbird Commander and Thunderbird LT
Handlebar clamp bolt	26	Tighten front bolts first then rear bolts
Handlebar end weights	8	
Switch cube screws (right hand)	2.5	
Throttle cable screw and union to switch housing	8	
Throttle cable and harness guide bolt (under fuel tank)	7	
Shroud support brackets (small)	3	Thunderbird Commander and Thunderbird LT
Front support brackets (large)	4	Thunderbird Commander and Thunderbird LT Replace fixing(s) if removed
Windscreen mountings/head light shroud	9	Thunderbird Commander and Thunderbird LT
Right hand and left hand harness guides	3	Thunderbird Commander and Thunderbird LT
Shrouds to lower yoke	9	Thunderbird Commander and Thunderbird LT Apply proprietary copper based grease to the threads
Shroud to upper yoke	18	Thunderbird Commander and Thunderbird LT

Wheels

Application	Torque (Nm)	Notes
Front wheel spindle/axle bolt	65	
Fork to wheel spindle pinch bolts	27	
Rear wheel spindle lock nut	110	Replace fixing(s) if removed
Drive belt pulley lock nuts	73	Replace fixing(s) if removed
Drive belt pulley studs to wheel flange	30	Replace fixing(s) if removed

Front Brakes

Application	Torque (Nm)	Notes
Caliper to fork	50	
Pad retaining pin (hexagon drive)	18	
Caliper bleed screw	5	
Hose to caliper	25	Fit new sealing washers if removed
Caliper left half to caliper right half bolts	24	
Master cylinder to handlebar	12	
Hose to master cylinder	25	Fit new sealing washers if removed
Hose support to lower yoke	6	Models without ABS
Master cylinder reservoir cap screws	2	
Disc to wheel	22	Replace fixing(s) if removed
Brake lever pivot bolt	1	
Brake lever pivot bolt lock nut	6	

Rear Brakes

Application	Torque (Nm)	Notes
Caliper bleed screw	8	
Hose to caliper	25	Fit new sealing washers if removed
Master cylinder to frame	24	
Master cylinder reservoir cap screws	2	Thunderbird Commander and Thunderbird LT
Master cylinder reservoir to frame	5	Thunderbird and Thunderbird Storm
Hose to master cylinder	25	Fit new sealing washers if removed
Brake light switch	15	Fit new sealing washers if removed
Brake pedal pivot bolt	22	Replace fixing(s) if removed
Brake hose P-clip bolt	7	Thunderbird and Thunderbird Storm
Brake hose P-clip bolt	9	Thunderbird Commander and Thunderbird Storm
Brake hose to hard-line frame support	7	
Bracket (rear) hard-line support to frame bolt	7	
Bracket (front) hard-line support to frame bolt	5	Replace fixing(s) if removed
Brake disc to wheel	22	Replace fixing(s) if removed

General Information

ABS System

Application	Torque (Nm)	Notes
ABS main bracket to engine	30	
ABS modulator to bracket	9	Replace fixing(s) if removed
Modulator bracket to ABS main bracket	7	
Hard-line supports to frame	7	Thunderbird, Thunderbird SE and Thunderbird Storm
Hard-line supports to frame	7	Thunderbird Commander and Thunderbird LT
Hard-line union to modulator	17	Thunderbird, Thunderbird SE and Thunderbird Storm
Front brake hose to hard-line union block	25	Thunderbird, Thunderbird SE and Thunderbird Storm
Rear brake hard-line union to rear brake hose	17	Thunderbird, Thunderbird SE and Thunderbird Storm
ABS sensor to bracket	7	
ABS sensor ring to wheel	5	Replace fixing(s) if removed
ABS brake hose/wire guide bolt	18	
Front brake hose P-clip bolt	7	Thunderbird, Thunderbird SE and Thunderbird Storm
Front brake hose P-clip bolt	9	Thunderbird Commander and Thunderbird LT
Front brake hard lines to hard line union block	19	Thunderbird, Thunderbird SE and Thunderbird Storm
Hard line union block to crankcase	7	Thunderbird, Thunderbird SE and Thunderbird Storm
Brake light switch mounting bolt	7	Thunderbird Commander and Thunderbird LT
Brake line bracket to crankcase	7	Thunderbird Commander and Thunderbird LT
Hard-line union to modulator	15	Thunderbird Commander and Thunderbird LT

Footrests and Control Plates

Application	Torque (Nm)	Notes
Footrest mounting bracket to engine (left)	40	Replace fixing(s) if removed
Footrest mounting bracket to engine (right)	28	Replace fixing(s) if removed
Brake pedal shaft mount	60	Replace if removed
Gear change shaft mount	12	
Control plate bracket to engine	50	
Front footrest rubber fixings	4	Thunderbird and Thunderbird Storm
Bank angle peg to footrest	10	Thunderbird and Thunderbird Storm
Bank angle indicator fixings	7	Thunderbird SE
Bank angle indicator fixings	6	Thunderbird Commander and Thunderbird LT
Highway peg clamp	100	Thunderbird LT
Silencer and rear footrest hanger to frame	40	
Footrest bracket to silencer and rear footrest hanger	40	
Rear footrest peg to hanger	36	
Cover to right hand control plate	6	Thunderbird SE
Adjustable arm to rear footrest bracket	36	Thunderbird SE
Adjustable rear footrest clevis	27	Thunderbird SE
Rear footboard pressing	9	Thunderbird SE and Thunderbird LT
Side stand pivot bolt	25	
Side stand pivot lock nut	25	
Side stand switch	7	

General Information

Frame and Bodywork

Application	Torque (Nm)	Notes
Engine to frame bolts	See text	
Front mudguard to forks	12	Replace fixing(s) if removed
Front mudguard to forks	19	Thunderbird Commander and Thunderbird LT
Rear mudguard to frame M8 bolts	24	
Rear mudguard to frame M10 bolts	45	
Rear mudguard to frame M6 bolts	8	Thunderbird Commander and Thunderbird LT
Number plate moulding	7	All models except Thunderbird Commander and Thunderbird LT
Number plate moulding	9	Thunderbird Commander and Thunderbird LT
Harness cover moulding	3	All models except Thunderbird Commander and Thunderbird LT
Front seat M12 bolt	40	All models except Thunderbird Commander and Thunderbird LT
Front seat bolt	9	All models except Thunderbird Commander and Thunderbird LT
Rear seat to mudguard	9	
Rear seat bracket to mudguard	9	
Rear seat strap to seat	10	
Dual seat to frame	9	Thunderbird SE
Dual seat to mudguard	9	Thunderbird SE
Seat strap to dual seat	10	Thunderbird SE
Backrest pad to passenger backrest	8	Thunderbird SE, Thunderbird Commander and Thunderbird LT
Backrest	27	Thunderbird SE, Thunderbird Commander and Thunderbird LT
Pannier to mounting bracket	10	Thunderbird SE
Pannier mounting bracket to frame M10 bolt	45	Thunderbird SE
Pannier mounting bracket to frame M8 bolt	26	Thunderbird SE
Outer pannier mounting to inner pannier mounting	6	Thunderbird SE
Pannier mounting damper assembly	10	Thunderbird SE
Pannier to mounting studs	15	Thunderbird LT
Pannier mounting studs	20	Thunderbird LT
Pannier to its frame	5	Thunderbird LT
Pannier rear mounting to pannier	8	
Mirror fixings	10	
Frame adjuster engine mounting (both sizes)	5	

Application	Torque (Nm)	Notes
Boss, RSU mount	110	
Engine mounting nuts M12	80	Replace fixing(s) if removed
Engine mounting nuts M10	48	Replace fixing(s) if removed
Headstock cover bolt	7	Replace fixing(s) if removed
Seat lock bayonet	3	Thunderbird Commander and Thunderbird LT
Seat lock to seat	5	Thunderbird Commander and Thunderbird LT Replace fixing(s) if removed
Front dresser bar centre bracket	20	Thunderbird Commander and Thunderbird LT
Front dresser bar upper fixing	20	Thunderbird Commander and Thunderbird LT
Front dresser bar lower fixing	50	Thunderbird Commander and Thunderbird LT
Rear dresser bar lower fixing	40	Thunderbird Commander and Thunderbird LT
Front and rear mudguard embellisher Torx screws	3	Thunderbird Commander and Thunderbird LT
Front mudguard embellisher M5 screws	5	Thunderbird Commander and Thunderbird LT
Pannier rear mounting on mudguard	5	Thunderbird Commander and Thunderbird LT
Rider's seat backrest	10	Thunderbird LT
Steering lock grub screw	3	Thunderbird Commander and Thunderbird LT
Silencer support brackets	40	Thunderbird Commander and Thunderbird LT

Windscreen

Application	Torque (Nm)	Notes
Lower mounting bracket to lower yoke	26	Thunderbird SE
Upper mounting bracket to upper yoke	26	Thunderbird SE
Upper mounting bracket to lower mounting bracket	9	Thunderbird SE
Lower windscreen mounting	5	Thunderbird SE
Upper windscreen mounting	9	Thunderbird SE
Windscreen mounting bracket and cross brace fixings	8	Thunderbird SE
Lower air deflector bracket	5	Thunderbird SE
Air deflector to its bracket	9	Thunderbird SE
Windscreen mountings	8	Thunderbird LT
Lower air deflector bracket	8	Thunderbird LT
Windscreen cross brace fixings	8	Thunderbird LT

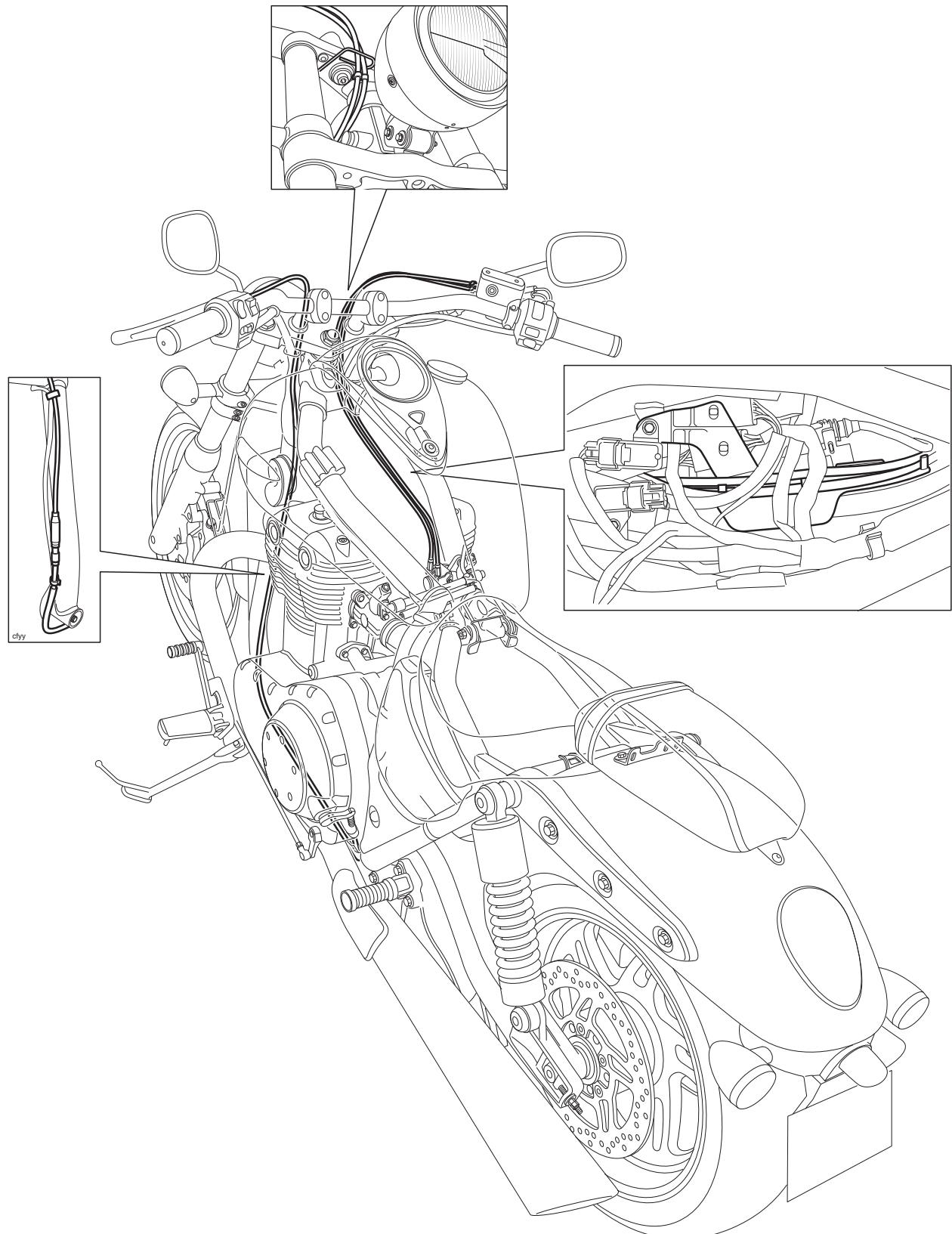
General Information

Electrical

Application	Torque (Nm)	Notes
Starter motor to engine	28	
Starter motor power lead connection	7	
Alternator rotor to crank	165	
Alternator stator to crankcase	12	
Alternator rectifier to bracket	9	
Alternator cover to crankcase	12	
Alternator harness retainer	9	Replace fixing(s) if removed
Rear light to mudguard	3	Replace fixing(s) if removed (lock nut) All models except Thunderbird LT
Rear light to mudguard	7	Replace fixing(s) if removed (lock nut) Thunderbird LT
Number plate light to bracket	2	
Front indicators to brackets	18	
Front indicators bracket	9	
Rear indicators to bracket nut	18	Replace fixing(s) if removed
Headlight horizontal adjuster	27	
Headlight vertical adjuster	9	Replace fixing(s) if removed (lock nut)
Headlight horizontal adjuster	26	Replace fixing(s) if removed (lock nut) Thunderbird Storm
Cover for headlight bracket	9	Thunderbird Commander
Headlight rim screws	2	
Front subharness bracket bolts (on lower crankcase)	7	
Moulding hose routing (three, fitted to the engine)	8	
Alternator cable guide	8	
Rectifier regulator bracket	7	
ECM retaining bracket	7	
Harness bracket, right hand	7	
Harness bracket, left hand	7	
Relay bracket	7	Thunderbird Commander and Thunderbird LT
Fall detection switch	3	Replace fixing(s) if removed
Horn mounting bolt	18	
Horn bracket mounting bolts	7	
Ignition switch lock nuts	7	Replace fixing(s) if removed
Instrument cowl to fuel tank	7	
Instrument to cowl screws	3	
Main ground lead to crankcase	7	
Wire guide	7	
Front fog/auxiliary lights	27	
Front lighting bar	9	

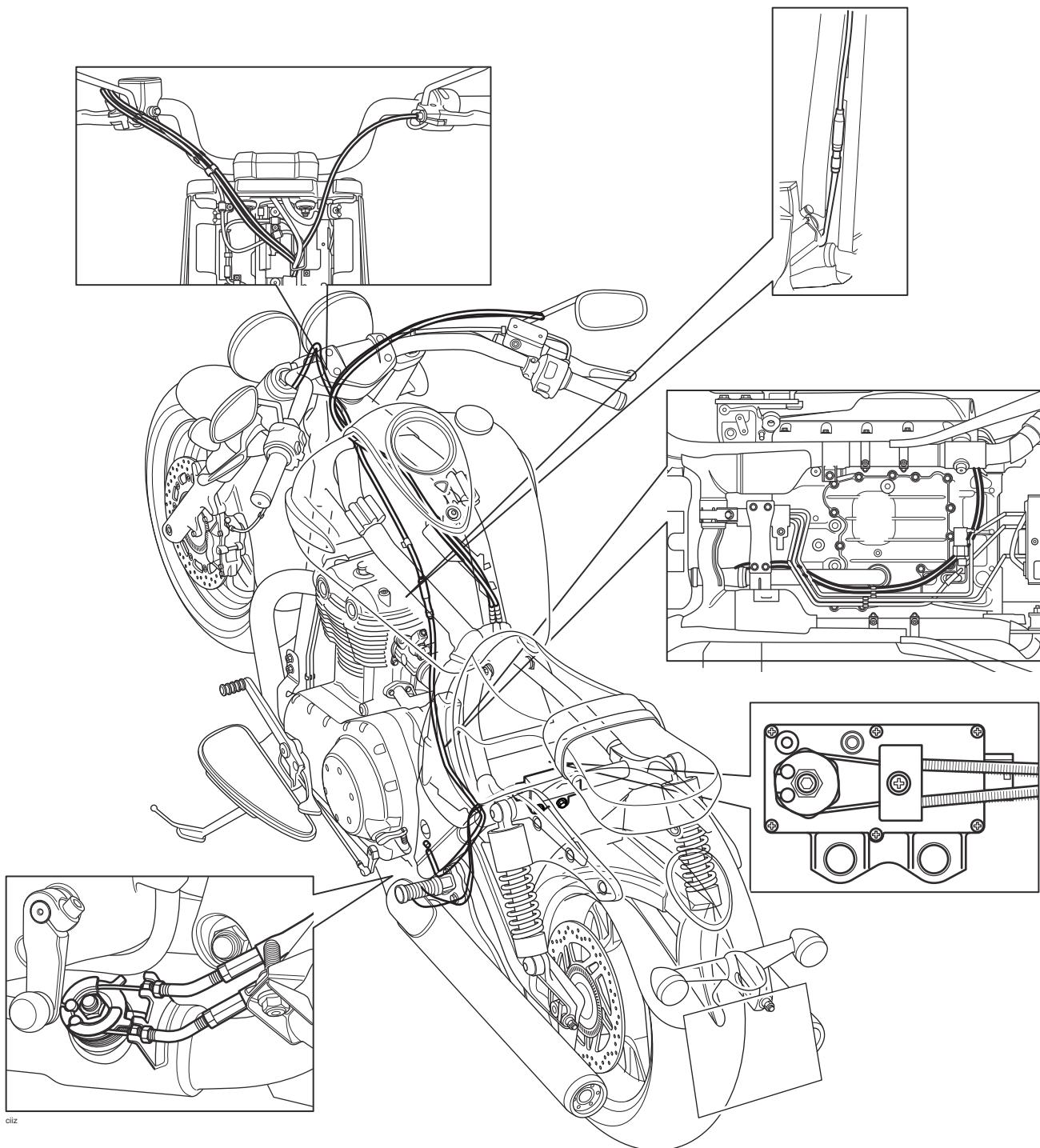
Routings

Clutch and Throttle Cable Routing – All Models Except Thunderbird Commander and Thunderbird LT

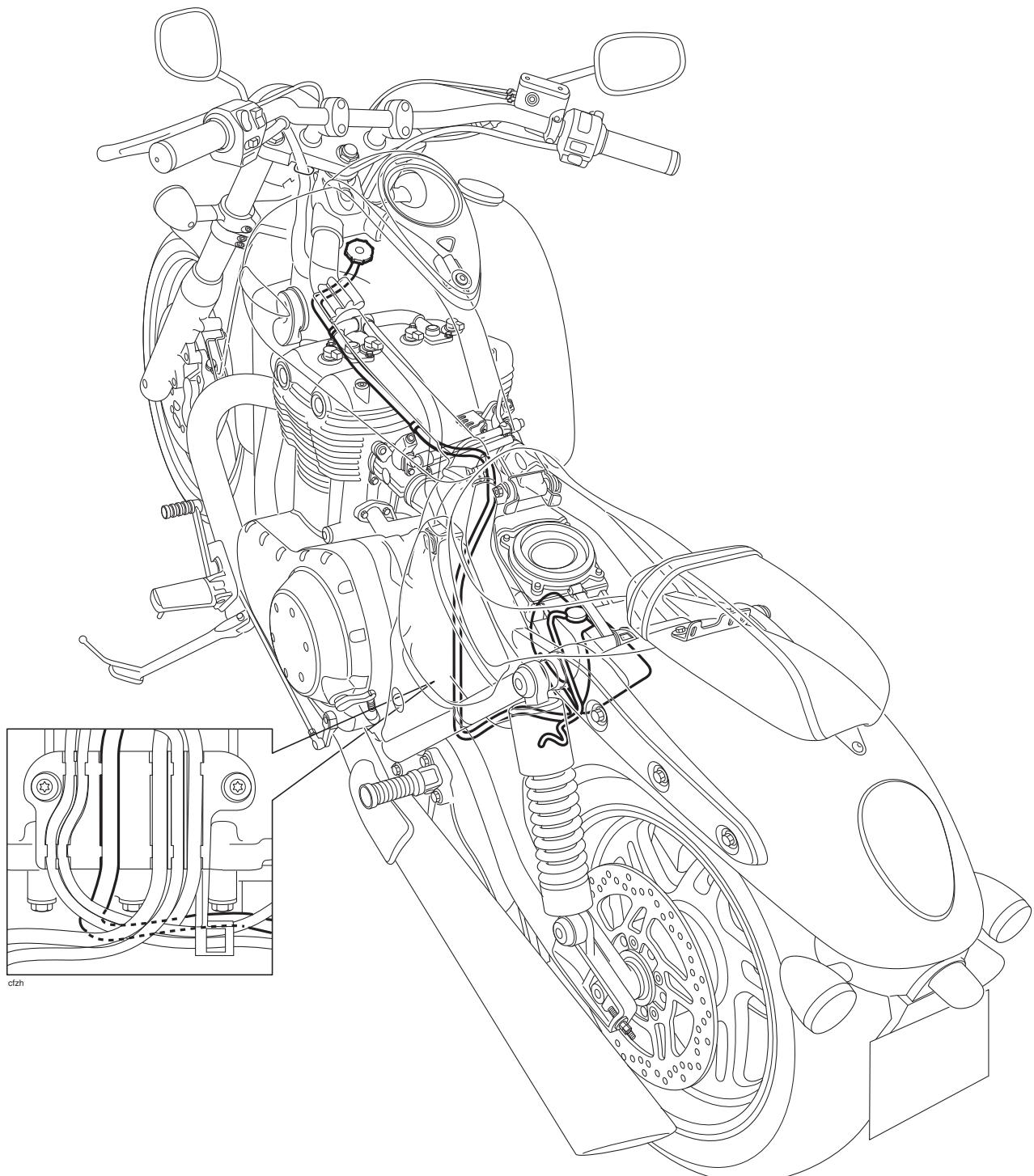


General Information

Clutch, Throttle Cable and Exhaust Butterfly Valve Cable Routing – Thunderbird Commander and Thunderbird LT

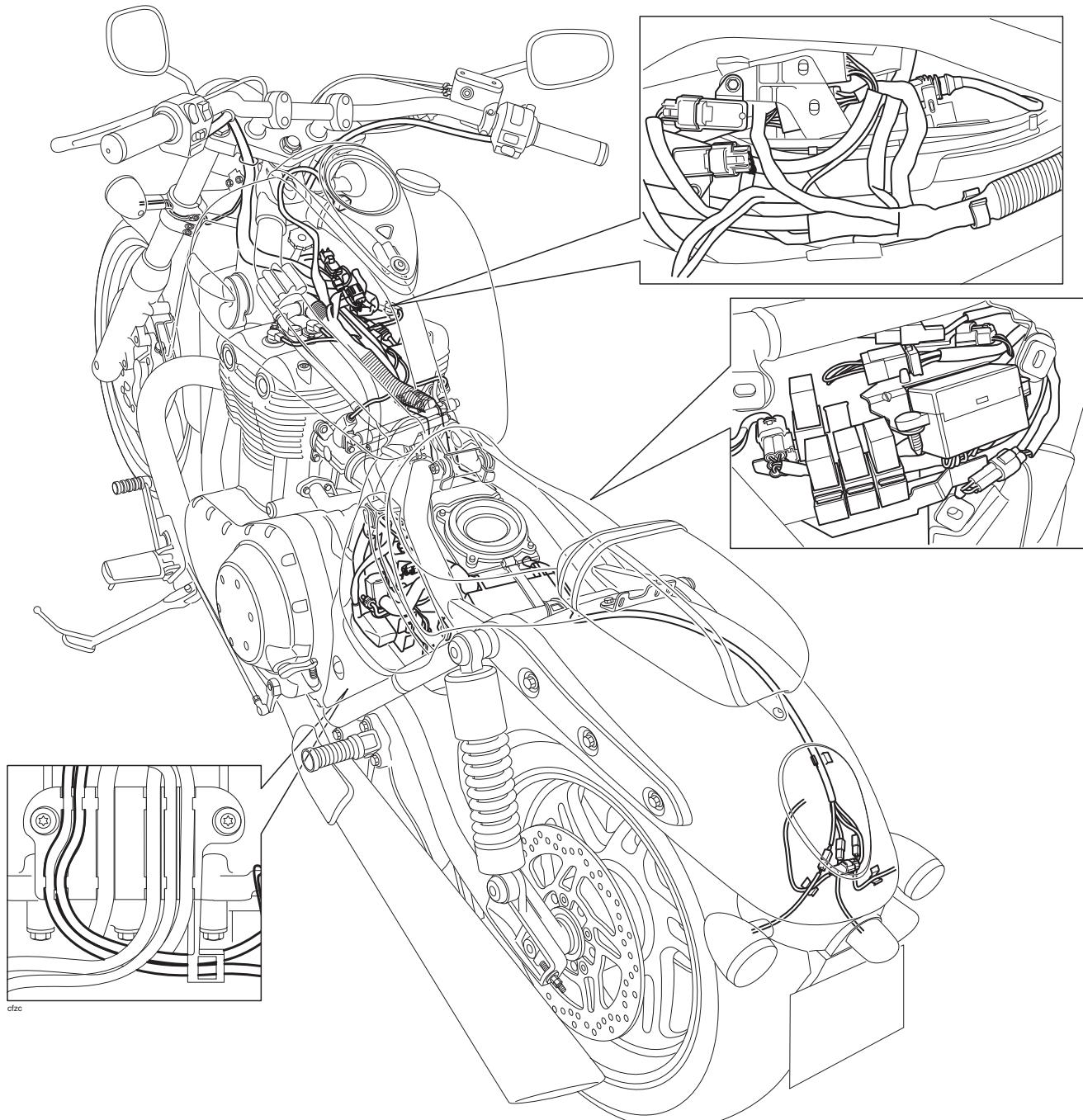


Coolant Expansion Tank Hose Routing

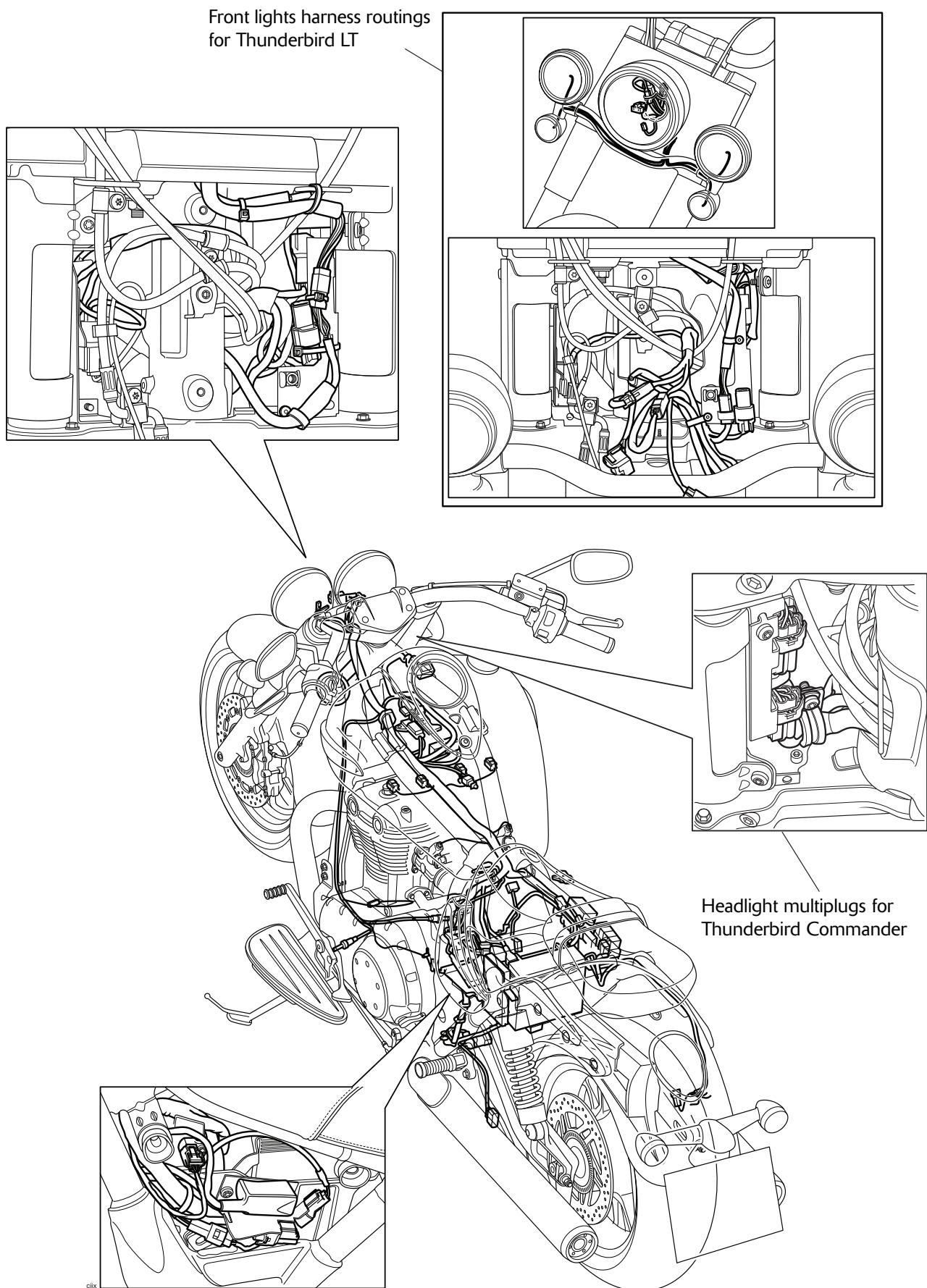


General Information

Main Wiring Harness Routing – All Models Except Thunderbird Commander and Thunderbird LT

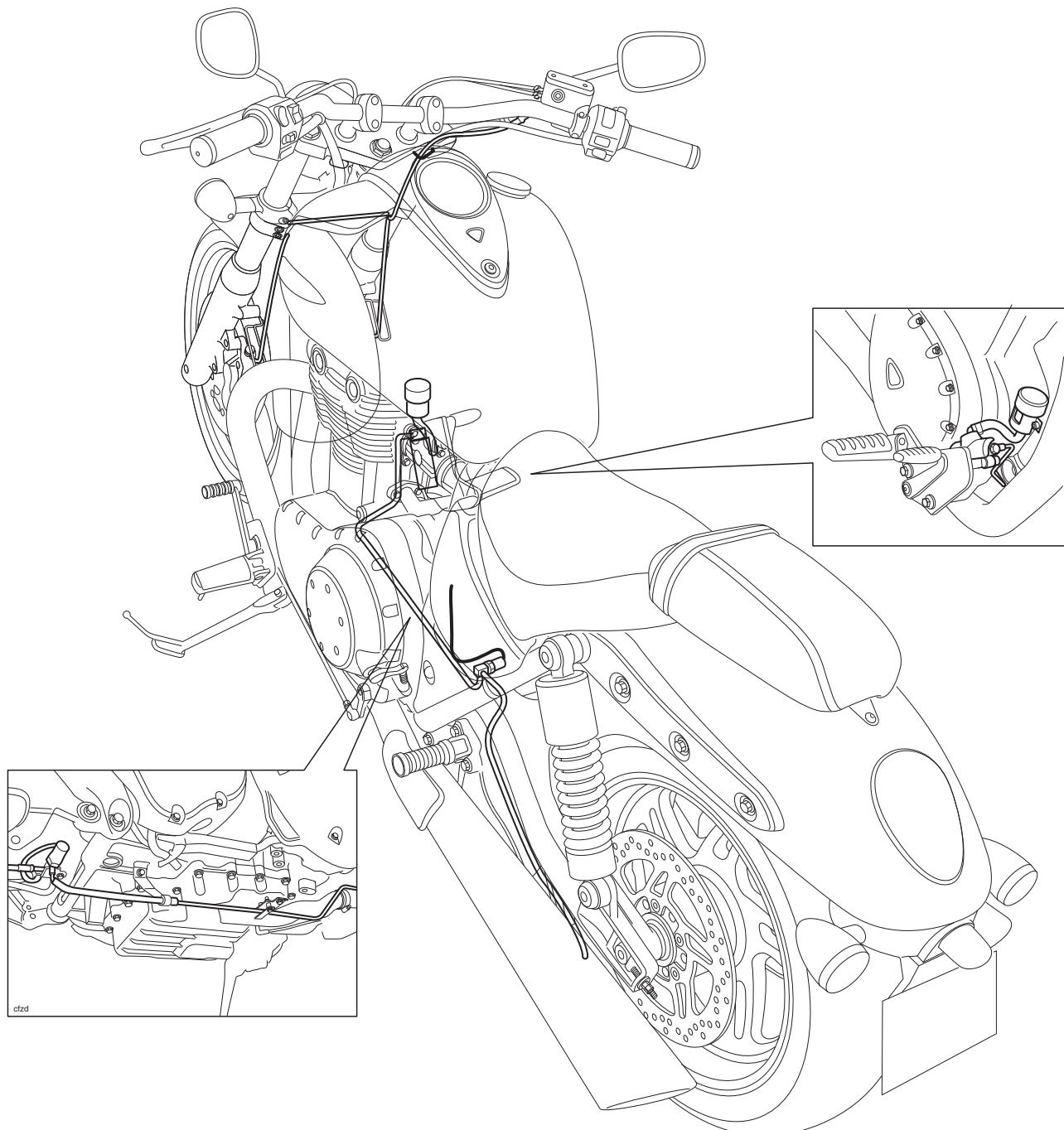


Main Wiring Harness Routing – Thunderbird Commander and Thunderbird LT

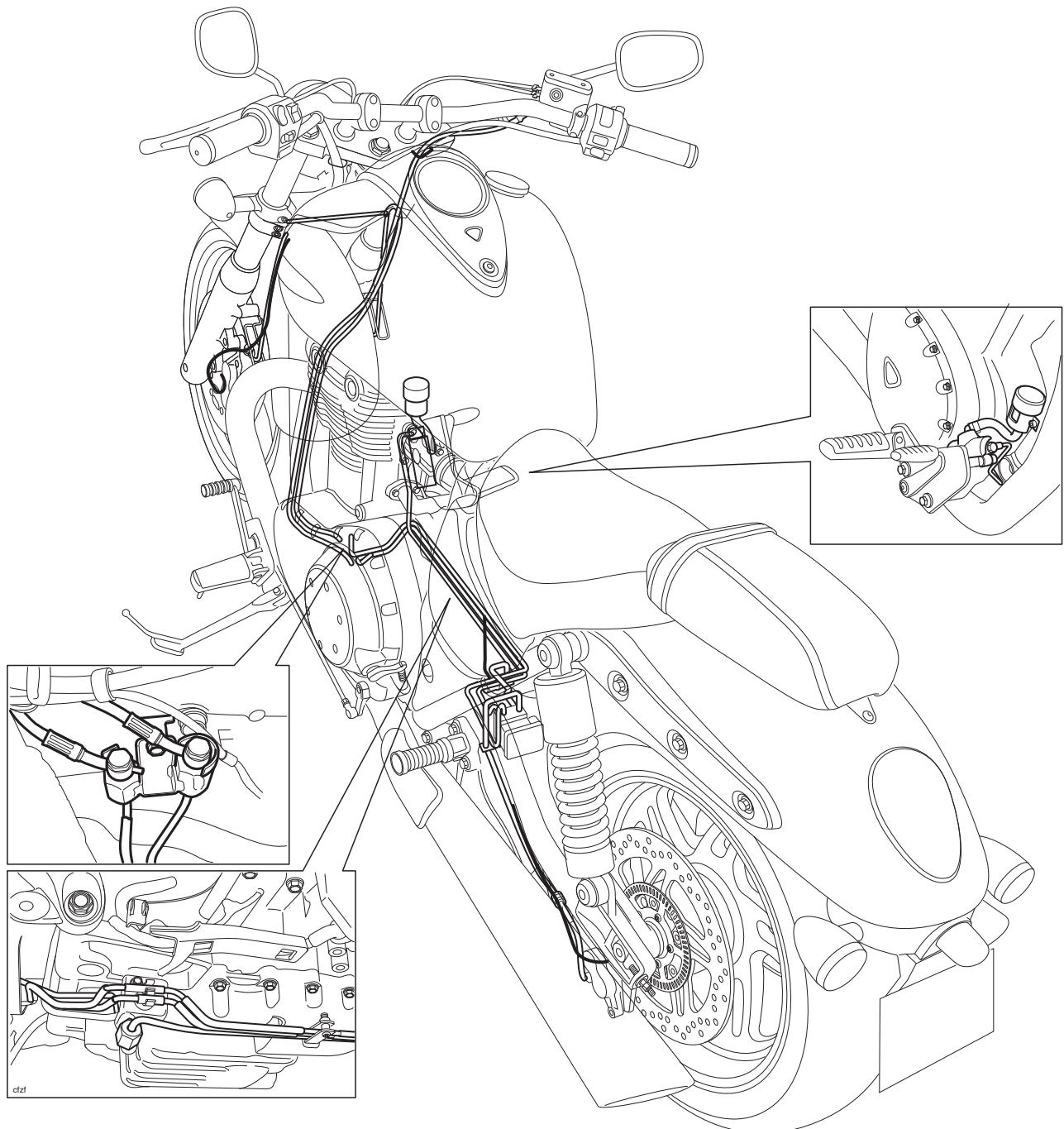


General Information

Brake Pipe and Hose Routing – Thunderbird without ABS

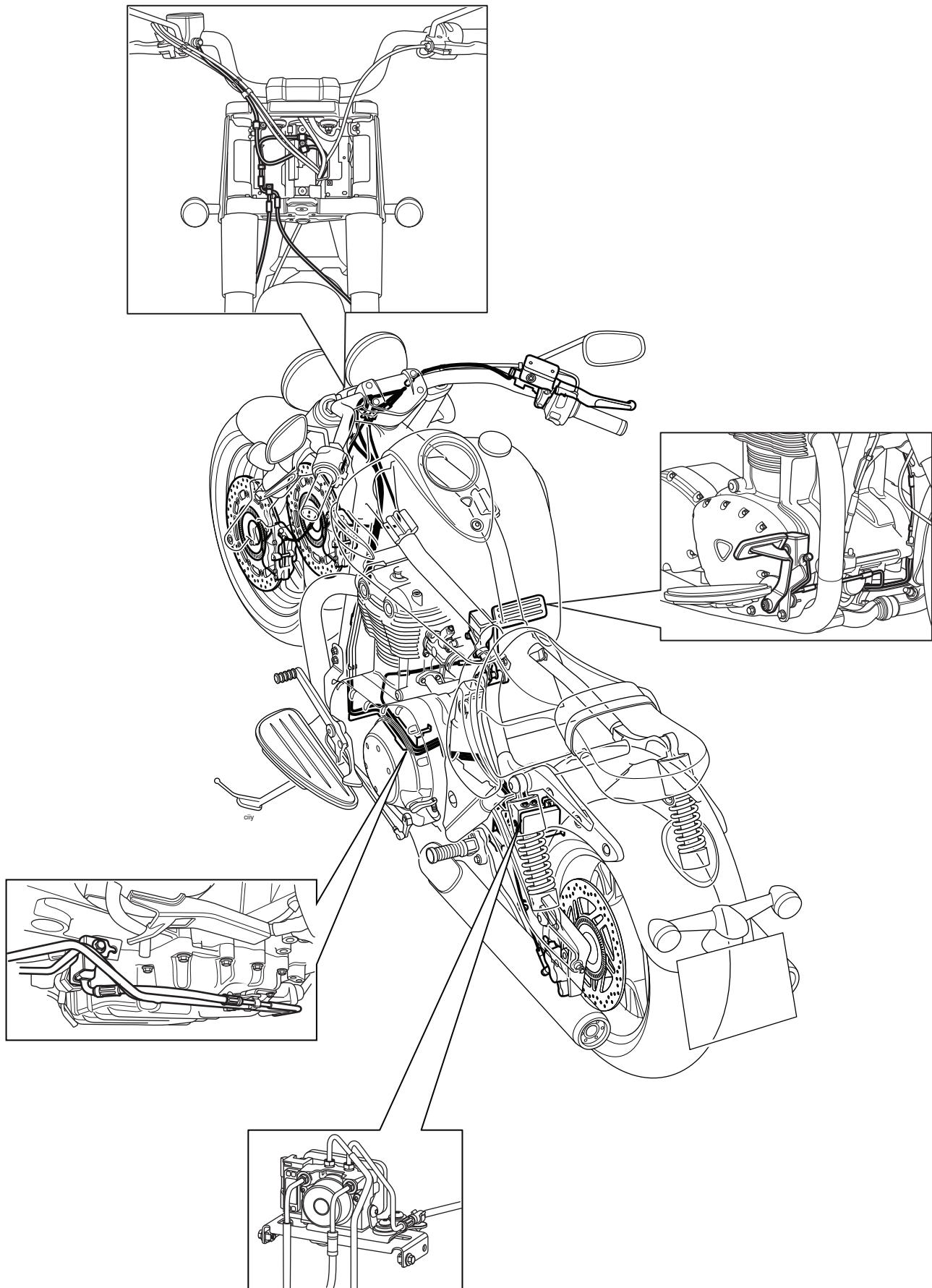


Brake Pipe and Hose Routing – Thunderbird with ABS – Except Thunderbird Commander and Thunderbird LT

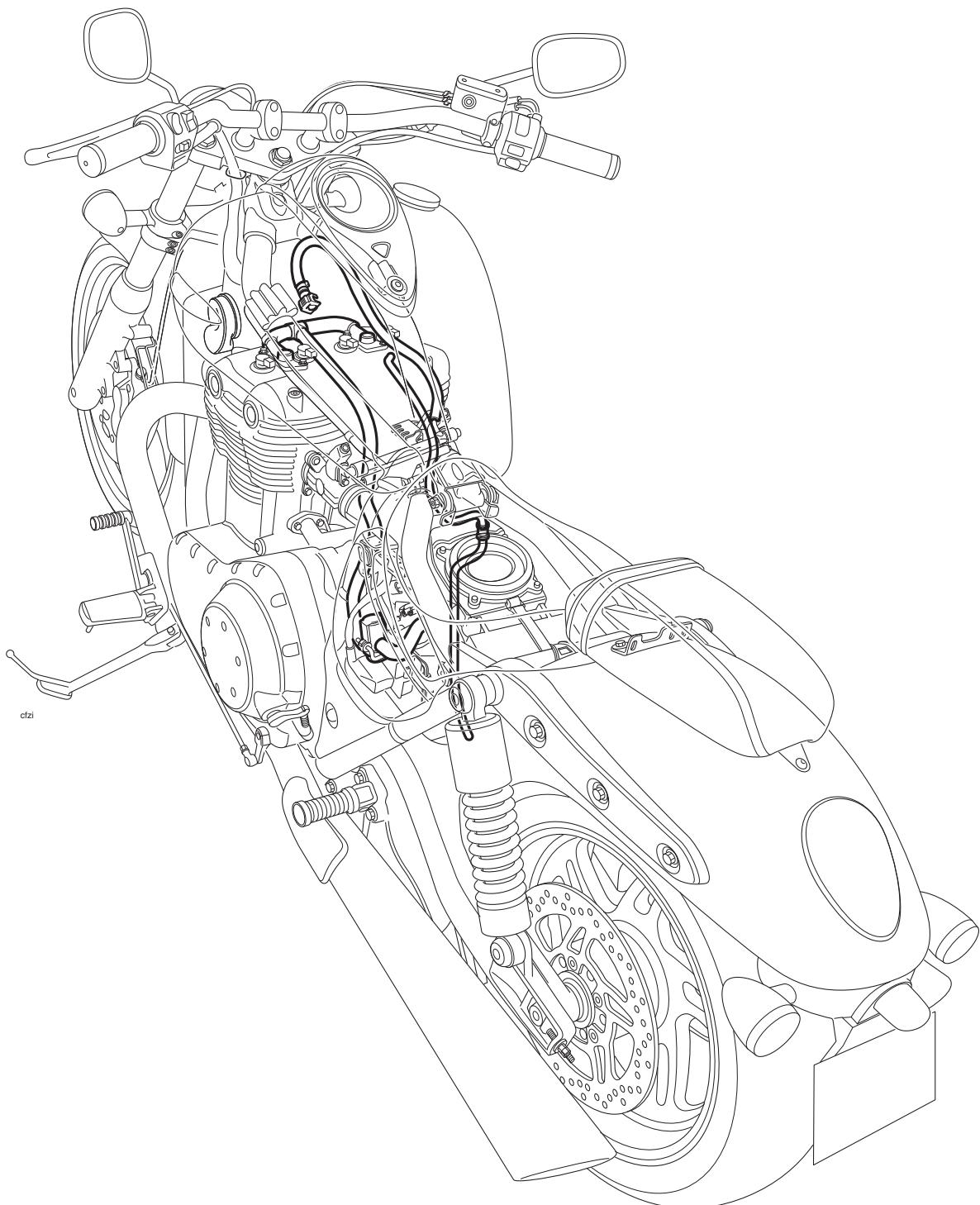


General Information

Brake Pipe and Hose Routing – Thunderbird Commander and Thunderbird LT

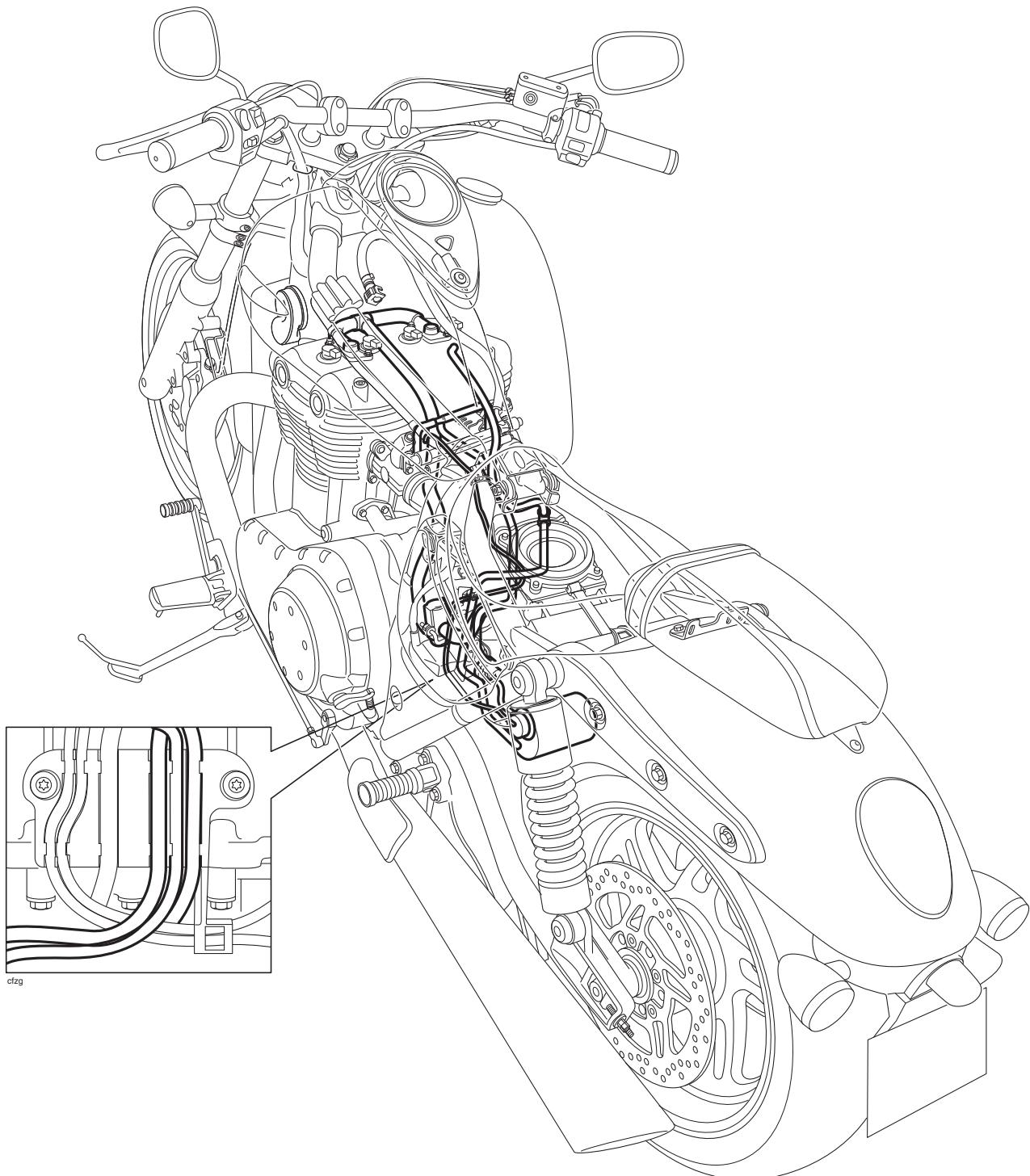


Fuel Hose and Fuel Tank Breather Hose Routing (non-evaporative emission control versions)



General Information

Fuel Hose and Evaporative/Fuel Tank Breather Hose Routing



2 Scheduled Maintenance

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Scheduled Maintenance

Introduction

To maintain the motorcycle in a safe and reliable condition, the maintenance and adjustments outlined in this section must be carried out as specified in the schedule of daily checks, and also in line with the Scheduled Maintenance chart.

Weather, terrain and geographical location affects maintenance. The maintenance schedule should be adjusted to match the particular environment in which the vehicle is used and the demands of the individual owner. For advice on adjusting the service schedule, consult your authorised Triumph dealer.



Warning

In order to correctly carry out the maintenance items listed in the Scheduled Maintenance chart, special tools and specialist knowledge will be required. As only an authorised Triumph dealer will have this knowledge and equipment, Triumph strongly recommends that your authorised Triumph dealer carries out all scheduled maintenance.

A dangerous riding condition could result from incorrect maintenance leading to loss of motorcycle control and an accident.



Warning

All maintenance is vitally important and must not be neglected. Incorrect maintenance or adjustment may cause one or more parts of the motorcycle to malfunction. A malfunctioning motorcycle is dangerous and may lead to an accident.

Scheduled maintenance may be carried out by your dealer in three ways; annual maintenance, mileage based maintenance or a combination of both, depending on the mileage the motorcycle travels each year.

- Motorcycles travelling less than 6,000 miles/10,000 km per year must be maintained annually. In addition to this, mileage based items require maintenance at their specified intervals, as the motorcycle reaches this mileage.
- Motorcycles travelling approximately 6,000 miles/10,000 km per year must have the annual maintenance and the specified mileage based items carried out together.
- Motorcycles travelling more than 6,000 miles/10,000 km per year must have the mileage based items maintained as the motorcycle reaches the specified mileage. In addition to this, annual based items will require maintenance at their specified annual intervals.

In all cases maintenance must be carried out at or before the specified maintenance intervals shown. Consult an authorised Triumph dealer for advice on which maintenance schedule is most suitable for your motorcycle.



Warning

Triumph Motorcycles cannot accept any responsibility for damage or injury resulting from incorrect maintenance or improper adjustment carried out by the owner.

Since incorrect or neglected maintenance can lead to a dangerous riding condition, always have an authorised Triumph dealer carry out the scheduled maintenance of this motorcycle.

Scheduled Maintenance Chart

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	6,000 and 18,000 (10,000 and 30,000)	12,000 (20,000)	24,000 (40,000)
Engine - check for leaks	Day	•	•	•	•	•
Engine oil - renew	-	•	•	•	•	•
Engine oil filter - renew	-	•	•	•	•	•
Valve clearances - check	-				•	•
Air cleaner - renew	-				•	•
Autoscan - Carry out a full Autoscan using the Triumph Diagnostic Tool (print a customer copy)			•	•	•	•
ABS ECM - check for stored DTCs		•	•	•	•	•
Spark plugs - check	-			•		
Spark plugs - renew	-				•	•
Throttle bodies - balance	-		•	•	•	•
Throttle cables - check/adjust	Day	•	•	•	•	•
Cooling system - check for leaks	-	•	•	•	•	•
Coolant level - check/adjust	Day	•	•	•		
Coolant - renew	-				•	•
Fuel system - check for leaks, chafing etc.	Day	•	•	•	•	•
Fuel filter - renew	-				•	•
Lights, instruments & electrical systems - check	Day	•	•	•	•	•
Steering - check for free operation	Day	•	•	•	•	•
Headstock bearings - check/adjust	-	•	•	•	•	•
Headstock bearings - lubricate	-				•	•
Forks - check for leaks/smooth operation	Day	•	•	•	•	•
Fork oil - renew	-					•
Brake fluid levels - check	Day	•	•	•	•	•
Brake fluid - renew		Every 2 years				
Brake pads - check wear levels	Day	•	•	•	•	•
Brake calipers - check for fluid leaks and seized pistons	-	•	•	•	•	•
Brake master cylinders - check for fluid leaks	-	•	•	•	•	•
Drive belt tension - check and adjust	Day	•	Every 2,500 miles (4,000 km)			
Drive belt - inspect for wear or damage	Day	•	•	•	•	•
Drive flange bearings - check for wear/smooth operation						•

Scheduled Maintenance

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	6,000 and 18,000 (10,000 and 30,000)	12,000 (20,000)	24,000 (40,000)
Drive flange assembly - renew ¹						•
Wheels - inspect for damage	Day	•	•	•	•	•
Wheels - check wheels for broken or damaged spokes and check spoke tightness (models with spoked wheels only)		•	•	•	•	•
Wheel and drive flange bearings - check for wear/smooth operation	-	•	•	•	•	•
Tyre wear/tyre damage - check	Day	•	•	•	•	•
Tyre pressures - check/adjust	Day	•	•	•	•	•
Fasteners - inspect visually for security	Day	•	•	•	•	•
Clutch cable - check/adjust	Day	•	•	•	•	•
Side stand - check operation	Day	•	•	•	•	•
Exhaust butterfly valve cables - check/adjust	-	•	•	•	•	•
Fuel and evaporative loss* hoses - renew	-					•

*Evaporative system fitted to models for certain markets only.

¹ For Thunderbird motorcycles up to VIN 454618 only: Renew the drive flange assembly (part number T2010461) at the first 24,000 mile/40,000 km service only. At subsequent services, check the drive flange bearings for wear/smooth operation.

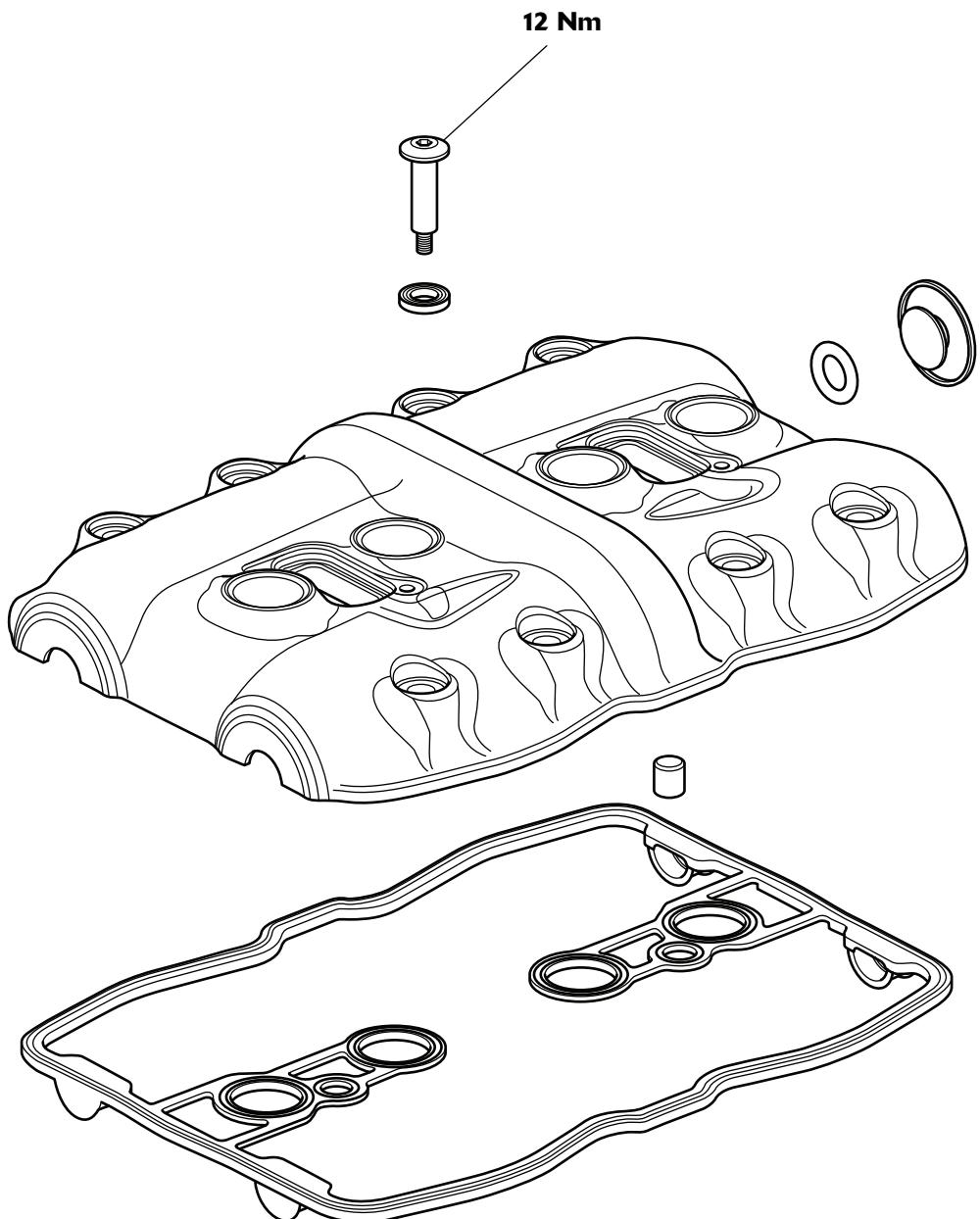
3 Cylinder Head

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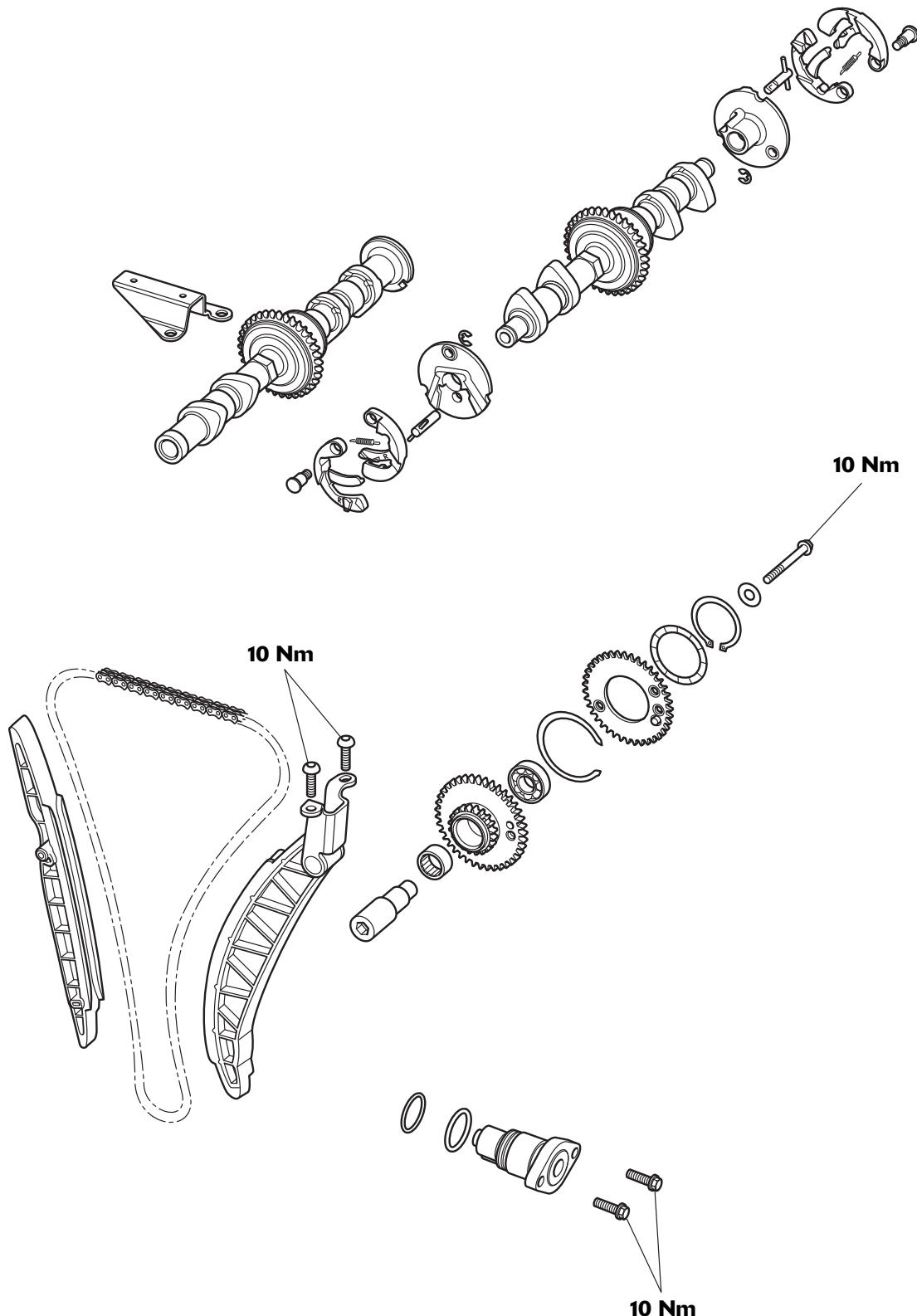
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Cylinder Head

Exploded View – Camshaft Cover

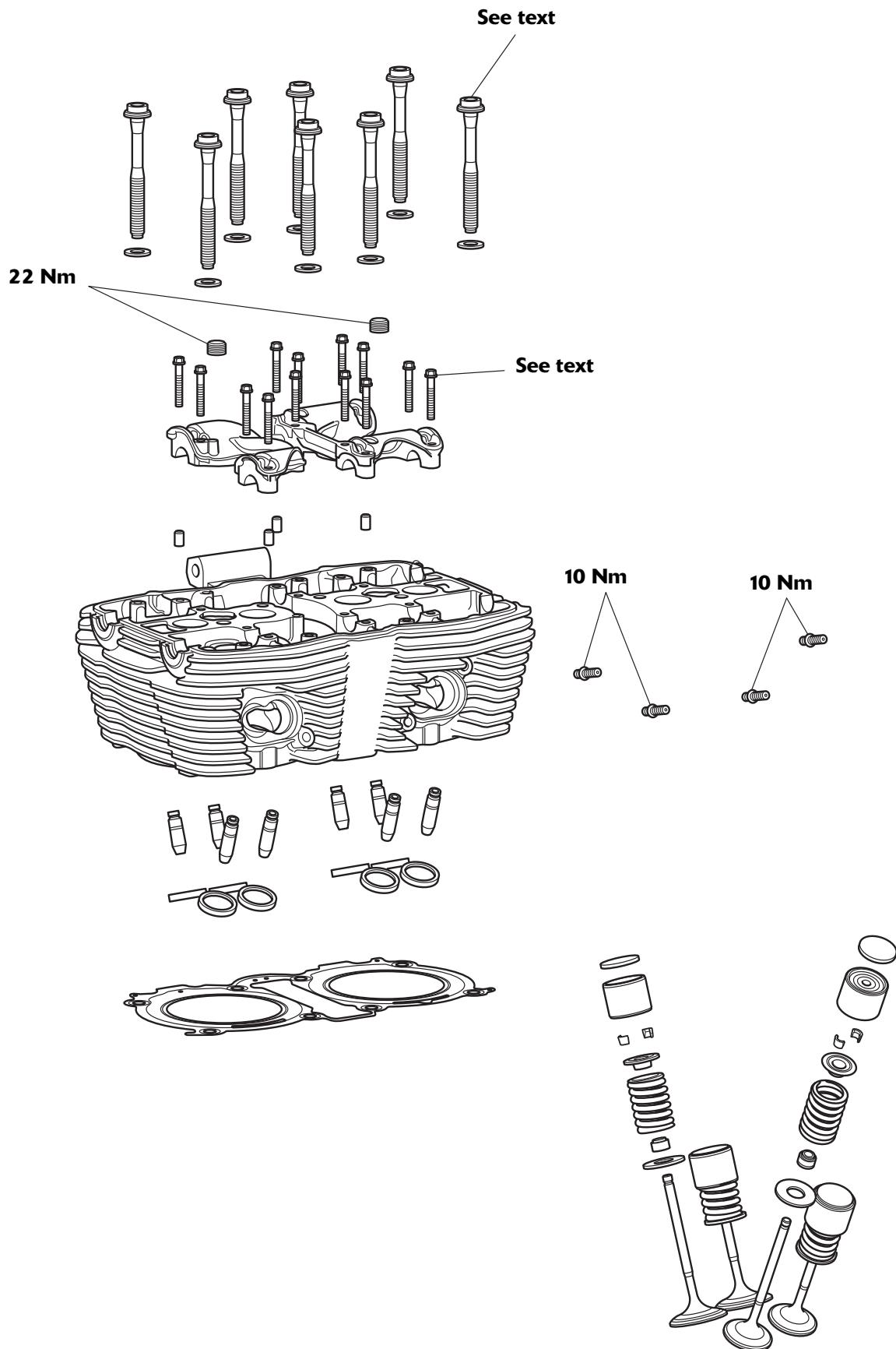


Exploded View – Camshaft and Camshaft Drive



Cylinder Head

Exploded View – Cylinder Head



Description

The engine is fitted with an aluminium alloy cylinder head, which carries the camshafts, valves and spark plugs. The cylinder head is cast as a single entity, to which various components are permanently added after machining.

A silent-running camshaft drive chain drives the twin-overhead camshafts, which run directly in the cylinder head without additional bearings. The crankshaft drives an idler gear, which in turn drives the camshaft drive chain. The idler gear, and therefore the camshafts, rotate in the opposite direction to the crankshaft.

The engine is fitted with a camshaft drive chain hydraulic tensioner. The tensioner is fed oil via a gallery in the crankcase. The combination of oil pressure and spring pressure pushes the plunger against the tensioner blade which tensions the camshaft drive chain. The hydraulic tensioner has an oil pressure relief valve located in the plunger that is set to open between 12 - 16 bar. The chain is guided by two nylon tensioner blades. The rubbing blade is located in the crankcase by lugs on the blade. The cylinder head must be removed to remove this blade. The tensioner blade is secured to the cylinder head by two bolts at its upper end, and its lower end rests on the tensioner plunger.

The exhaust camshaft is fitted with decompressors on each end. These decompressors use a small camshaft to open the outer exhaust valves at low engine speed to aid starting performance. Once the engine has started, fly weights on the decompressors are thrown outwards by centrifugal force, rotating the cams away from the exhaust valves. The engine will then operate in the normal way.

Valve clearances are adjusted by changing variable thickness shims that sit between the camshaft and valve tappet bucket. The valves are fitted with single, symmetrical valve springs. Both the tip and seat face of the valves are hardened to give a long service life. Due to the assembly methods used, the valve seats and valve guides cannot be replaced.

Oil is supplied to the cylinder head by an internal passageway inside the engine. Once it arrives at the cylinder head, it is passed through a restrictor, and is then delivered to the camshaft bearing journals along grooves in the camshaft ladders. The camshaft lobes are splash fed by oil coming from the camshaft journals.

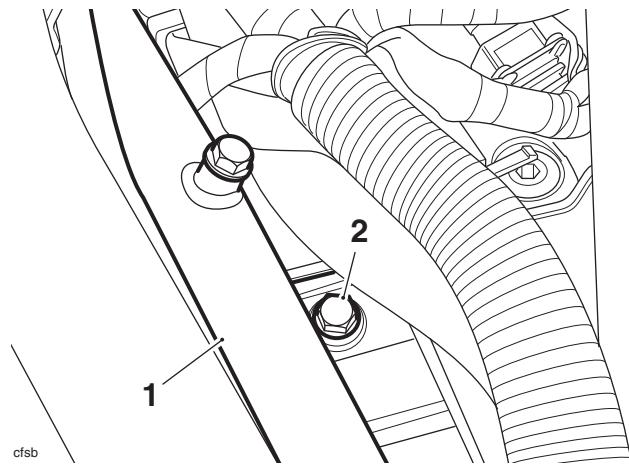
Camshaft Cover

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page 10-144).
4. Drain the cooling system (see page 11-6).
5. Remove the upper coolant tube fixing bolt.



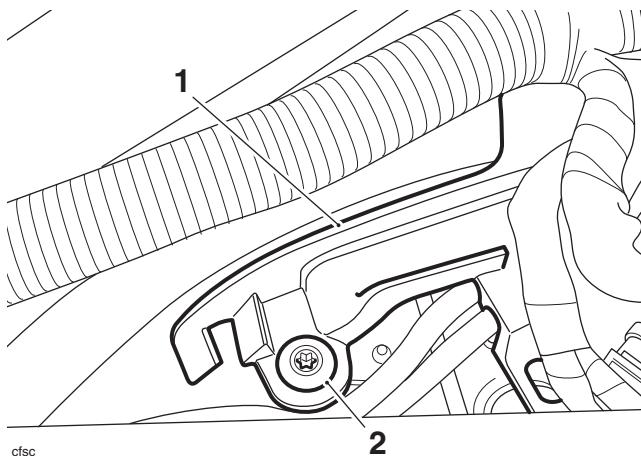
1. Upper coolant tube

2. Fixing

6. Release the hose clips securing the upper coolant tube to the thermostat housing hose, top hose and radiator cap housing hose.
7. Ease the upper coolant tube upwards at the rear to release it from the thermostat housing hose.
8. Release the coolant tube from the radiator top hose and then the radiator cap housing hose.
9. Remove the upper coolant tube upwards through the frame rails.
10. Remove both MAP sensors, noting the routing of the MAP sensor hoses and harnesses (see page 10-164).

Cylinder Head

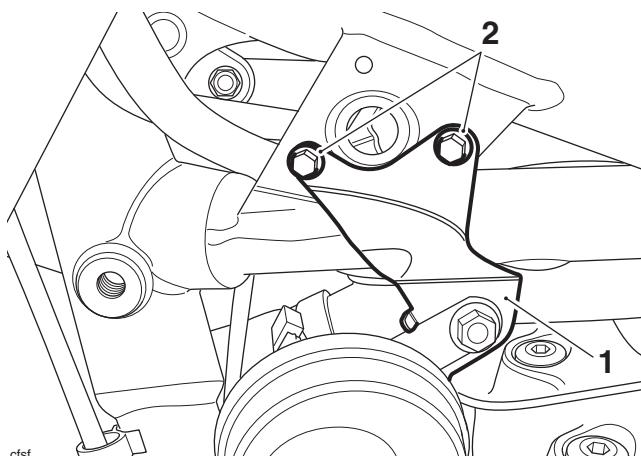
11. Remove the fixing securing the throttle cable and harness guide to the frame.



1. Throttle cable and harness guide

2. Fixing

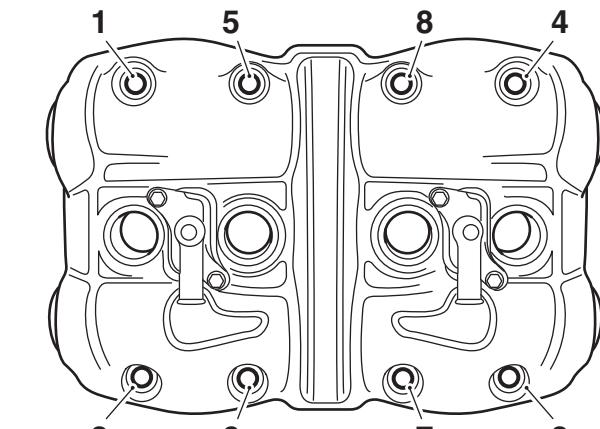
12. Disconnect the MAP sensor hoses at the throttle body.
 13. Detach the throttle cables from the throttle cable and harness guide. It is not necessary to disconnect the throttle cable at either the throttle body or twistgrip.
 14. **All models except Thunderbird Commander and Thunderbird LT:** Detach both switch housing connectors from the throttle cable and harness guide and remove the guide.
 15. Disconnect the electrical connectors and remove the four ignition coils from the camshaft cover.
 16. If fitted, detach the secondary air injection hoses from the reed valves on top of the camshaft cover. Position the hoses aside.
 17. **All models except Thunderbird Commander and Thunderbird LT:** Release the two fixings and detach the horn bracket from the frame. Position the horn and bracket aside. DO NOT allow the horn to hang unsupported on the horn wiring.



1. Horn bracket

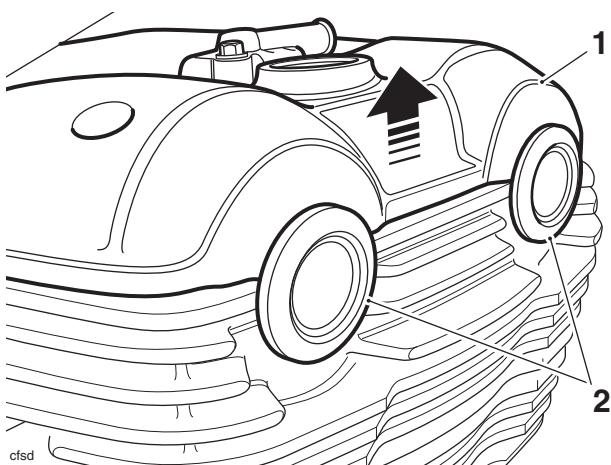
2. Fixings

18. Progressively release the camshaft cover bolts in the sequence shown below.



Camshaft Cover Bolt Release Sequence

19. Remove all the bolts and bolt seals from the camshaft cover.
 20. Raise the camshaft cover and collect the four camshaft cover end caps.



1. Camshaft cover

2. End caps (right hand shown)

21. Raise the camshaft cover and manoeuvre it towards the right hand side of the engine, where it can be removed.



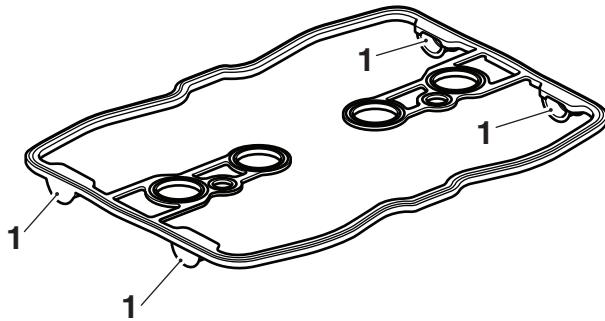
Caution

Never use a lever to remove the camshaft cover from the cylinder head. Using a lever will cause damage to the cylinder head and camshaft cover, which could lead to an oil leak.

22. Collect the camshaft cover seal from the head.

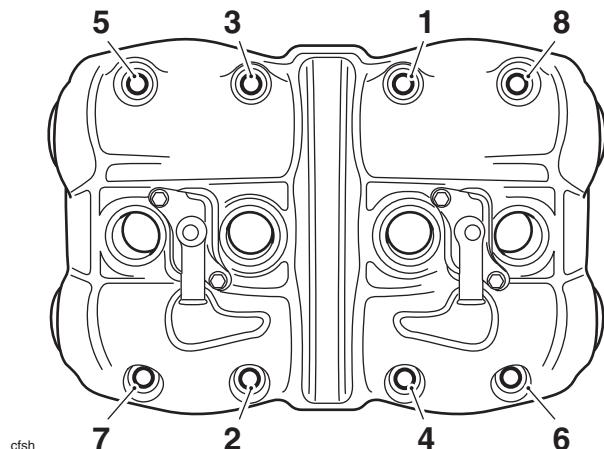
Installation

1. Apply silicone sealant (we recommend ThreeBond 1215 or equivalent) to the cylinder head where the four D-sections of the camshaft cover seal fit.



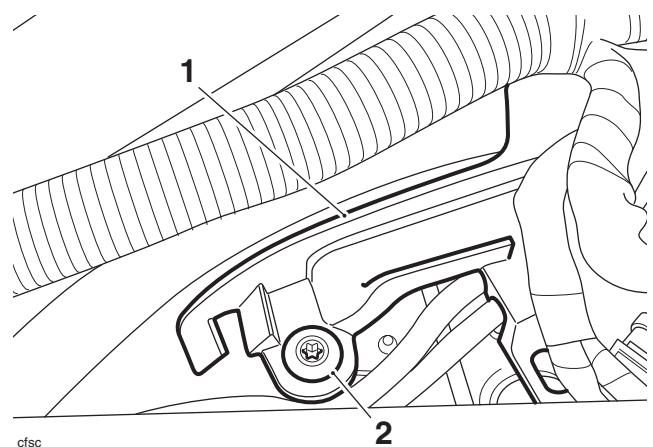
1. D-sections

2. Fit a new seal ensuring the four D-sections seat in the corresponding half-rounds in the cylinder head. Ensure the seal is fitted over the two camshaft cover dowels.
3. Position the camshaft cover to the cylinder head. Ensure that the seal remains in position, and align the camshaft cover to the two dowels.
4. Carefully raise the camshaft cover and fit the four camshaft cover end caps between the camshaft cover and the cylinder head. Ensure the seal is not disturbed during this operation.
5. Lubricate the new camshaft cover bolt seals with clean engine oil.
6. Fit the camshaft cover bolts, complete with new seals (steel ring side facing upwards) and tighten to finger tight.
7. Progressively and evenly tighten the camshaft cover bolts in the sequence shown below to **12 Nm**.



Camshaft Cover Bolt Tightening Sequence

8. **All models except Thunderbird Commander and Thunderbird LT:** Refit the horn and bracket, tightening the fixings to **7 Nm**.
9. If disconnected, refit the secondary air injection hose to the reed valves and secure with the clips.
10. Fit the four ignition coils and reconnect the electrical connectors.
11. **All models except Thunderbird Commander and Thunderbird LT:** Attach both switch housing connectors to the throttle cable and harness guide.
12. Refit the throttle cable and harness guide fixing, tightening to **7 Nm**.



1. Throttle cable and harness guide

2. Fixing

13. Refit the throttle cables to the throttle cable and harness guide.
14. Refit the two MAP sensors (see page 10-164). Ensure the right hand hose (identified with red tape) connected to the right hand throttle.
15. Ensure the hose clips are in position on the top hose, radiator cap housing and thermostat housing hose.
16. Position the upper coolant tube to the motorcycle, lowering it down between the frame rails. Connect the tube to the radiator cap housing, top hose then thermostat housing. Tighten the hose clips to **3 Nm**. Tighten the coolant tube fixing to **7 Nm**.
17. Refill the cooling system (see page 11-7).
18. Refit the fuel tank (see page 10-146).
19. Reconnect the battery, positive (identified with red tape) lead first.
20. Refit the rider's seat (see page 17-21).

Cylinder Head

Camshaft Drive Chain Tensioner

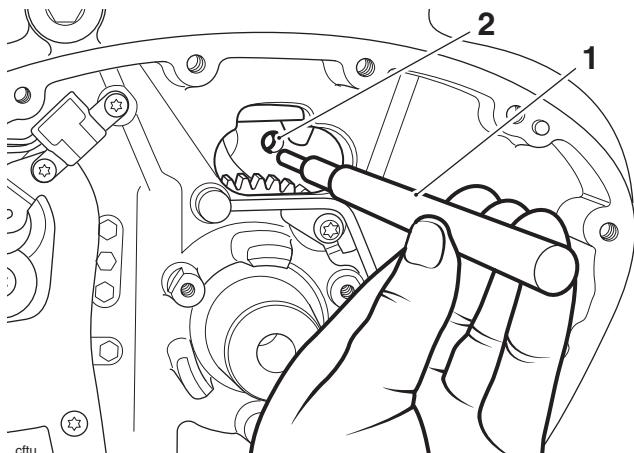


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Removal

1. Remove the camshaft cover (see page 3-5).
2. Remove the alternator rotor and stator (see page 18-39).
3. Turn the engine until the timing pin T3880039 can be inserted through the hole in the crankcase and into the idler gear.



1. Tool T3880039
2. Timing hole in crankcase



Warning

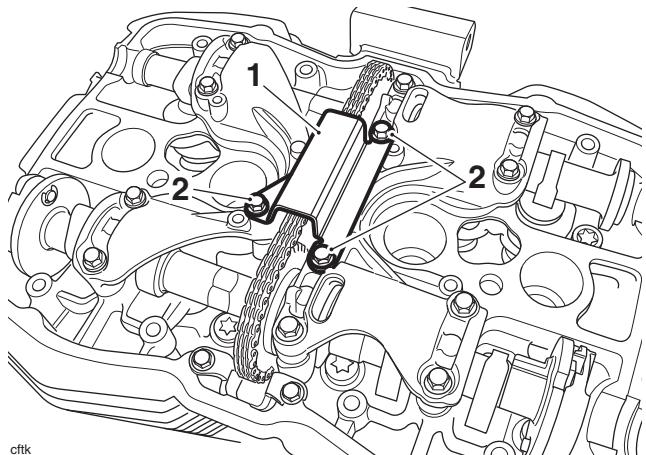
The plunger of the camshaft drive chain tensioner is under spring tension. Always wear hand, eye and facial protection when removing the tensioner as unprotected areas of the body can be injured if the spring tension is released in an unexpected or uncontrolled way.



Caution

The camshaft timing will be lost when the camshaft drive chain tensioner is removed. Do not refit the camshaft drive chain tensioner without first setting the camshaft timing. Rotating or attempting to start an engine with incorrectly adjusted camshaft timing will result in severe engine damage.

4. Remove the three fixings and remove the camshaft drive chain top pad.



1. Top pad
2. Fixings

5. Release the fixings and withdraw the camshaft drive chain tensioner from the crankcase.

Inspection

1. Inspect the camshaft drive chain tensioner spring for damage and deformation. Renew as necessary.
2. Inspect the tip of the camshaft drive chain tensioner plunger for wear and damage. Renew as necessary.

Installation

1. Fit new O-rings to the camshaft drive chain tensioner body.

Note:

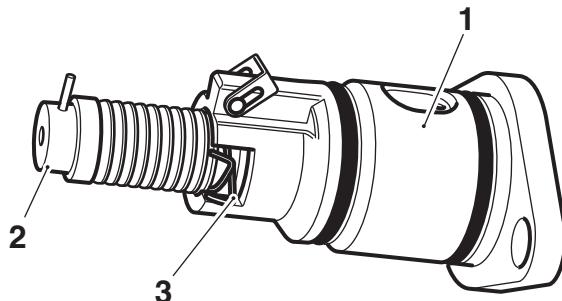
- If installing a new camshaft drive chain tensioner, do not release the plunger from its fully compressed, locked condition before fitting.
- If installing the original camshaft drive chain tensioner, prior to assembly into the engine, it is necessary to reset the plunger to its fully compressed, locked condition.



Warning

The plunger of the camshaft drive chain tensioner is under spring tension. Always wear hand, eye and facial protection when removing the tensioner as unprotected areas of the body can be injured if the spring tension is released in an unexpected or uncontrolled way.

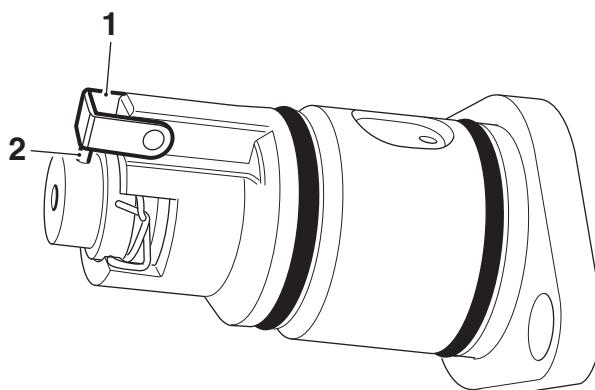
2. To set the camshaft drive chain tensioner plunger to its fully compressed, locked condition, hold the ends of the resister spring together and push the plunger into the tensioner body.



cftb

1. **Tensioner**
2. **Tensioner plunger**
3. **Resister spring**

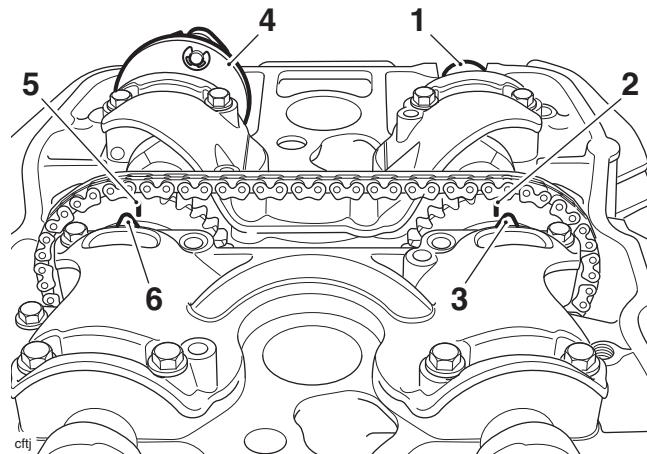
3. Once the plunger is fully compressed, rotate the latch over the pin on the plunger to lock the plunger in position.



cftb

1. **Latch**
2. **Pin**

4. Using a suitable spanner on the flats on the camshaft, rotate each camshaft so that the timing marks on each camshaft sprocket point upwards and align with the cast marks on the camshaft ladder; also ensure that the chain slack is towards the camshaft drive chain tensioner (front of engine) side.



1. **Inlet camshaft**
2. **Inlet camshaft timing mark**
3. **Camshaft ladder timing mark (inlet)**
4. **Exhaust camshaft**
5. **Exhaust camshaft timing marks**
6. **Camshaft ladder timing mark (exhaust)**

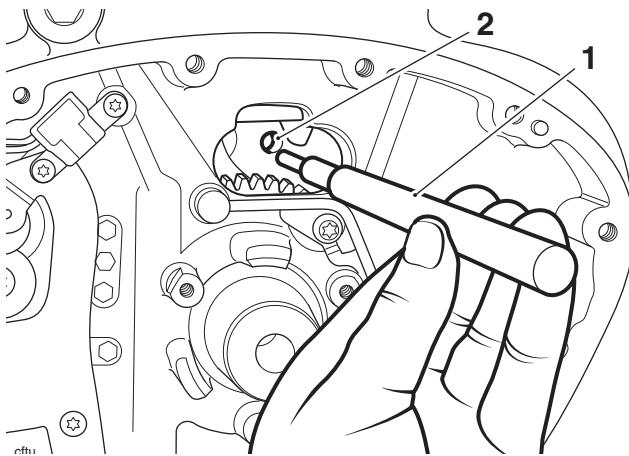
5. Hold the camshaft drive chain in position on the camshaft sprockets and fit the camshaft drive chain tensioner into the crankcase. Secure with the two fixings and tighten to **10 Nm**.

Note:

- **When installing the camshaft chain tensioner make sure the arrow on the outer casing points to the top of the crankcase and the latch located to the bottom.**
- 6. Using the edge of the hand, apply a sharp 'tap' to the top of the camshaft drive chain, between the two camshaft sprockets, to release the camshaft drive chain tensioner plunger latch. When the latch is released, the chain will become tight.
- 7. Remove tool T3880039 from the crankcase.

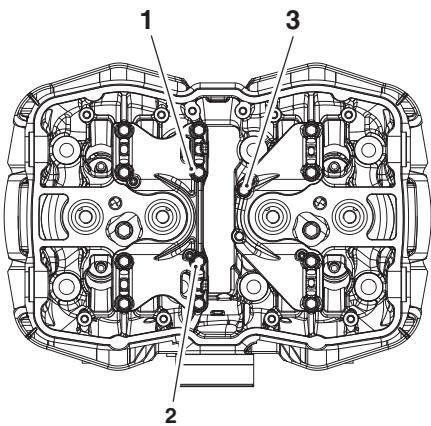
Cylinder Head

- Turn the crankshaft clockwise (as viewed from the left of the engine) through four complete revolutions. Stop when the hole in the crankshaft idler gear realigns with the hole in the upper crankcase and the timing pin can be refitted. Refit the timing pin.



- Tool T3880039**
- Timing hole in crankcase**

- Check that the camshaft timing marks align as described previously. Rectify as necessary.
- When the timing checks have been satisfactorily completed, remove tool T3880039.
- Refit the top pad. Tighten the fixings to **5 Nm** and then **10 Nm** in the sequence shown below.



**Camshaft Drive Chain Top Pad
Torque Sequence**

- Refit the alternator rotor and stator (see page 18-40).
- Refit the camshaft cover (see page 3-7).

Camshaft Drive Chain and Idler Gear

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

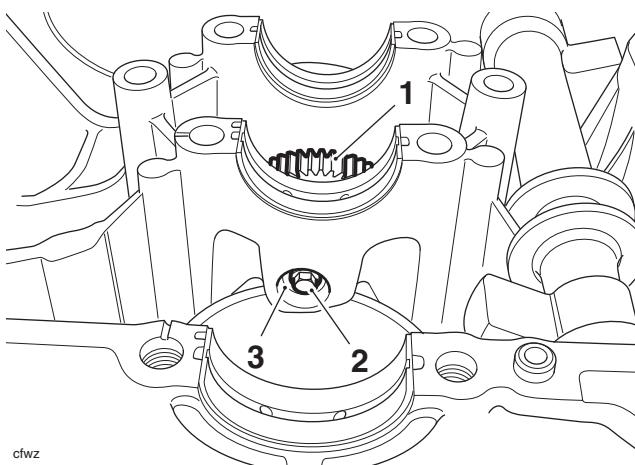
- Remove the camshaft cover (see page 3-5).

! Warning

Never use a 'dot punch' to mark the camshaft drive chain, camshaft or camshaft driven gears. Severe engine damage will result if impact is applied to machined parts.

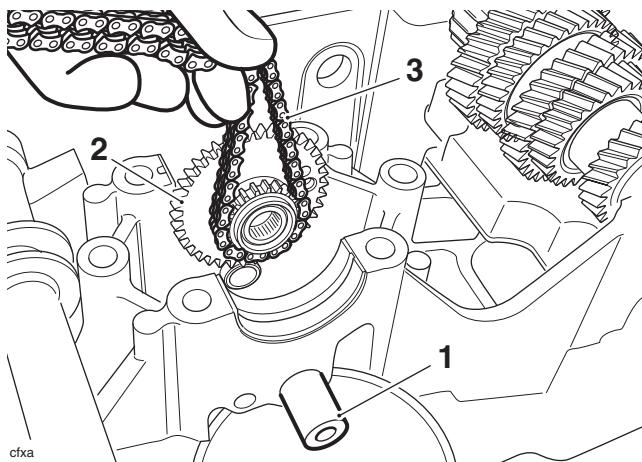
Note:

- To ensure the camshaft drive chain can be refitted in the same orientation, use a suitable marker pen to permanently mark one of the outer plates of the camshaft drive chain prior to removing the camshafts.
 - Note the side of which the marked outer plate is facing for installation.
- Remove the camshafts (see page 3-14).
 - Remove the crankshaft (see page 5-9).
 - Remove and discard the bolt from the idler gear shaft. Retain the washer for reuse.



- Idler gear**
- Bolt**
- Washer**

- Withdraw the idler gear shaft and collect the idler gear and camshaft drive chain from the upper crankcase.

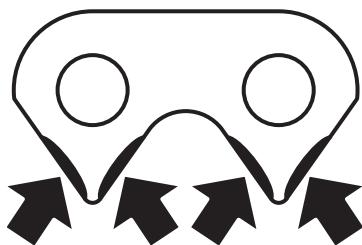


- 1. Idler gear shaft**
- 2. Idler gear**
- 3. Camshaft drive chain**
- Remove the camshaft drive chain from the idler gear.

Inspection

An in situ check can be made as follows:

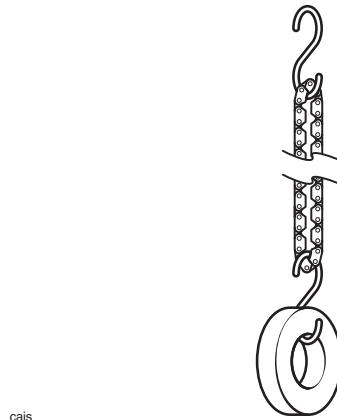
- Check for significant blue discolouration of the chain plates indicating excessive heat build-up.
- Examine all pins for signs of rotation.
- Check for cracking or deep scratching of the chain plates.
- Check for severe wear of the inner plates as indicated in the diagram below.



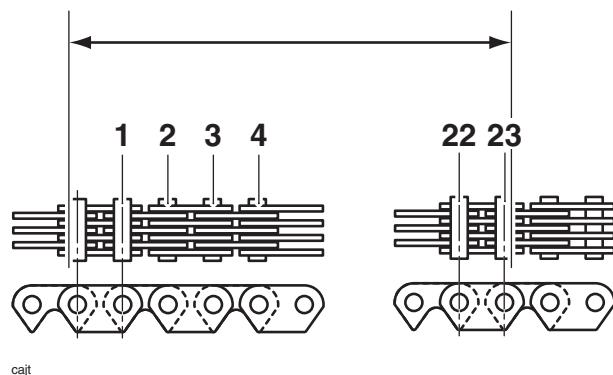
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For a more thorough check, proceed as follows:

- Remove the chain from the engine.
- Suspend the chain from a pin or hook with a 13 kg weight attached at the lower end.

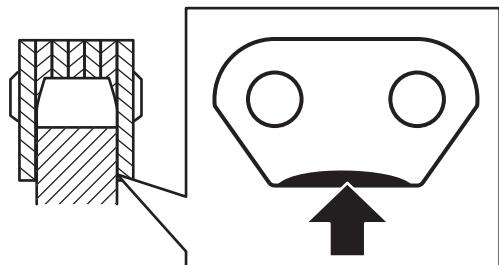


- Measure across 23 links as shown in the diagram. If the chain is within limits, the measurement should be no longer than 149.48 mm. Measurements beyond 149.48 mm indicate that the chain must be replaced.



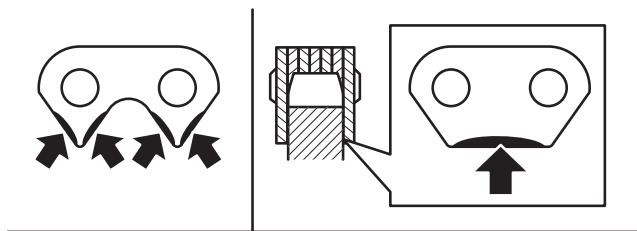
Cylinder Head

4. Check for severe wear of the inner surface of the outer plates at the side contact points with the sprocket teeth.



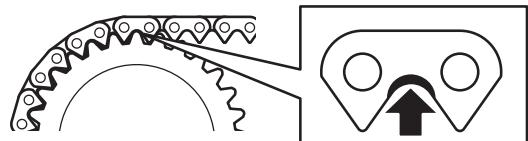
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5. Check for signs of stiffness or kinking.
6. Check for severe wear of the plates in the area shown below.



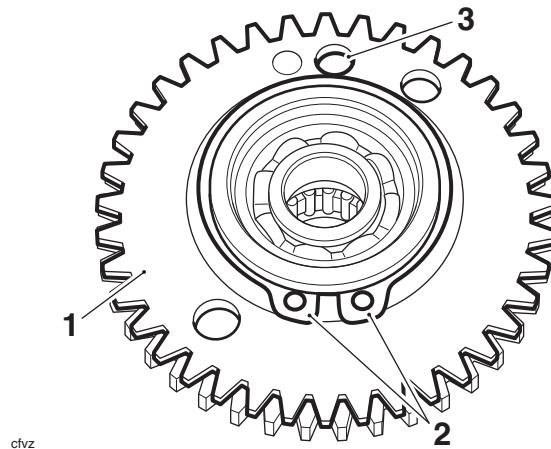
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If any of these symptoms are evident, the camshaft drive chain must be replaced.



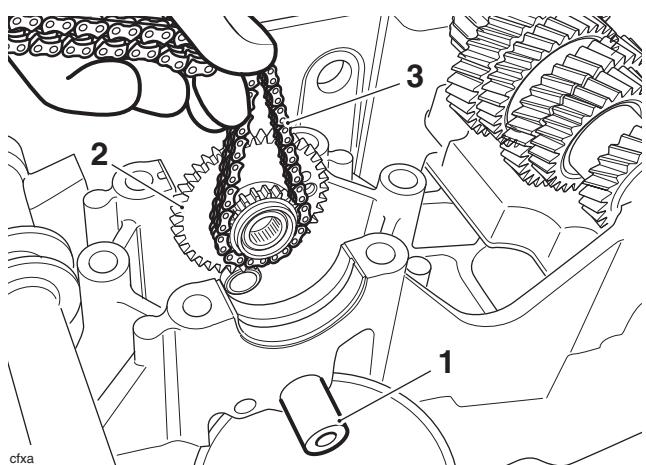
Installation

1. Check that the circlip ends are facing away from the timing pin hole in the backlash gear as shown below. This will prevent the circlip from fouling the idler gear pin spanner T3880041 during adjustment of the backlash gear.



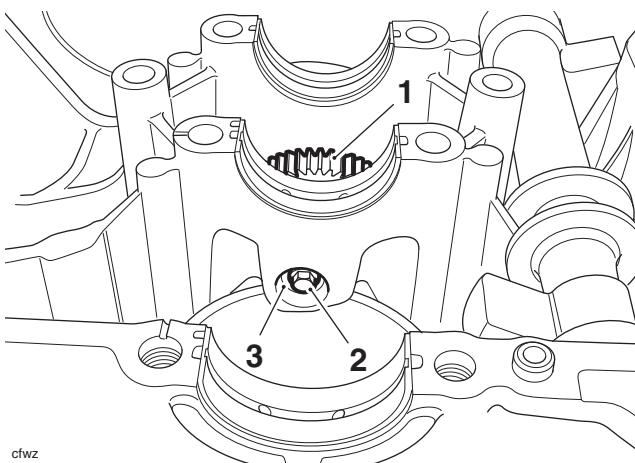
1. **Idler gear**
2. **Circlip ends**
3. **Timing pin hole**

2. Install the camshaft drive chain to the idler gear.
3. Refit the idler gear to the upper crankcase and install the idler gear shaft. Ensure that the marked outer plate on the camshaft drive chain is facing the same direction as noted for removal.



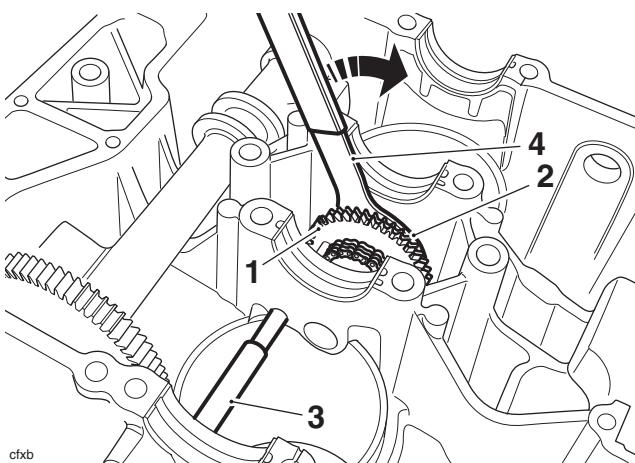
1. **Idler gear shaft**
2. **Idler gear**
3. **Camshaft drive chain**

- Install the washer to a new bolt and fit them to the idler gear shaft. Tighten to **10 Nm**.



1. Idler gear
2. Bolt
3. Washer

- Install the timing pin T3880039 through the hole in the upper crankcase (alternator side) and into the smaller hole in the idler gear. Note that the pin cannot be fully inserted until the backlash gear has been aligned to the idler gear as described below:
- Engage the pins of service tool T3880041 to the two holes in the backlash gear. Gently rotate the backlash gear against the spring tension until the timing pin T3880039 can be fully inserted through the backlash gear. Remove the idler gear pin spanner T3880041.



- 1. Idler gear**
2. Backlash gear
3. Timing pin T3880039
4. Pin spanner T3880041
- Refit the crankshaft (see page 5-9).
 - Refit the camshafts (see page 3-17).
 - Refit the camshaft cover (see page 3-7).

Camshaft Drive Chain Blades

Removal

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

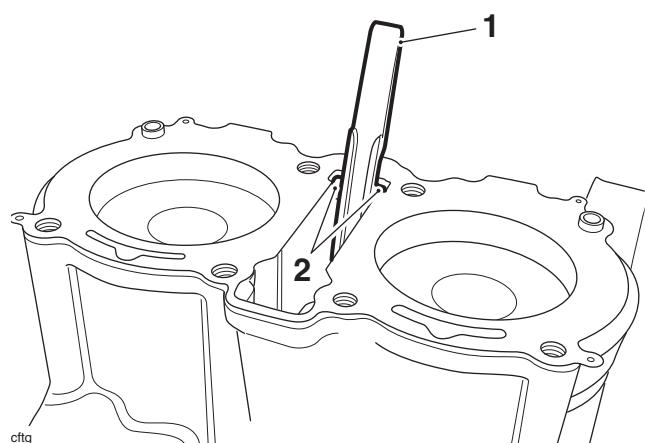
Note:

- The camshaft drive chain rubbing blade can only be removed after the cylinder head has been removed. The camshaft drive chain tensioner blade can be removed after the exhaust camshaft has been removed. This procedure assumes removal of both blades.

- Remove the cylinder head (see page 3-19).

Note:

- Note the position of the camshaft drive chain rubbing blade upper mounting for installation.
- Lift the camshaft drive chain tensioner rubbing blade out of the crankcase.



1. Camshaft drive chain tensioner rubbing blade
2. Mounting lugs

Inspection

- Inspect the camshaft drive chain blades for wear or damage. Renew as necessary.

Installation

- Refit the camshaft drive chain rubbing blade. Ensure the upper mounting lugs are correctly located in the upper crankcase as noted during removal.
- Refit the cylinder head (see page 3-21).

Cylinder Head

Exhaust Decompressors

Note:

- The de-compressor is attached to the camshaft. The de-compressor does not contain any serviceable parts and must be replaced as a complete assembly if faulty.

Camshafts

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note:

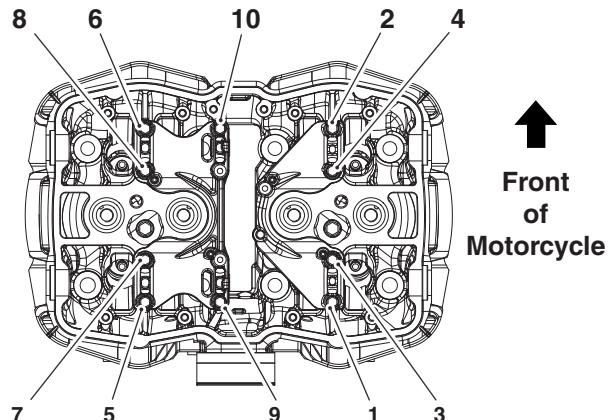
- Either camshaft can be removed from the cylinder head without complete removal of the camshaft drive chain. However, the camshaft drive chain must first be detached from the camshafts.

- Remove the camshaft cover (see page 3-5).
- Remove the camshaft drive chain tensioner (see page 3-8).

! Caution

To avoid damage to the camshaft ladders, always ensure as many camshaft lobes as possible are facing away from the valves. This will reduce stress on the camshaft ladders during removal. Damage to the camshaft ladders will result in replacement of the complete cylinder head.

- Evenly and progressively release the camshaft ladder fixings in the sequence shown below.



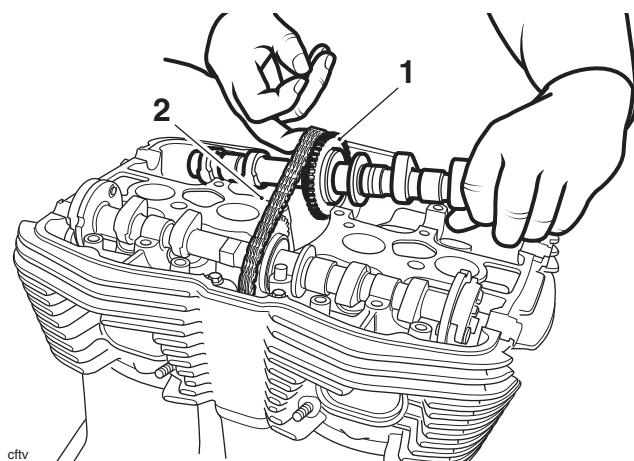
Camshaft Ladder Release Sequence



Caution

Failure to release the camshaft ladder fixings progressively and evenly may result in damage to the camshaft ladder, the camshafts or the cylinder head itself. A damaged camshaft ladder cannot be replaced as an individual item. It can only be obtained as part of a new cylinder head.

4. Once all the upward force on the camshaft ladders have been progressively released, collect all of the bolts and remove the ladders.
5. Secure the camshaft drive chain to prevent it from falling into the crankcase.
6. Lift the camshaft drive chain from one of the camshafts to allow removal of the camshaft from the cylinder head.

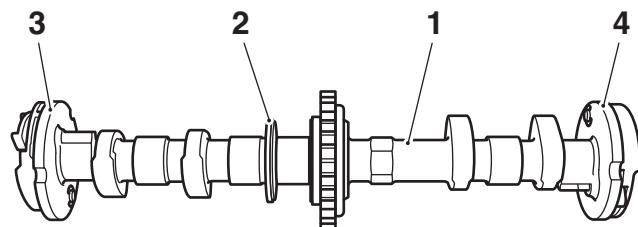


Removing a Camshaft

1. Inlet camshaft
2. Camshaft drive chain
7. Repeat for the second camshaft.

Camshaft Identification

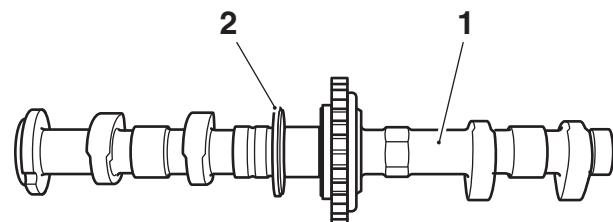
The exhaust camshaft can be identified by the decompressor fitted to each end. The inlet camshaft has no decompressors fitted.



cftq

Camshaft Identification (Exhaust - viewed from the rear of the engine)

1. Exhaust camshaft
2. Thrust face
3. Left hand decompressor
4. Right hand decompressor



cfue

Camshaft Identification (Inlet - viewed from the rear of the engine)

1. Inlet camshaft
2. Thrust face

Cylinder Head

Inspection

1. Inspect the camshaft sprockets for damage and worn or broken teeth.
2. Inspect the bearing surfaces in the cylinder head and camshaft ladder. If wear or damage is found, the cylinder head must be replaced.
3. Inspect the camshaft drive chain (see page 3-11).
4. Inspect the decompressors for damaged or missing flyweights or worn or broken springs. Carefully inspect the cam on each decompressor for damage or wear.
5. Check camshaft journal to camshaft ladder clearance using Plastigauge (Triumph part number 3880150-T0301) as follows:

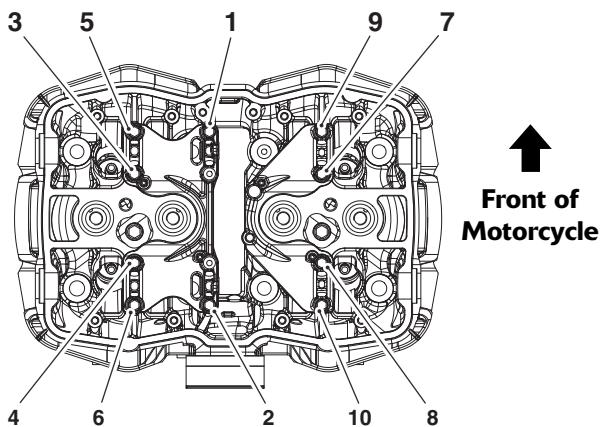


Caution

During the following procedure, the engine must not be rotated. Damage to valves, pistons and the cylinder head can result from rotating the engine.

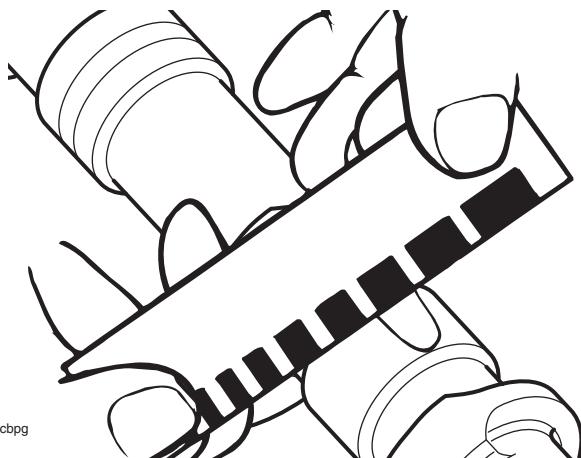
- a) Position a camshaft to the cylinder head in its correct location, (inlet camshaft to inlet valves, exhaust camshaft to exhaust valves). Ensure that the timing marks on the camshaft sprocket are positioned as for removal.
- b) Wipe the exposed areas of one of the camshaft journals and the corresponding position on the camshaft ladder.
- c) Apply a thin smear of grease to the wiped camshaft journal and a small quantity of silicone release agent to the corresponding position on the camshaft ladder.
- d) Size a piece of Plastigauge to fit across the wiped camshaft journal.
- e) Fit the Plastigauge to the camshaft journal using the grease to hold it in place.
- f) Position the camshaft ladder to the cylinder head, aligning bearing areas with camshaft journals. At this stage, it is not necessary to fit the camshaft drive chain top pad.
- g) Finger-tighten the camshaft ladder bolts until the under head areas are in contact with the camshaft ladder.

- h) In the sequence shown below, evenly and progressively tighten the camshaft ladder bolts, approximately half a turn each, until the camshaft ladder is in full contact with the cylinder head. Further tighten the camshaft ladder bolts to **5 Nm**.



Camshaft Ladder Tightening Sequence

- i) In the same sequence, torque each camshaft ladder bolt to **10 Nm**.
- j) Release and remove the camshaft ladder as previously described.
- k) Utilising the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge.



Taking a Plastigauge Measurement

6. Calculate the camshaft journal clearance using the chart provided with the Plastigauge kit.

7. If the journal to camshaft ladder clearance is within the specified tolerances (see table below), remove the camshaft ladder and clean off all traces of Plastigauge, silicone release agent and grease.
5. Lubricate the camshaft bearing areas of the camshaft ladders with a 50/50 solution of engine oil and molybdenum disulphide grease.

Standard	0.025 - 0.066 mm
Service limit	0.105 mm

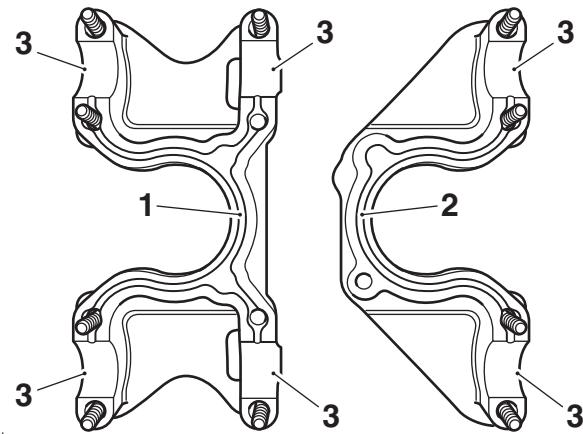
8. Check the diameter of the camshaft journals.

Standard	22.955 - 22.975
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9. If any of the journal to camshaft ladder clearances are outside the specified tolerances, but the camshaft journals are within their specified tolerances, the cylinder head must be replaced.

Installation

1. Correctly identify the inlet and exhaust camshafts as previously described (see page 3-15).
2. Position the camshafts to the two banks of valves ensuring that the inlet camshaft is located to the inlet valves and the exhaust camshaft to the exhaust valves.
3. Working on one camshaft at a time, locate the camshaft drive chain over the camshaft sprockets.
4. Ease the camshaft drive chain away from the sprockets then turn each camshaft until as many lobes as possible are facing away from the valves. Allow the chain to drop back onto the camshafts.

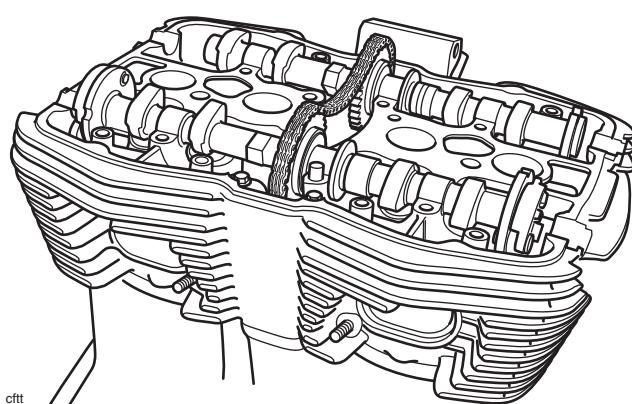


1. **Left hand camshaft ladder**
2. **Right hand camshaft ladder**
3. **Camshaft bearing areas**
6. Lubricate the threads of the camshaft ladder bolts with clean engine oil.
7. Position the camshaft ladder to the cylinder head, aligning the bearing areas with the camshaft journals.



Caution

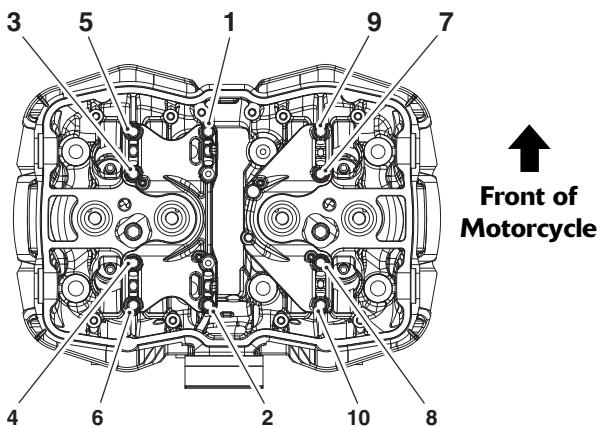
To avoid damage to the camshaft ladder, always ensure as many camshaft lobes as possible are facing away from the valves. This will reduce stress on the camshaft ladder during assembly. Damage to the camshaft ladder will result in replacement of the complete head.



Located Camshafts

Cylinder Head

8. Finger-tighten the camshaft ladder bolts until the bolt under head areas are in contact with the camshaft ladder.
9. In the sequence shown below evenly and progressively tighten the camshaft ladder bolts, approximately half a turn each, until the camshaft ladder is in full contact with the head. Further tighten the camshaft ladder bolts to **5 Nm**.



Camshaft Ladder Tightening Sequence

10. In the same sequence, torque each camshaft ladder bolt to **10 Nm**.
11. Refit the camshaft drive chain tensioner (see page 3-8).
12. Check all valve clearances (see page 3-18). Adjust as necessary to give the correct clearances.
13. Refit the camshaft cover (see page 3-7).

Valve Clearances

Camshaft, valve, valve shim and valve seat wear affect the valve clearances. The effect of this wear is to change the clearance between the camshaft and the adjustment shim, causing engine noise and/or improper running. If the valve clearances are incorrect, permanent damage to components in the valve-train will take place and engine performance will be affected.

Correct valve clearances are in the range given in the table below:

Inlet	0.10 to 0.15 mm
Exhaust	0.15 to 0.20 mm

Note:

- **Valve clearance adjustment must be carried out with the engine cold.**
1. Remove the camshaft cover (see page 3-5).
 2. Remove a spark plug from each cylinder to reduce compression resistance when turning the engine.
 3. Select a high gear and, using the rear wheel, turn the engine over until a pair of camshaft lobes are positioned pointing directly away from the valves.
 4. Using feeler gauges, measure and record the clearances for this pair of valves only.
 5. Repeat the process until the clearances for all valves have been checked.

If any of the recorded clearances fall outside the specified range, adjustments must be made. If all measured clearances are within tolerance, refit the camshaft cover (see page 3-7).

Valve Clearance Adjustment

Note:

- Valve clearance checking and adjustment must be carried out with the engine cold.
1. Measure and record all valve clearances as described previously.
 2. Remove the camshafts (see page 3-14).
 3. Remove a shim from one of the valves whose clearance required adjustment.
 4. Measure the original shim, using a micrometer.
 5. Calculate the shim thickness required to give the correct clearance. Clearance too small; fit a thinner shim. Clearance too large; fit a thicker shim.

Note:

- Shims are available ranging from 2.00 mm to 3.20 mm in increments of 0.025 mm.
6. Fit the selected shim to the tappet bucket.
 7. Repeat the procedure until all valves requiring adjustment have been correctly set.
 8. Refit the camshafts (see page 3-17).
 9. Rotate the engine several times to fully seat the shims.
 10. Repeat the clearance checks on all valves, adjust as necessary.
 11. Refit the camshaft cover (see page 3-17).

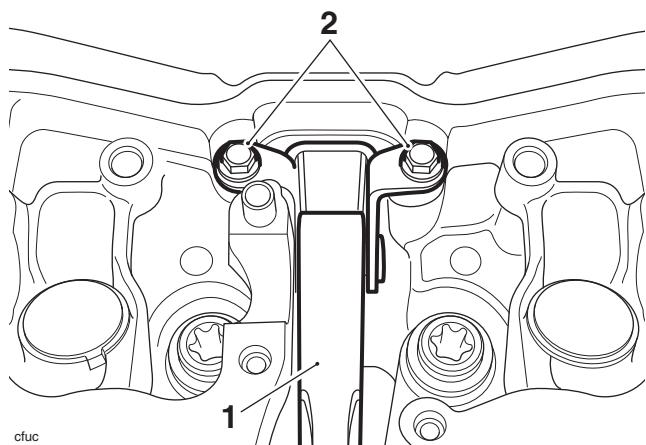
Cylinder Head

Removal

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the fuel tank (see page 10-144).
2. Remove the radiator (see page 11-12).
3. Remove the exhaust header system (see page 10-185).
4. Remove the throttle bodies (see page 10-171).
5. Remove the camshafts (see page 3-14).
6. Release the two bolts and remove the camshaft drive chain tensioner blade.



1. Camshaft drive chain tensioner blade

2. Bolts

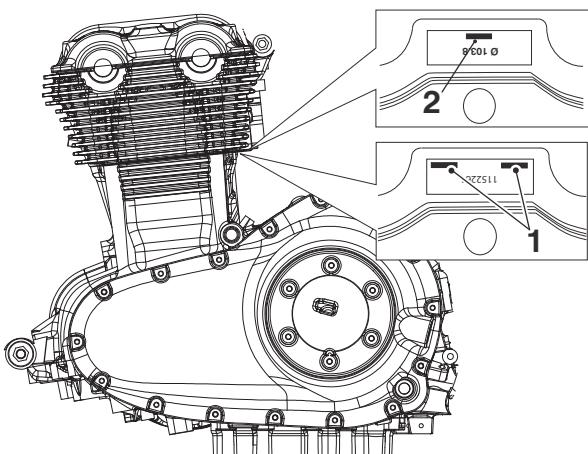
7. Disconnect the coolant temperature sensor connection.
8. Identify the position of each of the tappet buckets and shims before removing them from the head.

Note:

- It is possible that the identification marks may not be on the head gasket on engines up to engine number 467545 for 1,600 cc engines and engine number 480574 for 1,700 cc engines.

Cylinder Head

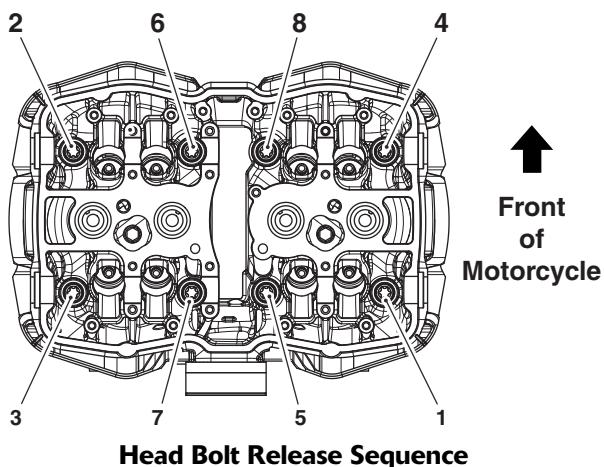
9. To ensure fitting the correct cylinder head gasket, check the identification mark on the gasket. The mark can be found at the rear of the cylinders, as shown below:



1. Identification mark (1,700 cc shown)

2. Identification mark (1,600 cc shown)

10. Progressively release the cylinder head bolts in the order shown below.



Head Bolt Release Sequence

11. Remove and discard the cylinder head bolts.

12. Remove the cylinder head from the crankcase.

Note:

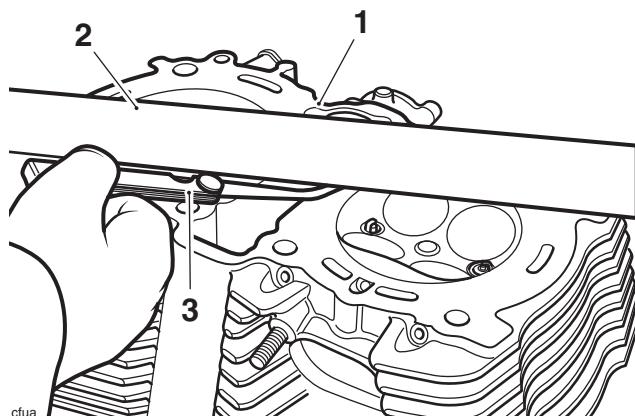
- If necessary, lightly tap the head with a soft-faced mallet to break the gasket seal.
- 13. Remove and discard the head gasket.
- 14. Remove the cylinder liners (see page 5-19).

Note:

- Cylinder liners must be resealed if the head is removed.

Inspection

1. Thoroughly clean the surface of the cylinder head and check for damage and/or pitting of the combustion chambers.
2. Using a straight edge and feeler gauges, check the cylinder head gasket face for warp, which could lead to gasket failure. Replace the cylinder head if warped beyond the flatness limit.



Checking Head Flatness

1. Cylinder head gasket face
2. Straight edge
3. Feeler gauges

Cylinder head flatness tolerance	0.030 mm
----------------------------------	----------

3. Check the camshaft drive chain rubbing blades. Renew if worn or damaged.

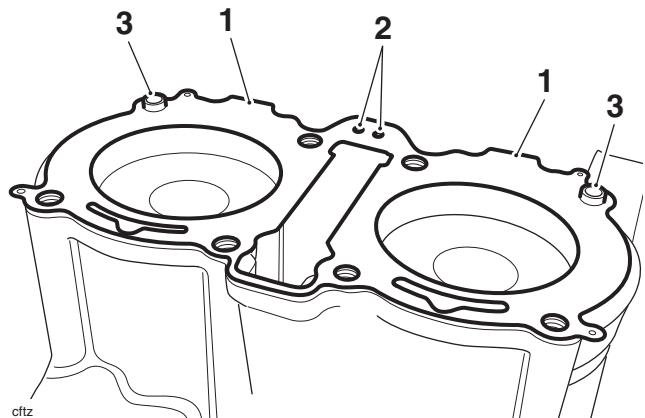


Caution

Ensure all traces of fluid (coolant, oil etc.) are removed from the threaded holes in the crankcase. Should any fluid remain in any of the threaded holes, severe crankcase damage could result from hydraulic locking of head bolts on assembly of the engine.

Installation

1. Thoroughly clean the upper faces of the crankcase and liners. Also clean the liner-to-crankcase mating faces.
2. Fit the cylinder liners (see page 5-20).
3. Refit the camshaft drive chain rubbing blade (see page 3-13).
4. Ensure that both head dowels remain in position in the crankcase.
5. Position a new cylinder head gasket to the crankcase, ensuring the gasket is fitted with the lettering uppermost and the oil restrictor holes to the rear.



1. Head gasket markings
2. Oil restrictor holes
3. Dowels

6. Lower the cylinder head over the camshaft drive chain rubbing blade and locate it onto the dowels.



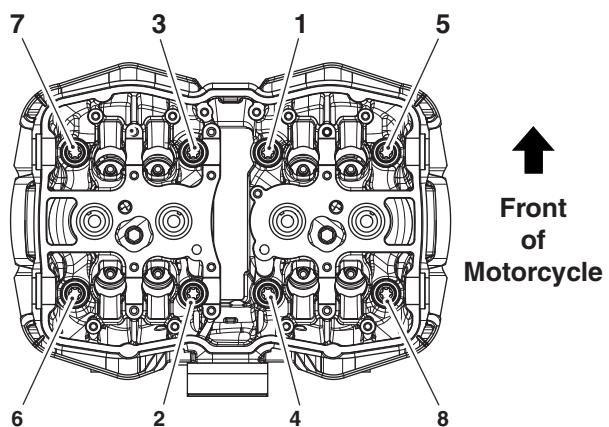
Caution

Cylinder head bolts must never be reused and must always be replaced if removed or loosened.

Use the correct procedure to tighten the cylinder head bolts carefully following the four-stage procedure below. This will ensure the long-term reliability of the cylinder head gasket.

Failure to follow the correct tightening procedure or reuse of old head bolts may lead to engine damage and premature failure of the cylinder head gasket.

7. In the sequence shown below, tighten the cylinder head bolts in four stages as follows:



Cylinder Head Bolt Tightening Sequence

8. In the sequence shown above, tighten the bolts to **20 Nm**.
9. In the sequence shown above, tighten the bolts to **50 Nm**.
10. In the sequence shown above, tighten the bolts to **70 Nm**.
11. In the sequence shown above, tighten the bolts through a further 90° using tool T3880105-T0301 or similar to measure the torque-angle.
12. Lubricate the tappet buckets with a 50/50 solution of molybdenum disulphide grease and engine oil, then refit them and the valve shims to their original locations in the head.
13. Refit the camshafts (see page 3-17).
14. Check and adjust the valve clearances (see page 3-18).
15. Reconnect the coolant temperature sensor.
16. Refit the throttle bodies (see page 10-173).
17. Refit the exhaust system (see page 10-187).
18. Refit the radiator (see page 11-13).
19. Refit the fuel tank (see page 10-146).
20. Start the engine and allow it to idle while checking for air, oil, coolant and exhaust leaks. Rectify as necessary.
21. Check and top up the cooling system (see page 11-5).
22. Check and top up the engine oil level (see page 8-6).

Cylinder Head

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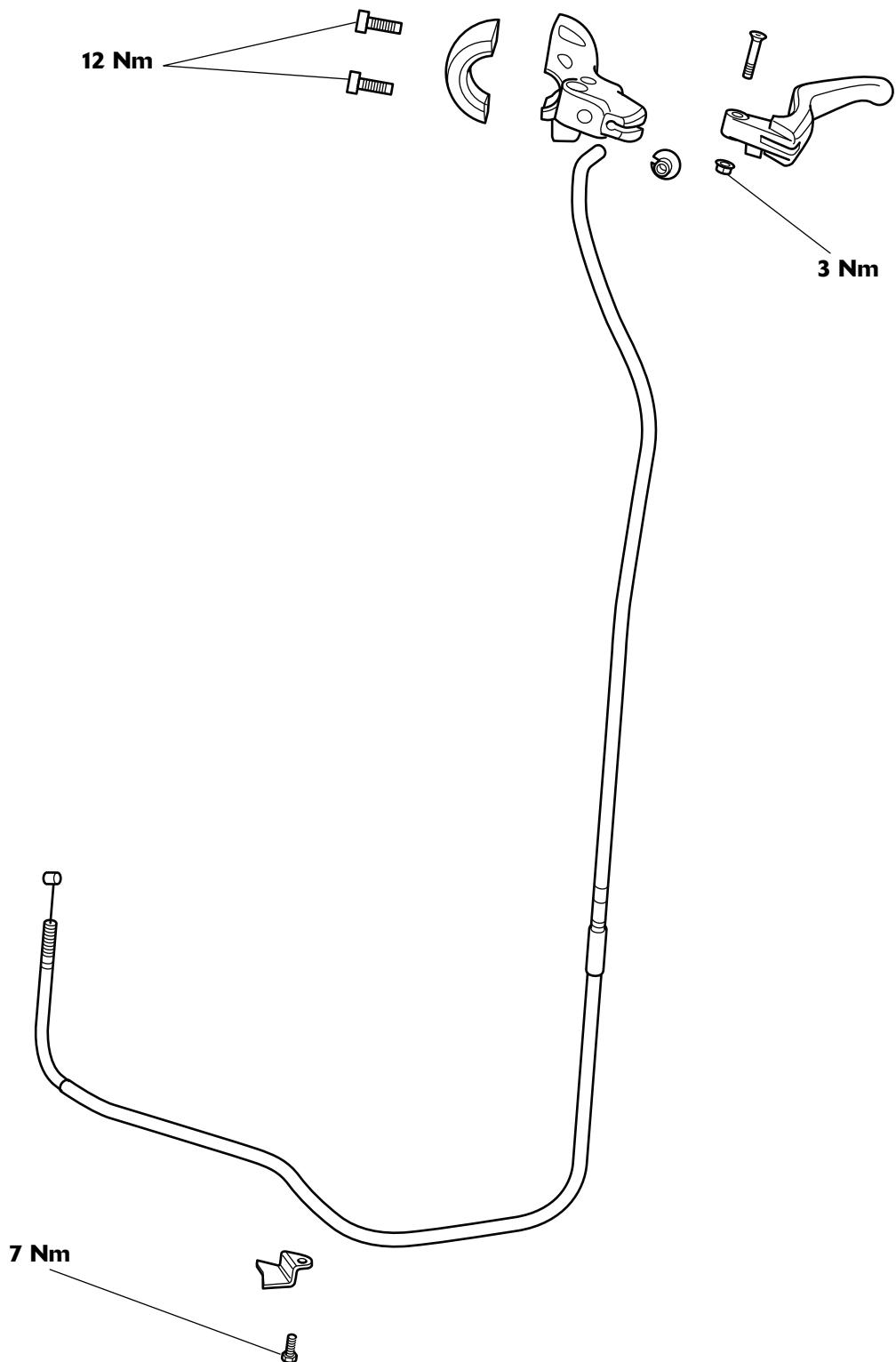
4 Clutch

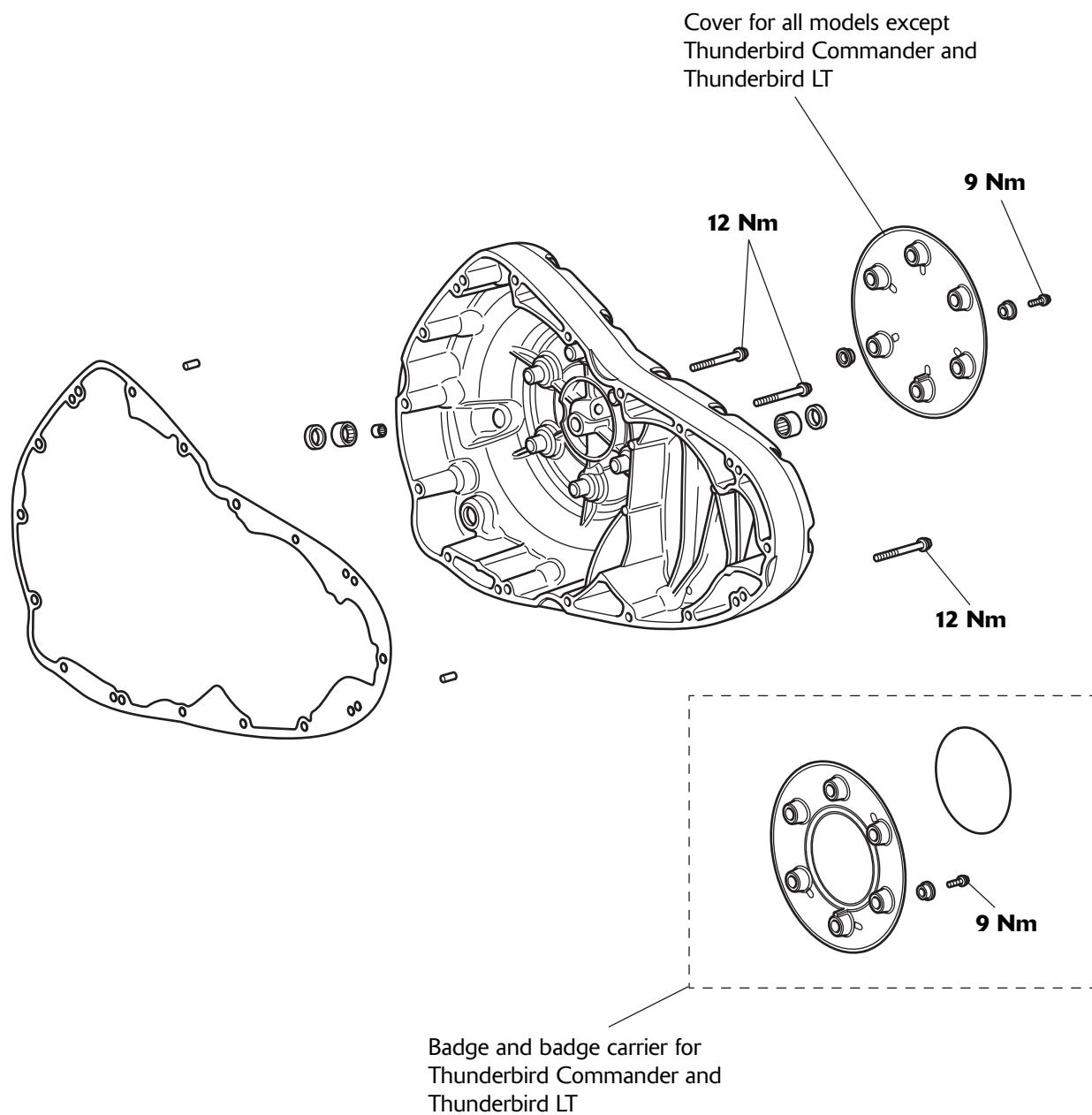
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Clutch

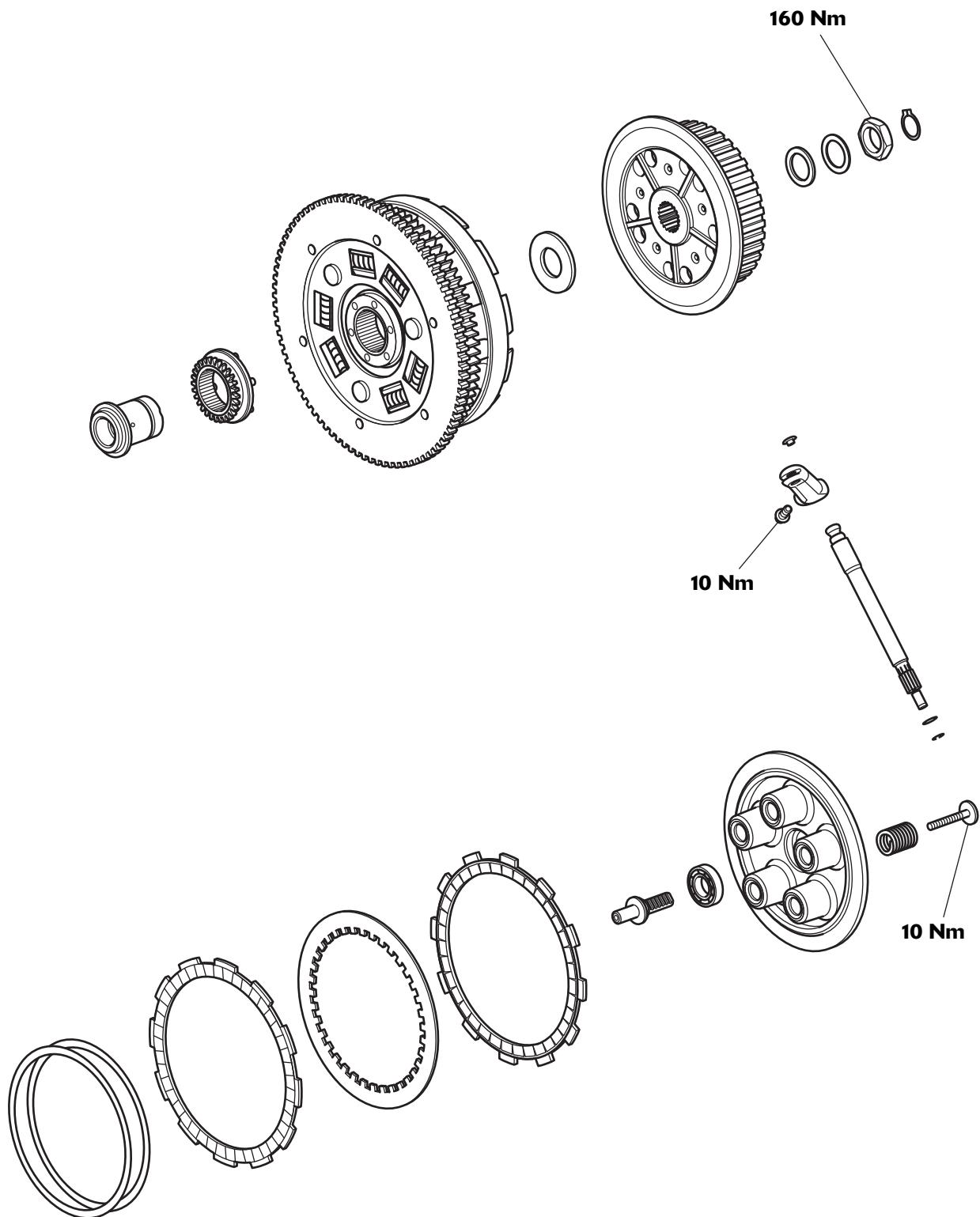
Exploded View – Clutch Controls



Exploded View – Clutch Cover

Clutch

Exploded View – Clutch



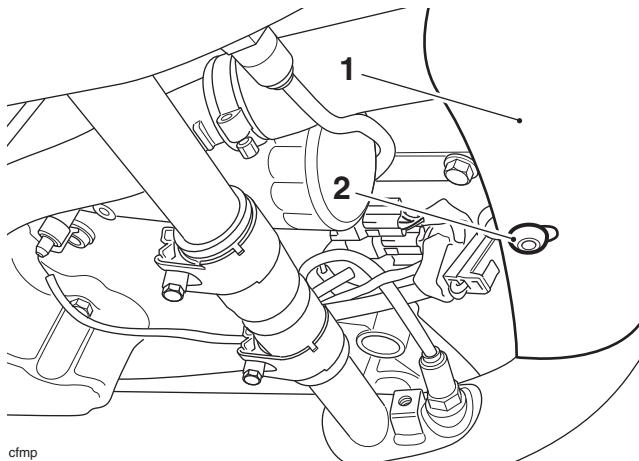
Clutch Cable – All Models Except Thunderbird Commander and Thunderbird LT

Removal

Warning

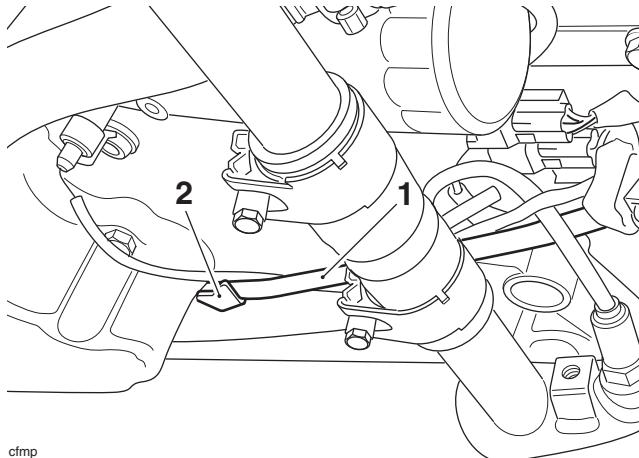
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Release the fixing and remove the radiator cowl.



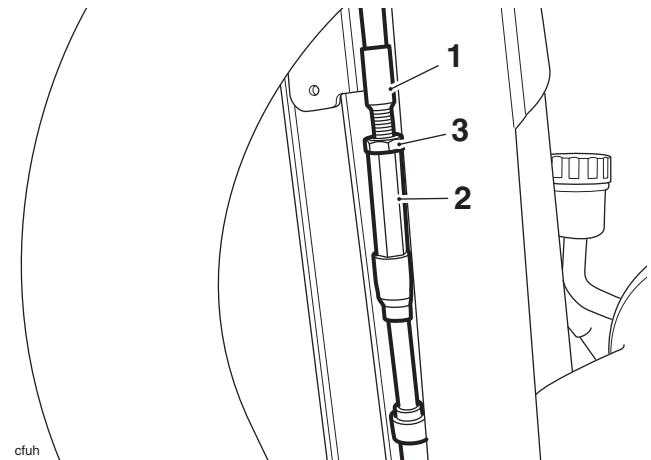
- cfmp**
1. Radiator cowl
 2. Fixing

4. Release the fixing and remove the cable retaining bracket from the lower crankcase, located to the left of the sump.



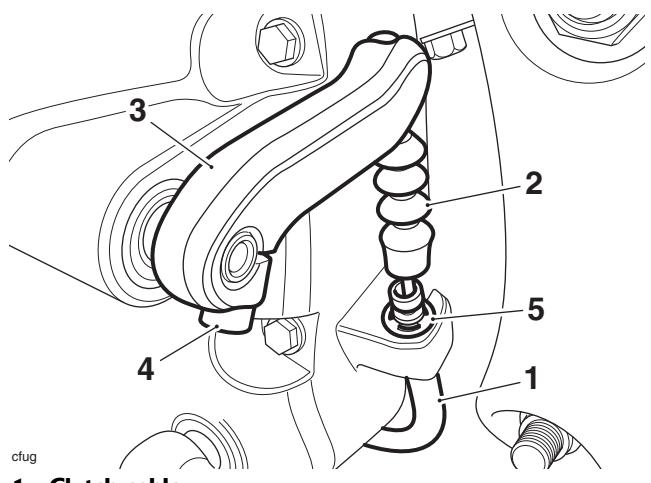
- cfmp**
1. Clutch cable
 2. Cable retaining bracket

5. Slacken the cable lock nut and release the adjuster adjacent to the radiator to give maximum play in the cable.



1. Clutch cable
2. Adjuster
3. Lock nut

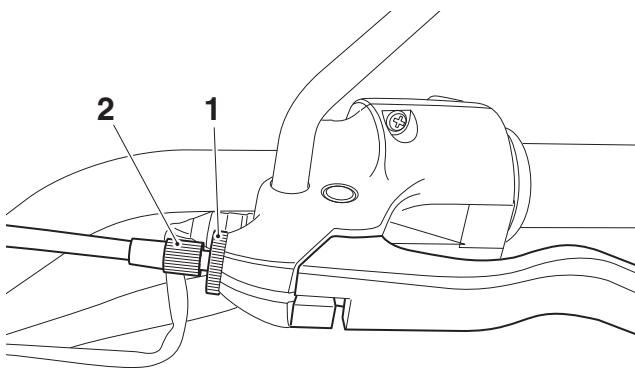
6. Detach the clutch cable boot and slide it up the inner cable to allow access to the E-clip on the clutch cable outer. Remove the E-clip.
7. Release the fixing and detach the clutch actuating arm from the clutch shaft. Rotate the arm to remove it from the clutch cable.
8. Release the clutch cable from the boss on the clutch cover.



1. Clutch cable
2. Boot
3. Actuating arm
4. Fixing
5. E-clip

Clutch

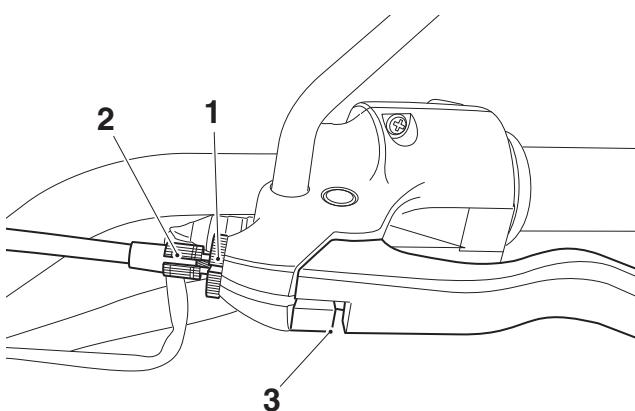
- Align the slots in the lever adjuster and lock nut.



clgp

- 1. Lock nut**
- 2. Lever adjuster**

- Pull in the clutch lever and turn the inner cable, anticlockwise through the slots in the adjuster and lock nut, until the cable can be detached from the lever.



clgp

- 1. Nut slot**
- 2. Lever adjuster slot**
- 3. Cable release point**

- Remove the cable from the motorcycle noting the cable routing, particularly where it passes through the steering area.

Note:

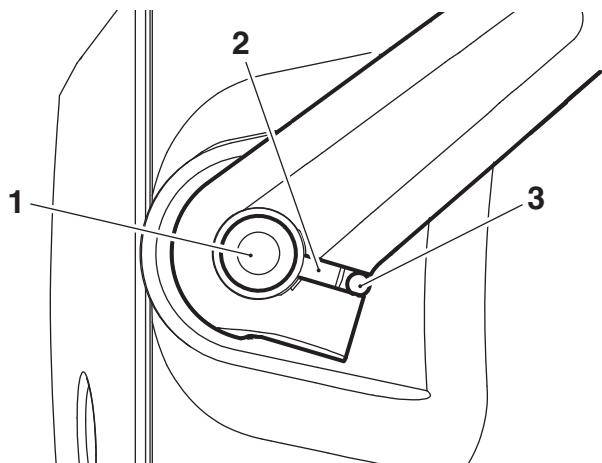
- To ensure the same route can be followed on installation, tie a length of string to one end while pulling the cable through from the other. When installing the new cable, tie the string to one end of the cable and use it to guide the new cable into position.**

Examination

- Check the inner cable for free movement through the outer cable.
- Examine the inner cable for frayed strands.
- Examine the two inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

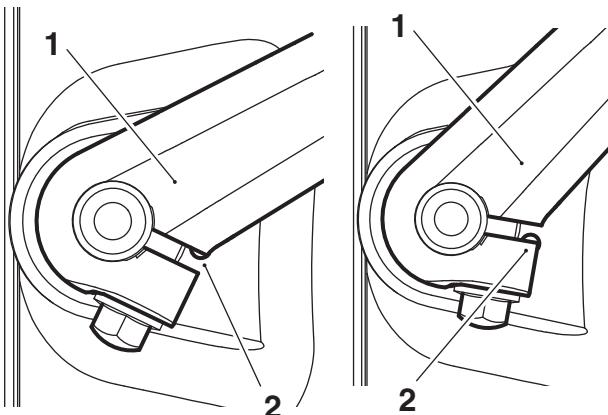
Installation

- Position the cable to the motorcycle following the same routing as noted during removal.
- Attach the inner cable to the clutch lever and actuating arm using a reversal of the removal process.
- Rotate the clutch shaft clockwise until the shaft makes contact with the clutch pressure plate bearing. Then align the split in the clutch actuating arm to the dot mark on the clutch cover.



- 1. Clutch shaft**
- 2. Split**
- 3. Dot mark**

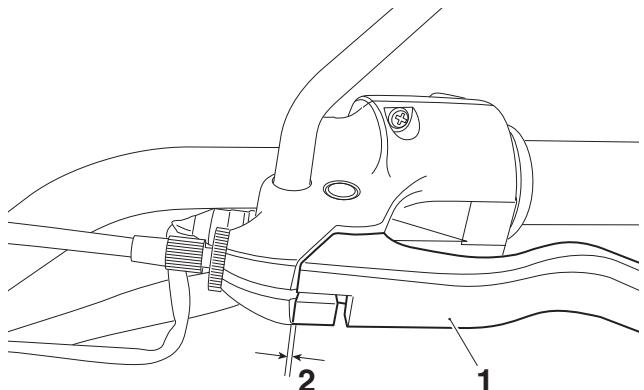
4. It is possible that the dot mark may not align with the split in the actuating arm. Acceptable limits for the alignment is shown below.



- 1. Actuating arm**
2. Dot mark

5. Tighten the actuating arm new fixing to **10 Nm**.
6. Tighten the clutch cable clamp fixing to **7 Nm**.
7. Refit the outer cable to the adjuster bracket at the engine end.
8. Set the lever adjuster to a point where an equal adjustment is possible in both directions.
9. Set the adjuster adjacent to the radiator to give a preliminary setting of 2 - 3 mm of free play as measured at the lever.

10. Operate the clutch lever several times and recheck the amount of free play present.
11. Set the final adjustment of the cable to give 1 - 2 mm of free play at the lever by turning the adjuster nut and lock nut at the lever end. Secure the setting with the knurled lock nut.



- ctgp
- 1. Clutch lever**
 - 2. Correct setting, 1 - 2 mm**
 12. Refit the radiator cowl and tighten the fixing to **4 Nm**.
 13. Reconnect the battery, positive (identified with red tape) lead first.
 14. Refit the rider's seat (see page 17-21).

Clutch

Clutch Cable – Thunderbird Commander and Thunderbird LT

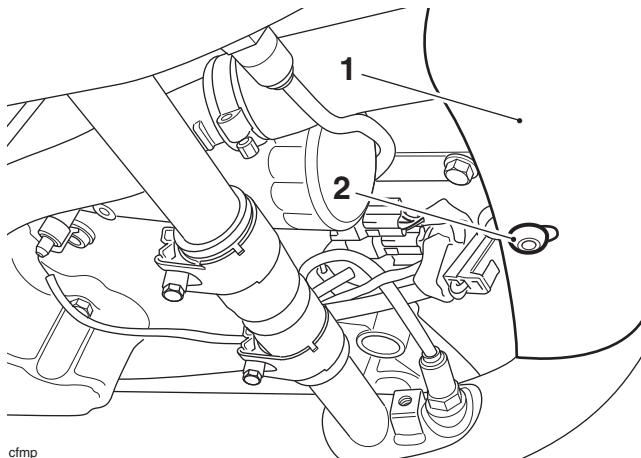
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Release the fixing and remove the radiator cowl.

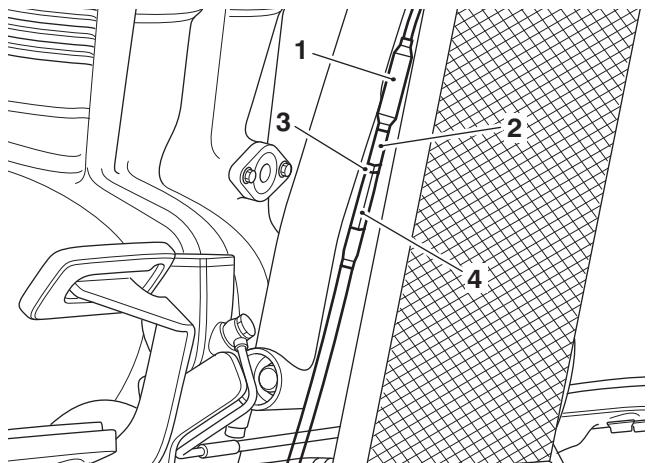


- cfmp
1. Radiator cowl
2. Fixing

Note:

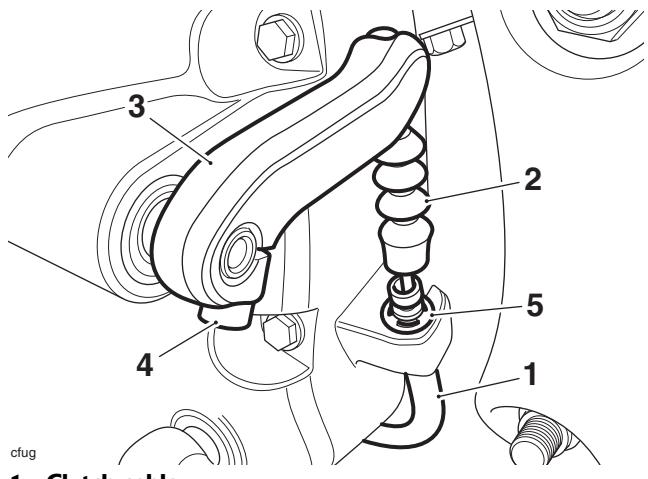
- **The clutch cable adjuster is located on the right hand side of the radiator.**
4. Move the clutch cable adjuster boot to access the lock nut and adjuster.

5. Loosen the cable lock nut and release the adjuster to give maximum play in the cable.



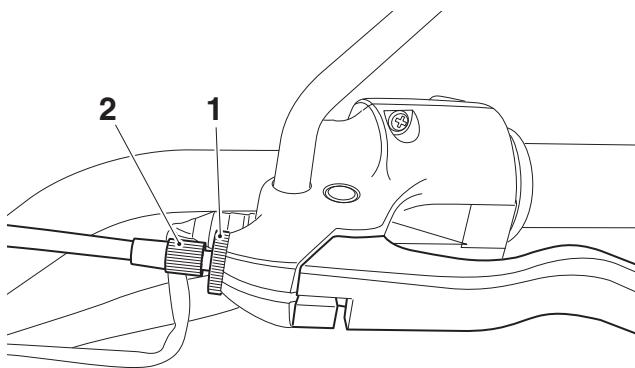
- 1. Boot**
2. Clutch cable
3. Lock nut
4. Adjuster

6. Detach the clutch cable boot and slide it up the inner cable to allow access to the E-clip on the clutch cable outer. Remove the E-clip.
7. Release the fixing and detach the clutch actuating arm from the clutch shaft. Rotate the arm to remove it from the clutch cable.
8. Release the clutch cable from the boss on the clutch cover.



- 1. Clutch cable**
2. Boot
3. Actuating arm
4. Fixing
5. E-clip

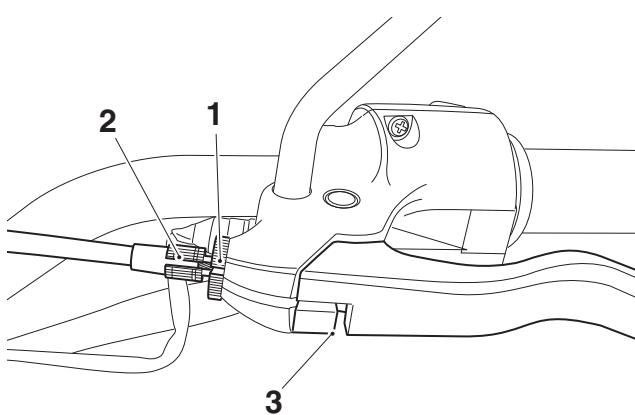
9. Align the slots in the lever adjuster and lock nut.



cfgp

- 1. Lock nut**
2. Lever adjuster

10. Pull in the clutch lever and turn the inner cable, anticlockwise through the slots in the adjuster and lock nut, until the cable can be detached from the lever.



cfgp

- 1. Nut slot**
2. Lever adjuster slot
3. Cable release point

11. Remove the cable from the motorcycle noting the cable routing, particularly where it passes through the steering area.

Note:

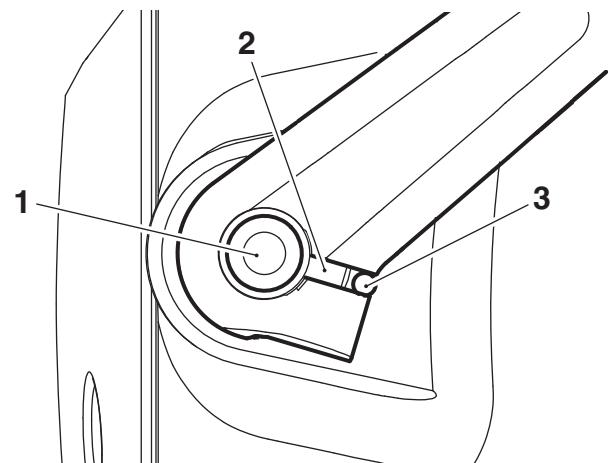
- To ensure the same route can be followed on installation, tie a length of string to one end while pulling the cable through from the other. When installing the new cable, tie the string to one end of the cable and use it to guide the new cable into position.**

Examination

- Check the inner cable for free movement through the outer cable.
- Examine the inner cable for frayed strands.
- Examine the two inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Installation

- Position the cable to the motorcycle following the same routing as noted during removal.
- Attach the inner cable to the clutch lever and actuating arm using a reversal of the removal process.
- Rotate the clutch shaft clockwise until the shaft makes contact with the clutch pressure plate bearing. Then align the split in the clutch actuating arm to the dot mark on the clutch cover.

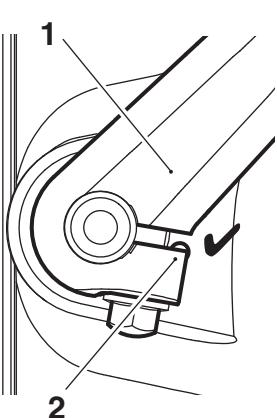


- 1. Clutch shaft**
2. Split
3. Dot mark

- While holding the clutch shaft in position, rotate the actuating arm one spline anticlockwise then fit to the shaft.

Clutch

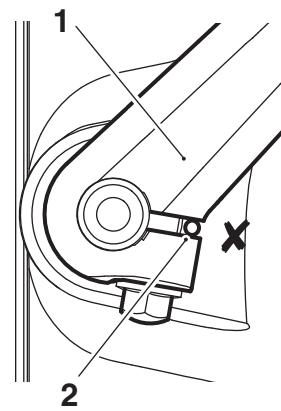
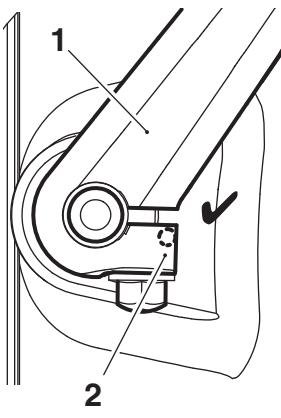
5. The acceptable limits for the alignment is shown below.



1. Actuating arm

2. Dot mark

6. The unacceptable limits for the adjustment is shown below.

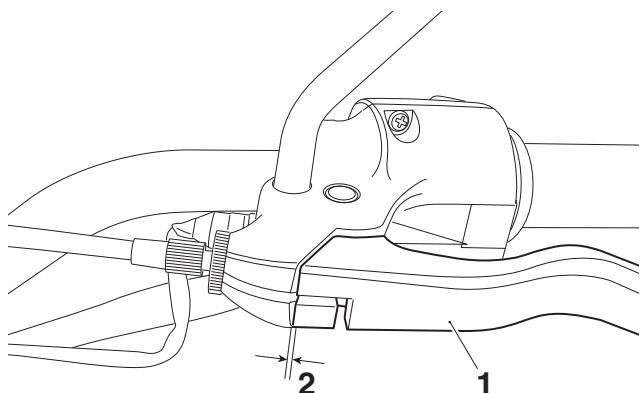


1. Actuating arm

2. Dot mark

7. Tighten the actuating arm new fixing to **10 Nm**.
8. Reconnect the brake light switch connector and cover with the rubber boot.
9. Refit the outer cable to the adjuster bracket at the engine end.
10. Set the lever adjuster to a point where an equal adjustment is possible in both directions.
11. Set the adjuster adjacent to the radiator to give a preliminary setting of 2 - 3 mm of free play as measured at the lever.
12. Operate the clutch lever several times and recheck the amount of free play present.

13. Set the final adjustment of the cable to give 1 - 2 mm of free play at the lever by turning the adjuster nut and lock nut at the lever end. Secure the setting with the knurled lock nut.



cfgp

1. Clutch lever

2. Correct setting, 1 - 2 mm

14. Refit the radiator cowl and tighten the fixing to **4 Nm**.
15. Reconnect the battery, positive (identified with red tape) lead first.
16. Refit the rider's seat (see page 17-21).

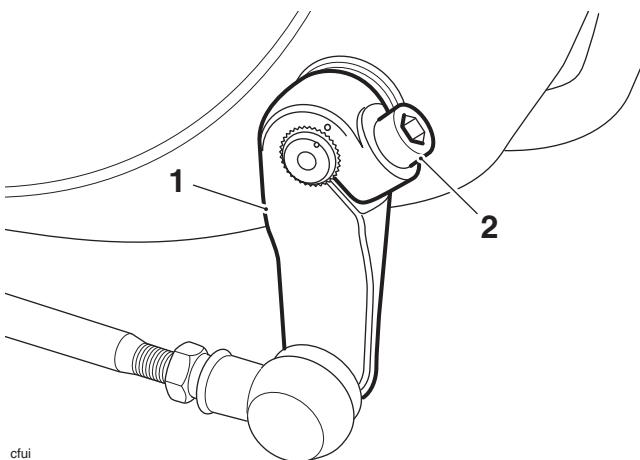
Clutch Cover

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

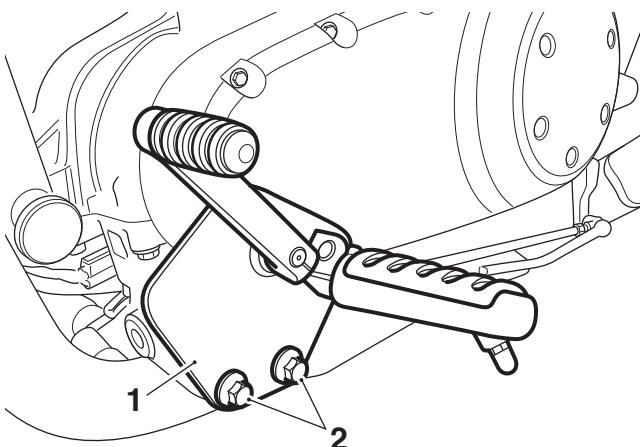
1. Disconnect the clutch cable at the clutch cover (see page 4-5 for all models except Thunderbird Commander and Thunderbird LT, see page 4-8 for Thunderbird Commander and Thunderbird LT).
2. Release the fixing and disconnect the gear change actuator arm at the clutch cover.



1. Gear change actuator arm

2. Fixing

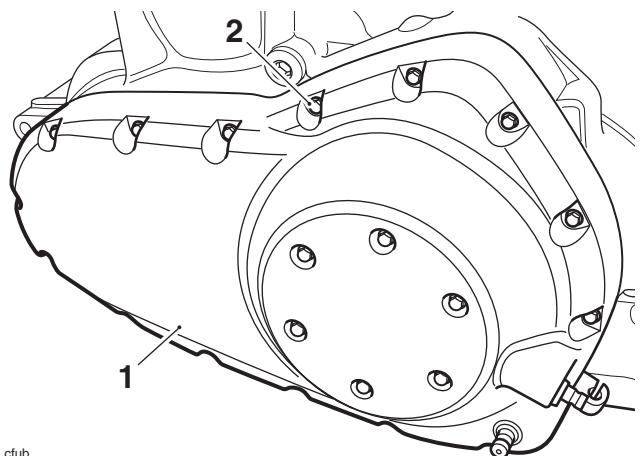
3. Release the two bolts and remove the left hand control plate assembly.



1. Control plate assembly (Thunderbird shown)

2. Bolts

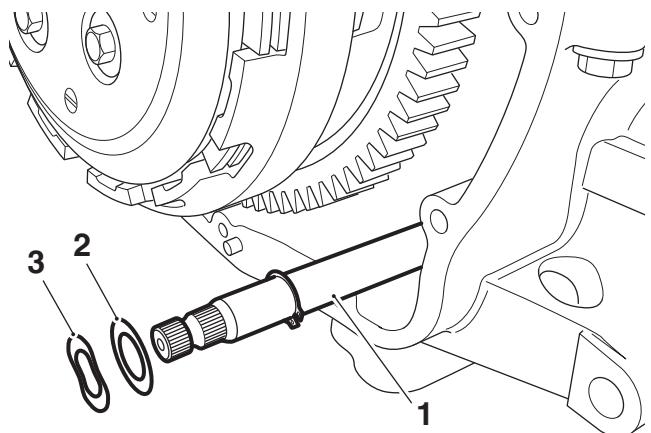
4. Release the ring of bolts securing the clutch cover to the crankcases.



1. Clutch cover

2. Bolt

5. Place an oil catch tray beneath the clutch cover to collect any oil that may spill out on removal.
6. Carefully withdraw the cover.
7. Note the position of the wavy washer and flat washer on the gear change shaft.



1. Gear change shaft

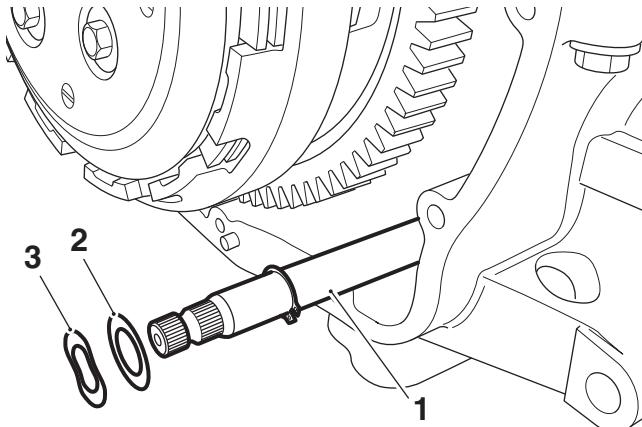
2. Flat washer

3. Wavy washer

Clutch

Installation

1. Ensure the wavy washer and flat washer are correctly positioned on the gear change shaft.



cfuf

1. Gear change shaft

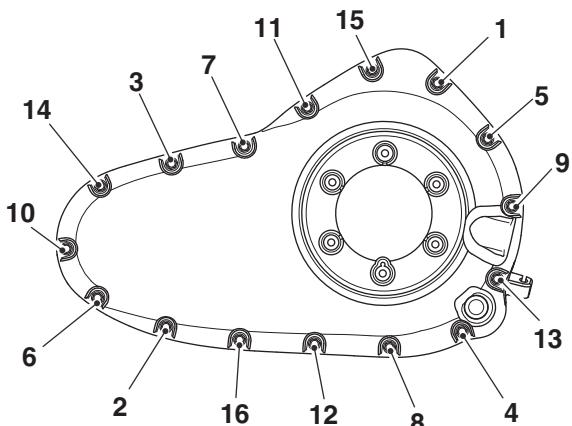
2. Flat washer

3. Wavy washer

2. Thoroughly clean the cover and crankcase mating faces.
3. Position a new gasket to the crankcase.
4. Refit the cover ensuring that the gasket does not become dislodged.

Note:

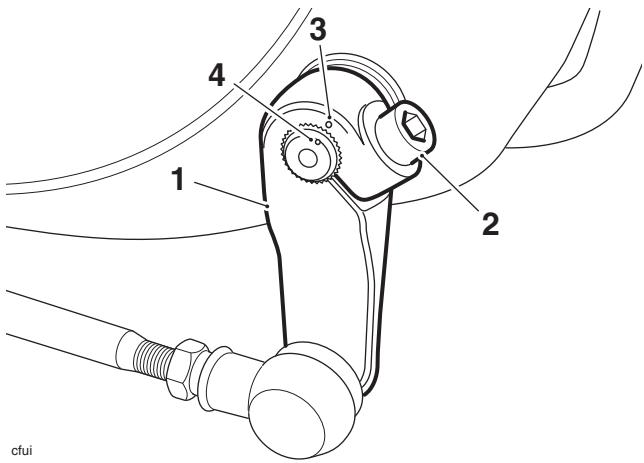
- **Ensure that the lifter piece rack engages correctly with the lifter arm pinion during assembly. It may be necessary to rotate the lifter piece rack to allow assembly to take place.**
5. Install and tighten the fixings as described below:
 - Tighten the fixings in the sequence shown below to **12 Nm**
 - Tighten fixings one and two again to **12 Nm**.



Clutch Cover Tightening Sequence

6. Refit the control plate assembly, tightening the bolts to **50 Nm**.

7. Align the dot on the gear change actuator arm with the dot on the gear change shaft and fit the actuator arm to the spline. Fit the bolt and tighten to **8 Nm**.



cfui

1. Gear change actuator arm

2. Fixing

3. Actuator arm dot mark

4. Gear change shaft dot mark

8. Refit and adjust the clutch cable (see page 4-6 for all models except Thunderbird Commander and Thunderbird LT, see page 4-9 for Thunderbird Commander and Thunderbird LT).

Clutch

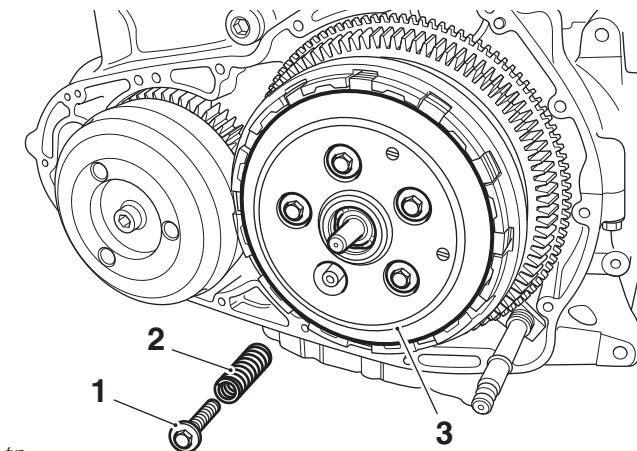
Removal



Warning

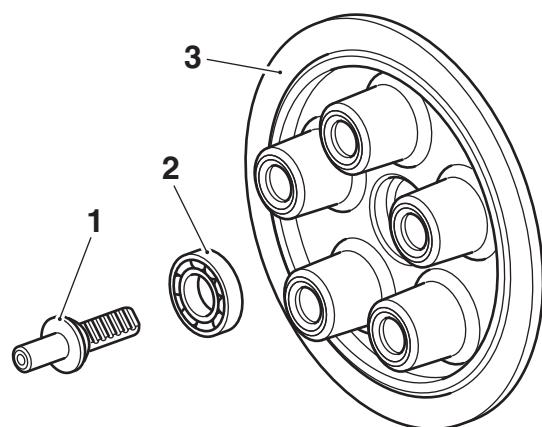
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the clutch cover (see page 4-11).
2. Undo the bolts, withdraw the springs and remove the clutch pressure plate.



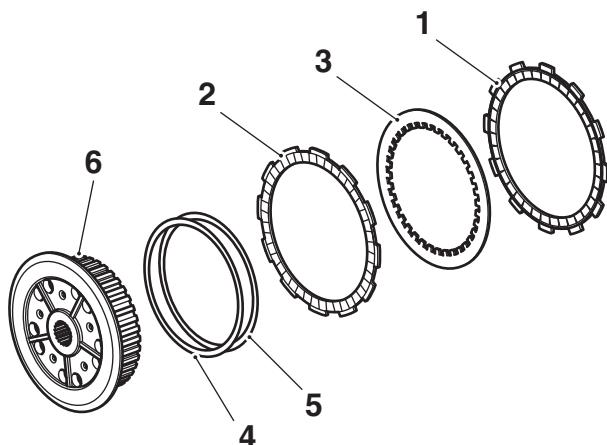
1. Pressure plate bolt
2. Spring
3. Pressure plate

3. Remove the lifter piece and roller bearing from the clutch pressure plate.



1. Lifter piece
2. Roller bearing
3. Clutch pressure plate

4. Remove all the clutch friction plates and steel plates together with the anti-judder seat washer and spring. Note the orientation of all components as they are removed.

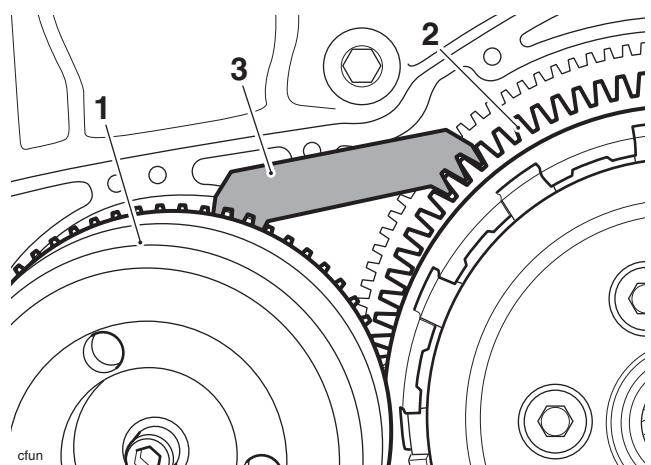


1. Outer friction plate
2. Friction plates
3. Steel plate
4. Anti-judder seat washer
5. Anti-judder spring
6. Clutch inner drum (shown for reference only)

Note:

- The outermost friction plate is different to the remainder. It must not be fitted in any other position.
- Refer to the following page of this section for details of clutch friction plate inspection.
- It is not normally necessary to disassemble the clutch further, but if the clutch inner and outer drums are to be removed, proceed as follows:

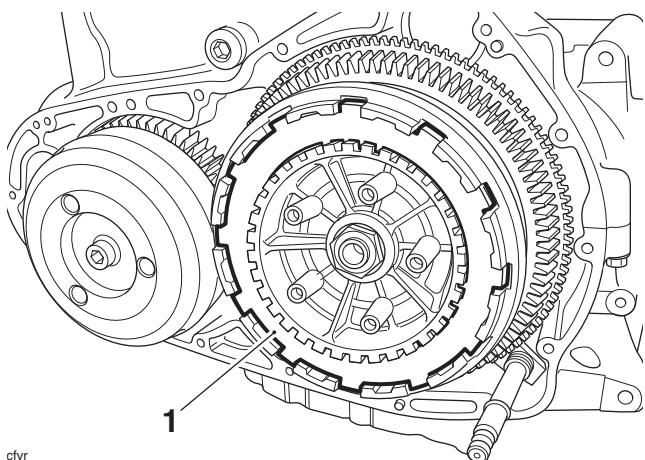
 5. Remove and discard the circlip from the gearbox input shaft.
 6. Lock the clutch to the torque compensator, using service tool T3880043 located **above** the clutch as shown below:



1. Torque compensator
2. Clutch primary gear
3. Service tool T3880043

Clutch

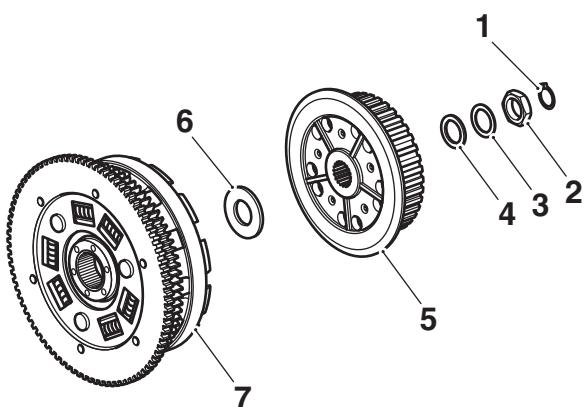
7. Lock the inner and outer clutch drums together using service tool T3880038.



cfvr

1. Service tool T3880043

8. Release the clutch centre nut.
9. Remove the centre nut, Belleville washer, plain washer, clutch inner drum and thrust washer.



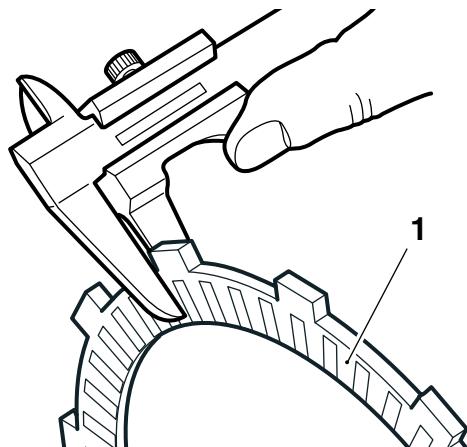
1. Circlip
2. Centre nut
3. Belleville washer
4. Plain washer
5. Inner drum
6. Thrust washer
7. Outer drum

10. Discard the Belleville washer and the plain washer.
11. Remove the torque compensator (see page 5-21).
12. Slide the clutch outer drum off the gearbox input shaft.

Friction Plate Inspection

Thickness

1. If any friction plate thickness is outside the service limit, replace the friction plates as a set.



1. Clutch friction plate

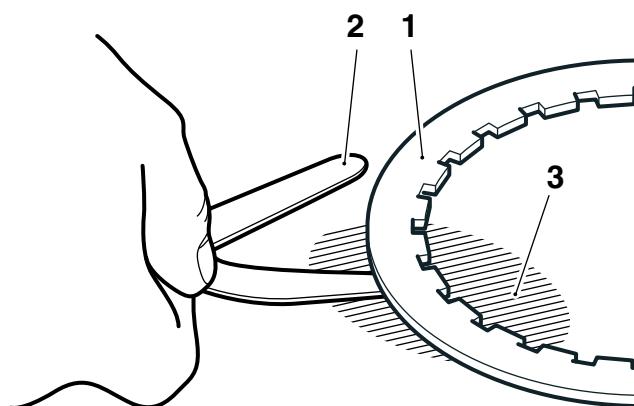
Friction plate thickness - all plates	
Standard	3.3 - 3.5 mm
Service limit	3.2 mm

Steel Plate Inspection

Bend/warp

Check all plates for bend and warp as follows:

1. Place the plate being checked on a clean surface plate and attempt to pass a feeler gauge of the maximum service limit thickness between the friction plate and surface plate. If the feeler gauge can be passed beneath the friction plate at any point, renew the plates as a set.



1. Friction plate
2. Feeler gauge
3. Surface plate

Friction plate bend/warp	
Service limit	0.30 mm

Clutch Pack Height

The clutch pack height should only be measured if the friction and steel plates have been replaced.

The clutch pack height is critical for a smooth operation of the gearchange and needs to be measured prior to installation.

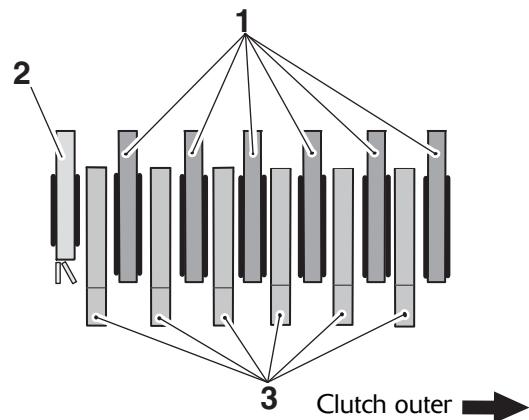
If used clutch plates are being fitted, the clutch pack height measurement is not necessary, as the plates may not be worn to the service limit (and are therefore still serviceable), but could fall outside the clutch pack height tolerance when measured.

If building a new clutch pack its height must be correct. To achieve this, build the new clutch pack with the following:

- 6 x new friction plates
- 1 x new inner friction plate
- 6 x steel plates, 2.3 mm thick.

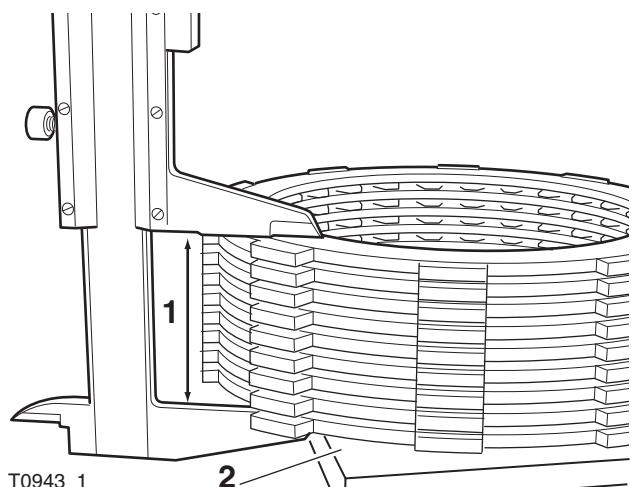
1. Arrange the new friction and new steel plates in a stack as shown below:

Friction plate and steel plate arrangement



1. Friction plates
2. Inner friction plate
3. Steel plates, 2.3 mm thickness

2. Place the assembled clutch pack on a flat surface and measure its height as shown below:



1. Clutch pack height

3. The correct clutch pack height for this clutch assembly is shown in the table below.

Standard height in mm	Tolerance in mm
37.60	+0.38 / -0.62

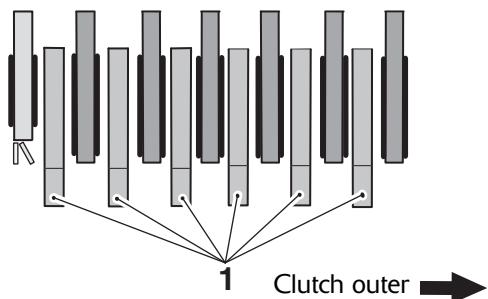
4. If the clutch pack is too high, continue from step 5, omit step 6 then continue from step 7.
If the clutch pack is too low, continue from step 6.

Note:

- Undersize plates are available size 2.0 mm

Clutch

5. If the clutch pack height is too high, replace any of the 2.3 mm steel plates (indicated below) with a new 2.0 mm steel plate.

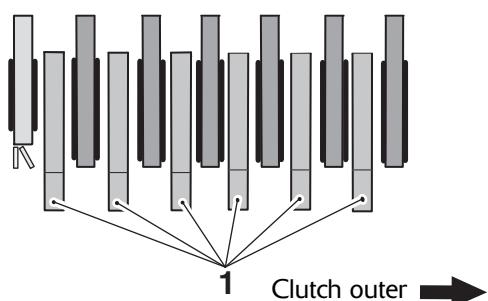


T0944_19

1. **2.3 mm steel plates (any plate can be replaced)**

Note:

- **Oversize plates are available size 2.6 mm.**
- 6. If the clutch pack height is too low, replace any of the 2.3 mm steel plates indicated below with a new 2.6 mm steel plate.



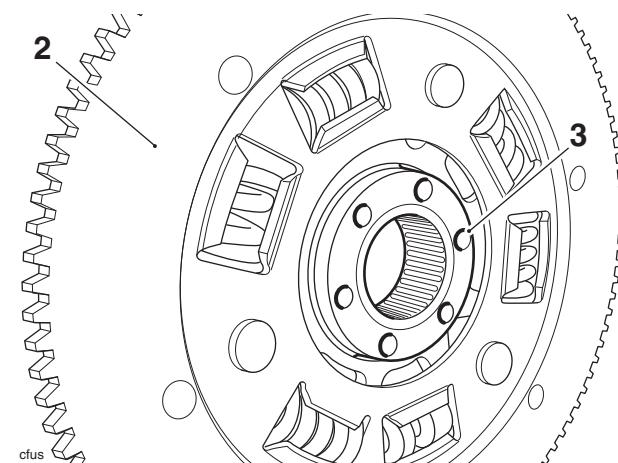
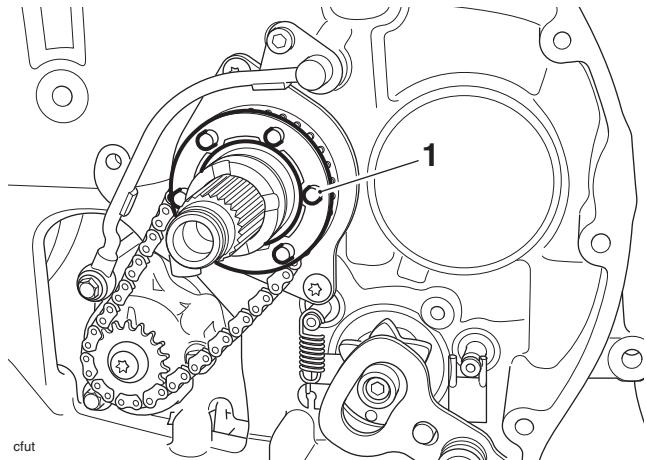
T0944_19

1. **2.3 mm steel plates (any plate can be replaced)**

7. Recheck the clutch pack height as described earlier.

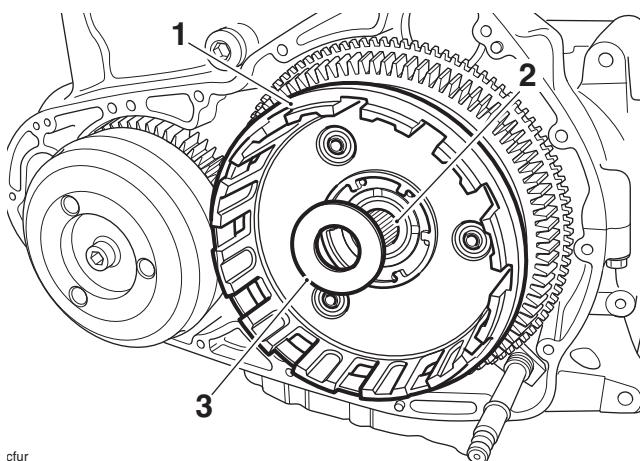
Installation

1. Position the clutch outer drum to the input shaft.
2. Align the oil pump drive pegs with the corresponding holes in the rear of the clutch outer drum.



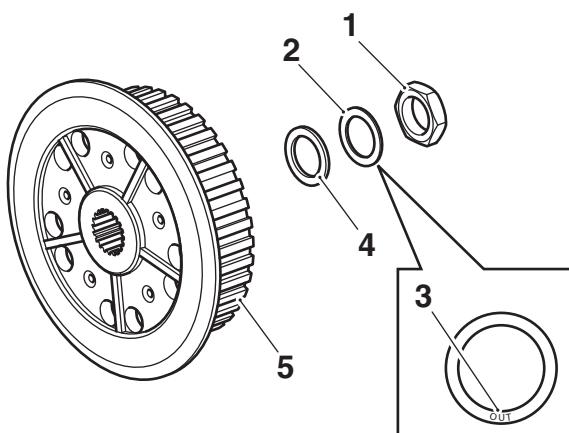
1. **Oil pump sprocket drive pegs**
 2. **Clutch outer drum**
 3. **Oil pump drive holes**
3. Refit the torque compensator (see page 5-22).

4. Fit the thrust washer to the input shaft.



- 1. Clutch outer drum**
2. Input shaft
3. Thrust washer

5. Fit the clutch inner drum.
6. Fit a new plain washer and a new Belleville washer (OUT mark facing outwards), and refit the centre nut.



- 1. Centre nut**

- 2. Belleville washer**

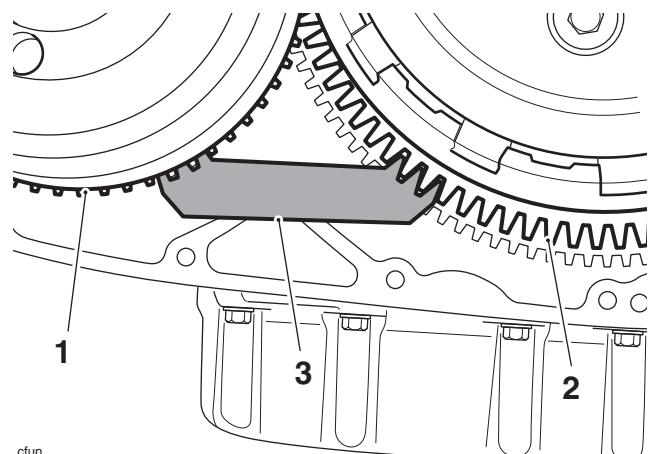
- 3. Belleville washer OUT mark**

- 4. Washer**

- 5. Clutch inner drum**

7. Lock the inner and outer drums together using service tool T3880038.

8. Lock the clutch to the torque compensator, using service tool T3880043 located **below** the clutch as shown below:



- 1. Torque compensator**
2. Clutch primary gear
3. Tool T3880043

9. Tighten the clutch centre nut to **160 Nm**.
10. Fit a new circlip to the input shaft.
11. Remove the service tools and check for free rotation of the clutch inner drum.
12. Coat all clutch friction plates in clean engine oil.

Note:

- **The innermost friction plate is different to the remainder. It must not be fitted in any other position.**
- 13. Fit the friction plates, steel plates, anti-judder seat and spring to the clutch basket, in the same order as noted during removal.
- 14. Refit the clutch lifter piece.
- 15. Refit the clutch pressure plate together with the springs and bolts. Tighten the bolts to **10 Nm**.
- 16. Fit the clutch cover (see page 4-12).

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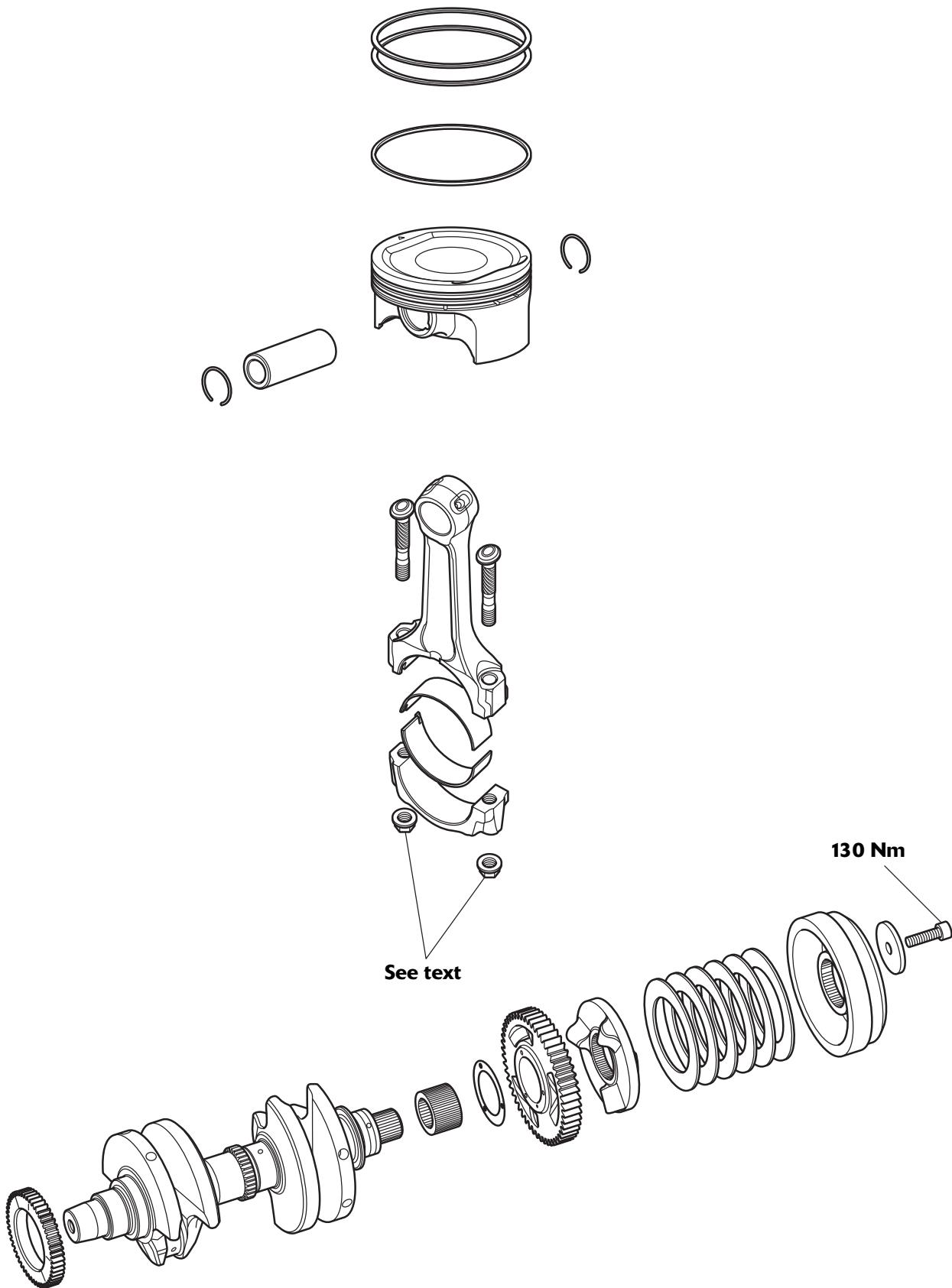
5 Crankshaft, Connecting Rods and Pistons

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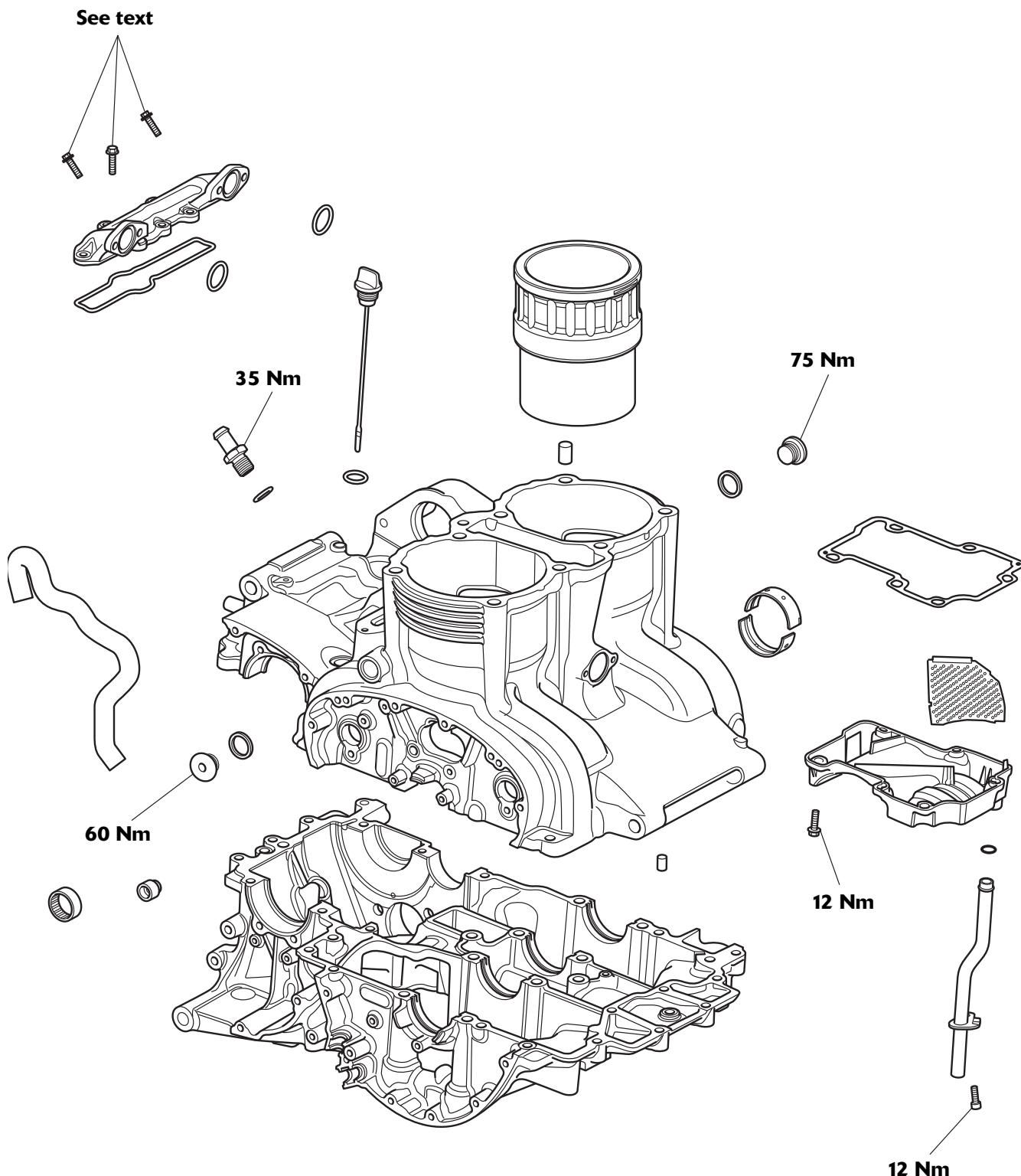
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Crankshaft, Connecting Rods and Pistons

Exploded View – Crankshaft, Connecting Rod and Piston



Exploded View – Crankcase and Liners



Crankshaft, Connecting Rods and Pistons

Crankcases



Warning

The following procedures often require lifting of heavy components. To avoid injury, always lift heavy components with a hoist or block and tackle and never attempt to manually lift items that are too heavy. Injury may result from failure to use the correct lifting equipment.

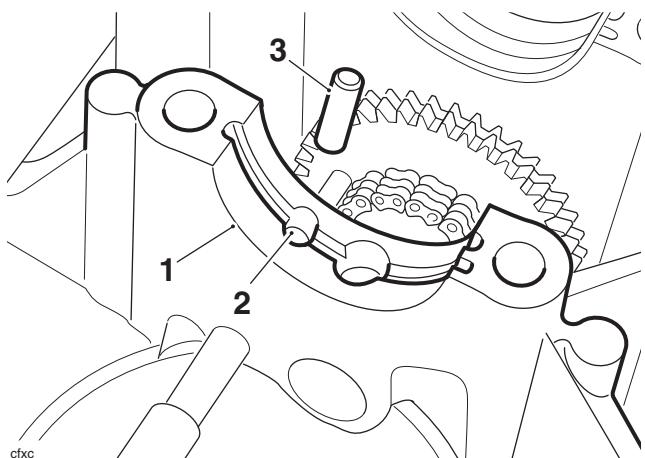


Caution

The upper and lower crankcases are machined as a matched set and must never be assembled to non-matching halves. Doing so will cause seizure of the engine.

Note:

- **The crankcase halves may be separated with the cylinder head fitted.**
- **If the crankshaft main bearing shells are removed from the crankcase, remove and collect the two loose-fitting piston cooling jets from the upper crankcase.**



1. Main bearing housing
2. Oil gallery
3. Piston cooling jet

If the big end bolts have been loosened or removed, new bolts must be installed.



Caution

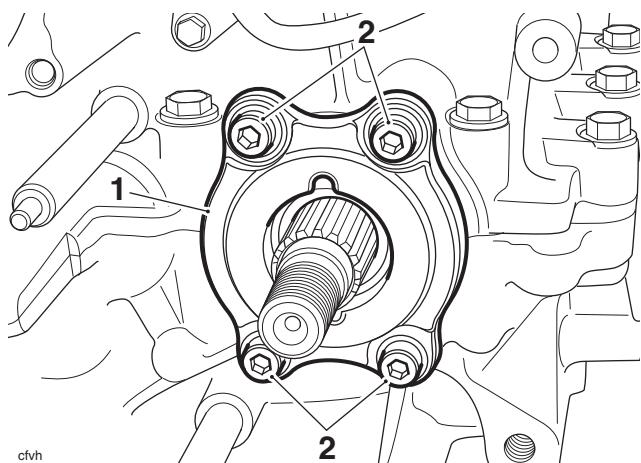
During crankcase assembly, ensure the two piston cooling jets are re-installed. If the piston cooling jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

Removal

1. Remove the engine from the frame (see page 9-2).
2. Remove the clutch (see page 4-13).
3. Remove the alternator (see page 18-42).
4. Remove the oil pump drive and oil pump (see page 8-12).
5. Remove the torque compensator (see page 5-21).
6. Remove the sump (see page 8-10).
7. Remove the water pump (see page 11-8).
8. Remove the gear position sensor (see page 10-166).

Disassembly

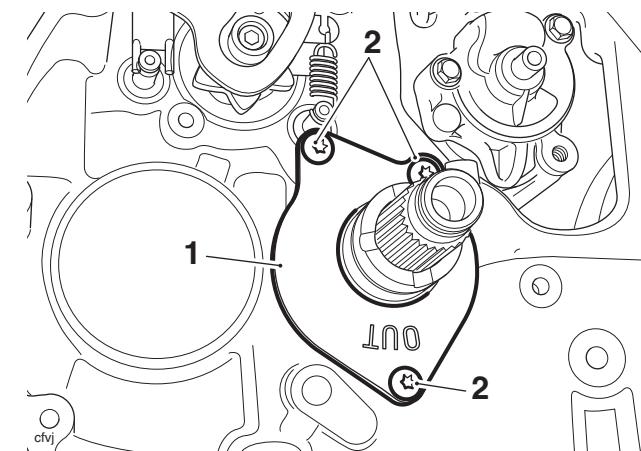
1. Remove the output shaft bearing retainer plate.



1. Bearing retainer plate

2. Fixings

2. Remove the input shaft bearing retainer plate.



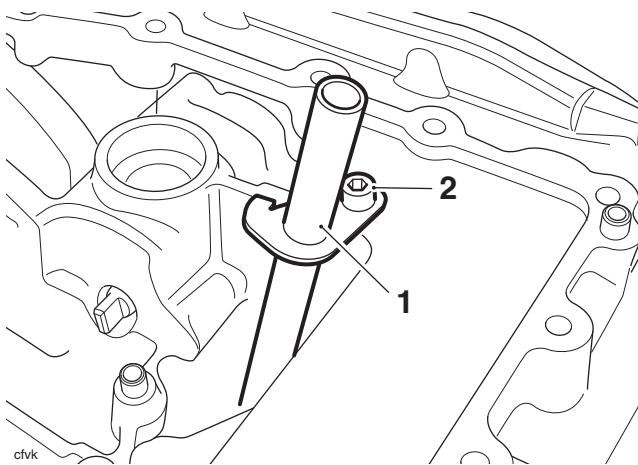
1. Bearing retainer plate

2. Fixings

3. Remove the oil filter (see page 8-7).
4. Remove the fixings and remove both control plate mounting brackets from the crankcase.

Crankshaft, Connecting Rods and Pistons

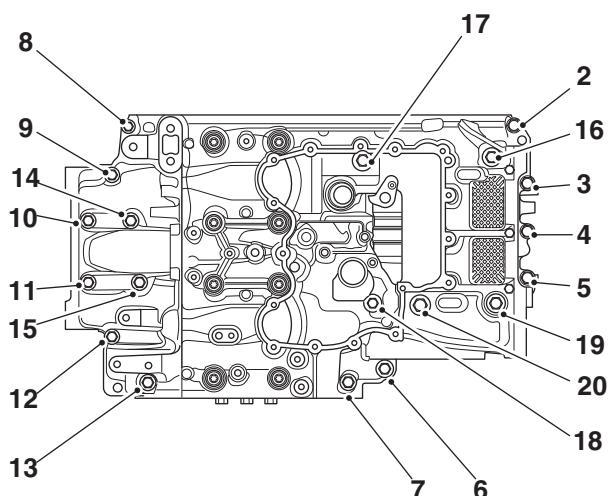
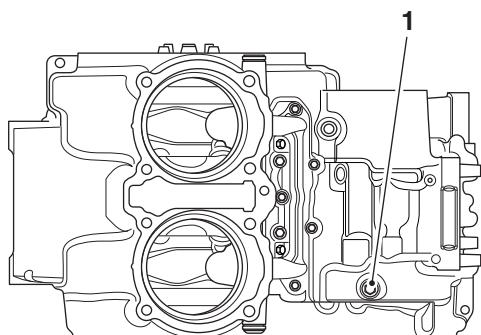
5. Release the fixing and remove the crankcase breather drain tube. Check that the breather housing O-ring is removed with the breather tube.



1. Breather drain tube

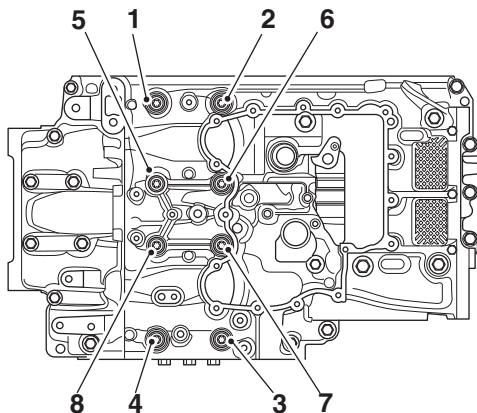
2. Fixing

6. Release the lower crankcase bolts in the sequence shown in the diagram below. Remove and discard the bolts.



Crankcase Bolt Release Sequence

7. As in the sequence shown below, release the crankcase main bearing bolts.



Main Bearing Bolt Release Sequence

8. Remove and discard the bolts.

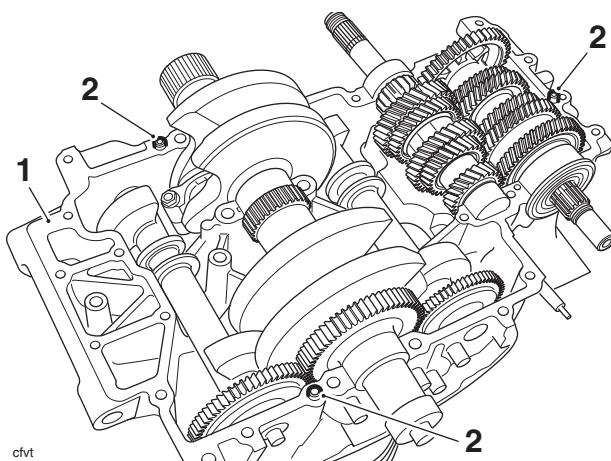


Caution

Do not use levers to separate the upper and lower sections of the crankcase as damage to the crankcases could result.

Note:

- Always check that all bolts have been released before attempting to separate the cases. Bolts are fitted in discreet locations such as under the oil pump and inside hollow bosses.
9. Separate the lower and upper crankcases noting the position of the three location dowels, which should be removed for safe-keeping.



1. Upper crankcase

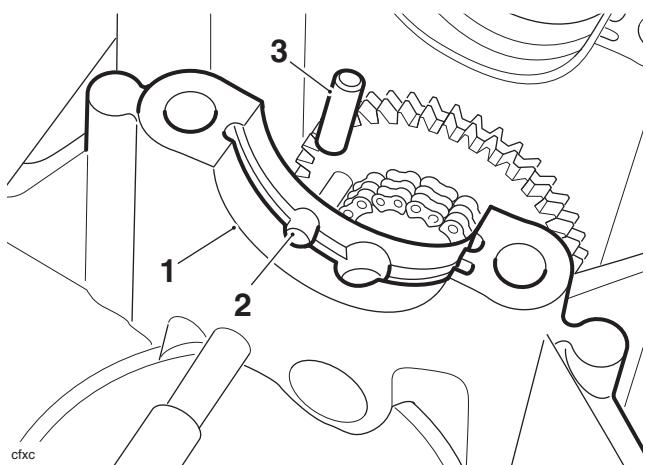
2. Dowels

10. At this point, the balancer shafts (see page 6-3), transmission shafts (see page 7-9) and selector drum (see page 7-7) may be removed. To detach the crankshaft, the big end caps must also be removed (see page 5-10).

Crankshaft, Connecting Rods and Pistons

Assembly

1. Use high flashpoint solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
2. If removed, install the camshaft drive chain and idler gear to the crankcase. Lock the idler gear in position using service tool T3880039 and preload the backlash gear using service tool T3880041 (see page 3-12).
3. Position the transmission shafts and the selector drum in the neutral position.
4. Ensure that the three locating dowels are in position in the upper crankcase.
5. If removed, insert the two piston cooling jets into the main bearing housings in the upper crankcase.



1. Main bearing housing
2. Oil gallery
3. Piston cooling jet

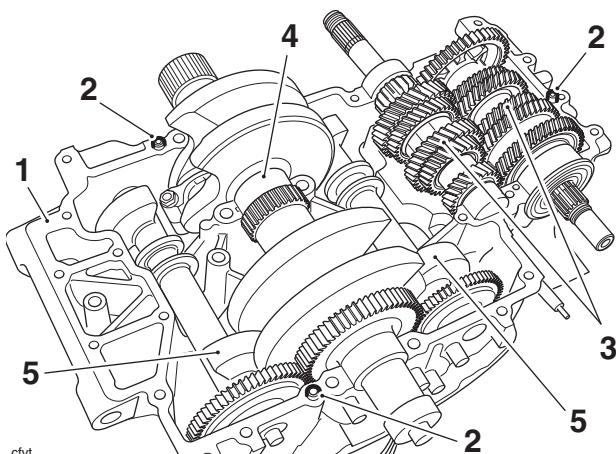


Caution

Ensure the two piston cooling jets are installed. If the piston cooling jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

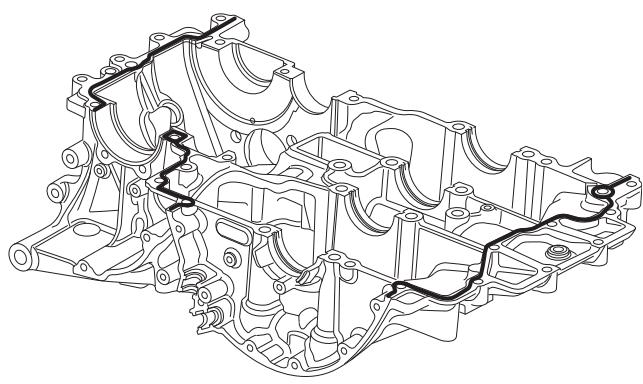
6. Install and lubricate the crankshaft main bearing shells with clean engine oil (see bearing selection on page 5-13 before proceeding).

7. Install the crankshaft ensuring the crankshaft to idler gear timing is correct (see page 5-9).



1. Upper crankcase
2. Dowels
3. Transmission shafts
4. Crankshaft
5. Balancer shafts

8. Fit the big end caps and tighten them (see page 5-11 for the tightening sequence and torque).
9. Install and lubricate the balancer shafts ensuring they are timed to the crankshaft correctly (see page 6-4).
10. Lubricate the crankshaft journals with clean engine oil.
11. Apply a thin bead of silicone sealant to the lower crankcase mating faces (at the factory, ThreeBond 1215 is used).



cfrm

Sealer Areas



Caution

Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases, causing severe engine damage.

12. Position the lower crankcase to the upper. An assistant may be required to support the crankcase during alignment.

Crankshaft, Connecting Rods and Pistons

13. Fit the screws into the lower crankcase and hand tighten them.
14. Tighten the crankcase screws as follows:

Note:

- The crankcase screws are tightened in stages.

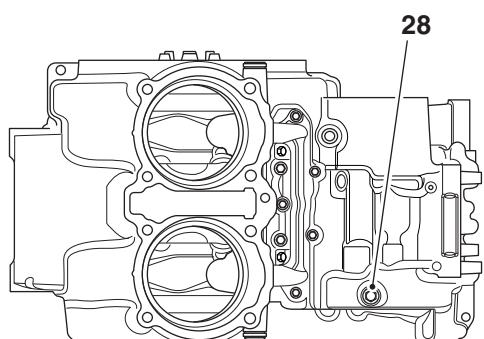
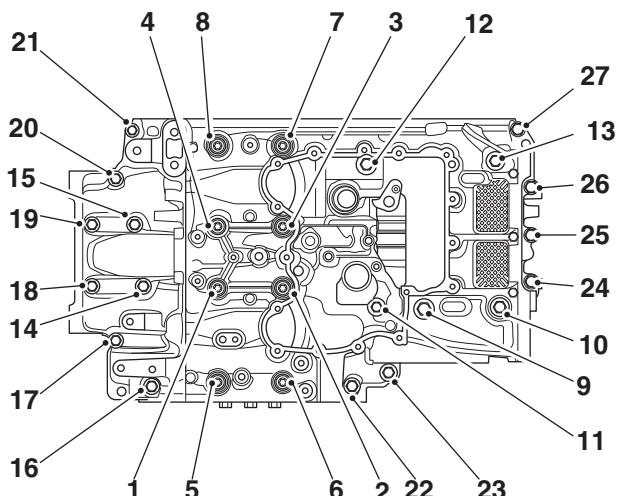


Caution

Failure to follow the correct screw tightening sequence may result in permanent crankcase damage.

Stage 1 - all screws

In the sequence shown below, tighten all crankcase fixings to **10 Nm**.

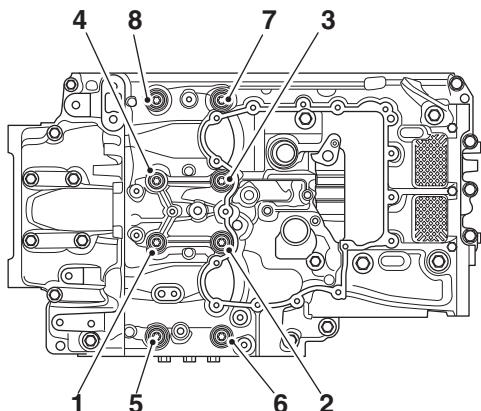


**Crankcase Fixing Tightening Sequence,
all fixings**

Stage 2

In the sequence shown below, loosen fixings 1 to 8.

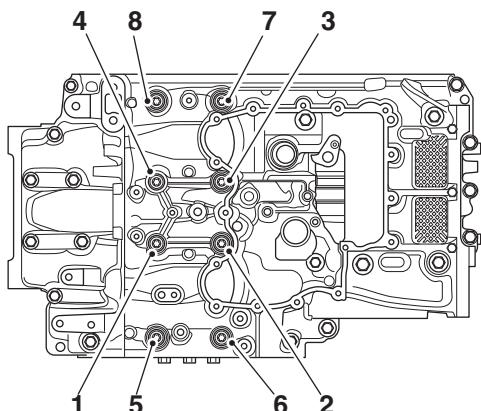
In the sequence shown below, tighten fixings 1 to 8 to **35 Nm**.



**Crankcase Bolt Tightening Sequence,
fixings 1 to 8**

Stage 3

In the sequence shown below, tighten bolts 1 to 8 through a further 90° using tool 3880105-T0301 or similar to measure the torque-angle.

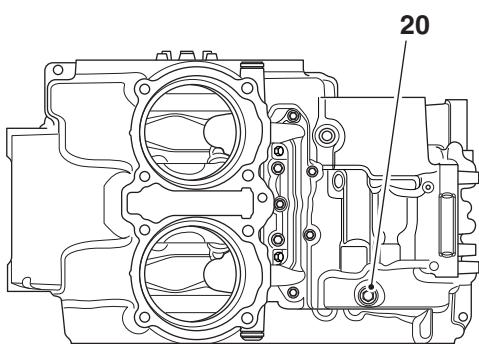
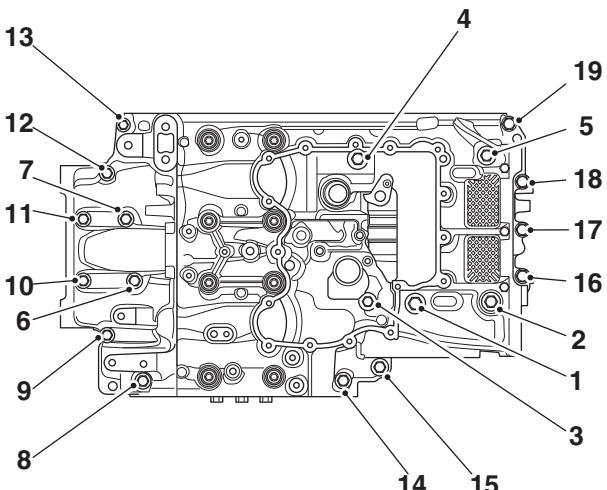


**Crankcase Bolt Tightening Sequence,
fixings 1 to 8**

Crankshaft, Connecting Rods and Pistons

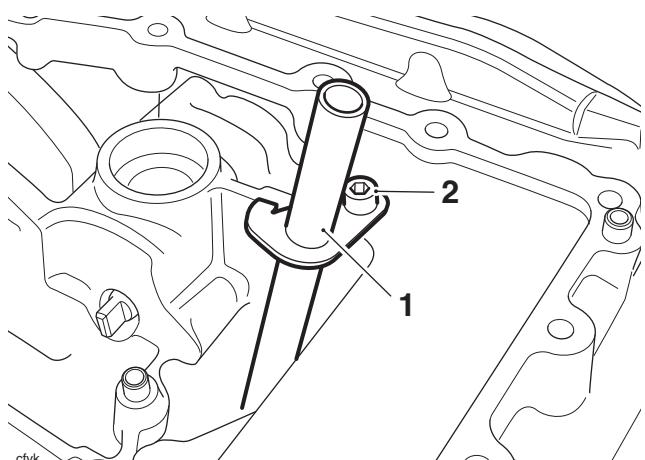
Stage 4

In the sequence shown below, tighten fixings 1 to 20 to **32 Nm**.



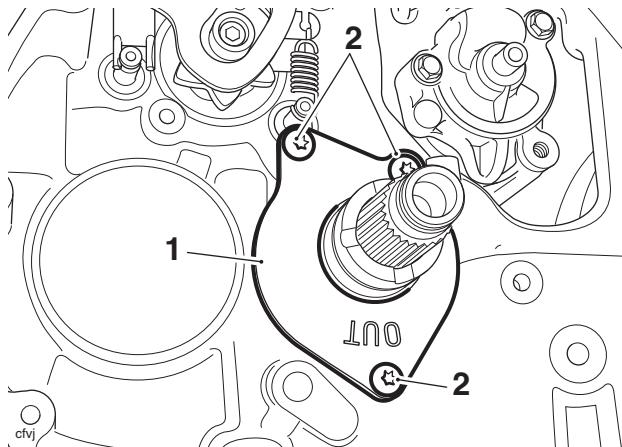
**Crankcase Fixing Tightening Sequence,
fixings 1 to 20**

15. Fit a new O-ring and install the breather drain tube to the crankcase. Ensure the tube is correctly installed in the breather housing.
16. Install a new fixing and tighten to **12 Nm**.



- 1. Breather drain tube**
- 2. Fixing**

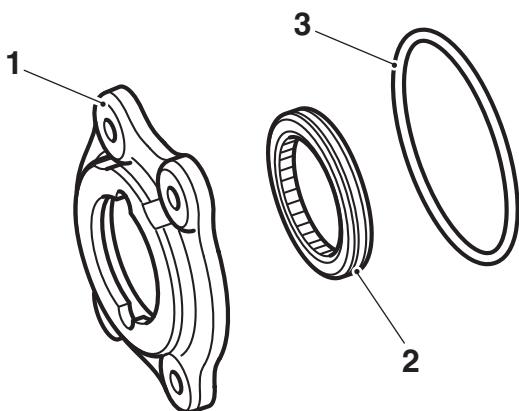
17. Refit both control plate mounting brackets to the lower crankcase. Tighten the left hand fixings to **40 Nm**, and the right hand fixings to **28 Nm**.
18. Fit a new oil filter (see page 8-7).
19. Refit the input shaft bearing retainer plate.
20. Install new fixings and tighten to **12 Nm**.



1. Bearing retainer plate

2. Fixings

21. Install a new oil seal in the output shaft bearing retainer plate.
22. Fit a new output shaft bearing retainer plate O-ring to the groove in the crankcase.



1. Output shaft bearing retainer

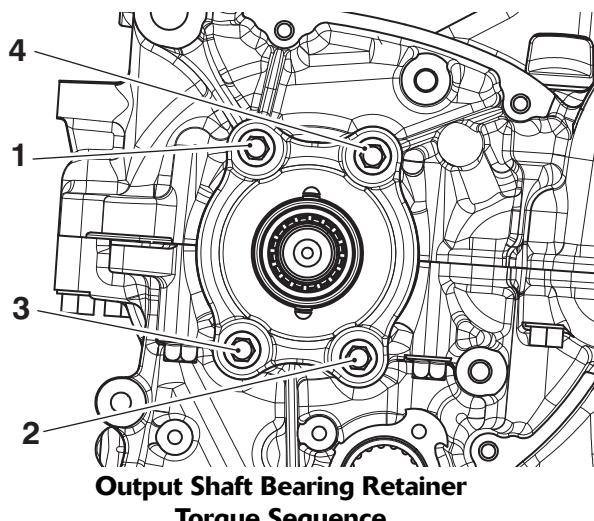
2. Seal

3. O-ring

23. Refit the output shaft bearing retainer plate.

24. Install new fixings and tighten in two stages in the sequence shown below:

- Tighten the fixings to **3 Nm**
- Tighten the fixings to **10 Nm**.



25. Refit the oil pump (see page 8-14).
26. Refit the water pump (see page 11-8).
27. Refit the sump (see page 8-11).
28. Refit the alternator (see page 18-40).
29. Refit the clutch (see page 4-16).
30. Refit the torque compensator (see page 5-22).
31. Refit the gear position sensor (see page 10-169).
32. Refit the engine to the frame (see page 9-7).

Crankshaft

Removal

1. Remove the engine from the frame (see page 9-2).
2. Separate the lower and upper crankcases (see page 5-4).
3. Remove the balancer shafts (see page 6-3).
4. Remove the connecting rod big end caps (see page 5-10). Discard the bolts after removal.
5. Lift the crankshaft from the upper crankcase. Support the connecting rods during crankshaft removal to prevent damage to the rods, liners and upper crankcase.

Installation



Caution

Always check the main bearing journal clearance (see page 5-13), before final assembly of the crankshaft. Failure to correctly select crankshaft bearings will result in severe engine damage.

1. Select and fit new main and big end bearing shells using the selection processes detailed on pages 5-12 and 5-13.
2. Lubricate all bearings with engine oil.
3. Ensure that the crankshaft is clean, and that the oil ways within the crankshaft are clean and free from blockages and debris.



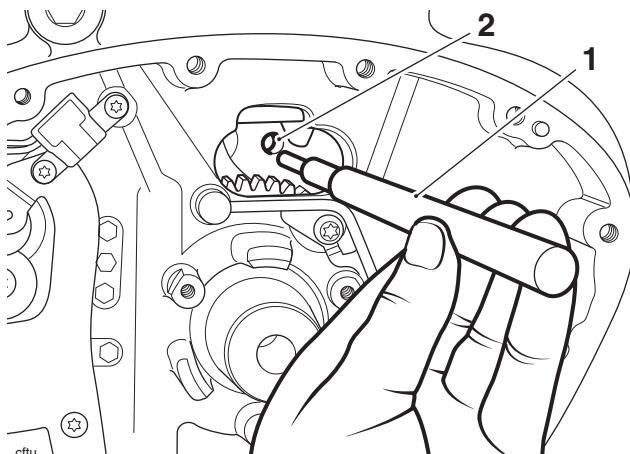
Caution

The crankshaft to idler gear timing will be lost when the crankshaft is removed. Do not refit the crankshaft without first setting the crankshaft to idler gear timing. Incorrect idler gear timing will result in incorrect camshaft timing. Rotating or attempting to start an engine with incorrectly adjusted camshaft timing will result in severe engine damage.

Crankshaft, Connecting Rods and Pistons

4. Install the crankshaft to the upper crankcase, ensuring the crankshaft drive gear is correctly timed to the idler gear as follows:

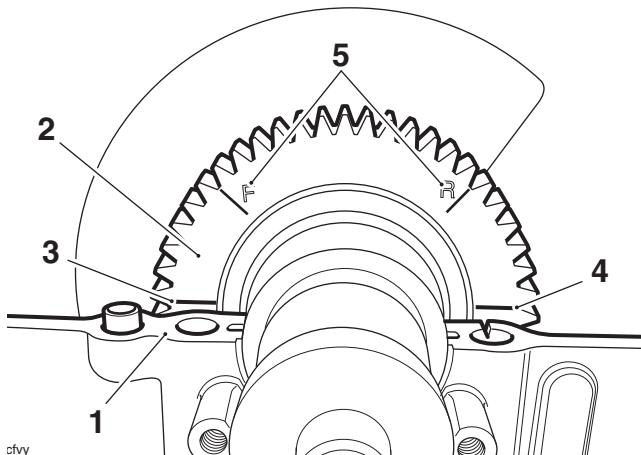
- Check that the timing pin T3880039 is fully installed in the idler gear, ensuring the pin passes through both the idler gear and the backlash gear and into the crankcase web (see page 3-12).



1. Tool T3880039

2. Timing hole in crankcase

- Carefully lower the crankshaft into the crankcase, ensuring that the crankpins align with the corresponding big ends and that the two timing marks on the balancer drive gear line up with the crankcase split line, as shown below. Make sure that two balancer shaft timing marks are visible as shown below:



1. Crankcase split line

2. Crankshaft balancer gear

3. Front timing mark

4. Rear timing mark

5. Balancer shaft timing marks

- Align the connecting rod big ends to the crankpins.
- Fit the big end caps and tighten them (see page 5-11 for the tightening sequence and torque).
- Install the balancer shafts (see page 6-4).
- Assemble the crankcases (see page 5-6).

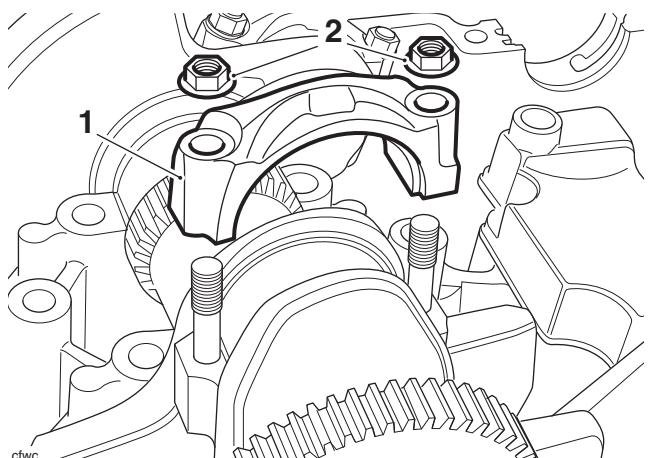
Connecting Rods

Removal

Note:

- The connecting rods and caps are etch-marked on one side to identify their correct orientation. However, the cylinder from which they are individually removed should also be identified, using a paint marker or similar.

- Remove the engine from the frame (see page 9-2).
- Remove the cylinder head (see page 3-19).
- Separate the lower and upper crankcases (see page 5-4).
- Remove and discard the connecting rod nuts.



1. Connecting rod cap

2. Connecting rod nuts

- Collect the big end caps.
- Push the connecting rod up through the liner and collect the piston and connecting rod from the liner top.
- Label the assembly to identify the cylinder from which it was removed.
- Remove the cylinder liners using tool T3880061 (see page 5-19).

Crankshaft, Connecting Rods and Pistons

Installation

Note:

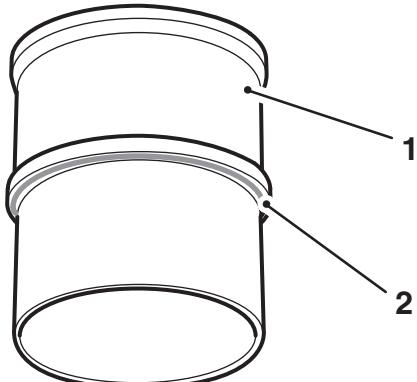
- **Connecting rod bolts and nuts are treated with an anti-rust solution, which must not be removed.**
1. Clean the connecting rod with high flashpoint solvent.
 2. Select new big end bearings (see page 5-12).
 3. Fit the selected big end shells to the connecting rods and big end caps.



Warning

Always renew the big end bolts and nuts. The bolts are torqued near to their yield point when first installed and are severely weakened if reused. Reusing the original bolts may cause bolt breakage resulting in engine damage, loss of motorcycle control and an accident.

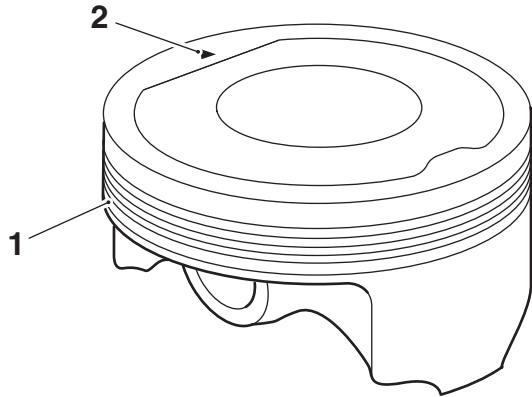
4. Fit new bolts to the connecting rods.
5. Fit the piston and connecting rod assemblies into the liners (see page 5-20).
6. Thoroughly clean the liner removing all traces of old sealer.
7. Remove all traces of sealer from the crankcase bores.
8. Apply a thin bead of silicone sealer (at the factory, ThreeBond TB1215J is used) to the liner-to-crankcase mating face.



ccvl

1. Liner
2. Sealer area

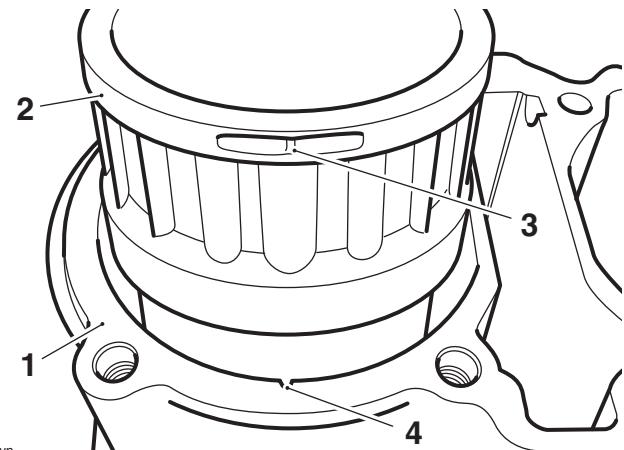
9. Fit the liner into the crankcase ensuring that the arrow on the piston faces the front of the engine.



caqj

1. Piston
2. Arrow

10. Align the cylinder liner alignment mark with the corresponding mark on the front edge of the crankcase.



1. Crankcase
2. Cylinder liner
3. Liner alignment mark
4. Crankcase alignment mark

Note:

- **Ensure that the piston/liner/connecting rod assemblies align correctly with the crankpins during assembly into the crankcase.**



Warning

Always renew the big end bolts and nuts. The bolts are torqued near to their yield point when first installed and are severely weakened if reused. Reusing the original bolts may cause bolt breakage resulting in engine damage, loss of motorcycle control and an accident.

Crankshaft, Connecting Rods and Pistons

- Align the connecting rod to the crankshaft and fit the big end cap. Tighten the NEW cap nuts as follows:

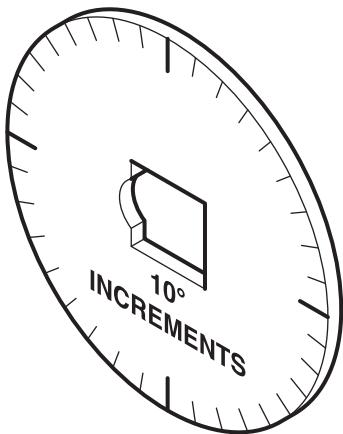


Warning

The torque characteristics of the connecting rod bolts are sensitive to the rate at which they are tightened. If all the torque is applied in one action, the bolts will be stretched beyond their yield point. This may cause bolt breakage resulting in engine damage, loss of motorcycle control and an accident.

Lubricate the underhead and thread areas of the bolts with undiluted molybdenum disulphide grease. Tighten the bolts, in two stages as follows:

- Tighten to **14 Nm**.
- Tighten through 120° of bolt rotation as measured using the Triumph torque turn gauge 3880105-T0301.



cbxt

Service Tool 3880105-T0301

- Refit the cylinder head (see page 3-21).
- Assemble the crankcases (see page 5-6).
- Refit the engine to frame (see page 9-7).

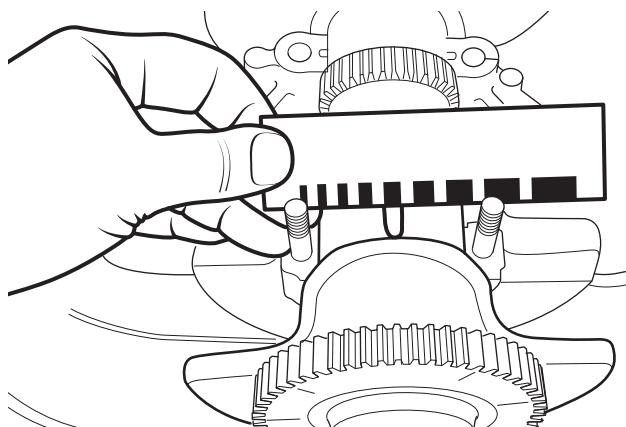
Connecting Rod Big End Bearing Selection/Crankpin Wear Check

- Measure the bearing and crankpin clearance as follows:

Note:

- The crankpin clearances are measured using Plastigauge (Triumph part number 3880150-T0301). Do not turn the connecting rod and crankshaft during the clearance measurement as this will damage the 'Plastigauge'.**
- Remove the big end cap from the journal to be checked.
- Wipe the exposed areas of the crankpin, and the bearing face inside the cap.

- Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the bearing.
- Trim a length of the Plastigauge to fit across the journal. Fit the strip to the journal using the grease to hold the Plastigauge in place.
- Lubricate the threads of the bolt and under head area with undiluted molybdenum disulphide grease. Refit the bearing and cap and tighten the big end bolts as described earlier.
- Release the bolts and remove the cap being measured. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking Connecting Rod Clearance using Plastigauge

Con rod big end bearing/crankpin clearance

Standard	0.035 - 0.066 mm
Service Limit	0.100 mm

Note:

- If the measured clearance exceeds the service limit, measure the crankpin diameter.**

Crankpin diameter

Standard	52.476 - 52.490 mm
Service limit	52.452 mm

Note:

- If any crankpin has worn beyond the service limit, the crankshaft must be replaced. Due to the advanced techniques used during manufacture, the crankshaft cannot be reground and oversize bearings are not available.**

Crankshaft, Connecting Rods and Pistons

Connecting Rod Bearing Selection

Note:

- Optimum running clearance is achieved by using selective big end bearings. For further information on bearing part number to colour cross-references, refer to the parts information system.

Select the correct big end bearing shell as follows:

- Measure each crankpin diameter.
- Measure each connecting rod bore diameter.
- Select the correct bearings by matching the information found with the chart below.

Connecting Rod Bearing Selection Chart

Crankpin diameter	Connecting rod bore diameter	Shell Colour
52.490 to 52.484 mm	55.507 to 55.500 mm	WHITE
52.483 to 52.476 mm	55.507 to 55.500 mm	GREEN
52.490 to 52.484 mm	55.518 to 55.510 mm	GREEN
52.483 to 52.476 mm	55.518 to 55.510 mm	RED

For instance:

- Crankpin diameter = 52.490 mm
- Connecting rod bore diameter = 55.518 mm
- Required bearing = GREEN

Note:

- Repeat the measurements for all connecting rods and their respective crankpins. It is normal for the bearings selected to differ from one connecting rod to another.



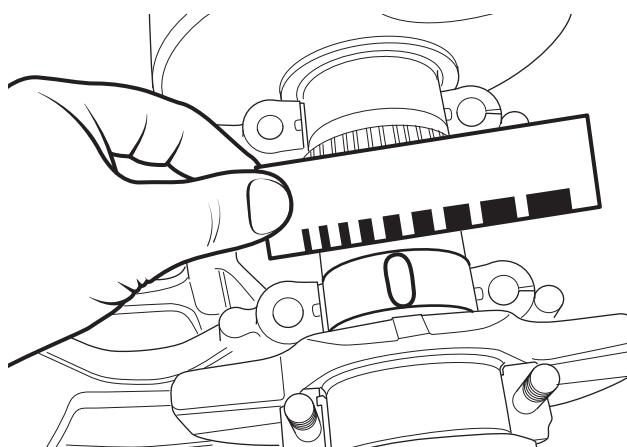
Warning

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance, resulting in loss of motorcycle control and an accident.

Crankshaft Main Bearing/Journal Wear Check

Using selective bearings compensates for minor differences in crankshaft main bearing journal and crankcase dimensions. For further information on bearing part number to colour cross-references, refer to the parts information system.

- Measure the bearing to crankshaft main journal clearance using Plastigauge (Triumph part number 3880150-T0301). Use the same method as described in connecting rod clearance measurement (see page 5-12).



Checking Crankshaft Clearance using Plastigauge

Crankshaft main bearing/journal clearance	
Standard	0.021 - 0.045 mm
Service limit	0.100 mm

- If the clearance exceeds the service limit, measure the diameter of the crankshaft main bearing journal.

Crankshaft main bearing journal diameter	
Standard	52.483 - 52.499 mm
Service limit	52.459 mm

Note:

- If any journal has worn beyond the service limit, the crankshaft must be replaced. Due to the techniques used during manufacture, the crankshaft cannot be reground and oversize bearings are not available.

Crankshaft, Connecting Rods and Pistons

Select bearings as follows:

1. Measure and record the diameter of each crankshaft main bearing journal.
2. Measure and record each main bearing bore diameter in the crankcase (bearings removed but all crankcase bolts fully torqued) (see page 5-13).

Note:

- **The original crankcase bolts may be reused for bearing selection. Do not use new bolts as they may only be used once, even if the single use is related to bearing selection.**

Compare the data found with the chart below to select bearings individually by journal.

Crankcase bore diameter	Crankshaft journal diameter	Shell colour	Running clearance
55.502 to 55.511 mm	52.491 to 52.499 mm	WHITE	0.021 to 0.044 mm
55.502 to 55.511 mm	52.483 to 52.491 mm	RED	0.021 to 0.044 mm
55.511 to 55.519 mm	52.491 to 52.499 mm	RED	0.022 to 0.044 mm
55.511 to 55.519 mm	52.483 to 52.491 mm	BLUE	0.022 to 0.044 mm
55.519 to 55.528 mm	52.491 to 52.499 mm	BLUE	0.022 to 0.045 mm
55.519 to 55.528 mm	52.483 to 52.491 mm	GREEN	0.022 to 0.045 mm

For example:

Crankcase Bore 55.511 mm

Crankshaft Journal Diameter..... 52.483 mm

Bearing Required. BLUE

Note:

- **It is normal for the bearings selected to differ from one journal to another.**

It is also normal for there to be two options of bearing shell colour. In such cases, pick the shell size that gives the greater running clearance.



Warning

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance resulting in loss of motorcycle control and an accident.

Crankshaft End Float

Crankshaft end float	
Standard	0.05 - 0.20 mm
Service limit	0.40 mm

Note:

- **Crankshaft end float is controlled by the tolerances in crankshaft and crankcase machining. Thrust washers are not used. If crankshaft end float is outside the specified limit, the crankshaft and/or the crankcases must be replaced.**

Pistons

Disassembly

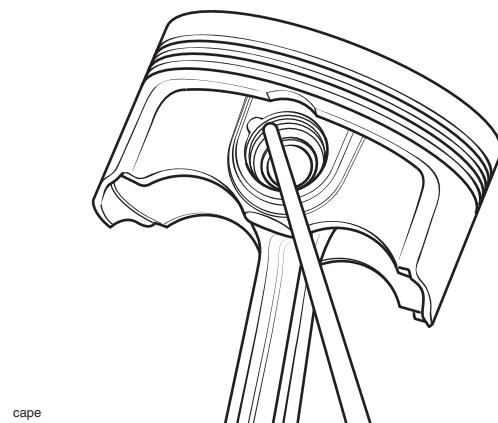
1. Remove the connecting rods (see page 5-10).



Caution

The cylinder liners and pistons are made of aluminium alloy and can therefore be easily damaged. Handle the cylinder liner and piston with care, ensuring the internal bore of the liner and the piston skirt are not scratched.

2. Remove the gudgeon pin circlip from one side of the piston.



Gudgeon Pin Circlip Removal

3. Remove the gudgeon pin by pushing the pin through the piston and rod toward the side from which the circlip was removed.

Note:

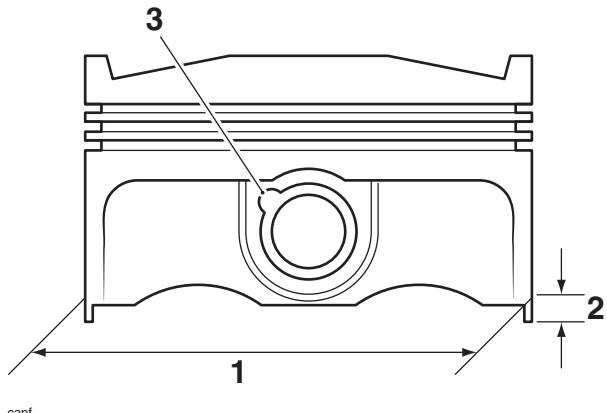
- If the gudgeon pin is found to be tight in the piston, check the piston for a witness mark caused by the circlip. Carefully remove the mark to allow the pin to be removed.
- 4. With the gudgeon pin removed, the piston can be detached from the connecting rod.
- 5. Remove the piston rings.

Note:

- The rings may be removed using a proprietary piston ring expander tool or, if a tool is not available, carefully spread the ring opening using thumb pressure then push up on the opposite side of the ring to remove it from the piston.

Piston Wear Check

1. Measure the piston outside diameter, 10 mm up from the bottom of the piston and at 90° to the direction of the gudgeon pin.



1. Piston outside diameter

2. Measurement point (10 mm up the piston skirt)

3. Gudgeon pin

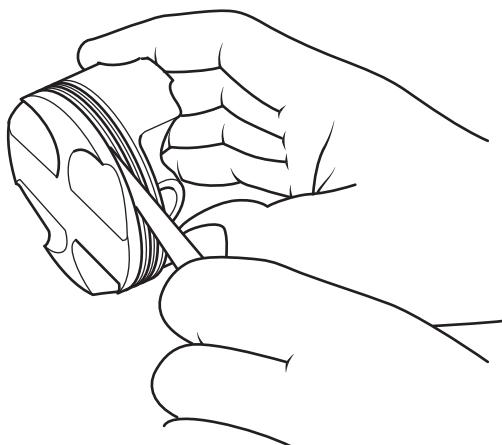
Piston outside diameter at 90° to gudgeon pin	1,600 cc	1,700 cc
All cylinders	103.771 - 103.787 mm	107.071 - 107.087 mm
Service limit	103.721 mm	107.019 mm

Replace the piston if the measured diameter falls outside the specified limit.

Crankshaft, Connecting Rods and Pistons

Piston Rings/Ring Grooves

1. Check the pistons for uneven groove wear by visually inspecting the ring grooves.
2. Clean the piston ring grooves.
3. Fit the piston rings to the pistons. Check, using feeler gauges, for the correct clearance between the ring grooves and the rings. Replace the piston and rings if outside the specified limit.



Checking Piston Ring to Groove Clearances

Piston ring/ groove clearance	1,600 cc	1,700 cc
Top - standard	0.02 - 0.06 mm	0.02 - 0.06 mm
Top - service limit	0.16 mm	0.16 mm
Second - standard	0.02 - 0.06 mm	0.02 - 0.06 mm
Second - service limit	0.16 mm	0.16 mm

Piston Ring Gap

Note:

- **Before final assembly the piston ring gap, when fitted in the liner, must first be checked.**

1. Place the piston ring inside the liner.
2. Push the ring into the top of the cylinder, using the piston to hold the ring square with the inside of the bore. Continue to push the ring into the bore until the third groove of the piston is level with the top of the liner around its full circumference.



Aligning Piston Rings using the Piston

3. Remove the piston and measure the gap between the ends of the piston ring using feeler gauges.

Piston ring end gap tolerance	1,600 cc	1,700 cc
Top - standard	0.30 - 0.45 mm	0.23 - 0.38 mm
Top - service limit	0.65 mm	0.58 mm
Second - standard	0.45 - 0.60 mm	0.33 - 0.53 mm
Second - service limit	0.775 mm	0.705 mm
Oil control - standard	0.20 - 0.70 mm	0.28 - 0.48 mm
Oil control - service limit	0.875 mm	0.655 mm

Note:

- **If the end gap is too large, replace the piston rings with a new set.**
- **If the gap remains too large with new piston rings, both the pistons and liners must be replaced.**
- **If the gap is too small, check the cylinder bore for distortion, replacing as necessary. DO NOT FILE PISTON RINGS!**

Crankshaft, Connecting Rods and Pistons

Piston Assembly

1,600 cc Engines

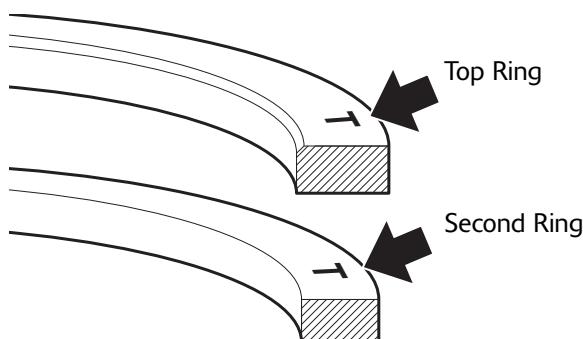
1. Clean the piston ring grooves and fit the piston rings to the piston.

Note:

- **The top ring upper surface is marked 'T' and can be identified by a small chamfer on the inside edge.**

The second ring upper surface is also marked 'T' but is plain on the inside edge and has a bronze appearance.

All oil control rings can be fitted with either face upward.



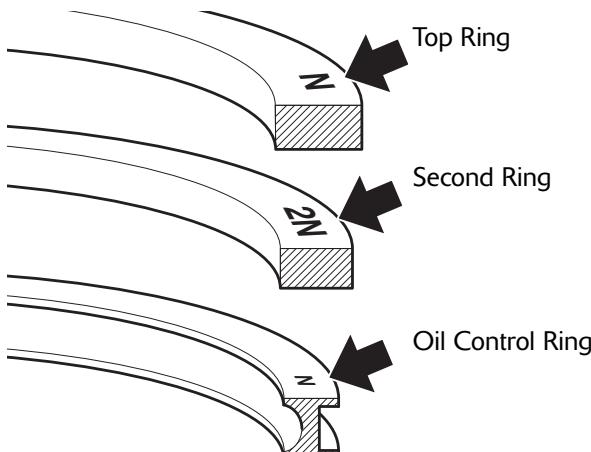
1,600 cc Piston Ring Identification Marks

1,700 cc Engines

The top ring has the letter 'N' etched on its upper face and is silver in colour. The 1,700 cc top ring has no chamfer on the inside edge.

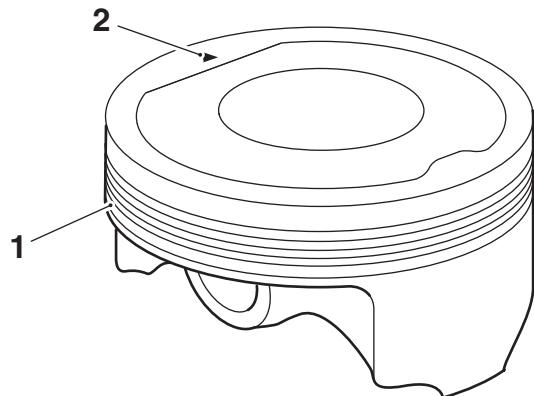
The second ring has the letters '2N' etched on its upper face, and is light bronze in colour, with a silver outer edge.

The oil scraper ring is made up of two components; a one piece steel ring with the letter 'N' etched on its upper face, and a spring expander ring that fits inside the steel ring.



1,700 cc Piston Ring Identification Marks

2. Install a new circlip to one side of the piston.
3. Locate the piston to the connecting rod ensuring that the piston direction arrow points to the front of the engine.



caqj

1. **Piston**
2. **Direction arrow**

4. Align the small end in the connecting rod with the gudgeon pin hole in the piston.
5. Lubricate the piston, small end and gudgeon pin with clean engine oil and fit the gudgeon pin from the opposite side to the installed circlip.
6. Fit a new circlip to the remaining location in the piston then check that both are correctly installed. Rectify if necessary.



Warning

Reusing the original circlips may cause gudgeon pin detachment resulting in engine seizure, loss of motorcycle control and an accident.

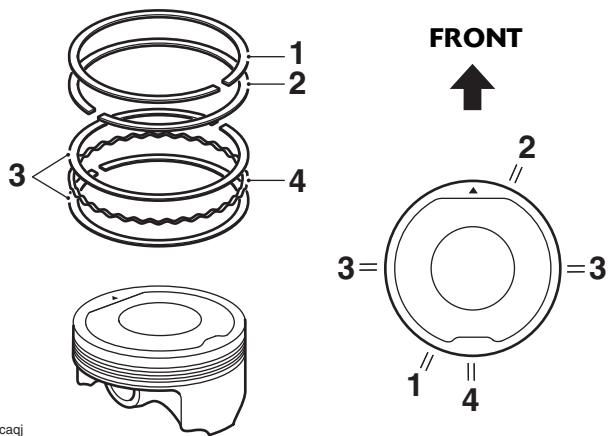
7. The piston ring gaps must be arranged according to the engine size as shown in the following diagrams.

Crankshaft, Connecting Rods and Pistons

1,600 cc engine

Note:

- The top ring gap should be positioned in the 7 o'clock position, the second ring gap in the 1 o'clock position and the steel oil control ring gaps in the 9 & 3 o'clock positions (one in each position).**

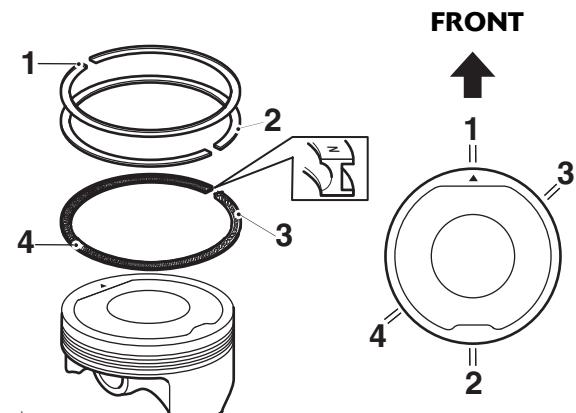


1. Top ring
2. Second ring
3. Steel oil control rings
4. Oil control ring expander

1,700 cc engine

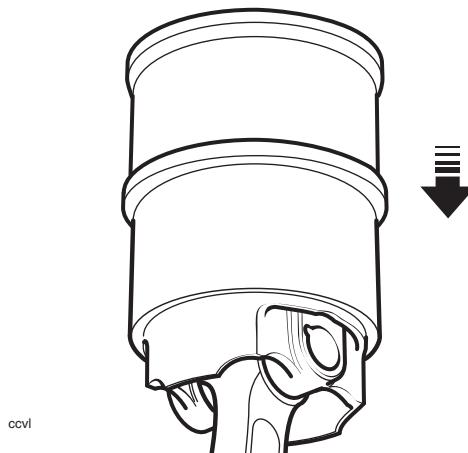
Note:

- The top ring gap should be positioned in the 12 o'clock position, the second ring gap in the 6 o'clock position, the steel oil control scraper ring in the 2 o'clock position and the expander ring in the 8 o'clock position.**



1. Top ring
2. Second ring
3. Oil control scraper ring
4. Oil control expander coil

8. Fit the piston into the bottom of the liner using a gentle rocking motion to engage the rings in the bore.



Fitting a Piston into a Liner

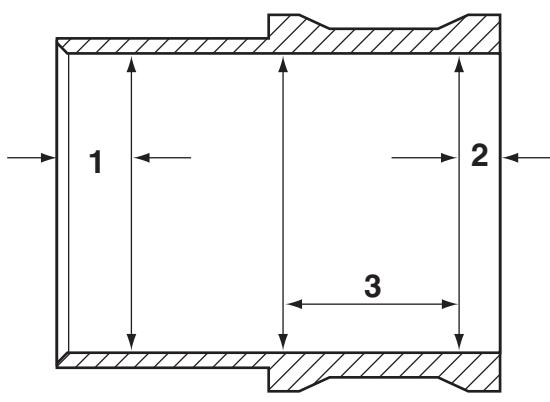
9. Install the connecting rods (see page 5-11).

Cylinder Wear

1. Measure the internal diameter of each cylinder liner using an internal micrometer or Mercer gauge. Always check in two places, at 90° to each other, as well as at three heights in the liner.

Cylinder liner internal diameter	1,600 cc	1,700 cc
Standard	103.791 - 103.809 mm	107.091 - 107.109 mm
Service limit	103.859 mm	107.161 mm

2. Check the diameter at points 1, 2 and 3.



Checking Positions For Bore Wear Check
(bore shown in section)

If any reading is outside the specified limits, replace the liner and piston as an assembly.

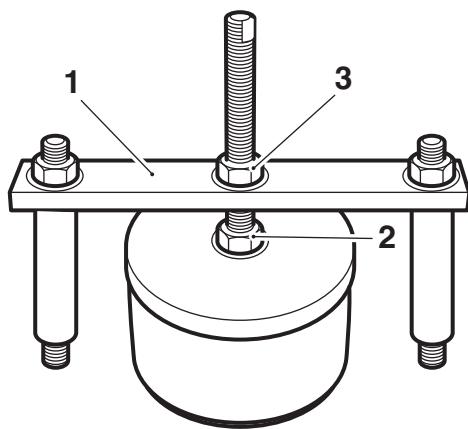
Cylinder Liners

Removal

1. Mark each liner to identify correct orientation and the cylinder number from which it has been removed.
2. Turn the crankshaft until the piston in the liner to be removed is at the bottom of its stroke.

Note:

- For the 1,600 cc engine, use service tool extractor, liner T3880061.
 - For the 1,700 cc engine, use service tool extractor, liner T3880121.
 - The removal procedure is identical for either size cylinder liners.
3. Check that the locking nut on tool T3880061 is loose, then fully unscrew the extraction nut.



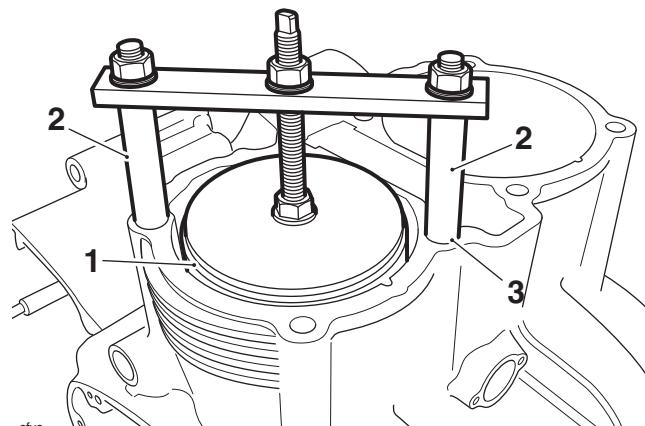
1. Tool T3880061
2. Locking nut
3. Extraction nut



Caution

The cylinder liners and pistons are made of aluminium alloy and can therefore be easily damaged. Handle the cylinder liner and piston with care, ensuring the internal bore of the liner and the piston skirt are not scratched.

4. Carefully fit the rubber section of the tool fully into the cylinder liner, positioning the studs supplied with the tool diagonally across a pair of head bolt-holes.



1. Cylinder liner
2. Studs
3. Head-bolt holes

5. Fully engage the threaded stud into the head bolt holes. It is not necessary to fully tighten the bolts.
6. Turn the locking nut clockwise until the rubber sleeve on the tool tightly grips the bore of the liner.
7. Turn the extraction nut clockwise sufficient to raise the liner and break the seal between the liner and crankcase.

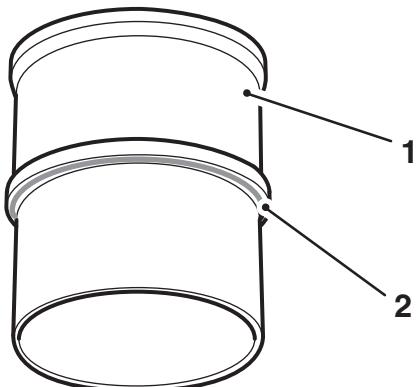
Note:

- It is not necessary (or possible) to fully extract the liner using this tool. Once the seal is broken, the tool must be removed and the liner extracted by hand.
8. Turn the locking nut anticlockwise to release the liner.
 9. Once the seal on the liner is released, remove the tool and manually remove the liner.

Crankshaft, Connecting Rods and Pistons

Installation

1. Thoroughly clean the liner removing all traces of old silicone sealer.
2. Remove all traces of sealer from the crankcase bores.
3. Apply a thin bead of silicone sealer (at the factory, ThreeBond 1215J is used) to the liner-to-crankcase mating face.



ccvl

1. Liner
2. Sealer area

4. Carefully fit each liner over the piston using a gentle rocking motion to allow compression of the piston rings.

Caution

Care must be taken when installing liners such that the silicone sealer is not forced out, blocking passageways in the crankcase.

Note:

- The liners have a large chamfer at the bottom of the bore, enabling fitting of the piston without the need for a piston ring compressor.

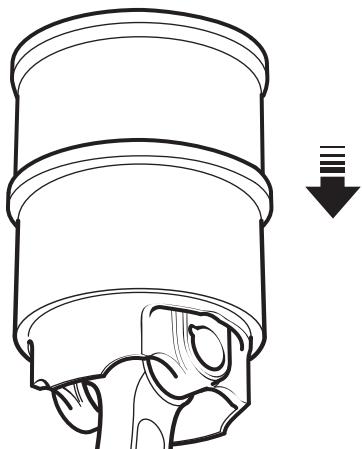
Caution

Fit each liner over whichever piston is at TDC. When turning the engine, do not allow the pistons to contact the inside of the crankcase and also do not allow fitted liners to lift off the crankcase base.

5. Continue fitting each liner in turn until all are fitted and sealed.

Note:

- When the liners have been fitted, they should not be disturbed. If it is necessary to remove the liner after fitting, the sealer must be reapplied.

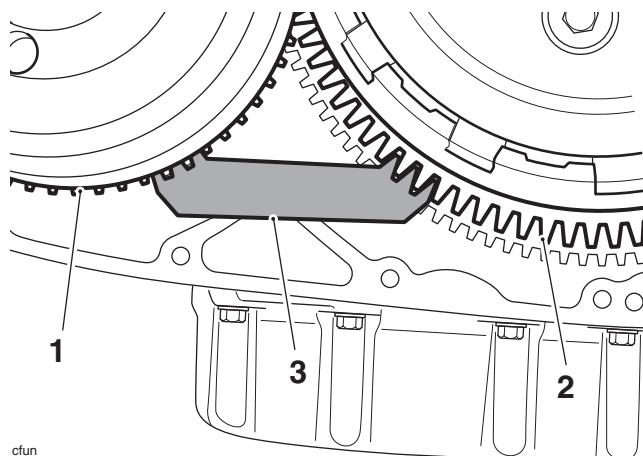


Fitting a Piston into a Liner

Torque Compensator

Removal

1. Remove the clutch cover (see page 4-11).
2. Lock the torque compensator to the clutch, using service tool T3880043 located **below** the clutch as shown below:



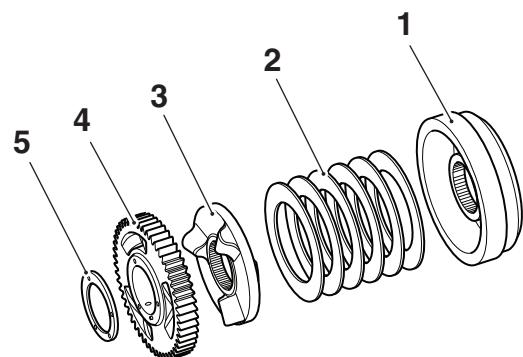
1. Torque compensator

2. Clutch primary gear

3. Tool T3880043

3. Remove the torque compensator fixing. Collect the large washer and (if fitted) the shim and plain washer. Discard the fixing.

6. Remove the primary gear and collect the thrust washer.



1. Spring retainer

2. Belleville washers

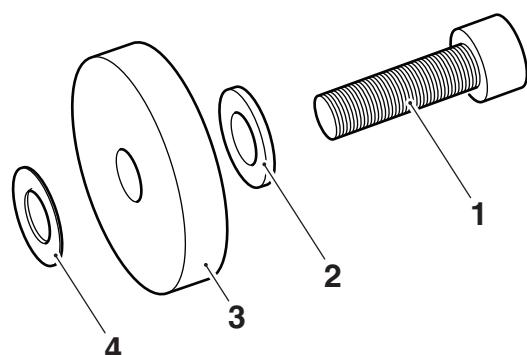
3. Cam follower

4. Primary gear

5. Thrust washer

Inspection

1. Inspect the Belleville washers for wear or damage.
2. Inspect the cam follower and primary gear for wear or damage.
3. Rectify as necessary.



1. Fixing

2. Plain washer

3. Large washer (12 mm thick)

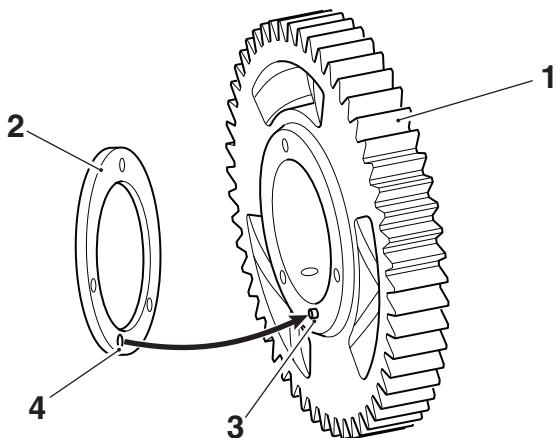
4. Shim

4. Remove the torque compensator spring retainer and noting their orientation, collect the six Belleville washers.
5. Remove the torque compensator cam follower from the crankshaft spline.

Crankshaft, Connecting Rods and Pistons

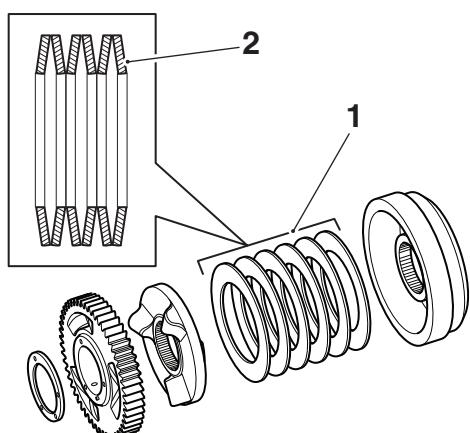
Installation

- Fit the thrust washer to the primary gear, ensuring the peg on the gear aligns with the corresponding hole in the washer, and that the thrust side of the washer, which can be identified by its copper coloured surface, faces away from the primary gear.



- Primary gear
- Thrust washer
- Peg
- Alignment hole

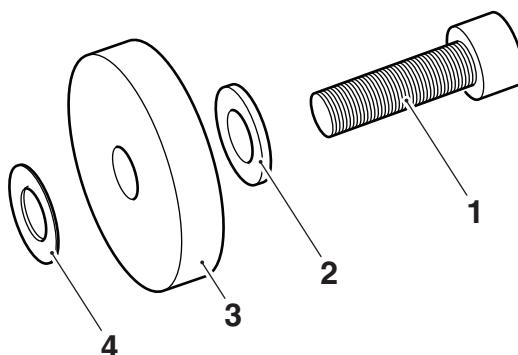
- Align the primary gear and slide it over the crankshaft. Check that the thrust washer does not become dislodged during installation.
- Refit the cam follower.
- Fit the six Belleville washers in their correct orientation as noted during disassembly.



- Belleville washers
- Correct orientation
- Refit the spring retainer.
- Fit the plain washer, large washer and shim (if required) to a new fixing.

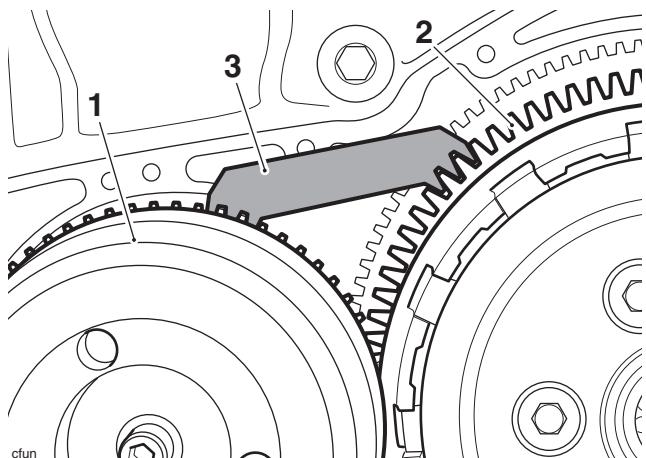
A modified crankshaft has been introduced at engine number 427425. This crankshaft is 0.5 mm longer at the torque compensator end and will be supplied automatically if a replacement is required for the older engine.

- When refitting the torque compensator to a new crankshaft, the shim, shown as item 4 below, must **not** be fitted and should be discarded.



- Fixing
- Plain washer
- Large washer (12 mm thick)
- Shim

- Secure the spring retainer with the fixing and washers, and hand tighten.
- Lock the torque compensator to the clutch, using service tool T3880043 located **above** the clutch as shown below:

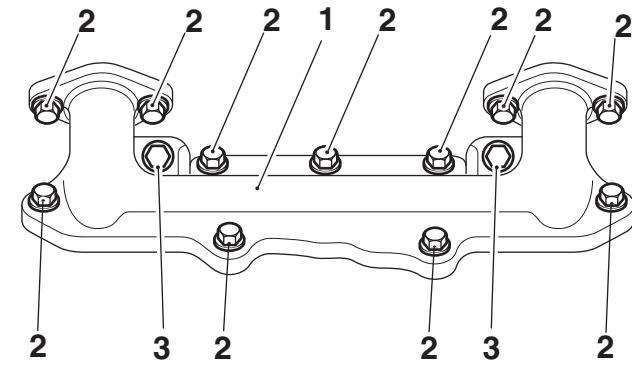


- Torque compensator
- Tool T3880043
- Clutch primary gear
- Tighten the torque compensator fixing to **130 Nm**.
- Refit the clutch cover (see page 4-12).

Coolant Manifold

Removal

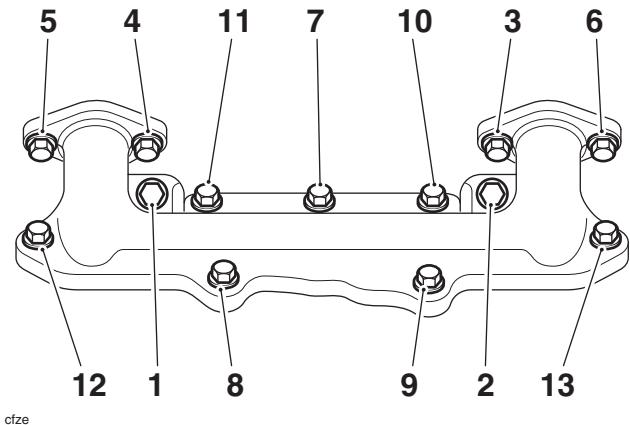
1. Remove and discard the 13 fixings, then remove the manifold from the rear of the crankcase.
2. Remove and discard the manifold seals.



1. Coolant manifold
2. Bolts
3. Encapsulated bolts

Installation

1. Fit new seals to the manifold.
2. Position the manifold to the crankcase, ensuring the seals are not dislodged during assembly.
3. Fit new encapsulated bolts in the sequence shown below, tighten to **9 Nm**.



Coolant Manifold Tightening Sequence

Crankshaft, Connecting Rods and Pistons

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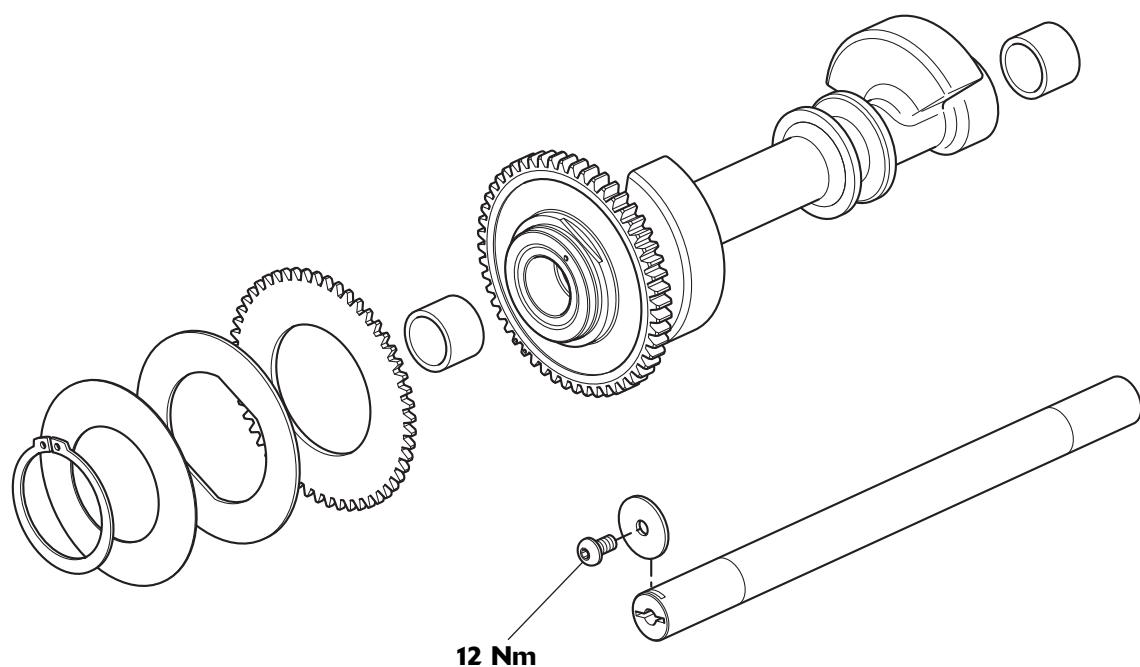
6 Balancer

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Exploded View – Balancer	6.2
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Inspection	6.3
Assembly/Installation	6.4

Balancer

Exploded View – Balancer



Introduction

The Thunderbird is fitted with two balancer shafts, one in front of the crankshaft and one behind it. Each balancer has the effect of a pair of counterbalance weights, which create an equal amount of energy in the opposite direction, and at the same time as that produced by the crankshaft, pistons and connecting rods. Because the opposing pulses occur at the same point of crankshaft rotation, and are of an equal magnitude, a state of equilibrium or balance is reached.

The balancer shaft drive gear is fitted with a backlash gear, to reduce backlash between the gear teeth and therefore reduce noise. The backlash gear uses a hunting tooth design, which means it has one less tooth than the balancer shaft driven gear. The balancer shaft driven gear has 55 teeth, the backlash gear has 54 teeth. This design has the effect of eliminating any backlash between the two gears. However it also means that the timing marks located on the backlash gear will only align with the timing marks on the balancer shaft driven gear once every 55 revolutions of the balancer shaft. Therefore it is essential to correctly align the backlash gear with the balancer shaft driven gear as described in the following instructions.

Removal



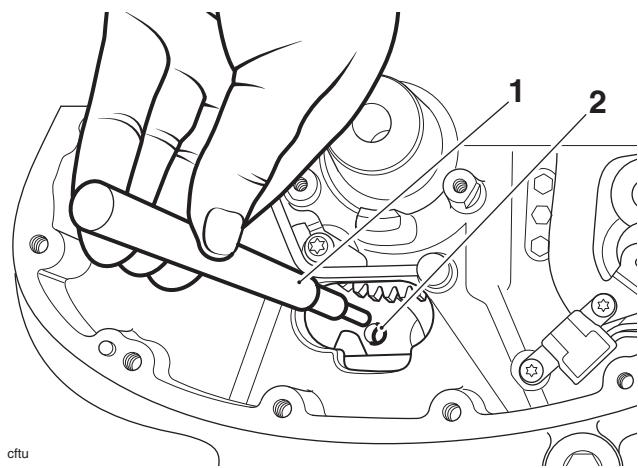
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note:

- The removal and installation procedure for either balancer shaft is the same. This procedure describes the replacement of the front balancer shaft.**

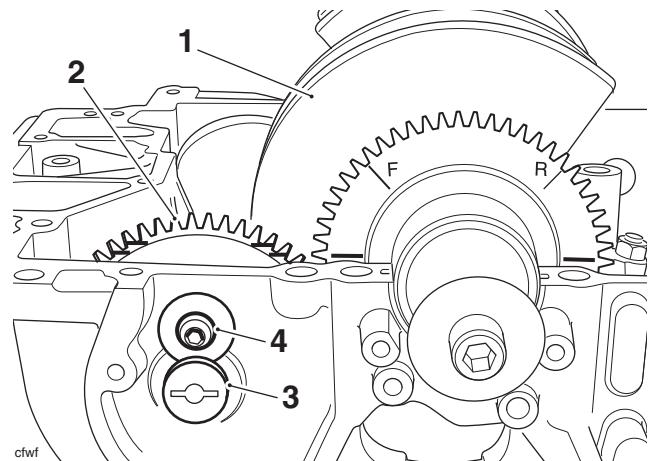
1. Remove the engine (see page 9-2).
2. Separate the crankcase halves (see page 5-4).
3. Turn the crankshaft until the timing pin T3880039 can be inserted through the hole in the upper crankcase and into the idler gear.



1. Tool T3880039

2. Timing hole in crankcase

4. Release the dead shaft screw and washer and slide out the dead shaft, supporting the balancer shaft as you do so.



1. Crankshaft

2. Balancer

3. Dead shaft

4. Screw and washer

5. Remove the balancer shaft.
6. Discard the dead shaft screw and retain the washer for reuse.

Inspection

1. Inspect all gears for chipped or missing teeth and for overheating (blue discolouration).
2. Inspect all bearings for signs of overheating (blue discolouration), seizure and any other damage. Check that all bearings rotate smoothly and without tight spots.

Balancer

Assembly/Installation

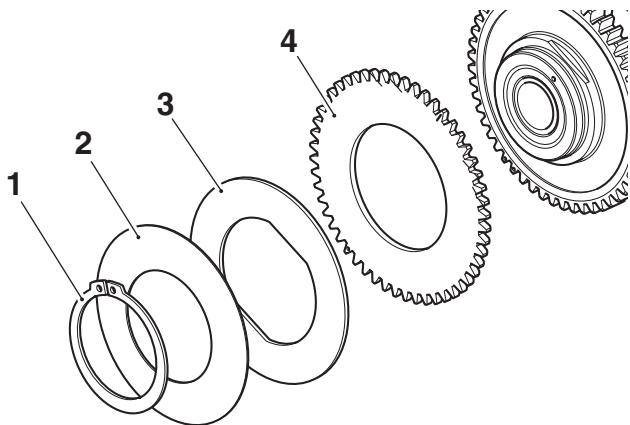
Note:

- To ensure a correct relationship, the balancer shaft must be installed in a specific orientation relative to the crankshaft.
- Before the balancer shaft is installed, it is necessary to reposition the backlash gear on the balancer shaft in relation to the driven gear. The timing marks on the two gears will not align once the engine has been rotated away from its initial timed position.

- Check that the timing pin T3880039 is still fully inserted into the idler gear, and that the crankshaft to idler gear timing is correct (see page 5-9).

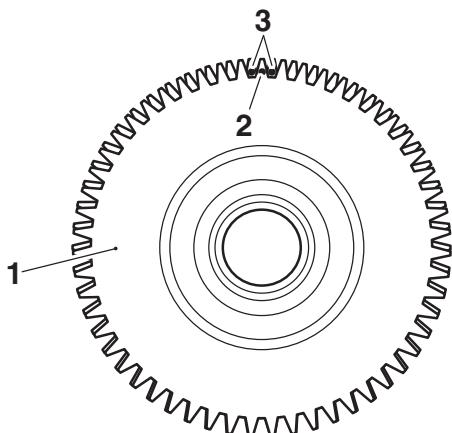
Note:

- Note the orientation of the Belleville washer before disassembly.
- Remove the circlip, Belleville washer and thrust washer from the balancer shaft.



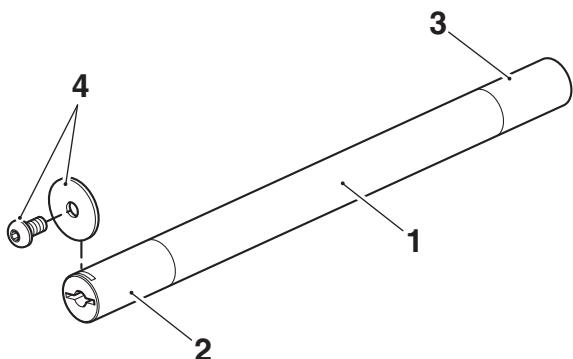
1. Circlip
2. Belleville washer
3. Thrust washer
4. Backlash gear

3. Rotate the backlash gear until the dot aligns with the two dots on the balancer shaft driven gear.



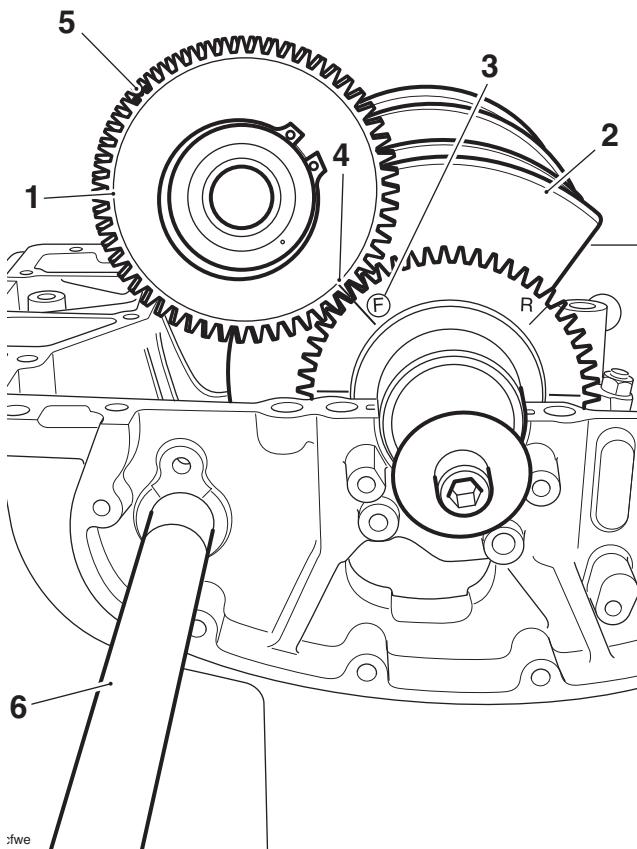
1. Backlash gear
2. Backlash gear dot mark
3. Balancer shaft driven gear dot marks

4. Refit the thrust washer, Belleville washer (concave side facing the balancer shaft) and secure with a new circlip. Ensure that the circlip is fully seated in the groove on the balancer shaft.
5. Lubricate the balancer shaft needle roller bearings with clean engine oil.
6. Position the plain end of the dead shaft into the crankcase. Do not fully insert the dead shaft at this stage.



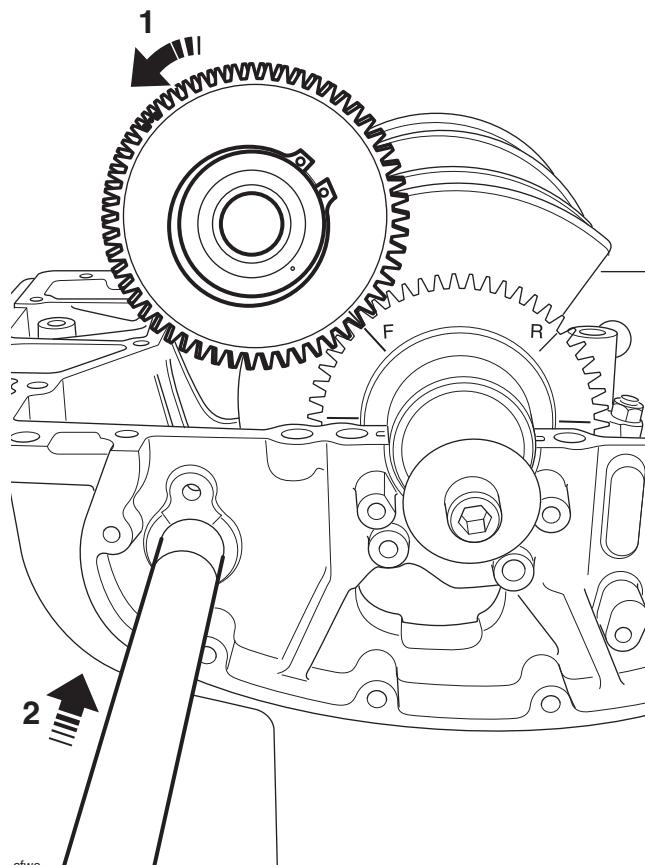
1. Dead shaft
2. Slotted end
3. Plain end
4. Screw and washer

7. Position the balancer shaft to the crankshaft, aligning the mark on the driven gear with the 'F' (front) mark on the crankshaft drive gear.



1. Balancer shaft
2. Crankshaft
3. Crankshaft 'F' (front) mark
4. Balancer shaft timing mark
5. Balancer shaft dot marks
6. Dead shaft

8. **Without disengaging the balancer shaft drive gear from the crank shaft drive gear**, rotate the balancer shaft downwards until the balancer is in its fitted position and insert the dead shaft. Do not fit the screw or washer at this stage.

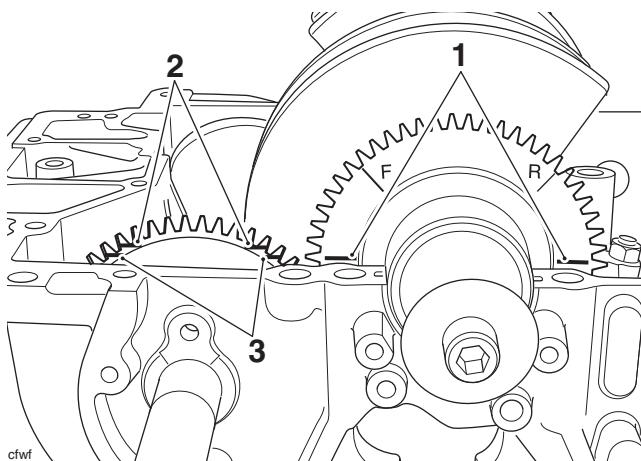


1. Rotate the balancer shaft
2. Install the dead shaft

Balancer

9. To check that the balancer shaft is correctly timed to the crankshaft proceed as follows:

- Check that the two lower horizontal lines on the balancer shaft backlash gear align with the crankcase split line.
- Check that the two upper horizontal lines on the balancer shaft backlash gear align with the corresponding lines on the crankshaft drive gear.

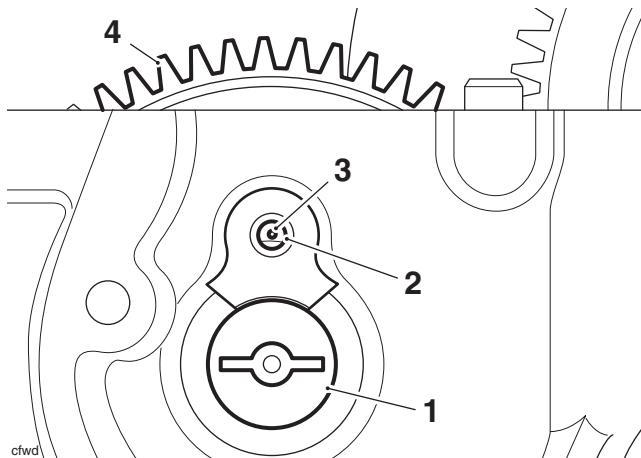


1. Crankshaft timing marks

2. Balancer gear to crankshaft timing marks

3. Balancer gear to crankcase split line marks

- Check that the dot mark on the balancer shaft is visible through the dead shaft screw hole in the crankcase.



1. Dead shaft

2. Screw hole

3. Dot mark

4. Balancer shaft

Note:

- If the timing is not correct, the procedure must be restarted from the beginning.
 - The timing marks on the backlash gear will no longer align with the marks on the balancer shaft driven gear once the balancer shaft has been rotated around the crankshaft, therefore the backlash gear must be removed and reset as described at step one above.
10. Fit a new screw to the washer and install the screw and washer to the dead shaft, ensuring the washer engages in the slot in the shaft. Tighten to **12 Nm**.
11. Install the rear balancer in the same way, noting that the rear balancer shaft uses the 'R' mark on the crankshaft gear and not the 'F' mark.
12. Assemble the crankcase halves (see page 5-6).
13. Refit the engine to the frame (see page 9-7).

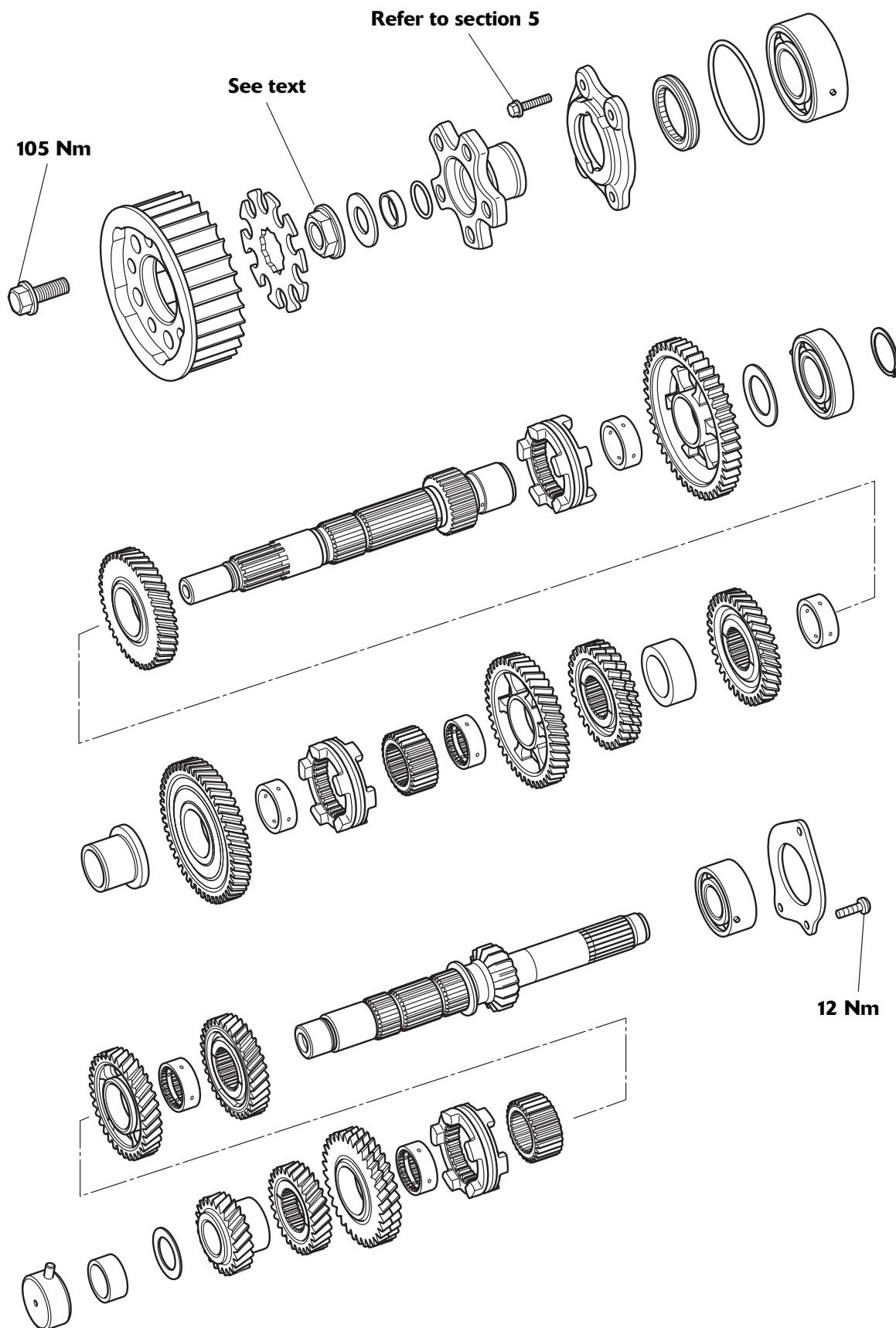
7 Transmission

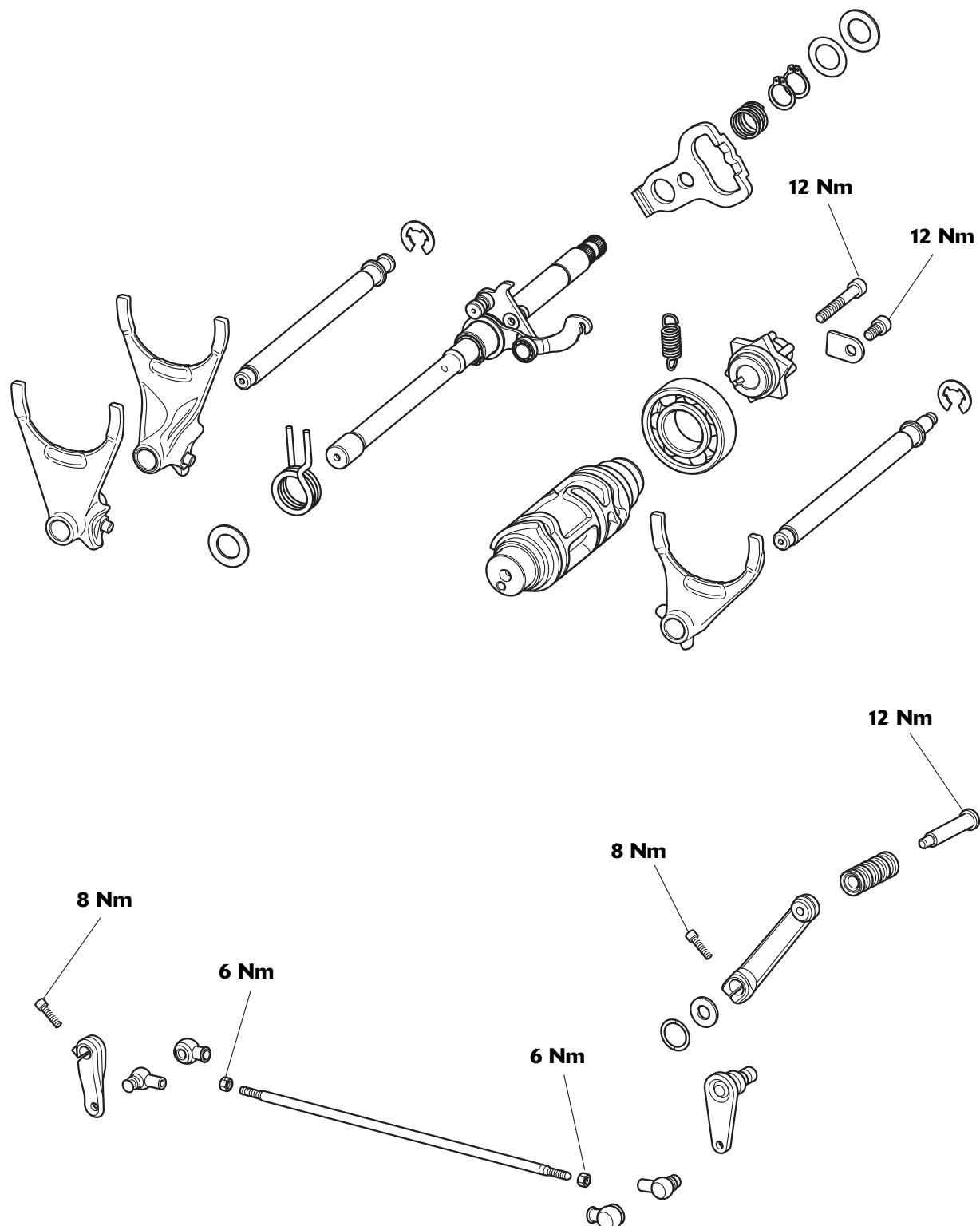
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Transmission

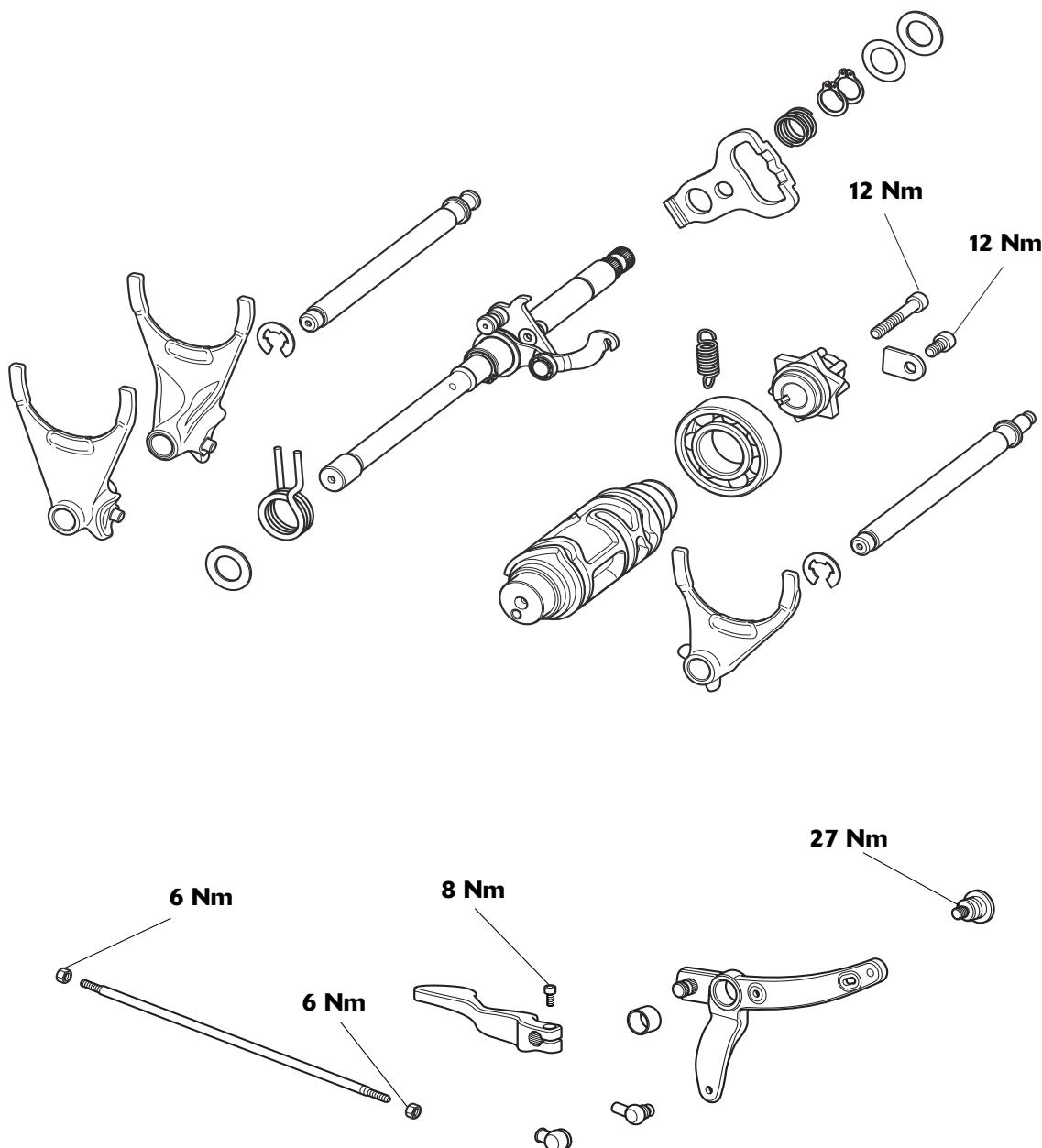
Exploded View – Input and Output Shafts

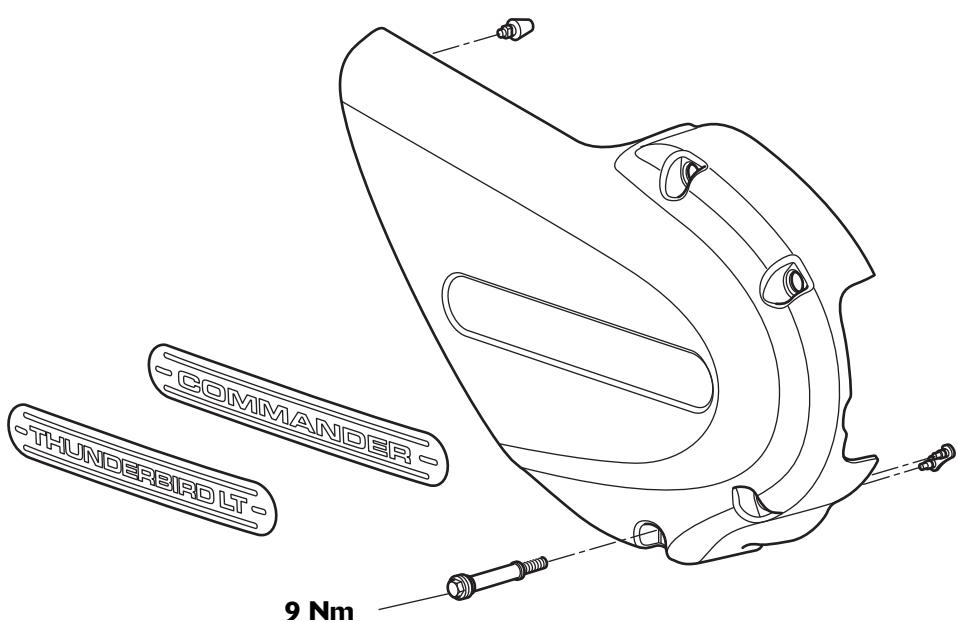
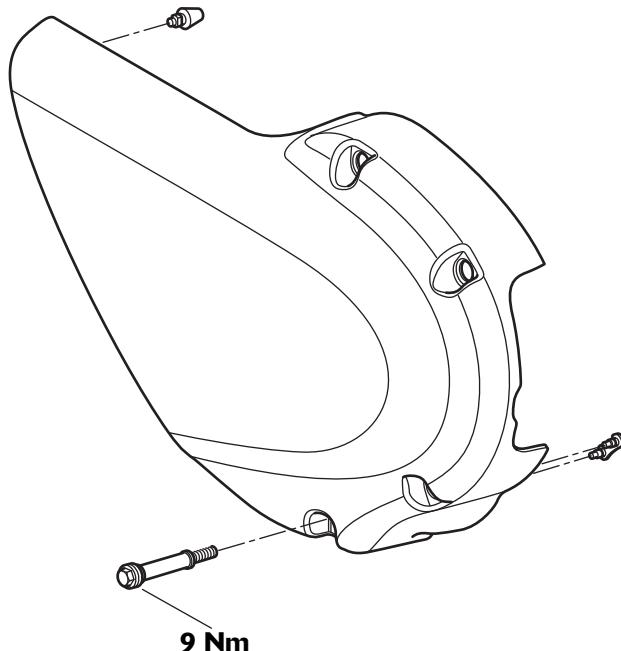


**Exploded View – Gear Selector and Gear Change Mechanisms –
Thunderbird and Thunderbird Storm**

Transmission

Exploded View – Gear Selector and Gear Change Mechanism – Thunderbird SE, Thunderbird Commander and Thunderbird LT



Exploded View – Drive Belt Cover

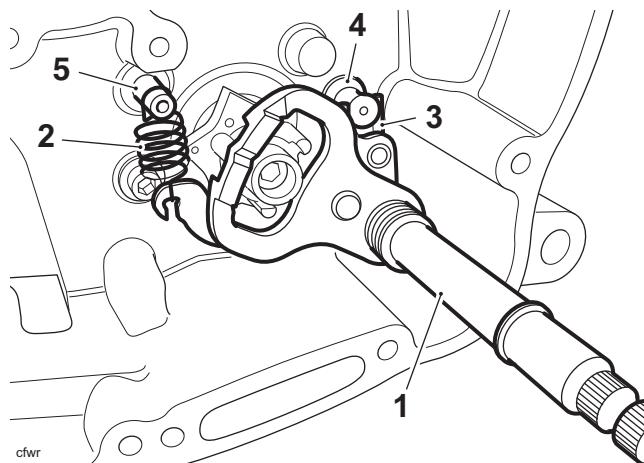
abir

Transmission

Selector Shaft

Removal

1. Remove the clutch (see page 4-13).
2. Release the detent arm spring.
3. Withdraw the selector shaft as an assembly. Note the position of the selector shaft spring over the rear selector fork shaft.



1. Selector shaft
2. Detent spring
3. Selector shaft spring
4. Rear selector fork shaft
5. Front selector fork shaft

4. Collect the washer from the selector shaft.

Inspection

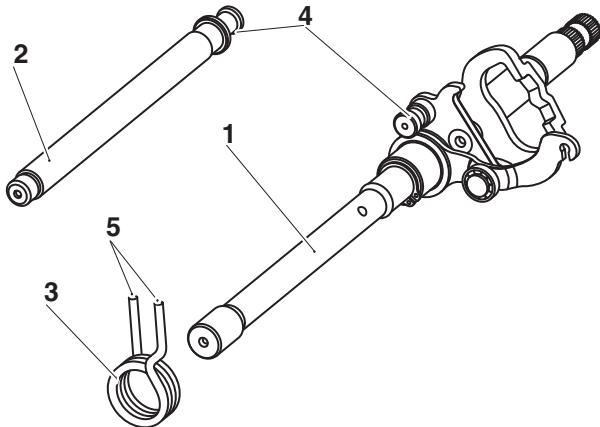
1. Inspect the gear change shaft assembly, rear selector fork shaft and spring for damage or wear, the springs for over-extension (i.e. abnormal gaps between coils). Renew the components as necessary.

Up to Engine Number 451966

If one of the above items require replacement, all three items must be replaced together.

From Engine Number 451967

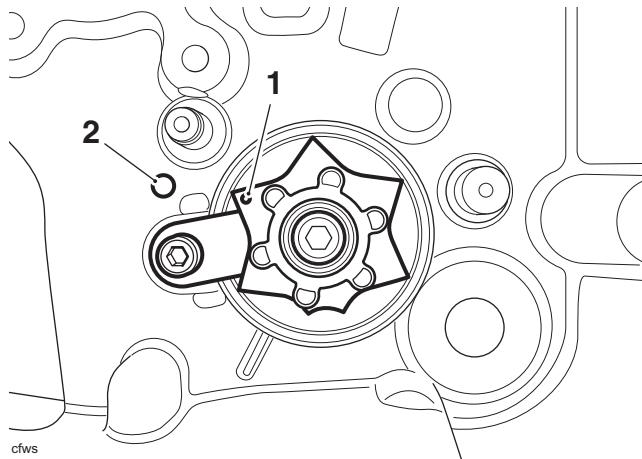
2. For newer models the individual items can be replaced like for like, and are recognised by the:
 - smaller diameter of the locating pins on the two shafts
 - shorter distance between the ends of the spring.



1. Gear change shaft assembly
2. Rear selector fork shaft
3. Spring
4. Locating pins
5. Spring ends

Installation

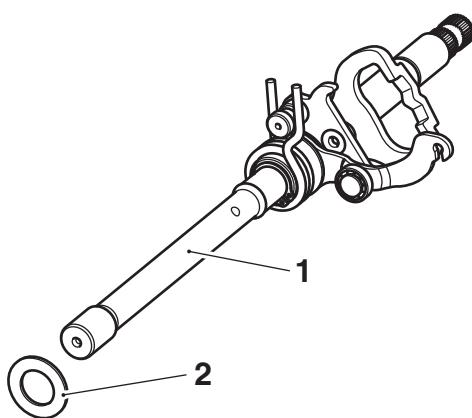
- Set the transmission in neutral. Rotate the selector drum until the dot mark on the drum aligns with the mark on the crankcase, as shown below:



1. Selector drum dot mark

2. Crankcase mark

- Check that the washer is in position on the selector shaft.



1. Selector shaft

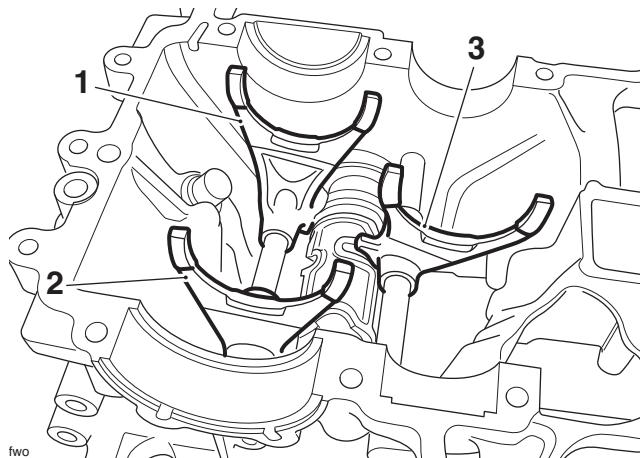
2. Washer

- Install the shaft to the crankcase, ensuring the selector shaft spring passes over the end of the rear selector fork shaft.
- Refit the detent spring.
- Refit the clutch (see page 4-16).

Selector Forks and Drum**Removal****Note:**

- Prior to removal, mark, or make a note of the relative positions of each selector fork in the selector drum.

- Remove the engine from the frame (see page 9-2).
- Separate the lower crankcase from the upper (see page 5-4).
- Remove the selector shaft (see page 7-6).
- Remove and discard the E-clips securing the two selector forks shafts into the crankcase.
- Withdraw the front selector fork shaft and collect the selector fork (marked C).
- Withdraw the rear selector fork shaft and collect the two selector forks (marked A and B).



1. Selector fork A

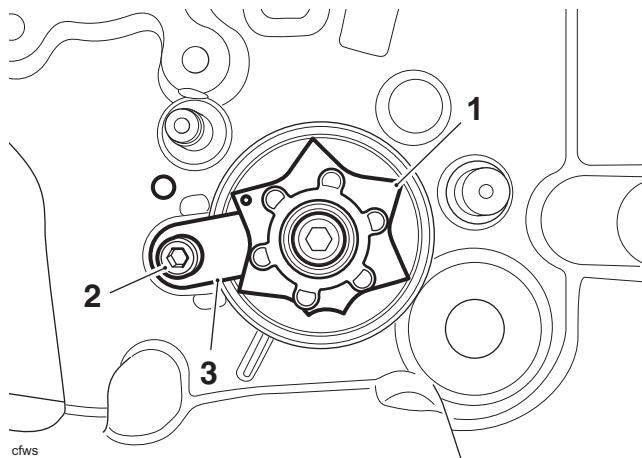
2. Selector fork B

3. Selector fork C

- Remove and discard the fixing and remove the selector drum bearing keeper plate.

Transmission

- Remove the selector drum.



- Selector drum**
- Fixing**
- Bearing keeper plate**

- If required, remove the fixing and remove the detent wheel from the selector drum.

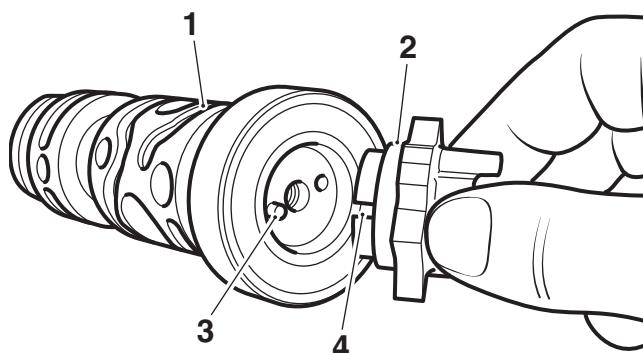
Inspection

- Inspect all bearings for damage and wear. Renew as necessary.
- Check the selector forks and selector grooves for wear beyond the service limits. Renew components as necessary.

Item	Standard	Service Limit
Selector fork thickness	4.35 - 4.45 mm	4.25 mm
Selector groove width	4.50 - 4.60 mm	4.75 mm
Fork to groove clearance	0.05 - 0.25 mm	0.50 mm

Installation

- If removed, refit the detent wheel to the selector drum, ensuring the pin on the drum locates in the slot in the detent wheel. Prevent the drum from turning and tighten the fixing to **12 Nm**.



- Selector drum**
- Detent wheel**
- Pin**
- Slot**

- Refit the selector drum, ensuring it is pushed fully home in the crankcase.
- Fit the bearing keeper plate and retain the plate using a new fixing. Tighten the fixing to **12 Nm**.
- Position the rear selector fork shaft to the crankcase, and refit the selector fork A (A marking facing towards the clutch) and then B (B marking facing away from the clutch).
- Position the front selector fork shaft to the crankcase, and refit selector fork C (C marking facing away from the clutch).
- Fit new E-clips to both selector fork shafts.
- Refit the selector shaft (see page 7-7).
- Assemble the crankcases (see page 5-6).
- Refit the engine (see page 9-7).

Input and Output Shaft Assemblies

Removal

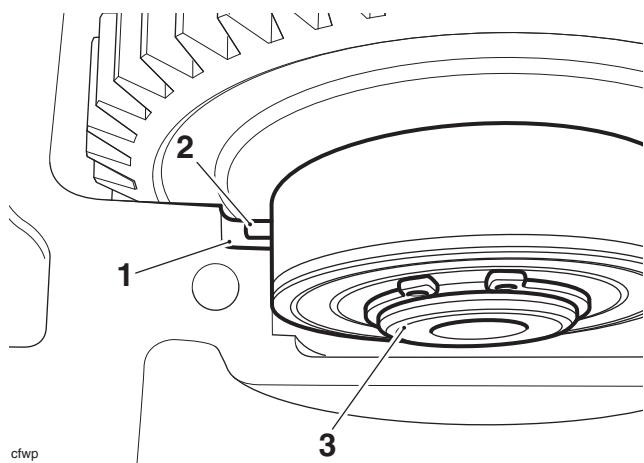
Note:

- The input and output shafts may be removed from the upper crankcase after first separating the lower crankcase from the upper.**

1. Remove the engine from the frame (see page 9-2).
2. Separate the lower crankcase from the upper (see page 5-4).
3. Lift the input shaft from the upper crankcase noting the orientation of each bearing.
4. Lift the output shaft from the upper crankcase noting the orientation of each bearing.

Installation

1. Refit the input shaft to the crankcase ensuring the pins fitted to the outer bearing races locate correctly in the holes in the crankcase.
2. Refit the output shaft to the crankcase ensuring the pins fitted to the outer bearing races locate correctly in the slots in the crankcase.



1. Crankcase slot (output shaft shown)

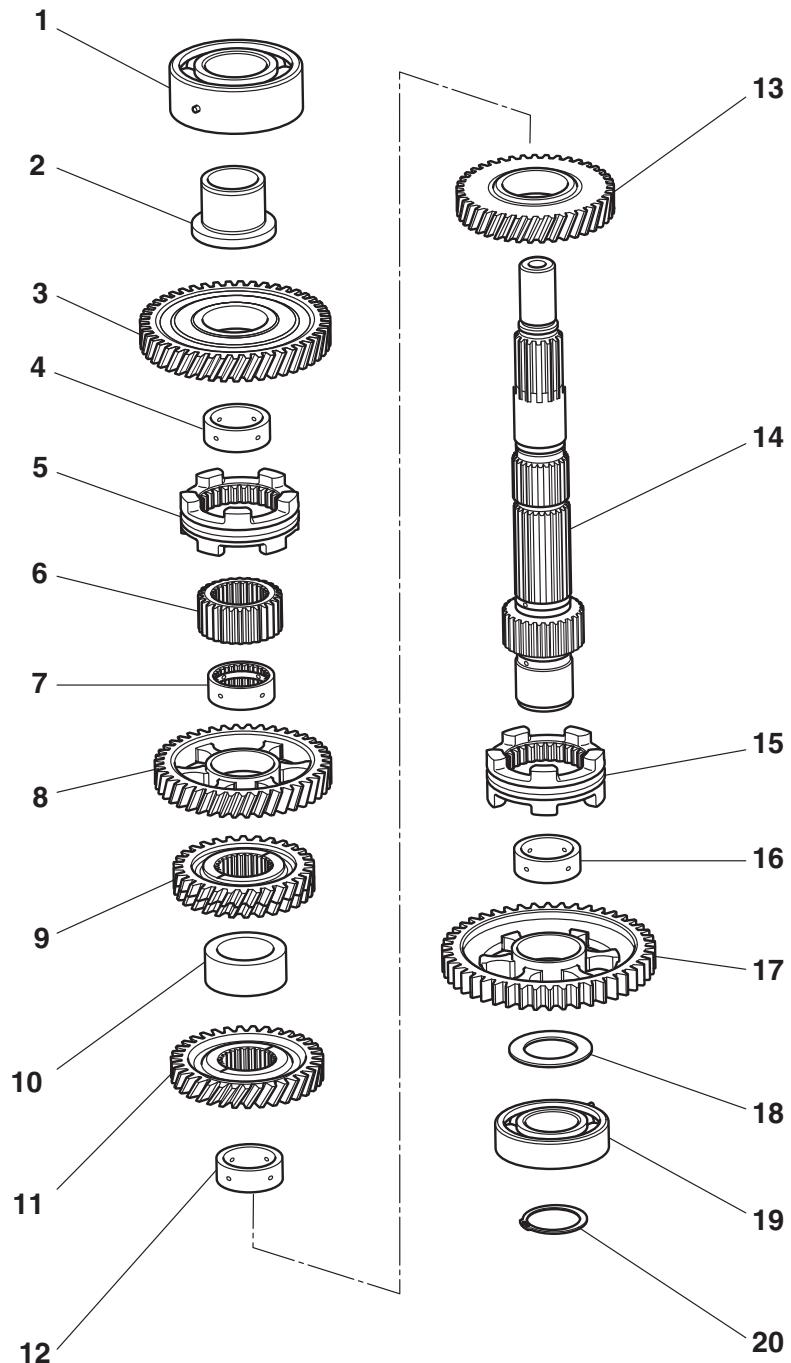
2. Bearing pin

3. Bearing

3. Assemble the crankcases (see page 5-6).
4. Refit the engine to the frame (see page 9-7).

Transmission

Output Shaft



- 1. Ball bearing
- 2. Bearing sleeve
- 3. Second gear
- 4. Plain bush
- 5. Dog ring
- 6. Splined spacer
- 7. Splined bush
- 8. Third gear
- 9. Sixth gear
- 10. Plain spacer
- 11. Fifth gear
- 12. Plain bush

- 13. Fourth gear
- 14. Output shaft
- 15. Dog ring
- 16. Plain bush
- 17. First gear
- 18. Thrust washer
- 19. Bearing
- 20. Circlip

Disassembly

Note:

- All numbers given within brackets in the procedure below refer directly to the numbered items in the diagram on page 7-10.**

Make a note or mark the orientation of all parts prior to removal.

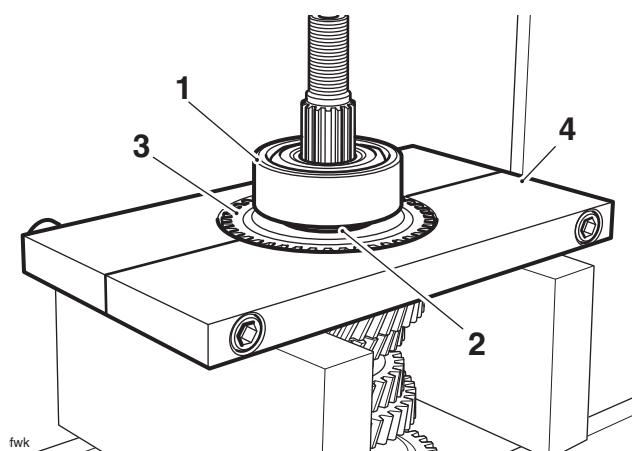


Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

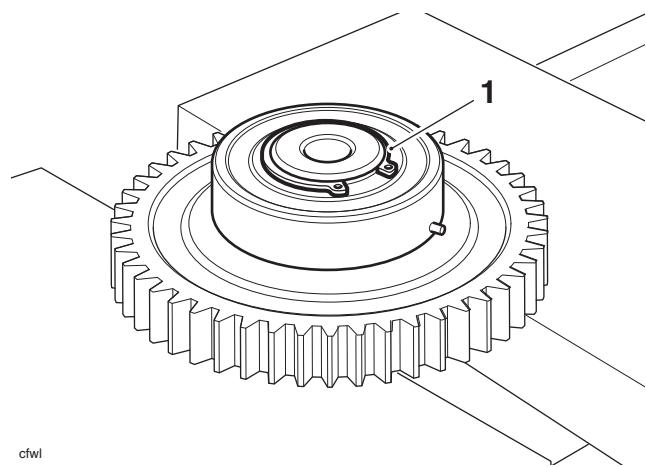
1. Attach service tool T3880133 to second gear (3) as shown below, and using a press, remove second gear and the outer bearing (1) and its sleeve (2).



1. Bearing
2. Sleeve
3. Second gear
4. Tool T3880133

2. If the bearing is to be renewed, noting the orientation of the bearing, press the bearing sleeve (2) out of the bearing using a press.
3. Remove the second gear plain bearing sleeve (4).
4. Noting its orientation, remove the second and third gear dog ring (5) and the splined spacer (6).
5. Noting its orientation, remove third gear (8).
6. Remove the splined bush (7).
7. Remove sixth gear (9).
8. Remove the plain spacer (10).
9. Remove fifth gear (11).
10. Noting its orientation, remove fourth gear (13) and its plain bush (12).

11. Noting its orientation, remove the fourth gear and first gear dog ring (15).
12. Working on the opposite end of the shaft, remove the circlip (20).



1. Circlip

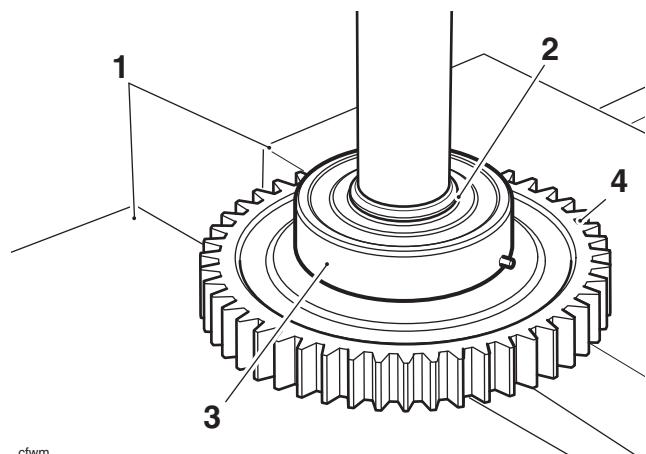


Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

13. Place the shaft (14) in a press with the threaded end of the shaft facing away from the press ram. Support first gear (17) on press bars.



1. Press bars
2. Output shaft
3. Inner bearing
4. First gear

14. Press the shaft (14) through the bearing (19) and first gear (17). Collect the thrust washer (18) from between the gear and bearing. Collect the plain bush (16) from the shaft.

Transmission

Inspection

1. Examine all gears, bearings, bushes and thrust washers for damage, distortion, chipped teeth and wear beyond the service limits. Replace all suspect components and always use a new circlip to assemble the shaft.

Assembly

Note:

- Lubricate each gear, thrust washer and bush with clean engine oil during assembly.



Caution

Bushes with oil holes must always be **MISALIGNED** with the corresponding oil holes in the output shaft. Reduced oil pressure and gear lubrication may result from alignment of the oil holes, which would cause premature wear of engine and transmission components.

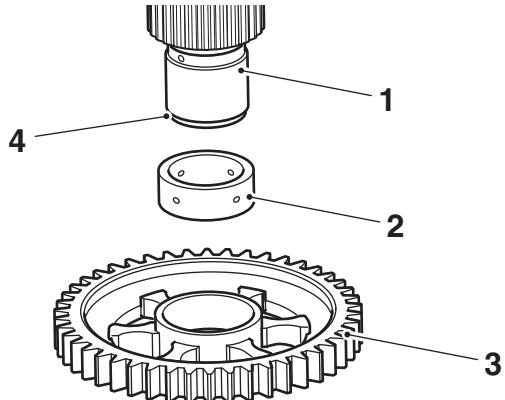


Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

1. Assemble the plain bush (16) and first gear (17), with the dog ring slots facing away from the circlip groove, to the output shaft (14).



1. Output shaft

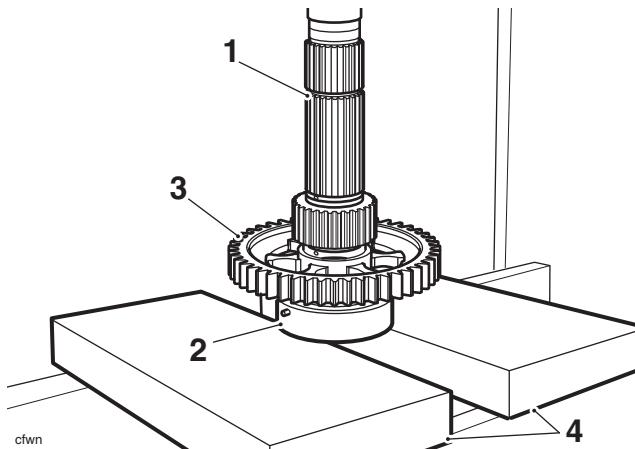
2. Plain bush

3. First gear

4. Circlip groove

2. Fit the thrust washer (18).

- Place the output shaft inner bearing (19) on press bars, ensuring that the press bars support the inner race of the bearing and the locating pin on the outer race will be facing towards first gear when fitted to the shaft.



- Output shaft**
- Bearing**
- First gear**
- Press bars**

- Locate the output shaft (14) to the bearing, with the circlip groove pointing through the bearing (i.e. away from the press).
- Press the output shaft through the bearing until the thrust washer contacts the bearing face.
- Fit a new circlip (20).
- Working from the opposite end of the shaft, slide on the fourth gear and first gear dog ring (15). Ensure that the larger dogs face towards first gear (17).
- Fit the plain bush (12) and fourth gear (13), ensuring the dog ring slots face the dog ring.
- Fit fifth gear (11), and the plain spacer (10).
- Fit sixth gear (9).
- Fit the splined bush (7) and third gear (8), with the dog ring slot facing away from sixth gear.
- Fit the splined spacer (6) and the second and third gear dog ring (5).
- Fit the plain bush (4) and second gear (3) with the dog ring slots facing towards the dog ring (5).

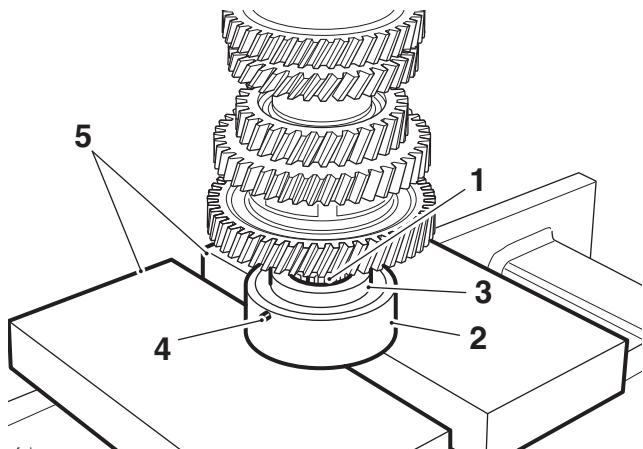
- If the bearing (1) has been removed from the bearing sleeve (2), press a new bearing on to the sleeve using a press. Ensure the pin in the outer bearing race is fitted facing towards the flange on the sleeve.

! Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

- Return the output shaft to the press, and press on the outer bearing and sleeve as an assembly.



- Output shaft**
- Bearing**
- Bearing sleeve**
- Bearing pin**
- Press plates**

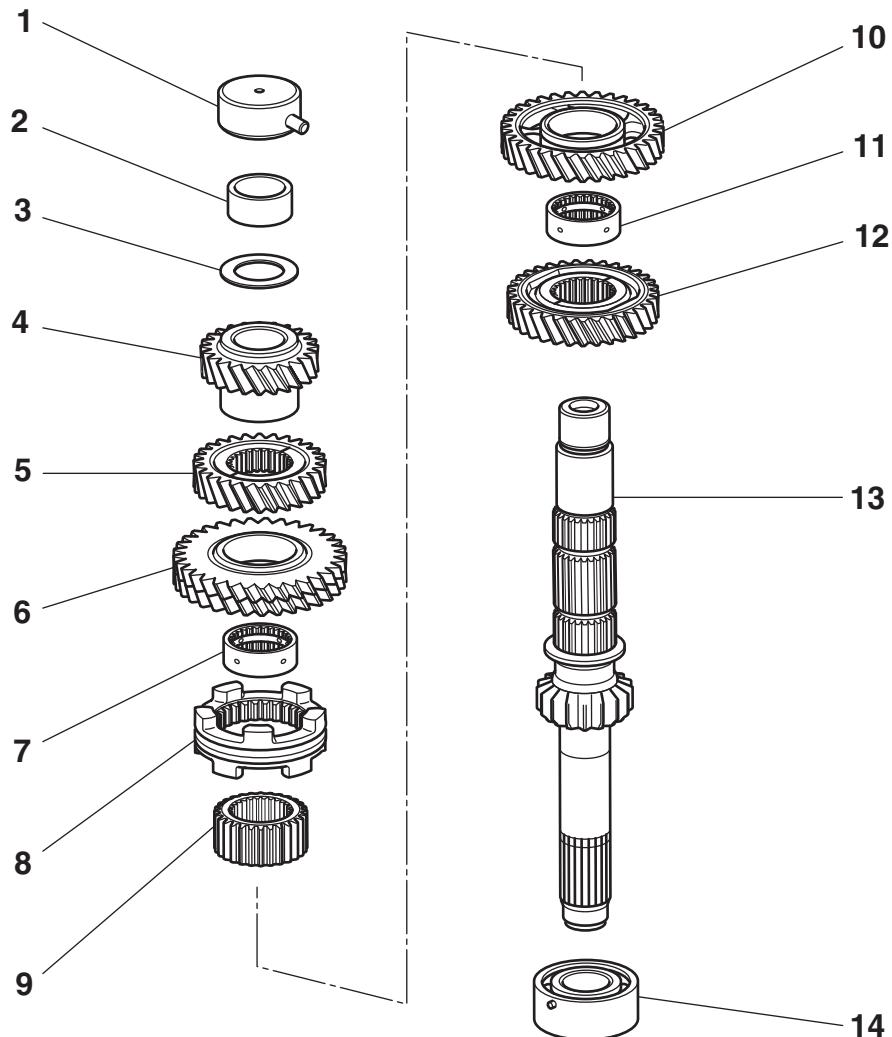
! Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

Transmission

Input Shaft



- | | |
|-----------------------|-------------------|
| 1. Bearing cup | 8. Dog ring |
| 2. Bearing inner race | 9. Splined spacer |
| 3. Thrust washer | 10. Fifth gear |
| 4. Second gear | 11. Splined bush |
| 5. Third gear | 12. Fourth gear |
| 6. Sixth gear | 13. Input shaft |
| 7. Splined bush | 14. Bearing |

Disassembly

Note:

- All numbers given within brackets in the procedure below refer directly to the numbered items in the diagram on page 7-14.**

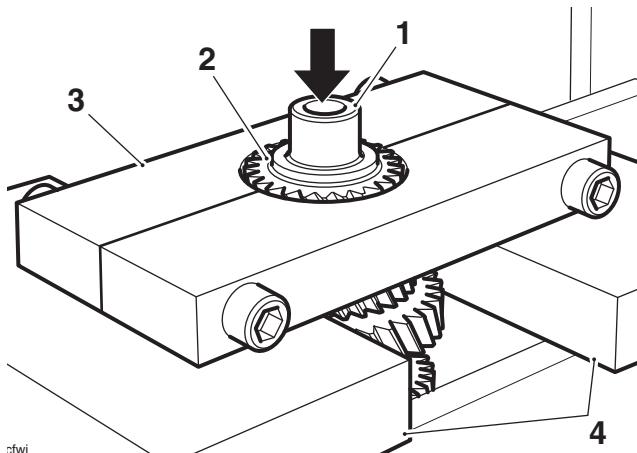
1. Remove the bearing cup (1), bearing race (2) and thrust washer (3).
2. Attach service tool T3880108 to second gear (4) as shown below, hand tighten the fixings to secure the press plates in position.

! Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

3. Using a press, remove second gear (4).



1. Input shaft
2. Second gear
3. Tool T3880108
4. Press plates

4. Remove third gear (5).
5. Noting its orientation, remove sixth gear (6) and its splined bush (7).
6. Noting its orientation, remove the fifth and sixth gear dog ring (8) and the splined spacer (9).
7. Remove fourth gear (12) and its splined bush (11).

Note:

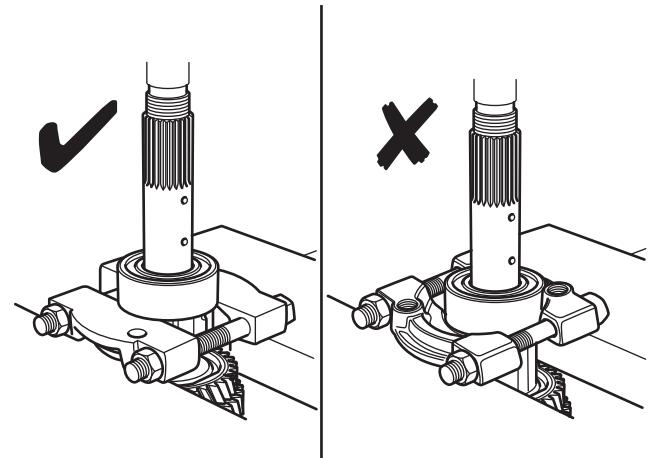
- Unless the bearing (14) at the clutch end of the input shaft is damaged or worn, it is not normally necessary to remove it from the shaft. The bearing is pressed onto the shaft.**

! Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

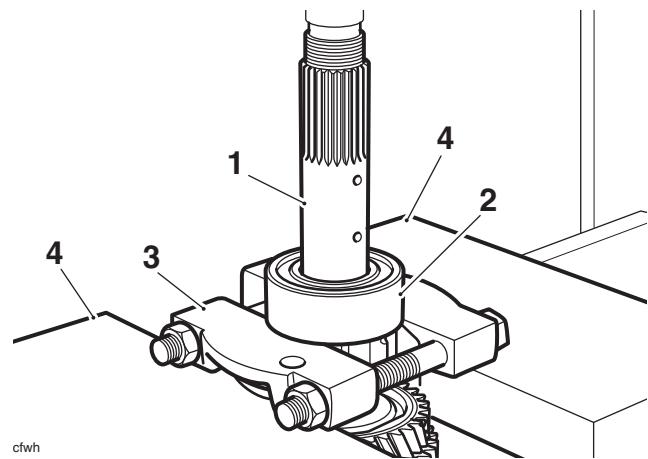
Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

8. Attach service tool T3880108 to the bearing, ensuring the flat side of the tool's jaws are in contact with the bearing.



Service Tool Installation

9. Support the service tool on press bars, then press the shaft through the bearing as shown below:



1. Input shaft
2. Bearing
3. Service tool T3880108
4. Press bars

Transmission

Inspection

1. Examine all gears, bearings and bushes and thrust washers for damage, distortion, chipped teeth and wear beyond the service limits. Replace all defective components.

Assembly

Note:

- Lubricate each gear, thrust washer and bush with clean engine oil during assembly.



Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.



Caution

Bushes with oil holes must always be **MISALIGNED** with the corresponding oil holes in the output shaft. Reduced oil pressure and gear lubrication may result from alignment of the oil holes, which would cause premature wear of engine and transmission components.

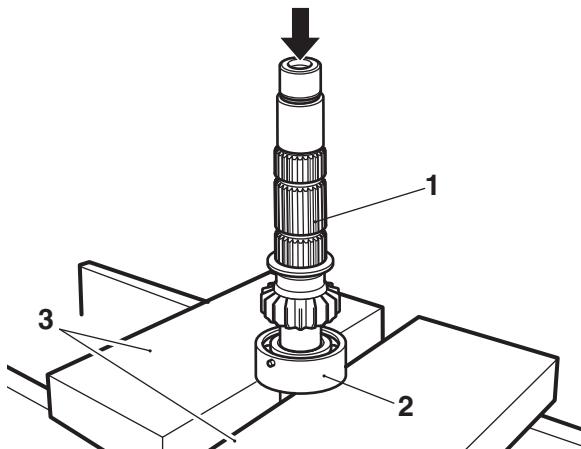


Caution

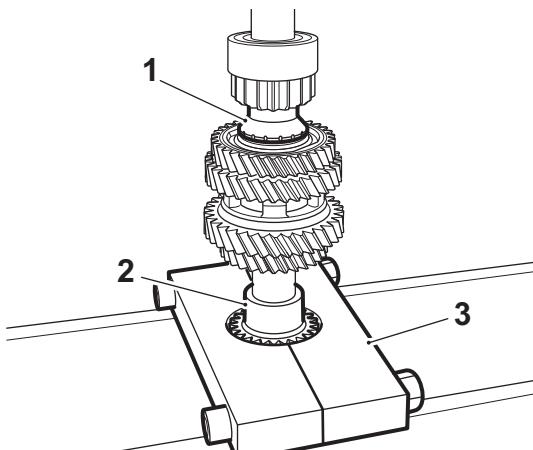
Removing the input shaft bearing from the shaft will damage the bearing. Never reuse removed bearings as use of damaged or weakened components could lead to engine and transmission damage.

1. Position a new bearing (14) to the input shaft.
2. Support the bearing on press bars as shown below, ensuring that the press bars support the inner race of the bearing.

3. Press the bearing fully on to the shaft.

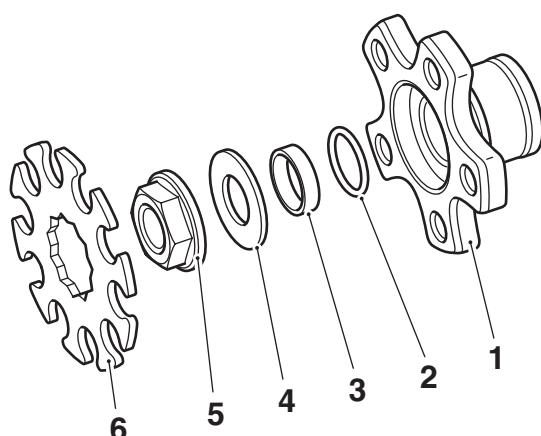


1. Input shaft
2. Bearing
3. Press plates
4. Working now on the opposite end to the bearing, slide on fourth gear (12).
5. Fit the splined bush (11) then fit fifth gear (12), ensuring the dog ring slots face away from the bearing (14).
6. Fit the splined spacer (9) and the fifth and sixth dog ring (8). Ensure that the smaller dogs face towards fifth gear (12).
7. Fit the splined bush (7).
8. Fit sixth gear (6), ensuring the dog ring slots face towards the dog ring (8).
9. Fit third gear (5).
10. Position second gear (4) to the shaft, ensuring the plain section of the gear faces towards third gear (5).
11. Position the input shaft assembly to service tool T3880108 and return to the press. Press second gear on to the input shaft.



1. Input shaft
2. Second gear
3. Tool T3880108
12. Refit the thrust washer (3), bearing race (2) and bearing cup (1).

Output Shaft Drive Belt Pulley Flange



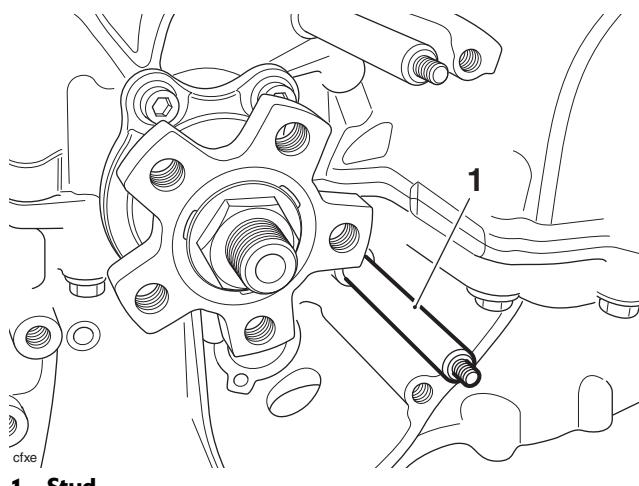
1. Pulley flange
2. O-ring
3. Plastic spacer
4. Washer
5. Nut
6. Locking ring

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the final drive belt (see page 15-8).
2. Remove the gear position sensor (see page 10-166).
3. Remove the locking ring.
4. Remove the expansion tank bracket lower stud.

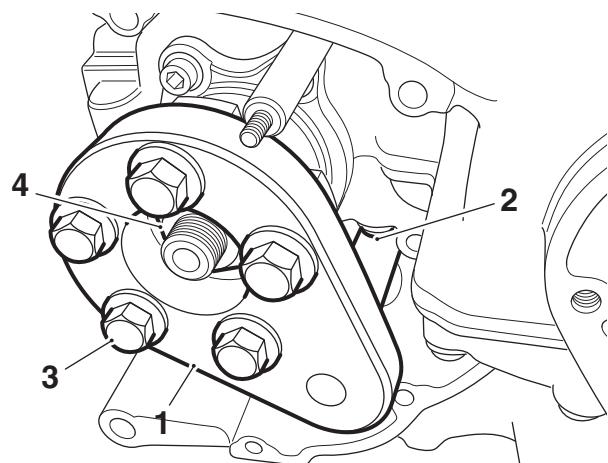


1. Stud

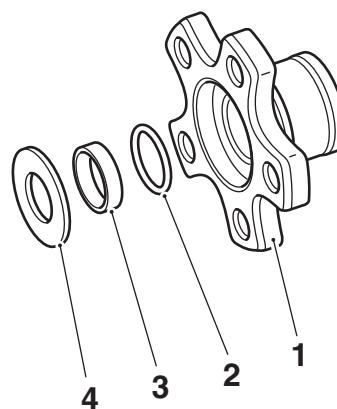
! Caution

Do not rest the pin of tool T3880152 on any part of the crankcase, always position the tool's pin on the bolt head as shown below. Use of the tool with the pin resting on any part of the crankcase will result in severe damage to the crankcases.

5. Install service tool T3880152 to the pulley flange, ensuring the pin on the tool rests on the head of the crankcase bolt as shown below, and secure with the five bolts removed from the final drive belt pulley.



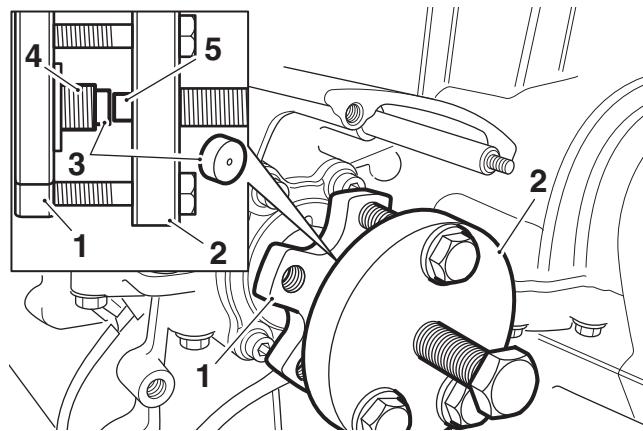
1. Service tool T3880152
2. Crankcase bolt head
3. Bolt
4. Pulley flange nut
6. Remove the pulley flange nut. Retain the nut for use during the assembly process.
7. Remove the washer, plastic spacer and O-ring.



1. Pulley flange
2. O-ring
3. Plastic spacer
4. Washer
8. Assemble service tool T3880054 to the pulley flange as shown below. Ensure the thread protection button is positioned on the end of the output shaft and retained by the tool's forcing screw.

Transmission

- Using the service tool remove the pulley flange from the output shaft.



- Collect the thread protection button and remove the service tool from the pulley flange.

Installation

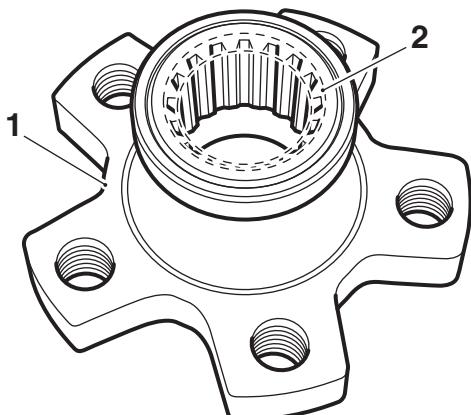
- Clean all traces of locking compound from the splines of the output shaft and pulley flange.



Caution

Only apply ThreeBond 1375B to the area shown below. Ensure the locking compound does not contact the output shaft sealing surface, damage to the oil seal will result from contact with the locking compound.

- Apply a bead of ThreeBond 1375B to the pulley flange as shown below:



- cfxf
- Pulley flange
 - ThreeBond 1375B application area

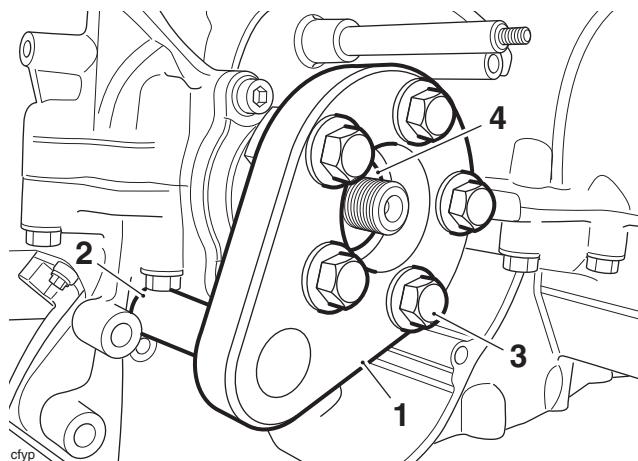
- Fit the pulley flange to the output shaft. Do not fit the O-ring, plastic spacer or washer at this stage.



Caution

Do not rest the pin of tool T3880152 on any part of the crankcase, always position the tool's pin on the bolt head as shown below. Use of the tool with the pin resting on any part of the crankcase will result in severe damage to the crankcases.

- Install service tool T3880152 to the pulley flange, ensuring the pin on the tool rests on the head of the crankcase bolt as shown below, and secure with the five bolts removed from the final drive belt pulley.



- Service tool T3880152
- Crankcase bolt head
- Bolt
- Pulley flange nut
- Refit the original nut removed during disassembly, and tighten to **165 Nm**.
- Remove and discard the original nut.
- Fit a new O-ring, plastic spacer and washer.
- Fit a new nut, and tighten to **350 Nm**.
- Refit the locking ring over the nut, ensuring the holes in the ring align with the bolt holes in the pulley flange.
- Refit the gear position sensor (see page 10-169).
- Refit the final drive belt (see page 15-10).

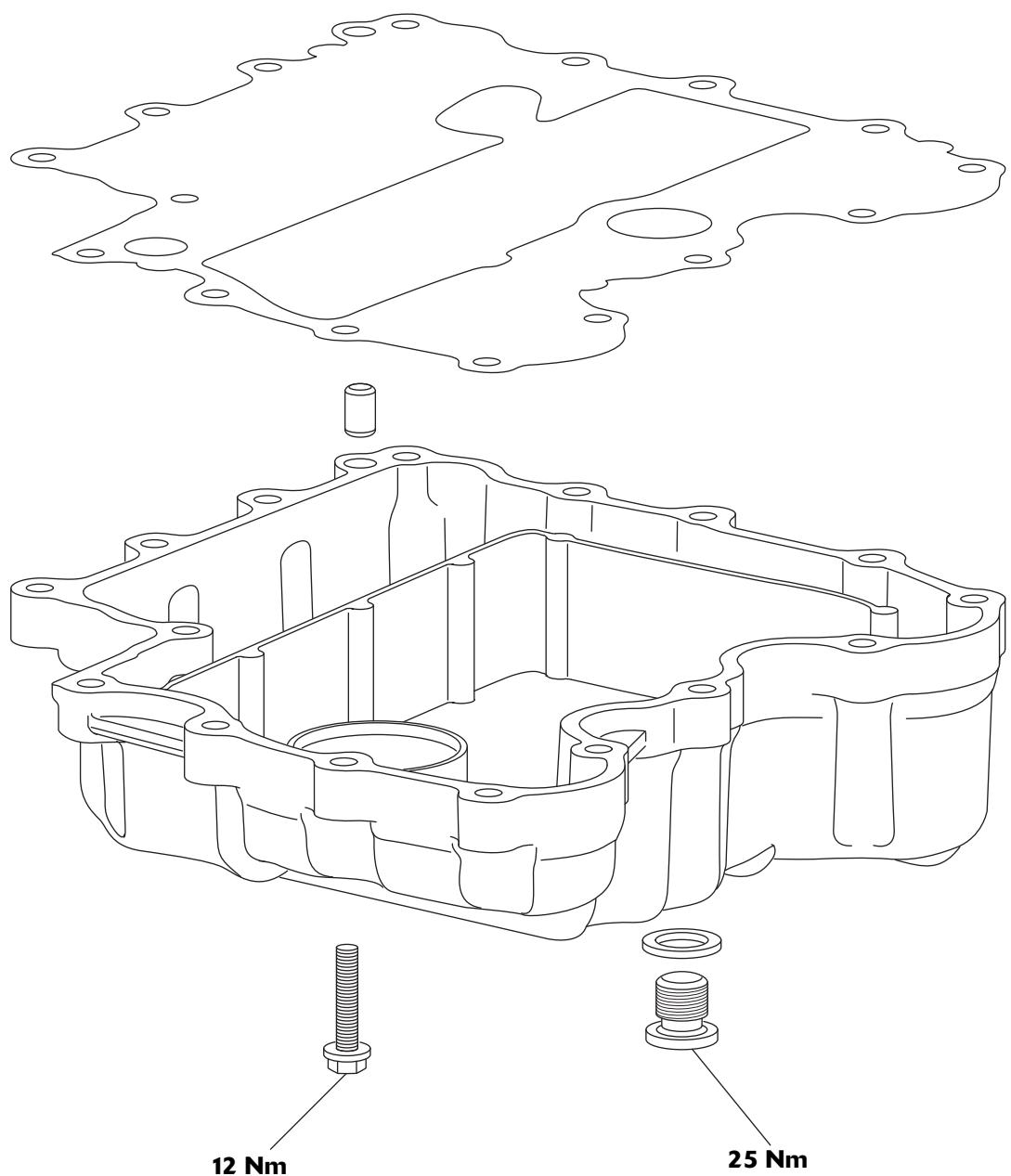
8 Lubrication

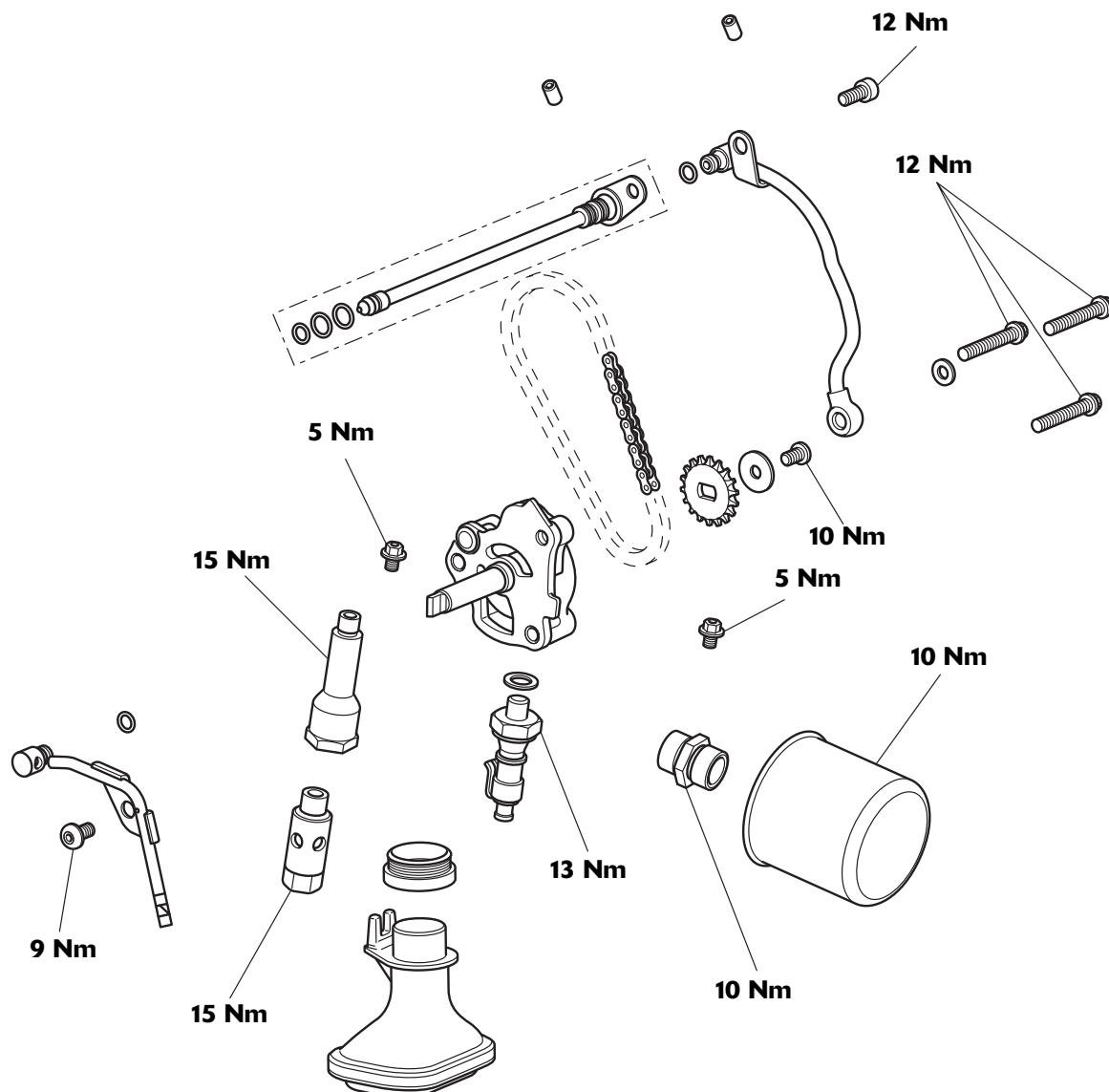
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Lubrication

Exploded View – Sump



Exploded View – Oil Filter and Pump

Lubrication

Oil Circuit

Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit. The oil circuit is split into two parts - the Main circuit and the Transmission circuit.

Main Circuit

Pressurised oil flows past the oil pressure relief valve, which controls the maximum pressure in the oil circuit. The relief valve is set to open at 5.1 bar (74 lb/in²) and when open, returns high pressure oil directly to the sump.

From the main oil circuit, some oil is fed to the balancer shaft thrust face spray jets. The oil in the main circuit then flows through the oil filter, after which another branch supplies oil to the hydraulic camshaft drive chain tensioner.

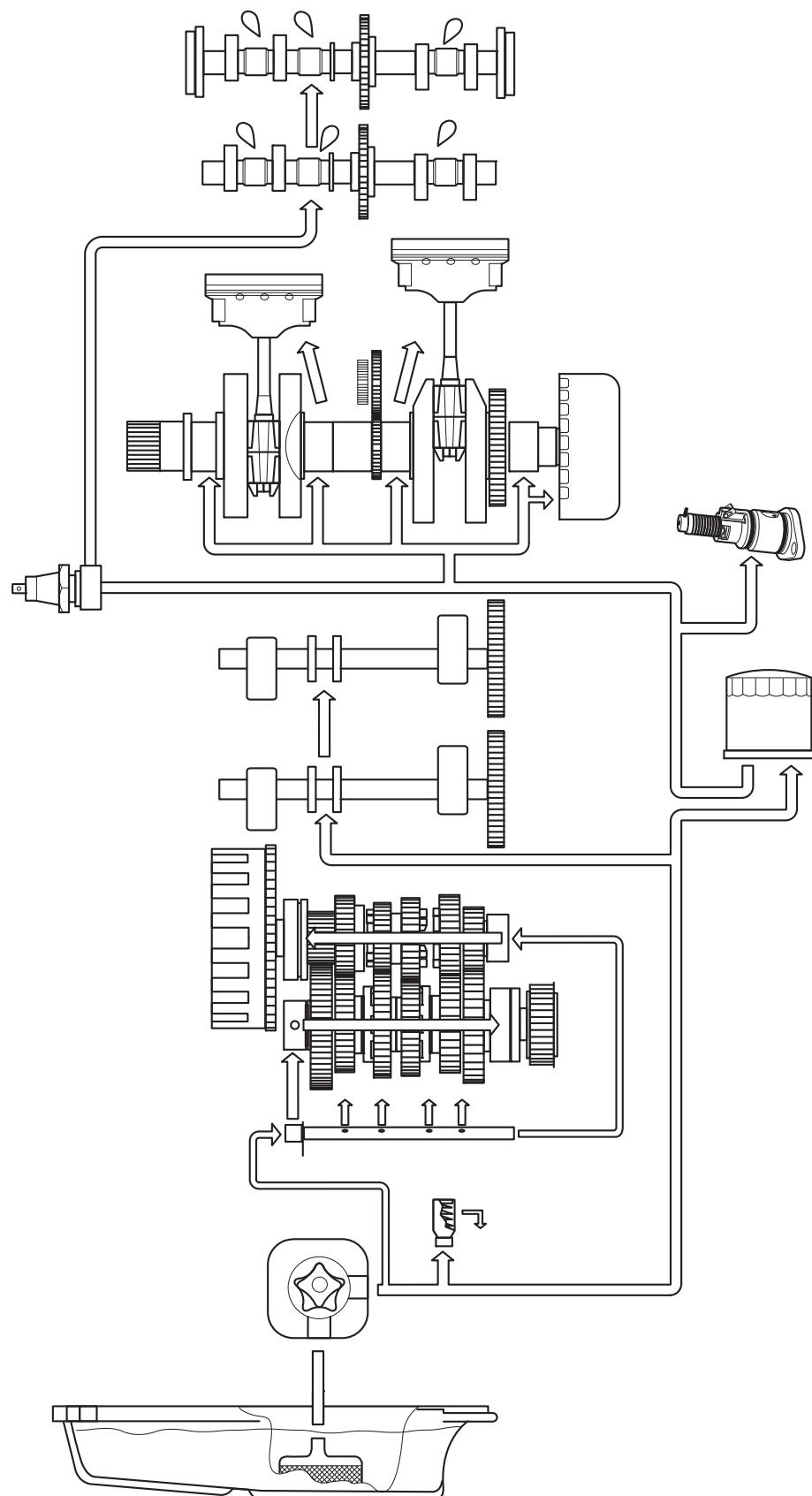
Filtered oil is then fed into the lower crankcase gallery. The low oil pressure switch is located in this gallery. From here oil is distributed around the engine:

- Some oil is sent directly to the cylinder head via a drilling in the upper crankcase. Oil that arrives at the cylinder head is fed to both camshafts via galleries in the camshaft ladder castings that deliver oil directly to the camshaft bearings. This oil also lubricates the tappet buckets and the valves. Oil from the cylinder head area lubricates the camshaft drive chain before draining back to the sump.
- The remaining oil is sent directly to the main gallery located to the rear of the cylinders. Here it is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings.
- Spray jets located in the upper crankcase, behind the main bearing shells, lubricate the pistons and connecting rod small ends. These jets are fed oil from the crankshaft oil feed.
- Oil is also fed to the alternator spray bar to aid cooling of the alternator. The oil is taken from the crankshaft oil feed and directed to the alternator stator and rotor.

Transmission Circuit

- Pressurised oil is fed via a pipe from the oil pump to the gearbox spray bar, where oil is directed via drillings to the input and output shafts and the clutch. Oil is circulated along the gearbox shafts to exit holes that feed directly to the bearings, gears and selectors. The gearbox spray bar also lubricates the gears and selector forks and selector drum.

Oil Circuit Diagram



Lubrication

Engine Oil

Specification

Use semi or fully synthetic 10W/40 or 10W/50 motorcycle engine oil which meets specification API SH (or higher) and JASO MA, such as Castrol Power 1 Racing 4T, sold as Castrol Power RS Racing 4T in some countries.



Caution

Triumph high performance fuel injected engines are designed to use semi or fully synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA.

Do not add any chemical additives to the engine oil. The engine oil also lubricates the clutch and any additives could cause the clutch to slip.

Do not use mineral, vegetable, non-detergent oil, castor based oils or any oil not conforming to the required specification. The use of these oils may cause instant, severe engine damage.

Ensure no foreign matter enters the oil tank during an oil change or top up.

Triumph Engine Oil

Your Triumph motorcycle is a quality engineered product which has been carefully built and tested to exacting standards. Triumph Motorcycles are keen to ensure that you enjoy optimum performance from your machine and with this objective in mind have tested many of the engine lubricants currently available to the limits of their performance.

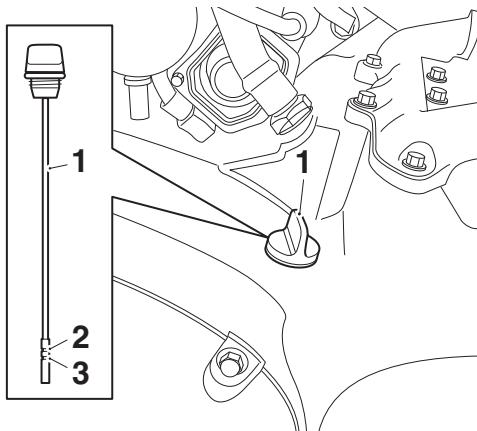
Oil Level Inspection

In order for the engine, transmission, and clutch to function correctly, maintain the engine oil at the correct level, and change the oil and oil filter in accordance with scheduled maintenance requirements.



Warning

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated engine wear and may result in engine or transmission seizure. Seizure of the engine or transmission may lead to sudden loss of control and an accident.



1. Filler cap/dipstick
2. Maximum mark
3. Minimum mark



Warning

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.



Caution

Running the engine with insufficient oil will cause engine damage. If the low oil pressure indicator remains on, stop the engine immediately and investigate the cause.



Caution

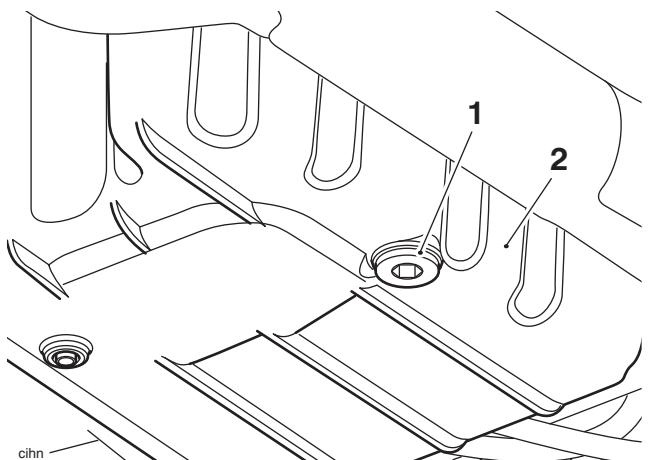
Ensure no foreign matter or contamination enters the engine during an oil change or top up. Contamination entering the engine may lead to engine damage.

- Start the engine and run at idle for approximately five minutes.
- Stop the engine, then wait for at least three minutes to allow the oil to settle.
- Carefully clean the area around the filler cap/dipstick before removal.
- Remove the filler cap/dipstick from the crankcase, wipe the dipstick clean and refit the filler cap/dipstick, screwing it fully home.

Note:

- The actual level is indicated when the motorcycle is upright, (not on the side stand) and when the filler cap/dipstick has been pushed fully home.**
- Remove the filler cap/dipstick.
- The maximum oil level is indicated by a mark on the filler cap/dipstick. When the oil level is correct, the indicated oil level must be between the maximum and minimum lines on the dipstick.
- If the oil level is too low, add oil a little at a time until the correct level is reached.
- Once the correct level is reached, fit the filler cap/dipstick.

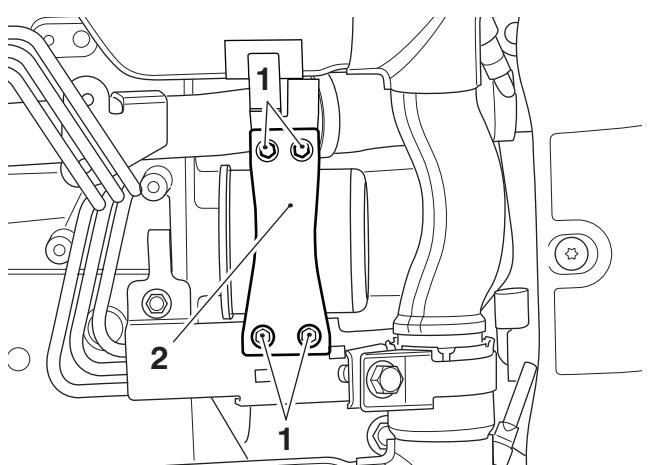
- Remove the sump plug from the bottom of the sump and allow the oil to drain.



1. Sump plug

2. Engine sump (Thunderbird LT shown)

- Incorporating a new washer, refit the sump plug, tightening it to **25 Nm**.
- For Thunderbird Commander and Thunderbird LT:** Release the fixings and remove the catalytic converter mounting bracket.



1. Fixings

2. Catalytic converter mounting bracket

- Position the oil drain pan beneath the oil filter.



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains harmful contamination that can lead to skin cancer. Always wear suitable protective clothing and avoid skin contact with used oil.

- Warm up the engine thoroughly then stop the engine and secure the motorcycle in an upright position.
- Allow the oil to settle for 5 minutes before draining.



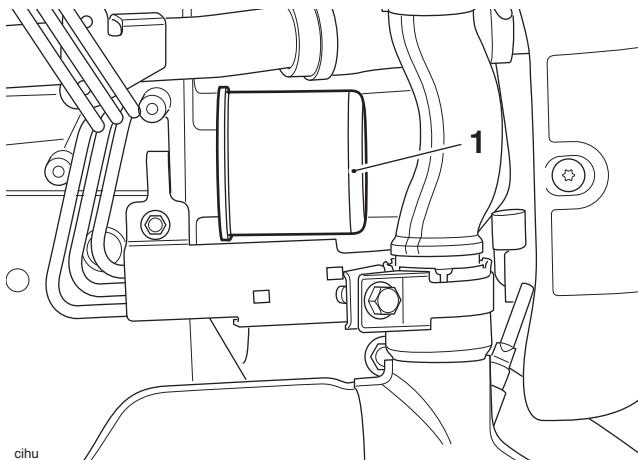
Warning

The oil and filter may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.

- Place an oil drain pan beneath the engine.

Lubrication

- Unscrew and remove the oil filter using Triumph service tool T3880313. Dispose of the old filter in an environmentally friendly way.



1. Oil filter (Thunderbird LT shown)

- Apply a thin smear of clean engine oil to the sealing ring of the new oil filter. Fit the oil filter and tighten to **10 Nm**.
- Fill the engine to the maximum mark with a 10W/40 or 10W/50 semi or fully synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA.
- Start the engine and allow it to idle for a minimum of 30 seconds.



Caution

Raising the engine speed above idle, before the oil reaches all parts of the engine can cause engine damage or seizure. Only raise engine speed after running the engine for 30 seconds to allow the oil to circulate fully.



Caution

If the engine oil pressure is too low, the low oil pressure warning light will illuminate. If this light stays on when the engine is running, stop the engine immediately and investigate the cause. Running the engine with low oil pressure will cause engine damage.

- Ensure that the low oil pressure warning light extinguishes shortly after starting.
- Turn off the ignition, check the oil level using the method previously described, and top up to between the minimum and maximum level lines on the dipstick.
- For Thunderbird Commander and Thunderbird LT:** Refit the catalytic converter bracket and tighten its fixings to **15 Nm**.

Disposal of Used Engine Oil and Oil Filters

To protect the environment, do not pour oil on the ground, down sewers or drains, or into watercourses. Do not place used oil filters in with general waste. If in doubt contact your local authority.

Low Oil Pressure Warning Light Switch



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants that can cause cancer.

When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.



Caution

Do not pour engine oil on the ground, down sewers or drains, or into watercourses. To prevent pollution of watercourses etc., dispose of used oil sensibly. If in doubt contact your local authority.

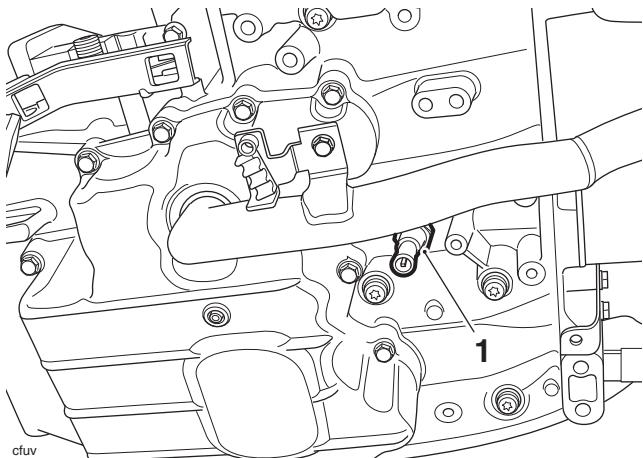


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Installation

- Incorporating a new sealing washer, fit the low oil pressure light switch, tightening it to **13 Nm**.



1. Low oil pressure warning light switch

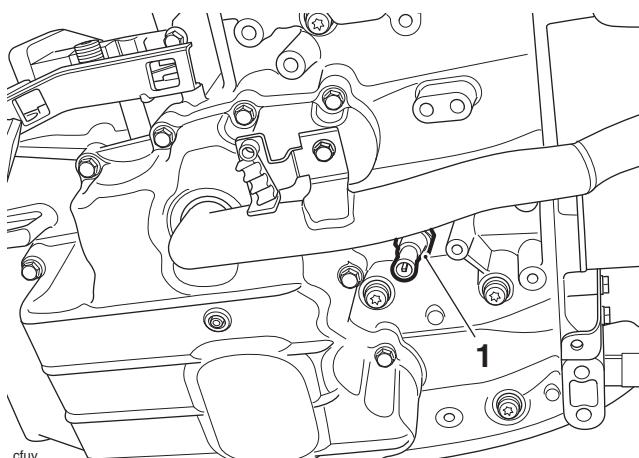
- Reconnect the electrical connector.
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).

Removal

- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Disconnect the electrical connection.

Note:

- A small amount of oil will drain from the oil gallery when the switch is removed.**
- Position a suitable receptacle to collect any displaced oil from the oil gallery.
- Unscrew and remove the switch.



1. Low oil pressure warning light switch

Lubrication

Sump

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.



Warning

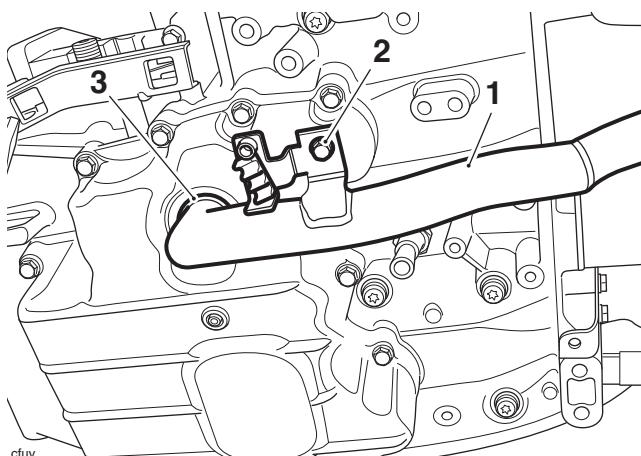
Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants that can cause cancer. When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.



Caution

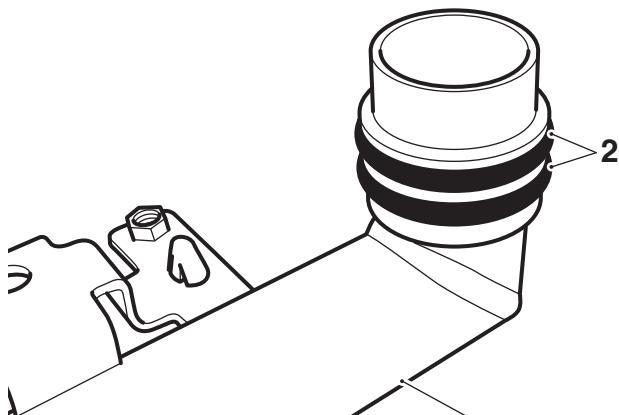
Do not pour engine oil on the ground, down sewers or drains, or into watercourses. To prevent pollution of watercourses etc., dispose of used oil sensibly. If in doubt contact your local authority.

3. Drain the engine oil (see page 8-7).
4. Drain the coolant (see page 11-6).
5. Release the fixing from the lower coolant tube.
6. Carefully ease the coolant tube out of the water pump inlet. Unclip the rear brake pipes from the clip on the coolant tube bracket as it is released.



1. Coolant tube
2. Fixing
3. Water pump inlet

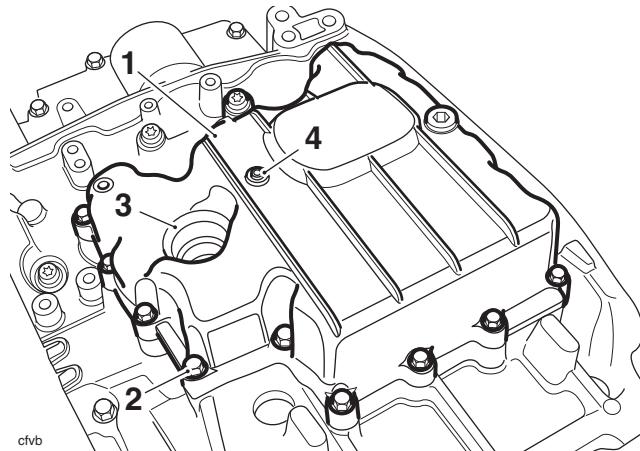
7. Remove, then discard the two coolant tube O-rings.



1. Coolant tube

2. O-rings

8. Remove the sump bolts.



1. Sump

2. Sump bolt

3. Water pump inlet

4. Water pump drain tube

9. Detach the sump noting the position of the dowel, and collect the water pump drain tube. Remove and discard the four drain tube O-rings.

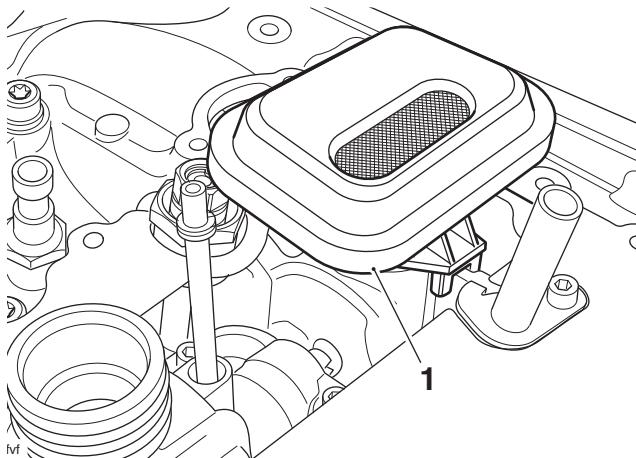
Note:

- The water pump drain tube may remain attached to the water pump or become detached with the sump.
10. Discard the sump gasket and two water pump O-rings.

Inspection**Warning**

Ensure the oil pick-up is clean and free of blockages or restrictions. If the oil flow is restricted, oil pressure will be reduced and may cause severe engine damage.

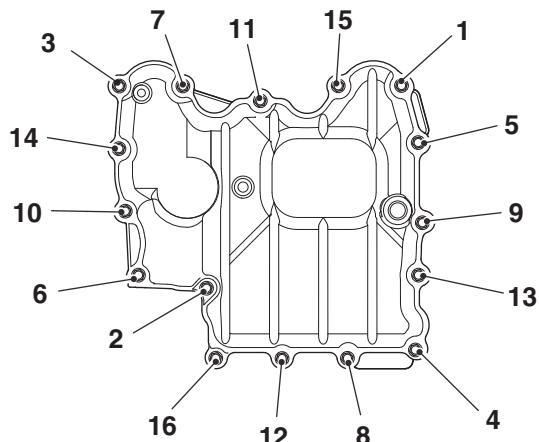
1. Check the oil pick-up for blockages or restrictions. Remove and clean if found to be blocked or restricted.



1. Oil pick-up

Installation

1. Position new O-rings to the water pump and water pump drain tube.
2. Refit the water pump drain tube to the water pump.
3. Position a new sump gasket to the crankcase.
4. Refit the oil pick-up.
5. Refit the sump, install and tighten the fixings as described below:
 - Tighten the fixings in the sequence shown below to **12 Nm**.
 - Tighten fixings one and two again to **12 Nm**.

**Sump Tightening Sequence**

6. Fit new O-rings to the lower coolant tube.
7. Insert the coolant tube into the water pump inlet. Refit the rear brake pipes to the clip on the coolant tube bracket.
8. Secure the coolant tube with the bolt, tightening to **9 Nm**.
9. Reconnect the battery, positive (identified with red tape) lead first.
10. Refill the engine with clean engine oil (see page 8-8).
11. Refill the cooling system (see page 11-7).
12. Start the engine and check for oil and coolant leaks.
13. Refit the rider's seat (see page 17-20).

Lubrication

Oil Pump



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants that can cause cancer. When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.

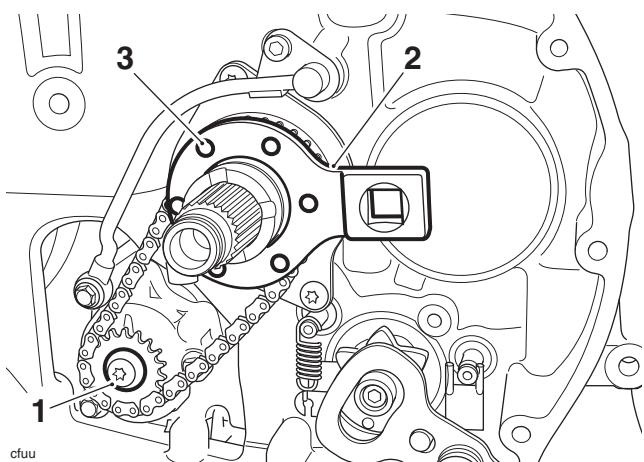


Caution

Do not pour engine oil on the ground, down sewers or drains, or into watercourses. To prevent pollution of watercourses etc., dispose of used oil sensibly. If in doubt contact your local authority.

Removal

1. Remove the clutch assembly (see page 4-13).
2. Fit service tool T3880121 to the drive pegs of the oil pump drive sprocket to prevent the sprocket from turning.
3. Remove the bolt and washer from the oil pump shaft. Discard the bolt.



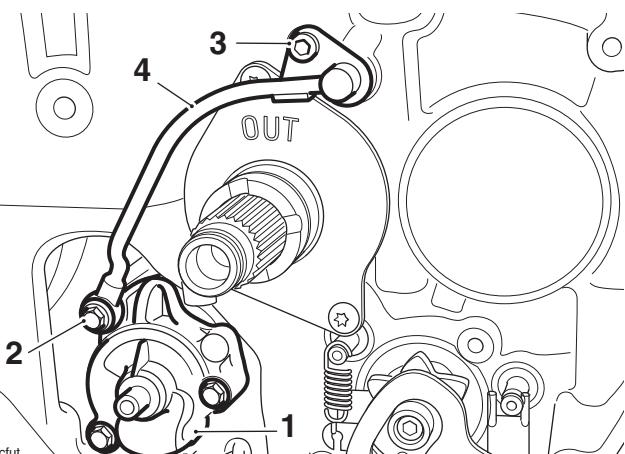
1. Bolt

2. Tool T3880121

3. Drive pegs

4. Remove service tool T3880121.
5. Remove the oil pump sprocket, drive sprocket and chain as one item by sliding them off the oil pump shaft and input shaft.
6. Remove the transmission oil feed pipe screw and oil pump upper bolt, noting the position of the washer under the bolt head.

7. Remove the transmission oil feed pipe from the transmission spray bar. Discard the O-ring.



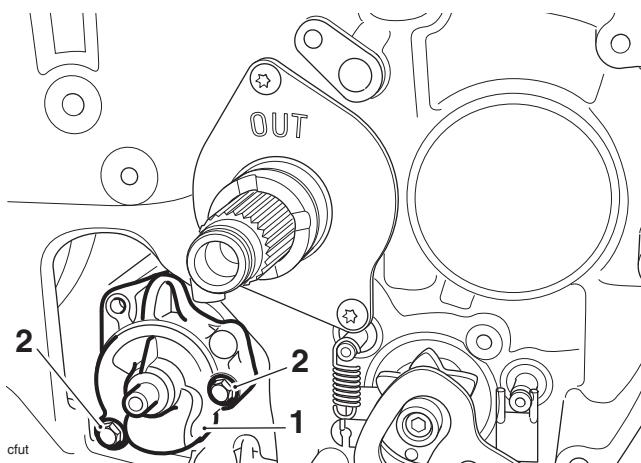
1. Oil pump

2. Oil pump upper bolt

3. Screw

4. Transmission oil pipe

8. Remove the remaining two oil pump bolts and remove the oil pump.



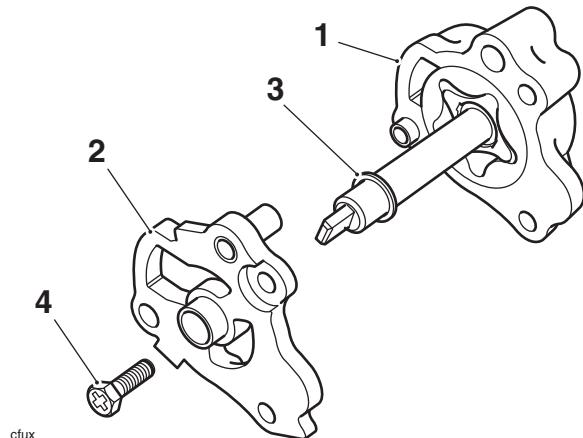
1. Oil pump

2. Bolts

9. Retain the washer from the upper oil pump fixing for reuse, and discard the oil pump and transmission oil feed pipe fixings.

Disassembly

1. Remove the bolt and withdraw the oil pump back plate.
2. Collect the shim from the oil pump shaft.



1. Oil pump body

2. Back plate

3. Shim

4. Bolt

Inspection



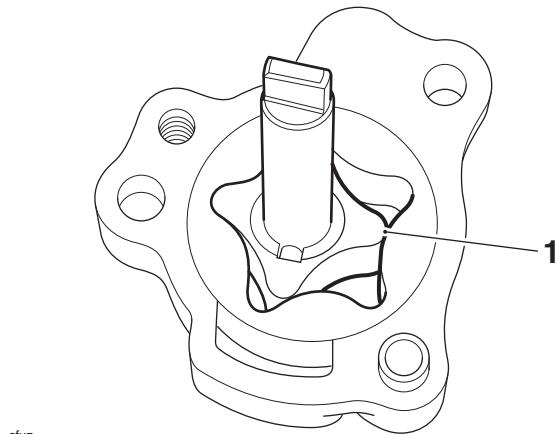
Caution

If any part of the oil pump is found to be outside the service limit, the complete pump must be replaced. Severe engine damage may result from the continued use of a faulty oil pump.

Clearances

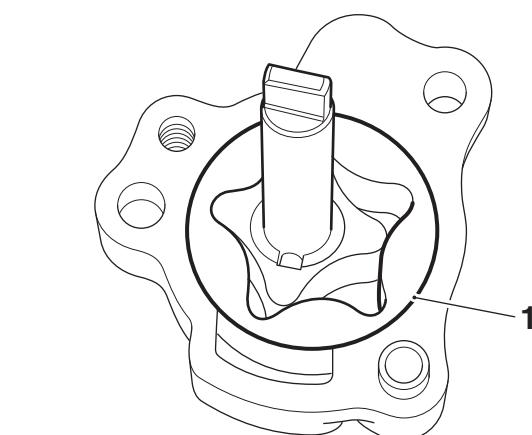
Item	Standard	Service limit
Oil pump rotor tip clearance	0.15 mm	0.30 mm
Oil pump body clearance	0.15 - 0.22 mm	0.35 mm
Oil pump rotor end float	0.02 - 0.07 mm	0.10 mm

1. Measure the oil pump rotor tip clearance using feeler gauges.



1. Rotor tip clearance

2. Measure the oil pump body clearance using feeler gauges.



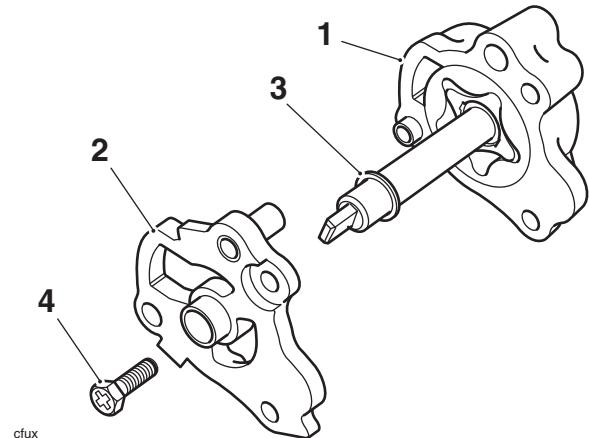
1. Pump body clearance

3. Measure the oil pump rotor end float.
4. Clearances:
 - a) If all clearances are within service limits, liberally apply clean engine oil to all internal components and refit the oil pump plate to the oil pump body.
 - b) If any clearance measured is outside the service limits, renew the complete pump.
5. Inspect the sprockets and chain for wear and/or damage. Replace the sprocket and chain if wear and/or damage is found.

Lubrication

Assembly

- If the pump is serviceable, refit the shim to the shaft and install the backplate. Tighten the backplate bolt to **12 Nm**.



cfux
1. Oil pump body
2. Back plate
3. Shim
4. Bolt

Installation

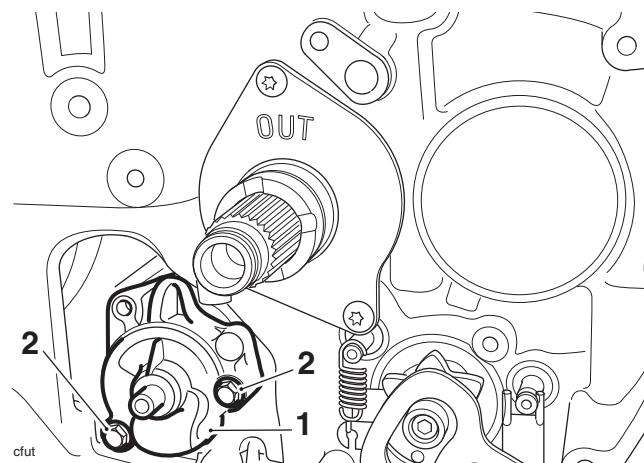


Caution

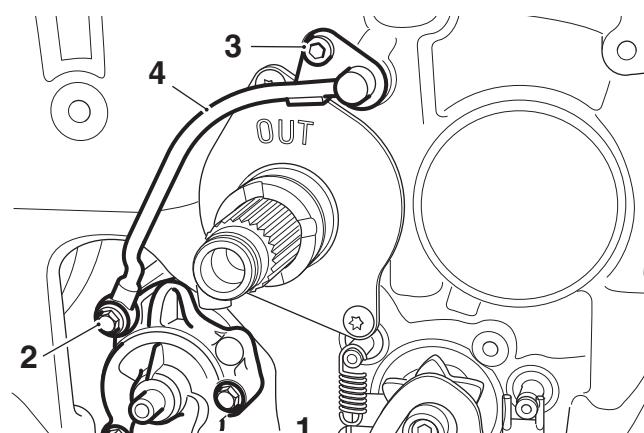
As a precaution, before fitting the oil pump to the crankcase, ensure the pump internal surfaces have been 'wetted' with clean engine oil. The pump may fail to pick up oil from the sump if the surfaces have not been 'wetted'. This will cause the engine to run without engine oil pressure and will lead to severe engine damage.

- Fill the oil pump with new engine oil, turning the pump rotor as the oil is poured in. Ensure all internal surfaces of the pump are coated in oil.
- Position the oil pump to the crankcase. Rotate the oil pump until the water pump drive shaft can be felt to engage with the water pump.

- Fit two new bolts to the lower oil pump fixing holes. Tighten to **12 Nm**.

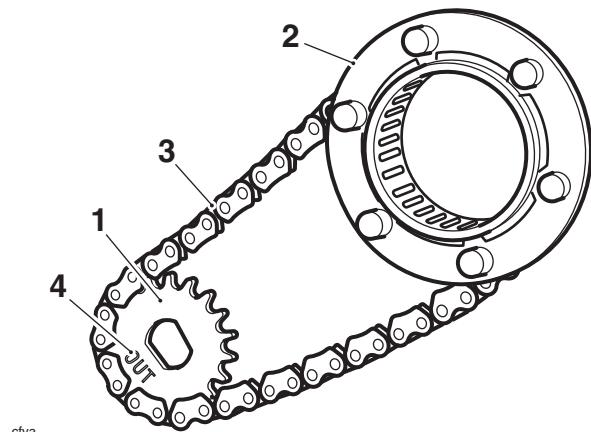


- 1. Oil pump**
- 2. Bolts**
- Fit a new O-ring to the transmission oil feed pipe.
- Refit the transmission oil feed pipe, ensuring the upper end of the pipe is fully seated in the transmission spray bar.
- Secure the lower end of the pipe with a new bolt, through the oil pump body. Ensure the washer is located under the upper oil pump bolt head as noted during removal. Tighten to **12 Nm**.
- Fit a new screw to the transmission oil feed pipe upper fixing. Tighten to **12 Nm**.



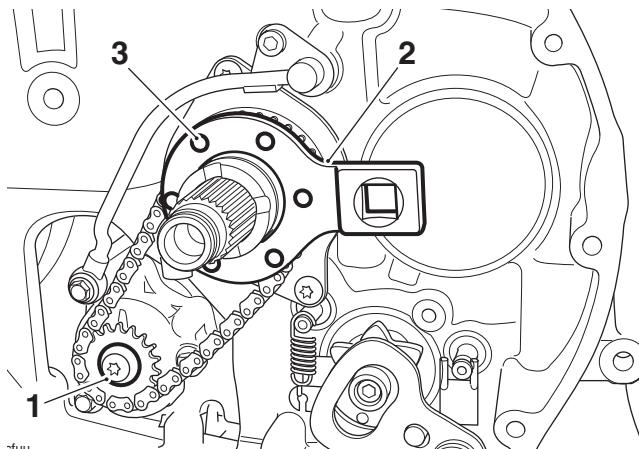
1. Oil pump
2. Oil pump upper bolt
3. Screw
4. Transmission oil pipe

8. Assemble the oil pump sprocket and input shaft drive sprocket to the chain ensuring the 'OUT' mark on the oil pump sprocket is facing outwards.



1. Pump sprocket
2. Drive sprocket
3. Chain
4. 'OUT' mark

9. Secure the oil pump sprocket to the pump shaft with a new bolt. Ensure the washer is fitted to the bolt as noted during removal.
10. Fit service tool T3880121 to the drive pegs of the oil pump drive sprocket to prevent the sprocket from turning and tighten the bolt to **10 Nm**.

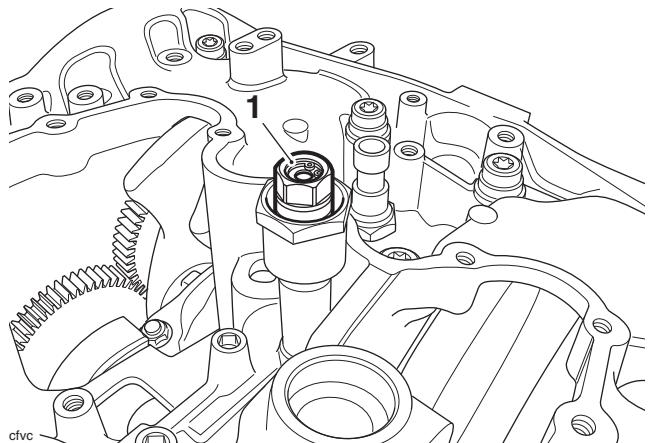


1. Bolt
2. Tool T3880121
3. Drive pegs

11. Refit the clutch assembly (see page 4-16).

Oil Pressure Relief Valve

The oil pressure relief valve is located in the lower crankcase. It is a threaded fit in the crankcase.



1. Oil pressure relief valve

When refitting the valve, tighten it to **15 Nm**. If removed, tighten the oil pressure relief valve adapter to **15 Nm**.

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9 Engine Removal and Refit

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Removal	9.2
Installation	9.7

Engine Removal and Refit

Removal

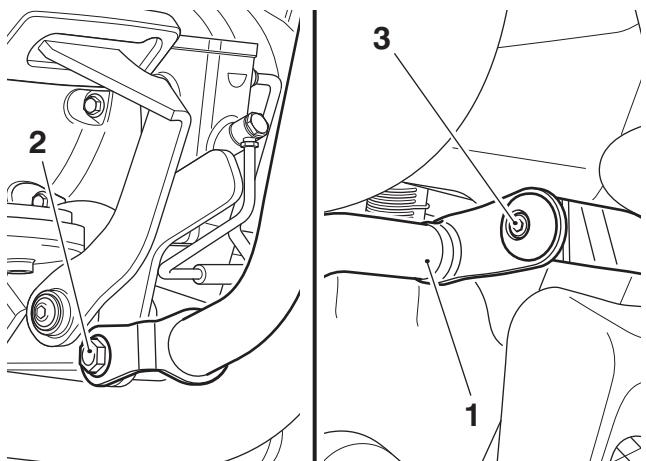


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

To gain access to the engine for removal:

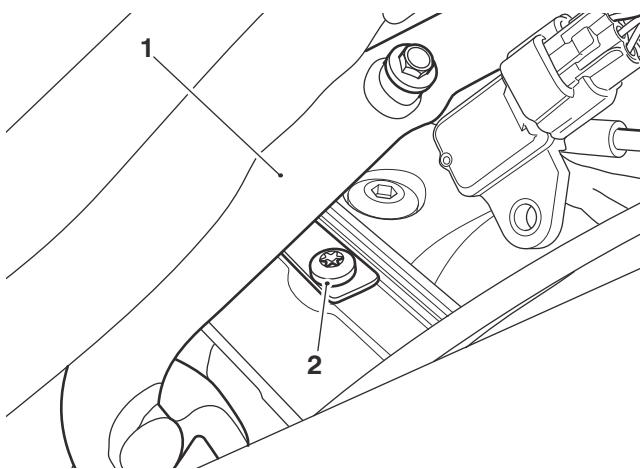
1. Raise and securely support the motorcycle and engine.
2. Remove the rider's seat (see page 17-21).
3. Disconnect the battery, negative (black) lead first.
4. Remove the left and right side panels (see page 17-30).
5. Drain the engine oil (see page 8-7).
6. Remove the fuel tank (see page 10-144).
7. Remove the throttle body (see page 10-171).
8. If fitted, remove the front dresser bars. Note the position of the finishers and washers for installation.



1. Dresser bar
2. Lower fixing
3. Upper fixing

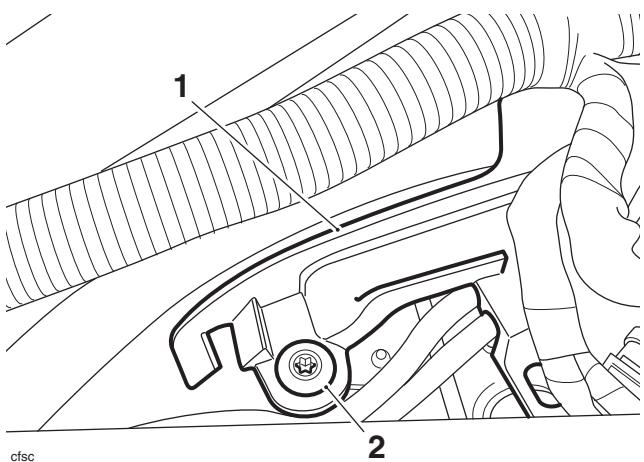
9. Remove the exhaust system (see page 10-185 for all models except Thunderbird Commander and Thunderbird LT, see page 10-189 for Thunderbird Commander and Thunderbird LT).
10. Drain the cooling system (see page 11-6).
11. Remove the radiator (see page 11-12).
12. Release the hose clips securing the upper coolant tube to the thermostat housing hose, top hose and radiator cap housing hose.

13. Remove and discard the fixing securing the coolant upper tube to the frame.



1. Coolant tube
2. Fixing

14. Ease the upper coolant tube upwards at the rear to release it from the thermostat housing hose.
15. Release the coolant tube from the radiator top hose and then the radiator cap housing hose.
16. Remove the upper coolant tube upwards through the frame rails.
17. Remove both MAP sensors, noting the routing of the MAP sensor hoses and harnesses (see page 10-164).
18. Remove the bolt securing the throttle cable and harness guide to the frame.

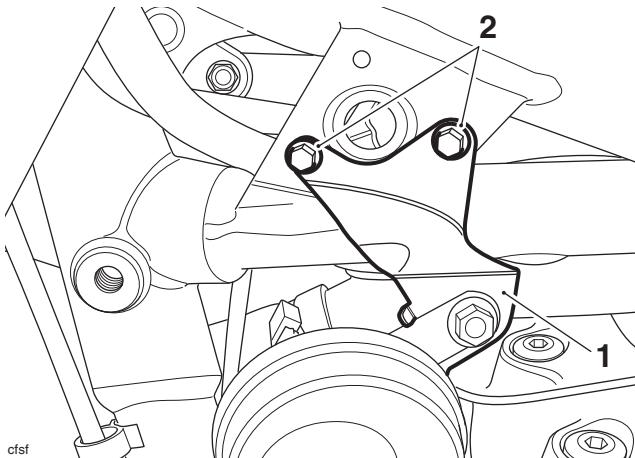


1. Throttle cable and harness guide
2. Fixing

19. Disconnect the MAP sensor hoses at the throttle body.
20. **For all Models except Thunderbird Commander and Thunderbird LT:** Detach both switch housing connectors from the throttle cable and harness guide.
21. Remove the cable and harness guide.
22. Noting their respective positions, disconnect the electrical connectors and remove the four ignition coils from the camshaft cover.

23. If fitted, detach the secondary air injection hoses from the reed valves on top of the camshaft cover. Position the hoses aside.

24. **For all Models except Thunderbird Commander and Thunderbird LT:** Release the two fixings and detach the horn bracket from the frame. Disconnect the horn and bracket and position aside.



1. Horn bracket
2. Fixings

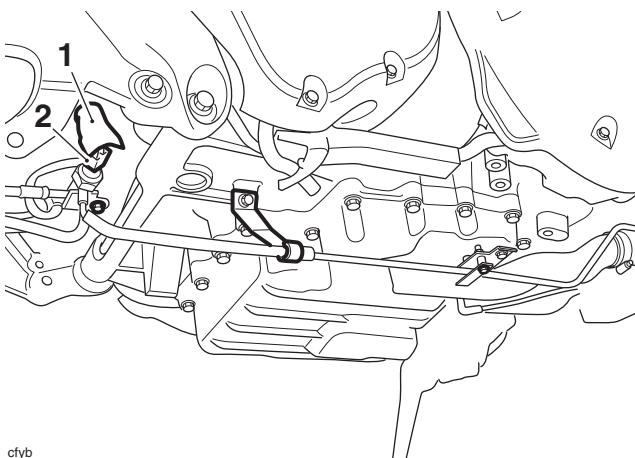
25. Detach the final drive belt from the front pulley (see page 15-8). It is not necessary to completely remove the drive belt from the motorcycle.

26. **For Thunderbird Commander and Thunderbird LT:** Detach the ground cable and P-clip from the left hand rear corner of the crankcase.

27. Disconnect the clutch cable and position it away from the engine (see page 4-5 for all models except Thunderbird Commander and Thunderbird LT, see page 4-8 for Thunderbird Commander and Thunderbird LT).

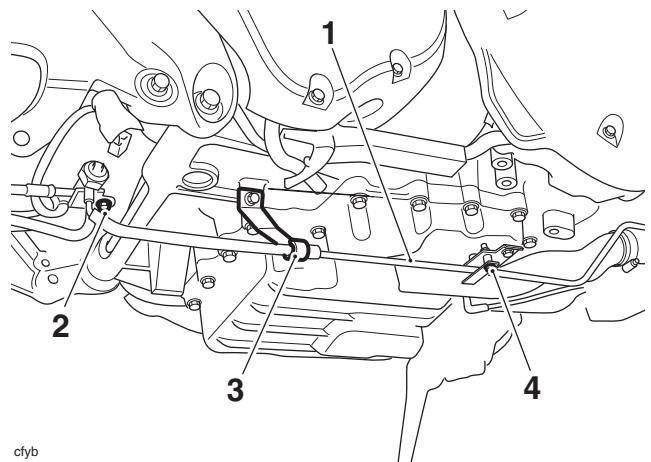
Models without ABS

28. Reposition the rubber boot and disconnect the brake light switch electrical connector.



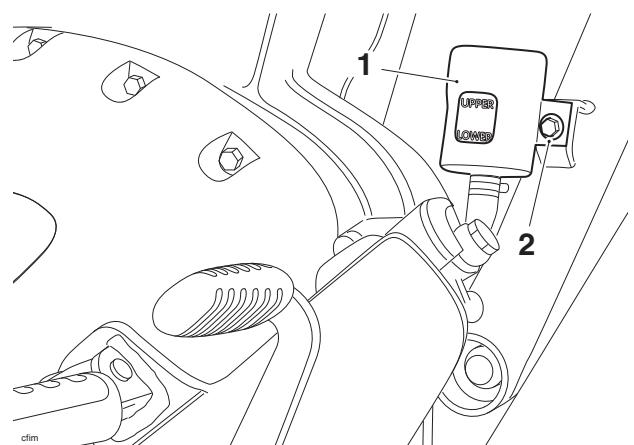
1. Boot
2. Brake Light switch connector

29. Remove the two bolts securing the rear brake hard-line to the engine and unhook the hard-line from the bracket at the rear of the engine.



1. Hard-line
2. Bolt
3. Bracket
4. Clamp bolt

30. Remove the fixing and remove the reservoir cover and rear brake reservoir.



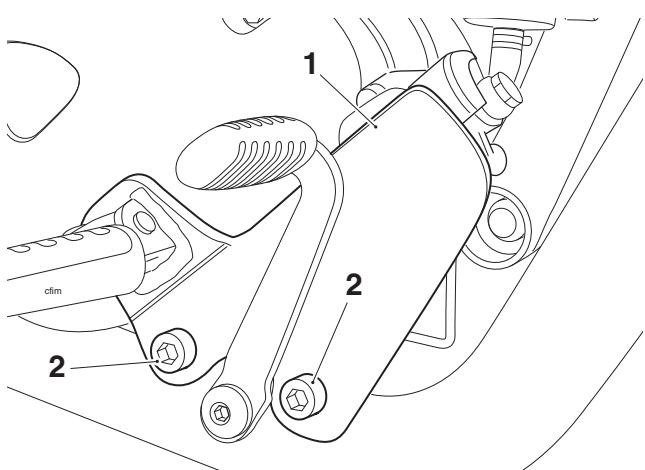
1. Reservoir cover
2. Fixing

31. Release the bolt securing the brake pedal to the engine bracket.

32. Release the bolts securing the control plate assembly to the engine bracket.

Engine Removal and Refit

33. Noting the position of the brake pedal return spring, detach the control plate assembly, brake pedal, reservoir and master cylinder as an assembly. Collect the brake pedal return spring.



1. Control plate assembly (Thunderbird shown)

2. Bolts



Caution

When repositioning the rear brake master cylinder, take care to prevent the steel brake pipe from becoming distorted.

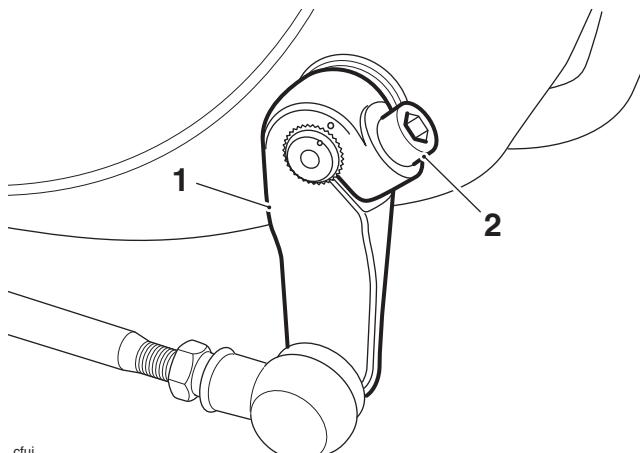
34. Without disconnecting the rear brake hard-line, tie the rear master cylinder and reservoir aside, preventing the brake fluid reservoir from becoming inverted.

Models with ABS

35. Remove the rear master cylinder (see page 14-29 for all models except Thunderbird Commander and Thunderbird LT, see page 14-33 for Thunderbird Commander and Thunderbird LT).
36. Remove the ABS modulator (see page 14-42 for all models except Thunderbird Commander and Thunderbird LT, see page 14-46 for Thunderbird Commander and Thunderbird LT).

All models

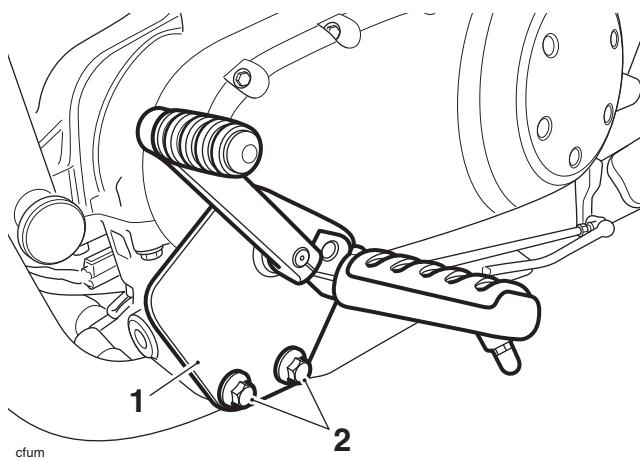
37. Release the fixing and disconnect the gear change actuator arm at the clutch cover.



1. Gear change actuator arm

2. Fixing

38. Release the two bolts and remove the left hand control plate assembly.



1. Control plate assembly (Thunderbird shown)

2. Bolts

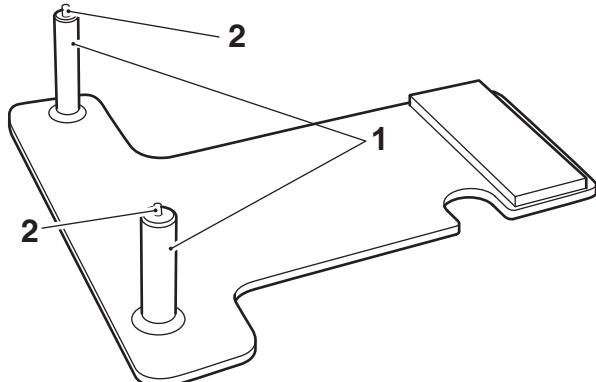
39. Disconnect the side stand switch.
40. Remove the cover from the right hand front engine mounting bolt.
41. Disconnect all electrical connections to the engine. These include:
- Low oil pressure warning light switch
 - Crankshaft position sensor
 - Gear position sensor
 - Road speed sensor
 - Coolant temperature sensor
 - Alternator.

Engine Removal and Refit

Note:

- The engine service tool T3880134 cannot be used on Thunderbird Commander and Thunderbird LT.
 - Engine service tools T3880179 can be used on all models.
42. All models except Thunderbird Commander and Thunderbird LT: Support the engine using service tool T3880134. Position the tool to the engine control plate brackets, locating the two pins to the corresponding bolts on the bracket. The pins rest on the bolt heads.

43. For Thunderbird Commander and Thunderbird LT only: Support the engine using service tool T3880179. Position the tool to the engine control plate brackets, locating the two pins to the corresponding bolts on the bracket. Ensure the locating pins on top of the pins locate into the bolt head.

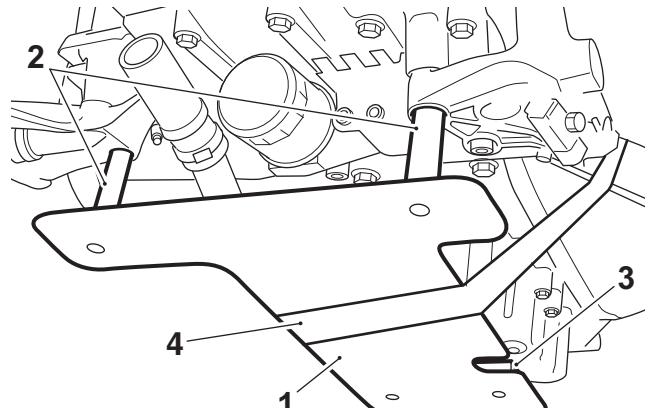


T3880177_1

- Pins
- Locating pins

44. Check that the plastic pad on the rear of the tool is aligned with the sump, and that no pipes, hoses or electrical connectors/harnesses are trapped between the plate and the engine.

45. Using a suitable ratchet strap, secure the engine support stand to the engine.



cyc

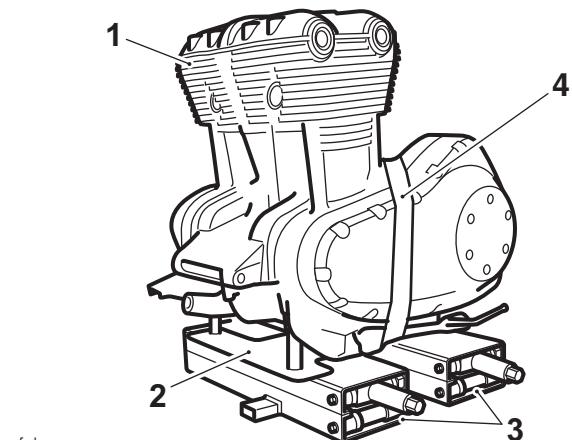
- Tool T3000134/T3880179 (Thunderbird shown)

- Pin locations

- Plastic pad

- Strap

46. Support the engine support stand and engine on proprietary lifting jacks, at the front and rear, as shown below:



cfd

- Engine

- Engine support stand T3880134

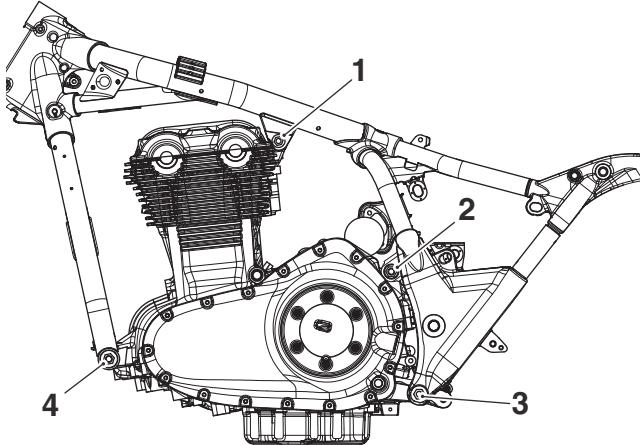
- Proprietary lifting jacks

- Strap

Engine Removal and Refit

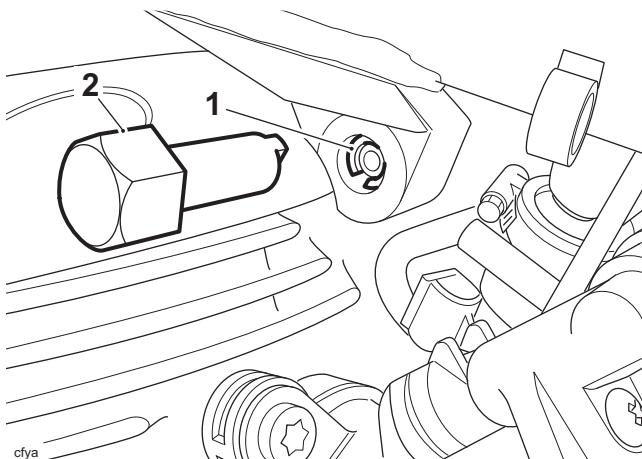
All Models

47. Check that the engine is still securely supported.
48. In the sequence shown below, undo all engine mounting bolts and nuts, leaving the bolts in place. Collect the washers under the nuts at positions 1 to 3 as shown below:



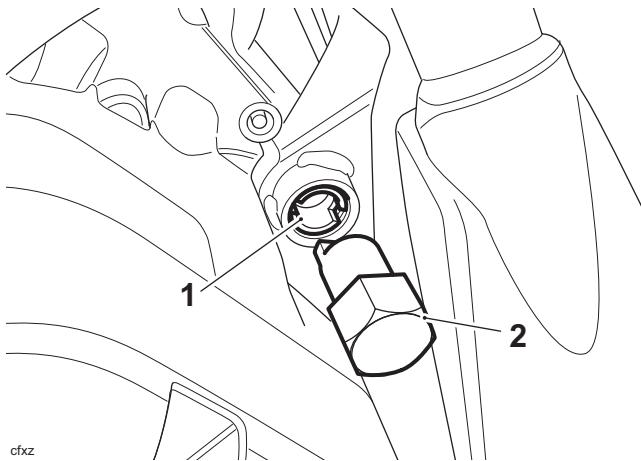
1. Cylinder head engine mounting
2. Upper rear engine mounting
3. Lower rear engine mounting
4. Front engine mounting

49. Partially withdraw the bolt and release the cylinder head engine mounting adjuster on the left side of the frame using service tool T3880103.



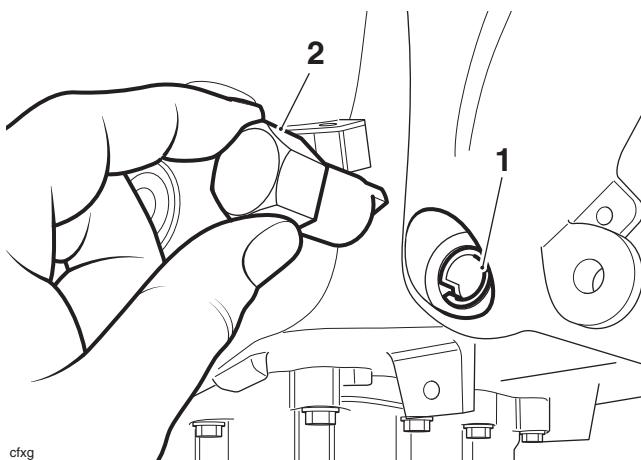
1. Engine mounting adjuster
2. Tool T3880103

50. Partially withdraw the bolt and release the upper rear engine mounting adjuster on the left side of the frame using service tool T3880377.



1. Engine mounting adjuster
2. Tool T3880377

51. Partially withdraw the bolt and release the lower rear engine mounting adjuster on the left side of the frame using service tool T3880377.

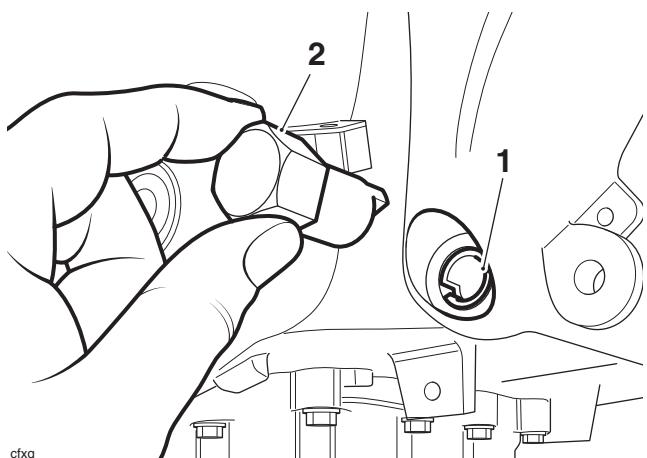


1. Lower rear mounting adjuster
2. Tool T3880377

52. Protect the left hand lower frame area, to the rear of the clutch housing, using a suitable heavy duty adhesive tape.
53. Remove the engine mounting bolts and lower the engine evenly out of the frame, taking care to avoid damage to components.

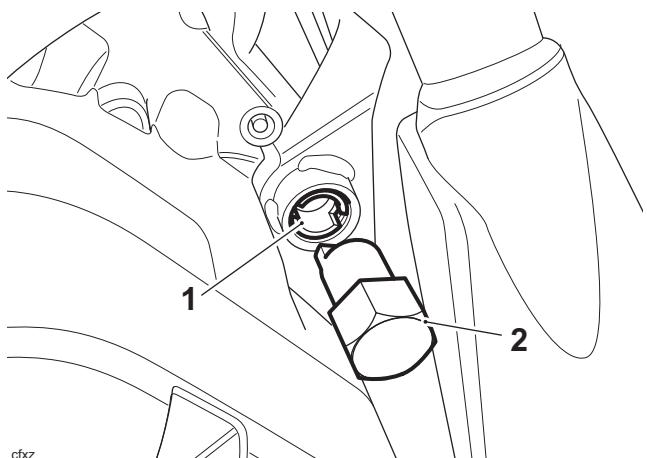
Installation

- Locate the engine to the frame aligning the engine mounting points with the corresponding positions on the frame.
- Install the engine mounting bolts, but do not fit the nuts or washers at this stage.
- Tighten the engine mounting bolts, nuts and adjusters in the following sequence:
 - Partially withdraw the lower rear engine mounting bolt and tighten the frame adjuster to **5 Nm** using service tool T3880103. Refit the bolt and washer.



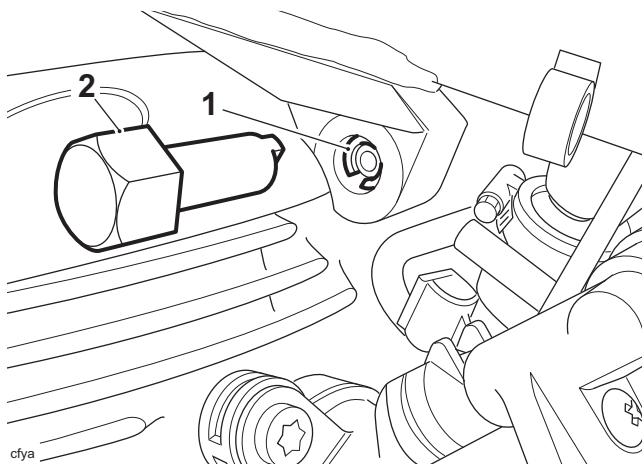
1. Lower rear mounting adjuster
2. Tool T3880377

- Partially withdraw the upper rear engine mounting bolt and tighten the frame adjuster to **5 Nm** using service tool T3880103. Refit the bolt and washer.



1. Engine mounting adjuster
2. Tool T3880103

- Partially withdraw the cylinder head engine mounting bolt and tighten the frame adjuster to **5 Nm** using service tool T3880103. Refit the bolt and washer.

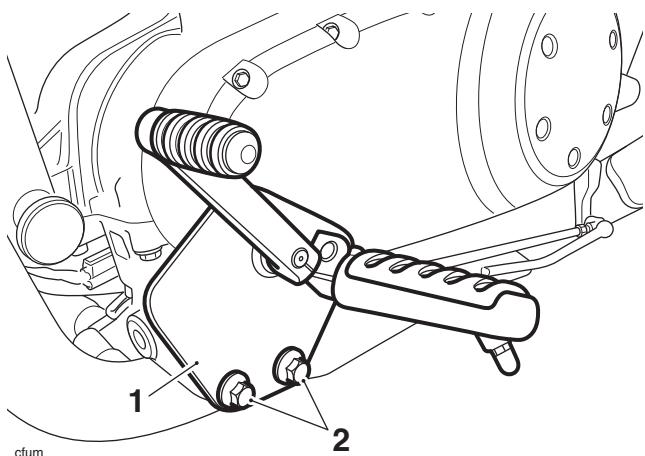


1. Engine mounting adjuster
2. Tool T3880103

- Fit new nuts to all four engine mounting bolts.
- Tighten the lower rear engine mounting bolt and nut to **80 Nm**.
- Tighten the upper rear engine mounting bolt and nut to **80 Nm**.
- Tighten the cylinder head engine mounting bolt and nut to **48 Nm**.
- Tighten the front engine mounting bolt and nut to **80 Nm**.
- Refit the cover to the right hand front engine mounting bolt.
- If used, remove the ratchet strap and the engine support stand.
- Reconnect the remaining electrical connections to the engine. These include:
 - Low oil pressure warning light switch
 - Crankshaft position sensor
 - Gear position sensor
 - Road speed sensor
 - Coolant temperature sensor
 - Alternator.

Engine Removal and Refit

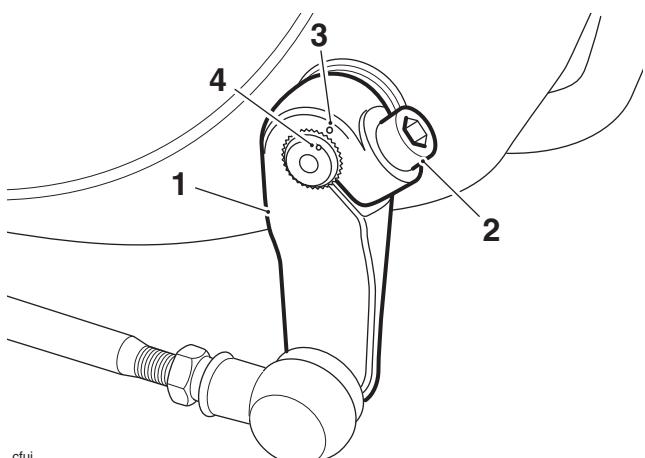
11. Refit the control plate assembly, tightening the bolts to **50 Nm**.



1. Control plate assembly

2. Bolts

12. Reconnect the side stand switch.
13. Align the dot on the gear change actuator arm with the dot on the gear change shaft and fit the actuator arm to the spline. Fit the bolt and tighten to **8 Nm**.



1. Gear change actuator arm

2. Fixing

3. Actuator arm dot mark

4. Gear change shaft dot mark

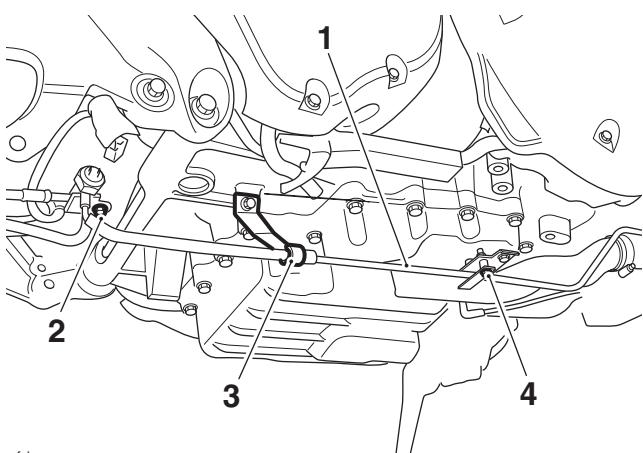
Models without ABS

14. **All models except Thunderbird Commander and Thunderbird LT:** Lubricate the brake pedal shaft with a thin smear of grease conforming to NLGI 2 specification.
15. Position the brake pedal return spring to the brake pedal shaft as noted during removal.
16. Align the brake pedal to its shaft and refit the master cylinder and control plate assembly to the engine bracket. Ensure the end of brake pedal return spring engages in the hole in the brake pedal.

Tighten the control plate fixings to **50 Nm**.

Tighten the brake pedal fixing to **22 Nm**.

17. Refit the brake fluid reservoir to the frame, position the cover and secure with the fixing. Tighten to **5 Nm**.
18. Refit the brake hard-line to its clips and refit the two fixings. Tighten the rear brake pipe fixing to **7 Nm** and the front brake pipe fixing to **5 Nm**.



cfyb

1. Brake hard-line

2. Bolt

3. Bracket

4. Clamp bolt

19. Reconnect the brake light switch connector and cover with the rubber boot.

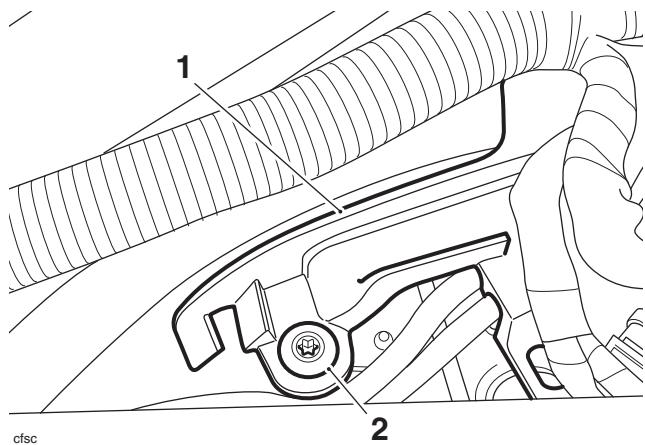
Models with ABS

20. Refit the ABS modulator (see page 14-44 for all models except Thunderbird Commander and Thunderbird LT, see page 14-48 for Thunderbird Commander and Thunderbird LT).
21. Refit the rear master cylinder (see page 14-32 for all models except Thunderbird Commander and Thunderbird LT, see page 14-34 for Thunderbird Commander and Thunderbird LT).

All models

22. **For Thunderbird Commander and Thunderbird LT:** Refit the ground cable and P-clip to the left hand rear corner of the crankcase and tighten the fixing to **7 Nm**.
23. Refit the final drive belt front pulley (see page 15-10) but DO NOT adjust the drive belt tension at this stage.
24. Refit the horn and bracket, tightening the fixings to **7 Nm**. Reconnect the electrical connector.
25. If fitted, refit the secondary air injection hose to the reed valves and secure with the clips.
26. Fit the four ignition coils and reconnect the electrical connectors.
27. Refit the throttle bodies (see page 10-173).

28. Reposition the throttle cable and harness guide to the frame, connecting the two MAP sensor hoses as you do so. Ensure the hoses are routed as noted during removal, with the right hand hose (identified with red tape) connected to the right hand throttle.
29. Refit the throttle cable and harness guide fixing, tightening to **7 Nm**.



1. Throttle cable and harness guide

2. Fixing

30. Refit the throttle cables to the throttle cable and harness guide.
31. Refit the two MAP sensors (see page 10-164).
32. Ensure the hose clips are in position on the top hose, radiator cap housing and thermostat housing hose.
33. Position the upper coolant tube to the motorcycle, lowering it down between the frame rails. Connect the tube to the radiator cap housing, top hose then thermostat housing.
Tighten the hose clips to **3 Nm**.
Tighten the coolant tube new fixing to **7 Nm**.
34. Refit the radiator (see page 11-13).
35. Refill the cooling system (see page 11-7).
36. Refit the exhaust system (see page 10-187 for all models except Thunderbird Commander and Thunderbird LT, see page 10-192 for Thunderbird Commander and Thunderbird LT).
37. Refit the fuel tank (see page 10-146).
38. Refill the engine with oil (see page 8-8).
39. Refit the left and right side panels (see page 17-21).
40. Connect the clutch cable to the clutch lever actuating arm (see page 4-6 for all models except Thunderbird Commander and Thunderbird LT, see page 4-9 for Thunderbird Commander and Thunderbird LT).
41. If removed, refit the front dresser bars as noted for removal.
Tighten the upper fixing to **20 Nm**.
Tighten the lower fixing to **50 Nm**.

42. Adjust the final drive belt tension as described below:

! Warning

Before adjusting the final drive belt tension, the belt must be over-tensioned to settle the engine position as described below. Failure to do so may result in the drive belt becoming loose when the motorcycle is first ridden. Riding the motorcycle with a loose drive belt may result in loss of control of the motorcycle and an accident, or damage to the drive belt or other motorcycle components.

Note:

- Over-tensioning of the drive belt is only required when the engine or swinging arm has been removed.
43. With the wheel spindle loose, tighten the right hand drive belt adjuster to **25 Nm**.
 44. Slacken off the right hand adjuster and check that the belt is now loose.
 45. Adjust the drive belt tension (see page 15-8).
 46. Reconnect the battery, positive (identified with red tape) lead first.
 47. Refit the rider's seat (see page 17-21).
 48. Lower the motorcycle to the ground and place it on the side stand.
 49. Start the engine and check for oil, coolant and any other leaks.
 50. Check and adjust the engine oil level (see page 8-6).
 51. Check the operation of the rear brake. Rectify as necessary.

! Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Engine Removal and Refit

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10 Fuel System/Engine Management

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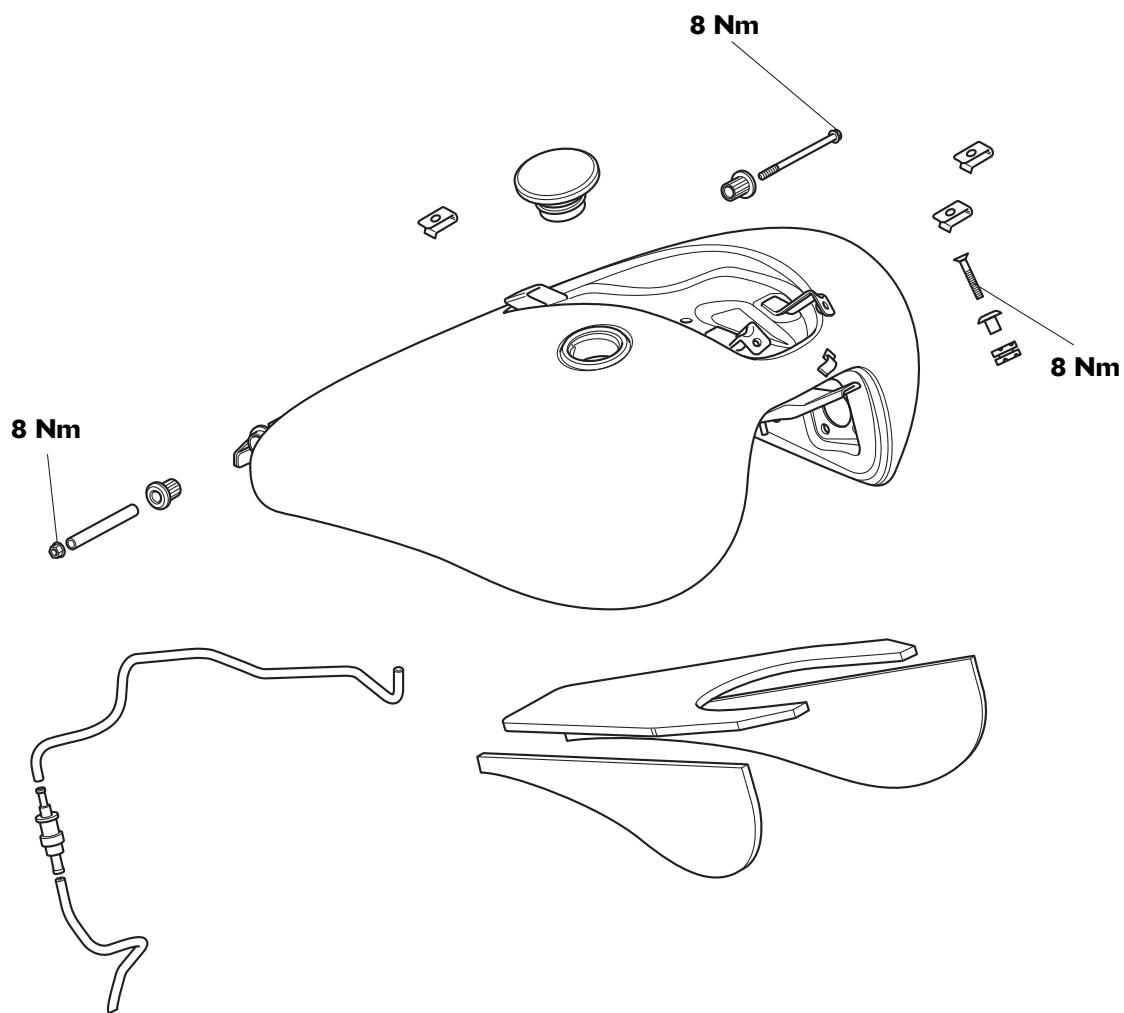
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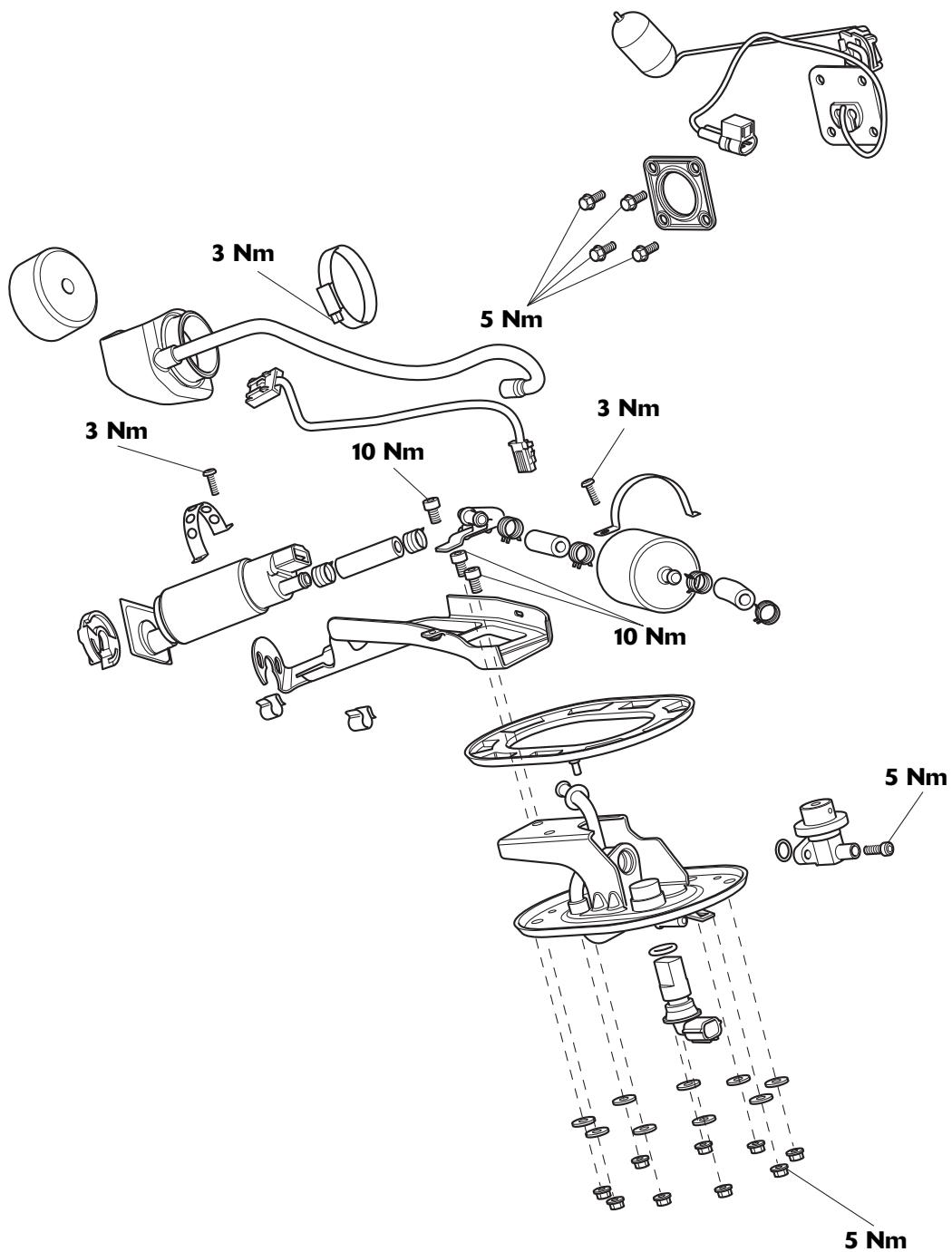
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Exploded View – Fuel Tank

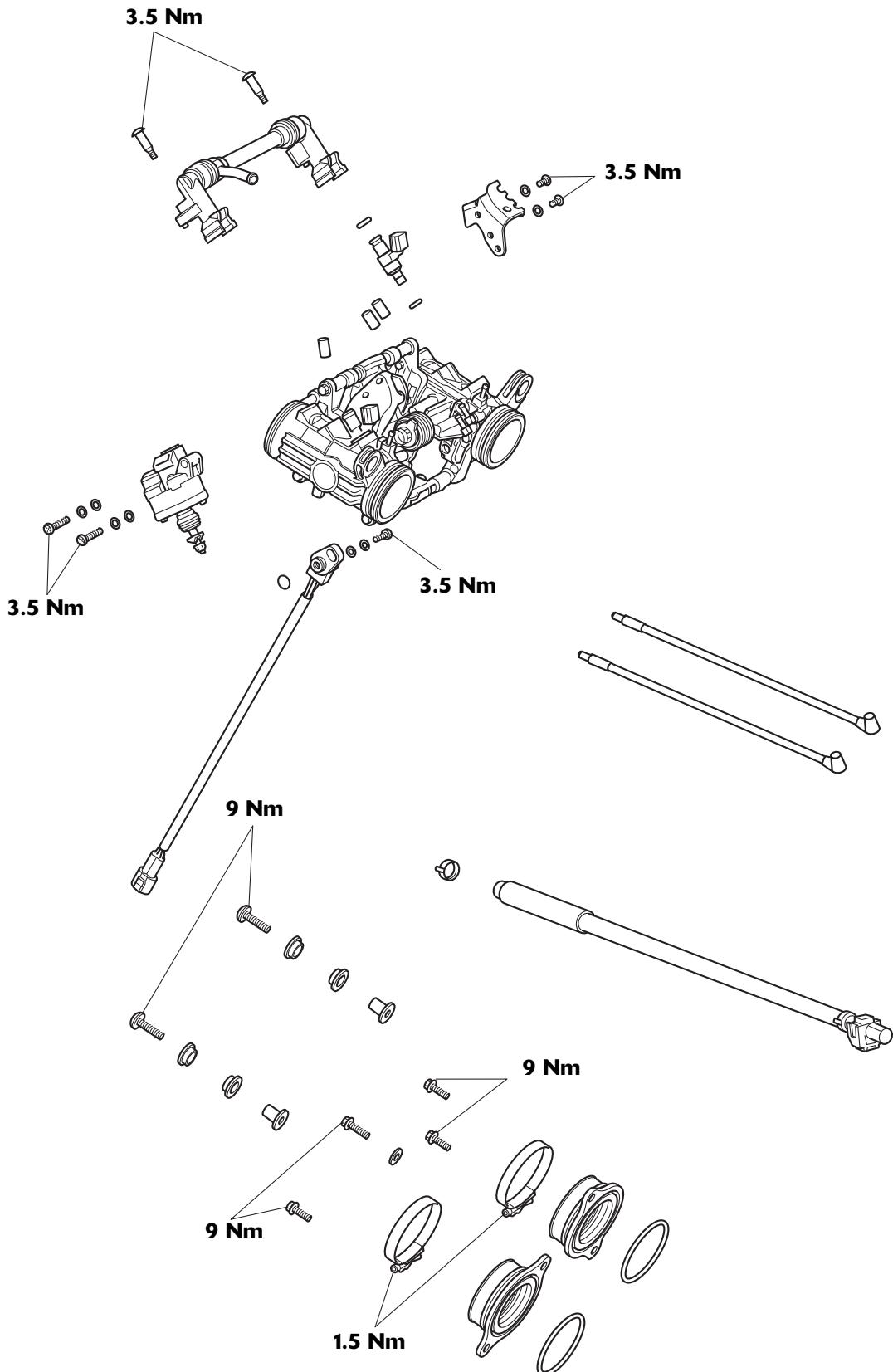


Fuel System/Engine Management

Exploded View – Fuel Pump

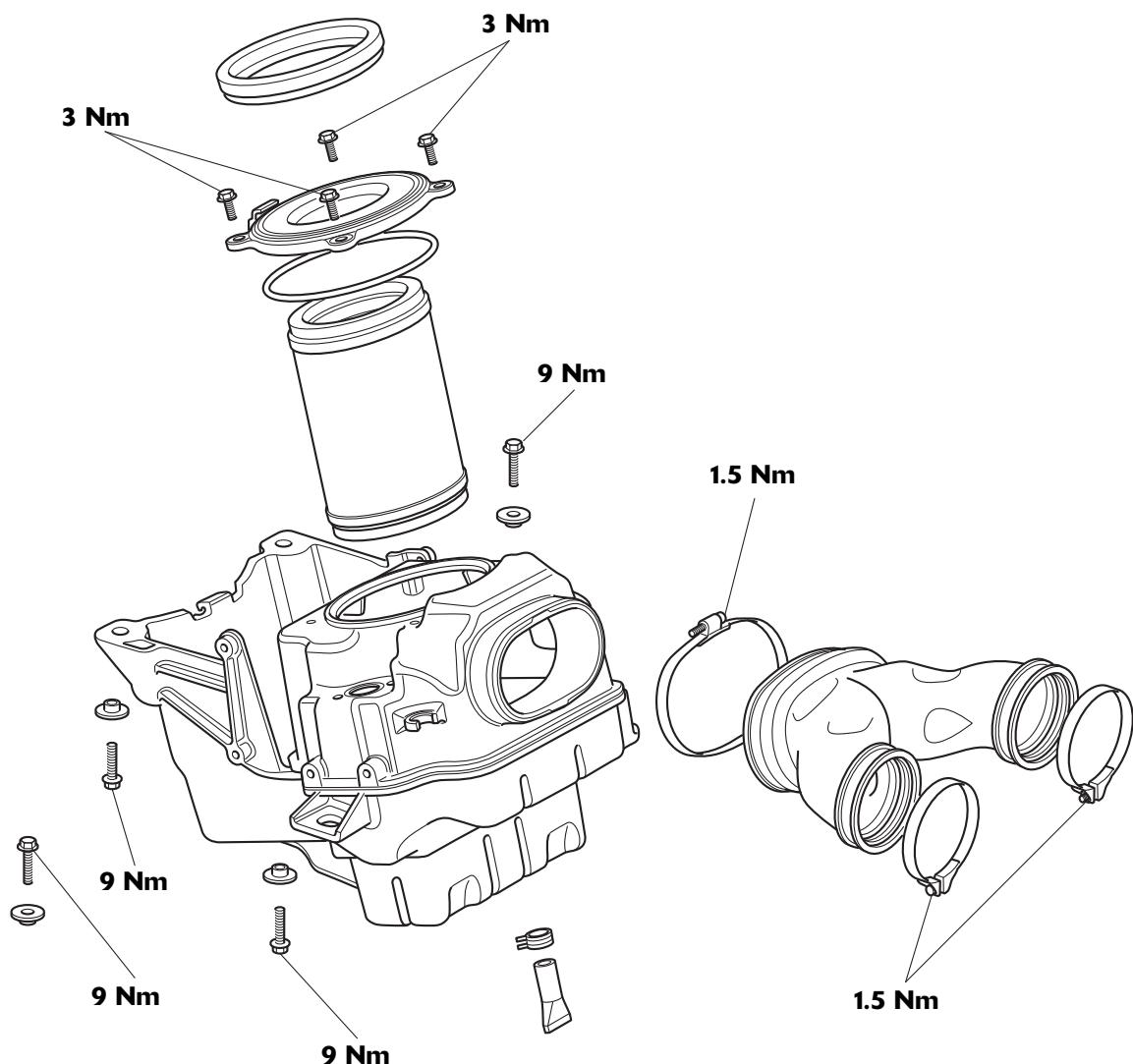


Exploded View – Fuel Rail, Throttles and Injectors

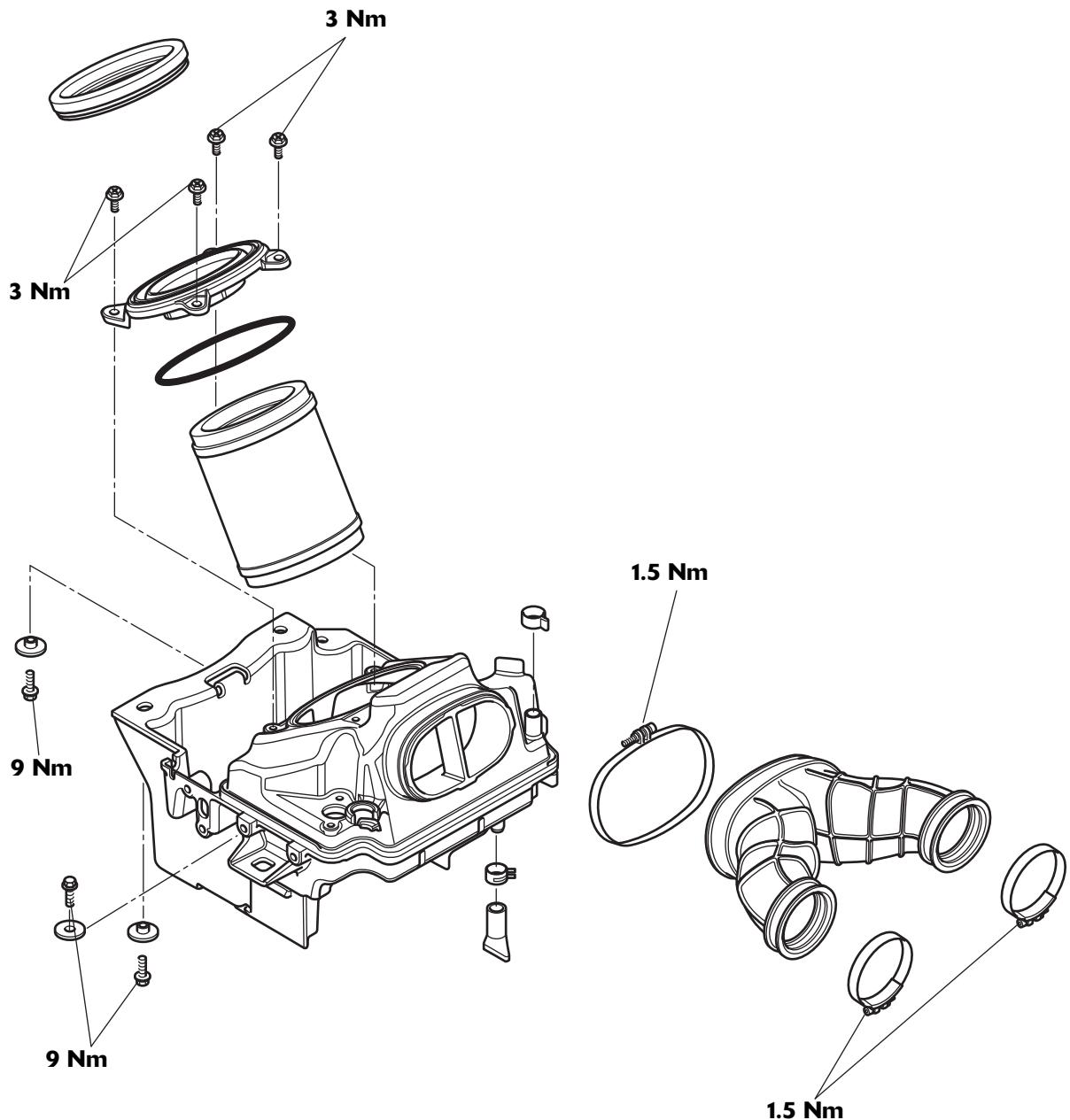


Fuel System/Engine Management

Exploded View – Airbox – All Models Except Thunderbird Commander and Thunderbird LT



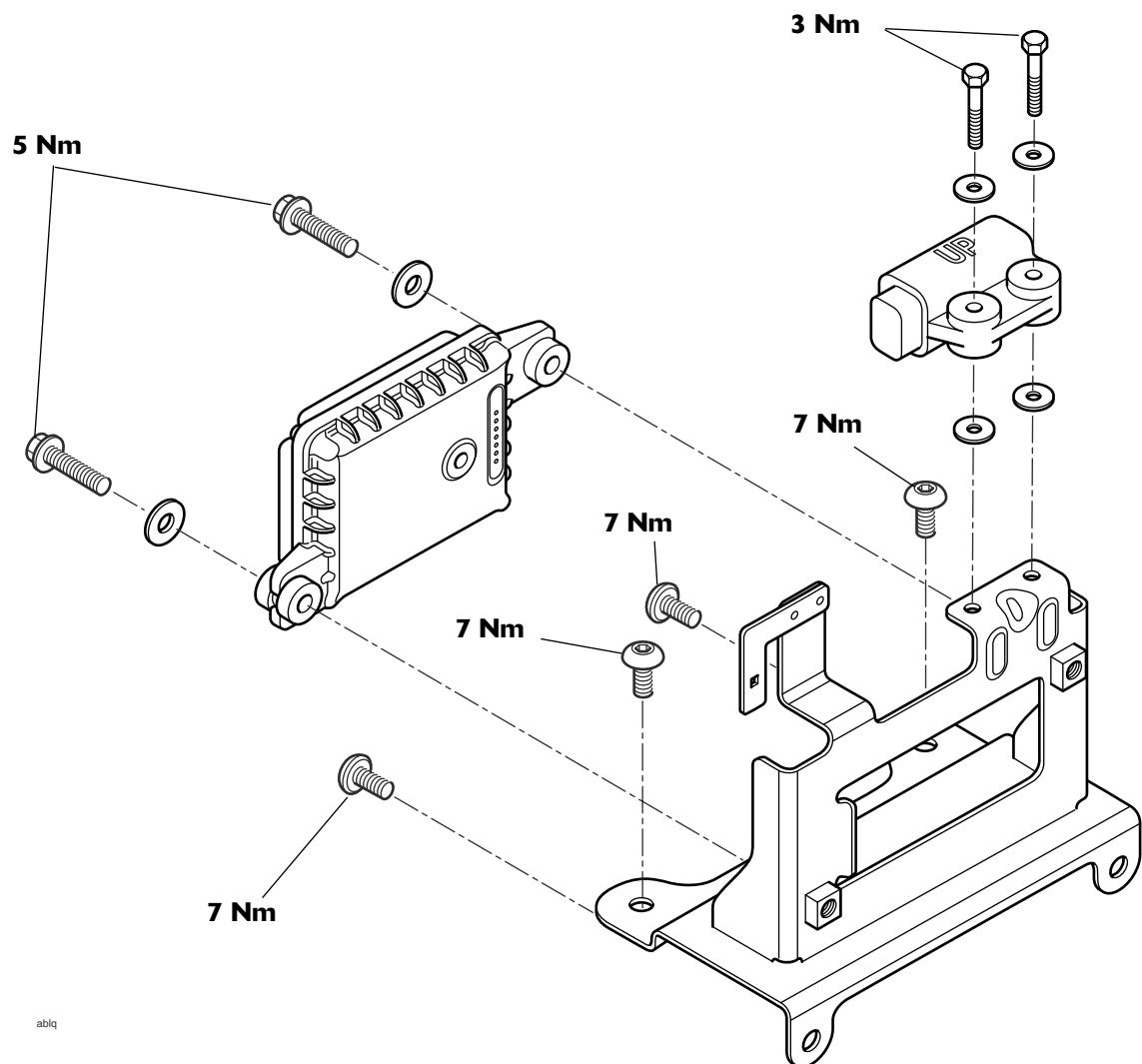
Exploded View – Airbox – Thunderbird Commander and Thunderbird LT



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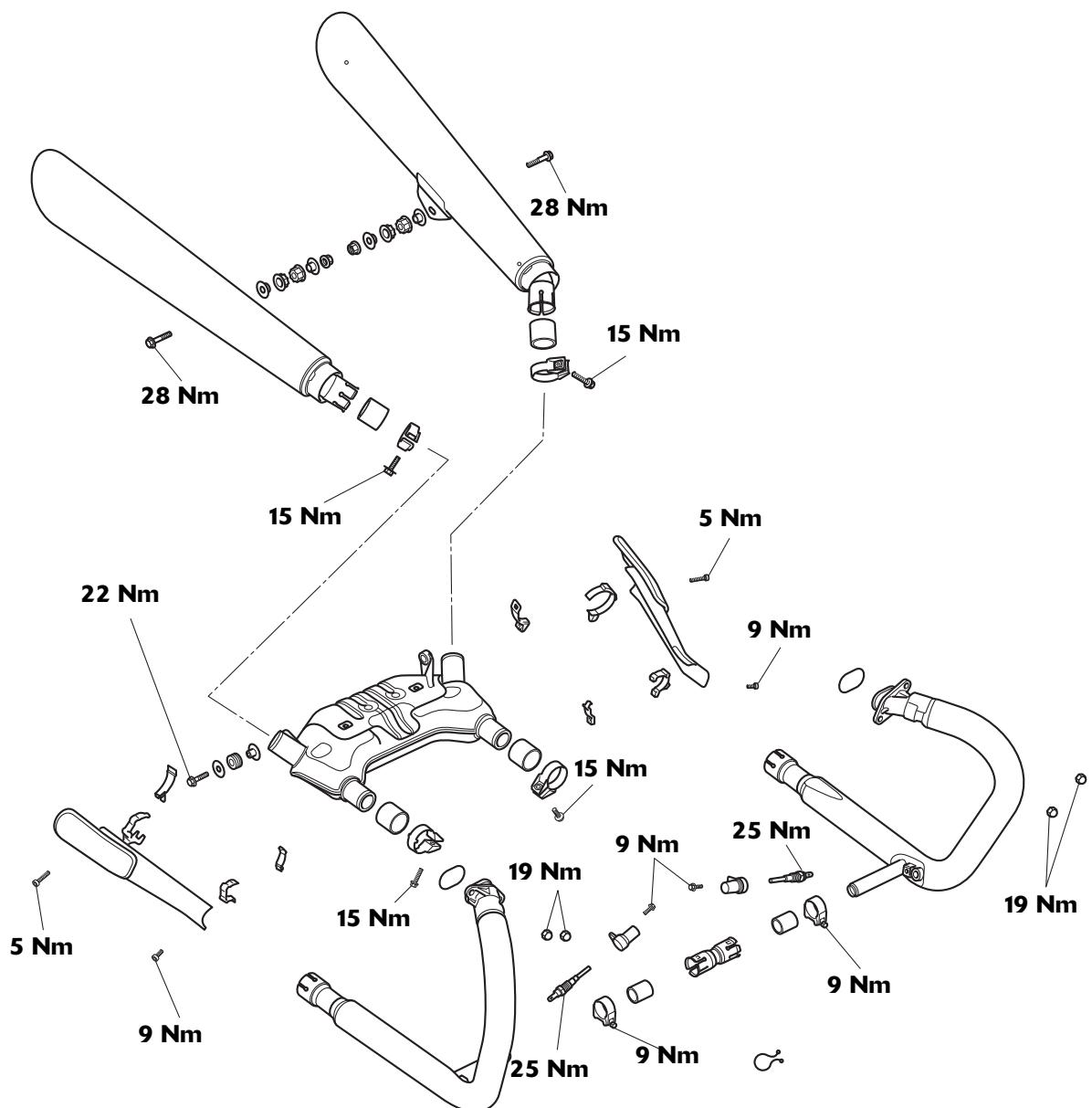
Fuel System/Engine Management

Exploded View – Immobiliser Control Module – Thunderbird Commander and Thunderbird LT



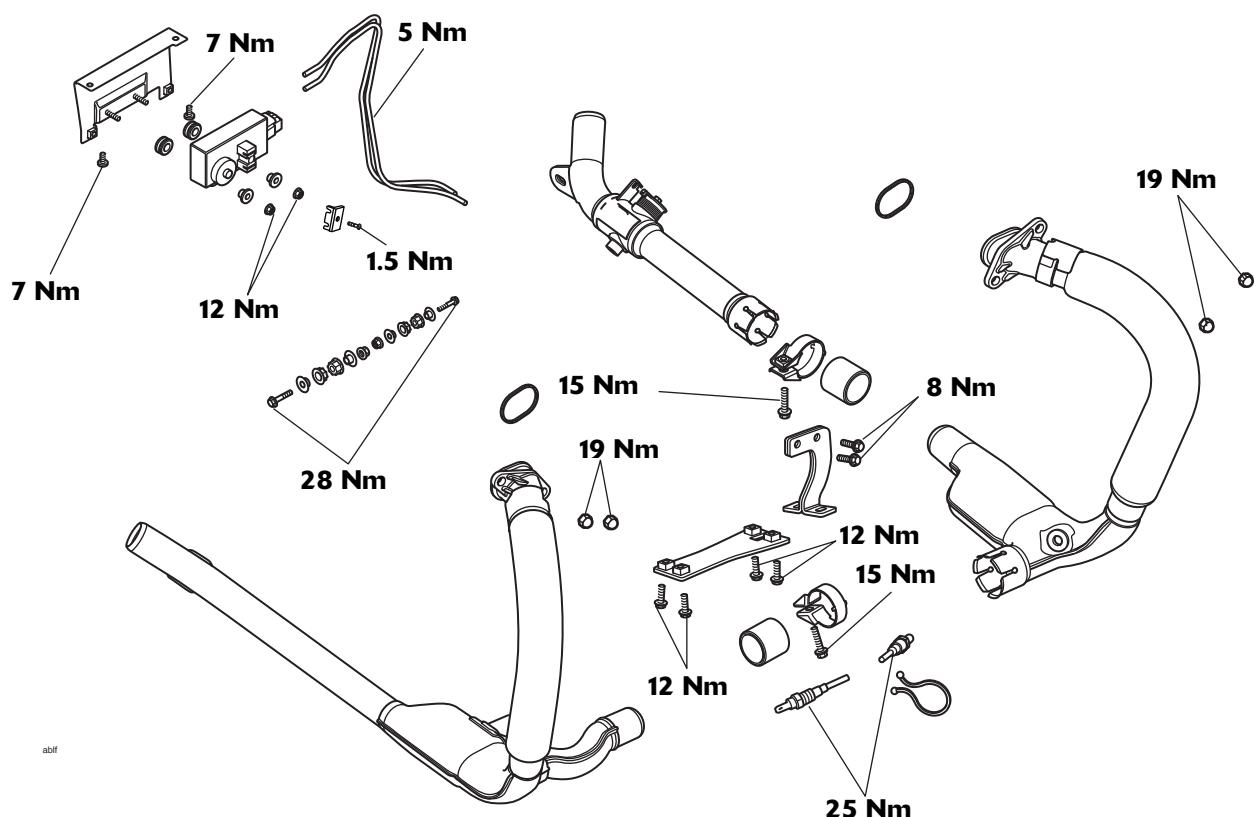
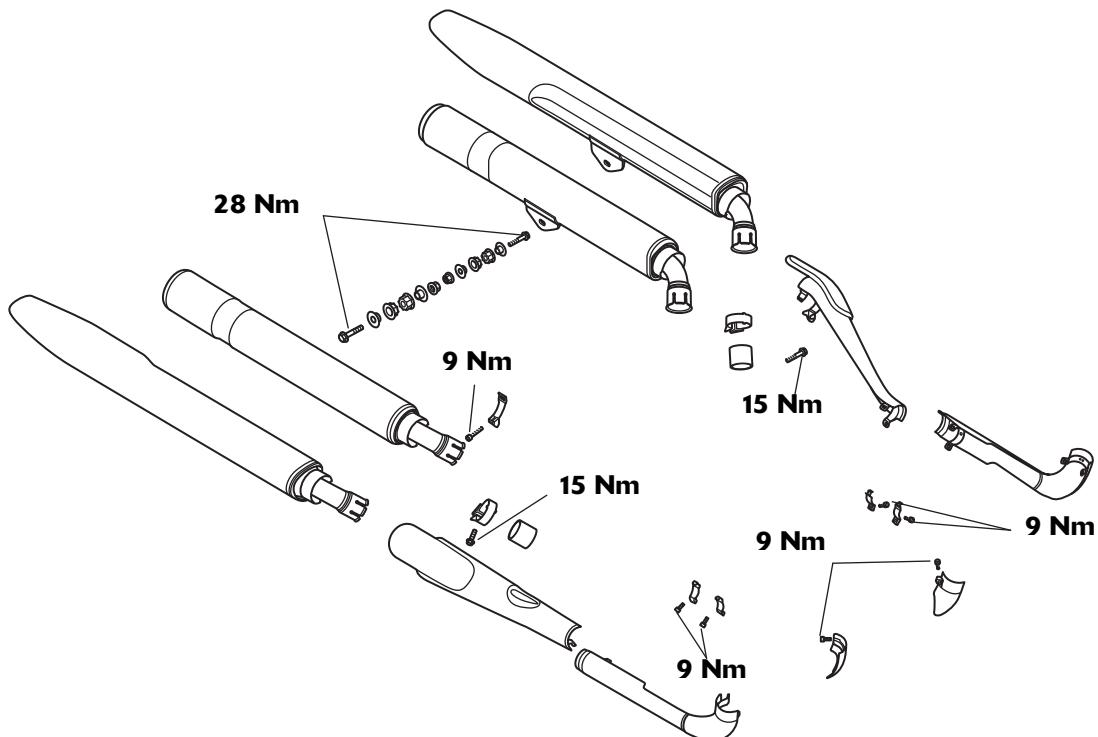
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Exploded View – Exhaust System – All Models Except Thunderbird Commander and Thunderbird LT

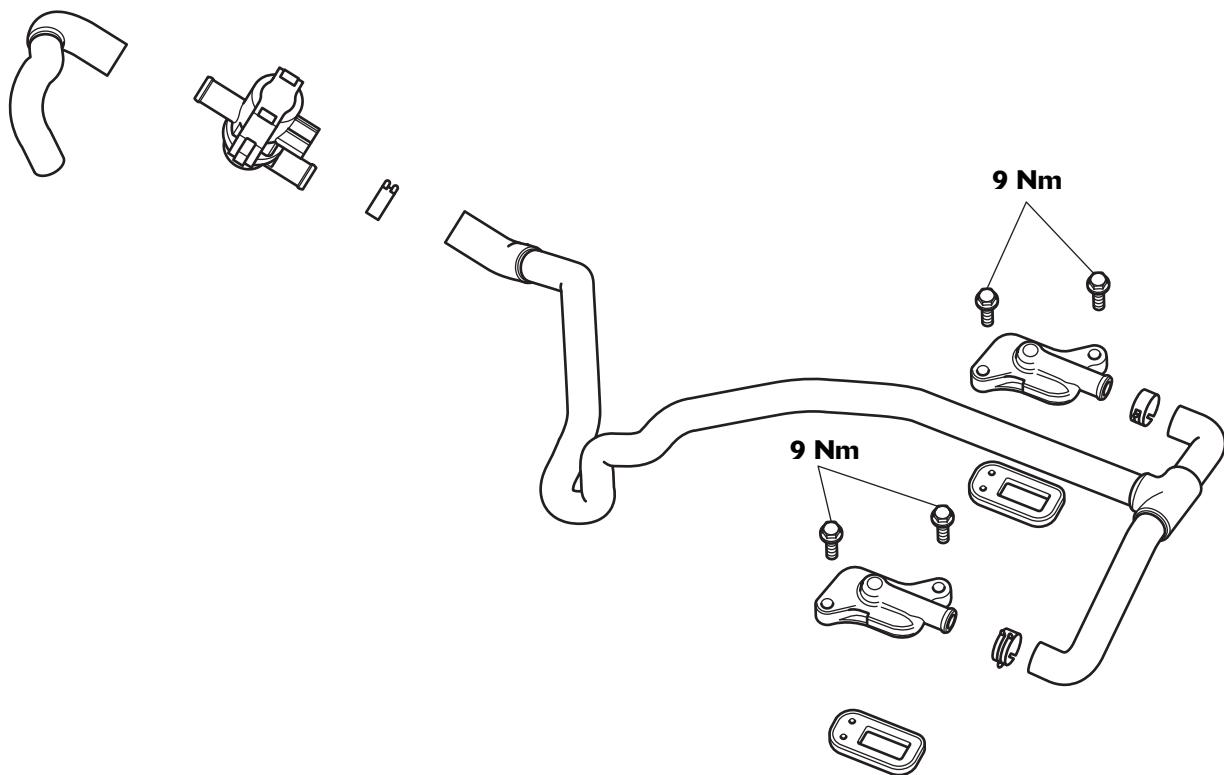


Fuel System/Engine Management

Exploded View – Exhaust System – Thunderbird Commander and Thunderbird LT

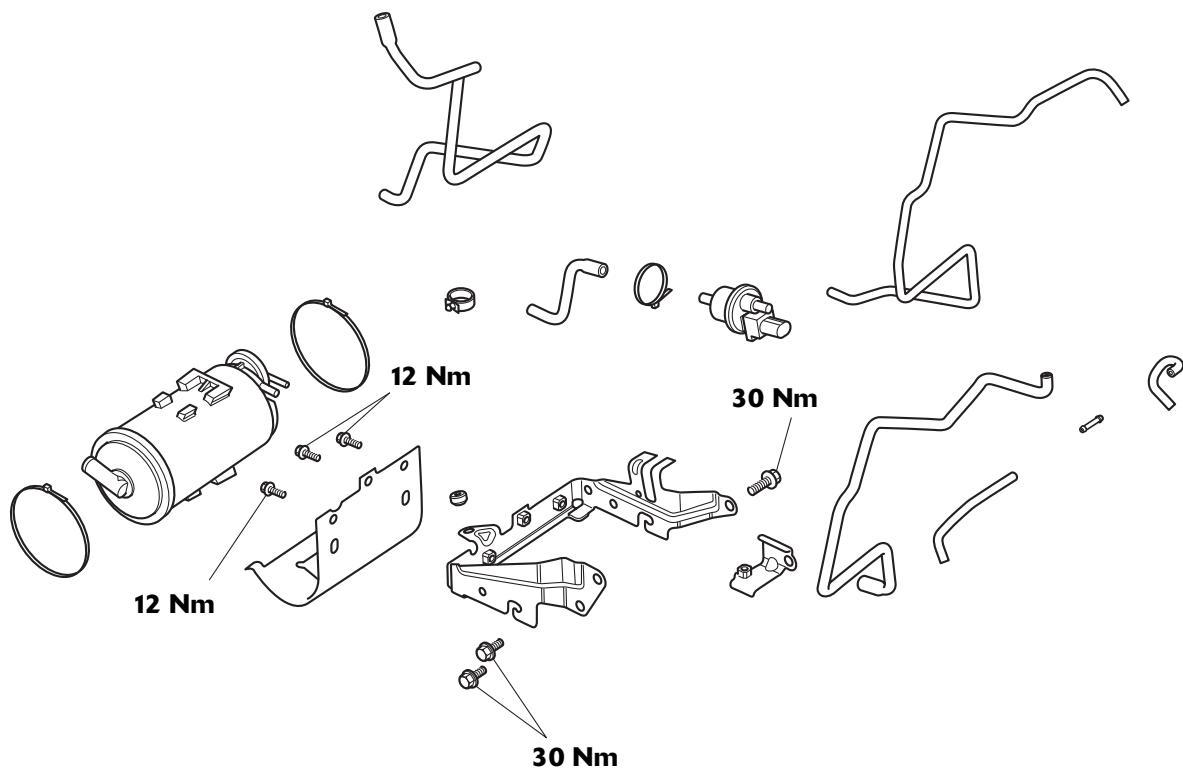


Exploded View – Secondary Air System (if fitted)



Fuel System/Engine Management

Exploded View – Evaporative System (if fitted)



Fuel Requirements

Fuel Requirements - all countries except USA

Outside America, Thunderbird models must be run on 91 RON or higher unleaded fuel.

Fuel Requirements - USA

In the United States of America where the octane rating of fuel is measured in a different way, the following information may be applied:

All Thunderbird models are designed to run on unleaded gasoline with a CLC or AKI octane rating (R+M)/2 of 87 or higher.

Note:

- If 'Knocking' or 'Pinking' occurs at a steady engine speed under normal load, use a different brand of gasoline or a higher octane rating.



Caution

The use of leaded gasoline is illegal in some countries, states or territories and will invalidate the vehicle and emissions control warranties. Additionally, leaded gasoline will cause damage to emissions control components.

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. The Thunderbird will give best performance when using unleaded gasoline. However, the following should be used as a guide to the use of oxygenated fuels.



Caution

Because of the generally higher volatility of oxygenated fuels, starting, engine response and fuel consumption may be adversely affected by their use. Should any of these difficulties be experienced, run the motorcycle on normal unleaded gasoline.

Ethanol

Ethanol fuel is a mixture of 10% ethanol and 90% gasoline and is often described under the names 'gasohol', 'ethanol enhanced', or 'contains ethanol'. This fuel may be used in Triumph motorcycles.

Methanol



Caution

Fuels containing methanol should not be used in Triumph motorcycles as damage to components in the fuel system can be caused by contact with methanol.

MTBE (Methyl Tertiary Butyl Ether)

The use of gasolines containing up to 15% MTBE (Methyl Tertiary Butyl Ether) is permitted in Triumph motorcycles.

Fuel System/Engine Management

Glossary of Terms

The following terms and abbreviations will be found in this section. Below is given a brief explanation of what some of the more common terms and abbreviations mean.

Air temperature

The air temperature in the airbox and intake hose.

Air temperature sensor

Sensor located in the airbox to detect the temperature of the incoming air.

ATDC

After Top Dead Centre (TDC).

Barometric pressure

Pressure of the air in the airbox.

Battery voltage

The voltage at the input to the Engine Control Module (ECM).

BTDC

Before Top Dead Centre (TDC).

Catalyst

Device placed in the exhaust system which reduces exhaust emissions by stimulating secondary combustion of the exhaust gases.

Closed throttle position

Throttle position at idle (i.e. against end stop), measured as a voltage and expressed as percentage.

Coolant temperature

The coolant temperature in the cylinder head.

Coolant temperature sensor

Sensor which detects coolant temperature.

Cooling fan status

The ON or OFF condition of the cooling fan.

DTC

Diagnostic Trouble Code.

ECM

Engine Control Module.

Engine speed

The crankshaft revolutions per minute.

EXBV

Exhaust Butterfly Valve (Thunderbird Commander and Thunderbird LT only).

Fall detection

The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately.

Freeze-frame

A data set captured at the time a Diagnostic Trouble Code (DTC) is set.

Idle fuel trim

The percentage above or below the nominal fuel requirement for the volume of air entering at idle.

Idle fueling

Adjustment of fueling at idle to suit the actual air inducted.

Idle reference speed

The target idle speed as determined by the Electronic Control Module (ECM). (It should be the same as the actual idle speed if the motorcycle is operating correctly.)

Ignition advance

The timing of ignition at the spark plug relative to Top Dead Centre.

Ignition switch position

The ON or OFF position of either or both the ignition switch and the engine stop switch.

Ignition timing

Same as ignition advance.

Immobiliser Control Module

The control module for the immobiliser system.

Injector pulse time

The time during which an injector remains open (i.e. delivering fuel).

Long term fuel trim

Fueling after adapting to the engine's long term fueling requirements (closed loop only). See also short term fuel trim.

MAP sensor

Manifold Absolute Pressure (the air pressure in the intake system).

MIL

Malfunction Indicator Lamp.

Illuminates when most Diagnostic Trouble Codes (DTCs) are set.

Neutral switch status

The NEUTRAL or IN GEAR status of the transmission.

Off idle fuel trim

The percentage above or below the nominal fuel requirement for the volume of air entering at engine speeds other than idle. This function is not currently used in the Triumph system.

Open circuit

A break in an electrical circuit - current cannot flow.

Over temp

High temperature within the Engine Control Module (ECM) caused by an internal or external failure.

Oxygen sensor

The oxygen sensor measures the oxygen levels in the exhaust gases and feeds this information to the ECM. Based on this information, adjustments to air/fuel ratio are made.

Purge valve duty cycle

The time the purge valve is open in an open/close cycle, expressed as a percentage of the cycle time.

Road speed sensor

Gearbox mounted sensor which delivers information to the ECM that is converted to the road speed value, which is then displayed on the speedometer.

Sensor reference voltage

Supply voltage to the system sensors (nominally 5 volts).

Short circuit

A 'short cut' in an electrical circuit - current bypasses the intended circuit (usually to earth).

Short term fuel trim

A correction applied to the fuel mixture during closed loop catalyst operation. This, in turn, has an effect on the long term fuel trim in that if an engine constantly requires mixture correction, the long term fuel trim will adapt to this requirement thus reducing the need for constant short term adjustment.

Side stand status

The 'up' or 'down' position of the side stand.

Target dwell time

The actual time from coil ON to coil OFF.

Throttle position

The position of the throttle butterfly given as a percentage of the movement range. When the data is displayed on the diagnostic software, fully open need not be 100% nor fully closed 0%.

Throttle position sensor

Sensor for the throttle position.

Throttle stepper motor

Stepper motor used to vary throttle opening at idle and when the engine is cold.

Throttle voltage

Voltage at the throttle potentiometer.

Transponder

A transponder-responder chip located in the ignition key. The transponder is activated by a radio signal sent out by the immobiliser control module, via an antenna located around the ignition switch. If the immobiliser control module does not receive the correct code signal from the transponder, the immobiliser will remain active and the engine will not start.

Vbatt

Battery voltage.

Fuel System/Engine Management

Engine Management System

System Description

The Thunderbird is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The electronic control module (ECM) draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fueling requirements for all engine speeds and loads.

In addition, the system has an on-board diagnostic function. For additional information, see page 10-34.

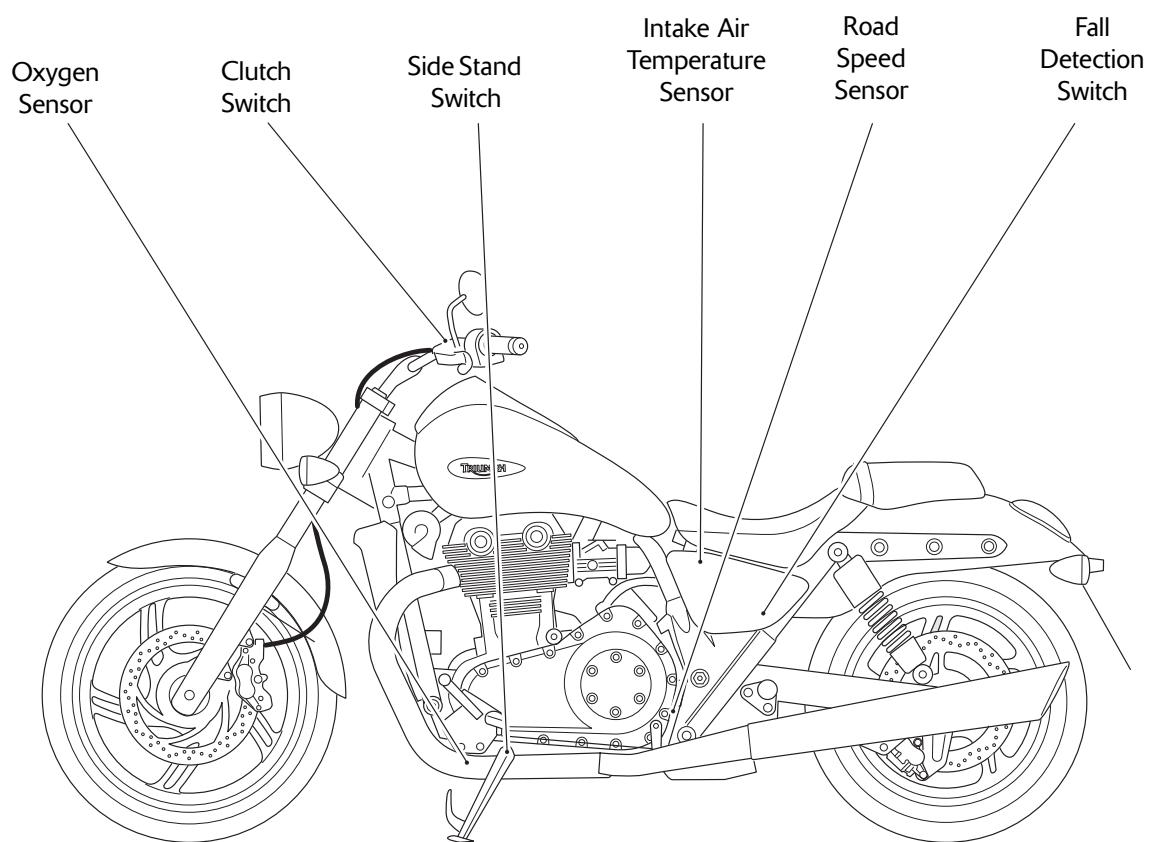
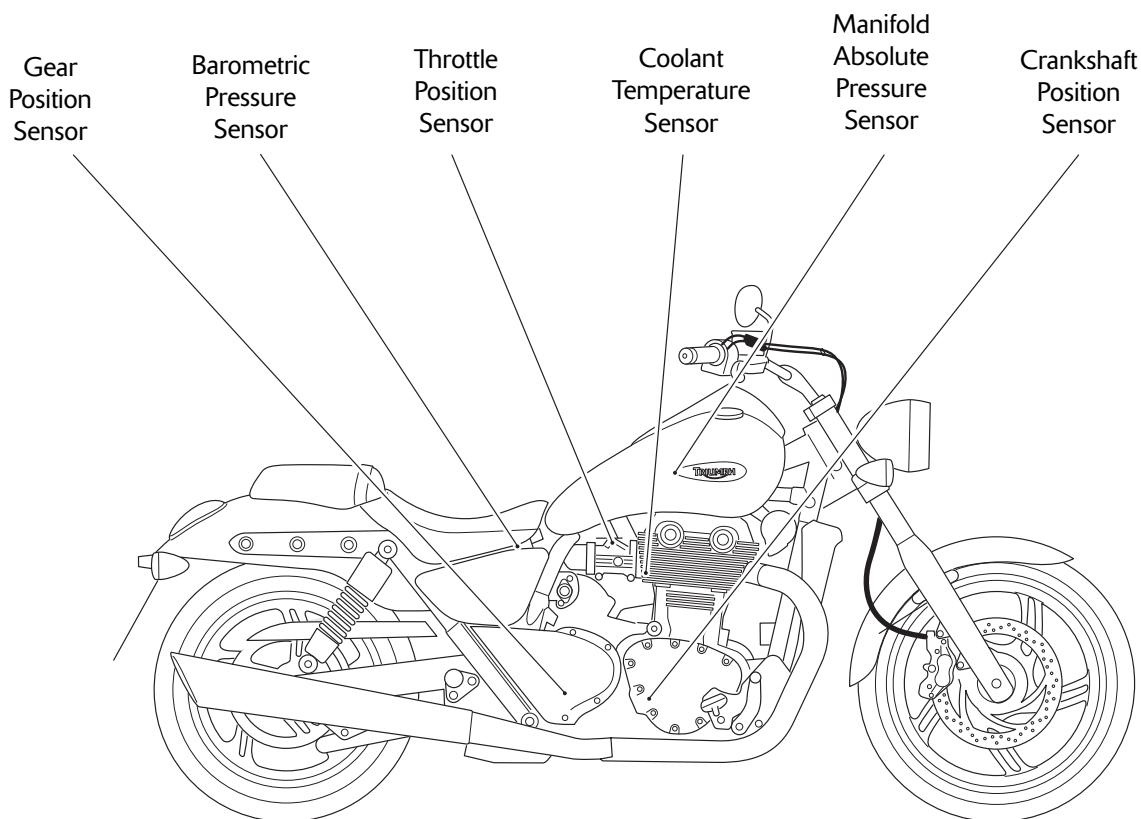
System Sensors

- **Intake air temperature sensor** - situated in the left hand side of the airbox. As the density of the air changes with temperature (therefore the amount of oxygen available to ignite the fuel), an intake air temperature sensor is fitted. Changes in air temperature are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Barometric pressure sensor** - situated beneath the motorcycle seat, in the top of the airbox. The barometric pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.
- **Manifold Absolute Pressure (MAP) sensor** - situated below the fuel tank, connected to each of the throttles by equal length tubes. The MAP sensor provides information to the ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the ECM. This degree of engine load accuracy allows the ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.
- **Clutch switch** - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate.
- **Crankshaft position sensor** - situated in the alternator cover. The crankshaft position sensor detects movement of teeth attached to the alternator rotor.
The teeth give a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.

- **Engine coolant temperature sensor** - situated towards the rear of the cylinder head, on the right hand side, below the throttle bodies. Coolant temperature information, received by the ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Throttle position sensor** - situated between the throttle bodies. Used to relay throttle position information to the ECM. Throttle opening angle is used by the ECM to determine fueling and ignition requirements for all throttle positions.
- **Road speed sensor** - situated in the lower crankcase, at the rear of the engine. The road speed sensor provides the ECM with data from which road speed is calculated and displayed on the speedometer. A vehicle speed limitation device also receives information from the road speed sensor.
- **Oxygen sensors** - situated in the exhaust header pipe system upstream of the catalyst box. The oxygen sensors constantly feed information to the ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated at the top of the side stand leg. If the side stand is in the down position, the engine will not run unless the transmission is in neutral.
- **Fall detection switch** - For all models except Thunderbird Commander and Thunderbird LT it is situated under the battery.
For Thunderbird Commander and Thunderbird LT it is situated under on the underside of the airbox.
The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately. This prevents the engine from running and the fuel pump from delivering fuel. In the event of a fall, the switch is reset by returning the bike to an upright position and switching the ignition off then back on again.
- **Gear position sensor** - situated in the lower crankcase, below the final drive belt pulley. The gear position sensor provides the ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The sensor also provides information to the neutral lamp in the instruments.

Fuel System/Engine Management

Sensor Locations



Fuel System/Engine Management

System Actuators

In response to signals received from the sensors, the ECM controls and directs messages to a series of electronic and electromechanical actuators. The function and location of the actuators is given below.

- **Throttle stepper motor** - situated at the front of the throttle bodies. The throttle stepper motor actuates a cam/lever which causes variations in the closed throttle position. Although used primarily to ensure target idle speed is maintained, it also increases throttle opening when the engine is cold.
- **Canister purge valve (California models only)** - situated in the vapour return line between the carbon canister and the throttle bodies. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is 'pulsed' by the ECM to give control over the rate at which the canister is purged.
- **Injectors** - located in the throttle bodies. The engine is fitted with two injectors. The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the ECM using data received from the various sensors in the system.
- **Ignition coils** - plug top coils are located in the camshaft cover. There are four coils fitted, one for each of the spark plugs. The ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the ECM allows sufficient time for the coils to charge to a level where a spark can be produced. The coils are switched off at the point of ignition, the timing of which is optimised for good engine performance.
- **Main power relay** - situated behind the right hand side panel. When the ignition is switched on, the main power relay is powered up to provide a stable voltage supply for the ECM.
- **Fuel pump** - located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant three bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that fuel at three bar pressure is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.

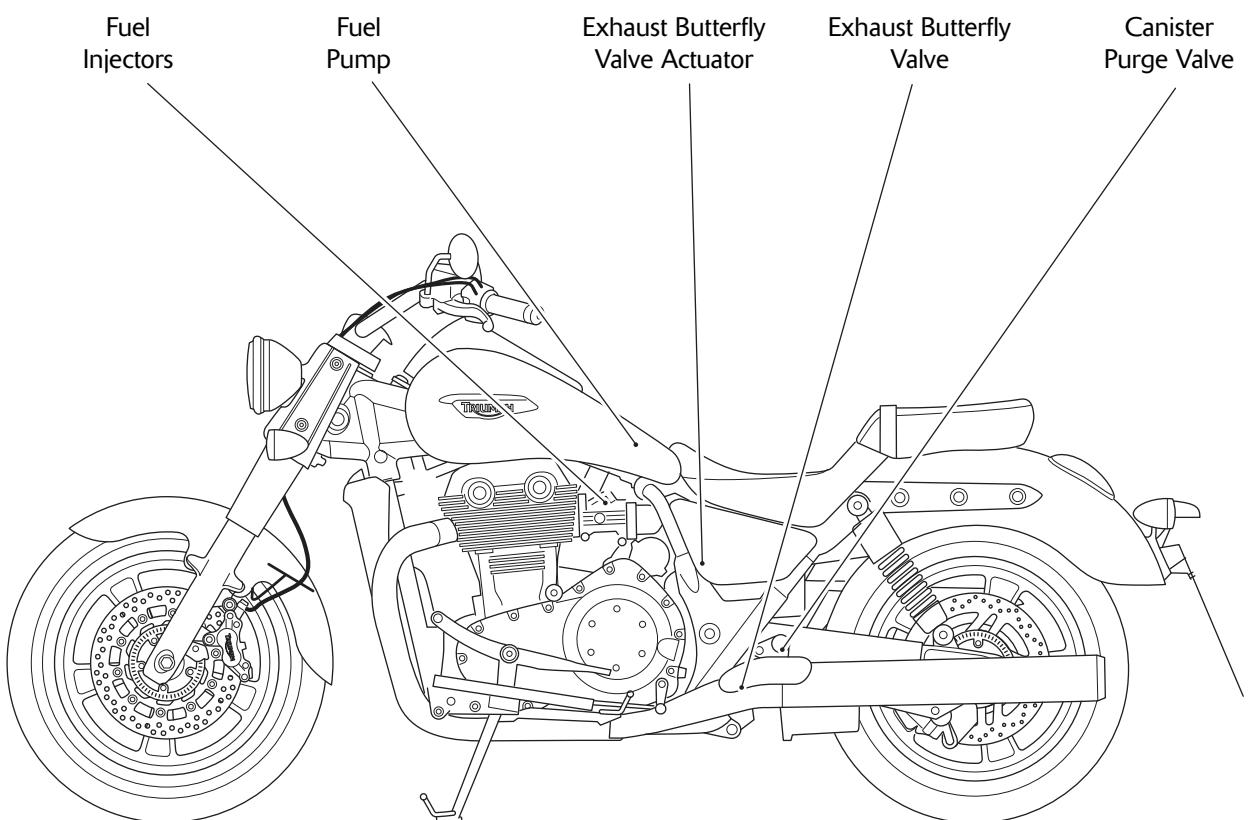
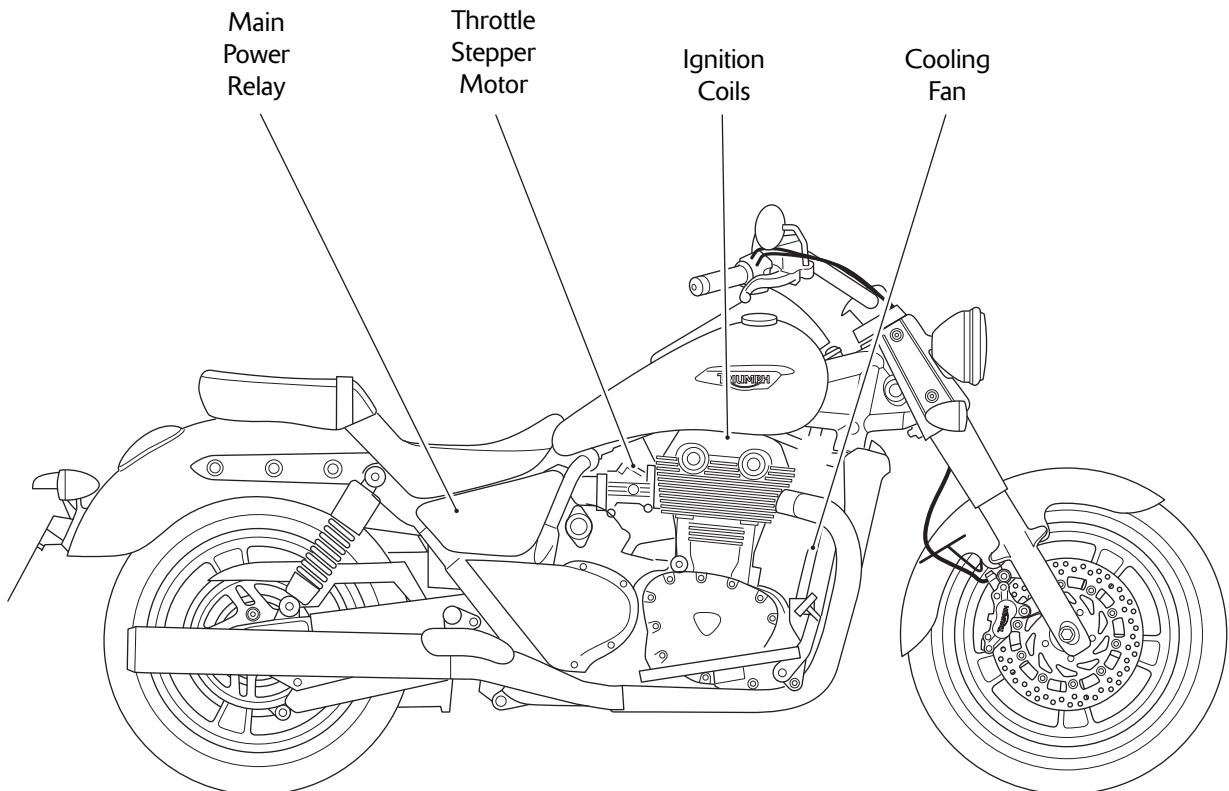
- **Cooling fan** - located behind the radiator. The ECM controls switching on and off of the cooling fan in response to a signal received from the coolant temperature sensor. When the coolant temperature rises to a level where the cooling effect of natural airflow is insufficient, the cooling fan is turned on by the ECM. When the coolant temperature falls sufficiently, the ECM turns the cooling fan off. The fan only becomes operational when the engine is running. It will not operate at any other time.
- **Exhaust butterfly valve actuator** - Thunderbird Commander and Thunderbird LT - is an integral part of the exhaust system. The Exhaust Butterfly valve has no effect on engine performance, but allows for improved tonal quality from the exhaust.

Note:

- **In this system, the starter lockout system (clutch switch, neutral switch, side stand switch) all operate through the engine management ECM.**

Fuel System/Engine Management

Actuator Locations – Thunderbird LT Shown



Immobiliser System – Thunderbird Commander and Thunderbird LT

System Description

The Thunderbird Commander and the Thunderbird LT are fitted with an electronic immobiliser system to help protect it against theft. This system has to be paired with the ECM and the ignition keys which contains a transponder chip. If all the components are correctly paired, the immobiliser will allow the engine to start. The Triumph Diagnostic Tool is the only way these components can be paired.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the immobiliser control module's memory. This stored data can be recovered using the Triumph Diagnostic Tool (see page 10-34).

System Components and Operation

- **Transponder chip** - situated inside the ignition key. The chip is activated by the antenna coil when the ignition switch is turned to the ON position.
- **Antenna coil** - situated around the ignition switch. When the ignition switch is turned to the ON position, and the transponder chip is activated, the signal from the chip is sent to the immobiliser control module.
- **Immobiliser control module** - situated on the underside of the airbox. This control module communicates with the transponder chip in the key and the ECM and will only allow the engine to start if a matching signal is received.
- **Alarm/immobiliser warning indicator light** - situated in the instrument pack. The light will flash for 24 hours to show that the engine immobiliser is on. When the ignition switch is turned to the ON position the immobiliser and indicator light will be off. If the indicator light remains on it indicates that the immobiliser has a malfunction that requires investigation.
- If an accessory alarm is fitted, the immobiliser indicator light will only illuminate when the conditions described in the accessory alarm instructions are met.

Keys

When the motorcycle is delivered from the factory it is supplied with two keys. Keys can be deleted or added to the immobiliser system using the Triumph Diagnostic Tool. A maximum of four keys can be added to the system.

To ensure the immobiliser system functions correctly note the following:

- Do not put any magnetic materials on the same key ring as the motorcycle key.
- Do not put any other ignition key with a transponder chip fitted near the motorcycle key when in use.
- Do not modify the immobiliser system.
- Do not submerge the key in water or any other fluid.
- Do not drop or strike the key against hard material.

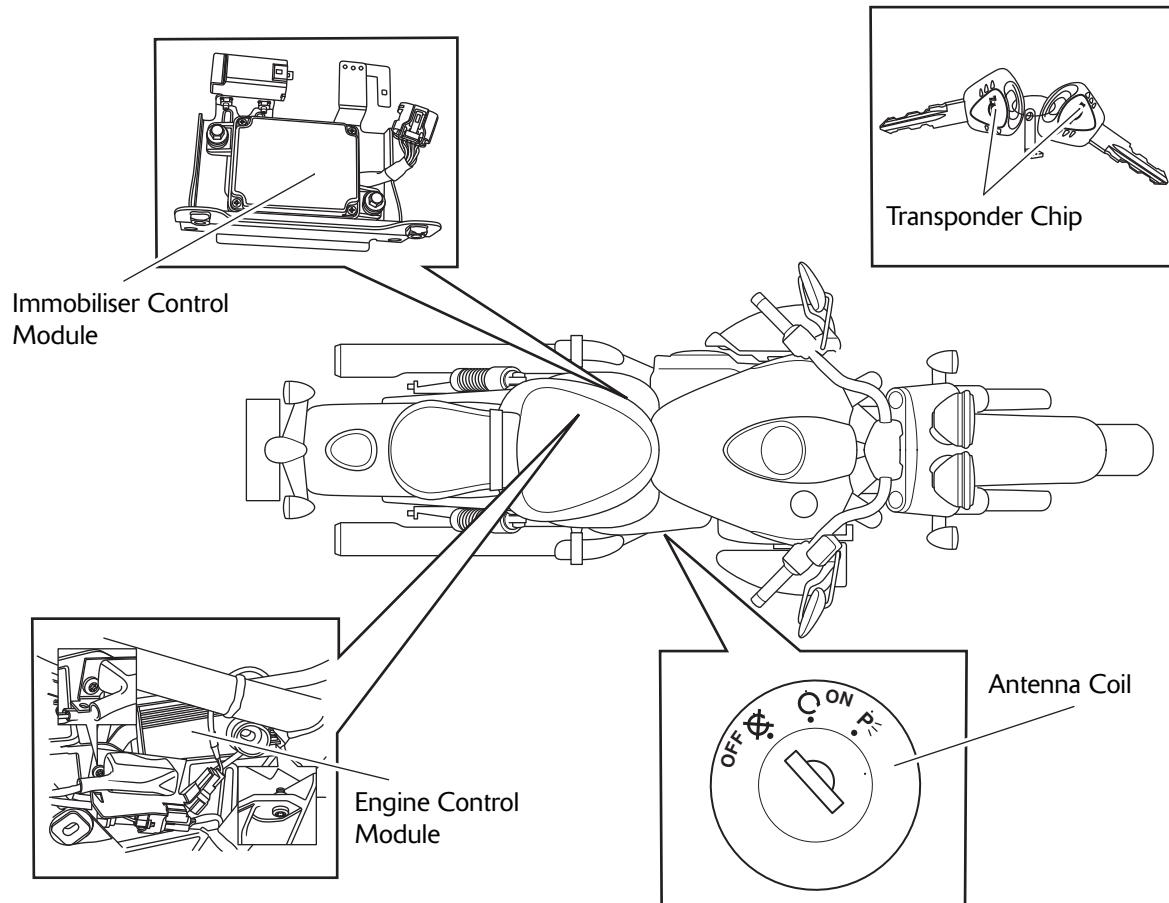
Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the immobiliser control module using the Triumph Diagnostic Tool (see page 10-34).

Further Diagnosis

The tables that start on page 10-42, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Components Location



Fuel System/Engine Management

Engine Management Circuit Diagram – All Models Except Thunderbird Commander and Thunderbird LT – Up To Engine Number 596480

Key To Wiring Circuit Diagram

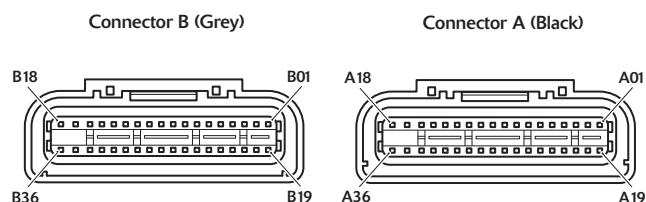
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	MAP Sensor Right Hand
13	MAP Sensor Left Hand
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Oxygen Sensor Right Hand
17	Oxygen Sensor Left Hand
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)
35	Oxygen Sensor Heater Right Hand*

36	Oxygen Sensor Heater Left Hand*
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

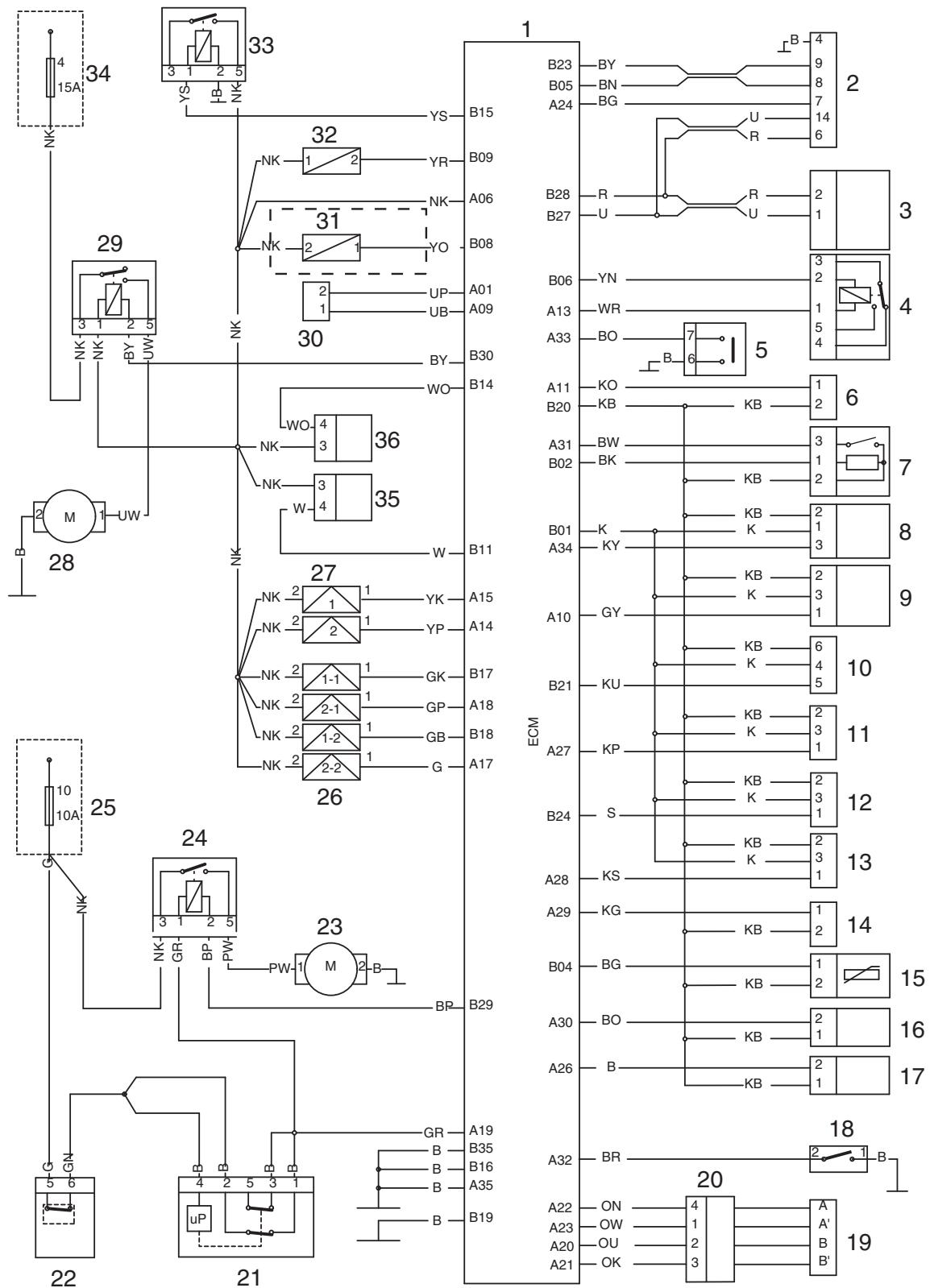
ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector pins are prefixed A and the grey connector pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Circuit Diagram – Engine Management System – All Models Except Thunderbird Commander and Thunderbird LT – Up To Engine Number 596480



Fuel System/Engine Management

Engine Management Circuit Diagram – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596480

Key To Wiring Circuit Diagram

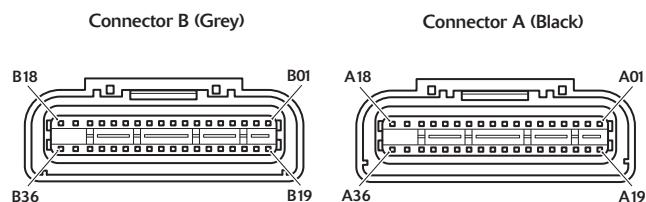
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	MAP Sensor Right Hand
13	MAP Sensor Left Hand
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Oxygen Sensor Right Hand
17	Oxygen Sensor Left Hand
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)
35	Oxygen Sensor Heater Right Hand*

36	Oxygen Sensor Heater Left Hand*
37	Gear Position Sensor Fly Lead
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

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O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

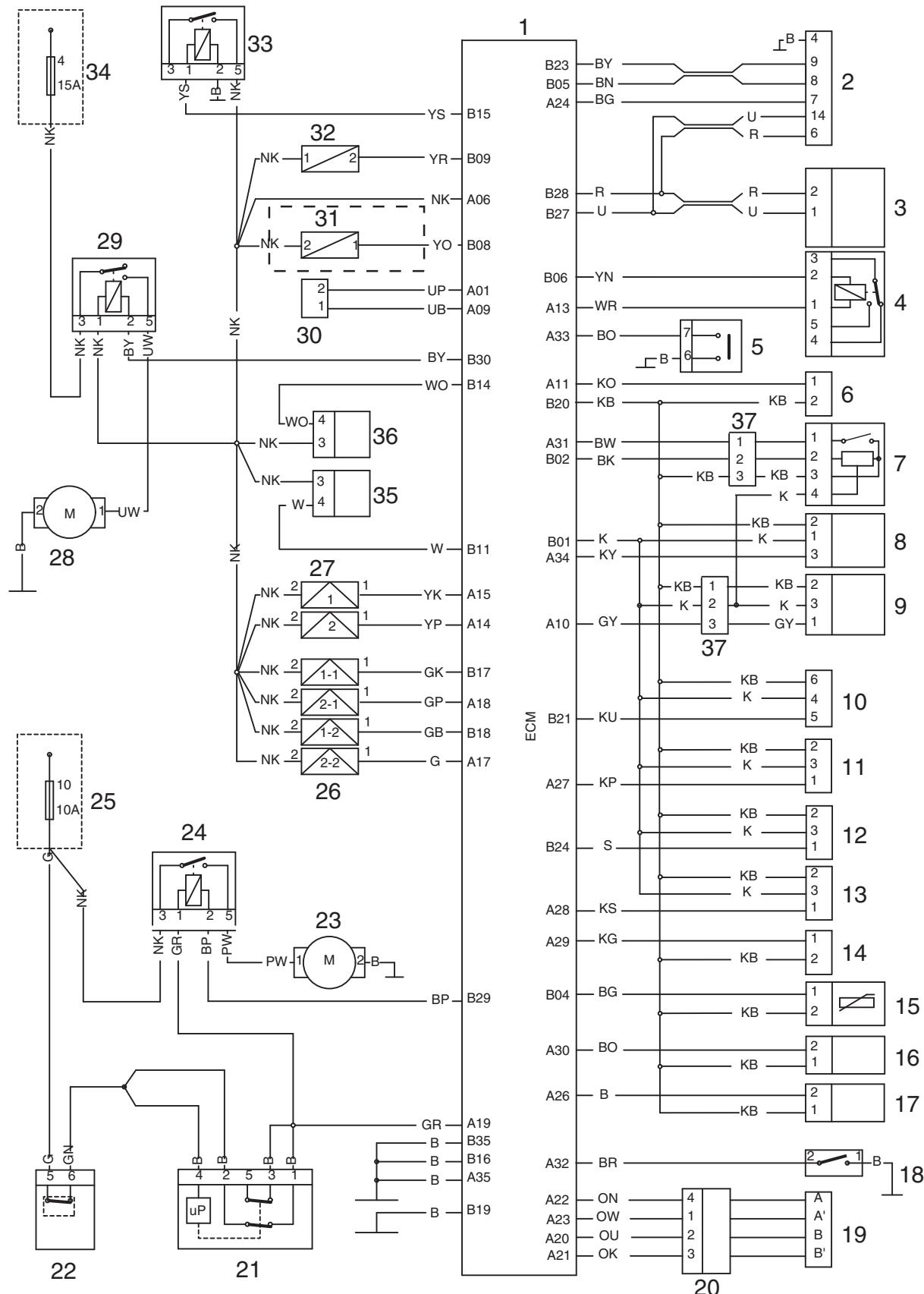
ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector pins are prefixed A and the grey connector pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Circuit Diagram – Engine Management System – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596480



Fuel System/Engine Management

Engine Management Circuit Diagram – All Models Except Thunderbird Commander and Thunderbird LT – With Four Pin Gear Position Sensor without Fly Lead

Key To Wiring Circuit Diagram

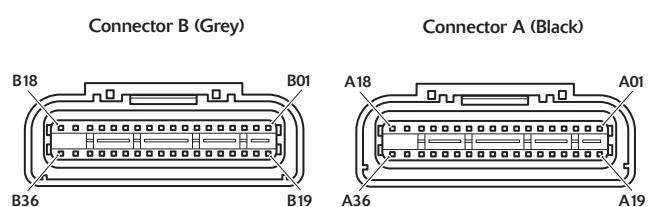
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	MAP Sensor Right Hand
13	MAP Sensor Left Hand
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Oxygen Sensor Right Hand
17	Oxygen Sensor Left Hand
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)

35	Oxygen Sensor Heater Right Hand*
36	Oxygen Sensor Heater Left Hand*
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

Code	Wiring Colour
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G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

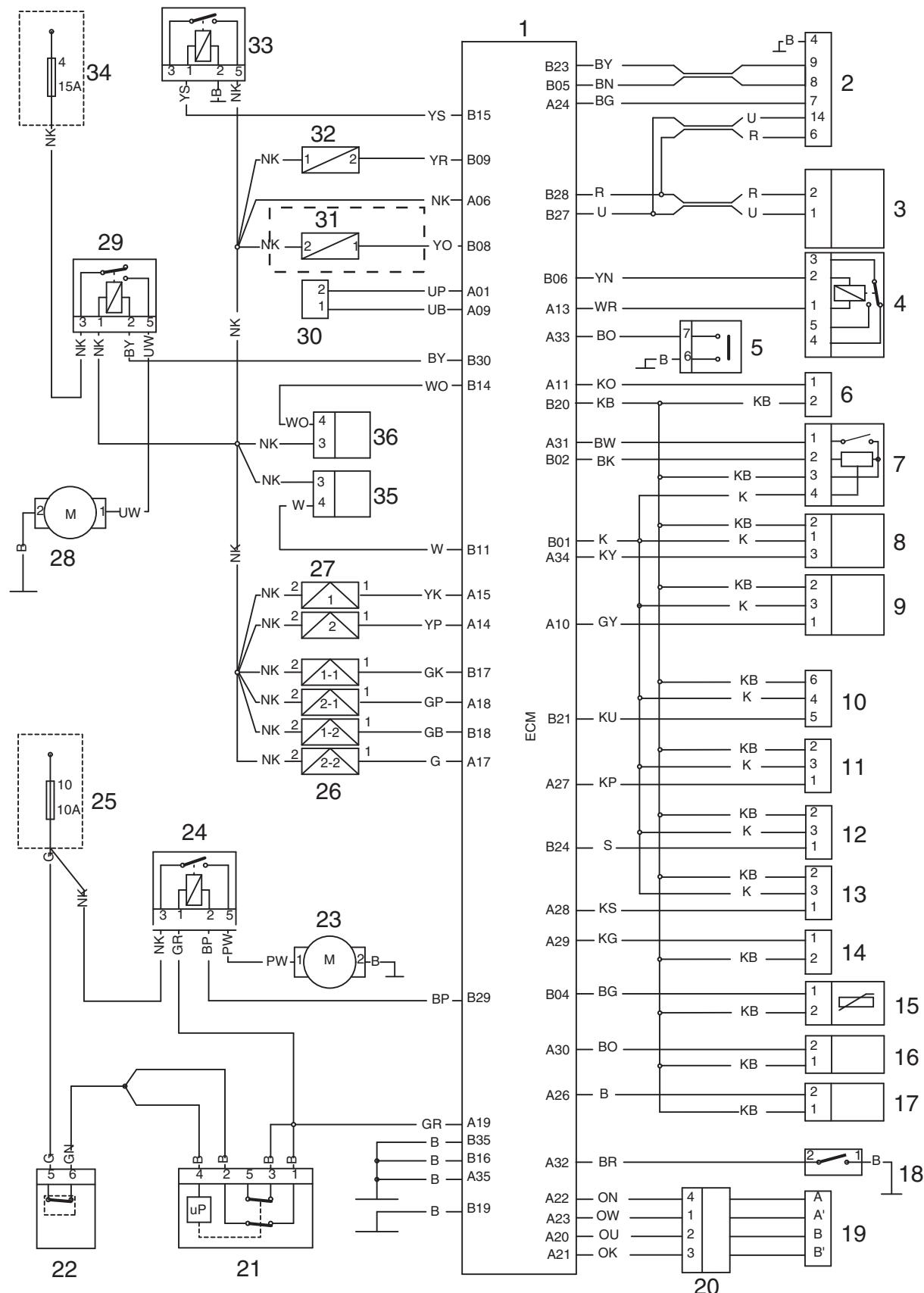
ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector pins are prefixed A and the grey connector pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Circuit Diagram – Engine Management System – All Models Except Thunderbird Commander and Thunderbird LT – With Four Pin Gear Position Sensor without Fly Lead



Fuel System/Engine Management

Engine Management Circuit Diagram – Thunderbird Commander and Thunderbird LT

Key To Wiring Circuit Diagram

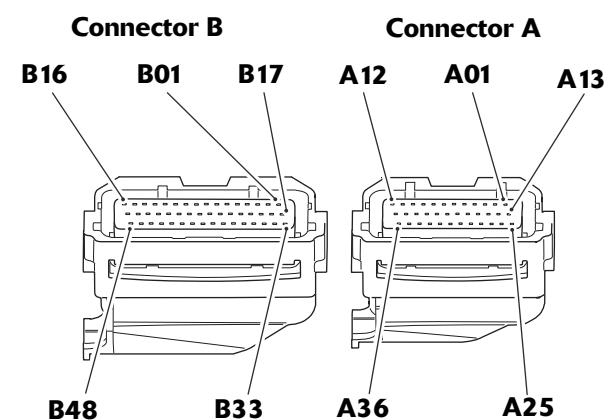
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instruments Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Throttle Position Sensor
9	Fall Detection Switch
10	Ambient Pressure Sensor
11	Immobiliser
12	ABS Module
13	Ignition Switch
14	Fuel Level Sender
15	MAP Sensor Right Hand
16	MAP Sensor Left Hand
17	Coolant Temperature Sensor
18	Oxygen Sensor Right Hand
19	Oxygen Sensor Left Hand
20	Exhaust Butterfly Valve Actuator
21	Side Stand Switch
22	Idle Speed Control Stepper Motor
23	Alarm Unit
24	Engine Stop Switch
25	Fuel Pump
26	Fuel Pump Relay
27	Fuse Box (Fuse 10)
28	Ignition Coils
29	Fuel Injectors
30	Crankshaft Sensor
31	Cooling Fan
32	Cooling Fan Relay
33	Fuse Box (Fuse 4)
34	Purge Valve
35	Engine Management System Relay

36	Oxygen Sensor Heater Right Hand*
37	Oxygen Sensor Heater Left Hand*
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

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K	Pink
R	Red
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W	White
Y	Yellow
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LU	Light Blue

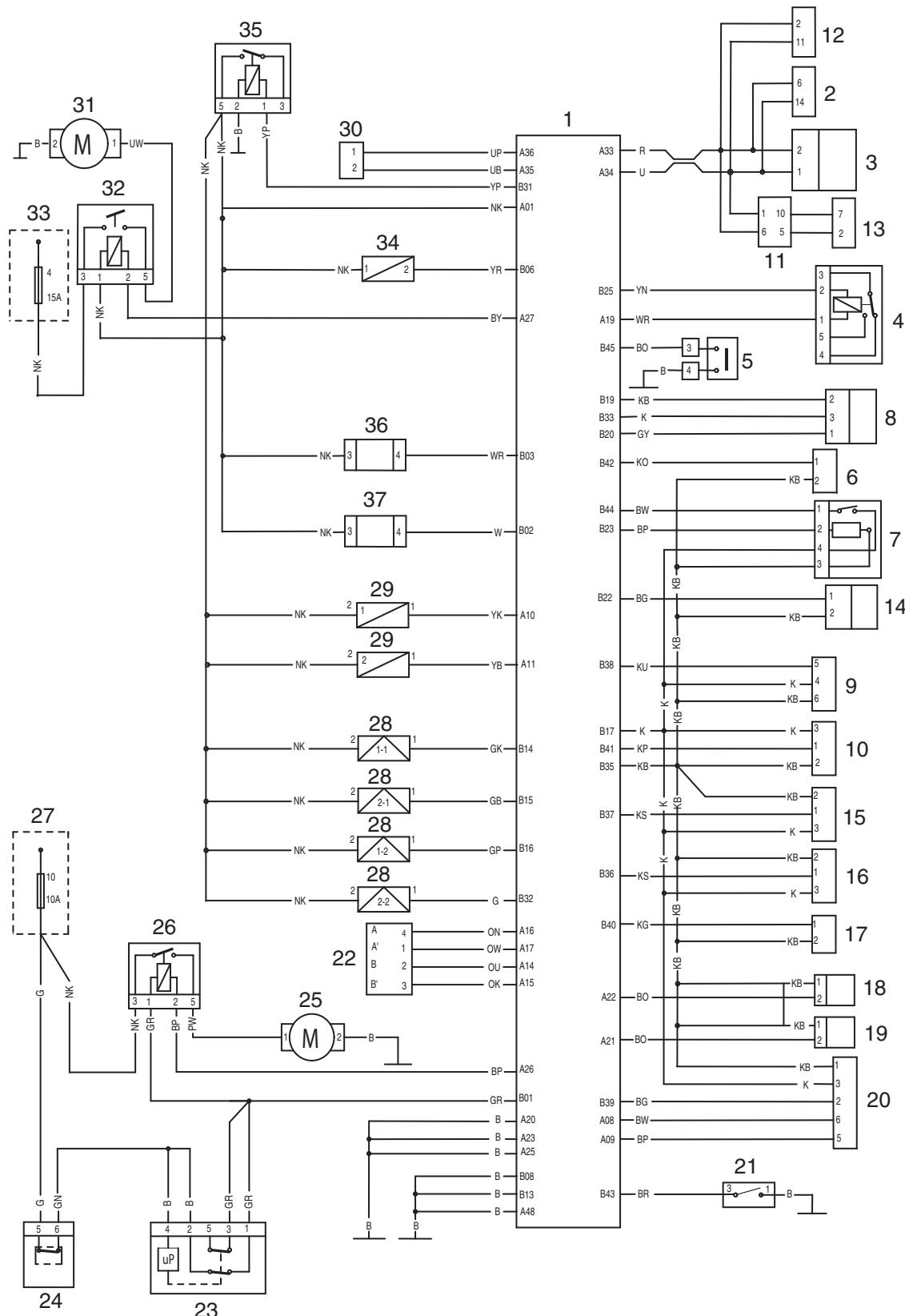
ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the engine management circuit diagram.

The smaller connector's pins are prefixed A and the larger connector pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Circuit Diagram – Engine Management System – Thunderbird Commander and Thunderbird LT



Fuel System/Engine Management

System Diagnostics

The engine management system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the left hand side panel. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed. If the fault is an emissions related fault or a serious malfunction affecting engine performance, a DTC (Diagnostic Trouble Code) and freeze-frame data will be logged in the ECM's memory and the MIL (Malfunction Indicator Lamp) on the motorcycle instrument panel is illuminated. Once a fault is confirmed, the number of warm-up cycles made by the engine is counted. If the fault clears, the warm-up cycle counter will extinguish the MIL (Malfunction Indicator Lamp) at a predetermined count, and erase the DTC and freeze-frame data from the ECM memory at another (higher) count.

A single warm-up cycle is deemed to have taken place when the following criteria have been met:

- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power down sequence must take place.

Note:

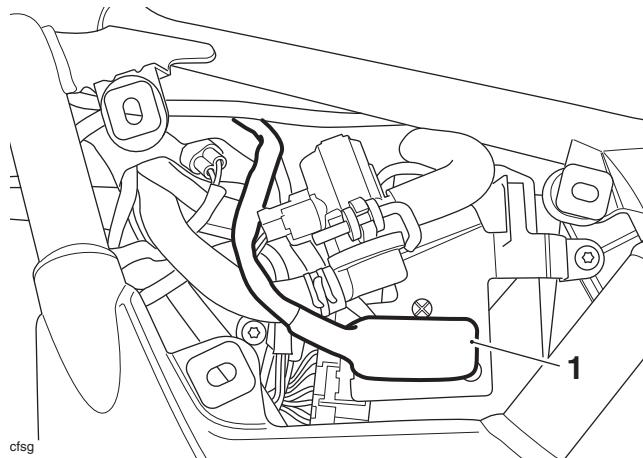
- When a fault has been rectified, the MIL will remain illuminated until sufficient non-fault warm-up cycles have taken place to turn it off. The MIL will be immediately extinguished if, after first rectifying the fault, the DTC (diagnostic trouble code) that caused the MIL illumination is erased from the ECM memory using the Triumph diagnostic software.

Note:

- In most cases, when a fault is detected, the engine management system will revert to a limp-home mode. In this mode, the engine will still function though the performance and fuel economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.

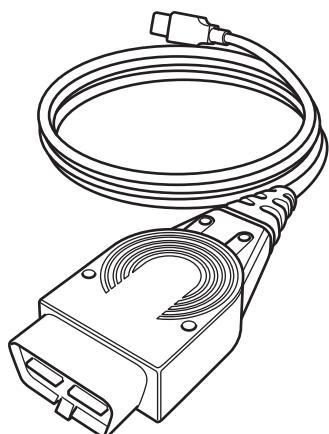
Diagnostic Tool Connection

- To connect the Triumph diagnostic interface to the motorcycle, remove the left hand side panel (see page 17-30) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

- Plug the diagnostic interface directly into the diagnostic connector.



Diagnostic Interface

- When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
- Refit the diagnostic connector to its locating tang and refit the side panel (see page 17-30).

Triumph Diagnostic Software

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

Note:

- Full details of how to operate the software and how to interpret the data can be found in the **Triumph Diagnostic Tool User Guide**, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.

Build Data

The **Build Data** screen will display the following information:

- Motorcycle model
- Vehicle Identification Number (VIN)
- ECM type
- ECM ID
- ECM serial number
- Tune number
- Date of last tune download
- Total tune downloads since manufacture
- The lock status of the ECM (ECM Locked, Unlocked or Not Applicable).

Fuel System/Engine Management

Current Data

The data available under Current Data is:

Function Examined	Result Reported (Scale)
Fuel system status 1	open or closed loop operation
Fuel system status 2	open or closed loop operation/engine not running
Calculated load value	%
Engine coolant temperature	°C
Short term fuel trim - bank 1	%
Short term fuel trim - bank 2	%
Intake manifold absolute pressure	mmHg
Engine speed	rpm
Vehicle speed	km/h
Ignition timing advance - cylinder 1	degrees
Intake air temperature	°C
Absolute throttle position	%
Bank 1 - oxygen sensor 1	Volts
Bank 1 - oxygen sensor 1 - short term fuel trim	%
Bank 2 - oxygen sensor 2	Volts
Bank 2 - oxygen sensor 2 - short term fuel trim	%

Sensor Data

When using this function it is possible to check the status of various sensors and actuators.

The data sets are divided into eight groups - Sensor Voltages, Sensor Readings, Injector Data, Ignition Data, Idle Speed and Throttle Data, Inputs, Outputs and Adaption Status. Each of these screens is described on the following pages.

Sensor Voltages

The data available under Sensor Voltages is:

Item Checked	Result Unit
Battery voltage	Volts
Voltage from ignition switch to ECM	Volts
Air temperature sensor voltage	Volts
Coolant temperature sensor voltage	Volts
Atmospheric pressure sensor voltage	Volts
Manifold absolute pressure sensor 1 voltage	Volts
Manifold absolute pressure sensor 2 voltage	Volts
Throttle position sensor voltage	Volts
Fuel level sensor voltage	Volts
Oxygen sensor output 1 voltage	Volts
Oxygen sensor output 2 voltage	Volts
Exhaust butterfly valve sensor voltage‡	Volts

‡ Applies to models fitted with an exhaust butterfly valve only. All other models will show **Not Applicable** in this field.

Sensor Readings

The data available under Sensor Readings is:

Item Checked	Result Unit
Air temperature	°C
Coolant temperature	°C
Atmospheric (barometric) pressure	mmHg
Manifold absolute pressure (one reading per cylinder)	mmHg
Low fuel light	on/off
Oxygen sensor 1 heater status	on/off
Oxygen sensor 2 heater status	on/off
Exhaust butterfly valve sensor voltage‡	%

‡ Applies to models fitted with an exhaust butterfly valve only. All other models will show **Not Applicable** in this field.

Fuel System/Engine Management

Injector Data

The data available under Injector Data is:

Item Checked	Result Unit
Injector 1 pulse time	milliseconds
Injector 2 pulse time	milliseconds

Ignition Data

The data available under Ignition Data is:

Item Checked	Result Unit
Ignition timing cyl 1	degrees BTDC
Ignition timing cyl 2	degrees BTDC
Coil 1 dwell time	milliseconds
Coil 2 dwell time	milliseconds

Idle Speed and Throttle Data

The data available under Idle Speed and Throttle Data is:

Item Checked	Result Unit
Engine speed	rpm
Idle reference speed	rpm
Idle speed control current steps	numeric
Idle speed control target steps	numeric
Throttle position	% open
Secondary air injection status	SAI on/off

Fuel System/Engine Management

Inputs

The data available under Inputs is:

Item Checked	Result Unit
Starter switch status	switch on/off
Side stand status	up/down
Fall detection switch status	normal/over
Clutch switch status	release/grip
Neutral switch status	gear/neutral
Gear position status	numeric value or neutral
Vehicle speed	km/h
Calculated load	%

Outputs

The data available under Outputs is:

Item Checked	Result Unit
EMS main relay status	relay on/off
Fuel pump relay status	on/off
Starter relay status	starter on/off
Malfunction indicator light status	MIL on/off
Cooling fan status	fan on/off
Purge valve duty cycle	%
Accessory control relay status	relay on/off
Headlight relay status	headlight on/off

Adaption Status

Because the fuel system is adaptive, the engine management system is able to automatically adjust to new working conditions, such as changes in altitude, component wear, air leaks etc. This screen displays information on the adaption status of the vehicle which will show if it has adapted or not.

Function Examined	Report Method
Closed Throttle Position Adapted	adapted/not adapted
Idle speed control adaption status	%
Oxygen sensor 1 adaption range (off idle)	%
Oxygen sensor 1 adaption range (idle)	%
Oxygen sensor 1 adaption status (off idle)	%
Oxygen sensor 1 adaption status (idle)	%
Oxygen sensor 2 adaption range (off idle)	%
Oxygen sensor 2 adaption range (idle)	%
Oxygen sensor 2 adaption status (off idle)	%
Oxygen sensor 2 adaption status (idle)	%

Fuel System/Engine Management

Function Tests

The system allows the diagnostic software to perform a series of function tests on various actuators in the engine management system. In some cases it is necessary to make a visual observation of a component and in others, if faults are present, DTCs will be logged.

The Function Tests available are:

Function Examined	Report Method
Instrument Panel	Observe instrument panel, refer to Service Manual
Idle Air Control Stepper Motor	Observe throttle position/Stored fault code*
Purge Valve	Listen for valve operation/Stored fault code*
Fuel Pump - Priming	Listen for fuel pump operation/Stored fault code*
Fuel Pump - Continuous Operation	Fuel pressure test/Listen for fuel pump operation/Stored fault code*
Cooling Fan Control	Observe the cooling fan/Stored fault code*
Secondary Air Injection†	Listen for valve operation/Stored fault code*
Exhaust Butterfly Valve Actuator†	Listen or observe for exhaust butterfly valve actuator operation/Stored fault code*

* If a fault is detected.

†Test will only be displayed if the component is fitted.

Adjust Tune

Using the Triumph diagnostic software, it is possible to:

- reset the adaptions
- balance the throttle bodies.

Further functions are provided to allow correct replacement and adjustment of the:

- throttle position sensor
- idle speed control stepper motor.

These functions are needed as, after replacement of the parts concerned, adjustments have to be made to specific voltage settings, with the throttles set in a specific position.

To reset the adaptions, see page 10-184.

To replace and adjust the throttle position sensor, see page 10-171.

To replace and adjust the ISC stepper motor, see page 10-181.

To balance the throttles, see page 10-177.

Freeze-Frame Data

Freeze-frame data is stored at the time a DTC is recorded (confirmed) by the ECM. If multiple DTCs are recorded, the freeze-frame data which is stored will relate to the first recorded DTC only.

By calling up freeze-frame data associated with the first recorded DTC, the technician can check the engine condition at the time the fault occurred. The data available is:

Function Examined	Result Reported (Scale)
DTC	Diagnostic Trouble Code (DTC) number
Fuel system status 1	open or closed loop operation
Fuel system status 2	open or closed loop operation
Calculated load	%
Coolant temperature	°C
Short term fuel trim - bank 1	%
Short term fuel trim - bank 2	%
Intake manifold absolute pressure	mmHg
Engine speed	rpm
Vehicle speed	km/h
Ignition advance	degrees
Intake air temperature	°C
Throttle position	%
Oxygen sensor 1 output voltage	Volts
Oxygen sensor 1 short term fuel trim	%
Oxygen sensor 2 output voltage	Volts
Oxygen sensor 2 short term fuel trim	%

Fuel System/Engine Management

Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic software as a four digit code.

As mentioned earlier, when the system detects a fault, it begins to count the number of times the fault occurs before illuminating the MIL and storing a fault code.

Similarly, if a fault clears, the ECM also records this fact and will turn off the MIL when sufficient no fault warm-up cycles have taken place. Any fault codes will remain in the ECM memory until the required number of no fault warm-up cycles have taken place. The number of warm-up cycles required to extinguish the MIL will always be less than the number required to remove a DTC from the ECM memory. DTCs can be removed at any time using the Triumph diagnostic software.

The system will log the diagnostic trouble codes listed below/over:

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0031	Oxygen sensor 1 heater open circuit or short to ground	3	40	Yes	Thunderbird SE/Storm 10-88 Thunderbird Commander/LT 10-90
P0032	Oxygen sensor 1 heater short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-88 Thunderbird Commander/LT 10-90
P0051	Oxygen sensor 2 heater open circuit or short to ground	3	40	Yes	Thunderbird SE/Storm 10-88 Thunderbird Commander/LT 10-90
P0052	Oxygen sensor 2 heater short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-88 Thunderbird Commander/LT 10-90
P0078	Exhaust motor circuit malfunction	3	40	Yes	Thunderbird Commander/LT 10-134
P0107	Manifold absolute pressure sensor 1 short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108
P0112	Intake air temperature sensor short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-74 Thunderbird Commander/LT 10-76
P0113	Intake air temperature sensor open circuit or short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird SE/Storm 10-74 Thunderbird Commander/LT 10-76

Fuel System/Engine Management

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0117	Engine coolant temperature sensor short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-70 Thunderbird Commander/LT 10-72
P0118	Engine coolant temperature sensor open circuit or short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird SE/Storm 10-70 Thunderbird Commander/LT 10-72
P0122	Throttle position sensor 1 short circuit to ground or open circuit	3	40	Yes	Thunderbird SE/Storm 10-60 Thunderbird Commander/LT 10-61
P0123	Throttle position sensor 1 short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-60 Thunderbird Commander/LT 10-61
P0130	Oxygen sensor 1 circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-84 Thunderbird Commander/LT 10-86
P0150	Oxygen sensor 2 heater circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-84 Thunderbird Commander/LT 10-86
P0201	Injector 1 circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-56 Thunderbird Commander/LT 10-58
P0202	Injector 2 circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-56 Thunderbird Commander/LT 10-58
P0335	Crankshaft sensor circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-50 Thunderbird Commander/LT 10-51
P0351	Ignition coil 1 malfunction	3	40	Yes	Thunderbird SE/Storm 10-66 Thunderbird Commander/LT 10-68
P0352	Ignition coil 2 malfunction	3	40	Yes	Thunderbird SE/Storm 10-66 Thunderbird Commander/LT 10-68
P0353	Ignition coil 3 malfunction	3	40	Yes	Thunderbird SE/Storm 10-66 Thunderbird Commander/LT 10-68
P0354	Ignition coil 4 malfunction	3	40	Yes	Thunderbird SE/Storm 10-66 Thunderbird Commander/LT 10-66
P0413	Secondary air injection system short circuit to ground or open circuit	3	40	Yes	Thunderbird SE/Storm 10-111

Fuel System/Engine Management

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0414	Secondary air injection short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-111
P0444	Purge valve short circuit to ground or open circuit	3	40	Yes	Thunderbird SE/Storm 10-62 Thunderbird Commander/LT 10-64
P0445	Purge valve short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-62 Thunderbird Commander/LT 10-64
P0460	Fuel level sensor circuit malfunction	0	40	No	Thunderbird SE/Storm 10-115 Thunderbird Commander/LT 10-116
P0500	Vehicle speed sensor malfunction	3	40	Yes	All Models 10-102
	Wheel speed sensor	3	40	Yes	
P0505	Idle Air Control Valve system malfunction	3	40	Yes	Thunderbird SE/Storm 10-52 Thunderbird Commander/LT 10-54
P0560	System voltage - battery circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-80 Thunderbird Commander/LT 10-81
P0603	EEPROM Error	0	40	No	All Models 10-93
P0705	Gear position sensor circuit malfunction	0	40	No	Thunderbird SE/Storm up to engine number 596480 10-112 Thunderbird SE/Storm from engine number 596481 10-113 Thunderbird Commander/LT 10-114
P1078	Exhaust position sensor - short circuit to ground or open circuit	3	40	Yes	Thunderbird Commander/LT 10-133
P1079	Exhaust position sensor - short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird Commander/LT 10-133
P1080	Exhaust actuator control mechanism fault	3	40	Yes	Thunderbird Commander/LT 10-134
P1105	Manifold absolute pressure sensor 1 pipe malfunction	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108
P1106	Manifold absolute pressure sensor 2 pipe malfunction	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108

Fuel System/Engine Management

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1107	Ambient air pressure sensor circuit short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-104 Thunderbird Commander/LT 10-104
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird SE/Storm 10-103 Thunderbird Commander/LT 10-104
P1111	Manifold absolute pressure sensor pipes reversed	3	40	Yes	All Models 10-110
P1131	Oxygen sensor circuits reversed	3	40	Yes	All Models 10-92
P1231	Fuel pump relay short circuit to ground or open circuit	3	40	Yes	Thunderbird SE/Storm 10-78 Thunderbird Commander/LT 10-79
P1232	Fuel pump relay short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-78 Thunderbird Commander/LT 10-79
P1508	Unmatched Immobiliser ECM	3	40	Flashing	Thunderbird Commander/LT 10-132
P1520	Unmatched ABS	3	40	Flashing	Models with ABS 10-135
P1521	Lost communication with ABS	3	40	Yes	Thunderbird Storm with ABS 10-136 Thunderbird Commander/LT 10-138
P1552	Cooling fan relay short circuit to ground or open circuit	3	40	Yes	Thunderbird SE/Storm 10-82 Thunderbird Commander/LT 10-83
P1553	Cooling fan relay short circuit to Vbatt or over temp	3	40	Yes	Thunderbird SE/Storm 10-82 Thunderbird Commander/LT 10-83
P1604	ECM tamper detected - return to Triumph	0	0	Yes	All Models 10-140
P1605	ECM locked by the tune lock function	Only if tune lock is unlocked		Flashing	All Models 10-128

Fuel System/Engine Management

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1614	Instrument ID incompatible	Only if Instrument ID Matching		Flashing	All Models 10-129
P1619	Headlamp relay short circuit to ground or open circuit	0	40	No	Thunderbird Commander/LT 10-141
P1620	Headlamp relay short circuit to Vbatt	0	40	No	Thunderbird Commander/LT 10-141
P1631	Fall detection circuit short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-95 Thunderbird Commander/LT 10-96
P1632	Fall detection circuit short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-95 Thunderbird Commander/LT 10-96
P1650	Lost communication with Immobiliser ECM	3	40	Yes	Thunderbird Commander/LT 10-130
P1659	Ignition power supply malfunction	3	40	Yes	Thunderbird SE/Storm 10-122 Thunderbird Commander/LT 10-123
P1680	Exhaust actuator control internal motor relay circuit malfunction	3	40	Yes	Thunderbird Commander/LT 10-94
P1685	Main relay circuit malfunction	3	40	Yes	Thunderbird SE/Storm 10-118 Thunderbird Commander/LT 10-120
P1687	Manifold absolute pressure sensor 2 short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108
P1688	Manifold absolute pressure sensor 2 open circuit or short circuit to 5 volt sensor supply	3	40	Yes	Thunderbird SE/Storm 10-106 Thunderbird Commander/LT 10-108
P1690	CAN Fault	3	40	Yes	Thunderbird Commander/LT 10-98
P1695	Lost communication with instrument panel	0	40	No	Thunderbird SE/Storm 10-100 Thunderbird Commander/LT 10-101

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1696	5 volt sensor supply short circuit to ground	3	40	Yes	Thunderbird SE/Storm 10-124 Thunderbird Commander/LT 10-126
P1697	5 volt sensor supply short circuit to Vbatt	3	40	Yes	Thunderbird SE/Storm 10-124 Thunderbird Commander/LT 10-126
P1698	5 volt sensor supply malfunction	3	40	Yes	Thunderbird SE/Storm 10-124 Thunderbird Commander/LT 10-126

Immobiliser Control Module Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the immobiliser/TPMS control module memory when there is a confirmed fault in the system.

The codes are reported to the Triumph Diagnostic Tool as a four digit code.

The system will log the Diagnostic Trouble Codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description	Warning Light/Information
L0008	Invalid key: Key authentication unsuccessful	Alarm/Immobiliser light ON

Fuel System/Engine Management

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note:

- A major cause of hidden electrical faults can be traced to faulty electrical connectors. For example:
 - Dirty/corroded terminals
 - Damp terminals
 - Broken or bent cable pins within multiplugs.

For example, the electronic control module (ECM) relies on the supply of accurate information to enable it to plan the correct fuelling and ignition timing. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- If testing with a voltmeter, the voltage across a connector should be virtually battery Volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.

When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated, e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent
- Check for dampness/dirt/corrosion
- Check cables for security
- Check cable pin joints for damage.

When Connecting a Connector:

- Ensure there is no dirt around the connector/seal
- Push together squarely to ensure terminals are not bent or incorrectly located
- Push the two halves together positively.

Disconnection of ECM Connectors

Caution

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

Caution

Never disconnect an ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

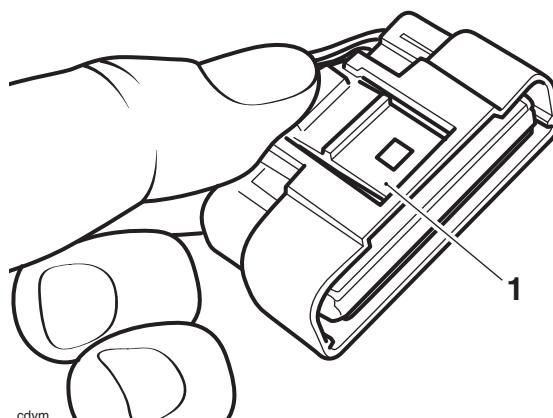
Always disconnect an ECM after disconnecting the battery negative (black) lead first.

1. Turn the ignition to the OFF position and wait at least 1 minute for the ECM to complete its power down sequence.
2. Detach the ECM from its bracket and the airbox (see page 10-160).

All Models Except Thunderbird Commander and Thunderbird LT

Note:

- Two different coloured and shaped connectors are used in the ECM, which ensures correct connection is always made. The connectors on the ECM are coloured black and grey, and correspond with identical coloured connectors on the main harness.
- 3. Press down on the locking device and gently pull back on the connector to release it from the ECM.

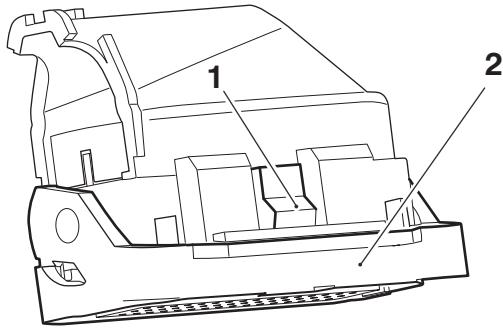


1. Locking device

Thunderbird Commander and Thunderbird LT

Note:

- Two different sized connectors are used in the ECM, which ensures correct connection is always made. The connectors are coloured black and correspond with identical connectors on the main harness.**
- Press down on the locking device and gently pull back on the connector to release it from the ECM.



- Locking device
- Locking lever

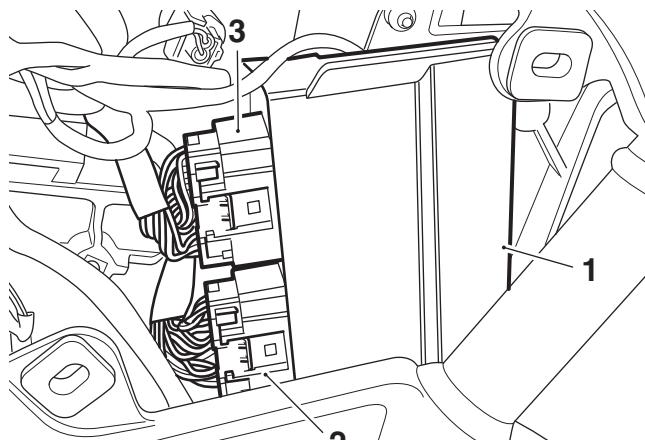
Reconnection of ECM Connectors



Caution

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

All Models except Thunderbird Commander and Thunderbird LT

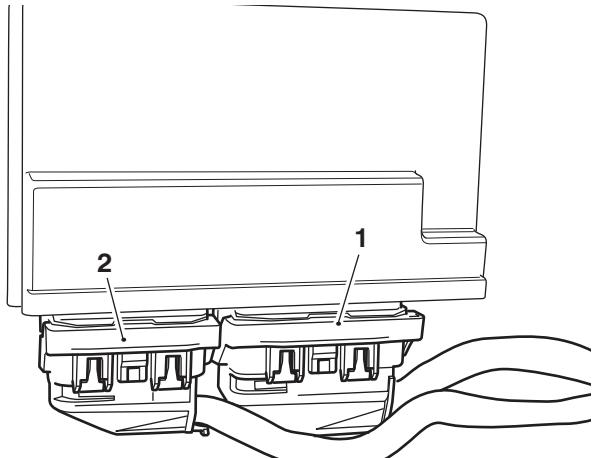


- ECM
- Grey connector
- Black connector

- Fit the connector into its socket and, whilst holding the connector in place, insert it fully into the ECM until the locking device retains it.

Thunderbird Commander and Thunderbird LT

- Fit the connector into its socket. When the locking lever starts to move, stop pushing the connector and use the locking lever to fully insert the connector home and lock it.



- Connector B (large)
- Connector A (small)

All Models

- Refit the ECM and its bracket to the airbox (see page 10-160)

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Fuel System/Engine Management

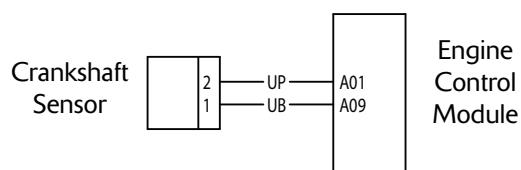
Crankshaft Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0335	Crankshaft sensor circuit malfunction	<p>View and note diagnostic software 'freeze-frame' data if available.</p> <p>Ensure sensor is fitted correctly and connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A01 - ECM pin A09	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A01 to earth - ECM pin A09 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A01 to sensor pin 2 - ECM pin A09 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A01 to ECM pin A09	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crankshaft toothed wheel: - Damage to teeth - magnetic debris contamination	OK	Renew crankshaft sensor, proceed to test 6
	Faulty	Clean/renew toothed wheel, proceed to test 6
6 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



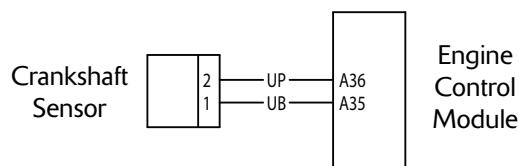
Crankshaft Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0335	Crankshaft sensor circuit malfunction	<p>View & note diagnostic software 'freeze-frame' data if available.</p> <p>Ensure sensor is fitted correctly and connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A36 - ECM pin A35	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A36 to earth - ECM pin A35 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A36 to sensor pin 2 - ECM pin A35 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A36 to ECM pin A35	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crankshaft toothed wheel: - Damage to teeth - magnetic debris contamination	OK	Renew crankshaft sensor, proceed to test 6
	Faulty	Clean/renew toothed wheel, proceed to test 6
6 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

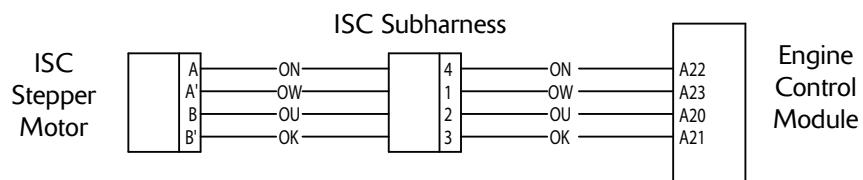
Idle Speed Control – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0505	Idle Air Control Valve system malfunction	<p>View and note diagnostic software 'freeze-frame' data if available.</p> <p>View & note diagnostic software 'sensor' data.</p> <p>Ensure sensor connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A22 - ECM pin A23 - ECM pin A20 - ECM pin A21	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A22 to ECM pin A23 - ECM pin A20 to ECM pin A21	6Ω to 10Ω	Proceed to test 3
	Open circuit	Disconnect stepper motor and proceed to test 4
	Short circuit	Disconnect stepper motor and proceed to test 5
3 Check cable for short circuit: - ECM pin A22 to earth - ECM pin A23 to earth - ECM pin A20 to earth - ECM pin A21 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin A22 to stepper motor pin 4 - ECM pin A23 to stepper motor pin 1 - ECM pin A20 to stepper motor pin 2 - ECM pin A21 to stepper motor pin 3	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A20 to ECM pin A21 - ECM pin A20 to ECM pin A22 - ECM pin A20 to ECM pin A23 - ECM pin A21 to ECM pin A22 - ECM pin A21 to ECM pin A23 - ECM pin A22 to ECM pin A23	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check stepper motor resistance: - Motor pin A to motor pin A ¹ - Motor pin B to motor pin B ¹	6Ω to 10Ω	Proceed to test 7
	Faulty	Renew stepper motor, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of stepper motor.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Idle Speed Control – Thunderbird Commander and Thunderbird LT

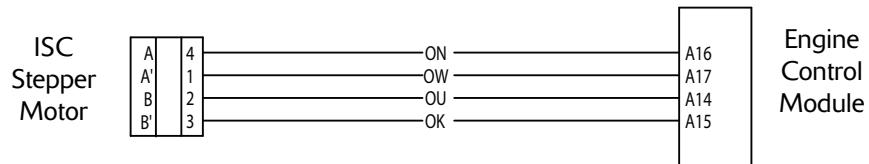
Fault Code	Possible cause	Action
P0505	Idle Air Control Valve system malfunction	<p>View and note diagnostic software 'freeze-frame' data if available.</p> <p>View & note diagnostic software 'sensor' data.</p> <p>Ensure sensor connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A16 - ECM pin A17 - ECM pin A14 - ECM pin A15	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A16 to ECM pin A17 - ECM pin A14 to ECM pin A15	6Ω to 10Ω	Proceed to test 3
	Open circuit	Disconnect stepper motor and proceed to test 4
	Short circuit	Disconnect stepper motor and proceed to test 5
3 Check cable for short circuit: - ECM pin A16 to earth - ECM pin A17 to earth - ECM pin A14 to earth - ECM pin A15 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin A16 to stepper motor pin 4 - ECM pin A17 to stepper motor pin 1 - ECM pin A14 to stepper motor pin 2 - ECM pin A15 to stepper motor pin 3	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A14 to ECM pin A15 - ECM pin A14 to ECM pin A16 - ECM pin A14 to ECM pin A17 - ECM pin A15 to ECM pin A16 - ECM pin A15 to ECM pin A17 - ECM pin A16 to ECM pin A17	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check stepper motor resistance: - Motor pin A to motor pin A ¹ - Motor pin B to motor pin B ¹	6Ω to 10Ω	Proceed to test 7
	Faulty	Renew stepper motor, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of stepper motor.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

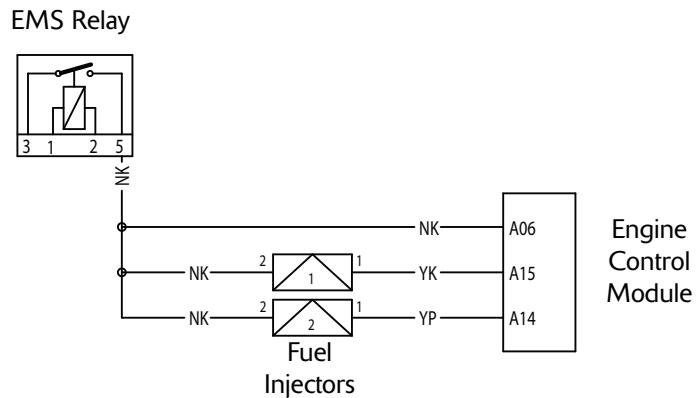
Fuel Injectors – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0201	Injector 1 circuit malfunction	View and note diagnostic software 'freeze-frame' data if available.
P0202	Injector 2 circuit malfunction	Ensure relevant injector connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A15 - ECM pin A14 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A06 to ECM pin A15 (injector 1) - ECM pin A06 to ECM pin A14 (injector 2)	9Ω to 12Ω	Proceed to test 3
	Open circuit	Disconnect relevant injector and proceed to test 4
	Short circuit	Disconnect relevant injector and proceed to test 5
3 Check cable for short circuit to ground: - ECM pin A15 to earth - ECM pin A14 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - EMS relay pin A06 to relevant injector pin 2 - ECM pin A15 to injector 1 pin 1 - ECM pin A14 to injector 2 pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit to supply box: - ECM pin A06 to ECM pin A15 (injector 1) - ECM pin A06 to ECM pin A14 (injector 2)	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant injector resistance: - Injector pin 1 to injector pin 2	9Ω to 12Ω	Proceed to test 7
	Faulty	Renew relevant injector, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

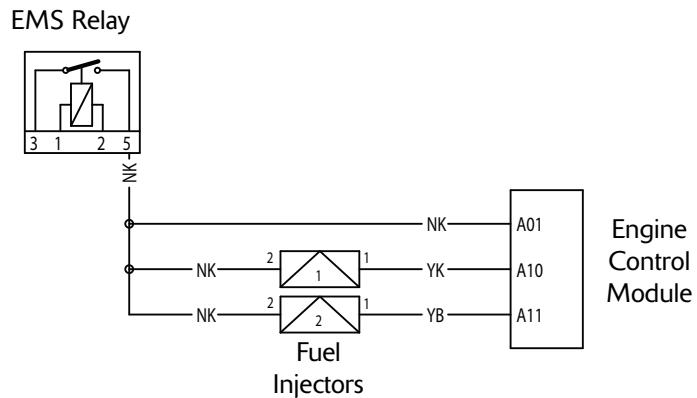
Fuel Injectors – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0201	Injector 1 circuit malfunction	View and note diagnostic software 'freeze-frame' data if available.
P0202	Injector 2 circuit malfunction	Ensure relevant injector connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A10 - ECM pin A11 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A01 to ECM pin A10 (injector 1) - ECM pin A01 to ECM pin A11 (injector 2)	9Ω to 12Ω	Proceed to test 3
	Open circuit	Disconnect relevant injector and proceed to test 4
	Short circuit	Disconnect relevant injector and proceed to test 5
3 Check cable for short circuit to ground: - ECM pin A10 to earth - ECM pin A11 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - EMS relay pin A01 to relevant injector pin 2 - ECM pin A10 to injector 1 pin 1 - ECM pin A11 to injector 2 pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit to supply box: - ECM pin A01 to ECM pin A10 (injector 1) - ECM pin A01 to ECM pin A11 (injector 2)	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant injector resistance: - Injector pin 1 to injector pin 2	9Ω to 12Ω	Proceed to test 7
	Faulty	Renew relevant injector, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

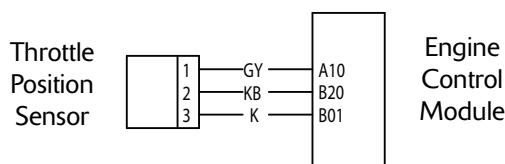
Throttle Position Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0122	Throttle position sensor 1 short circuit to ground or open circuit	View and note diagnostic software 'freeze-frame' data if available.
P0123	Throttle position sensor 1 short circuit to Vbatt	View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A10 - ECM pin B01 - ECM pin B20	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A10 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B01 to sensor pin 3 - ECM pin B20 to sensor pin 2 - ECM pin A10 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A10 to ECM pin B01 - ECM pin A10 to ECM pin B20	OK	Renew throttle position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



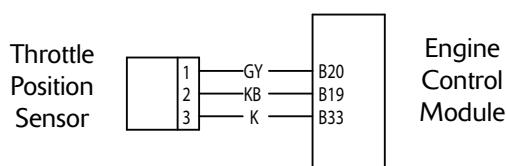
Throttle Position Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0122	Throttle position sensor 1 short circuit to ground or open circuit	View and note diagnostic software 'freeze-frame' data if available.
P0123	Throttle position sensor 1 short circuit to Vbatt	View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B20 - ECM pin B33 - ECM pin B19	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B20 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B33 to sensor pin 3 - ECM pin B19 to sensor pin 2 - ECM pin B20 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B20 to ECM pin B33 - ECM pin B20 to ECM pin B19	OK	Renew throttle position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

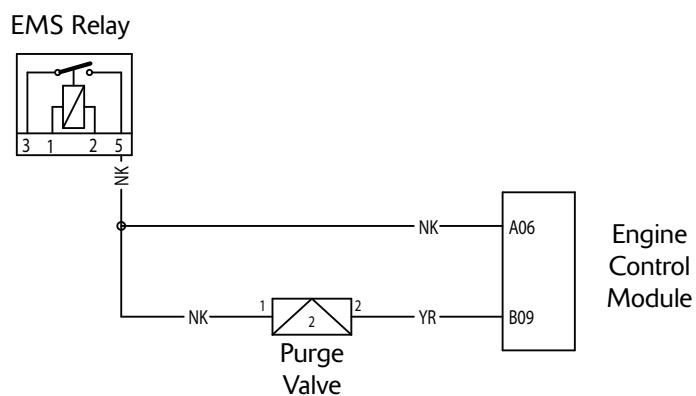
Purge Valve – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0444	Purge valve short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure purge valve connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0445	Purge valve short circuit to Vbatt	Disconnect the purge valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B09 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A06 to ECM pin B09	22Ω to 30Ω	Proceed to test 3
	Open circuit	Disconnect purge valve and proceed to test 4
	Short circuit	Disconnect purge valve and proceed to test 5
3 Check cable for short circuit: - ECM pin B09 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin B09 to valve pin 2 - EMS relay pin 5 to valve pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A06 to ECM pin B09	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check purge valve resistance: - Valve pin 1 to valve pin 2	22Ω to 30Ω	Proceed to test 7
	Faulty	Renew purge valve, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of purge valve.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

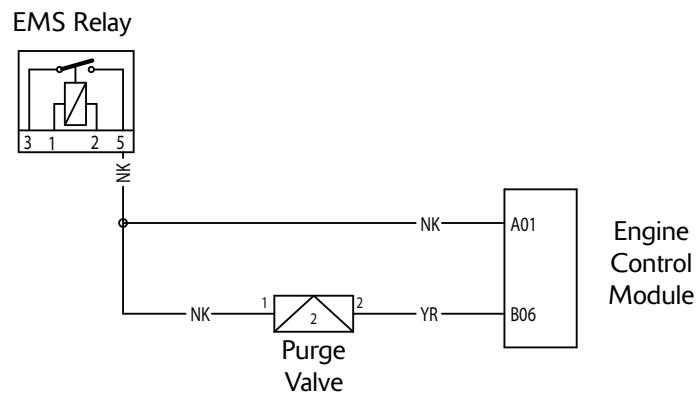
Purge Valve – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0444	Purge valve short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure purge valve connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0445	Purge valve short circuit to Vbatt	Disconnect the purge valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B06 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A01 to ECM pin B06	22Ω to 30Ω	Proceed to test 3
	Open circuit	Disconnect purge valve and proceed to test 4
	Short circuit	Disconnect purge valve and proceed to test 5
3 Check cable for short circuit: - ECM pin B06 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin B06 to valve pin 2 - EMS relay pin 5 to valve pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A01 to ECM pin B06	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check purge valve resistance: - Valve pin 1 to valve pin 2	22Ω to 30Ω	Proceed to test 7
	Faulty	Renew purge valve, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of purge valve.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Ignition Coils – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0351	Ignition coil 1 malfunction	View and note diagnostic software 'freeze-frame' data if available.
P0352	Ignition coil 2 malfunction	Ensure relevant ignition coil connector is secure.
P0353	Ignition coil 3 malfunction	Disconnect ECM and proceed to pinpoint test 1:
P0354	Ignition coil 4 malfunction	

Pinpoint Tests

Note:

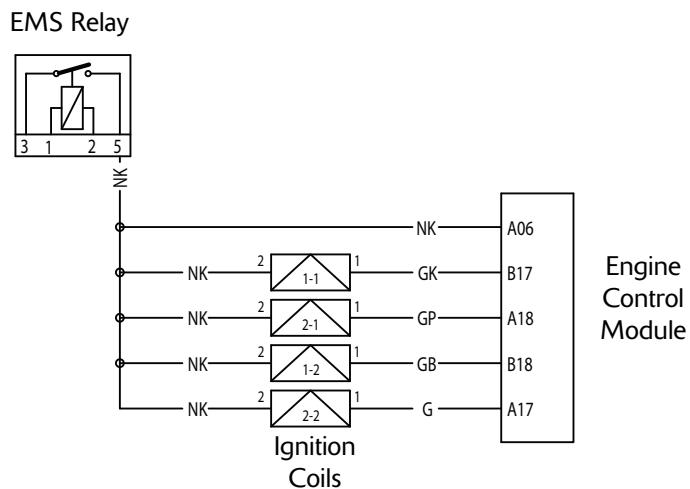
- **Thunderbird has 4 ignition coils, two per cylinder. Ignition coils are numbered 1 to 4 from the left hand (cylinder 1) side.**

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B17 - ECM pin A18 - ECM pin B18 - ECM pin A17 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: ECM pin A06 to - ECM pin (ign coil 1) B17 - ECM pin (ign coil 2) A18 - ECM pin (ign coil 3) B18 - ECM pin (ign coil 4) A17	0.8Ω to 1.2Ω	Proceed to test 3
	Open circuit	Disconnect relevant ignition coil and proceed to test 4
	Short circuit	Disconnect relevant ignition coil and proceed to test 5
3 Check cable for short circuit: - ECM pin B17 to earth - ECM pin A18 to earth - ECM pin B18 to earth - ECM pin A17 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: EMS relay pin 5 to relevant ignition coil pin 2 - ECM pin B17 to ign coil 1 pin 1 - ECM pin A18 to ign coil 2 pin 1 - ECM pin B18 to ign coil 3 pin 1 - ECM pin A17 to ign coil 4 pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: ECM pin A06 to - ECM pin (ign coil 1) B17 - ECM pin (ign coil 2) A18 - ECM pin (ign coil 3) B18 - ECM pin (ign coil 4) A17	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7

Fuel System/Engine Management

Test	Result	Action
6 Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	0.8Ω to 1.2Ω	Proceed to test 7
	Faulty	Renew relevant ignition coil, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Ignition Coils – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0351	Ignition coil 1 malfunction	View and note diagnostic software 'freeze-frame' data if available.
P0352	Ignition coil 2 malfunction	Ensure relevant ignition coil connector is secure.
P0353	Ignition coil 3 malfunction	Disconnect ECM and proceed to pinpoint test 1:
P0354	Ignition coil 4 malfunction	

Pinpoint Tests

Note:

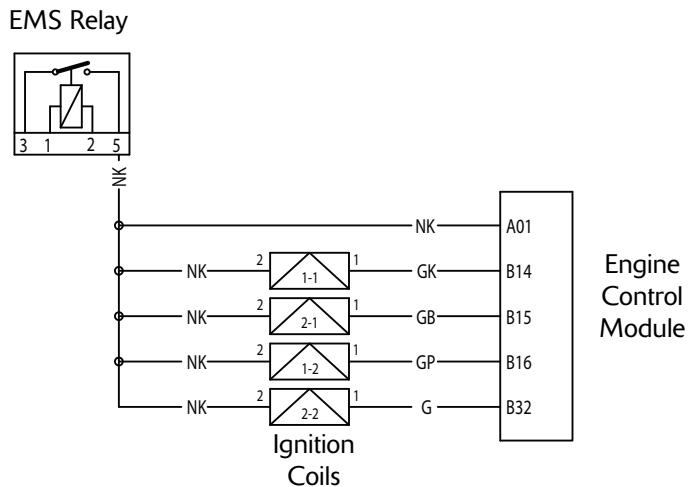
- Thunderbird has 4 ignition coils, two per cylinder. Ignition coils are numbered 1 to 4 from the left hand (cylinder 1) side.**

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B14 - ECM pin B15 - ECM pin B16 - ECM pin B32 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: ECM pin A01 to - ECM pin (ign coil 1) B14 - ECM pin (ign coil 2) B16 - ECM pin (ign coil 3) B15 - ECM pin (ign coil 4) B32	0.8Ω to 1.2Ω	Proceed to test 3
	Open circuit	Disconnect relevant ignition coil and proceed to test 4
	Short circuit	Disconnect relevant ignition coil and proceed to test 5
3 Check cable for short circuit: - ECM pin B14 to earth - ECM pin B16 to earth - ECM pin B15 to earth - ECM pin B32 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: EMS relay pin 5 to relevant ignition coil pin 2 - ECM pin B14 to ign coil 1 pin 1 - ECM pin B16 to ign coil 2 pin 1 - ECM pin B15 to ign coil 3 pin 1 - ECM pin B32 to ign coil 4 pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: ECM pin A01 to - ECM pin (ign coil 1) B14 - ECM pin (ign coil 2) B16 - ECM pin (ign coil 3) B15 - ECM pin (ign coil 4) B32	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7

Fuel System/Engine Management

Test	Result	Action
6 Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	0.8Ω to 1.2Ω	Proceed to test 7
	Faulty	Renew relevant ignition coil, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Coolant Temperature Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0118	Open circuit, or short circuit to battery positive	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0117	Short circuit to ground	Disconnect sensor and proceed to pinpoint test 6:

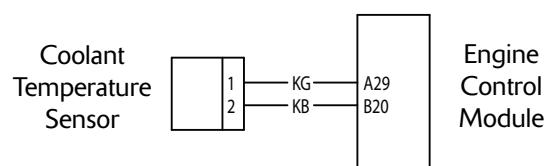
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A29 - ECM pin B20	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A29 to ECM pin B20 (Temperature dependent - see overleaf)	OK	Proceed to test 6
	Open circuit	Disconnect sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin A29 to sensor pin 1 - ECM pin B20 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin A29 to ECM pin B20	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see overleaf)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin A29 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Resistance data under typical conditions:

Cold engine:	
Temperature	
20°C ambient	2.35 to 2.65 KΩ
-10°C ambient	8.50 to 10.25 KΩ
Warm engine:	
Temperature	
-	200 to 400Ω

Circuit Diagram



Fuel System/Engine Management

Coolant Temperature Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0118	Open circuit, or short circuit to battery positive	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0117	Short circuit to ground	Disconnect sensor and proceed to pinpoint test 6:

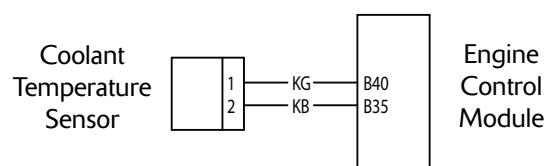
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B40 - ECM pin B35	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin B40 to ECM pin B20 (Temperature dependent - see overleaf)	OK	Proceed to test 6
	Open circuit	Disconnect sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin B40 to sensor pin 1 - ECM pin B35 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin B40 to ECM pin B35	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see overleaf)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin B40 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Resistance data under typical conditions:

Cold engine:	
Temperature	
20°C ambient	2.35 to 2.65 KΩ
-10°C ambient	8.50 to 10.25 KΩ
Warm engine:	
Temperature	
-	200 to 400Ω

Circuit Diagram



Fuel System/Engine Management

Inlet Air Temperature Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0113	Intake air temperature sensor open circuit or short circuit to 5 volt sensor supply	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0112	Intake air temperature sensor short circuit to ground	Disconnect ECM and sensor and proceed to pinpoint test 6:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A11 - ECM pin B20	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A11 to ECM pin B20 (Temperature dependent - see below)	OK	Proceed to test 6
	Open circuit	Disconnect temp sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin A11 to sensor pin 1 - ECM pin B20 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin A11 to ECM pin B20	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see below)	OK	Proceed to test 7
	Faulty	Renew air temperature sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin A11 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

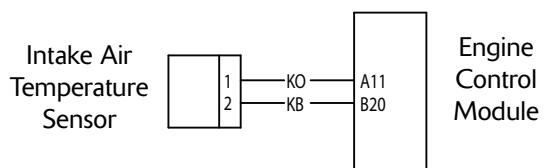
Fuel System/Engine Management

Resistance data:

If engine is warm, remove the sensor and allow time to cool to ambient temperature prior to test.

Ambient Temperature	Resistance Value
80°C	200 to 400Ω
20°C	2.35 to 2.65 KΩ
-10°C	8.50 to 10.25 KΩ

Circuit Diagram



Fuel System/Engine Management

Inlet Air Temperature Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0113	Intake air temperature sensor open circuit or short circuit to 5 volt sensor supply	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0112	Intake air temperature sensor short circuit to ground	Disconnect ECM and sensor and proceed to pinpoint test 6:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B42 - ECM pin B35	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin B42 to ECM pin B35 (Temperature dependent - see below)	OK	Proceed to test 6
	Open circuit	Disconnect temp sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin B42 to sensor pin 1 - ECM pin B35 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin B42 to ECM pin B35	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see below)	OK	Proceed to test 7
	Faulty	Renew air temperature sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin B42 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

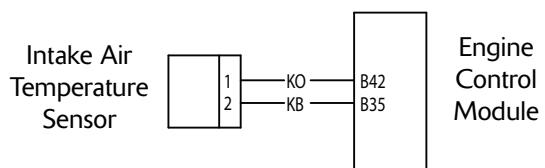
Fuel System/Engine Management

Resistance data:

If engine is warm, remove the sensor and allow time to cool to ambient temperature prior to test.

Ambient Temperature	Resistance Value
80°C	200 to 400Ω
20°C	2.35 to 2.65 KΩ
-10°C	8.50 to 10.25 KΩ

Circuit Diagram



Fuel System/Engine Management

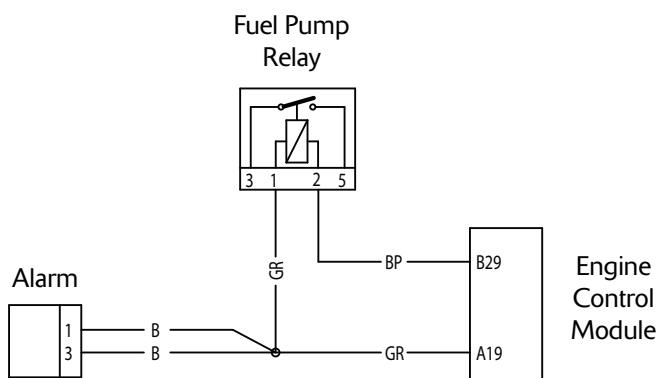
Fuel Pump Relay – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1231	Fuel pump relay short circuit to ground or open circuit	Check if pump runs briefly when ignition is switched on. Ensure fuel pump relay connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1232	Fuel pump relay short circuit to Vbatt	Disconnect ECM and fuel pump relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B29 - Alarm pin 1 - Alarm pin 3	OK	Disconnect fuel pump relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B29 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B29 to fuel pump relay pin 2 - Alarm pin 1 or 3 to fuel pump relay pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B29 to ECM pin A19	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic software function test to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



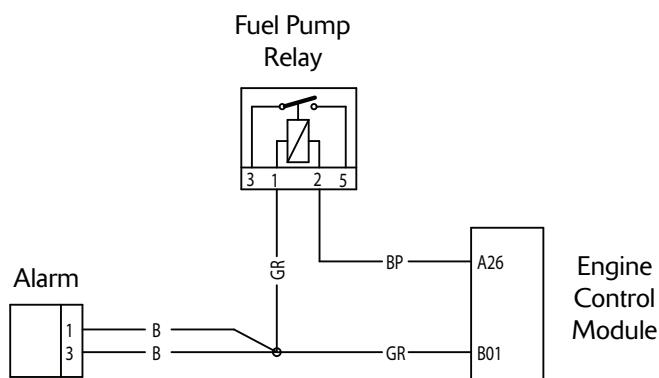
Fuel Pump Relay – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1231	Fuel pump relay short circuit to ground or open circuit	Check if pump runs briefly when ignition is switched on. Ensure fuel pump relay connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1232	Fuel pump relay short circuit to Vbatt	Disconnect ECM and fuel pump relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A26 - Alarm pin 1 - Alarm pin 3	OK	Disconnect fuel pump relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A26 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A26 to fuel pump relay pin 2 - Alarm pin 1 or 3 to fuel pump relay pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A26 to ECM pin B01	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic software function test to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

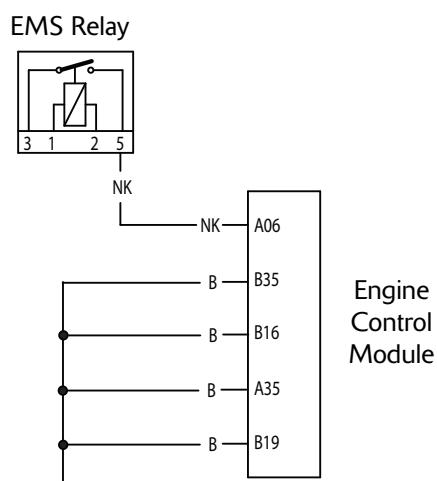
System Voltage – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0560	Bike voltage system fault	View and note diagnostic software 'sensor' data. Ensure voltage across battery is acceptable, note voltage. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A06 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 3
2 With Ignition 'on', check voltage at: - ECM pin A06	Same as 'across battery' voltage	Proceed to test 3
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 3
3 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



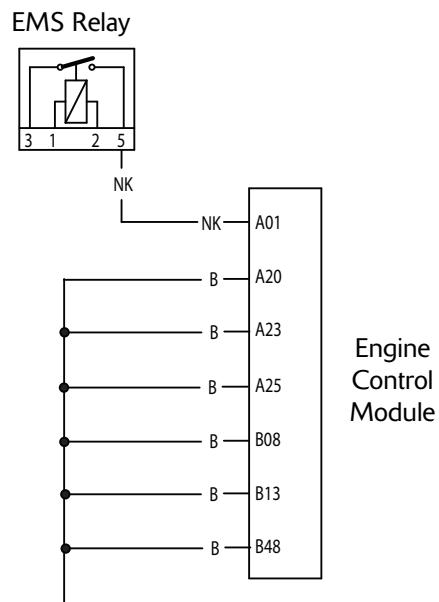
System Voltage – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0560	Bike voltage system fault	View and note diagnostic software 'sensor' data. Ensure voltage across battery is acceptable, note voltage. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A01 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 3
2 With Ignition 'on', check voltage at: - ECM pin A06	Same as 'across battery' voltage	Proceed to test 3
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 3
3 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

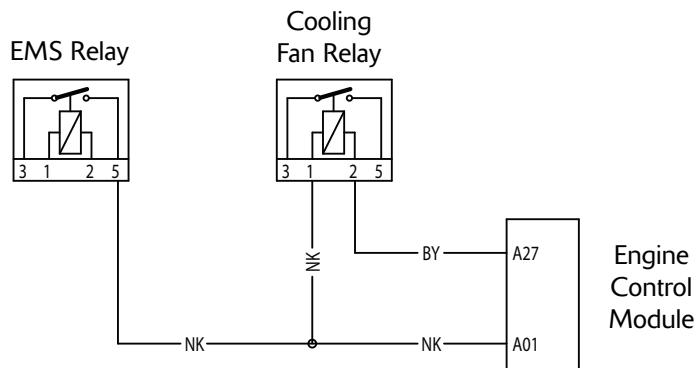
Cooling Fan Relay – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1552	Cooling fan relay short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure fan relay connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1553	Cooling fan relay short circuit to Vbatt or over temp	Disconnect ECM and fan relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B30 - EMS relay pin 5	OK	Disconnect fan relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B30 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B30 to fan relay pin 2 - EMS relay pin 5 to fan relay pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B30 to ECM pin A06	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of cooling fan.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



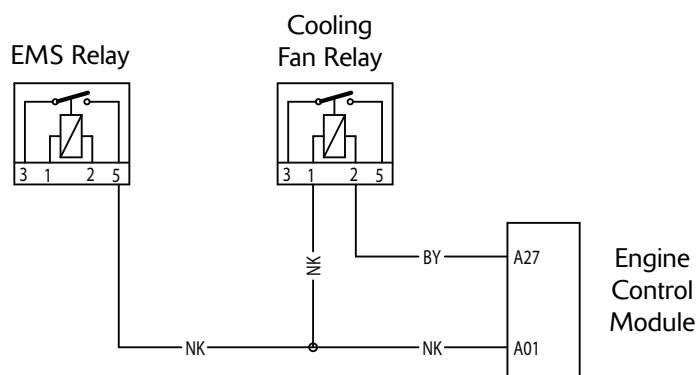
Cooling Fan Relay – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1552	Cooling fan relay short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure fan relay connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1553	Cooling fan relay short circuit to Vbatt or over temp	Disconnect ECM and fan relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A27 - EMS relay pin 5	OK	Disconnect fan relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A27 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A27 to fan relay pin 2 - EMS relay pin 5 to fan relay pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A27 to ECM pin A01	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of cooling fan.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Oxygen Sensor – All Models Except Thunderbird Commander and Thunderbird LT

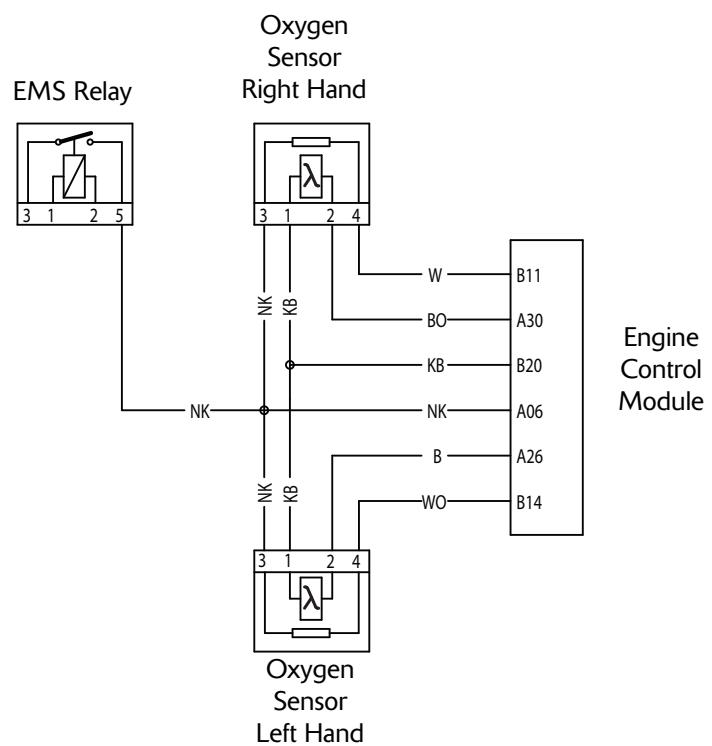
Fault Code	Possible cause	Action
P0130	Oxygen sensor 1 circuit malfunction	View and note 'freeze-frame' data if available.
P0150	Oxygen sensor 2 heater circuit malfunction	View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A26 - ECM pin A30 - ECM pin B20	OK	Disconnect oxygen sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A26 to earth - ECM pin A30 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - ECM pin A26 to left hand oxygen sensor pin 2 - ECM pin A30 to right hand oxygen sensor pin 2 - ECM pin B20 to relevant oxygen sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Check cable for short circuit: - ECM pin B20 to ECM pin A26 (left hand oxygen sensor) - ECM pin B20 to ECM pin A30 (right hand oxygen sensor)	OK	Renew relevant oxygen sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine. Check adaption status.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

Oxygen Sensor – Thunderbird Commander and Thunderbird LT

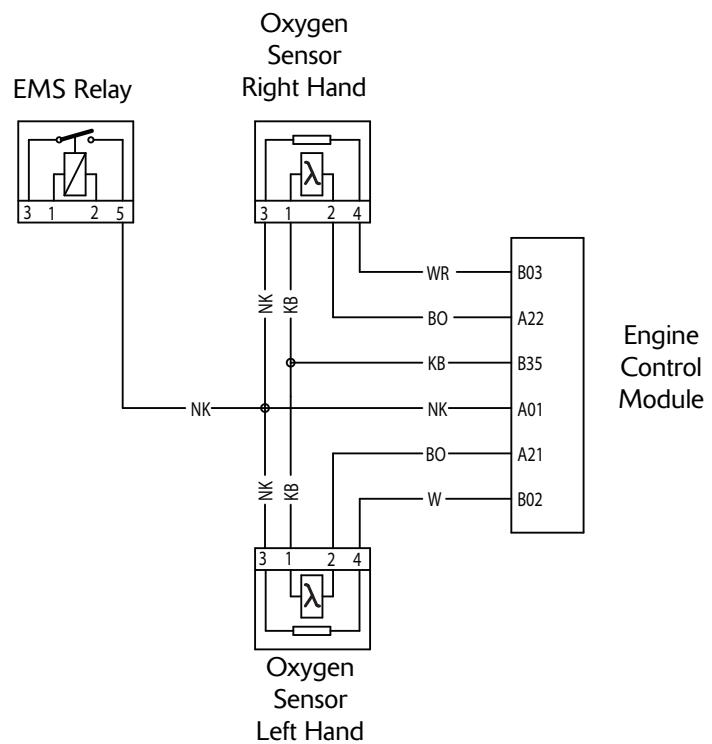
Fault Code	Possible cause	Action
P0130	Oxygen sensor 1 circuit malfunction	View and note 'freeze-frame' data if available.
P0150	Oxygen sensor 2 heater circuit malfunction	View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A21 - ECM pin A22 - ECM pin B35	OK	Disconnect oxygen sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A21 to earth - ECM pin A22 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - ECM pin A21 to left hand oxygen sensor pin 2 - ECM pin A22 to right hand oxygen sensor pin 2 - ECM pin B35 to relevant oxygen sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Check cable for short circuit: - ECM pin B35 to ECM pin A21 (left hand oxygen sensor) - ECM pin B35 to ECM pin A22 (right hand oxygen sensor)	OK	Renew relevant oxygen sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine. Check adaption status.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

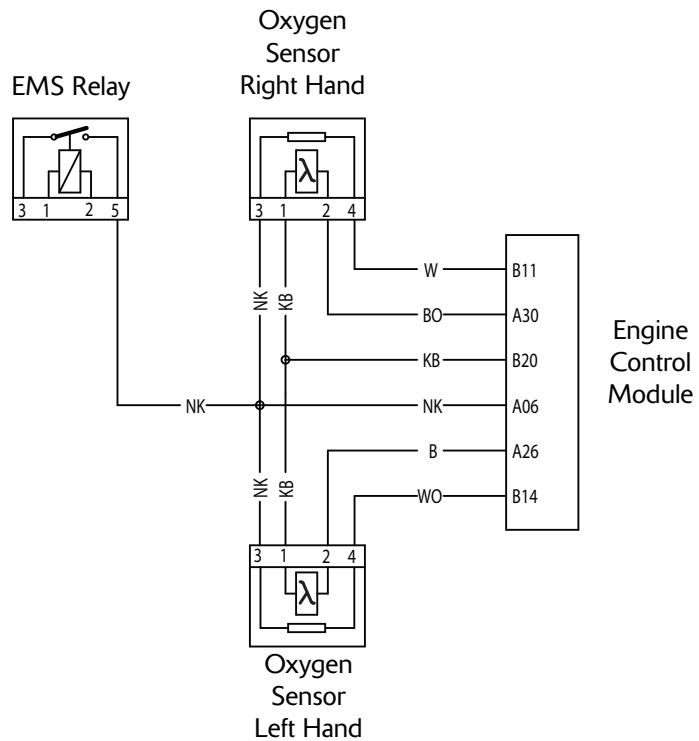
Oxygen Sensor Heater – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0031	Oxygen sensor 1 heater circuit short circuit to ground or open circuit	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P0051	Oxygen sensor 2 heater circuit short circuit to ground or open circuit	
P0032	Oxygen sensor 1 heater circuit, short circuit to battery positive	Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1: Disconnect oxygen sensor and proceed to pinpoint test 4:
P0052	Oxygen sensor 2 heater circuit, short circuit to battery positive	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B14 - ECM pin B11 - EMS relay pin 5	OK	Disconnect oxygen sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B14 to ground - ECM pin B11 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B14 to left hand oxygen sensor pin 4 - ECM pin B11 to right hand oxygen sensor pin 4 - EMS relay pin 5 to relevant oxygen sensor pin 3	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A6 to ECM pin B14 (left hand oxygen sensor) - ECM pin A6 to ECM pin B11 (right hand oxygen sensor)	OK	Renew relevant oxygen sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine. Check adaption status.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

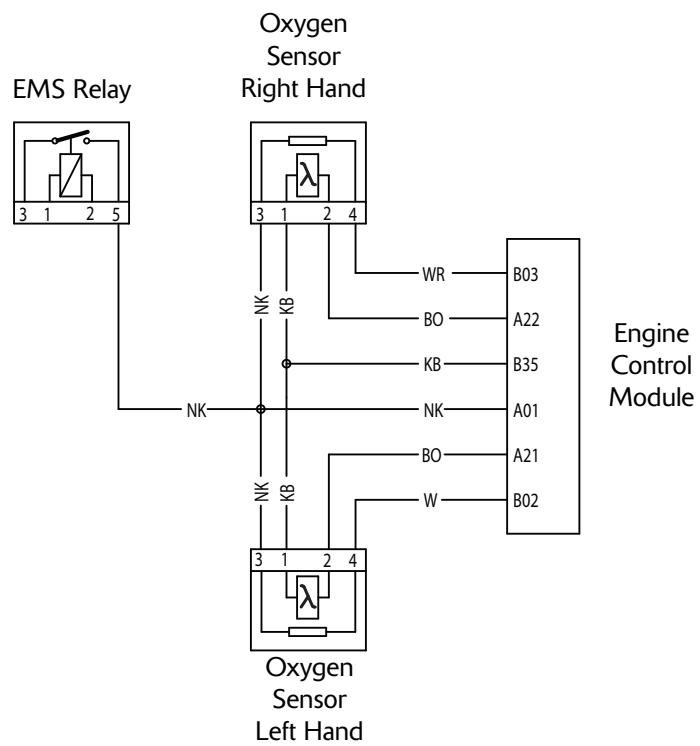
Oxygen Sensor Heater – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0031	Oxygen sensor 1 heater circuit short circuit to ground or open circuit	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P0051	Oxygen sensor 2 heater circuit short circuit to ground or open circuit	Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0032	Oxygen sensor 1 heater circuit, short circuit to battery positive	Disconnect oxygen sensor and proceed to pinpoint test 4:
P0052	Oxygen sensor 2 heater circuit, short circuit to battery positive	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B02 - ECM pin B03 - EMS relay pin 5	OK	Disconnect oxygen sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B02 to ground - ECM pin B03 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B02 to left hand oxygen sensor pin 4 - ECM pin B03 to right hand oxygen sensor pin 4 - EMS relay pin 5 to relevant oxygen sensor pin 3	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A01 to ECM pin B02 (left hand oxygen sensor) - ECM pin A01 to ECM pin B03 (right hand oxygen sensor)	OK	Renew relevant oxygen sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine. Check adaption status.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Oxygen Sensor Reverse Connection

Fault Code	Possible cause	Action
P1131	Oxygen sensor circuits reversed	Check oxygen sensor connections and swap cylinder number 1 and cylinder number 2 connections if incorrect.

EEPROM Error

Fault Code	Possible cause	Action
P0603	EEPROM error	View and note 'freeze-frame' data if available. No tests available - contact Triumph service.

Fuel System/Engine Management

Exhaust Actuator Control

Fault Code	Possible cause	Action
P1680	Exhaust actuator control internal error (Thunderbird Commander and Thunderbird LT only)	View and note 'freeze-frame' data if available. No tests available - contact Triumph service.

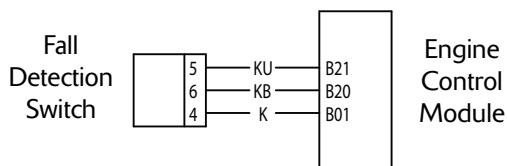
Fall Detection Switch – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1631	Fall detection circuit short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P1632	Fall detection circuit short circuit to Vbatt	Ensure switch connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B21 - ECM pin B20 - ECM pin B01	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B21 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B01 to sensor pin 4 - ECM pin B21 to sensor pin 5 - ECM pin B20 to sensor pin 6	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B21 to ECM pin B01 - ECM pin B21 to ECM pin B20	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

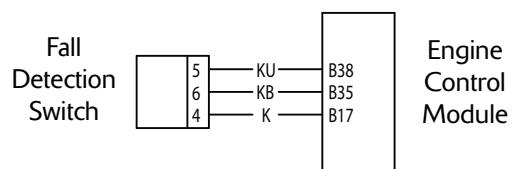
Fall Detection Switch – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1631	Fall detection circuit short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure switch connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1632	Fall detection circuit short circuit to Vbatt	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B38 - ECM pin B35 - ECM pin B17	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B38 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B17 to sensor pin 4 - ECM pin B38 to sensor pin 5 - ECM pin B35 to sensor pin 6	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B38 to ECM pin B17 - ECM pin B38 to ECM pin B35	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

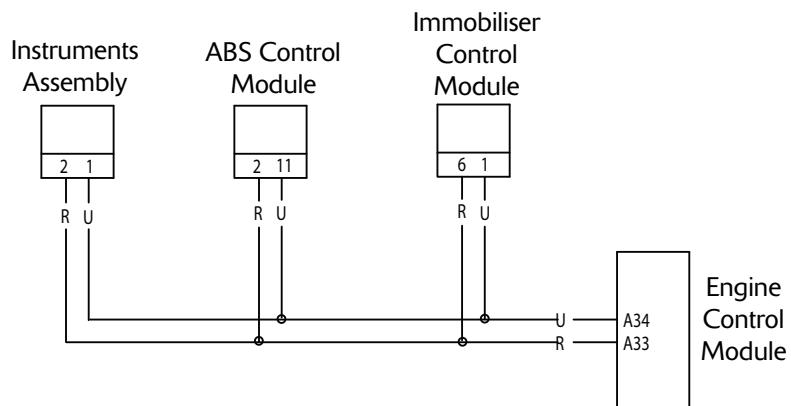
CAN Communication – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1690	CAN Fault	<p>View and note 'freeze-frame' data if available.</p> <p>View and note 'sensor' data.</p> <p>Ensure Instrument connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A34 - ECM pin A33 - Instrument pin 1 - Instrument pin 2 - ABS module pin 1 - ABS module pin 11 - Immobiliser module pin 1 - Immobiliser module pin 6	OK	Disconnect instruments and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B34 to ground - ECM pin B35 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A34 to Instrument pin 1 - ECM pin A33 to Instrument pin 2 - ECM pin A34 to ABS control module pin 11 - ECM pin A33 to ABS control module pin 2 - ECM pin A34 to Immobiliser module pin 1 - ECM pin A33 to Immobiliser module pin 6	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A34 to ECM pin A3	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

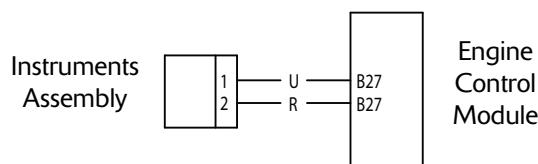
Instrument Communication (CAN) – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1695	Lost communication with instrument panel	View and note 'freeze-frame' data if available. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B27 - ECM pin B28 - Instrument pin 1 - Instrument pin 2	OK	Disconnect instruments and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B27 to ground - ECM pin B28 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B27 to Instrument pin 1 - ECM pin B28 to Instrument pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B27 to ECM pin B28	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



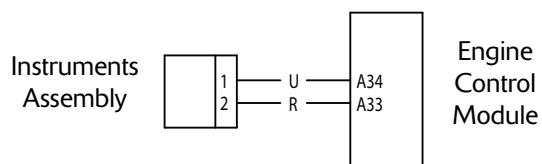
Instrument Communication (CAN) – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1695	Lost communication with instrument panel	View and note 'freeze-frame' data if available. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - Instrument pin 1 - Instrument pin 2	OK	Disconnect instruments and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A34 to Instrument pin 1 - ECM pin A33 to Instrument pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A34 to ECM pin A33	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

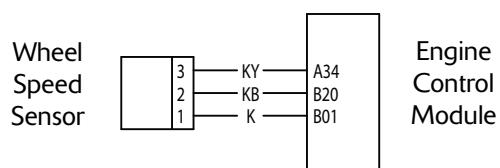
Vehicle Speed Sensor/Wheel Sensor

Fault Code	Possible cause	Action
P0500	Vehicle speed sensor malfunction - all models except Thunderbird Commander and Thunderbird LT	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
	Rear wheel speed sensor - Thunderbird Commander and Thunderbird LT	Refer to C1611 (see page 14-74). Refer to C1613 (see page 14-78).

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A34 - ECM pin B20 - ECM pin B01	OK	Disconnect vehicle speed sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable for continuity: - ECM pin B01 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin A34 to sensor pin 3	OK	Renew vehicle speed sensor and proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Check cable for short circuit: - ECM pin A34 to ECM pin B01 - ECM pin A34 to ECM pin B20	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



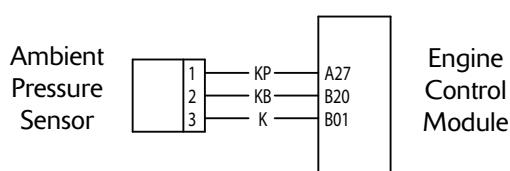
Barometric Pressure Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1107	Ambient air pressure sensor circuit short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 volt sensor supply	Disconnect barometric pressure sensor and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A27 - ECM pin B20 - ECM pin B01	OK	Disconnect barometric pressure sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A27 to earth - ECM pin A27 to ECM pin B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable for continuity: - ECM pin B01 to sensor pin 3	OK	Renew barometric pressure sensor and proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A27 to ECM pin B01	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable continuity: - ECM pin A27 to sensor pin 1 - ECM pin B20 to sensor pin 2	OK	Renew ambient pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

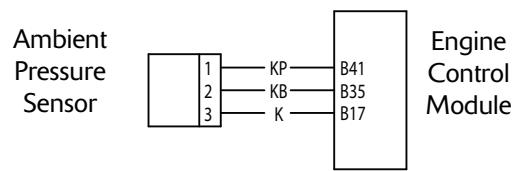
Barometric Pressure Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1107	Ambient air pressure sensor circuit short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 volt sensor supply	Disconnect barometric pressure sensor and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B41 - ECM pin B35 - ECM pin B17	OK	Disconnect barometric pressure sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin B41 to earth - ECM pin B41 to ECM pin B35	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable for continuity: - ECM pin B17 to sensor pin 3	OK	Renew barometric pressure sensor and proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin B41 to ECM pin B17	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable continuity: - ECM pin B41 to sensor pin 1 - ECM pin B35 to sensor pin 2	OK	Renew ambient pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

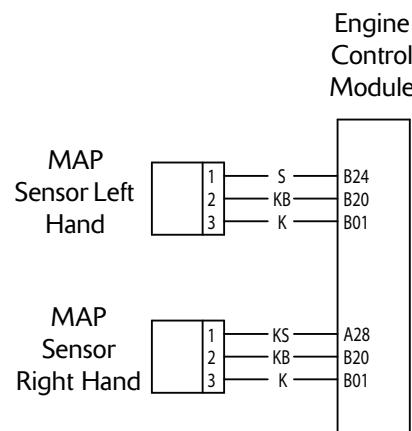
Manifold Absolute Pressure (MAP) Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0107	Manifold absolute pressure sensor 1 short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P1687	Manifold absolute pressure sensor 2 short circuit to ground	Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 volt sensor supply	Disconnect ECM and MAP sensor and proceed to pinpoint test 4:
P1688	Manifold absolute pressure sensor 2 open circuit or short circuit to 5 volt sensor supply	
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipes from MAP sensors to throttle body.
P1106	Manifold absolute pressure sensor 2 pipe malfunction	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A28 - ECM pin B24 - ECM pin B20 - ECM pin B01	OK	Disconnect MAP sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A28 to earth - ECM pin B24 to earth - ECM pin A28 to ECM pin B20 - ECM pin B24 to ECM pin B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable for continuity: - ECM pin B01 to relevant MAP sensor pin 3	OK	Renew relevant MAP pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A28 to ECM pin B01 - ECM pin B24 to ECM pin B01	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable continuity: - ECM pin A28 to left hand MAP sensor pin 1 - ECM pin B24 to right hand MAP sensor pin 1 - ECM pin B20 to relevant MAP sensor pin 2	OK	Renew relevant MAP pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Manifold Absolute Pressure (MAP) Sensor – Thunderbird Commander and Thunderbird LT

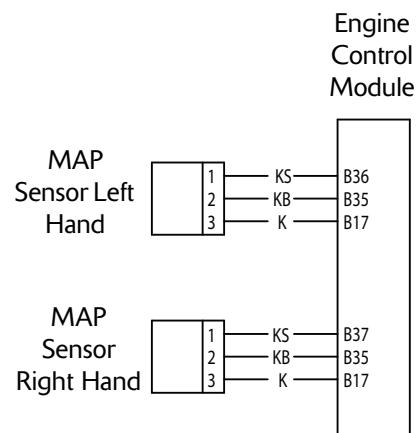
Fault Code	Possible cause	Action
P0107	Manifold absolute pressure sensor 1 short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P1687	Manifold absolute pressure sensor 2 short circuit to ground	Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 volt sensor supply	Disconnect ECM and MAP sensor and proceed to pinpoint test 4:
P1688	Manifold absolute pressure sensor 2 open circuit or short circuit to 5 volt sensor supply	
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipes from MAP sensors to throttle body.
P1106	Manifold absolute pressure sensor 2 pipe malfunction	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B37 - ECM pin B36 - ECM pin B35 - ECM pin B17	OK	Disconnect MAP sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin B37 to earth - ECM pin B36 to earth - ECM pin B37 to ECM pin B20 - ECM pin B36 to ECM pin B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable for continuity: - ECM pin B17 to relevant MAP sensor pin 3	OK	Renew relevant MAP pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin B37 to ECM pin B17 - ECM pin B36 to ECM pin B17	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable continuity: - ECM pin B37 to left hand MAP sensor pin 1 - ECM pin B36 to right hand MAP sensor pin 1 - ECM pin B35 to relevant MAP sensor pin 2	OK	Renew relevant MAP pressure sensor, proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

Manifold Absolute Pressure (MAP) Sensor Reverse Connection

Fault Code	Possible cause	Action
P1111	Manifold absolute pressure sensor pipes reversed	Check MAP sensor pipes and swap left hand and right hand pipes around.

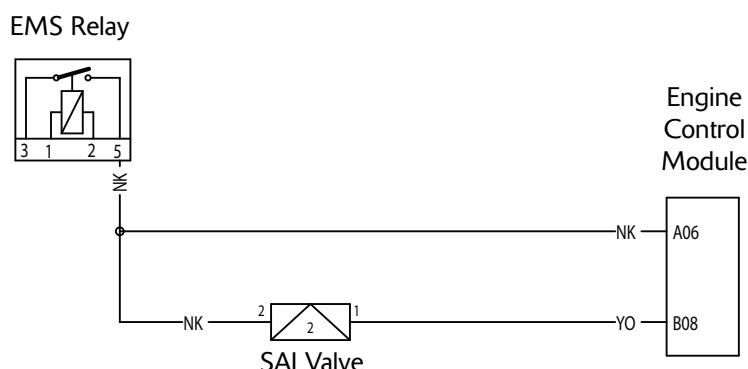
SAI Valve

Fault Code	Possible cause	Action
P0413	Secondary air injection short circuit to ground or open circuit	View and note diagnostic tool 'sensor' data. Ensure SAI valve connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0414	Secondary air injection short circuit to Vbatt	Disconnect ECM and SAI valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B08 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A06 to ECM pin B08	18Ω to 22Ω	Proceed to test 3
	Open circuit	Disconnect SAI valve and proceed to test 4
	Short circuit	Disconnect SAI valve and proceed to test 5
3 Check cable for short circuit: - ECM pin B08 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - EMS relay pin 5 to SAI valve pin 2 - ECM pin B08 to SAI valve pin 1	OK	Disconnect main relay and proceed to test 5
	Faulty	Rectify fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A06 to ECM pin B08	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check SAI valve resistance: - Valve pin 1 to valve pin 2	18Ω to 22Ω	Proceed to test 7
	Open circuit	Renew SAI valve, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of SAI valve.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Gear Position Sensor – All Models Up To Engine Number 596480

Note:

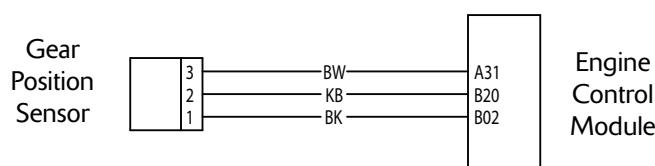
- From engine number 596481 a new gear position sensor was introduced which has a four pin multiplug.
- If the latest condition gear position sensor, with the four pin multiplug, has been fitted, refer to page 10-113 for diagnostics.

Fault Code	Possible cause	Action
P0705	Gear position sensor circuit malfunction	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A31 - ECM pin B02 - ECM pin B20	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A31 to ground - ECM pin B02 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B02 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin A31 to sensor pin 3	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A31 to ECM pin B02 - ECM pin A31 to ECM pin B20 - ECM pin B02 to ECM pin B20	OK	Renew gear position sensor and contact pin and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



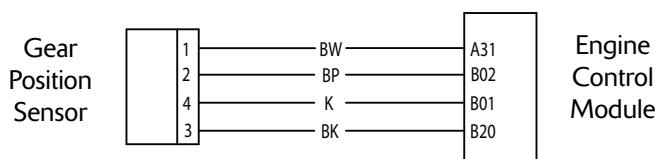
Gear Position Sensor – All Models From Engine Number 596481 Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0705	Gear position sensor circuit malfunction	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A31 - ECM pin B20 - ECM pin B02 - ECM pin B01	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A31 to ground - ECM pin B01 to ground - ECM pin B02 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A31 to sensor pin 1 - ECM pin B02 to sensor pin 2 - ECM pin B01 to sensor pin 4 - ECM pin B20 to sensor pin 3	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B01 to ECM pin B02 - ECM pin B01 to ECM pin B20 - ECM pin B01 to ECM pin A31 - ECM pin B02 to ECM pin B20 - ECM pin B02 to ECM pin A31 - ECM pin A31 to ECM pin B20	OK	Renew gear position sensor and contact pin and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

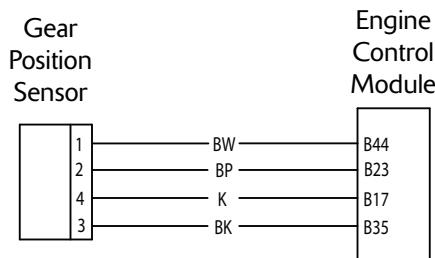
Gear Position Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0705	Gear position sensor circuit malfunction	<p>View and note 'freeze-frame' data if available.</p> <p>View and note 'sensor' data.</p> <p>Ensure sensor connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B23 - ECM pin B44 - ECM pin B35 - ECM pin B17	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B23 to ground - ECM pin B44 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B17 to sensor pin 4 - ECM pin B35 to sensor pin 3 - ECM pin B23 to sensor pin 2 - ECM pin B44 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B44 to ECM pin B17 - ECM pin B23 to ECM pin B17 - ECM pin A23 to ECM pin B35 - ECM pin B44 to ECM pin B35	OK	Renew gear position sensor and contact pin and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



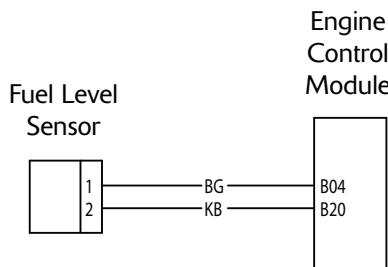
Fuel Level Sensor Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0460	Fuel level sensor circuit malfunction	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B04 - ECM pin B20	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin B04 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B04 to sensor pin 1 - ECM pin B20 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B04 to ECM pin B20	OK	Renew fuel level sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Fuel Level Sensor Circuit – Thunderbird Commander and Thunderbird LT

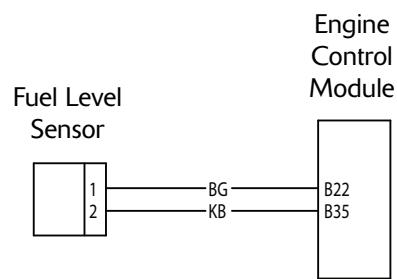
Fault Code	Possible cause	Action
P0460	Fuel level sensor circuit malfunction	<p>View and note 'freeze-frame' data if available.</p> <p>View and note 'sensor' data.</p> <p>Ensure sensor connector is secure.</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B22 - ECM pin B35	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin B22 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B22 to sensor pin 1 - ECM pin B35 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B22 to ECM pin B35	OK	Renew fuel level sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

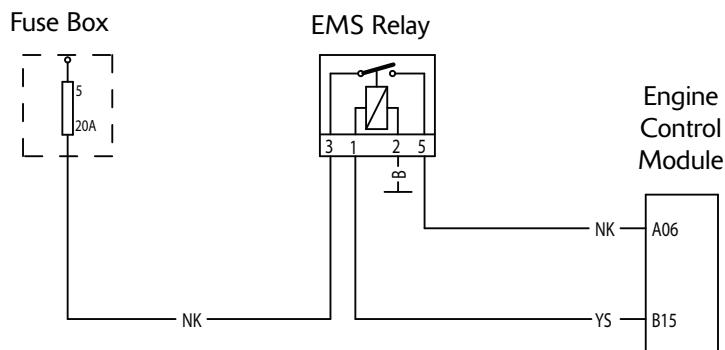
EMS Main Relay Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1685	Main relay circuit malfunction	Note that the starter motor cannot be powered if a main relay fault exists. Ensure the EMS main relay connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Ensure ignition has been switched off for greater than one minute. Identify EMS main relay on the harness. Check that relay operates when the ignition is switched ON.	OK	Proceed to test 2
	Faulty	Disconnect ECM and proceed to test 4
2 Check fuse box Fuse 5 integrity.	OK	Disconnect ECM and proceed to test 4
	Faulty	Disconnect ECM and proceed to test 3
3 Check cable for short circuit: - ECM pin A06 to ground - EMS Main relay pin 3 to ground	OK	Replace Fuse 5 and proceed to test 4
	Short circuit	Locate and rectify wiring fault, replace Fuse 5 and proceed to test 7
4 Check cable and terminal integrity: - ECM pin A06 - ECM pin B15 - EMS main relay pin 1 - EMS main relay pin 2 - EMS main relay pin 3 - EMS main relay pin 5	OK	Disconnect main relay and proceed to test 5
	Faulty	Rectify fault, proceed to test 7
5 Check cable for short circuit: - ECM pin B15 to ground	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check cable continuity: - ECM pin A06 to EMS main relay pin 5 - ECM pin B15 to EMS relay pin 1 - EMS main relay pin 2 to earth - EMS main relay pin 3 to fuse box fuse 5	OK	Replace EMS main relay and proceed to test 7
	Open circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code. Switch ignition off for longer than one minute. Switch ignition on and check that the EMS main relay operates. Start engine as final check.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

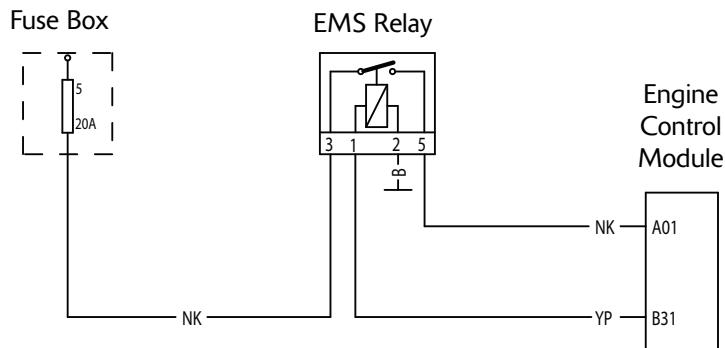
EMS Main Relay Circuit – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1685	Main relay circuit malfunction	<p>Note that the starter motor cannot be powered if a main relay fault exists. Ensure the EMS main relay connector is secure.</p> <p>Proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Ensure ignition has been switched off for greater than one minute. Identify EMS main relay on the harness. Check that relay operates when the ignition is switched ON.	OK	Proceed to test 2
	Faulty	Disconnect ECM and proceed to test 4
2 Check fuse box Fuse 5 integrity.	OK	Disconnect ECM and proceed to test 4
	Faulty	Disconnect ECM and proceed to test 3
3 Check cable for short circuit: - ECM pin A01 to ground - EMS Main relay pin 3 to ground	OK	Replace Fuse 5 and proceed to test 4
	Short circuit	Locate and rectify wiring fault, replace Fuse 5 and proceed to test 7
4 Check cable and terminal integrity: - ECM pin A01 - ECM pin B31 - EMS main relay pin 1 - EMS main relay pin 2 - EMS main relay pin 3 - EMS main relay pin 5	OK	Disconnect main relay and proceed to test 5
	Faulty	Rectify fault, proceed to test 7
5 Check cable for short circuit: - ECM pin B31 to ground	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check cable continuity: - ECM pin A01 to EMS main relay pin 5 - ECM pin B31 to EMS relay pin 1 - EMS main relay pin 2 to earth - EMS main relay pin 3 to fuse box fuse 5	OK	Replace EMS main relay and proceed to test 7
	Open circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code. Switch ignition off for longer than one minute. Switch ignition on and check that the EMS main relay operates. Start engine as final check.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

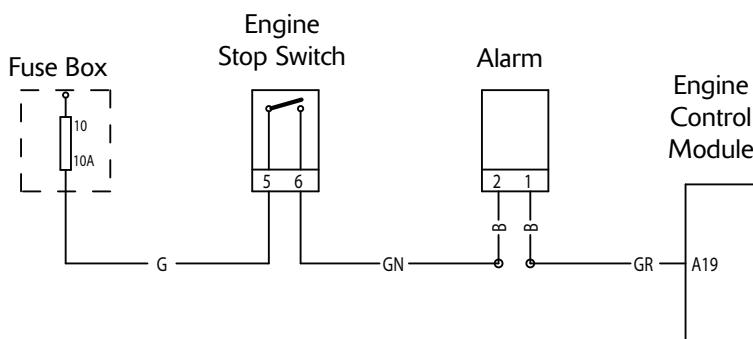
EMS Ignition Voltage Input Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1659	Ignition power supply malfunction	Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check fuse box Fuse 10 integrity.	OK	Proceed to test 3
	Faulty	Proceed to test 2
2 Check cable for short circuit: - ECM pin A19 to ground	OK	Replace Fuse 10 and proceed to test 3
	Short circuit	Locate and rectify wiring fault, replace Fuse 10 and proceed to test 5
3 Check cable and terminal integrity: - ECM pin A19 - Alarm connector pin 1 - Alarm connector pin 2 - Right hand switch housing pin 5 - Right hand switch housing pin 6	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4 Check cable continuity: - ECM pin A19 to fuse box Fuse 10 Note that the engine stop switch must be in the 'RUN' position and any alarm fitted must be disarmed.	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring, immobiliser or engine stop switch fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



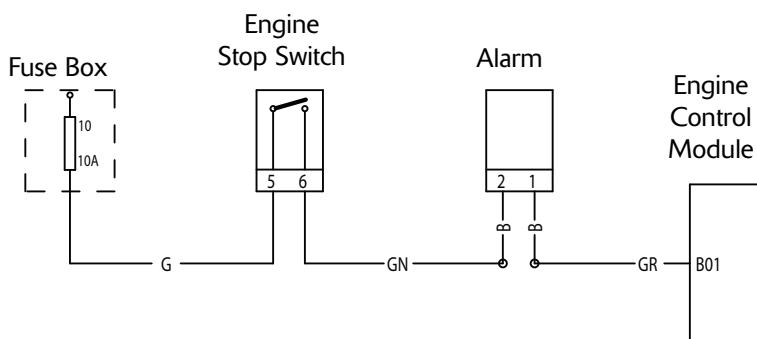
EMS Ignition Voltage Input Circuit – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1659	Ignition power supply malfunction	Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check fuse box Fuse 10 integrity.	OK	Proceed to test 3
	Faulty	Proceed to test 2
2 Check cable for short circuit: - ECM pin B01 to ground	OK	Replace Fuse 10 and proceed to test 3
	Short circuit	Locate and rectify wiring fault, replace Fuse 10 and proceed to test 5
3 Check cable and terminal integrity: - ECM pin B01 - Alarm connector pin 1 - Alarm connector pin 2 - Right hand switch housing pin 5 - Right hand switch housing pin 6	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4 Check cable continuity: - ECM pin B01 to fuse box Fuse 10 Note that the engine stop switch must be in the 'RUN' position and any alarm fitted must be disarmed.	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring, immobiliser or engine stop switch fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

5 Volt Sensor Supply Circuit – All Models Except Thunderbird Commander and Thunderbird LT

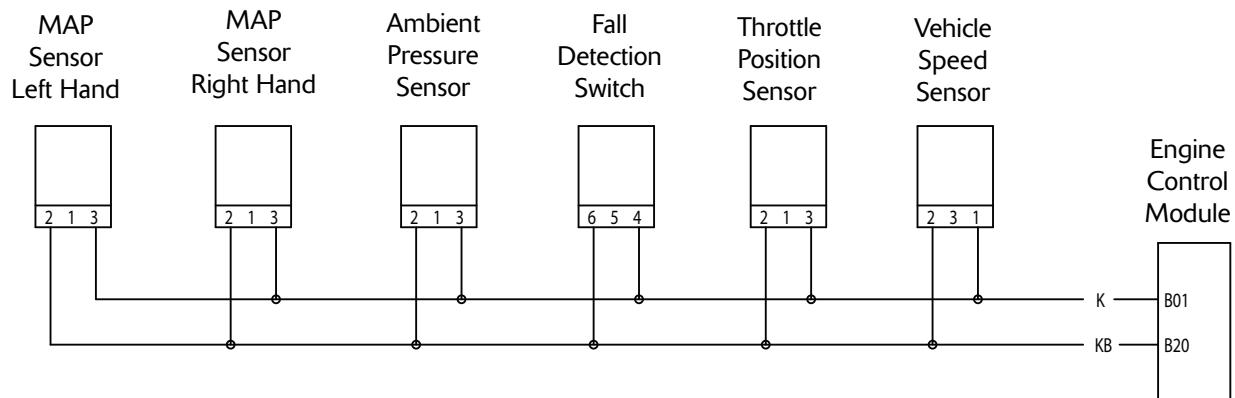
Fault Code	Possible cause	Action
P1696	5 V sensor supply short circuit to ground	View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active. Disconnect ECM and proceed to pinpoint test 1:
P1697	5 V sensor supply short circuit to Vbatt	
P1698	5 V sensor supply malfunction	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B01 - ECM pin B20	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit - ECM pin B01 to ECM pin B20	OK	Proceed to test 4
	Faulty	Proceed to test 3
3 Disconnect the following sensors in turn: - MAP sensors (left hand and right hand) - Ambient pressure sensor - Fall detection sensor - Throttle position sensor - Vehicle speed sensor and retest for short circuit - ECM pin B01 to ECM pin B20	OK	Replace sensor last removed and proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - ECM pin B01 to ground - ECM pin B20 to ground - ECM pin B01 to A06 - ECM pin B20 to A06 - ECM pin B01 to battery positive - ECM pin B20 to battery positive	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and use diagnostic software to check for correct sensor outputs and 5 volt sensor supply voltage level.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

5 Volt Sensor Supply Circuit – Thunderbird Commander and Thunderbird LT

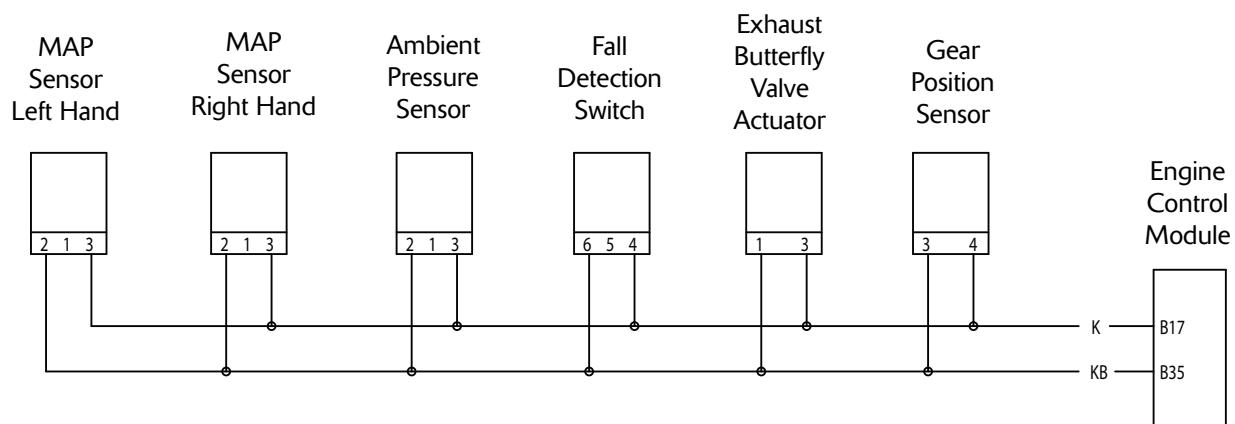
Fault Code	Possible cause	Action
P1696	5 V sensor supply short circuit to ground	View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active.
P1697	5 V sensor supply short circuit to Vbatt	Disconnect ECM and proceed to pinpoint test 1:
P1698	5 V sensor supply malfunction	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B17 - ECM pin B35	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit - ECM pin B17 to ECM pin B35	OK	Proceed to test 4
	Faulty	Proceed to test 3
3 Disconnect the following sensors in turn: - MAP sensors (left hand and right hand) - Ambient pressure sensor - Fall detection sensor - Exhaust butterfly valve actuator - Gear position sensor and retest for short circuit - ECM pin B17 to ECM pin B35	OK	Replace sensor last removed and proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - ECM pin B17 to ground - ECM pin B35 to ground - ECM pin B17 to A01 - ECM pin B35 to A01 - ECM pin B17 to battery positive - ECM pin B35 to battery positive	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and use diagnostic software to check for correct sensor outputs and 5 volt sensor supply voltage level.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

Circuit Diagram



Fuel System/Engine Management

Tune Lock

Fault Code	Possible cause	Action
P1605	ECM locked by the tune lock function	<p>This is also identified by a fast flashing MIL indication, and a disabled engine management system.</p> <p>Unlock the ECM using the diagnostic software and supplied unlock code from Triumph service.</p>

Instrument ID Incompatible

Fault Code	Possible cause	Action
P1614	Instrument ID incompatible	This is also identified by a fast flashing MIL indication, and a disabled engine management system.

Pinpoint Tests

Test	Result	Action
1 Check ECM part number is correct for the motorcycle.	OK	Proceed to test 2
	Incorrect	Replace ECM with correct part and proceed to test 3
2 Check that the tune is correct for the motorcycle, using the diagnostic software.	OK	Proceed to test 3
	Incorrect	Update tune using diagnostic software, proceed to test 3
3 Clear fault code, check for normal operation.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

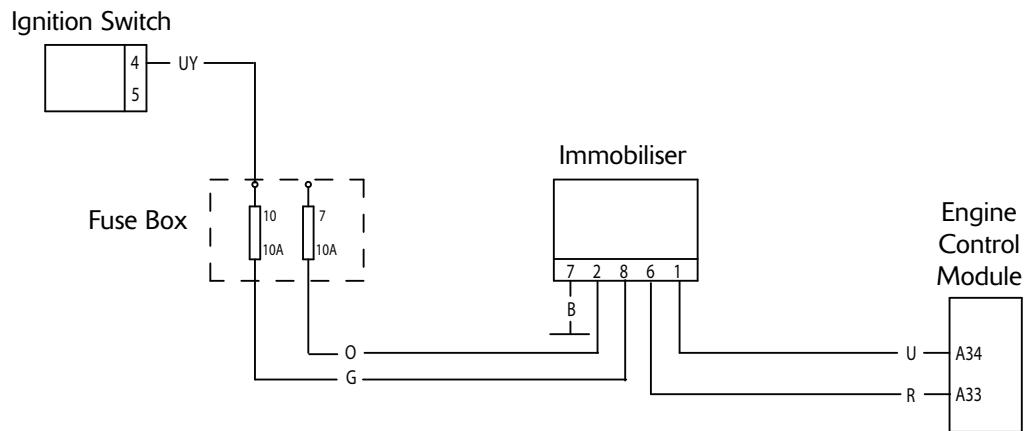
Immobiliser Control Module Communication – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1650	Lost communication with Immobiliser ECM	<p>View and note 'freeze-frame' data if available.</p> <p>Ensure immobiliser control module connector is secure.</p> <p>Ensure the ignition switch is turned to the OFF position.</p> <p>Proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - Immobiliser pin 1 - Immobiliser pin 2 - Immobiliser pin 6 - Immobiliser pin 7 - Immobiliser pin 8	OK	Disconnect ECM and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Disconnect immobiliser, ignition switch and proceed to test 3
	Faulty	Locate and rectify wiring fault, proceed to test 6
3 Check fuse box Fuse 7 and 10 integrity.	OK	Proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - Immobiliser pin 2 to ground - Immobiliser pin 8 to ground	OK	Proceed to test 5
	Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5 Check cable continuity: - ECM pin A33 to immobiliser pin 6 - ECM pin A34 to Immobiliser pin 1 - Immobiliser pin 7 to ground - Fuse box Fuse 7 to immobiliser pin 2 - Fuse box Fuse 10 to immobiliser pin 8 - Fuse box Fuse 10 to ignition switch pin 4	OK	Proceed to test 6
	Fault still present	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Immobiliser Control Module ID Incompatible – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1508	Unmatched Immobiliser ECM	This is also identified by a MIL indication and a disabled engine management system.

Pinpoint Tests

Test	Result	Action
1 Follow the Pair ECM and Immobiliser procedure as described in the Triumph Diagnostic Tool user guide.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

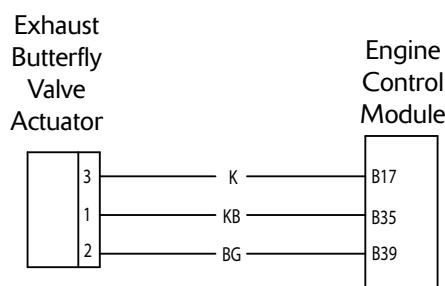
Exhaust Butterfly Valve (EXBV) Position Sensor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1078	Exhaust position sensor - short circuit to ground or open circuit	View and note diagnostic software 'freeze-frame' data if available.
P1079	Exhaust position sensor - short circuit to 5 volt sensor supply	View and note diagnostic software 'sensor' data. Ensure actuator connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B19 - ECM pin B35 - ECM pin B39	OK	Disconnect actuator and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B39 to ground - ECM pin B39 to ECM pin B17	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B17 to actuator pin 3 - ECM pin B35 to actuator pin 1 - ECM pin B39 to actuator pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B17 to ECM pin B39 - ECM pin B17 to ECM pin B35 - ECM pin B35 to ECM pin B39	OK	Renew exhaust control valve actuator, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of the exhaust control valve actuator.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

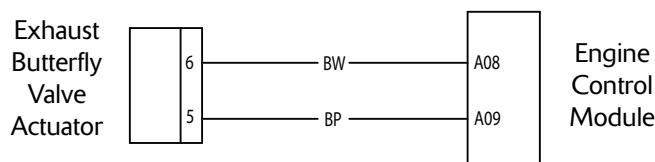
Exhaust Butterfly Valve (EXBV) Motor – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P0078	Exhaust motor circuit malfunction	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Ensure actuator connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1080	Exhaust actuator control mechanism fault	Proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A08 - ECM pin A09	OK	Disconnect actuator and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A08 to ground - ECM pin A09 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A08 to Actuator pin 6 - ECM pin A09 to Actuator pin 5	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A08 to ECM pin A09	OK	Renew exhaust control valve actuator, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check adjustment of cables is within specification. Disconnect cables and check that the cables are free to slide through the cable outers (see page 10-198). Using a suitable tool check that the exhaust control valve can be rotated manually.	OK	Renew Exhaust control valve actuator, proceed to test 6
	Faulty	Renew relevant part and proceed to test 6
6 Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of the exhaust control valve actuator.	OK	Action complete - quit test

Circuit Diagram



ABS Modulator ID Incompatible

Fault Code	Possible cause	Action
P1520	Unmatched ABS	This is also identified by ABS warning light indication. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check ABS modulator part number is correct for the motorcycle.	OK	Proceed to test 2
	Incorrect	Replace ABS modulator with correct part and proceed to test 3
2 Check that the tune is correct for the motorcycle, using the diagnostic tool.	OK	Proceed to test 3
	Incorrect	Update tune using service tool, proceed to test 3
3 Clear fault code, check for normal operation.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System/Engine Management

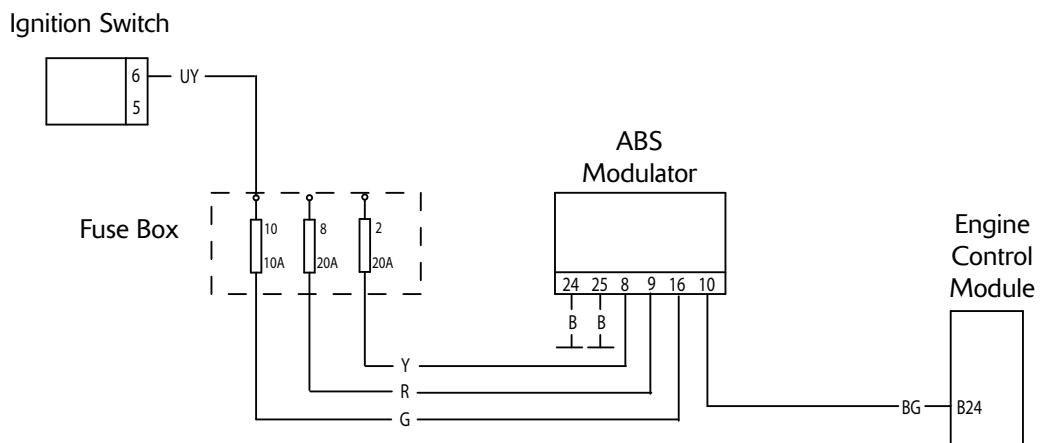
ABS Modulator Communication – Thunderbird Storm with ABS

Fault Code	Possible cause	Action
P1521	Lost communication with ABS	View and note 'freeze-frame' data if available. Ensure ABS modulator connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A24 - ABS modulator pin 8 - ABS modulator pin 9 - ABS modulator pin 10 - ABS modulator pin 16 - ABS modulator pin 24 - ABS modulator pin 25	OK	Disconnect ECM and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A24 to ground	OK	Disconnect ABS modulator and proceed to test 3
	Faulty	Locate and rectify wiring fault, proceed to test 6
3 Check fuse box Fuse 2, 8 and 10 integrity.	OK	Proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - ABS pin 8 to ground - ABS pin 9 to ground - ABS pin 16 to ground	OK	Proceed to test 5
	Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5 Check cable continuity: - ECM pin A24 to ABS pin 10 - ABS pin 24 to ground - ABS pin 25 to ground - Fuse box Fuse 2 to ABS pin 8 - Fuse box Fuse 8 to ABS pin 9 - Fuse box Fuse 10 to ABS pin 16 - Fuse box Fuse 10 to ignition switch pin 6	OK	Proceed to test 6
	Fault still present	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

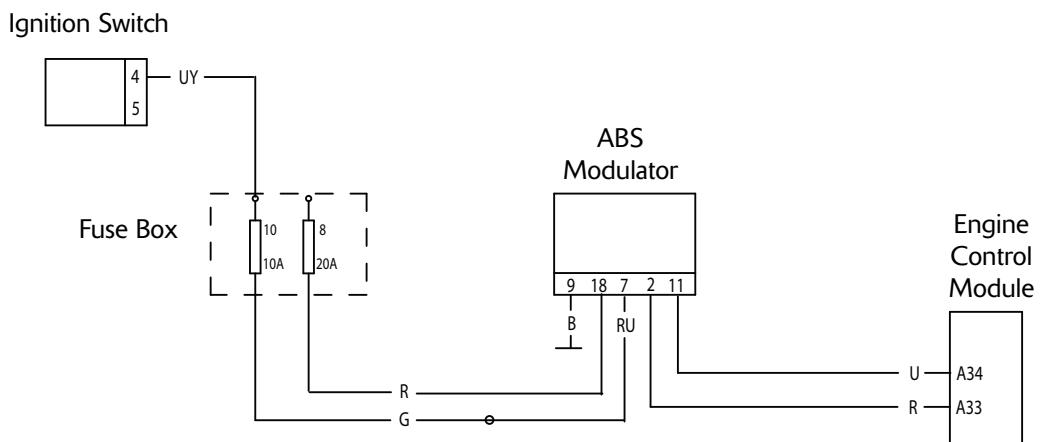
ABS Modulator Communication – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1521	Lost communication with ABS	View and note 'freeze-frame' data if available. Ensure ABS modulator connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - ABS modulator pin 2 - ABS modulator pin 7 - ABS modulator pin 9 - ABS modulator pin 11 - ABS modulator pin 18	OK	Disconnect ECM and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Disconnect ABS modulator and proceed to test 3
	Faulty	Locate and rectify wiring fault, proceed to test 6
3 Check fuse box Fuse 8 and 10 integrity.	OK	Proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - ABS pin 7 to ground - ABS pin 18 to ground	OK	Proceed to test 5
	Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5 Check cable continuity: - ECM pin A33 to ABS pin 2 - ECM pin A34 to ABS pin 11 - ABS pin 9 to ground - Fuse box Fuse 8 to ABS pin 18 - Fuse box Fuse 10 to ABS pin 7 - Fuse box Fuse 10 to ignition switch pin 4	OK	Proceed to test 6
	Fault still present	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

ECM Tamper Detected

Fault Code	Possible cause	Action
P1604	ECM tamper detected - return to Triumph	Contact Triumph service

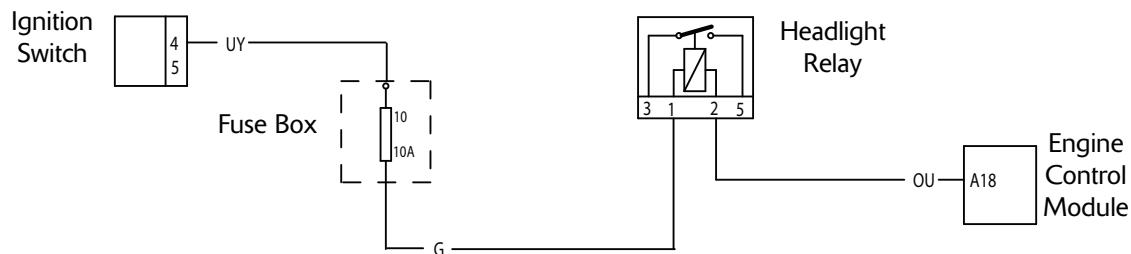
Headlight Relay – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
P1619	Headlamp relay short circuit to ground or open circuit	View and note 'freeze-frame' data if available. Ensure ABS modulator connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P1620	Headlamp relay short circuit to Vbatt	Disconnect ECM and headlight relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A18 - Fuse box Fuse 10 - Ignition switch pin 4	OK	Disconnect headlight relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check fuse box fuse 10 integrity.	OK	Proceed to test 4
	Faulty	Proceed to test 3
3 Check cable for short circuit: - Fuse box Fuse 10 to ground	OK	Proceed to test 4
	Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 7
4 Check cable for short circuit: - ECM pin A18 to ground	OK	Proceed to test 5
	Faulty	Locate and rectify wiring fault, proceed to test 7
5 Check cable continuity: - ECM pin A18 to headlight relay pin 2 - Fuse box Fuse 10 to headlight relay pin 1 - Fuse box Fuse 10 to ignition switch pin 4	OK	Proceed to test 6
	Faulty	Locate and rectify wiring fault, proceed to test 7
6 Check cable for short circuit: - ECM pin A18 to ignition switch pin 4	OK	Renew headlight relay, proceed to test 7
	Faulty	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Fault Finding – Non Electrical

Symptom	Possible cause(s)
Poor throttle response at low rpm	Low fuel pressure caused by filter blockage/leaks Low fuel pressure caused by loose fuel pipes to the fuel pump and filter
Cutting out at idle	Throttle bodies out of balance ISC (Idle Speed Control) actuator inoperative Low fuel pressure caused by loose fuel pipes to the fuel pump and filter Low fuel pressure Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face
Idle speed too low/high	ISC (Idle Speed Control) actuator sticking Incorrect closed throttle position setting Mechanical fault with the throttle linkage
Diagnostic software malfunctions during tune download procedure	Low battery voltage
Throttle hang-up	Incorrect closed throttle position setting
Bike will start but cuts out immediately	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter Low fuel pressure due to split fuel filter ISC motor stuck
Abnormally high fuel pressure	Fuel pressure regulator inoperative
Temperature gauge reads cooler than normal	Cooling system air–locked resulting in coolant temperature sensor operating in air instead of coolant Thermostat fault

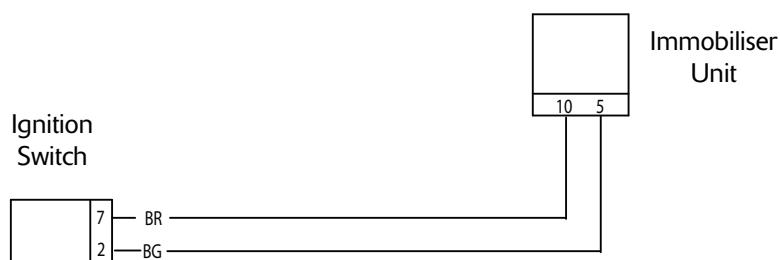
Invalid Key: Key Authentication Unsuccessful

Fault Code	Possible cause	Action
L0008 or Alarm/immobiliser warning indicator light is on when the ignition switch is at the ON position (only visible on motorcycles without the accessory alarm fitted)	Invalid key: Key authentication unsuccessful	Check that the key has been registered with the immobiliser control module, if it is a new key or an additional key. Check that there are no additional keys with a transponder chip fitted close to the ignition key and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 If available, try to start the motorcycle with the second registered key:	OK	Transponder chip in the key not functioning correctly. Register a new key using the Triumph Diagnostic Tool then proceed to test 5
	Faulty	Proceed to test 2
2 Check the condition of cable, connector housing and terminals for the following: - Ignition switch - Immobiliser control module	OK	Disconnect the ignition switch, proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check antenna coil resistance: - Ignition switch pin 2 to ignition switch pin 7	7Ω to 13Ω	Proceed to test 4
	Faulty	Replace the ignition switch, register new keys and proceed to test 5
4 Check cable continuity: - Ignition switch pin 2 to Immobiliser control module pin 10 - Ignition switch pin 7 to Immobiliser control module pin 5	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System/Engine Management

Fuel Tank



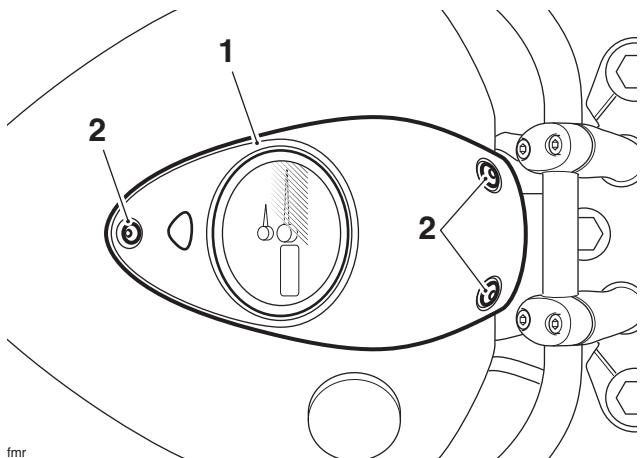
Warning

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Fuel Tank – Removal

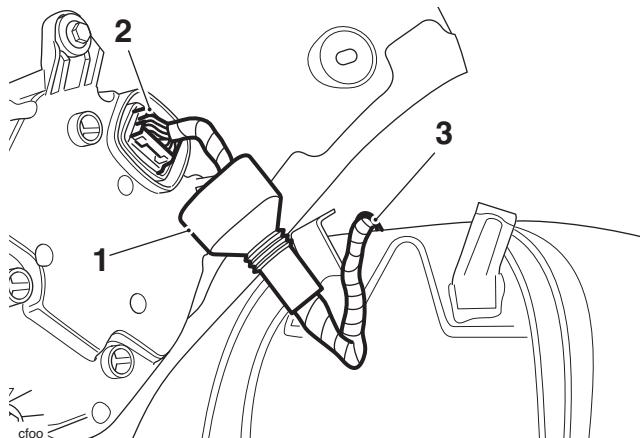
1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery negative (black) lead first.
3. Release the three fixings securing the instrument assembly to the fuel tank.



1. Instrument assembly

2. Fixings

4. Lift the instrument assembly to access its underside.
5. Slide the protective cover down the harness and disconnect the electrical connector. Place the instrument assembly to one side.

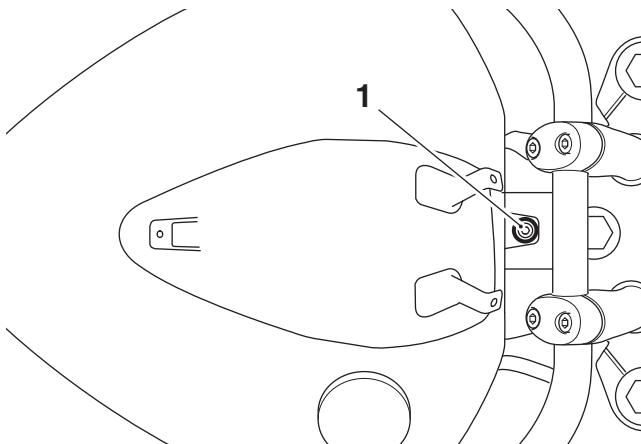


1. Protective cover

2. Electrical connector

3. Instrument harness clip

6. Detach the instrument harness from the clip at the front of the fuel tank.
7. Release the fixing from the front of the fuel tank.



1. Front fuel tank fixing



Warning

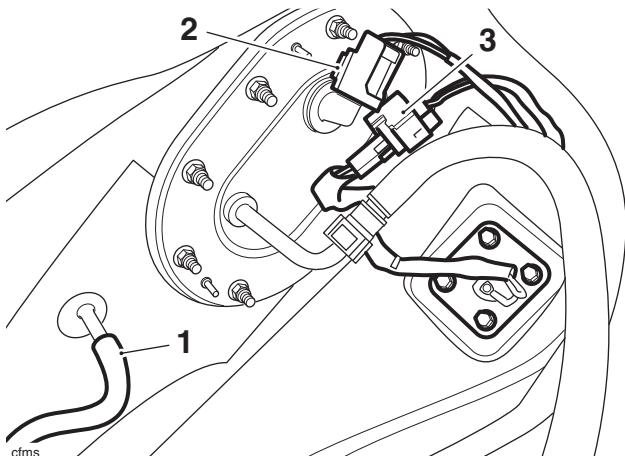
If the fuel rail is dismantled without first reducing pressure, fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

8. Pivot the fuel tank upwards at the front.

Note:

- **Make a note of, or mark the position of the breather hose and the wiring harness on the underside side of the tank.**
- 9. Disconnect the breather hose and the electrical connectors to the fuel pump and the fuel level sensor.



1. Breather hose

2. Fuel pump electrical connector

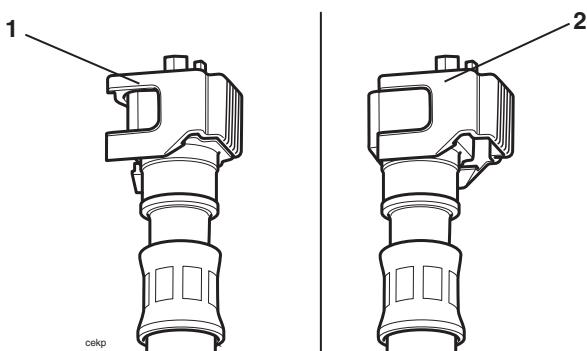
3. Fuel level sensor electrical connector

10. Temporarily reconnect the battery, positive (identified with red tape) lead first.

Fuel System/Engine Management

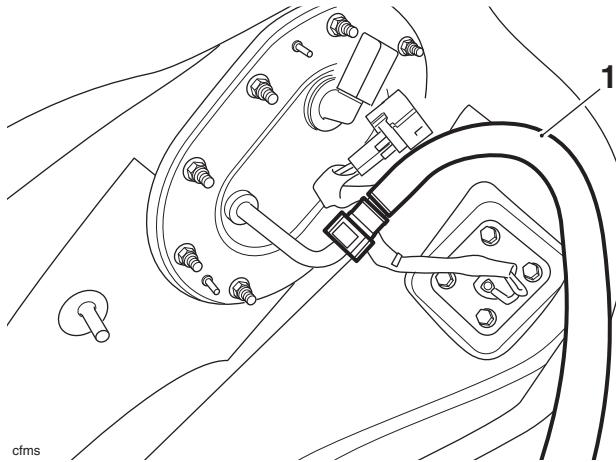
Note:

- Because fuel stored in the fuel rail will be at 3.5 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump disconnected.
 - When disconnected, the fuel tank is self-sealing but a small amount of fuel may dribble from the hose.
 - To protect the components under the fuel tank, place suitable material over the components to absorb the small amount of fuel that may come from the fuel tank and its fuel lines.
11. Briefly crank the engine to reduce the fuel pressure in the fuel rail.
12. Disconnect the battery, negative (black) lead first.
13. To release the double check clip, ease the latch away from the connector until the release buttons are exposed.



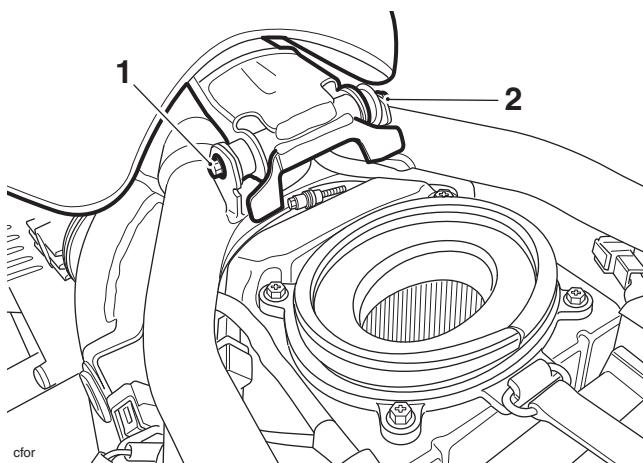
1. Locked Position
2. Unlocked Position

14. Disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from its spigot on the fuel pump plate. Collect any fuel remaining in the hose in a suitable container.



1. Fuel hose

15. Support the fuel tank while removing the rear mounting bolt and nut.



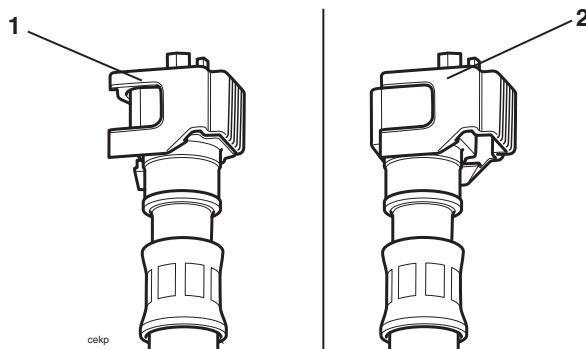
1. Rear mounting bolt
2. Nut

16. Raise the tank from the frame and place safely to one side.

Fuel System/Engine Management

Fuel tank – Installation

1. Position the fuel tank to the frame and install the rear mounting bolt.
2. Reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.
3. Slide the double check latch to the locked position until the release buttons are covered. If the latch will not slide into position, then the fuel hose is not fully home on its spigot and must therefore be refitted correctly.



1. Locked Position

2. Unlocked Position

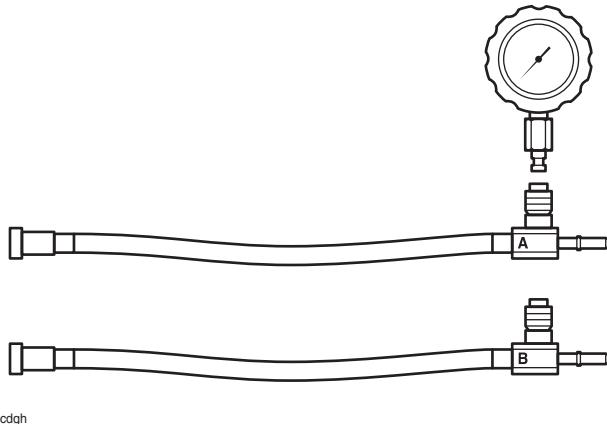
4. Attach and connect the breather pipe and harnesses to the fuel tank as noted/mark prior to removal.
5. Lower the tank into position ensuring the breather pipe is not trapped, kinked or twisted.
6. Fit the forward fixing and tighten to **8 Nm**.
7. Tighten the rear fuel tank mounting bolt to **8 Nm**.
8. Ensure the electrical connector gasket is in place and connect the electrical connector to the instrument assembly. Slide the protective cover over the connector.
9. Refit the instrument assembly and tighten the fixings to **7 Nm**.
10. Reconnect the battery, positive (identified with red tape) lead first.
11. Refit the rider's seat (see page 17-20).

Fuel Pressure Checking

Warning

Observe the fuel handling precautions given in the General Information section.

Fuel pressure is checked using service tool T3880001.



Tool T3880001

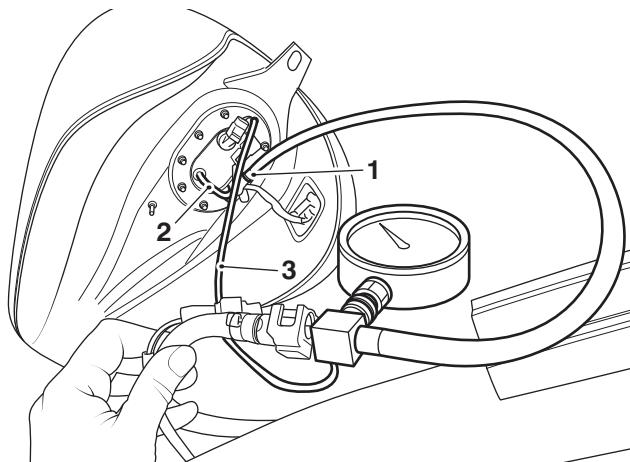
1. Remove the fuel tank (see page 10-144) and place on a suitable support, close to the motorcycle.
2. Using the extension cable T3880129, carefully connect the fuel pump connection on the main harness to the fuel tank.
3. Select the fuel pressure gauge adapter marked 'A' from service tool T3880001.

Warning

Always use the correct fuel pressure gauge adapter (**Adapter 'A' for Thunderbird**). Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

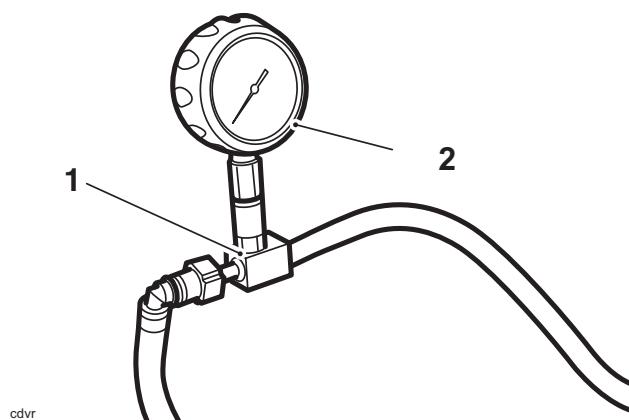
Fuel System/Engine Management

4. Connect the adapter hose to the fuel pump plate outlet and fuel hose as shown in the illustration below.



1. Adaptor hose 'A'
2. Fuel pump plate outlet
3. Extension cable T3880129

5. Connect the fuel pressure gauge to the adapter hose as shown below by pushing the gauge spigot into the adapter until a click can be heard.



1. Adapter hose
2. Fuel pressure gauge

Note:

- To release the fuel pressure gauge from the adapter, slide the outer ferrule downwards. This will allow the gauge to spring upwards from the adapter.
- 6. Ensure the gauge is visible to the side of the motorcycle.

Note:

- The engine can be run with the fuel tank in the raised position.
- 7. Start the engine and observe the fuel pressure reading on the gauge.

Note:

- The fuel pressure should be 3.5 bar nominally.
- 8. When fuel pressure checking is complete, disconnect the fuel pressure gauge adapter and wiring extension. Collect any fuel in the hose in a suitable container.
- 9. Refit the fuel tank (see page 10-146).

Fuel System/Engine Management

Fuel Pump, Filter and Pressure Regulator Assembly

Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank (see page 10-144).
4. Detach the fuel level sensor harness from its clip on the fuel pump plate.



Warning

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

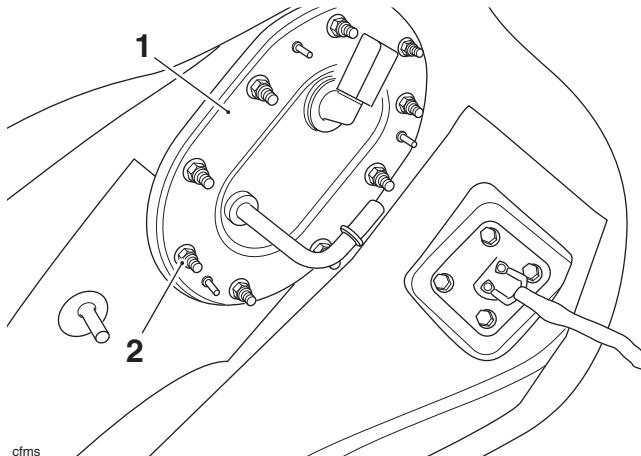
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.



Warning

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

5. Using proprietary professional automotive workshop equipment approved for fuel handling, drain all fuel from the fuel tank.
6. Invert the fuel tank and place on a protective surface to prevent paint damage.
7. Release the ring of nuts securing the fuel pump mounting plate to the tank.



1. Fuel pump mounting plate

2. Nut

8. Separate the pump/filter/regulator assembly from the fuel tank. Discard the pump plate seal.

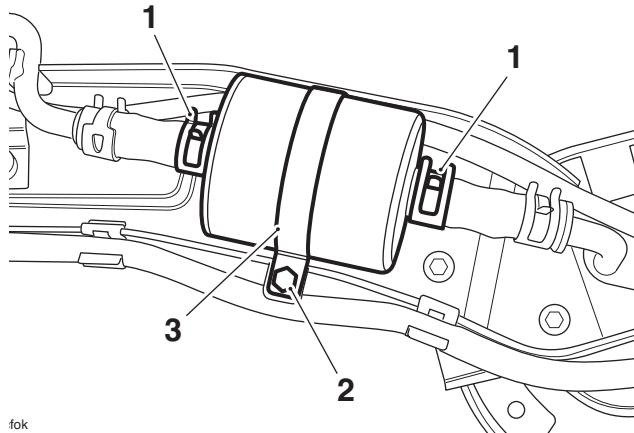
Installation

1. Position a new O-ring seal to the fuel tank opening.
2. Refit the fuel pump assembly to the tank. Fit and tighten the nuts to **5 Nm** working on diagonally opposite nuts to spread the clamping load evenly.
3. Refit the fuel level sensor harness to the clip on the fuel pump plate.
4. Refit the fuel tank (see page 10-146).
5. Refill the fuel tank with the fuel drained during removal, and check carefully for fuel leaks.
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Refit the rider's seat (see page 17-21).

Fuel Filter

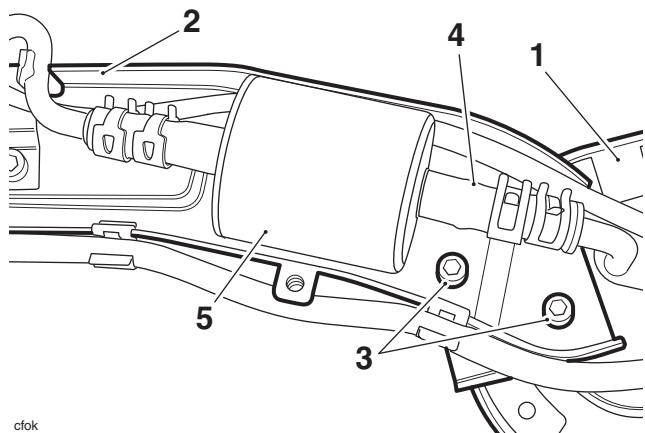
Removal

1. Remove the fuel pump, filter and pressure regulator assembly (see page 10-148).
2. Release the two fuel hose clips from either side of the fuel filter.
3. Remove the fuel filter securing bolt and strap.



- 1. Clips**
2. Bolt
3. Strap

4. Remove the two screws securing the pump plate to the fuel pump bracket.
5. Ease the two brackets apart, disconnecting the hose from the filter as you do so.



- 1. Pump plate**
2. Fuel pump bracket
3. Screws
4. Hose
5. Fuel filter

Note:

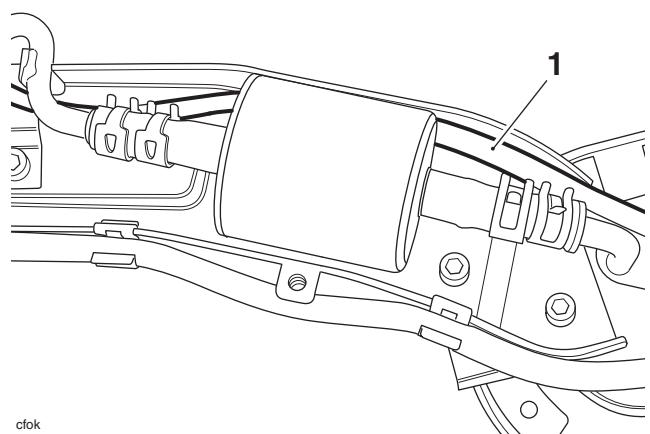
- Prior to removing the filter, note the direction of the arrow on the side of the filter. The arrow should point away from the fuel pump, towards the pressure regulator.
- 6. Remove the filter from the remaining hose.

Inspection

1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
2. Check all hose clips for cracks and signs of distortion. Replace as necessary.

Installation

1. Install the fuel filter to the fuel pump hose, ensuring the arrow on the filter points away from the pump.
2. Align the pump plate to the fuel pump bracket, engaging the fuel filter outlet into the pressure regulator hose as you do so.
3. Secure the pump plate to the fuel pump bracket with new screws. Tighten to **10 Nm**.
4. Ensure the fuel pump harness is routed so that it will be retained under the fuel filter strap when it is installed. Ensure the harness will not be trapped by the filter or strap.



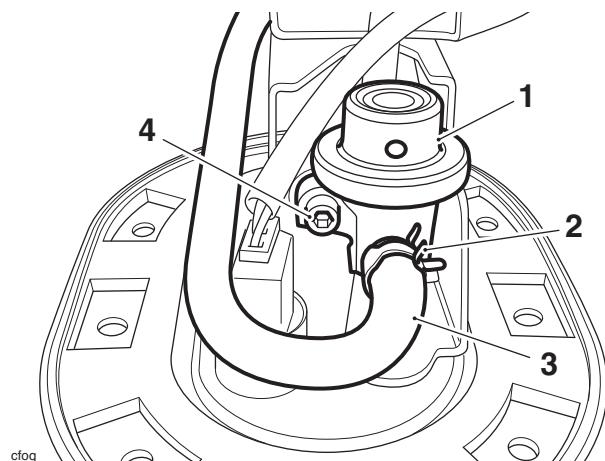
- 1. Fuel pump harness**
5. Secure the fuel filter with the strap and fit the screw. Tighten to **3 Nm**.
 6. Refit the two hose clips.
 7. Refit the fuel pump, filter and pressure regulator assembly (see page 10-148).

Fuel System/Engine Management

Fuel Pressure Regulator

Removal

1. Remove the fuel pump, filter and pressure regulator assembly (see page 10-148).
2. Release the hose clip and detach the hose from the fuel pressure regulator.
3. Release the screw securing the fuel pressure regulator to the fuel pump plate.



1. **Pressure regulator**
2. **Hose clip**
3. **Hose**
4. **Screw**

4. Remove the fuel pressure regulator from the fuel pump plate. Discard the O-ring from the fuel pressure regulator spigot.

Inspection

1. Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
2. Check all hose clips for cracks and signs of distortion. Replace as necessary.

Installation

1. Install a new O-ring to the fuel pressure regulator spigot.
2. Position the fuel pressure regulator to the fuel pump plate.
3. Secure the fuel pressure regulator with the screw and tighten to **5 Nm**.
4. Refit the hose and secure with the hose clip.
5. Refit the fuel pump, filter and pressure regulator assembly (see page 10-148).

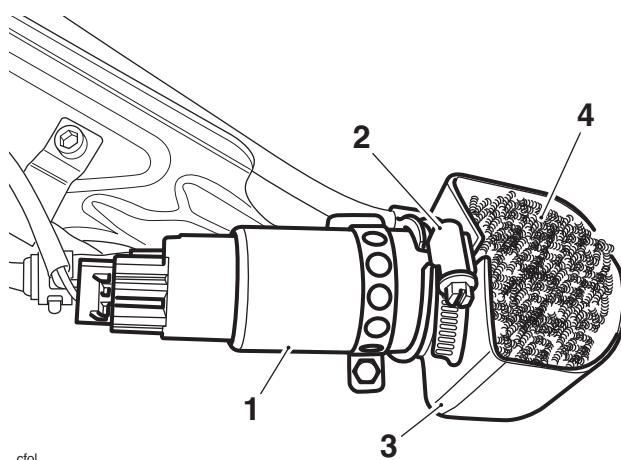
Fuel Pump

Removal

1. Remove the fuel filter (see page 10-149).
2. Release the hose clip securing the baffle housing to the fuel pump.
3. Reposition the hose clip and carefully slide the baffle housing off the fuel pump body.

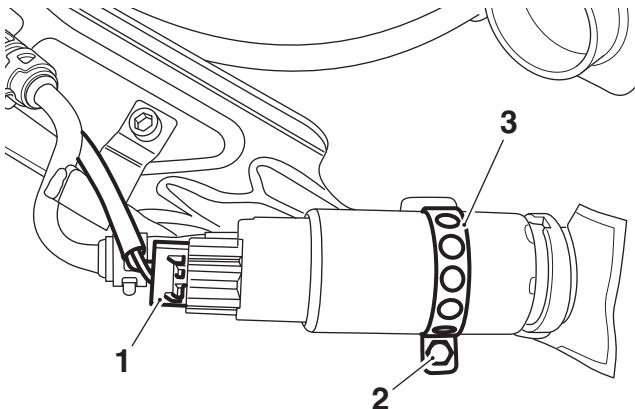
Note:

- **It is not necessary to disconnect the baffle housing hose from the fuel pressure regulator unless it is to be removed at the same time as the fuel pump.**
- 4. Carefully remove the baffle material from the fuel pump, easing it over the inlet filter.



1. **Fuel pump**
 2. **Hose clip**
 3. **Baffle housing**
 4. **Baffle material**
5. Remove the baffle housing hose clip over the inlet filter.
 6. Disconnect the fuel pump electrical connector.

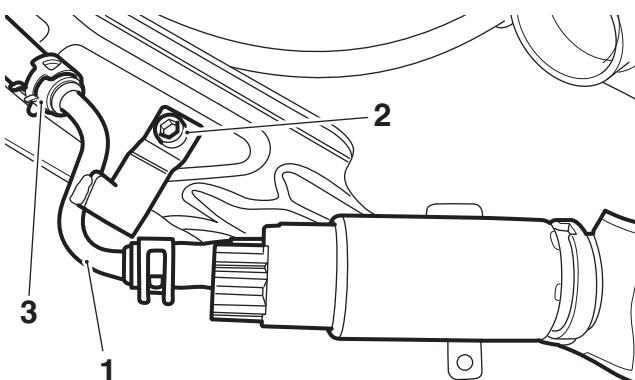
- Remove the fuel pump securing bolt and strap.



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- Fuel pump electrical connector**
- Bolt**
- Strap**

- Remove the bolt securing the steel outlet pipe to the fuel pump bracket. Discard the bolt.
- Detach the fuel pump, connector hose and steel outlet pipe from the fuel pump bracket as an assembly.



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- Steel outlet pipe**
- Bolt**
- Hose clip**

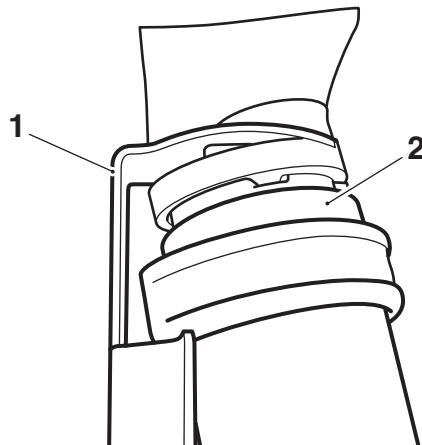
- If necessary, release the hose clip and remove the connector hose and steel outlet pipe from the pump.

Inspection

- Inspect all hoses for cracks, splits, fraying and other damage. Replace as necessary.
- Check all hose clips for cracks and signs of distortion. Replace as necessary.

Assembly

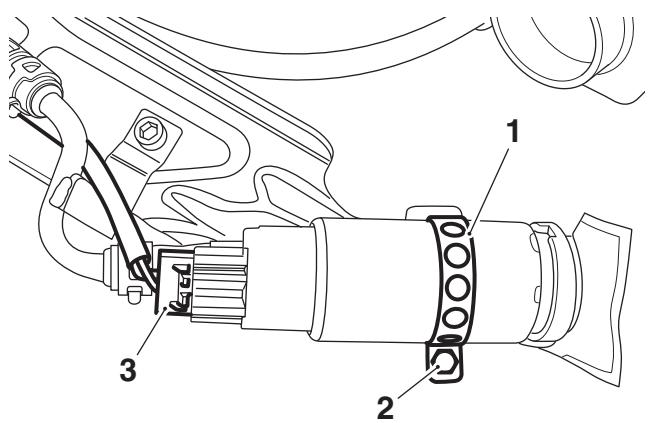
- If removed, refit the connector hose and steel outlet pipe to the fuel pump. Secure with the hose clip.
- Position the fuel pump to the bracket, ensuring the feet of the rubber isolator engage correctly in the fork.



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- Fork**
- Isolator feet**

- Align the steel outlet pipe bracket to the fuel pump bracket and fit a new bolt. Tighten to **10 Nm**.
- Refit the fuel pump strap and secure with a new bolt. Tighten to **3 Nm**.
- Reconnect the fuel pump electrical connector.



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- Fuel pump clamp**
- Bolt**
- Electrical connector**

- Position the baffle housing hose clip loosely over the fuel pump body.
- Carefully refit the baffle material over the inlet filter, ensuring the filter is completely covered.
- Refit the baffle housing over the fuel pump, ensuring the cut out in the housing aligns with the fuel pump bracket. Refit the hose clip and tighten to **3 Nm**.
- Refit the fuel filter, ensuring the fuel pump harness is routed under the fuel filter strap to retain it (see page 10-149).

Fuel System/Engine Management

Fuel Level Sensor

Removal

Note:

- The fuel level sensor is located at the front left hand edge on the underside of the fuel tank.

- Remove the fuel tank (see page 10-144).



Warning

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

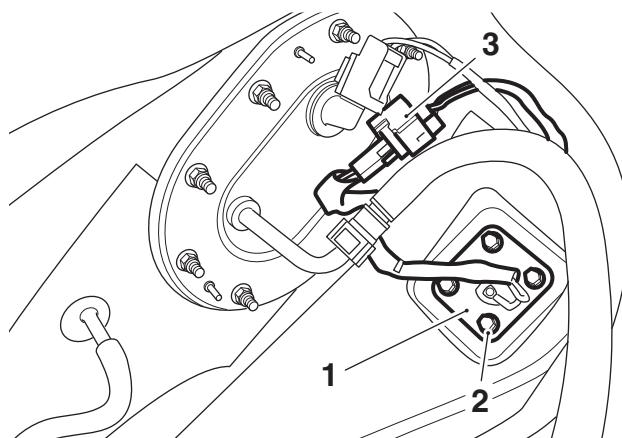


Warning

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

- Using proprietary professional automotive workshop equipment approved for fuel handling, drain all fuel from the fuel tank.
- Invert the fuel tank and place on a protective surface to prevent paint damage.
- Disconnect the fuel level sensor electrical connector from the harness.
- Detach the fuel level sensor harness from the fuel pump plate.

- Release the bolts securing the fuel level sensor to the fuel tank.



- Fuel level sensor
- Bolts
- Electrical connector

- Carefully manoeuvre the fuel level sensor out of the fuel tank. Discard the seal.

Installation

- Position a new seal on to the fuel level sensor.
- Carefully refit the fuel level sensor to the fuel tank. Fit and tighten the bolts to **5 Nm**.
- Reconnect the fuel level sensor electrical connector and secure to the fuel pump plate.
- Refit the fuel tank (see page 10-146).

Ignition Coils

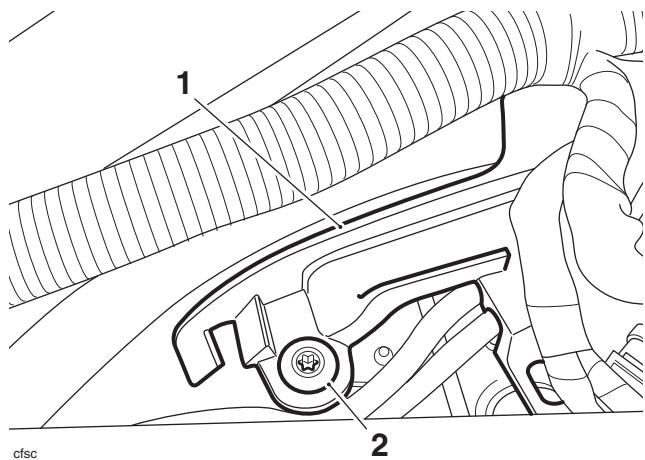


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page 10-144).
4. Remove the bolt securing the throttle cable and harness guide to the frame.

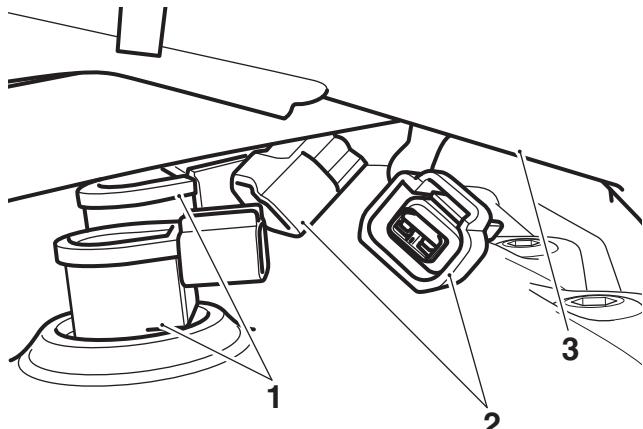


1. Throttle cable and harness guide

2. Fixing

5. Remove both MAP sensor fixings, noting the routing of the MAP sensor hoses and harnesses (see page 10-164).
6. Disconnect the MAP sensor hoses at the throttle body.
7. Detach the throttle cables from the throttle cable and harness guide. It is not necessary to disconnect the throttle cable at either the throttle body or twist grip.
8. Detach both electrical connector multiplugs from the throttle cable and harness guide, and remove the guide ensuring the two MAP sensor hoses remain clipped into the underside.

9. Disconnect the electrical connectors.

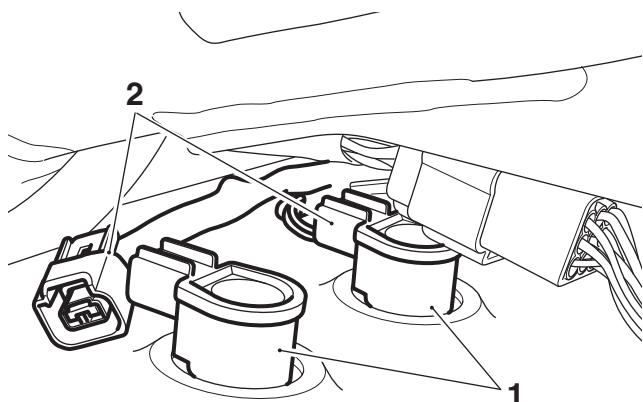


1. Ignition coil
2. Electrical connector
3. Frame

10. Remove the four ignition coils from the camshaft cover.

Installation

11. Push fit the four ignition coils into the camshaft cover and reconnect the electrical connectors.

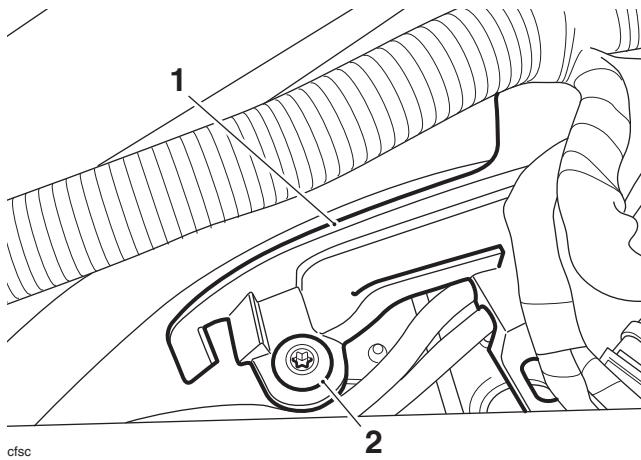


1. Ignition coil
2. Electrical connector

12. Reposition the throttle cable and harness guide to the frame, connecting the two MAP sensor hoses as you do so. Ensure the hoses are routed as noted during removal, with the right hand hose (identified with red tape) connected to the right hand throttle.
13. Refit both MAP sensor fixings, noting the routing of the MAP sensor hoses and harnesses (see page 10-164).

Fuel System/Engine Management

- Refit the throttle cable and harness guide fixing, tightening to **7 Nm**.



- 1. Throttle cable and harness guide**

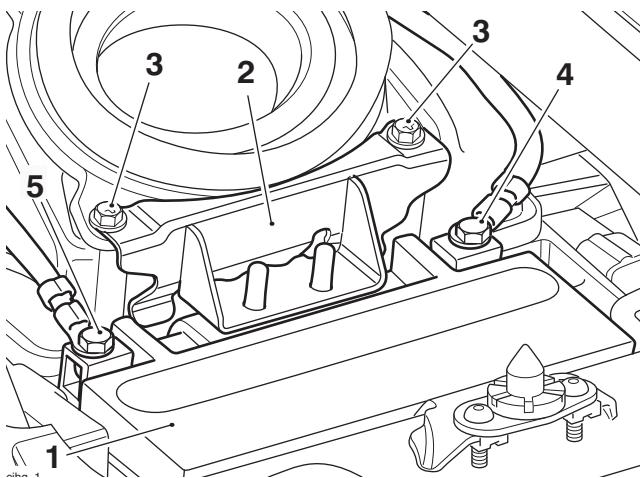
- 2. Fixing**

- Refit the electrical connector multiplugs.
- Refit the throttle cables to the throttle cable and harness guide.
- Refit the two MAP sensors (see page 10-164).
- Refit the fuel tank (see page 10-146).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).

Air Filter Element

Removal

- Remove the rider's seat (see page 17-21).
- Disconnect the battery, negative (black) lead first.
- For Thunderbird Commander and Thunderbird LT only:** Release the fixings and remove the battery clamp.



- 1. Battery**

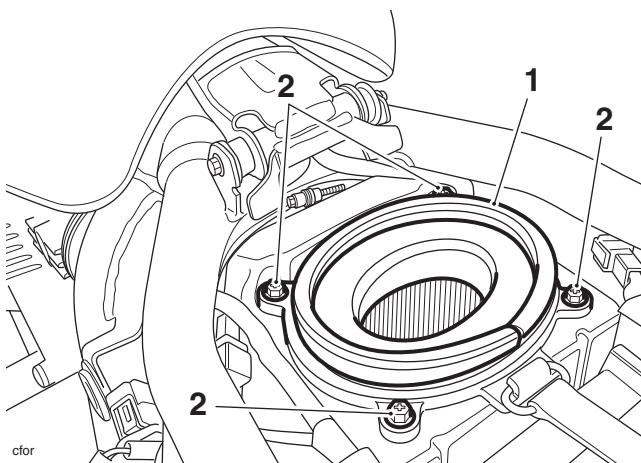
- 2. Battery clamp**

- 3. Fixings**

- 4. Negative terminal**

- 5. Positive terminal**

- Release the four screws securing the air filter cover to the airbox.



- 1. Air filter cover**

- 2. Screws**

- Raise the filter cover and remove the air filter element from the housing.
- Inspect the cover seal for damage.

Assembly

1. Clean the air filter cover and interior of the airbox.
2. Locate the new filter element to the airbox.
3. Refit (or replace if necessary) the cover seal, fit the filter cover and tighten the screws to **3 Nm**.
4. **For Thunderbird Commander and Thunderbird LT:** Refit the battery clamp and tighten its fixings to **3 Nm**.
5. Reconnect the battery, positive (identified with red tape) lead first.
6. Refit the rider's seat (see page 17-21).

Airbox and Intake Duct

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect and remove the battery (see page 18-16).
3. Remove the fuel tank (see page 10-144).
4. Remove both side panels (see page 17-30).

Thunderbird Commander and Thunderbird LT

5. Remove the immobiliser control module (see page 10-161).

All Models

6. Remove the rear wheel (see page 16-12).
7. Remove the rear mudguard (see page 17-31 for all models except Thunderbird Commander and Thunderbird LT, see page 17-33 for Thunderbird Commander and Thunderbird LT).
8. Remove the air filter element (see page 10-154).

All Models Except Thunderbird Commander and Thunderbird LT

9. Disconnect the engine breather hose from the airbox.
10. Remove and discard the O-ring from the airbox.
11. If fitted, disconnect the SAI hose and slide the SAI valve off its bracket.

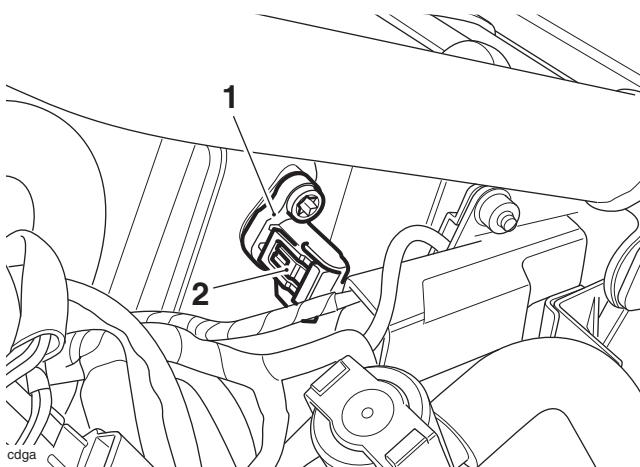
All Models

Note:

- **Before the disconnection of any wiring, note the routing of all wiring and wiring connectors on both sides of the airbox.**
12. Remove the ECM (see page 10-160).

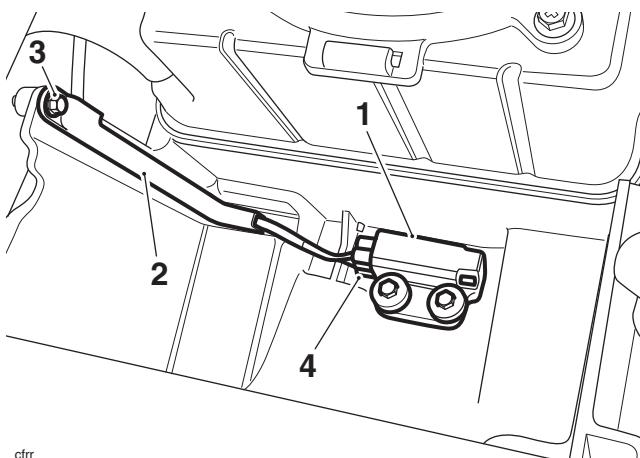
Fuel System/Engine Management

13. Disconnect the intake air temperature sensor connector.



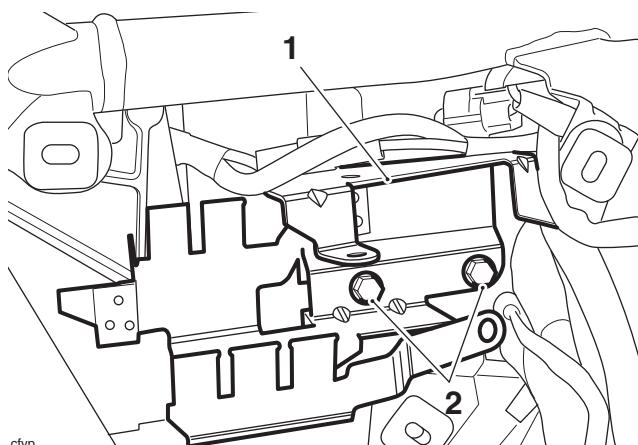
14. Disconnect the barometric pressure sensor connector.
- All Models Except Thunderbird Commander and Thunderbird LT**

15. Remove the fir tree clip and remove the fall detection switch cable guide.
16. Disconnect the fall detection switch connector.



17. Release the fir tree plugs securing the fuse box to the relay bracket.
18. Noting their position, detach the four relays from the relay bracket, remove the two fixings and remove the bracket.

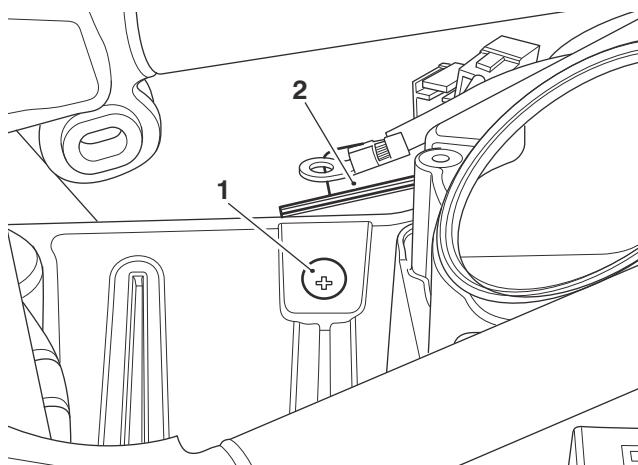
18. Noting their position, detach the four relays from the relay bracket, remove the two fixings and remove the bracket.



1. Relay bracket
2. Fixings

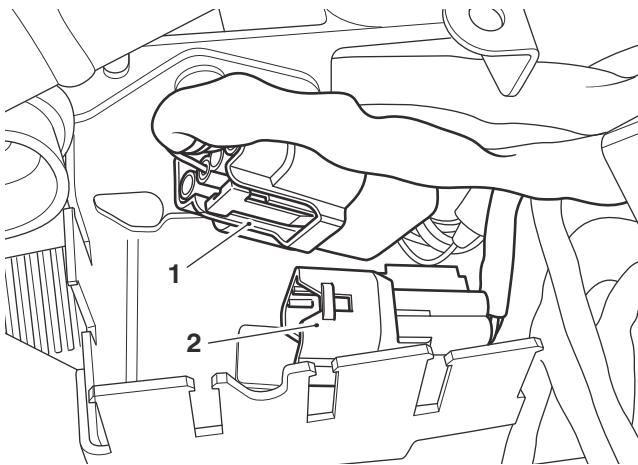
Thunderbird Commander and Thunderbird LT

19. Remove the fixing on the left hand side of the airbox and detach the harness bracket from the airbox.



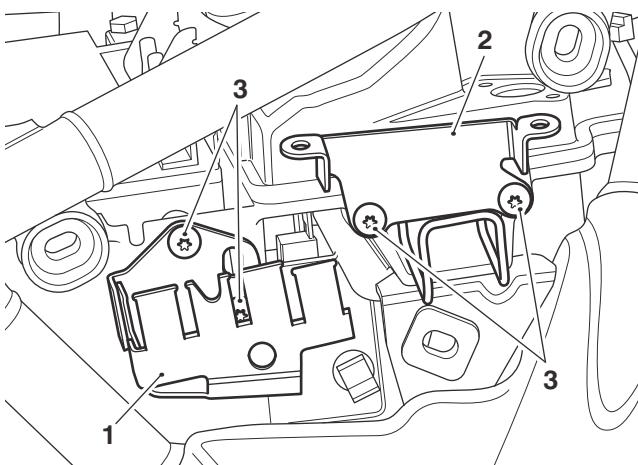
1. Fixing
2. Harness bracket (left hand side)
20. Noting their position, detach all the relays from the relay bracket.

21. Detach the ignition switch multiplug and the rear light multiplug from the relay bracket.



1. Ignition switch multiplug
2. Rear lights multiplug

22. Remove the two fixings and remove the relay bracket.
23. Remove and discard the fir tree clips and detach the fuse box from its bracket.
24. Remove the two fixings and remove the fuse box bracket from the airbox.

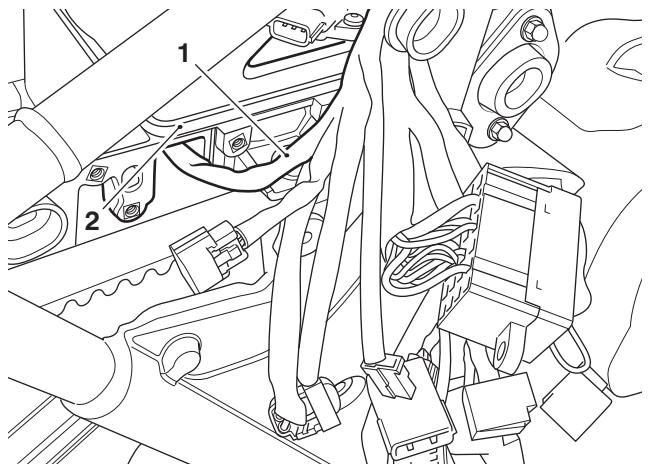


1. Relay bracket (harness shown removed for clarity)
2. Fuse box bracket
3. Fixings

Note:

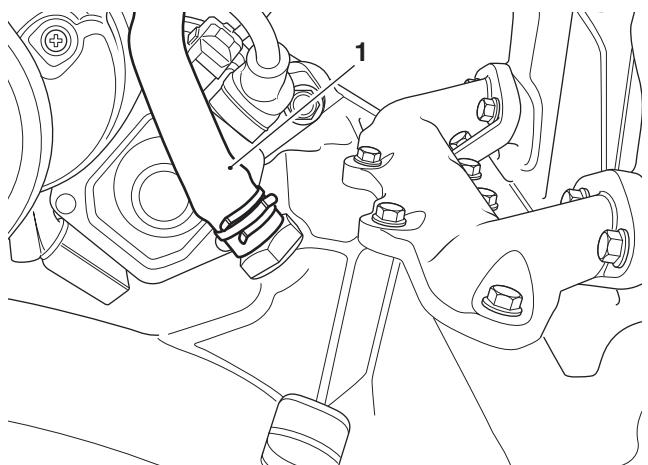
- Note the routing of the harnesses for the immobiliser control module and fall detection switch for installation.**

25. Pull the harness for the immobiliser control module and fall detection switch out of the air box.



1. Harness
2. Airbox

26. Disconnect the engine breather hose from the engine.



1. Engine breather hose

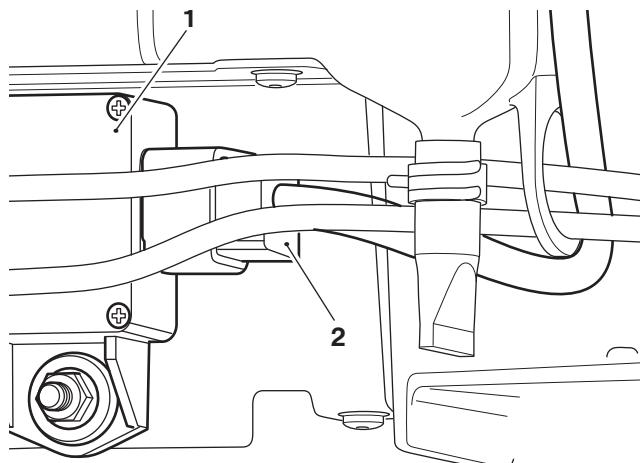
Fuel System/Engine Management

All Models

27. Loosen the intake hose clamp.
28. Remove both rear suspension units (see page 13-3) and lower the swinging arm clear of the airbox.
29. Remove the three airbox fixings - two at the rear and one on the right hand side.

Note:

- **For the Thunderbird Commander and Thunderbird LT, the exhaust butterfly valve actuator is attached to the airbox. Note the routing of the exhaust butterfly cables and harness for installation.**
30. Noting the harness and hose routings, remove the airbox to the rear of the motorcycle, unclipping the roll over valve from the right of the airbox as you do so.
 31. **For Thunderbird Commander and Thunderbird LT:** While moving the airbox to the rear of the motorcycle, disconnect the multiplug from the exhaust butterfly valve actuator.



1. Exhaust butterfly valve actuator
2. Multiplug

32. To remove the intake duct, release the two clips securing the duct to the throttle bodies and remove the duct to the rear.

Installation

1. If removed, refit the intake duct. Tighten the hose clips to **1.5 Nm**.

Note:

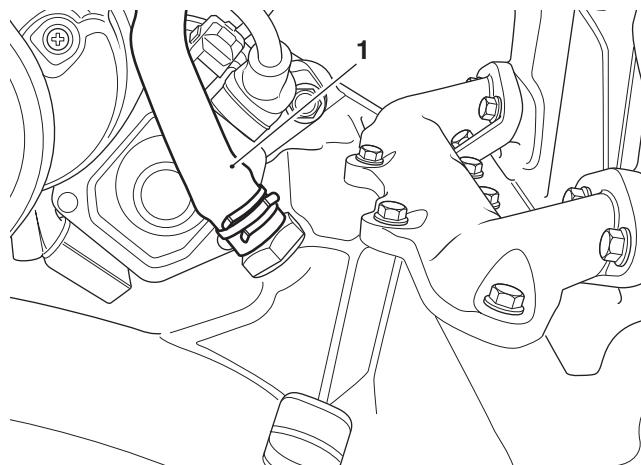
- **For the Thunderbird Commander and Thunderbird LT, ensure that the exhaust butterfly valve cables and harness are routed as noted for removal.**
2. **For Thunderbird Commander and Thunderbird LT:** While positioning the airbox onto the frame, connect the multiplug to the exhaust butterfly valve actuator.
 3. Position the airbox to the air intake duct, ensuring the duct is correctly aligned to the airbox. Clip the roll over valve to the right hand side of the airbox.
 4. Check that the harnesses and hoses are routed as noted on removal.
 5. Secure the airbox with the three fixings and tighten to **9 Nm**.
 6. Tighten the intake duct clip to **1.5 Nm**.
 7. Refit both rear suspension units (see page 13-4).

All Models Except Thunderbird Commander and Thunderbird LT

8. Refit the relay bracket, ensuring the harness is not trapped, and secure with the two fixings. Tighten to **7 Nm**.
9. Refit the relays to the relay bracket, in the position noted during removal.
10. Reposition the fuse box to the relay bracket, and secure with new fir tree clips.
11. Reconnect the fall detection switch connector.
12. Ensuring the wiring is not trapped, refit the fall detection switch cable guide and secure with a new fir tree clip.

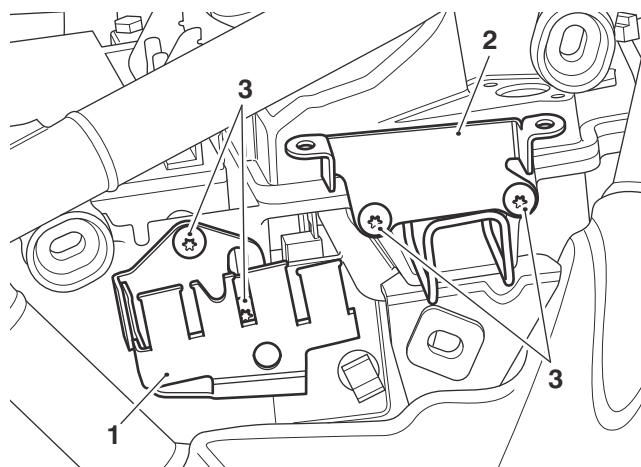
Thunderbird Commander and Thunderbird LT

- Reconnect the engine breather hose to the engine.



1. Engine breather hose

- Route the harness for the immobiliser control module and fall detection switch into the airbox as noted for removal.
- Refit the relay and fuse box brackets, ensuring the harness is not trapped, tighten their fixings to **7 Nm**.



1. Relay bracket (harness shown removed for clarity)

- 2. Fuse box bracket**
3. Fixings

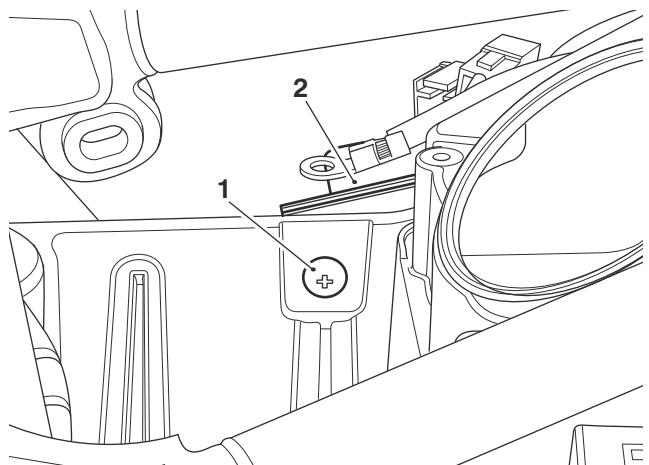
Note:

- Refit the relays to their bracket when the rear mudguard has been fitted and its harness connected to the main harness.**
- Attach the ignition multiplug and the rear light multiplug to the relay bracket.
- Reposition the fuse box to the relay bracket, and secure with new fir tree clips.

Note:

- When fitting the harness bracket to the left hand side of the airbox, only secure it with the rear fixing. The front fixing will be fitted when the ECM bracket is fitted.**

- Refit the left hand harness bracket and secure with the rear fixing only. Ensure the front hole aligns with the hole in the airbox and tighten the rear fixing to **7 Nm**.



1. Fixing

2. Harness bracket (left hand side)

All Models

- Reconnect the intake air temperature sensor connector.
- Reconnect the barometric pressure sensor connector.
- Refit the ECM (see page 10-160).

All Models Except Thunderbird Commander and Thunderbird LT

- If fitted, refit the SAI valve to its bracket and reconnect the SAI hose to the airbox.
- Ensure the wiring to both sides of the airbox is routed as noted during removal.
- Position a new O-ring to the engine breather hose.
- Reconnect the engine breather hose to the airbox.

All Models

- Refit the air filter element (see page 10-155).
- Refit the rear mudguard (see page 17-32 for all models except Thunderbird Commander and Thunderbird LT, see page 17-35 for Thunderbird Commander and Thunderbird LT).
- Refit the rear wheel (see page 16-12).
- For Thunderbird Commander and Thunderbird LT only:** Refit the immobiliser control module to the airbox (see page 10-162).
- Refit both side panels (see page 17-30).
- Refit the fuel tank (see page 10-146).
- Refit the battery (see page 18-17).
- Refit the rider's seat (see page 17-20).

Fuel System/Engine Management

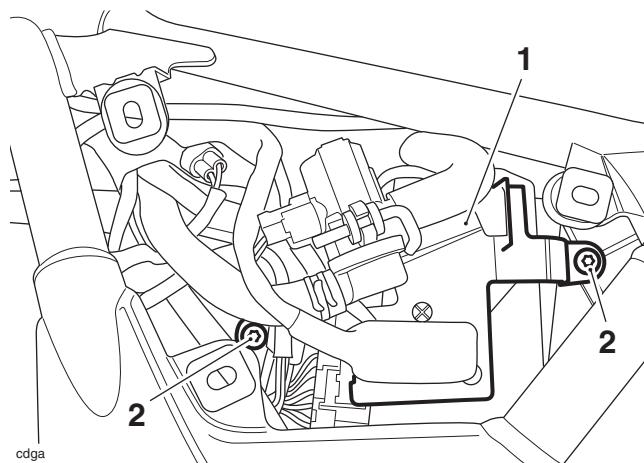
Engine Control Module (ECM)

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand side panel (see page 17-30).
4. If fitted, disconnect the secondary air injection (SAI) hose from the SAI valve.

All Models except Thunderbird Commander and Thunderbird LT

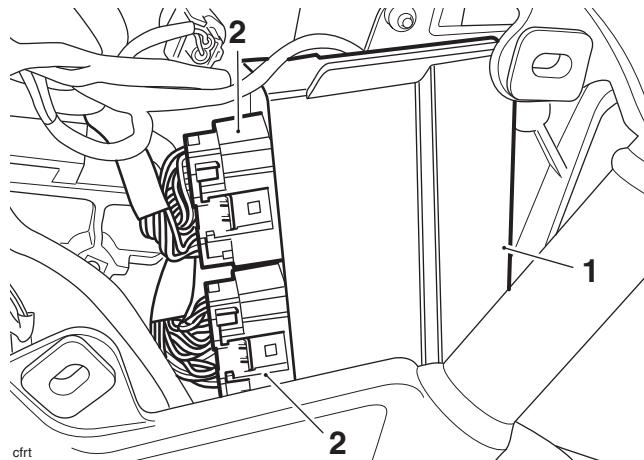
5. Remove the two fixings and detach the ECM bracket.



1. ECM bracket

2. Fixings

6. Detach the ECM from the airbox and disconnect the two electrical connectors (see page 10-48).

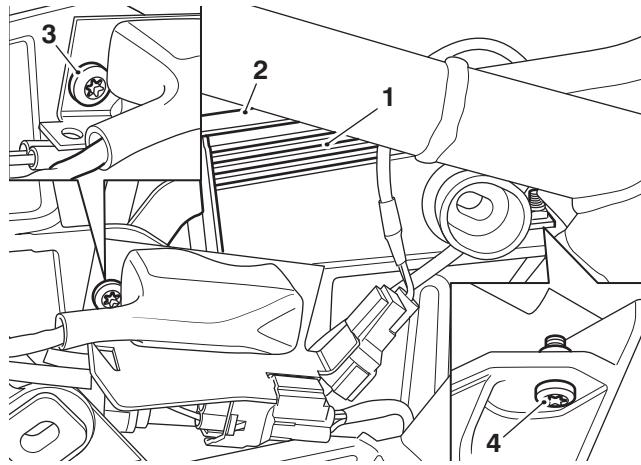


1. ECM

2. ECM connectors

Thunderbird Commander and Thunderbird LT

7. Remove the two fixings and remove the ECM bracket.



1. ECM

2. Bracket

3. Front fixing

4. Rear fixing

8. Lift the ECM out of the airbox and disconnect the two electrical connectors (see page 10-48).

All Models

9. Remove the ECM.

Installation

1. Reconnect the ECM connectors (see page 10-49).
2. Position the ECM to the airbox.
3. Refit the ECM bracket, ensuring the harness is not trapped, and secure with the two fixings. Tighten to **7 Nm**.
4. If fitted, reconnect the SAI hose to the SAI valve.
5. Refit the left hand side panel (see page 17-30).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Refit the rider's seat (see page 17-21).

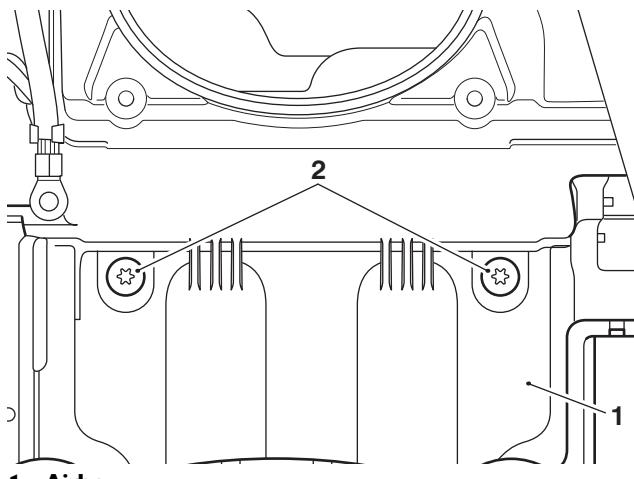
Immobiliser Control Module – Thunderbird Commander and Thunderbird LT

Removal

! Warning

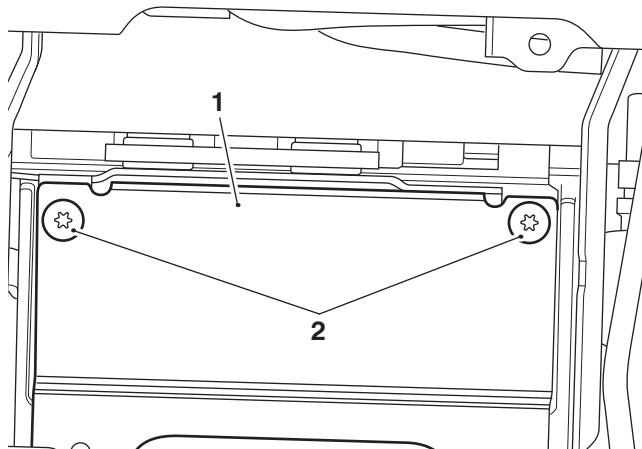
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-21).
2. Disconnect and remove the battery, negative (black) lead first.
3. Release the two fixings from the battery area that secure the immobiliser control module bracket to the base of the airbox. Discard the fixings.



4. Remove the ABS modulator (see page 14-46) to gain access to the fixings for the immobiliser control module mounting bracket.

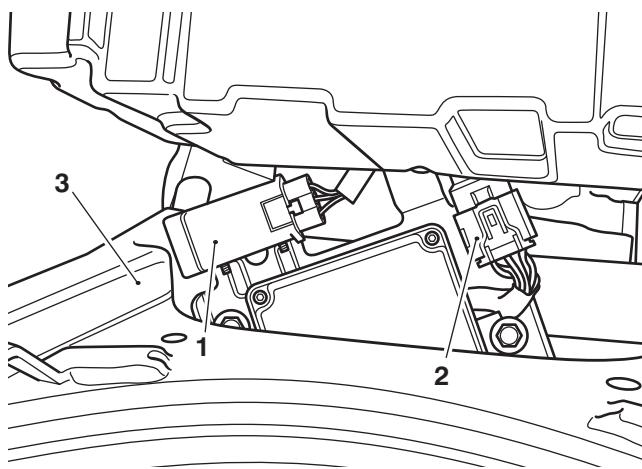
5. Release the two fixings that secure the immobiliser control module bracket to the airbox. Discard the fixings.



- Note:**
1. Bracket, immobiliser control module
 2. Fixings

Note:

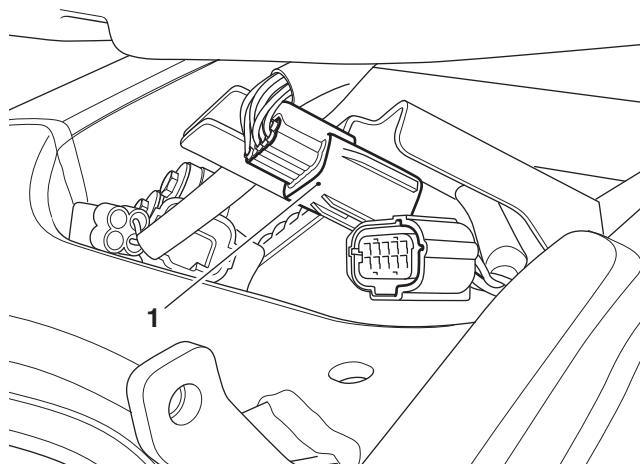
- Note the routing of the harnesses for the immobiliser control module and fall detection switch for installation.
- 6. Lower the bracket out of the airbox and detach the multiplugs to the immobiliser control module and the fall detection switch.



1. Multiplug, fall detection switch
2. Multiplug, immobiliser
3. Swinging arm

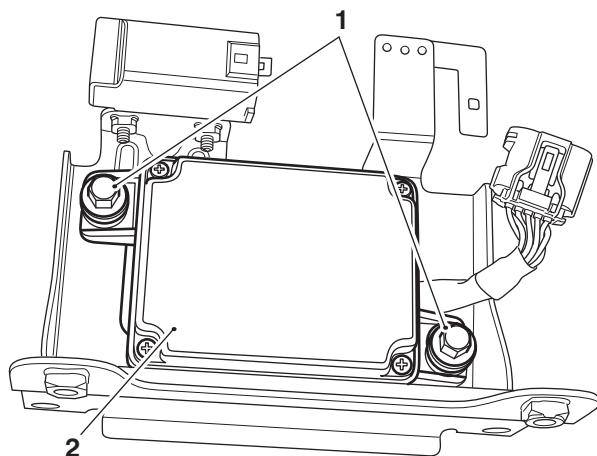
Fuel System/Engine Management

7. Detach the multiplug for the main harness from the bracket and remove the immobiliser control module and bracket assembly.



1. Multiplug

8. Remove the fixings and remove the immobiliser control module. Discard the fixings.

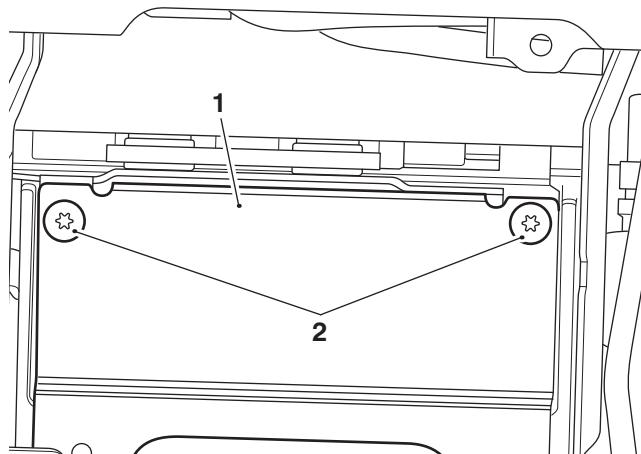


1. Fixings

2. Immobiliser

Installation

- Fit the immobiliser control module to its bracket and tighten the new fixings to **5 Nm**.
- Attach the multiplug for the main harness to the bracket.
- With the harnesses routed as for removal, connect the multiplugs to the immobiliser control module and the fall detection switch.
- Position the bracket and immobiliser control module assembly into the underside of the airbox and tighten the new fixings to **7 Nm**.



1. Bracket, immobiliser control module

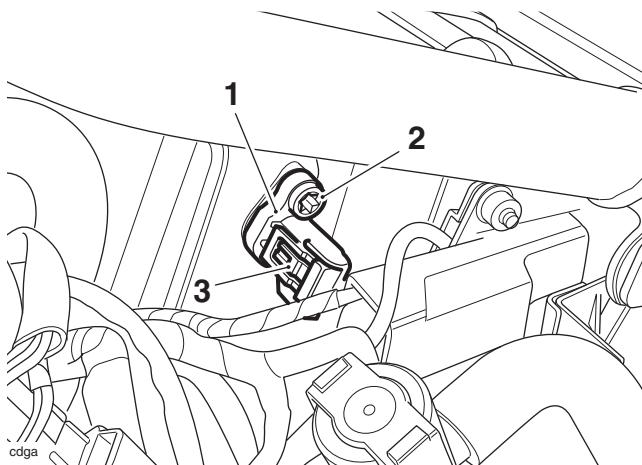
2. Fixings

- Refit the ABS modulator (see page 14-48).
- Bleed the front and rear brakes (see page 14-12 for front brakes, see page 14-24 for rear brakes).
- Refit the rider's seat (see page 17-20).
- Check that the brakes operate correctly.

Intake Air Temperature Sensor

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand side panel (see page 17-30).
4. Disconnect the electrical multiplug from the sensor.



1. Air temperature sensor

2. Fixing

3. Multiplug

5. Release the fixing and remove the sensor from the airbox.

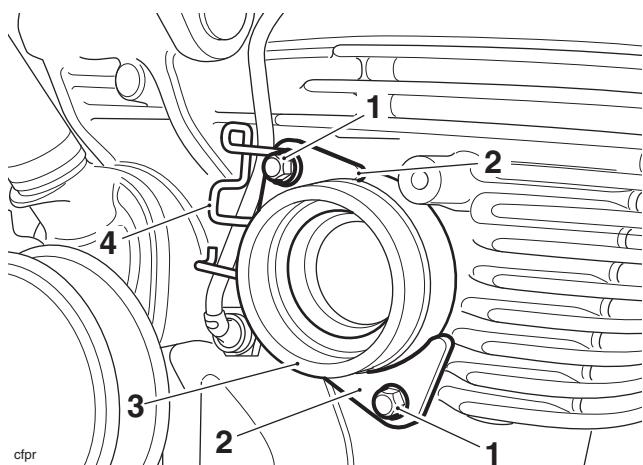
Installation

1. Fit the sensor to the airbox and secure with the fixing. Tighten to **3 Nm**.
2. Reconnect the multiplug.
3. Refit the left hand side panel (see page 17-30).
4. Reconnect the battery, positive (identified with red tape) lead first.
5. Refit the rider's seat (see page 17-21).

Coolant Temperature Sensor

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Drain the cooling system (see page 11-6).
4. Remove the throttle bodies (see page 10-171).
5. Remove the inner screw and clamping plate securing the right hand cylinder transition piece to the cylinder head. Recover the coolant temperature sensor cable guide from the fixing.



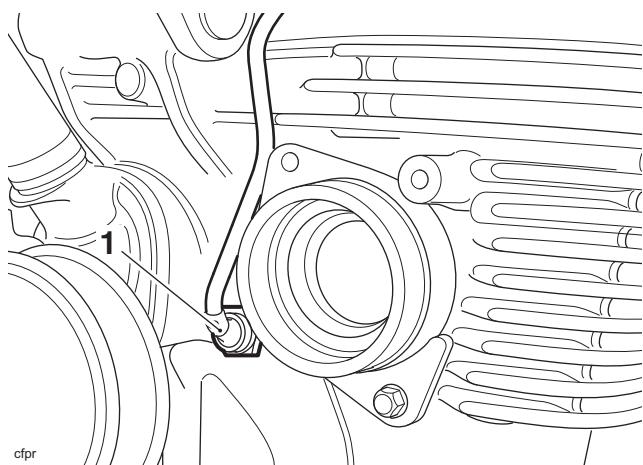
1. Screws

2. Clamping plates

3. Transition piece

4. Cable guide

6. Noting its routing, trace the sensor wiring back to the connector and disconnect from the main harness.
7. Remove the coolant temperature sensor from the cylinder head.



1. Coolant temperature sensor

Fuel System/Engine Management

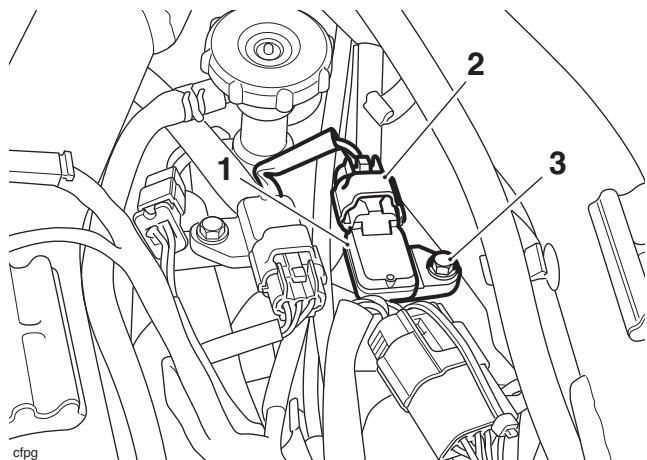
Installation

1. Refit the sensor into the cylinder head. Tighten to **18 Nm**.
2. Route the wiring as noted prior to removal and reconnect the sensor.
3. Refit the clamping plate and cable guide, and secure with the screw. Tighten to **9 Nm**.
4. Refit the throttle bodies (see page 10-173).
5. Refill the cooling system (see page 11-7).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Refit the rider's seat (see page 17-21).

Manifold Absolute Pressure (MAP) Sensor

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page 10-144).
4. Disconnect the electrical multiplug from the sensor.



1. MAP sensor (right hand shown)

2. Multiplug

3. Bolt

5. Unscrew the bolt securing the sensor to the intake duct.
6. Raise the sensor in order to disconnect the hose from below it.

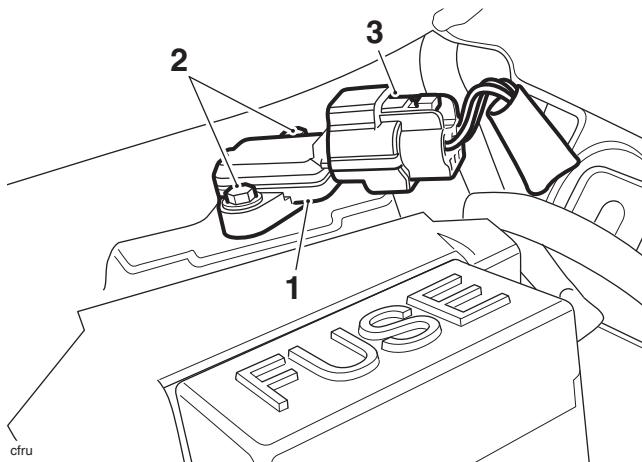
Installation

1. Fit the sensor to the intake duct, reconnect the hose and tighten the bolt to **3 Nm**.
2. Reconnect the multiplug.
3. Refit the fuel tank (see page 10-146).
4. Reconnect the battery, positive (identified with red tape) lead first.
5. Refit the rider's seat (see page 17-21).

Barometric Pressure Sensor

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the right hand side cover (see page 17-30).
4. Disconnect the electrical multiplug from the sensor.



1. Barometric pressure sensor
2. Screws
3. Multiplug

5. Release the two screws securing the sensor to the airbox.
6. Raise the sensor to remove it from the airbox and collect the O-ring.

Installation

1. Take a new O-ring and lubricate it with a smear of petroleum jelly. Fit the O-ring to the sensor, then fit the sensor to the airbox, tightening the two screws to **7 Nm**.
2. Reconnect the multiplug.
3. Refit the right hand side cover (see page 17-30).
4. Reconnect the battery, positive (identified with red tape) lead first.
5. Refit the rider's seat (see page 17-21).

Fall Detection Switch

Removal

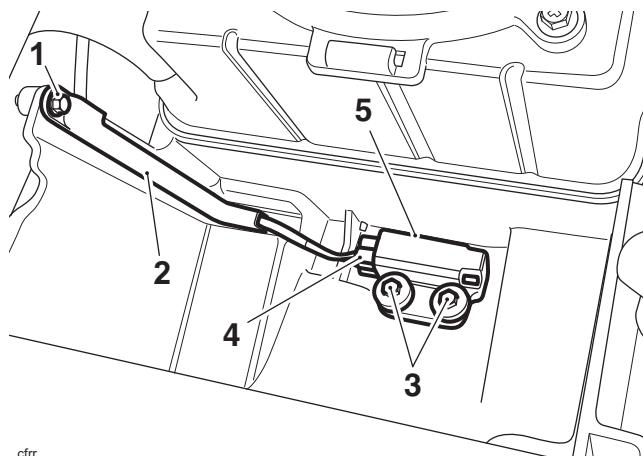
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-21).

All Models except Thunderbird Commander and Thunderbird LT

2. Disconnect the battery, negative (black) lead first.
3. Remove the ECM (see page 10-160).
4. Remove the fir tree clip and remove the fall detection switch cable guide.
5. Remove and discard the fixings securing the fall detection switch to the airbox.
6. Disconnect the multiplug and remove the fall detection switch connector.



1. Fir tree clip
2. Cable guide
3. Fixings
4. Connector
5. Fall detection switch

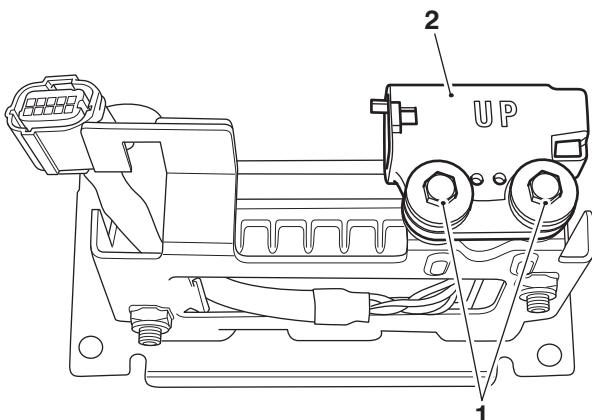
Fuel System/Engine Management

Thunderbird Commander and Thunderbird LT

7. Disconnect and remove the battery (see page 18-16).
8. Remove the immobiliser control module (see page 10-161).

Note:

- **Note the position and orientation of the fall detection switch for installation.**
9. Release the fixings and remove the fall detection switch from the bracket for the immobiliser control module. Discard the fixings.



1. Fixings
2. Fall detection switch

Installation

Thunderbird Commander and Thunderbird LT

1. Fit the fall detection switch to the immobiliser control module bracket as noted for removal. Tighten the new fixings to **3 Nm**.
2. Refit the immobiliser control module (see page 10-162).
3. Refit and connect the battery (see page 18-17).

All Models except Thunderbird Commander and Thunderbird LT

4. Connect the harness multiplug to the fall detection switch.
5. Fit the fall detection switch into the base of the battery compartment and tighten the new fixings to **3 Nm**.
6. Fit the fall detection switch cable guide and secure with a new fir tree clip.
7. Fit the ECM (see page 10-160).
8. Reconnect the battery, positive (identified with red tape) lead first.

All Models

9. Refit the rider's seat (see page 17-21).

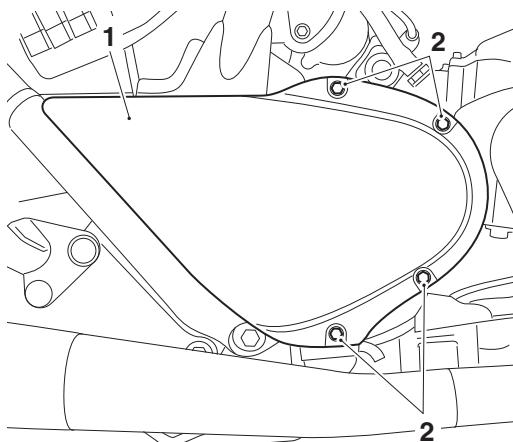
Gear Position Sensor

Removal

Warning

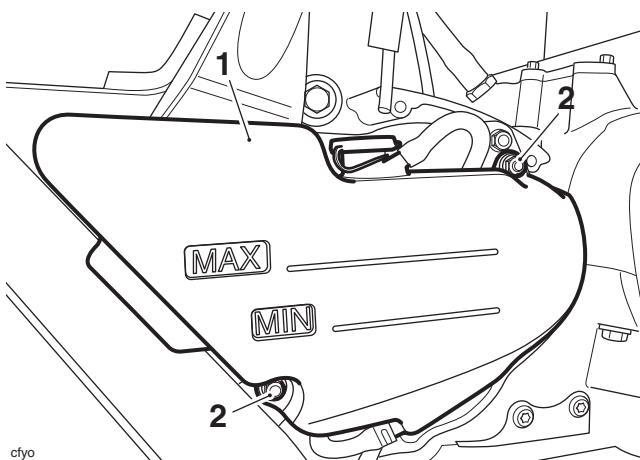
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the drive belt pulley cover fixings and remove the cover.



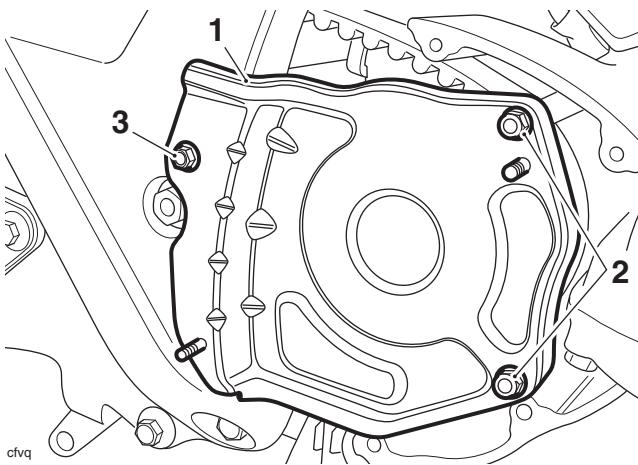
1. Drive belt cover
2. Fixings

4. Remove the two lock nuts securing the expansion tank to its bracket and collect the two flanged sleeves from under the nuts.
5. Detach the expansion tank and position aside. Do not allow the expansion tank to hang unsupported from its hoses. It is not necessary to drain the expansion tank or the cooling system.



1. Coolant expansion tank
2. Lock nuts

- Remove the three fixings and remove the coolant expansion tank bracket. Discard the lock nuts.

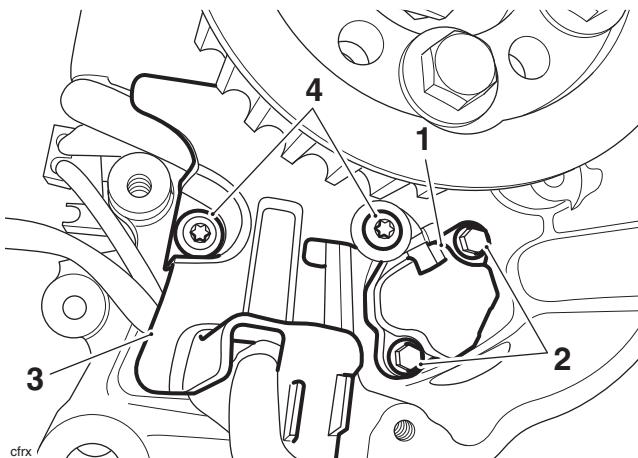


- 1. Coolant expansion tank bracket**
- 2. Lock nuts**
- 3. Bolt**

- Remove the fixings and remove the hose guide.

Note:

- **Note the routing of the hose and harnesses behind the hose guide for installation.**
- 8. Remove the two fixings and detach the gear position sensor from the engine.



- 1. Gear position sensor**
- 2. Gear position sensor fixings**
- 3. Hose guide**
- 4. Hose guide fixings**

Note:

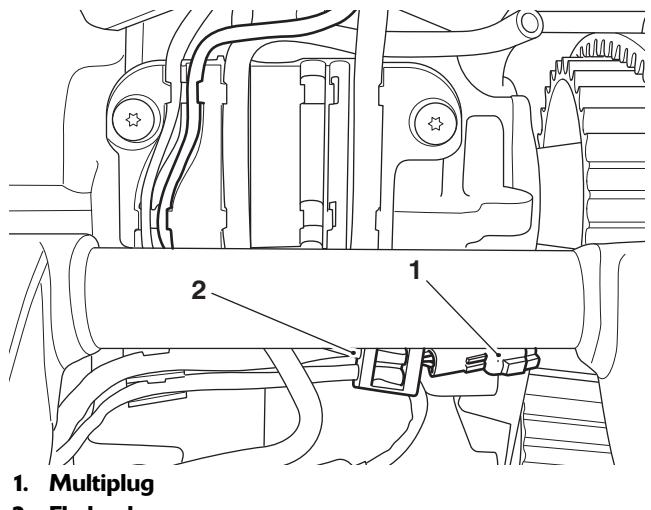
- **The gear position sensor may be fitted with or without a fly lead.**
- **For models with a fly lead fitted, the sensor has a four pin connector which is located at the rear of the engine near the gear position sensor.**
- **For models without a fly lead fitted, the sensor connector is located behind the left hand side panel.**
- **Note the routing of the sensor harness and the location of the harness connector and retaining clips for installation.**

Note:

- **For models with a fly lead, complete step 9 then continue from Installation.**
- **For models without a fly lead, omit step 9.**

Models With a Fly Lead Fitted

- Trace the sensor wire to its multiplug, disconnect from the fly lead and remove the sensor.



- 1. Multiplug**
- 2. Fly lead**

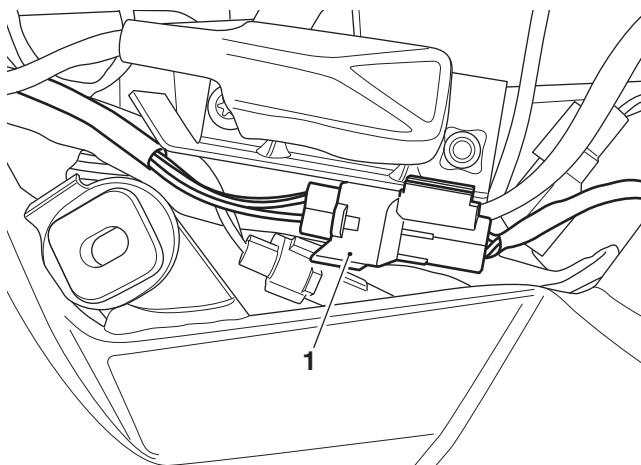
Models Without a Fly Lead Fitted

Note:

- **For the complete removal and installation of the gear position sensor, the engine will need to be lowered slightly to allow access of the sensor's multiplug between the engine and the motorcycle frame.**
 - **Raise and support the rear of the motorcycle such that the engine can also be supported and lowered when required.**
10. Remove the fuel tank (see page 10-144).
 11. Remove the exhaust system (see page 10-185 for all models except Thunderbird Commander and Thunderbird LT, see page 10-189 for Thunderbird Commander and Thunderbird LT).

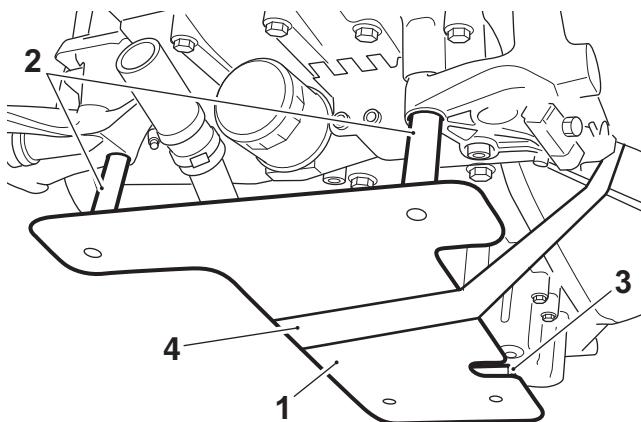
Fuel System/Engine Management

12. Remove the airbox (see page 10-155).
13. Remove the left hand side panel (see page 17-30).
14. Trace the sensor wire to its multiplug and disconnect from the main harness.



1. Multiplug (Thunderbird Commander shown)

15. Support the engine using service tool T3880134. Position the tool to the engine control plate brackets, locating the two pins to the corresponding bolts on the bracket. The pins rest on the bolt heads.
16. Check that the plastic pad on the rear of the tool is aligned with the sump, and that no pipes, hoses or electrical connectors/harnesses are trapped between the plate and the engine.

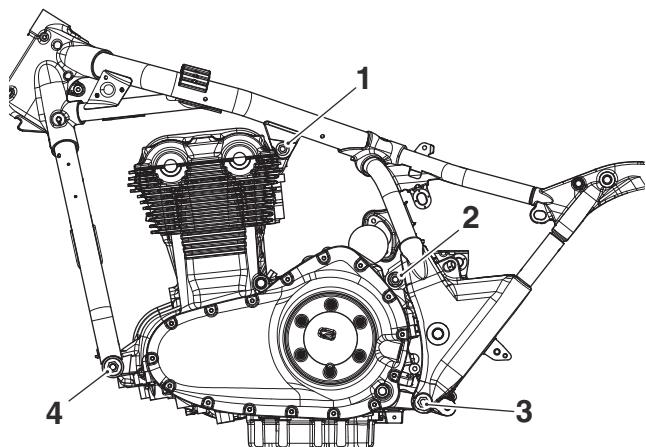


cfc

1. Tool T3000134
2. Pin locations
3. Plastic pad

17. Support the support stand and engine on a proprietary lifting jack.

18. In the sequence shown below, undo all engine mounting bolts and nuts, leaving the bolts in place. Collect the washers under the nuts at positions 1 to 3 as shown below:



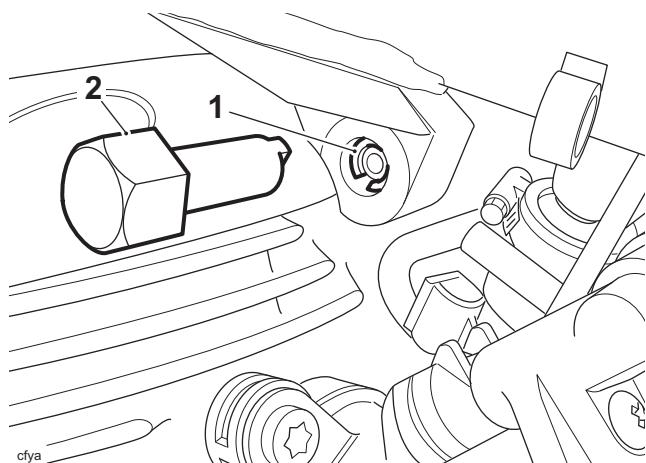
1. Cylinder head engine mounting

2. Upper rear engine mounting

3. Lower rear engine mounting

4. Front engine mounting

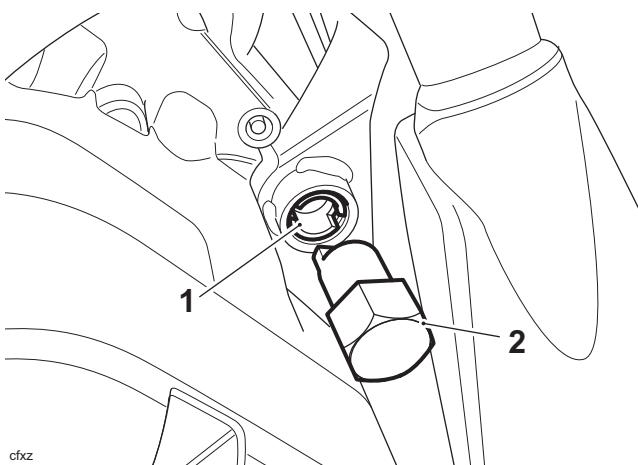
19. Partially withdraw the bolt and release the cylinder head mounting adjuster on the left hand side of the frame using service tool T3880103.



1. Engine mounting adjuster

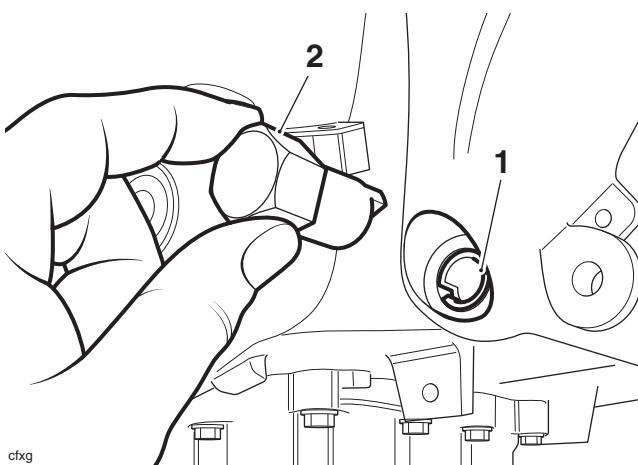
2. Tool T3880103

20. Partially withdraw the bolt and release the upper rear engine mounting adjuster on the left hand side of the frame using service tool T3880377.



1. Engine mounting adjuster
2. Tool T3880377

21. Partially withdraw the bolt and release the lower rear engine mounting adjuster on the left hand side of the frame using service tool T3880377.



1. Engine mounting adjuster
2. Tool T3880377

22. Remove the following engine mounting bolts only:

- Cylinder head mounting bolt
- Upper rear mounting bolt
- Lower rear mounting bolt.

23. Carefully lower the engine enough to allow the gear position sensor multiplug to pass between the frame and the engine.

Installation

Note:

- **Up to engine number 596481: If fitting a new gear position to an engine that does not have a fly lead fitted, refer to Technical News Issue 143 Dated April 2013.**

1. Fit a new O-ring to the sensor. Lubricate the O-ring with a smear of petroleum jelly.
2. Position the sensor to the engine, ensuring that the sensor engages with the slot in the selector drum shaft. Secure with the two screws and tighten to **5 Nm**.
3. Reroute the harness as noted during removal, and reconnect the sensor electrical connector to the harness/fly lead.

Note:

- **For models with a fly lead fitted, omit steps 4 to 9.**
- **For models without a fly lead fitted, continue from step 4.**

Models Without a Fly Lead Fitted

4. Carefully raise the engine and fit the mounting bolts. Do not fit the nuts and washers at this stage.
5. Adjust the frame adjusters, fit the washers, new lock nuts and tighten as described in the Engine Removal and Refit Section (see page 9-7).
6. Refit the airbox (see page 10-158).
7. Refit the exhaust system (see page 10-187 for all models except Thunderbird Commander and Thunderbird LT, see page 10-192 for Thunderbird Commander and Thunderbird LT).
8. Refit the fuel tank (see page 10-146).
9. Refit the left hand side panel (see page 17-30).

All Models

10. Refit the hose guide with the hose and harnesses routed as noted for removal. Tighten the fixings to **8 Nm**.
11. Refit the coolant expansion tank bracket and secure with new lock nuts. Tighten bolt and lock nuts to **3 Nm**.
12. Position the coolant expansion tank to its bracket. Refit the flanged sleeves, secure with new lock nuts and tighten to **3 Nm**.
13. Refit the drive belt pulley cover and tighten its fixings to **9 Nm**.
14. Reconnect the battery, positive (identified with red tape) lead first.
15. Refit the rider's seat (see page 17-21).
16. Turn the ignition to the ON position and select through the gears. Check that the instruments display each gear as it is selected.

Fuel System/Engine Management

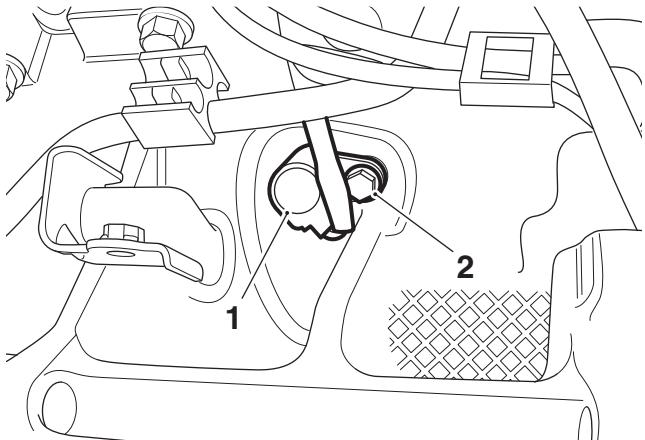
Road Speed Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Removal

Note:

- **Thunderbird Commander and Thunderbird LT use the rear wheel speed sensor for road speed.**

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand side panel (see page 17-30).
4. Remove the swinging arm (see page 13-4).
5. Release the screw securing the sensor to the lower crankcase, at the rear of the engine.



1. Road speed sensor

2. Fixing

6. Ease the sensor out of the crankcase. Discard the sensor O-ring.
7. Noting its routing, trace the sensor wiring back to the connector. Disconnect the sensor and detach it from the motorcycle.

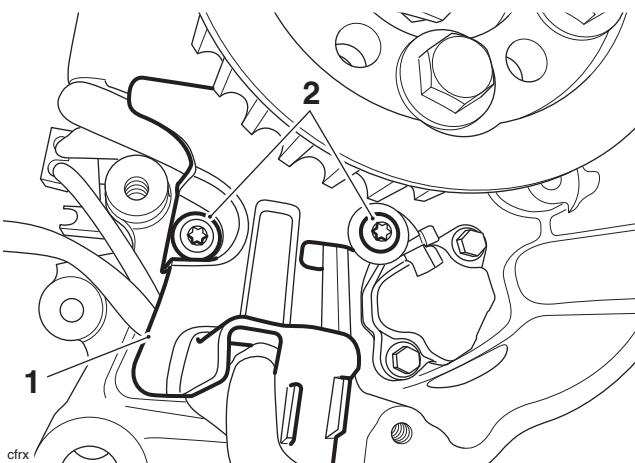
Installation

1. Fit a new O-ring to the sensor. Lubricate the O-ring with a smear of petroleum jelly.
2. Position the sensor to the engine and secure with the screw. Tighten to **7.5 Nm**.
3. Reroute the harness as noted during disassembly, and reconnect the sensor electrical connector to the harness.
4. Refit the swinging arm (see page 13-7).
5. Refit the left hand side panel (see page 17-30).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Refit the rider's seat (see page 17-21).

Crankshaft Position Sensor

Removal

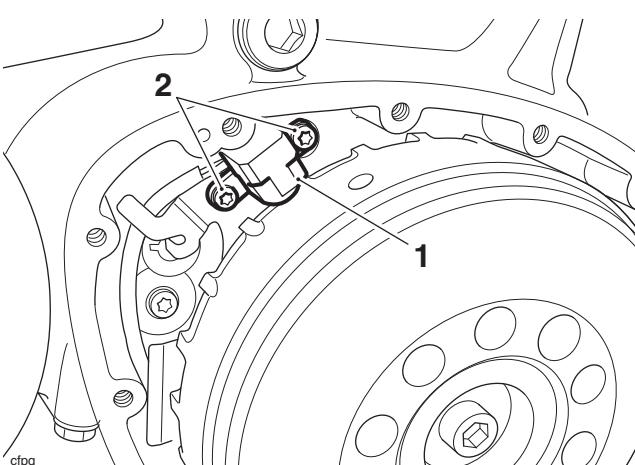
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand side panel (see page 17-30).
4. Remove the swinging arm (see page 13-4).
5. Remove the alternator cover (see page 18-39).
6. Remove the three nuts and remove the coolant expansion tank bracket.
7. Remove the fixings and remove the hose guide.



1. Hose guide

2. Fixings

8. Remove and discard the fixings and detach the sensor from the crankcase.



1. Crankshaft position sensor

2. Fixings

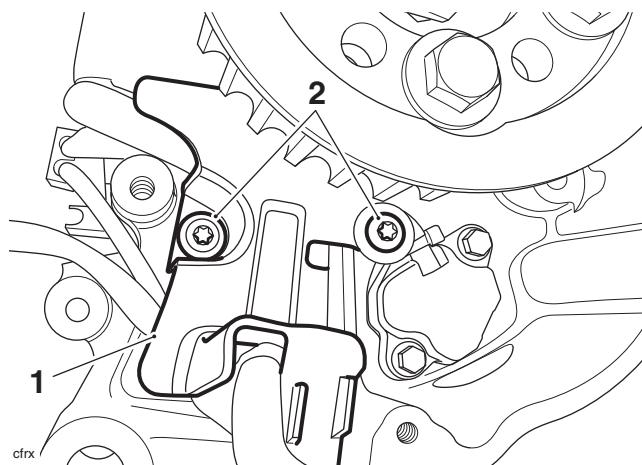
9. Noting its routing, trace the sensor wiring back to the connector. Disconnect the sensor and remove it from the motorcycle.

Installation

- Position the sensor to the engine and route the wiring as noted prior to removal.

Note:

- The air gap for the crankshaft position sensor is not adjustable.**
- Retain the sensor with the two fixings. Tighten to **6 Nm**.
- Refit the hose guide and secure with the fixings. Tighten to **8 Nm**.



1. Hose guide

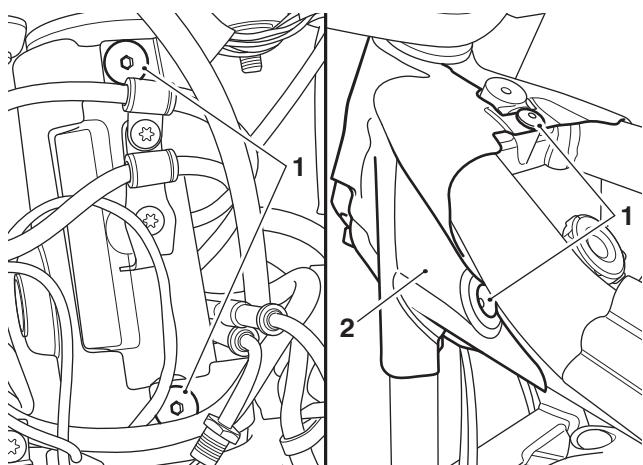
2. Fixings

- Refit the coolant expansion tank bracket and secure with the three nuts. Tighten to **3 Nm**.
- Reroute the harness as noted during disassembly, and reconnect the sensor to the main wiring harness.
- Refit the alternator cover (see page 18-39).
- Refit the swinging arm (see page 13-7).
- Refit the left hand side panel (see page 17-30).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).

Throttle Body

Removal

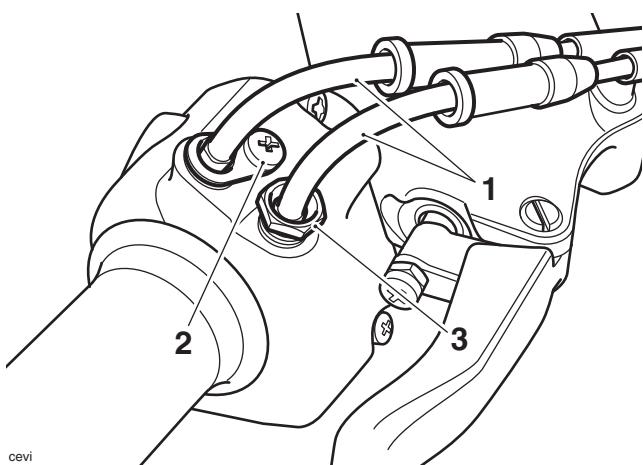
- Remove the rider's seat (see page 17-21).
- Disconnect the battery, negative (black) lead first.
- Remove the fuel tank (see page 10-144).
- Remove the starter motor (see page 18-42).
- For Thunderbird Commander and Thunderbird LT only:** Release the four fixings and remove the left hand headstock cover.



1. Fixings

2. Headstock cover

- Remove the left hand side panel (see page 17-30).
- At the twist grip end, release the screw and union securing the throttle cables to the switch housing.



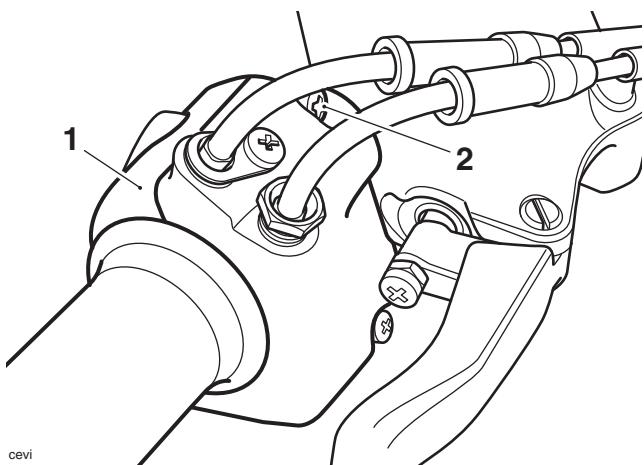
1. Throttle cables

2. Screw

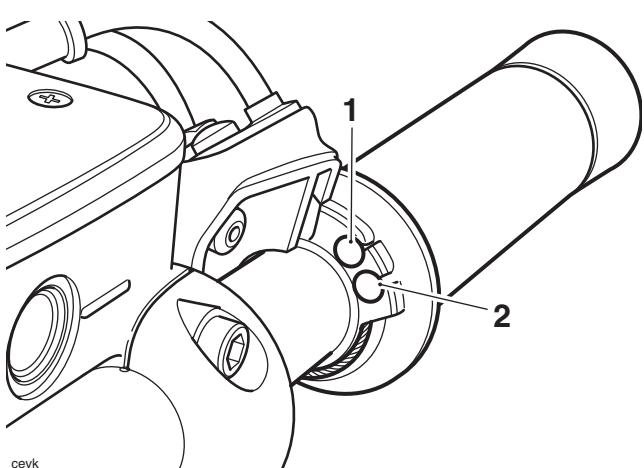
3. Union

Fuel System/Engine Management

8. Remove the screws securing the right hand switch housing.



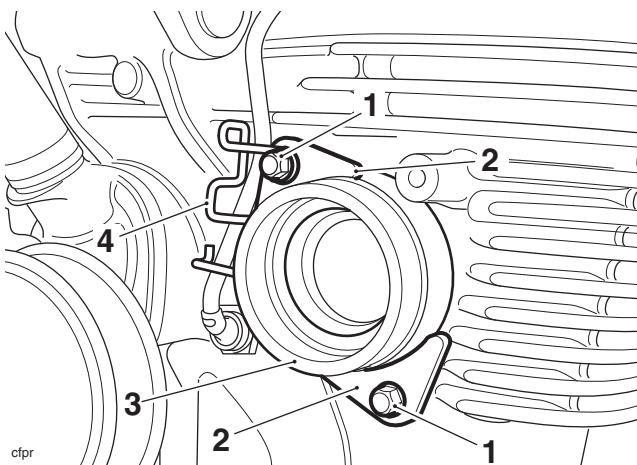
9. Detach the switch housing then release the inner cables from the twist grip.



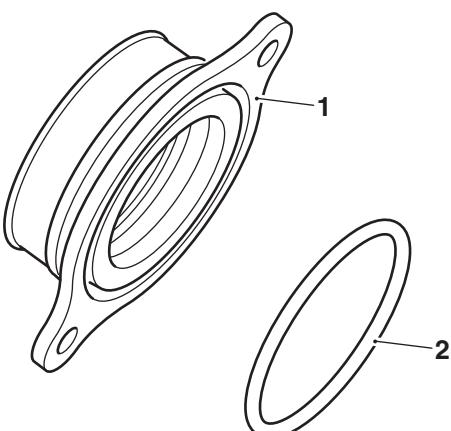
10. Detach the throttle cables from the throttle cable and harness guide under the fuel tank.
11. Noting their orientation, disconnect the MAP hoses from the throttle body.
12. Noting their orientation, disconnect the evaporative return hoses from the throttle body (if fitted).
13. Disconnect the throttle position switch (TPS) connector, located behind the left hand side panel.
14. Remove the two throttle to cylinder head fixings.
15. Loosen the four throttle body hose clips.
16. Carefully move the throttle body to the rear of the motorcycle and release from the transition pieces on the cylinder head.
17. Rotate the throttle body downwards to release it from the intake duct.
18. Withdraw the throttle body to the right of the motorcycle, disconnecting the idle speed control (ISC) stepper motor connector as you do so.

19. Remove the throttle body from the motorcycle, complete with the throttle cables, noting the routing of the throttle cables, fuel hose and TPS harness.

20. Remove the screws and clamping plates securing each transition piece to the cylinder head. Recover the coolant temperature sensor cable guide from the inner, longer, fixing of cylinder number two.



21. Remove the transition pieces and discard the O-ring seals from the transition pieces or cylinder head grooves.



1. Transition piece
2. O-ring

22. Cover the inlet ports to prevent the ingress of dirt and other objects.

Installation

- If removed, refit the throttle cables to the throttle body. Ensure the opening cable (identified with an adjuster midway down its length) and closing cable are located to the correct cams then fit the cable lock nuts. Tighten to **3 Nm**.

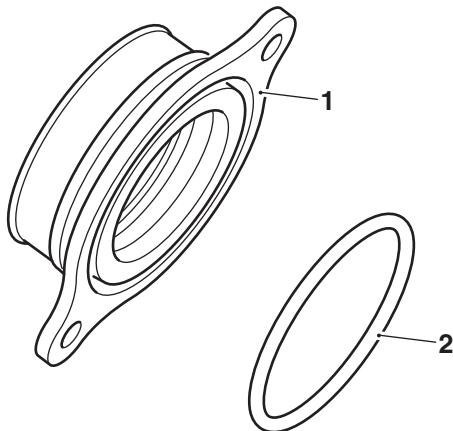


Warning

Ensure that all the lock nuts of both cables are correctly seated and tightened as a sticking throttle could result from a loose lock nut.

An incorrectly adjusted, sticking or stuck throttle will lead to loss of motorcycle control and an accident.

- If the throttle position switch has been removed, carry out the adjustment procedure before installing the throttle body (see page 10-183).
- Remove the covers from the inlet ports and ensure that the mating faces are clean.
- Locate new O-ring seals into the groove in the transition piece or the cylinder head, as removed previously.



1. Transition piece

2. O-ring

- Position each transition piece to the cylinder head, together with the cable guide for the coolant temperature sensor on the inner, longer, fixing of cylinder number two. Secure with the screws and clamping plates and tighten to **9 Nm**.
- Ensure the throttle body clips are in position on the transition pieces and intake duct, with the screw heads positioned so that they are under the throttle body and will face outwards when tightened.
- Reconnect the ISC stepper motor connector and position the throttle body assembly to the motorcycle, feeding the throttle cables, fuel hose and TPS harness through the frame.



Caution

Ensure the throttle body is positively located to the intake duct and is retained by the clip through its full circumference. Rectify if necessary as poor engine performance and engine damage may result from poor throttle body to intake duct sealing.

- Push the throttle body into the intake duct and then the transition pieces. Ensure that each throttle body is fully seated, and seals each throttle through 360°.
- Tighten the four throttle body clips, with the screw heads all facing outwards, to **1.5 Nm**.
- Refit the two throttle to cylinder head fixings. Tighten to **9 Nm**.
- If fitted, reconnect the evaporative return hoses to each throttle body.

Note:

- The MAP sensor hoses must not be swapped between cylinders. If either of the hoses are swapped over, engine malfunctions will occur.**
- The right hand MAP (Cylinder 2) sensor hose is marked with a red tape.**
- Refit the MAP sensor hoses to each throttle, ensuring the right hand MAP sensor hose is connected to the right hand throttle.
- Connect the multiplugs to:
 - the throttle position sensor
 - each injector, repositioning the boot over each connector.
- Locate the throttles cables to the frame, following the routing noted during removal. Ensure the cables are secured in the throttle cable and harness guide.
- Feed the outer throttle cables through the openings in the switch housing.
- Engage the nipples of the inner cables to the twist grip.
- Assemble the switch housing, tightening the two screws to **2.5 Nm**.
- Attach the cable retainer screw and union to the switch housing, tightening both to **3 Nm**.



Warning

Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.



Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness that binds will restrict the steering and may cause loss of control and an accident.

19. Refit the starter motor (see page 18-44).
20. Refit the headstock cover and tighten its fixings to **7 Nm**.
21. Refit the fuel tank (see page 10-146).
22. Refit the left hand side panel (see page 17-30).
23. Reconnect the battery, positive (identified with red tape) lead first.
24. Refit the rider's seat (see page 17-21).



Warning

The throttle grip controls the throttle valves in the throttle bodies. If the throttle cables are incorrectly adjusted, either too tight or too loose, the throttle may be difficult to control and performance will be adversely affected.

Check the throttle grip free play in accordance with the scheduled maintenance requirements and make adjustments as necessary.

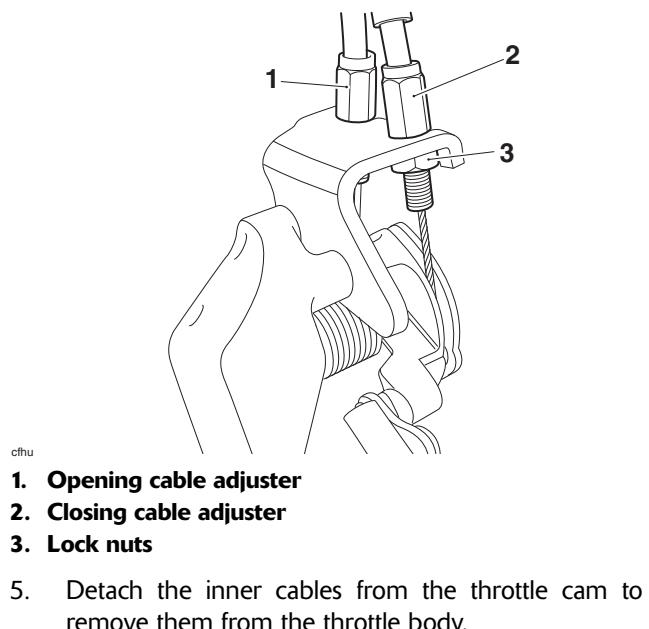
Always be alert for changes in the 'feel' of the throttle and have the throttle system checked by an authorised Triumph dealer if any changes are detected. Changes can be due to wear in the mechanism, which could lead to a sticking throttle.

An incorrectly adjusted, sticking or stuck throttle will lead to loss of motorcycle control and an accident.

Removal

Note:

- **Prior to removal, clearly identify the opening and closing cables so that they may be refitted in the correct positions.**
1. Remove the rider's seat (see page 17-21).
 2. Disconnect the battery, negative (black) lead first.
 3. Remove the throttle bodies (see page 10-171).
 4. Slacken the adjuster lock nuts at the throttle body such that they will allow the outer cables to be detached from the cable brackets.



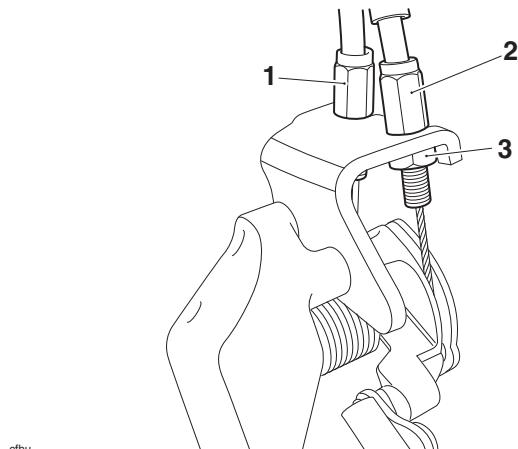
Inspection

- Check that the throttle cables operate smoothly, without sticking or binding. Replace the cable if there is any doubt as to its correct operation.

Installation

Note:

- The opening and closing cables must be correctly identified and fitted to the correct positions as noted prior to removal.**
- Attach the inner cables to the throttle cam and locate the outer cables to the cable bracket. Ensure the opening and closing cables are located to the correct cams then fit the cable lock nuts and tighten to **8 Nm**.



- cflhu
1. Opening cable
2. Closing cable
3. Lock nuts (Closing cable lock nut shown only)



Warning

Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.



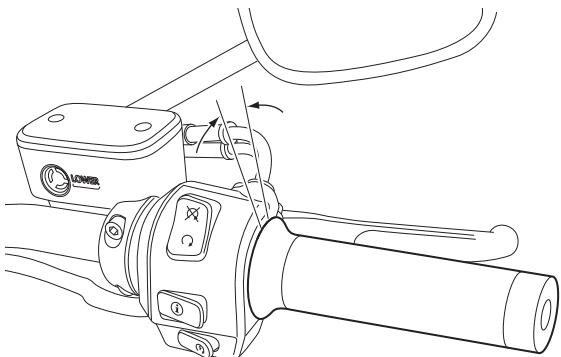
Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness that binds will restrict the steering and may cause loss of control and an accident.

- Refit the throttle bodies (see page 10-173).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).
- Set the cable adjustment (see page 10-175).

Throttle Cable Adjustment

- When correctly set, the throttle must have 2 - 3 mm of free play at the throttle twist grip. If there is more or less than 2 - 3 mm of free play present, the throttle cables must be adjusted.



- ctfd
1. Throttle twist grip
2. 2 - 3 mm

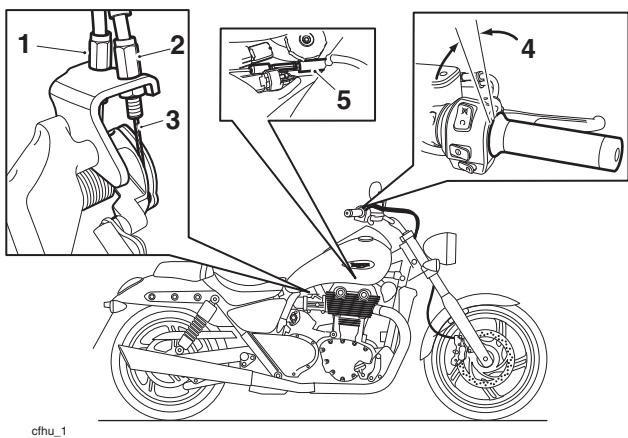
- If there is an incorrect amount of free play, adjustment may be made as follows:



Warning

Use of the motorcycle with incorrectly adjusted, incorrectly routed, sticking or damaged throttle cables will interfere with the throttle function resulting in loss of motorcycle control and an accident.

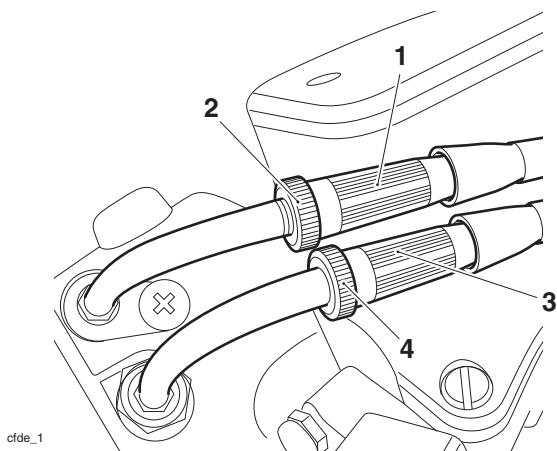
To avoid incorrect adjustment, incorrect routing, or continued use of a sticking or damaged throttle, always have your throttle checked and adjusted by your authorised Triumph dealer.



- cflhu_1
1. Opening cable
2. Closing cable
3. Closing cable - free play measurement point
4. Opening cable - free play measurement point
5. Opening cable in-line adjuster

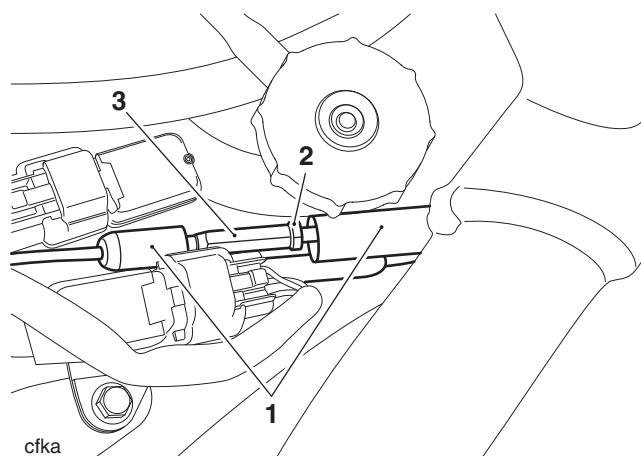
Fuel System/Engine Management

3. Rotate both cable adjusters such that there is an equal amount of adjustment in each direction.



1. **Opening cable adjuster**
2. **Opening cable lock nut**
3. **Closing cable adjuster**
4. **Closing cable lock nut**

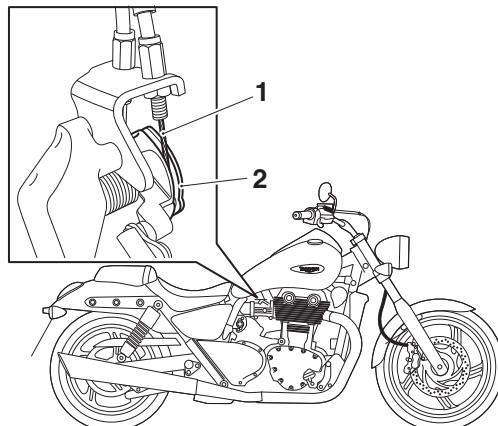
4. Rotate the in-line adjuster on the 'opening' cable to give 2 - 3 mm of play at the twist grip end. Tighten the lock nut.



1. **Covers**
2. **Lock nut**
3. **Adjuster**

5. Refit the adjuster covers.
6. Make any minor adjustments to the 'opening' cable as necessary to give 2 - 3 mm of play using the adjuster near the twist grip end of the cable. Tighten the lock nut.

7. With the throttle fully closed, ensure that there is 2 - 3 mm of free play in the 'closing' cable at the throttle cam. If necessary, rotate the adjuster for the 'closing' cable near the twist grip end until 2 - 3 mm of play is present. Tighten the lock nut.



1. **Closing cable**
2. **Throttle cam**

! Warning

Ensure that all the adjuster lock nuts of both cables are tightened, as a loose lock nut could result in a sticking throttle.

An incorrectly adjusted, sticking or stuck throttle can lead to loss of motorcycle control and an accident.

8. Check that the throttle opens smoothly, without undue force and that it closes without sticking. Rectify as necessary.

! Warning

Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

! Warning

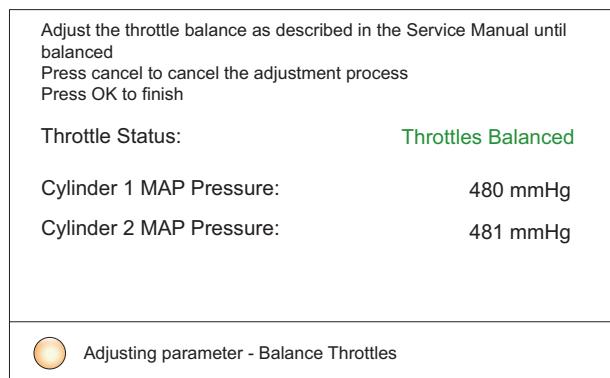
Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness that binds will restrict the steering and may cause loss of control and an accident.

Throttle Body Balancing

Note:

- The throttles cannot be balanced using equipment to measure vacuum in each throttle. Instead, the Triumph Diagnostic Tool must be used.
- Remove the left hand side panel (see page 17-30).
 - Connect the diagnostic tool, start the engine and navigate to 'ADJUST TUNE' (see page 10-34).
 - Select 'BALANCE THROTTLES'.

Adjust Tune Procedure

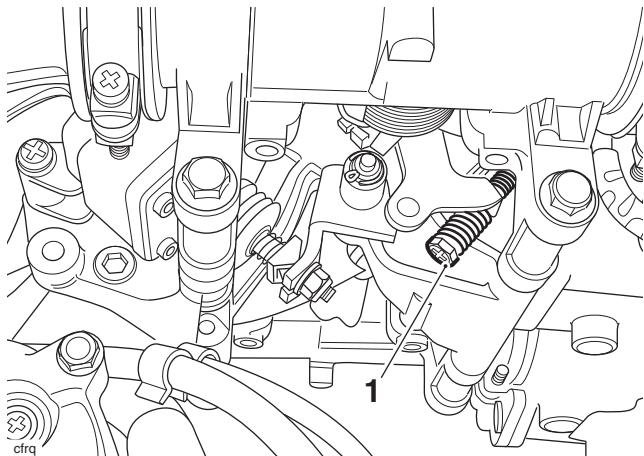


Balance Throttles Screen

Note:

- The balance throttles screen will show the vacuum value of each throttle in mmHg. In addition, when the throttles are balanced to an acceptable range of each other, the words 'THROTTLES BALANCED' in green text will appear on the right of the screen. At this point, no further adjustment is necessary or productive.
- If the throttles are not balanced to each other the words 'THROTTLES UNBALANCED' in red text will appear on the right of the screen. At this point adjustment will be necessary.
- The adjuster is located beneath the throttle bodies, and is easily accessible from the right hand side of the motorcycle.

- Make adjustments until the word 'THROTTLES BALANCED' appears on the right hand side of the screen.



1. Adjuster

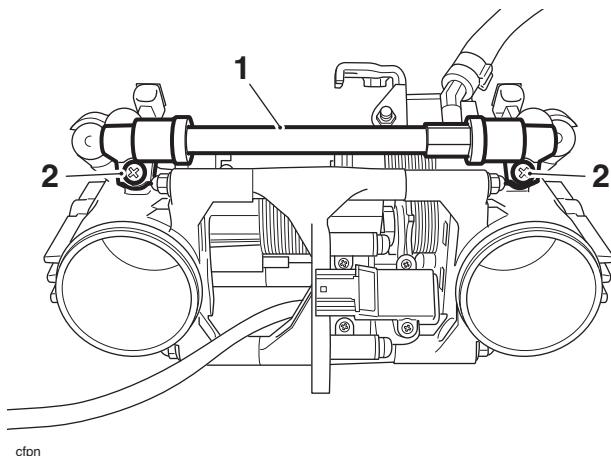
- When balanced, stop the engine and disconnect the diagnostic tool.
- Refit the diagnostic connector to its clip.
- Refit the left side panel (see page 17-30).

Fuel System/Engine Management

Fuel Injectors and Fuel Rail

Removal

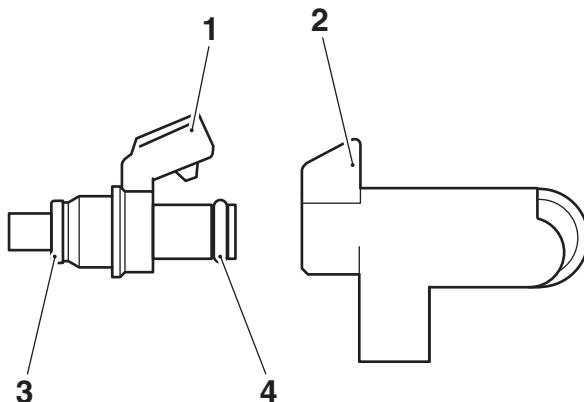
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the throttle bodies (see page 10-171).
4. Remove the two screws securing the fuel rail and fuel hose to the throttle body assembly.



- 1. Fuel rail**
2. Screws

Note:

- **The fuel rail and injectors are removed from the throttle bodies together.**
5. Gently ease the fuel rail and injectors upwards to release them from the throttles.
 6. Ease each injector from the fuel rail.
 7. Recover the upper and lower O-rings from each injector.



- 1. Injectors**
2. Fuel rail
3. Lower O-ring
4. Upper O-ring

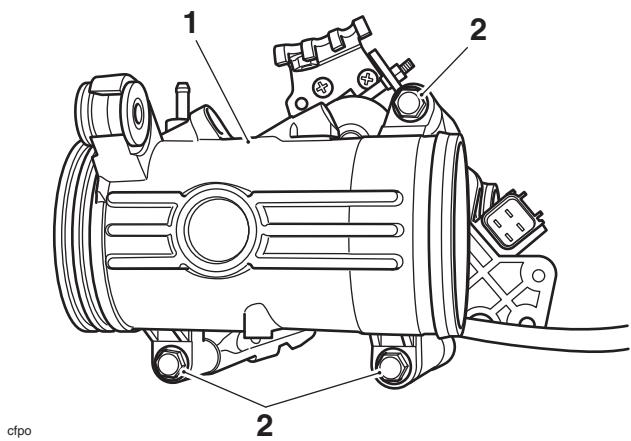
Installation

1. Fit new O-rings to each injector.
2. Locate each injector to the fuel rail.
3. Fit the injector/fuel rail assembly to the throttle body, orientating each injector such that the electrical connection is facing upwards.
4. Fit and tighten the fuel rail screws to **3.5 Nm**.
5. Refit the throttle bodies (see page 10-173).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Refit the rider's seat (see page 17-21).

Throttle Position Switch

Removal

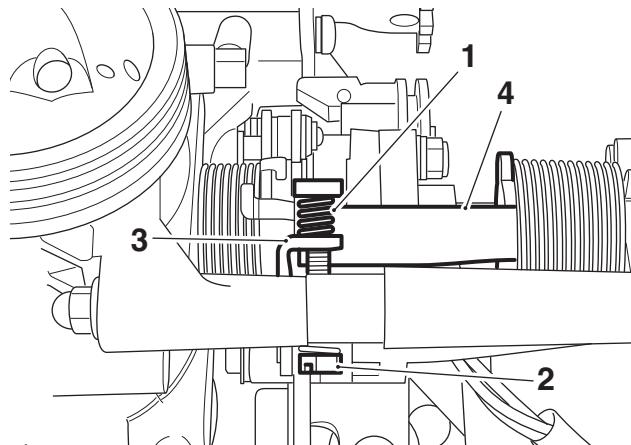
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the throttle bodies (see page 10-171).
4. Remove the fuel injectors and fuel rail (see page 10-178).
5. From the left hand side, remove the three nuts securing the two halves of the throttle body together.



1. Throttle body

2. Nuts

6. Carefully separate the two halves of the throttle body, collecting the balance spring from the throttle linkage as you do so.



1. Balance spring

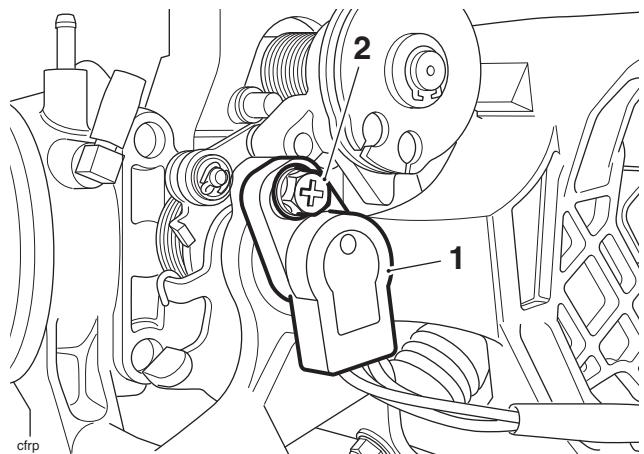
2. Throttle balance adjuster screw

3. Left hand throttle linkage

4. Right hand throttle linkage

7. Position the left hand throttle aside.

8. Remove the screw securing the throttle position sensor to the throttle body.



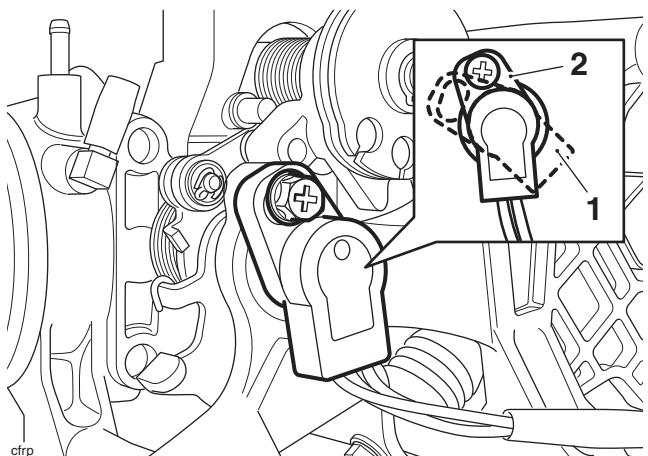
1. Throttle position sensor

2. Screw

9. Turn the sensor anticlockwise and detach it from the throttle body by gently pulling outwards.

Installation

1. Lubricate the sensor O-ring with a few drops of engine oil.
2. Insert the sensor to the throttle body at the angle shown below then turn it anticlockwise until the screw hole aligns with the thread in the throttle body.



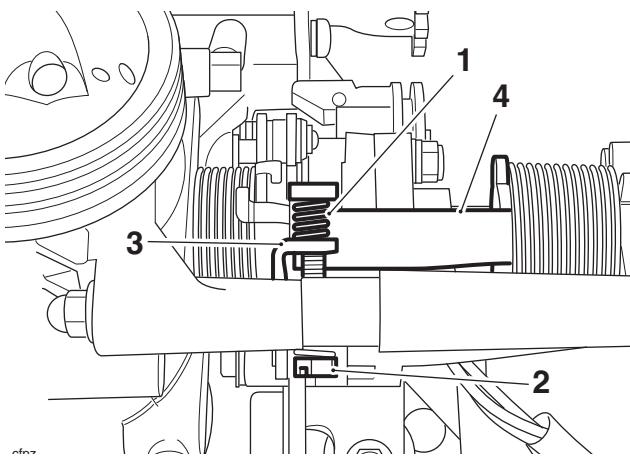
1. Sensor insertion position (dotted line)

2. Sensor initial fitted position (solid line)

3. Insert the screw to secure the throttle position sensor, but do not fully tighten the screw yet.
4. Position the left hand throttle to the right hand throttle, ensuring the left hand linkage correctly engages in the right hand linkage.

Fuel System/Engine Management

- Refit the throttle balance spring.



- Balance spring
- Throttle balance adjuster screw
- Left hand throttle linkage
- Right hand throttle linkage

- Refit the three fixings and tighten to **3.5 Nm**.
- Carefully insulate the positive starter motor cable to ensure it cannot cause a short circuit.
- Temporarily reconnect the throttle position sensor and idle speed control valve connectors. DO NOT allow the throttle body to hang on the throttle position sensor and idle speed control valve harnesses.
- Temporarily reconnect the battery, positive (identified with red tape) lead first.
- Attach the Triumph Diagnostic Tool to the dedicated plug, refer to the Triumph Diagnostic Tool User Guide for additional information.
- Turn the ignition to the **ON** position.
- On the diagnostic tool navigate to and select the **Adjust Tune** option.
- At the next screen, select Throttle Position Sensor Renew then press the **Adjust** button.

- On pressing the **Adjust** button, the diagnostic tool will send a command which drives the throttle to the fully closed position. The tool will also display the voltage reading coming from the throttle position sensor.

Adjust Tune Procedure

Adjust the throttle position sensor as described in the Service Manual until the voltage reading is within the range shown below
Press OK when the adjustment is complete
Press cancel to cancel the adjustment process

Throttle Voltage: 0.59 V

Target Voltage Range: 0.58 V - 0.62 V

Adjusting parameter - Throttle Position Sensor Adjust

- Gently rotate the throttle position sensor until the voltage reading on the tool is between 0.58 volts and 0.62 volts. The reading on the screen will turn green, indicating that the reading is correct.

Note:

- This is a setting voltage only. Because of the adaptive nature of the engine management system, in-service voltage may vary from this setting figure.**
- Tighten the sensor retaining screw to **3.5 Nm** and recheck the voltage reading shown on the tool. Repeat the adjustment if the reading is outside the specified range.
 - Press the **OK** button to return the throttle to normal control and return the diagnostic tool to the **Adjust Tune** menu.
 - Disconnect the diagnostic tool.
 - Disconnect the battery negative (black) lead first.
 - Refit the throttle body (see page 10-173).
 - Check that the throttle opens and closes without obstruction/sticking and has a smooth action throughout the full range of its movement. Rectify as necessary.

Warning

Operation of the motorcycle with an incorrectly adjusted throttle position sensor, or a throttle position sensor that causes the throttle to stick could result in loss of throttle control. Loss of throttle control could result in loss of control of the motorcycle and an accident.



Warning

Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.



Warning

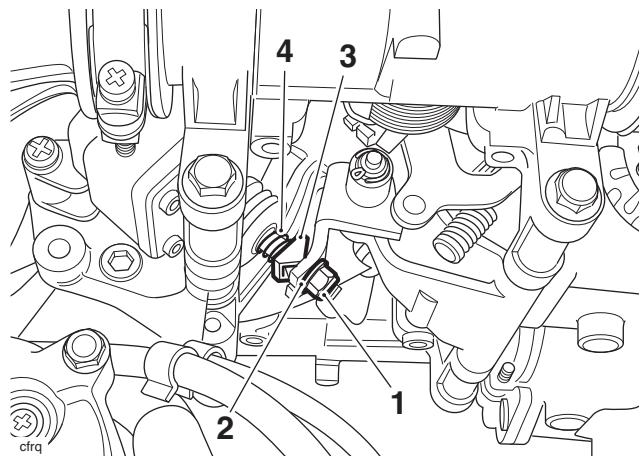
Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness that binds will restrict the steering and may cause loss of control and an accident.

22. Reconnect the battery, positive (identified with red tape) lead first.
23. Refit the rider's seat (see page 17-21).

Idle Speed Control Stepper Motor

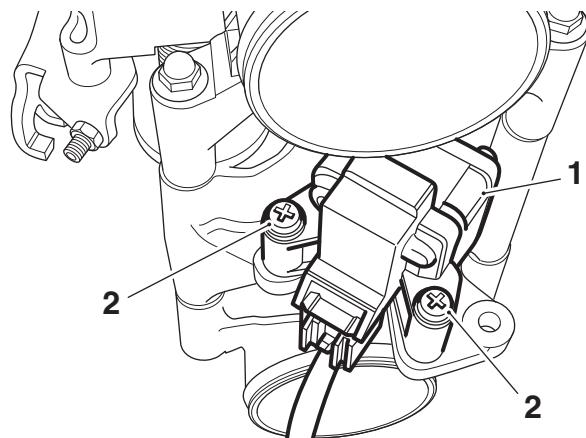
Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the throttle bodies (see page 10-171).
4. Remove the nut, metal washer and plastic washer attaching the idle control stepper arm to the idle speed control lever.



1. Nut
2. Washers
3. Plastic collar
4. Spring

5. Remove the two screws securing the idle speed control stepper motor to its bracket, then remove the stepper motor. Collect the plastic collar and spring.

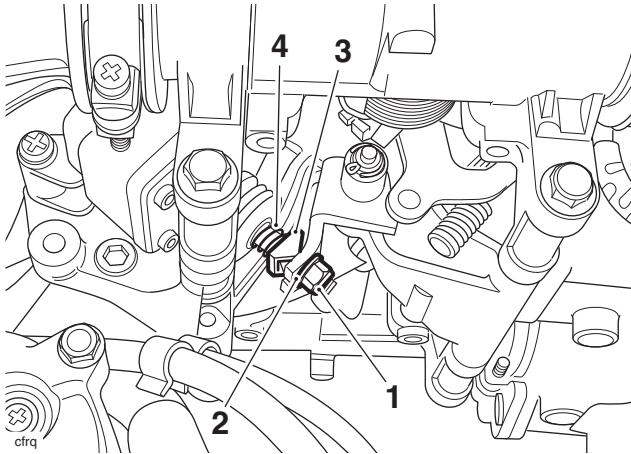


1. Idle speed control stepper motor
2. Fixings

Fuel System/Engine Management

Installation

1. Locate the spring and plastic collar to the stepper motor shaft.
2. Locate the stepper motor to its bracket and tighten the fixings to **3.5 Nm**.



1. **Nut**
2. **Washers**
3. **Plastic collar**
4. **Spring**
3. Fit the plastic washer then fit the metal washer and nut.
4. Carefully insulate the positive starter motor cable to ensure it cannot cause a short circuit.
5. Temporarily reconnect the throttle position sensor and idle speed control valve connectors. DO NOT allow the throttle body to hang on the throttle position sensor and idle speed control valve harnesses.
6. Temporarily reconnect the battery, positive (identified with red tape) lead first.
7. Attach the Triumph Diagnostic Tool to the dedicated plug; refer to the Triumph Diagnostic Tool User Guide for additional information.
8. Turn the ignition to the **ON** position.
9. On the diagnostic tool navigate to **Engine Diagnostics** and select the **Adjust Tune** button.
10. Select **Idle Speed Control Stepper Renew** then press the **Adjust** button.

11. On pressing the **Adjust** button, the diagnostic tool will send a command that drives the throttle to the fully closed position. The tool will also display the voltage reading coming from the throttle position sensor which should be between the target voltage range of 0.58 volts and 0.62 volts.

Adjust Tune Procedure

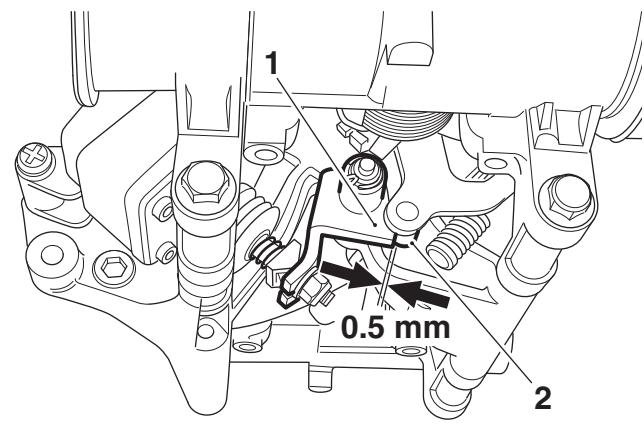
Adjust the throttle position sensor as described in the Service Manual until the voltage reading is within the range shown below
Press OK when the adjustment is complete
Press cancel to cancel the adjustment process

Throttle Voltage: 0.59 V

Target Voltage Range: 0.58 V - 0.62 V

Adjusting parameter - Throttle Position Sensor Adjust

12. Tighten the stepper arm nut on the idle speed stepper motor until a clearance of 0.5 mm can be measured between the idle speed control cam and the throttle roller (see the diagram below).

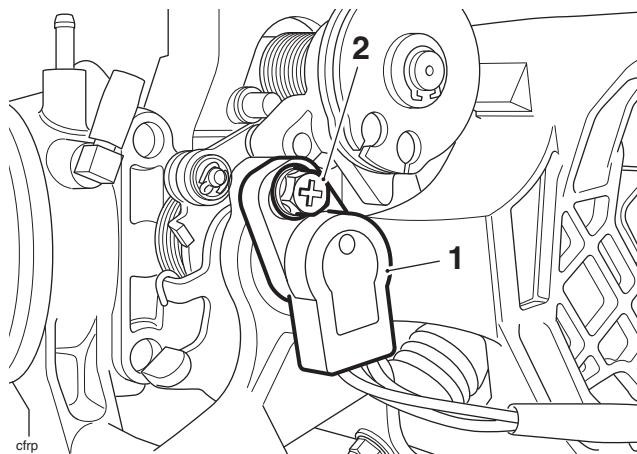


cfrq

1. **Idle speed control cam**
2. **Throttle roller**

13. Check the voltage reading shown on the software. If the reading is between the target voltage range, then proceed to step 19. If the reading is not within this range, adjustment must be made as described in steps 14 to 16.

- Slacken the screw securing the throttle position sensor to the throttle body.



1. Throttle position sensor

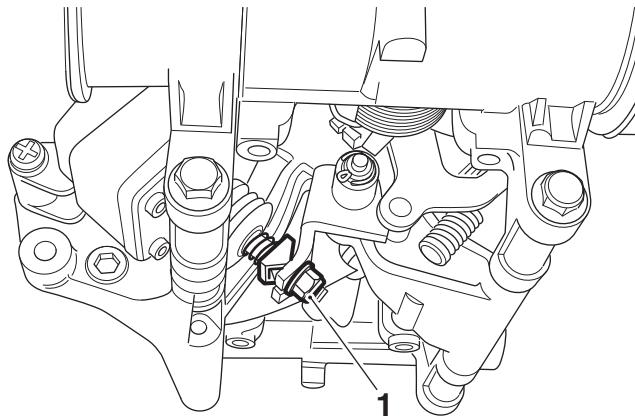
2. Screw

- Gently turn the throttle position sensor until the voltage reading shown on the software is between the target voltage range.
- Tighten the sensor retaining screw to **3.5 Nm** and check the voltage reading shown on the software. Repeat the adjustment if the reading is outside the specified range.
- Press the **OK** button to progress to the next adjustment.

Note:

- The diagnostic software will calculate the target voltage range for when the throttle is in the fully open position.**
- On pressing the **OK** button, the diagnostic tool will send a command that drives the throttle to the fully open position. The tool will also display the voltage reading coming from the throttle position sensor which should be between the target voltage range calculated by the software and shown on the screen.

- With the stepper fully opened, check the voltage shown on the software and, if necessary, adjust the nut on the top of the stepper arm until the software shows a voltage within the target voltage range shown on the screen. The reading on the screen will change from red to green, indicating that the reading is correct.



1. Adjustment nut

- Press the **Adjust** button to fully close the idle speed control stepper motor. After a minimum of 15 seconds (the tool will show 'Adapting' and not allow further actions to take place during this period), press the **OK** button again to return the ECM to normal control.



Caution

Do not operate the throttle while the stepper motor is being adjusted, otherwise the incorrect value will be adapted and the engine will not start.

- Turn the ignition to the **OFF** position.
- Disconnect the diagnostic tool.
- Disconnect the battery, negative (black) lead first.
- Refit the throttle bodies (see page 10-173).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).

Fuel System/Engine Management

Engine Management Adaption

General Information

The engine management system fitted to this model is adaptive. This means that the system is able to learn about new or changing operating conditions and continuously adapt itself without needing to constantly make major adjustments from a fixed baseline setting.

Adaptive changes can become necessary because of changing rider behaviour, changes in the region in which the bike is operated (i.e. operation at high altitude where it was previously used at sea level) or because a new part may have been fitted which has slightly different characteristics to the old part. All adaptive changes are automatic and require no intervention by rider or dealer.

Adaption Status

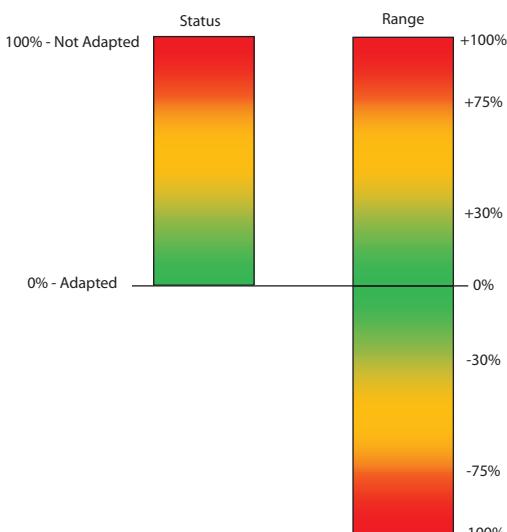
To see if a motorcycle has fully adapted, a facility named 'ADAPTION STATUS' is provided on the diagnostic tool. The following adaption details can be examined:

Function Examined	Report Method
Closed throttle position reference status	adapted/not adapted
Idle speed control adaption status	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption status (idle)	%
Oxygen sensor adaption range (idle)	%

Terminology

Where the term 'status' is used, this indicates how far the present operating parameter is from the stored (baseline) value. The nearer these figures are to zero the better as it indicates the motorcycle has adapted to its current operating conditions.

The term 'range' indicates how much (in percentage terms) of the adjustment range has been used to reach the current operating status.



Status Versus Range

Typical Values

In a correctly adapted motorcycle, the following will be typical:

Function Examined	Read Out
Closed throttle position reference status	Adapted
Idle speed control adaption status	Between +100 and -100%
Oxygen sensor adaption status (off idle)	0% +/- 10%
Oxygen sensor adaption range (off idle)	Between +100 and -100%
Oxygen sensor adaption status (idle)	0% +/- 10%
Oxygen sensor adaption range (idle)	Between +100 and -100%

Forcing Adaption to Take Place

If the read out indicates that the motorcycle is not adapted, the following will force the system to make adaptions:



Warning

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

Note:

- Resetting adaptions with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, causing poor engine running. Always reset the adaptions with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well ventilated area.**

1. Ensure the engine is cold.
2. WITHOUT TOUCHING THE THROTTLE, start the engine and allow it to warm up until the cooling fan comes on.
3. Leave the engine to idle for a further 12 minutes.

Note:

- As an alternative to the above process, connect the diagnostic tool, select ADJUST TUNE (see the Triumph Diagnostic Tool User Guide) and select RESET ADAPTIONS. This will force a fast adaption routine to take place in around 5 seconds. For this to happen, the engine MUST be running, it must be at normal operating temperature and in closed loop control mode. Under any other conditions fast adaption will not take place and may cause default values to be loaded, which may then require a normal 12 minute adaption routine to be run.**

Fault Indications

If 'range' figures at 100% are seen, then the adjustment has reached maximum indicating a mechanical fault exists on the motorcycle. This can be due to a number of faults but the most likely causes will be low/high fuel pressure, faulty injectors or air leaks at the throttle bodies or airbox.

In these circumstances, locate and rectify the fault, and reset the adaptions as described above.

Exhaust System – All Models Except Thunderbird Commander and Thunderbird LT

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



Warning

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Note:

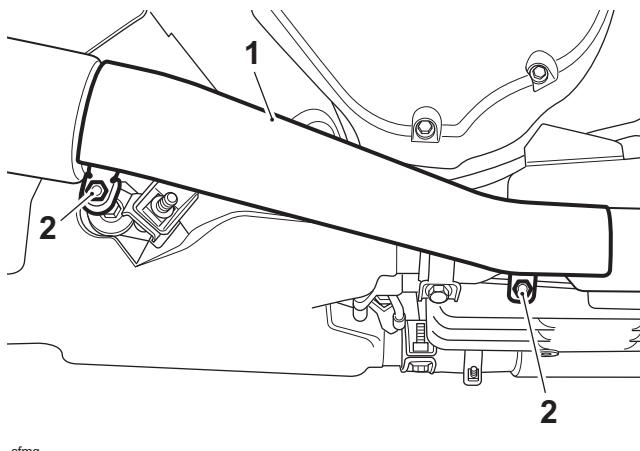
- In the following procedures, the term catalyst box refers to the rectangular chamber to which the silencers are attached. In many countries, catalytic converters are fitted inside this component. However, in certain countries (depending on their exhaust emission regulation) no catalyst will be fitted.**

Note:

- Always note the position and orientation of exhaust clamps prior to releasing them, and return them to the noted position and orientation on assembly.**

Fuel System/Engine Management

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the catalyst box/silencer heat shields.

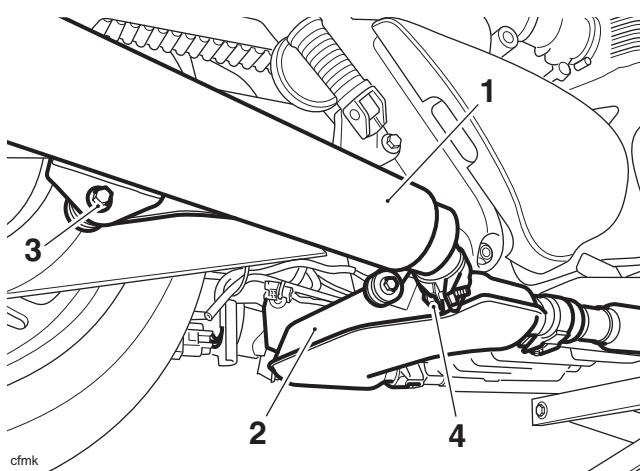


cfmg

1. Heat shield

2. Heat shield fixings

4. Release the clamps securing the silencers to the catalyst box.
5. Release the fixing securing the silencers to their brackets.



cfmk

1. Silencer

2. Catalyst box

3. Silencer fixing

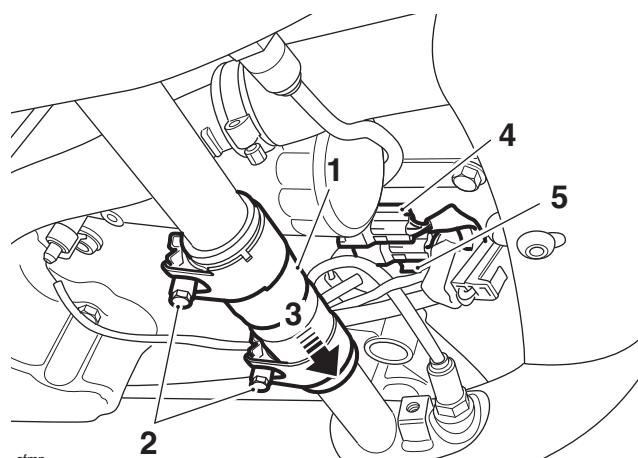
4. Silencer clamp fixings

6. Detach the silencers from the catalyst box.
7. Remove the silencer gaskets.

Note:

- The oxygen sensor electrical connections must not be swapped between cylinders. If the connections are swapped over, engine malfunctions will occur.
- The right hand (Cylinder 2) oxygen sensor connector on the main harness is marked with red tape.
- The oxygen sensors are NOT marked. Always ensure the right hand oxygen sensor harness is connected to the main harness connector identified with red tape.

8. Disconnect the two oxygen sensor connections from the wiring harness.
9. Release the link pipe clamps.
10. Slide the link pipe on to the left hand header pipe.



cfmn

1. Link pipe

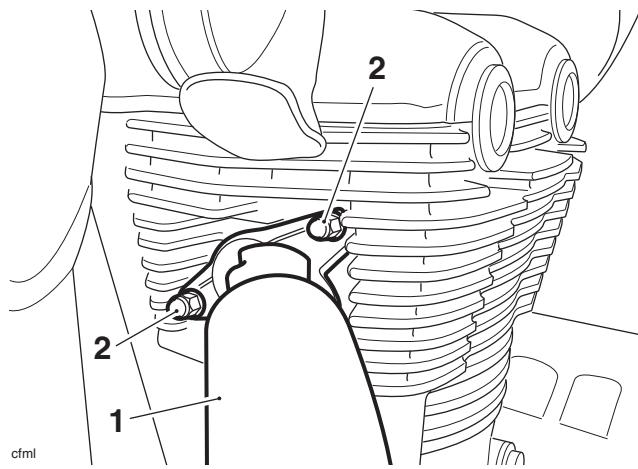
2. Link pipe clamps

3. Link pipe removal direction

4. Right hand oxygen sensor connection (marked with red tape)

5. Left hand oxygen sensor connection

11. Release the clamps securing the header pipes to the catalyst box.
12. At the cylinder head, release the nuts securing the header pipes to the head.



cfml

1. Header pipe

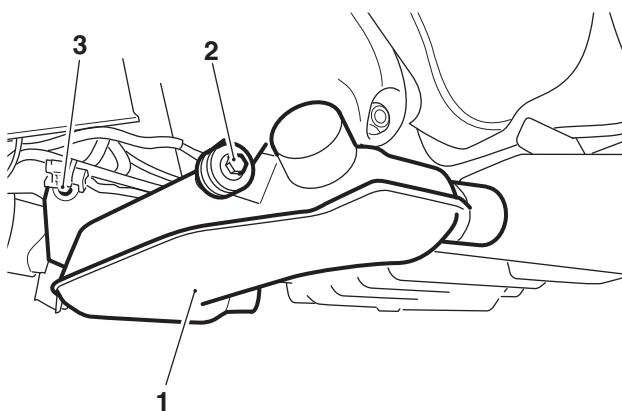
2. Fixings

13. With the aid of an assistant, detach and remove both header pipes.
14. Collect the header pipe gaskets from the cylinder head. Remove the header pipe to catalyst box gaskets from the header pipes.

Note:

- The catalyst box is secured to the frame by a single fixing on the right hand side, and is located on a stud and grommet on the left hand side.

15. Release the fixing securing the catalyst box to the frame.



cfmk

- 1. Catalyst box**
- 2. Bolt/washer**
- 3. Left hand mounting**

16. Detach the catalyst box from its mounting by easing it to the right hand side of the motorcycle.

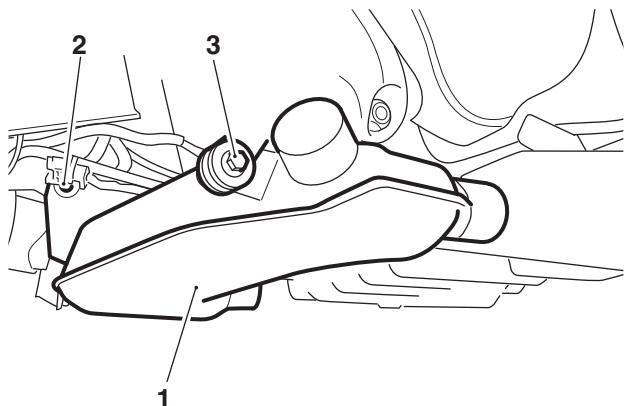
Note:

- **The catalyst box mounting grommet may remain in the catalyst box or may adhere to the mounting stud on removal of the catalyst box.**

17. Collect the catalyst box mounting grommet.

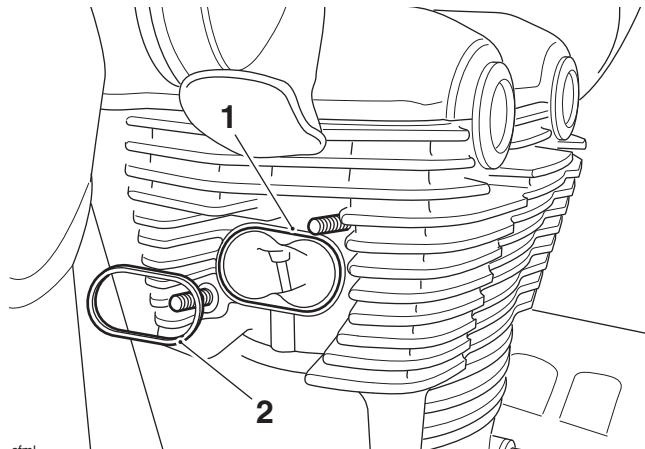
Installation

1. Check and if necessary renew the catalyst mounting box grommet. Fit the mounting grommet to the mounting point on the catalyst box.
2. Locate the catalyst box to the mounting stud on the left hand side. Insert the flanged sleeve into the right hand grommet and then fit the bolt and washer to retain the assembly.



cfmk

- 1. Catalyst box**
 - 2. Left hand mounting**
 - 3. Bolt/washer**
3. Fit new gaskets to the cylinder head ports.



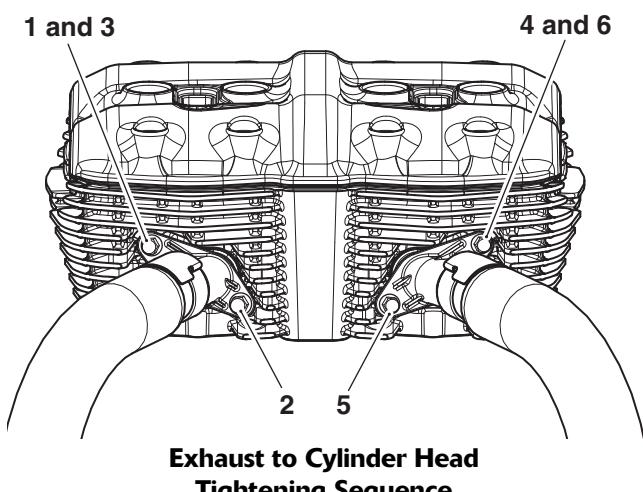
- 1. Cylinder head port**
2. Gasket

Note:

- **To retain the gaskets during assembly, apply a smear of grease or petroleum jelly to the gasket faces in the head.**
- 4. Apply a proprietary high temperature grease to the header pipe studs on the cylinder head.

Fuel System/Engine Management

5. Fit new gaskets to the header pipes and position the clamps over the joints.
6. If removed, fit the oxygen sensors and tighten to **25 Nm**.
7. If removed, fit the oxygen sensor covers and tighten the fixings to **9 Nm**.
8. Locate both header pipes to the catalyst box, then align to the cylinder head. Ensure the gaskets do not become displaced during assembly.
9. Slide the link pipe from the right hand header pipe and connect to the left hand header pipe. Do not tighten the clamp bolts at this stage.
10. Tighten the header pipe fixings to the cylinder head in the following sequence:



- a) Tighten the right hand header pipe nuts 1 to 3 to **19 Nm** in the order shown.
 - b) Tighten the left hand header pipe nuts 4 to 6 to **19 Nm** in the order shown.
11. Tighten the catalyst box mounting bolt to **22 Nm**.
 12. Tighten the header pipe to catalyst box clamp bolts to **15 Nm**.
 13. Tighten the link pipe clamp bolts to **9 Nm**.

Note:

- The oxygen sensor electrical connections must not be swapped between cylinders. If the connections are swapped over, engine malfunctions will occur.
- The right hand (Cylinder 2) oxygen sensor connector on the main harness is marked with red tape.
- The oxygen sensors are NOT marked, always ensure the right hand oxygen sensor harness is connected to the main harness connector identified with red tape.

Exhaust System – Thunderbird Commander and Thunderbird LT

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

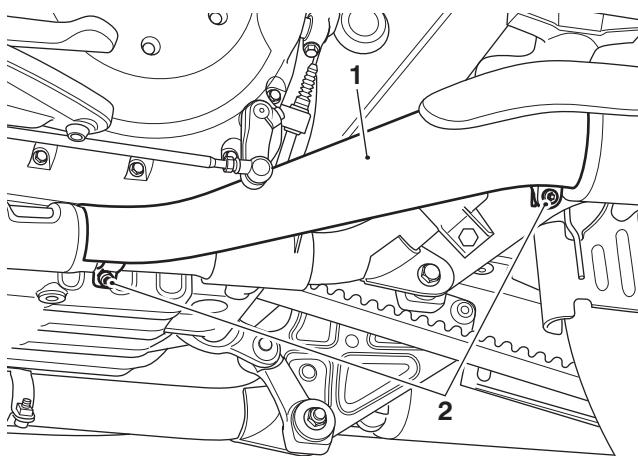
! Warning

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Note:

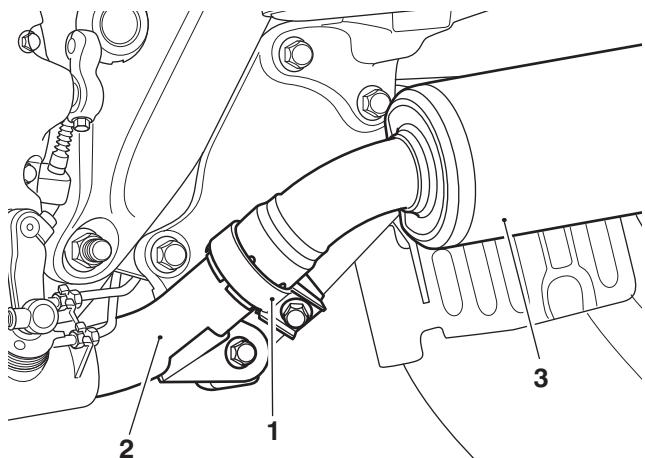
- Always note the position and orientation of exhaust clamps prior to releasing them, and return them to the noted position and orientation on assembly.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Release the clamps and remove the rear heat shields.



1. Rear heat shield (left hand side)
2. Clamp fixings

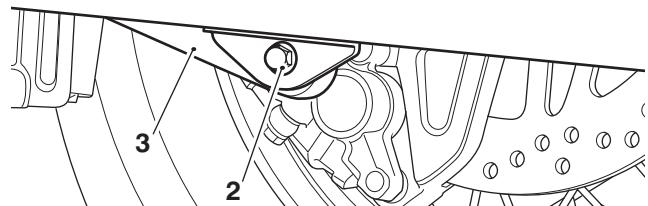
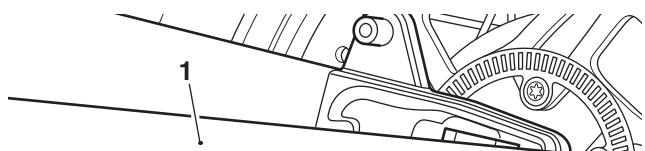
4. Release the clamps securing the silencers to the header pipe/exhaust butterfly valve assembly.



1. Silencer clamp (left hand side)
2. Exhaust butterfly valve assembly
3. Rear footrest hanger

Note:

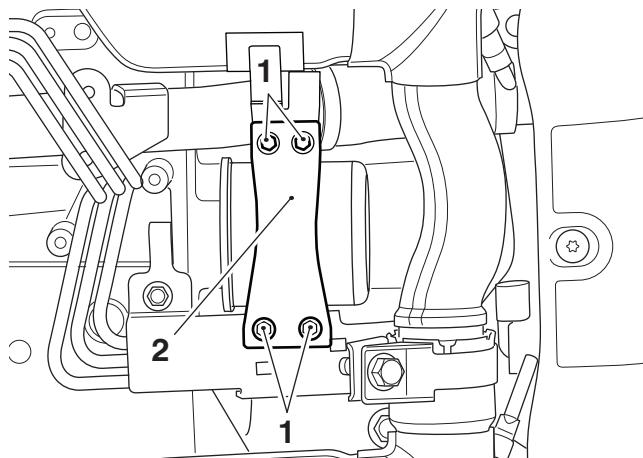
- Note the position of the washers and rubber bushes in the footrest hanger for installation.
- 5. Release the fixing securing the silencer to their rear footrest hangers and remove the silencer. Collect the washers and rubber bushes.



1. Silencer (left hand side)
2. Fixing
3. Footrest hanger
6. Remove the silencer gasket.
7. Detach the cables from the exhaust butterfly valve (see page 10-198).

Fuel System/Engine Management

8. Release the fixings and remove the catalytic converter mounting bracket.



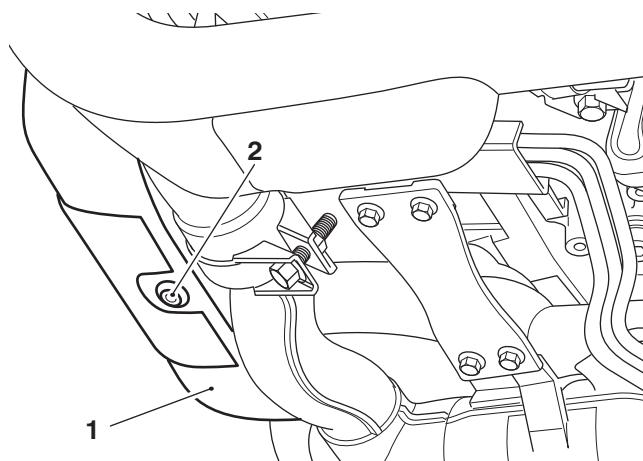
1. Fixings
2. Clamp

9. Remove the exhaust link pipe clamp.



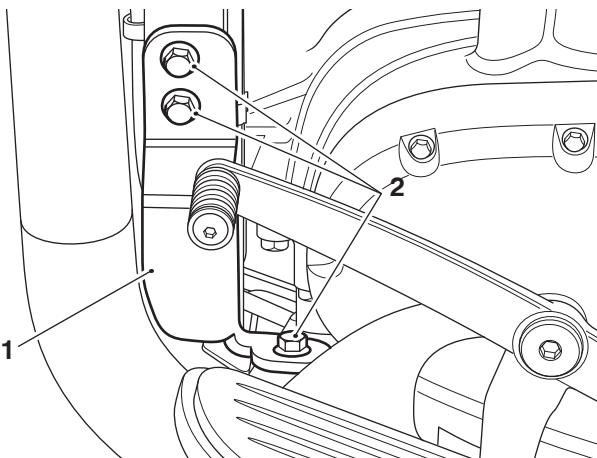
1. Clamp

10. Release the fixing and remove the radiator cowl.



1. Radiator cowl
2. Fixing

11. Release the three fixings and remove the cover for the left hand oxygen sensor.



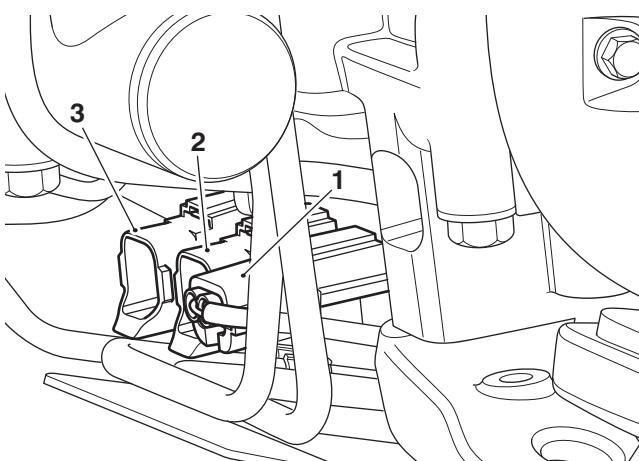
1. Fixings
2. Cover

12. If the oxygen sensors are to be removed, loosen the oxygen sensor. Do not fully remove it at this stage.

Note:

- The oxygen sensor electrical connections must not be swapped between cylinders. If the connections are swapped over, engine malfunctions will occur.
- The right hand (Cylinder 2) oxygen sensor connector on the main harness is marked with red tape.
- The oxygen sensors are NOT marked. Always ensure the right hand oxygen sensor harness is connected to the main harness connector identified with red tape.

13. Carefully release the locking device and detach the multiplug for the left hand oxygen sensor from its bracket.

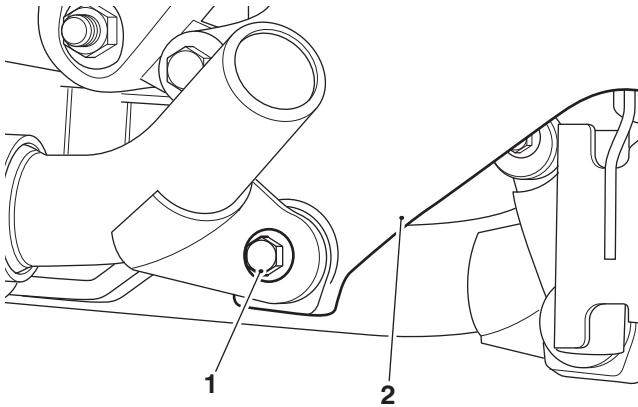


1. Multiplug, left hand oxygen sensor
2. Multiplug, side stand switch
3. Multiplug, right hand oxygen sensor

14. Disconnect the left hand oxygen sensor from the main harness.

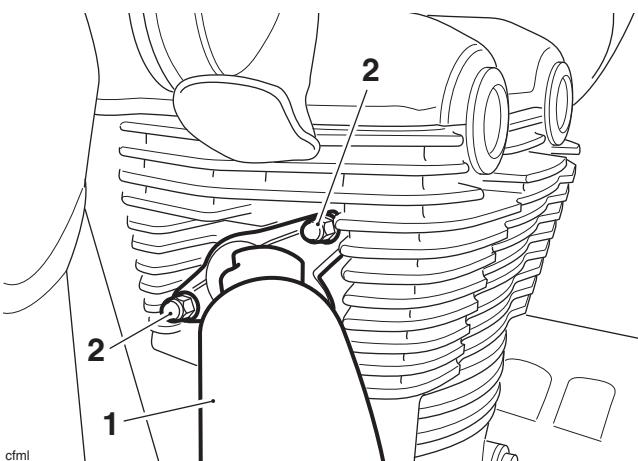
Note:

- **Note the position of the washers and rubber bushes in the footrest hanger for installation.**
- 15. Detach the rear of the left hand header pipe from the rear footrest hanger.



1. Fixing
2. Rear footrest hanger

16. At the cylinder head, release the fixings securing the header pipe to the cylinder head.

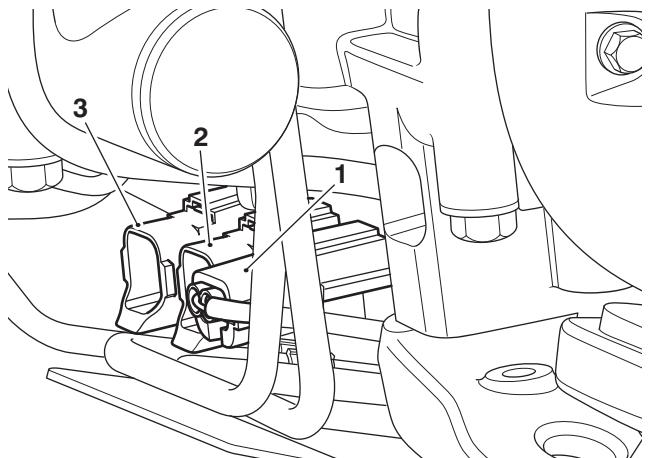


1. Header pipe
2. Fixings

Note:

- **Note the routing of the oxygen sensor harness for installation.**
- 17. With the aid of an assistant, detach the left hand header pipe from the cylinder head and the link pipe to the right hand header pipe. Remove the left hand header pipe.
- 18. Carefully release the locking device and detach the multiplug for the right hand oxygen sensor from its bracket.

19. Disconnect the right hand oxygen sensor from the main harness.



1. Multiplug, left hand oxygen sensor
2. Multiplug, side stand switch
3. Multiplug, right hand oxygen sensor

Note:

- **Note the routing of the oxygen sensor harness for installation.**
- 20. Repeat steps 15 to 17 for the right hand header pipe and remove it.
- 21. Collect the header pipe gaskets from the cylinder head.

Inspection

1. Using an open ended spanner on the flats of the spindle, check that the exhaust valve is free to rotate and operates smoothly. If the exhaust valve is seized or does not operate smoothly, proceed as follows:
 - Spray penetrating fluid into the spindle bushes of the butterfly valve, and again using an open-ended spanner on the flats of the spindle, turn the spindle end until it turns freely.
 - Once free, check the spindle end float. The standard end float is 0.3 to 1.9 mm but, if the end float is less than 0.3 mm, exhaust butterfly valve must be renewed.
 - Once satisfied that the valve is in a serviceable condition, refit the exhaust system to the motorcycle and adjust the butterfly valve cables (see page 10-203).

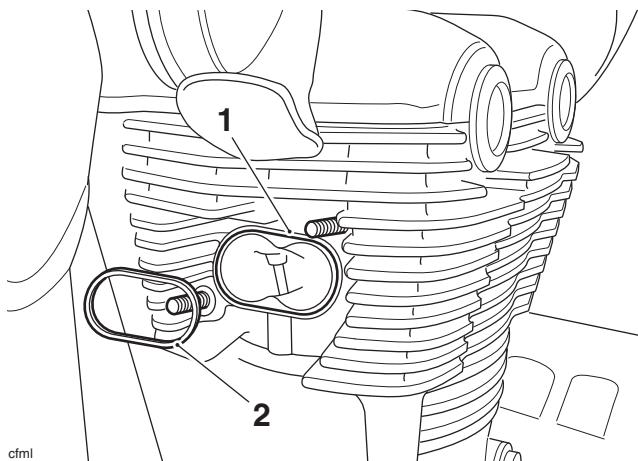
Fuel System/Engine Management

Installation

- Fit new gaskets to the cylinder head ports.

Note:

- To retain the gaskets during assembly, apply a smear of grease or petroleum jelly to the gasket faces in the head.

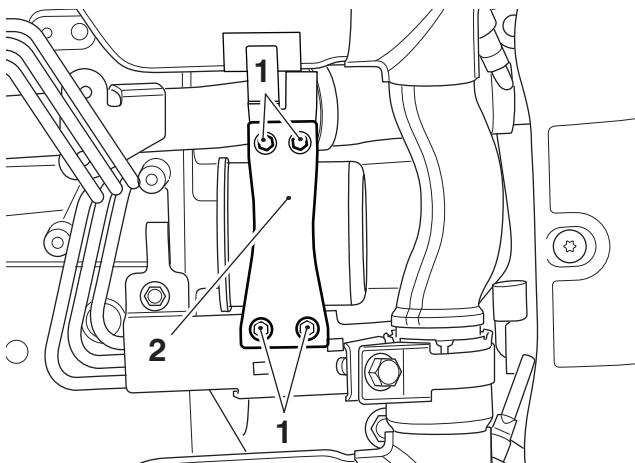


1. Cylinder head port

2. Gasket

- Apply a proprietary high temperature grease to the header pipe studs on the cylinder head.
- Fit new gaskets to the silencers and position the clamps over the joints. If removed, refit the oxygen sensors and tighten to **25 Nm**.
- Locate the right hand header pipe to the cylinder head, routing the oxygen sensor harness as noted for removal. Ensure the gasket does not become displaced during assembly. Fit new fixings to the cylinder head studs but do not fully tighten at this stage.
- Check and if necessary renew the rubber bushes for the exhaust mountings to the rear footrest hangers.
- Fit the rubber bushes to the rear footrest hangers as noted for removal.
- Secure the rear of the right hand header pipe to the rear footrest hanger with the washers positioned as noted for removal. Do not fully tighten at this stage.
- Connect the oxygen sensor harness to the main harness (marked with the red tape) and attach the multiplug to its mounting bracket.
- Locate the left hand header pipe to the cylinder head and the link pipe to the right hand header pipe. Ensure the gaskets do not become displaced during assembly. Fit new fixings to the cylinder head studs but do not fully tighten at this stage.
- Secure the rear of the exhaust butterfly valve assembly to the rear footrest hanger but do not fully tighten at this stage. Ensure the washers and rubber bushes are as noted for removal.

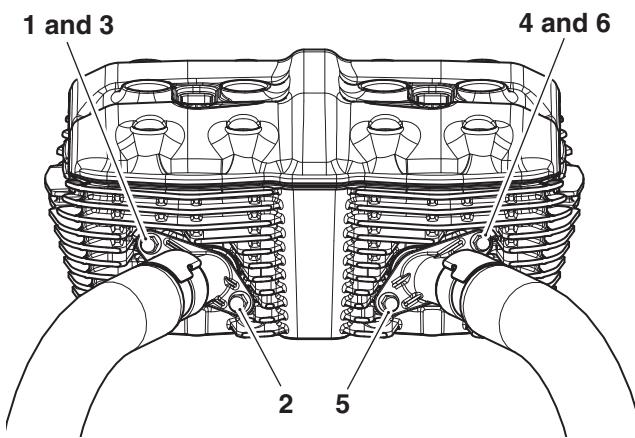
- Connect the oxygen sensor to the main harness and attach the multiplug to its mounting bracket.
- Refit the catalytic converter mounting bracket but do not fully tighten at this stage.



1. Fixings

2. Clamp

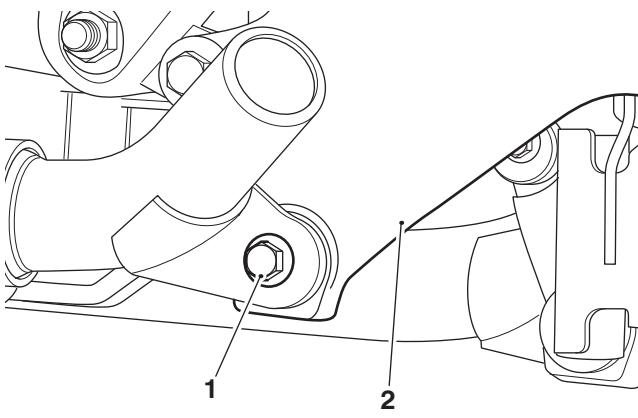
- Tighten the header pipe fixings to the cylinder head in the following sequence:



Exhaust to Cylinder Head
Tightening Sequence

- Tighten the right hand header pipe nuts 1 to 3 to **19 Nm** in the order shown.
- Tighten the left hand header pipe nuts 4 to 6 to **19 Nm** in the order shown.

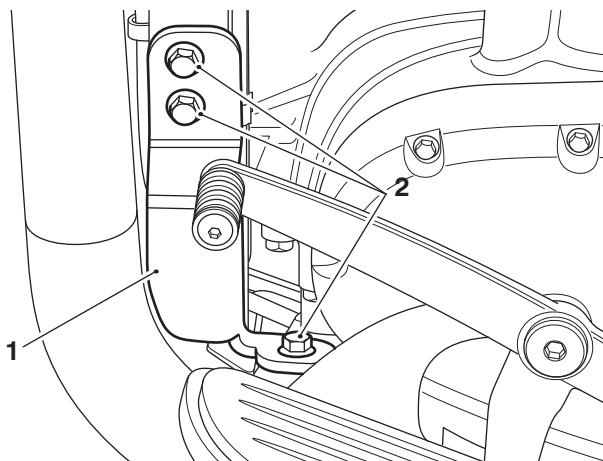
14. Tighten the header pipe/exhaust butterfly valve assembly rear fixing to **28 Nm**.



1. Fixing

2. Rear foot rest hanger

15. Position the link pipe clamp as noted for removal and tighten **15 Nm**.
 16. Tighten the mounting bracket for the catalytic converter to **12 Nm**.
 17. Attach the exhaust butterfly cables to the exhaust butterfly valve (see page 10-200).
 18. Fit the cover for the left hand oxygen sensor and tighten its fixings to **27 Nm**.

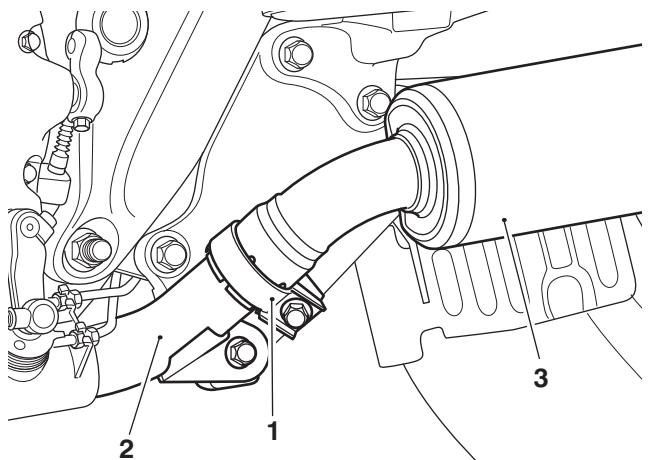


1. Cover

2. Fixings

19. Fit each silencer to the header pipe/exhaust butterfly valve assembly and position to the rear footrest hanger.
 20. Secure the silencers to the rear footrest hanger, ensure the washers and rubber bushes are as noted for removal. Tighten the fixing to **28 Nm**.

21. Position the silencer clamps as noted for removal and tighten to **15 Nm**.

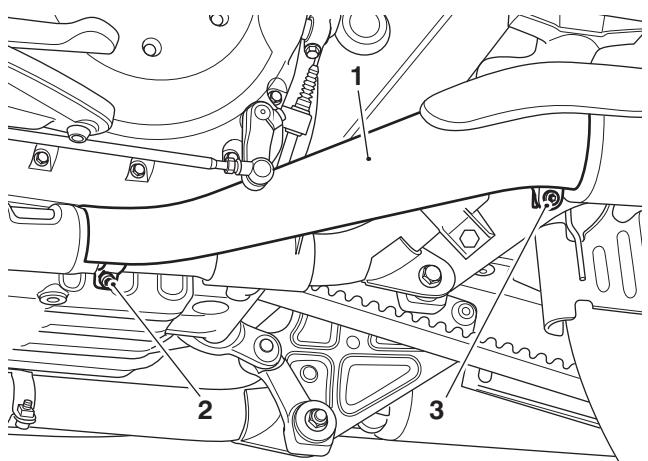


1. Silencer clamp (left hand side)

2. Exhaust butterfly valve assembly

3. Silencer

22. Reconnect the battery, positive (identified with red tape) lead first.
 23. Check and if necessary adjust the exhaust butterfly cables (see page 10-203).
 24. Fit the rear heat shields and tighten its:
 - front clamp fixing to **9 Nm**
 - rear clamp fixing to **5 Nm**.



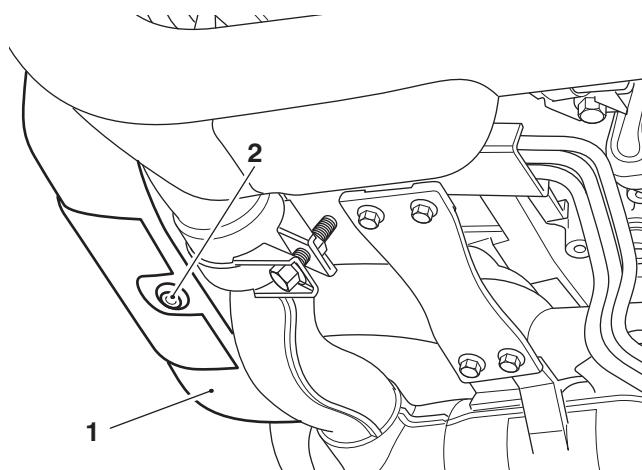
1. Rear heat shield (left hand side)

2. Front fixing

3. Rear fixing

Fuel System/Engine Management

25. Fit the radiator cowl and tighten its fixing to **4 Nm**.



1. Radiator cowl
2. Fixing

26. Fit the rider's seat (see page 17-20).
27. Start the engine and check for exhaust gas leaks. Rectify as necessary.

Exhaust Butterfly Valve – Thunderbird Commander and Thunderbird LT

Removal

! Warning

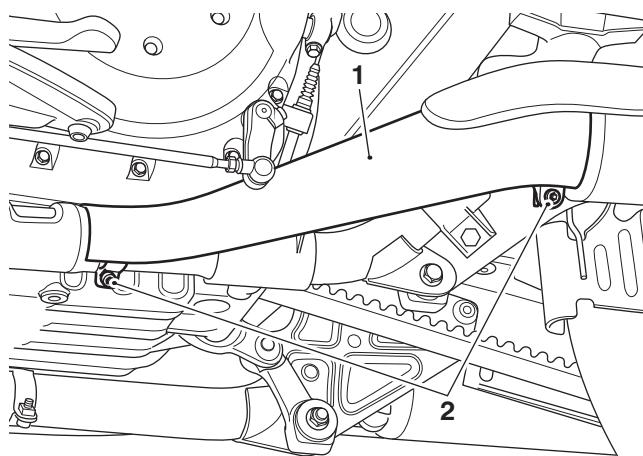
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

! Warning

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Note:

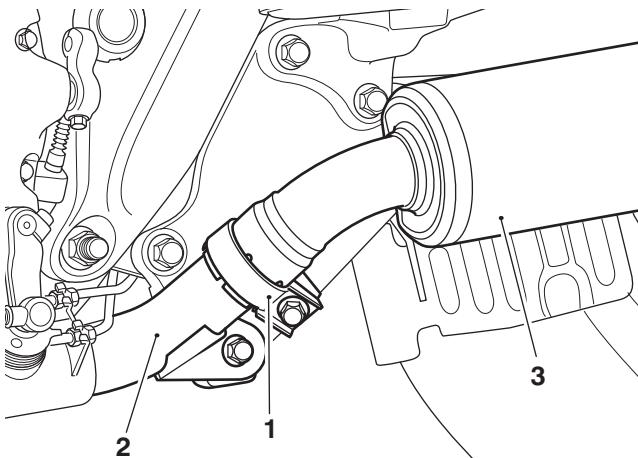
- Always note the position and orientation of exhaust clamps prior to releasing them, and return them to the noted position and orientation on assembly.
1. Remove the rider's seat (see page 17-20).
 2. Disconnect the battery, negative (black) lead first.
 3. Release the clamps and remove the left hand rear heat shield.



1. Rear heat shield
2. Clamp fixings

Fuel System/Engine Management

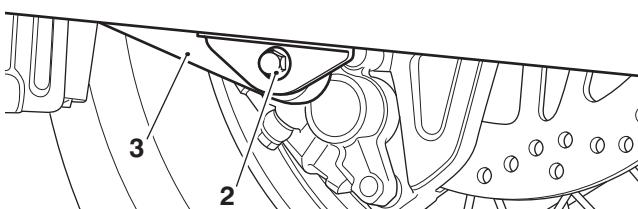
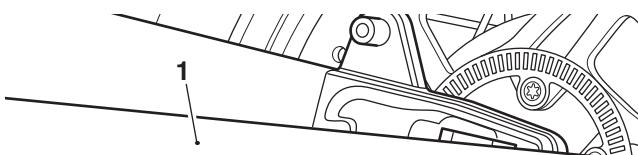
4. Release the clamps securing the silencers to the exhaust butterfly valve assembly.



1. Silencer clamp (left hand side)
2. Exhaust butterfly valve assembly
3. Silencer

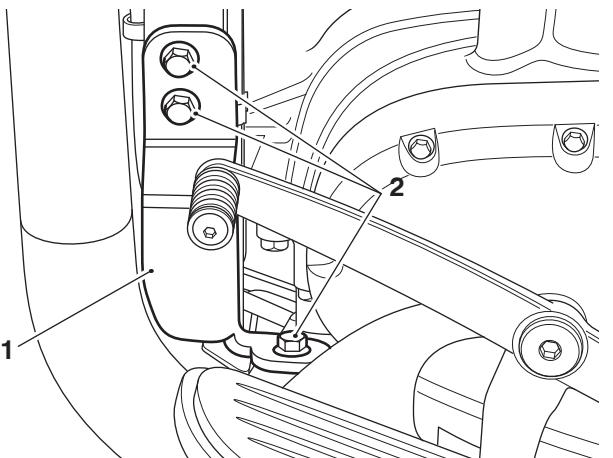
Note:

- **Note the position of the washers and rubber bushes in the footrest hanger for installation.**
5. Release the fixing securing the silencer to the rear footrest hanger and remove the silencer. Collect the washer and rubber bushes.

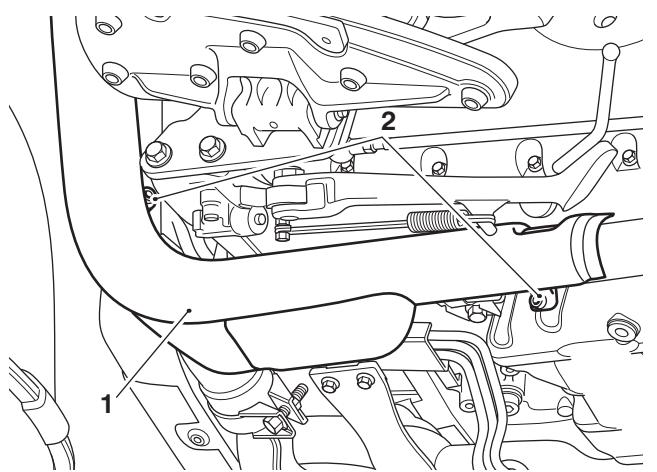


1. Silencer (left hand side)
 2. Fixing
 3. Rear footrest hanger
6. Remove the silencer gasket.
7. Detach the exhaust butterfly cables from the exhaust butterfly valve (see page 10-198).

8. Release the three fixings and remove the cover for the left hand oxygen sensor.



1. Cover
 2. Fixings
9. Release the clamps and remove the front heat shield.



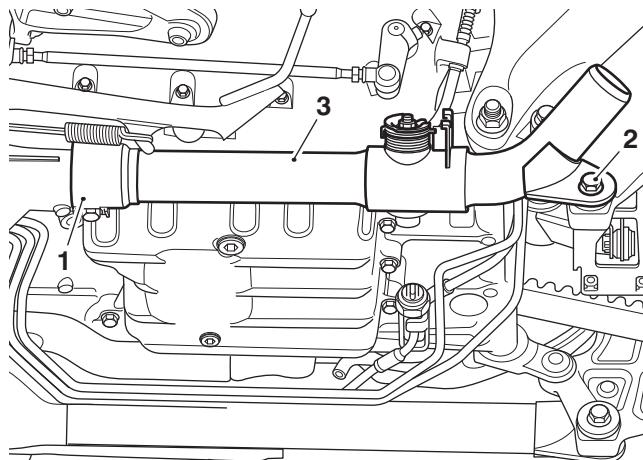
1. Front heat shield
 2. Clamp fixings
10. Release the clamp securing the exhaust butterfly assembly to the header pipe.

Note:

- **Note the position of the washers and rubber bushes in the footrest hanger for installation.**

Fuel System/Engine Management

- Release the rear fixing and remove the exhaust butterfly valve assembly. Collect the washer and rubber bushes.

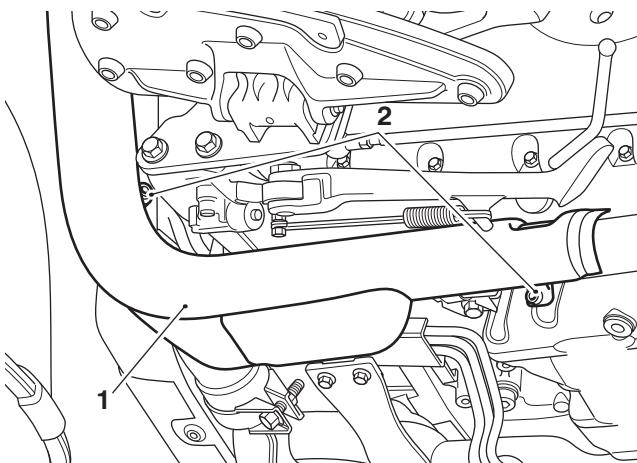


- Clamp
- Rear fixing
- Exhaust butterfly valve assembly

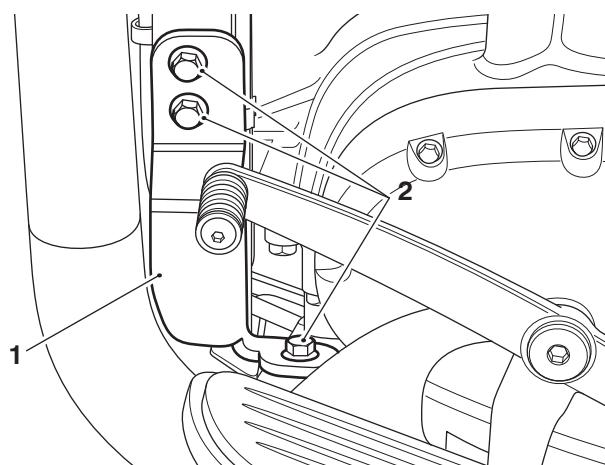
Installation

- Check that the exhaust butterfly valve is free to rotate and operates smoothly (see page 10-191).
- Check and if necessary renew the rubber bushes for the exhaust mountings to the rear footrest hangers.
- Fit a new exhaust gasket to the header pipe and position the clamps over the joint.
- Locate the exhaust butterfly valve assembly to the header pipe. Ensure the gasket does not become displaced during assembly.
- Secure the rear of the exhaust butterfly valve assembly to the rear footrest hanger, ensure the washers and rubber bushes are as noted for removal. Tighten the rear fixing to **28 Nm**.
- Position the exhaust butterfly valve assembly clamp as noted for removal and tighten to **15 Nm**.

- Fit the front heat shield and tighten its fixings to **9 Nm**.

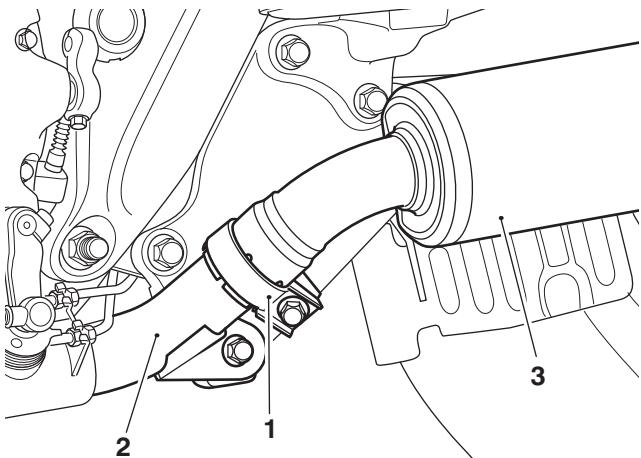


- Front heat shield
- Clamp fixings
- Fit the cover for the left hand oxygen sensor and tighten its fixings to **27 Nm**.



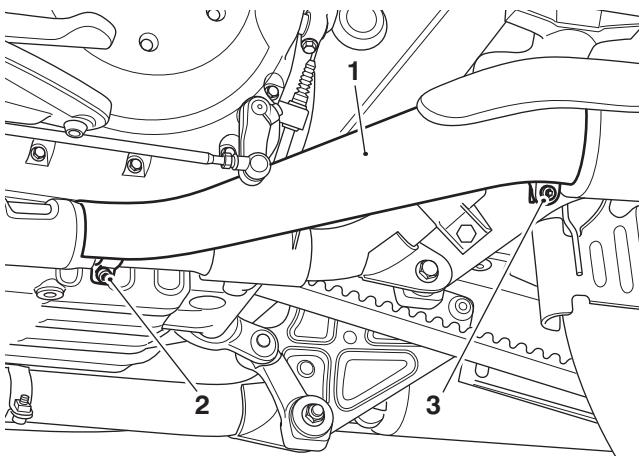
- Cover
- Fixings
- Attach the exhaust butterfly cables to the exhaust butterfly valve (see page 10-200).
- Fit a new exhaust gasket to the exhaust butterfly valve assembly and position the clamps over the joint.
- Fit the silencer to the exhaust butterfly valve assembly and position to the rear footrest hanger.
- Secure the silencers to the rear footrest hanger, ensure the washers and rubber bushes are as noted for removal. Tighten the fixing to **28 Nm**.

13. Position the silencer clamp as noted for removal and tighten to **15 Nm**.



- 1. Silencer clamp (left hand side)**
- 2. Exhaust butterfly valve assembly**
- 3. Silencer**

14. Reconnect the battery, positive (identified with red tape) lead first.
15. Check and if necessary adjust the exhaust butterfly cables (see page 10-203).
16. Fit the rear heat shields and tighten its:
 - front clamp fixing to **9 Nm**
 - rear clamp fixing to **5 Nm**.



- 1. Rear heat shield**
- 2. Front fixing**
- 3. Rear fixing**
17. Fit the rider's seat (see page 17-20).
18. Start the engine and check for exhaust gas leaks.
Rectify as necessary.

Exhaust Butterfly Valve Actuator – Thunderbird Commander and Thunderbird LT

Removal

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Warning

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

Caution

Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

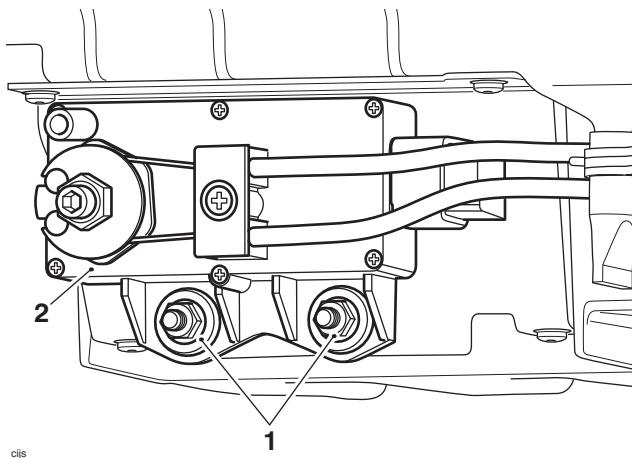
1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the cables from the exhaust butterfly valve (see page 10-198).

Note:

- **Note the routing of the exhaust butterfly valve cables when removing the airbox for installation.**
- 4. Remove the airbox (see page 10-155).
- 5. If necessary, remove the cables from the exhaust butterfly valve actuator (see page 10-198).

Fuel System/Engine Management

- Release the lock nuts and remove the exhaust butterfly valve actuator. Discard the lock nuts.



1. Lock nuts
2. Exhaust butterfly valve actuator

Installation



Caution

Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

1. If removed, fit the cables to the exhaust butterfly valve actuator (see page 10-200).
2. Fit the exhaust butterfly valve actuator to the airbox with the cables routed as for removal. Tighten the new lock nuts to **12 Nm**.
3. Fit the airbox (see page 10-158). Ensure the exhaust butterfly valve cables are routed as noted for removal.
4. Connect the cables to the exhaust butterfly valve (see page 10-200).
5. Reconnect the battery, positive (identified with red tape) lead first.
6. Check and if necessary adjust the exhaust butterfly cables (see page 10-203).
7. Fit the rider's seat (see page 17-20).

Exhaust Butterfly Valve Cables – Thunderbird Commander and Thunderbird LT

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



Warning

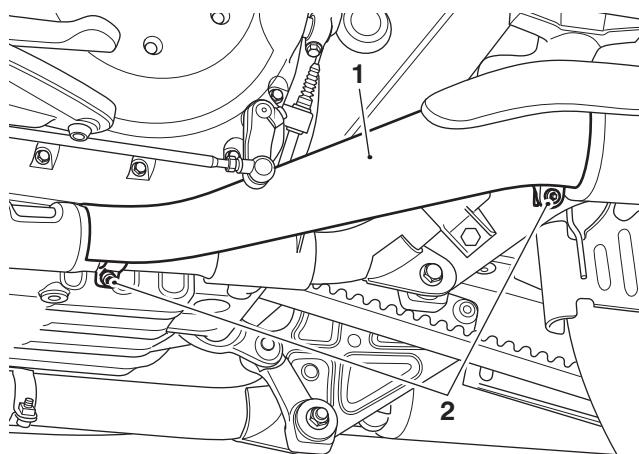
If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.



Caution

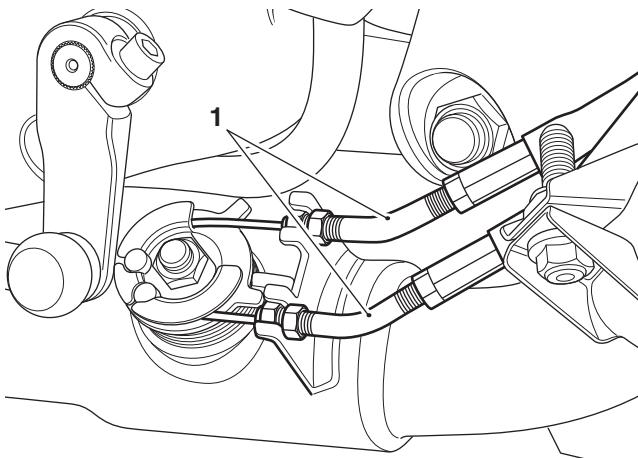
Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Release the clamps and remove the left hand rear heat shield.



1. Rear heat shield
2. Clamp fixings

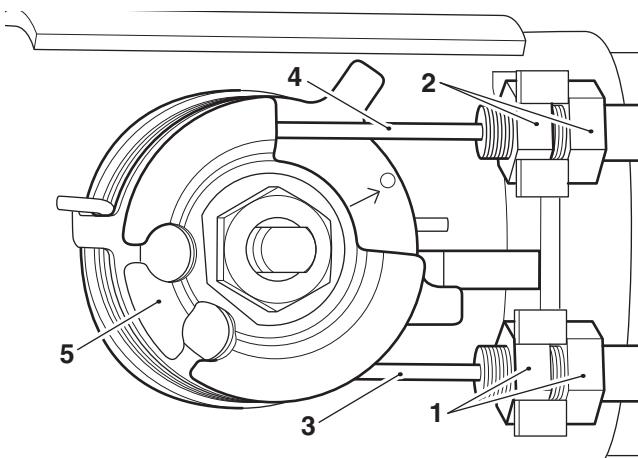
4. Slacken the adjuster on each exhaust butterfly valve cable to allow the outer cables to be detached from their bracket.



1. Adjusters

Note:

- The closing cable is uppermost and its outer cable is coloured silver and black with white writing on it. The adjuster end is silver.**
 - The opening cable is lowermost and its outer cable is coloured black with yellow writing on it. The adjuster end is silver.**
 - Note the cables positions for installation.**
5. Loosen the fixings and detach the outer cables from their bracket.
6. Noting the orientation of the cables, detach the inner cables from the exhaust butterfly valve pulley wheel.



1. Opening cable fixings
2. Closing cable fixings
3. Opening inner cable
4. Closing inner cable
5. Exhaust butterfly valve pulley wheel

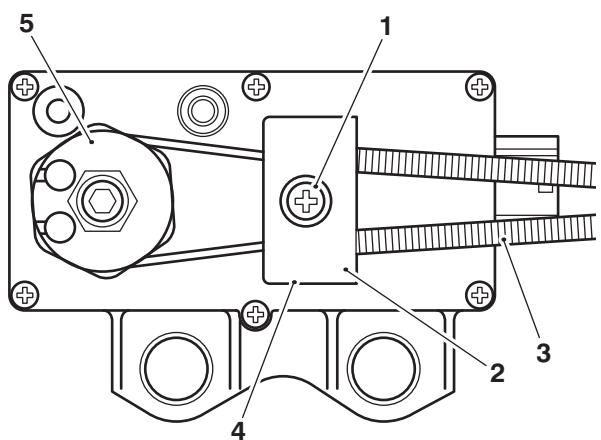
Note:

- Note the routing of the exhaust butterfly valve cables for installation.**

7. Remove the airbox (see page 10-155).

Note:

- The opening cable, with the yellow writing, is fitted to the mounting labelled 1 on the actuator.**
 - Note the position of the cables on the actuator for installation.**
 - Note the routing of the exhaust butterfly valve cables through the airbox for installation.**
8. Release the fixing and remove the clip.
9. Slide the outer cables out of their mounting on the actuator and detach the inner cables from the actuator pulley wheel.



1. Fixing

2. Clip

3. Opening cable, with yellow writing

4. Mounting labelled 1

5. Pulley wheel

Fuel System/Engine Management

Inspection



Caution

Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

1. Check that both the exhaust valve cables operate smoothly, without sticking or binding. Replace the cables if there is any doubt as to their correct operation.
2. Using an open ended spanner on the flats of the spindle, check that the exhaust valve in the exhaust butterfly assembly is free to rotate and operates smoothly. If the exhaust valve is seized or does not operate smoothly, proceed as follows:
 - a) Spray penetrating fluid into the spindle bushes of the butterfly valve, and again using an open ended spanner on the flats of the spindle, turn the spindle end until it rotates freely.
 - b) Once free, check the spindle end-float. The standard end-float is 0.3 to 1.9 mm but, if end-float is less than 0.3 mm, the exhaust butterfly assembly must be renewed.

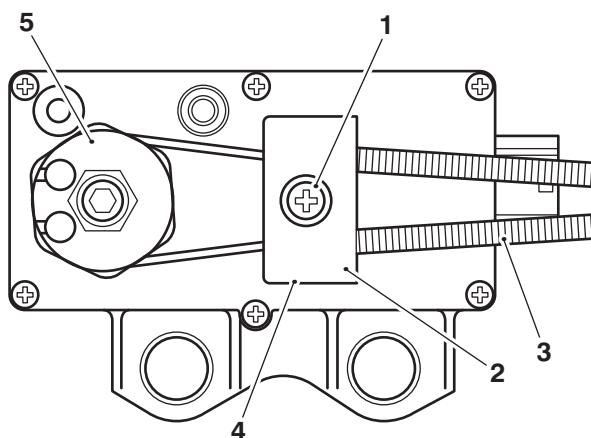
Installation



Caution

Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

1. Feed the cables through the airbox as noted for removal.
2. Insert the outer cables into their mounting on the actuator. Ensure the cable with the yellow writing is fitted to the mounting labelled 1 as noted for removal.
3. Attach the inner cables to the actuator pulley wheel.
4. Fit the retaining clip and tighten its fixing to **1.5 Nm**.



1. Fixing

2. Clip

3. Opening cable, with yellow writing

4. Mounting labelled 1

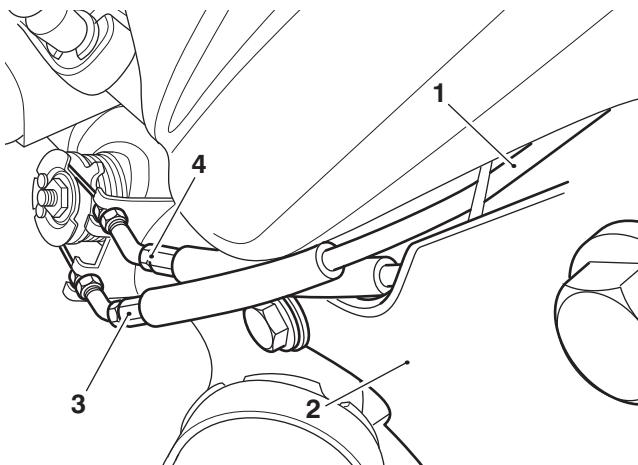
5. Pulley wheel

5. Fit the airbox (see page 10-158). Ensure the exhaust butterfly valve cables are routed as noted for removal.

Note:

- **The closing cable is uppermost and its outer cable is coloured silver and black with white writing on it. The adjuster end is silver.**
- **The opening cable is lowermost and its outer cable is coloured black with yellow writing on it. The adjuster end is silver.**

6. Position the cables to the exhaust butterfly valve pulley wheel as noted for removal. Ensure the opening cable is above the closing cable when they are between the frame and the footrest hanger.

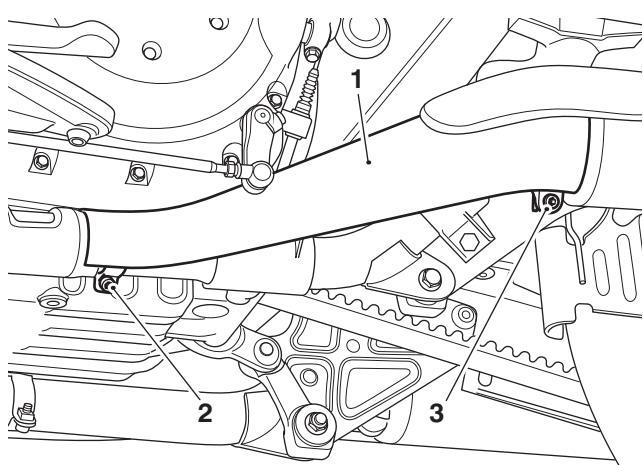


- 1. Frame**
- 2. Footrest hanger**
- 3. Opening cable**
- 4. Closing cable**

7. Attach the inner cables to the exhaust butterfly valve pulley wheel.
8. Attach the outer cables to their bracket and tighten their fixings to **5 Nm**.

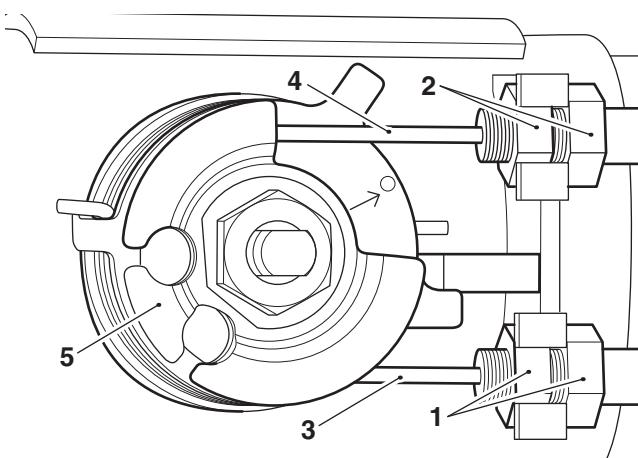
11. Fit the rear heat shields and tighten its:

- front clamp fixing to **9 Nm**
- rear clamp fixing to **5 Nm**.



- 1. Rear heat shield**
- 2. Front fixing**
- 3. Rear fixing**

12. Fit the rider's seat (see page 17-20).



- 1. Opening cable fixings**
 - 2. Closing cable fixings**
 - 3. Opening inner cable**
 - 4. Closing inner cable**
 - 5. Exhaust butterfly valve pulley wheel**
9. Reconnect the battery, positive (identified with red tape) lead first.
10. Check and if necessary adjust the exhaust butterfly cables (see page 10-203).

Fuel System/Engine Management

Exhaust Butterfly Valve Cable Function Test – Thunderbird Commander and Thunderbird LT

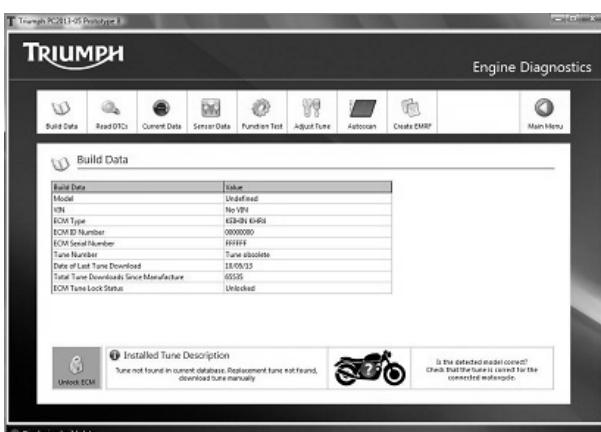


Warning

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

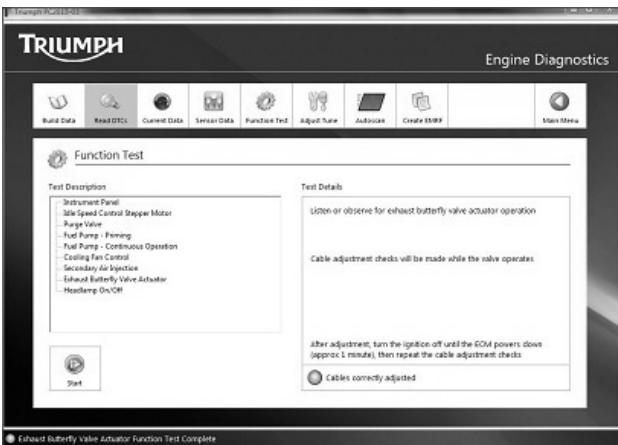
To help accurately check and set the adjustment of the control cables for the exhaust butterfly valve, use the Triumph Diagnostic Tool as described below:

1. Remove the left hand side panel (see page 17-30).
2. Attach the Triumph Diagnostic Tool to the dedicated plug, refer to the Triumph Diagnostic Tool User Guide.
3. Open the engine management diagnostic menu.



Engine Diagnostic Menu

4. Open the function test menu.



Function Test Menu



Warning

Clicking the 'Start' button will cause the exhaust valve actuator to move several times. To prevent injury, never place loose clothing, fingers or hands near the exhaust valve actuator, cables or the exhaust butterfly valve, until the actuator has stopped moving. Loose clothing, fingers or the hands could become trapped during valve/actuator movement and cause crushing injury to the fingers, hands or other parts of the anatomy.

5. Select Exhaust Butterfly Valve Actuator then click the 'Start' button. The software will also show the message 'Cable adjustment checks will be made while the valve operates'.
6. Typically, the software will operate the valve several times and will then report its cable adjustment findings near the bottom of the PC screen. In some circumstances, particularly if the cables are not correctly adjusted, the test result will be shown immediately without running a test. This is because the software recovers data from the ECM on initiation and does not need to run the function test to determine a result. The software will display four possible results as follows:
 - Cables too tight
 - Cables too loose
 - Cables not evenly adjusted
 - Cables correctly adjusted.



Function Test Menu

Note:

- With the diagnostic software in the Function Test screen, one cable will be under tension and the other will be slack. This will prevent the cables from being evenly adjusted.
- If the test fails, do not adjust the cables while the diagnostic software is in the Function Test screen. Select the Adjust Tune option then adjust the cables as described in Adjustment of the Control Cables.

Exhaust Butterfly Valve Cable Adjustment – Thunderbird Commander and Thunderbird LT

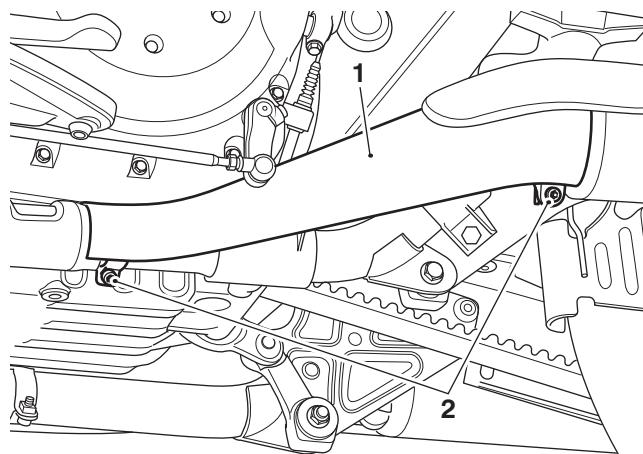


Caution

Do not rotate the pulley on the exhaust butterfly valve actuator. Rotating the pulley will damage the internal components of the actuator.

Note:

- The adjustment procedure must be followed to give a preliminary cable setting. Correct cable adjustment must be confirmed by the diagnostic software.**
- Remove the left hand side panel (see page 17-30).
 - Attach the Triumph Diagnostic Tool to the dedicated plug, refer to the Triumph Diagnostic Tool User Guide.
 - Release the clamps and remove the left hand rear heat shield.

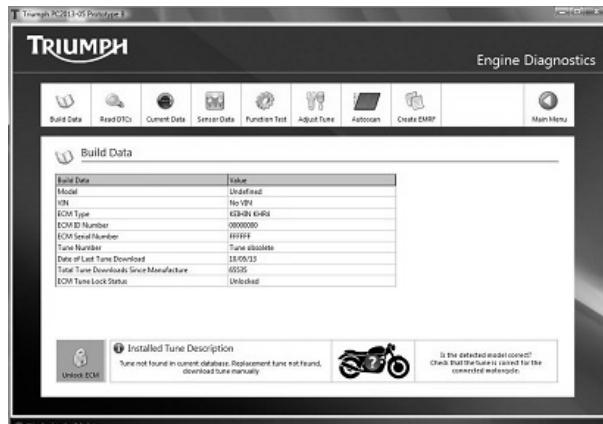


1. Rear heat shield

2. Clamp fixings

- Turn the ignition to the 'ON' position.

- Open the engine management diagnostic menu.



Engine Diagnostic Menu

- On the diagnostic software navigate to and select the 'ADJUST TUNE' option.



Warning

Clicking the 'Adjust' button will cause the exhaust valve actuator to move to the adjustment position. To prevent injury, never place loose clothing, fingers or hands near the exhaust valve actuator, cables or the exhaust butterfly valve, until the actuator has moved to the adjustment position. Loose clothing, fingers or the hands could become trapped during valve/actuator movement and cause crushing injury to the fingers, hands or other parts of the anatomy.

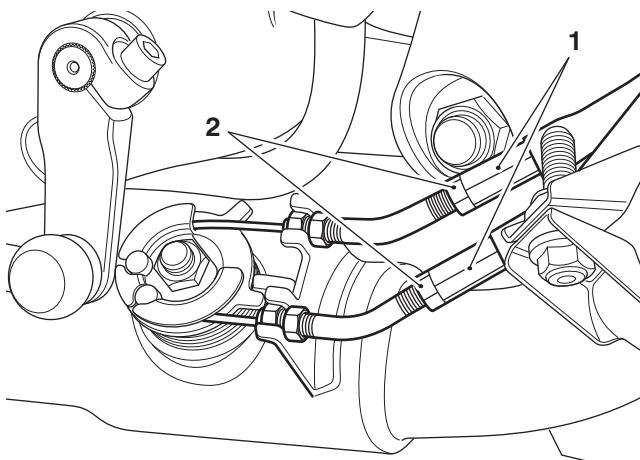
- Select 'Exhaust Butterfly Valve Cable Adjust' then click the 'Adjust' button.

Note:

- The cable adjustment must only be made when the exhaust butterfly valve is in its middle position.**
- Click the 'Adjust' button a second time. The diagnostic software will send a command which drives the exhaust valve actuator to the middle position. The diagnostic software will then show 'Adjust cable - press OK to continue' on the screen. **Do not click the 'OK' button until the cable adjustment is completed.**

Fuel System/Engine Management

9. The exhaust butterfly cables can now be adjusted as follows:
10. Slacken the adjuster on each exhaust butterfly valve cable.

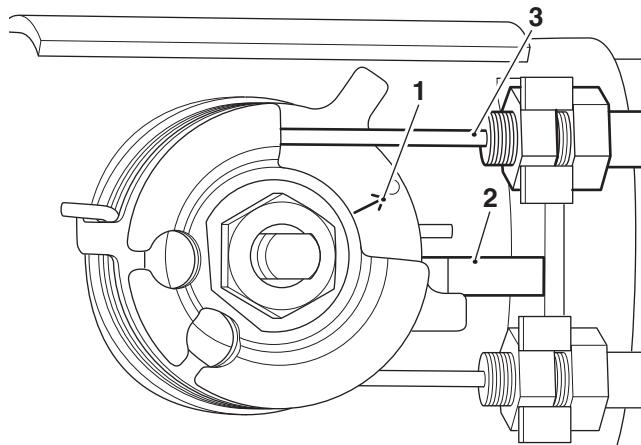


1. Adjusters
2. Lock nuts

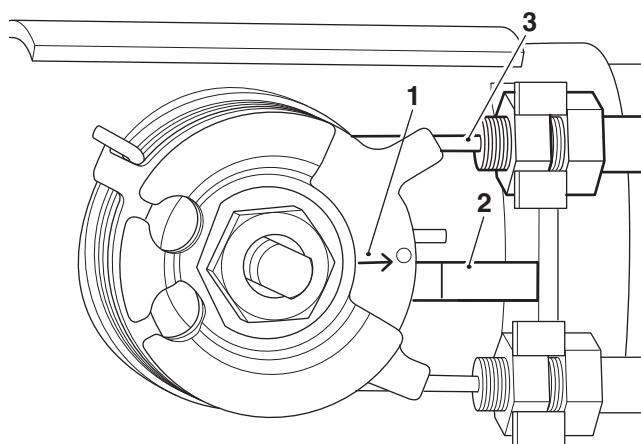
Note:

- The closing cable is uppermost and its outer cable is coloured silver and black with white writing on it.

11. Adjust the closing cable adjuster until the arrow on the butterfly valve pulley is aligned with the upper edge of the butterfly stop.

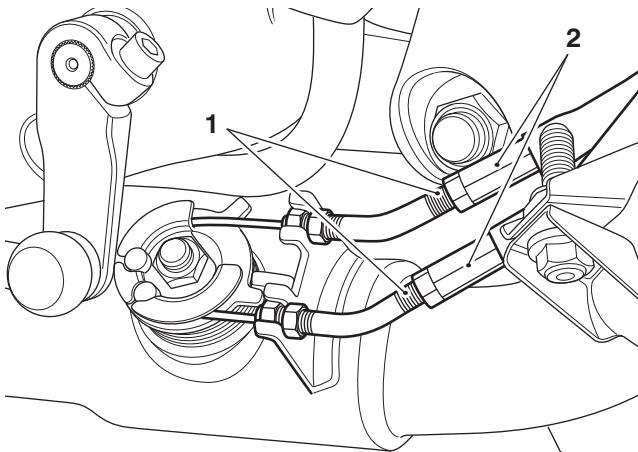


1. Arrow
2. Butterfly valve stop
3. Closing cable



1. Arrow, after adjustment
2. Butterfly valve stop
3. Closing cable

- With the arrow aligned with the upper edge of the butterfly valve stop, adjust the opening cable until it has the same amount of threads showing as the closing cable.



1. Threaded area

2. Adjusters



Warning

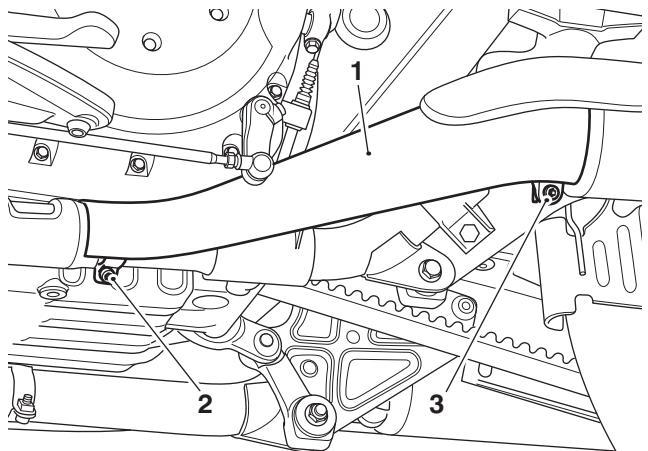
Clicking the 'OK' button will cause the exhaust valve actuator to move to the closed position and then the fully open position. To prevent injury, never place loose clothing, fingers or hands near the exhaust valve actuator, cables or the exhaust butterfly valve, until the actuator has stopped. Loose clothing, fingers or the hands could become trapped during valve/actuator movement and cause crushing injury to the fingers, hands or other parts of the anatomy.

- When the adjustment of the cable is complete, click the 'OK' button. The exhaust butterfly valve will now move to the closed position and then the fully open position.
- Click the 'OK' button again to finish.
- If the adjustment is not correct, 'Cables too loose - Adjust cables' or 'Cables too tight - Adjust cables' will be displayed. Repeat steps 7 to 12 to tighten or loosen the cables evenly as required.
- On the diagnostic software, click the 'Adjust' button to check the cable adjustment. If necessary, repeat the adjustment procedure.
- Once adjustment is correct, tighten the adjuster lock nuts to **5 Nm**.

Note:

- If the adjustment is not correct, the Malfunction Indicator Light (MIL) will be illuminated, indicating the presence of DTCs (Diagnostic Trouble Codes).**
- The following will be displayed: 'Exhaust butterfly cables adjust DTCs present - Read and erase DTCs'.**

- Rectify the DTCs as necessary by repeating the adjustment procedure.
- On the diagnostic software, select READ STORED DTCs, erase any stored DTCs.
- Close the software and disconnect the Triumph Diagnostic Tool.
- Fit the rear heat shields and tighten its:
 - front clamp fixing to **9 Nm**
 - rear clamp fixing to **5 Nm**.



1. Rear heat shield

2. Front fixing

3. Rear fixing

- Fit the left hand side panel (see page 17-30).

Fuel System/Engine Management

Evaporative Canister (if fitted)

Removal

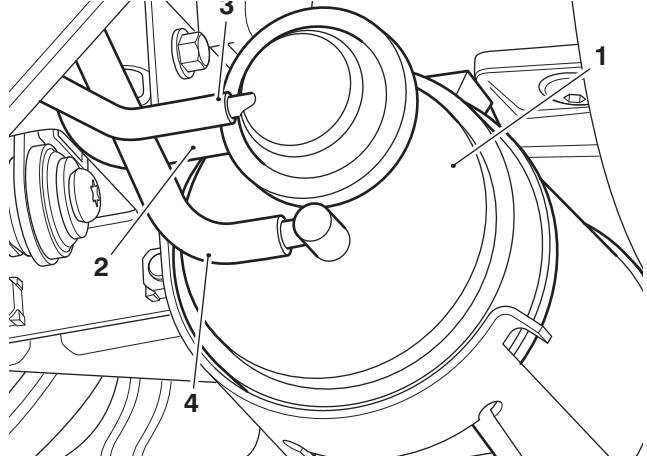


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

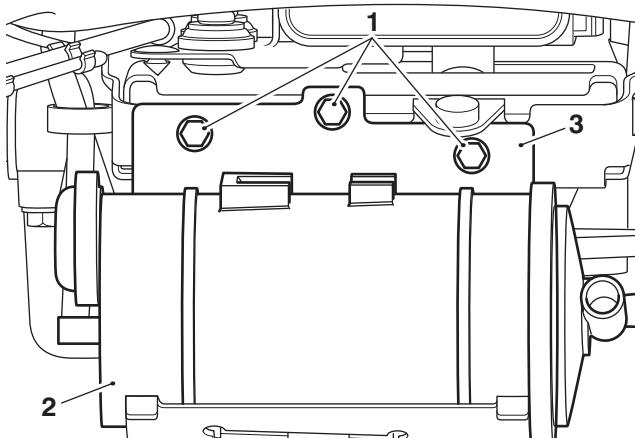
Note:

- Note the position of the three hoses attached to the left hand side of the evaporative canister for installation.
1. Disconnect the purge, vacuum and the fuel tank breather pipes from the left hand side of the evaporative canister.



1. Evaporative canister
2. Purge Pipe
3. Vacuum pipe
4. Fuel tank breather pipe

2. Release the three fixings and remove the evaporative canister and bracket assembly.



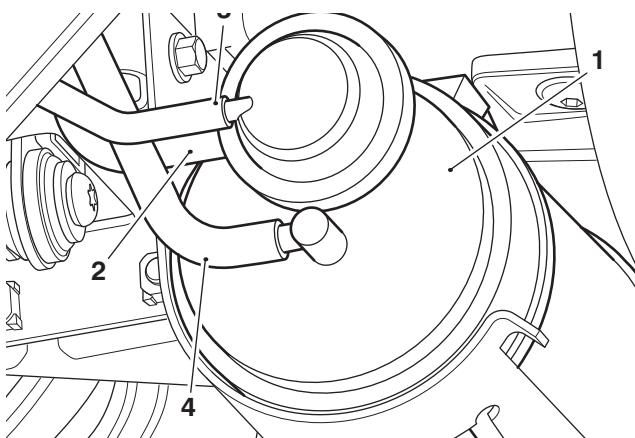
1. Fixings
2. Canister
3. Mounting bracket

Note:

- Note the orientation of the evaporative canister in its bracket for installation.
 - Note the routing of the cable ties for installation.
3. Cut the cable ties securing the canister to its bracket and remove the canister.

Installation

1. Fit the evaporative canister to its mounting bracket as noted for removal and secure in position with two new cable ties routed as noted for removal.
2. Fit the evaporative canister and bracket assembly to the motorcycle and tighten its fixings to **12 Nm**.
3. Connect the purge, vacuum and the fuel tank breather pipes to the left hand side of the evaporative canister as noted for removal.



1. Evaporative canister
2. Purge pipe
3. Vacuum pipe
4. Fuel tank breather pipe

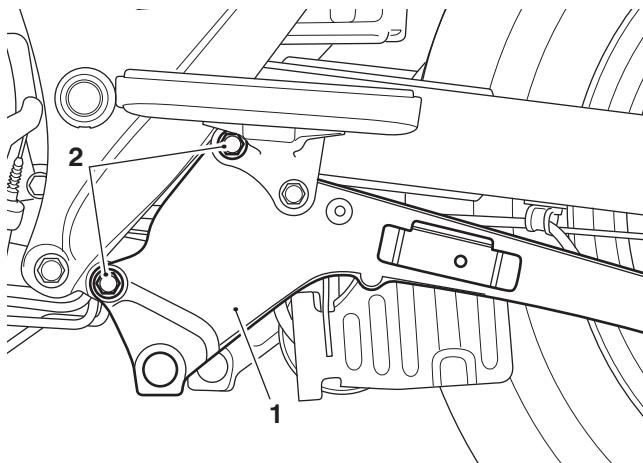
Purge Control Valve (if fitted)

Removal

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand silencer (see page 10-189).
4. Release the two fixings and detach the left hand rear footrest hanger from the frame.



1. Rear footrest hanger

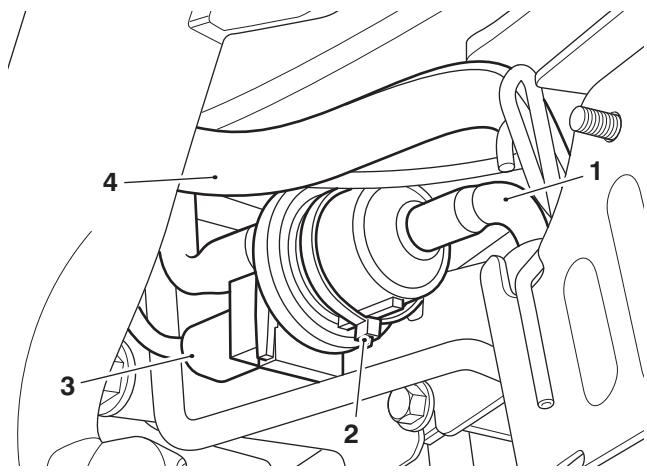
2. Fixings

5. Detach the evaporative canister purge pipe from the rear of the purge control valve.

Note:

- **Note the position and orientation of the purge valve for installation.**
6. Cut the cable tie that secures the purge valve to the ABS modulator bracket.

7. Disconnect the multiplug and the throttle bodies purge pipe from the front of the purge valve.



1. Evaporative canister purge pipe

2. Cable tie

3. Multiplug

4. Throttle bodies purge pipe

8. Remove the purge control valve.

Installation

1. Connect the multiplug and the throttle bodies purge pipe to the front of the purge valve.
2. Position the purge valve to the ABS modulator bracket as noted for removal. Secure in position with a cable tie.
3. Fit the evaporative canister purge pipe to the rear of the purge valve.
4. Fit the left hand rear footrest hanger to the frame and tighten its fixings to **40 Nm**.
5. Fit the left hand silencer (see page 10-192).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Fit the rider's seat (see page 17-20).

Fuel System/Engine Management

Evaporative Loss Control System – Certain Markets Only

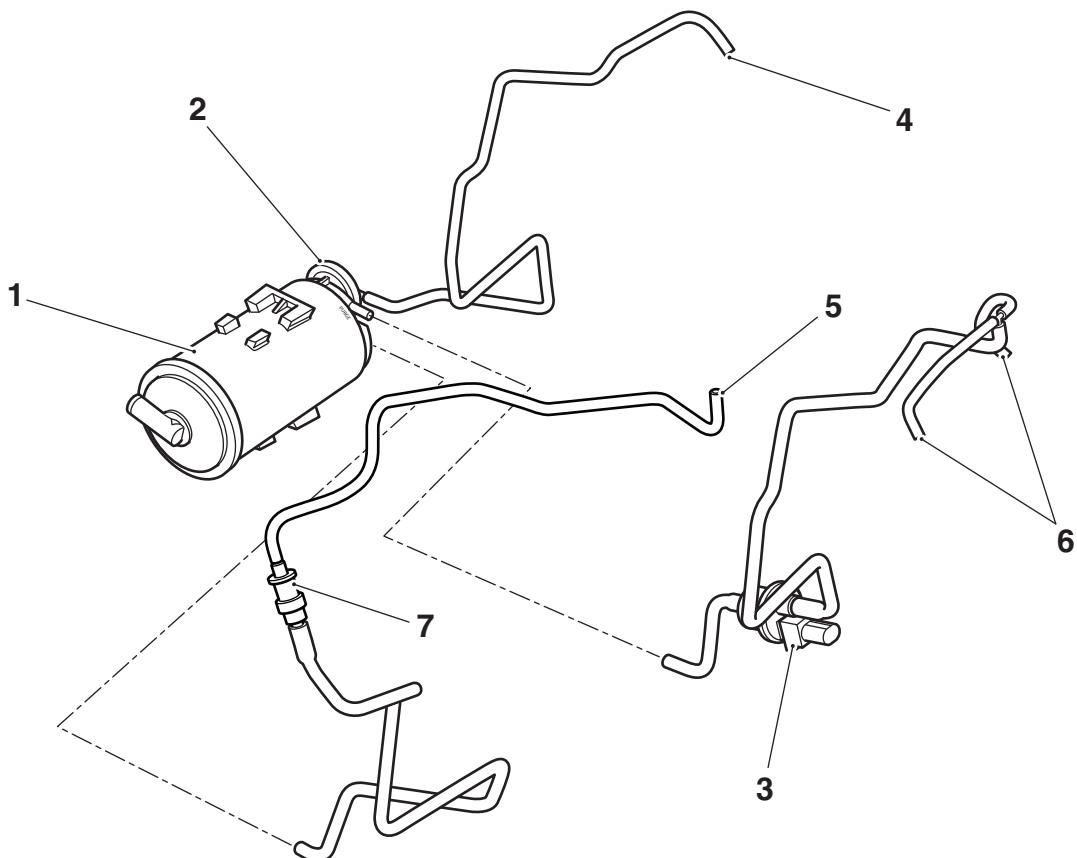
For certain markets models are fitted with an evaporative emissions control system to prevent the exhausting of fuel vapour into the atmosphere.

A canister containing activated charcoal, located beneath the swinging arm, absorbs hydrocarbon vapour given off by the fuel in the fuel tank. Vapour delivery to the canister occurs at all times, but is particularly high after riding, when the motorcycle is parked in direct sunlight or in high temperatures. This causes the fuel temperature in the fuel tank to rise, resulting in a rise in the vapour pressure inside the tank. Normally this vapour would be vented to atmosphere but on California models, it is stored in the charcoal canister.

When the engine is started, the vapour is returned to the throttle body by means of induction vacuum, and is burnt in the engine.

There are two distinct phases to the system's operation, engine off and engine running. These two conditions are explained overleaf.

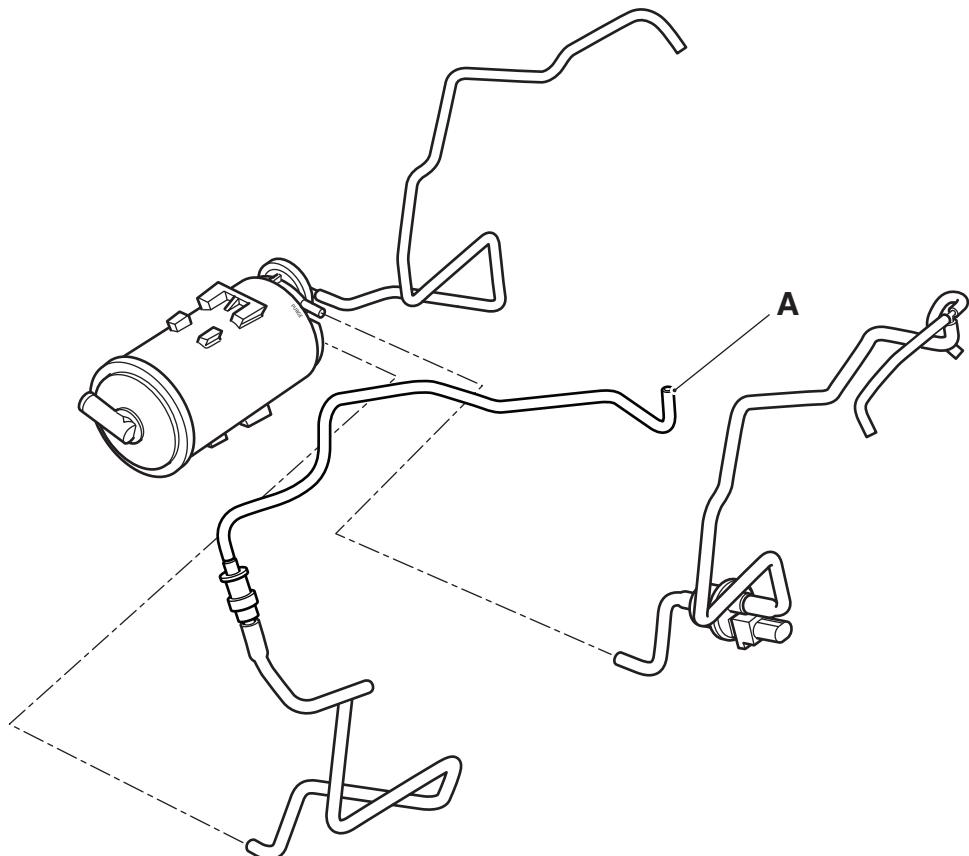
Component Locations



1. Carbon canister
2. Purge valve
3. Purge control valve
4. Vacuum signal hose
5. Fuel tank vent hose
6. Purge hose connection to throttle bodies
7. Roll-over valve

Evaporative Control System – Engine Off

When the engine is switched off, hydrocarbon fuel vapour passes down the breather pipe A, through the roll-over valve to the canister. Vapour is then stored in charcoal layers within the canister.

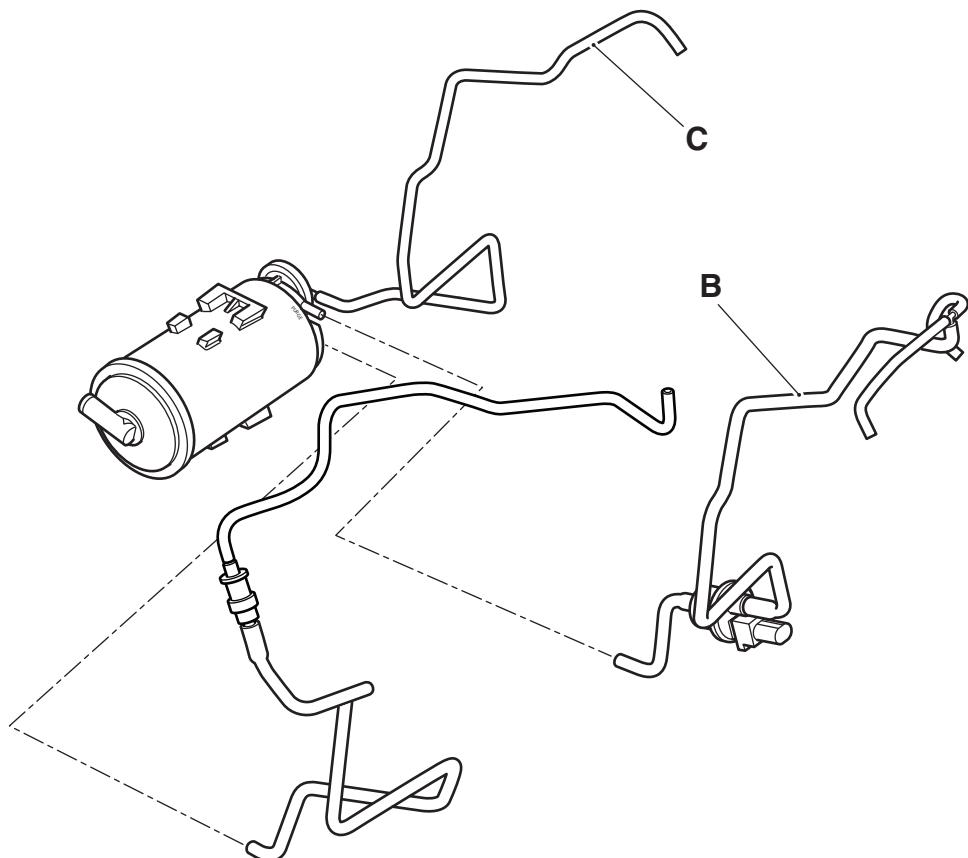


Fuel System/Engine Management

Evaporative Control System – Engine Running

When the engine is started, vacuum from the engine is applied through pipe C to the vacuum switch on the canister, causing the canister return valve to open. Direct return of vapour, along pipe B, to the throttle bodies is prevented by the purge control valve which is governed by the engine management system. When open, the valve allows stored vapour to return to the throttle bodies where it enters the engine and is burnt in the cylinders.

The purge control valve is shuttled between the open and closed position during purging to prevent transient rich mixture and high emissions.



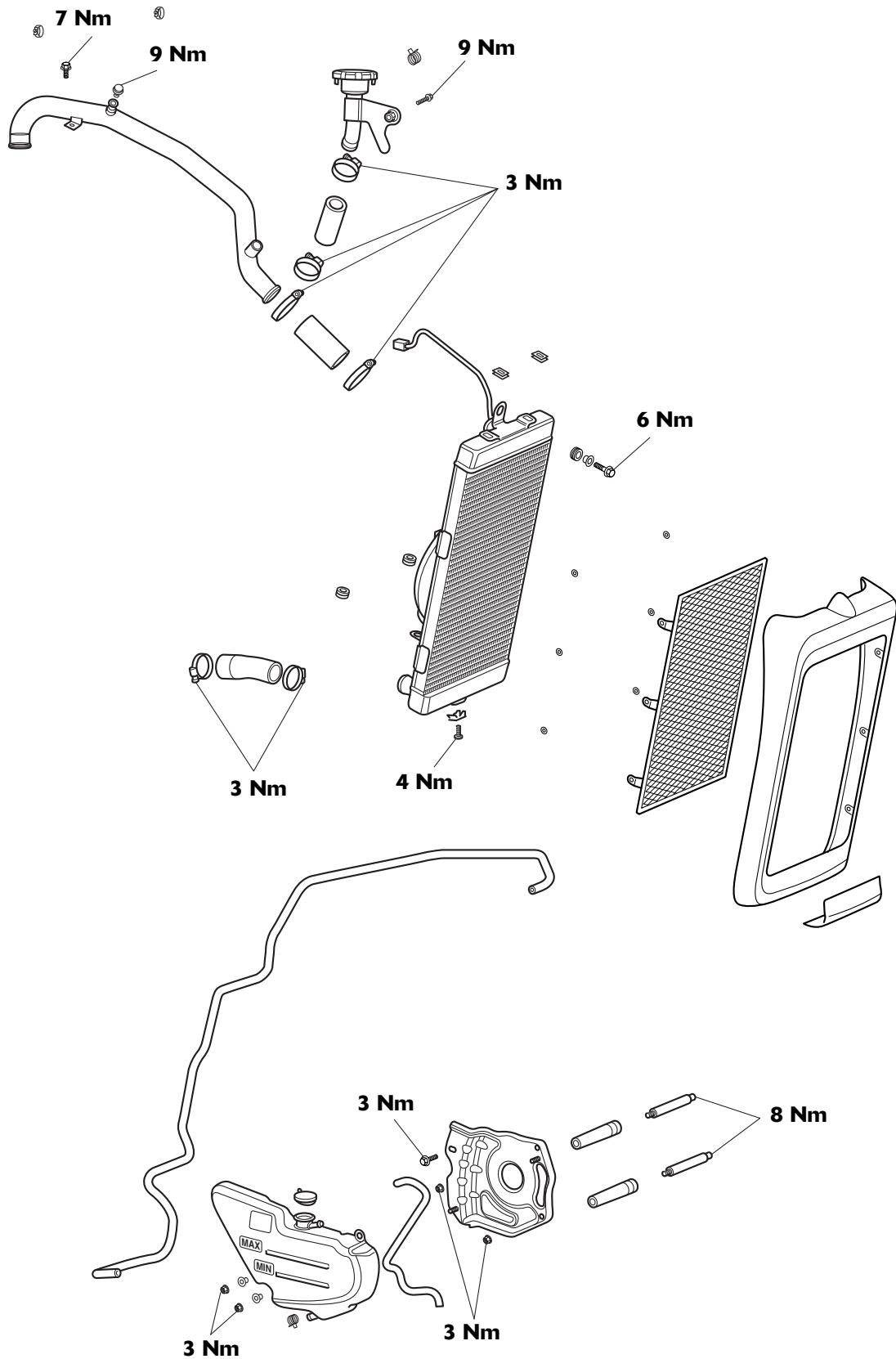
11 Cooling

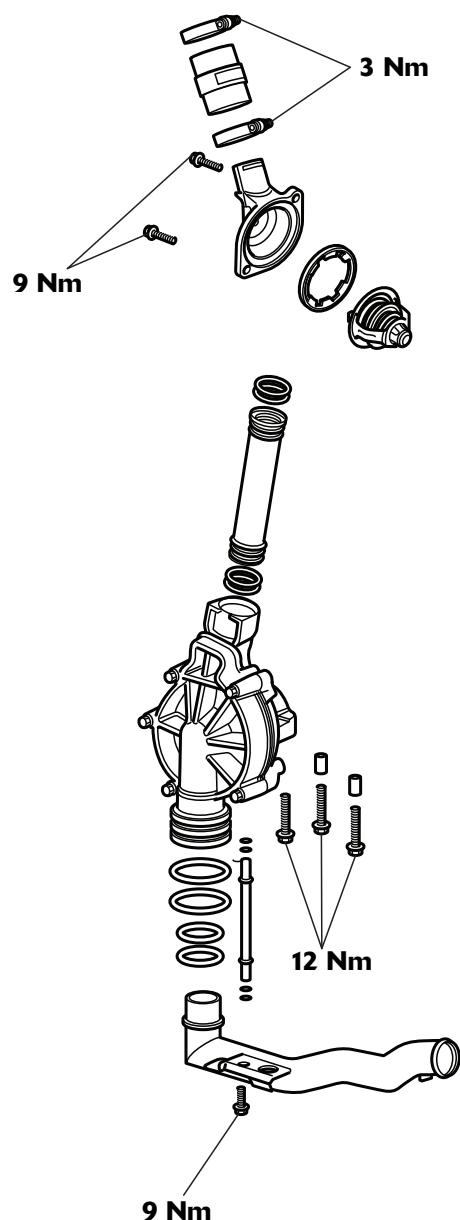
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Cooling

Exploded View – Radiator, Expansion Tank and Hoses



Exploded View – Water Pump

Cooling

Coolant

A year-round, Hybrid Organic Acid Technology (known as Hybrid OAT or HOAT) coolant is installed in the cooling system when the motorcycle leaves the factory. It is coloured green, contains a 50% solution of ethylene glycol based antifreeze, and has a freezing point of -35°C (-31°F).

Always change the coolant at the intervals specified in the Scheduled Maintenance chart.



Warning

The standard coolant mixture contains toxic chemicals that are harmful to the human body. Never swallow neat antifreeze or any of the coolant mixture.



Caution

The antifreeze incorporated in the coolant mixture contains a corrosion inhibitor that helps prevent damage to the cooling system and engine. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage.

Always use the antifreeze listed in the Specification section and never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.

Note:

- HD4X Hybrid OAT coolant, as supplied by Triumph, is premixed and does not need to be diluted prior to filling or topping up the cooling system.**

Radiator Hoses

Regularly check all radiator hoses and hose clips for cracks, leaks or deterioration.

Radiator and Cooling Fan

The motorcycle is fitted with a thermostatically controlled electric fan situated behind the radiator. When the fan operates with the motorcycle stationary or at slow speed, cool air is drawn through the radiator from the front of the motorcycle.

Check the radiator fins for obstruction by insects, mud, leaves and general debris. Clean off any obstructions by hand or with a stream of low-pressure water.



Caution

Using high pressure water, such as from a pressure-washer, can damage the radiator fins and impair the radiator's efficiency.

Do not obstruct or deflect airflow through the radiator by installing unauthorised accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

Coolant Level Inspection



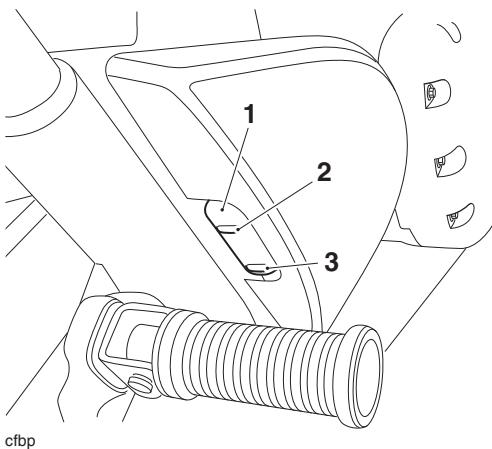
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the motorcycle on level ground and in an upright position.

Note:

- **The coolant level within the expansion tank can be inspected without removing any covers. The expansion tank can be viewed from the right hand of the motorcycle, through a window in the rear of the final drive belt cover. Always inspect the coolant level with the engine cold.**
- 2. The coolant level must be between the MAX (upper line) and MIN (lower line) marks in the expansion tank.



1. Expansion tank

2. MAX mark

3. MIN mark

3. If the coolant is below the minimum level, or exceeds the maximum, the coolant level must be adjusted.

Coolant Level Adjustment



Warning

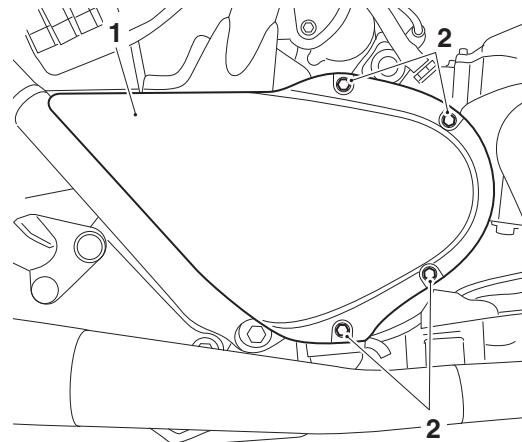
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



Warning

Do not remove the expansion tank or radiator pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Allow the engine to cool for at least 30 minutes.
2. Release the four screws and remove the final drive belt cover.



1. Final drive belt cover

2. Final drive belt cover screws

3. Remove the cap from the expansion tank, and add coolant mixture through the filler opening until the level reaches the MAX mark. Refit the cap.

Note:

- **If the coolant level is being checked because the coolant has overheated, also check the level in the radiator and top up if necessary.**
- **In an emergency, distilled water can be added to the cooling system. However, the coolant must then be drained and replenished with HD4X Hybrid OAT coolant as soon as possible.**
- 4. Align the final drive belt cover to the crankcase. Fit and tighten the four screws to **9 Nm**.

Cooling

Coolant Replacement

Drainage



Warning

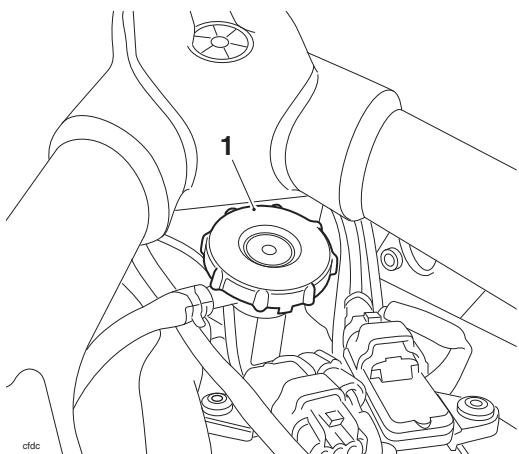
Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

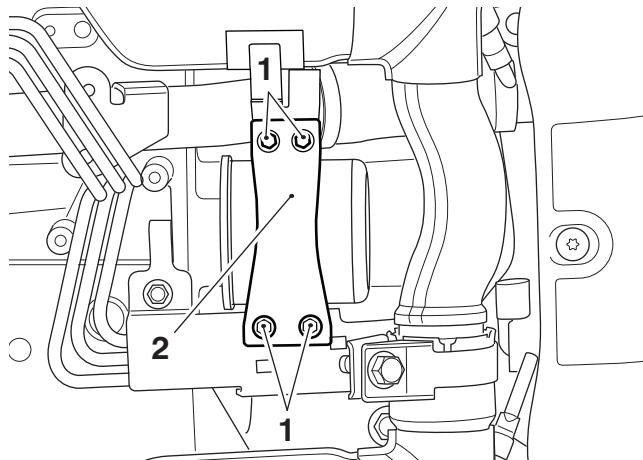
1. Remove the fuel tank (see page 10-144).
2. Remove the coolant pressure cap on the upper coolant tube.



1. Radiator cap

3. Position a container beneath the radiator to collect the displaced coolant.

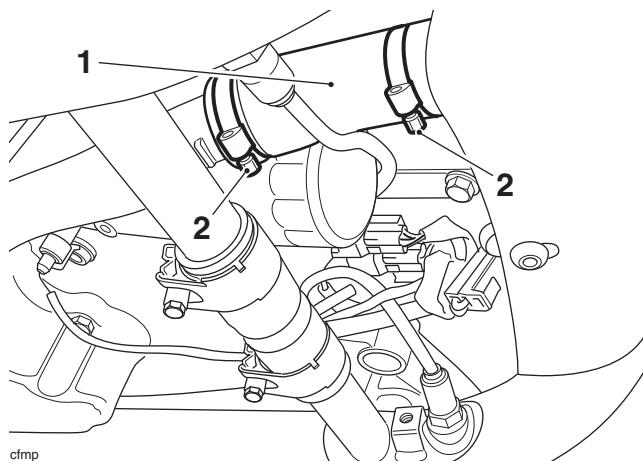
4. **For Thunderbird Commander and Thunderbird LT:** Release the fixings and remove the catalytic converter mounting bracket.



1. Fixings

2. Clamp

5. Release the hose clips, detach the bottom hose from the radiator and allow the coolant to drain out.

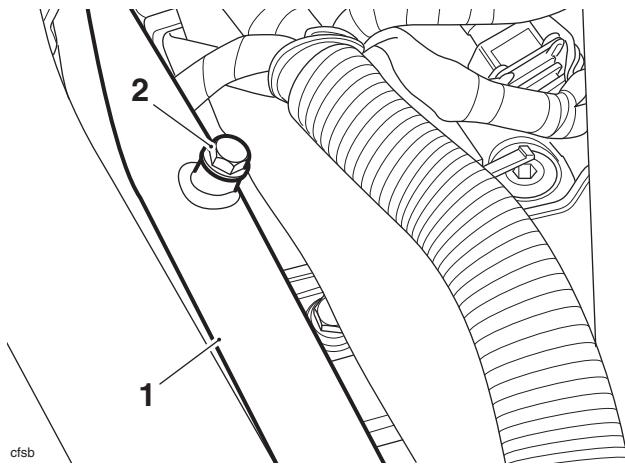


1. Bottom hose

2. Hose clips

Filling

6. Reconnect the bottom hose and tighten the clips to **3 Nm**.
7. Open the cooling system bleed screw, located below the fuel tank.



1. Coolant pipe
2. Bleed screw

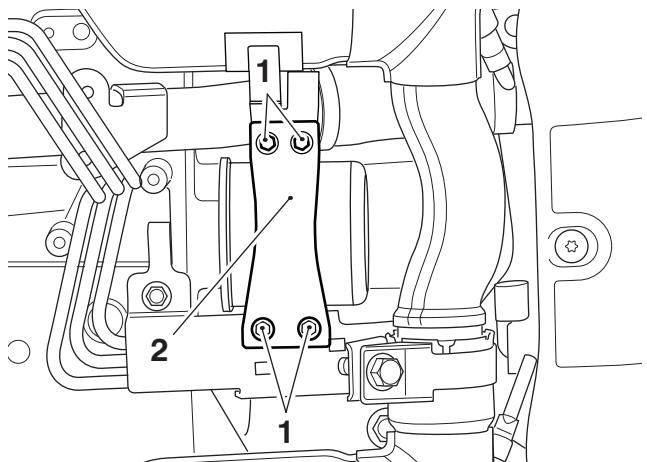
8. Slowly add coolant mixture to the system, through the filler opening below the fuel tank, until coolant escapes from the bleed screw. Close the bleed screw, tightening it to **9 Nm**.
9. If necessary, top up the system through the radiator filler.
10. Refit the pressure cap.
11. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system.

**Warning**

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

12. Stop the engine and allow it to cool. Top up the coolant level as necessary.
13. Refit the coolant pressure cap.
14. Refit the fuel tank (see page 10-146).

15. **For Thunderbird Commander and Thunderbird LT:** Refit the catalytic converter mounting and tighten the fixings to **12 Nm**.



1. Fixings
2. Clamp

16. Check the expansion tank level and top up if necessary (see page 11-5).

Cooling

Water Pump

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

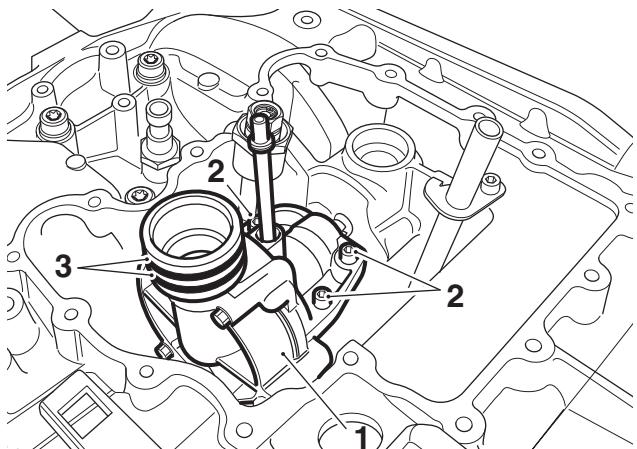
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.



Warning

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

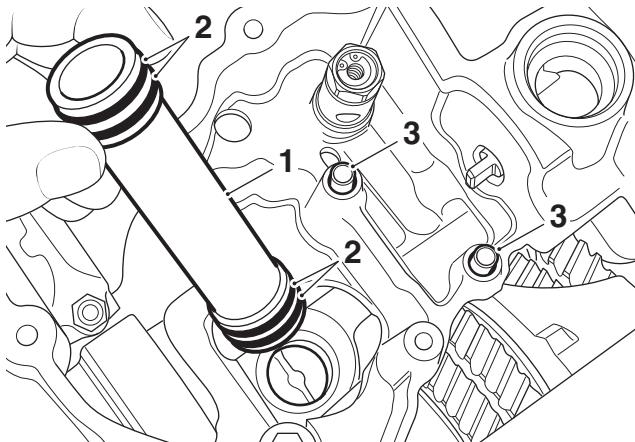
3. Drain the coolant (see page 11-6).
4. Remove the sump (see page 8-10).
5. Release the three bolts securing the water pump to the crankcase.



1. Water pump
2. Fixings
3. O-rings

6. Withdraw the water pump, collecting the two locating dowels as you do so.

7. Withdraw the water pump outlet tube from the crankcase. Remove and discard the O-rings from the tube.



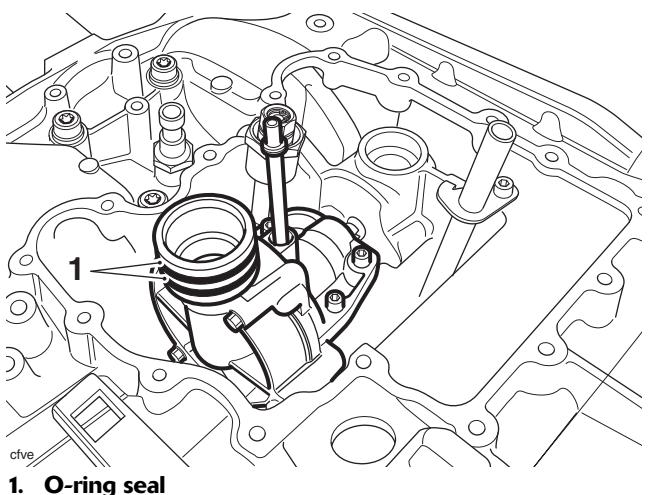
1. Outlet tube
2. O-rings
3. Water pump dowels

Inspection

1. Remove the pump outer cover to check for corrosion and scale build-up around the impeller and in the pump body. Renew if necessary.
2. Check the water pump shaft and shaft bearings for side and end float. Clean or renew if necessary.
3. Check the water pump gland for signs of leakage. Renew the pump if leakage is evident.

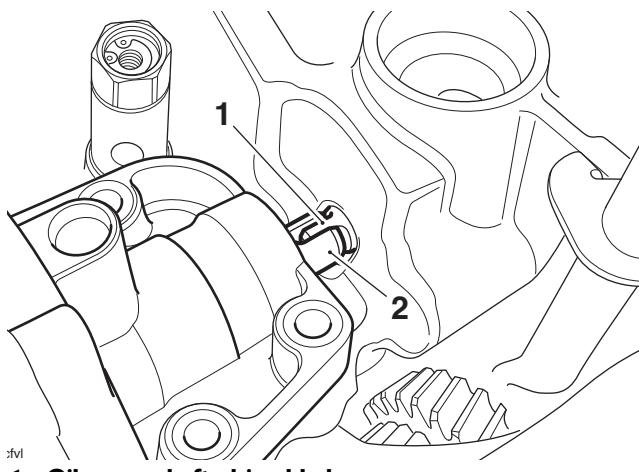
Installation

1. Fit new O-rings to the water pump outlet tube and refit the tube to the upper crankcase.
2. Replace the water pump O-ring seals.



1. O-ring seal

- Position the water pump to the crankcase, aligning the drive slot in the water pump with the drive blade on the oil pump shaft.



**1. Oil pump shaft, drive blade
2. Water pump slot**

Note:

- The water pump will not engage fully into the crankcase unless the drive slot and blade are aligned and engaged.**
- Fit the pump ensuring it correctly locates on the two dowels and tighten the fixings to **12 Nm**.
- Refit the sump (see page 8-11).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).
- Refill the cooling system (see page 11-7).

Coolant Pressure Cap and Coolant System Testing

Inspection

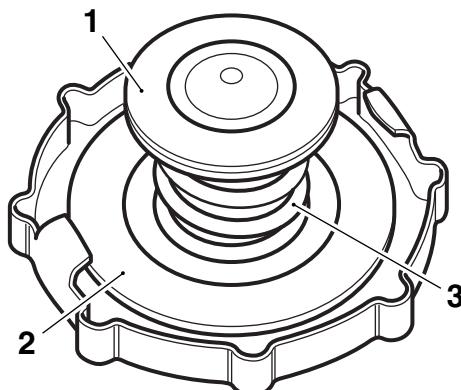
! Warning

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Allow the engine temperature to cool for at least 30 minutes.
- Remove the coolant pressure cap as described in the Coolant Drain section on page 11-6.
- Check the condition of the upper and lower seals of the coolant pressure cap.



**1. Lower Seal
2. Upper Seal
3. Spring**

Note:

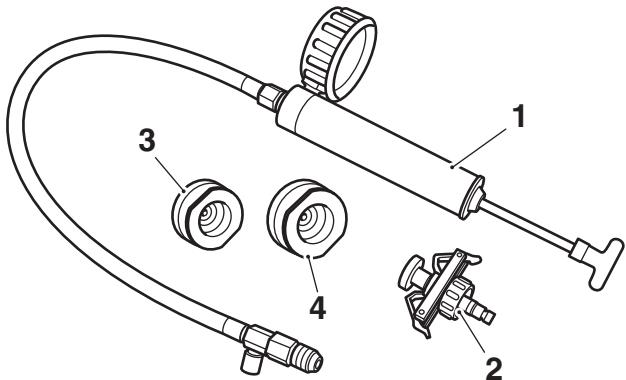
- If there is any sign of damage or deterioration replace the cap.**
- Pressure test the cap and cooling system to the blow off pressure of 1.2 bar as described below using T3880147.

Note:

- It is recommended to carry out coolant pressure cap and cooling system pressure tests consecutively.**

Cooling

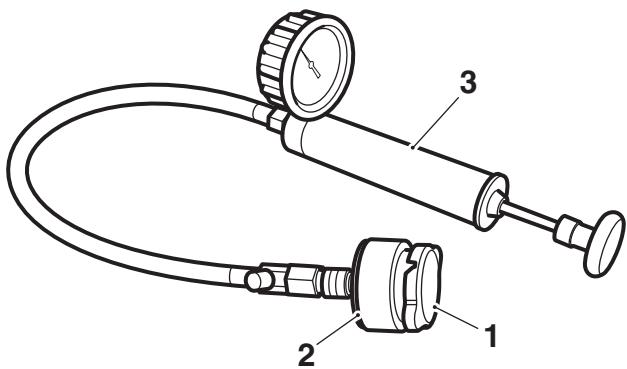
Coolant Pressure Cap Test



cgwp

1. Hand held pump
2. Bayonet type connector
3. Pressure cap test adapter 44 mm
4. Pressure cap test adapter 46 mm

1. Select the correct test adapter and securely fasten to the pressure cap.
2. Carefully connect the hand pump to the adapter ensuring an air tight seal is maintained.

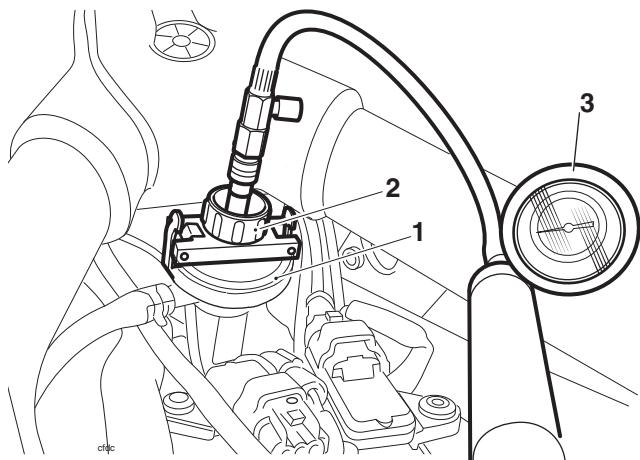


cgwq

1. Pressure cap
 2. Test adapter
 3. Hand held pump
3. Pressure test the cap to its 1.2 bar blow off pressure. If the coolant cap opens at a lower pressure, fails to open at the correct pressure or the seal leaks, replace the cap.

Coolant System Pressure Test

1. Select the bayonet type adapter and securely fasten to the radiator.
2. Carefully connect the hand pump to the bayonet connector ensuring an air tight seal is maintained.

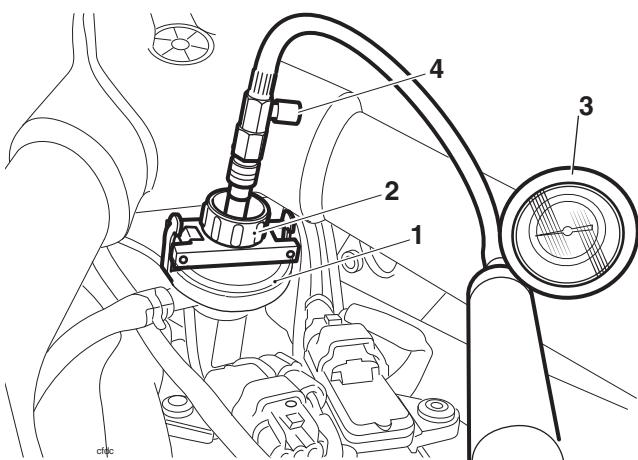


1. Radiator filler
 2. Bayonet type connector
 3. Hand held pump
3. Pressurise the cooling system to the operating pressure, using the hand pump taking care not to exceed 1.2 bar.
 4. Hold the pressure for a minimum of 10 minutes, whilst visually inspecting the external components of the coolant system for leaks.
 5. Remove the engine oil filler cap/dipstick and check for contamination of the engine oil caused by coolant escaping into the engine sump.

Note:

- If the engine oil is contaminated further exploratory investigation will be required.
- If the engine oil is contaminated rectify the cause of the problem and then renew the oil and filter.

- Depressurise the coolant test kit using the pressure release valve.



- Radiator filler
- Bayonet type connector
- Hand held pump
- Pressure release valve
- Refit the pressure cap as described in the Coolant Fill section on page 11-7.
- Fill the coolant to the maximum mark (see page 11-7).

Thermostat

Removal

Note:

- Prior to disassembly of the coolant hoses, note the orientation and position of the hose clips to help ensure that they are returned to the same positions and orientation on assembly.

Warning

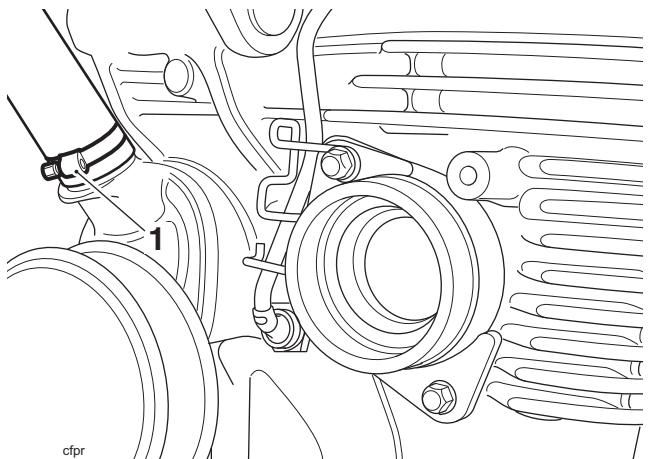
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Remove the rider's seat (see page 17-21).
- Disconnect the battery, negative (black) lead first.
- Drain the coolant (see page 11-6).
- Remove the throttle body (see page 10-171).

Warning

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

- Release the top hose clip at the thermostat housing.



1. Top hose

- Release the fixings securing the thermostat housing to the cylinder head, and withdraw the housing downwards, detaching it from the top hose as you do so.
- Remove the housing and collect the thermostat.

Cooling

Inspection

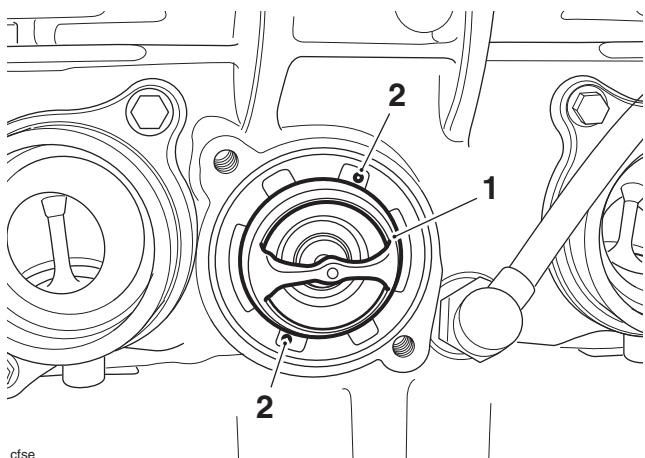
1. Inspect the thermostat at room temperature. If the valve is open, the thermostat must be replaced.
2. To check the valve opening temperature, suspend the thermostat in a container of water together with a thermometer. Raise the temperature of the water until the thermostat opens. The thermostat should start to open at $82^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
3. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

Installation

1. Clean the mating surfaces of the cylinder head and thermostat housing.
2. Position a new seal to the thermostat, seating the thermostat into the groove in the seal.

Note:

- **A new thermostat with a smaller diameter has been introduced from engine number 422367. If a replacement thermostat is required for the older engines a new seal must also be fitted.**
- 3. Locate the thermostat into the head with the centre bars of the thermostat in a horizontal position, and one of the two bypass holes positioned uppermost.



1. Thermostat
2. Bypass holes

4. Ensure the top hose clip is in position on the top hose.
5. Locate the thermostat housing to the head, ensuring that the top hose is fully seated on to the thermostat outlet. Tighten the fixings to **9 Nm**.
6. Tighten the hose clip to **3 Nm**.
7. Refit the throttle bodies (see page 10-173).
8. Reconnect the battery, positive (identified with red tape) lead first.
9. Refit the rider's seat (see page 17-21).
10. Refill the cooling system (see page 11-7).

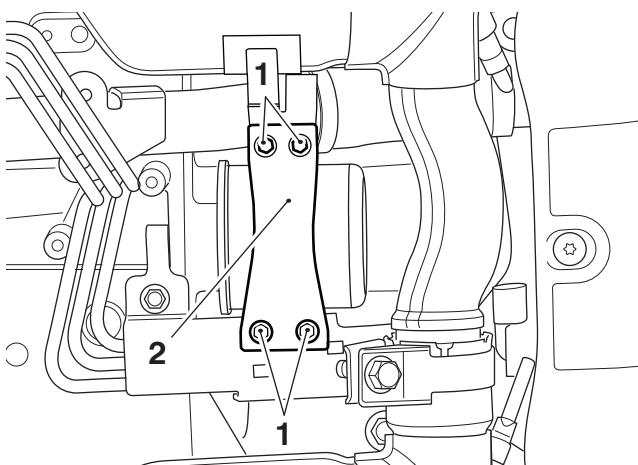
Radiator

Removal

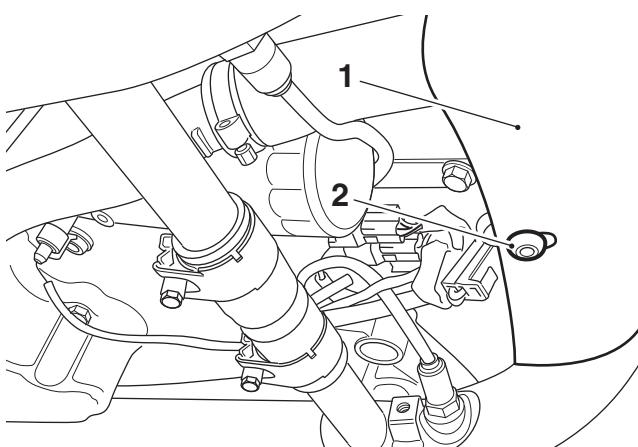
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. **For Thunderbird Commander and Thunderbird LT:** Release the fixings and remove the catalytic converter mounting bracket.



1. Fixings
 2. Clamp
4. Release the fixing and remove the radiator cowl.



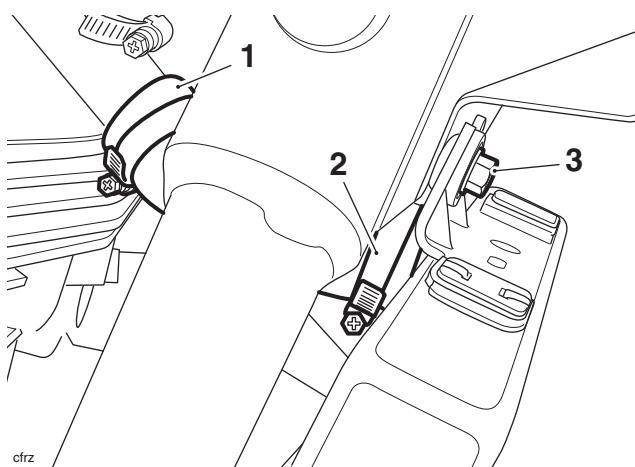
1. Radiator cowl
2. Fixing



Warning

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

5. Drain the coolant (see page 11-6).
6. Loosen the top hose clip at the radiator.
7. Remove the radiator fixing bolt.



1. Top hose
2. Top hose clip
3. Radiator fixing

8. Raise the radiator off the lower mounting studs and carefully ease towards the front of the motorcycle to disconnect the top hose.
9. Disconnect the cooling fan connector.
10. Remove the radiator from the motorcycle, taking care not to damage the radiator or front mudguard.

Inspection

1. Check the radiator for stone damage.
2. Check the radiator core, for damage to fins or obstructions to air flow.
3. Rectify any damage and clear all obstructions.



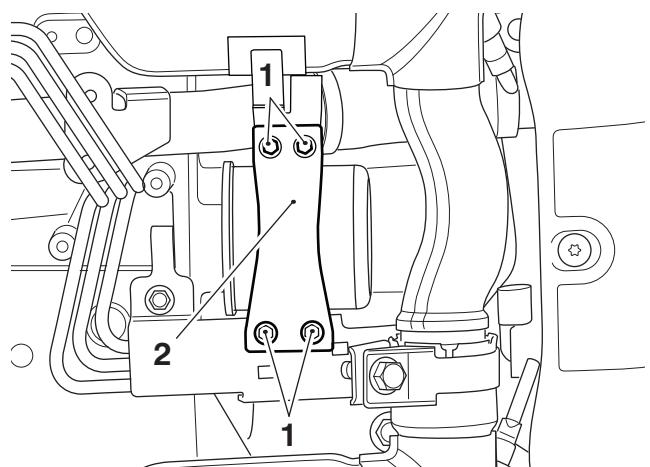
Caution

To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Check that the fan spins freely and without tight spots.
5. Check the fan blades for signs of heat distortion.

Installation

1. Ensure the hose clips are in position on the top and bottom hoses.
2. Position the radiator to the motorcycle and connect the cooling fan connector.
3. Connect the radiator to the bottom hose and align to the lower mounting studs.
4. Connect the radiator to the top hose and align to the upper fixing.
5. Refit the radiator fixing bolt. Tighten to **6 Nm**.
6. Tighten the top and bottom hose clips to **3 Nm**.
7. Refit the radiator cowl and tighten the fixing to **4 Nm**.
8. **For Thunderbird Commander and Thunderbird LT:** Refit the catalytic converter mounting and tighten the fixings to **12 Nm**.



1. Fixings
2. Clamp

9. Reconnect the battery, positive (identified with red tape) lead first.
10. Refit the rider's seat (see page 17-21).
11. Refill the cooling system (see page 11-7).

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12 Front Suspension

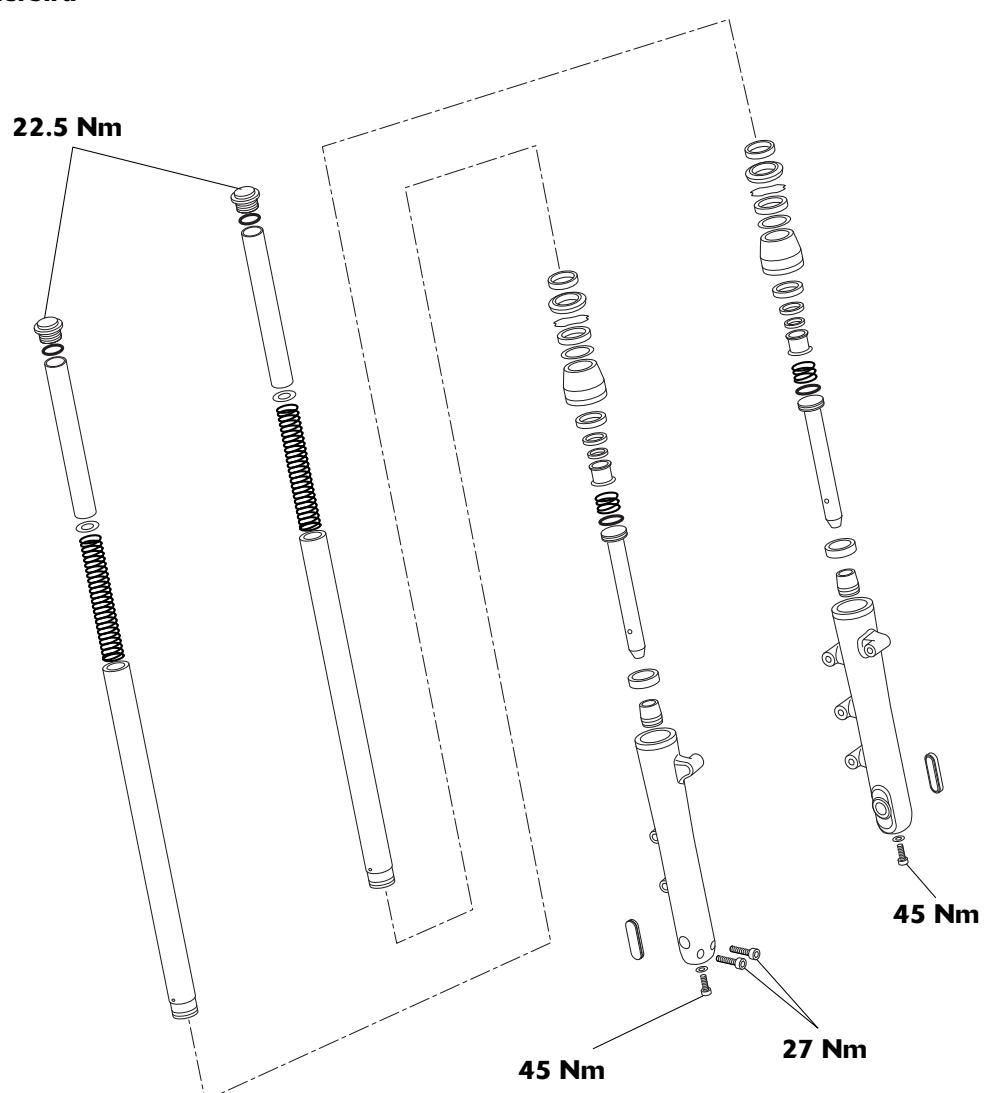
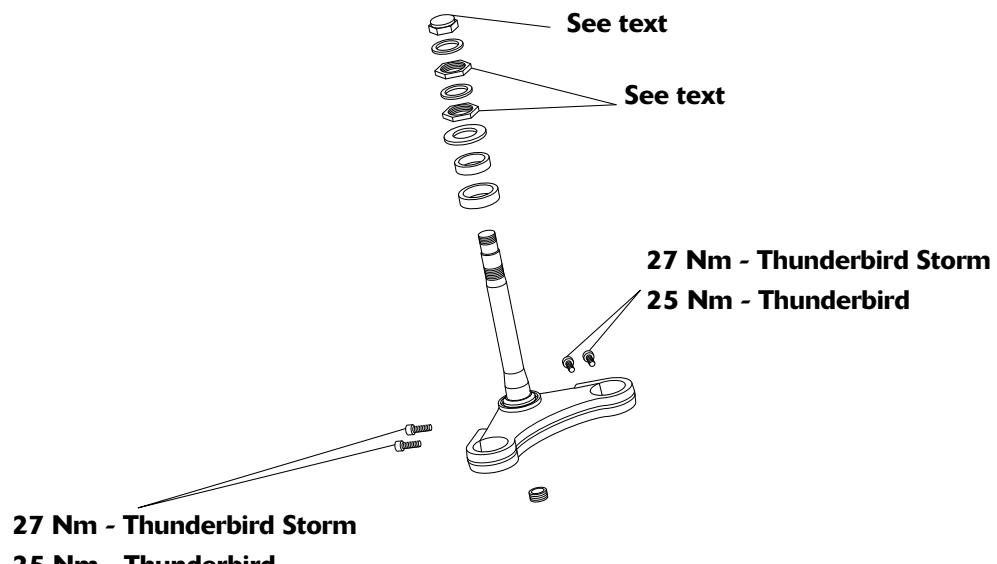
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Front Suspension

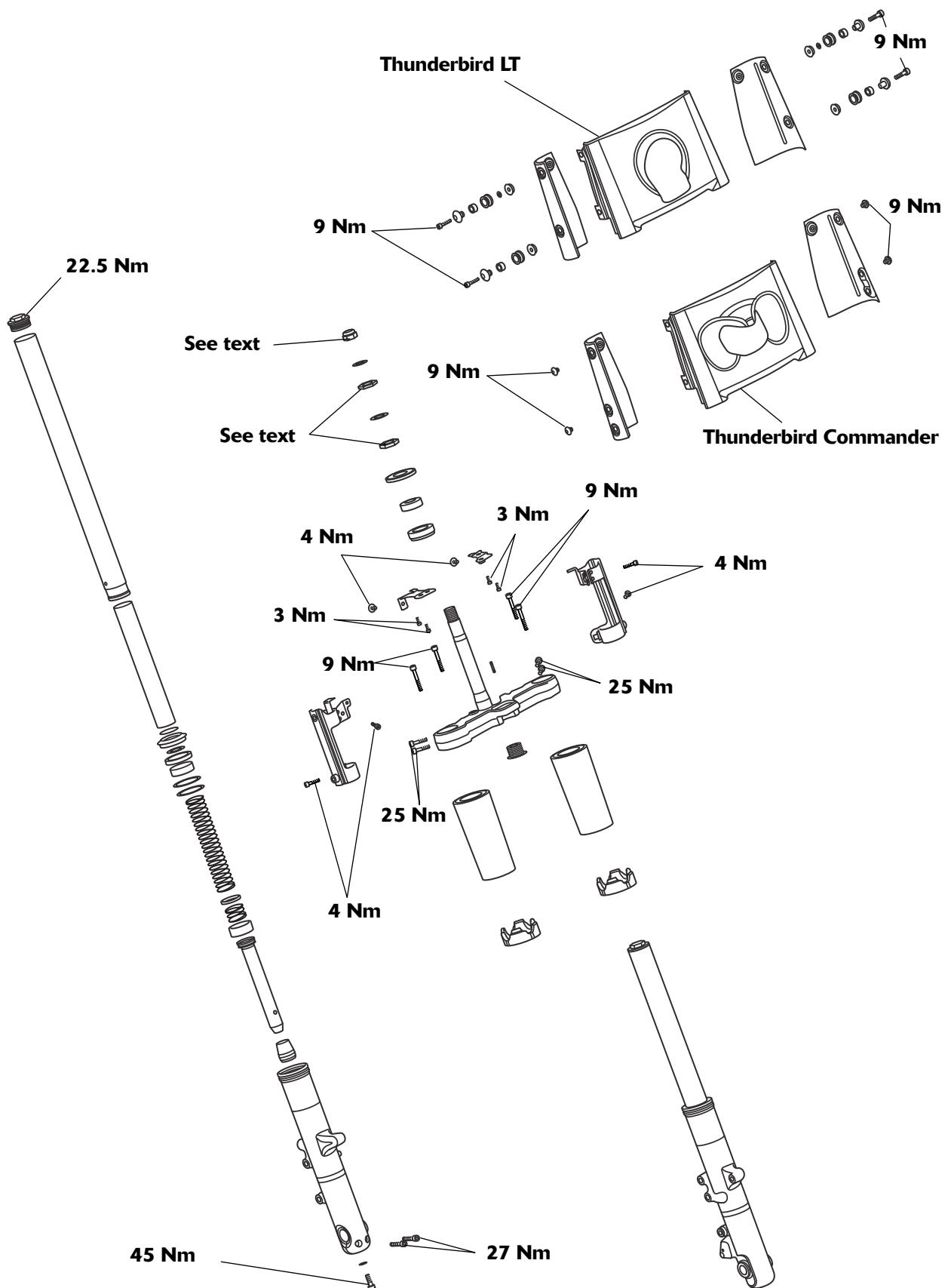
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Exploded View – Front Fork, Bottom Yoke and Steering Head Bearings – All Models Except Thunderbird Commander and Thunderbird LT

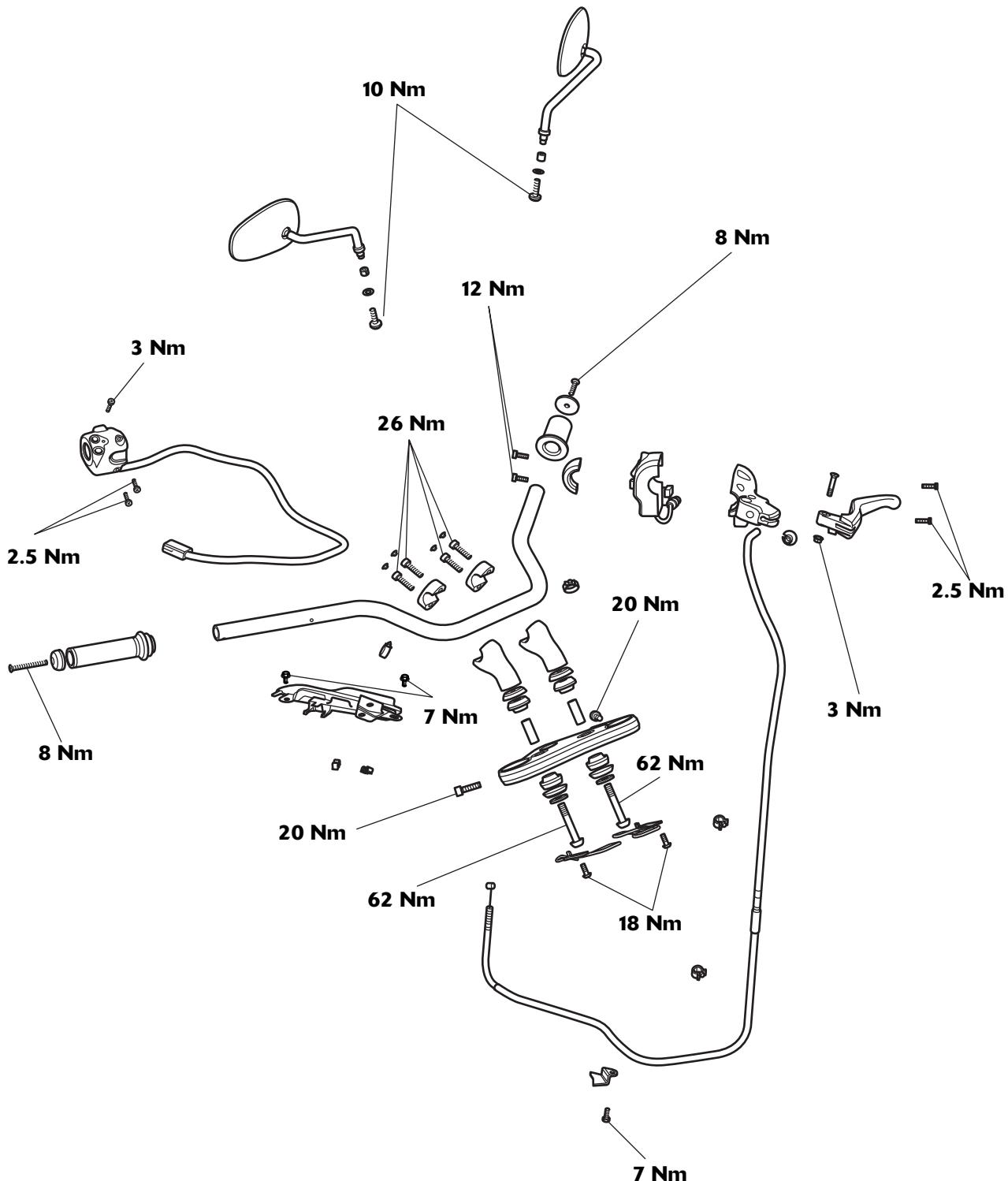


Front Suspension

Exploded View – Front Fork, Bottom Yoke and Steering Head Bearings – Thunderbird Commander and Thunderbird LT

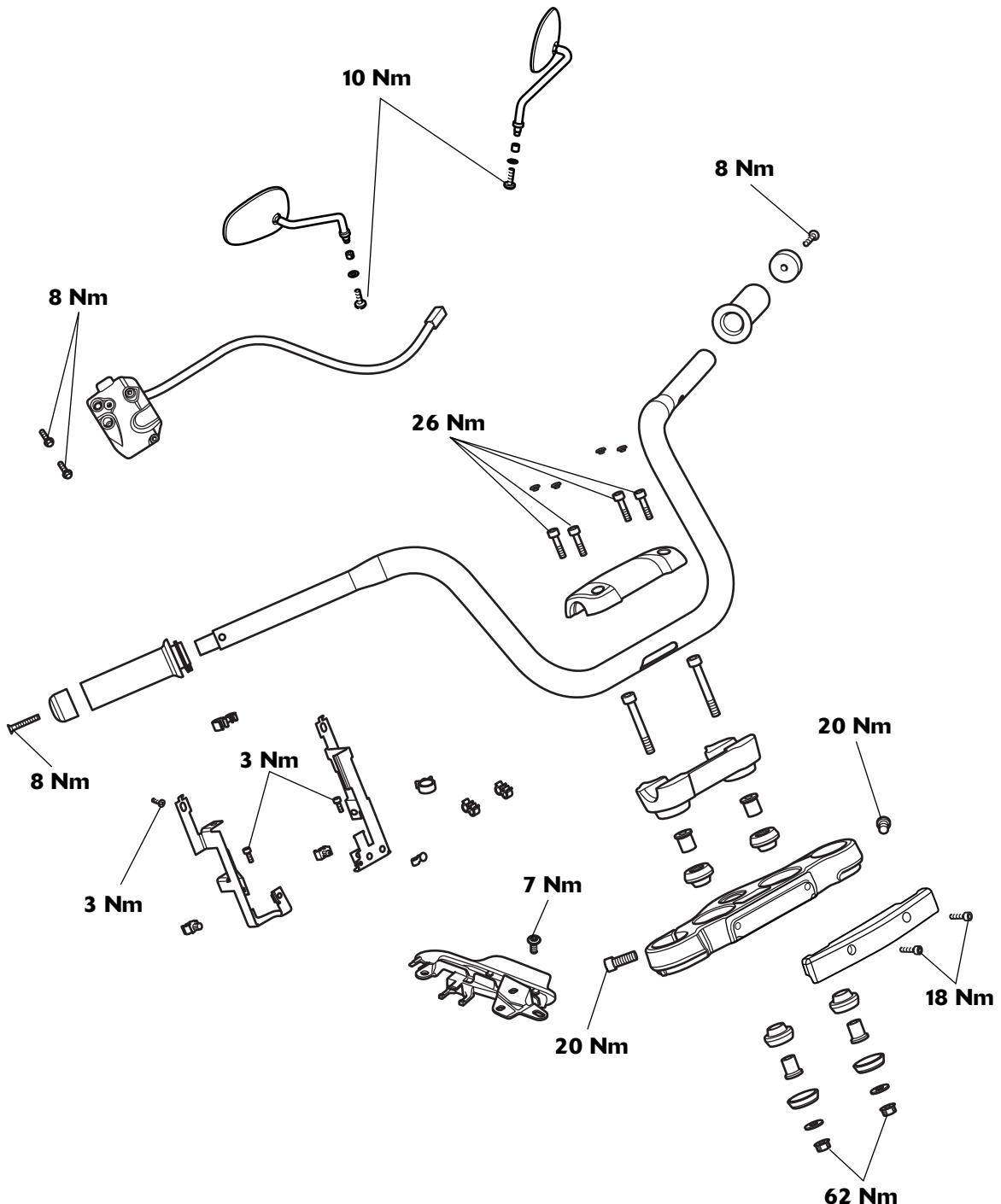


Exploded View – Handlebars and Top Yoke – All Models Except Thunderbird Commander and Thunderbird LT



Front Suspension

Exploded View – Handlebars and Top Yoke – Thunderbird Commander and Thunderbird LT



Fork Inspection

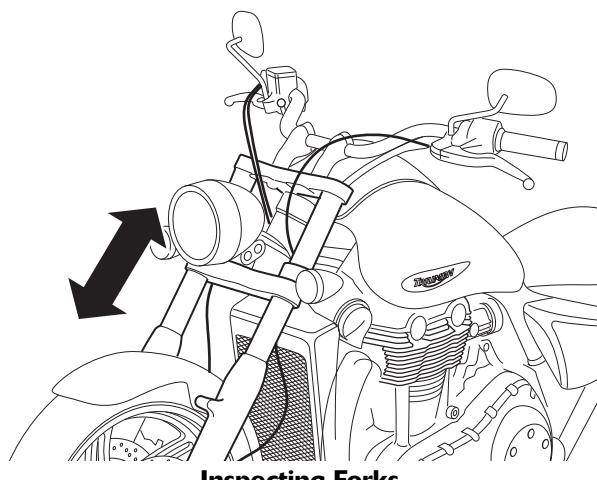
Examine each fork for any sign of damage, scratching of the slider surface, or for oil leaks.

If any damage or oil leakage is found, consult an authorised Triumph dealer.

Check that the forks operate smoothly as follows:

Position the motorcycle on level ground.

While holding the handlebars and applying the front brake, pump the forks up and down several times.



Inspecting Forks

If roughness or excessive stiffness is detected, consult your authorised Triumph dealer.



Warning

Riding the motorcycle with defective or damaged suspension is dangerous and may lead to loss of motorcycle control and an accident.

Front Fork

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the front of the motorcycle.
2. Remove the rider's seat (see page 17-20).
3. Disconnect the battery, negative (black) lead first.
4. **For Thunderbird LT:** Remove the windscreen (see page 17-41).
5. Remove the front wheel (see page 16-10).



Warning

Never allow the brake calipers to hang on the brake hoses as this may damage the hoses. A damaged brake hose can cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

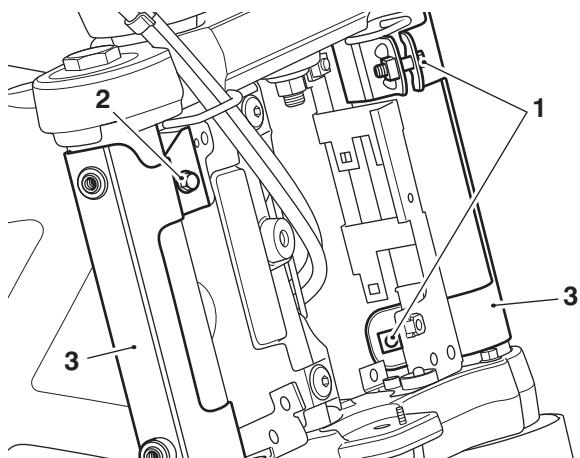
6. Remove the front mudguard (see page 17-31).

Thunderbird Commander and Thunderbird LT

7. Remove the headlight (see page 18-27).
8. Remove the front fork shrouds (see page 17-42).

Note:

- **Note the position of the harness brackets to the shroud mounting brackets for installation.**
- 9. Remove and discard the fixings securing the shroud mounting brackets to the front forks.



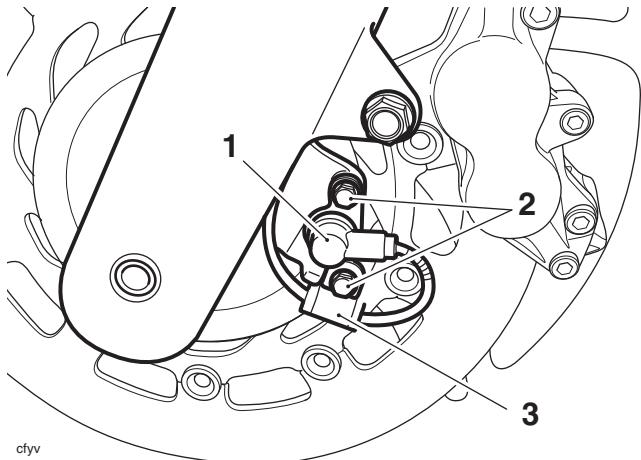
1. Left hand bracket fixings (harnesses shown removed for clarity)
2. Right hand bracket upper fixing (lower fixing behind the fork)
3. Shroud mounting brackets

Front Suspension

Models with ABS

Note:

- Note the routing of the wheel speed sensor for installation.
 - There is a shim between the wheel speed sensor and the front fork leg.
10. Release the bolt(s) securing the wheel speed sensor to the left hand fork leg, and remove the sensor, along with the P-clip, if fitted.
11. Collect the shim from between the wheel speed sensor and the front fork leg.

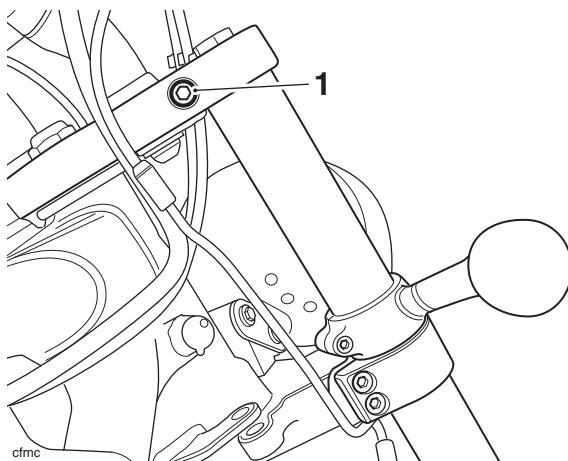


1. Front ABS wheel speed sensor (Thunderbird shown)
2. Fixings
3. P-clip (except Thunderbird Commander and Thunderbird LT)

All Models

Note:

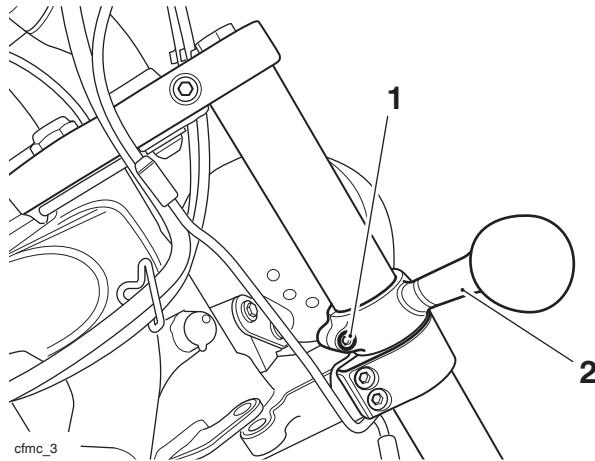
- If the forks are to be dismantled, slacken the fork top caps.
12. Slacken the top yoke clamp bolts.



1. Top yoke clamp bolt (Thunderbird shown)

All Models Except Thunderbird Commander and Thunderbird LT

13. Note the orientation and position of the direction indicators on the forks, and slacken both direction indicator bracket clamp bolts.



1. Bolts
2. Direction indicator

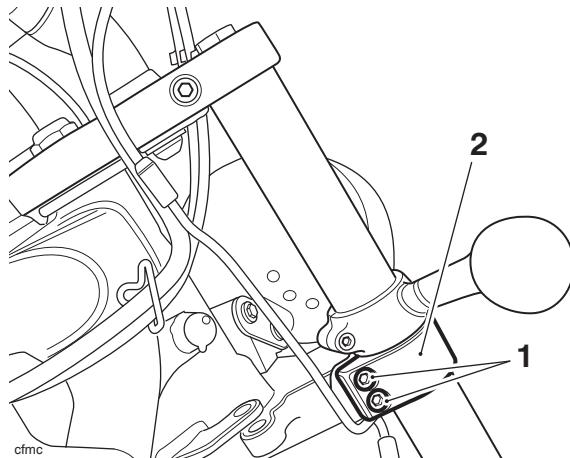
All Models



Caution

Care must be taken when removing the forks, to ensure that the outer surfaces do not become scratched.

14. Slacken the bottom yoke clamp bolts and slide the forks down through the yokes.



1. Bolt
2. Bottom yoke

15. All Models Except Thunderbird Commander and Thunderbird LT: As the forks are released, slide the direction indicator brackets off the forks and tie aside. Do not allow the direction indicators to hang on the wiring harnesses.
16. Remove the forks from the bottom yoke.

Installation

All models Except Thunderbird Commander and Thunderbird LT

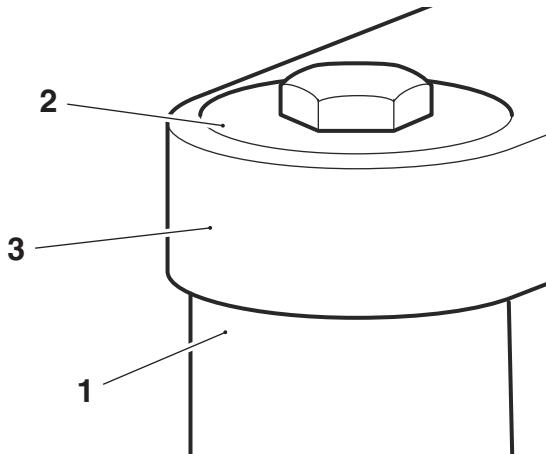
- Position the indicator clamp end between the upper and lower yoke.
- Install each fork through the bottom yoke, and slide the direction indicator clamp on to the forks.

Thunderbird Commander and Thunderbird LT

- Install each fork through the bottom yoke and the shroud support brackets.

All Models

- Position the fork through the top yoke so that the flat upper surface of the top cap is flush with the upper surface of the top yoke.



- Outer tube**
- Outer tube top cap**
- Top yoke**

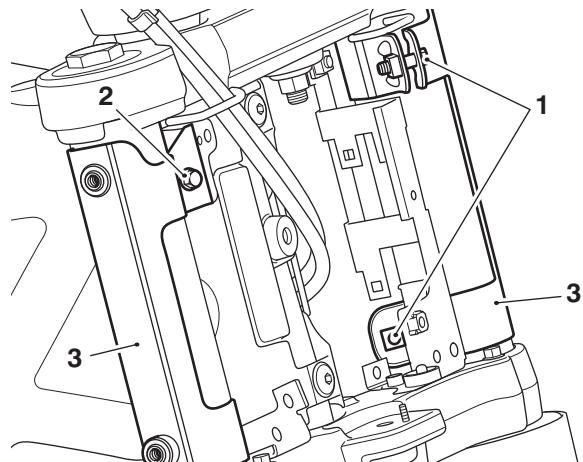
- Tighten the bottom yoke clamp bolts to:
 - 27 Nm** for Thunderbird Storm
 - 25 Nm** for all models except Thunderbird Storm.
- If the fork top caps have been loosened, tighten them to **22.5 Nm**.
- Tighten the top yoke clamp bolts to **20 Nm**.

All Models Except Thunderbird Commander and Thunderbird LT

- Reposition the direction indicator brackets as noted for removal. Ensure the direction indicator harness is correctly routed in the groove in the bracket, and that the wiring is not trapped by the bracket. Tighten their fixings to **9 Nm**.

Thunderbird Commander and Thunderbird LT

- Tighten the new fixings for the shroud support brackets to **4 Nm**.



- Left hand bracket fixings (harnesses shown removed for clarity)**
- Right hand bracket upper fixing (lower fixing behind the fork)**
- Shroud mounting brackets**



Warning

Move the handlebars to the left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

- Refit the front fork shrouds (see page 17-43).
- Refit the headlight (see page 18-29).
- For Thunderbird LT:** Refit the windscreens (see page 17-41).

All Models

- Refit the front mudguard (see page 17-31).
- Install the front wheel (see page 16-11).

Models with ABS

- Fit the wheel speed sensor to the left hand fork leg. Secure the sensor harness to the fork leg as noted for removal and tighten the fixing(s) to **7 Nm**.
- The air gap between the wheel speed sensor ring and the sensor must be between 0.37 mm and 1.25 mm. Check, and if necessary, adjust the air gap (see page 14-38).

All Models

- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).
- Lower the motorcycle to the ground and park it on the side stand.

Front Suspension

Fork Oil Change

Oil draining

1. Remove the fork assembly (see page 12-7).
2. Secure the fork inner tube upright in a soft jawed vice.

Caution

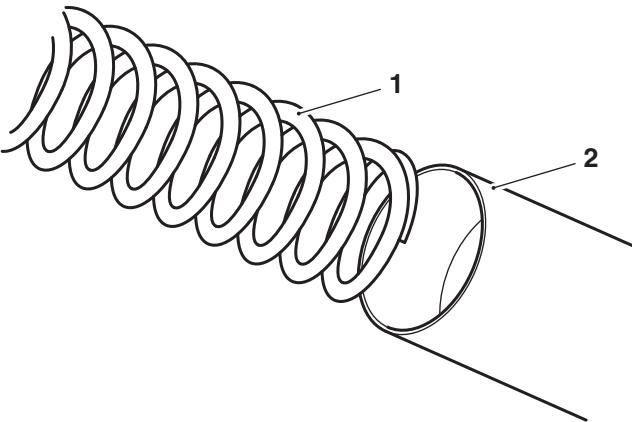
When securing the fork in a vice, take great care not to overtighten the vice as this will cause the fork tube to distort beyond repair.

3. Carefully unscrew the top cap from the inner tube.

Warning

The top cap is under pressure from the fork spring. As the last few threads of the cap are unscrewed, keep the cap pushed firmly into the tube to prevent it being forcibly expelled as the threads release. To prevent injury, always wear eye, face and hand protection when removing the top cap.

5. Lift out the spring.



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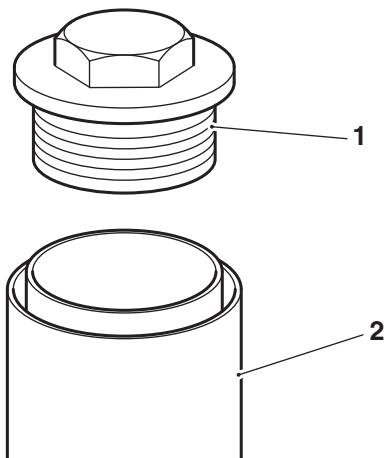
1. Spring
2. Fork tube

6. Invert the fork and pour out the fork oil into a suitable container. Pump the fork assembly to remove all oil.

Oil Refilling

The oil level is measured from the upper surface of the fork inner tube, with the spring removed and the fork fully compressed.

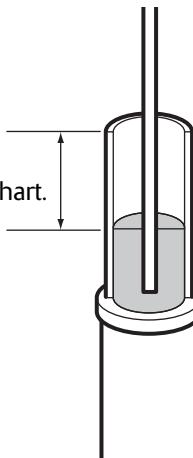
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1. Top cap
2. Fork tube

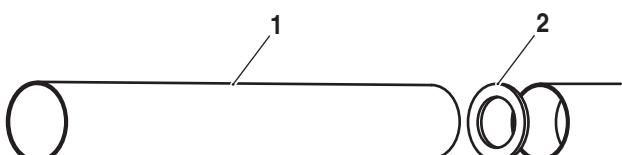
4. Remove the spacer and spring seat.

For the measurement,
refer to the fork oil level chart.



**Fork Oil Level (spring removed and the fork
fully compressed)**

cbyf



1. Spacer
2. Spring seat

Fork Oil Level Chart

All Models Except Thunderbird Commander and Thunderbird LT			
Oil Level*	Oil Volume	Oil Grade	Fork Pull Through
106 mm	677 cc	Showa AHSS8 (SAE 10W)	Upper surface of top cap flush with upper surface of top yoke
Thunderbird Commander and Thunderbird LT			
Oil Level*	Oil Volume	Oil Grade	Fork Pull Through
90 mm	720 cc	Showa AHSS8 (SAE 10W)	Upper surface of top cap flush with upper surface of top yoke

*Spring Removed and Fork Fully Compressed



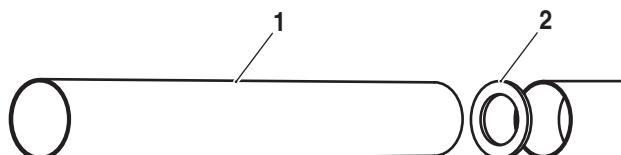
Warning

Any variation from the figures quoted in the fork oil level chart could result in an unsafe riding condition leading to loss of motorcycle control and an accident.

7. Return the fork to an upright position and fill the fork with Showa AHSS8 (SAE 10W) fork oil until the oil level is slightly above the recommended level.
8. Pump the fork assembly several times to expel any trapped air then fully compress the fork and support it in an upright position. Leave the fork for a few minutes to allow the oil level to stabilise.
9. Refer to the oil level chart and set the scale on tool 3880160-T0301 to the specified level.

Note:

- Zero level on the tool is set at the small exit hole in the side of the scale tube, NOT AT THE END TIP. Do not attempt to block this side hole as this will cause the final fluid level to be incorrect.
- 10. Insert the scale end of the tool into the fork inner tube.
- 11. Hold the tool adjuster plate level with the upper surface of the fork inner tube and draw fluid into the syringe until fluid flow ceases (empty the syringe if the body becomes full before fluid flow stops).
- 12. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.
- 13. Extend the inner tube and insert the fork spring.
- 14. Fit the spring seat and spacer.



1. Spacer
2. Spring seat

15. Lubricate the O-ring with a smear of fork oil then screw the top cap fully into the inner tube.



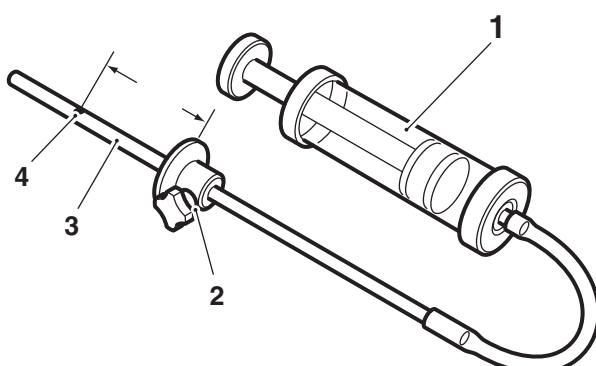
Warning

Keep the top cap under pressure until you are sure it is fully engaged with the inner tube threads. To prevent injury, always wear eye, face and hand protection when refitting the top cap.

16. Refit the fork (see page 12-9) and tighten the top cap to **22.5 Nm**.

Note:

- It is much easier to tighten the top cap when the fork is securely clamped in the top yoke.



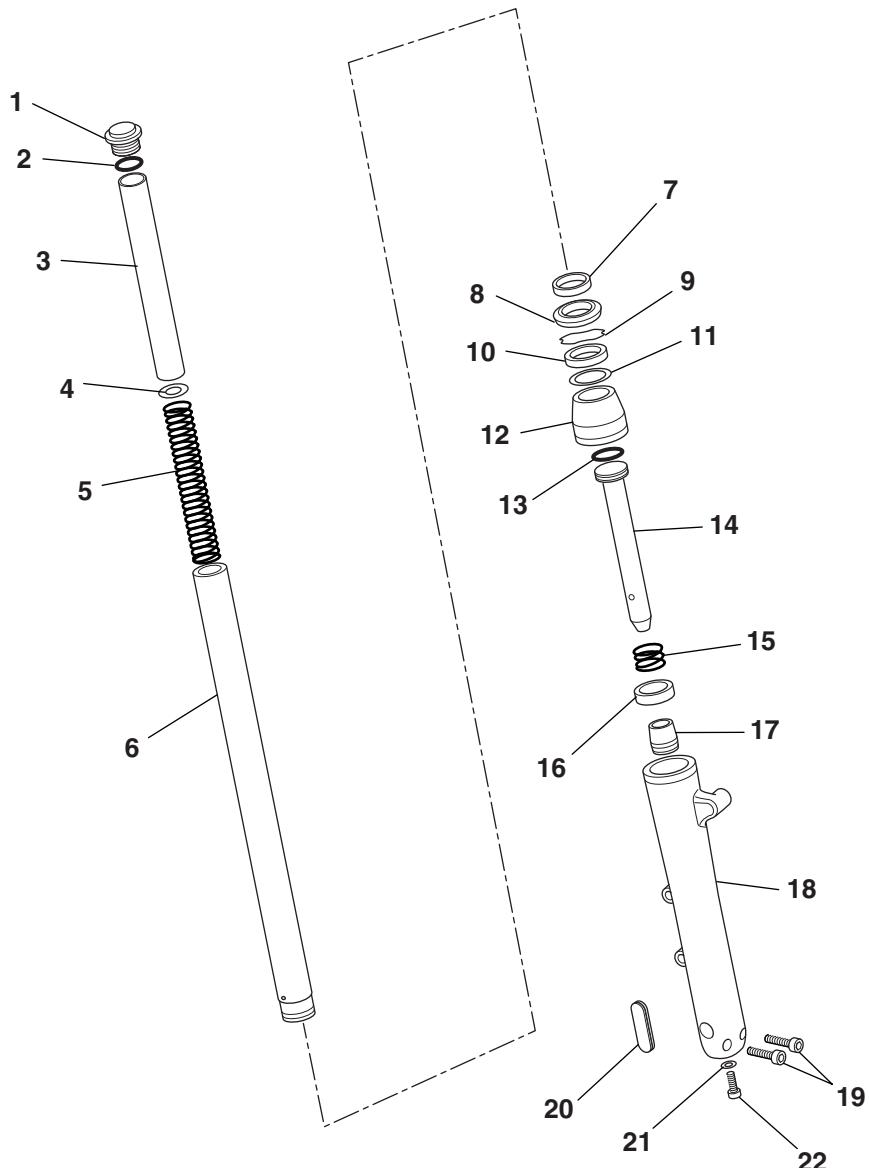
cbyg

1. Tool 3880160-T0301
2. Adjuster plate
3. Scale area
4. Hole (zero position)

Front Suspension

Front Fork

Disassembly



Fork Components (Thunderbird shown)

1. Top cap
2. O-ring
3. Spacer
4. Spring seat
5. Spring
6. Inner tube
7. Bush (upper)
8. Dust seal
9. Circlip
10. Oil seal
11. Washer
12. Chrome cap (all models except Thunderbird Commander and Thunderbird LT)
13. Damper seal
14. Damper rod
15. Rebound spring
16. Bush (lower)
17. Oil lock
18. Outer tube
19. Axle pinch bolts
20. Reflector (if fitted)
21. Sealing washer
22. Damper cylinder bolt



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

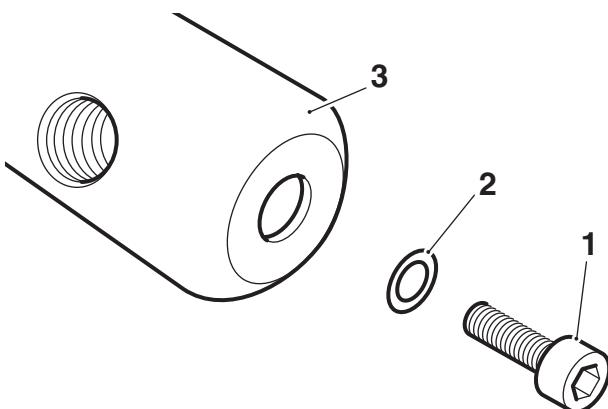
1. Remove the fork assembly (see page 12-7).
2. If not already done, release the torque on the damping cylinder bolt, then lightly retighten it to prevent fluid loss.



Caution

When securing the fork in a vice, take great care not to overtighten the vice as this will cause the fork tube to distort beyond repair.

3. Drain the fork oil (see page 12-10).
4. If fitted, carefully remove the chrome cap from the fork outer tube (18), using a suitable pin punch. Locate the pin punch in the recess in the fork leg, located above the front mudguard mountings.
5. Remove the damper rod bolt and sealing washer from the base of the outer tube. Discard the sealing washer.



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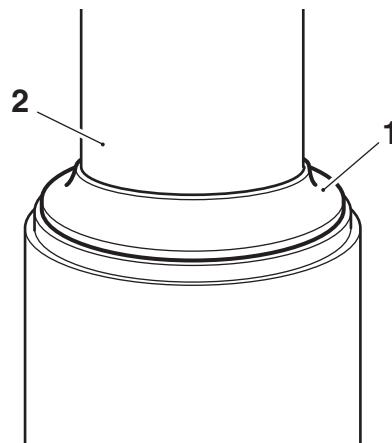
1. Damper rod bolt

2. Sealing washer

3. Outer tube

6. Invert the fork and tip out the damper rod and rebound spring.

7. Ease the dust seal out of position and slide it off the inner tube.

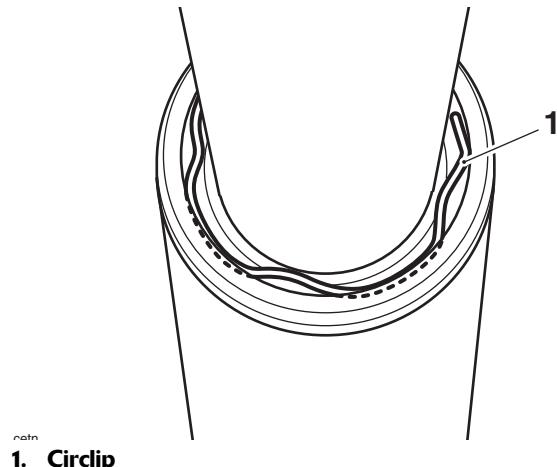


ceto

1. Dust seal

2. Inner tube

8. Carefully ease the circlip out from the top of the outer tube.



cetn

1. Circlip



Caution

Keep the fork fully compressed whilst removing the circlip. Any accidental damage to the inner tube will then be confined to the area which is normally above the oil seal.

9. Compress the fork then pull the inner tube sharply out of the outer tube. Repeat this procedure until the top bush and seal are forced out of position and the inner and outer tube can be separated.
10. Invert the outer tube and tip out the damper rod seat.
11. Slide the oil seal, washer and upper bush off the top of the inner tube.
12. Carefully slide the lower bush off the inner tube.

Front Suspension

Inspection

1. Thoroughly clean and examine all components for damage, wear, scoring, corrosion etc., paying particular attention to the bushes and damper rod piston ring. Renew as necessary.
2. Always renew the oil seal, dust seal and the damper rod bolt sealing washer every time the fork is dismantled.

Assembly



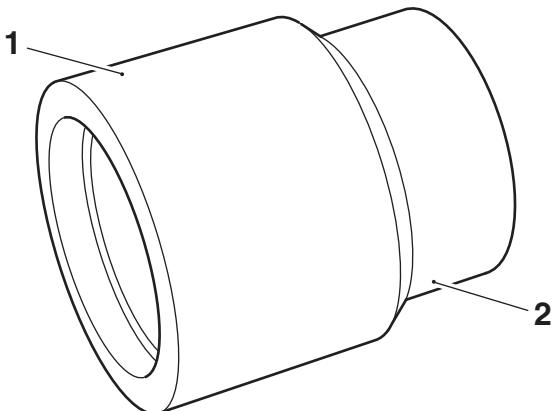
Warning

The front forks comprise many precision machined parts. Total cleanliness must be observed at all times and assembly must take place in a dirt/dust-free environment.

Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of control or an accident.

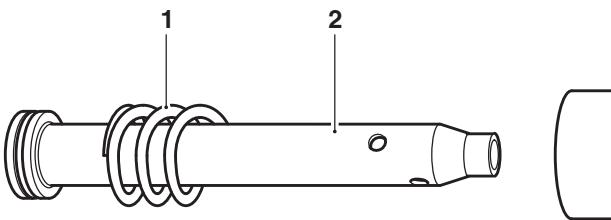
Note:

- During assembly of the fork, tool T3880131 will be used extensively. In the text, reference to a plain end and a stepped end will be made. This describes the two ends of the tool as shown in the diagram below.



1. Plain end
2. Stepped end

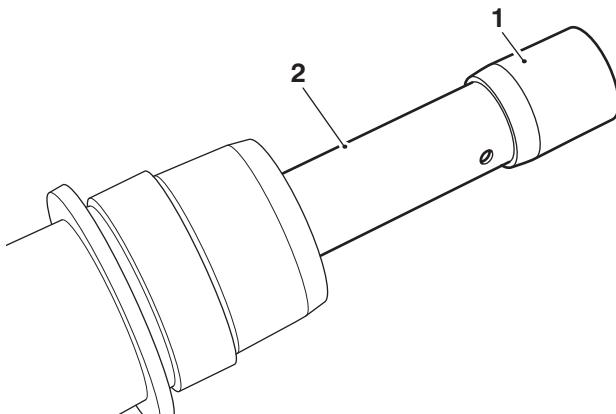
1. If removed, refit the lower bush to the inner tube.
2. Lubricate the damper rod piston ring and the upper and lower bushes with clean fork oil.
3. Fit the rebound spring to the damper rod then insert the assembly into the inner tube.



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1. Rebound spring
2. Damper rod

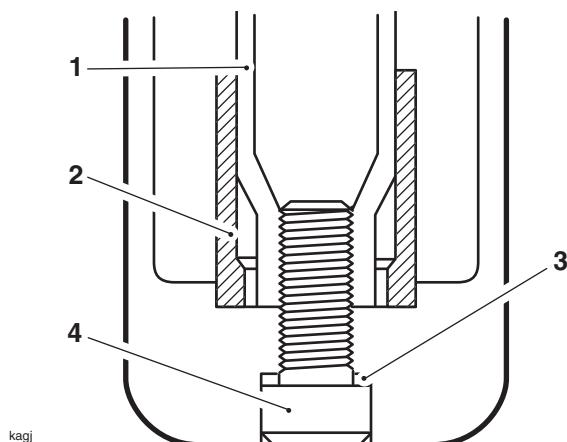
4. Fit the damper rod seat securely to the end of the damper rod then insert the inner tube assembly into the outer tube.



1. Seat
2. Damper rod

5. Fit a new sealing washer to the damper rod bolt then apply locking compound (ThreeBond 1342) to the bolt threads.

6. Ensure the damper rod and seat are correctly located in the outer tube then fit the damper rod bolt.

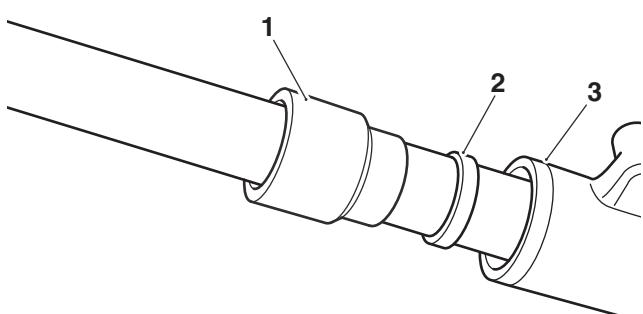


1. Damper rod
2. Seat
3. Sealing washer
4. Bolt

7. Slide the top bush along the inner tube and locate it in the outer tube. Drift the bush into position using the stepped end of tool T3880131.

Caution

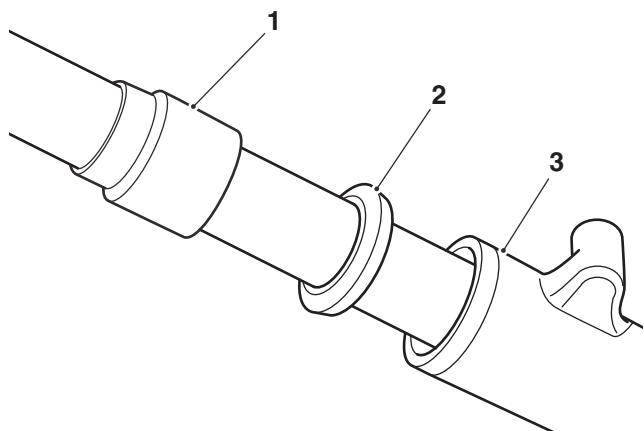
Keep the fork fully compressed whilst installing the bush, oil seal and circlip. Any accidental damage to the inner tube will then be confined to the area which is normally above the oil seal.



1. Tool T3880131
2. Top bush
3. Outer tube

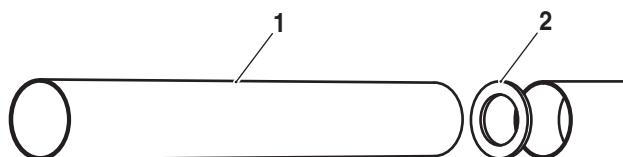
8. Slide the washer along the inner tube and locate it in the outer tube.
9. Lubricate the lip of the new oil seal with fork oil. Ensure the seal is the correct way around then ease it onto the inner tube. Drift the seal into position in the outer tube using the stepped end of tool T3880131.
10. Secure the oil seal in position with the circlip, ensuring it is correctly located in its groove.

11. Fit the new dust seal onto the inner tube and drift it into position in the outer tube using the plain end of tool T3880131.



1. Tool T3880131
2. Dust seal
3. Outer tube

12. Refill the fork with new oil (see page 12-11).
13. Extend the inner tube and insert the fork spring.
14. Fit the spring seat and spacer.



1. Spacer
2. Spring seat

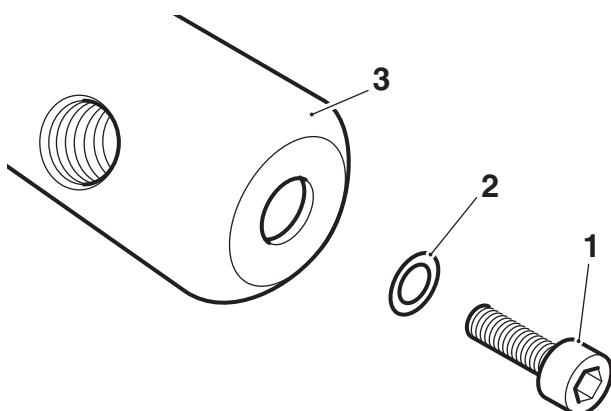
15. Lubricate the O-ring with a smear of fork oil then screw the top cap fully into the inner tube.

Warning

Keep the top cap under pressure until you are sure it is fully engaged with the inner tube threads. To prevent injury, always wear eye, face and hand protection when refitting the top cap.

Front Suspension

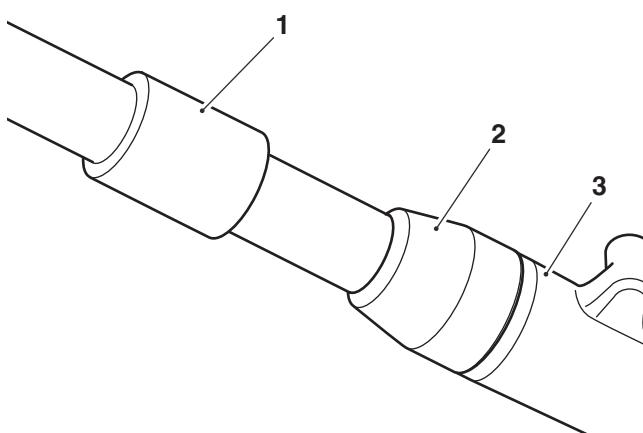
16. Tighten the damper rod bolt to **45 Nm**.



cetp

1. Damper rod bolt
2. Sealing washer
3. Fork leg

17. If removed, inspect the chrome cap for damage caused during removal, and renew if necessary. Position the chrome cap to the fork and drift into position using tool T3880132.



1. Tool T3880132
2. Chrome cap
3. Outer tube

18. Refit the fork (see page 12-9) and tighten the top cap to **22.5 Nm**.

Note:

- It is much easier to tighten the top cap when the fork is securely clamped in the bottom yoke.

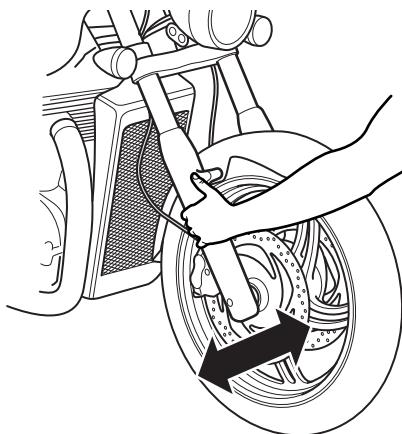
Steering Head Bearing Check and Adjustment

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Check

1. Raise and support the motorcycle so that the front wheel is clear of the ground.
2. Move the handlebars from lock-to-lock whilst checking for signs of tight spots or notchiness (bearings overtightened).
3. Hold the lower end of the front forks and try to move them forward and backward to check for signs of free play in the bearings (bearings insufficiently tightened or worn).



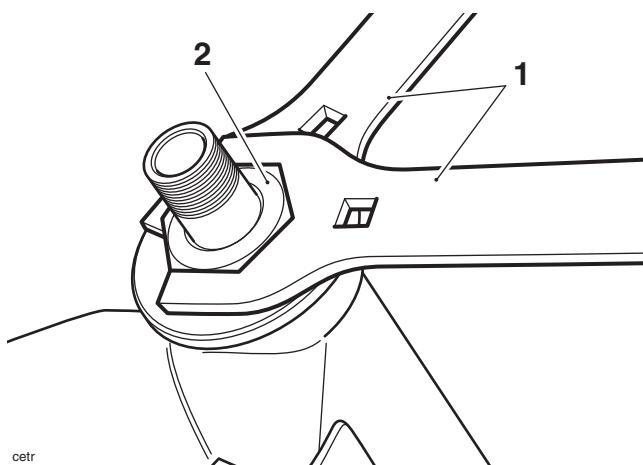
cgt

Checking for Free Play in Steering Head Bearings

4. Adjust as described below then lower the motorcycle to the ground.

Adjustment

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the top yoke (see page 12-25 for all models except Thunderbird Commander and Thunderbird LT see page 12-26 for Thunderbird Commander and Thunderbird LT).
4. Slacken the lock nut and adjuster nut.



1. Tools 3880140-T0301

2. Lock nut

5. Adjust the bearing free play as follows:
 - a) Tighten the adjuster nut to **40 Nm**.
 - b) Slacken the adjuster nut fully.
 - c) Retighten the adjuster nut to **6 Nm**.
 - d) Loosen the adjuster nut by 45°. Note that there will now be free play present.
6. With the bearing free play correctly set, hold the adjuster nut stationary then tighten the lock nut to **40 Nm** using tools 3880140-T0301.

Note:

- **Ensure the adjuster nut does not move as the lock nut is tightened.**
- 7. Refit the top yoke (see page 12-26 for all models except Thunderbird Commander and Thunderbird LT see page 12-27 for Thunderbird Commander and Thunderbird LT).
- 8. Check that the free play has been eliminated and that the steering can be turned freely from lock-to-lock without any sign of tightness. Readjust if necessary.



Warning

Operation of the motorcycle with incorrectly adjusted steering head bearings, either too loose or too tight, may cause a dangerous riding condition leading to loss of motorcycle control and an accident.

9. Reconnect the battery, positive (identified with red tape) lead first.
10. Refit the rider's seat (see page 17-20).

Front Suspension

Handlebars – All Models Except Thunderbird Commander and Thunderbird LT

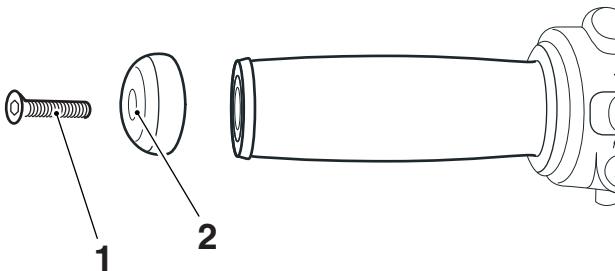


Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Removal

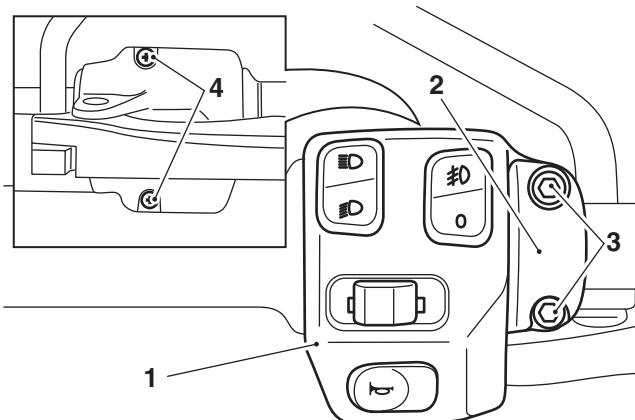
1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the right hand handlebar end weight.



1. Fixing screw
2. End weight

4. Release the wiring and brake hose from their clips on either side of the handlebars.
5. Undo the screws and free the left hand switch housing assembly from the handlebars.

6. Release the screws and remove the clamp from the clutch lever assembly.



cfki

1. Left hand switch housing
2. Clamp
3. Screws
4. Screws

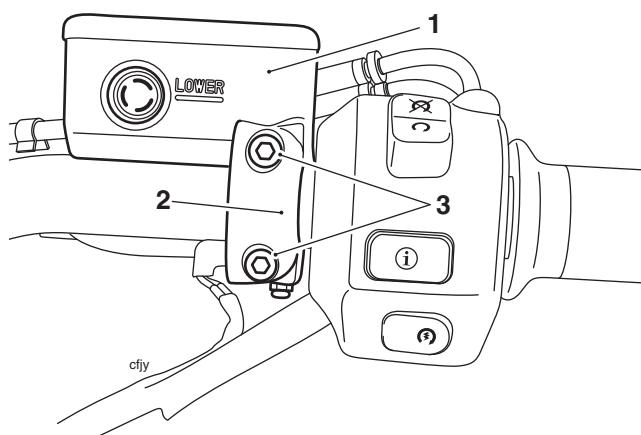
7. Release the screws and detach the right hand switch housing assembly from the handlebar. Detach the switch wiring from the handlebars.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork or frame. Spilled brake fluid will damage paintwork.

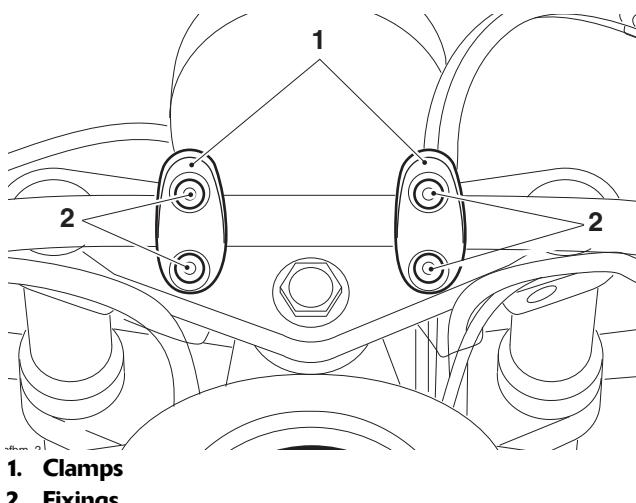
8. Release the fixings and remove the clamp from the master cylinder. Detach the master cylinder from the handlebars and support it in an upright position.



1. Front brake master cylinder
2. Clamp
3. Screws

9. Remove the fixing covers from the handlebar clamps fixings. Retain the fixing covers for reuse.

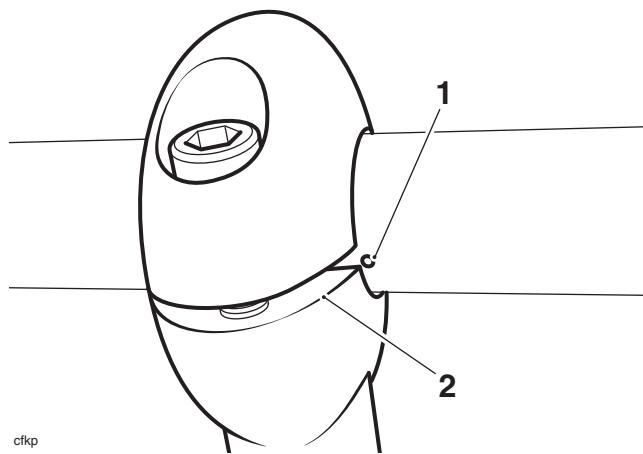
10. Support the handlebars then unscrew the screws and lift off the handlebar clamps.



11. Free the handlebars from the twist-grip/master cylinder assembly and remove them from the motorcycle. Support the master cylinder in an upright position.

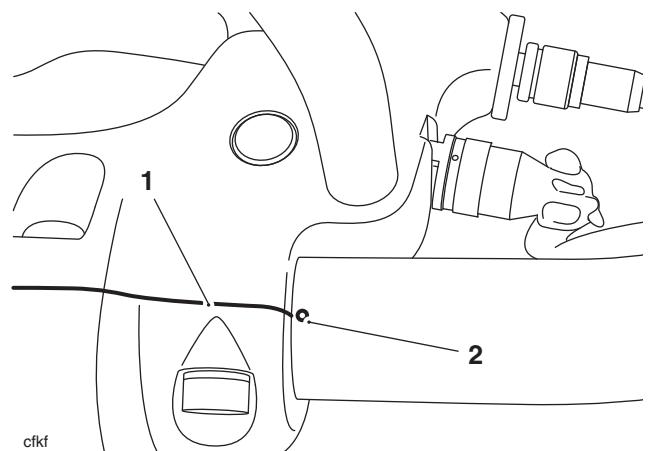
Installation

- Fit the throttle twist-grip assembly then locate the handlebars in the lower halves of the clamp. Fit the clamp and secure with the fixings.
- Align the handlebar punch mark with the lower-rear inner left hand split line of the clamp.



- 1. Handlebar dot mark
2. Clamp split line**

- Tighten the front clamp screws to **26 Nm**, then the rears. Fit the fixing covers to the handlebar clamp bolts.
- Locate the clutch lever assembly to the handlebar and fit the clamp.
- Align the clamp lower split line with the punch mark on the handlebar then tighten the clamp screws to **12 Nm**.

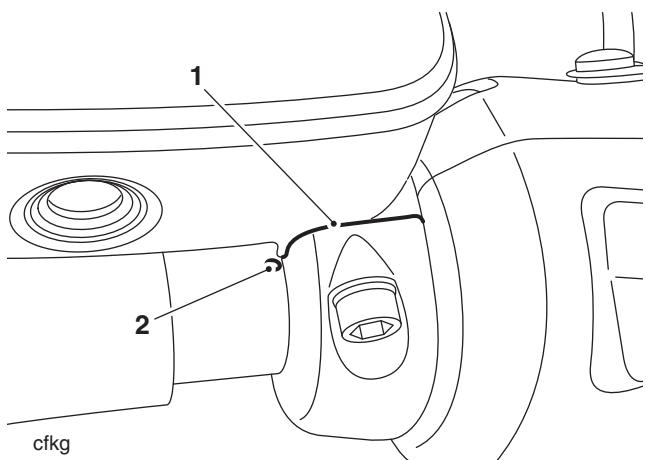


- 1. Clamp lower split line
2. Handlebar dot mark**

- Fit the clamp to the front brake master cylinder.

Front Suspension

7. Align the clamp lower split line with the punch mark on the handlebar then evenly tighten the clamp screws to **12 Nm**.



1. Clamp lower split line

2. Handlebar dot mark

8. Refit both switch housing assemblies, tightening the screws to **2.5 Nm**.
9. Assemble the handlebar end weights into the handlebar ends, and tighten the fixings to **8 Nm**.

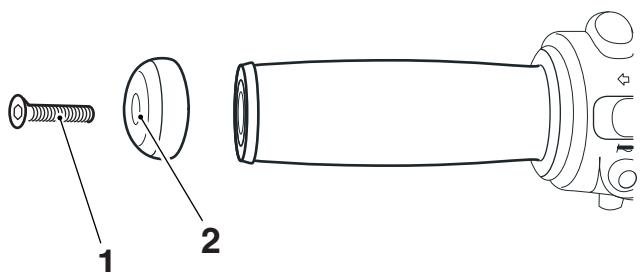
10. Renew any damaged clips and secure the left hand and right hand switch housing wiring to the handlebars.
11. Check that the throttle opens and closes smoothly without sticking. Rectify as necessary.

Warning

Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.



cccw_3

1. Fixing

2. End weight assembly

Handlebars – Thunderbird Commander and Thunderbird LT



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

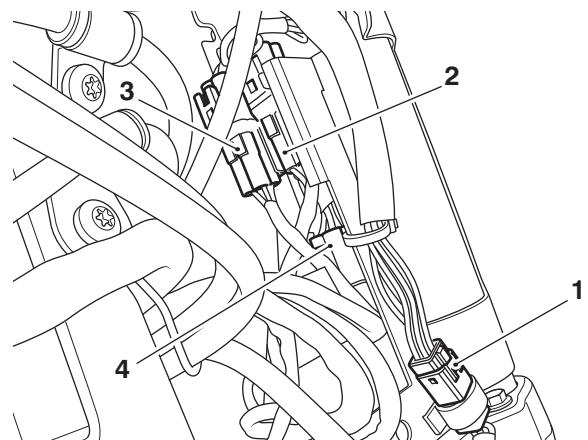
Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. **For Thunderbird LT:** Remove the windspeed (see page 17-41).
4. Remove the headlight (see page 18-27).
5. Remove the front fork shrouds (see page 17-42).
 - **Note the routing of the left and right hand switch housing harnesses in the headstock area for installation.**
 - **The right hand switch housing has three multiplugs connected to the main harness and can be identified as follows:**
Multiplug 1 - no tape marking.
Multiplug 2 - identified with green tape.
Multiplug 3 - identified with red tape.
6. Release the locking devices and detach the right hand switch housing multiplugs from the harness bracket.
7. Release the locking device and detach the left hand switch housing multiplugs from the harness bracket.

Note:

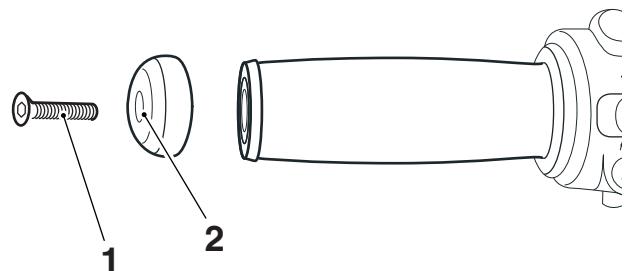
- **Note the location of the right switch housing multiplugs on the harness bracket for installation.**
- 8. Disconnect the right hand switch housing multiplug from the main harness.

9. Disconnect the left hand switch housing multiplugs from the main harness.



1. Multiplug, right hand switch housing
2. Multiplug number 2, left hand switch housing
3. Multiplug number 3, left hand switch housing
4. Multiplug number 1, left hand switch housing

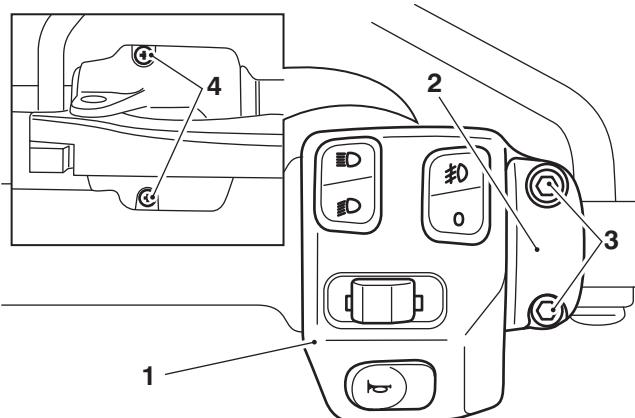
10. Remove the handlebar end weights.



1. Fixing screw
2. End weight

Front Suspension

11. Release the fixings and remove the clamp from the clutch lever assembly.



cfki_1

- 1. Left hand switch housing**
- 2. Clamp**
- 3. Fixings**
- 4. Fixings**

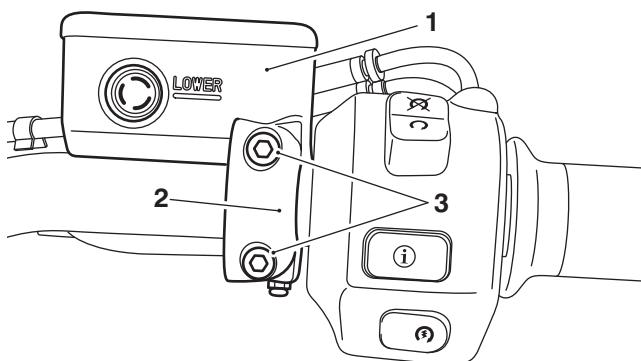
12. Release the fixings securing the clutch lever and switch housing assembly to the handlebar. Position the clutch lever to one side.
 13. Disconnect the brake light switch connection on the front brake master cylinder.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork or frame. Spilled brake fluid will damage paintwork.

14. Release the fixings and remove the clamp from the master cylinder. Detach the master cylinder from the handlebars and support it in an upright position.



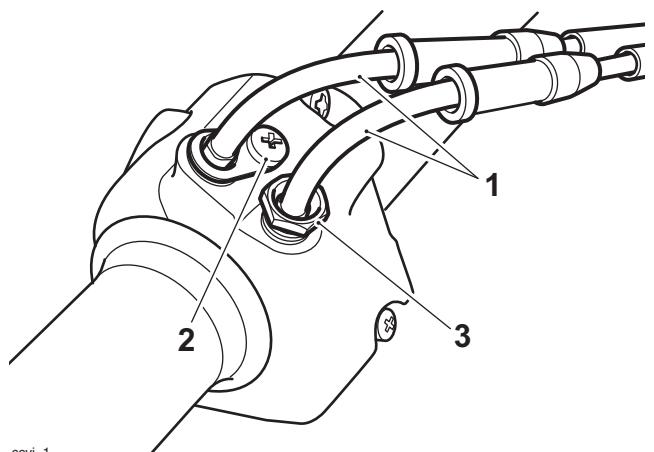
cfjy_1

- 1. Front brake master cylinder**
- 2. Clamp**
- 3. Fixings**

Note:

- Before detaching the throttle cables from the twist grip, note the location of both cables to help ensure that they are returned to the same location on installation.

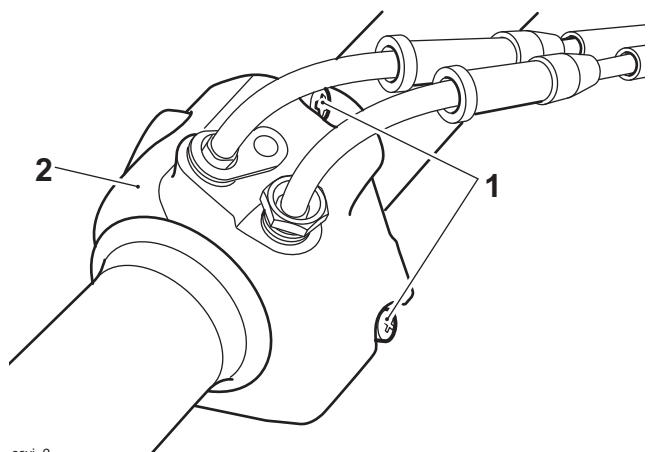
15. Release the screw and union securing the throttle cables to the switch housing.



cevi_1

- 1. Throttle cables**
- 2. Screw**
- 3. Union**

16. Remove the fixings securing the right hand switch housing.



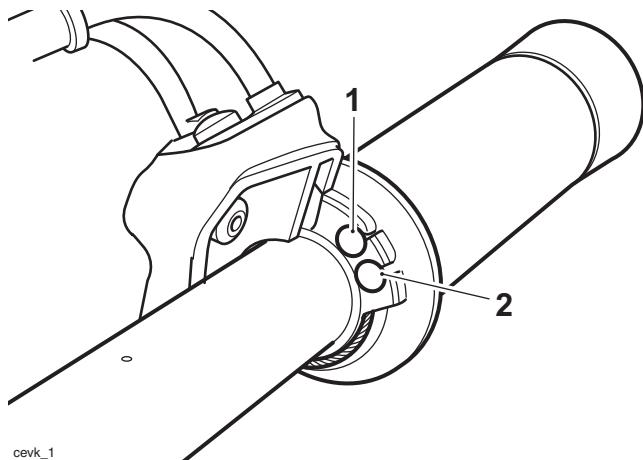
cevi_2

- 1. Fixings**
- 2. Switch housing**

Note:

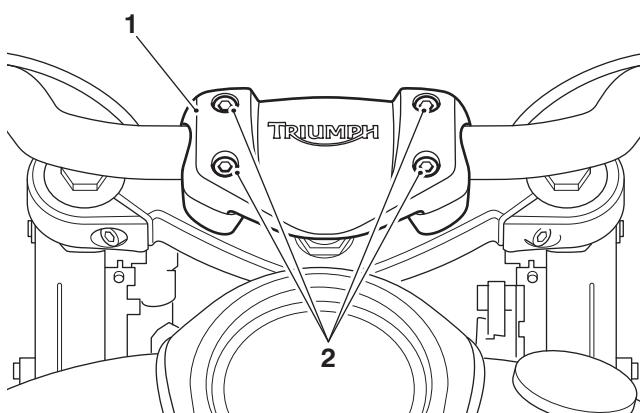
- Note the position of the throttle opening and closing cables for installation.

17. Release the inner cables from the twist grip.



1. Opening cable
2. Closing cable

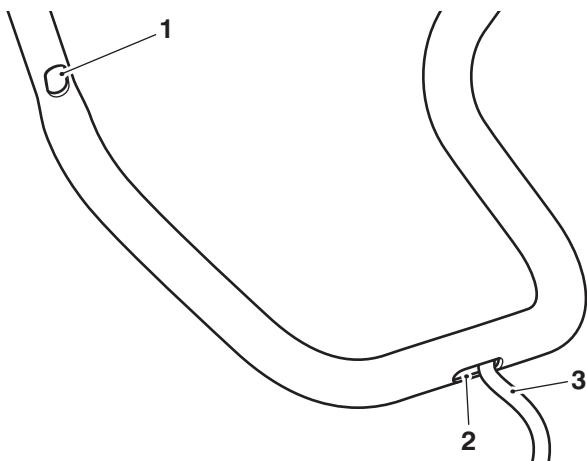
18. Remove the twist grip from the handlebar.
19. Support the handlebars then release the fixings and lift off the handlebar clamp.



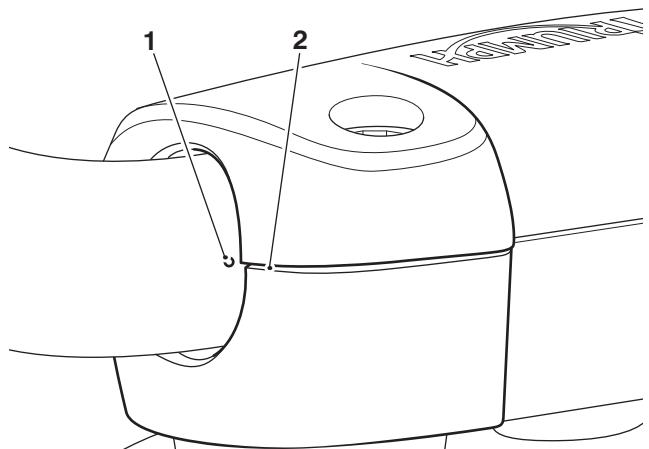
20. If necessary, remove the switch housings by gently pulling the harnesses out of the handlebar.

Installation

1. Carefully feed the left and right hand switch housing harnesses through their slots in the handlebars.



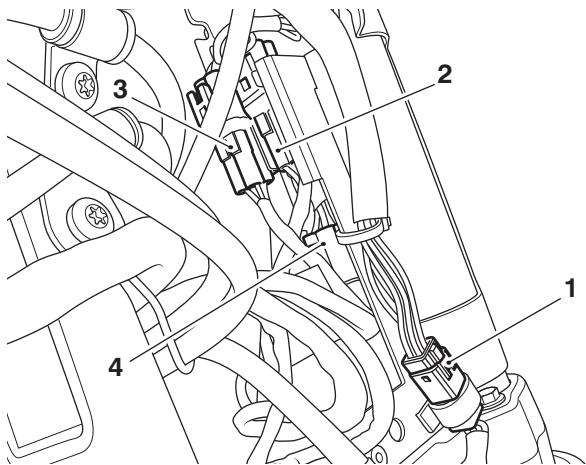
- cikp**
1. **Slot for left hand switch housing**
2. **Exit slot for the harnesses**
3. **Harness for right hand switch housing**
2. Route the switch housing harnesses into the headstock area as noted for removal.
3. Locate the handlebars into the lower half of the clamp. Fit the clamp and secure with the fixings, do not fully tighten at this stage.
4. Align the handlebar punch mark with the right hand split line of the lower clamp.



1. **Handlebar dot mark**
2. **Clamp split line**
5. Tighten the front clamp screws to **26 Nm**, then the rears.
6. Attach the main harness multiplugs for the left hand switch housing to the harness bracket as noted for removal.
7. Connect the left hand switch housing multiplugs to their main harness multiplugs as noted for removal.

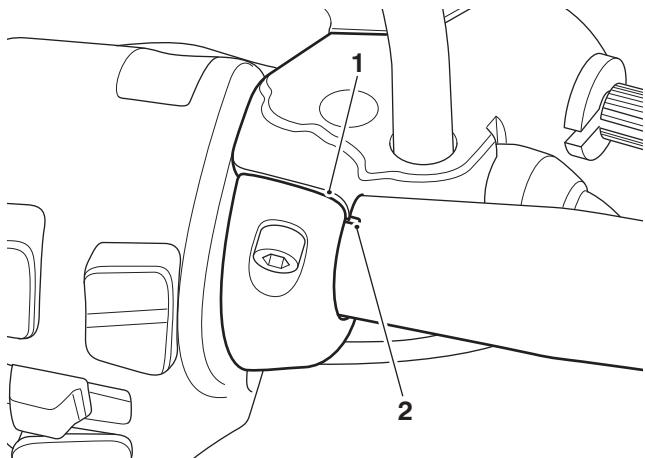
Front Suspension

8. Connect the right hand switch housing multiplug to the main harness.



1. Multiplug, right hand switch housing
2. Multiplug number 2, left hand switch housing
3. Multiplug number 3, left hand switch housing
4. Multiplug number 1, left hand switch housing

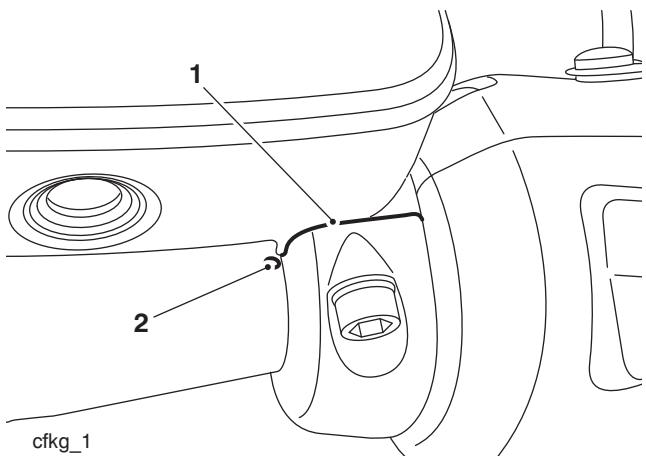
9. Locate the clutch lever assembly to the handlebar and fit the clamp.
 10. Align the clutch lever split line with the punch mark on the handlebar then tighten the clamp screws to **12 Nm**.



1. Clutch lever split line
2. Handlebar dot mark

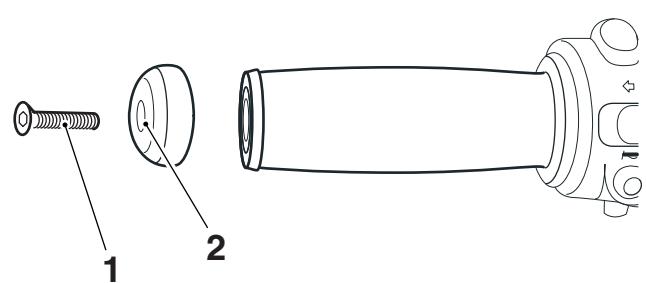
11. Secure the left hand switch housing to the clutch lever housing and tighten its fixings to **2.5 Nm**.
 12. Fit the twist grip to the handlebar.
 13. Feed the outer throttle cables through the openings in the switch housing.
 14. Engage the nipples of the inner cables to the twist grip as noted for removal.
 15. Assemble the switch housing, tightening the two screws to **2.5 Nm**.
 16. Attach the cable retainer screw and union to the switch housing, tightening both to **3 Nm**.
 17. Align the front brake master cylinder and its clamp to the handlebar.

18. Align the master cylinder split line with the punch mark on the handlebar then evenly tighten the clamp screws to **12 Nm**.



1. Clamp lower split line
2. Handlebar dot mark

19. Reconnect the wires to the brake light switch on the front master cylinder.
 20. Assemble the handlebar end weights into the handlebar ends, and tighten the fixings to **8 Nm**.



ccow_3

1. Fixing
2. End weight

21. Check and, if necessary, adjust the throttle cable free play (see page 10-175).
 22. Check that the throttle opens and closes smoothly without sticking. Rectify as necessary.



Warning

Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.



Warning

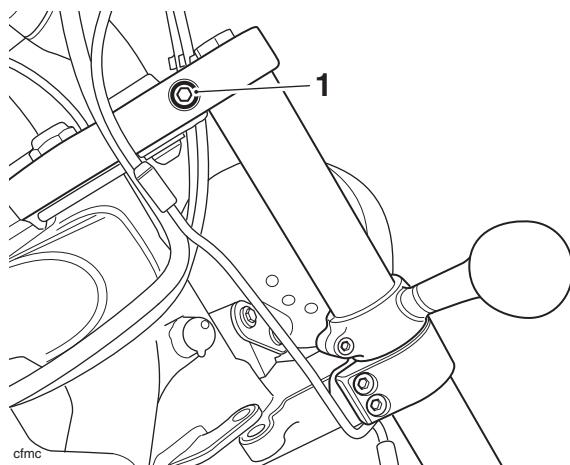
Move the handlebars to the left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

23. Refit the front fork shrouds (see page 17-43).
24. Refit the headlight (see page 18-29).
25. **For Thunderbird LT:** Fit the windscreens (see page 17).
26. Reconnect the battery, positive (identified with red tape) lead first.
27. Refit the rider's seat (see page 17-20).
28. Check the operation and beam setting of the front headlight, adjust if necessary.

Top Yoke – All Models Except Thunderbird Commander and Thunderbird LT

Removal

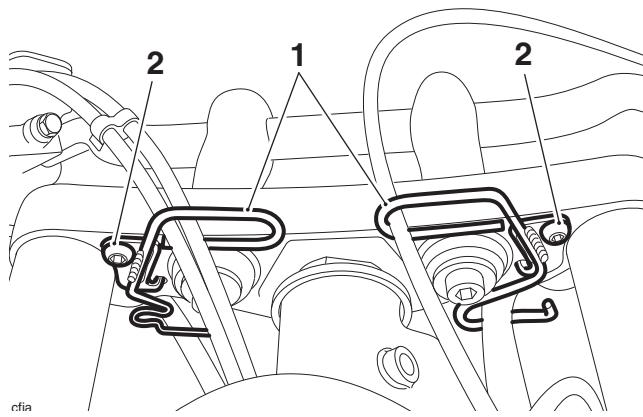
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the handlebars (see page 12-18).
4. Slacken the top yoke clamp bolts.



1. Top yoke clamp bolt

Note:

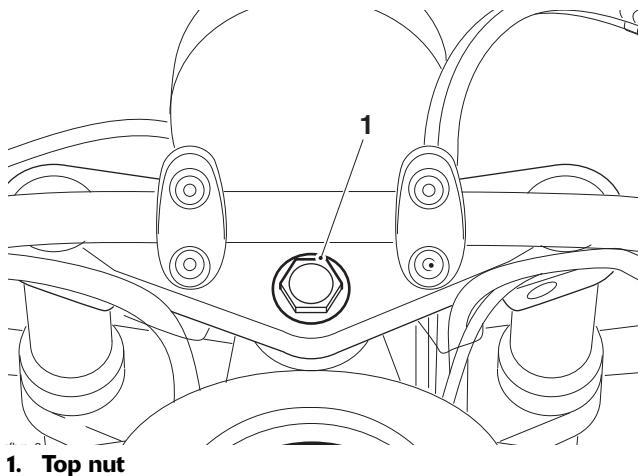
- **Make a note of the cable routings behind the cable guide.**
- 5. Release the screws and detach the two cable guides.



1. Cable guides
2. Cable guide fixings

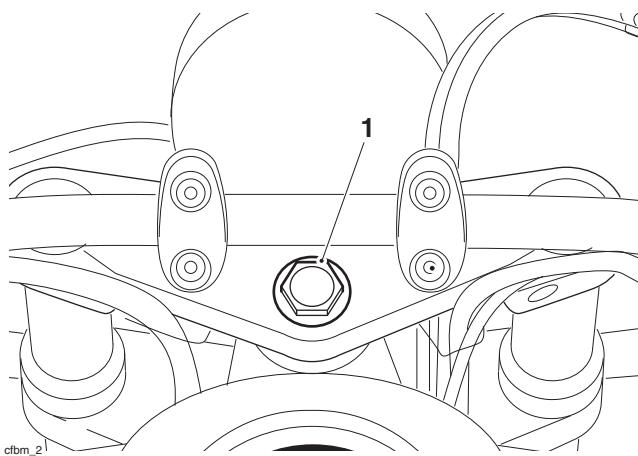
Front Suspension

- Slacken and remove the top nut and washer. Lift and remove the top yoke.



Installation

- Seat the top yoke into position.
- Refit the washer and top nut, tightening it to **65 Nm**.



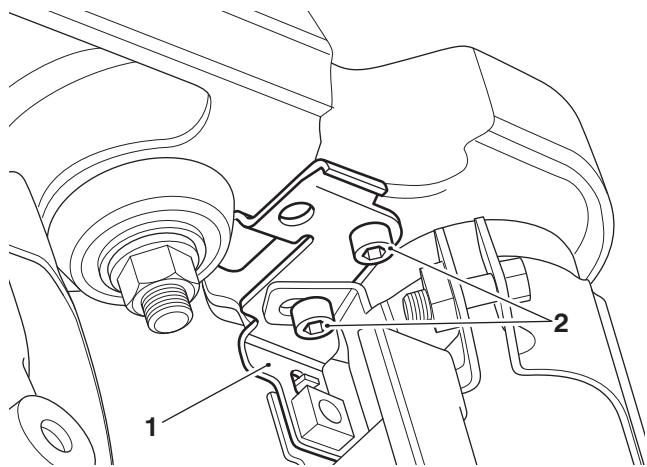
1. Top nut

- Tighten the top yoke clamp bolts to **20 Nm**.
- Install the handlebars (see page 12-19).
- Refit the cable guides and tighten the fixings to **18 Nm**.
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-21).

Top Yoke – Thunderbird Commander and Thunderbird LT

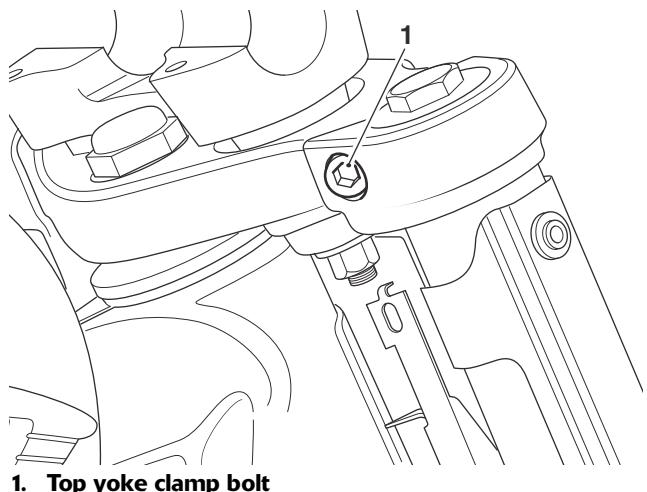
Removal

- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Remove the handlebars (see page 12-21).
- Remove the fixings securing the cable guide and shroud support brackets to the upper yoke.

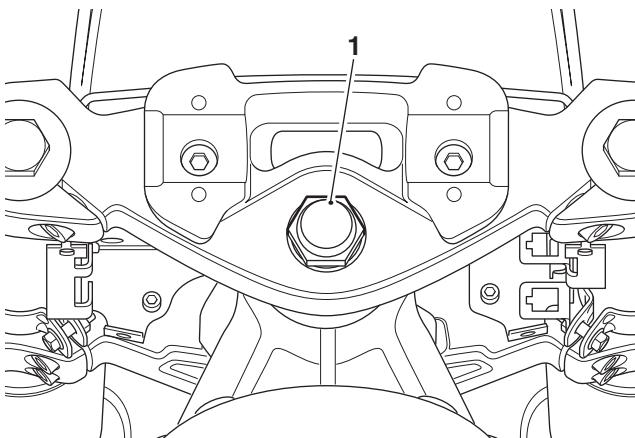


- Shroud support bracket (left hand shown)
- Fixings (harnesses shown removed for clarity)

- Loosen the top yoke clamp bolts.



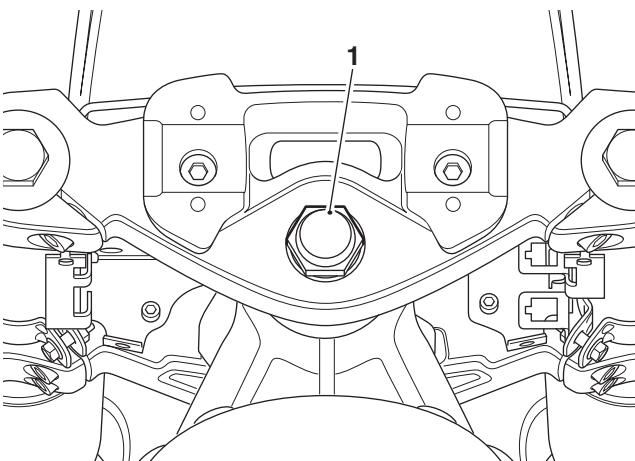
- Loosen and remove the top nut and washer. Lift and remove the top yoke.



1. Top nut

Installation

- Seat the top yoke into position.
- Refit the washer and top nut, tightening it to **65 Nm**.



1. Top nut

- Tighten the top yoke clamp bolts to **20 Nm**.
- Install the handlebars (see page 12-19).
- Secure the shroud support brackets to the upper yoke. Tighten the fixings to **3 Nm**.
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).

Bottom Yoke and Headstock Bearings – All Models Except Thunderbird Commander and Thunderbird LT

Removal

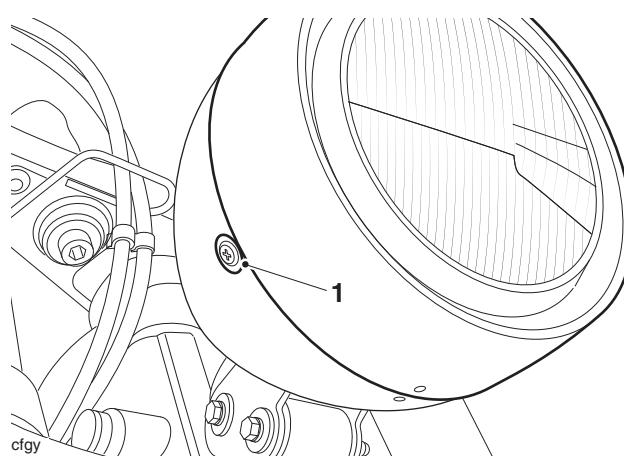
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Remove the rider's seat (see page 17-21).
- Disconnect the battery, negative (black) lead first.
- Remove both front forks (see page 12-7).
- Remove the top yoke (see page 12-25).

Thunderbird and Thunderbird SE

- Release the two screws and detach the headlight from the headlight bowl.



1. Headlight screw (1 of 2)

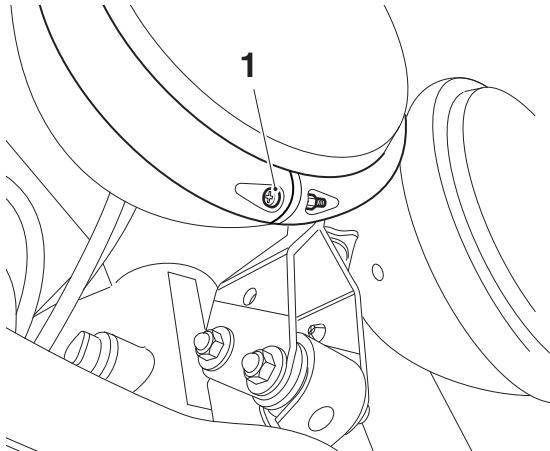
Note:

- Make a note of the direction indicator harness routing and the wiring harness routing inside the headlight bowl before disconnection.

Front Suspension

Thunderbird Storm

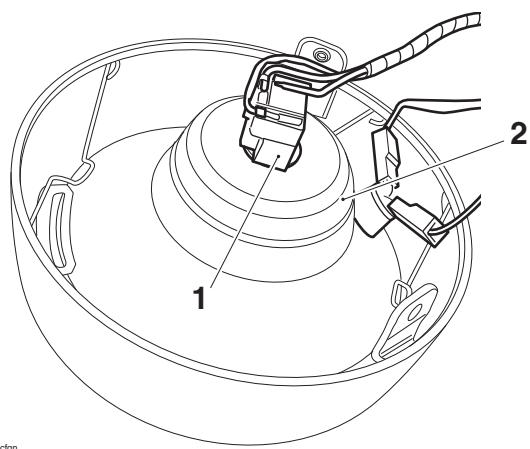
- Release the screws, remove both headlight rims and detach the headlights from the headlight bowls.



1. Screw (right hand headlight)

All Models

- Disconnect the electrical connector from the headlight bulb, detach the position light and remove the headlight.

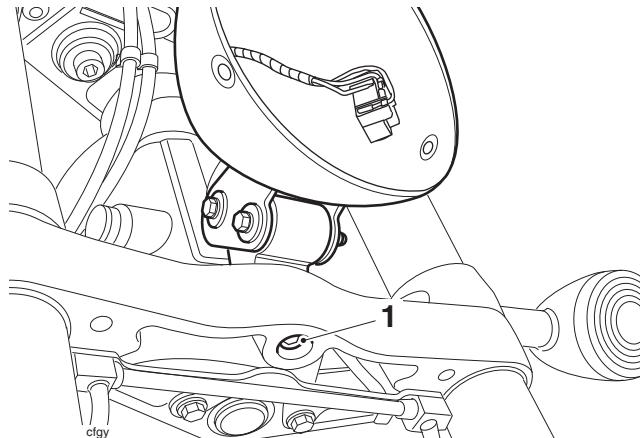


1. Electrical connector

2. Position light

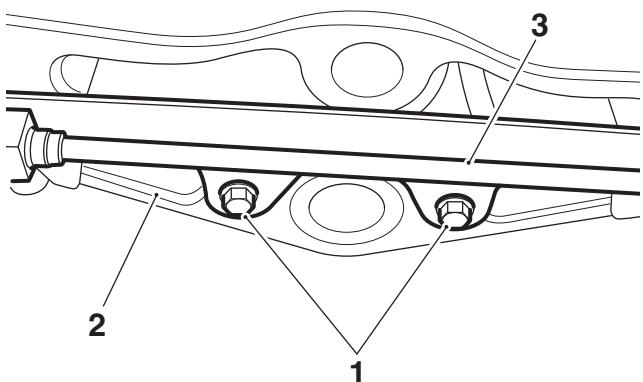
- Disconnect the two direction indicator electrical connectors.

- Release the headlight horizontal adjustment bolt and remove the headlight assembly while feeding the harnesses out of the headlight bowl.



1. Headlight horizontal adjustment bolt
(Thunderbird and Thunderbird SE shown)

- Release the two bolts, detach the brake hose from the bottom yoke and tie aside.



cfn

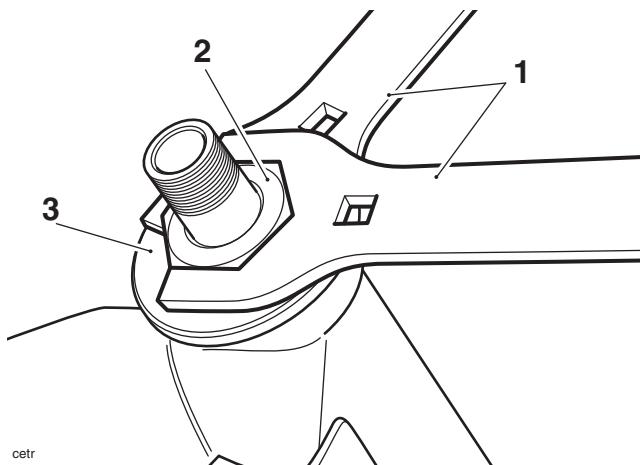
1. Bolts

2. Bottom yoke

3. Brake hose

- Thread the two direction indicator harnesses through the hole in the bottom yoke and remove the direction indicators from the motorcycle.

12. Remove the lock nut, adjuster nut and bearing cover.



- 1. Tools 3880140-T0301**
- 2. Lock nut**
- 3. Bearing cover**

13. Remove the bottom yoke from below the frame headstock.

Bearing removal

1. Using a suitable drift, evenly and progressively drive the bearing outer races from the frame headstock.
2. Remove the bearing from the bottom yoke using a press or puller.

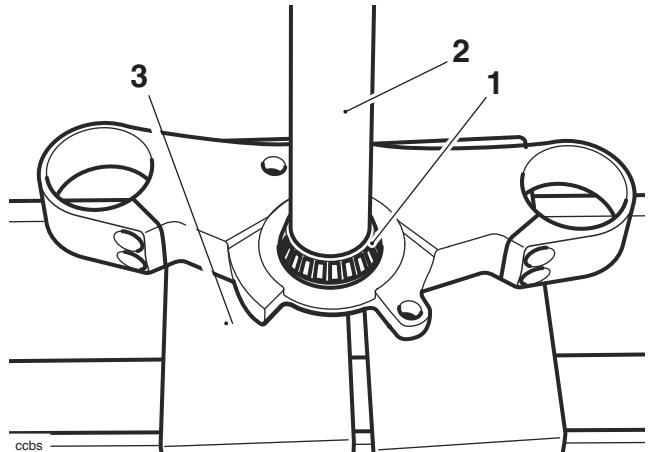


Caution

Protect the threads of the bottom yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

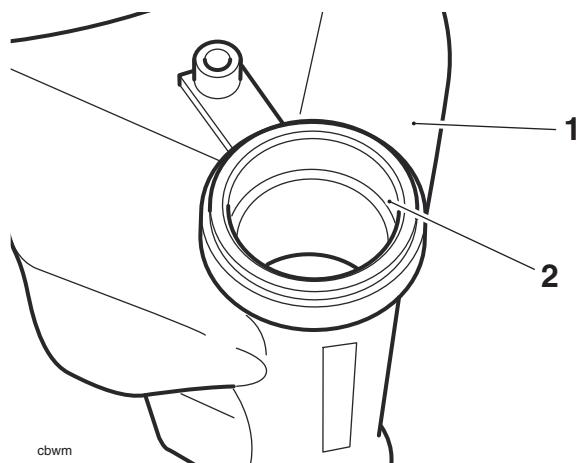
Installation

1. Press a new bearing onto the steering stem of the bottom yoke.



- 1. Bearing**
- 2. Press**
- 3. Press bed**

2. Evenly and progressively drive new bearing outer races into the frame headstock.



- 1. Headstock**

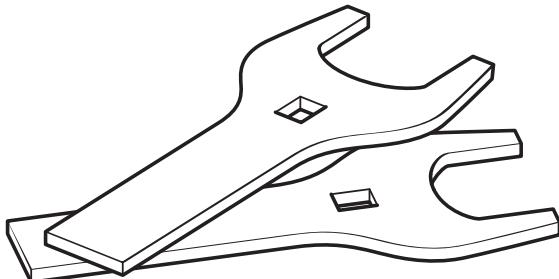
- 2. Bearing outer race**

3. Lubricate the headstock bearings using multi-purpose grease conforming to NLGI 2 specification.
4. Insert the lower yoke to the frame headstock, fit the upper bearing and retain with the bearing cover, adjuster nut and lock nut.
5. Adjust the bearing free play as follows:
 - a) Tighten the adjuster nut to **40 Nm**.
 - b) Slacken the adjuster nut fully.
 - c) Retighten the adjuster nut to **6 Nm**.
 - d) Loosen the adjuster nut by 45°. Note that there will now be free play present.
 - e) Fit the tab washer to the steering stem.
 - f) Fit the lock nut.
 - g) Hold the adjuster nut in that position while tightening the lock nut to **40 Nm**.

Front Suspension

Note:

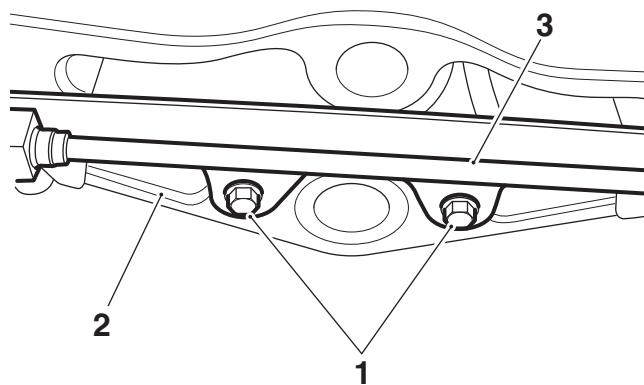
- Ensure the adjuster nut does not move as the lock nut is tightened.



kagf1

Tools 3880140-T0301

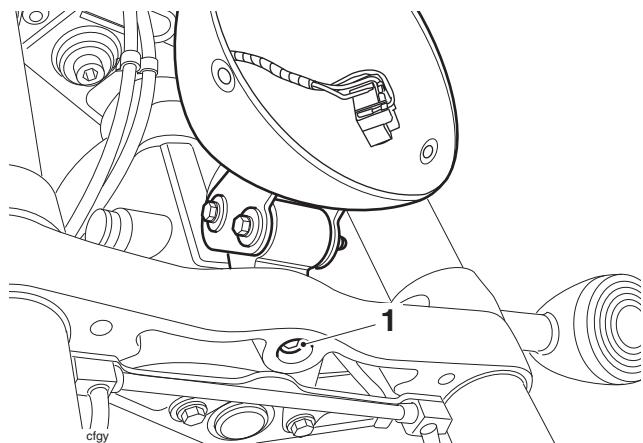
6. Feed the indicator harnesses up through the bottom yoke and secure temporarily until the front forks are refitted. Do not allow the indicators to hang on the harnesses.
7. Refit the brake hose to the bottom yoke, ensuring the direction indicator harnesses are routed as noted during removal, and not trapped by the brake hose. Tighten the bolts to **6 Nm**.



cfkn

1. Brake hose bolt
2. Bottom yoke
3. Brake hose

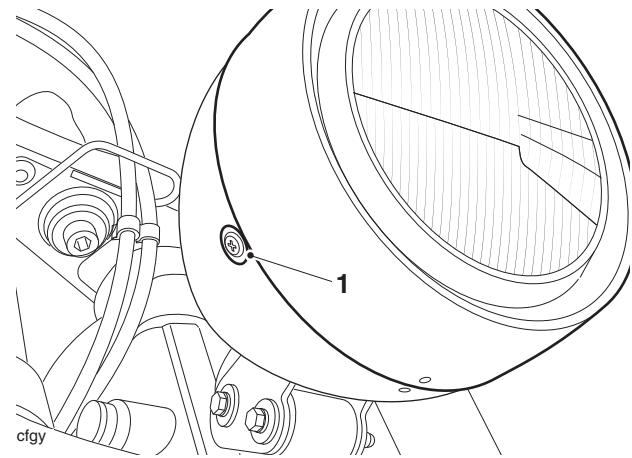
8. Refit headlight bowl and bracket assembly. Tighten the bolt to **27 Nm**.



1. Headlight horizontal adjustment bolt
(Thunderbird and Thunderbird SE shown)
9. Refit the wiring harnesses into the headlight bowl as noted during removal.
10. Reconnect the direction indicator electrical connectors as noted during removal. The right hand direction indicator harness and the main harness are both marked with red tape to aid correct connection.
11. Reconnect the headlight electrical connector and refit the position light.

Thunderbird and Thunderbird SE

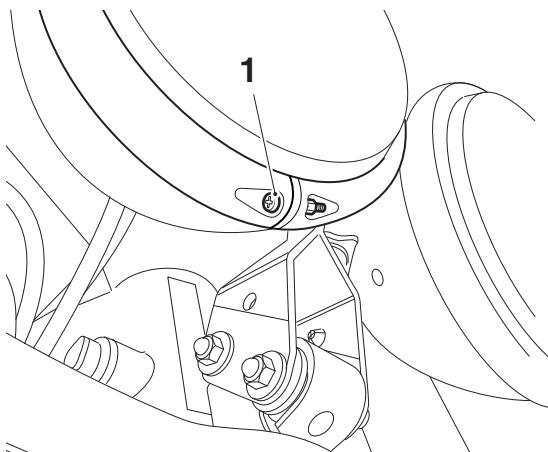
12. Refit the headlight, tightening the screws to **2 Nm**.



1. Headlight screw (1 of 2)

Thunderbird Storm

13. Refit the headlight and rims, tightening the screws to **2 Nm**.



1. Screw (right hand headlight)

All Models

14. Refit the top yoke (see page 12-26).
15. Install the front forks (see page 12-9).
16. Reconnect the battery, positive (identified with red tape) lead first.
17. Check and if necessary correct the headlight adjustment (see page 18-23).
18. Refit the rider's seat (see page 17-21).
19. Check that the free play has been eliminated and that the steering can be turned freely from lock-to-lock without any sign of tightness. Readjust if necessary.



Warning

Operation of the motorcycle with incorrectly adjusted steering head bearings, either too loose or too tight, may cause a dangerous riding condition leading to loss of motorcycle control and an accident.

Bottom Yoke and Headstock

Bearings – Thunderbird Commander and Thunderbird LT

Removal



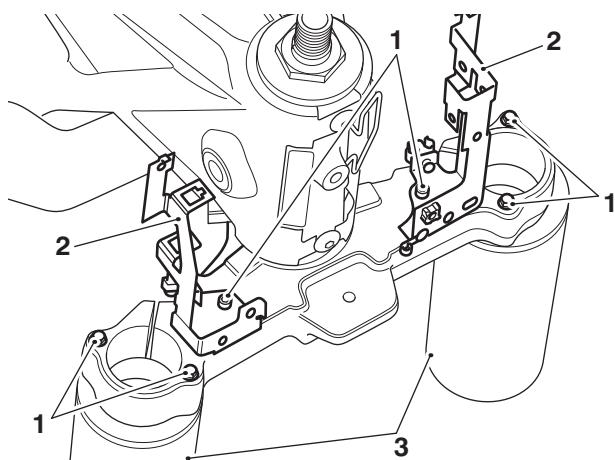
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. **For Thunderbird LT:** Remove the windscreens (see page 17-41).
4. Remove the headlight (see page 18-27).
5. Remove the front fork shrouds (see page 17-42).
6. **For Thunderbird LT only:** Remove the front indicators and fog light assembly (see page 18-36).
7. Remove both front forks (see page 12-7).
8. Remove the top yoke (see page 12-26).

Note:

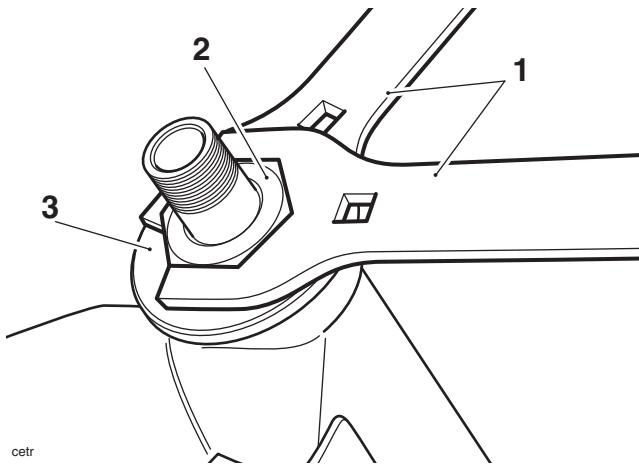
- **Note the position and orientation of the harness brackets for installation.**
- 9. Remove the fixings and detach the harness brackets and the front fork lower shrouds from the lower yoke.



- 1. Fixings (harnesses removed for clarity)**
2. Harness brackets
3. Front fork lower shrouds

Front Suspension

10. Remove the lock nut, adjuster nut and bearing cover.



1. Tools 3880140-T0301

2. Lock nut

3. Bearing cover

11. Remove the bottom yoke from below the frame headstock.

Bearing removal

1. Using a suitable drift, evenly and progressively drive the bearing outer races from the frame headstock.
2. Remove the bearing from the bottom yoke using a press or puller.

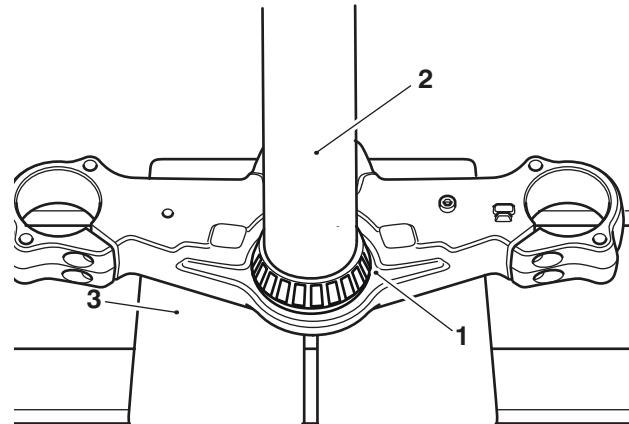


Caution

Protect the threads of the bottom yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

Installation

1. Press a new bearing onto the steering stem of the bottom yoke.

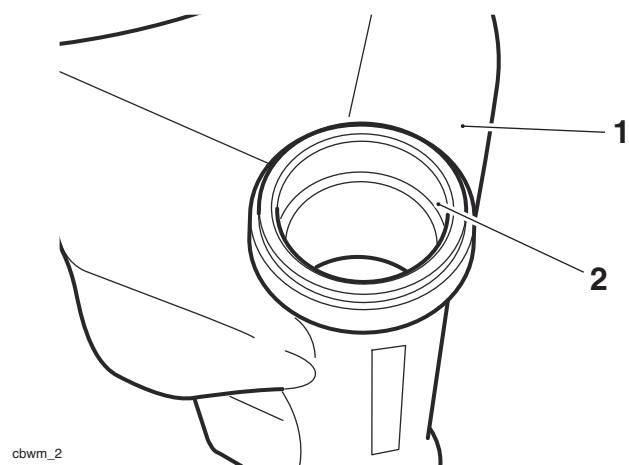


1. Bearing

2. Press

3. Press bed

2. Evenly and progressively drive new bearing outer races into the frame headstock.



cbwm_2

1. Headstock

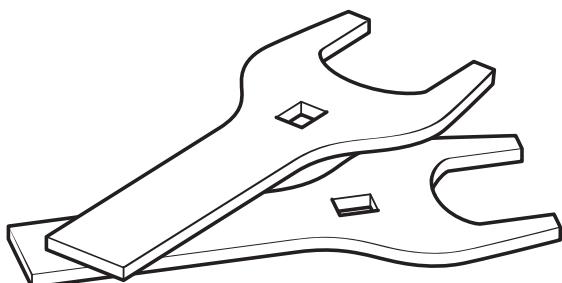
2. Bearing outer race

3. Lubricate the headstock bearings using multi-purpose grease conforming to NLGI 2 specification.
4. Insert the lower yoke to the frame headstock, fit the upper bearing and retain with the bearing cover, adjuster nut and lock nut.

5. Adjust the bearing free play as follows:
 - a) Tighten the adjuster nut to **40 Nm**.
 - b) Slacken the adjuster nut fully.
 - c) Retighten the adjuster nut to **6 Nm**.
 - d) Loosen the adjuster nut by 45°. Note that there will now be free play present.
 - e) Fit the tab washer to the steering stem.
 - f) Fit the lock nut.
 - g) Hold the adjuster nut in that position while tightening the lock nut to **40 Nm**.

Note:

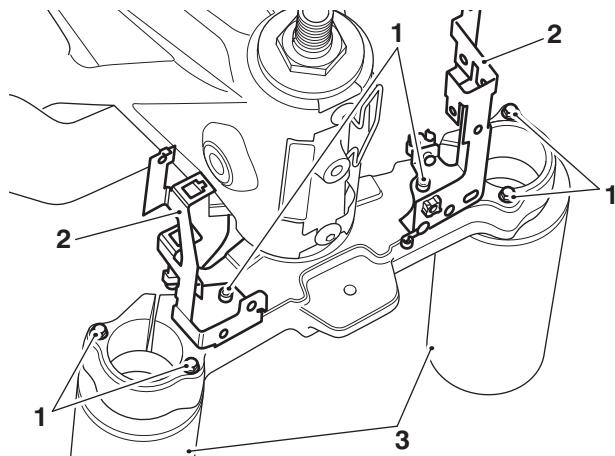
- **Ensure the adjuster nut does not move as the lock nut is tightened.**



kagf1

Tools 3880140-T0301

6. Fit the harness brackets to the lower yoke as noted for removal and tighten their fixings to **3 Nm**.
7. Apply a small amount of proprietary copper based grease the fixings for the front fork lower shrouds.
8. Fit the front fork lower shrouds to the lower yoke as noted for removal and tighten their fixings to **9 Nm**.



1. Fixings
2. Harness brackets
3. Fork lower shrouds

9. Refit the top yoke (see page 12-27).
10. Refit both front forks (see page 12-9).
11. **For Thunderbird LT only:** Refit the front indicators and fog light assembly (see page 18-38).
12. Refit the front fork shrouds (see page 17-43).
13. Refit the headlight (see page 18-29).
14. Reconnect the battery, positive (identified with red tape) lead first.
15. Check and if necessary correct the headlight adjustment (see page 18-27).
16. Refit the rider's seat (see page 17-20).
17. Check that the free play has been eliminated and that the steering can be turned freely from lock-to-lock without any sign of tightness. Readjust if necessary.



Warning

Operation of the motorcycle with incorrectly adjusted steering head bearings, either too loose or too tight, may cause a dangerous riding condition leading to loss of motorcycle control and an accident.

Front Suspension

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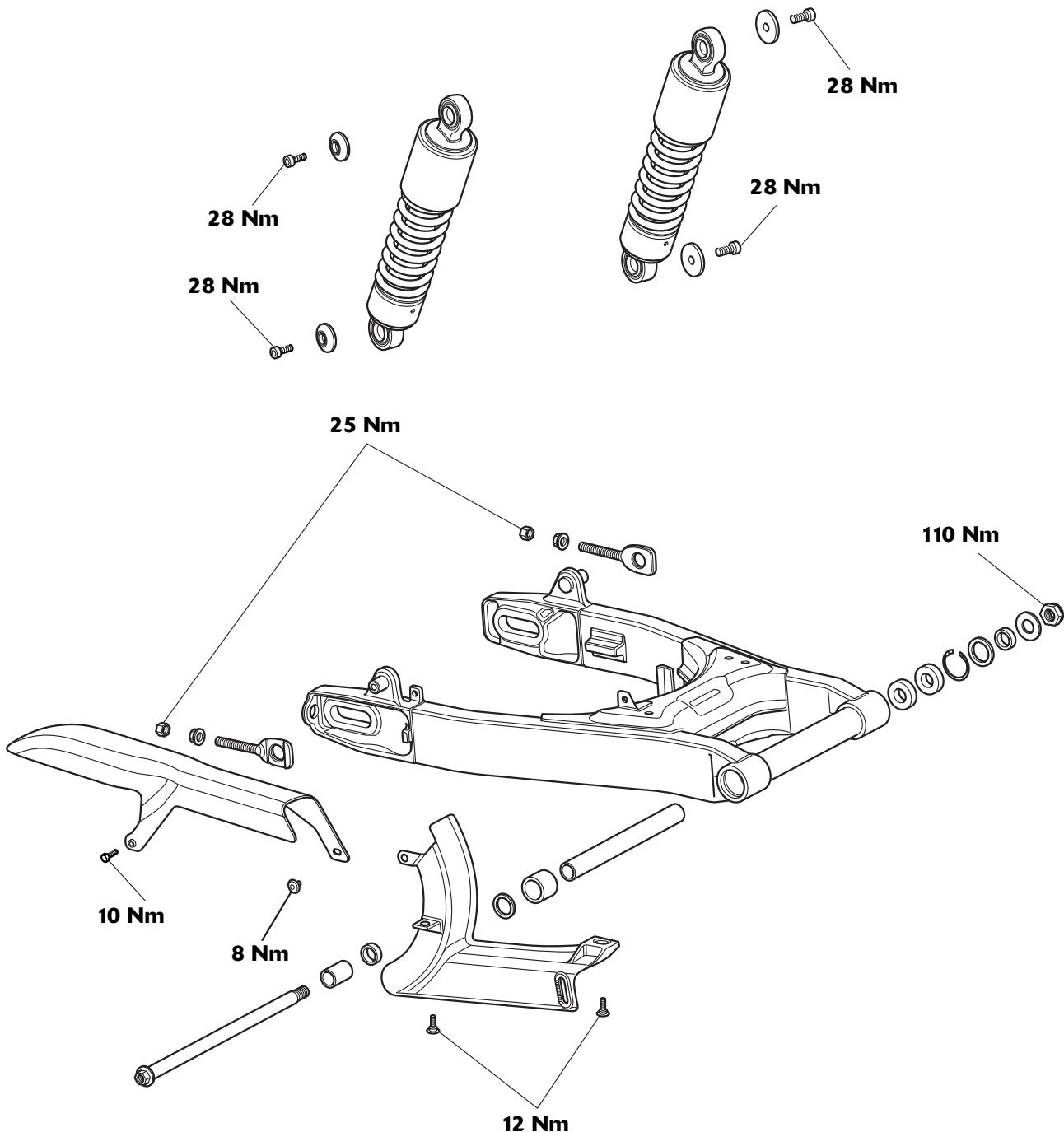
13 Rear Suspension

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Rear Suspension

Exploded View – Rear Suspension and Swinging Arm



Rear Suspension Units

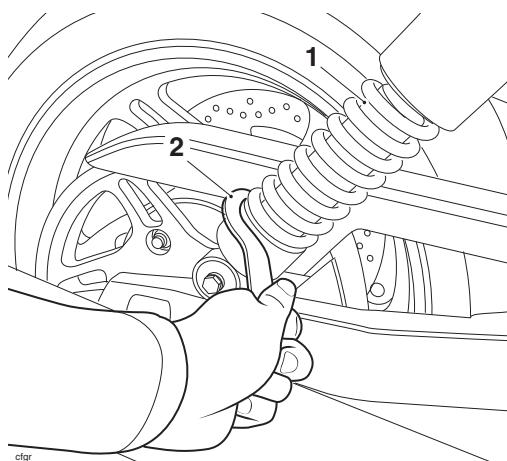
Adjustment

The rear suspension is adjustable for preload only.

Thunderbird LT only: Remove the panniers (see page 17-26).

The adjustment tool for the rear suspension unit is stored under the pillion seat. Remove the pillion seat (see page 17-21).

To change the rear suspension spring preload setting, insert the adjustment tool into the hole provided in the adjuster ring.



1. Rear Suspension Unit

2. Tool

Turn the adjuster ring clockwise to increase spring preload, and anticlockwise to decrease spring preload. When delivered from the factory, the preload adjuster will be set at position 1.



Warning

Ensure that the adjusters are set to the same setting on both rear suspension units. Settings that vary from left to right may affect handling and stability resulting in loss of motorcycle control, and an accident.

Suggested Suspension Settings

Adjuster settings are counted from one with position one being with the adjuster turned fully anticlockwise. There are five positions in total. Position one gives the minimum amount of spring preload.

Riding Condition	Suspension Preload Setting
Rider only	Position 1
Rider and passenger	Position 5
Rider, passenger and luggage	Position 5

Note:

- The details given in the table are only a guide. Setting requirements may vary for rider and passenger weight and personal preferences.

Removal



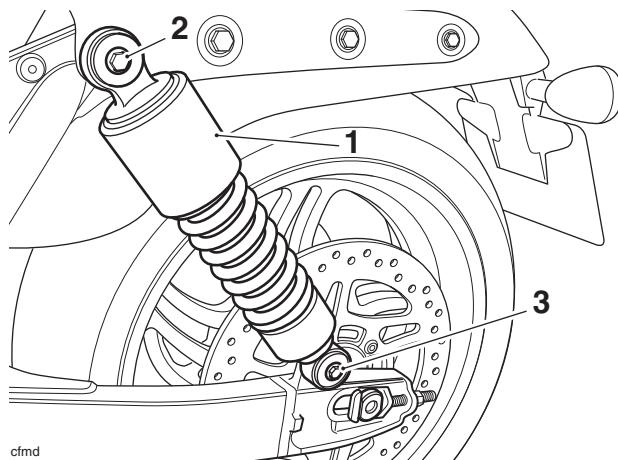
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- If fitted, remove the panniers (see page 17-27 for all models except Thunderbird Commander and Thunderbird LT, see page 17-26 for Thunderbird Commander and Thunderbird LT).
- Raise and support the motorcycle so that the rear wheel is clear of the ground.

Note:

- If both suspension units are to be removed, place a block beneath the rear wheel to prevent it dropping when the second unit is removed.
- Slacken and remove the upper and lower mounting bolts and washers then remove the suspension unit from its mounting spigots. Discard the bolts.



1. Rear suspension unit

2. Upper mounting bolts

3. Lower mounting bolts

- Repeat operations 3 and 4 for the other rear suspension unit (if required).

Rear Suspension

Inspection

1. Remove all traces of dirt and inspect for damage/wear to the mountings and springs.
2. Inspect the unit closely for fluid leaks from all parts of the unit and for cracks and damage to the springs. If there is any damage, or any leaks are evident, both rear suspension units must be renewed as a matched pair.
3. Check the mounting rubbers for cracks and signs of elongation. Replace as necessary.



Warning

Always renew both rear suspension units as a pair, even if only one appears to be faulty. If only one suspension unit is replaced, the handling of the motorcycle could be adversely affected. This could result in an unsafe riding condition leading to a loss of motorcycle control and an accident.

Installation

1. Locate the suspension units to the mounting spigots, articulating the swinging arm until the distance between the upper and lower spigots allows the units to fit.
2. Fit the original washers to new mounting bolts. Install the bolts then tighten them to **28 Nm**.
3. Repeat operations 1 and 2 for the other rear suspension unit (if removed).
4. Remove the wheel support (if fitted), lower the motorcycle to the ground and park it on the side stand.
5. If removed, refit the panniers (see page 17-28 for all models except Thunderbird Commander and Thunderbird LT, see page 17-27 for Thunderbird Commander and Thunderbird LT).

Swinging Arm

For suspension adjustment and suspension settings see page 13-3.

Removal



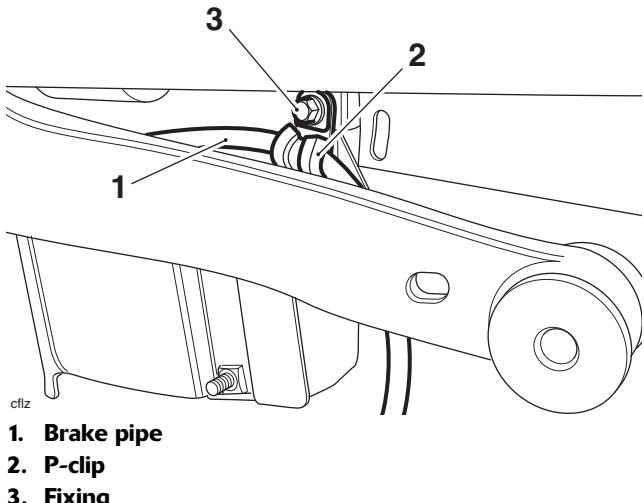
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. If fitted, remove the panniers (see page 17-27 for all models except Thunderbird Commander and Thunderbird LT, see page 17-26 for Thunderbird Commander and Thunderbird LT).
2. Support the motorcycle so that the rear wheel is clear of the ground, with no weight on the swinging arm and suspension units.
3. Remove the rear wheel (see page 16-12).
4. Remove the rear suspension units (see page 13-3).

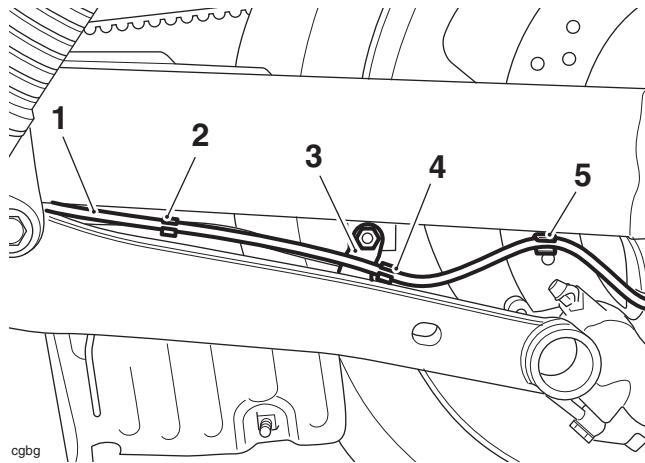
Non-ABS models

5. Remove the fixing and detach the brake hose P-clip from the left hand side of the swinging arm.



ABS Models Except Thunderbird Commander and Thunderbird LT

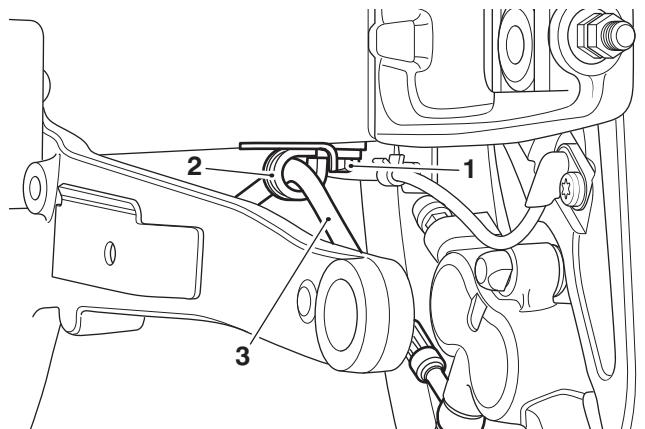
- Remove the fixing and detach the ABS sensor cable clips and the brake hose P-clip from the left hand side of the swinging arm.



- 1. ABS sensor cable
- 2. Front brake hose clips (Thunderbird shown)
- 3. P-clip
- 4. Rear brake hose clips
- 5. Swinging arm cable clip

Thunderbird Commander and Thunderbird LT

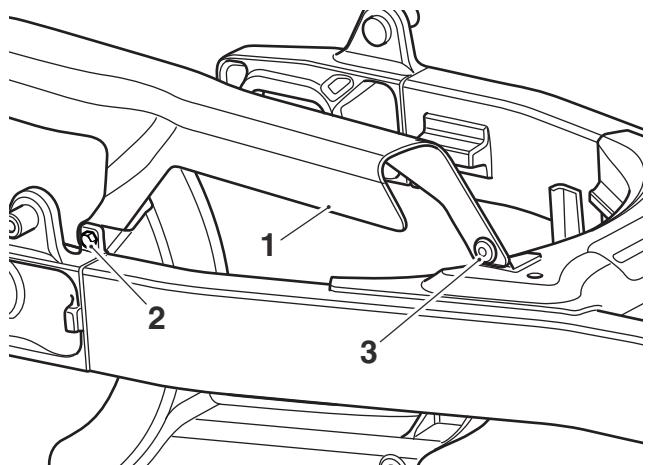
- Remove the fixing and detach the brake hose P-clip from the left hand side of the swinging arm.



- 1. Fixing
- 2. P-clip
- 3. Brake hose

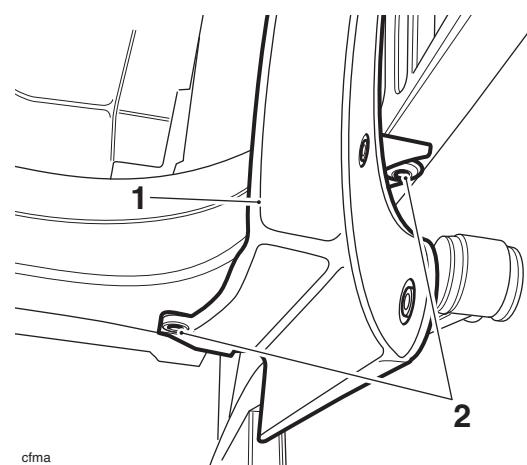
All models:

- Remove the upper drive belt guard.



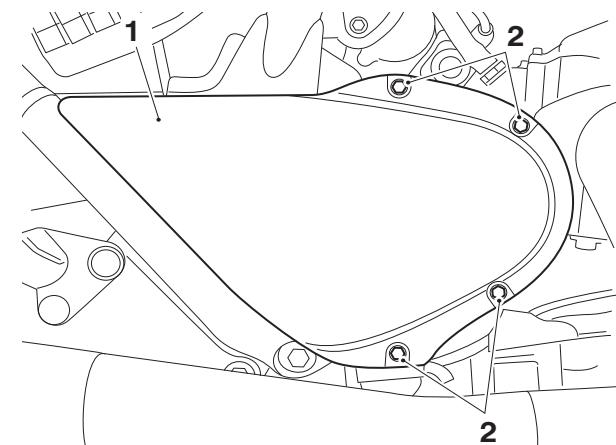
- 1. Upper drive belt guard
- 2. Rear fixing
- 3. Front fixing

- Remove the lower drive belt guard.



- 1. Lower belt guard
- 2. Fixings

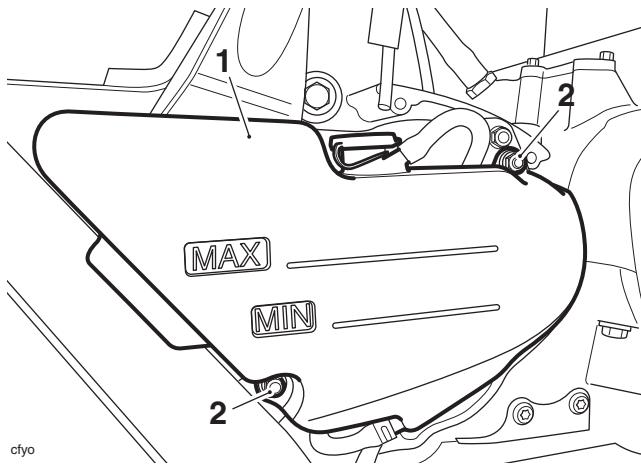
- Remove the drive belt pulley cover fixings and remove the cover.



- 1. Final drive belt cover
- 2. Final drive belt cover fixings

Rear Suspension

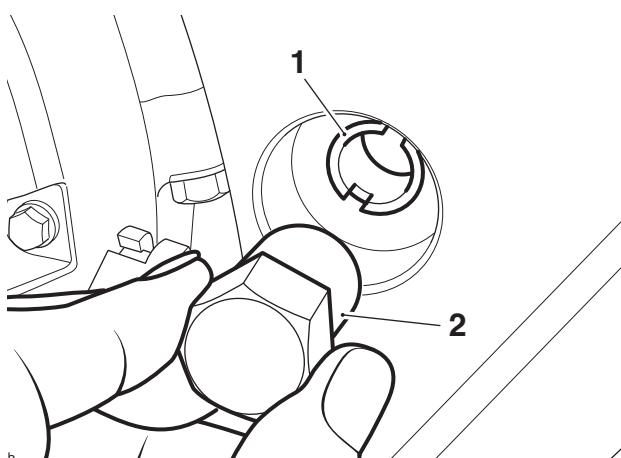
11. Remove the two nuts securing the expansion tank to its bracket and collect the two flanged sleeves from under the nuts.
12. Detach the expansion tank and position aside. Do not allow the expansion tank to hang unsupported from its hoses. It is not necessary to drain the expansion tank or cooling system.
20. Remove the right hand bearing by drifting through from the left.
21. Collect the spacer tube.



1. Coolant expansion tank

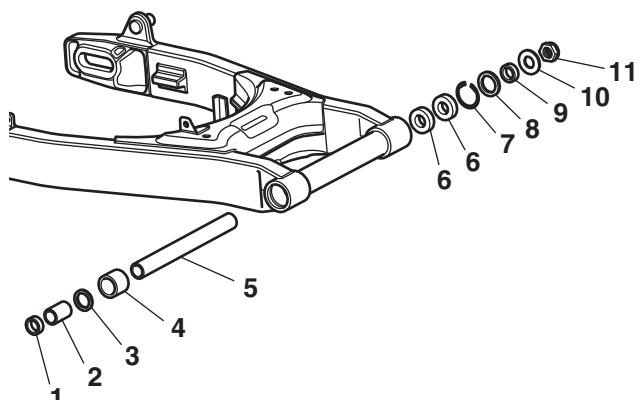
2. Nuts

13. Carefully remove the swinging arm pivot cover.
14. Remove the swinging arm pivot nut and collect the washer.
15. Partially withdraw the swinging arm spindle from the right hand side, to allow access to the frame adjuster sleeve located on the left hand side of the frame.
16. Engage tool T3880104 in the slots of the frame adjuster sleeve and rotate anticlockwise to slacken the sleeve fully.



1. Frame adjuster
2. Tool T3880104

17. Support the swinging arm and withdraw the swinging arm spindle from the right hand side.
18. Carefully manoeuvre the swinging arm rearwards and remove from the frame.
19. Collect the bearing sleeves from both sides.



- 1. Spacer**
- 2. Sleeve**
- 3. Seal**
- 4. Needle roller bearing**
- 5. Spacer tube**
- 6. Ball Bearing**
- 7. Circlip**
- 8. Seal**
- 9. Spacer**
- 10. Washer**
- 11. Nut**

Note:

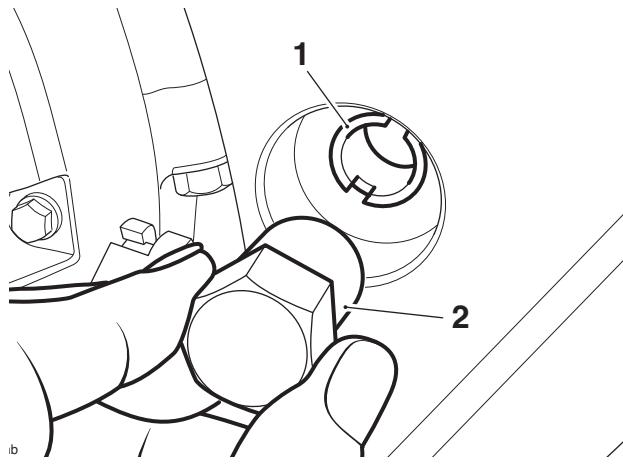
- **The needle roller bearing in the left hand side of the arm cannot be removed undamaged.**
- 22. If required, renew the drive belt (see page 15-8).

Inspection

1. Check all swinging arm bearings for damage, pitting, and cracks. Replace as necessary.
2. Check the swinging arm for damage. Replace as necessary.
3. Check the wheel bearings for damage, pitting, and cracks. Replace as necessary.
4. Check all bearing seals for damage, splits etc. Replace as necessary.
5. Check the drive belt for wear, damage etc. Replace as necessary.
6. Check both drive belt pulleys for wear, damage etc. Replace as necessary.

Installation

1. Install the bearings (marked faces outwards), sleeves and seals etc. into the swinging arm in the order shown on the previous page. Use new seals throughout.
2. Position the swinging arm to the frame.
3. Refit the swinging arm spindle from the right hand side such that it will support the swinging arm, but not pass all the way through the frame adjuster sleeve. This will allow tool T3880104 to engage in the slot in the frame adjuster sleeve.
4. Using tool T3880104, tighten the frame adjuster sleeve to **6 Nm**.

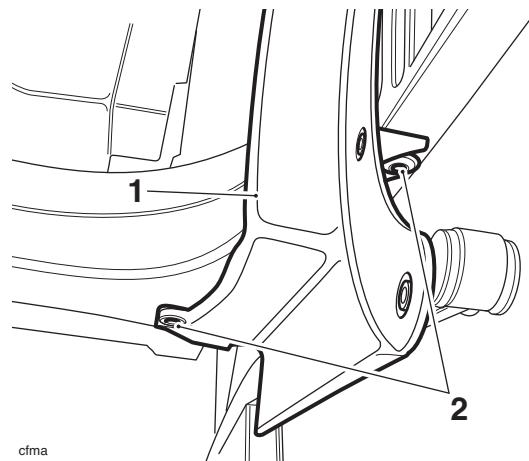


1. Frame adjuster
2. Tool T3880104

5. Fully insert the swinging arm spindle.
6. Fit the washer and a new swinging arm spindle nut, tighten the nut to **110 Nm**.
7. Refit the coolant expansion tank to its bracket.
8. Refit the two flanged sleeves and secure with new nuts, tighten the nuts to **3 Nm**.
9. Check and if necessary top up the coolant level (see page 11-5).
10. Refit the drive belt pulley cover and secure with the four fixings. Tighten to **9 Nm**.

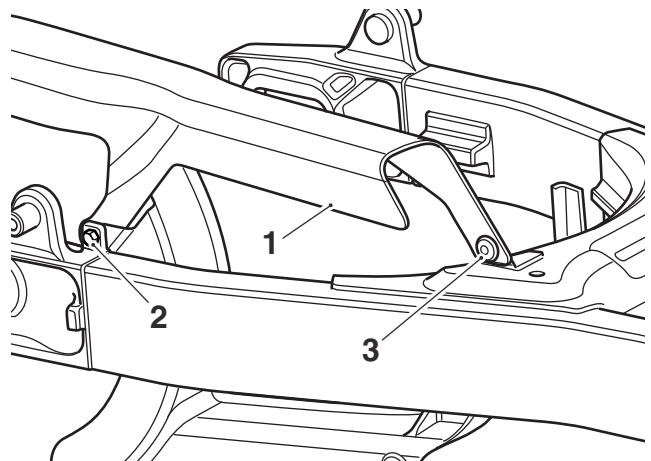
All models

11. Refit the lower drive belt guard and tighten the two lower fixings to **12 Nm**.



1. Lower drive belt guard
2. Fixings

12. Refit the upper drive belt guard. Tighten the rear fixing to **10 Nm** and the front fixing to **8 Nm**.

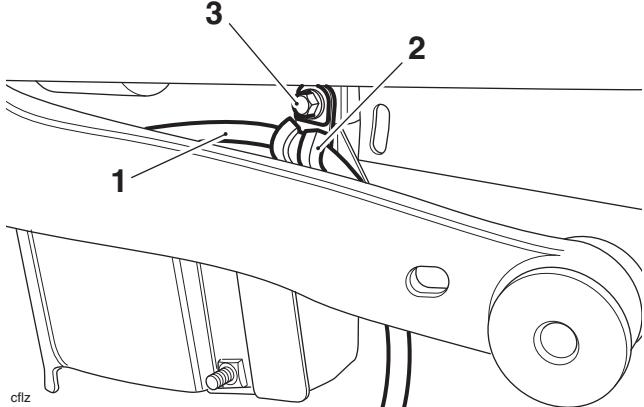


1. Upper drive belt guard
2. Rear fixing
3. Front fixing

Rear Suspension

Non-ABS models

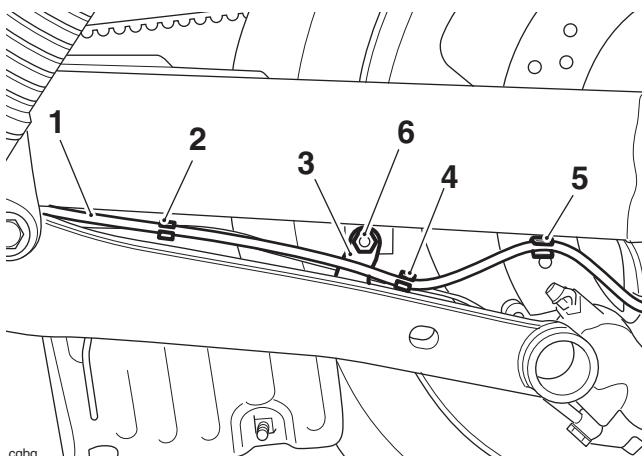
- Align the brake pipe P-clip to the left hand side of the swinging arm. Tighten the clip fixing to **7 Nm**.



- 1. Brake pipe**
- 2. P-clip**
- 3. Fixing**

ABS Models Except Thunderbird Commander and Thunderbird LT

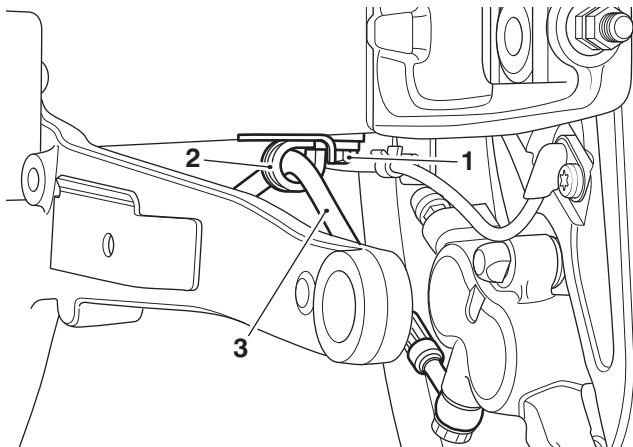
- ABS models: Align the brake pipe P-clip to the left hand side of the swinging arm. Tighten the brake hose P-clip fixing to **7 Nm**.
- Clip the ABS sensor cable to the clip on the swinging arm (5), and the two clips on the brake hose, ensuring that:
 - the rear-most clip (4) is to the rear of, and adjacent to, the P-clip (3)
 - the front clip (2) is approximately 100 mm (4 in) forwards of the P-clip (3).



- 1. ABS sensor cable**
- 2. Front brake hose clips**
- 3. P-clip**
- 4. Rear brake hose clips**
- 5. Swinging arm cable clip**
- 6. Fixing**

Thunderbird Commander and Thunderbird LT

- Align the brake pipe clip and its P-clip to the left hand side of the swinging arm. Tighten the clip fixing to **7 Nm**.



- 1. Fixing**
- 2. P-clip**
- 3. Brake pipe**

All Models

- Refit the rear suspension units (see page 13-4).
- Refit the rear wheel (see page 16-12), but DO NOT adjust the drive belt tension at this stage.

Warning

Before adjusting the final drive belt tension, the belt must be over-tensioned to settle the swinging arm position as described below. Failure to do so may result in the drive belt becoming loose when the motorcycle is first ridden. Riding the motorcycle with a loose drive belt may result in loss of control of the motorcycle and an accident, or damage to the drive belt or other motorcycle components.

Note:

- Over-tensioning of the drive belt is only required when the engine or swinging arm has been removed.**
- With the wheel spindle loose, tighten the right hand drive belt adjuster to **25 Nm**.
- Slacken off the right hand adjuster and check that the belt is now loose.
- Adjust the drive belt tension (see page 15-8).
- Lower the motorcycle to the ground and park it on the side stand.
- Pump the rear brake pedal to position the rear brake pads.
- If removed, refit the panniers (see page 17-28 for all models except Thunderbird Commander and Thunderbird LT, see page 17-27 for Thunderbird Commander and Thunderbird LT).

14 Brakes

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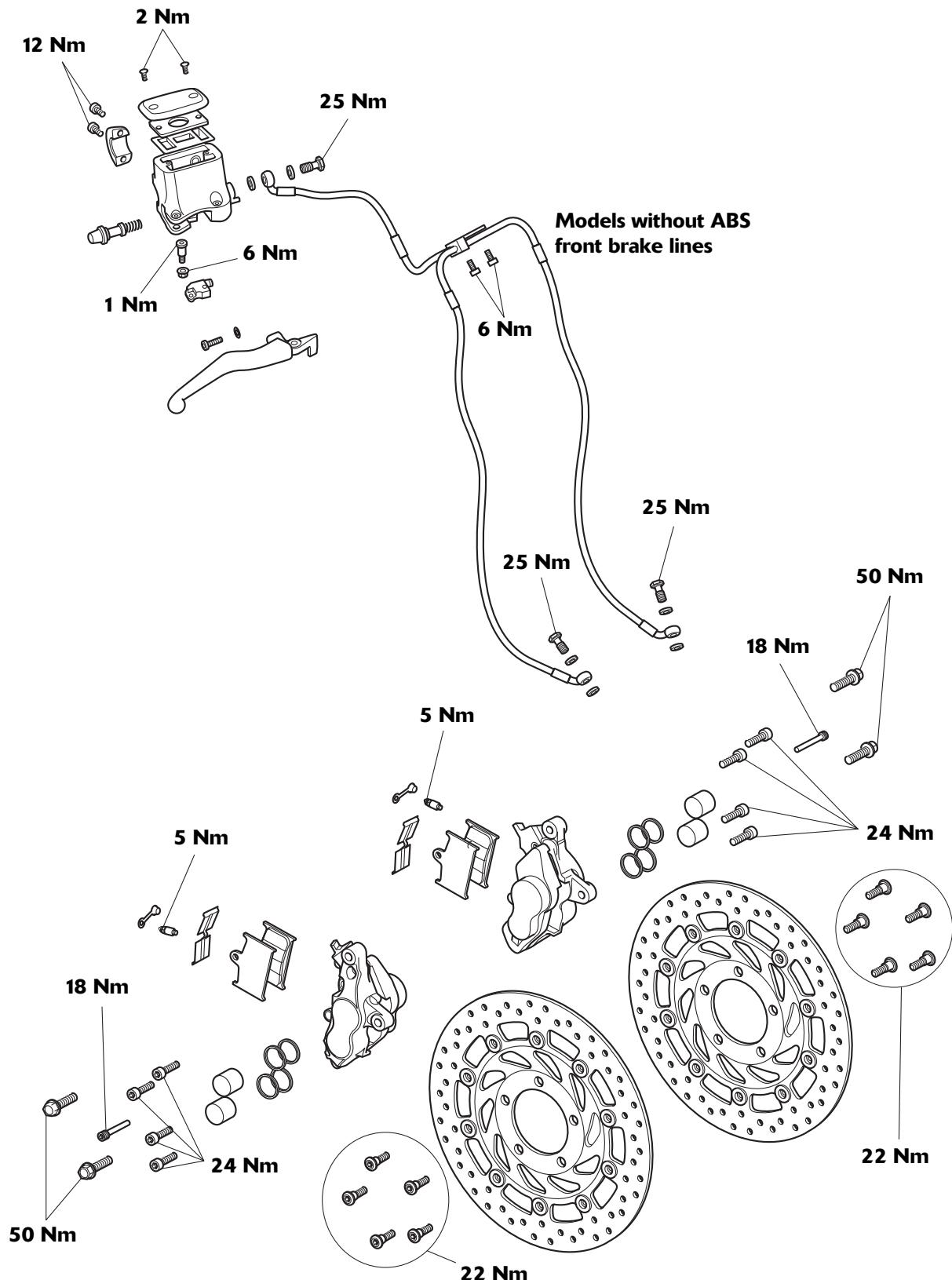
Brakes

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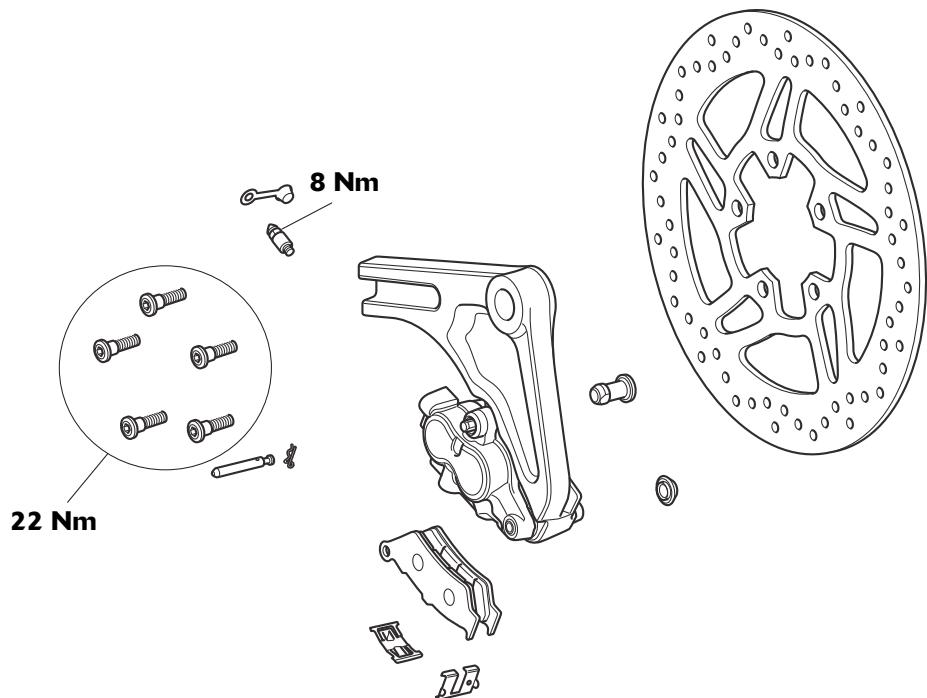
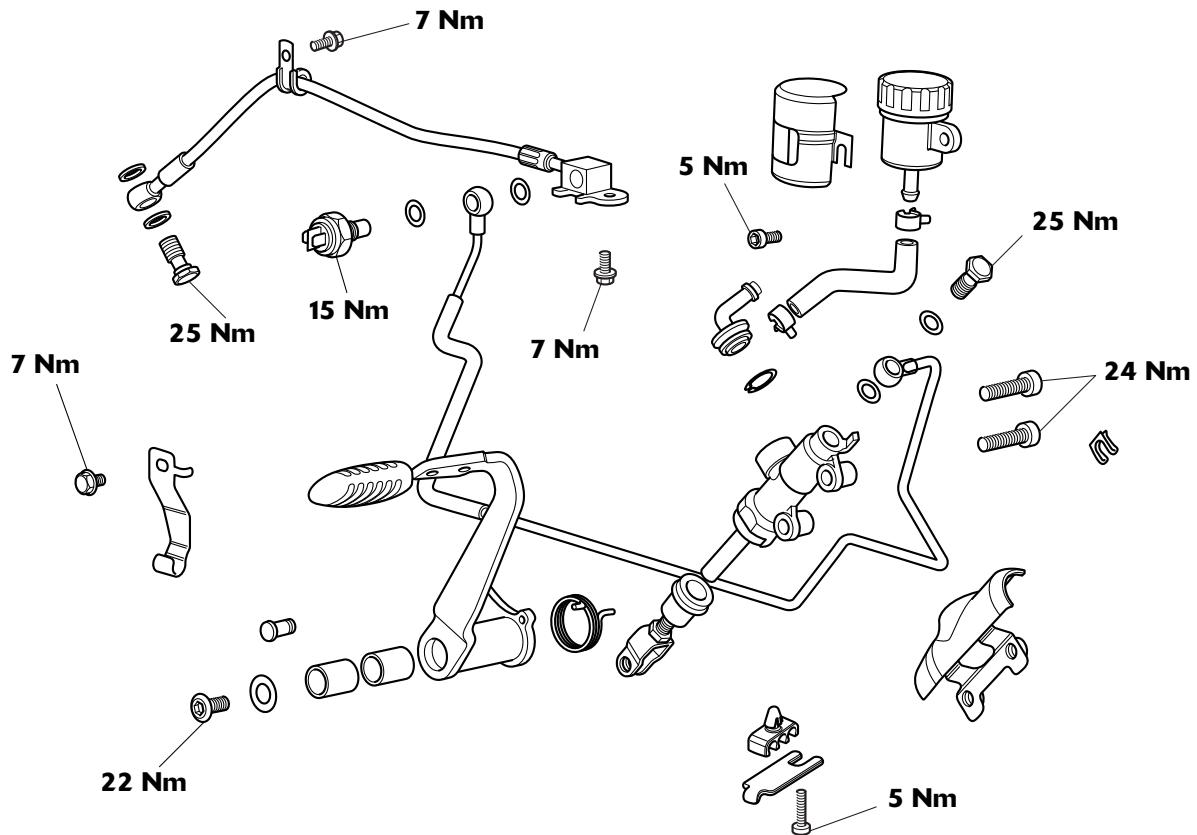
Brakes

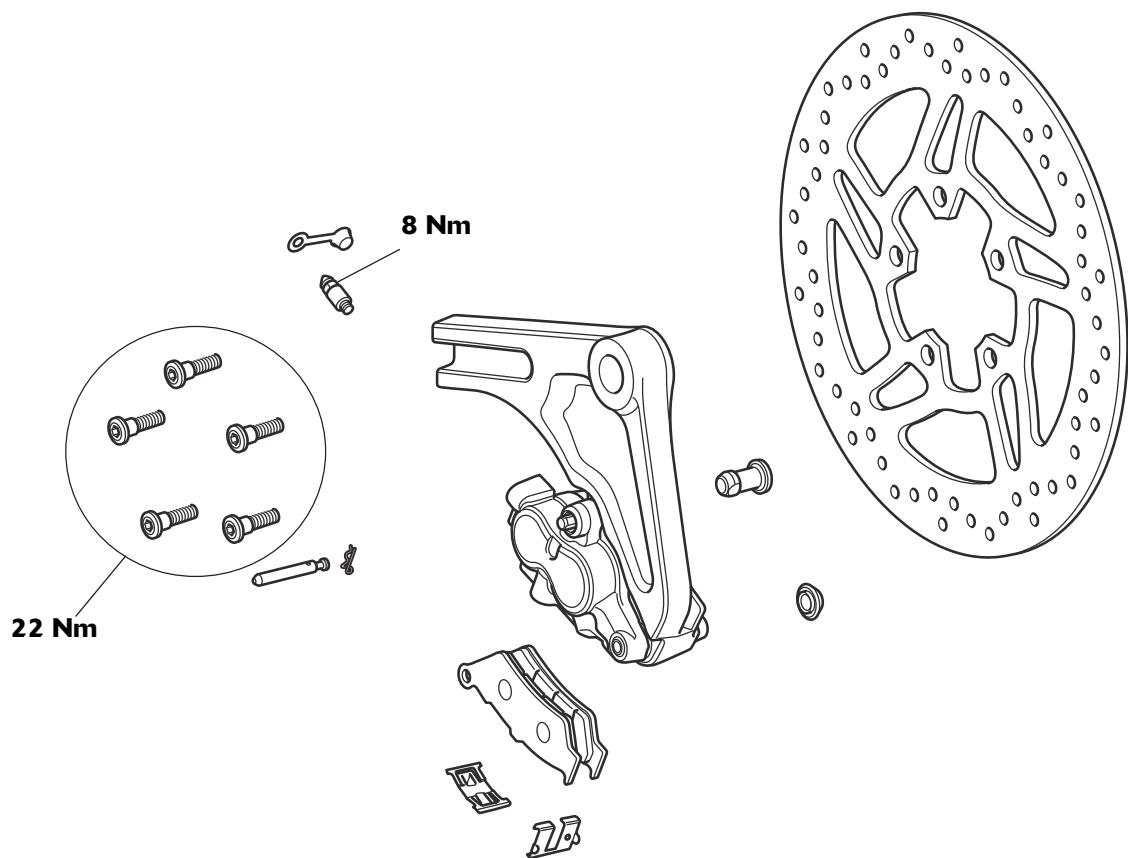
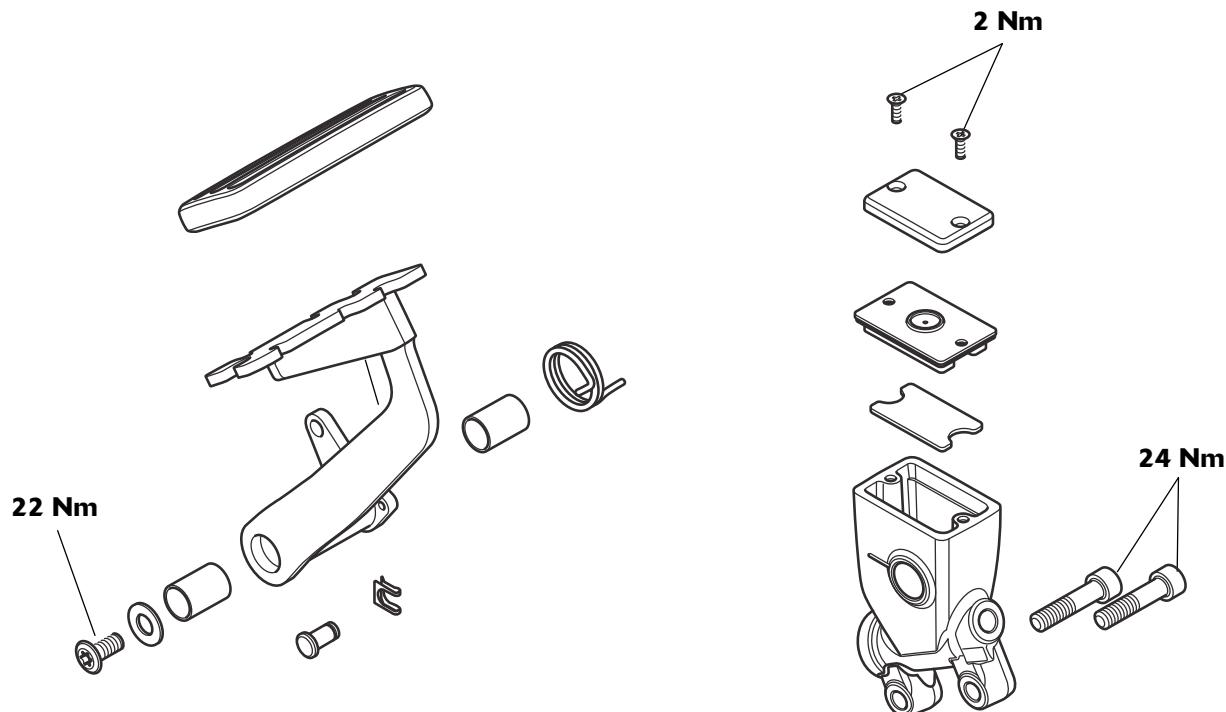
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Exploded View – Front Brake Master Cylinder, Caliper and Disc – All Models

Brakes

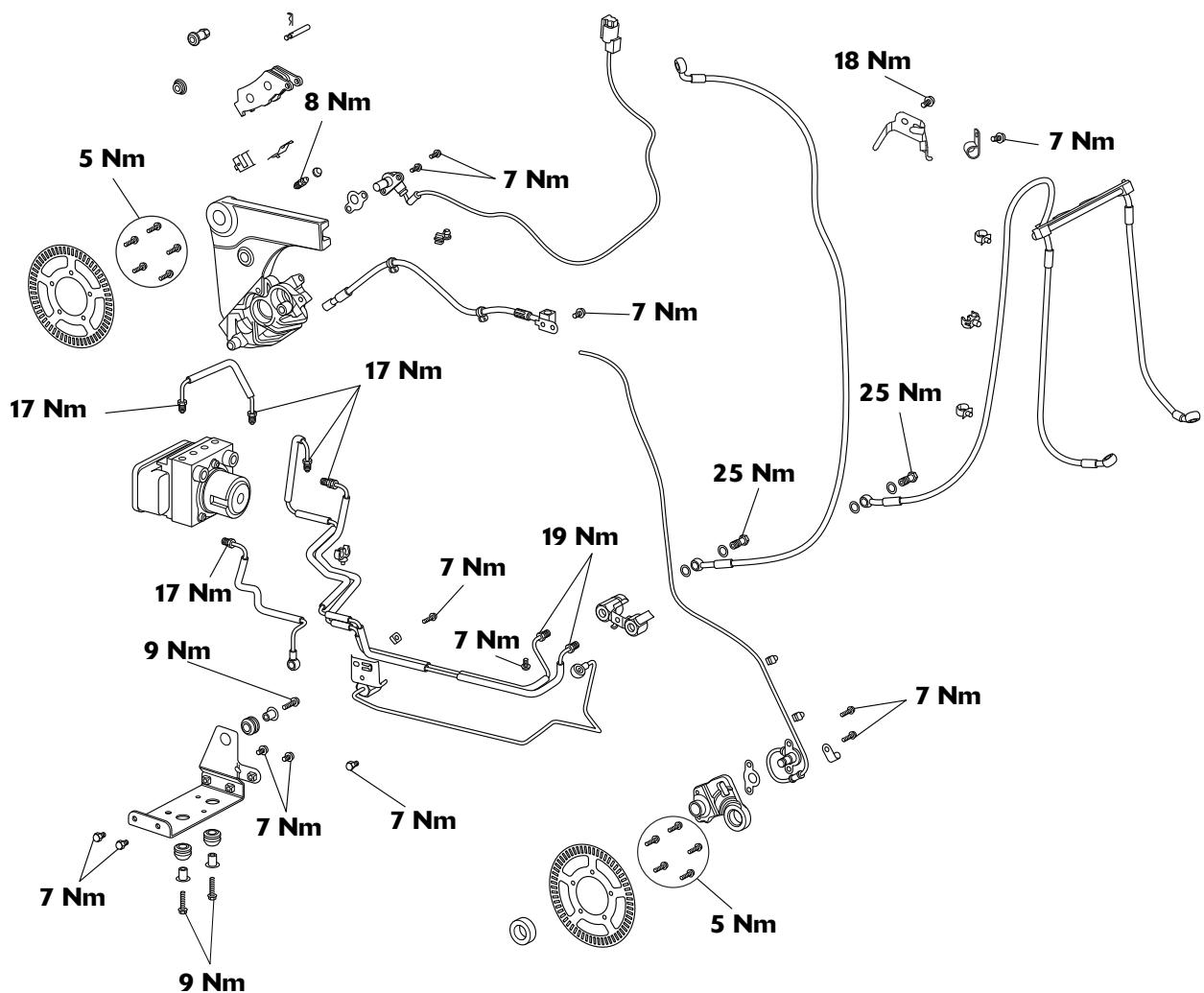
Exploded View – Rear Brake Master Cylinder, Caliper and Disc – All Models Except Thunderbird Commander and Thunderbird LT

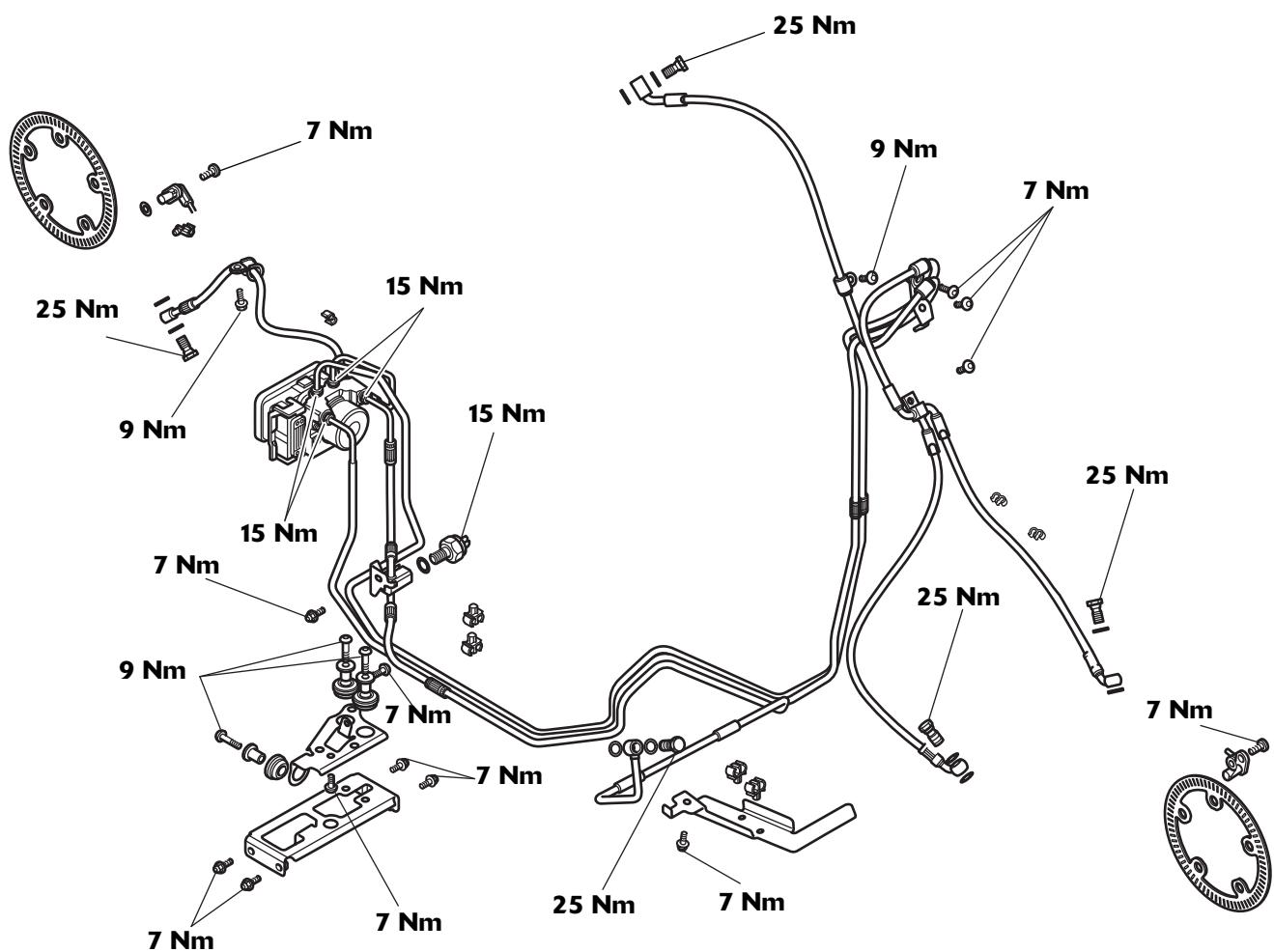


**Exploded View – Rear Brake Master Cylinder, Caliper and Disc –
Thunderbird Commander and Thunderbird LT**

Brakes

Exploded View – ABS system – All Models Except Thunderbird Commander and Thunderbird LT



Exploded View – ABS system – Thunderbird Commander and Thunderbird LT

Brakes

Braking System Maintenance Safety Precautions



Warning

Brake fluid is hygroscopic which means it will absorb moisture from the air. The absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the Scheduled Maintenance chart. A dangerous riding condition could result if this important maintenance item is neglected.

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO LOSS OF MOTORCYCLE CONTROL AND AN ACCIDENT.



Warning

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Failure to change the brake fluid at the interval specified in the Scheduled Maintenance chart may reduce braking efficiency resulting in loss of motorcycle control and an accident.



Warning

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.



Warning

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

Brake Fluid Level Inspection

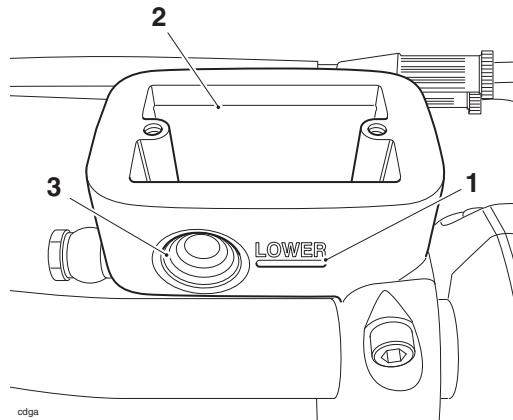
! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

In accordance with the Scheduled Maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

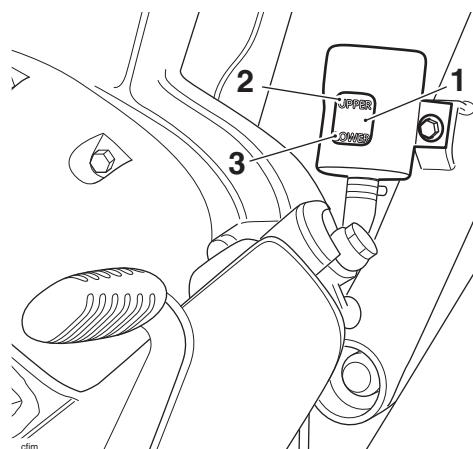
1. Ensure that the brake fluid level in the front and rear brake fluid reservoirs is between the upper and lower level lines (reservoir held horizontal).

Front Brake Fluid Reservoir - All Models



1. Lower level line
2. Upper level line
3. Fluid level window

Rear Brake Fluid Reservoir - All Models Except Thunderbird Commander and Thunderbird LT



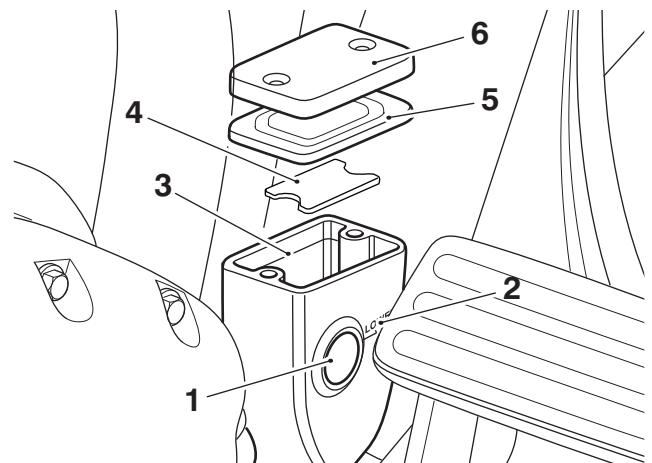
1. Fluid level window
2. Upper level line
3. Lower level line

Rear Brake Fluid Reservoir - Thunderbird Commander and Thunderbird LT

! Warning

After checking or topping up the brake fluid in the rear brake fluid reservoir, ensure the float is installed into the reservoir.

Failure to install the float may result in aeration of the brake fluid in the reservoir. Riding with the brake fluid in this condition may reduce brake performance potentially leading to loss of motorcycle control and an accident.



1. Fluid level window
2. Lower level line
3. Upper level line
4. Float
5. Diaphragm
6. Cover

Changing Brake Fluid

Brake fluid must be changed every two calendar years, irrespective of the mileage the motorcycle has covered in that time.

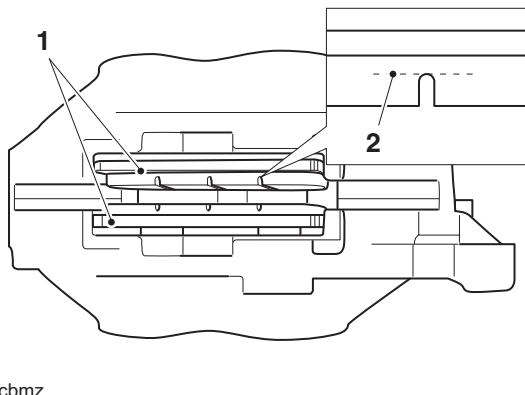
Brake Pads

Front and rear brake pad wear is automatically compensated for and has no effect on brake lever or pedal action.

Brakes

Brake Wear Inspection

In accordance with the Scheduled Maintenance chart, inspect the brake pads for wear. The minimum thickness of lining material for any front or rear brake pad is 1.5 mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



1. Brake pads
2. Minimum thickness line



Warning

Do not replace individual brake pads; replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced simultaneously. Replacing individual pads will reduce braking efficiency and may cause loss of motorcycle control and an accident.

Breaking-in New Brake Pads and Discs

After replacement brake discs and/or pads have been fitted to the motorcycle, we recommend a period of careful breaking-in that will optimise the performance and longevity of the discs and pads. The recommended distance for breaking in new pads and discs is 200 miles (300 km).

After fitting new brake discs and/or pads avoid extreme braking, ride with caution and allow for greater braking distances during the breaking-in period.

Bleeding the Front Brakes, Renewing Brake Fluid

Note:

- Models with ABS brakes: Refer to bleeding ABS brakes later in this section (see page 14-35).



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Turn the handlebars to bring the fluid reservoir to a level position.
2. Remove the screws from the reservoir cover.



Warning

Ensure absolute cleanliness when adding brake fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder, as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container that has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

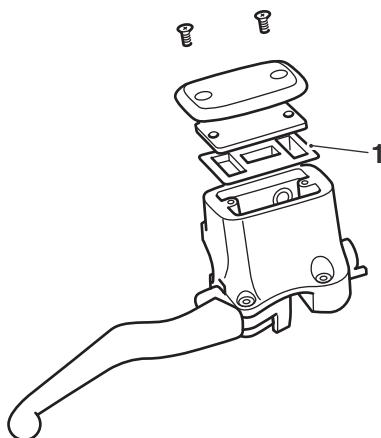


Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. Carefully remove the reservoir cover taking care not to spill any fluid.

4. Check the condition of the reservoir sealing diaphragm. Replace if necessary.



1. Diaphragm

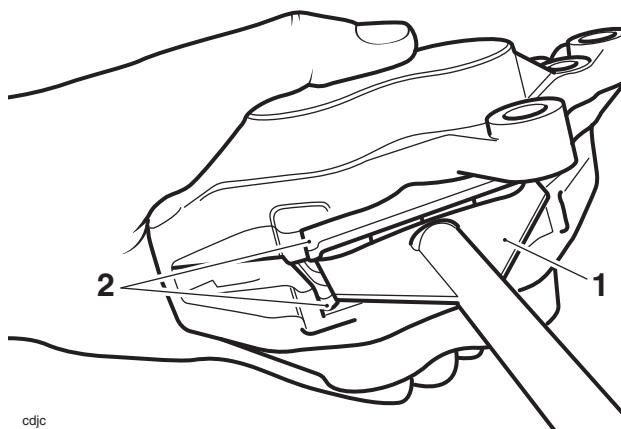
5. Undo and remove the bolts securing the right hand front brake caliper to the fork and manoeuvre the caliper clear of the brake disc. Do not remove the brake hose connected to the caliper.



Warning

Do not allow the caliper to hang on the brake hose as this may damage the hose and could lead to an accident.

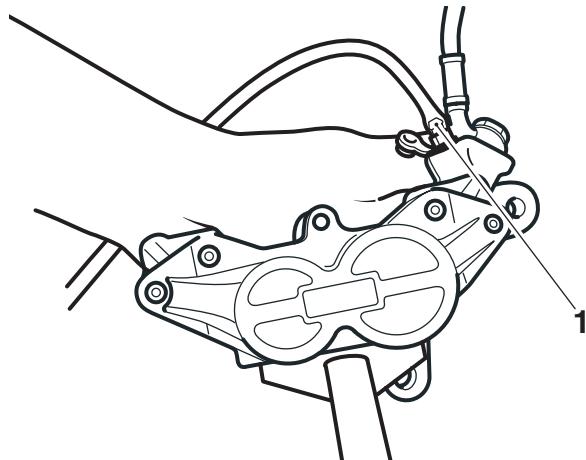
6. Obtain a suitable, wide, flat metal plate which is approximately 2 mm thick and place it between the brake pads. Pump the front brake lever a few times until the metal plate is held in place by the brake pads.



1. Plate

2. Brake pads

7. Remove the rubber cap from the bleed nipple on the caliper.
8. Whilst supporting the front brake caliper, attach a transparent tube to the bleed nipple and place the other end of the tube in a suitable receptacle containing new brake fluid. Keep the tube end below the level of fluid.
9. Support the caliper so that the bleed nipple is uppermost.



1. Bleed nipple

10. Release the bleed nipple.

Note:

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**
11. Get an assistant to slowly pull the brake lever to the handlebar.
12. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
13. Repeat steps 11 and 12 until no more air appears in the bleed tube.
14. When all air has been expelled from the system, hold the lever fully against the handlebar and close the bleed nipple.
15. Remove the transparent bleed tube.

Brakes

16. Using the flat metal plate, gently push the brake pads apart to allow clearance for the brake disc when the caliper is refitted.



Caution

Brake fluid may be displaced as the caliper pistons are compressed. To prevent bodywork damage, ensure that the displaced fluid does not come into contact with any part of the bodywork or wheel.

17. Secure the caliper to the front fork using the original fixings. Tighten the fixings to **50 Nm**.
18. Refit the transparent bleed tube and repeat steps 10 to 13 until no more air appears in the bleed tube.

Note:

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**

19. Tighten the bleed nipple to **5 Nm**.
20. Remove the bleed tube.
21. Replace the bleed nipple cap.
22. Fill the reservoir to the upper level with new DOT 4 fluid.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

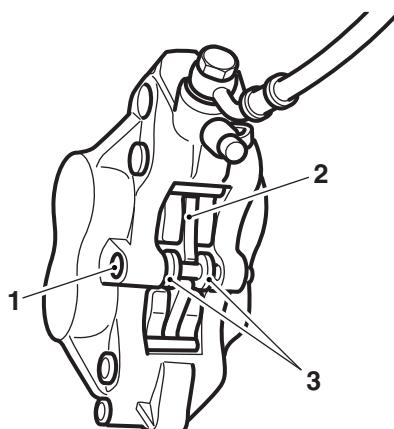
Front Brake Pads

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the brake pad retaining pin after removing and discarding its split pin. Inspect the retaining pin for damage.
2. Remove the anti-rattle spring and inspect the spring for damage.



- cbza
1. Retaining pin
 2. Anti-rattle spring
 3. Brake pads

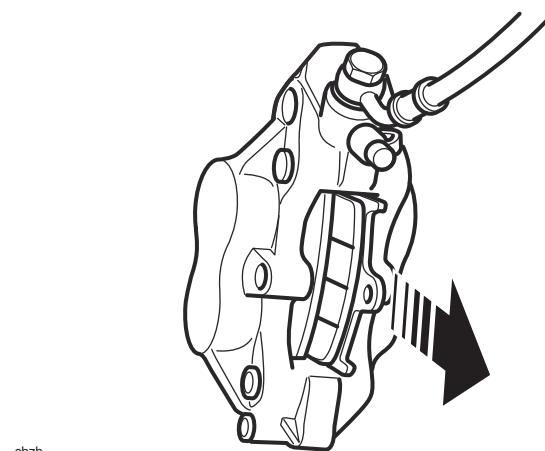
! Caution

In the following operation, never lever directly against the disc, caliper or the pad lining material as this will damage these components. Always use a levering tool made from a soft material that will not cause damage to the load bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent paint damage, ensure that the displaced fluid does not come into contact with any part of the bodywork.

3. Carefully push the brake pads apart to force the caliper pistons back and allow withdrawal of the pads.

4. Remove both brake pads and inspect for damage and wear beyond the service limit.



Brake Pad Removal

Note:

- **Complete the assembly of the brake pads to one caliper (see assembly for details) before removing the pads from the other caliper.**

Installation

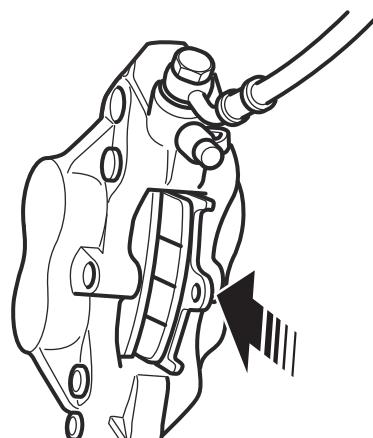
! Warning

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

1. Fit new brake pads as an axle set or, if all the pads are in a serviceable condition, clean the pad grooves before refitting all pads in their original positions.

cbzc



Installing Brake Pads

Brakes



Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature brake grease.
3. Fit the anti-rattle spring over the pads and push down in the centre to allow the pad retaining pin to slide across the top of the spring.
4. Tighten the pad retaining pin to **18 Nm**, and secure with a new split pin.
5. Pump the brake lever to correctly position the caliper pistons.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident. Observe the brake fluid handling warnings given on page 1-6.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

6. Check the front brake fluid level and top up as required with new DOT 4 fluid.
7. Check the operation of the front brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Caliper

Removal



Warning

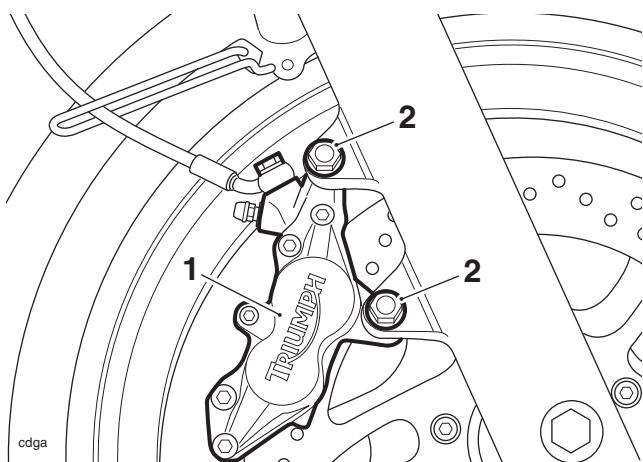
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Disconnect the brake hose at the caliper and place the free end of the hose in a suitable container to collect any displaced brake fluid.
2. Remove the brake pads (see page 14-15).
3. Remove the two caliper bolts.



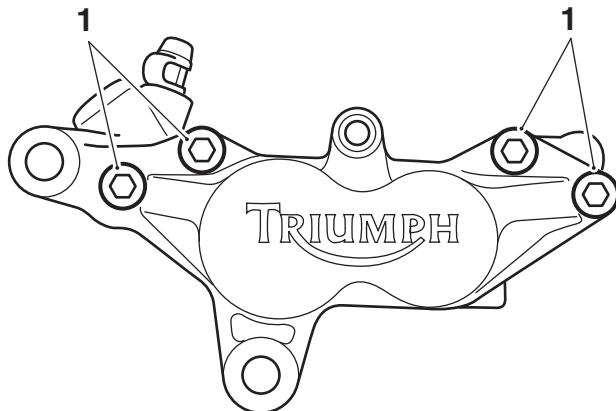
1. Caliper (Thunderbird shown)

2. Fixings

4. Manoeuvre the caliper clear of the disc, taking care not to damage the wheel.

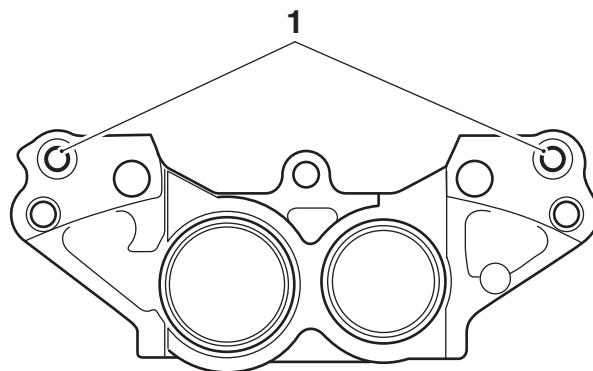
Disassembly

1. Remove the four bolts which secure the two halves of the brake caliper together. Discard the bolts.



1. Bolts

2. Carefully split the two halves of the caliper then remove and discard the two joint seals.



1. Joint seals



Warning

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air or brake fluid.



Warning

Ensure that the caliper bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment otherwise damage to the caliper could result.

A dangerous riding condition leading to an accident could result if this warning is ignored.

3. Cover the caliper half with a clean, heavy cloth and, using compressed air, remove the pistons, one at a time.



Warning

Ensure the seal grooves in the caliper are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

4. Remove the old piston seals and the dust seals then thoroughly clean and dry the caliper bores. Discard the old seals.

Inspection

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.



Warning

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used. A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Assembly



Warning

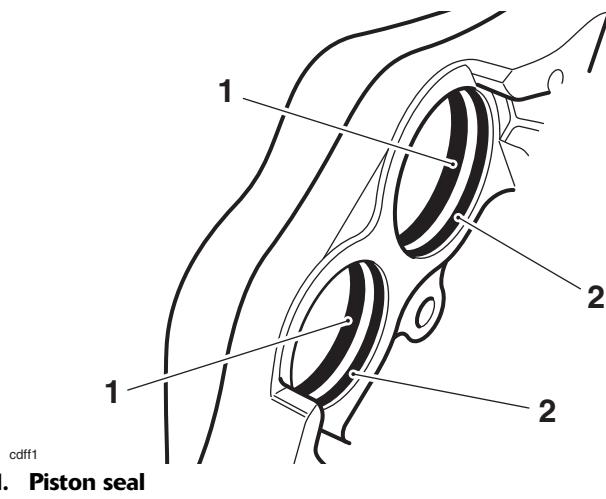
Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. A dangerous riding condition leading to loss of motorcycle control and an accident could result from use of mineral grease.

Note:

- The piston seals are slightly thicker than the dust seals.

Brakes

- Fit new piston seals and dust seals to the caliper bores.



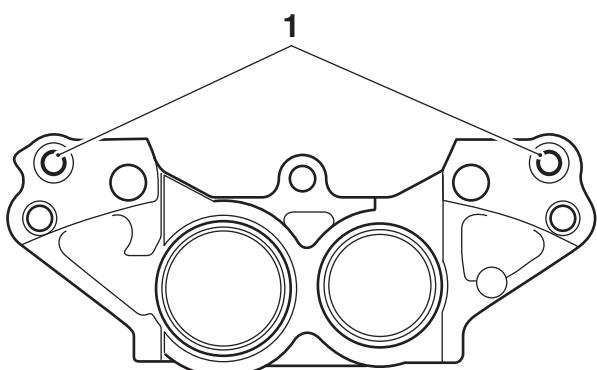
1. Piston seal
2. Dust seal



Warning

Ensure that the bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment, as incorrect fitment can lead to seal and bore damage. A dangerous riding condition leading to loss of motorcycle control and an accident could result from damaged seals and/or bores.

- Apply brake fluid to the outside of the caliper pistons and fluid seals.
- Carefully push the pistons fully and squarely into the caliper bores by hand.
- Once all seals and pistons have been fitted, carefully clean the mating faces of both sides of the caliper.
- Fit new joint seals to the recess in one half of the caliper.



1. Joint seals



Warning

Ensure the mating surfaces of the caliper halves are clean and free from dust prior to assembly. Failure to ensure that the mating faces are clean and free from dust will result in a dangerous riding condition leading to loss of motorcycle control and an accident.

- Apply a small drop of threadlocking compound (ThreeBond 1305 or equivalent) to the threads of the new caliper bolts and secure the two halves of the caliper together. Tighten the caliper bolts to **24 Nm**.

Installation

- Position the caliper over the disc taking care not to damage the wheel.
- Tighten the caliper bolts to **50 Nm**.
- Refit the brake pads (see page 14-15).
- Connect the brake hose to the caliper incorporating new sealing washers on each side of the union.
- Tighten the brake hose union bolt to **25 Nm**.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.



Caution

To prevent body damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
- Bleed the front brake (see page 14-12).
- Check the operation of the front brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Discs



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

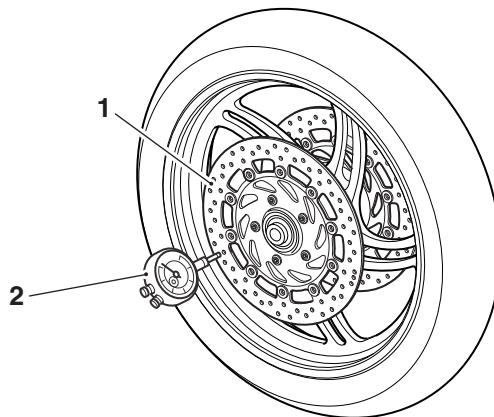
Wear

- Replace any brake disc worn beyond the service limit or exceeding the disc run-out limit.

Front Disc Thickness	
Standard	5.0 mm
Service limit	4.5 mm

Disc Run-out	
Service limit	0.25 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



1. Disc
2. Dial gauge

Removal



Warning

Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Remove the front wheel (see page 16-10).

For All Models Except Thunderbird Commander and Thunderbird LT

2. Motorcycles with ABS: Remove the ABS pulser ring (see page 14-39).

Thunderbird Commander and Thunderbird LT

Note:

- The fixings securing the left hand brake disc to the wheel also secures the ABS pulser ring.
- Note the orientation of the brake disc and the ABS pulser ring fitted to the left hand brake disc for installation.

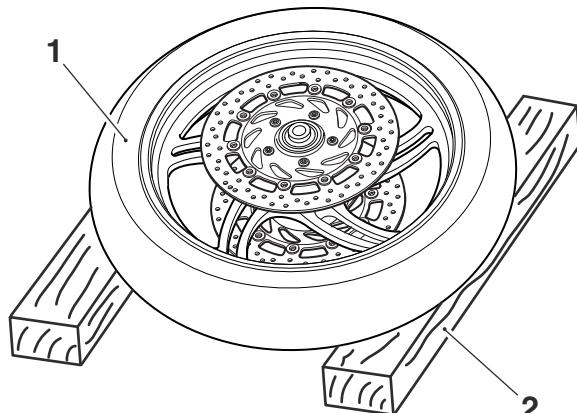
All Models



Warning

To avoid wheel damage, always support the wheel as instructed below. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

3. Support the wheel on blocks as illustrated.



1. Wheel
2. Support block

4. Remove and discard the disc securing bolts.

Brakes

Note:

- The discs are different on either side. Note the position and orientation of each disc before removal.
- 5. Detach the disc.
- 6. Repeat operations 3, 4 and 5 to remove the disc on the opposite side.

Installation

Note:

- For Thunderbird Commander and Thunderbird LT, the ABS Pulser ring must be fitted to the left hand brake disc as noted for removal.
- 1. Locate the first disc on the correct side of the wheel (offset of disc outwards) as noted during removal.
- 2. Fit new disc bolts and tighten to **22 Nm**.
- 3. Fit the remaining disc in the same way.
- 4. **Motorcycles with ABS:** Refit the ABS pulser ring (see page 14-39).
- 5. Refit the wheel (see page 16-11).
- 6. **Motorcycles with ABS:** Check and, if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see page 14-38).
- 7. Check the operation of the front brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Master Cylinder

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

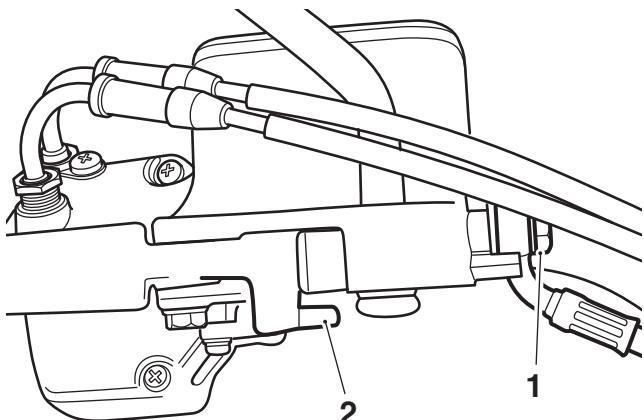
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery negative (black) lead first.



Caution

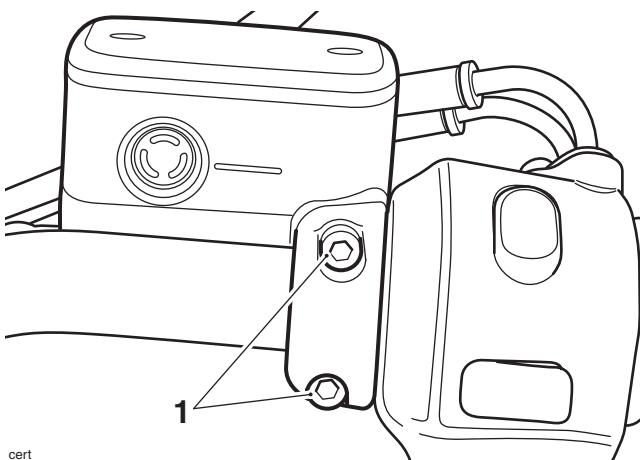
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. To drain the fluid from the master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and operate the brake lever until all fluid has been expelled into a suitable container.
4. Disconnect the brake hose and brake light switch connections to the master cylinder.



1. Brake hose connection
2. Brake light switch connection

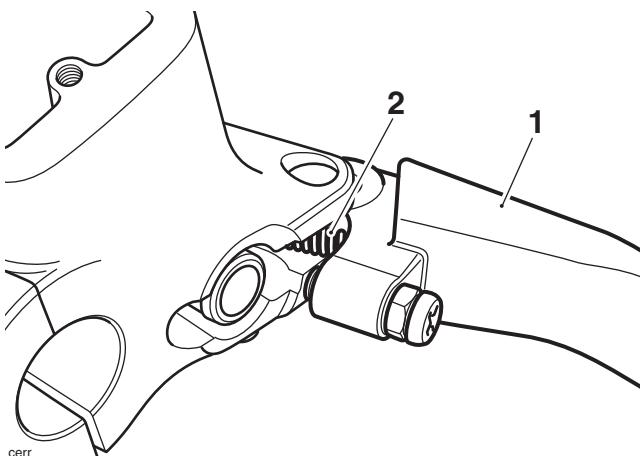
5. Release the clamp screws from the handlebar to remove the master cylinder.



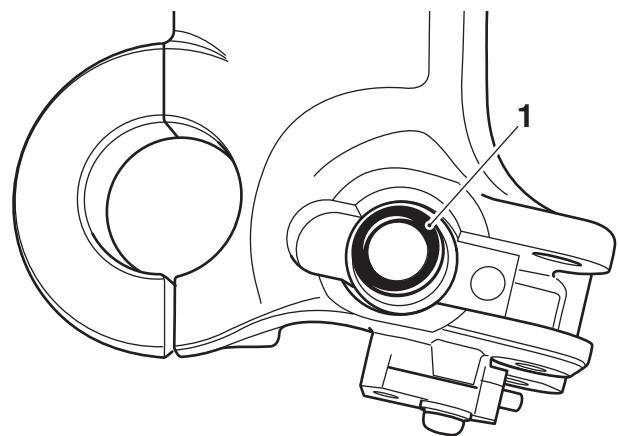
cert

1. Clamp screws**Disassembly**

1. Remove the pivot lock nut and bolt securing the brake lever to the master cylinder.
2. Remove the brake lever and spring.

**1. Brake lever
2. Spring**

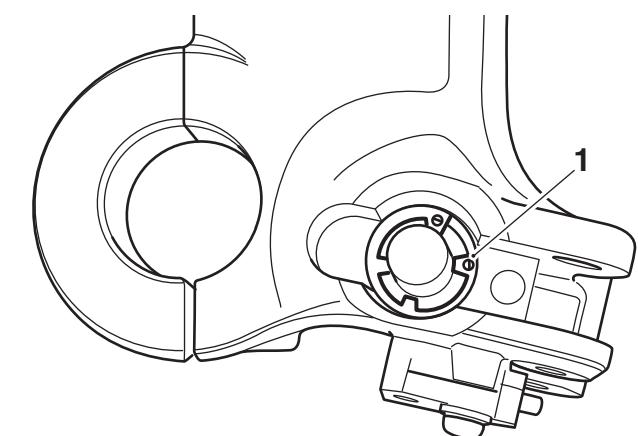
3. Detach the dust cover from the lever end of the cylinder.



ceqx

1. Dust cover

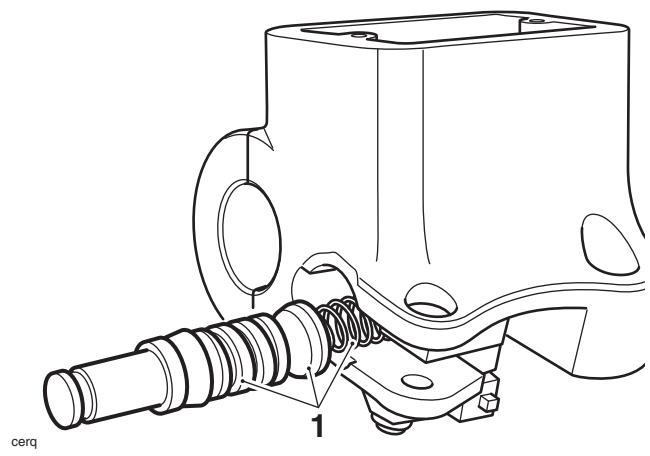
4. Remove the circlip from beneath the dust cover.



ceax

1. Circlip

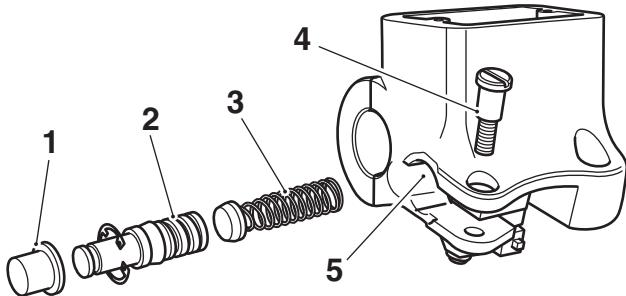
5. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.

**1. Piston Set**

Brakes

Inspection

1. Check the following for wear, damage, cracks or deterioration:

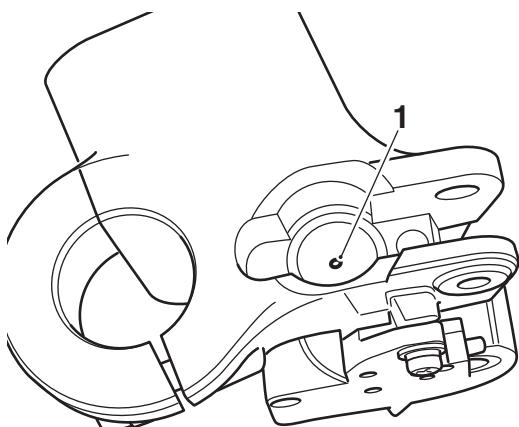


ceru

1. **Dust cover**
2. **Piston**
3. **Spring**
4. **Pivot bolt**
5. **Cylinder bore**

Note:

- **Always renew the piston and seal set if the cylinder is dismantled.**
- 2. Check that the relief and supply ports on the cylinder are not blocked.



1. **Ports**

Assembly

Warning

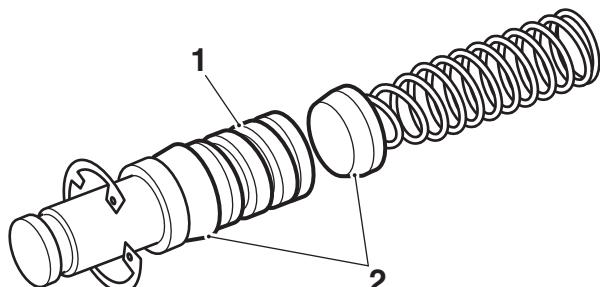
Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Lubricate the piston and cylinder with new, clean brake fluid.

Warning

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to loss of motorcycle control and an accident could result from incorrect assembly of the master cylinder.

2. Fit the new piston set into the master cylinder and retain with a new circlip.

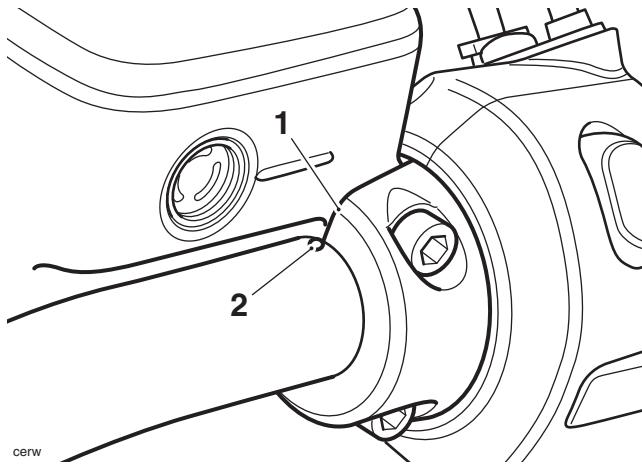


ceqw

1. **Piston**
2. **Seals (in correct orientation)**
3. Refit the master cylinder dust cover.

Installation

1. Locate the master cylinder to the handlebars.
2. Position the clamp to the rear side of the handlebars.
3. Align the master cylinder/clamp split line with the dot mark on the upper side of the handlebar.



- 1. Dot mark**
2. Split line

4. Tighten the clamp bolts, upper first and then the lower to **12 Nm**.
5. Connect the brake light switch.
6. Position the brake lever and spring ensuring that the pivot boss is correctly aligned to the push rod.
7. Fit and tighten the pivot bolt to **1 Nm**, and the lock nut to **6 Nm**.
8. Connect the brake hose to the master cylinder incorporating new sealing washers to each side of the union. Tighten the union bolt to **25 Nm**.

9. Fill and bleed the front brakes (see page 14-12).
10. Examine the system for correct operation and fluid leaks. Rectify as necessary.
11. Check the operation of the front brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

12. Reconnect the battery, positive (identified with red tape) lead first.
13. Refit the rider's seat (see page 17-21).



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.



Caution

To prevent body damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

Brakes

Bleeding the Rear Brakes, Renewing Brake Fluid

Note:

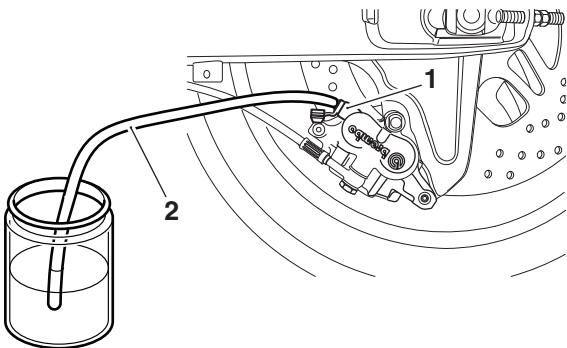
- **Models with ABS brakes:** Refer to bleeding ABS brakes later in this section (see page 14-40).



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the cap from the rear bleed nipple.
2. Attach a transparent tube to the bleed nipple.



1. Bleed nipple

2. Bleed tube

3. Place the other end of the tube in a suitable receptacle containing new brake fluid.

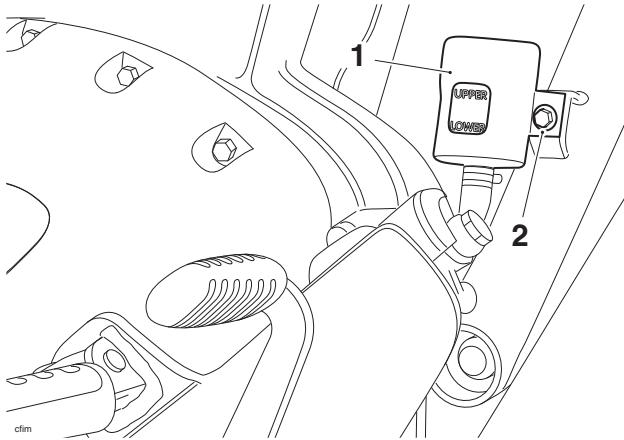


Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

All Models Except Thunderbird Commander and Thunderbird LT

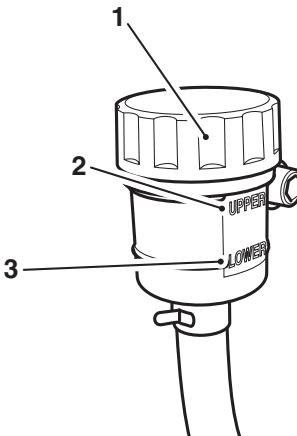
4. Remove the fixing and remove the reservoir cover, noting that the reservoir is secured on the same fixing. Temporarily refit the reservoir.



1. Reservoir cover

2. Fixing

5. Remove the rear brake reservoir cap taking care not to spill any fluid.



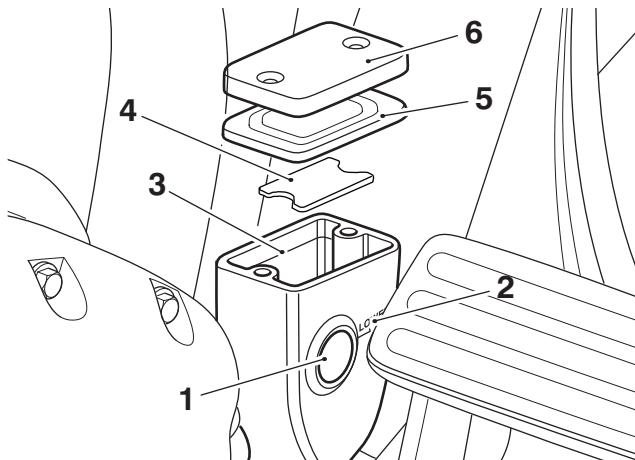
1. Reservoir cap

2. Rear reservoir upper level

3. Rear reservoir lower level

Thunderbird Commander and Thunderbird LT

- Remove the fixings and remove the cover noting the position of the diaphragm and the float inside.



- Fluid level window
- Lower level line
- Upper level line
- Float
- Diaphragm
- Cover

All Models**Warning**

Ensure absolute cleanliness when adding brake fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder, as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container that has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

**Caution**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Check the condition of the sealing diaphragm. Replace the diaphragm as necessary.
- Release the bleed nipple.

Note:

- During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**

- Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple. Repeat steps 8 and 9 until no more air appears in the bleed tube, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
- When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **8 Nm**.
- Fill the reservoir to the maximum level with new DOT 4 fluid.

**Warning**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident. Observe the brake fluid handling warnings given earlier in this section of the manual.

**Caution**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Fit the reservoir cap and diaphragm.

All Models Except Thunderbird Commander and Thunderbird LT

- Remove the fixing and support the reservoir. Refit the reservoir cover, and tighten the fixings to **5 Nm**.

Brakes

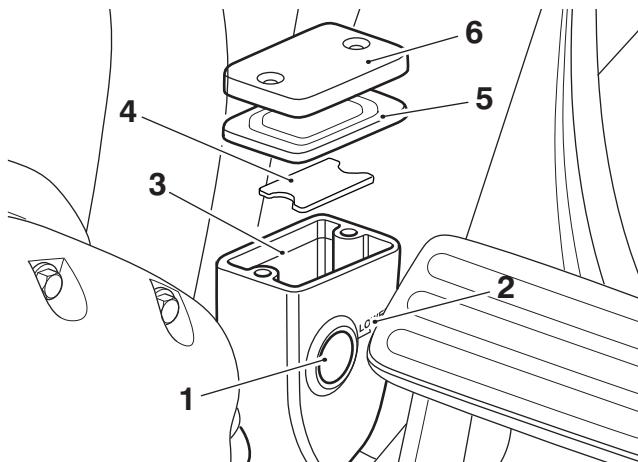
Thunderbird Commander and Thunderbird LT



Warning

After checking or topping up the brake fluid in the rear brake fluid reservoir, ensure the float is installed into the reservoir.

Failure to install the float may result in aeration of the brake fluid in the reservoir. Riding with the brake fluid in this condition may reduce brake performance potentially leading to loss of motorcycle control and an accident.



1. Fluid level window

2. Lower level line

3. Upper level line

4. Float

5. Diaphragm

6. Cover

14. Refit the float into the reservoir then the diaphragm seal and reservoir cover, ensuring that the diaphragm seal is correctly positioned between the cap and reservoir body. Tighten the fixings to **2 Nm**.

All Models

15. Remove the bleed tube from the nipple.
16. Replace the bleed nipple dust cap.
17. Ensure the brake pedal operation has a firm resistive feel to it, does not feel spongy and that the pedal cannot be depressed through its full range of travel. Rectify as necessary.
18. Check the operation of the rear brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Pads, Rear Brake Caliper

Note:

- **The seals and pistons of the rear caliper are not serviceable items. Should a fault occur in the caliper, the complete caliper must be renewed.**

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the rear of the motorcycle.
2. Remove the rear wheel (see page 16-12).
3. If removing the caliper completely, disconnect the brake hose at the caliper and place the free end of the hose in a suitable container to collect any displaced brake fluid. If only the brake pads are to be renewed, leave the hose attached.
4. **Motorcycles with ABS:** If removing the caliper completely, remove the ABS wheel speed sensor (see page 14-40).

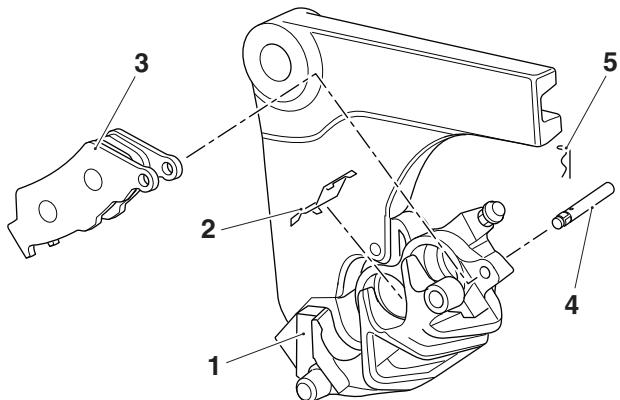


Warning

Do not allow the caliper to hang on the brake hose as this may damage the hose and could lead to reduced brake efficiency causing loss of motorcycle control and an accident.

5. Remove the R-clip from the pad retaining pin, and carefully drift the pin out of the caliper using a suitable pin punch.
6. Remove the brake pads and inspect for damage or wear beyond the service limit.

7. Remove the anti-rattle spring and inspect for damage.



1. Rear caliper and carrier assembly
2. Anti-rattle spring
3. Brake pads
4. Pad retaining pin
5. R-clip

Installation

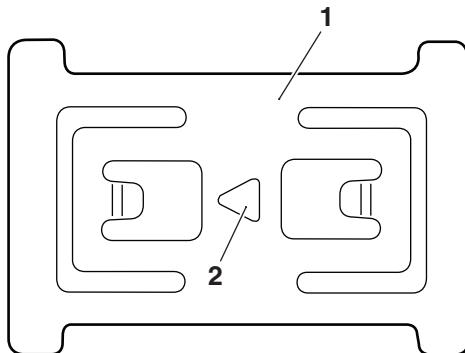
! Warning

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. Damage caused by mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

! Caution

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork or the rear wheel.

1. If fitting new pads, use hand pressure to compress the caliper pistons fully into their bores.
2. Install the anti-rattle spring into the caliper, ensuring the direction arrow on the spring points in the direction of disc rotation.



1. Anti-rattle spring
2. Direction arrow

3. Renew the brake pads as a pair or, if both pads are in a serviceable condition, clean the pad grooves before fitting them.

! Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

4. Inspect the R-clip and pad retaining pin for damage. Renew as necessary.
5. Lubricate the pad retaining pin using a minimum amount of proprietary high temperature brake grease. Refit the pin and retain with the R-clip. Ensure the bent portion of the R-clip is facing away from the brake disc.
6. Refit the rear wheel (see page 16-12).
7. **Motorcycles with ABS:** If removed, refit the ABS wheel speed sensor (see page 14-41).
8. If previously disconnected, incorporating new washers to each side of the union, fit and tighten the brake union bolt to **25 Nm**.
9. If the brake hose has been disconnected, bleed the rear brake (see page 14-24).
10. Pump the brake pedal to correctly position the caliper pistons.

Brakes



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

11. Check the brake fluid level and top up as required with new DOT 4 fluid.
12. Check the operation of the rear brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Disc

Wear



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Replace any brake disc worn beyond the service limit or exceeding the disc run-out limit.

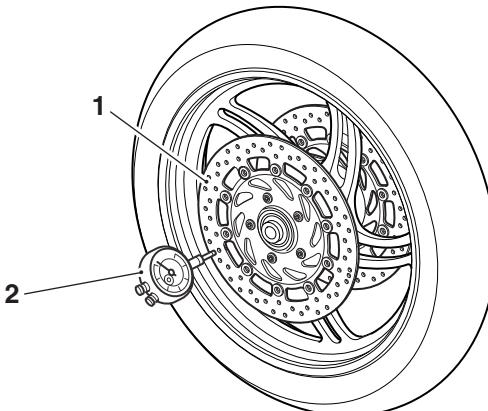
Rear Disc Thickness

Standard	6.0 mm
Service limit	5.5 mm

Disc Run-out

Service limit	0.25 mm
---------------	---------

Measure disc run-out using an accurate dial gauge mounted on a surface plate.



1. Disc (front wheel shown)

2. Dial gauge

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rear wheel (see page 16-12).
2. Support the wheel on blocks to avoid damage to the wheel centre.

Thunderbird Commander and Thunderbird LT

Note:

- **The fixings securing the rear brake disc to the wheel also secures the ABS pulser ring.**
- **Note the orientation of the brake disc and the ABS pulser ring for installation.**

All Models

3. Remove and discard the fixings and remove the brake disc.

Installation

Note:

- **For Thunderbird Commander and Thunderbird LT, the ABS Pulser ring must be fitted to the rear brake disc as noted for removal.**

1. Locate the brake disc to the wheel as noted during removal.
2. Fit new securing bolts and tighten to **22 Nm**.
3. Refit the rear wheel (see page 16-12).
4. **Motorcycles with ABS:** Check and, if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see page 14-38).
5. Check the operation of the rear brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Master Cylinder – All Models Except Thunderbird Commander and Thunderbird LT

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

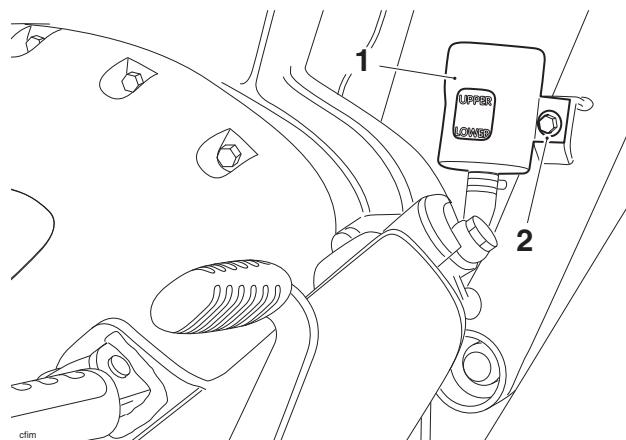
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled.
4. Remove the fixing and remove the reservoir cover and rear brake reservoir.

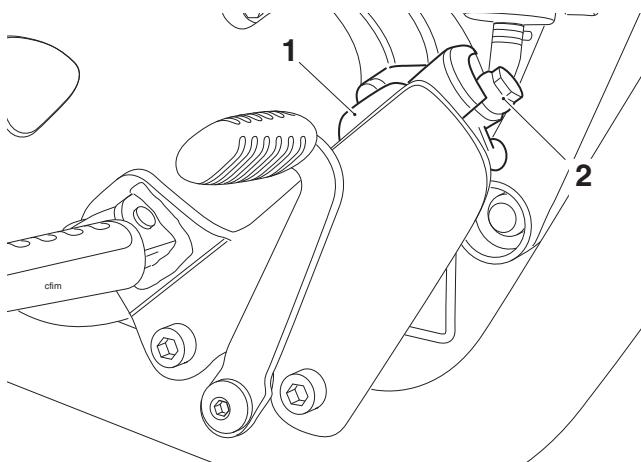


1. Reservoir cover

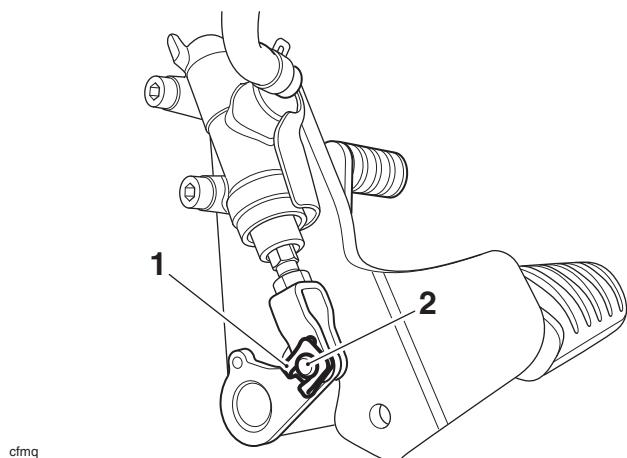
2. Fixing

Brakes

5. Disconnect the hard-line from the rear master cylinder (discard the sealing washers).



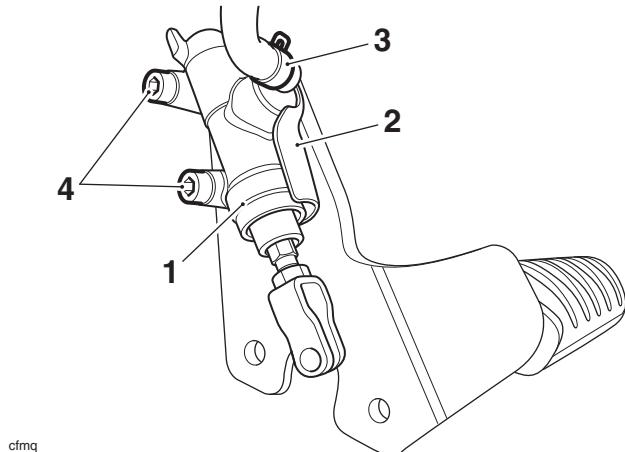
1. Master cylinder
2. Hard-line union bolt
6. Release the bolt securing the brake pedal to the engine bracket.
7. Release the bolts securing the control plate assembly to the engine bracket.
8. Noting the position of the brake pedal return spring, detach the control plate assembly, brake pedal, reservoir and master cylinder as an assembly. Collect the brake pedal return spring.
9. Remove the clip from the brake pedal clevis pin. Remove the clevis pin.



- cfmq
1. Clip
 2. Clevis pin

10. Remove the brake pedal from the master cylinder.
11. Release the clip, and noting its orientation, remove the brake fluid reservoir and hose from the master cylinder.

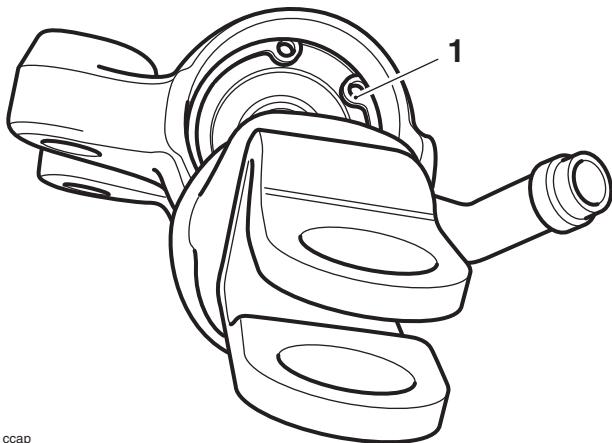
12. Release the bolts securing the master cylinder to the control plate assembly. Remove the master cylinder and its cover.



- cfmq
1. Master cylinder
 2. Master cylinder cover
 3. Hose clip
 4. Master cylinder bolts

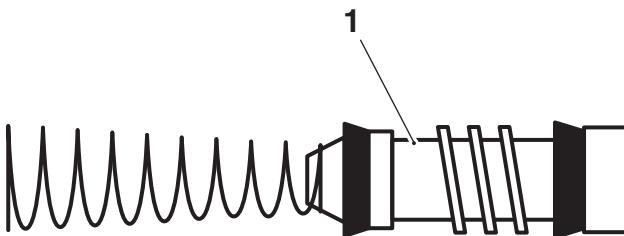
Disassembly

1. Remove the rubber boot from the cylinder and pushrod.
2. Remove the circlip retaining the pushrod to the cylinder.



- ccap
1. Circlip

- Remove the pushrod and piston set from the master cylinder bore noting the relative position of the seals and piston components.

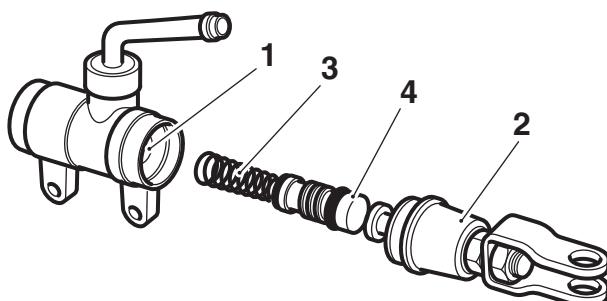


ccaq

1. Piston

Inspection

- Check the following for wear, damage, cracks or deterioration:



ccad

1. Cylinder bore

2. Dust cover

3. Spring

4. Piston

- Examine the pushrod for distortion and other damage. Replace as necessary.

Assembly

Warning

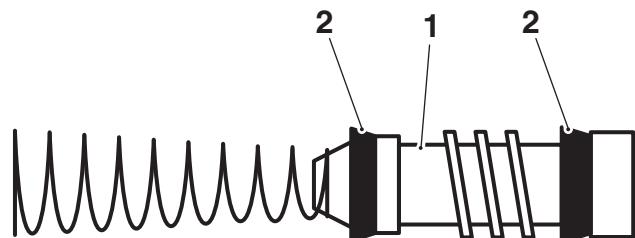
Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. A dangerous riding condition leading to loss of motorcycle control and an accident could result from use of mineral grease.

- Lubricate the piston and cylinder with new, clean brake fluid.

Warning

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to loss of motorcycle control and an accident could result from incorrect assembly of the master cylinder.

- Fit the new piston and seal set into the master cylinder.



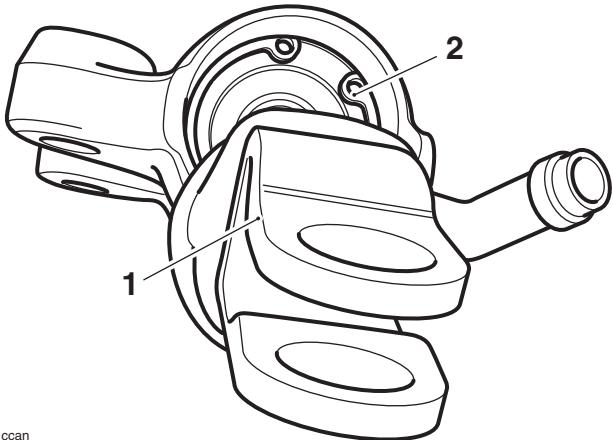
1. Piston

2. Seals (in correct orientation)

- Apply a small amount of brake grease to the pushrod.

Brakes

4. Install the pushrod in the master cylinder, compress the spring and retain the assembly with a new circlip.

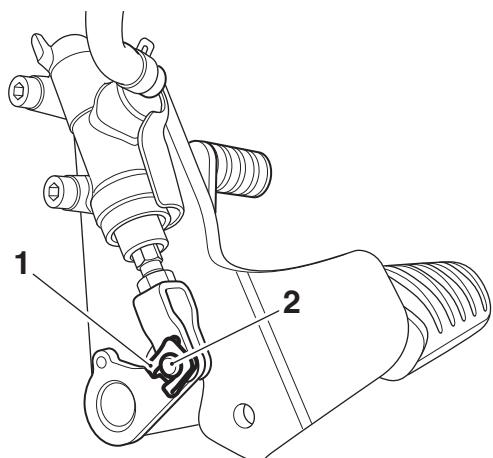


- ccan
1. Pushrod
2. Circlip

5. Refit the master cylinder boot.

Installation

1. Position the master cylinder and its cover to the control plate assembly.
2. Secure with two new bolts, tightening to **24 Nm**.
3. Refit the brake fluid reservoir and its hose to the master cylinder, and position as noted on disassembly. Secure with the clip.
4. Position the brake pedal to the pushrod, engage the clevis and retain it with the clip. Ensure the clip is fitted as shown below:



- cfrmq
1. Clip
2. Clevis pin

5. Lubricate the brake pedal shaft with a thin smear of grease conforming to NLGI 2 specification.
6. Position the brake pedal return spring to the brake pedal shaft as noted during removal.

7. Align the brake pedal to its shaft and refit the master cylinder and control plate assembly to the engine bracket. Ensure the end of brake pedal return spring engages in the hole in the brake pedal. Tighten the control plate fixings to **50 Nm**. Tighten the brake pedal fixing to **22 Nm**.
8. Refit the brake fluid reservoir to the frame, position the cover and secure with the fixing. Tighten to **5 Nm**.
9. Incorporating new washers to either side of the union, fit the hard-line. Tighten the union bolt to **25 Nm**.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident. Observe the brake fluid handling warnings given earlier in this section of the manual.

10. Fill and bleed the rear brake system (see page 14-24).
11. Reconnect the battery, positive (identified with red tape) lead first.
12. Refit the rider's seat (see page 17-21).
13. Check the operation of the rear brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Master Cylinder – Thunderbird Commander and Thunderbird LT

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

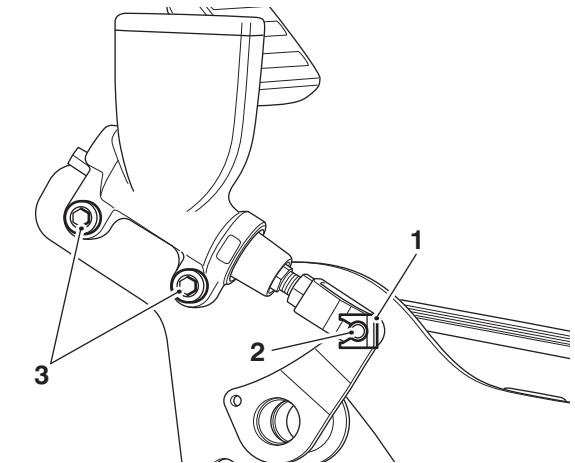
1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.



Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled.
4. Disconnect the hard line from the rear master cylinder. Discard the sealing washers.
5. Release the bolt securing the brake pedal to the pivot. Discard the bolt.
6. Release the bolts securing the control plate assembly to the engine bracket.
7. Noting the position of the brake pedal return spring, detach the control plate assembly, brake pedal, and rear master cylinder as an assembly. Collect the brake pedal return spring.



1. Clip
2. Clevis pin
3. Bolts, master cylinder to control plate

Disassembly

Note:

- The seals and pistons of the rear brake master cylinder are not serviceable items. Should a fault occur in the master cylinder, the complete master cylinder must be renewed.

The following items can be replaced on the rear brake master cylinder:

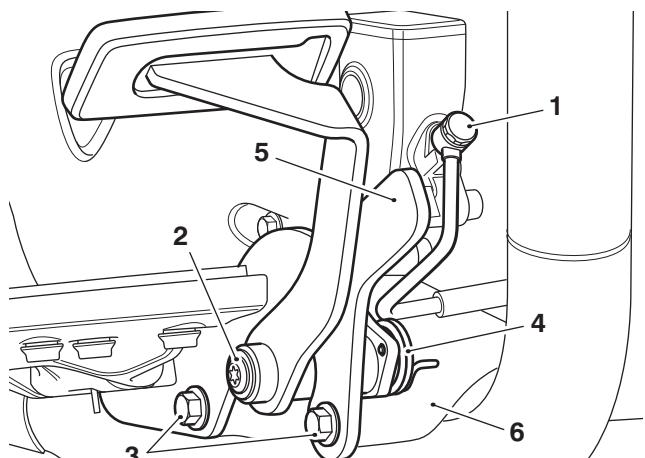
- Float
- Diaphragm
- Cover.



Warning

After checking or topping up the brake fluid in the rear brake fluid reservoir, ensure the float is installed into the reservoir.

Failure to install the float may result in aeration of the brake fluid in the reservoir. Riding with the brake fluid in this condition may reduce brake performance potentially leading to loss of motorcycle control and an accident.

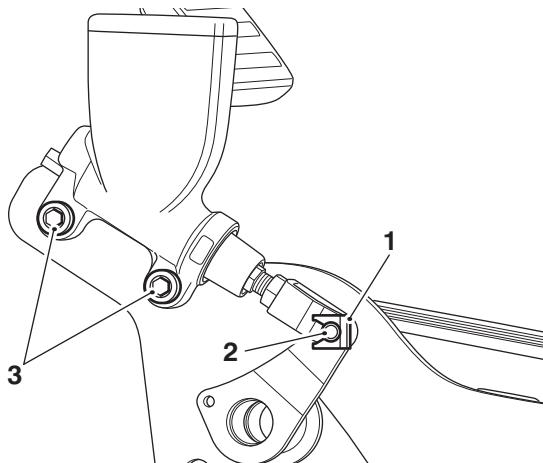


1. Hard line union
2. Bolt, brake pedal
3. Bolts, control plate
4. Spring
5. Control plate
6. Engine bracket

Brakes

Installation

1. Position the master cylinder to the control plate.
2. Secure with two new bolts, tightening to **24 Nm**.
3. Position the brake pedal to the pushrod, engage the clevis and retain it with the clip. Ensure the clip is fitted as shown below:



1. Clip
2. Clevis pin
3. Bolts, master cylinder to control plate

4. Position the brake pedal return spring to the brake pedal shaft as noted during removal.
5. Align the brake pedal to its shaft and refit the master cylinder and control plate assembly to the engine bracket. Ensure the end of brake pedal return spring engages in the hole in the brake pedal.
Tighten the control plate fixings to fixings to **50 Nm**.
Tighten the brake pedal new bolt to **22 Nm**.
6. Incorporating new washers to either side of the union, fit the hard-line. Tighten the union bolt to **25 Nm**.



Warning

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident. Observe the brake fluid handling warnings given earlier in this section of the manual.

7. Fill and bleed the rear brake system (see page 14-24).
8. Reconnect the battery, positive (identified with red tape) lead first.
9. Refit the rider's seat (see page 17-21).
10. Check the operation of the rear brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Bleeding the Front Brakes, Renewing Brake Fluid, Motorcycles with ABS

1. Complete the brake bleed procedure as for models without ABS brakes (see page 14-12). Do not remove the bleed tube from the bleed nipple.
2. Connect the Triumph Diagnostic Tool (see page 14-56).
3. Follow the on screen menu to ABS Diagnostics. From the menu, select **BLEED SYSTEM** (see page 14-57).

Note:

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to open the 2nd circuit solenoid.**
- **When the ABS modulator 2nd circuit is activated by the bleed command, the front brake lever travel will increase as the ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
- **Pressure must be applied to the front brake lever before operating the bleed sequence on the diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake lever.**
- 4. Apply pressure to the front brake lever, press the **Start** button to activate the bleed sequence on the diagnostic tool, and with assistance, release one of the bleed nipples.
- 5. Get an assistant to slowly pull the brake lever to the handlebar.
- 6. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
- 7. Repeat steps 5 and 6 until no more air appears in the bleed tube, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.

8. The bleed sequence will run for a maximum of 90 seconds. Press the **Stop** button to end the bleed sequence at any time. Once the bleed sequence has completed, the diagnostic tool will display the message **ABS system bleed complete**.



Caution

The ABS module must be allowed to cool between bleeding operations. Always allow the ABS module to cool for 5 minutes before starting the bleed procedure again. Failure to follow this instruction may result in damage to the ABS module.

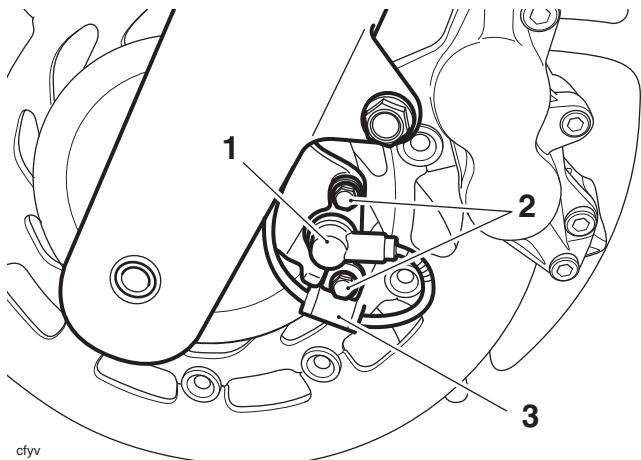
9. Repeat the above procedure as necessary until all air is expelled from the system.
10. When all air has been expelled from the system, apply pressure to the brake lever and close the bleed nipple. Tighten the nipple to **5 Nm**.
11. Repeat the brake bleed procedure as for models without ABS brakes (see page 14-12).

Brakes

Front ABS Wheel Speed Sensor – All Models Except Thunderbird Commander and Thunderbird LT

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the headlight and clamp from the headlight body (see page 18-30).
4. Disconnect the wheel speed sensor multiplug, located inside the headlight.
5. Release the wheel speed sensor harness from the brake hose clips.
6. Release the fixings securing the wheel speed sensor to the fork leg, and remove the sensor, along with the P-clip.



1. Front ABS wheel speed sensor (Thunderbird shown)
2. Fixings
3. P-clip

Installation

1. Position the wheel speed sensor to the fork leg and tighten the fixings to **7 Nm**.
2. Secure the wheel speed sensor harness to the fork leg and tighten the fixing to **7 Nm**.
3. Secure the wheel speed sensor harness to the brake hose clips.
4. Route the harness as noted for removal and connect the wheel speed sensor multiplug to the main harness.
5. Refit the headlight and clamp to the headlight body (see page 18-30).
6. The air gap between the wheel speed sensor ring and the sensor must be between 0.37 mm and 1.25 mm. Check, and if necessary, adjust the air gap (see page 14-38).
7. Reconnect the battery, positive lead (identified with red tape) first.
8. Fit the rider's seat (see page 17-21).

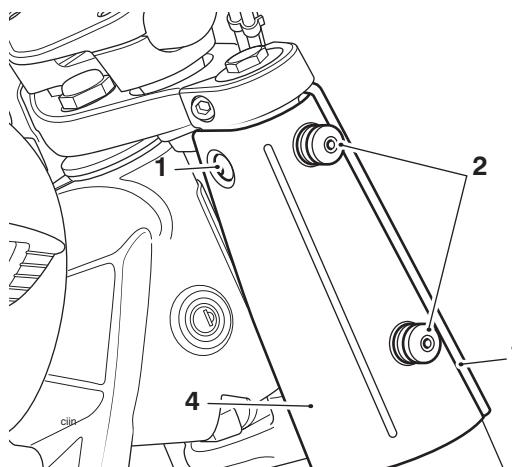
Front ABS Wheel Speed Sensor – Thunderbird Commander and Thunderbird LT

Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. **For Thunderbird LT only:** Remove the windscreen (see page 17-41).
4. Remove the headlight(s) (see page 18-27).

Note:

- Note that the upper fixings for the shrouds/windscreen mountings are shorter than the lower mounting fixings for installation.**
- 5. Remove the upper and lower fixings/windscreen mountings.
- 6. Release the rear fixings and remove the front and rear shrouds.

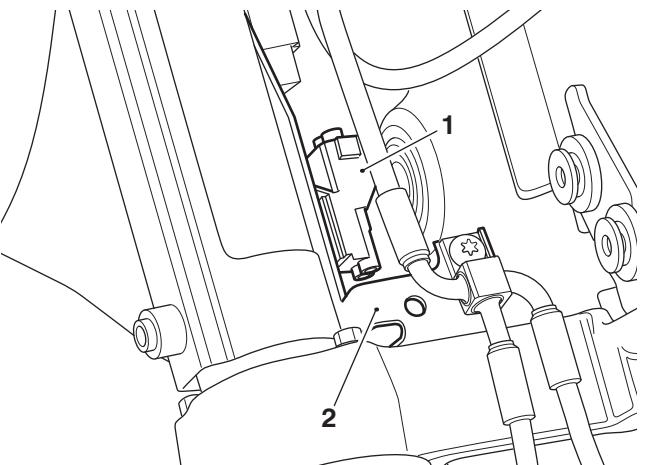


- 1. Rear fixing**
2. Fixings/windscreen mountings (Thunderbird LT shown)
3. Front shroud
4. Rear shroud

Note:

- Note the routing of the harness for the front wheel speed sensor and its clips for installation.**

7. Disconnect the wheel speed sensor multiplug from the main harness. It can be identified as the white connector mounted on the right hand harness bracket.



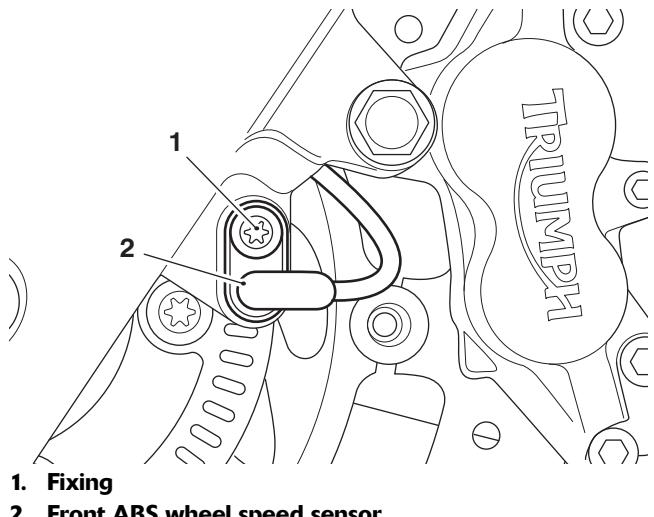
1. Front wheel sensor multiplug

2. Right hand harness bracket

8. Release the wheel speed sensor harness from the brake hose clips.

Note:

- There is a shim between the wheel speed sensor and the front fork leg.**
- 9. Release the fixing securing the wheel speed sensor to the fork leg, detach the harness from the fork leg and remove the sensor.
- 10. Collect the shim from between the wheel speed sensor and the front fork leg.



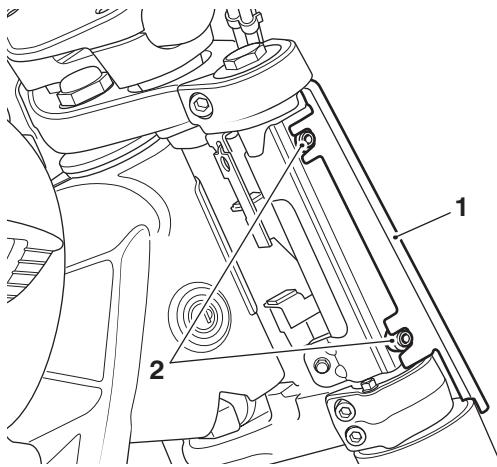
1. Fixing

2. Front ABS wheel speed sensor

Brakes

Installation

- Fit the fixing to the wheel speed sensor then fit the shim to the fixing such that the shim will be between the fork leg and wheel speed sensor.
- Position the wheel speed sensor to the fork leg and tighten the fixing to **7 Nm**.
- Secure the wheel speed sensor harness to the fork leg and brake hose clips, as noted for removal.
- Route the harness as noted for removal and connect the wheel speed sensor multiplug to the main harness.
- Position the forks front shroud to the motorcycle.



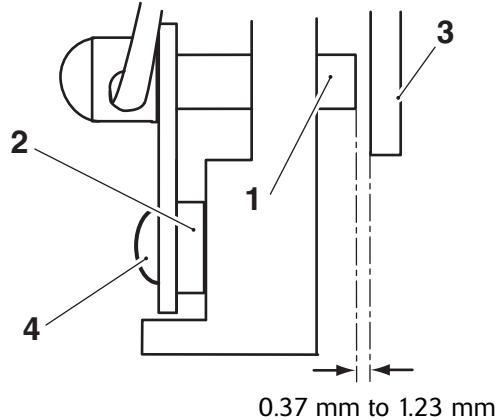
1. Front shroud

2. Fixings

- Position the rear shrouds and fit the rear fixing, but do not fully tighten at this stage.
- Fit the fixings/windscreen mountings as noted for removal and tighten to **8 Nm**.
- Tighten the fixing for the rear shroud to **8 Nm**.
- Refit the headlight (see page 18-29).
- The air gap between the wheel speed sensor ring and the sensor must be between 0.37 mm and 1.25 mm. Check, and if necessary, adjust the air gap (see page 14-38).
- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-21).
- Check the operation and beam setting of the headlight, rectify as necessary.

Air Gap Measurement

- Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.



1. ABS sensor (front sensor shown)

2. Shim

3. Pulser ring

4. Fixing

- Rotate the wheel and repeat the measurement in several places to ensure the pulser ring is not distorted or bent. Renew a damaged pulser ring.
- Adjust the air gap using the correct shim to achieve an air gap between 0.37 mm and 1.23 mm.
- Shims are available in the following sizes:
 - For all models except Thunderbird Commander and Thunderbird LT: shims - 0.5 mm and 1.0 mm.
 - Thunderbird Commander and Thunderbird LT: shims - 0.5 mm, 1.0 mm, 1.5 mm and 2.0 mm.
- If necessary, remove the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor and tighten the fixing to **7 Nm**.
- Repeat the air gap measurement. Readjust as necessary.

Front ABS Pulser Ring

Removal

Thunderbird Commander and Thunderbird LT

1. Remove the left hand brake disc and pulser ring (see page 14-19).

All Models Except Thunderbird Commander and Thunderbird LT

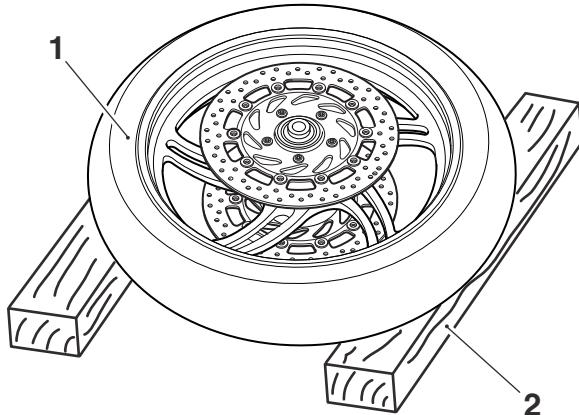
2. Remove the front wheel (see page 16-10).



Warning

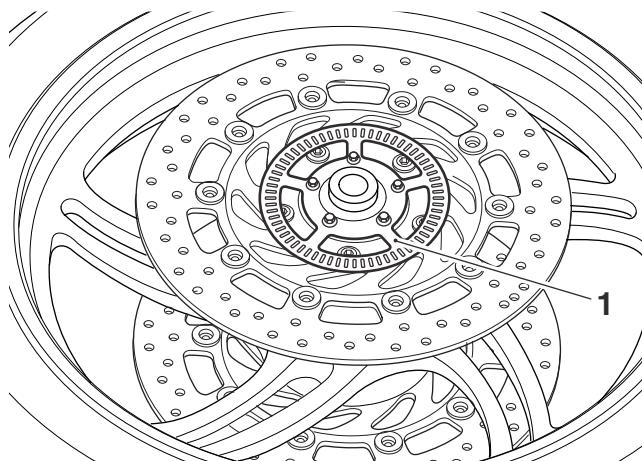
Damage to the wheel centre could cause misalignment of the wheel when refitted. A dangerous riding condition leading to an accident could result if this warning is ignored.

3. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.



1. Wheel
2. Support block

4. Remove and discard the five fixings and remove the pulser ring.



1. Pulser ring

Inspection

All Models

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

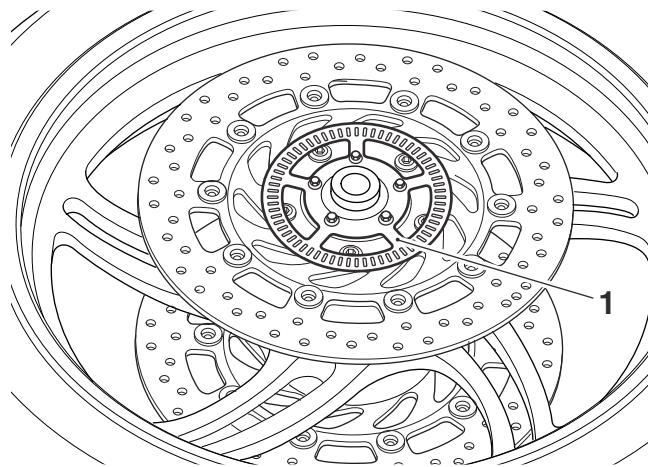
Installation

Thunderbird Commander and Thunderbird LT

1. Fit the left hand brake disc and ABS pulser ring (see page 14-20).

All Models Except Thunderbird Commander and Thunderbird LT

2. Locate the pulser ring on the wheel, fit new fixings and tighten to **5 Nm**.



1. Pulser ring

All Models

3. Refit the front wheel (see page 16-11).
4. Check and, if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see page 14-38).

Brakes

Bleeding the Rear Brakes, Renewing Brake Fluid, Motorcycles with ABS

1. Complete the brake bleed procedure as for models without ABS brakes (see page 14-24).
2. Connect the Triumph Diagnostic Tool (see page 14-56).
3. Follow the on screen menu to ABS Diagnostics. From the menu, select **BLEED SYSTEM** (see page 14-57).

Note:

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to open the 2nd circuit solenoid.**
 - **When the ABS modulator 2nd circuit is activated by the bleed command, the rear brake pedal travel will increase as the ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
 - **Pressure must be applied to the rear brake pedal before operating the bleed sequence on the diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake pedal.**
4. Apply pressure to the rear brake pedal, press the **Start** button to activate the bleed sequence on the diagnostic tool, and with assistance, release the bleed nipple.
 5. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple. Repeat until no more air appears in the bleed tube, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
 6. The bleed sequence will run for a maximum of 90 seconds. Press the **Stop** button to end the bleed sequence at any time. Once the bleed sequence has completed the diagnostic tool will display a message **ABS system bleed complete.**



Caution

The ABS module must be allowed to cool between bleeding operations. Always allow the ABS module to cool for 5 minutes before starting the bleed procedure again. Failure to follow this instruction may result in damage to the ABS module.

7. Repeat the above procedure as necessary until all air is expelled from the system.
8. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **8 Nm**.
9. Repeat the brake bleed procedure as for models without ABS brakes (see page 14-24).

Rear ABS Wheel Speed Sensor

Removal

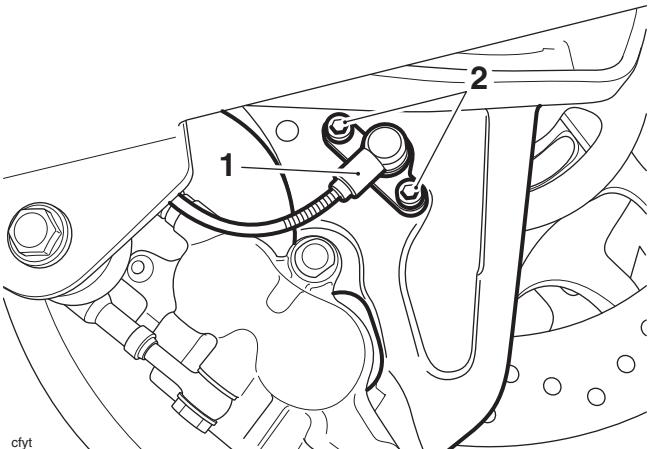
1. Remove the seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the left hand side panel (see page 17-30).

Note:

- **Note the routing of the wheel speed sensor harness and it clips for installation.**
4. Disconnect the wheel speed sensor multiplug, identified as the white connector.
 5. Release the wheel speed sensor harness from its retaining P-clips.

Note:

- **For Thunderbird Commander and Thunderbird LT, there is only one fixing securing the rear wheel speed sensor to the brake caliper carrier.**
6. Release the fixing(s) securing the wheel speed sensor to the rear brake caliper carrier, and remove the sensor.



1. Rear ABS wheel speed sensor (Thunderbird shown)

2. Fixings

Installation

1. Position the wheel speed sensor to the brake caliper carrier and tighten the fixing(s) to **7 Nm**.
2. Route and secure the wheel speed sensor harness to its retaining clip as noted for removal.
3. Connect the wheel speed sensor multiplug.
4. Refit the left hand side panel (see page 17-30).
5. The air gap between the wheel speed sensor ring and the sensor must be between 0.37 mm and 1.25 mm. Check, and if necessary, adjust the air gap (see page 14-38).
6. Reconnect the battery, positive (identified with red tape) lead first.
7. Fit the seat (see page 17-21).

Rear ABS Pulser Ring

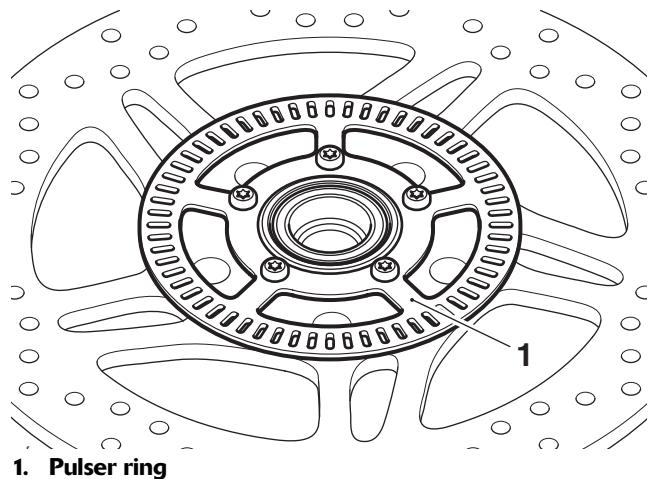
Removal

Thunderbird Commander and Thunderbird LT

1. Remove the rear brake disc and ABS pulser ring (see page 14-29).

All Models Except Thunderbird Commander and Thunderbird LT

2. Remove the rear wheel (see page 16-12).
3. Remove and discard the five fixings and remove the pulser ring.



Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Installation

Thunderbird Commander and Thunderbird LT

1. Fit the rear brake disc and ABS pulser ring (see page 14-29).

All Models Except Thunderbird Commander and Thunderbird LT

2. Locate the pulser ring on the wheel, fit new fixings and tighten to **5 Nm**.

All Models

3. Refit the rear wheel (see page 16-12).
4. Check and, if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see page 14-38).

Brakes

ABS Hydraulic Modulator/ECM – All Models Except Thunderbird Commander and Thunderbird LT

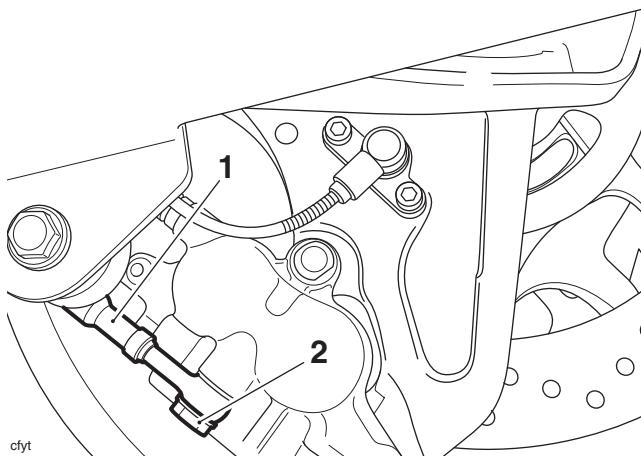
Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the exhaust system (see page 10-185).

Caution

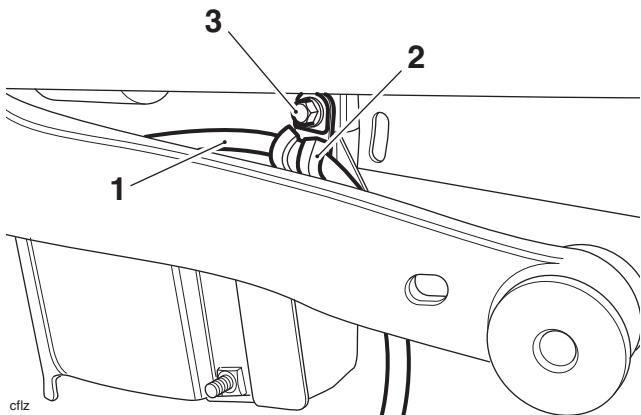
To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.

4. Drain the fluid from the front master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled (see page 14-12).
5. Drain the fluid from the rear master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see page 14-24).
6. Disconnect the rear brake hose at the rear caliper. Discard the sealing washers.

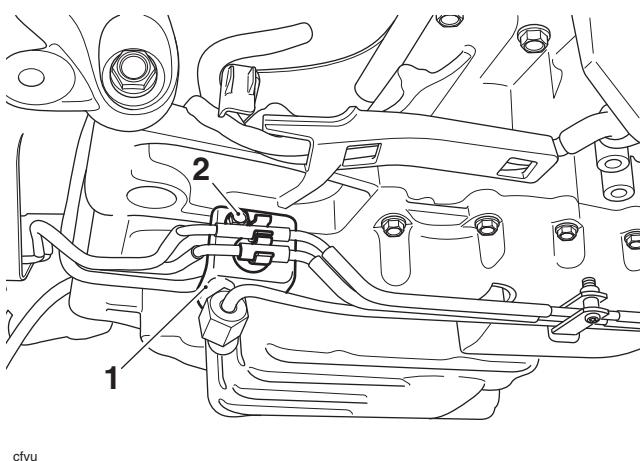


1. Rear brake hose
2. Union

7. Remove the fixing and detach the brake hose P-clip from the left hand side of the swinging arm.

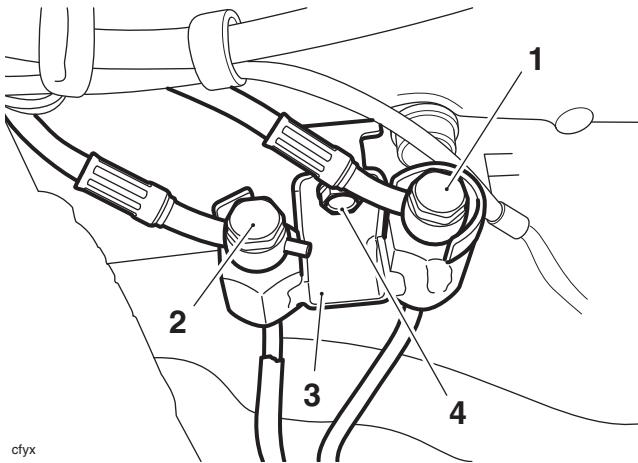


1. Brake hose
2. P-clip
3. Fixing
8. Reposition the rubber boot and disconnect the brake light switch.
9. Remove the fixing and detach the brake light switch boss from the crankcase.



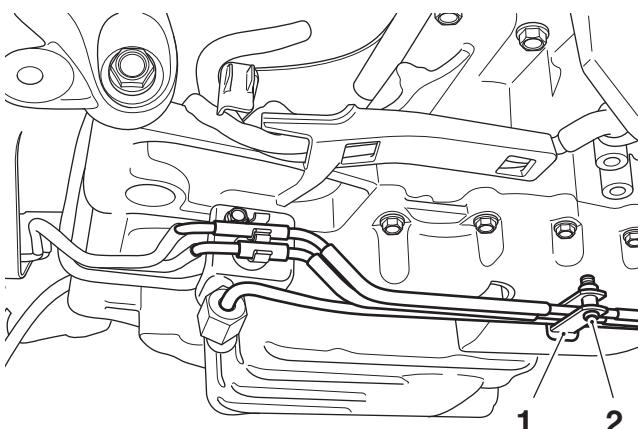
1. Brake light switch boss
2. Fixing

10. Noting their positions and orientation, disconnect the two front brake hoses at the union under the front of the engine. Discard the sealing washers.
11. Remove the front brake hard-line union block fixing from the crankcase.



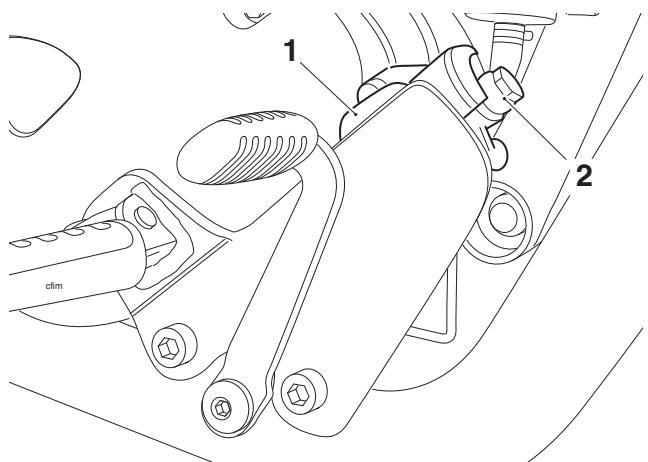
1. Front master cylinder hose union
2. Front brake caliper hose union
3. Front brake hard-line union block
4. Fixing

12. Remove the centre hard-line fixing.



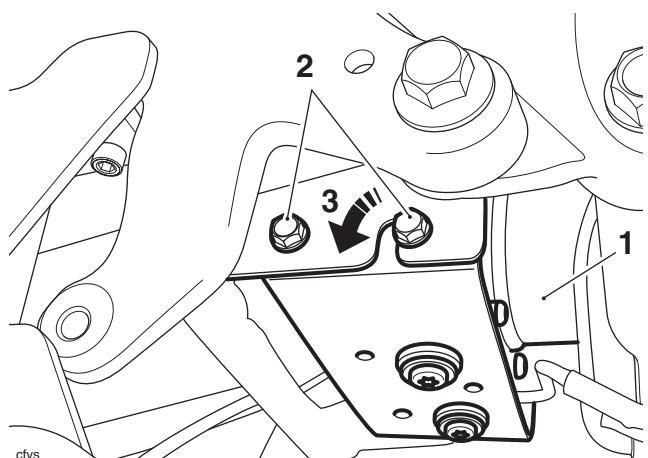
1. Centre hard-line clamp
2. Fixing

13. Disconnect the hard-line from the rear master cylinder (discard the sealing washers).



1. Master cylinder
2. Hard-line union bolt

14. Remove the two rear-most bolts on the ABS modulator bracket, and loosen the two remaining bolts.
15. Slide the modulator and brake hard-lines rearwards as an assembly to release it from the bracket, and then lower the assembly downwards through the bracket.



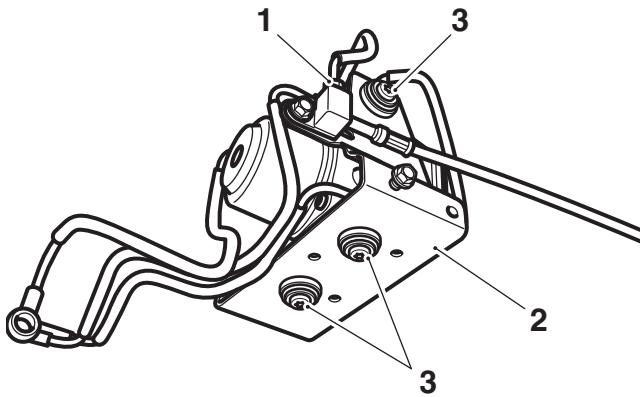
1. Modulator assembly
2. Fixings
3. Removal direction

Brakes

16. Disconnect the ABS modulator multiplug (see page 14-61).
17. Feed the rear brake hose through the bracket and remove the modulator assembly from the motorcycle.

Disassembly

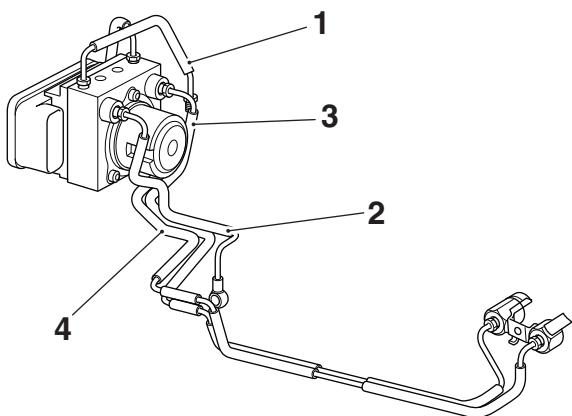
1. Release the rear brake hose union on the side of the modulator assembly.
2. Release the three fixings and remove the bracket from the modulator.



cfyq

1. **Rear brake hose union**
2. **Bracket**
3. **Fixings**

3. Noting their position and orientation, remove the four hard-lines from the modulator.



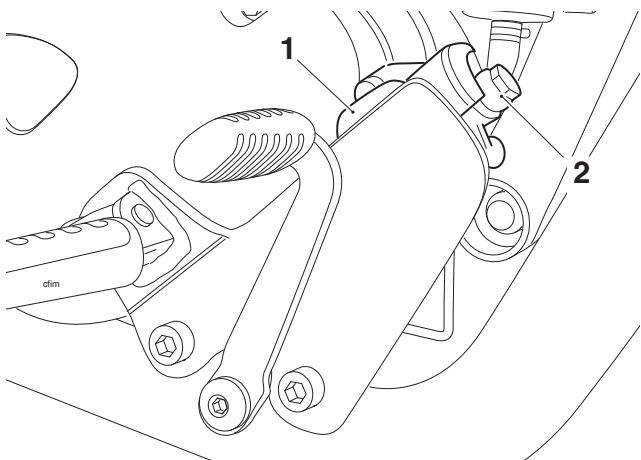
1. **Rear hard-line to caliper**
2. **Rear hard-line from master cylinder**
3. **Front hard-line from master cylinder**
4. **Front hard-line to caliper**

Assembly

1. Refit the hard-lines to the modulator in the positions noted during disassembly. Tighten the four unions to **17 Nm**.
2. Position the modulator bracket to the modulator, aligning the rear brake hose to the rear brake hard-line from the modulator. Tighten the bracket fixings to **9 Nm**, and the rear brake union to **17 Nm**.

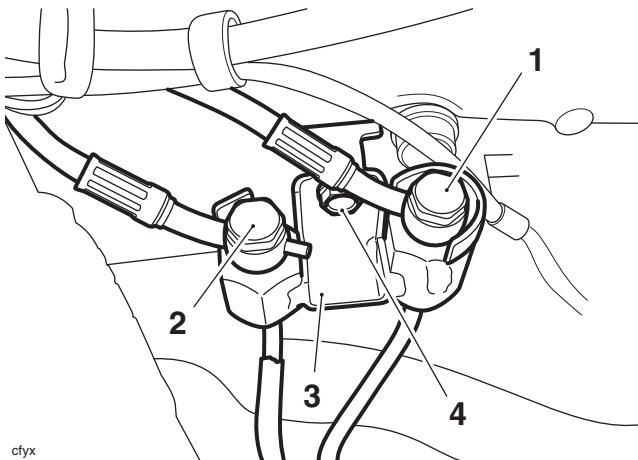
Installation

1. Position the rear brake hose upwards through the bracket below the swinging arm.
2. Connect the ABS modulator multiplug (see page 14-61).
3. Position the ABS modulator and brake hard-lines to the bracket below the swinging arm and align the two front bolts to the slot in the bracket. Ensure the rear brake master cylinder hard-line aligns correctly with the rear master cylinder as the ABS modulator is installed.
4. Refit the two rear fixings and tighten all fixings to **7 Nm**.
5. Incorporating new washers to either side of the union, fit the rear brake hard-line. Tighten the union bolt to **25 Nm**.



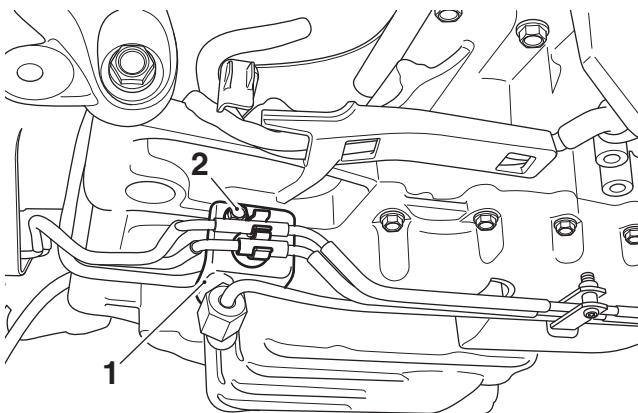
1. **Rear master cylinder**
2. **Hard-line union bolt**
6. Refit the front brake hard line union block fixing to the crankcase, tightening the bolt to **7 Nm**.

7. Incorporating new washers to either side of the unions, reconnect the two front brake hoses in the positions noted on disassembly. Counter hold each union block in turn with a spanner and tighten the union bolts to **25 Nm**.



- 1. Front master cylinder hose union**
2. Front brake caliper hose union
3. Front brake hard-line assembly
4. Fixing

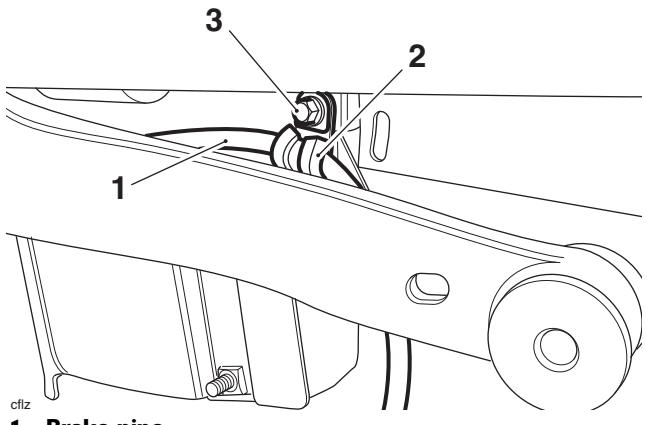
8. Secure the brake light switch boss to the crankcase and tighten the fixing to **7 Nm**.



- 1. Brake light switch boss**
2. Fixing

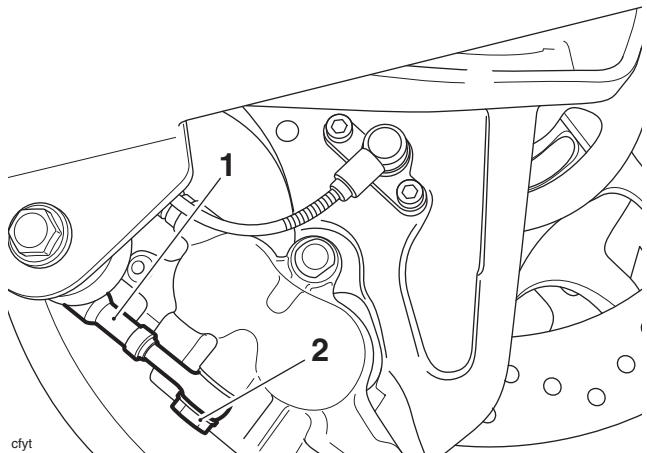
9. Reconnect the brake light switch connector and cover with the rubber boot.

10. Align the brake pipe clip to the left hand side of the swinging arm. Tighten the clip fixing to **7 Nm**.



- 1. Brake pipe**
2. P-clip
3. Fixing

11. Incorporating new washers to either side of the union, fit the rear brake line to the rear caliper. Tighten the union bolt to **25 Nm**.



- 1. Rear brake hose**
2. Union

12. Bleed the front brakes (see page 14-12).
 13. Bleed the rear brakes (see page 14-24).
 14. Refit the fuel tank (see page 10-146).
 15. Reconnect the battery, positive (identified with red tape) lead first.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph Dealer take remedial action. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

16. Refit the rider's seat (see page 17-21).
 17. Check that the brakes operate correctly.

Brakes

ABS Hydraulic Modulator/ECM – Thunderbird Commander and Thunderbird LT

Removal

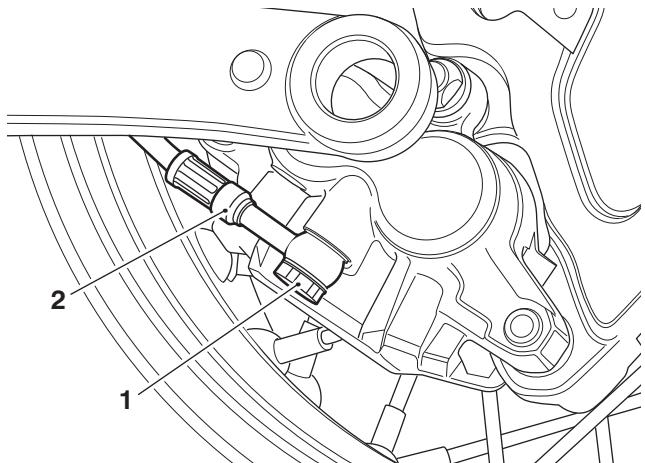
1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the complete exhaust system (see page 10-189).
4. If fitted remove the evaporative canister (see page 10-206).



Caution

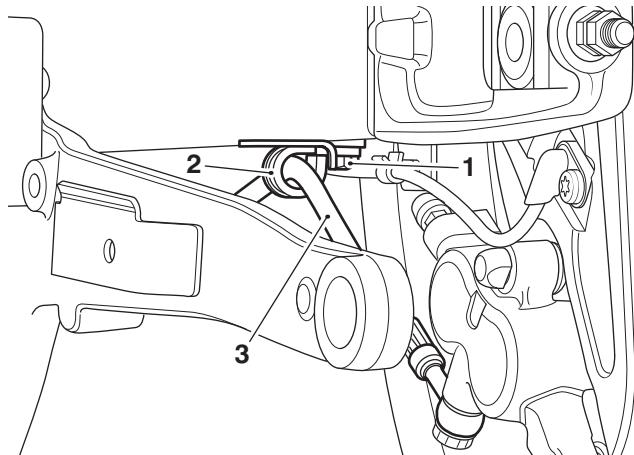
To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.

5. Drain the fluid from the front master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled (see page 14-12).
6. Drain the fluid from the rear master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see page 14-24).
7. Disconnect the rear brake hose at the rear caliper. Discard the sealing washers.



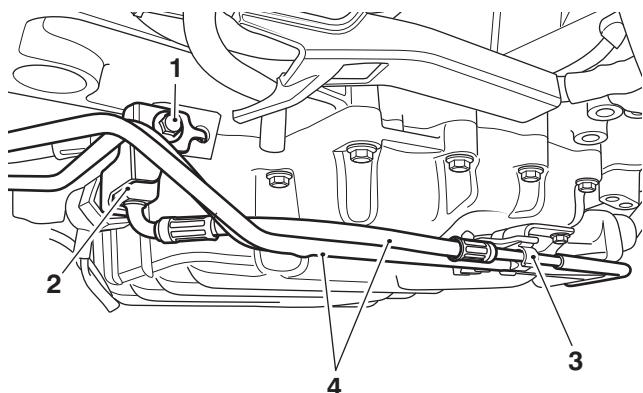
1. Union
2. Rear brake hose

8. Remove the fixing and detach the brake hose P-clip from the left hand side of the swinging arm.



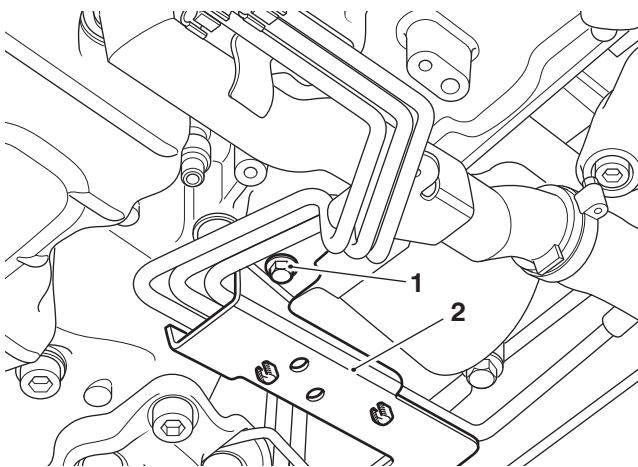
1. Fixing
2. P-clip
3. Brake hose

9. Reposition the rubber boot and disconnect the brake light switch.
10. Remove the fixing and detach the brake light switch bracket from the crankcase.
11. Detach the brake lines from the centre clips.



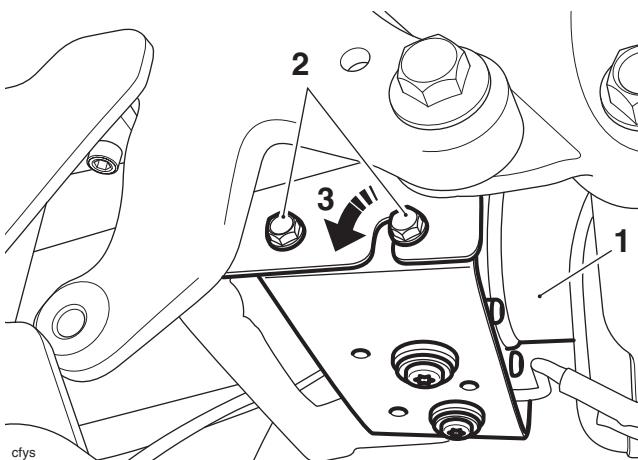
1. Fixing
2. Bracket, brake light switch
3. Clip
4. Brake lines

12. Release the fixing and detach the front bracket for the hard-line from the crankcase.



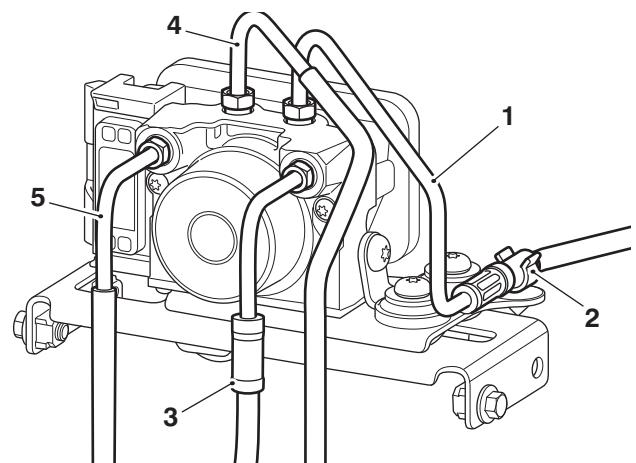
- 1. Fixing
2. Bracket**

13. Remove the two rearmost bolts on the ABS modulator bracket, and loosen the two remaining bolts.
14. Slide the modulator and brake hard-lines rearwards as an assembly to release it from the bracket, and then lower the assembly downwards through the bracket.



- 1. Modulator assembly
2. Fixings
3. Removal direction**

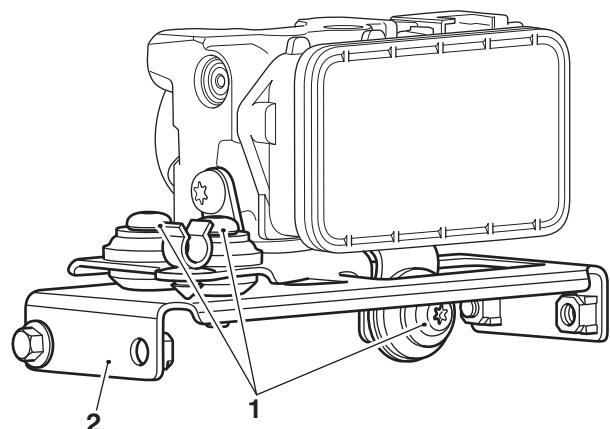
15. Disconnect the ABS modulator multiplug (see page 14-61).
16. Release the rear brake hose on the side of the modulator assembly.
17. Noting their position and orientation, remove the four hard-lines from the modulator and remove the modulator assembly from the motorcycle.



- 1. To rear caliper
2. Clip
3. From rear brake master cylinder
4. To front calipers
5. From front brake master cylinder**

Disassembly

1. Release the three fixings and remove the modulator from its bracket.



- 1. Fixings
2. Bracket**

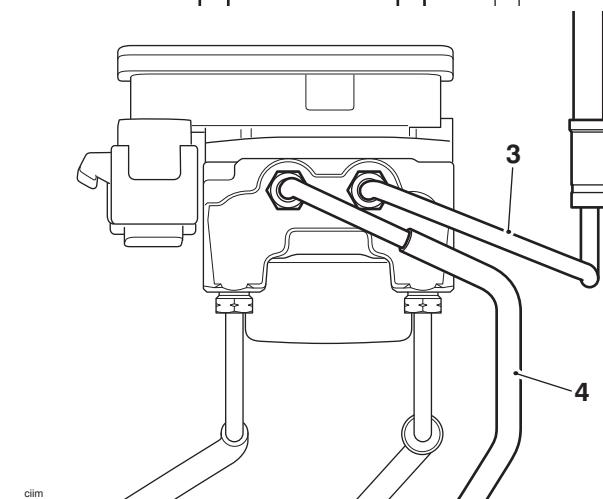
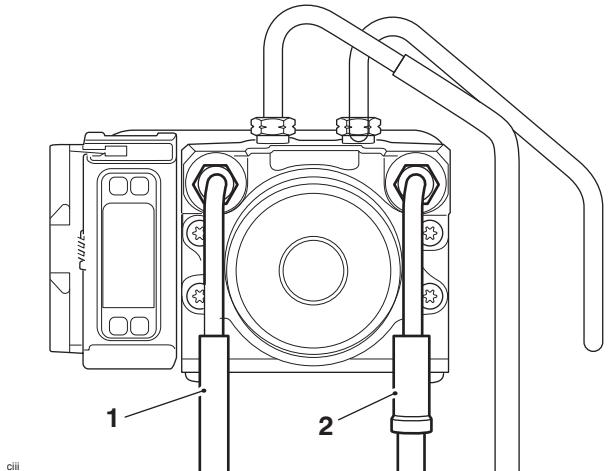
Brakes

Assembly

1. Position the modulator to its bracket, and tighten the three fixings to **9 Nm**.

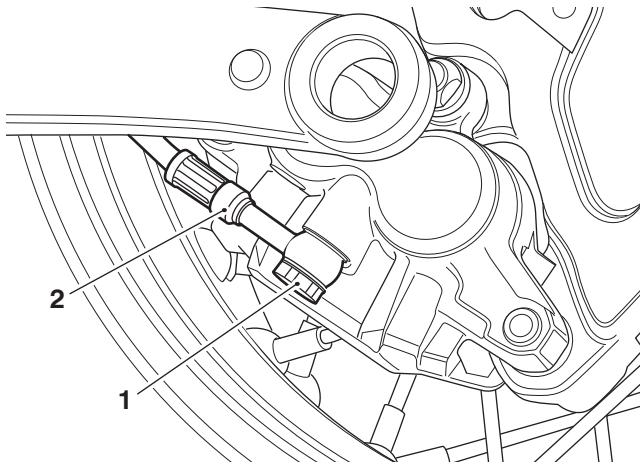
Installation

1. Align the ABS module assembly to the brake lines. Refit the hard-lines to the modulator in the positions noted during disassembly (as shown below). Tighten the four unions to **15 Nm**.



1. **To front brake master cylinder**
 2. **To rear brake master cylinder**
 3. **To rear brake caliper**
 4. **To front calipers**
2. Connect the ABS modulator multiplug (see page 14-61).
 3. Position the ABS modulator and brake hard-lines to the bracket below the swinging arm and align the two front bolts to the slot in the bracket. Ensure the rear brake line aligns correctly with the rear caliper as the ABS modulator is installed.
 4. Refit the two rear fixings and tighten all fixings to **7 Nm**.

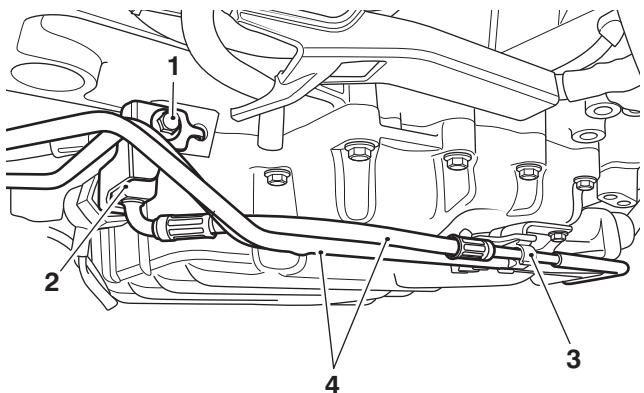
5. Incorporating new washers to either side of the union, fit the rear brake line to the rear caliper. Tighten the union bolt to **25 Nm**.



1. Union

2. Rear brake hose

6. Secure the brake light switch boss to the crankcase and tighten the fixing to **7 Nm**.
7. Reconnect the brake light switch connector and cover with the rubber boot.
8. Attach the brake lines to the centre clips.



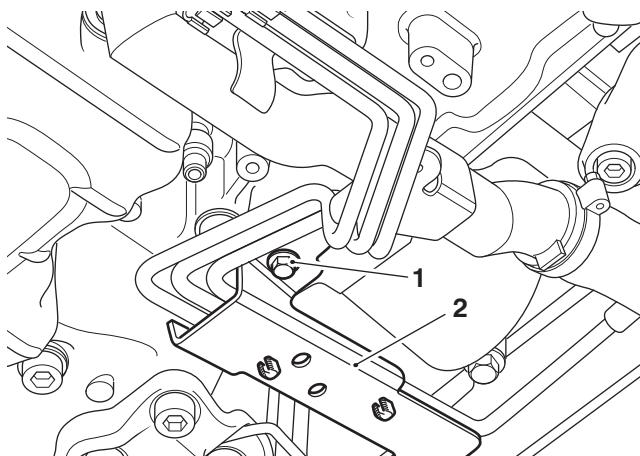
1. Fixing

2. Bracket, brake light switch

3. Clip

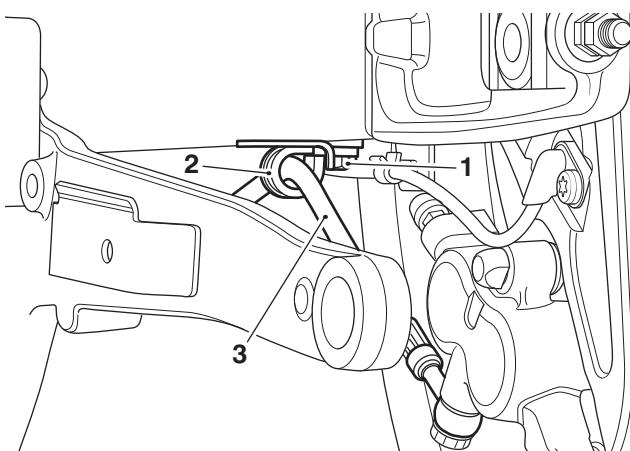
4. Brake lines

9. Attach the front bracket for the hard-line to the crankcase and tighten its fixing to **7 Nm**.



- 1. Fixing
2. Bracket**

10. Align the brake pipe clip and its P-clip to the left hand side of the swinging arm. Tighten the clip fixing to **7 Nm**.



- 1. Fixing
2. P-clip
3. Brake pipe**

11. Bleed the front brakes (see page 14-12).
12. Bleed the rear brakes (see page 14-24).
13. If removed, refit the evaporative canister (see page 10-206).
14. Refit the exhaust system (see page 10-192).
15. Reconnect the battery, positive (identified with red tape) lead first.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph Dealer take remedial action. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

16. Refit the rider's seat (see page 17-20).
17. Check that the brakes operate correctly.

Brakes

Anti-lock Brake System (ABS)

System Description

The ABS versions of the Thunderbird are fitted with an electronic anti-lock brake system which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper as required.

The system consists of a hydraulic modulator and ECM assembly mounted to a bracket beneath the swinging arm, a front wheel speed sensor mounted to the front fork, and a rear wheel speed sensor mounted to the rear brake caliper carrier.

Both front and rear wheels have a pulser ring mounted on to the wheel hub.

The front and rear master cylinders are connected via lines to the modulator and from the modulator the lines connect to the brake calipers. The calipers and master cylinders are identical to the non-ABS equipped motorcycle.

The front and rear brake circuits operate as separate systems. The front and rear brakes are not connected in any way inside the modulator.

The modulator ECM continuously calculates the front and rear wheel speeds, and from these inputs the ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is calculated to be slipping (skidding).

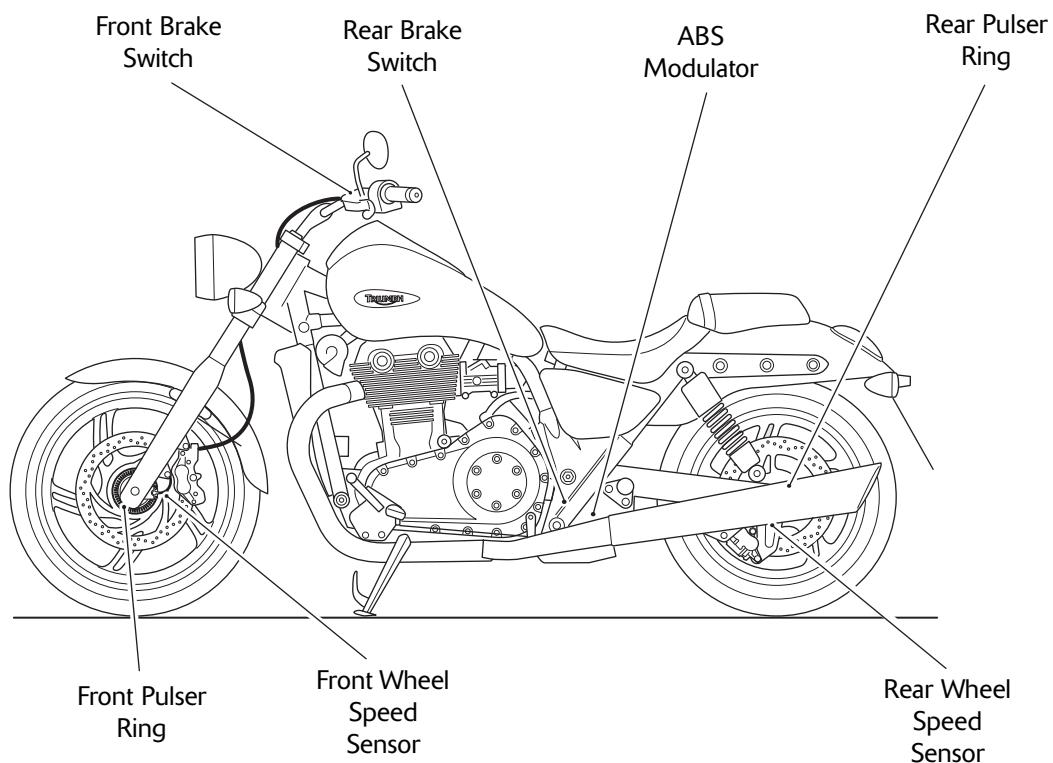
Under braking, if the modulator detects that either wheel is about to slip, due to the brake force exceeding the available traction between the tyre and road surface (the wheel will begin to slip or 'skid'), the ECM very rapidly releases and reapplies the brake pressure to prevent the wheel from slipping.

This is felt through the brake pedal or lever as a rapid 'pulsing'.

If the rider reduces braking effort, or traction increases (so that traction exceeds braking force, the wheel will rotate once more) the wheel will no longer lock up. The ABS system will detect this and stop controlling brake pressure, and return to its monitoring state.

The system has a self diagnostic function built-in which monitors the fail safe relay, solenoid valves, motor relay, wheel speed sensors, power supply and ground, as well as internal ECM functions. In the event of a malfunction being detected, the ECM will illuminate the ABS warning light, and store a diagnostic trouble code in the system memory. This stored data can then be recovered using the Triumph Diagnostic Tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Under normal operation, the ABS warning light will stay illuminated after the ignition is switched on and until the vehicle speed exceeds 6 mph (10 km/h). The ABS performs a self check and if no faults are found the light is extinguished. If a trouble code is stored the ABS warning light will stay illuminated and the ABS will not function, however the brakes will operate normally. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden, refer to the ABS system diagnostics (see page 14-56).

Component Locations

Brakes

ABS System Circuit Diagram – All Models Except Thunderbird Commander and Thunderbird LT

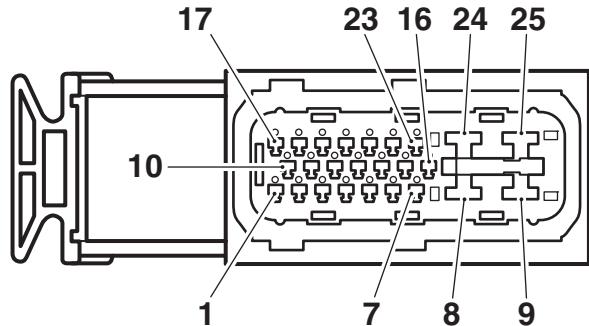
Key To Wiring Circuit Diagram

Key	Item Description
1	Fuse box (fuse 2, 8 and 10)
2	ABS Module
3	Diagnostic Connector
4	Engine Control Module
5	Front Wheel Speed Sensor
6	Rear Wheel Speed Sensor
7	Instruments
8	Front Brake Light Switch
9	Rear Brake Light Switch
10	Rear Lighting Subharness
11	Brake Light

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

ABS ECM Connector Pin Numbering

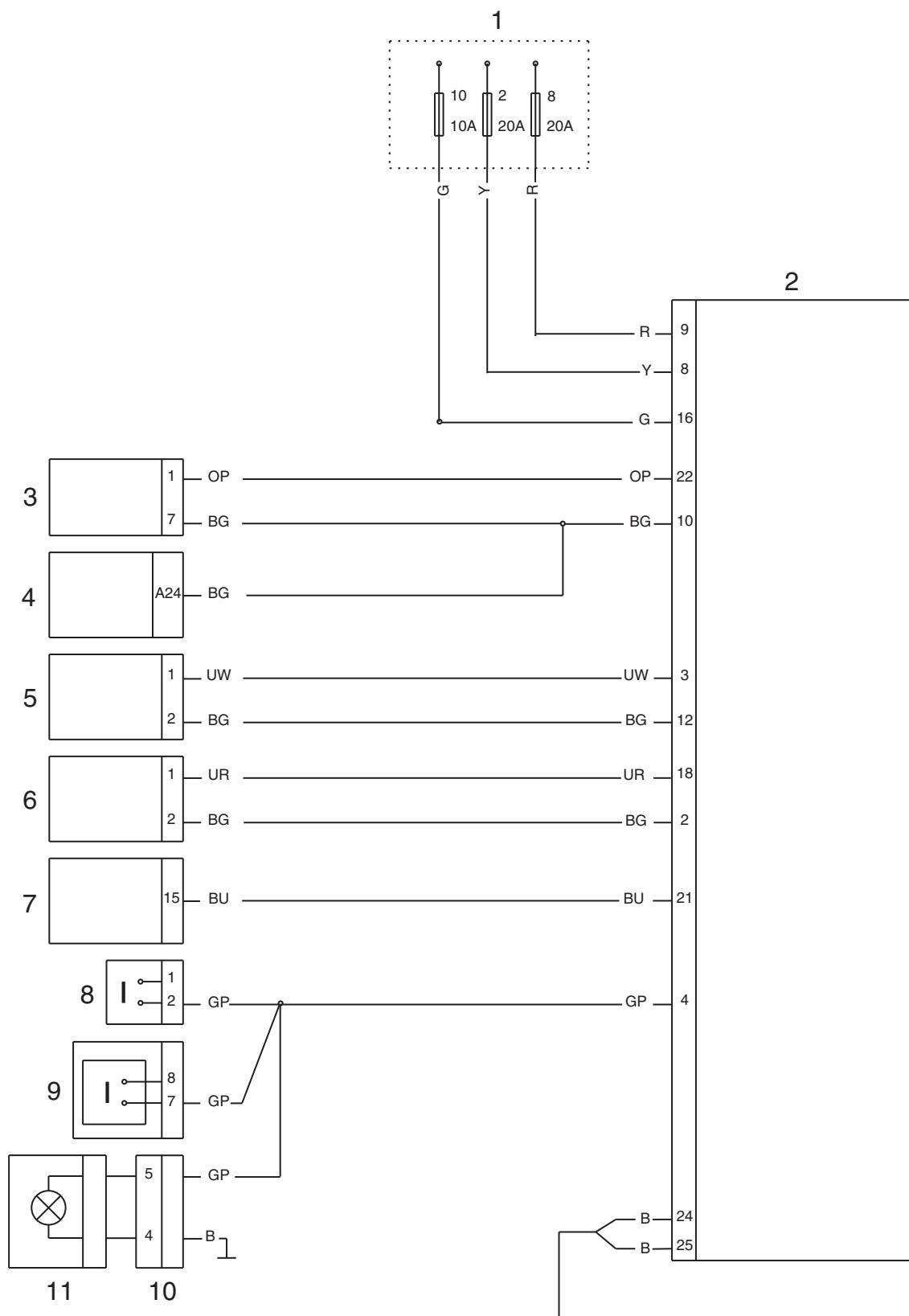


cdhg

The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from left to right with number one in the bottom left hand corner.

ABS System Circuit Diagram



Brakes

ABS System Circuit Diagram – Thunderbird Commander and Thunderbird LT

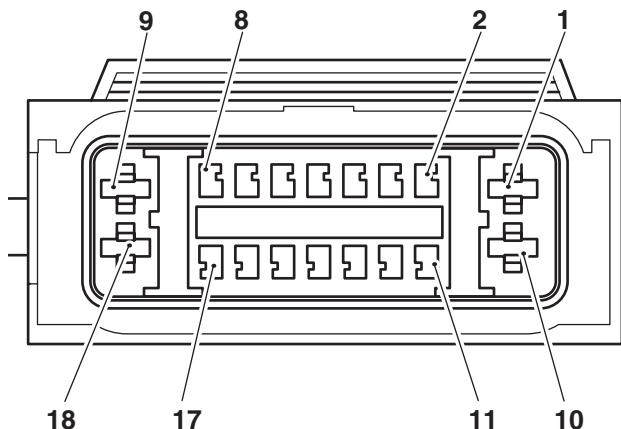
Key To Wiring Circuit Diagram

Key	Item Description
1	Fuse box (fuse 8 and 10)
2	ABS Module
3	Ignition Switch
4	Rear Brake Light Switch
5	Front Brake Light Switch
6	Rear Lighting Subharness
7	Front Wheel Speed Sensor
8	Rear Wheel Speed Sensor
9	Diagnostic Connector
10	Instruments

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

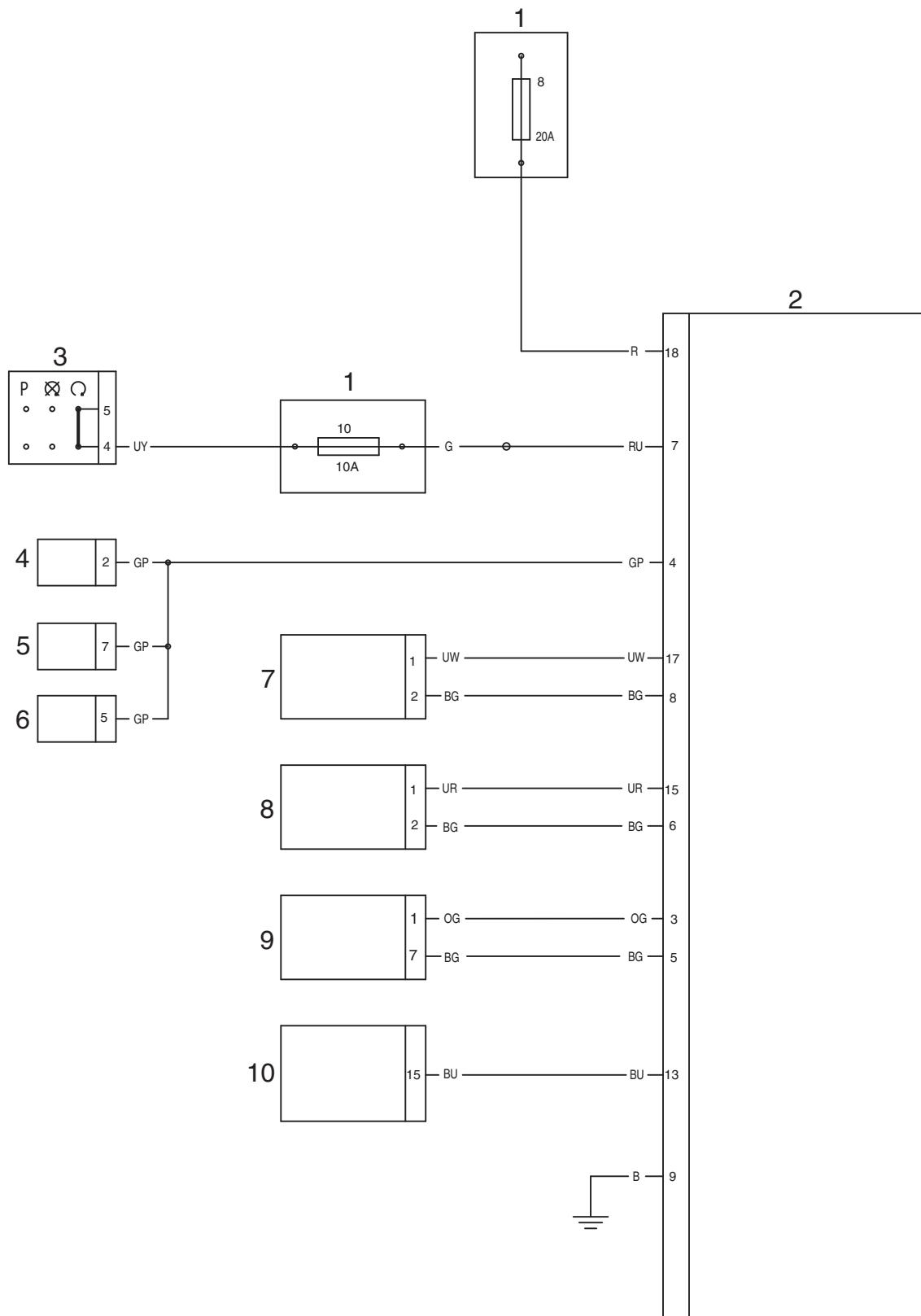
ABS ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from right to left with number one in the top right hand corner.

ABS System Circuit Diagram



Brakes

System Diagnostics

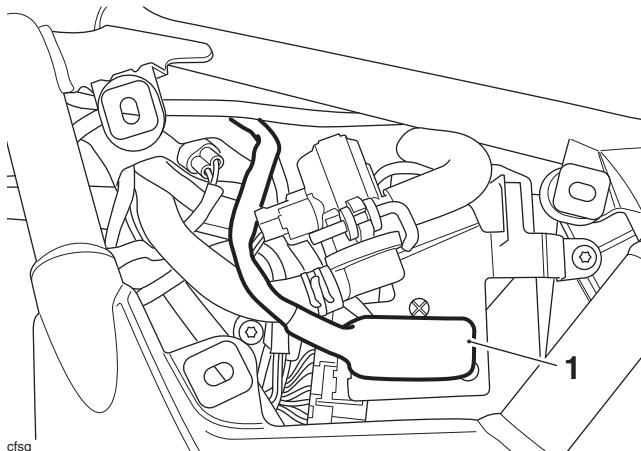
The ABS system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the left hand side panel. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

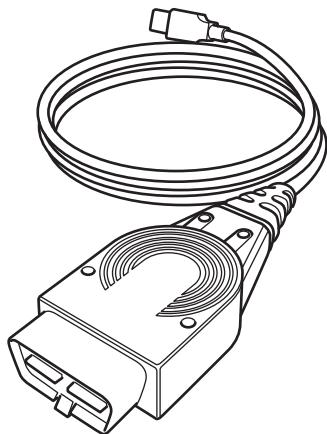
Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the left hand side panel (see page 17-30) and release the diagnostic connector from its locating tang.



1. Diagnostic connector (Thunderbird shown)

2. Plug the diagnostic interface directly into the diagnostic connector.



Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the side panel (see page 17-30).

Triumph Diagnostic Tool

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

Note:

- Full details of how to operate the software and how to interpret the data can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.**

Build Data

The **Build Data** screen will display the following information:

Function Examined
ECM type
ECM ID number
Software version number

Current Data

The **Current Data** screen will display the following information:

Function Examined	Result Reported (Scale)
Front wheel speed	km/h
Rear wheel speed	km/h
Brake switch status	On/Off
ABS warning light status	On/Off

Bleed System

Using the Triumph Diagnostic Tool, it is possible to bleed the ABS modulator of trapped air. This is necessary when the hydraulic brake system has been dismantled, or the ABS modulator renewed.

Full details of this procedure are provided on page 14-35 for front brakes or page 14-40 for rear brakes.

Brakes

Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph Diagnostic Tool as a four digit code.

DTCs can be removed at any time using the Triumph Diagnostic Tool.

The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description	Pinpoint Test Page Number	Pinpoint Test Page Number
		All models except Thunderbird Commander and Thunderbird LT	Thunderbird Commander and Thunderbird LT
C1611	Front Wheel Sensor Open Circuit/Short Circuit	14-72	14-74
C1612	Front Wheel Sensor Abnormal Input/Losing Contact	14-80	14-80
C1613	Rear Wheel Sensor Open Circuit/Short Circuit	14-76	14-78
C1614	Rear Wheel Sensor Abnormal Input/Losing Contact	14-81	14-81
C1621	Front Wheel Pulser Gear Missing Teeth	14-82	14-82
C1623	Rear Wheel Pulser Gear Missing Teeth	14-83	14-83
C1631	Front Wheel Input Solenoid Open/Short Circuit	14-84	14-85
C1632	Front Wheel Output Solenoid Open/Short Circuit	14-84	14-85
C1633	Rear Wheel Input Solenoid Open/Short Circuit	14-84	14-85
C1634	Rear Wheel Output Solenoid Open/Short Circuit	14-84	14-85
C1641	Front Wheel Actuator (Hydraulic Control) Wheel Lock	14-86	14-86
C1643	Rear Wheel Actuator (Hydraulic Control) Wheel Lock	14-86	14-86
C1651	Motor - Lock	14-87	14-88
C1652	Motor - Stuck OFF	14-87	14-88
C1653	Motor - Stuck ON	14-87	14-88
C1654	Solenoid Relay - Stuck OFF/ON	14-84	14-85
C1661	Power Source Voltage Drop	14-90	14-91
C1662	Power Source Voltage Rise	14-90	14-91
C1671	Different Tyre Diameter	14-92	14-92
C1681	Abnormal ECU	14-93	14-93

Diagnostic Trouble Codes

Dependant on the DTC stored, the ABS ECM will act in one of two ways:

- Inhibit ABS operation immediately, irrespective of the ABS operating mode
- or
- Allow the ABS operation to complete before inhibiting the ABS.

Once the ABS ECM has inhibited ABS function, the ECM will act in one of three ways:

- Allow the ABS to resume operation if the fault clears
- or
- Allow ABS operation after an ignition cycle if the fault clears
- or
- Inhibit the ABS function until the fault is rectified and the DTC erased.

The ABS system will act on the DTC stored according to the following table:

Fault Description	ABS warning light illuminated when fault is logged	ABS operation is inhibited when fault is logged	ABS continues to operate when fault is logged (Only when ABS is active. When ABS is no longer active, operation is inhibited)	ABS will resume operation if fault clears
Front Wheel Sensor Open Circuit/Short Circuit	Yes		Yes	No
Front Wheel Sensor Abnormal Input/Losing Contact	Yes	Yes		Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Sensor Open Circuit/Short Circuit	Yes		Yes	No
Rear Wheel Sensor Abnormal Input/Losing Contact	Yes	Yes		Yes, if after ignition cycle, no fault is detected. DTC remains stored
Front Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Rear Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Front Wheel Input Solenoid Open/Short Circuit	Yes	Yes		No
Front Wheel Output Solenoid Open/Short Circuit	Yes		Yes	No
Rear Wheel Input Solenoid Open/Short Circuit	Yes	Yes		No
Rear Wheel Output Solenoid Open/Short Circuit	Yes		Yes	No

Brakes

Fault Description	ABS warning light illuminated when fault is logged	ABS operation is inhibited when fault is logged	ABS continues to operate when fault is logged (Only when ABS is active. When ABS is no longer active, operation is inhibited)	ABS will resume operation if fault clears
Front Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Motor - Lock	Yes	Yes (Thunderbird Commander and LT only)	Yes (Not for Thunderbird Commander or LT)	No
Motor - Stuck OFF	Yes	Yes (Thunderbird Commander and LT only)	Yes (Not for Thunderbird Commander or LT)	No
Motor - Stuck ON	Yes	Yes (Thunderbird Commander and LT only)	Yes (Not for Thunderbird Commander or LT)	No
Solenoid Relay - Stuck OFF/ON	Yes	Yes		No
Power Source Voltage Drop	Yes, light will extinguish if fault clears	Yes		Yes, if voltage rises above a preset threshold for more than 10 seconds
Power Source Voltage Rise	Yes, light will extinguish if fault clears	Yes		Yes, if voltage drops below a preset threshold for more than 10 seconds
Different Tyre Diameter	Yes	Yes		No
Abnormal ECU	Yes	Yes		No

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note:

- **A major cause of hidden electrical faults can be traced to faulty electrical connectors.**

For example:

- Dirty/corroded terminals
- Damp terminals
- Broken or bent cable pins within multiplugs.

For example, the ABS electronic control module (ABS ECM) relies on the supply of accurate information to enable it to monitor and control the brake system. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- If testing with a voltmeter, the voltage across a connector should be virtually battery volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.

When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

When Connecting a Connector:

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Disconnection of ABS ECM Connector

Caution

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

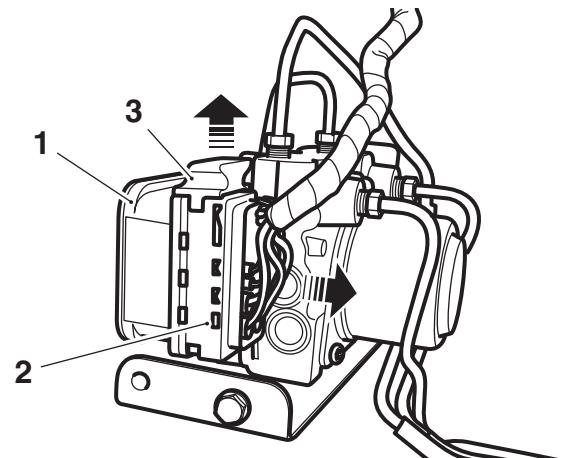
Caution

Never disconnect the ABS ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect an ECM after disconnecting the battery negative (black) lead first.

All Models except Thunderbird Commander and Thunderbird LT

1. Lift up the locking device and gently pull back on the connector to release it from the ECM.

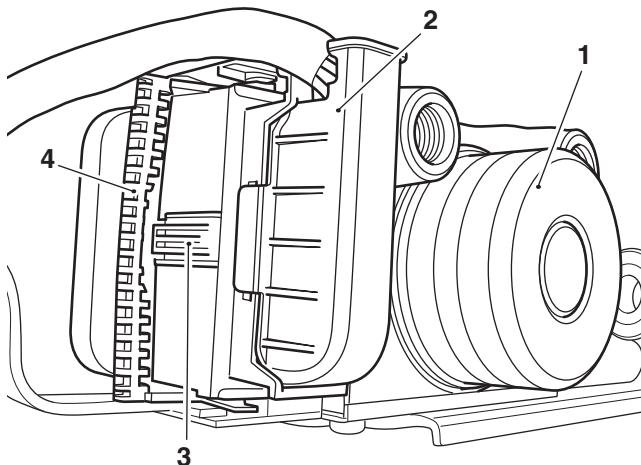


1. ABS modulator
2. Connector
3. Locking device

Brakes

Thunderbird Commander and Thunderbird LT

2. Press the locking device and move the lever to the rear of the connector while disconnecting it from the ABS ECM.
3. When disconnected, ensure the lever is fully to the rear of the connector. An audible click can be heard when it is locked in position.



1. ABS modulator, shown removed for clarity
2. Connector
3. Locking device
4. Lever

All Models

Note:

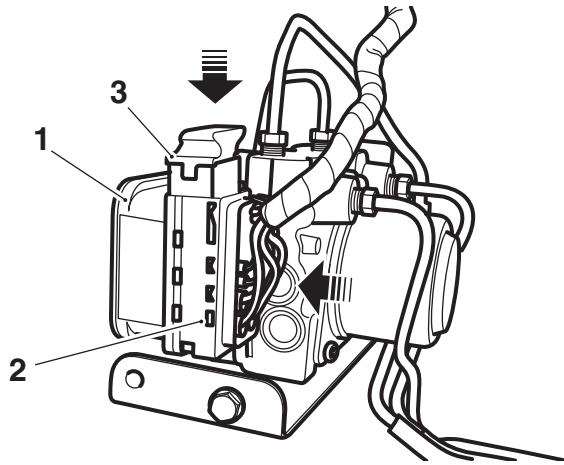
- The ABS ECM is an integral part of the ABS modulator. Under no circumstances should the ECM be removed from the ABS modulator. If a new ECM is required, repair is by replacement of the ABS modulator and ECM as an assembly only.

Reconnection of the ABS ECM Connector

All Models Except Thunderbird Commander and Thunderbird LT

Caution

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.



1. ABS modulator
 2. Connector
 3. Locking device
4. Fit the connector into its socket and, whilst holding the connector in place, push down gently on the locking device until it locks.

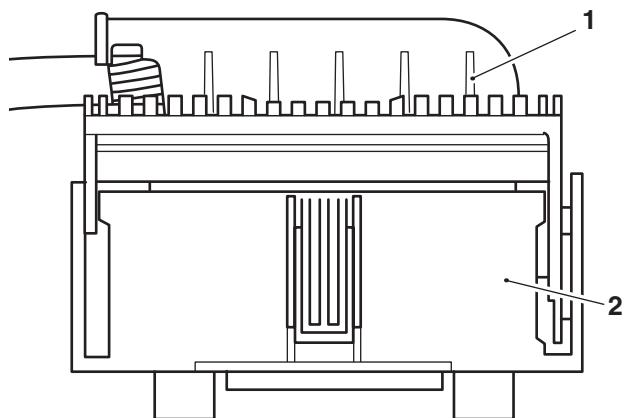
Thunderbird Commander and Thunderbird LT**Caution**

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

**Caution**

If the lever is not fully over to the rear position, it is possible that the connector may not fully engage into its socket.

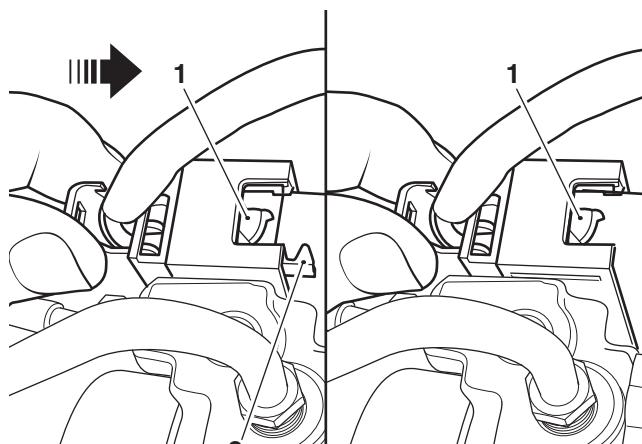
5. Ensure the lever on the connector is fully over to the unlocked position, as shown below:



1. Lever

2. Connector

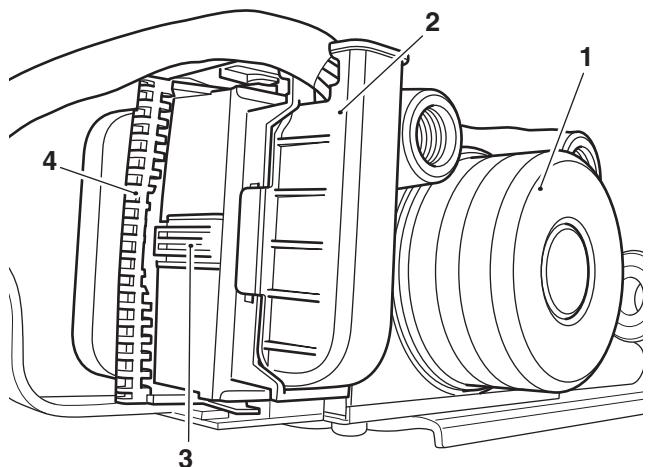
6. Align the connector to its socket on the ABS modulator such that the end of the lever aligns with lug on the socket.



1. Lever end

2. Lug

7. Release the lever by pushing it towards the front of the connector. At the same time, push the connector into its socket until the lever is fully forward and locked in position. An audible click can be heard when locked.



1. ABS modulator, shown removed for clarity

2. Connector

3. Locking device

4. Lever

Brakes

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests

Before Starting Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.



Warning

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If the DTC is not repeated, this indicates the DTC may have been stored due to external influences such as bad road surfaces or electrical interference.

After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

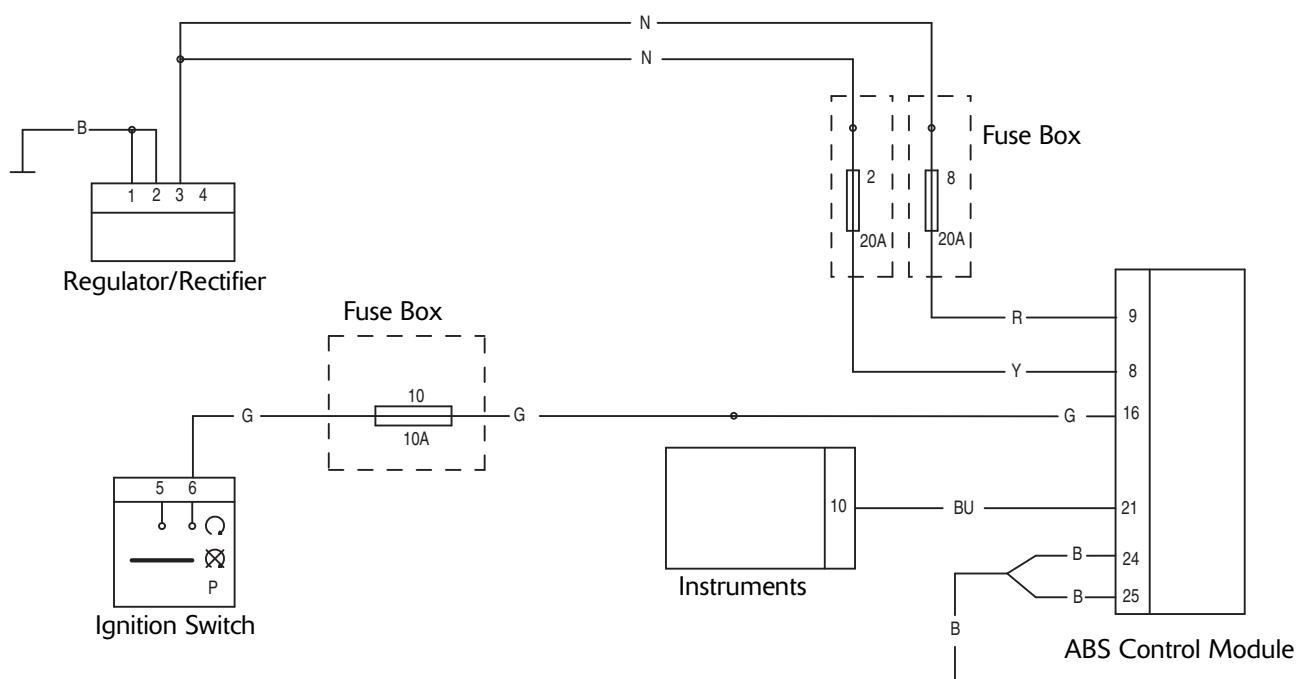
ABS Warning Light ON (No DTCs Stored) – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
ABS Warning Light ON (No DTCs Stored)	ABS Ignition supply fuse/circuit fault ABS Warning light circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 16 and ground pin 24	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable continuity of the ABS ignition supply circuit: With the ignition 'ON', check voltage between: - ABS ECM connector pin 16 and ground	Same as 'across battery' voltage	Proceed to test 3
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity of the ABS warning light circuit: Check voltage between: - ABS ECM connector pin 21 and ground	Voltage greater than 1.5 V	Proceed to test 4
	Voltage less than 1.5 V	Locate and rectify fault, proceed to test 5
4 Check cable continuity of the ABS warning light circuit: - Short ABS ECM connector pin 21 and ground pin 24 together: Turn ignition 'ON'	ABS warning light 'OFF'	Proceed to test 5
	ABS warning light 'ON'	Locate and rectify fault, proceed to test 5
5 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



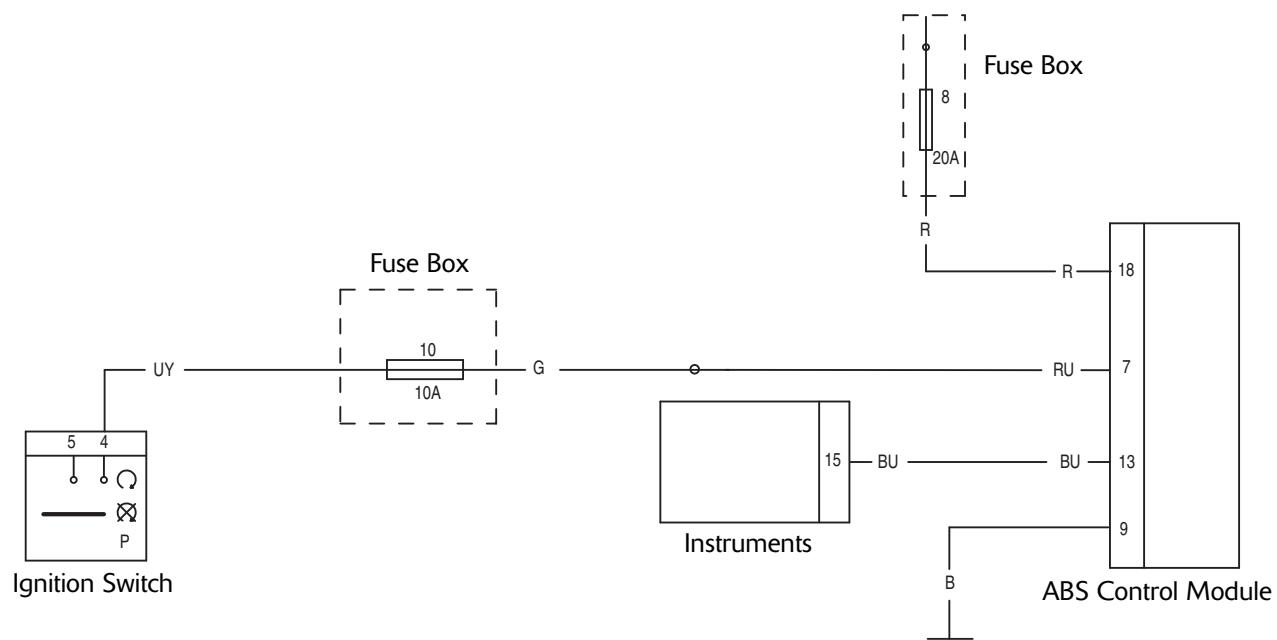
Brakes

ABS Warning Light ON (No DTCs Stored) – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
ABS Warning Light ON (No DTCs Stored)	ABS Ignition supply fuse/circuit fault ABS Warning light circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 7 and ground pin 9	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable continuity of the ABS ignition supply circuit: With the ignition 'ON', check voltage between: - ABS ECM connector pin 7 and ground	Same as 'across battery' voltage	Proceed to test 3
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity of the ABS warning light circuit: Check voltage between: - ABS ECM connector pin 13 and ground	Voltage greater than 1.5 V	Proceed to test 4
	Voltage less than 1.5 V	Locate and rectify fault, proceed to test 5
4 Check cable continuity of the ABS warning light circuit: - Short ABS ECM connector pin 13 and ground pin 9 together: Turn ignition 'ON'	ABS warning light 'OFF'	Proceed to test 5
	ABS warning light 'ON'	Locate and rectify fault, proceed to test 5
5 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

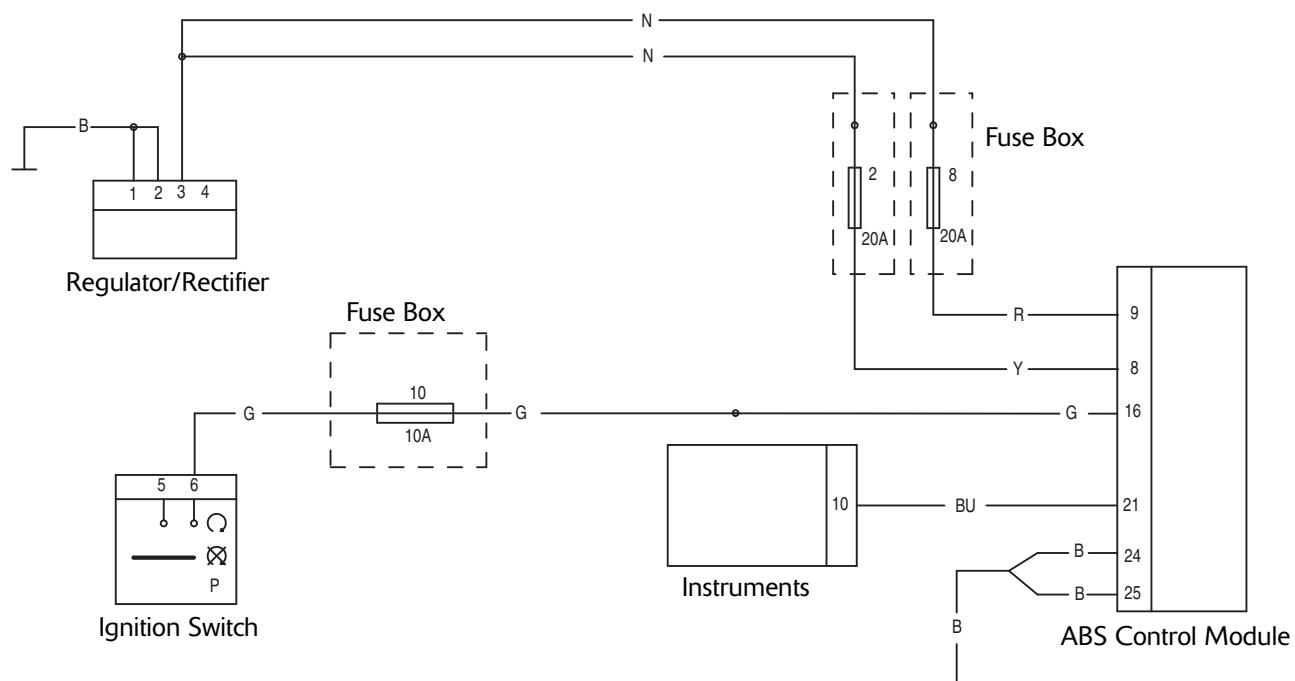
Brakes

ABS Warning Light Does not Illuminate (No DTCs Stored) All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
ABS Warning Light OFF (No DTCs Stored)	Warning light circuit fault ABS ECM ground circuit fault	Ensure ABS ECM connector is secure. Ensure ABS ECM ground connection is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS warning light circuit fuses (fuse 8 and 10):	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable and terminal integrity: - ABS ECM connector pin 16 and ground	OK	Proceed to test 3
	Faulty	Replace fuse, proceed to test 6
3 Check cable for short to voltage: With ignition 'OFF', check voltage between: - ABS ECM connector pin 16 and ground	0 V	Proceed to test 4
	Above 3 V	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short to ground: With ignition 'ON', check the ABS warning light circuit voltage between: - ABS ECM connector pin 21 and ground	Voltage greater than 1.5 V	Proceed to test 5
	Voltage less than 1.5 V	Locate and rectify fault, proceed to test 6
5 Check cable for continuity: ABS ECM connector pin 24 and ground: Turn ignition 'ON'	OK	Proceed to test 6
	Faulty	Locate and rectify fault, proceed to test 6
6 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Brakes

ABS Warning Light Does not Illuminate (No DTCs Stored)

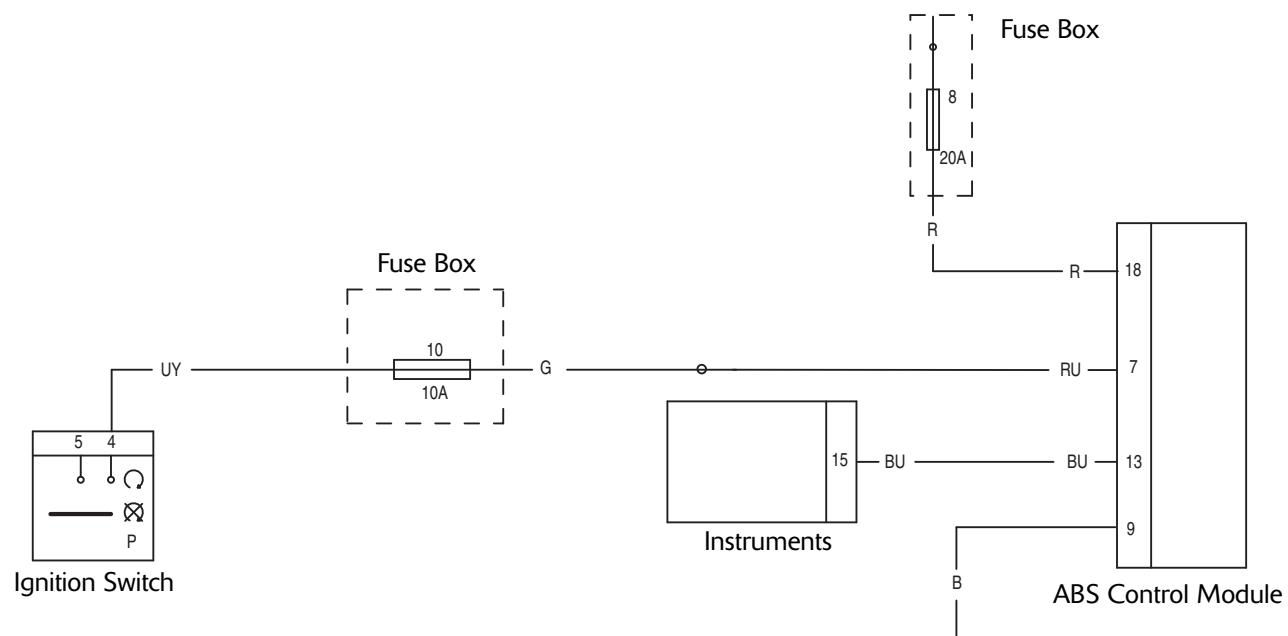
Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
ABS Warning Light OFF (No DTCs Stored)	Warning light circuit fault ABS ECM ground circuit fault	Ensure ABS ECM connector is secure. Ensure ABS ECM ground connection is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS warning light circuit fuse in the fuse box (fuse 8 and 10):	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable and terminal integrity: - ABS ECM connector pin 7 and ground	OK	Proceed to test 3
	Faulty	Replace fuse, proceed to test 6
3 Check cable for short to voltage: With ignition 'OFF', check voltage between: - ABS ECM connector pin 7 and ground	0 V	Proceed to test 4
	Above 3 V	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short to ground: With ignition 'ON', check the ABS warning light circuit voltage between: - ABS ECM connector pin 13 and ground	Voltage greater than 1.5 V	Proceed to test 5
	Voltage less than 1.5 V	Locate and rectify fault, proceed to test 6
5 Check cable for continuity: ABS ECM connector pin 9 and ground:	OK	Proceed to test 6
	Faulty	Locate and rectify fault, proceed to test 6
6 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Brakes

Front Wheel Sensor Open Circuit/Short Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1611	Front wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

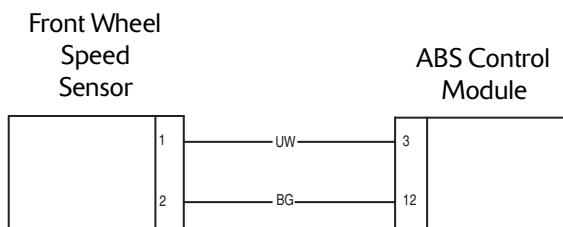
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 3 and ABS ECM connector pin 12	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 9
2 Check cable for short circuit: - ABS ECM connector pin 12 and ground	OK	Proceed to test 4
	Short circuit	Proceed to test 3
3 Disconnect the front wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 2 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4 Check cable for short circuit: - ABS ECM connector pin 3 and ground	OK	Proceed to test 6
	Short circuit	Proceed to test 5
5 Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6 Check cable continuity: - ABS ECM connector pin 12 and wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7 Check cable continuity: - ABS ECM connector pin 3 and wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8 Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 12 (positive) and pin 3 (negative), and measure the current consumption of the wheel speed sensor	3.1 mA to 13.6 mA	Proceed to test 9
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16 V)	8.1 mA	10.5 mA	13.6 mA



Brakes

Front Wheel Sensor Open Circuit/Short Circuit – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1611	Front wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

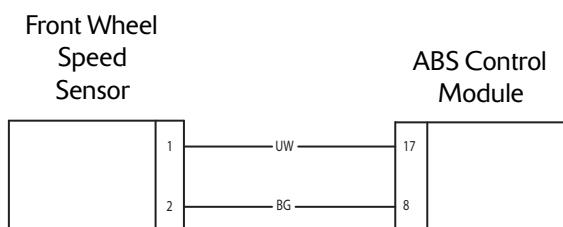
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 17 and ABS ECM connector pin 8	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 9
2 Check cable for short circuit: - ABS ECM connector pin 8 and ground	OK	Proceed to test 4
	Short circuit	Proceed to test 3
3 Disconnect the front wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 2 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4 Check cable for short circuit: - ABS ECM connector pin 17 and ground	OK	Proceed to test 6
	Short circuit	Proceed to test 5
5 Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6 Check cable continuity: - ABS ECM connector pin 8 and wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7 Check cable continuity: - ABS ECM connector pin 17 and wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8 Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 8 (positive) and pin 17 (negative), and measure the current consumption of the wheel speed sensor	1.8 mA to 14.2 mA	Proceed to test 9
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	1.8 mA	2.4 mA	3.0 mA
High (16 V)	5.4 mA	7.2 mA	14.2 mA



Brakes

Rear Wheel Sensor Open Circuit/Short Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1613	Rear wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

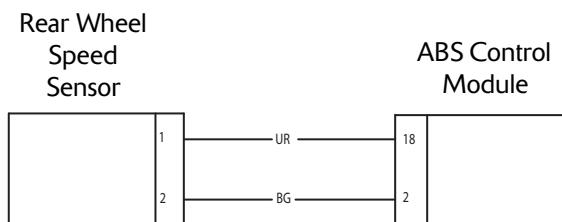
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 2 and ABS ECM connector pin 18	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 9
2 Check cable for short circuit: - ABS ECM connector pin 2 and ground	OK	Proceed to test 4
	Short circuit	Proceed to test 3
3 Disconnect the rear wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 2 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4 Check cable for short circuit: - ABS ECM connector pin 18 and ground	OK	Proceed to test 6
	Short circuit	Proceed to test 5
5 Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6 Check cable continuity: - ABS ECM connector pin 2 and wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring harness fault, proceed to test 7
7 Check cable continuity: - ABS ECM connector pin 18 and wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8 Reconnect the rear wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 2 (positive) and pin 18 (negative), and measure the current consumption of the wheel speed sensor	3.1 mA to 13.6 mA	Proceed to test 9
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16 V)	8.1 mA	10.5 mA	13.6 mA



Brakes

Rear Wheel Sensor Open Circuit/Short Circuit – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1613	Rear wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

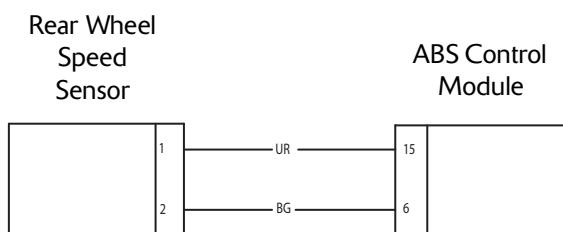
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 6 and ABS ECM connector pin 15	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 9
2 Check cable for short circuit: - ABS ECM connector pin 6 and ground	OK	Proceed to test 4
	Short circuit	Proceed to test 3
3 Disconnect the rear wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 6 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4 Check cable for short circuit: - ABS ECM connector pin 15 and ground	OK	Proceed to test 6
	Short circuit	Proceed to test 5
5 Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6 Check cable continuity: - ABS ECM connector pin 6 and wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7 Check cable continuity: - ABS ECM connector pin 15 and wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8 Reconnect the rear wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 6 (positive) and pin 15 (negative), and measure the current consumption of the wheel speed sensor	1.8 mA to 14.2 mA	Proceed to test 9
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	1.8 mA	2.4 mA	3.0 mA
High (16 V)	5.4 mA	7.2 mA	14.2 mA



Brakes

Front Wheel Sensor Abnormal Input/Losing Contact

Fault Code	Possible cause	Action
C1612	Front wheel speed sensor poor signal Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.37 mm and 1.2 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 5
2 Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 5
4 Check the wheel speed sensor circuit (see page 14-72)	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Rear Wheel Sensor Abnormal Input/Losing Contact

Fault Code	Possible cause	Action
C1614	Rear wheel speed sensor poor signal Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.37 mm and 1.2 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 5
2 Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 5
4 Check the wheel speed sensor circuit (see page 14-81)	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Brakes

Front Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1621	Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.37 mm and 1.2 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 5
2 Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 5
4 Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Rear Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1623	Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.37 mm and 1.2 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 5
2 Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 5
4 Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Brakes

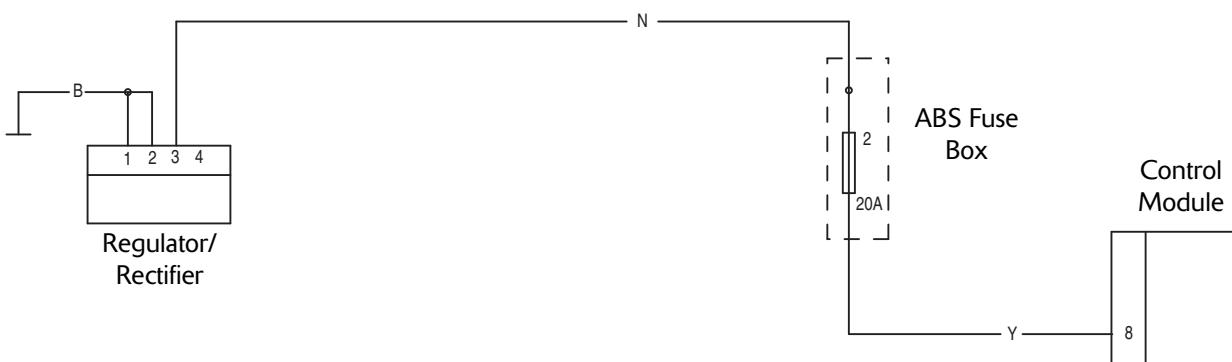
Front or Rear Input/Output solenoid Open/Short Circuit – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
Front: C1631; C1632 Rear: C1633; C1634 C1654	ABS solenoid circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS solenoid fuse (fuse 2):	OK	Proceed to test 3
	Faulty	Proceed to test 2
2 Check cable and terminal integrity: - ABS ECM connector pin 8 and ground	OK	Replace fuse, proceed to test 5
	Faulty	Rectify fault, replace fuse, proceed to test 5
3 Check cable continuity: With ignition 'ON', check voltage between: - ABS ECM connector pin 8 and ground	Same as 'across battery' voltage	Proceed to test 4
	Less than 'across battery' voltage	Locate and rectify fault, proceed to test 5
4 Check cable for continuity: - ABS ECM connector pin 24 and ground	OK	Proceed to test 5
	Faulty	Locate and rectify fault, proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



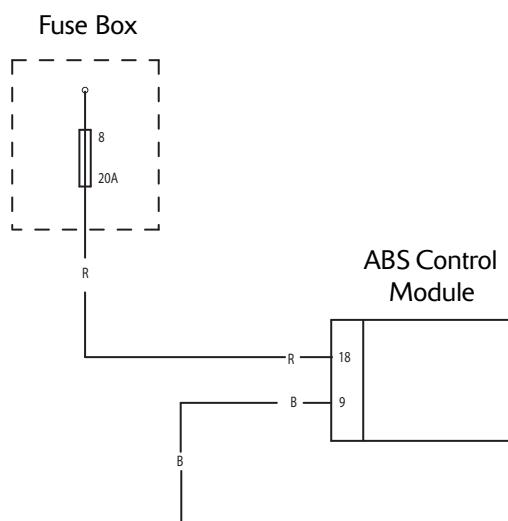
Front or Rear Input/Output solenoid Open/Short Circuit – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
Front: C1631; C1632 Rear: C1633; C1634 C1654	ABS solenoid circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS solenoid fuse in the fuse box (fuse 8):	OK	Proceed to test 3
	Faulty	Proceed to test 2
2 Check cable and terminal integrity: - ABS ECM connector pin 18 and ground	OK	Replace fuse, proceed to test 5
	Faulty	Rectify fault, replace fuse, proceed to test 5
3 Check cable continuity: With ignition 'ON', check voltage between: - ABS ECM connector pin 18 and ground	Same as 'across battery' voltage	Proceed to test 4
	Less than 'across battery' voltage	Locate and rectify fault, proceed to test 5
4 Check cable for continuity: - ABS ECM connector pin 9 and ground	OK	Proceed to test 5
	Faulty	Locate and rectify fault, proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Brakes

Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock

Fault Code	Possible cause	Action
C1641; C1643	Binding brake Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the relevant wheel for brake bind caused by caliper or master cylinder faults, or other mechanical causes	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 4
2 Measure the air gap of the wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.37 mm to 1.2 mm	OK	Proceed to test 3
	Faulty	Rectify the fault and proceed to test 4
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 4
4 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

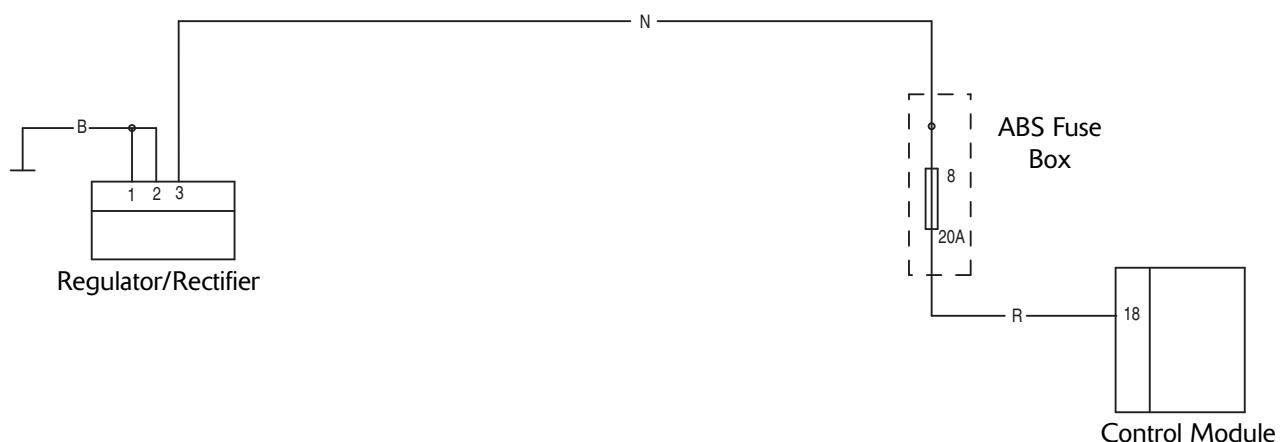
Motor – Lock; Motor Stuck OFF; Motor stuck ON – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1651; C1652; C1653	Motor circuit fault Motor runs continually Motor does not run at all	Ensure ABS ECM connector is secure. Turn the ignition 'ON'. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS motor circuit fuse (fuse 8 in ABS fuse box)	OK	Proceed to test 2
	Faulty	Replace fuse and proceed to test 5
2 Check the motor function Check that with the motorcycle stationary and the ABS ACM modulator connected, the motor does not operate	OK	Proceed to test 3
	Motor runs continually.	Contact Triumph service
3 Check cable continuity: With ignition 'ON', check voltage between: - ABS ECM connector pin 9 and ground	Same as 'across battery' voltage	Proceed to test 4
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4 Check cable for continuity: - ABS ECM connector pin 25 and ground	OK	Proceed to test 5
	Faulty	Locate and rectify fault, proceed to test 5
5 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



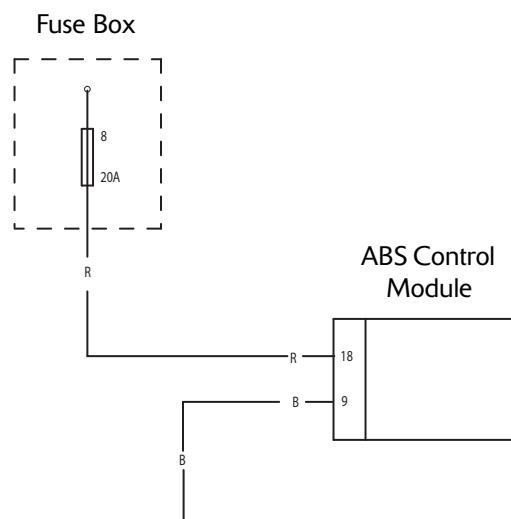
Brakes

Motor – Lock; Motor Stuck OFF; Motor stuck ON – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1651; C1652; C1653	Motor circuit fault Motor runs continually Motor does not run at all	Ensure ABS ECM connector is secure. Turn the ignition 'ON'. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check the ABS motor circuit fuse in the fuse box (fuse 8)	OK	Proceed to test 2
	Faulty	Replace fuse and proceed to test 5
2 Check the motor function: Check that with the motorcycle stationary and the ABS ACM modulator connected, the motor does not operate	OK	Proceed to test 3
	Motor runs continually	Contact Triumph service
3 Check cable continuity: With ignition 'ON', check voltage between: - ABS ECM connector pin 18 and ground	Same as 'across battery' voltage	Proceed to test 4
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4 Check cable for continuity: - ABS ECM connector pin 9 and ground	OK	Proceed to test 5
	Faulty	Locate and rectify fault, proceed to test 5
5 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Brakes

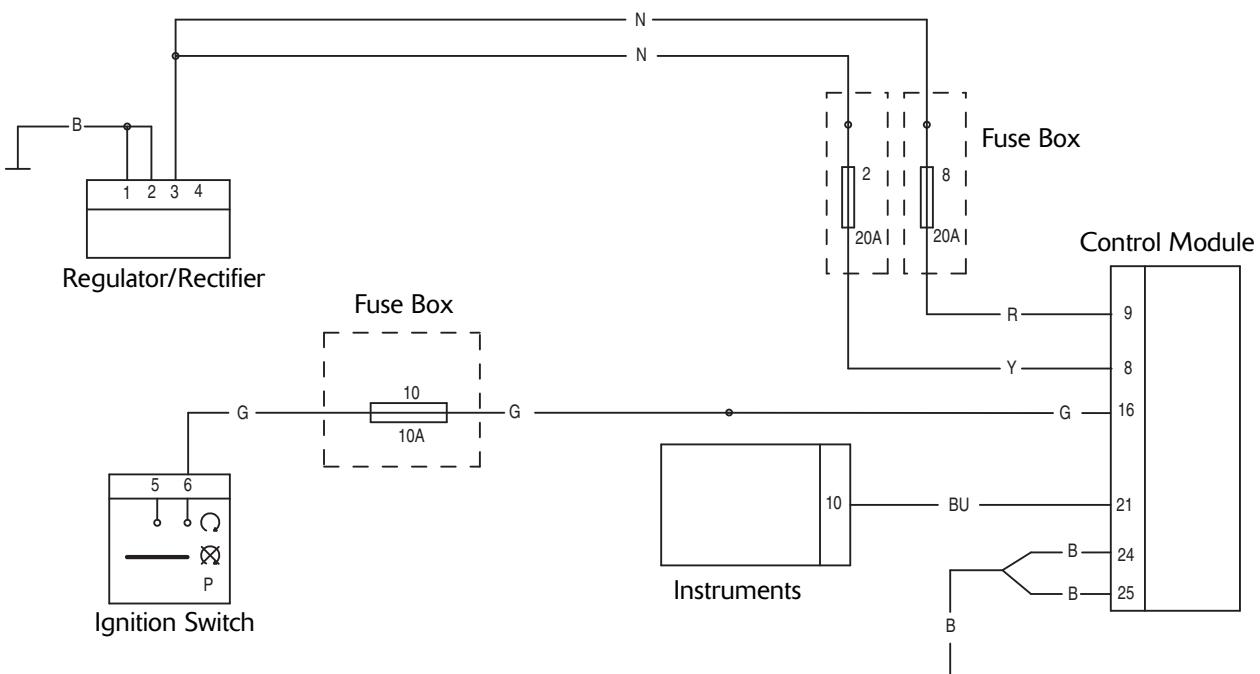
Power Source Voltage Drop/Voltage Rise – All Models Except Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1661; C1662	Power supply circuit fault Battery charging circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 16 and ground pin 24	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check the cable for continuity: - ABS ECM connector pin 24 and ground	OK	Proceed to test 3
	Faulty	Rectify wiring harness fault, proceed to test 5
3 Check battery voltage: With ignition 'ON', check the voltage between: - ABS ECM connector pin 16 and ground pin 24	Voltage greater than 10 V	Proceed to test 4
	Voltage less than 10 V	Locate and rectify fault, proceed to test 5
4 Check battery voltage: Reconnect ABS ECM connector and start the engine, check the voltage between: - Battery positive (red) terminal and negative (black) terminal	Voltage between 10 V and 16 V	Proceed to test 4
	Voltage greater than 16 V	Check the battery charging circuit. Locate and rectify fault, proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



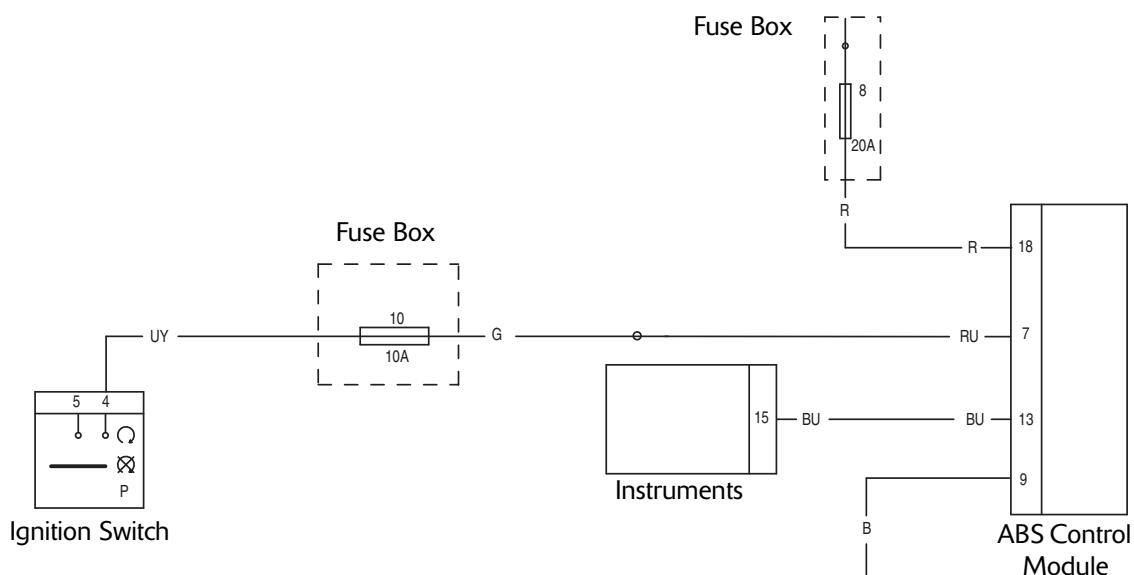
Power Source Voltage Drop/Voltage Rise – Thunderbird Commander and Thunderbird LT

Fault Code	Possible cause	Action
C1661; C1662	Power supply circuit fault Battery charging circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 7 and ground pin 9	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check the cable for continuity: - ABS ECM connector pin 9 and ground	OK	Proceed to test 3
	Faulty	Rectify wiring harness fault, proceed to test 5
3 Check battery voltage: With ignition 'ON', check the voltage between: - ABS ECM connector pin 7 and ground pin 9	Voltage greater than 10 V	Proceed to test 4
	Voltage less than 10 V	Locate and rectify fault, proceed to test 5
4 Check battery voltage: Reconnect ABS ECM connector and start the engine, check the voltage between: - Battery positive (red) terminal and negative (black) terminal	Voltage between 10 V and 16 V	Proceed to test 4
	Voltage greater than 16 V	Check the battery charging circuit. Locate and rectify fault, proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Brakes

Different Tyre Diameter

Fault Code	Possible cause	Action
C1671	Incorrect diameter wheels installed Incorrect tyre pressures Incorrect wheel speed sensor air gap Damaged or dirty pulser ring	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check for installation of wheels and tyres of the correct size	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check the tyre pressures	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check the pulser rings for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 4
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5
4 Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap between 0.37 mm to 1.2 mm	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Abnormal ECU

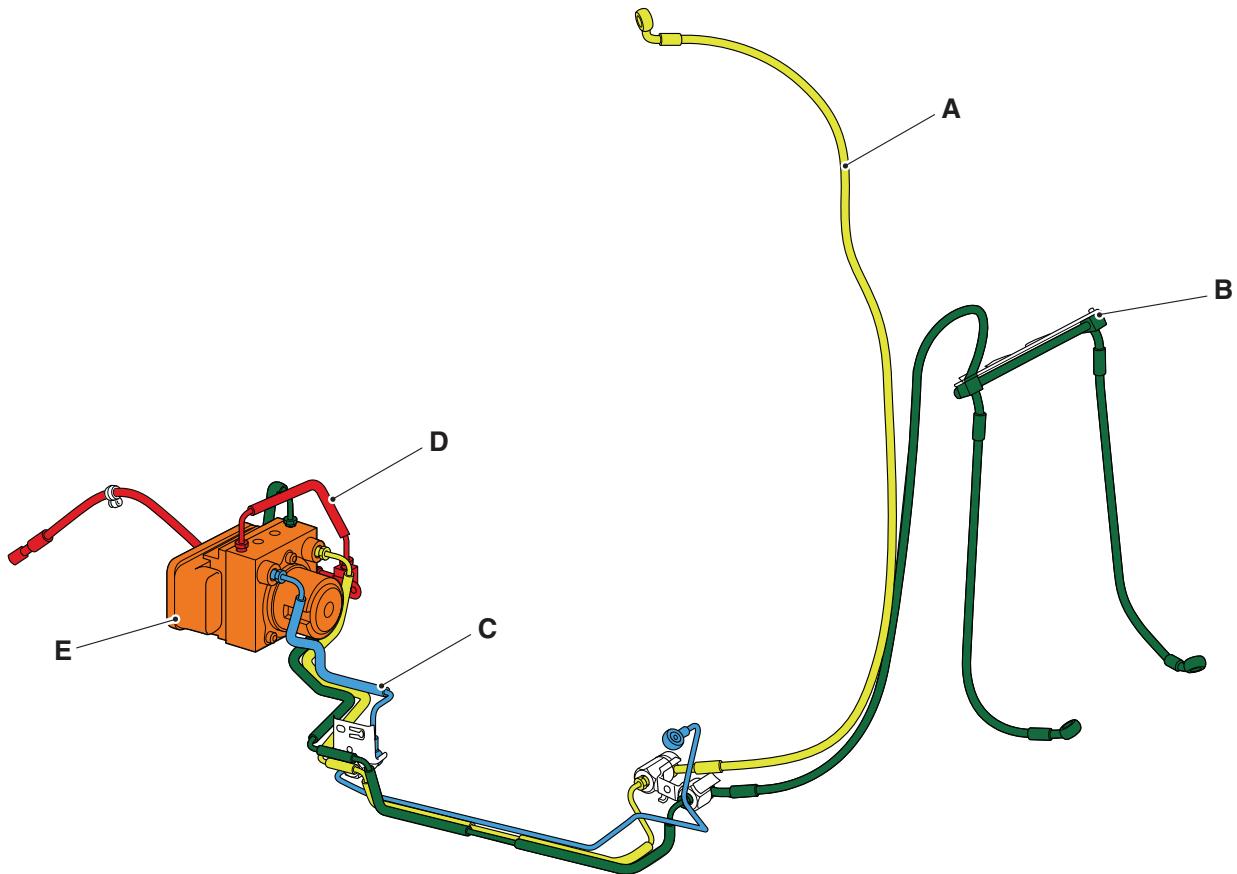
Fault Code	Possible cause	Action
C1681	Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap between 0.37 mm to 1.2 mm	OK	Proceed to test 1
	Faulty	Rectify the fault and proceed to test 4
2 Check the pulser rings for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 2
	Faulty	Clean or replace the ABS pulser ring, proceed to test 4
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 4
4 Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Brakes

ABS Hydraulic Circuit Layout – All Models Except Thunderbird Commander and Thunderbird LT



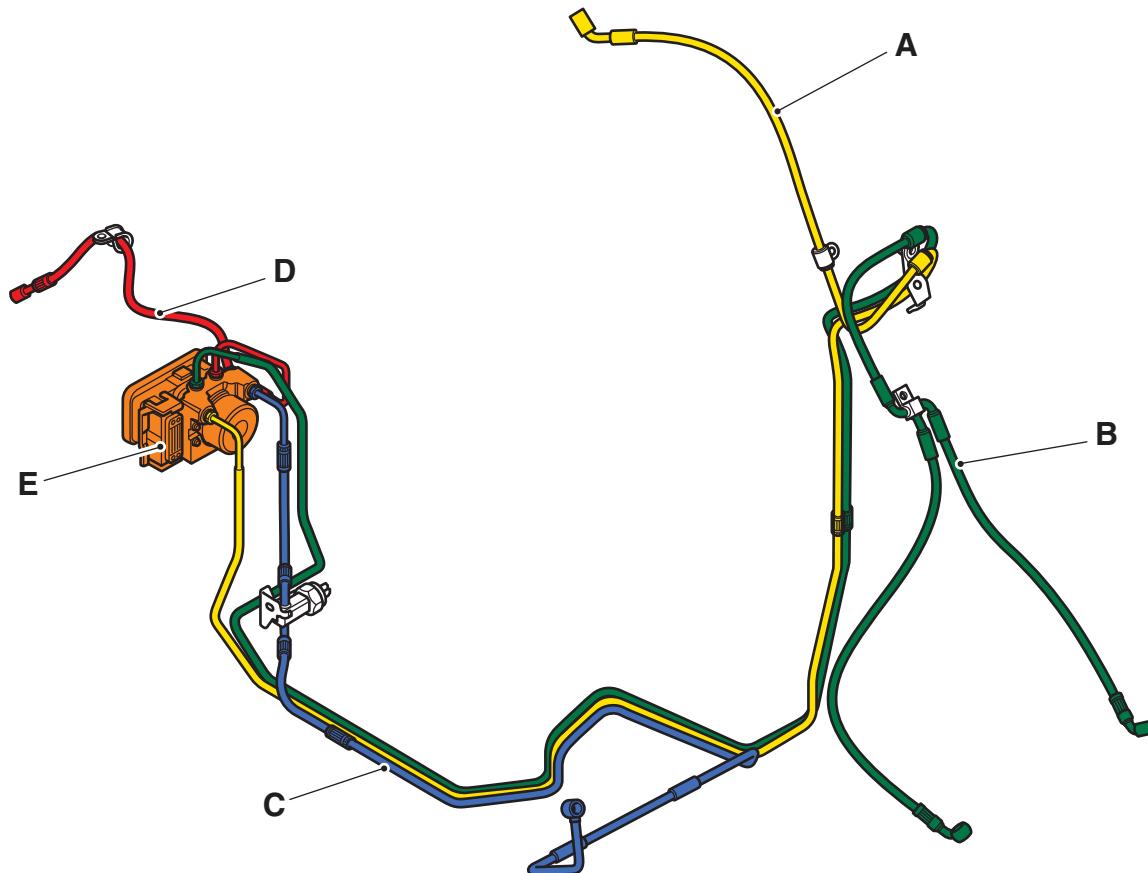
A. Front Brake Circuit from Master Cylinder to ABS Modulator

B. Front Brake Circuit from ABS Modulator to Front Calipers

C. Rear Brake Circuit from Master Cylinder to ABS Modulator

D. Rear Brake Circuit from ABS Modulator to Rear Caliper

E. ABS Modulator

ABS Hydraulic Circuit Layout – Thunderbird Commander and Thunderbird LT

- | | |
|---|--|
| | A. Front Brake Circuit from Master Cylinder to ABS Modulator |
| | B. Front Brake Circuit from ABS Modulator to Front Calipers |
| | C. Rear Brake Circuit from Master Cylinder to ABS Modulator |
| | D. Rear Brake Circuit from ABS Modulator to Rear Caliper |
| | E. ABS Modulator |

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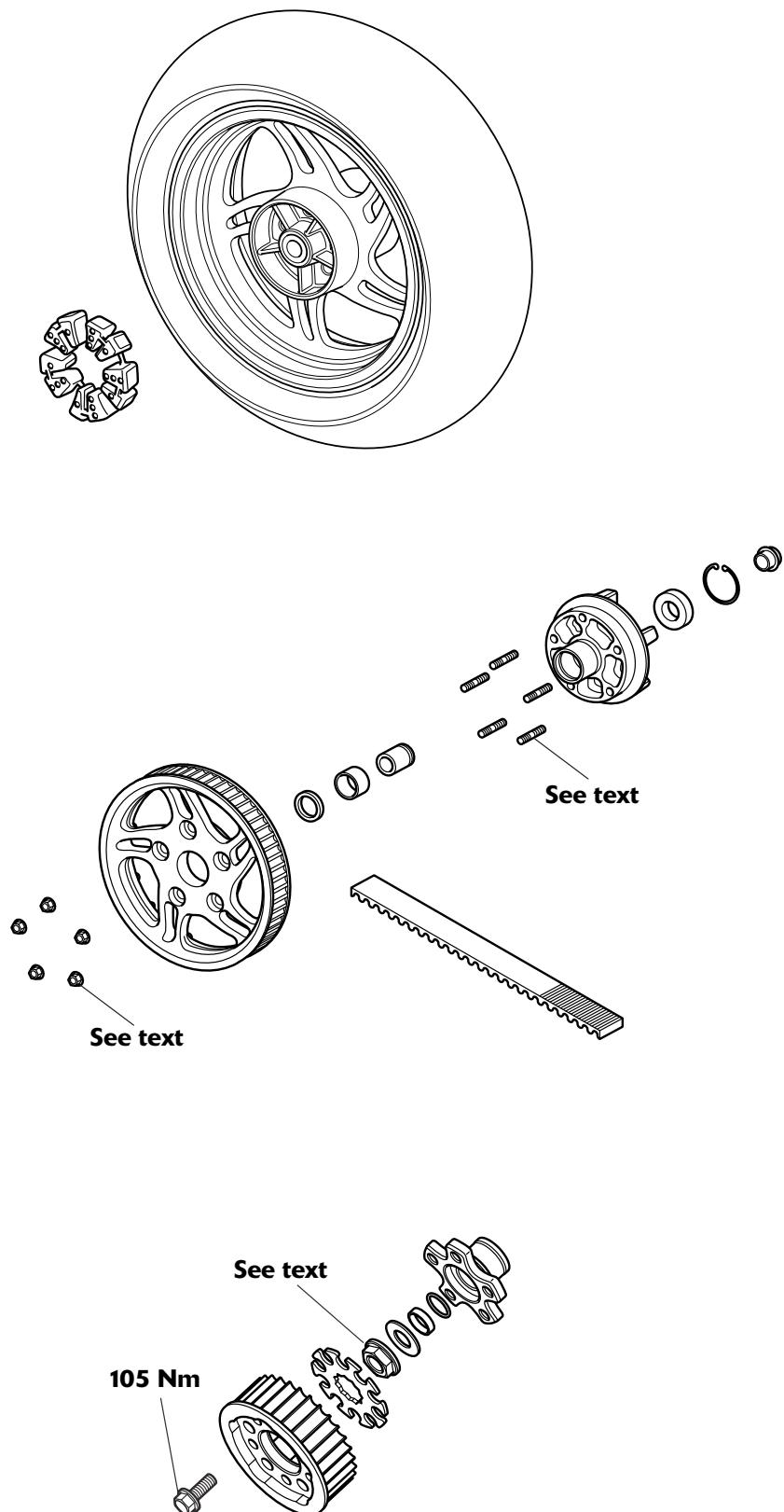
15 Final Drive

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Final Drive

Exploded View – Final Drive

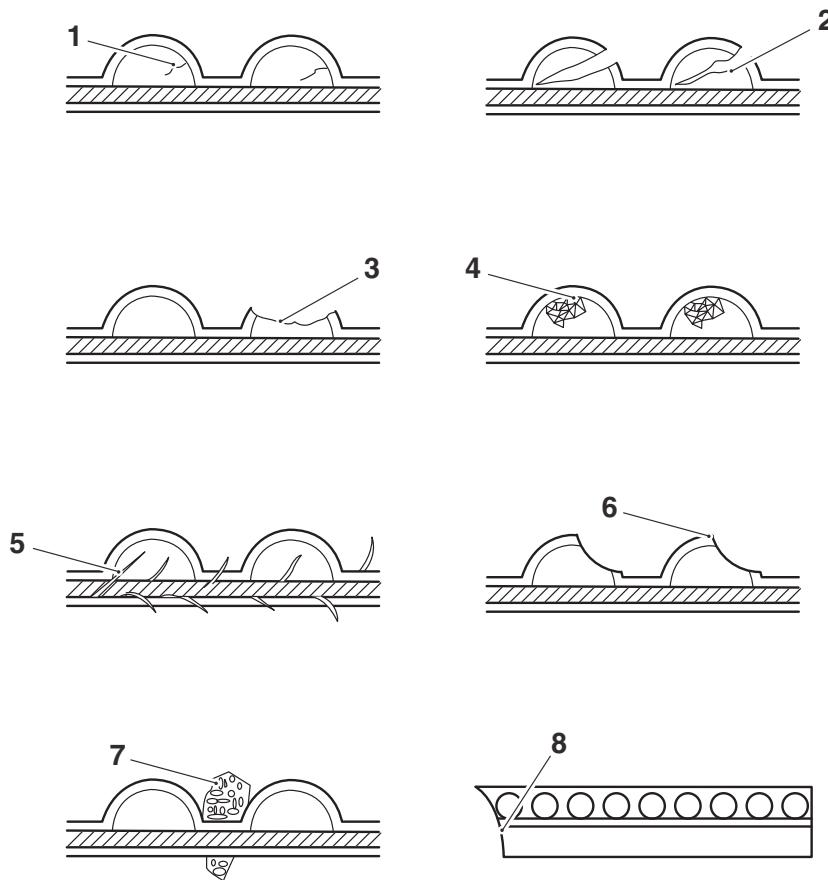


Final Drive Belt

For safety and to prevent excessive wear, the drive belt must be checked, adjusted and renewed in accordance with Scheduled Maintenance requirements. Checking and adjustment must be carried out more frequently for extreme conditions such as salty or heavily gritted roads.

If the drive belt is badly worn or incorrectly adjusted (either too loose or too tight) the belt could jump off the drive belt pulleys or break. Therefore, always replace worn or damaged drive belts using genuine Triumph parts supplied by an authorised Triumph dealer. The drive belt requires no lubrication.

Final Drive Belt Wear and Pulley Inspection



Item	Condition	Required Action
1.	Internal tooth cracks (hairline)	OK to use but monitor condition
2.	External tooth cracks	Replace belt immediately
3.	Missing teeth	Replace belt immediately
4.	Cracked teeth edges (minor)	OK to use but monitor condition
5.	Frayed belt edge cords	OK to use but monitor condition
6.	Hooked teeth	Replace belt immediately
7.	Stone damage	Replace belt if the damage is on the edge of the belt
8.	Belt edge wear (outboard edge only)	OK to use but monitor condition

Final Drive

Drive Belt

Inspect the drive belt for:

- cuts or unusual wear patterns
- wear (bevelling) to the outside edge of the belt. Some wear is common, but it can indicate the drive pulleys are misaligned
- punctures to the outside (ribbed) surface of the belt. If cracks or damage are evident near to the edge of the belt, replace it immediately. Minor damage to the centre of the belt will require belt replacement eventually, but when cracks extend to the edge of the belt, failure is imminent
- exposed tensile cords on the inside (toothed) surface of the belt. The teeth are normally covered in nylon and polyethylene layers, and damage to these layers will result in belt failure. This condition usually indicates worn drive pulley teeth; replace the drive belt and pulleys
- signs of puncture or cracking at the base of the drive belt teeth. Replace the belt if either condition exists
- replace the belt if external tooth cracks, missing teeth, hooked wear or punctures to the edge of the belt exist.

Note:

- **Internal cracks to the belt teeth may develop into external cracks or missing teeth over time. Internal cracks are not grounds for immediate belt replacement, but should be monitored closely before external cracks develop, which will require immediate belt replacement.**

Drive Pulleys

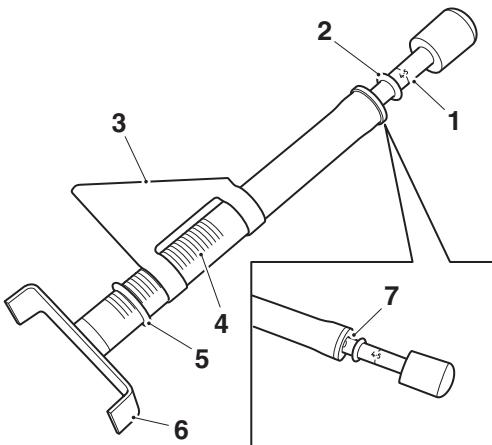
Inspect each pulley tooth visually for:

- severe tooth wear or damage to either pulley
- damage caused by hard object (such as stones)
- damage or flaking to the hard coating of the rear pulley.

Final Drive Belt Tension Inspection

Always inspect the drive belt tension at the intervals specified in the Scheduled Maintenance chart.

Drive belt tension must be measured using Triumph service tool T3880126, which is available from your Triumph dealer.



Service Tool T3880126

1. Load scale - 4.5 kgf (10 lbf) mark
2. O-ring
3. Deflection slider
4. Deflection scale (0.5 mm (0.020 in) increments)
5. O-ring
6. Belt cradle
7. Load scale (zero position)

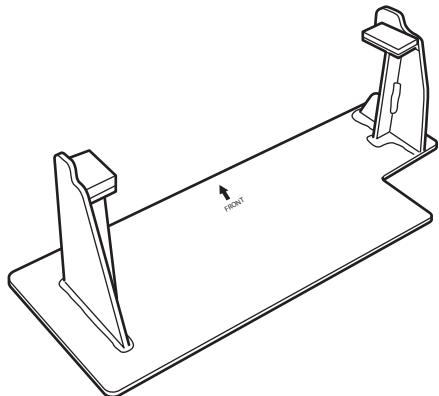
Drive belt tension can be measured with the motorcycle on the side stand, or with the rear wheel raised off the ground. The method of measurement and adjustment is identical, but the belt tension specification for each method is different.

Drive belt tension must be measured with the drive belt cold (at ambient temperature).

Position the motorcycle either on the side stand or with the rear wheel raised off the ground.

To Raise the Rear Wheel off the Ground

For all models except Thunderbird Commander and Thunderbird LT, service tool T3880803, shown below, will be required.

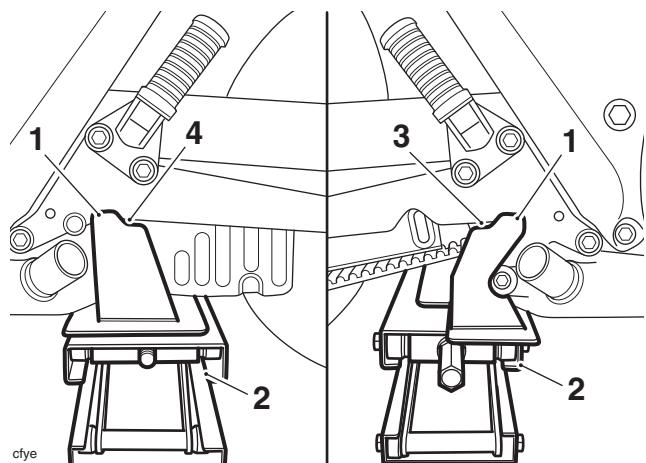


T3880803

Tool T3880803

All Models Except Thunderbird Commander and Thunderbird LT

Service tool T3880803 should be positioned with the arrow facing the front of the motorcycle, with the plastic pads located under each rear footrest bracket as shown below:



1. Tool T3880803

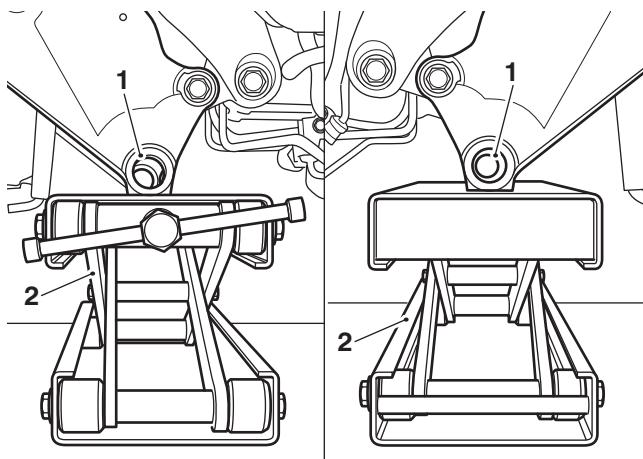
2. Proprietary motorcycle lifting jack

3. Plastic pad, right hand

4. Plastic pad, left hand

Thunderbird Commander and Thunderbird LT

Position a proprietary motorcycle lifting jack to the front of the rear footrest hanger as shown below:



- 1. Rear footrest hanger**
- 2. Proprietary motorcycle lifting jack**

All Models

Raise the motorcycle so that the rear wheel is clear of the ground using a proprietary motorcycle lifting jack.

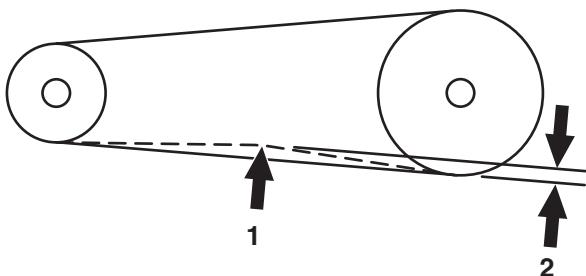
Refer to the chart below for the correct drive belt tension specification for the method of motorcycle support you are using.

Final Drive

Drive Belt Tension Specification

Motorcycle on side stand	5.5 to 7.0 mm (0.20 to 0.27 in)
Motorcycle with the rear wheel off the ground	7.5 to 9.0 mm (0.30 to 0.35 in)

Drive belt tension is measured by applying a 4.5 kilogram-force (kgf) (10 pound-force (lbf)) load to the plunger on service tool T3880126, once it has been positioned to the lower run of drive belt; this load then deflects the belt. The belt deflection can then be measured using a scale on the tool.



1. 4.5 kgf (10 lbf) applied to belt

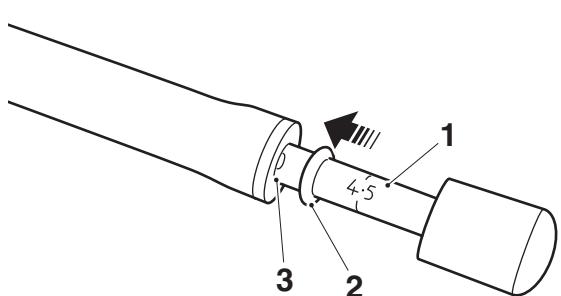
2. Amount of deflection

Measure the drive belt tension as follows:

Note:

- During the following procedure the exhaust is shown removed for clarity, however it is not necessary to remove the exhaust to check or adjust the drive belt tension.

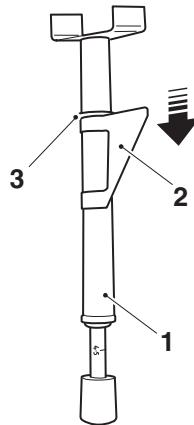
- Slide the small O-ring on tool T3880126 along the tool to the zero position on the load scale.



cfhc

- Load scale
- O-ring
- Zero position

- Push the deflection slider and its O-ring down the tool, so that it will not touch the drive belt lower cover when the tool is positioned to the drive belt.
- Rotate the deflection slider so that it will contact the lower belt cover when the tool is positioned to the motorcycle.

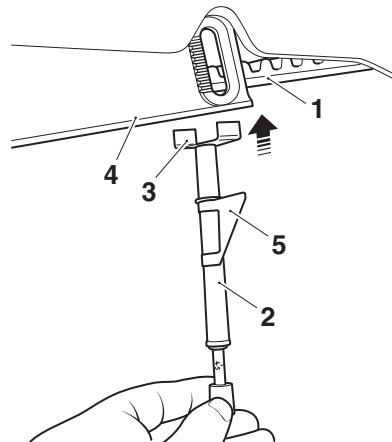


1. Service tool T3880126

2. Deflection slider

3. O-ring

- Gently position the tool's belt cradle to the centre of the lower drive belt run, ensuring the deflection slider on the tool body is **NOT** in contact with the drive belt cover at this stage.



1. Drive belt

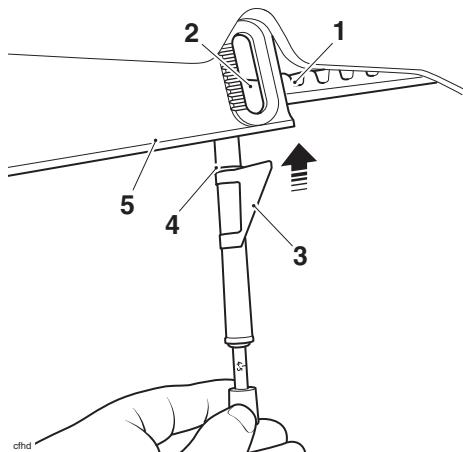
2. Service tool T3880126

3. Belt cradle

4. Drive belt lower cover

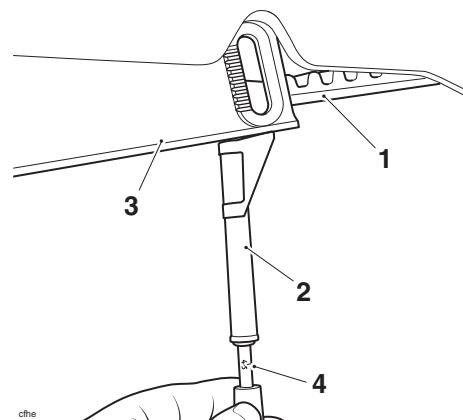
5. Deflection slider

5. Taking care not to deflect the belt, slide the deflection slider and its O-ring upwards until the slider just touches the belt cover.



- 1. Drive belt**
- 2. Belt cradle**
- 3. Deflection slider**
- 4. O-ring**
- 5. Drive belt lower cover**

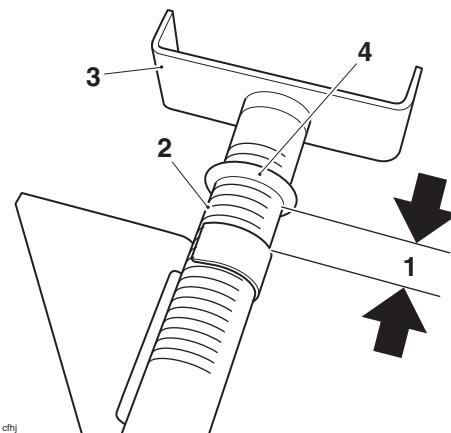
6. Apply force to the belt tension gauge in an upwards direction, until the 4.5 kgf (10 lbf) mark on the load scale is reached. The deflection slider must remain stationary against the belt cover while the force is applied.



- 1. Drive belt**
- 2. Scale**
- 3. Drive belt lower cover**
- 4. Load scale**

7. Remove the tool, taking care not to move the O-ring or deflection slider, and read the belt deflection on the scale on the tool.

8. The belt deflection is the gap between the top of deflection slider and the lower edge of the O-ring. The increments on the scale are 0.5 mm (0.020 in) apart.



- 1. Belt deflection**
- 2. Scale**
- 3. Deflection slider**
- 4. O-ring**

9. Repeat the measurement at several points around the drive belt to locate its tightest point. Always adjust drive belt tension at the tightest point in the drive belt.

If the drive belt deflection is outside the limits given below, the drive belt must be adjusted (see page 15-8).

Drive Belt Tension Specification

Motorcycle on side stand	5.5 to 7.0 mm (0.20 to 0.27 in)
Motorcycle on support stand T3880803	7.5 to 9.0 mm (0.30 to 0.35 in)

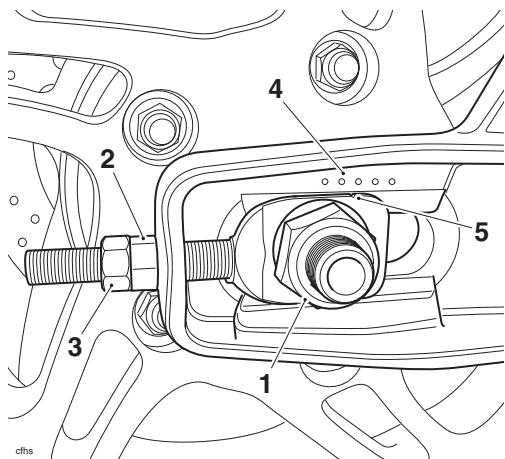
Final Drive

Final Drive Belt Tension Adjustment

Always adjust the drive belt tension at the intervals specified in the Scheduled Maintenance chart.

Note:

- **Always adjust drive belt tension at the tightest point in the drive belt.**
- **Always adjust drive belt tension with the motorcycle engine and drive belt cold.**



1. **Wheel spindle nut**
2. **Adjuster nut**
3. **Adjuster lock nut**
4. **Adjuster markings**
5. **Axle adjuster marking**

1. Loosen the wheel spindle nut.
2. Release the lock nuts on both the left hand and right hand adjusters.
3. Moving both adjusters by an equal amount, turn the adjuster nuts clockwise to increase drive belt tension and counter clockwise to decrease drive belt tension.
4. When the correct drive belt tension has been set, push the wheel into firm contact with the adjuster. Ensure the axle adjuster marking is aligned with the same adjuster marking on both sides of the swinging arm.
5. Tighten both adjuster lock nuts to **25 Nm** and the rear wheel spindle nut to **110 Nm**.
6. Repeat the drive belt tension check (see page 15-4)
7. Check the rear wheel alignment (see page 16-13).
8. Readjust if necessary.



Warning

Operation of the motorcycle with insecure adjuster lock nuts or a loose wheel spindle may result in impaired stability and handling of the motorcycle. This impaired stability and handling may lead to loss of control or an accident.

Final Drive Belt Replacement

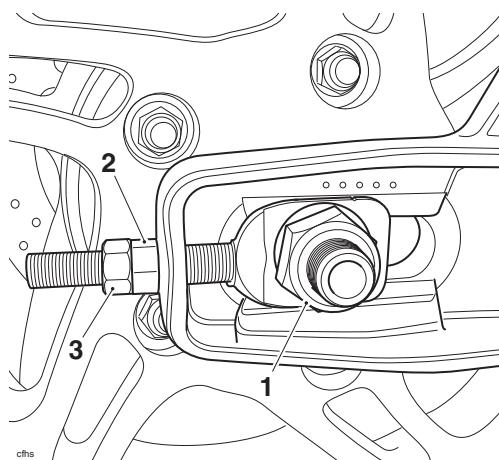
Removal



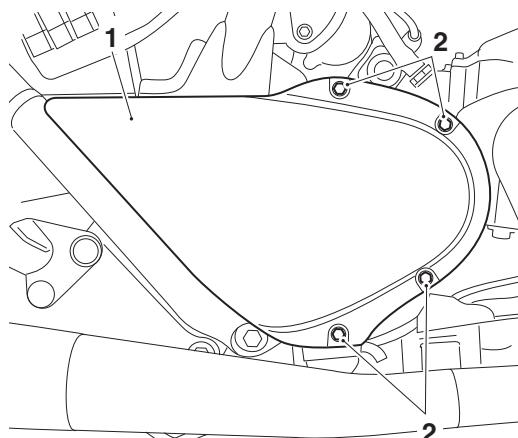
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Loosen the wheel spindle nut.
4. Release the lock nuts on both the left hand and right hand adjusters.
5. Release both adjusters and release the final drive belt tension.

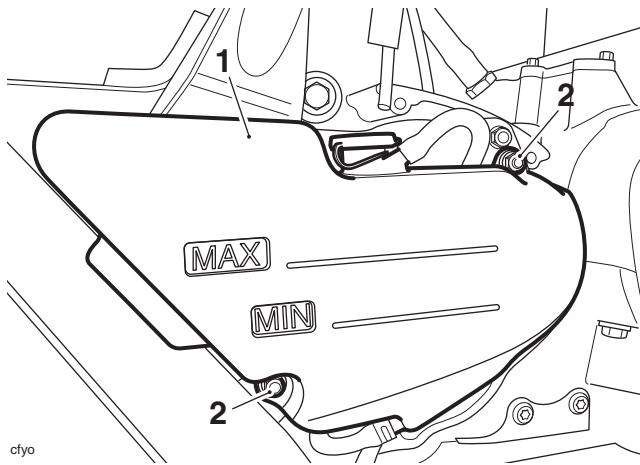


1. **Wheel spindle nut**
 2. **Adjuster nut**
 3. **Adjuster lock nut**
6. Release the four screws and remove the final drive belt cover.



1. **Final drive belt cover**
2. **Final drive belt cover screws**

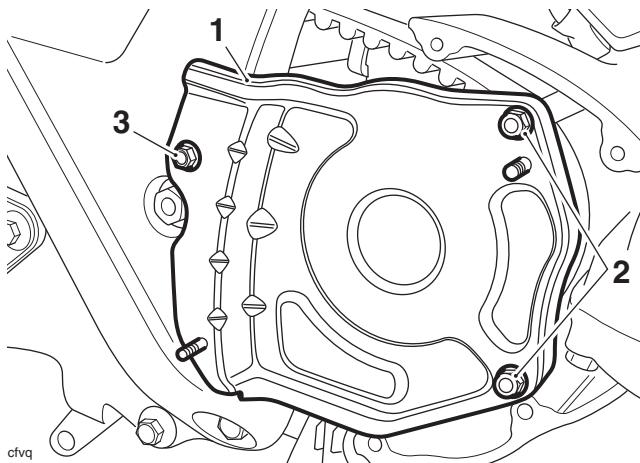
7. Release the expansion tank fixings, collect the flanged sleeves and position the expansion tank aside. Do not allow the expansion tank to hang unsupported from its hoses. It is not necessary to drain the expansion tank or cooling system.



1. Coolant expansion tank

2. Nuts

8. Remove the three fixings and remove the coolant expansion tank bracket.



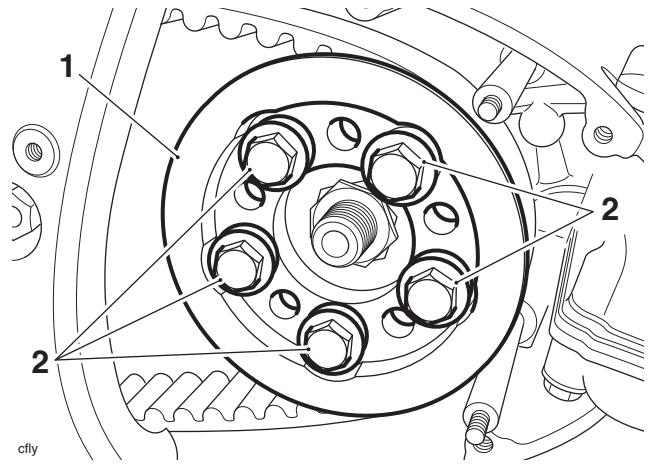
1. Coolant expansion tank bracket

2. Nuts

3. Bolt

9. Prevent the rear wheel from turning by applying the rear brake.

10. Remove the five bolts and remove the front drive belt pulley. If the drive belt pulley flange (see page 7-17) is to be removed, retain the bolts for use during the removal procedure, otherwise, discard the bolts.



1. Drive belt pulley

2. Fixings

11. Remove the swinging arm (see page 13-4).
 12. Note the direction of rotation of the fitted belt. If the belt is to be reused, it must be refitted in the same direction of rotation.
 13. Manoeuvre the belt out from between the frame and the output shaft pulley, taking care to avoid damage to the motorcycle or drive belt, and remove to the rear of the motorcycle.

Inspection

Note:

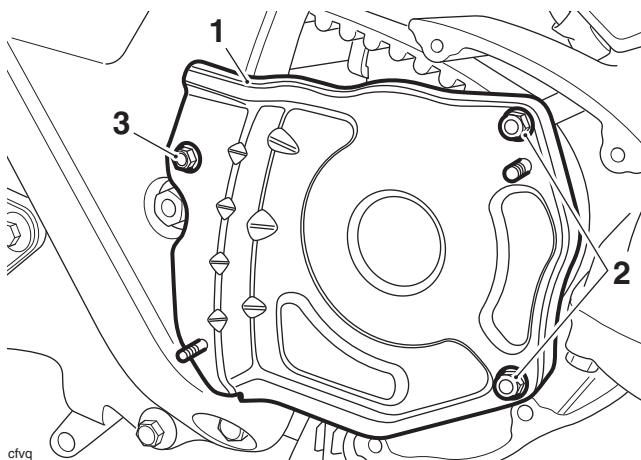
- **If the drive belt is to be renewed, always check and if necessary replace the rear belt pulley drive flange bearings (see page 15-12).**

1. Inspect the drive belt for wear, cracks in the teeth, frayed edges or damage (see page 15-4). Renew if necessary.
2. Inspect the drive belt pulleys for wear or damage (see page 15-4). Renew if necessary.

Final Drive

Installation

1. Position the belt to the motorcycle, and align to the front drive pulley flange. If a previously used belt is to be refitted, fit the belt in its original direction of rotation as noted during removal.
2. Refit the front drive belt pulley and secure with new bolts. Do not fully tighten the bolts at this stage.
3. Refit the swinging arm (see page 13-7), but DO NOT adjust the final drive belt tension at this stage.
4. Lower the motorcycle to the ground and prevent the rear wheel from turning by applying the rear brake.
5. Tighten the front drive belt pulley bolts to **105 Nm**.
6. Refit the coolant expansion tank bracket and secure using the original bolt to the rear and two new lock nuts to the front. Tighten to **3 Nm**.



1. Coolant expansion tank bracket

2. Nuts

3. Bolt

7. Refit the coolant expansion tank to its bracket.
8. Refit the two flanged sleeves and secure with new fixings. Tighten to **3 Nm**.
9. Align the final drive belt cover to the crankcase. Fit and tighten the four screws to **9 Nm**.
10. Adjust the final drive belt tension as described for swinging arm removal (see page 13-8).
11. Check the rear wheel alignment (see page 16-13).
12. Reconnect the battery, positive (identified with red tape) lead first.
13. Refit the rider's seat (see page 17-21).

Cush Drive

Always change the drive flange assembly at the intervals specified in the Scheduled Maintenance chart.

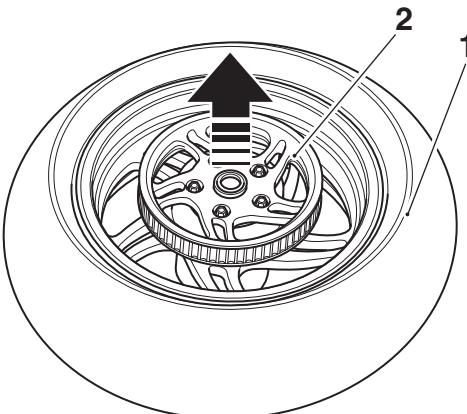
Removal

1. Remove the rear wheel (see page 16-12).

Caution

Do not allow the wheel to rest on the brake disc, as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

2. Place the wheel on wooden blocks with the drive belt pulley uppermost.
3. Gently lever the drive belt pulley and flange from the wheel hub.



1. Rear wheel

2. Drive flange

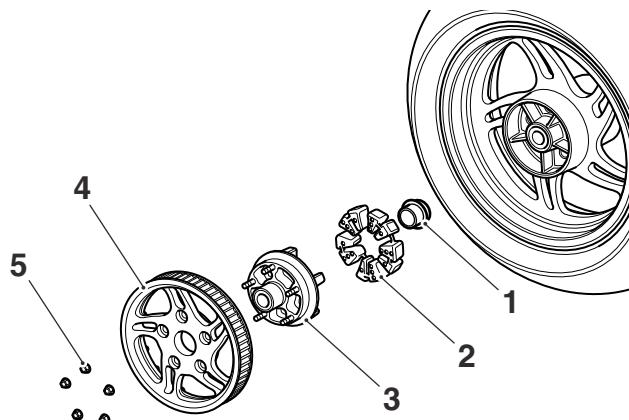
Warning

Reusing the original drive belt pulley studs and nuts may cause the drive belt pulley to become detached, resulting in rear wheel seizure, loss of motorcycle control and an accident

Caution

Always renew the drive belt pulley studs and nuts. The studs and nuts are torqued near to their yield point when first installed and are severely weakened if reused. Reusing the original studs and nuts may cause stud breakage resulting in damage to the motorcycle, loss of motorcycle control and an accident.

4. Remove the spacer and cush drive rubbers.



1. **Spacer**
 2. **Cush drive rubbers**
 3. **Drive flange**
 4. **Drive belt pulley**
 5. **Drive belt pulley nuts**
5. If the drive belt pulley is to be removed, remove and discard the nuts then remove the pulley from the flange.
 6. Remove the studs and discard.

Inspection

1. Check the cushion drive rubbers for deterioration, cracks etc.
2. Inspect the drive belt pulley teeth for wear, damage and chips.
3. Check the wheel and drive flange for wear, cracks and damage.
4. Check the rear belt pulley drive flange bearings spin smoothly with no signs of play. If not, renew the bearings.

Installation

1. If removed, refit the drive belt pulley to the drive flange. Fit new studs and tighten to **30 Nm**.
2. Fit new nuts and tighten to **73 Nm**.
3. Install the cushion drive rubbers to the wheel.
4. Check the drive flange bearing spacer is correctly installed in the drive flange bearing.
5. Refit the drive flange to the wheel.
6. Refit the rear wheel (see page 16-12).
7. Check the rear wheel alignment (see page 16-13).

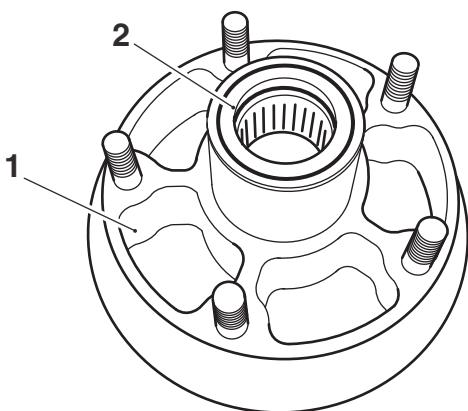
Final Drive

Drive Pulley Flange Bearings

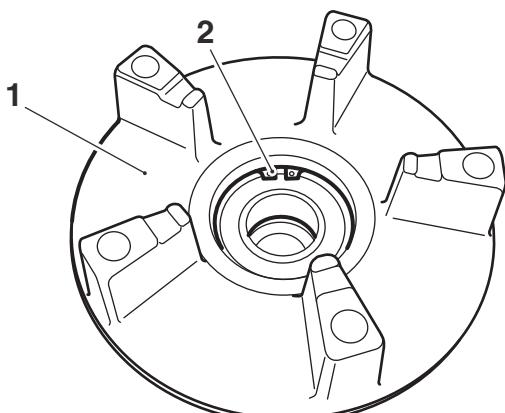
Always change the drive flange assembly at the intervals specified in the Scheduled Maintenance chart.

Disassembly

1. Remove the cush drive (see page 15-10).
2. Remove the drive pulley from the drive flange. Discard the studs and nuts.
3. Remove and discard the seal.



1. Drive flange
2. Seal
4. Working from the opposite side of the drive flange, remove and discard the bearing circlip.



1. Drive flange
2. Circlip



Warning

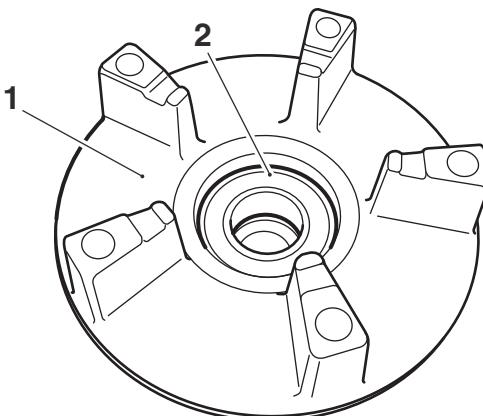
Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.



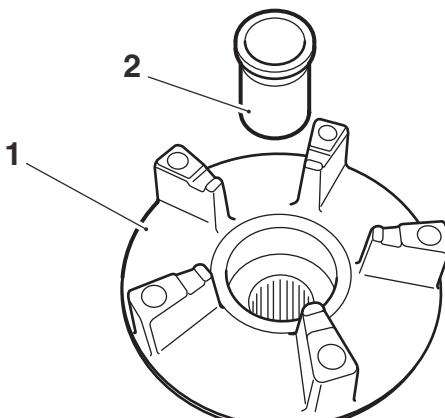
Caution

To prevent drive flange damage and to aid bearing removal, always apply force evenly on both sides of the bearing to prevent it from 'tipping' and becoming stuck. Application of uneven force will lead to difficulty in removing the bearing and to a damaged drive flange.

5. Working through the hole in the centre of the needle roller bearing, use a pin punch to drift out the ball bearing.



1. Drive flange
2. Ball bearing
6. Collect the inner bearing sleeve from the needle roller bearing.



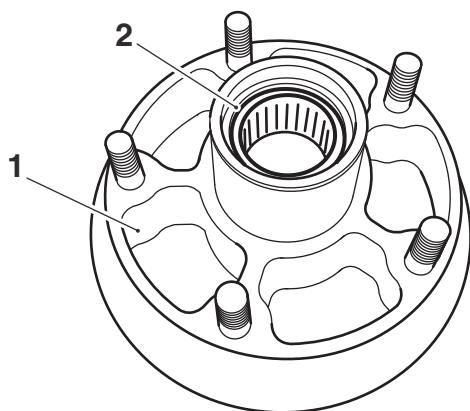
1. Drive flange
2. Inner bearing sleeve



Warning

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

- Working through the hole in the centre of the drive flange, use a pin punch to drift out the needle roller bearing.



- Drive flange**
- Needle roller bearing**

Inspection

- Inspect the bearings and bearing sleeve for wear or damage. Renew if necessary.

Assembly

- Position the needle roller bearing, marked side facing outwards, to the drive flange.

Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

- Using a suitable press, fully insert the needle roller bearing into the drive flange.
- Lubricate the bearing with grease to NLGI 2 specification.
- Install a new seal, marked side facing outwards, to the drive flange.
- Lubricate the seal's knife-edge with grease to NLGI 2 specification.
- Working from the opposite side of the drive flange, install the inner bearing sleeve to the needle roller bearing.
- Position the inner ball bearing, marked side facing outwards, to the drive flange.

Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

- Using a suitable press, fully insert the ball bearing into the drive flange.
- Fit a new circlip.
- Refit the drive pulley to the drive flange.
- Fit new studs and tighten to **30 Nm**.
- Fit new nuts and tighten to **73 Nm**.
- Refit the cush drive (see page 15-11).

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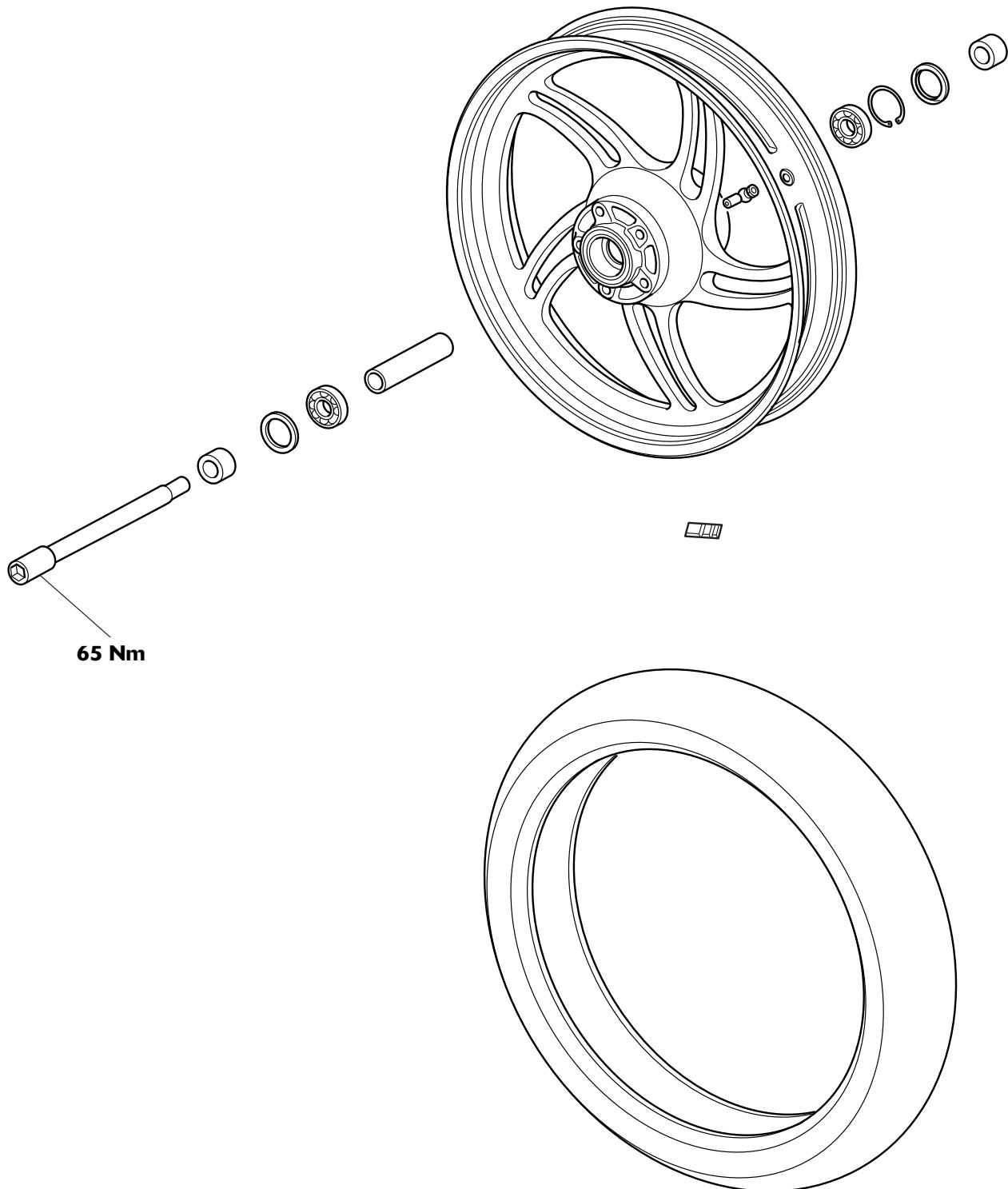
16 Wheels/Tyres

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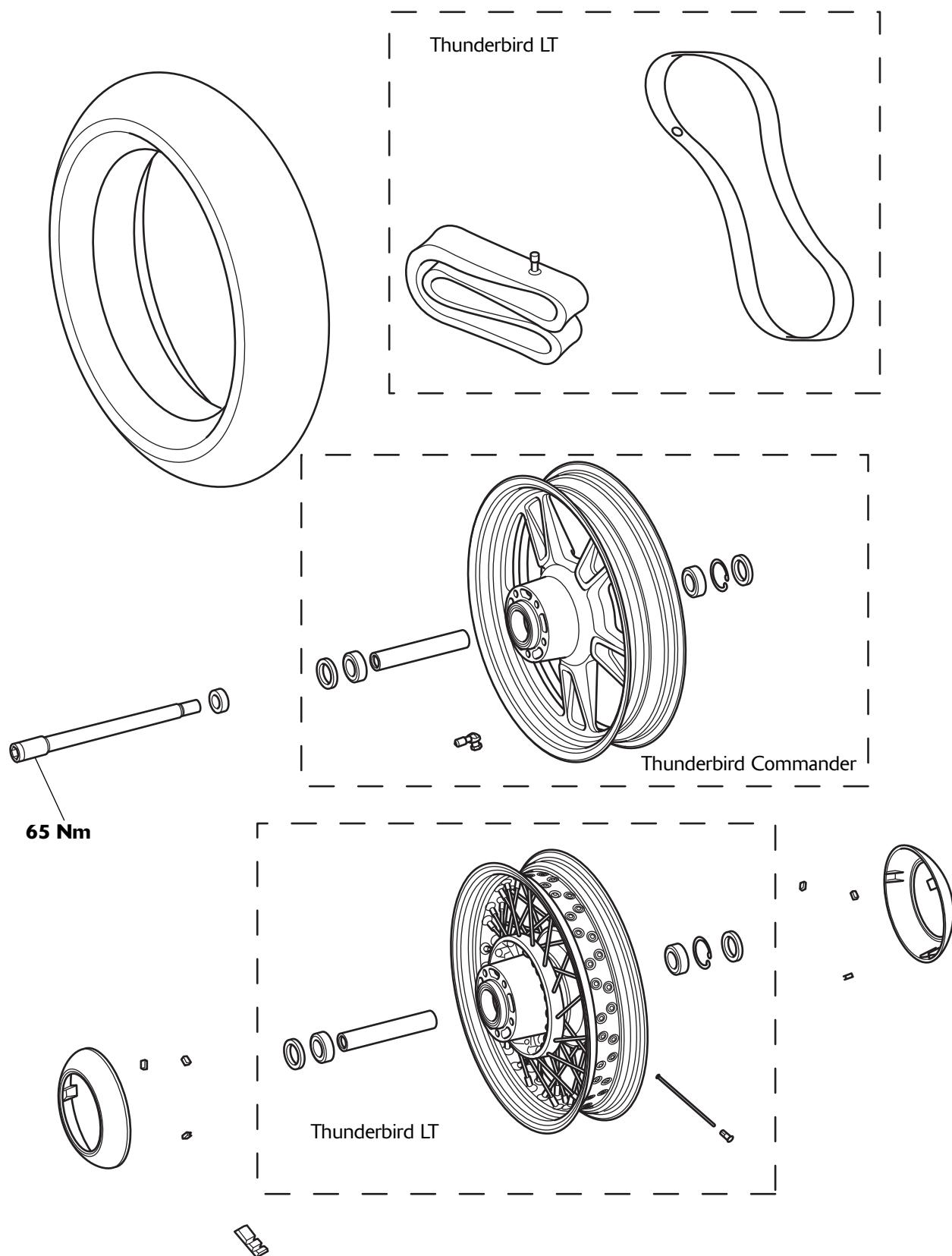
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Wheels/Tyres

Exploded View – Front Wheel – All Models Except Thunderbird Commander and Thunderbird LT

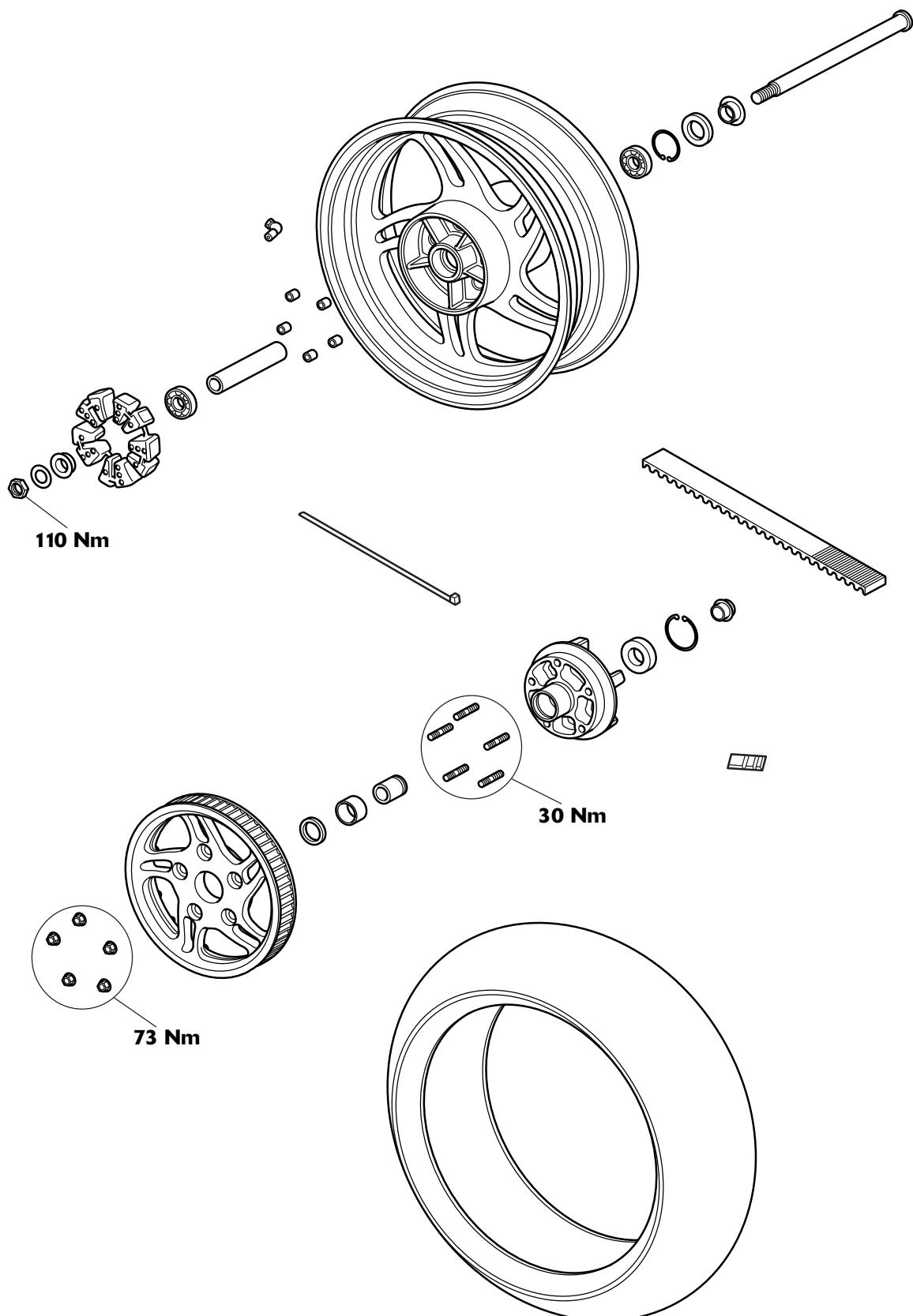


Exploded View – Front Wheel – Thunderbird Commander and Thunderbird LT

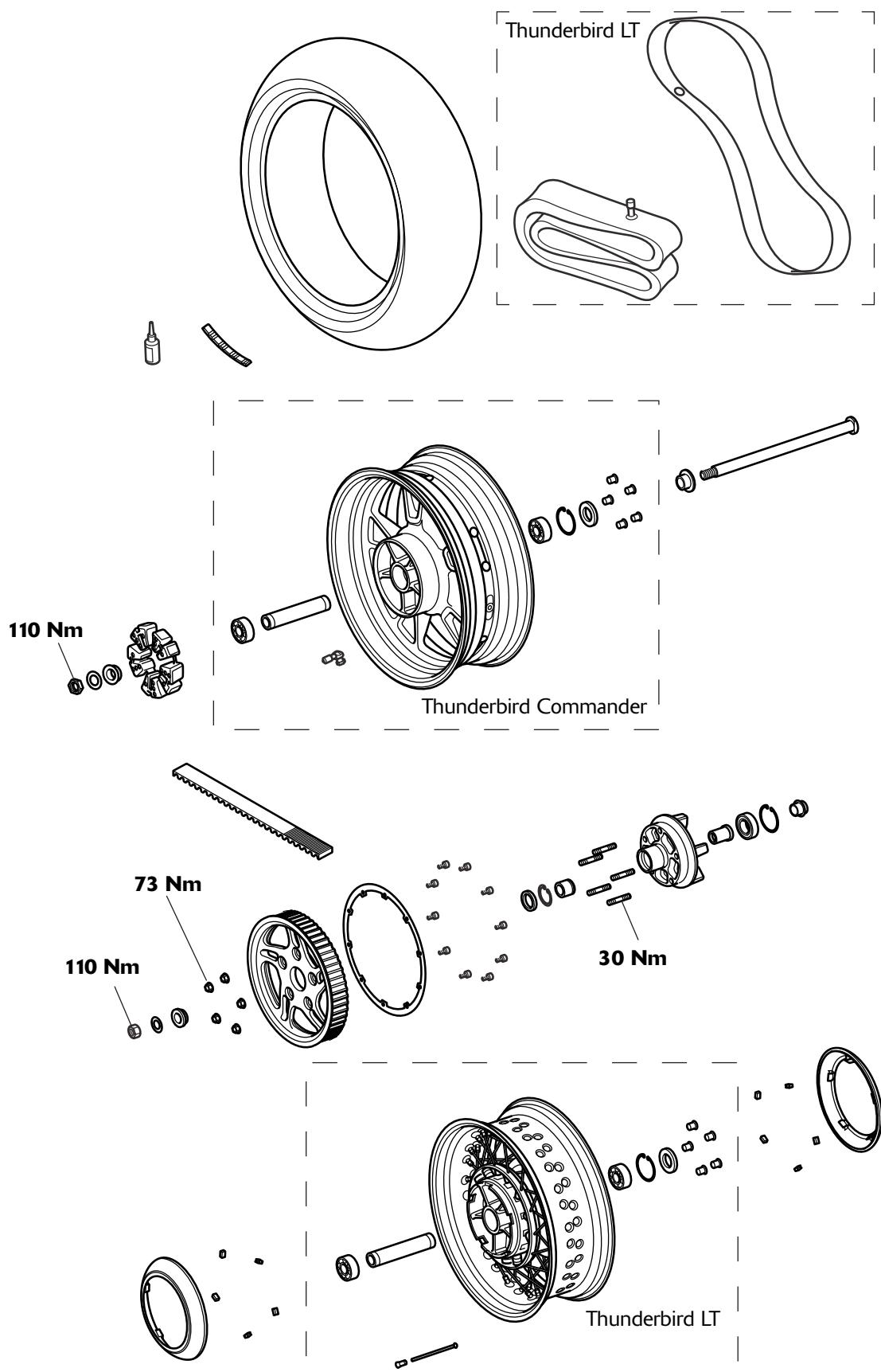


Wheels/Tyres

Exploded View – Rear Wheel and Cush Drive – All Models Except Thunderbird Commander and Thunderbird LT



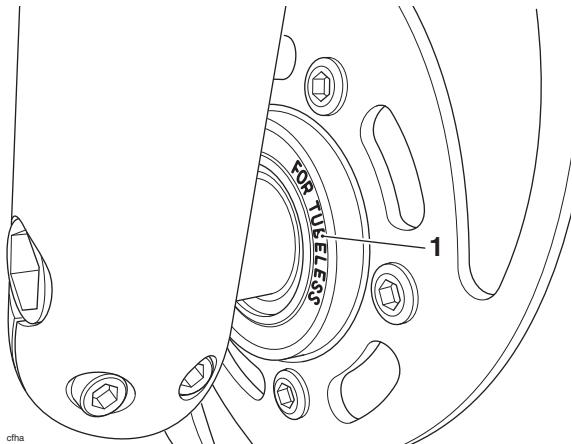
Exploded View – Rear Wheel and Cush Drive – Thunderbird Commander and Thunderbird LT



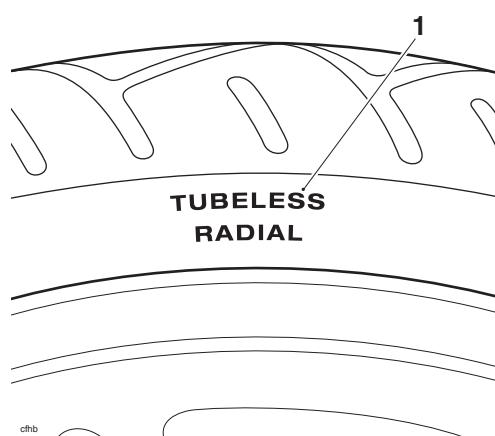
Wheels/Tyres

Tyres

All models except Thunderbird LT are equipped with tubeless tyres, valves, and wheel rims. Only tyres marked 'TUBELESS' and tubeless type tyre valves mounted on rims marked 'SUITABLE FOR TUBELESS TYRES' or 'FOR TUBELESS' can be used.



1. Wheel marking



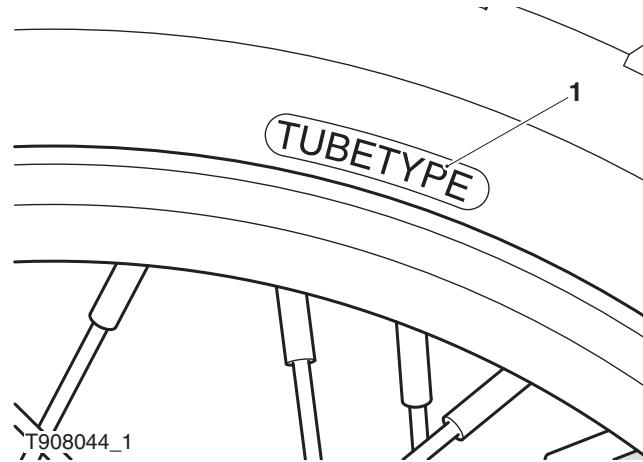
1. Tyre marking

Thunderbird LT is equipped with spoked wheels which require a tyre suitable for use with an inner tube.

The protection band fitted between the wheel rim and the inner tube must be secured to the rim with ThreeBond 1747. This will ensure that the protection band will remain in place when the inner tube and tyre are fitted.

! Warning

Failure to use an inner tube in a spoked wheel will cause deflation of the tyre resulting in loss of motorcycle control and an accident.



1. Tyre marking

! Warning

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing rapid tyre deflation that may result in a loss of vehicle control and an accident. Never install an inner tube inside a tubeless tyre. This will cause friction inside the tyre and the resulting heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.

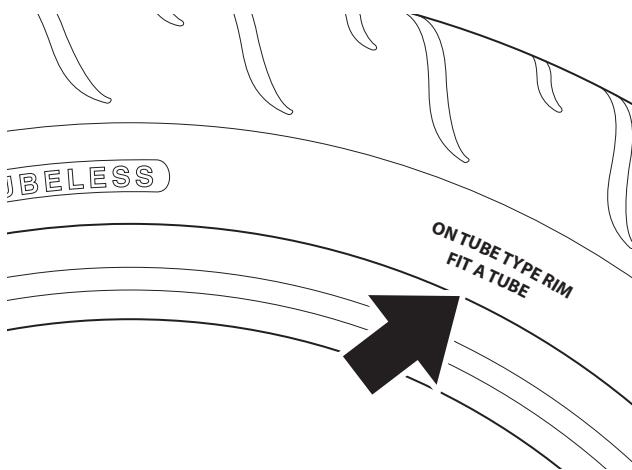


Warning

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE-TYPE'.

Some brands of approved tyres marked 'TUBELESS' may be suitable for use with an inner tube. Where this is the case, the tyre wall will be marked with text permitting the fitment of an inner tube (see the following illustration).

Use of an inner tube with a tyre marked 'TUBELESS' and NOT marked as suitable for use with an inner tube, or use of an inner tube on an alloy wheel marked 'SUITABLE FOR TUBELESS TYRES' will cause deflation of the tyre resulting in loss of motorcycle control and an accident.



Typical Tyre Marking - Tubeless Tyre Suitable For Use With An Inner Tube



Warning

Tyres and inner tubes that have been used on a rolling road dynamometer may become damaged. In some cases, the damage may not be visible on the external surface of the tyre.

Tyres and inner tubes must be replaced after such use as continued use of a damaged tyre may lead to instability, loss of motorcycle control and an accident.

Note:

- The option 2 tyres for Thunderbird LT listed in the Owner's Handbook may not have the text 'ON TUBE-TYPE RIM FIT A TUBE' printed on them. These tyres are suitable for use with an inner tube and can be fitted to Thunderbird LT with an inner tube.

Tyre Pressures

The correct tyre pressures are shown in the table below. The tyre pressures must always be checked and adjusted when the tyres are cold.

All Models Except Thunderbird LT

Loading condition	Front	Rear
Rider only	2.48 bar (36 lb/in ²)	2.62 bar (38 lb/in ²)
Rider, passenger and luggage	2.48 bar (36 lb/in ²)	2.62 bar (38 lb/in ²)

Thunderbird LT

Loading condition	Front	Rear
Rider only	2.48 bar (36 lbs/in ²)	2.9 bar (42 lbs/in ²)
Rider, passenger and luggage	2.48 bar (36 lbs/in ²)	2.9 bar (42 lbs/in ²)



Warning

Correct tyre inflation pressures will provide maximum stability, rider comfort and tyre life. Tyre pressures must be checked according to the Scheduled Maintenance chart, when the tyres are cold, and adjusted as necessary.

Incorrect tyre inflation pressures will cause abnormal tread wear and instability problems that may lead to loss of motorcycle control and an accident. Underinflation may result in the tyre slipping on, or coming off the rim. Overinflation will cause instability and accelerated tread wear. Both conditions are dangerous as they may cause loss of motorcycle control and an accident.

Wheels/Tyres

Tyre Wear/Wheel Inspection

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

All tyres are fitted with tread wear indicators. When the tyre becomes worn down as far as the top of a tread wear indicator, the tyre is worn beyond its service life and must be replaced. Attention must also be paid to the legal limits for tread wear, which differ from country to country. Tyres that have worn to the legal limit in the country or region in which the motorcycle is operated must be replaced, even if tread wear has not yet reached the level of the tread wear indicators.

In accordance with the Scheduled Maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth.

Inspect wheels for cracks, splits and kerb damage. Always replace wheels that are suspected of having become damaged.



Warning

Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of motorcycle control or an accident.

When tubeless tyres become punctured, leakage is often very slow.

Check the tyres for cuts, embedded nails or other sharp objects. Replace any that are damaged or worn.

Check the wheel rims for cracks, splits, kerb damage, dents and deformation and replace any that show signs of being defective.

Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Always consult your Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

Minimum Recommended Tread Depth

In accordance with the periodic maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum legally allowable tread depth specified below:

Speed	Minimum Tread Depth
Under 130 km/h (80 mph)	2 mm (0.08 in)
Over 130 km/h (80 mph)	Rear 3 mm (0.12 in) Front 2 mm (0.08 in)



Warning

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.



Warning

Only operate this Triumph motorcycle at high speed in closed-course, on-road competition or on closed-course racetracks. High-speed operation should only then be attempted by riders who have been instructed in the techniques necessary for high speed riding and are familiar with the motorcycle's characteristics in all conditions. High-speed operation in any other circumstances is dangerous and may lead to loss of motorcycle control and an accident.

Important Tyre Information

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. Always refer to the Owner's Handbook Data section for details of approved tyres and tyre combinations.



Warning

The ABS computer operates by comparing the relative speed of the front and rear wheels. Use of non-recommended tyres can affect wheel speed and cause the ABS function not to operate, potentially leading to loss of motorcycle control and an accident in conditions where the ABS would normally function.



Warning

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE-TYPE'.

Use of an inner tube with a tyre marked 'TUBELESS' and/or on an alloy wheel can lead to loss of motorcycle control and an accident.

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. Always refer to the Owner's Handbook data section for details of approved tyres and tyre combinations or ask your authorised Triumph dealer.



Warning

If a tyre or inner tube sustains a puncture, the tyre and inner tube must be replaced together. Failure to replace a punctured tyre and inner tube together, or operation with a repaired tyre or inner tube can lead to instability, loss of motorcycle control or an accident.

If tyre or inner tube damage is suspected, such as after striking the kerb, ask your authorised Triumph dealer to inspect the tyre both internally and externally and to also inspect the inner tube. Remember, tyre damage may not always be visible from the outside. Operation of the motorcycle with damaged tyres could lead to loss of motorcycle control and an accident.

When replacing a tyre on a spoked wheel, always inspect the rim tape (rim protection band) to ensure that it is correctly protecting the tube from the spoke threads. A damaged rim tape may lead to rapid tyre deflation causing loss of control and an accident.



Warning

Never use an inner tube to repair a punctured tubeless tyre. The rough surface inside the tyre can chafe the tube leading to instability, rapid deflation, loss of motorcycle control and an accident.



Warning

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing tyre deflation that may result in a loss of motorcycle control and an accident.



Warning

The use of tyres other than those listed in the Specification section of the Owner's Handbook may adversely affect handling leading to loss of motorcycle control or an accident. Use the recommended tyre options only in the combinations given in the Owner's Handbook. Do not mix tyres from different manufacturers or tyres from the same manufacturer but from another option.



Warning

Accurate wheel balance is important for safe, stable handling of the motorcycle. Do not remove or change any wheel balance weights. Incorrect wheel balance may cause instability leading to loss of motorcycle control and an accident.

When wheel balancing is required, such as after tyre replacement, see your authorised Triumph dealer.

Only use self-adhesive weights. Clip-on weights will damage the wheel and tyre potentially resulting in tyre deflation, loss of motorcycle control and an accident.



Caution

The dynamic balancing method must be used when balancing the front wheel on the Thunderbird LT.

Static balancing the front wheel on Thunderbird LT will NOT adequately balance the wheel.



Warning

When replacement tyres are required, consult your authorised Triumph dealer who will arrange for the tyres to be fitted according to the tyre manufacturer's instructions.

When tyres are replaced, allow time for the tyre to seat itself to the rim (approximately 24 hours). During this seating period, ride cautiously as an incorrectly seated tyre could cause loss of motorcycle control or an accident. Initially, the new tyre will not produce the same handling characteristics as the worn tyre and the rider must allow adequate riding distance (approximately 100 miles/160 km) to become accustomed to the new handling characteristics.

After both 24 hours and 100 miles (160 km), the tyre pressures should be checked and adjusted and the tyre examined for correct seating and rectified as necessary.

Use of a motorcycle when not accustomed to its handling characteristics, with incorrect tyre pressures or an incorrectly seated tyre is dangerous and may lead to loss of motorcycle control and an accident.

Front Wheel

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the front of the motorcycle.
2. Detach and support both brake calipers.

Note:

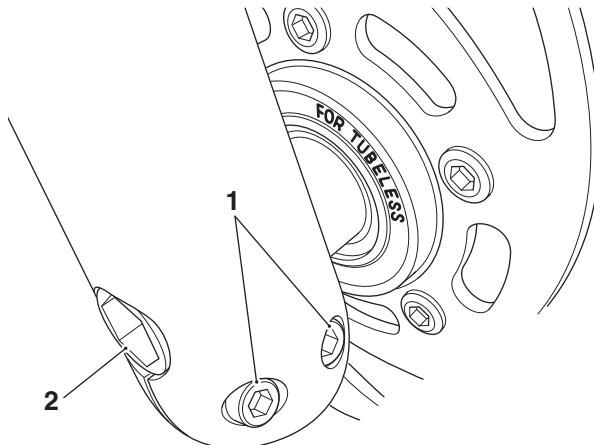
- It is not necessary to disconnect the brake hoses.



Warning

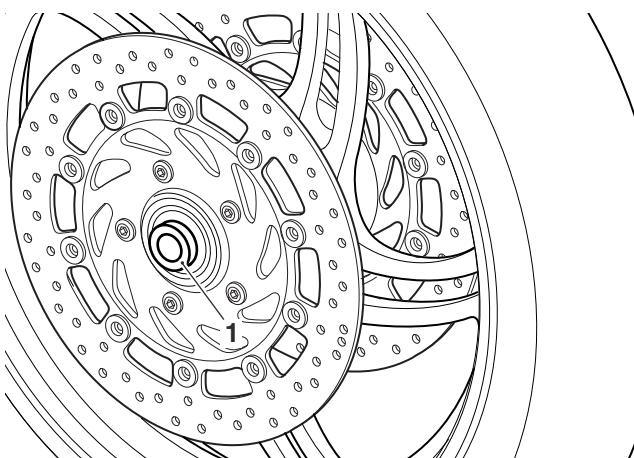
Do not allow the calipers to hang on the brake hoses as this may damage the hoses. Damaged hoses could cause brake failure leading to loss of control and an accident.

3. Slacken both pinch bolts at the lower end of the right hand fork.
4. Working from the right hand side, release and remove the wheel spindle which is threaded into the left hand fork.



1. Pinch bolts
2. Wheel spindle

- Remove the wheel, recovering the spacers from both sides.



1. Spacer (right hand shown)

- Place the wheel on wooden blocks to prevent damage to the brake discs.



Warning

Do not allow the wheel to rest on either brake disc as this may damage the disc leading to loss of motorcycle control and an accident.



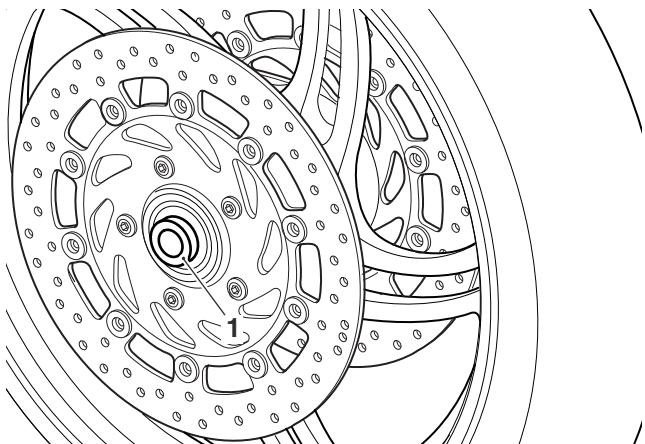
Caution

To prevent wheel and wheel bearing damage, ensure dirt and debris are not allowed to enter the wheel bearings.

- Thoroughly clean all components and inspect for wear or damage.

Installation

- Lightly smear the spacers with grease and locate into the left hand and right hand sides of the hub.



1. Spacer (right hand shown)

- Position the wheel between the forks.
- Raise the wheel until it is in alignment with the spindle holes in both forks. Take care to not dislodge the spacers.
- Refit the wheel spindle from the right hand side and tighten to **65 Nm**.
- Thoroughly clean and degrease the brake discs.
- Fit the brake calipers, tightening the mounting bolts to **50 Nm**.
- Check that the brake disc is centrally located to the caliper on the right hand side. If not, apply gentle pressure to the fork to ensure the disc is centred with the caliper.
- Maintaining the above position, tighten the fork pinch bolts to **27 Nm**.
- Check the operation of the front brake. Rectify as necessary.



Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Wheels/Tyres

Rear Wheel

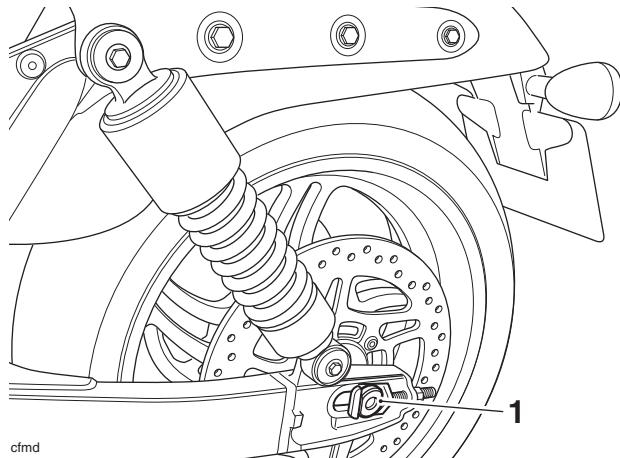
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Support the motorcycle so the rear wheel is raised clear of the ground.
2. If fitted, remove the panniers (see page 17-27 for all models except Thunderbird Commander and Thunderbird LT, see page 17-26 for Thunderbird Commander and Thunderbird LT).
3. Remove both silencers (see page 10-185).
4. Slacken the rear wheel spindle nut.
5. Slacken both drive belt adjusters.
6. Remove the spindle nut and washer then support the wheel and withdraw the spindle.



1. Spindle

7. Lower the wheel to the ground, and noting its position, release the brake caliper and carrier from the slot on the swinging arm.



Warning

Do not allow the caliper to hang on the brake hose as this may damage the hose.

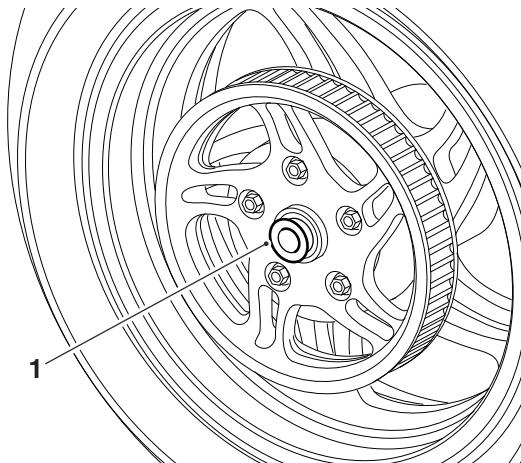
Damaged hoses could cause brake failure leading to loss of control and an accident.

8. Roll the wheel forward until the drive belt can be detached from the rear pulley.
9. Disengage the drive belt from the rear pulley and tie aside.
10. Manoeuvre the wheel out of position and recover the spacers from the hub and drive flange.



Caution

Do not allow the wheel to rest on the brake disc as this could damage the disc. To prevent bearing damage, ensure no dirt enters the wheel bearings whilst the wheel is removed.



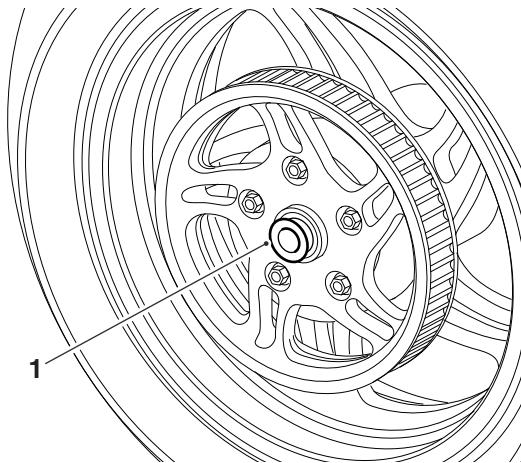
1. Spacer (right hand shown)

Inspection

1. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings.

Installation

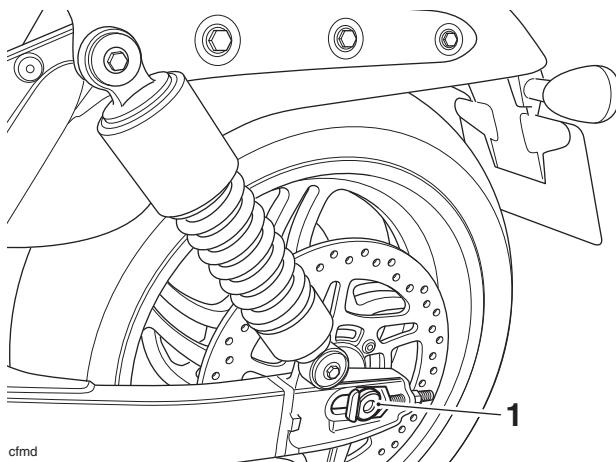
1. Lubricate the lips of the wheel bearing seals with a smear of multipurpose grease.
2. Fit the spacer to the hub and drive flange.



1. Spacer (right hand shown)

3. Position the wheel in between the swinging arm and engage the drive belt with the pulley.
4. Fit the brake caliper mounting plate, locating its slot on the swinging arm lug.

- Lift the wheel into position, ensuring the spacers and caliper mounting plate remain correctly positioned, and insert the spindle from the left hand side.



1. Spindle

- Fit the washer and a new nut to the spindle and hand tighten.
- Lower the motorcycle to the ground and adjust the drive belt tension (see final drive section), then tighten the spindle nut to **110 Nm**.
- Operate the brake pedal a few times to ensure the brake pads are in firm contact with the disc.
- Install the silencers (see page 10-187).
- If removed, refit the panniers (see page 17-28 for all models except Thunderbird Commander and Thunderbird LT, see page 17-27 for Thunderbird Commander and Thunderbird LT).
- Check the operation of the rear brake. Rectify as necessary.

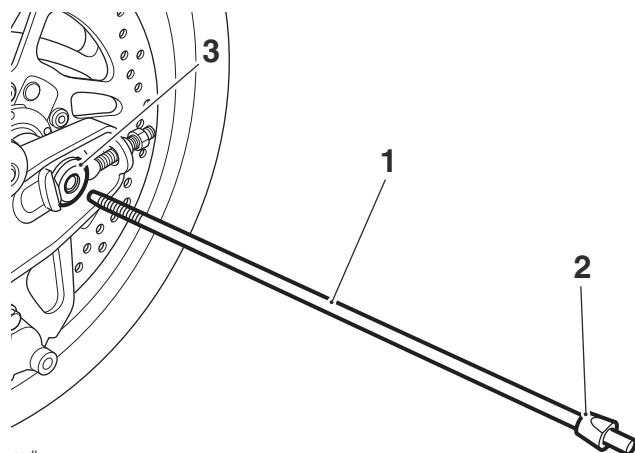


Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Wheel alignment

- If fitted, remove the panniers (see page 17-27 for all models except Thunderbird Commander and Thunderbird LT, see page 17-26 for Thunderbird Commander and Thunderbird LT).
- Remove both silencers (see page 10-185).
- Adjust the final drive belt tension (see final drive section).
- Remove the measuring block from the threaded end of the tool T3880148.
- Insert the threaded end through the rear wheel axle from the left hand side. Locate the taper on the rod into the axle.



1. Tool T3880148

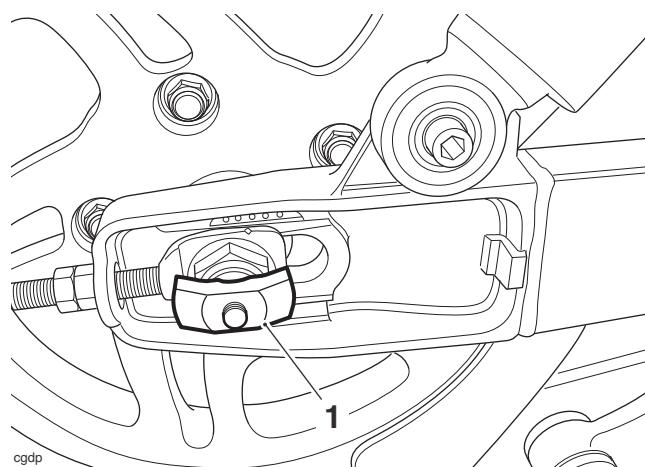
2. Taper

3. Rear wheel axle

- Refit the measuring block on to the threaded rod, ensuring the block faces the swinging arm as shown below:

Note:

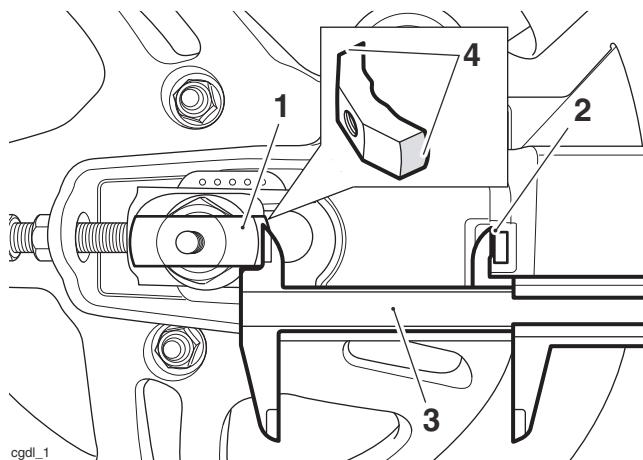
- If fitted correctly, the tool will self-centre on the axle, and the measuring surface of the block will align with the machined block on the swinging arm.**



1. Measuring block (shown in correct orientation)

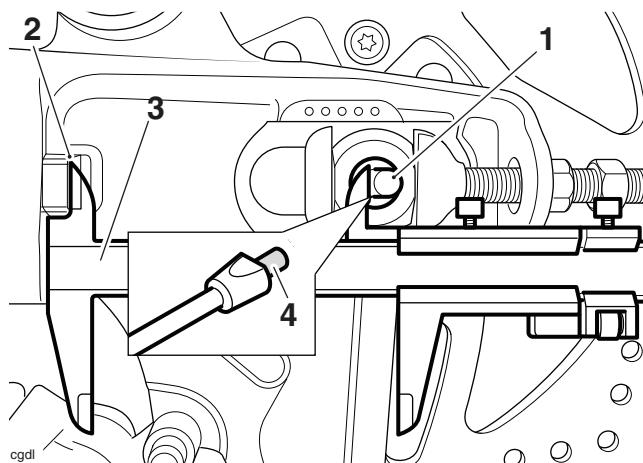
Wheels/Tyres

7. Rotate the block so it aligns with the axle slot in the swinging arm.
8. Hand tighten the tool sufficiently to prevent it from rotating during measurement. Do not overtighten.
9. On the right hand side of the motorcycle, measure between the machined face of the swinging arm and the measuring surface of the tool using a vernier caliper, as shown below. Note the reading.



1. Tool T3880148 measuring pin
2. Swinging arm measuring surface
3. Vernier caliper
4. Tool measurement surface

10. Repeat the measurement on the left hand side of the motorcycle, measuring between the machined face of the swinging arm and the measuring pin of the tool, as shown below. Note the reading.



1. Tool T3880148 measuring pin
2. Swinging arm measuring surface
3. Vernier caliper
4. Tool measurement surface

11. The two measurements must be equal ± 0.30 mm. If the measurements are not equal, loosen the rear wheel spindle and carefully adjust the wheel position using the final drive belt adjusters. Repeat the adjustment until the measurements are within the limits specified.
12. Check that the final drive belt adjustment is still correct. Readjust as necessary until the final drive belt tension **and** wheel alignment are both correct.
13. Tighten the rear wheel spindle to **110 Nm**.
14. Tighten both adjuster lock nuts to **25 Nm**.
15. Remove the service tool.
16. Refit both silencers (see page 10-187).
17. If removed, refit the panniers (see page 17-28 for all models except Thunderbird Commander and Thunderbird LT, see page 17-27 for Thunderbird Commander and Thunderbird LT).



Warning

Operation of the motorcycle with insecure adjuster lock nuts or a loose wheel spindle may result in impaired stability and handling of the motorcycle. This impaired stability and handling may lead to loss of control or an accident.

Front and Rear Wheel Bearings

Removal

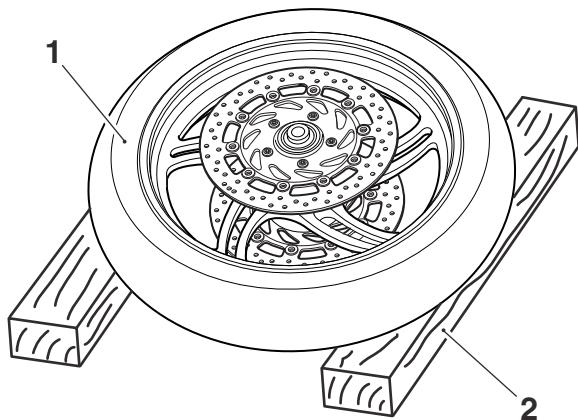
1. Remove the wheel (see page 16-10 for the front wheel, on page 16-12 for the rear wheel).



Warning

To avoid wheel damage, always support the wheel as instructed below. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

2. Support the wheel on blocks as illustrated.



1. **Wheel (front shown)**

2. **Support block**

3. Remove and discard the seal (two on the front wheel, one on the rear) and the bearing circlip.



Warning

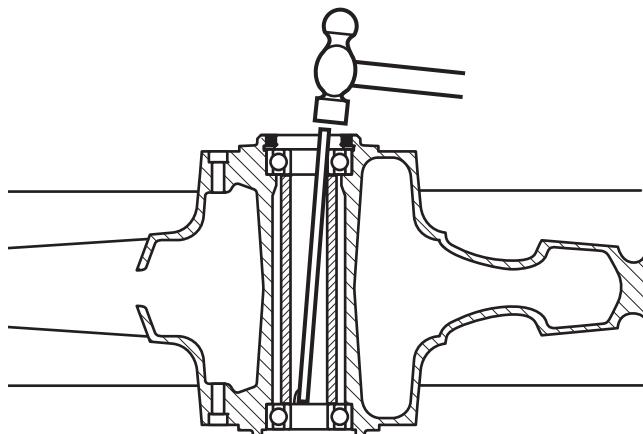
Always wear eye, hand and face protection when using a drift as use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and hand injuries if suitable protective apparel is not worn.



Caution

To prevent wheel damage and to aid bearing removal, always apply force evenly on both sides of the bearing to prevent it from 'tipping' and becoming stuck. Application of uneven force will lead to difficulty in removing the bearing and to a damaged wheel.

4. Using a suitable pin punch through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Wheel Bearing Removal

Inspection



Warning

Only remove raised witness marks from within the wheel. Removal of material below any raised areas will reduce the level of interference between the wheel and the bearings. Loss of interference could cause the bearing to become loose in the wheel leading to loss of motorcycle control and an accident.

1. Examine the wheel for any raised witness marks caused by the removal process. Remove any such marks with fine emery paper or a gentle file.

Installation

Note:

- Refer to the chart below for the correct tool and tool face when inserting bearings. Bearings are inserted by means of a draw bolt acting on the insertion tool. A support tool is located on the opposite side of the wheel to the insertion tool and as the bolt is tightened, the bearing is drawn into the wheel.
- Insert bearings with the marked or shielded side facing outwards and always fit a new bearing circlip and seals.

Wheels/Tyres

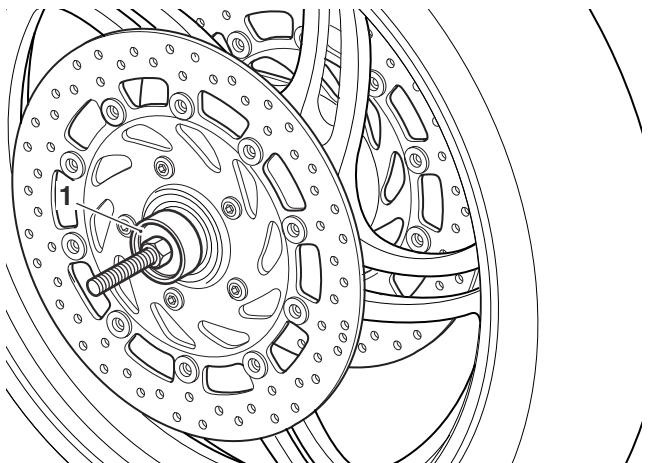
Front Wheel Bearing Tool Selection Chart

	Bearing insertion tool	Support tool
Left bearing	3880070-T0310 Small face to bearing	3880075-T0310 Large face to wheel
Right bearing	3880070-T0310 Small face to bearing	3880075-T0310 Large face to wheel

Rear Wheel Bearing Tool Selection Chart

	Bearing insertion tool	Support tool
Left bearing	T3880053 Large face to bearing	3880075-T0310 Small face to wheel
Right bearing	T3880053 Large face to bearing	3880075-T0310 Small face to wheel

1. Fit the wheel bearings and centre sleeve using the method described above.



1. **Tool 3880070 in position on wheel**
2. Fit a new circlip.
3. Lubricate and fit new seal(s) to the wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
4. Fit the wheel (see page 16-11 for the front wheel, on page 16-12 for the rear wheel).

17 Frame and Bodywork

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Frame and Bodywork

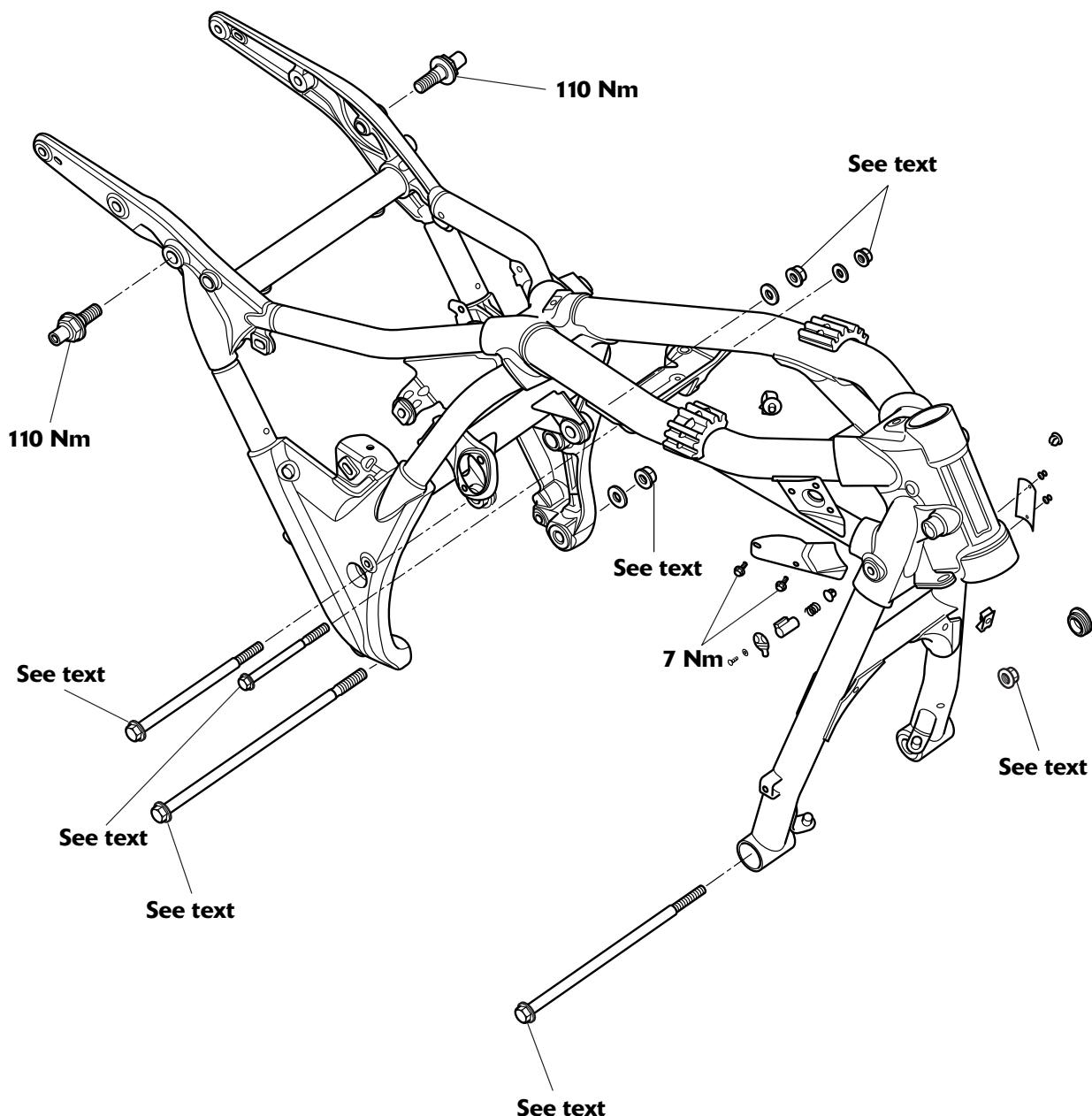
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Frame and Bodywork

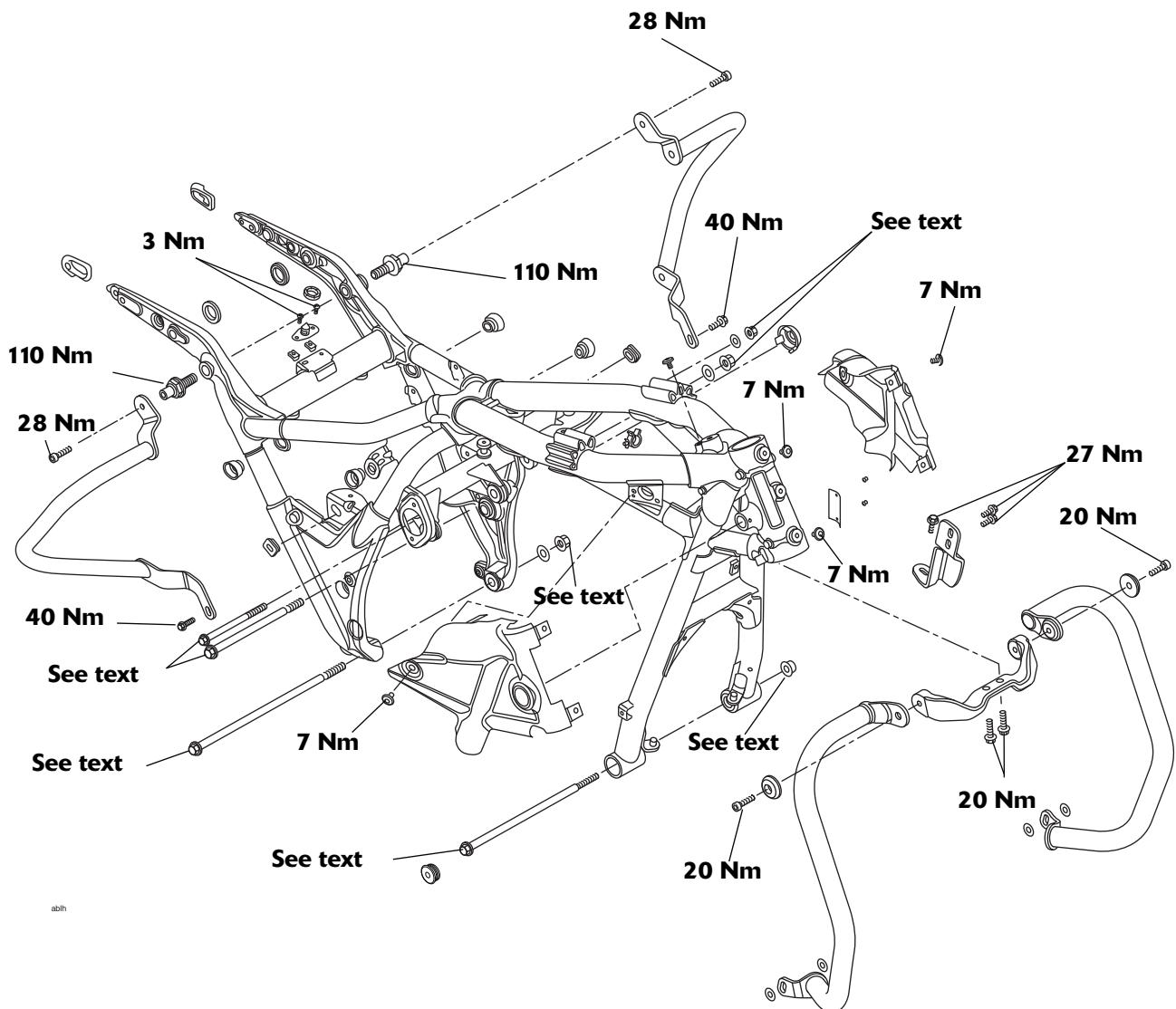
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Frame and Bodywork

Exploded View – Frame and Fixings – All Models Except Thunderbird Commander and Thunderbird LT

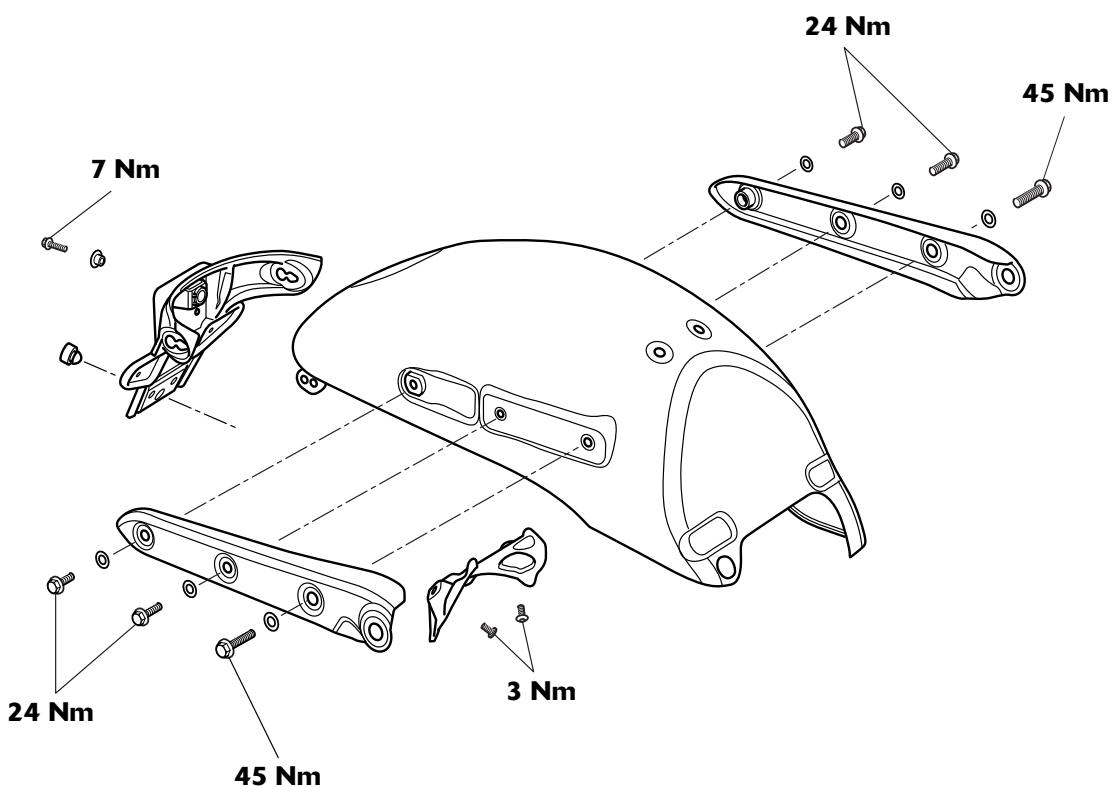
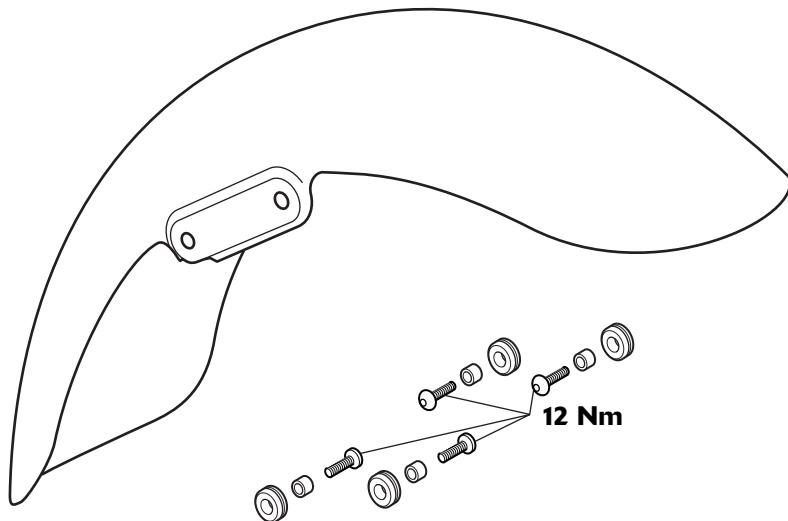


Exploded View – Frame and Fixings – Thunderbird Commander and Thunderbird LT

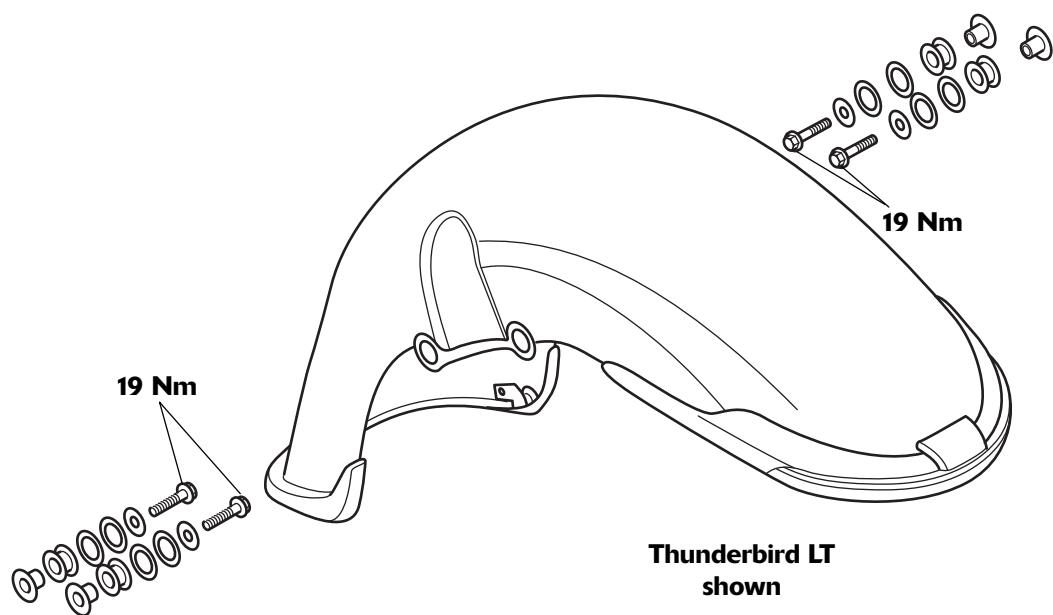
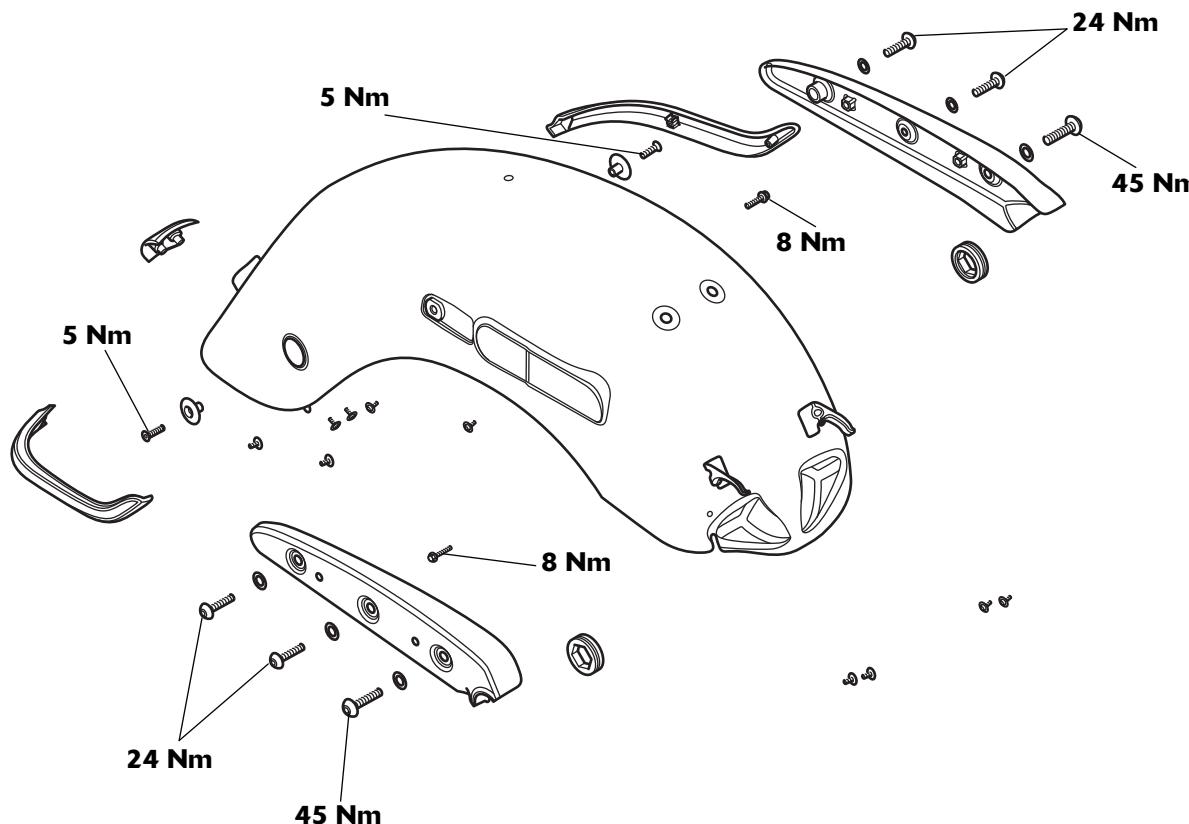


Frame and Bodywork

Exploded View – Front and Rear Mudguards – All Models Except Thunderbird Commander and Thunderbird LT



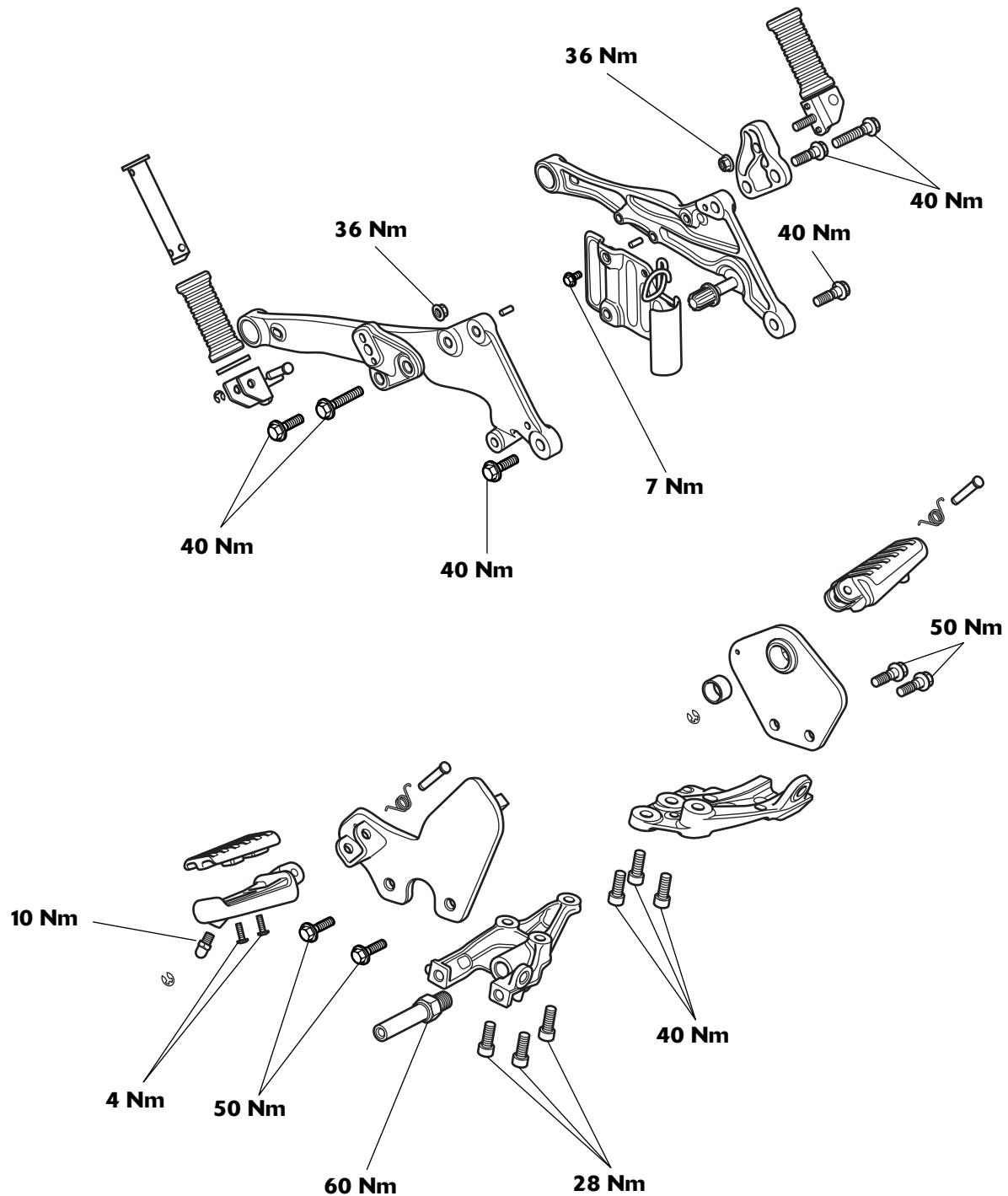
Exploded View – Front and Rear Mudguards – Thunderbird Commander and Thunderbird LT



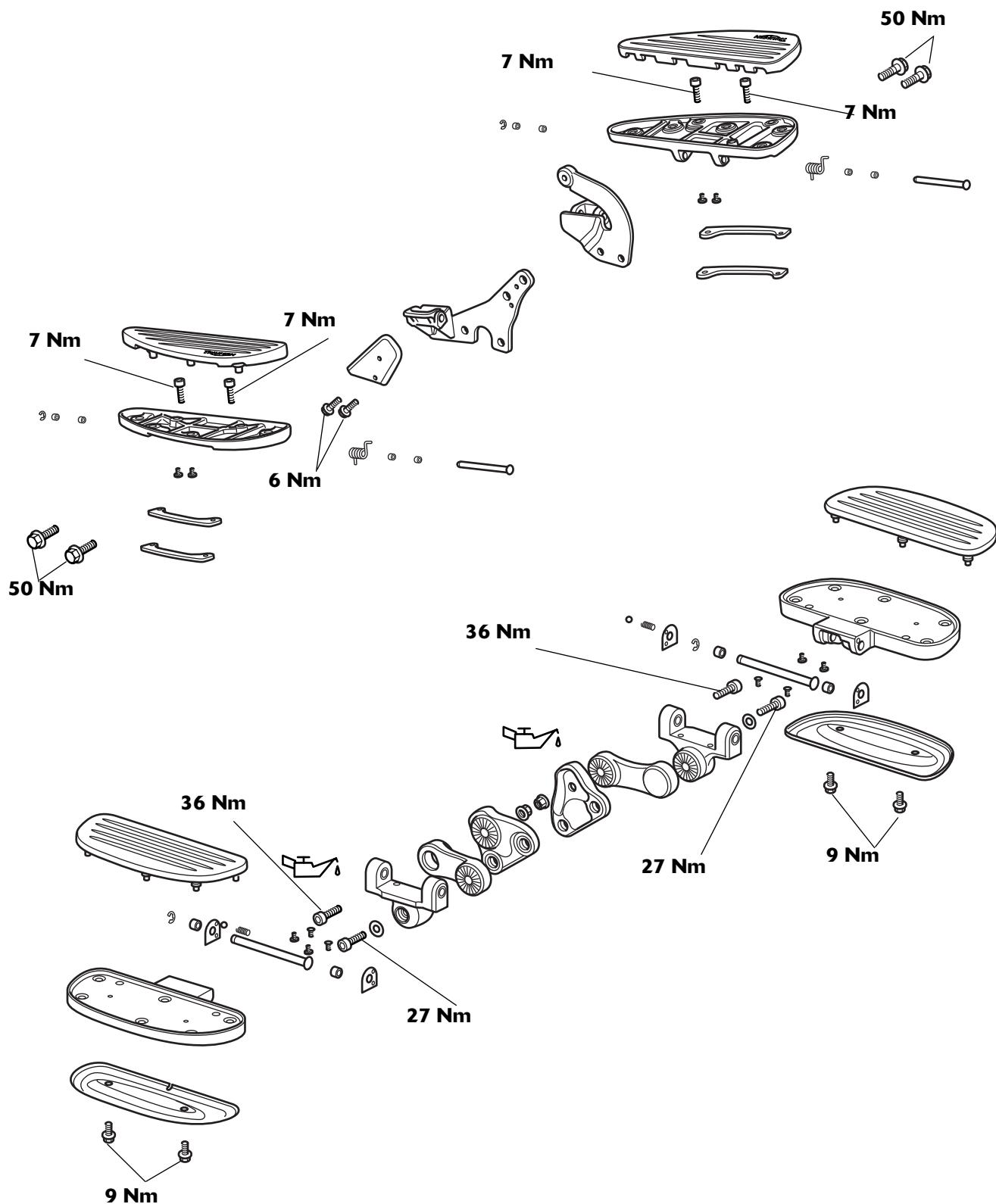
ablj

Frame and Bodywork

Exploded View – Front and Rear Footrests – Thunderbird and Thunderbird Storm

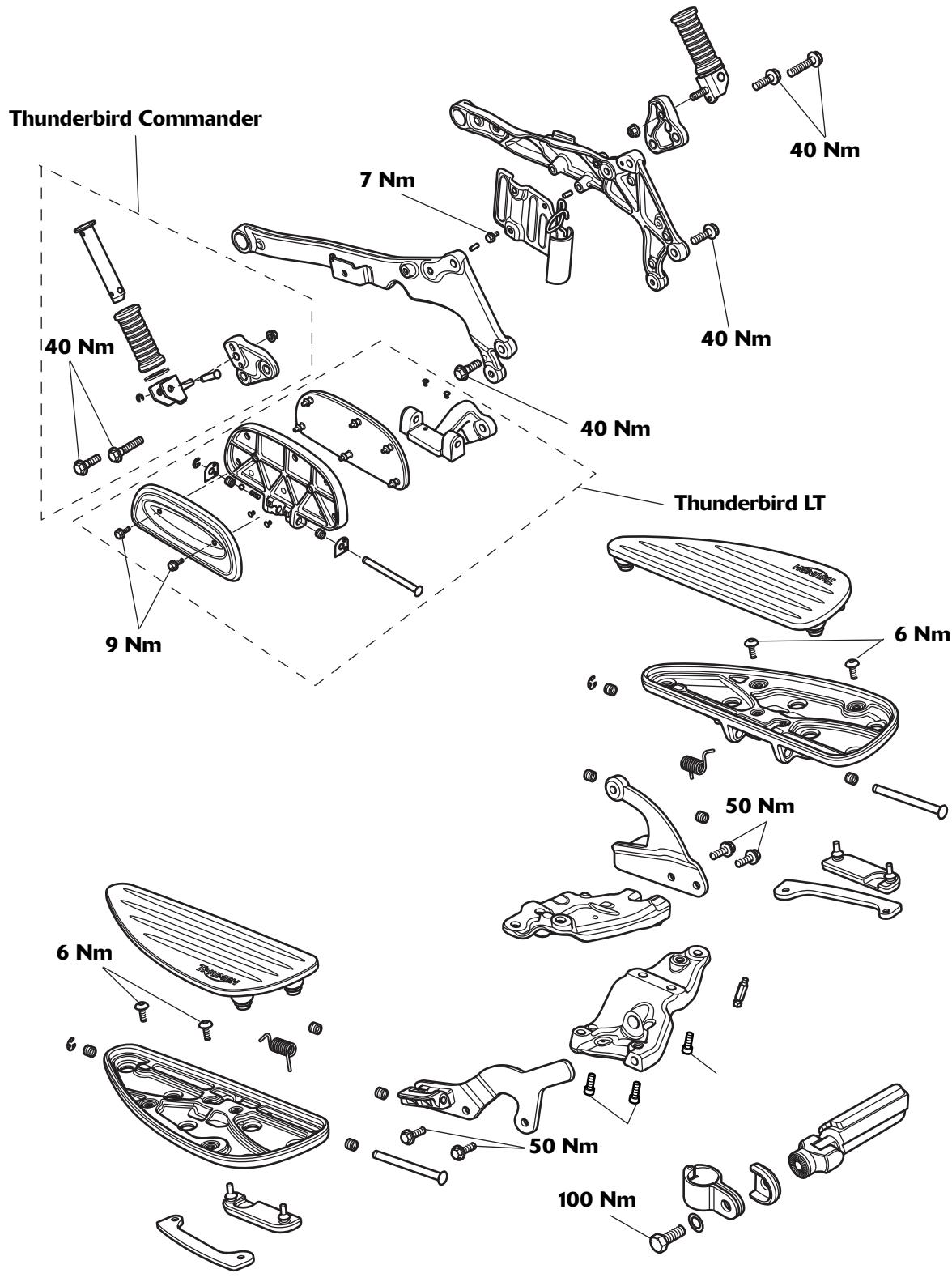


Exploded View – Front and Rear Footboards – Thunderbird SE

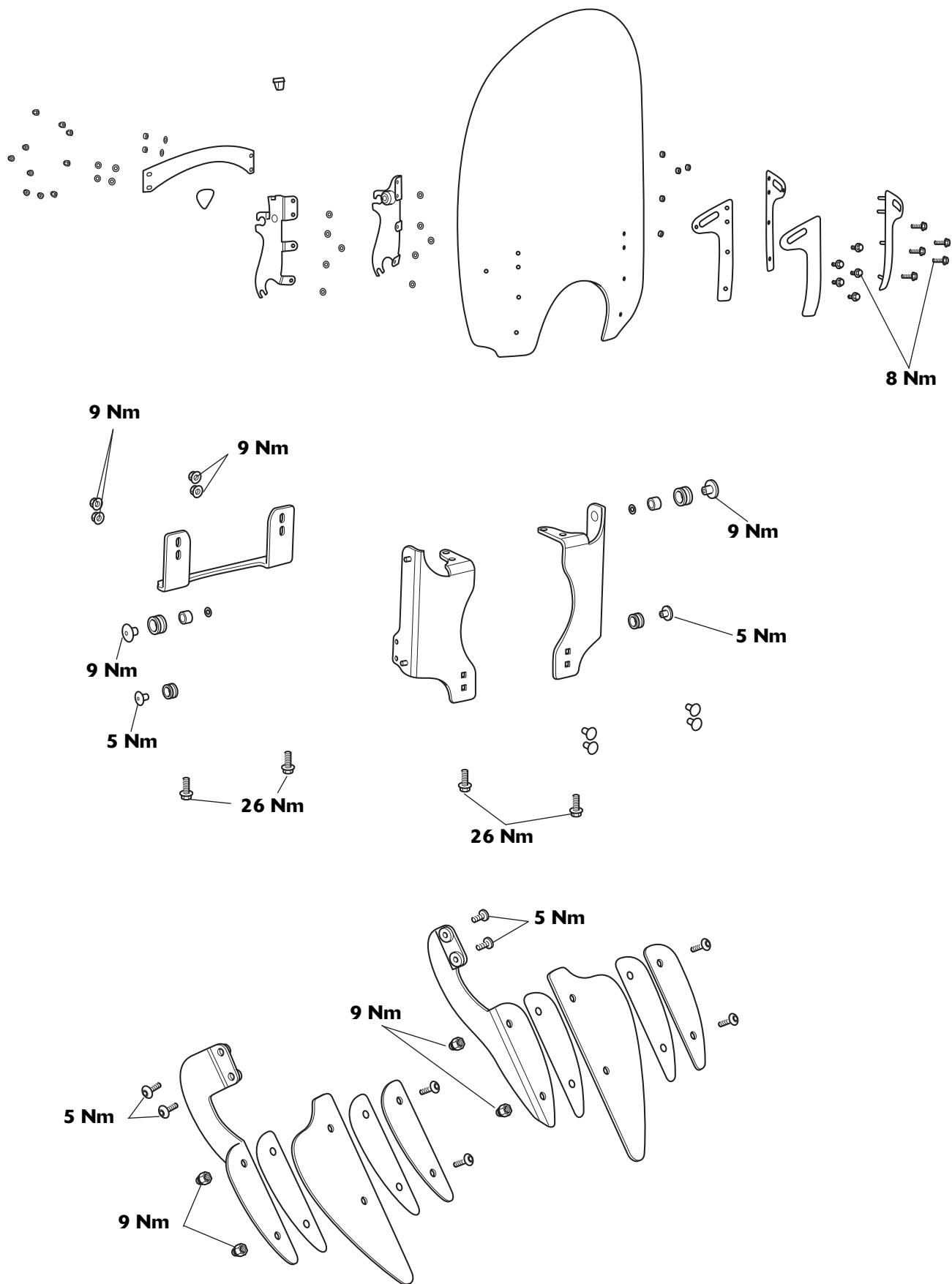


Frame and Bodywork

Exploded View – Front and Rear Footboards – Thunderbird Commander and Thunderbird LT

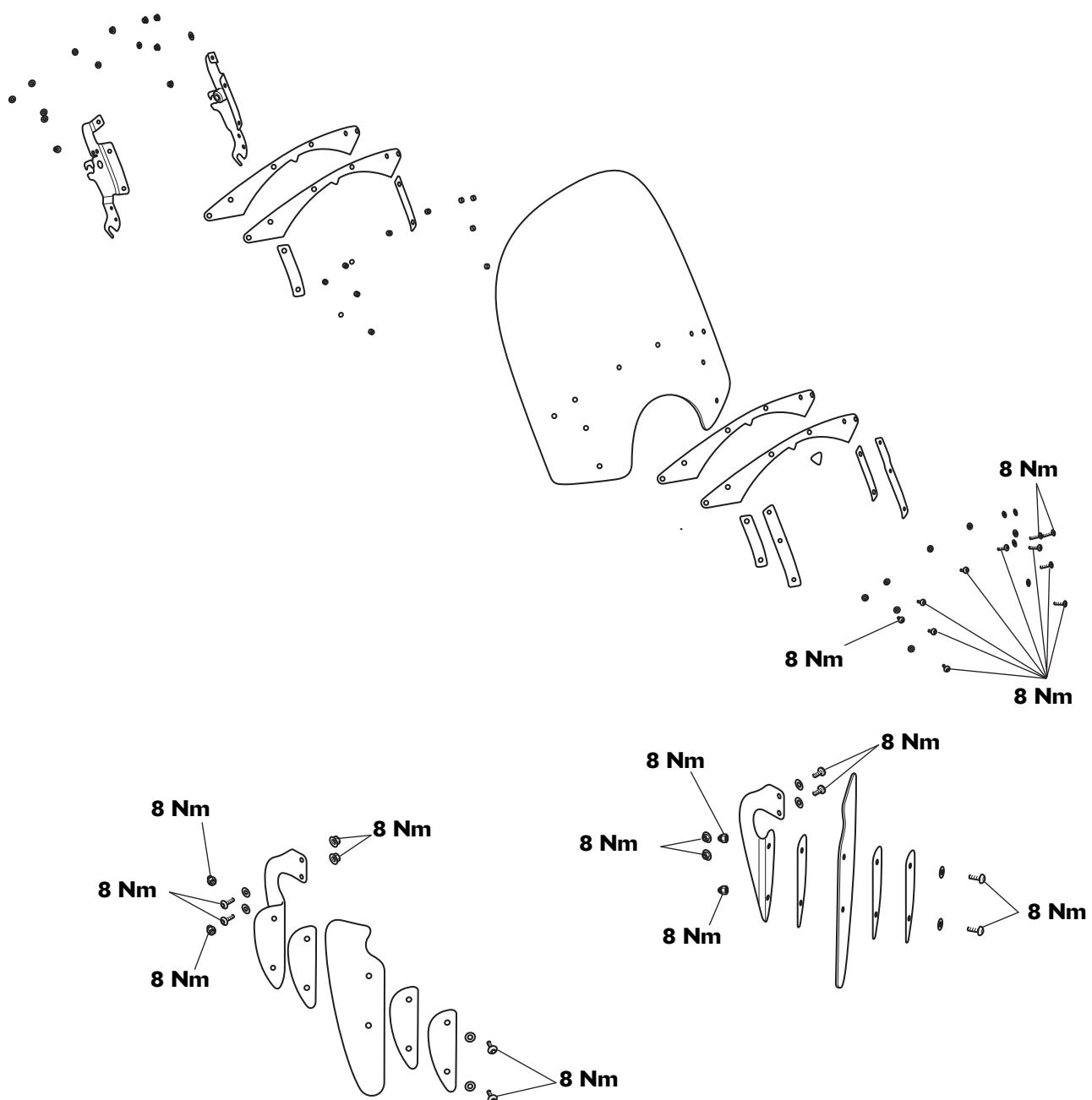


Exploded View – Windscreen – Thunderbird SE



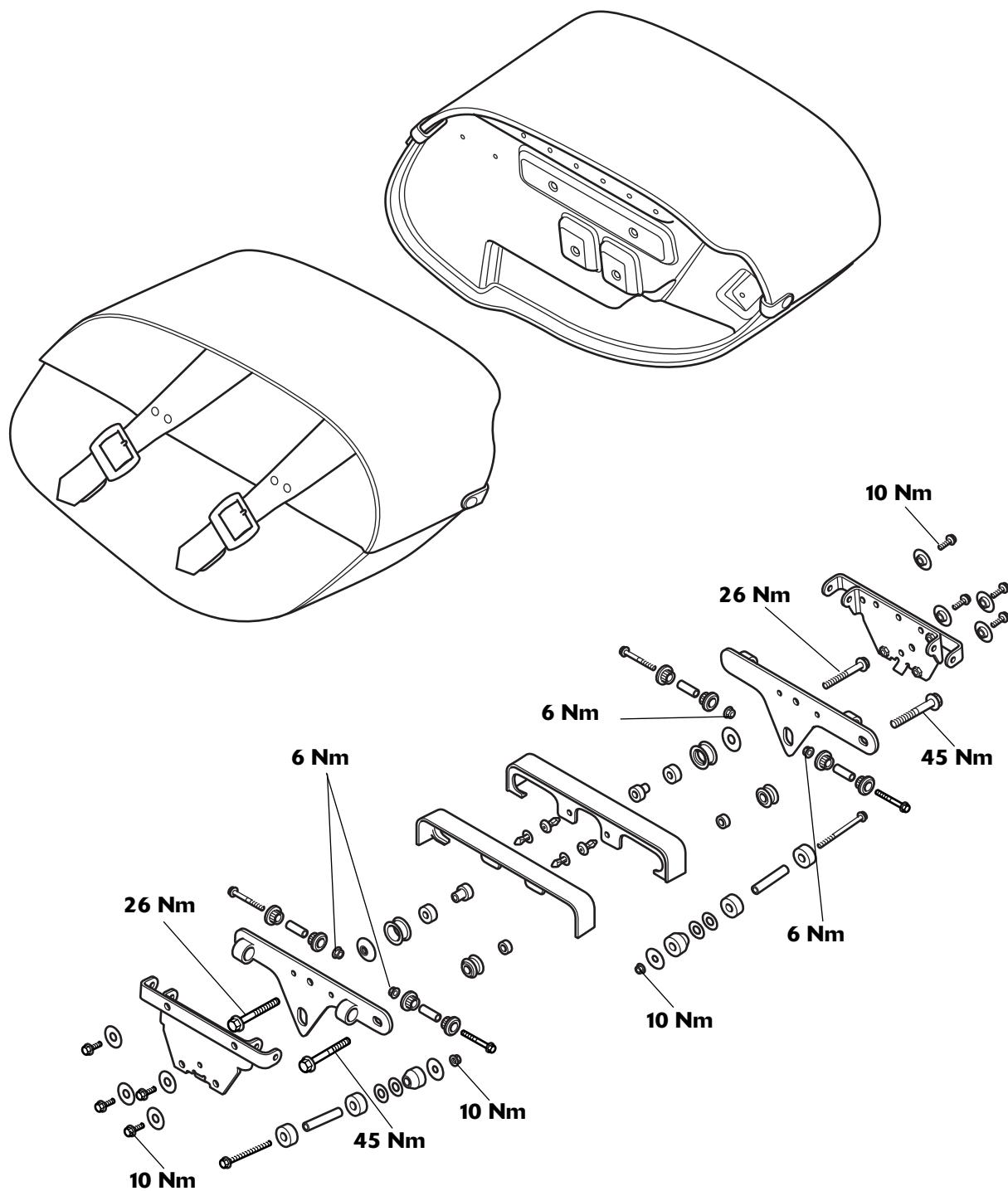
Frame and Bodywork

Exploded View – Windscreen – Thunderbird LT



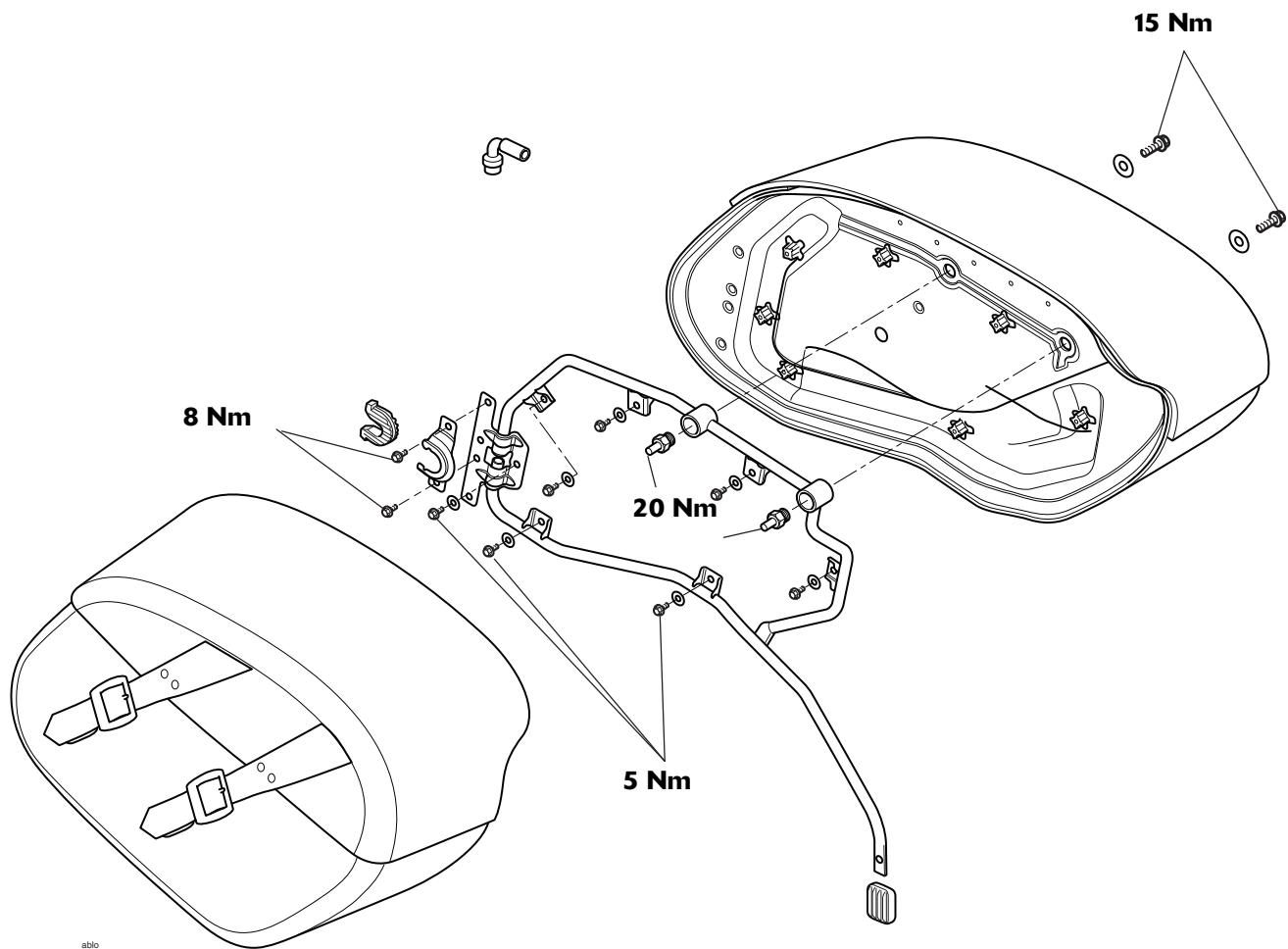
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Exploded View – Pannier Mountings – Thunderbird SE

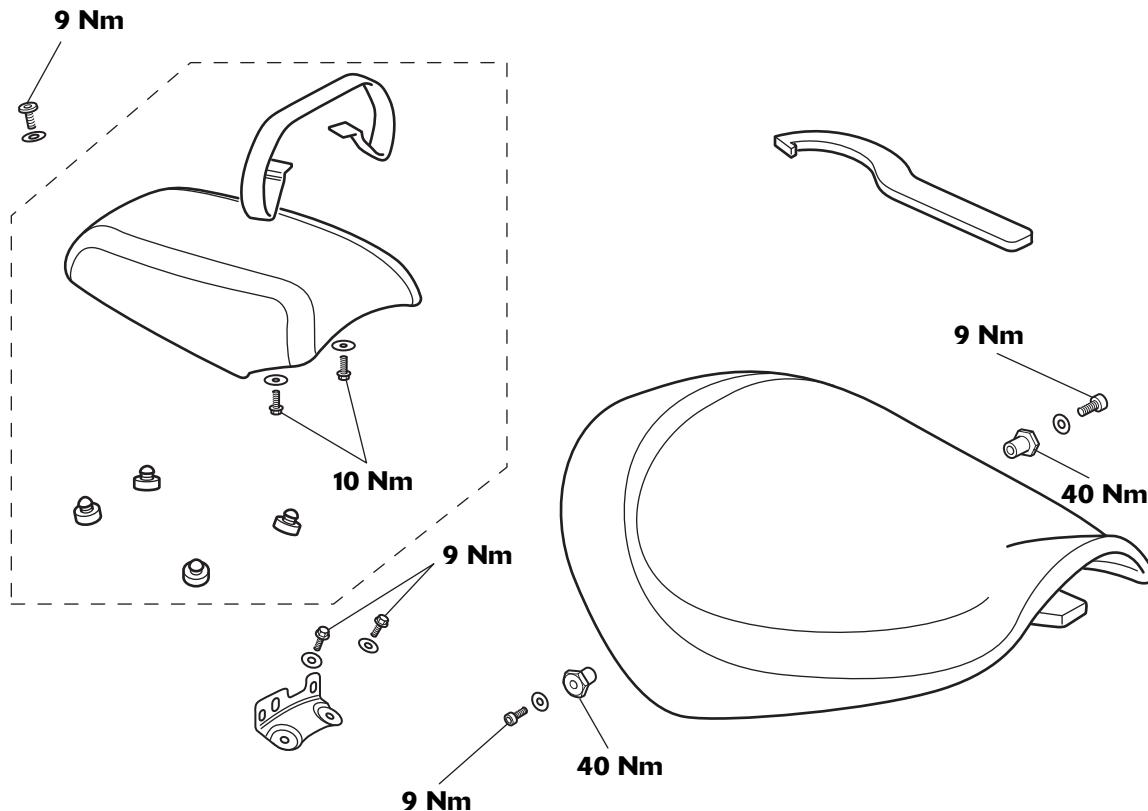


Frame and Bodywork

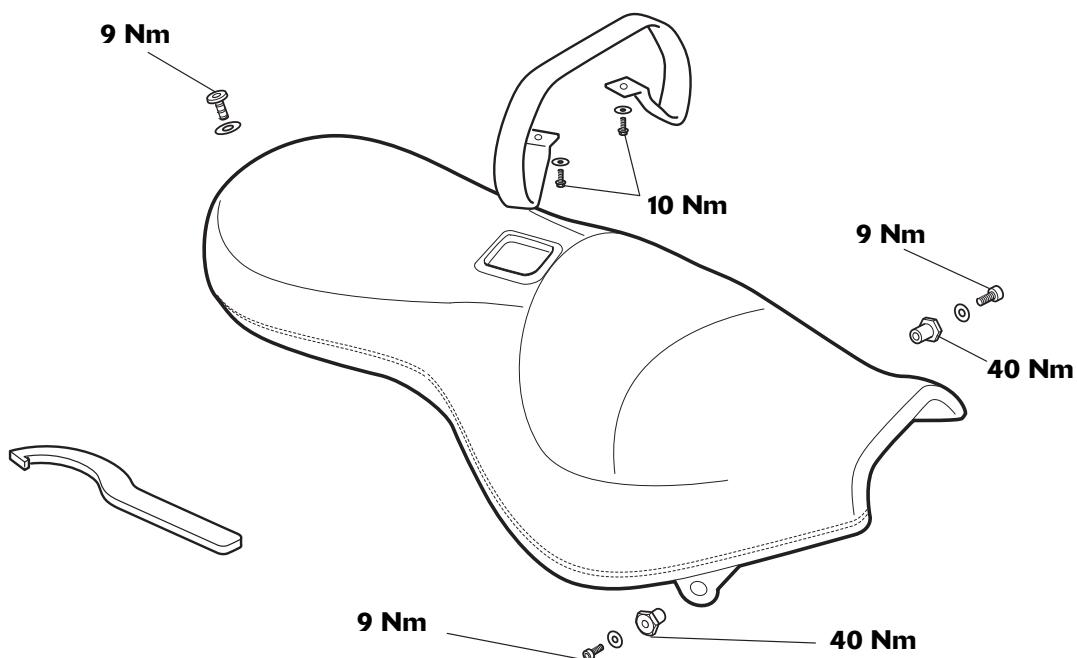
Exploded View – Pannier Mountings – Thunderbird LT



Exploded View – Seat and Tool Kit – Thunderbird and Thunderbird Storm

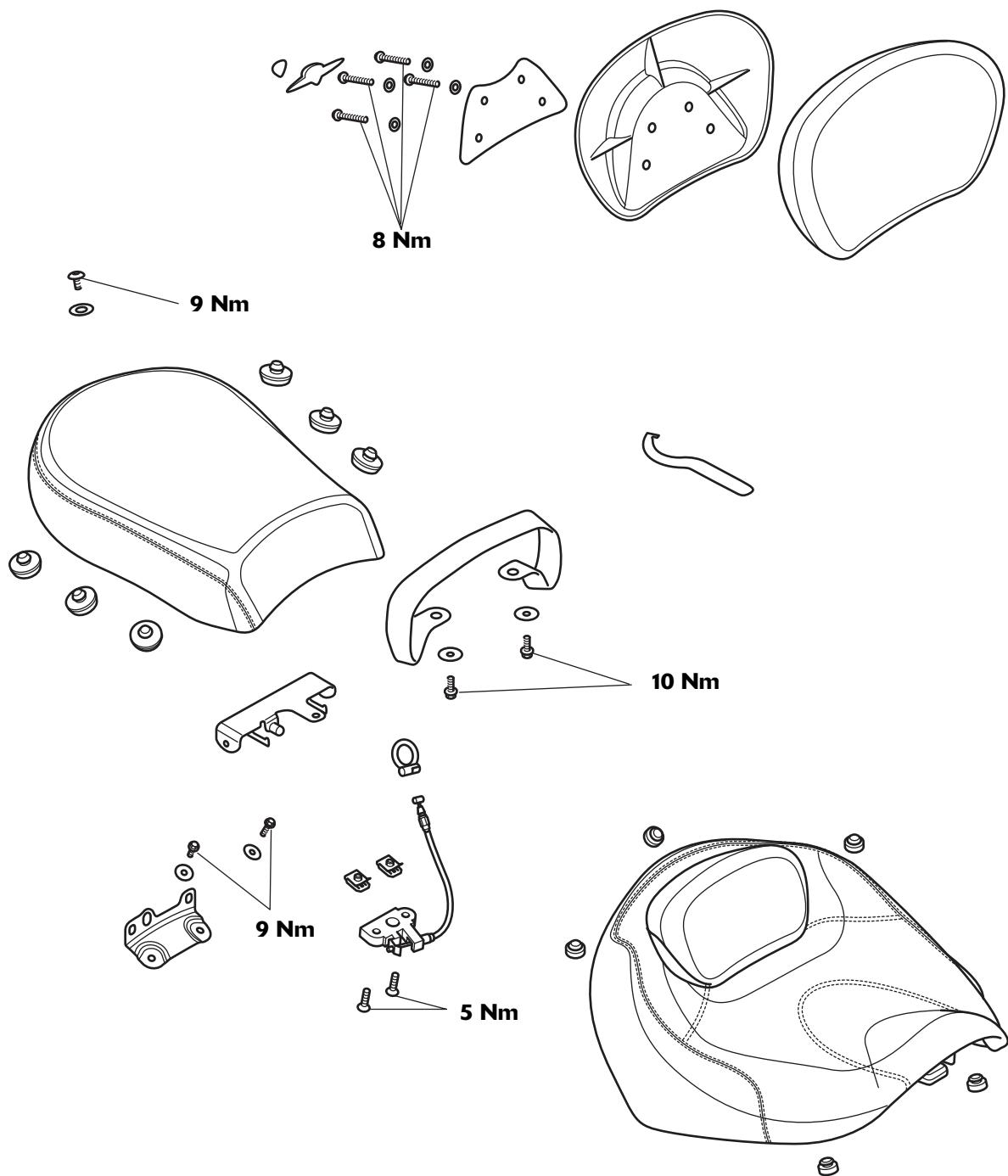


Exploded View – Seat and Tool Kit – Thunderbird SE



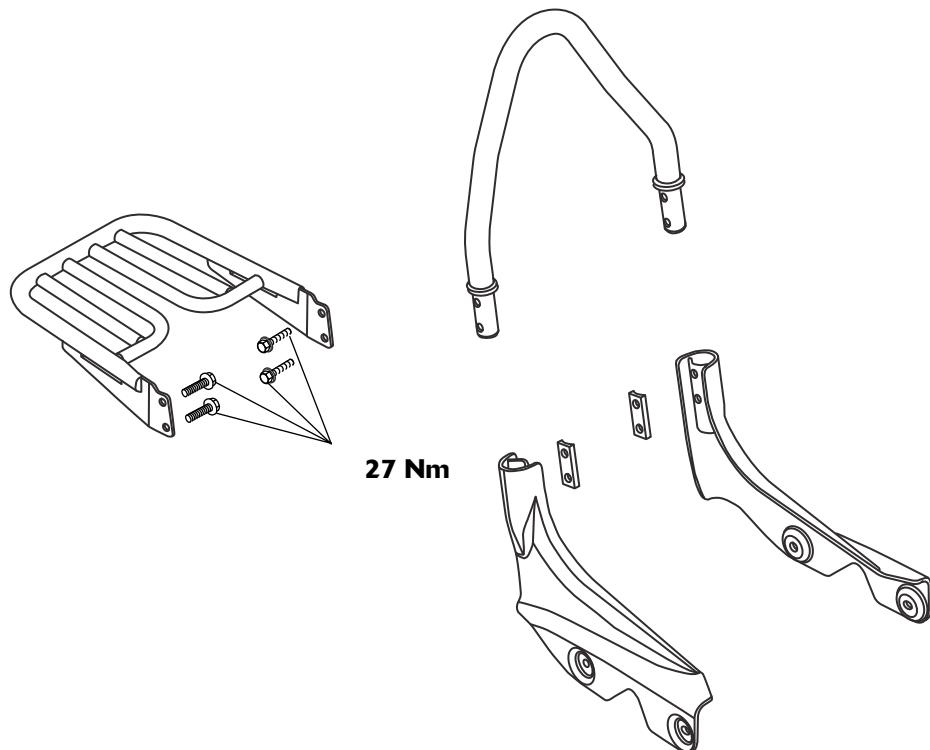
Frame and Bodywork

Exploded View – Seat and Tool Kit – Thunderbird Commander and Thunderbird LT

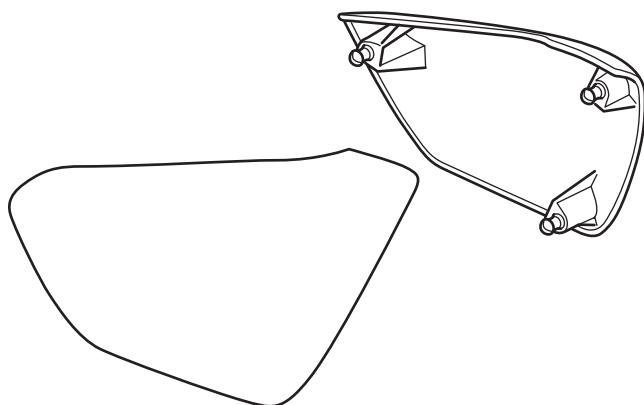


ablk

Exploded View – Backrest and Rack – Thunderbird LT

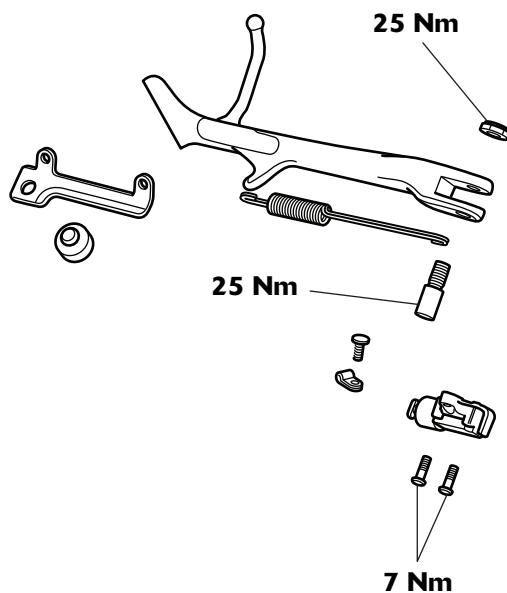


Exploded View – Side Panels



Frame and Bodywork

Exploded View – Side Stand



General Frame Inspection

- Inspect the frame, bodywork and footrests for accident and other damage, cracks, splits and general dilapidation. Check all fixings for security. If any faults are found, rectify as necessary. If any faults with the frame are found, the frame must be replaced; repairs to the frame are not permitted.



Warning

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for inspection and repair before it is ridden again.



Warning

The frame must not be modified in any way. Any modification to the frame, such as welding or drilling, may weaken the structure causing an unsafe riding condition leading to loss of control and an accident.

- Check the operation of the side stand to make sure it is securely held in the retracted position by the spring. Rectify any faults.



Warning

If the return spring is faulty, the side stand could extend whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.



Warning

Use of a motorcycle with bank angle indicators worn beyond the maximum limit (when the bank angle indicator is worn to a minimum 5 mm in length) will allow the motorcycle to be banked to an unsafe angle. Therefore, always replace the bank angle indicator pegs when they are worn to 5 mm in length.

Banking to an unsafe angle may cause instability, loss of motorcycle control and an accident.



Warning

The bank angle pegs must not be used as a guide to how far the motorcycle may be safely banked. This depends on many various conditions including, but not limited to, road surface, tyre condition and weather. Banking to an unsafe angle will lead to loss of motorcycle control and an accident.

Bank Angle Indicators – Thunderbird SE, Thunderbird Commander and Thunderbird LT

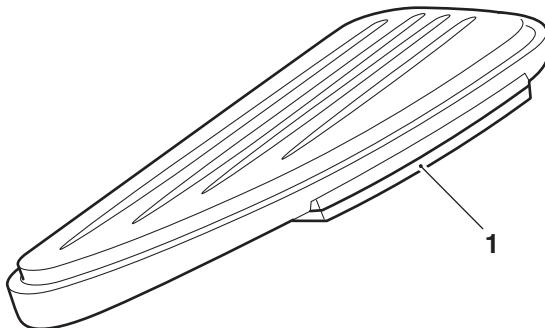
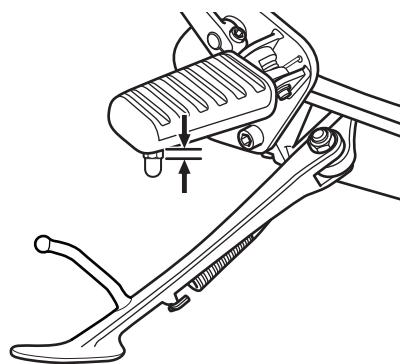
The bank angle indicators are located on the outer edge of the rider's footboards.

Inspect the bank angle indicators for wear on the outer edge.

Replace the bank angle indicator when it is worn before the footboard starts to get damaged.

Bank Angle Indicators – Thunderbird and Thunderbird Storm

- Inspect the bank angle indicators on the rider's footrests for wear. The bank angle indicators are worn out when 5 mm of the bank angle peg remains.



ceoe_4

1. Bank angle indicator



Warning

When banking and the bank angle indicator, attached to the rider's footboard, makes contact with the ground, the motorcycle is nearing its bank angle limit. A further increase of the banking angle is unsafe.

Banking to an unsafe angle may cause instability, loss of motorcycle control and an accident.

dfcb

Bank Angle Indicators

Frame and Bodywork

Seats



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



Caution

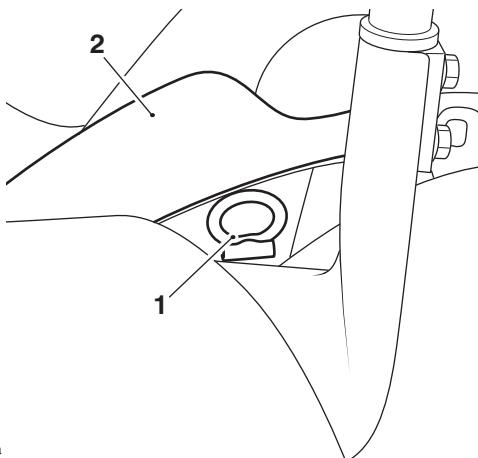
To prevent damage to the seats or seat covers, care must be taken not to drop the seats. Do not lean the seats against the motorcycle or any surface which may damage the seats or seat covers. Instead, place the seats, with the seat cover facing upwards, on a clean, flat surface which is covered with a soft cloth.

Do not place any item on the seats which may cause damage or staining to the seat covers.

Rider's Seat – Thunderbird Commander and Thunderbird LT

Removal

1. Remove the pillion seat (see page 17-21).
2. Pull the lock release cable, located at the rear left hand side of the seat, rearwards to release the seat from its lock.
3. Lift the seat up from the back for complete removal from the motorcycle.



- ciha
1. Lock release
2. Rider's seat

Installation

1. Engage the seat's tongue under the fuel tank.

Note:

- An audible click can be heard when the seat lock is engaged.
2. Press firmly down in the centre of the seat to engage the seat lock.
 3. Refit the pillion seat (see page 17-21).



Warning

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured, it may detach from the motorcycle. A loose or detached seat could cause loss of motorcycle control and an accident.

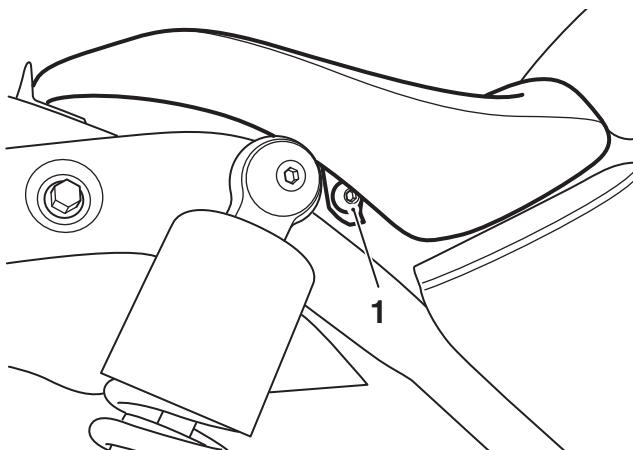
Rider's Seat – Thunderbird and Thunderbird Storm

Removal

1. Remove the two side fixings using the Allen key provided in the tool kit.
2. Lift the seat up at the back for complete removal from the motorcycle.

Installation

1. Engage the seat's tongue under the fuel tank, fit and tighten the side fixings to **9 Nm**.



1. Seat fixing (right hand shown)



Warning

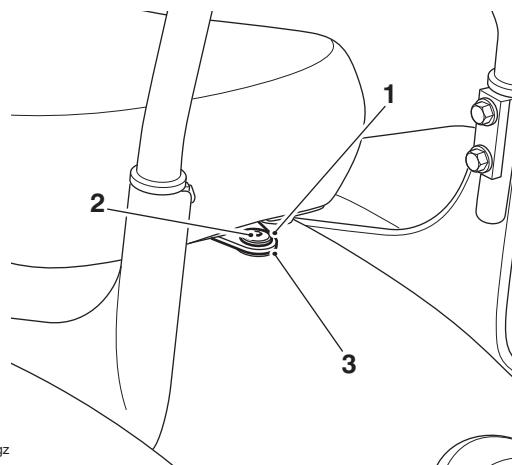
To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured, it may detach from the motorcycle. A loose or detached seat could cause loss of motorcycle control and an accident.

Pillion Seat – All Models Except Thunderbird SE

Removal

Note:

- Note the position of the rubber washer between the pillion seat mounting bracket and the rear mudguard.
1. Remove the fixing using the Allen key provided in the tool kit.



1. Fixing (Thunderbird LT shown)

2. Mounting bracket

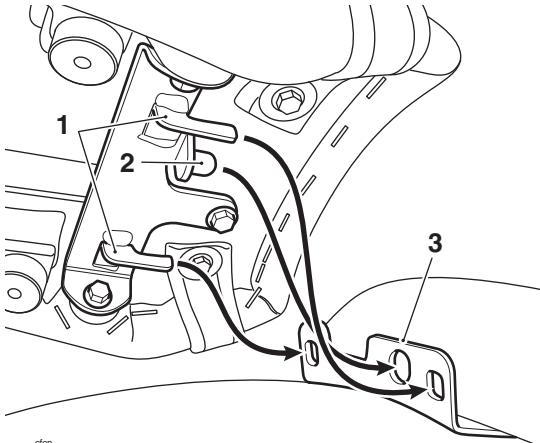
3. Rubber washer

2. Lift the seat up at the back for complete removal from the motorcycle. Collect the rubber washer.

Frame and Bodywork

Installation

1. Engage the seat's two hooks and location pin into the bracket behind the rider's seat.
2. Fit and tighten the rear fixing to **9 Nm**.



1. Pillion seat hooks
2. Location peg
3. Pillion seat bracket



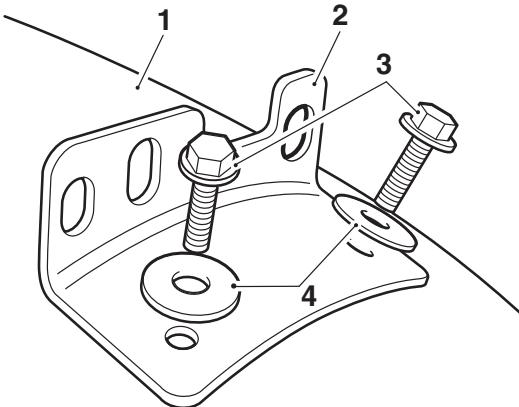
Warning

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured in the lock it will detach from the rear frame. A loose or detached seat could cause loss of motorcycle control and an accident.

Pillion Seat Mounting Bracket – All Models except Thunderbird SE

Removal

1. Remove the pillion seat mounting bracket from the rear mudguard.

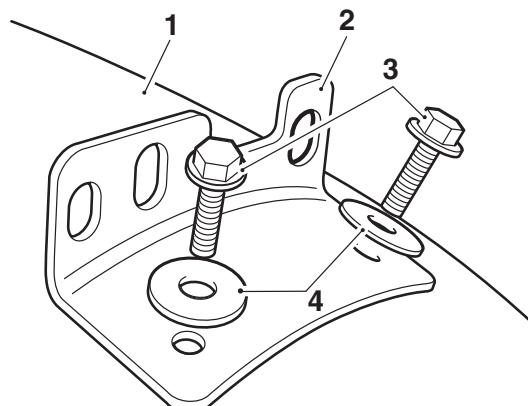


1. Rear mudguard
2. Pillion seat mounting bracket
3. Fixings
4. Washers

2. Insert two M6 blanking plugs into the fixing holes.

Installation

1. Remove the two blanking plugs (if fitted during removal of the rear seat) from the rear mudguard.
2. Align the pillion seat mounting bracket to the rear mudguard and secure with the two fixings and washers.

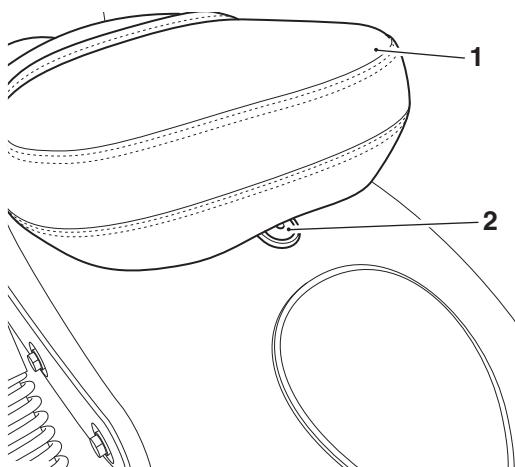


1. Rear mudguard
 2. Pillion seat mounting bracket
 3. Fixings
 4. Washers
3. Tighten the fixings to **9 Nm**.

Dual Seat – Thunderbird SE

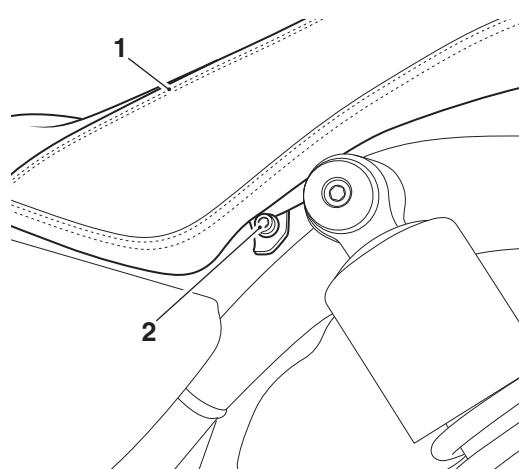
Removal

Remove the rear fixing.



1. Seat
2. Fixing

1. Remove the two side fixings.

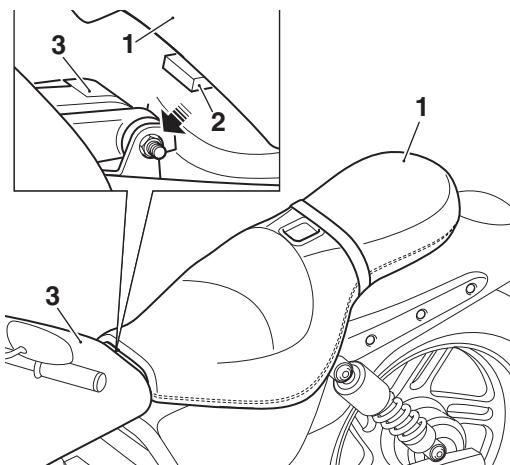


1. Seat
2. Side fixing (left hand shown)

2. Lift the seat up at the rear for complete removal from the motorcycle.

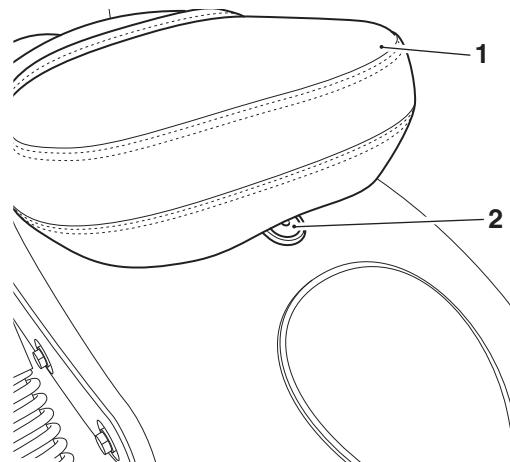
Installation

1. Engage the seat's tongue under the fuel tank and align the side fixings with the frame fixing points. Fit the side fixings, but do not fully tighten at this stage.



1. Seat
2. Seat tongue
3. Fuel tank

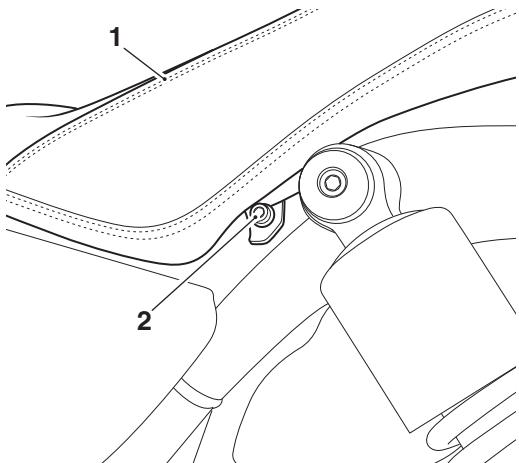
2. Align the seat rear fixing bracket with the fixing position on the rear mudguard. Fit the original fixing and tighten to **9 Nm**.



1. Seat
2. Fixing

Frame and Bodywork

3. Tighten the side fixings to **9 Nm**.

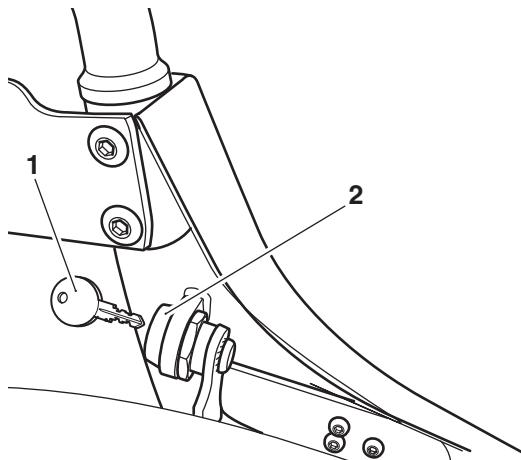


- 1. Seat**
2. Side fixing (left hand shown)

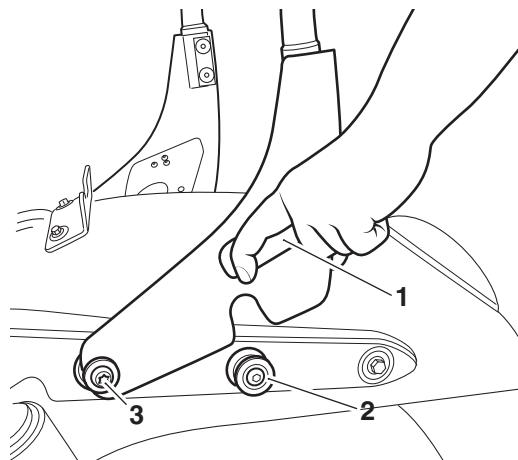
Passenger Backrest and Rack – Thunderbird SE

Removal

1. Remove the dual seat (see page 17-23).
2. Insert the key in to the passenger backrest lock (located behind the left hand passenger backrest bracket) and turn it anticlockwise to unlock.



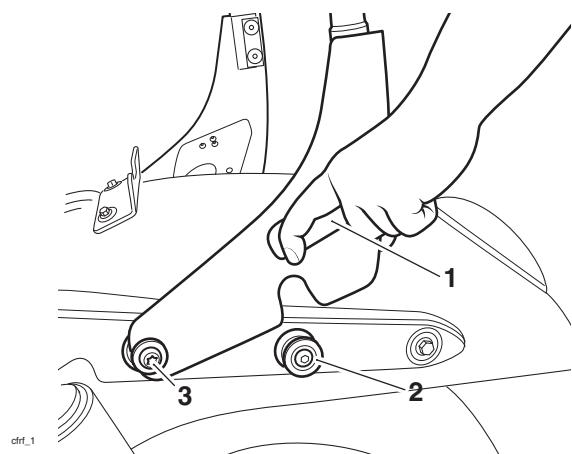
- 1. Key**
2. Lock
3. With the key operated lock in the unlocked position, pull both latch levers rear-wards and simultaneously lift the rear of the passenger backrest off the rear mountings.
 4. Lift the passenger backrest off the front mountings for complete removal from the motorcycle.



- 1. Latch lever (left hand shown)**
2. Rear mounting
3. Front mounting

Installation

1. Position the passenger backrest to the front mountings.



1. Latch lever (left hand shown)

2. Rear mounting

3. Front mounting

2. Pull the latch levers fully rear-wards and engage the rear slots onto the rear mountings. Release the latch levers and apply downward pressure until the mounting plates lock in to the rear mountings.



Warning

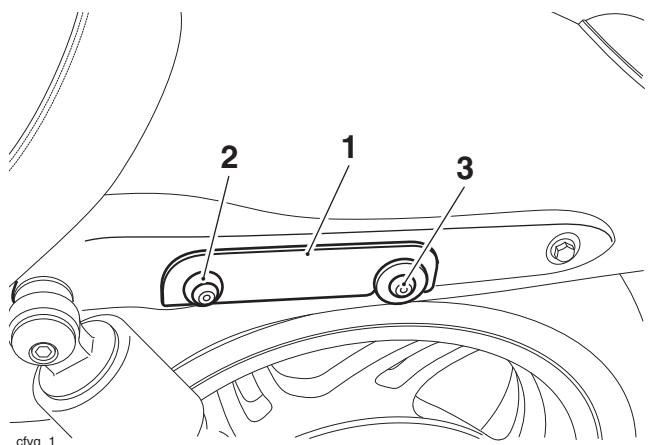
To prevent detachment of the passenger backrest and rack during riding, after fitting always grasp the rack and pull firmly upwards. If the passenger backrest and rack is not correctly secured in the lock, it will detach from the lock. A loose or detached passenger backrest and rack could cause loss of motorcycle control and an accident.

3. Slide the latch levers forward in to the locked position.
4. Insert the key and turn clockwise to the locked position.
5. Refit the seat (see page 17-23).

Adjustment

If the passenger backrest is loose or excessively tight at the mountings, check and, if necessary, adjust the mountings following the procedure below.

1. Remove the passenger backrest as described earlier.
2. Fit tool T3380500 to the large and small mountings.



1. Tool T3380500 (shown with the pannier mounting removed)

2. Small mounting

3. Large mounting

3. If tool T3380500 does not fit, adjust the mountings following the steps below.
4. Remove the panniers (see page 17-27, step 4).
5. To access the mounting bolts, remove the bolt, lock nut and dampers from the pannier mounting assembly (see page 17-27, step 5).
6. Loosen the bolts for both mountings and fit tool T3380500.
7. Tighten the M10 bolt to **45 Nm**.
Tighten the M8 bolt to **26 Nm**.
8. Remove tool T3380500.
9. Refit the bolt, lock nut and dampers to the pannier mounting assembly (see page 17-29, step 7).
10. Align the panniers to their mounting brackets, fit the washers and bolts and tighten to **10 Nm**.
11. Fit the passenger backrest and check that it is secure, repeat the adjustment if necessary.

Frame and Bodywork

Panniers and Passenger Backrest – Thunderbird LT

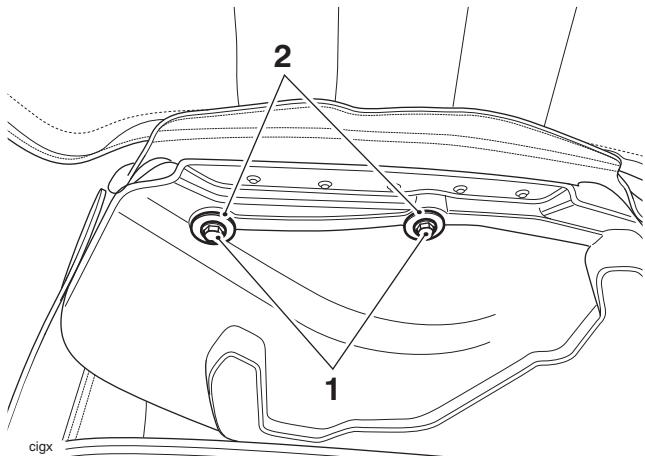
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Open the pannier lid.
2. Support the pannier and remove the two fixings and their washer. Keep the fixings and washers with the pannier.

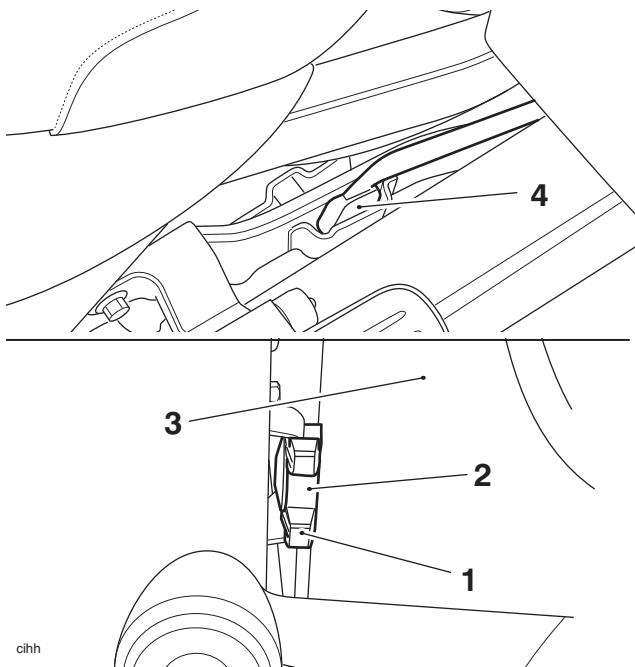


1. Fixings

2. Washers

3. Pull the top of the pannier away from its mounting studs.
4. Lift up the front of the pannier to disengage it from the front mounting.

5. Slide the pannier forwards to disengage it from the rear mounting and remove the pannier.



1. Rear mounting

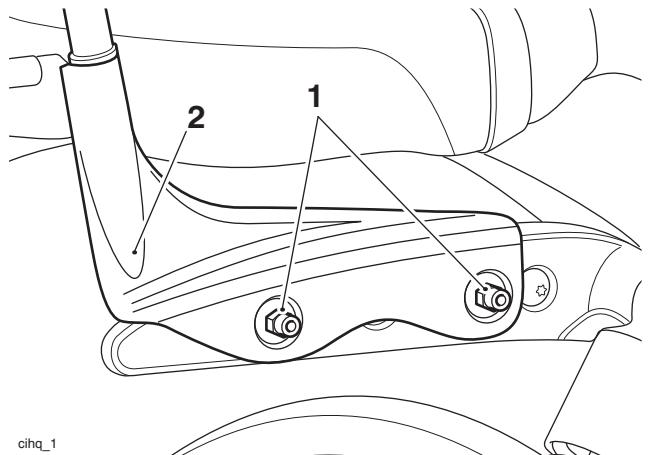
2. Flanged sleeve

3. Rear mudguard

4. Front mounting

6. Repeat steps 1 to 5 for the other pannier.

7. Support the passenger backrest, release the four fixings, two either side, and remove the passenger backrest and rack assembly.



1. Fixings

2. Passenger backrest and rack assembly

Installation

1. Align the passenger backrest assembly to the motorcycle.
2. Fit and tighten the four fixings to **20 Nm**.
3. Align the rear mounting of the pannier to the flanged sleeve on the mudguard. Slide the pannier rearwards to fully engage on to it.
4. Fit the front mounting into its slot on the frame of the motorcycle.
5. Align the top of the pannier to its mounting studs and install the washers and fixings and tighten to **15 Nm**.



Warning

Always ensure that the front and rear mountings of the pannier are correctly engaged and the fasteners are secure. A loose or detached pannier could cause loss of motorcycle control and an accident.

Pannier mountings – Thunderbird SE

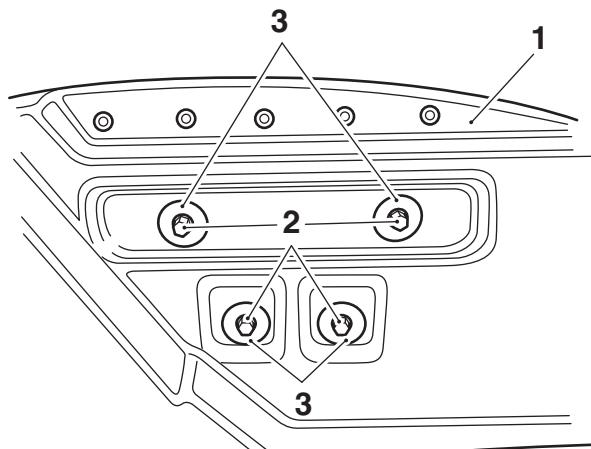
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the dual seat (see page 17-23).
2. Remove the passenger backrest and rack (see page 17-24).
3. Open the pannier lid.
4. Support the pannier, release the fixings and remove the pannier. Collect the four washers from inside the pannier.

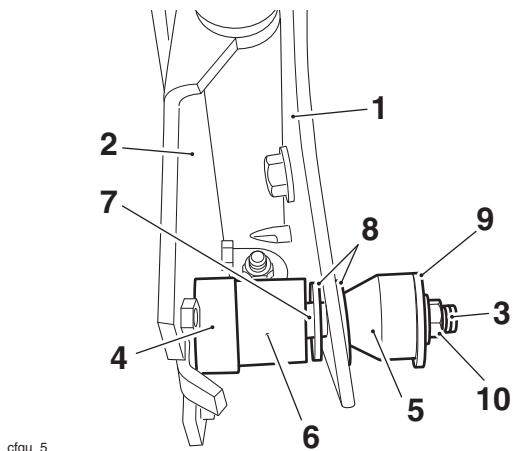


1. Pannier
2. Fixings
3. Washers

Frame and Bodywork

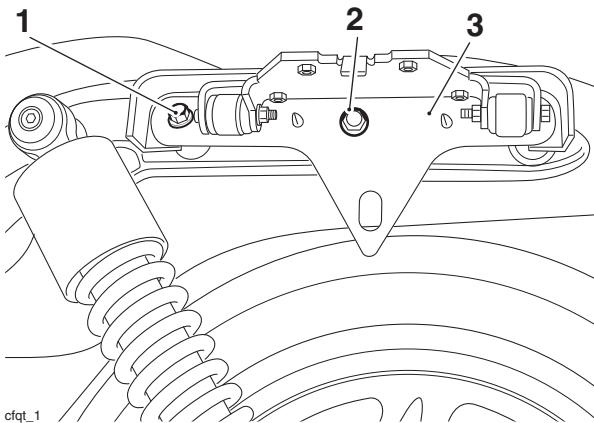
5. Remove the bolt, lock nut and rubber dampers from the pannier mounting assembly. Collect the following:

- Lock nut
- Bolt
- Spacer
- Rubber damper
- Rubber damper, tapered
- Sleeve
- Two washers
- M6 washer.



1. Inner pannier mounting
2. Outer pannier mounting
3. Bolt
4. Spacer
5. Rubber damper, tapered
6. Rubber damper
7. Sleeve
8. Washers
9. Washer, M6
10. Lock nut

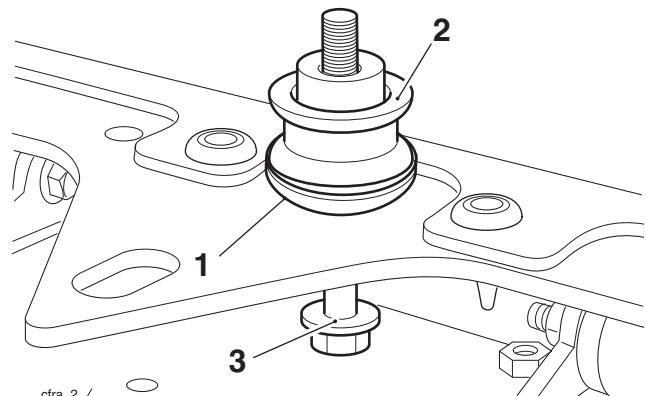
6. Remove the two bolts and the pannier mounting.



1. Bolt, M10
2. Bolt, M8
3. Pannier mounting assembly

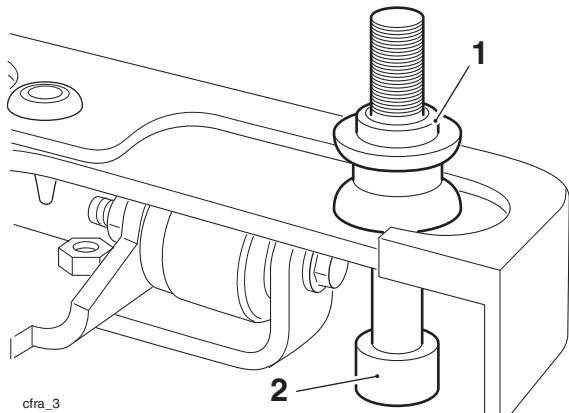
Installation

1. Ensure that the large mounting and finisher are fitted to the M8 bolt, as shown below:



1. Finisher
2. Large mounting
3. Bolt, M8

2. Ensure that the small mounting and spacer are fitted to the M10 bolt, as shown below:



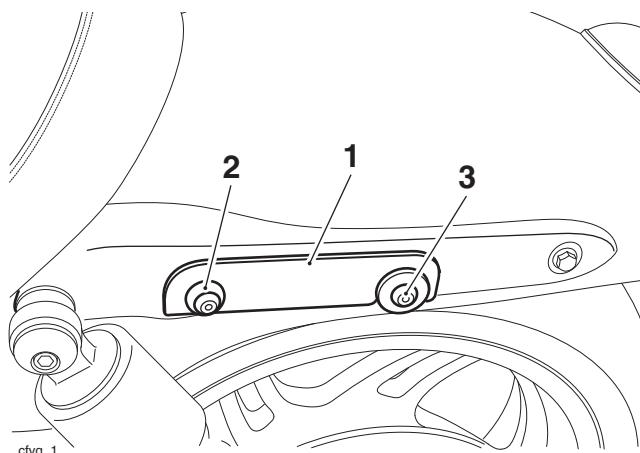
1. Small mounting

2. Bolt, M10

3. Fit the left hand pannier mounting to the motorcycle.
Do not fully tighten the bolts at this stage.

Note:

- **The small mounting has a small amount of movement for adjustment.**
- 4. Fit tool T3380500 to the large and small mountings.
Tighten the M10 bolt to **45 Nm**.
Tighten the M8 bolt to **26 Nm**.



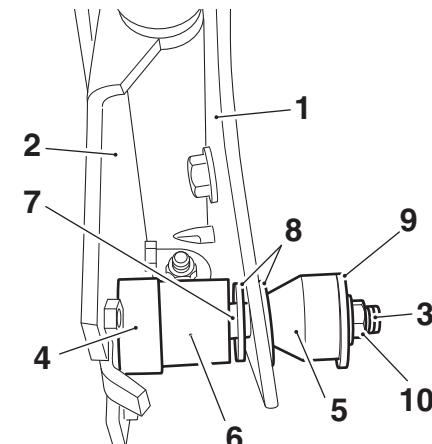
1. Tool T3380500 (shown with the pannier mounting removed)

2. Small mounting

3. Large mounting

5. Remove tool T3380500.
6. Repeat steps 3 to 5 for the right hand side.

7. Fit the bolt, the spacer, the rubber dampers, the sleeve, two washers, the M6 washer and the lock nut to the pannier mounting assembly, as shown below:



1. Inner pannier mounting

2. Outer pannier mounting

3. Bolt

4. Spacer

5. Rubber damper, tapered

6. Rubber damper

7. Sleeve

8. Washers

9. Washer, M6

10. Lock nut

8. Tighten the lock nut to **10 Nm**.

9. Align the panniers to their mounting brackets, fit the washers and bolts and tighten to **10 Nm**.

10. Refit the passenger backrest and rack (see page 17-25).

11. Refit the seat (see page 17-23).

Frame and Bodywork

Side Panels

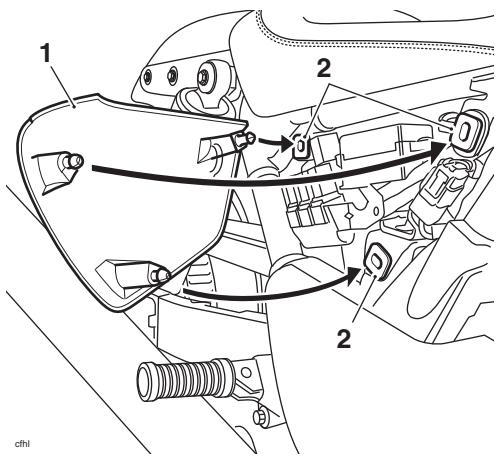
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

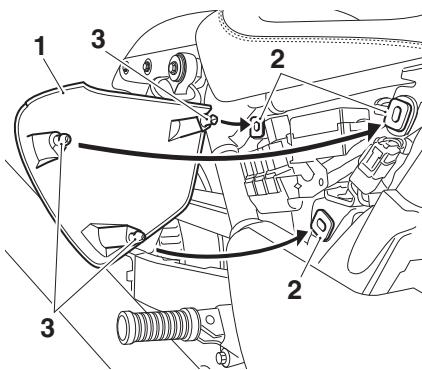
1. To remove either side panel, grasp the panel firmly in both hands, pull the panel away from the motorcycle until it clears the three retaining grommets (leaving the grommets in place).



1. Side panel (right hand shown)
2. Grommets

Installation

1. Check that the three side panel grommets are correctly located in the frame.
2. Position the three locating dowels to the grommets, then press firmly to secure the panel.
3. Ensure the panel dowels are correctly located into the grommets.



1. Side panel (right hand shown)
2. Grommets
3. Dowels

4. Grasp the panel firmly with both hands and ensure that it is fully retained.

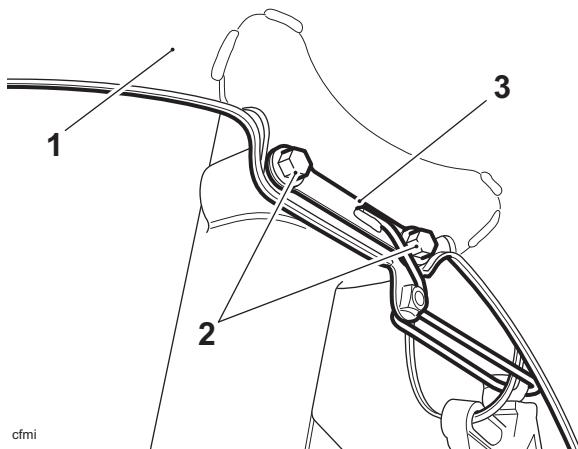
Front Mudguard

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the front wheel (see page 16-10).
2. **For all models except Thunderbird Commander and Thunderbird LT:** Release the mudguard fixings and detach the two brake hose cable guides as the fixings are removed and position aside.
3. **For Thunderbird Commander and Thunderbird LT:** Release the mudguard fixings and retain for reuse.



1. Mudguard (Thunderbird shown)

2. Mudguard fixings

3. Brake hose cable guide

4. Carefully remove the mudguard.

Installation

1. Carefully manoeuvre the mudguard into position between the forks.
2. **For all models except Thunderbird Commander and Thunderbird LT:** Fit the new mudguard fixings, securing both brake hose cable guides as the fixings are installed. Tighten to **12 Nm**.
3. **For Thunderbird Commander and Thunderbird LT:** Fit the mudguard fixings and tighten to **19 Nm**.
4. Refit the front wheel (see page 16-11).

Rear Mudguard – All Models Except Thunderbird Commander and Thunderbird LT

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Thunderbird and Thunderbird Storm

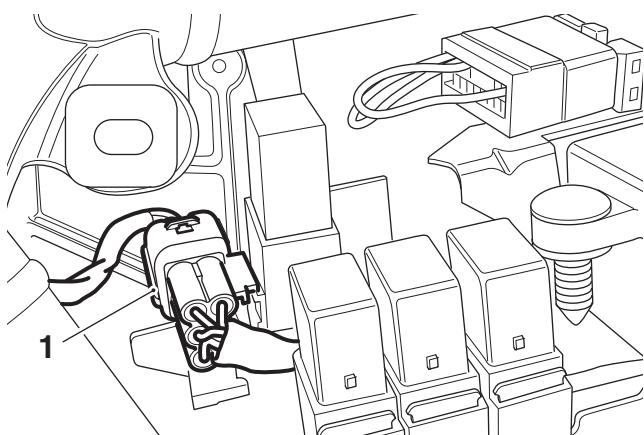
1. Remove the rider's seat (see page 17-21) and pillion seat (see page 17-21).

Thunderbird SE

2. Remove the dual seat (see page 17-23).
3. Remove the passenger backrest and rack (see page 17-24).
4. Remove the panniers and pannier mountings (see page 17-27).

All models

5. Disconnect the battery, negative (black) lead first.
6. Remove both side panels (see page 17-30).
7. Trace the wiring back from the number plate light, rear indicators and rear light assembly and disconnect the multiplug from the main harness. The connection is to the rear of the fuse box on the right hand side of the motorcycle.

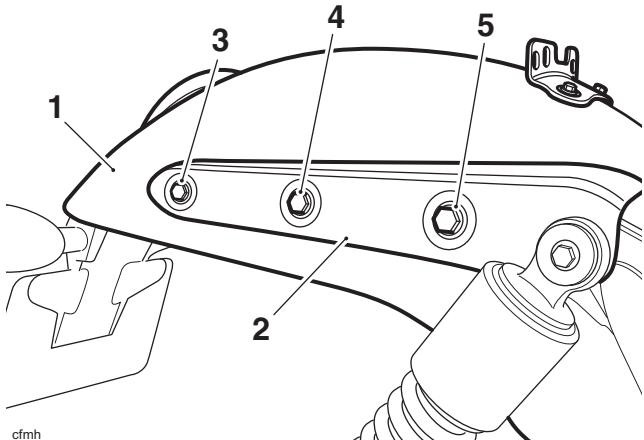


1. Wiring connection

Frame and Bodywork

Thunderbird and Thunderbird Storm

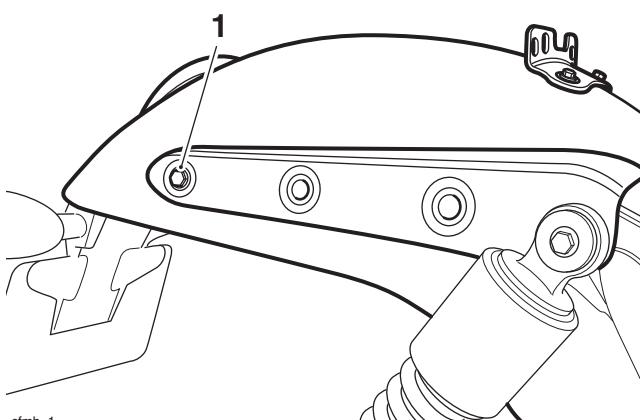
8. Support the rear mudguard then remove the six fixings and washers that secure the rear mudguard to the frame and frame covers. Note the different lengths of each pair of bolts.



1. Rear mudguard
2. Frame cover
3. M8 x 25 mm fixings
4. M8 x 33 mm fixings
5. M10 x 45 mm fixings

Thunderbird SE

9. Support the rear mudguard then remove the two M8 x 25 mm fixings from the rear of the mudguard.



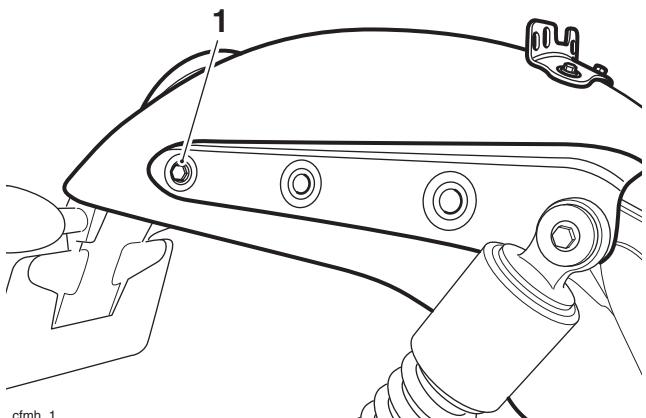
1. Fixing

All Models

10. Carefully lower the rear mudguard downwards to clear the two rear frame tubes, taking care not to damage the mudguard or frame painted surfaces.
11. Once the mudguard is clear of the frame, carefully remove it towards the rear of the motorcycle.

Installation

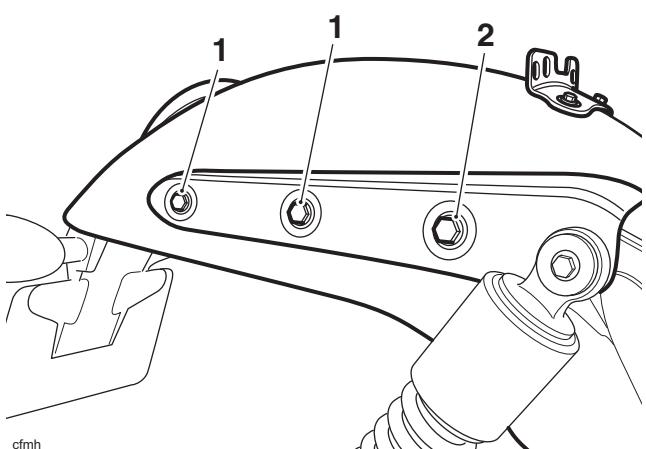
1. Carefully locate the mudguard to the frame, positioning the locating holes to the holes in the frame and frame covers.
2. Support the mudguard with the two M8 x 25 mm fixings and washers through the rearmost holes in the frame and into the mudguard. Do not fully tighten the fixings at this stage.



1. Fixing

Thunderbird and Thunderbird Storm

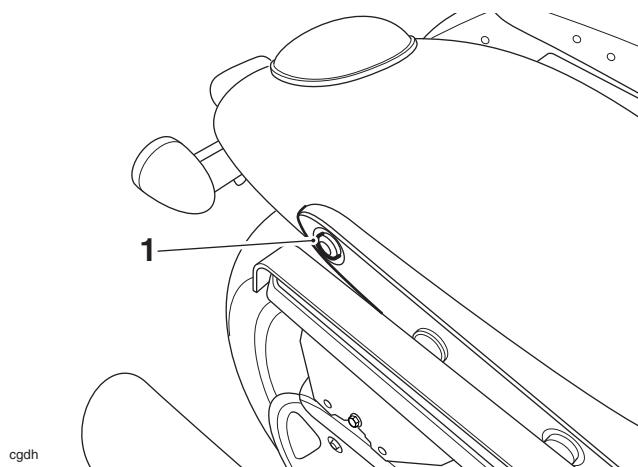
3. Insert the M10 x 45 mm fixings and washers to the front holes in the mudguard, and the M8 x 33 mm fixings and washers to the centre holes.
4. Tighten the four M8 fixings to **24 Nm** and the two M10 fixings to **45 Nm**.



1. M8 fixings
2. M10 fixing

Thunderbird SE

5. Carefully locate the mudguard to the frame, positioning the locating holes in the frame and frame covers.
6. Support the mudguard with the two M8 x 25 mm fixings through the rearmost holes in the frame and into the mudguard. Do not fully tighten the fixings at this stage.



1. Fixing

7. Fit the pannier mounting brackets (see page 17-28).
8. Tighten the rear M8 fixings to **24 Nm**.
9. Reconnect the rear light, number plate light and indicator connector.
10. Reconnect the battery, positive (identified with red tape) lead first.
11. Check that the rear light, number plate light and indicators all function correctly.
12. Refit the side panels (see page 17-30).

Thunderbird and Thunderbird Storm

13. Refit the rider's seat (see page 17-21) and pillion seat (see page 17-21).

Thunderbird SE

14. Refit the passenger backrest and rack (see page 17-25).
15. Refit the panniers (see page 17-28 step 9).
16. Refit the dual seat (see page 17-23).

Rear Mudguard –

Thunderbird Commander and Thunderbird LT

Removal

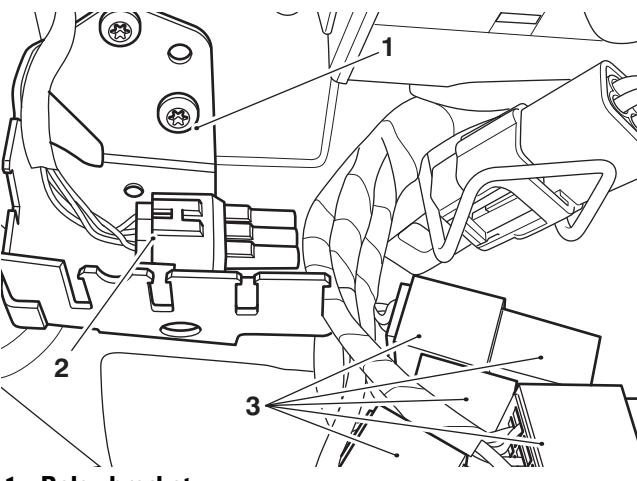
Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page 17-20).
2. **For Thunderbird LT only:** Remove the panniers and the passenger backrest (see page 17-26).
3. Disconnect the battery, negative (black) lead first.
4. Remove both side panels (see page 17-30).

Note:

- **Note the routing of the rear light harness for installation.**
- 5. Trace the wiring back from the number plate light, rear indicators and rear light assembly to the relay bracket on the right hand side of the frame.
- 6. Noting their position, detach the five relays from their mounting bracket and disconnect the rear lights multiplug from the main harness.



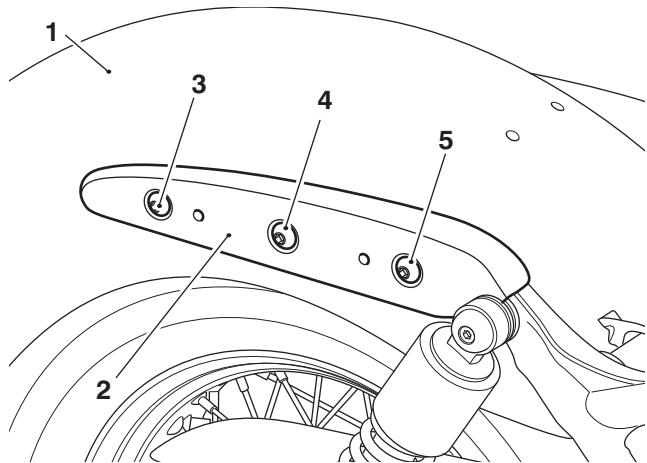
1. Relay bracket

2. Rear lights multiplug

3. Relays (shown disconnected)

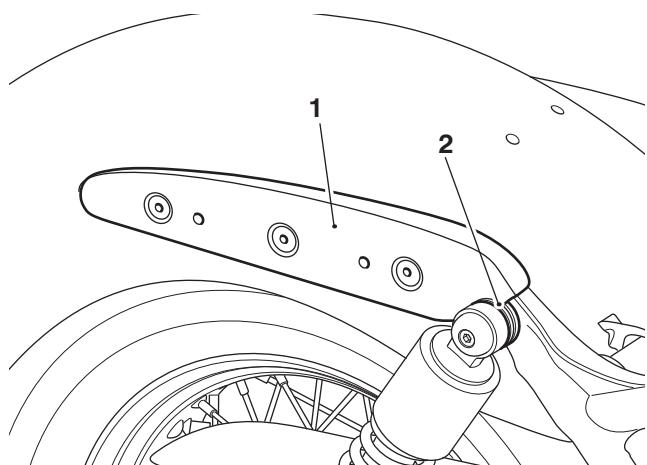
Frame and Bodywork

7. Remove the six fixings and washers that secure the rear mudguard to the frame and frame covers. Note the different lengths of each pair of bolts.



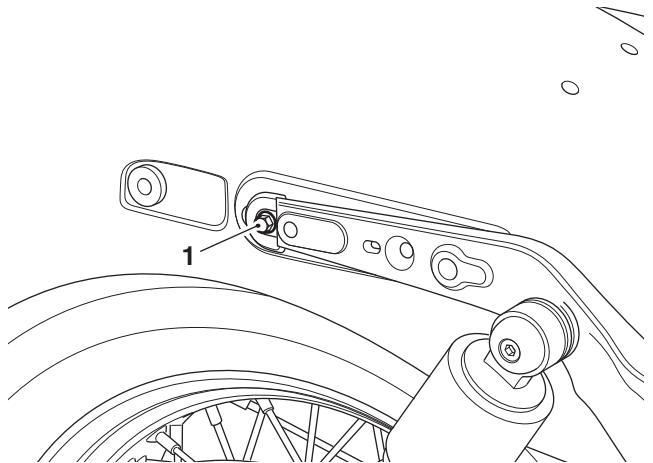
- 1. Rear mudguard**
2. Frame cover
3. M8 x 30 mm fixings
4. M8 x 35 mm fixings
5. M10 x 45 mm fixings

8. Remove the frame covers. The covers locate in a grommet at their forward edge.



- 1. Frame cover**
2. Grommet

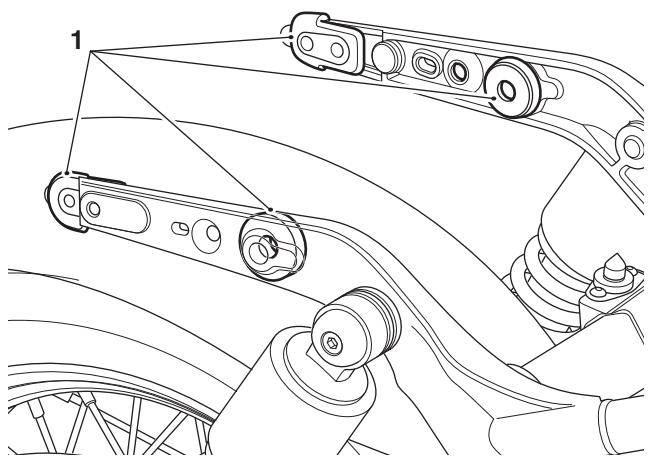
9. Support the rear of the mudguard then release the remaining M6 fixing (one each side) that secure the rear mudguard to the frame.



- 1. M6 fixing**

Note:

- There are rubber protectors for the rear mudguard on the frame. These prevent damage to the mudguard when removing or installing it.
 - Note the position of the rubber protectors for installation.
10. Ensure that the rubber protectors remain on the frame while lowering the rear of the mudguard downwards.



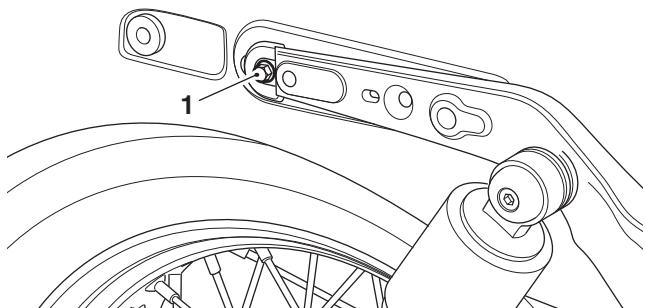
- 1. Rubber protectors**

11. Once the mudguard is clear of the frame, carefully remove it towards the rear of the motorcycle.

Installation

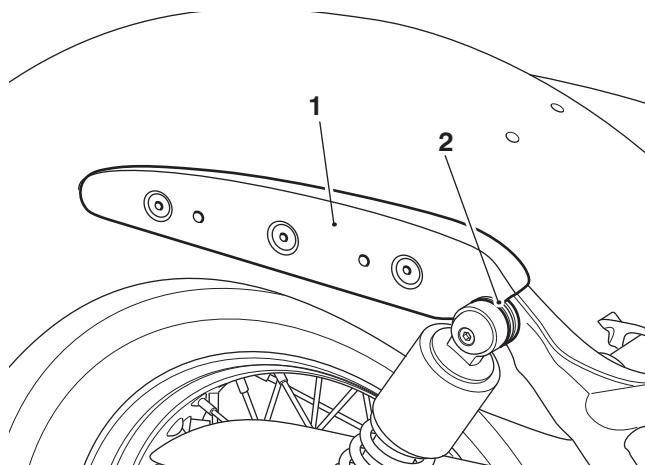
Note:

- Ensure the rubber protectors are fitted to the frame as noted for removal.
 - Ensure the rear lights harness is routed as noted for removal.
1. Carefully locate the mudguard to the frame, positioning the locating holes to the holes in the frame.
 2. Support the mudguard with the two M6 fixings through the rearmost hole in the frame and into the mudguard. Tighten the fixings to **8 Nm**.



1. Fixing

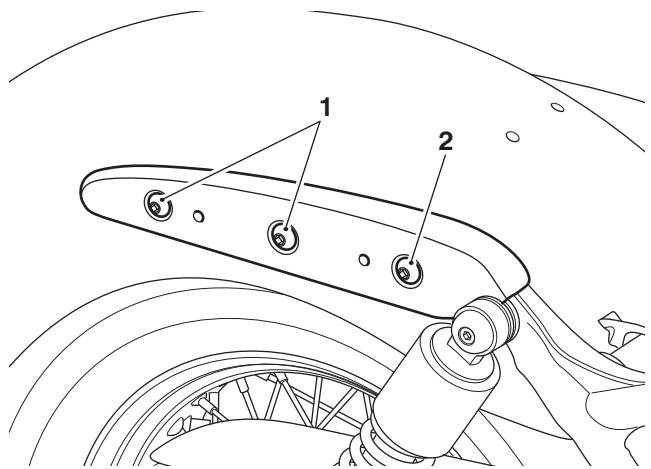
3. Position the mudguard covers, engaging their forward edges to the grommets.



1. Cover 2. Grommet

4. Insert the fixings for the mudguard as follows:
 - M10 x 45 mm fixings and washers to the front holes
 - M8 x 35 mm fixings and washers to the centre holes
 - M8 x 30 mm fixings and washers to the rear holes.

5. Tighten the four M8 fixings to **24 Nm** and the two M10 fixings to **45 Nm**.



1. M8 fixings 2. M10 fixing

6. With the rear lights harness routed as for removal, connect its multiplug to the main harness.
7. Refit the five relays to their bracket as noted for removal.
8. Reconnect the battery, positive (identified with red tape) lead first.
9. Check that the rear light, number plate light and indicators all function correctly.
10. Refit the side panels (see page 17-30).
11. Refit the rider's seat (see page 17-20).
12. Refit the panniers and the passenger backrest (see page 17-27).

Frame and Bodywork

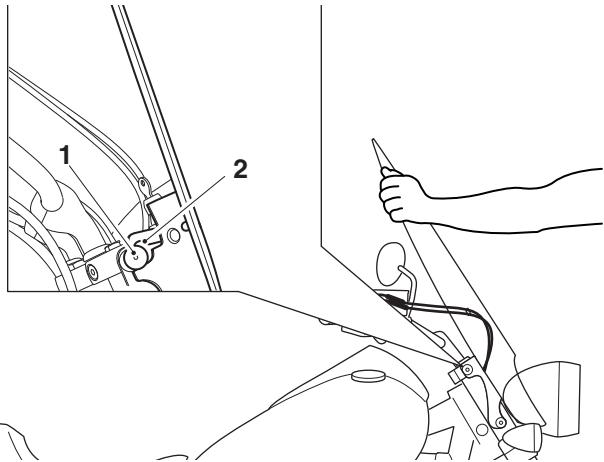
Windscreen – Thunderbird SE

Removal

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Turn the windscreen lock to the unlocked position.
2. Stand astride the front wheel and firmly grip both sides of the windscreens close to the top.



1. Upper mounting
2. Windscreen upper mounting slot

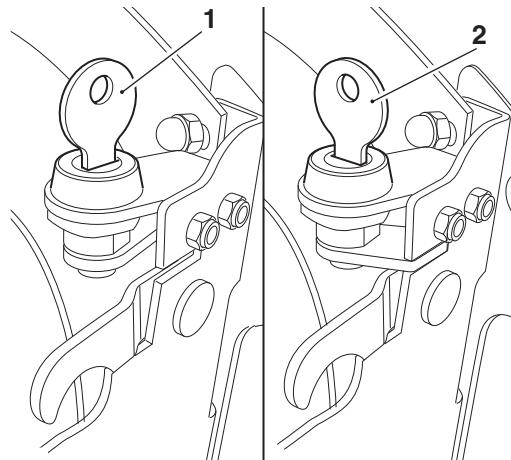
3. Pull the windscreen firmly to disengage the upper mountings. Then lift the windscreen up to disengage the lower mountings and completely remove from the motorcycle.

Installation

Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

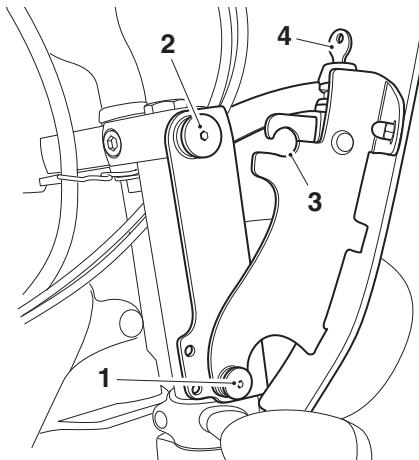
1. Turn the windscreen lock to the unlocked position and remove the key.



1. Unlocked position

2. Locked position

2. Stand astride the front wheel and align the windscreen lower mounting slots to the lower mountings on the mounting brackets.



1. Lower mounting

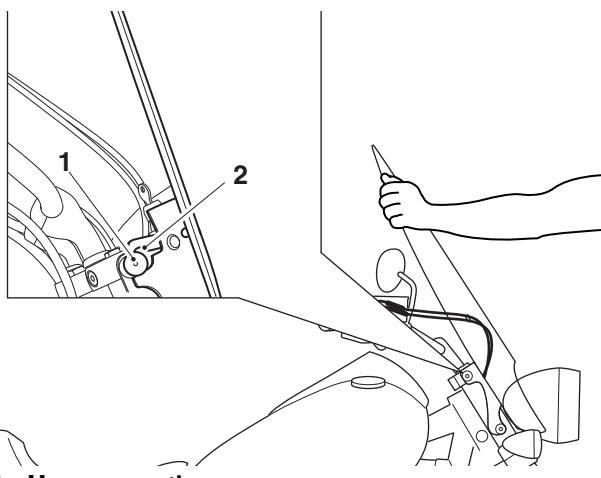
2. Upper mounting

3. Upper mounting slot

4. Lock

Note:

- An audible click can be heard when the windscreens upper mountings are fully engaged.
- 3. Align the windscreen upper mounting slots to the mountings on the motorcycle. Firmly grip both sides of the windscreen close to the top, and with a firm push, fully engage the upper mountings.



1. Upper mounting
2. Windscreen upper mounting slot

4. Turn the windscreen lock to the locked position.

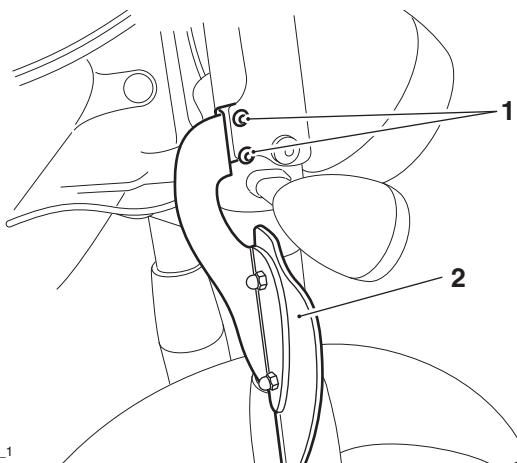
Windscreen mounting brackets – Thunderbird SE

Removal

Warning

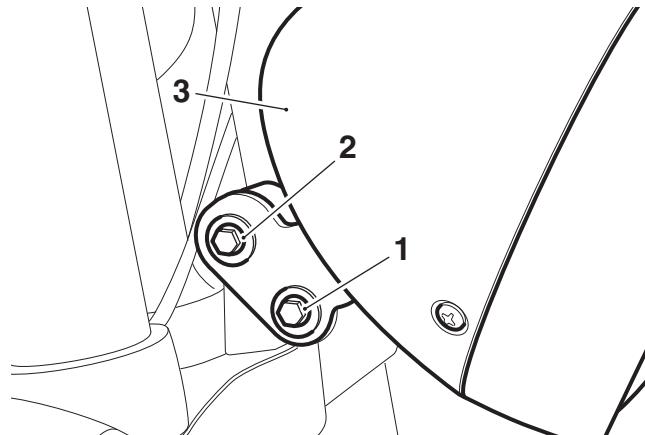
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the windscreen (see page 17-36).
2. Release the fixings and remove the lower air deflector assemblies.



1. Fixings
2. Air deflector assembly (right hand shown)

3. Remove the upper bolt from the headlight mounting.
4. Loosen the lower bolt for the headlight mounting and lower the headlight.

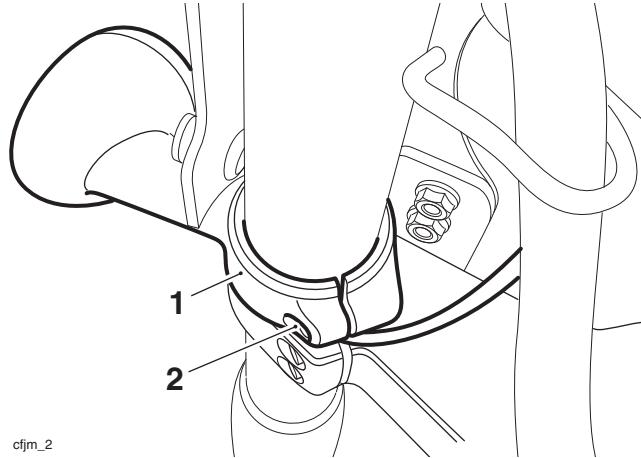


1. Lower bolt
2. Upper bolt
3. Headlight

Frame and Bodywork

Note:

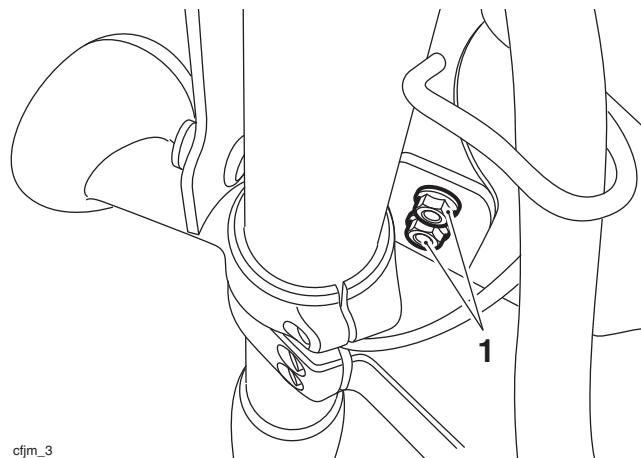
- **Note the position of the split line for the front indicator clamp.**
- 5. To access the lower fixings for the windscreens upper mounting bracket, loosen the screws for the two front indicator clamps and push the indicators forward.



1. Front indicator clamp (left hand shown)

2. Screw

- 6. Remove the lower bolts and nuts from the upper mounting bracket.



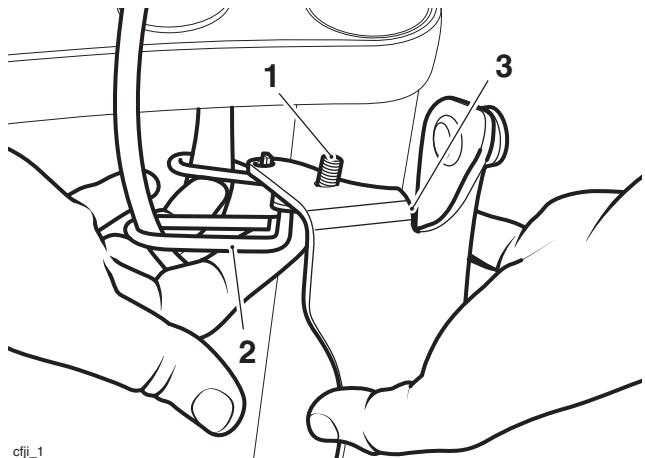
cjfm_3

1. Nuts

Note:

- **Note the position of the cable guide locating tang.**

- 7. Support the upper mounting bracket and remove the upper fixing, position the cable guide aside and remove the mounting bracket.



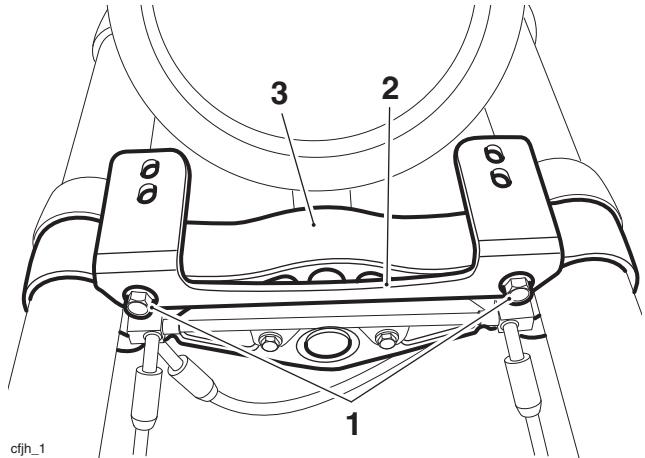
cjji_1

1. Upper fixing

2. Cable guide

3. Upper mounting bracket

- 8. Release the fixings and remove the lower mounting bracket from the lower yoke.



cjfh_1

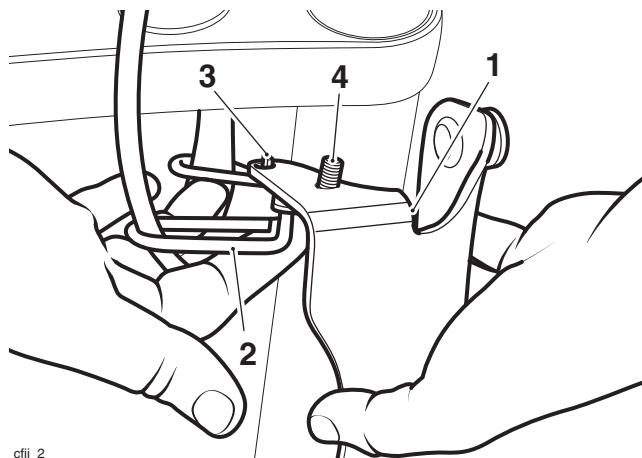
1. Fixings

2. Lower mounting bracket

3. Lower yoke

Installation

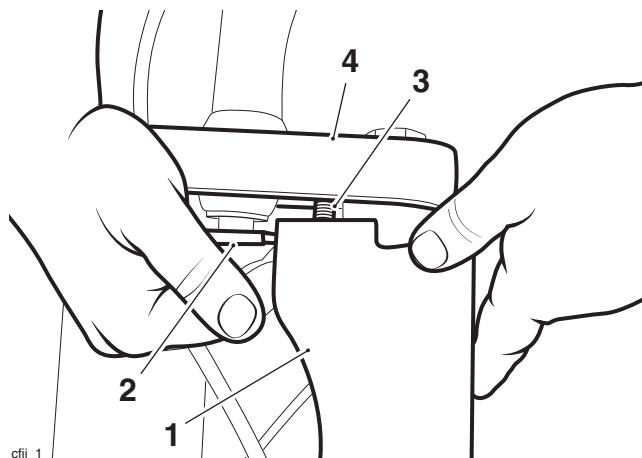
- Fit the lower mounting bracket to the lower yoke. Do not fully tighten the fixings at this stage.
- Align the left hand cable guide to the lower edge of the left hand upper mounting bracket.
- Ensure that the cable guide locating feature aligns with the rear hole and fit the fixing through the front hole.



cfji_2

- 1. Left hand upper mounting bracket**
- 2. Left hand cable guide**
- 3. Cable guide locating feature**
- 4. Fixing**

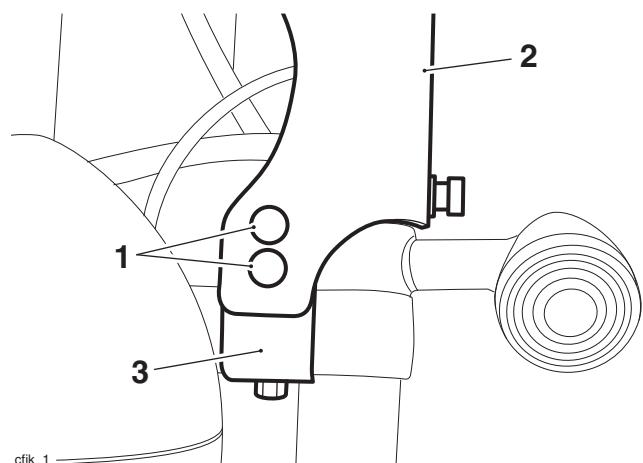
- Fit the left hand upper mounting bracket and cable guide to the upper yoke. Ensure the cable guide is located as noted for removal. Do not fully tighten the fixing at this stage.



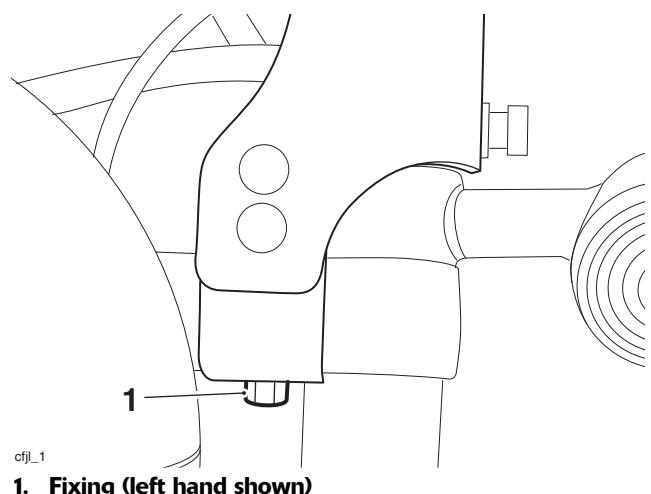
cfjj_1

- 1. Upper mounting bracket**
- 2. Cable guide**
- 3. Fixing**
- 4. Upper yoke**

- Attach the upper mounting plate to the lower mounting plate. Do not fully tighten the bolts and nuts at this stage.



- cfjk_1**
- 1. Bolts**
 - 2. Upper mounting bracket**
 - 3. Lower mounting bracket**
 - Repeat steps 2 to 5 to fit the right hand upper mounting bracket.
 - Tighten the fixings for the lower mounting bracket to **26 Nm**.

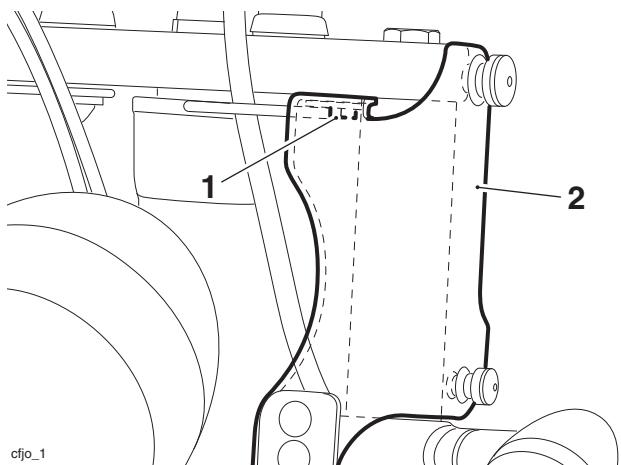


cfjl_1

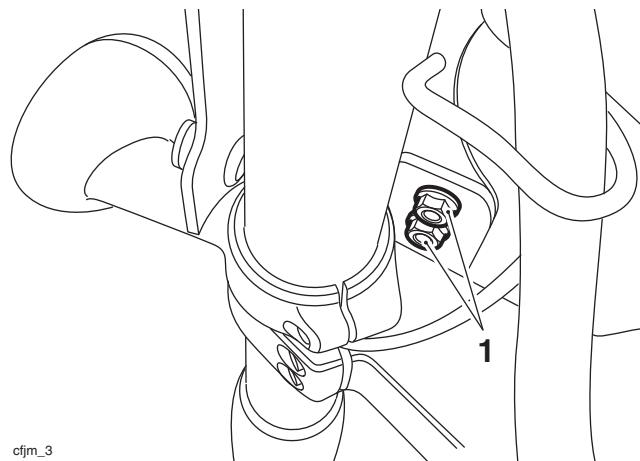
- 1. Fixing (left hand shown)**

Frame and Bodywork

8. Tighten the upper fixings for the upper mounting brackets to **26 Nm**.

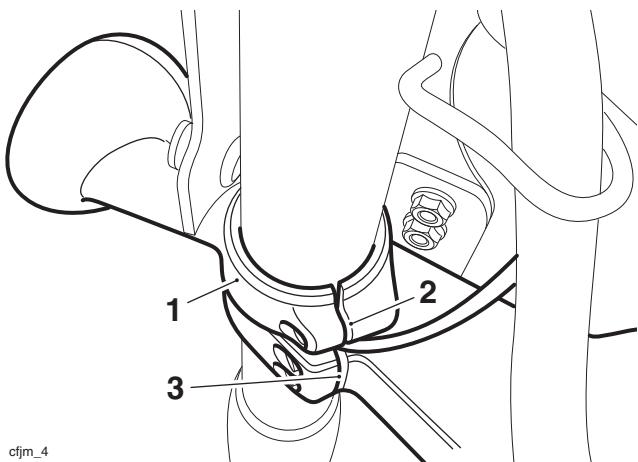


- 1. Fixing**
2. Upper mounting bracket (left hand shown)
9. Tighten the nuts to **9 Nm**.



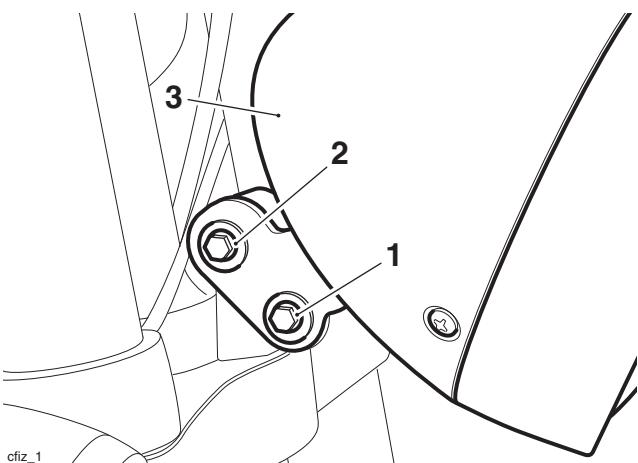
- 1. Nuts**

10. Position the split line of both front indicator clamps as previously noted for removal and tighten the screws to **18 Nm**.



- 1. Front indicator clamp (left hand shown)**
2. Indicator clamp split line
3. Lower yoke clamp split line

11. Fit the lower air deflector assemblies and tighten the fixings to **5 Nm**.
 12. Raise the headlight and fit the upper bolt. Do not fully tighten the bolt at this stage.



- 1. Lower bolt**
2. Upper bolt
3. Headlight
13. Check the headlight alignment (see page 18-23).
 14. Tighten the headlight vertical alignment bolts to **9 Nm**.
 15. Fit the windscreen (see page 17-36).

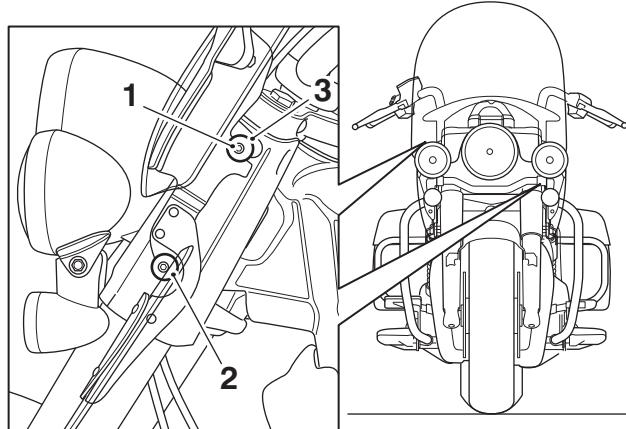
Windscreen – Thunderbird LT

Removal

! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Stand astride the front wheel and firmly grip both sides of the windscreen close to the upper mounting.
2. Pull the windscreen firmly to disengage the upper mountings. Then lift the windscreen up to disengage the lower mountings and completely remove from the motorcycle.



1. Upper mounting
2. Lower mounting
3. Latch

Installation

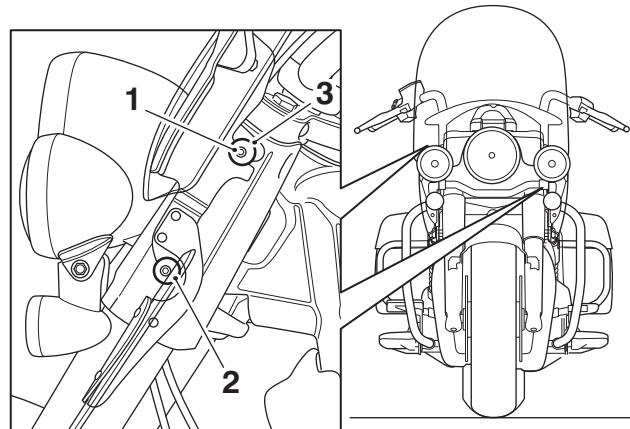
! Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Stand astride the front wheel and align the windscreen lower mounting slots to the lower mountings on the mounting brackets.

Note:

- An audible click can be heard when the windscreen upper mountings are fully engaged.
- 2. Align the windscreen upper mounting slots with their upper mountings on the front forks. With a firm push, fully engage the upper mountings.
- 3. Ensure both of the upper mounting latches are fully engaged round the mountings.



1. Upper mounting
2. Lower mounting
3. Latch

! Warning

To prevent detachment of the windscreen during riding, after fitting always grasp the windscreen and pull firmly upwards. If the windscreen is not correctly secured it may detach from the motorcycle. A loose or detached windscreen could cause loss of motorcycle control and an accident.

Frame and Bodywork

Front Fork Shrouds – Thunderbird Commander and Thunderbird LT

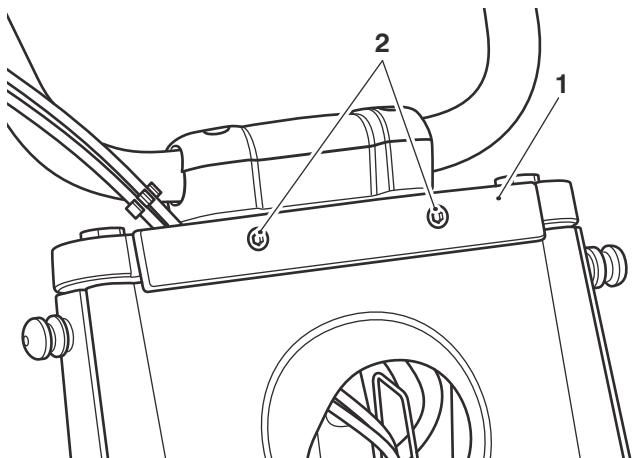
Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. **Thunderbird LT only:** Remove the windscreen (see page 17-36).
2. Remove the rider's seat (see page 17-20).
3. Disconnect the battery, negative (black) lead first.
4. Remove the headlight (see page 18-27).
5. Release the two fixings and remove the shroud from the upper yoke.



1. Shroud
2. Fixings

Thunderbird Commander

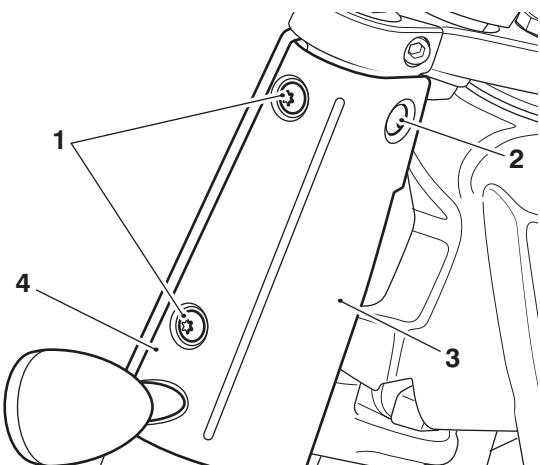
Note:

- Note that the upper side fixing for the shrouds is shorter than the lower fixing for installation.
6. Remove the upper and lower side fixings for the left hand shroud.

Note:

- The front indicators on the Thunderbird Commander are attached to the rear shrouds.
- Note the routing of the front indicator harness for installation.

7. Release the rear fixing, disconnect the indicator harness from the main harness and remove the front and rear shrouds.

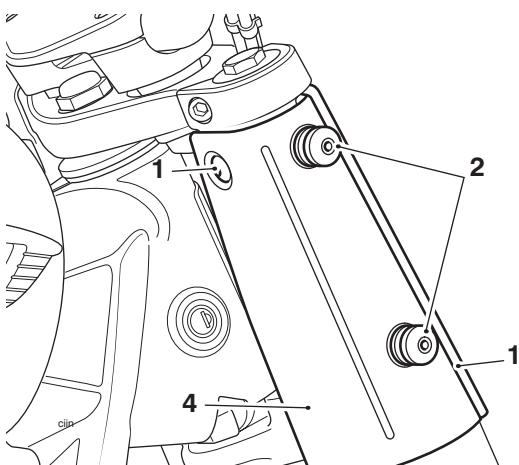


1. Side fixings
2. Rear fixing
3. Rear shroud
4. Front shroud

Thunderbird LT

Note:

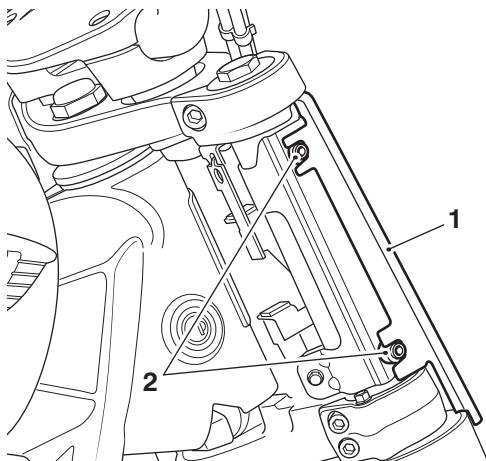
- Note that the upper fixings for the windscreen mountings are shorter than the lower fixings for installation.
8. Remove the upper and lower windscreen mountings.
 9. Release the rear fixings and remove the front and rear shrouds.



1. Rear fixing
2. Windscreen mountings
3. Front shroud
4. Rear shroud

Installation

- Position the front shroud to the motorcycle. Ensure the cut outs on the edge of the shroud align with the mounting bosses.



- Front shroud**
- Mounting bosses**

Thunderbird Commander

Note:

- Do not fit the right hand rear shroud until the headlight has been fitted and connected to the main harness.**
- Route the left hand front indicator harness as noted for removal and connect to the main harness.
- Position the left hand rear shroud to the front fork and secure with the three fixings as noted for removal. Tighten the fixings to **8 Nm**.

Thunderbird LT

- Position the rear shrouds and fit the rear fixing, but do not fully tighten at this stage.
- Fit the windscreens mountings as noted for removal and tighten to **8 Nm**.
- Tighten the fixing for the rear shroud to **8 Nm**.

All Models

- Refit the shroud to the upper yoke and tighten its fixings to **18 Nm**.
- Refit the headlight (see page 18-29).
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).
- Check the operation of the front lights and indicators, rectify any faults as necessary.
- Thunderbird LT only:** Fit the windscreens (see page 17-41).

Front Fork Shroud Support Brackets – Thunderbird Commander and Thunderbird LT

Removal

Warning

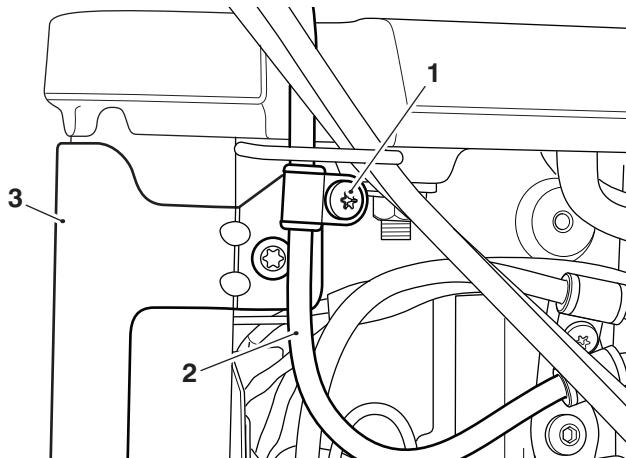
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Thunderbird LT only:** Remove the windscreens (see page 17-36).
- Raise and support the front of the motorcycle.
- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Remove the front wheel (see page 16-10).

Warning

Never allow the brake calipers to hang on the brake hoses as this may damage the hoses. A damaged brake hose can cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

- Remove the front mudguard (see page 17-31).
- Remove the headlight (see page 18-27).
- Remove the front fork shrouds (see page 17-42).
- Release the fixing and detach the brake line from the right hand shroud support bracket.

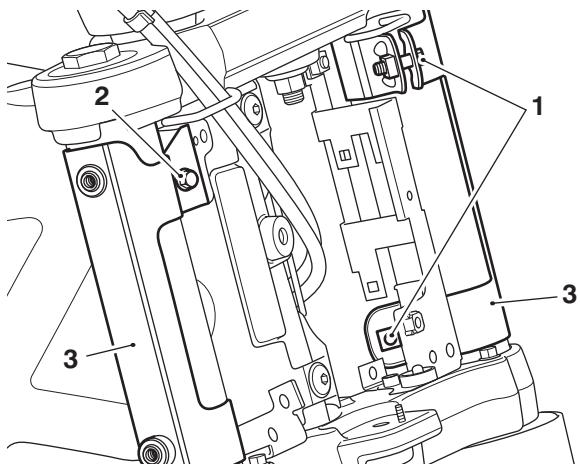


- Fixing**
- Brake line**
- Support bracket**

Frame and Bodywork

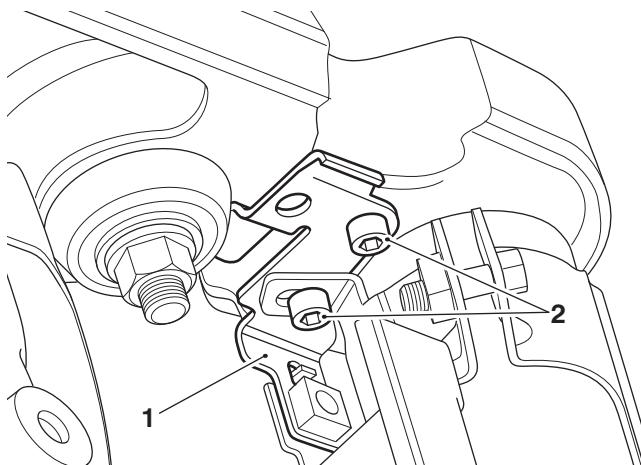
Note:

- **Note the position and orientation of the shroud mounting brackets for installation.**
- **Note the position of the harness brackets to the shroud mounting brackets for installation.**
- 10. Remove and discard the fixings securing the shroud mounting brackets to the front forks.



1. **Left hand bracket fixings (harnesses shown removed for clarity)**
2. **Right hand bracket upper fixing (lower fixing behind the fork)**
3. **Shroud mounting brackets**

11. Remove the fixings securing the shroud support bracket to the upper yoke.



1. **Fixings (harnesses shown removed for clarity)**
2. **Cable guide (left hand shown)**
3. **Shroud support bracket (left hand shown)**

12. Remove the front fork (see page 12-7). As the forks are released, slide the shroud support brackets off the forks and remove them.

Installation

1. Position the shroud support bracket between the upper and lower yokes. Secure to the upper yoke and tighten the fixing to **3 Nm**. Ensure the harness bracket is positioned as noted for removal.
2. Fit the front forks (see page 12-9).
3. Attach the brake line to the right hand shroud support bracket and tighten its fixing to **9 Nm**.

Warning

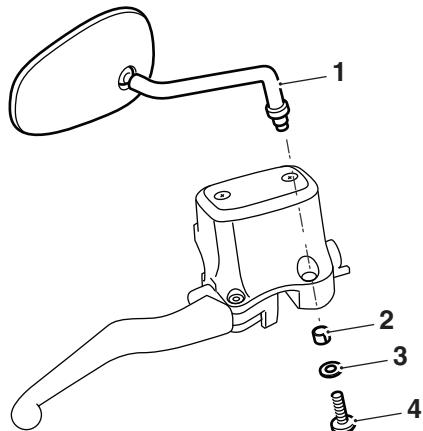
Move the handlebars to the left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable that binds, or steering that is tight/difficult to turn will restrict the steering and may loss of motorcycle control and an accident.

4. Fit the front fork shrouds (see page 17-43).
5. Refit the headlight (see page 18-29).
6. Refit the front mudguard (see page 17-31).
7. Refit the front wheel (see page 16-11).
8. Reconnect the battery, positive (identified with red tape) lead first.
9. Refit the rider's seat (see page 17-20).
10. Refit the windscreen (see page 17-41).
11. Remove the motorcycle from its support and place it on its side stand.
12. Check the operation and beam setting of the headlight, rectify as necessary.

Mirrors

Removal

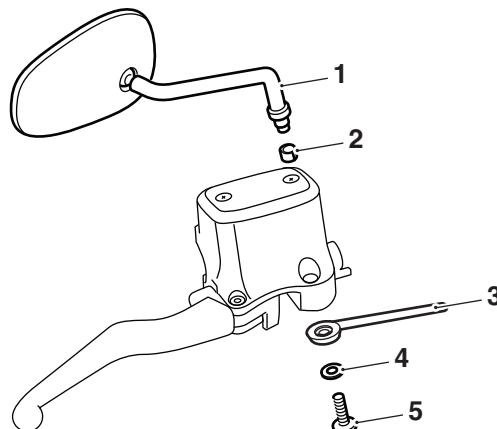
1. Remove the mirror screw and collect the wavy washer.
2. Using a twisting action, remove the mirror in an upwards direction.
3. Remove and discard the tolerance ring.



1. Mirror
2. Tolerance ring
3. Wavy washer
4. Mirror screw

Installation

1. Push a new tolerance ring into the recess in the mirror mounting location.
2. Insert the mirror into the tolerance ring.
3. Working from below the mirror, carefully position Triumph service tool T3880007 centrally over the mirror stem bore with the handle of the tool angled downwards.



1. Mirror mounting location
2. Tolerance ring
3. Tool T3880007
4. Wavy washer
5. Mirror screw
4. Fit and tighten the mirror screw to **10 Nm** whilst ensuring that the tolerance ring is drawn evenly into the hole in the mirror stem bore.
5. Remove the screw and tool. Ensure that the mirror stem has approximately 1.5 mm pull through visible underneath the mirror stem bore.
6. Fit the wavy washer and retighten the mirror screw to **10 Nm**.

Frame and Bodywork

Side Stand

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

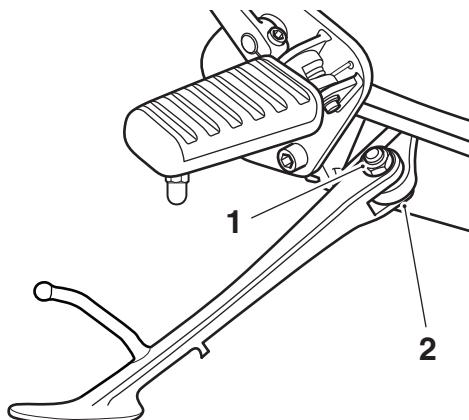
1. Raise and support the motorcycle.
2. Unhook the spring from the side stand and remove it from the motorcycle.



Warning

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

3. Unscrew the nut from the side stand pivot bolt.
4. Unscrew the pivot bolt and remove the stand from the bike.



ctcb

1. Nut
2. Pivot bolt

Installation

1. Lubricate the pivot bolt shoulder and side stand pivot with multipurpose grease.
2. Fit the stand to the bike and insert the pivot bolt, tightening it to **25 Nm**.
3. Fit the lock nut to the pivot bolt and tighten it to **25 Nm**.
4. Hook the spring onto its frame lug then carefully hook it onto the stand lug.



Warning

Wear hand, eye and face protection when fitting the stand spring. Take great care to minimise the risk of personal injury and loss of components.

5. Check the operation of the side stand before riding the motorcycle. Ensure the spring holds the stand securely in the retracted position.

18 Electrical System

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Electrical System

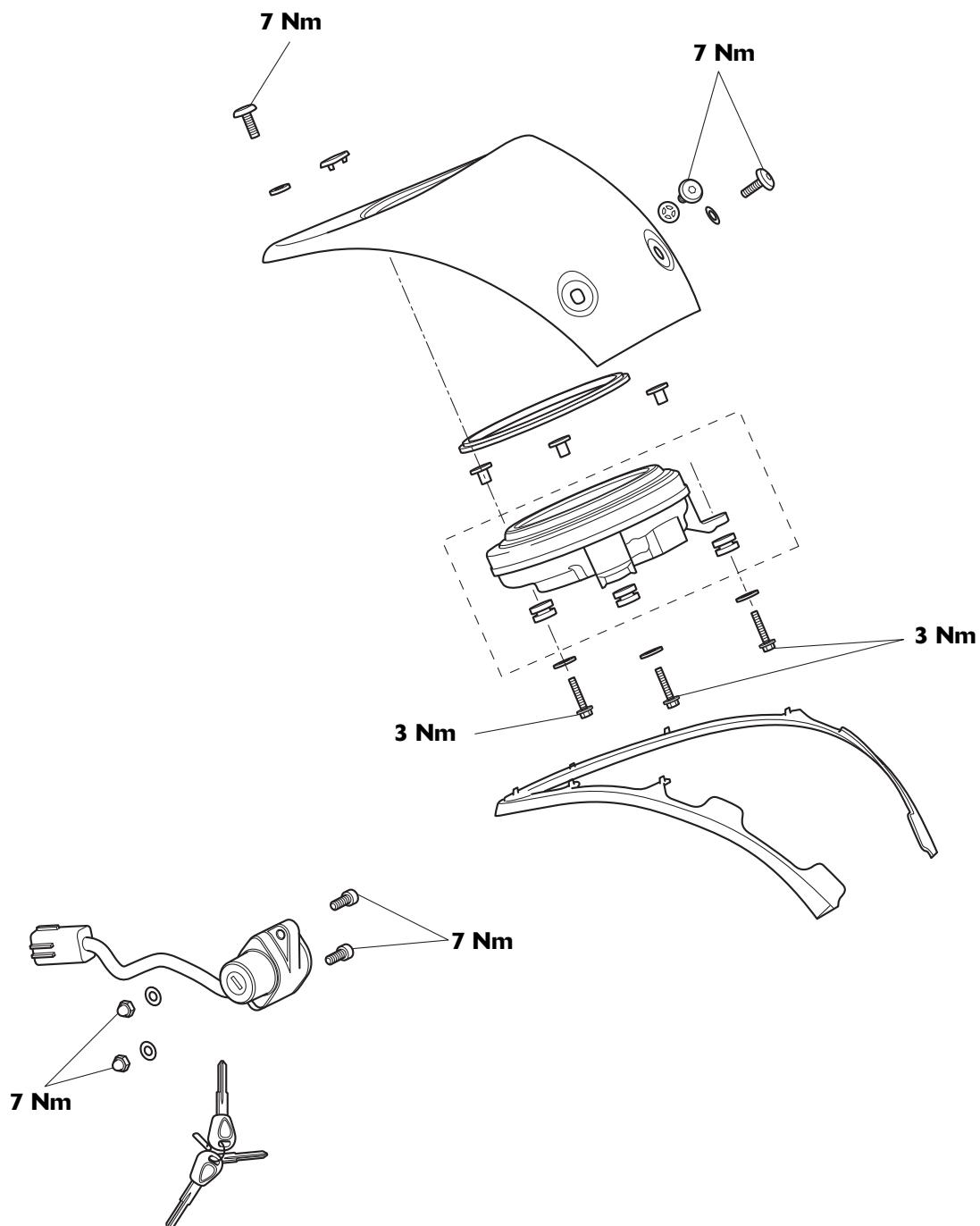
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Electrical System

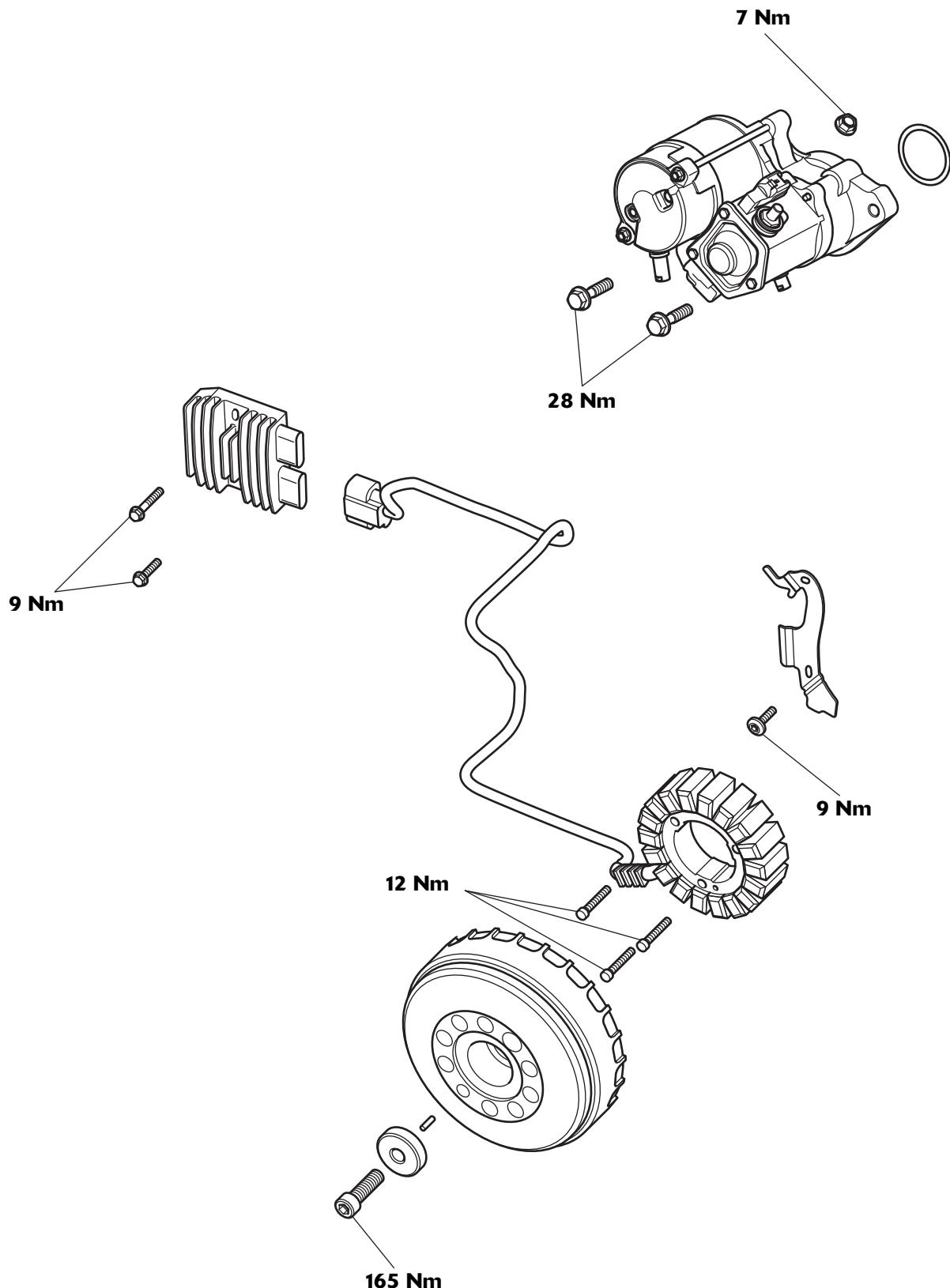
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Exploded View – Instruments and Ignition Switch

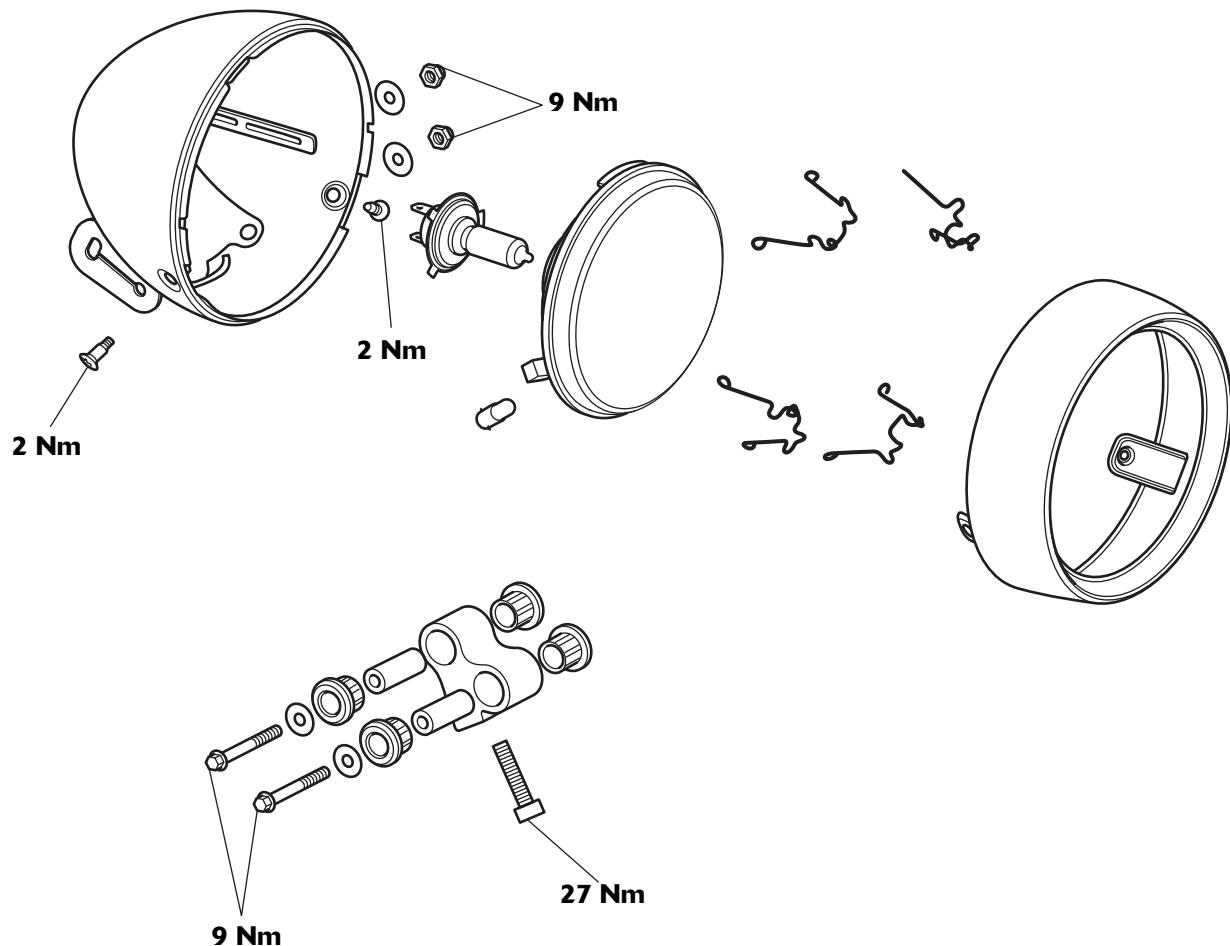


Electrical System

Exploded View – Alternator and Starter Motor

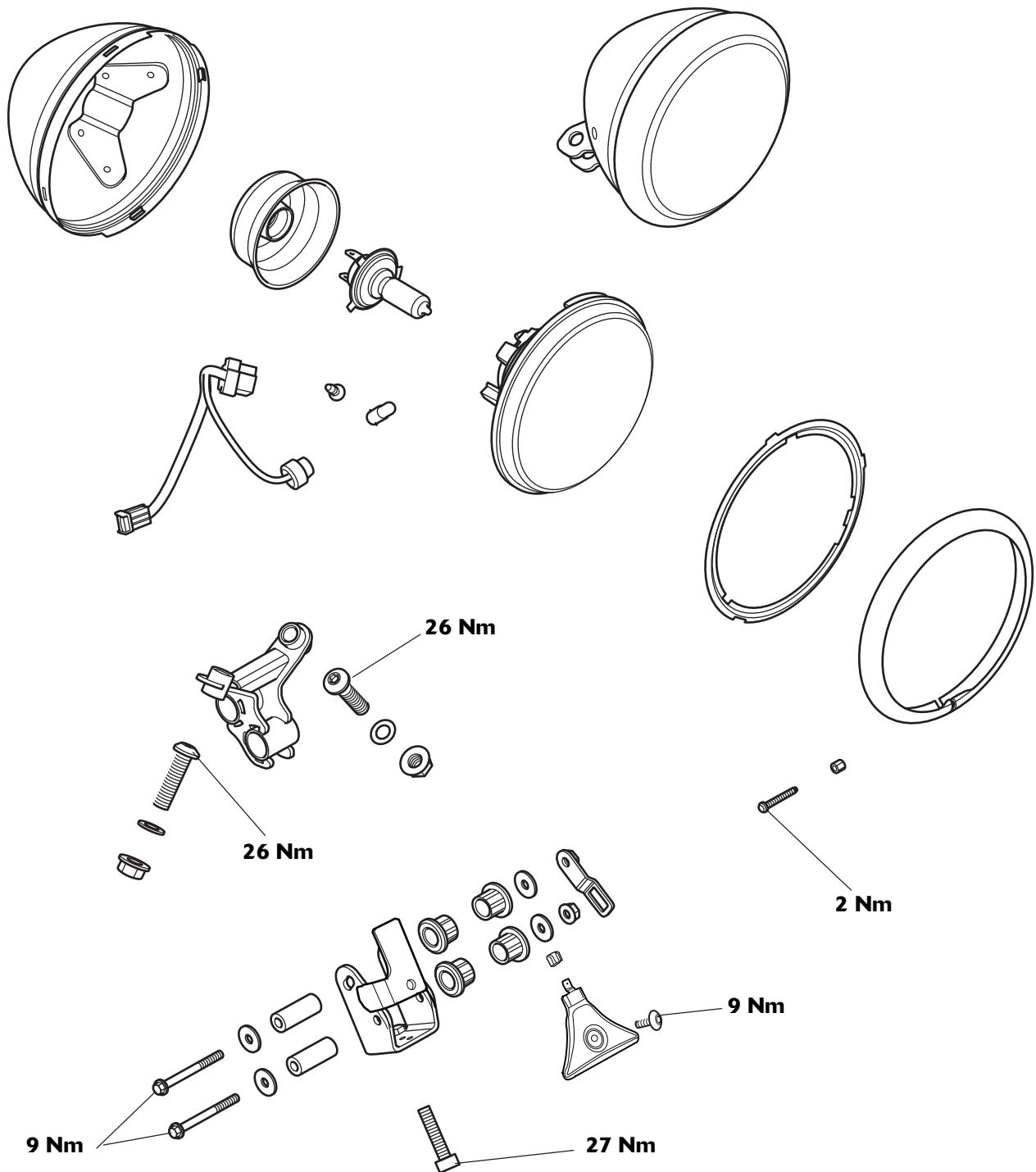


Exploded View – Headlight – Thunderbird and Thunderbird SE



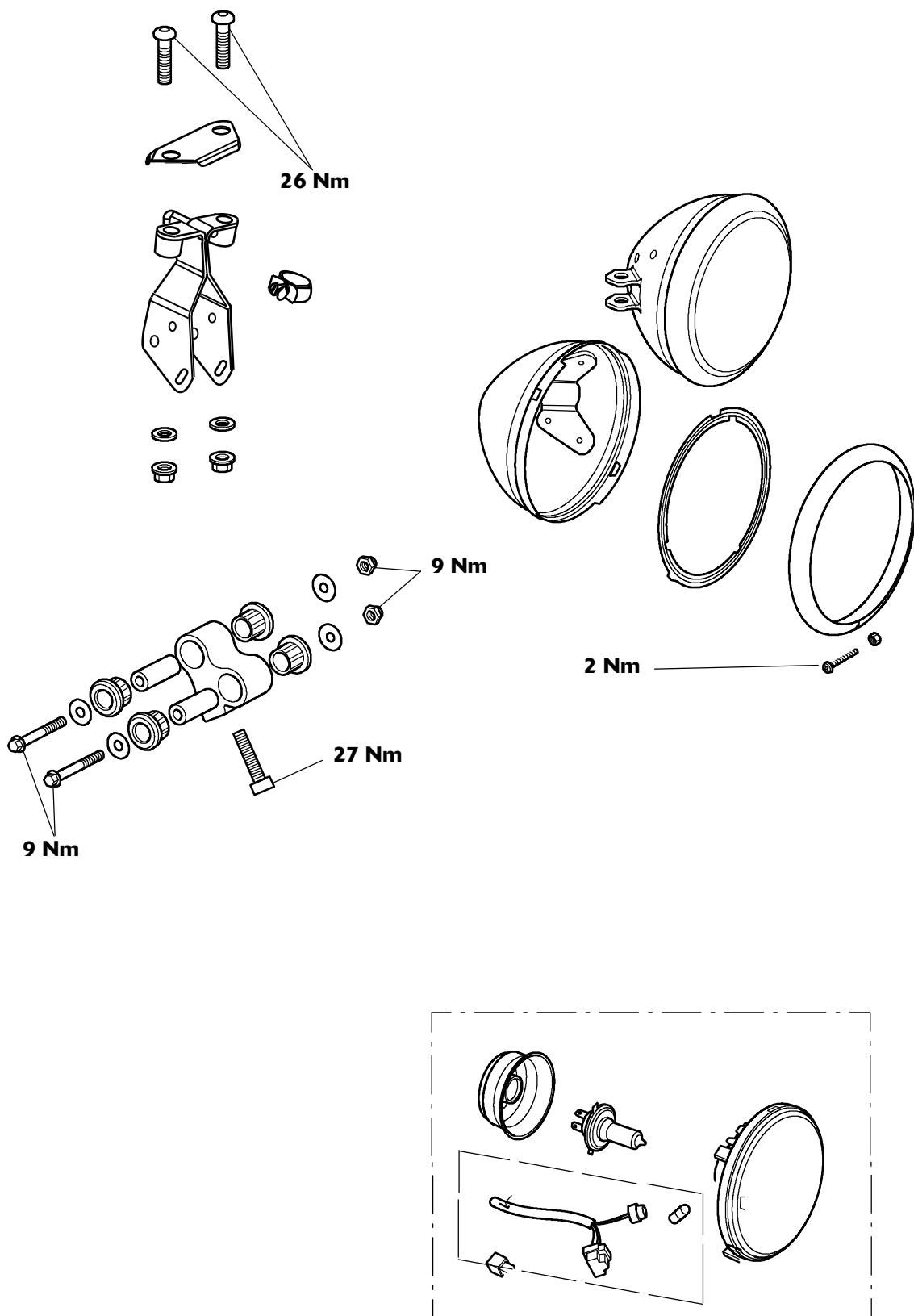
Electrical System

Exploded View – Headlights and Fog Lights – Thunderbird Commander



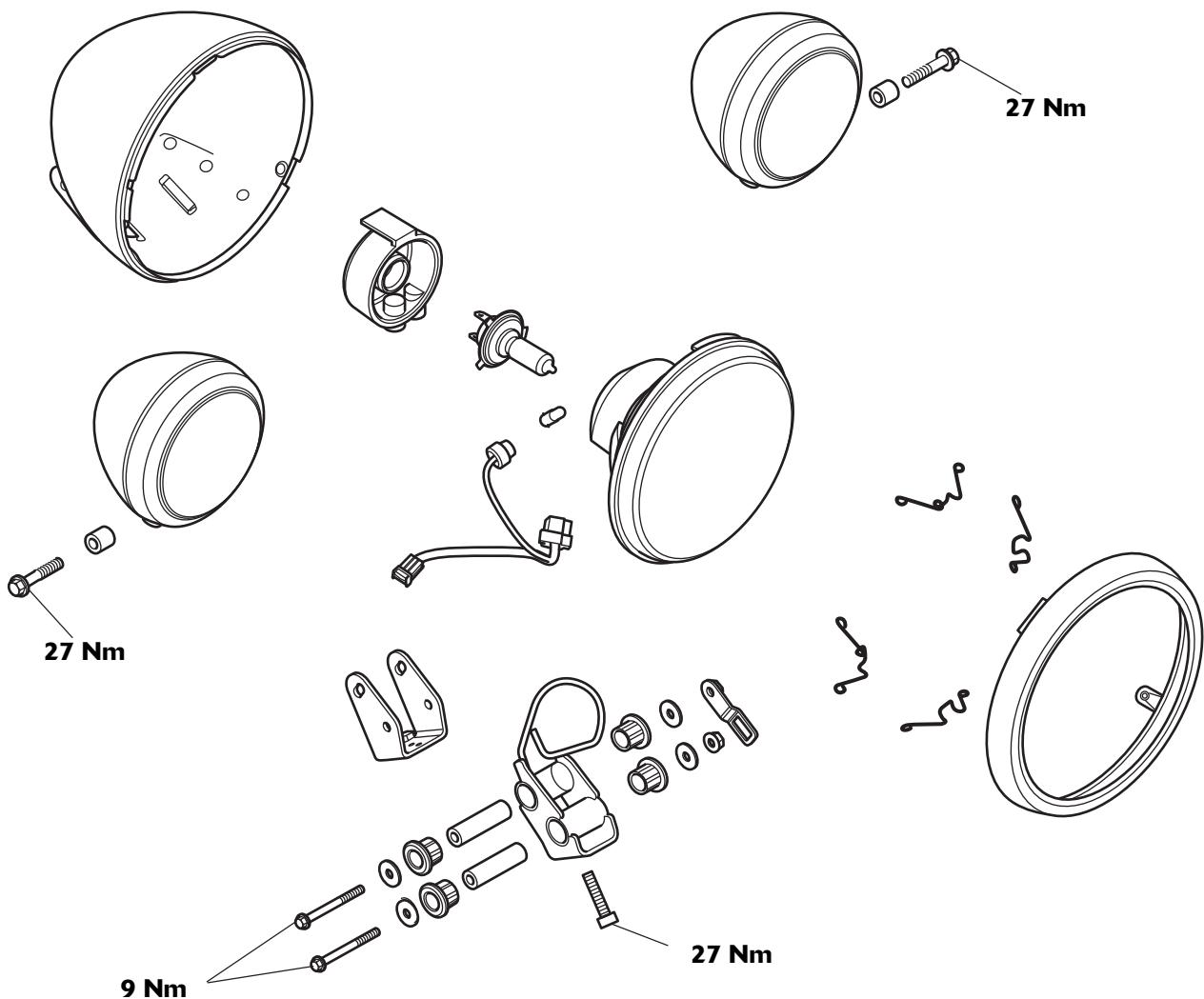
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Exploded View – Headlights – Thunderbird Storm



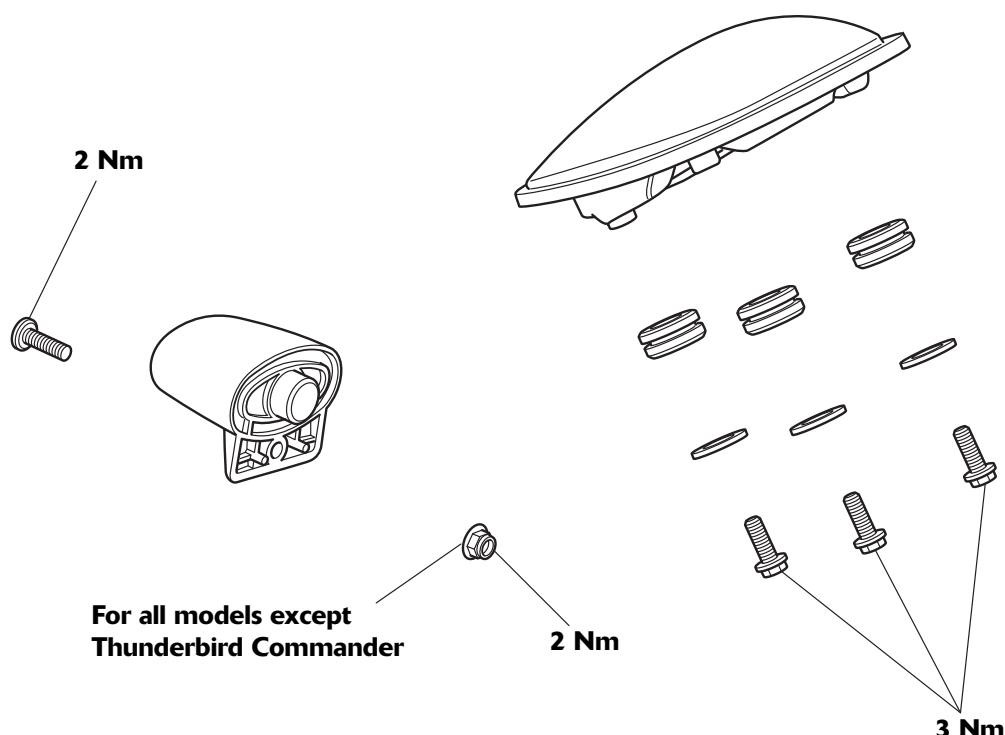
Electrical System

Exploded View – Headlights – Thunderbird LT



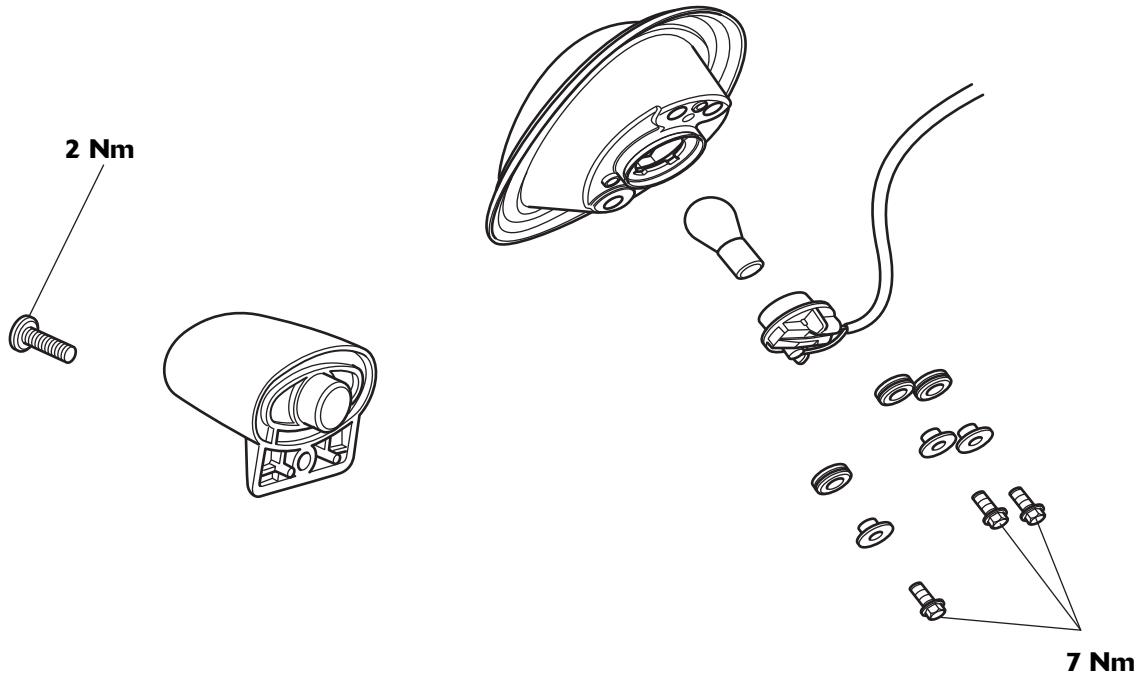
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Exploded View – Rear Lights – All Models Except Thunderbird LT

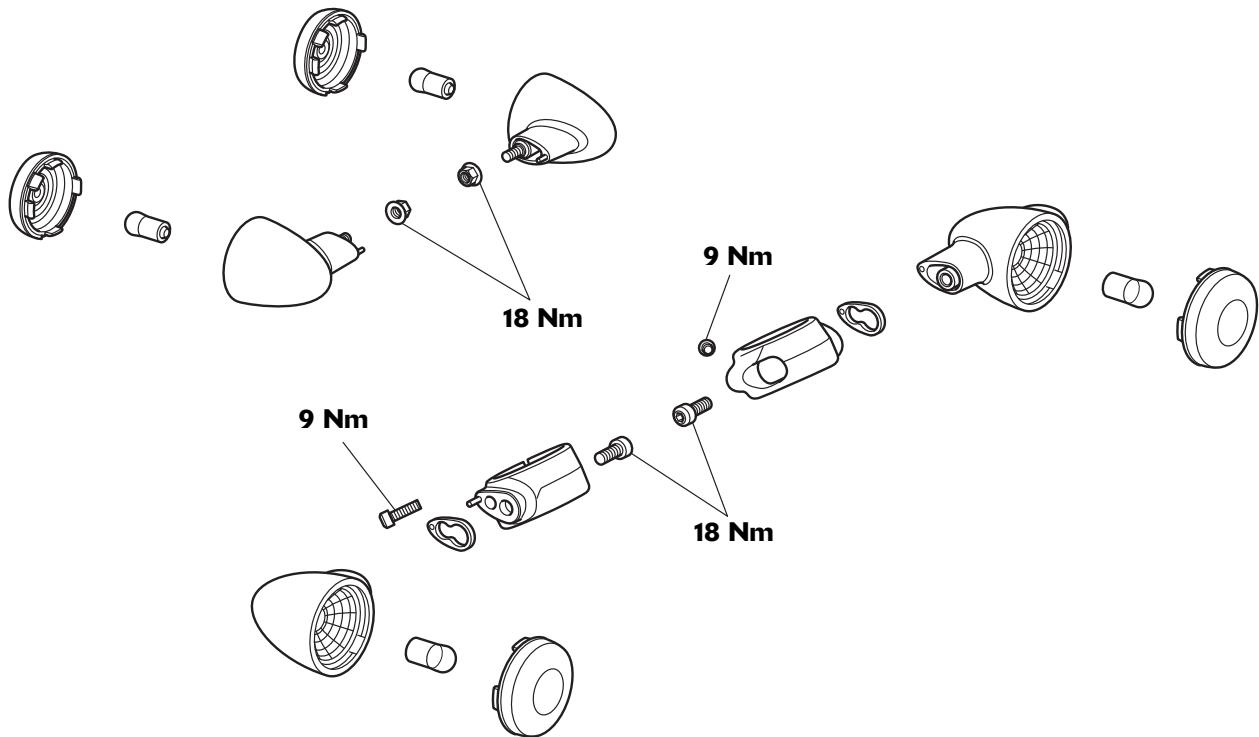


Electrical System

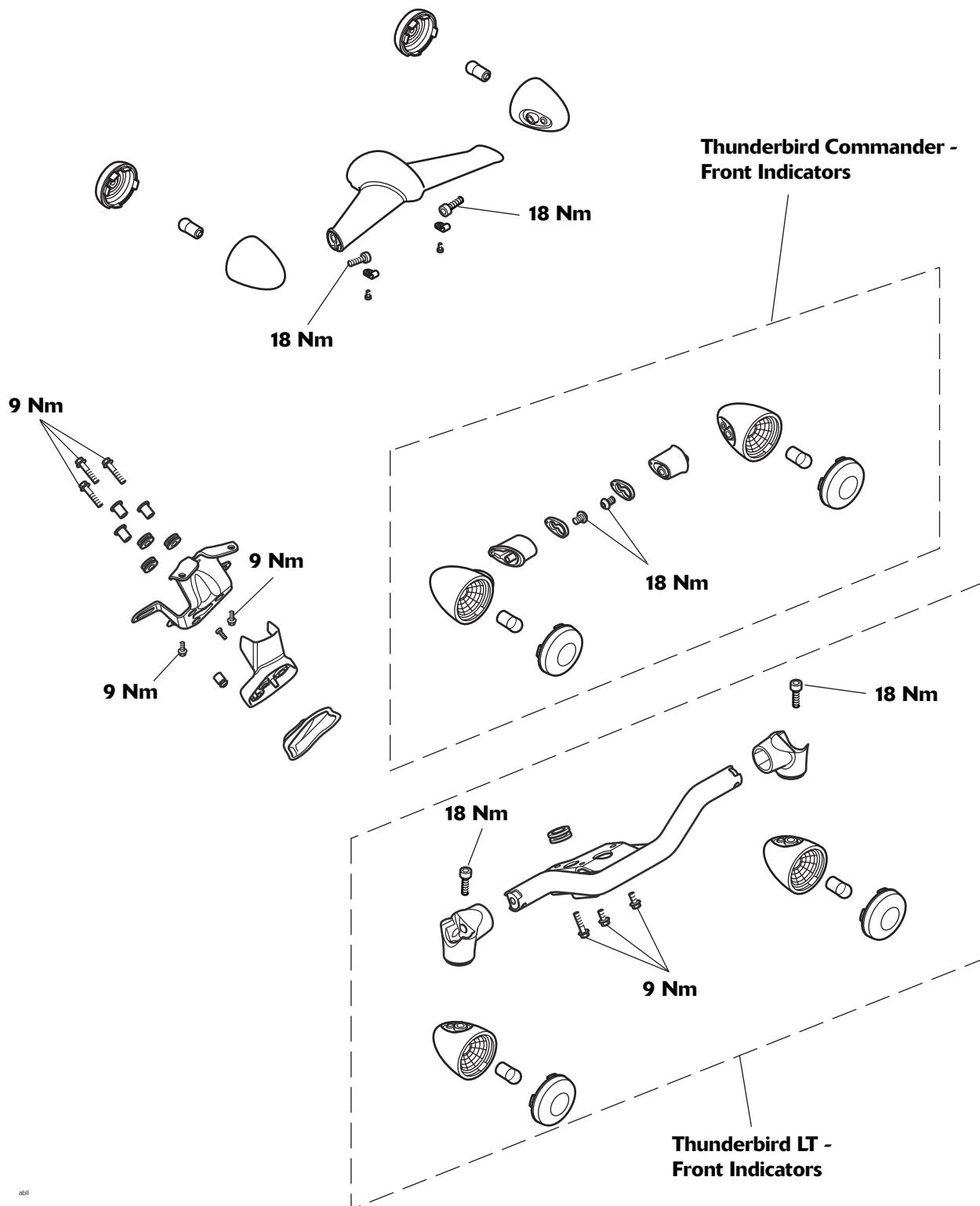
Exploded View – Rear Lights – Thunderbird LT



Exploded View – Indicators – All Models Except Thunderbird Commander and Thunderbird LT



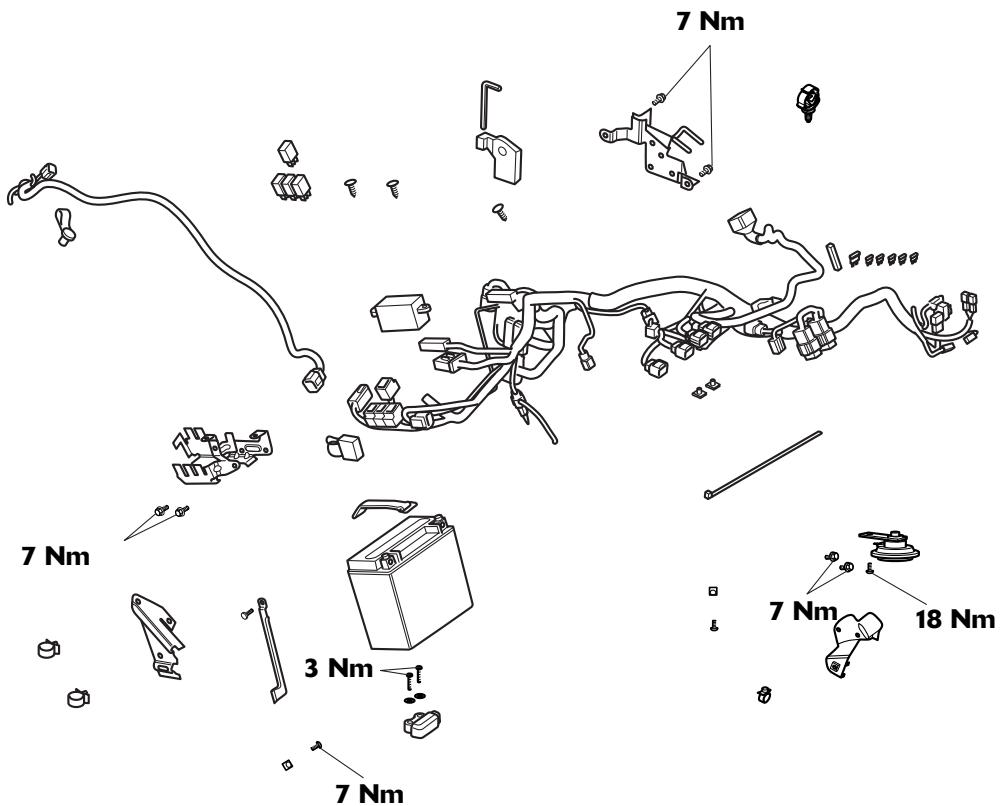
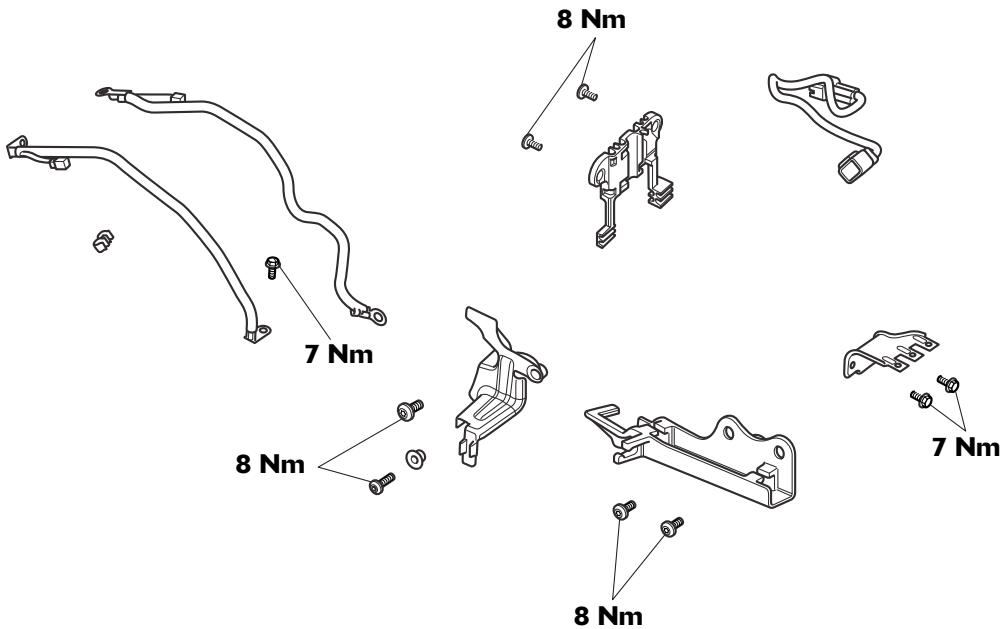
Exploded View – Indicators – Thunderbird Commander and Thunderbird LT



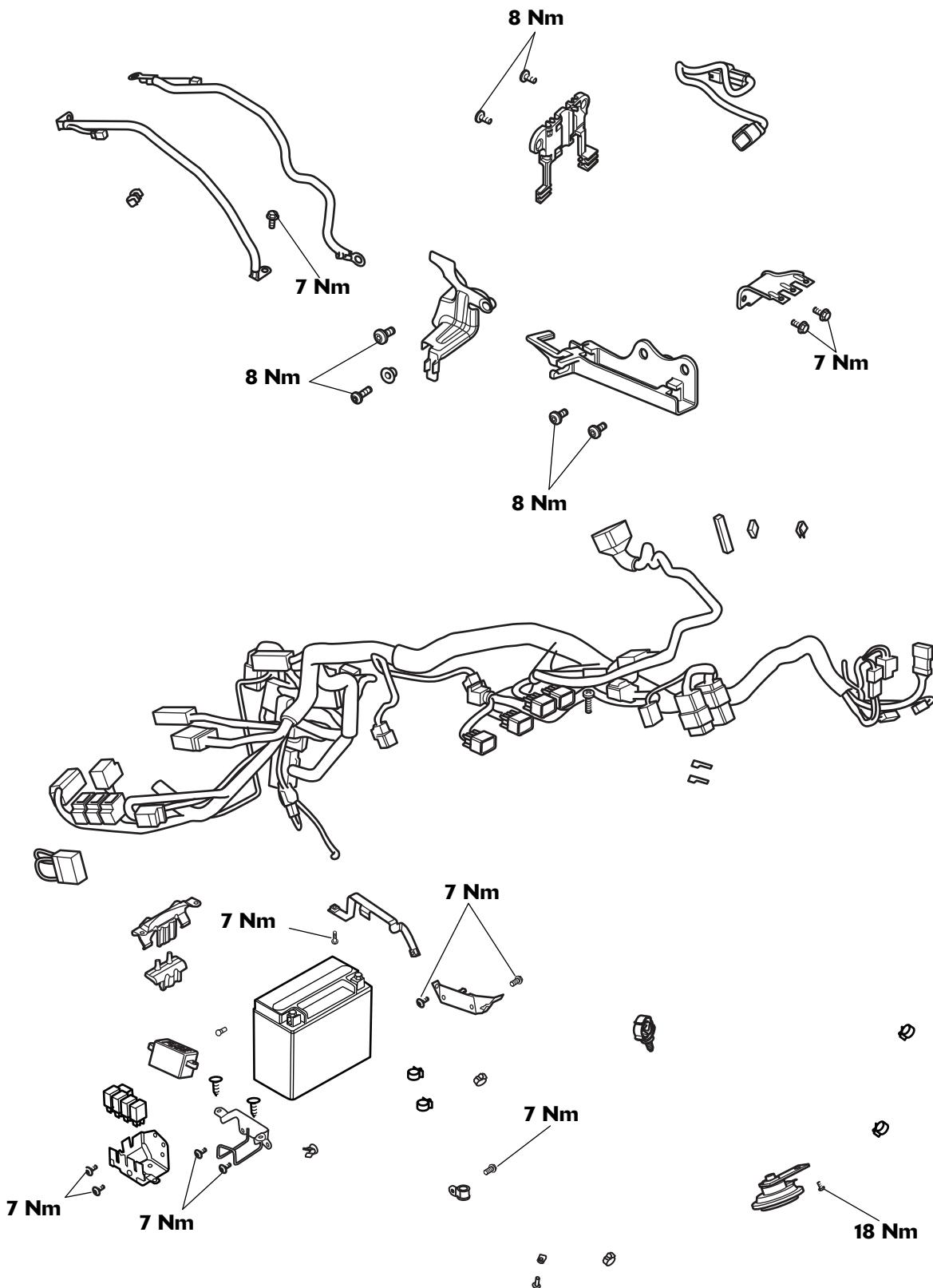
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Electrical System

Exploded View – Battery, Horn and Wiring – All Models Except Thunderbird Commander and Thunderbird LT



Exploded View – Battery, Horn and Wiring – Thunderbird Commander and Thunderbird LT



abls

Electrical System

Battery



Warning

Under some circumstances, the battery can give off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

If electrolyte gets on your skin, flush with water immediately.

If electrolyte gets in your eyes, flush with water for at least 15 minutes and SEEK MEDICAL ATTENTION IMMEDIATELY.

If electrolyte is swallowed, drink large quantities of water and SEEK MEDICAL ATTENTION IMMEDIATELY.

KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.



Warning

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

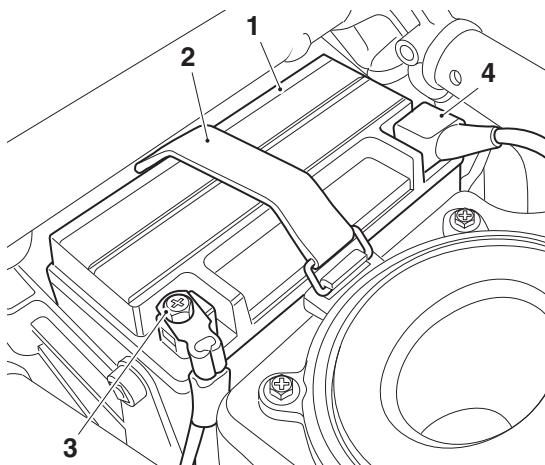
Do not attach jump leads to the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

Battery Disposal

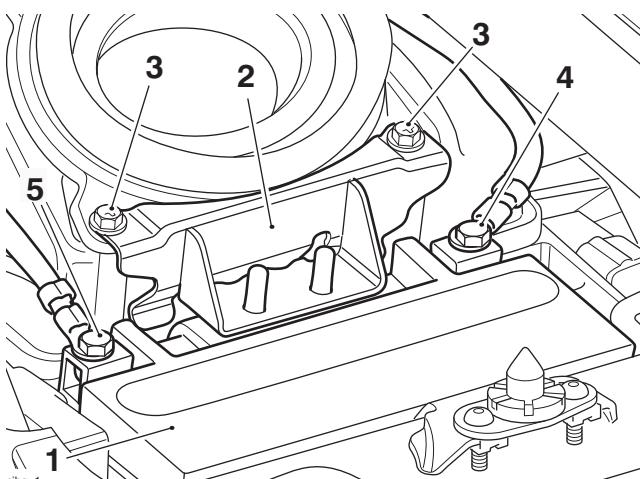
Should the battery ever require replacement, the original battery must be handed to a recycling agent who will ensure that the dangerous substances from which the battery is manufactured do not pollute the environment.

Battery Removal

1. Remove the rider's seat (see page 17-21).
2. **For all models except Thunderbird Commander and Thunderbird LT:** Remove the battery strap.



1. **Battery**
2. **Battery strap**
3. **Negative terminal**
4. **Positive terminal (identified with red tape on the lead)**
3. **For Thunderbird Commander and Thunderbird LT only:** Release the fixings and remove the battery clamp.



1. **Battery**
2. **Battery clamp**
3. **Fixings, battery clamp**
4. **Negative terminal**
5. **Positive terminal**

All Models

4. Disconnect the battery leads, negative (black) lead first.



Warning

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

- Take the battery out of the case.

Battery Installation



Warning

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

- Place the battery in the battery case.
- Reconnect the battery, positive (identified with red tape) lead first.
- Apply a light coat of grease to the terminals to prevent corrosion.
- Cover the positive terminal with the protective cap.
- For all models except Thunderbird Commander and Thunderbird LT:** Refit the battery strap.
- For Thunderbird Commander and Thunderbird LT:** Refit the battery clamp and tighten its fixings to **3 Nm**.

All Models

- Refit the rider's seat (see page 17-21).

Battery Commissioning and Charging

New Battery

In order to correctly and safely commission a new battery, the battery commissioning procedure listed below must be carefully followed. This is the only battery commissioning procedure that Triumph recommends. The procedure is designed to ensure that the battery is at its best when fitted to the motorcycle, and will provide the best possible performance and reliability.

Failure to comply with this procedure may lead to reduced battery performance and/or shorten the life of the battery.



Warning

The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

- If electrolyte gets on your skin, flush with water immediately.
- If electrolyte gets in your eyes, flush with water for at least 15 minutes and SEEK MEDICAL ATTENTION IMMEDIATELY.
- If electrolyte is swallowed, drink large quantities of water and SEEK MEDICAL ATTENTION IMMEDIATELY.

KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.

- Ensure the VIN number printed on the anti-tamper label attached to the battery matches the motorcycle VIN.
- Read the instructions and warnings delivered with the battery.
- Place the battery on a flat level surface and remove the sealing foil.



Caution

Ensure the electrolyte container part number matches the battery part number to be filled. Battery life will be greatly reduced if the incorrect volume (either too little or too much) of acid is added to the battery.

Electrical System

4. Remove the battery sealing strip from the electrolyte container (if applicable) and save for later in this procedure. Place the sealing strip on a clean surface, with the upper side facing downwards to avoid contamination of the sealing strip. Do not break the seal on the electrolyte container.
5. Place the electrolyte container and adapter (if applicable) on the battery and fill the battery according to the manufacturers instructions.
6. After starting to fill the battery with electrolyte, allow the battery to stand for 30 minutes with the filling container in place.
7. Check that all of the electrolyte has drained from the container. Do not remove the container at this point. If the container has not completely drained, tap the sides of the container to start the electrolyte flowing again.
8. After the electrolyte has drained into the battery, allow the battery to stand with the electrolyte container in place for a further 30 minutes for batteries 3 Ah - 12 Ah or 1 hour for batteries greater than 12 Ah.
9. Remove the electrolyte container and adapter carefully, and dispose of immediately.
10. Place the sealing cap strip LOOSELY over the filling holes of the battery.
11. Charge the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9.



Caution

The caps must be fitted (after charging) within two hours of filling the battery with acid. Leaving the battery open to the atmosphere for longer than is necessary will start to reverse the chemical reaction which takes place within the battery, greatly reducing the battery's service life.

12. After charging is complete, press down firmly with both hands to seat the caps (do not use tools or force the caps into position).
13. Disconnect the charger and allow the battery to stand for 1 hour before fitting to the motorcycle.
14. Fit the battery to the motorcycle, positive (red) lead first.

Battery Maintenance

The battery is a sealed type and does not require any maintenance other than checking the voltage and routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

Note:

- **The charge level in the battery must be maintained to maximise the battery life.**

With normal use of the motorcycle, the charging system will keep the battery charged. If the motorcycle is unused, the battery will gradually discharge due to battery self discharge and the continuous current drain for the clock and the engine control module memory.

The rate of battery discharge can be greatly increased by the addition of electrical security systems or other accessories.

Allowing a battery to discharge, or leaving it discharged over a period of time, causes sulphation of the lead plates within the battery.

Sulphation is a normal chemical reaction inside the battery and over a period of time sulphate will crystallise on to the lead plates making charging difficult or impossible. The result is a permanently damaged battery, which would not be covered by the motorcycle warranty.

Keeping a battery at full charge reduces the chance of it freezing in cold conditions. Allowing a battery to freeze can cause serious internal damage to the battery.

When leaving the motorcycle standing for more than a few days, regularly check the battery voltage using a digital multimeter. Should the battery voltage fall below 12.8 V, charge the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9.

For extended periods of storage (beyond two weeks) the battery should be removed and the battery voltage checked regularly and charged when below 12.8 V.

Battery Already in Service

Note:

- Before carrying out the following procedure the battery must be disconnected and removed from the motorcycle.

Use the guidelines in the table below for charging. Always verify the battery condition before charging, and 30 minutes after charging.

Note:

- A fully charged battery should read 12.8 volts or higher after the battery has been off the charger for 30 minutes or more.

Table of Battery Charging Times

State of charge	Voltage	Action	Charge time (using BatteryMate 150-9)
100%	12.8 V - 13.0 V	None. Check at 6 months from date of manufacture	None required
75% - 100%	12.5 V - 12.8 V	May need slight charge. If no charge given, check in 3 - 4 months	3 - 6 hours
50% - 75%	12.0 V - 12.5 V	Needs charge	5 - 11 hours
25% - 50%	11.5 V - 12.0 V	Needs charge	At least 13 hours
0% - 25%	11.5 V or less	Needs recovery using BatteryMate 150-9. Retest after recovery	20 hours

Electrical System

Fuses

The fuse box is located behind the right hand side panel. To allow access to the fuse box, the right hand side panel must be removed (see page 17-30).



Warning

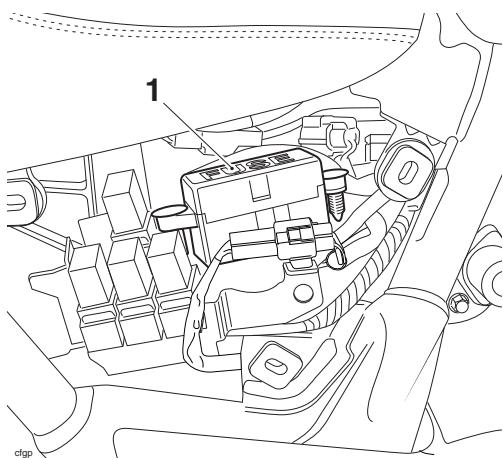
Always replace blown fuses with new ones of the correct rating (as specified on the fuse box cover) and never use a fuse of higher rating. Use of an incorrect fuse could lead to an electrical problem, resulting in motorcycle damage, loss of motorcycle control and an accident.

Fuse Identification

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, use the table below to establish which fuse has blown.

All Models Except Thunderbird Commander and Thunderbird LT

Fuse Box



1. Fuse box

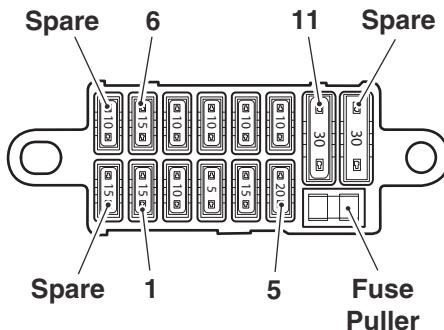
Models without ABS:

Position	Circuit Protected	Rating (Amps)
1	Dip and main headlight beams, starter solenoid	15
2	Spare	10
3	Auxiliary lights	5
4	Cooling fan	15
5	Engine management system	20
6	Accessory socket, heated grips	15
7	Alarm, instruments	10
8	Accessory lights, fog lights	10* or 15*
9	Horn, brake switch	10
10	Ignition, starter circuit	10
11	Main fuse	30

* Refer to the label in the fuse box cover

Note:

- Numbers shown in the diagram correspond to the fuse position numbers in the models without ABS table.



Front of
Motorcycle

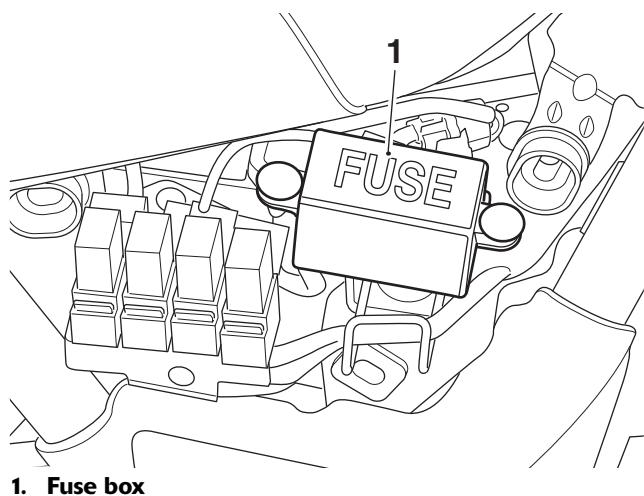
Models fitted with ABS:

Position	Circuit Protected	Rating (Amps)
1	Dip and main headlight beams, starter solenoid	15
2	ABS	20
3	Auxiliary lights	5
4	Cooling fan	15
5	Engine management system	20
6	Accessory socket, heated grips‡, accessory lights, fog lights	15* or 20*
7	Alarm, instruments, heated grips‡	10
8	ABS	20
9	Horn, brake switch	10
10	Ignition, starter circuit	10
11	Main fuse	30

* Refer to the label in the fuse box cover
 ‡ If the fuse fitted at position 6 is 15 amps, the heated grips will be powered from this fuse.
 If the fuse fitted at position 6 is 20 amps, the heated grips will be powered from fuse 7.

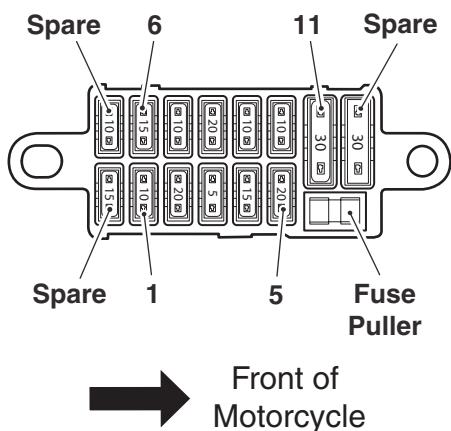
Thunderbird Commander and Thunderbird LT

Fuse Box



Note:

- Numbers shown in the diagram correspond to the fuse position numbers in the models fitted with ABS table.



Electrical System

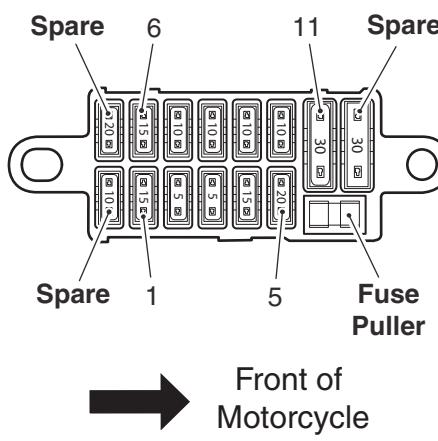
Thunderbird Commander:

Position	Circuit Protected	Rating (Amps)
1	Dip and main headlight beams, starter solenoid	15
2	Spare	10
3	Auxiliary lights	5
4	Cooling fan	15
5	Engine management system	20
6	Accessory socket, heated grips	15
7	Alarm, instruments	10
8	Accessory lights, fog lights	10* or 15*
9	Horn, brake switch	10
10	Ignition, starter circuit	10
11	Main fuse	30

* Refer to the label in the fuse box cover

Note:

- Numbers shown in the diagram correspond to the fuse position numbers in the following table.



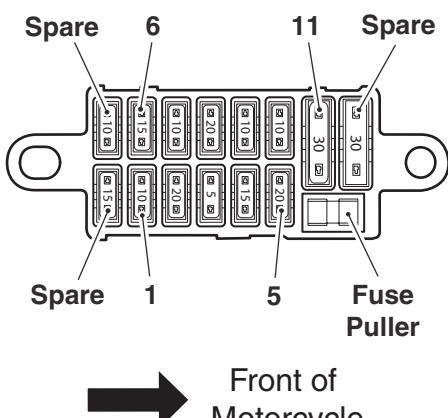
Thunderbird LT:

Position	Circuit Protected	Rating (Amps)
1	Dip and main headlight beams, starter solenoid	10
2	ABS	20
3	Auxiliary lights	5
4	Cooling fan	15
5	Engine management system	20
6	Accessory socket, heated grips, accessory lights, fog lights	15* or 20*
7	Alarm, instruments, heated grips	10
8	ABS	20
9	Horn, brake switch	10
10	Ignition, starter circuit	10
11	Main fuse	30

* Refer to the label in the fuse box cover

Note:

- Numbers shown in the diagram correspond to the fuse position numbers in the following table.



Headlight – Thunderbird and Thunderbird SE



Warning

Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated. Ensure that the beams are adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.

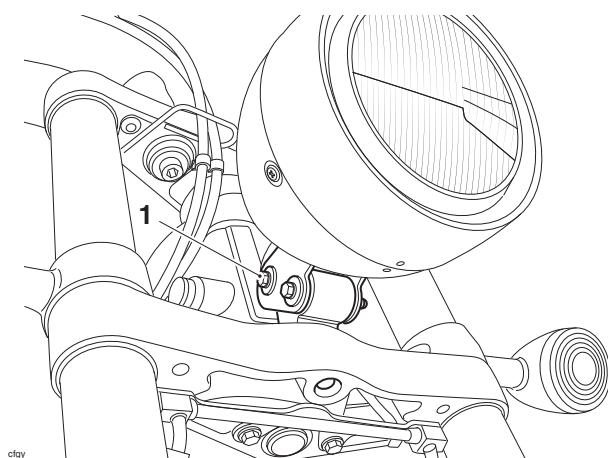


Warning

Never attempt to adjust a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

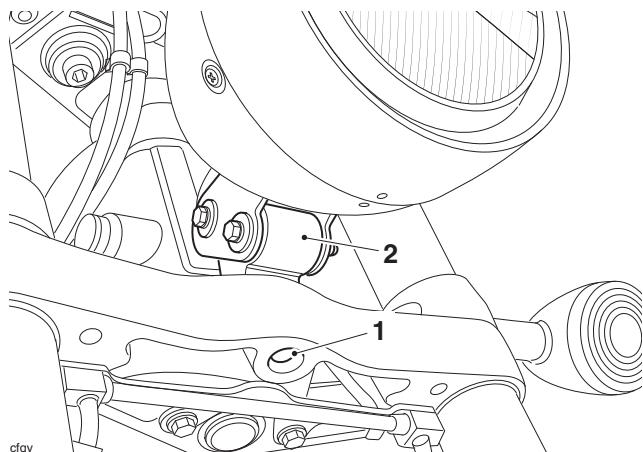
Headlight Vertical Adjustment



1. Vertical beam adjuster

1. Switch the headlight dipped beam on.
2. Slacken the clamp bolt sufficiently to allow restricted movement of the headlight.
3. Adjust the position of the headlight to give the required beam setting.
4. Tighten the clamp bolt to **9 Nm**.
5. Recheck the headlight beam setting.
6. Switch the headlight off when the beam setting is satisfactorily set.

Headlight Horizontal Adjustment

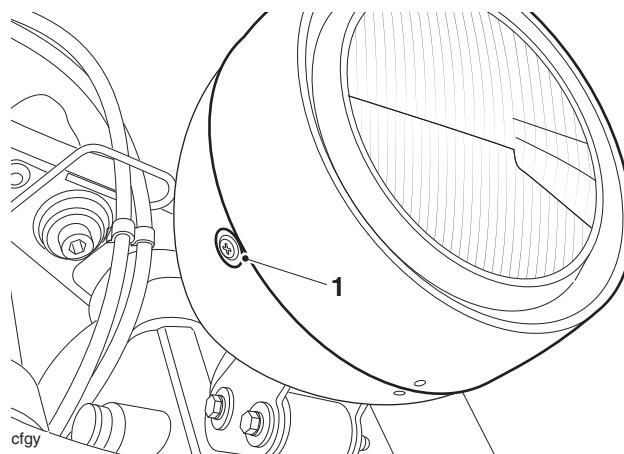


- 1. Horizontal beam adjuster**
2. Headlight mounting bracket

1. Switch the headlight dipped beam on.
2. Slacken the headlight mounting bracket fixing.
3. Adjust the horizontal position of the headlight and mounting bracket to give the required beam setting.
4. Tighten the headlight mounting bracket fixing to **27 Nm**.
5. Recheck the headlight beam settings.
6. Switch the headlight off when the beam setting is satisfactorily set.

Headlight Removal

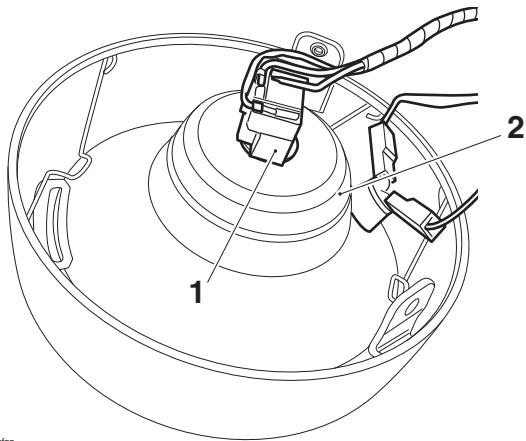
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Release the two screws and detach the headlight from the headlight bowl.



1. Headlight screw (1 of 2)

Electrical System

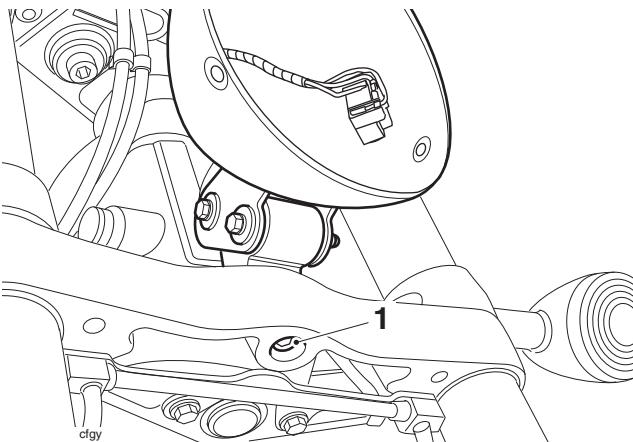
- Disconnect the electrical connector from the headlight bulb, detach the position light and remove the headlight.



- 1. Electrical connector**
- 2. Position light**

Note:

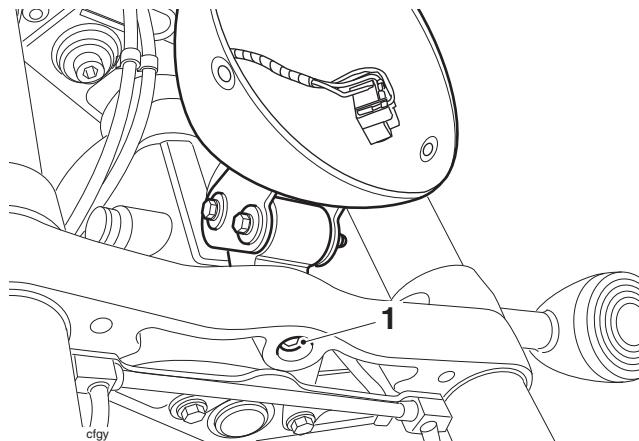
- The right hand indicator wiring is identified by a section of red tape.**
 - Make a note of the direction indicator harness routing and the wiring harness routing inside the headlight bowl before disconnection.**
- Disconnect the two direction indicator electrical connectors.
 - Release the headlight horizontal adjustment bolt and remove the headlight assembly while feeding the harnesses out of the headlight bowl.



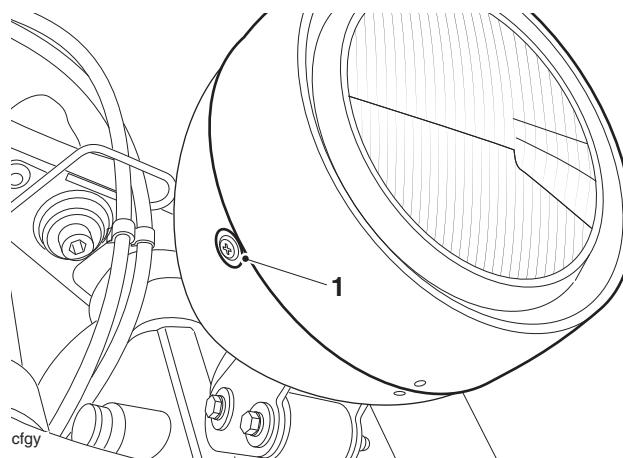
- 1. Headlight horizontal adjustment bolt**

Headlight Installation

- Refit the headlight bowl and bracket assembly while feeding the harnesses into the headlight bowl. Tighten the bolt to **27 Nm**.



- 1. Headlight horizontal adjustment bolt**
- Secure the wiring harnesses in the headlight bowl as noted during removal.
- Reconnect the direction indicator electrical connectors as noted during removal. The right hand direction indicator harness and the main harness are both marked with red tape to aid correct connection.
- Reconnect the headlight electrical connector and refit the position light.
- Refit the headlight, tightening the screws to **2 Nm**.



- 1. Headlight screw (1 of 2)**
- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-21).
- Check the headlight operation and the beam setting, rectify as necessary.

Headlights – Thunderbird Storm

! Warning

Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated.

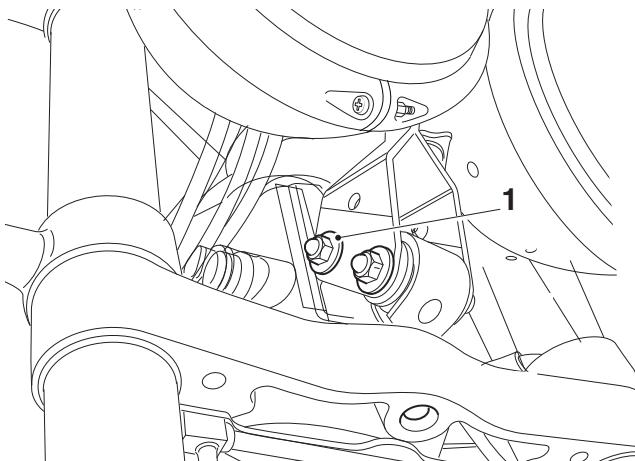
Ensure that the beams are adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.

! Warning

Never attempt to adjust a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

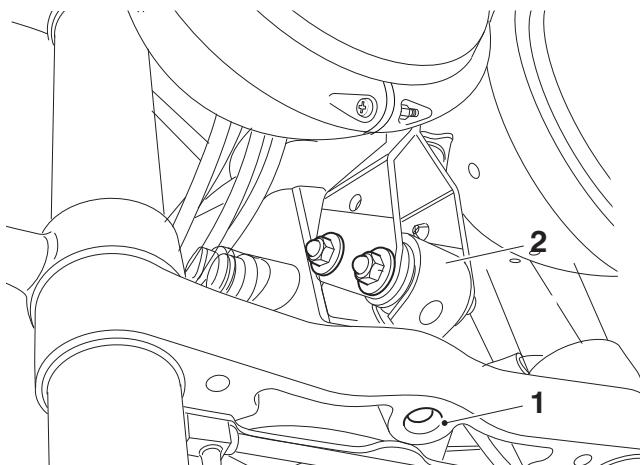
Headlights Vertical Adjustment



1. Vertical beam adjuster

1. Switch the headlight dipped beams on.
2. Slacken the clamp bolt sufficiently to allow restricted movement of the headlight.
3. Adjust the position of the headlights to give the required beam setting.
4. Tighten the clamp bolt to **9 Nm**.
5. Recheck the headlight beam setting.
6. Turn the ignition off when both beam settings are satisfactorily set.

Headlights Horizontal Adjustment

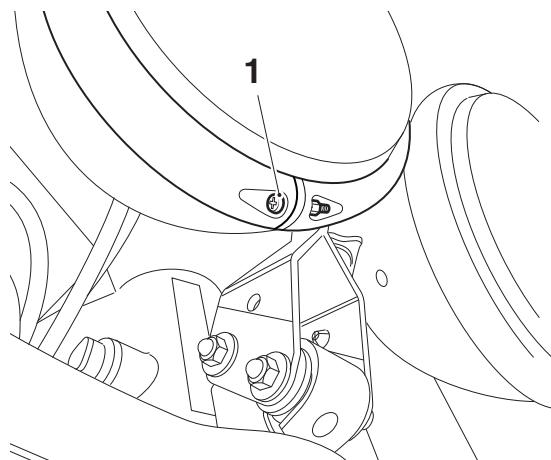


- 1. Horizontal beam adjuster**
2. Headlight mounting bracket

1. Switch the headlight dipped beam on.
2. Slacken the headlight mounting bracket fixing.
3. Adjust the horizontal position of the headlight and mounting bracket to give the required beam setting.
4. Tighten the headlight mounting bracket fixing to **27 Nm**.
5. Recheck the headlight beam settings.
6. Switch the headlight off when the beam setting is satisfactorily set.

Headlight Removal

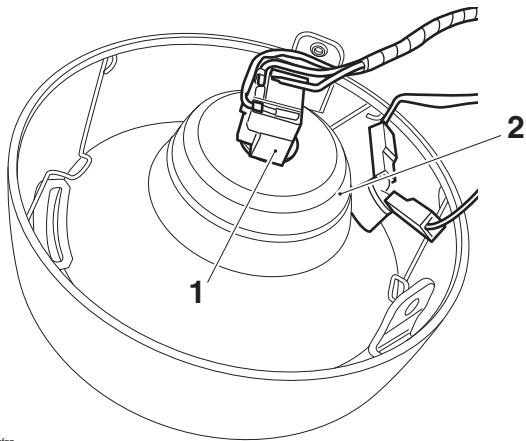
1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Release the screws, remove both headlight rims and detach the headlights from the headlight bowls.



1. Screw (right hand headlight)

Electrical System

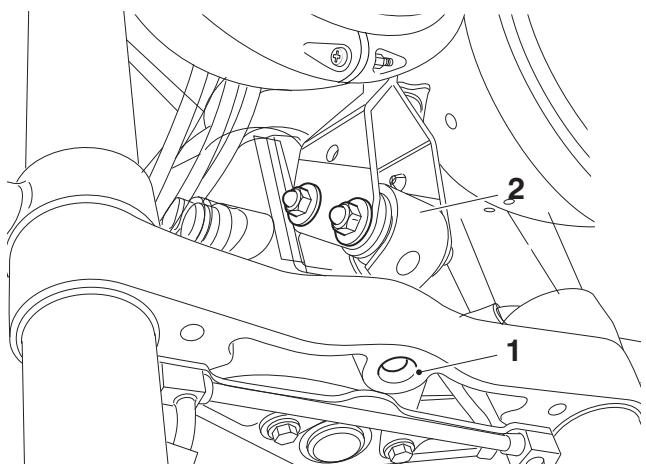
- Disconnect the electrical connector from the headlight bulb, detach the position light and remove the headlight.



- 1. Electrical connector**
- 2. Position light**

Note:

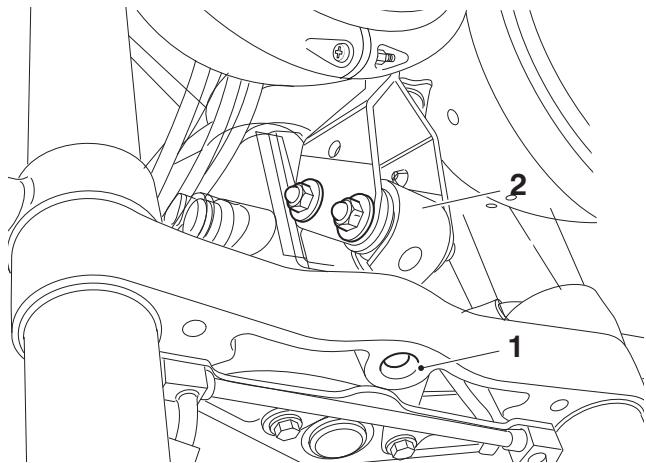
- The right hand indicator wiring is identified by a section of red tape.
 - Make a note of the direction indicator harness routing and the wiring harness routing inside the headlight bowl before disconnection.
- Disconnect the two direction indicator electrical connectors.
 - Release the headlight horizontal adjustment bolt and remove the headlight assembly while feeding the harnesses out of the headlight bowl.



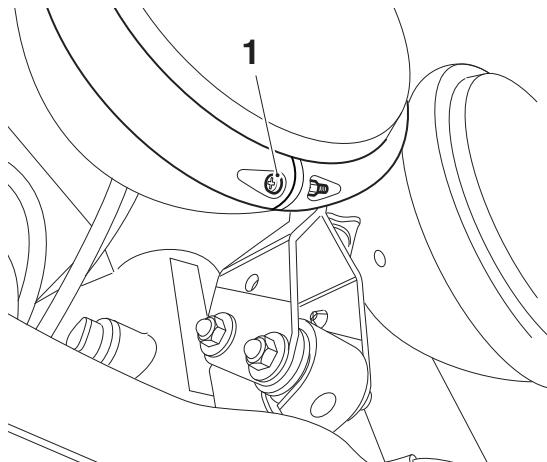
- 1. Headlight horizontal adjustment bolt**
- 2. Headlight mounting**

Headlight Installation

- Refit the headlight bowl and bracket assembly while feeding the harnesses into the headlight bowl. Tighten the bolt to **27 Nm**.



- 1. Headlight horizontal adjustment bolt**
 - 2. Headlight mounting**
- Secure the wiring harnesses in the headlight bowl as noted during removal.
 - Reconnect the direction indicator electrical connectors as noted during removal. The right hand direction indicator harness and the main harness are both marked with red tape to aid correct connection.
 - Reconnect the headlight electrical connector and refit the position light.
 - Refit the headlight, tightening the screws to **2 Nm**.



- 1. Headlight screw (1 of 2)**
- Reconnect the battery, positive (identified with red tape) lead first.
 - Fit the rider's seat (see page 17-21).
 - Check the headlight operation and the beam setting, rectify as necessary.

Headlights – Thunderbird Commander and Thunderbird LT



Warning

Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated. Ensure that the beams are adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.

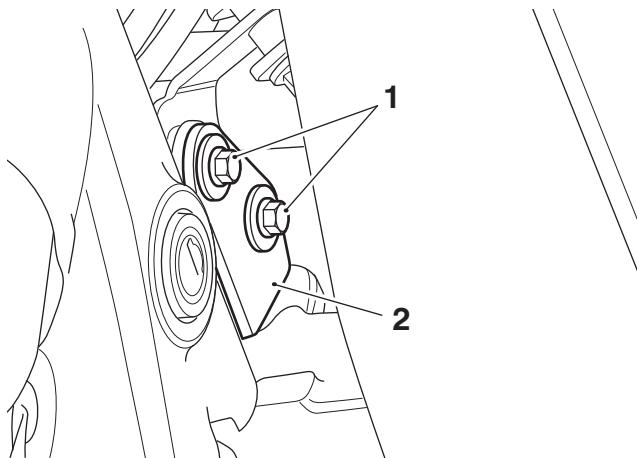


Warning

Never attempt to adjust a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

Headlights Vertical Adjustment



- 1. Vertical beam adjuster
- 2. Headlight mounting bracket

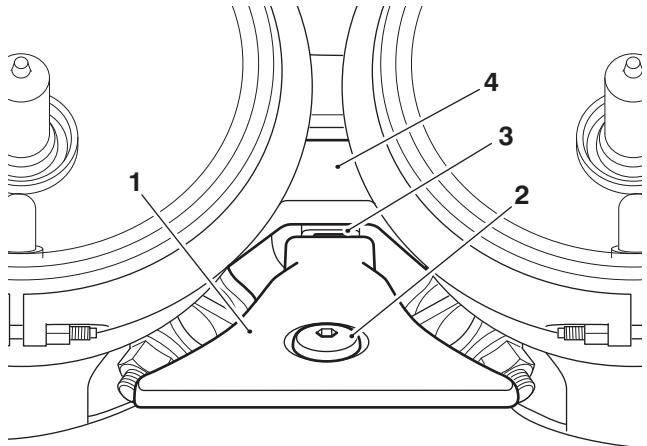
1. Switch the headlight dipped beams on.
2. Turn the steering fully to the left.
3. On the right hand side, slacken the clamp bolt sufficiently to allow restricted movement of the headlight.
4. With the handlebars in the straight ahead position, adjust the position of the headlights to give the required beam setting.
5. Tighten the clamp bolt to **9 Nm**.
6. Recheck the headlight beam setting.
7. Switch the headlight off when the beam setting is satisfactorily set.

Headlight Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.

Thunderbird Commander

3. Remove the fixing securing the cover to the headlight bracket.
4. Remove the cover, ensure the rubber cover remains on the locating lug.



- 1. Cover
- 2. Fixing
- 3. Rubber cover
- 4. Headlight shroud

Note:

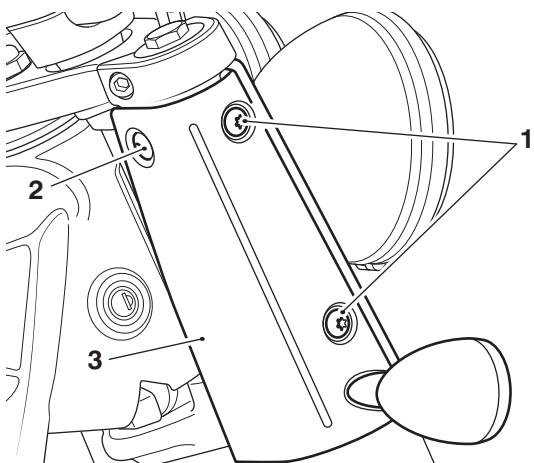
- Note that the upper side fixing for the shrouds is shorter than the lower fixing for installation.
- 5. Remove the upper and lower side fixings for the right hand shroud.

Note:

- The front indicators on the Thunderbird Commander are attached to the shrouds.
- Note the routing of the front indicator harness for installation.

Electrical System

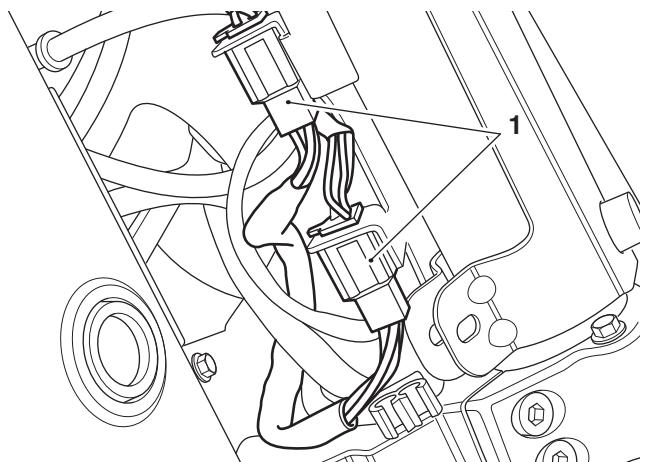
6. Release the rear fixing, disconnect the indicator harness from the main harness and remove the rear shroud.



- 1. Side fixings**
2. Rear fixing
3. Rear shroud

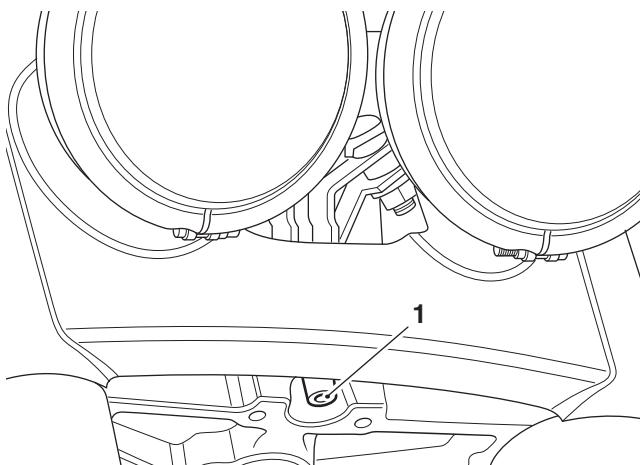
Note:

- **Note the routing of the headlight harness for installation.**
- 7. Disconnect the two multiplugs for the headlights from the main harness.



- 1. Headlight multiplugs**

8. Release the headlight mounting bolt and remove the headlight assembly.



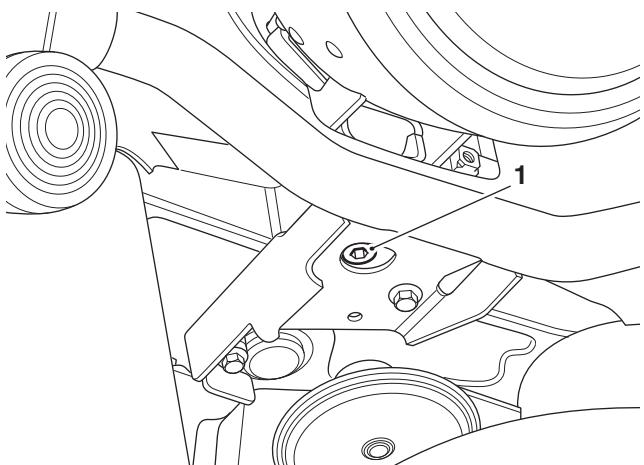
- 1. Headlight mounting bolt**

Thunderbird LT

9. Release the two fixings and detach the headlight from the headlight bowl.
10. Disconnect the headlight electrical connector and remove the position light.

Note:

- **Note how the harnesses are secured in the headlight bowl for installation.**
- 11. Release the headlight mounting bolt and remove the headlight assembly while feeding the harnesses out of the headlight bowl.

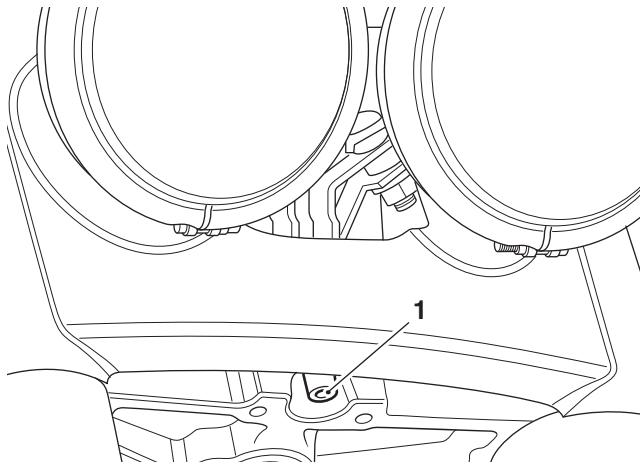


- 1. Headlight mounting bolt**

Headlight Installation

Thunderbird Commander

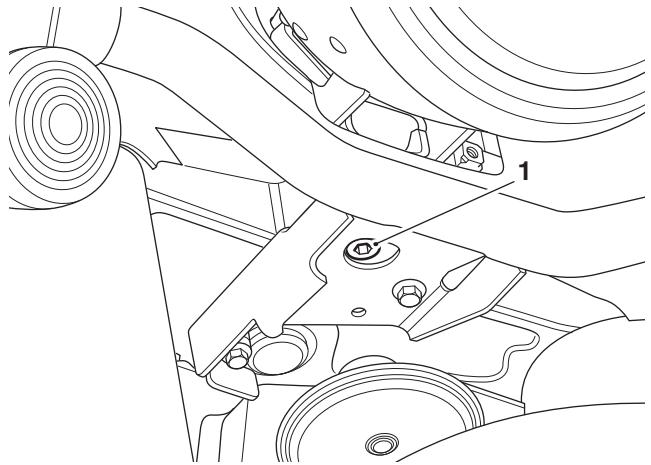
- Refit the headlight and bracket assembly and tighten the mounting bolt to **27 Nm**.



- Headlight mounting bolt**
- Route the harness for the headlight as noted for removal and connect to the main harness.
- Route the front indicator harness as noted for removal and connect to the main harness.
- Position the rear shroud to the front fork and secure with the three fixings as noted for removal. Tighten the fixings to **8 Nm**.
- Refit the cover for the headlight bracket and tighten its fixing to **9 Nm**.

Thunderbird LT

- Refit the headlight bowl and bracket assembly while feeding the harnesses into the headlight bowl. Tighten the mounting bolt to **27 Nm**.
- Secure the harnesses in the headlight bowl as noted for removal.



- Headlight mounting bolt**
- Reconnect the headlight electrical connector and refit the position light.
- Refit the headlight to the headlight bowl and tighten the fixings to **2 Nm**.

All Models

- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-20).
- Check the headlight operation and the beam setting, rectify as necessary.

Electrical System

Headlight Bulb Replacement

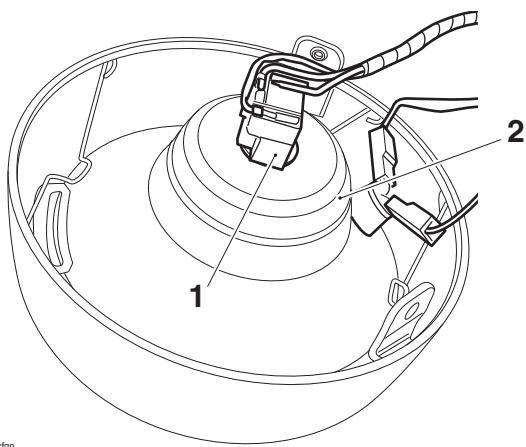
It is necessary to remove the headlight from the headlight bowl to gain access to the bulbs.



Warning

The bulbs become hot during use. Always allow sufficient time for the bulbs to cool before handling. Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before reuse.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Undo the fixings, securing the headlight clamp to the headlight body.
4. Support the headlight while removing the clamp.
5. Remove the headlight from its bowl while supporting it to prevent the cables from being overextended.
6. Disconnect the multi-pin electrical connector from the headlight bulb and remove the rubber cover.

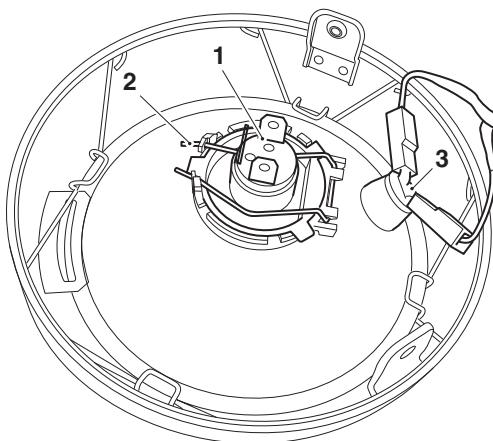


1. Multi-pin electrical connector

2. Rubber cover

7. Detach the wire retainer from its clip then remove the bulb from the light unit.

8. **To remove the position light bulb:** Without pulling on the wires, ease the bulb holder from its socket. The bulb is removed from its holder by pulling gently upwards.



1. Headlight bulb

2. Bulb clip

3. Position Light bulb

9. Installation for both bulbs is the reverse of the removal procedure. Tighten the headlight clamp to **2 Nm**.



Warning

Do not reconnect the battery until the assembly process has been completed. Premature battery reconnection could result in ignition of the battery gases causing risk of injury.

10. Reconnect the battery, positive (identified with red tape) lead first.
11. Refit the rider's seat (see page 17-20).

Fog Lights (if fitted)

Bulb Replacement

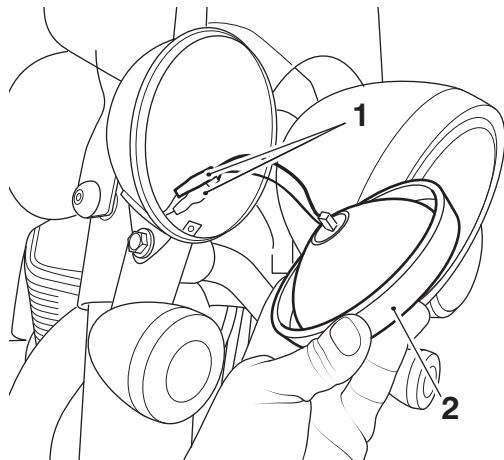
It is necessary to remove the fog light from its bowl to gain access to the bulb.



Warning

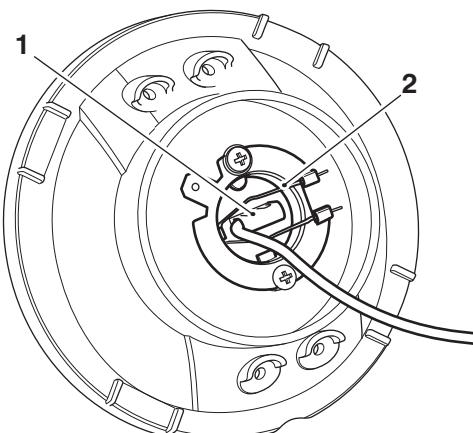
The bulbs become hot during use. Always allow sufficient time for the bulbs to cool before handling. Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before reuse.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Release the fixing securing the fog light to the fog light body.
4. Detach the fog light from its bowl while supporting it to prevent the cables from being over extended.
5. Disconnect the electrical connectors for the fog light bulb from the harness and remove the fog light.



1. Electrical connectors
2. Fog light

6. Release the wire retainer and remove the bulb.



1. Bulb
2. Wire retainer

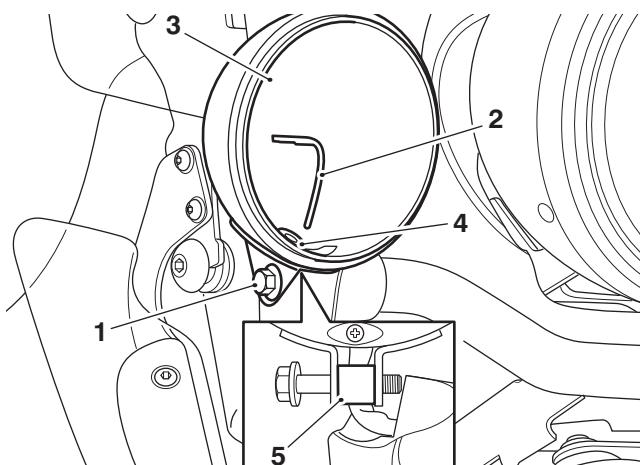
7. Installation of the bulb is the reverse of the removal procedure.
8. Reconnect the battery, positive (identified with red tape) lead first.
9. Refit the rider's seat (see page 17-20).

Fog Light Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fog light from its bowl (see page 18-31).

Note:

- When the fog light fixing has been removed, the indicator and bracket assembly may detach from the lighting bar.
- 4. Release the fixing, remove the fog light bowl and carefully feed the harness through the grommet. Collect the spacer for the fog light mounting.

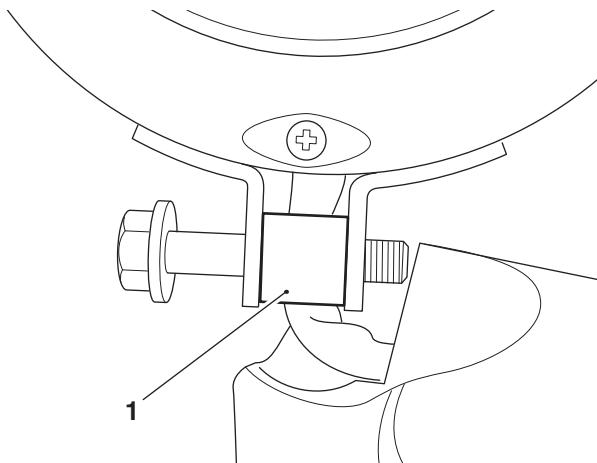


1. Fixing
2. Harness
3. Fog light bowl
4. Grommet
5. Spacer

Electrical System

Fog Light Installation

1. Feed the harness into the fog light bowl through the grommet.
2. Fit the spacer to the fog light mounting.



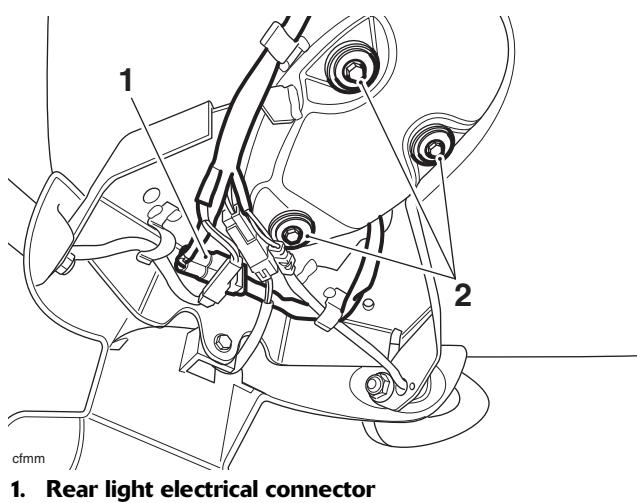
1. Spacer

3. Fit the fog light bowl to the lighting bar and tighten its fixing to **27 Nm**.
4. Fit the fog light to its bowl (see page 18-31).
5. Reconnect the battery, positive (identified with red tape) lead first.
6. Refit the rider's seat (see page 17-20).
7. Check the operation and the beam setting of the fog light, rectify as necessary.

Rear Light – All Models Except Thunderbird LT

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear wheel (see page 16-12).
4. Release the fixings and remove the harness cover below the rear mudguard.
5. Disconnect the rear light electrical connector, and release the rear light harness from its clip on the mudguard.
6. Release the three fixings and remove the rear light.



Bulb Replacement

The rear light unit is a sealed, maintenance free LED unit.

Installation

1. Installation is the reverse of the removal, noting the following:
 - Tighten the rear light fixings to **3 Nm**.
 - Tighten the harness cover fixings to **3 Nm**.
 - Reconnect the battery, positive (identified with red tape) lead first.

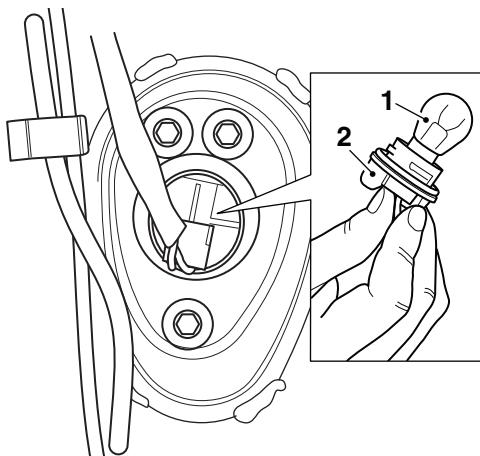
Rear Light – Thunderbird LT

Bulb Replacement

! Warning

The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling. Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before reuse.

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. The rear light bulb holder can be located underneath the rear mudguard.
4. Rotate the bulb holder anticlockwise to release it from the lamp body.
5. To remove the bulb from the holder, gently press inwards and twist anticlockwise.



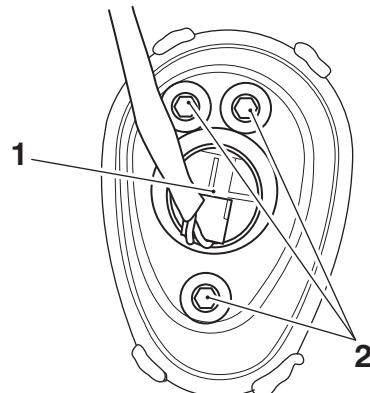
1. Bulb
2. Bulb holder

Bulb Installation

1. Installation is the reverse of the removal.
2. Reconnect the battery, positive (identified with red tape) lead first.
3. Refit the rider's seat (see page 17-20).

Rear Light Removal

1. Remove the rider's seat (see page 17-20).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear wheel (see page 16-12).
4. Remove the bulb holder from the rear light (see page 18-33).
5. Release the three fixings and remove the rear light.



1. Rear light bulb holder
2. Fixings

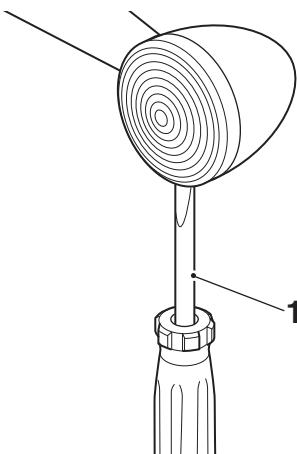
Installation

1. Installation is the reverse of the removal, noting the following:
 - Tighten the rear light fixings to **3 Nm**.
2. Reconnect the battery, positive (identified with red tape) lead first.

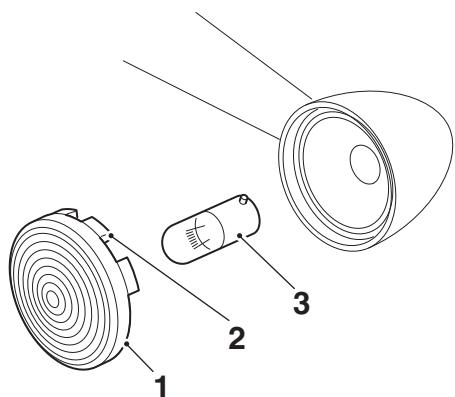
Electrical System

Indicator Lights

Bulb Replacement



cfhh
1. Screwdriver



cfhi
1. Lens
2. Locating tang
3. Bulb

Use a flat bladed screwdriver to carefully remove the lens from the indicator to gain access to the bulb for replacement.



Warning

The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling. Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before reuse.



Caution

When installing the lens, ensure that the locating tang is correctly aligned to the indicator body.

To install the indicator lens, align the locating tang with the indicator body and push the lens until the retaining clips secure the lens.

Front Indicators – All Models Except Thunderbird Commander and Thunderbird LT

Removal



Warning

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

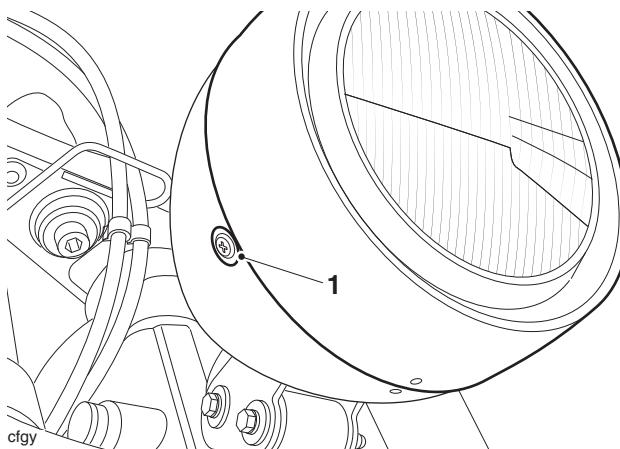
1. Raise and support the front of the motorcycle.
2. Remove the rider's seat (see page 17-21).
3. Disconnect the battery, negative (black) lead first.
4. Remove the front wheel (see page 16-10).



Warning

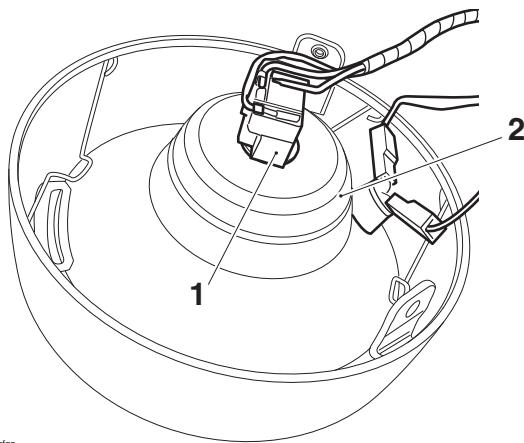
Never allow the brake calipers to hang on the brake hoses as this may damage the hoses. A damaged brake hose can cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

1. Remove the front mudguard (see page 17-31).
2. Release the two screws and detach the headlight from the headlight bowl.



cfgy
1. Headlight screw (1 of 2)

- Disconnect the electrical connector from the headlight bulb, detach the position light and remove the headlight.



- 1. Electrical connector**
- 2. Position light**

Note:

- The right hand indicator wiring is identified by a section of red tape.**
 - Make a note of the direction indicator harness routing and the wiring harness routing inside the headlight bowl before disconnection.**
- Disconnect the two direction indicator electrical connectors.
 - Remove the front fork (see page 12-7).
 - As the forks are released, slide the direction indicator brackets off the forks and remove them.

Installation

- Position the indicator clamp end between the upper and lower yokes and fit the front fork (see page 12-9).
- Route the direction indicator harness as noted during removal and connect it to the main harness. The right hand direction indicator harness and the main harness are both marked with red tape to aid correct connection.
- Reconnect the headlight electrical connector and refit the position light.
- Refit the headlight, tightening the screws to **2 Nm**.
- Refit the front mudguard (see page 17-31).
- Refit the front wheel (see page 16-11).
- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-21).
- Check the operation of the front indicators, rectify as necessary.

Front Indicators – Thunderbird Commander

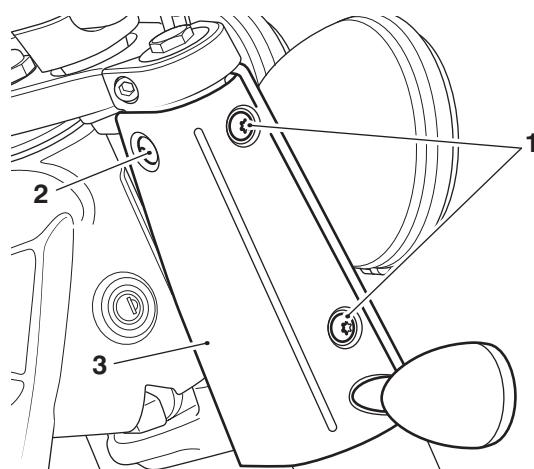
- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.

Note:

- Note that the upper side fixing for the shrouds is shorter than the lower fixing for installation.**
- Remove the upper and lower side fixings for the rear shroud.

Note:

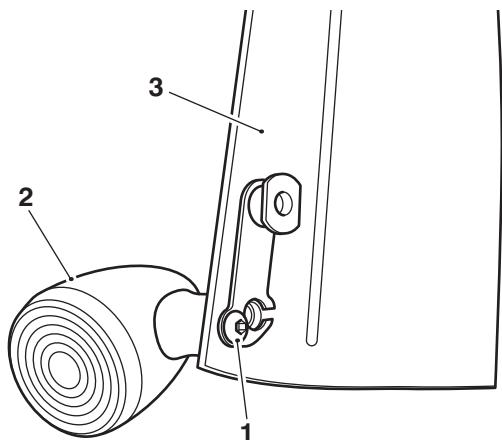
- The front indicators on the Thunderbird Commander are attached to the shrouds.**
 - Note the routing of the front indicator harness for installation.**
- Release the rear fixing, disconnect the indicator harness from the main harness and remove the rear shroud.



- 1. Side fixings**
- 2. Rear fixing**
- 3. Rear shroud**

Electrical System

- Release the fixing and remove the front indicator.



- Fixing**
- Front indicator (right hand shown)**
- Shroud**

Installation

- Fit the front indicator to its shroud and tighten the fixing to **18 Nm**.
- Route the front indicator harness as noted for removal and connect it to the main harness.
- Position the rear shroud to the front fork and secure with the three fixings as noted for removal. Tighten the fixings to **8 Nm**.
- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-20).
- Check the operation of the front indicators, rectify as necessary.

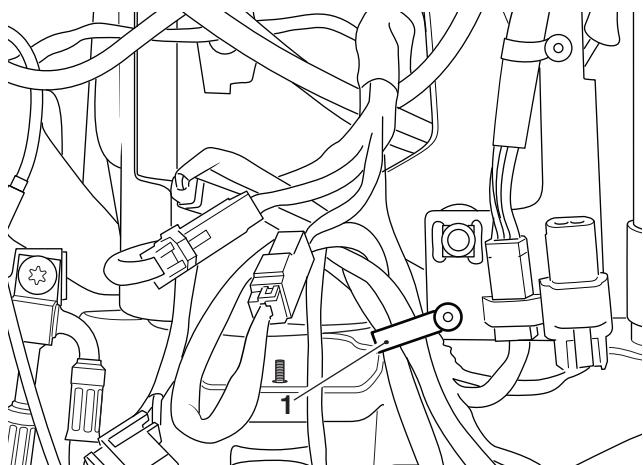
Front Indicators – Thunderbird LT

Removal

- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Remove the windscreens (see page 17-41).
- Remove the headlight (see page 18-27).
- Remove the front fork shrouds (see page 17-42).

Note:

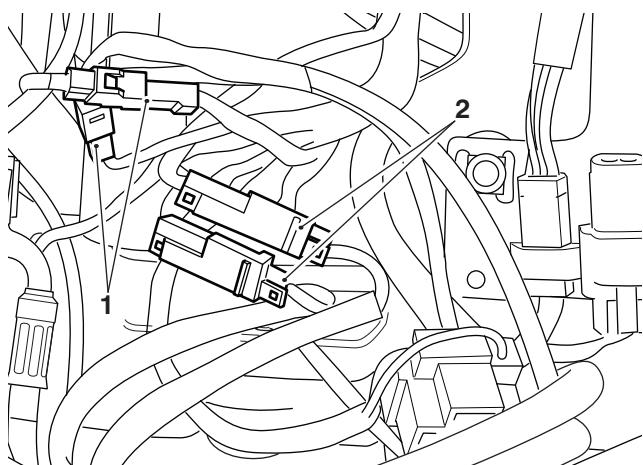
- Note the routing of the harnesses for installation.**
- Remove and discard the harness retaining clip indicated below.



1. Harness retaining clip

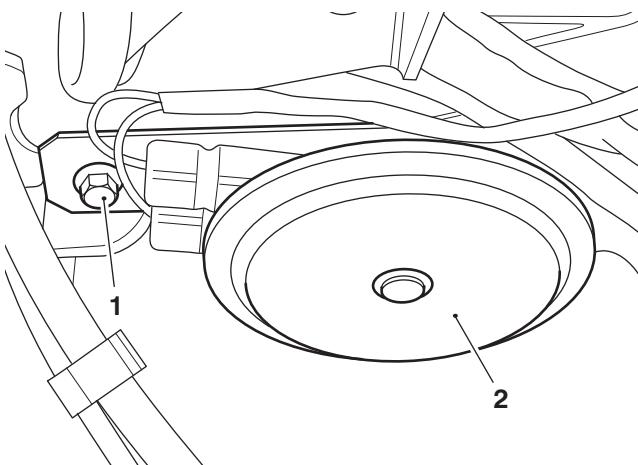
Note:

- The right hand indicator wiring is identified by a section of red tape.**
- Disconnect the indicators and fog light harnesses from the main harness.



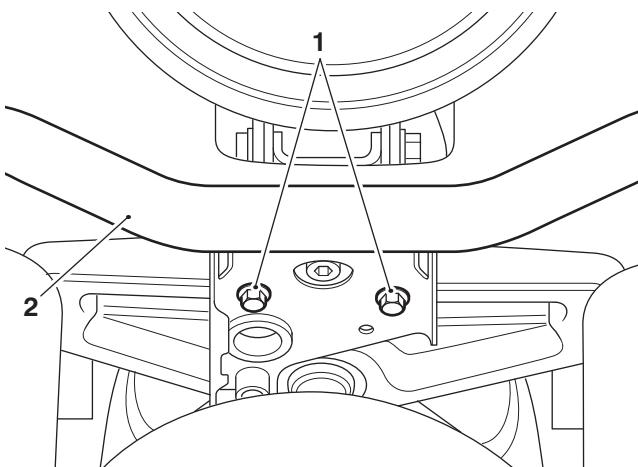
1. Indicator connectors
2. Fog light connectors

8. Release the fixing and detach the horn from the underside of the lower yoke. Do not allow the horn to hang on its harness.



- 1. Horn**
2. Fixing

9. Release the two remaining fixings and remove the lighting bar. Harnesses shown removed for clarity.

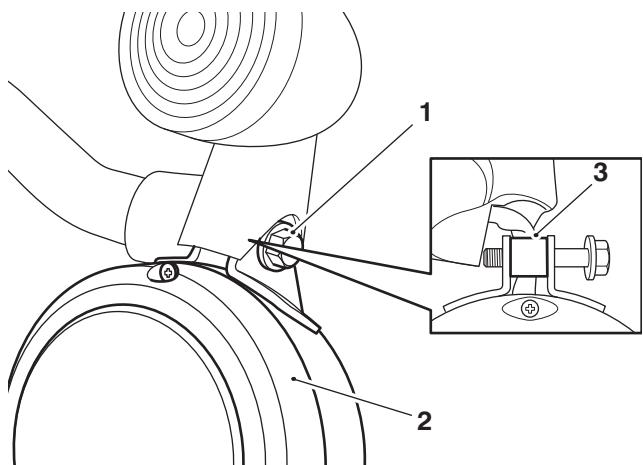


- 1. Fixings**
2. Lighting bar

Note:

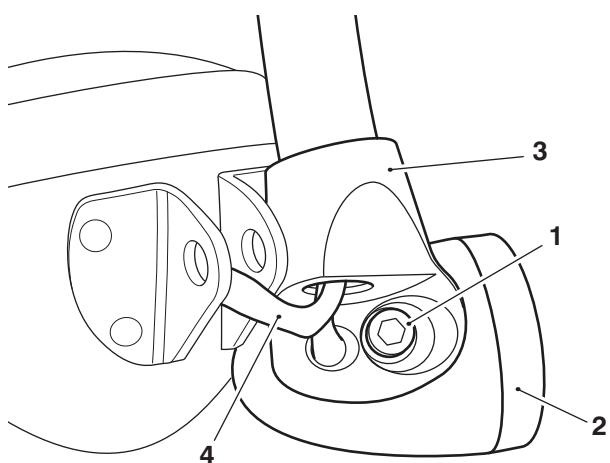
- When the fog light fixing has been removed, the indicator and bracket assembly may detach from the lighting bar.

10. Release the fixing and detach the fog light from the lighting bar. Collect the spacer for the fog light mounting.



- 1. Fixing**
2. Fog light
3. Spacer

11. Release the fixing and detach the front indicator from its bracket.



- 1. Fixing**
2. Front indicator
3. Indicator bracket
4. Fog light and front indicator harnesses

12. Detach the indicator bracket from the lighting bar.

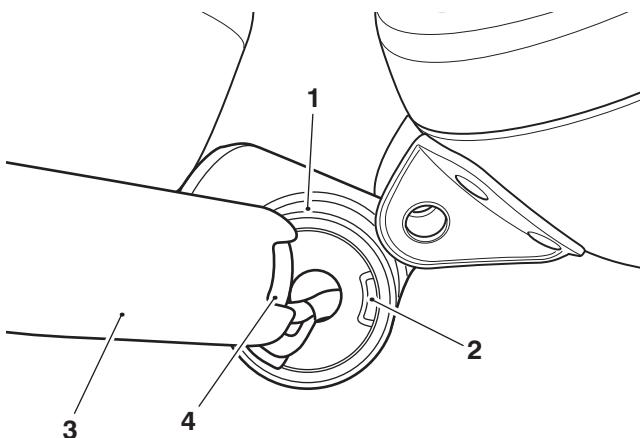
Note:

- Note the routing of the harnesses for installation.
- 13. For complete removal of the indicator, carefully pull the harnesses for the indicator and fog light out of the lighting bar and indicator bracket.

Electrical System

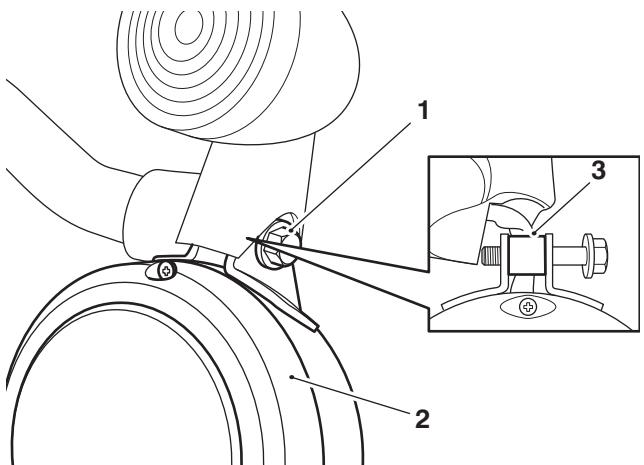
Installation

- Carefully feed the fog light and front indicator harnesses through the indicator bracket and the lighting bar as noted for removal.
- Fit the indicator bracket on to the lighting bar. Ensure the locating lug in the bracket aligns to its slot on the lighting bar.



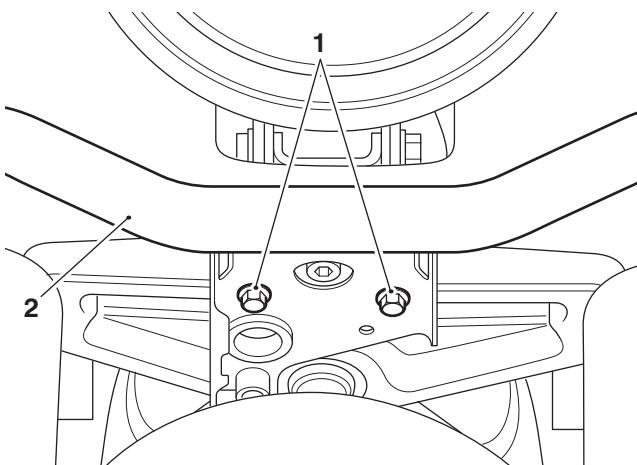
- Indicator bracket
- Locating lug
- Lighting bar
- Slot

- Fit the indicator to its bracket and tighten its fixing to **18 Nm**.
- Fit the spacer to the fog light mounting.
- Fit the fog light to the lighting bar and tighten the fixing to **27 Nm**.



- Fixing
- Fog light
- Spacer

- Fit the lighting bar to the motorcycle, ensure the harnesses are routed as noted for removal. Fit the front two fixings and tighten to **9 Nm**.

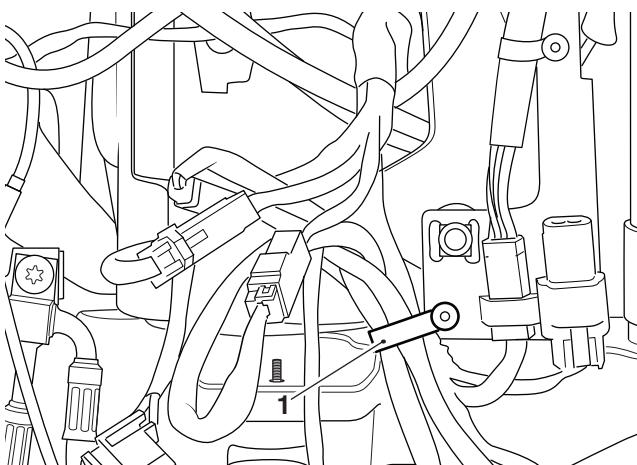


- Front fixings
- Lighting bar

- Fit the horn and tighten the fixing to **9 Nm**.

Note:

- The right hand indicator wiring is identified by a section of red tape.
- Connect the indicators and fog light harnesses to the main harness.
- Route the harnesses as noted for removal and secure with a new harness retaining clip.



- Harness retaining clip
- Refit the front fork shrouds (see page 17-43).
- Refit the headlight (see page 18-29).
- Reconnect the battery, positive (identified with red tape) lead first.
- Fit the rider's seat (see page 17-20).
- Check the operation of the fog lights and front indicators, rectify as necessary.

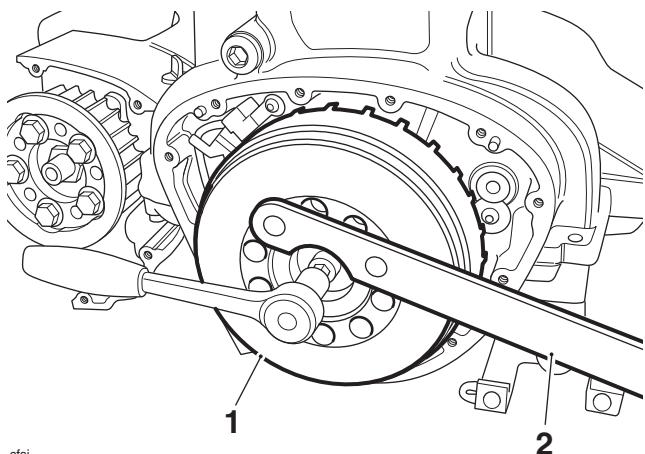
Alternator

Removal

1. Remove the rider's seat (see page 17-21).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear brake master cylinder (see page 14-29 for all models except Thunderbird Commander and Thunderbird LT, see page 14-33 for Thunderbird Commander and Thunderbird LT).
4. Release the bolts securing the alternator cover to the engine.
5. Withdraw the alternator cover from the crankcase.

Note:

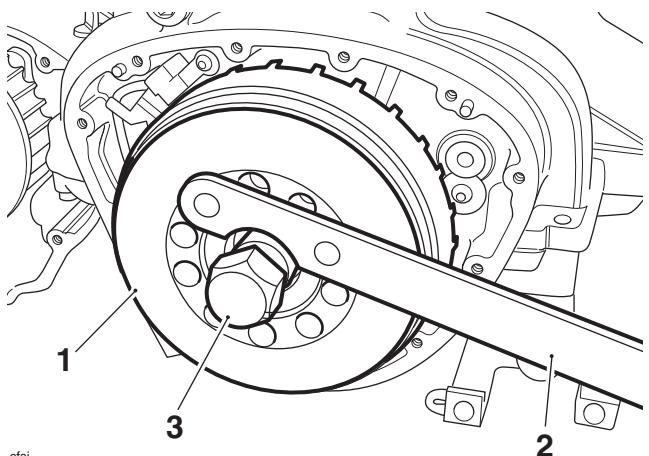
- To use tool T3880096, insert the tool pegs into a pair of rotor holes. However, tool T3880096 will not engage with every pair of holes in the rotor. One of the holes is larger and so the tool will only engage with certain pairs of holes.**
- 6. To remove the rotor, prevent the crankshaft from rotating using tool T3880096, and remove the centre bolt and washer from the end of the crankshaft.



1. Rotor
2. Tool T3880096

7. Screw tool T3880200 into the rotor centre.

8. Prevent the rotor from turning using tool T3880096 while tightening using tool T3880200. This will release the taper seating of the rotor to the crankshaft.

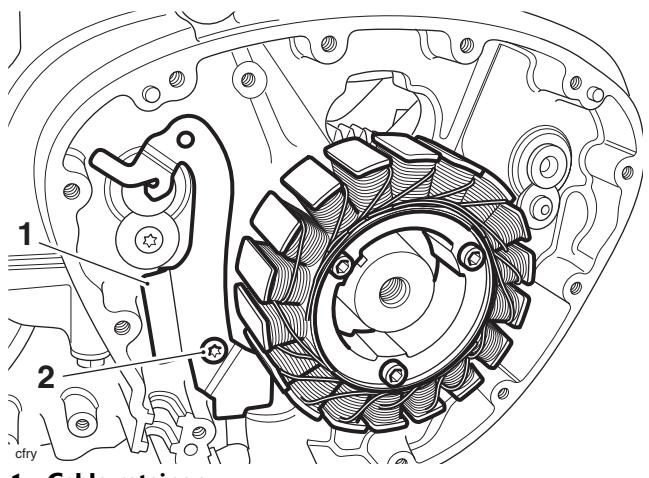


1. Rotor
2. Tool T3880096
3. Tool T3880200

9. Withdraw the rotor and tool as an assembly and then separate the tool from the rotor.

Note:

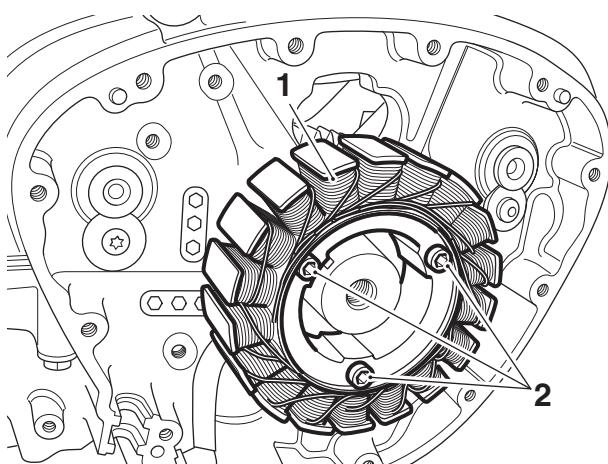
- If removing the stator, make a note of the cable routing before removing the cable retainer.**
- 10. Remove the crankshaft sensor (see page 10-170).
- 11. To remove the stator, release the bolt securing the cable retainer to the crankcase.



1. Cable retainer
2. Bolt

Electrical System

12. Release the three bolts securing the stator to the crankcase.



1. Stator
2. Stator bolts

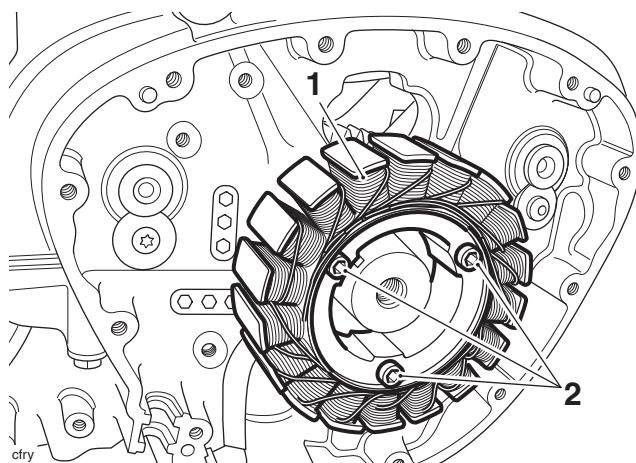
13. Withdraw the stator from the crankcase. Noting its routing, trace the stator wiring back to its electrical connector and disconnect the stator.

Inspection

1. Inspect the key in the crankshaft for damage and distortion. Replace the key if necessary.
2. Inspect the rotor for damage and high spots to the taper centre. Replace the rotor if necessary.
3. Inspect the stator for signs of overheating and short/open circuits. Replace as necessary.

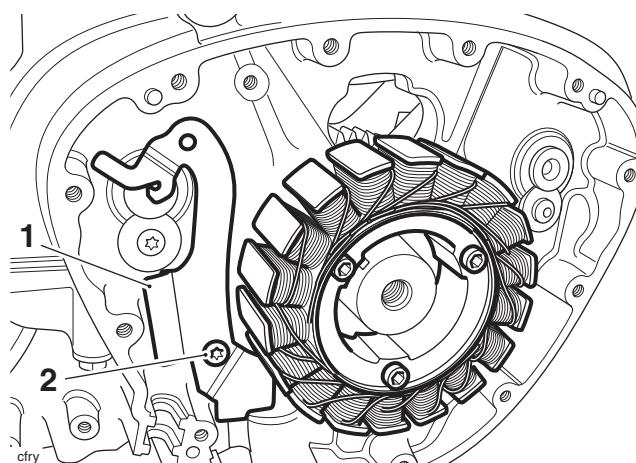
Installation

1. Locate the stator to the crankcase and secure with the three screws.



1. Stator
2. Fixings

2. Apply silicone sealer to the cable grommet and align the cable to the crankcase exit slot.
3. Fit the cable retainer bracket, routing the cable as noted on disassembly. Tighten the retainer bolt to **9 Nm**. Reconnect the electrical connector.



1. Cable retainer
2. Bolt

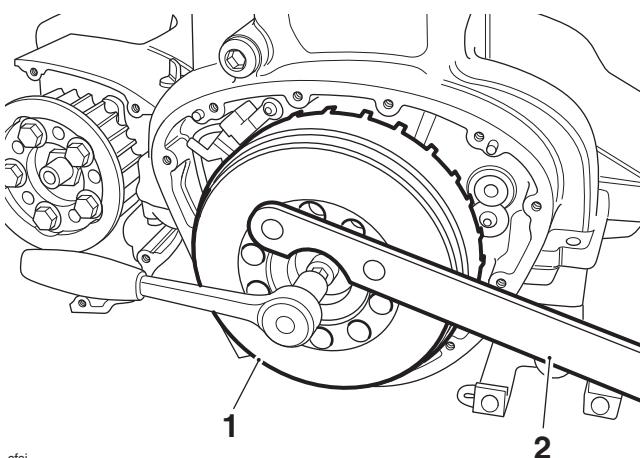
4. Tighten the stator screws to **12 Nm**.



Warning

The rotor magnets are very strong. During rotor installation, the magnets may 'grab' the rotor, causing injury to the hands or fingers. When installing the rotor, wear suitable gloves and only grip the rotor by the outside circumference; always keep hands and fingers clear of the rear of the rotor.

5. Assemble the rotor to the keyway on the crankshaft, taking care to ensure the Woodruff key is correctly installed.
6. Fit the bolt and washer to the threaded hole in the crankshaft.
7. Refit tool T3880096 to prevent the crankshaft from rotating and tighten the rotor bolt to **165 Nm**.



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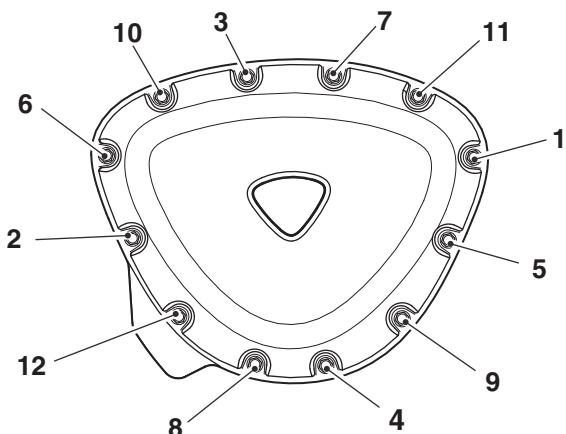
1. Rotor

2. Tool T3880096

8. Remove tool T3880096.
9. Incorporating a new gasket, refit the alternator cover to the engine.

10. Install and tighten the fixings as described below:

- Tighten the fixings in the sequence shown below to **12 Nm**.
- Tighten fixings one and two again to **12 Nm**.



Alternator Cover Tightening Sequence

11. Fit the rear brake master cylinder (see page 14-32 for all models except Thunderbird Commander and Thunderbird LT, see page 14-34 for Thunderbird Commander and Thunderbird LT).
12. Fill and bleed the rear brake system (see page 14-40).
13. Reconnect the battery, positive (identified with red tape) lead first.
14. Refit the rider's seat (see page 17-21).

Electrical System

Alternator Rectifier

Note:

- The alternator rectifier is attached to a bracket below the swinging arm. The rectifier does not contain any serviceable parts and must be replaced if faulty.

Removal

- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Disconnect both multiplugs from the alternator rectifier.
- Release the two screws securing the rectifier to its bracket and withdraw the rectifier.

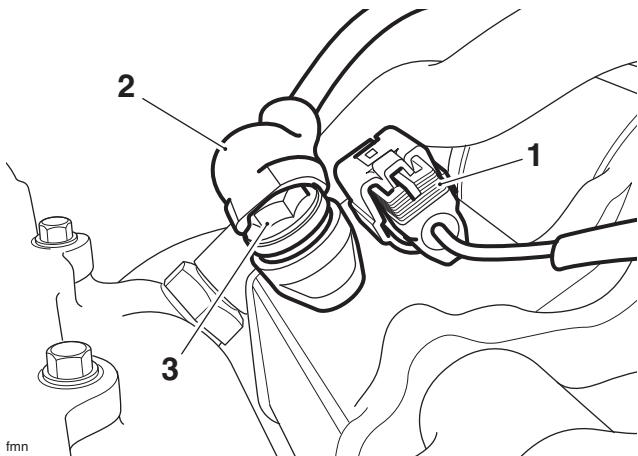
Installation

- Position the rectifier to the bracket and secure with the two screws. Tighten the screws to **9 Nm**.
- Reconnect the two multiplugs to the rectifier.
- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).

Starter Motor

Removal

- Remove the rider's seat (see page 17-20).
- Disconnect the battery, negative (black) lead first.
- Disconnect the solenoid connection from the main wiring harness.
- Ease the rubber boot from the starter cable, release the nut and disconnect the cable.



1. Solenoid connection

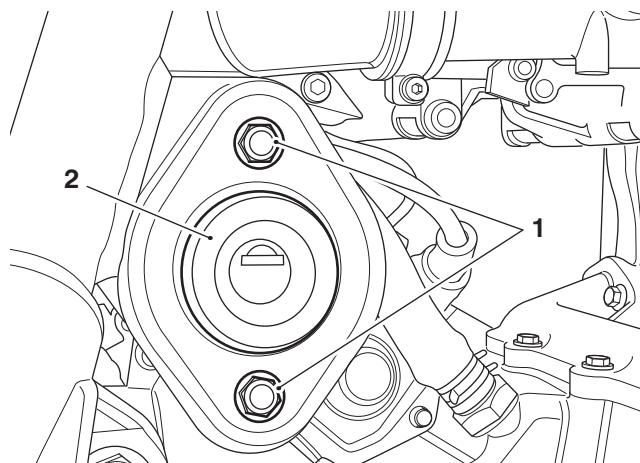
2. Boot

3. Nut

- Remove the bolt, detach the main engine ground cable from the crankcase and position aside.
- Detach the engine breather hose from the breather spout.
- Remove the engine breather spout from the crankcase, collecting the copper washer as it is removed. Discard the washer.
- Loosen the right hand throttle body hose clip and rotate it upwards to allow clearance for the starter motor.

Thunderbird Commander and Thunderbird LT

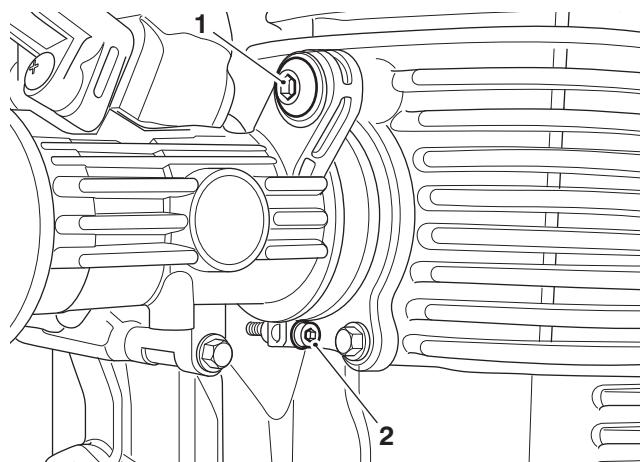
- Release the two fixings and detach the ignition switch from its bracket.



1. Fixings

2. Ignition switch

- Remove the two throttle to cylinder head fixings.
- Loosen the two throttle body hose clips.

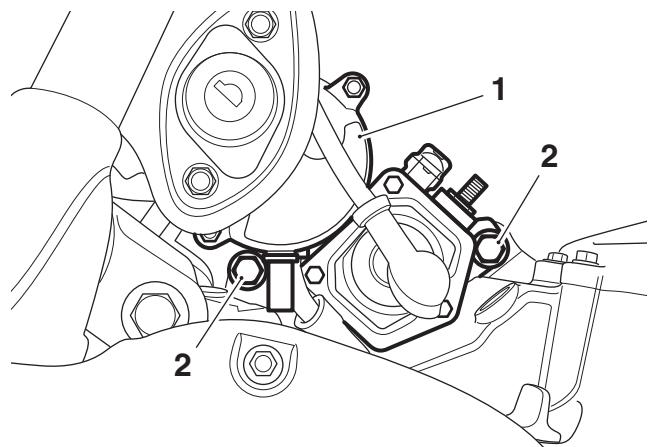


1. Fixing, throttle body (right hand shown)

2. Clip

All Models

- Protect the crankcase painted surfaces from damage, using a suitable self-adhesive tape such as masking tape.
- Release the two bolts securing the starter motor to the crankcase.



cfmo

1. Starter motor

2. Bolts



Caution

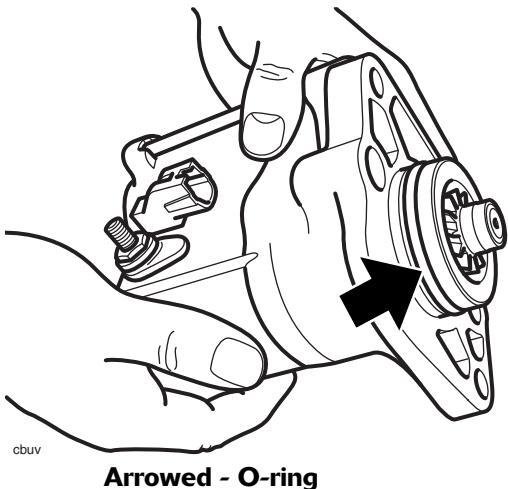
Damage to painted surfaces could result from inadequate care during removal or installation of the starter motor. Always protect the crankcase from damage during removal or installation.

- For Thunderbird Commander and Thunderbird LT only:** Get an assistant to raise the rear of the throttle bodies to allow clearance for the starter motor.
- Carefully manoeuvre the starter motor out to the right hand side of the motorcycle.

Electrical System

Installation

- Fit a new O-ring to the starter motor.



Arrowed - O-ring



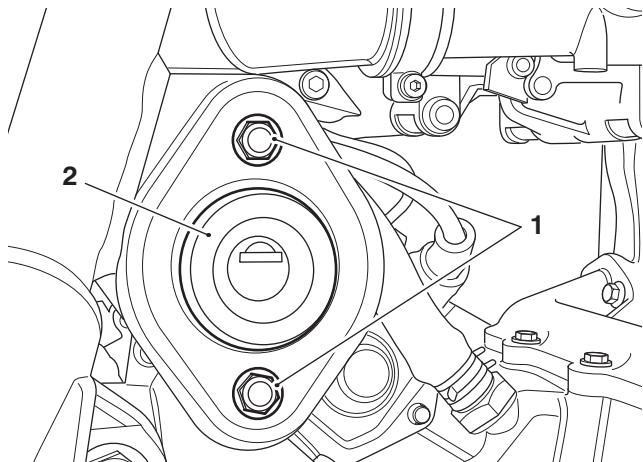
Caution

Damage to painted surfaces could result from inadequate care during removal or installation of the starter motor. Always protect the crankcase from damage during removal or installation.

- For Thunderbird Commander and Thunderbird LT only:** Get an assistant to raise the rear of the throttle bodies to allow clearance for the starter motor.
- Carefully position the starter to the crankcase and retain with the two bolts. Tighten the bolts to **28 Nm**.
- Remove any self-adhesive tape used to protect the crankcase.
- Reposition the throttle body hose clip and tighten to **1.5 Nm**.
- Incorporating a new copper washer, refit the breather spout and tighten to **35 Nm**.
- Attach the engine breather hose to the breather spout.
- Align the main engine ground cable to the crankcase and secure with the bolt. Tighten to **7 Nm**.
- Locate the starter cable to its connection pole. Fit the nut and tighten it to **7 Nm**.
- Refit the boot.
- Reconnect the solenoid to the main harness.

Thunderbird Commander and Thunderbird LT

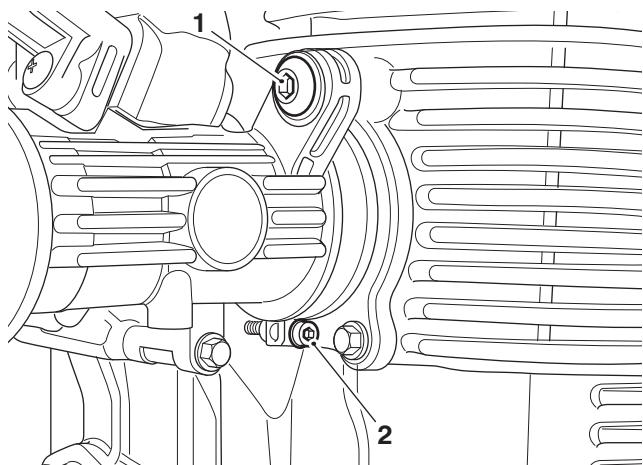
- Position the ignition switch to its bracket, fit its fixings and tighten to **7 Nm**.



1. Fixings

2. Ignition switch

- Refit the two throttle to cylinder head fixings and tighten to **9 Nm**.
- Tighten the two throttle body hose clips to **1.5 Nm**.



1. Fixing, throttle body (right hand shown)

2. Clip

All Models

- Reconnect the battery, positive (identified with red tape) lead first.
- Refit the rider's seat (see page 17-20).

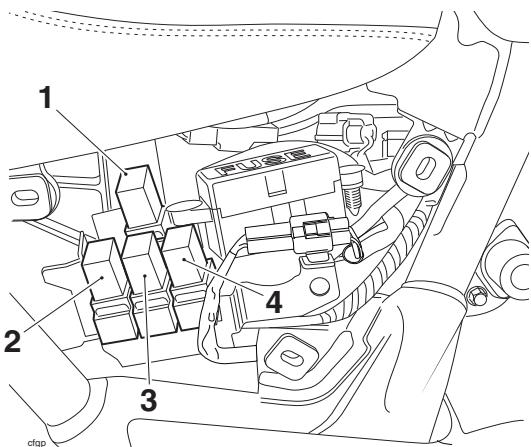
Relays

Identification and Location

Note:

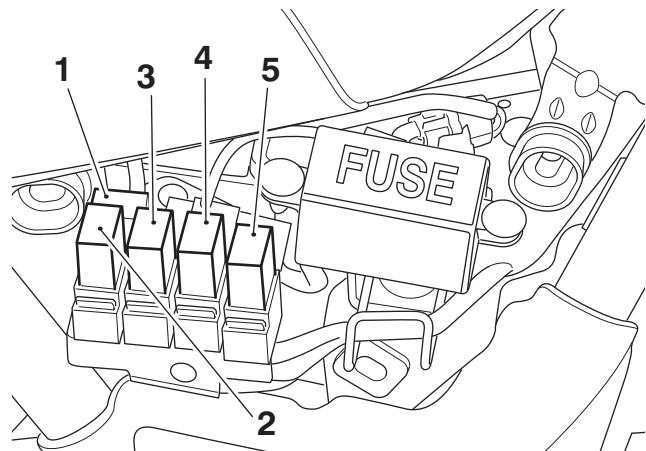
- Relays can be found beneath the right hand side cover.

All Models Except Thunderbird Commander and Thunderbird LT



1. Starter Relay
2. Fuel pump relay
3. EMS relay
4. Cooling fan relay

Thunderbird Commander and Thunderbird LT

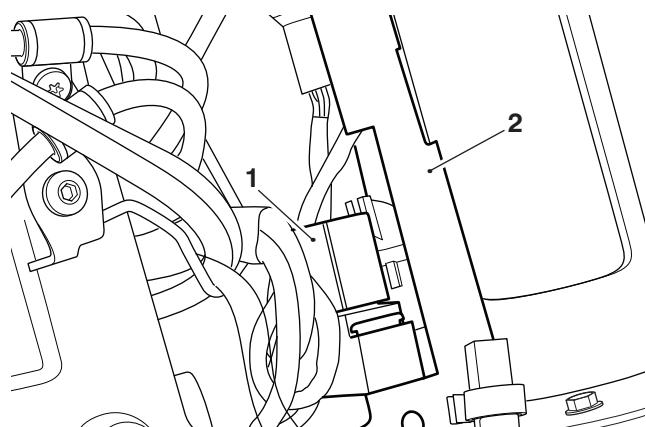


1. Starter Relay
2. Fuel pump relay
3. Headlight relay
4. Cooling fan relay
5. EMS relay

For Thunderbird Commander and Thunderbird LT there is an additional relay located on the head light shroud's left hand support bracket.

For Thunderbird Commander this relay is used operate one of the two headlights while the headlight switch operates the other.

For Thunderbird LT this relay is used for the fog light operation.



1. Relay
2. Left hand support bracket

Electrical System

Alternator Stator

The stator is an assembly of 18 coils, arranged into three phases. It is possible to check for continuity and short circuits through the coils and to earth.

Note:

- Only repair the stator harness between the rectifier and where the harness goes into the crankcase.
- Do not attempt to repair the stator coils.
- If the battery is not fully charged, the charging voltage may be lower than specified when checking at 2,000 rpm.
- Ensure all additional accessories (auxiliary lights, heated grips etc.) are switched off.

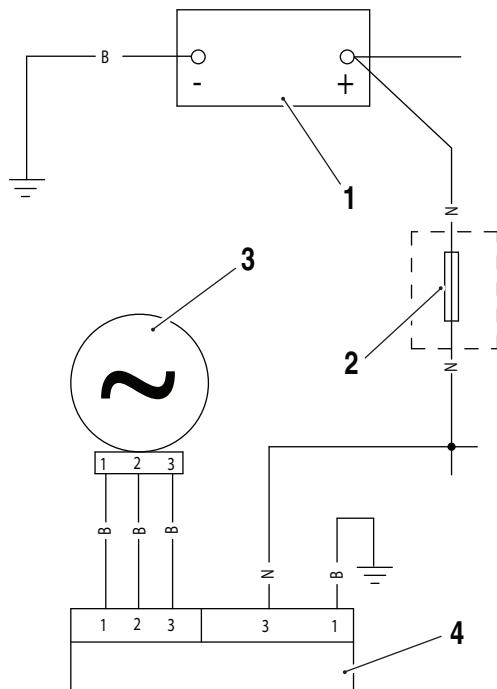
Fault	Possible cause	Action
Battery not charging	Fuse 11	Check the condition of fuse 11:
	Battery	Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable:
	Alternator	Proceed to pinpoint test 1:
	Rectifier/Regulator	Test the rectifier/regulator (see page 18-48)

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Battery positive (+) - Battery negative (-) - Rectifier/regulator black connector pin 1 - Rectifier/regulator black connector pin 3 - Rectifier/regulator grey connector pin 1 - Rectifier/regulator grey connector pin 2 - Rectifier/regulator grey connector pin 3	OK	Disconnect the battery leads, negative (black) lead first. Disconnect rectifier/regulator black connector and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable continuity: - Rectifier/regulator black connector pin 1 to battery lead negative connector - Rectifier/regulator black connector pin 3 to battery lead positive connector	OK	Reconnect the battery leads, positive (red) lead first. Reconnect the rectifier/regulator black connector. Disconnect the rectifier/regulator grey connector and proceed to test 3
	Open circuit	Locate and rectify wiring fault, proceed to test 4
3 Check resistance through the coils: - Alternator pin 1 to pin 2 - Alternator pin 2 to pin 3 - Alternator pin 3 to pin 1	0.14Ω to 0.18Ω	Proceed to test 4
	Open circuit or short circuit	If the fault is between the rectifier and the crankcase, repair the harness. Proceed to test 4 If the fault is after the crankcase, replace the unit. Proceed to test 5
4 Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:	13.5 V - 15 V	Action complete - quit test
	Fault still present	Disconnect the rectifier/regulator grey connector and proceed to test 5

Test	Result	Action
5 Check the alternator AC output voltage at 850 rpm by probing the 3-pin stator connector as follows: - Positive (+) probe to pin 1 negative (-) probe to pin 2 - Positive (+) probe to pin 2 negative (-) probe to pin 3 - Positive (+) probe to pin 3 negative (-) probe to pin 1	15 V AC to 25 V AC	Test rectifier/regulator (see page 18-48)
	Less than 15 V AC	Replace unit. Proceed to pinpoint test 6
6 Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:	13.5 V - 15 V	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Battery
2. Fuse box (Fuse 11)
3. Alternator
4. Rectifier/Regulator

Electrical System

Rectifier/Regulator

Internally the rectifier/regulator consists of three diodes, one between each input and the positive terminal, and three Field Effect Transistors (FETs), one between each input and the ground terminal.

As the voltage of the AC signal from the alternator rises, the voltage controller switches the FETs to avoid over voltage on the output.

The diodes and FETs can be checked using a multimeter on DIODE setting. Disconnect the two electrical connectors from the rectifier/regulator and check the readings as indicated below.

Note:

- This test does not check for voltage regulation.

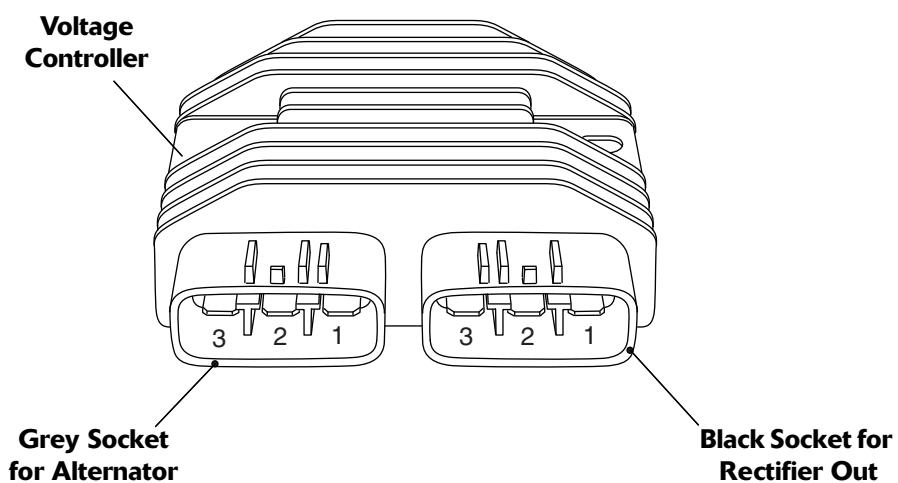
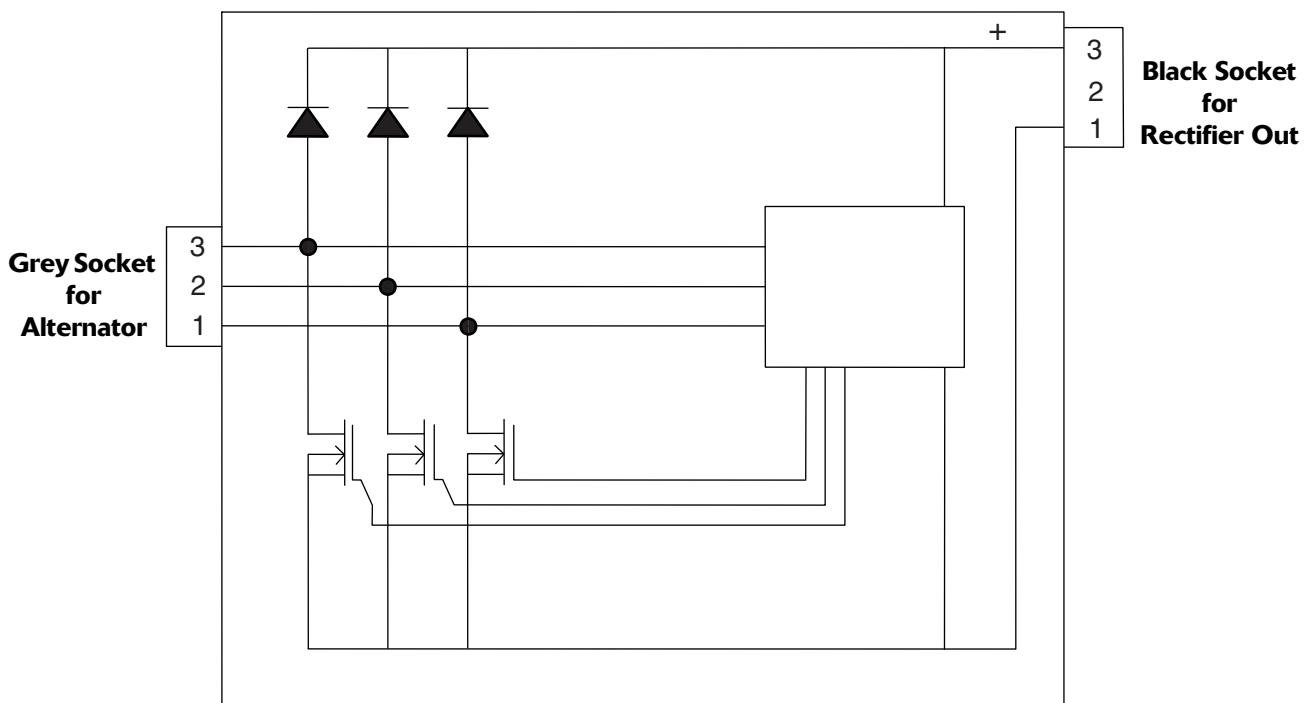
Fault	Possible cause	Action
Battery not charging	Fuse 11	Check the condition of fuse 11:
	Battery	Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable.
	Rectifier/Regulator	Disconnect the black and the grey connectors from the rectifier/regulator and proceed to pinpoint test 1:
	Alternator	Test the alternator stator (see page 18-46).

Pinpoint Tests

Test	Result	Action
1 Check FET forward bias: Positive (+) probe to rectifier black socket pin 1 to: - Negative (-) probe to rectifier grey socket pin 1 - Negative (-) probe to rectifier grey socket pin 2 - Negative (-) probe to rectifier grey socket pin 3	0.4 V to 0.7 V	Proceed to test 2
	Open circuit or short circuit	Replace the unit. Proceed to test 4
2 Check diodes function forward bias: Negative (-) probe to rectifier black socket pin 3 to: - Positive (+) probe to rectifier grey socket pin 1 - Positive (+) probe to rectifier grey socket pin 2 - Positive (+) probe to rectifier grey socket pin 3	0.1 V to 0.3 V	Proceed to test 3
	Open circuit or short circuit	Replace the unit. Proceed to test 4
3 Check diodes reverse bias: Negative (-) probe to rectifier black socket pin 1 to: - Positive (+) probe to rectifier grey socket pin 1 - Positive (+) probe to rectifier grey socket pin 2 - Positive (+) probe to rectifier grey socket pin 3 Positive (+) probe to rectifier black socket pin 3 to: - Negative (-) probe to rectifier grey socket pin 1 - Negative (-) probe to rectifier grey socket pin 2 - Negative (-) probe to rectifier grey socket pin 3	More than 1.4 V or OL on meter	Proceed to test 4
	Less than 1.4 V or short circuit	Replace the unit. Proceed to test 4

Test	Result	Action
4 Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:	13 V - 15 V	Action complete - quit test
	Fault still present	Test alternator stator (see page 18-46)
		If alternator stator is serviceable, contact Triumph service

Circuit Diagram



Electrical System

Lighting Circuit – Thunderbird without ABS

Key to Circuit Diagram

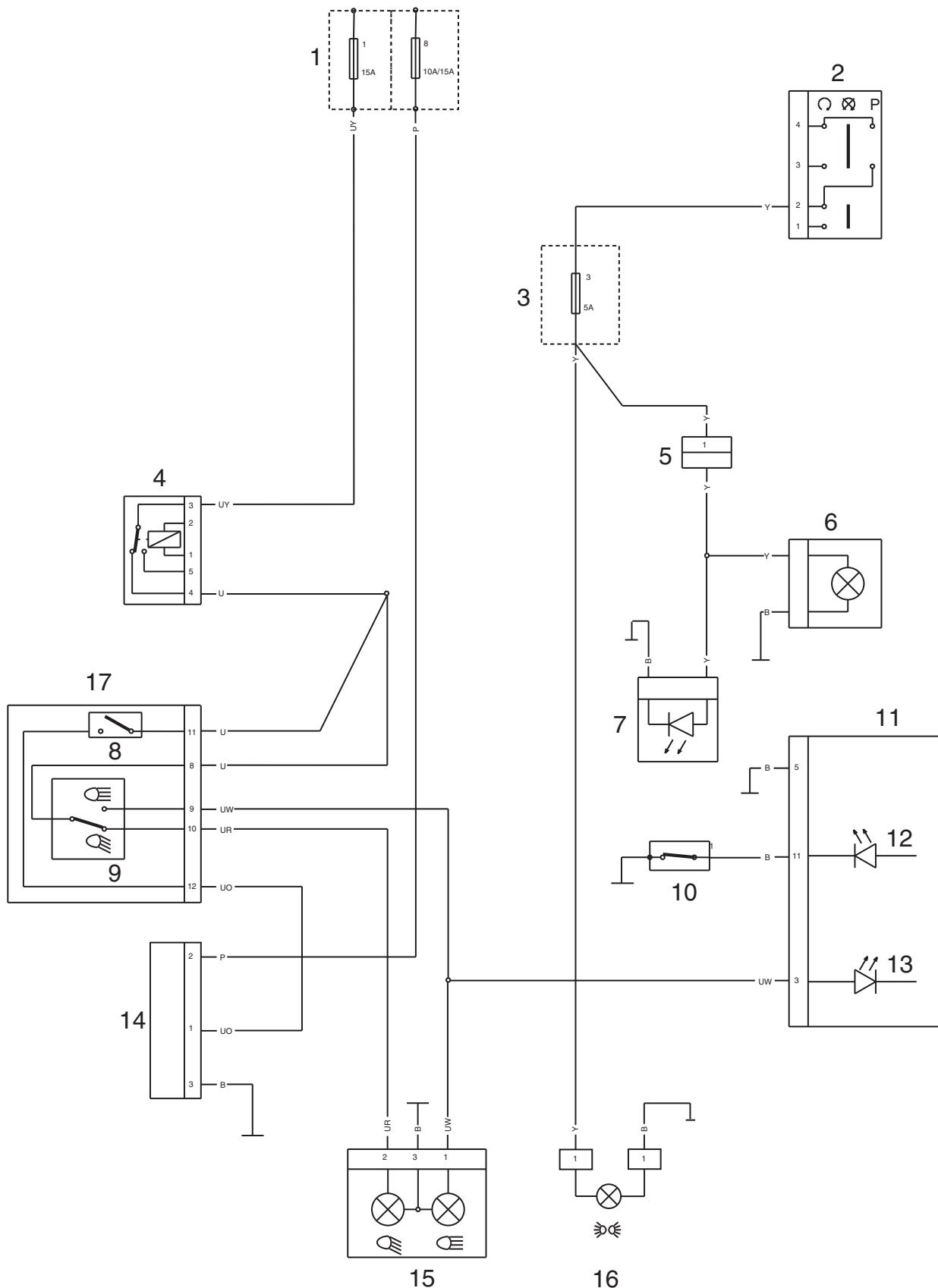
Key	Item Description
1	Fuse Box (Fuses 1 and 8*)
2	Ignition Switch
3	Fuse Box (Fuse 3)
4	Starter Relay
5	Rear Lighting Subharness
6	Number Plate Light
7	Rear Light
8	Accessory /Fog Light Switch
9	Headlight Dip Switch
10	Oil Pressure Switch
11	Instrument Assembly
12	Oil Pressure Warning Light
13	Main Beam Warning Light
14	Accessory Light
15	Headlight
16	Front Position Light
17	Left Hand Switch Housing

* For fuse 8 value refer to the label in the fuse box cover

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird without ABS



Note: For fuse 8 value, refer to the label in the fuse box cover

Electrical System

Lighting Circuit – Thunderbird and Thunderbird SE with ABS

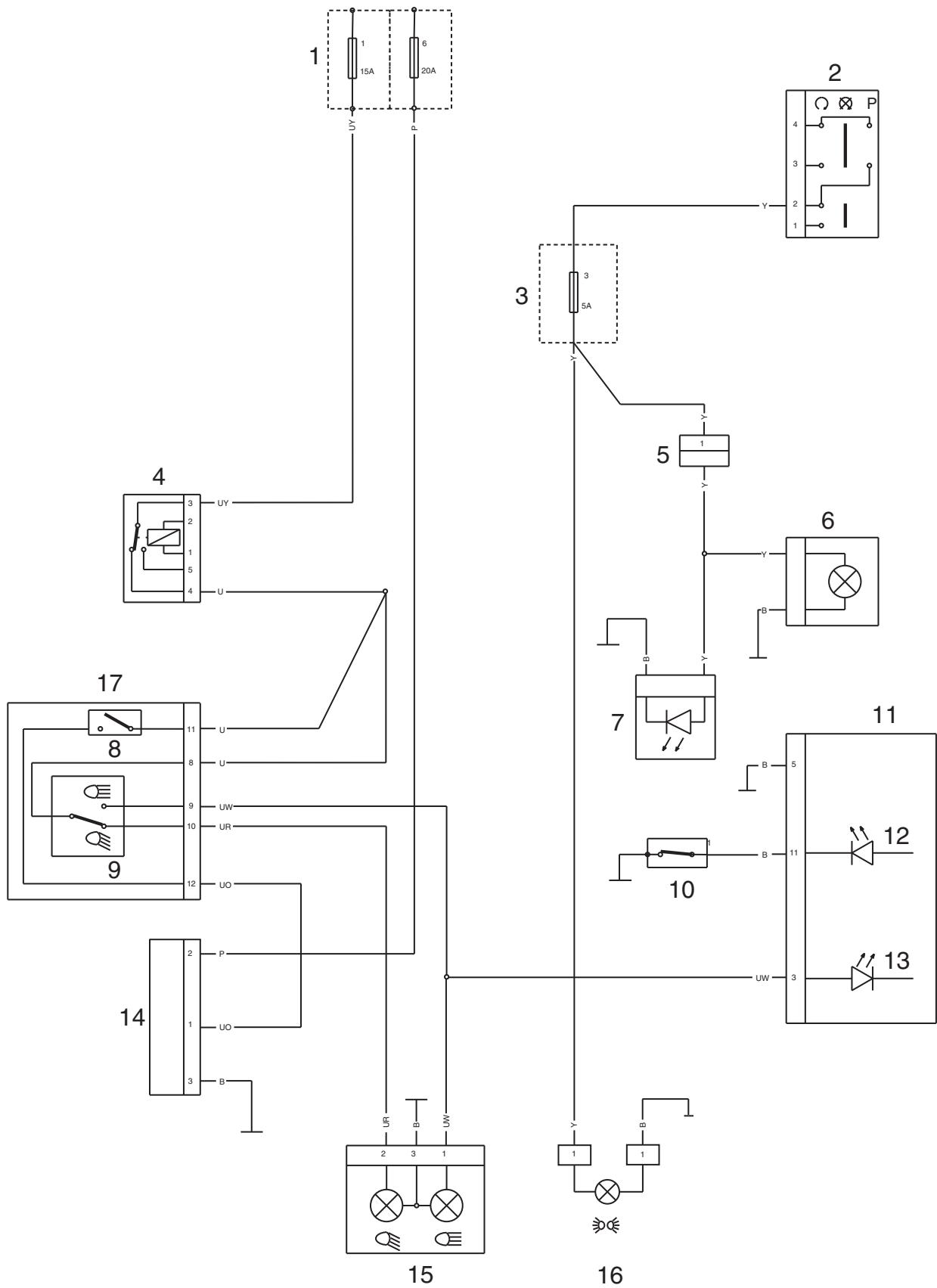
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (Fuses 1 and 8)
2	Ignition Switch
3	Fuse Box (Fuse 3)
4	Starter Relay
5	Rear Lighting Subharness
6	Number Plate Light
7	Rear Light
8	Accessory Light Switch
9	Headlight Dip Switch
10	Oil Pressure Switch
11	Instrument Assembly
12	Oil Pressure Warning Light
13	Main Beam Warning Light
14	Accessory Light
15	Headlight
16	Front Position Light
17	Left Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird and Thunderbird SE with ABS



Electrical System

Lighting Circuit – Thunderbird Storm without ABS

Key to Circuit Diagram

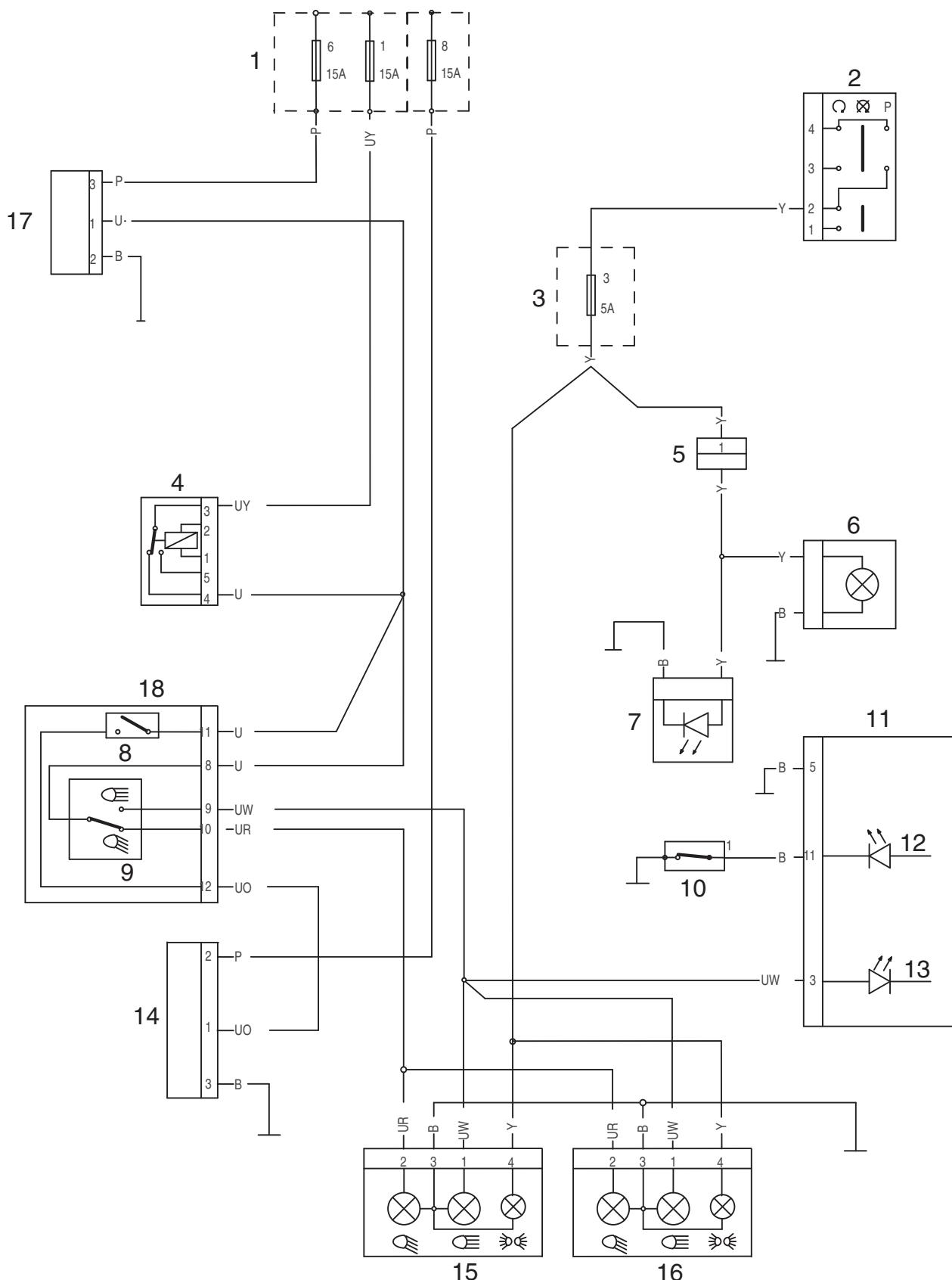
Key	Item Description
1	Fuse Box (Fuses 1, 6 and 8*)
2	Ignition Switch
3	Fuse Box (Fuse 3)
4	Starter Relay
5	Rear Lighting Subharness
6	Number Plate Light
7	Rear Light
8	Accessory Light Switch
9	Headlight Dip Switch
10	Oil Pressure Switch
11	Instrument Assembly
12	Oil Pressure Warning Light
13	Main Beam Warning Light
14	Accessory Light
15	Headlight 1
16	Headlight 2
17	Heated Grips
18	Left Hand Switch Housing

* For fuse 8 value refer to the label in the fuse box cover

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird Storm without ABS



Note: For fuse 8 value, refer to the label in the fuse box cover

Electrical System

Lighting Circuit – Thunderbird Storm with ABS

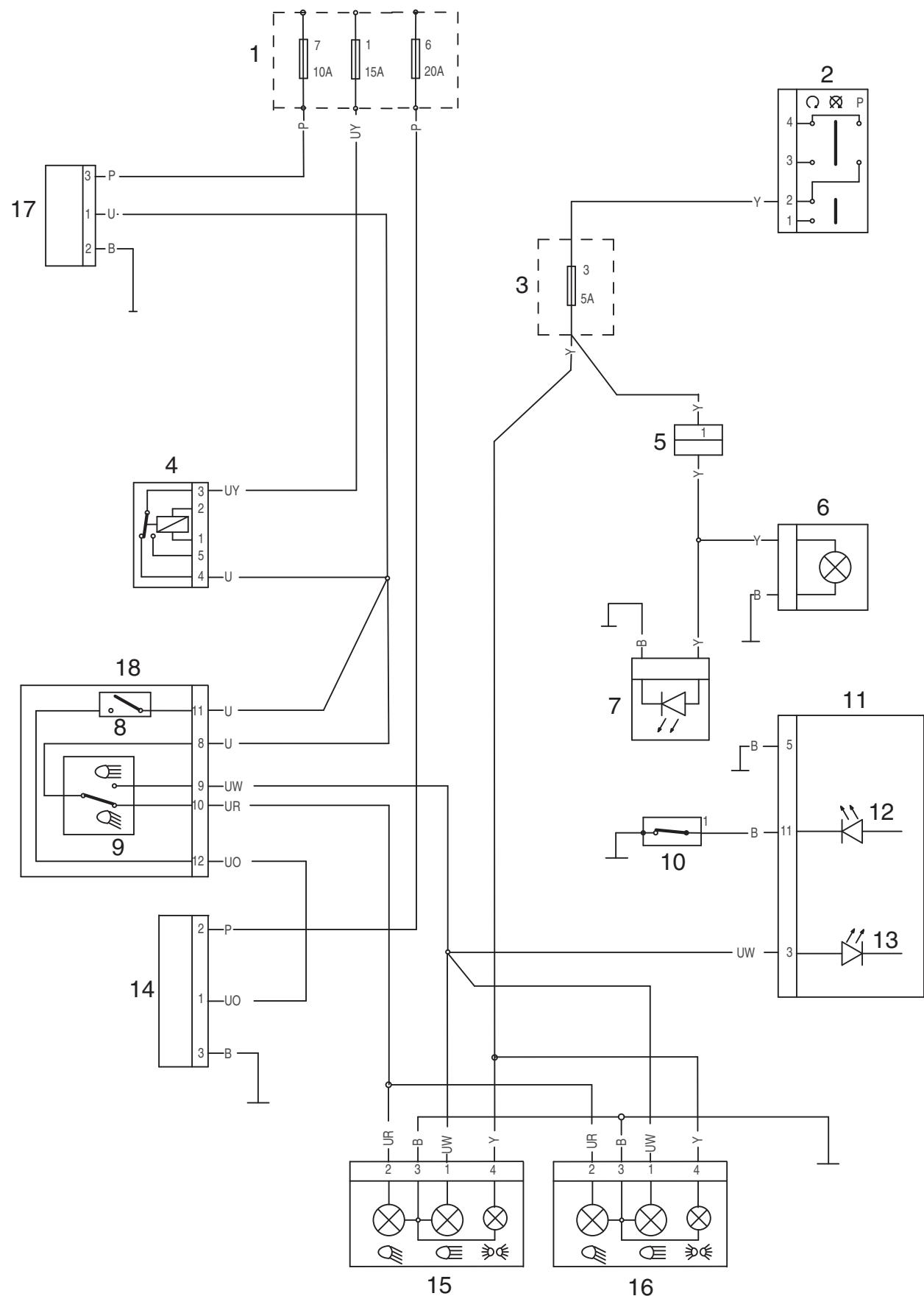
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (Fuses 1, 6 and 7)
2	Ignition Switch
3	Fuse Box (Fuse 3)
4	Starter Relay
5	Rear Lighting Subharness
6	Number Plate Light
7	Rear Light
8	Accessory Light Switch
9	Headlight Dip Switch
10	Oil Pressure Switch
11	Instrument Assembly
12	Oil Pressure Warning Light
13	Main Beam Warning Light
14	Accessory Light
15	Headlight 1
16	Headlight 2
17	Heated Grips
18	Left Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird Storm with ABS



Electrical System

Lighting Circuit – Thunderbird Commander

Key to Circuit Diagram

Key	Item Description
1	Ignition Switch
2	Fuse Box (Fuses 1, 3 and 10)
3	Headlight Relay
4	Engine Control Module
5	Left Hand Switch Housing*
6	Headlight Dip Switch
7	Headlight Dip Relay
8	Rear Light Assembly
9	Rear Light
10	Number Plate Light
11	Instrument Assembly
12	Main Beam Warning Light
13	Oil Pressure Warning Light
14	Oil Pressure Switch
15	Headlight 1
16	Headlight 2

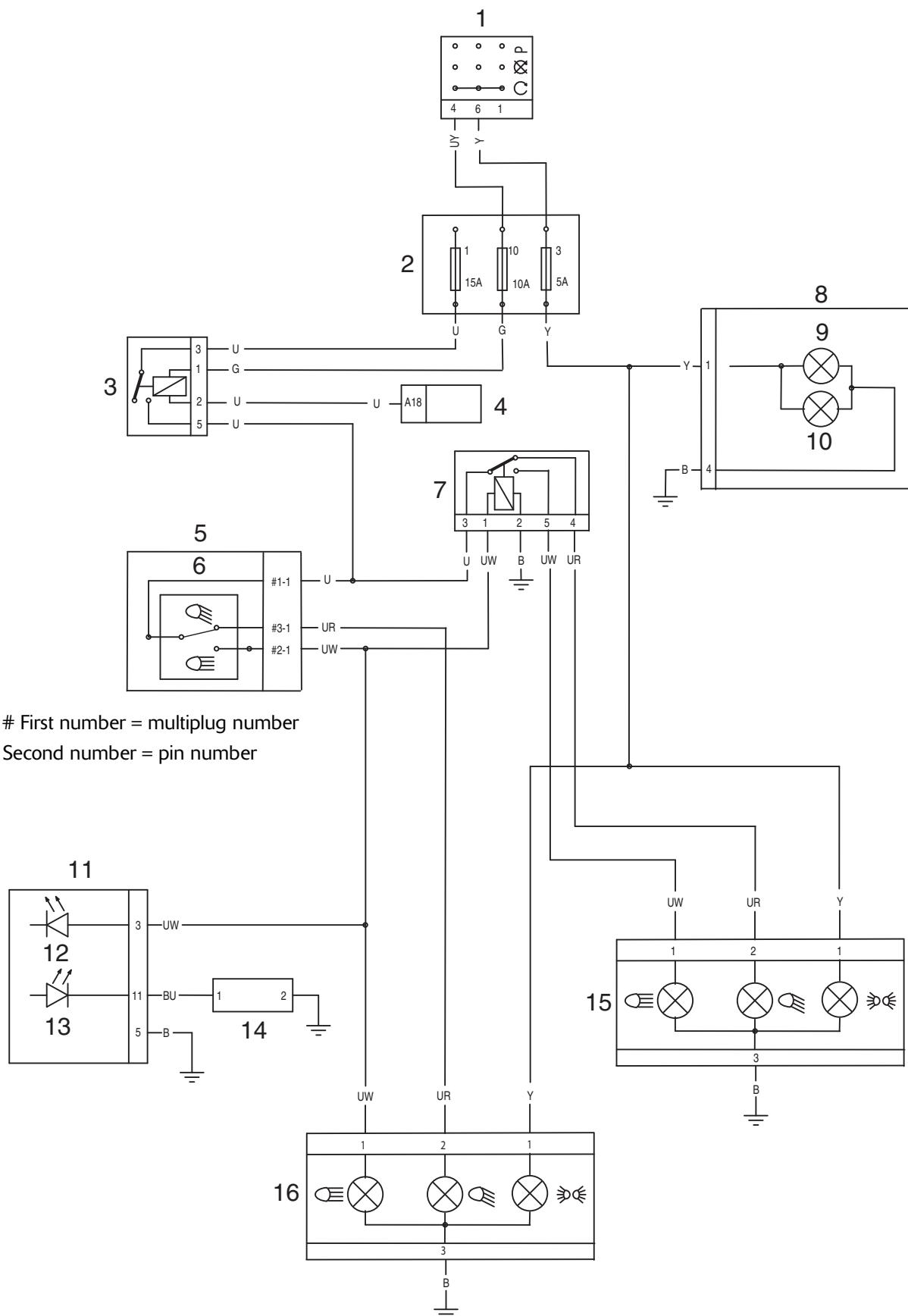
* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird Commander



Electrical System

Lighting Circuit – Thunderbird LT

Key to Circuit Diagram

Key	Item Description
1	Ignition Switch
2	Fuse Box (Fuses 1, 2, 3 and 10)
3	Headlight Relay
4	Engine Control Module
5	Left Hand Switch Housing*
6	Headlight Dip Switch
7	Fog Light Relay
8	Left Hand Fog Light
9	Right Hand fog Light
10	Fog Light Switch
11	Instrument Assembly
12	Main Beam Warning Light
13	Oil Pressure Warning Light
14	Oil Pressure Switch
15	Rear Light Assembly
16	Rear Light
17	Number Plate Light
18	Headlight
19	Front Position Light

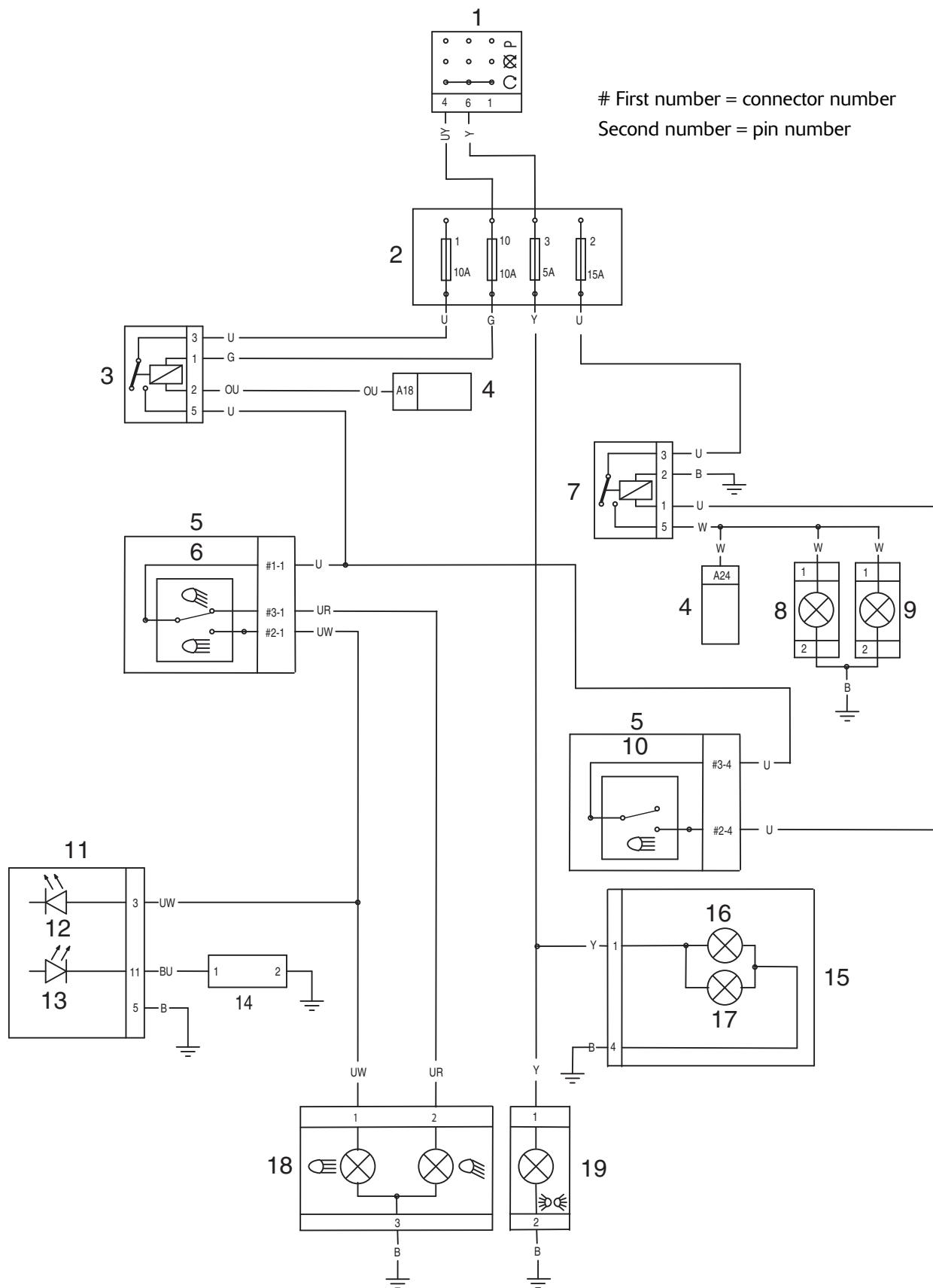
* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Lighting Circuit – Thunderbird LT



Electrical System

Starting and Charging Circuit – All Models without ABS

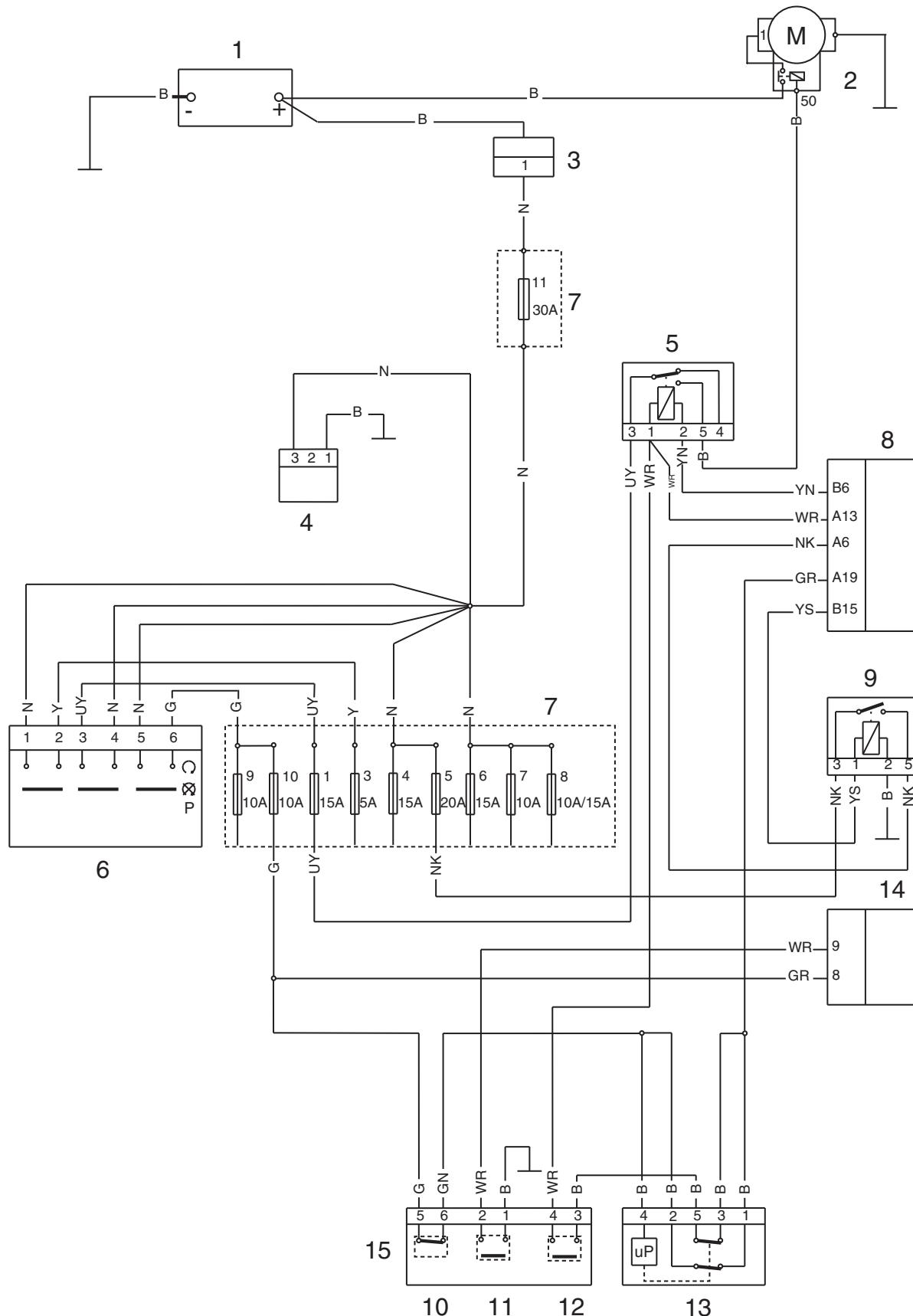
Key to Circuit Diagram

Key	Item Description
1	Battery
2	Starter Motor
3	Battery Connector
4	Rectifier/Regulator
5	Starter Relay
6	Ignition Switch
7	Fuse Box
8	Engine Control Module
9	Engine Management System Relay
10	Engine Stop Switch
11	Scroll Switch
12	Starter Switch
13	Alarm Control Unit Or Harness Link Connector
14	Instrument Assembly
15	Right Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Starting and Charging Circuit – All Models without ABS



Electrical System

Starting and Charging Circuit – All Models with ABS Except Thunderbird Commander and Thunderbird LT

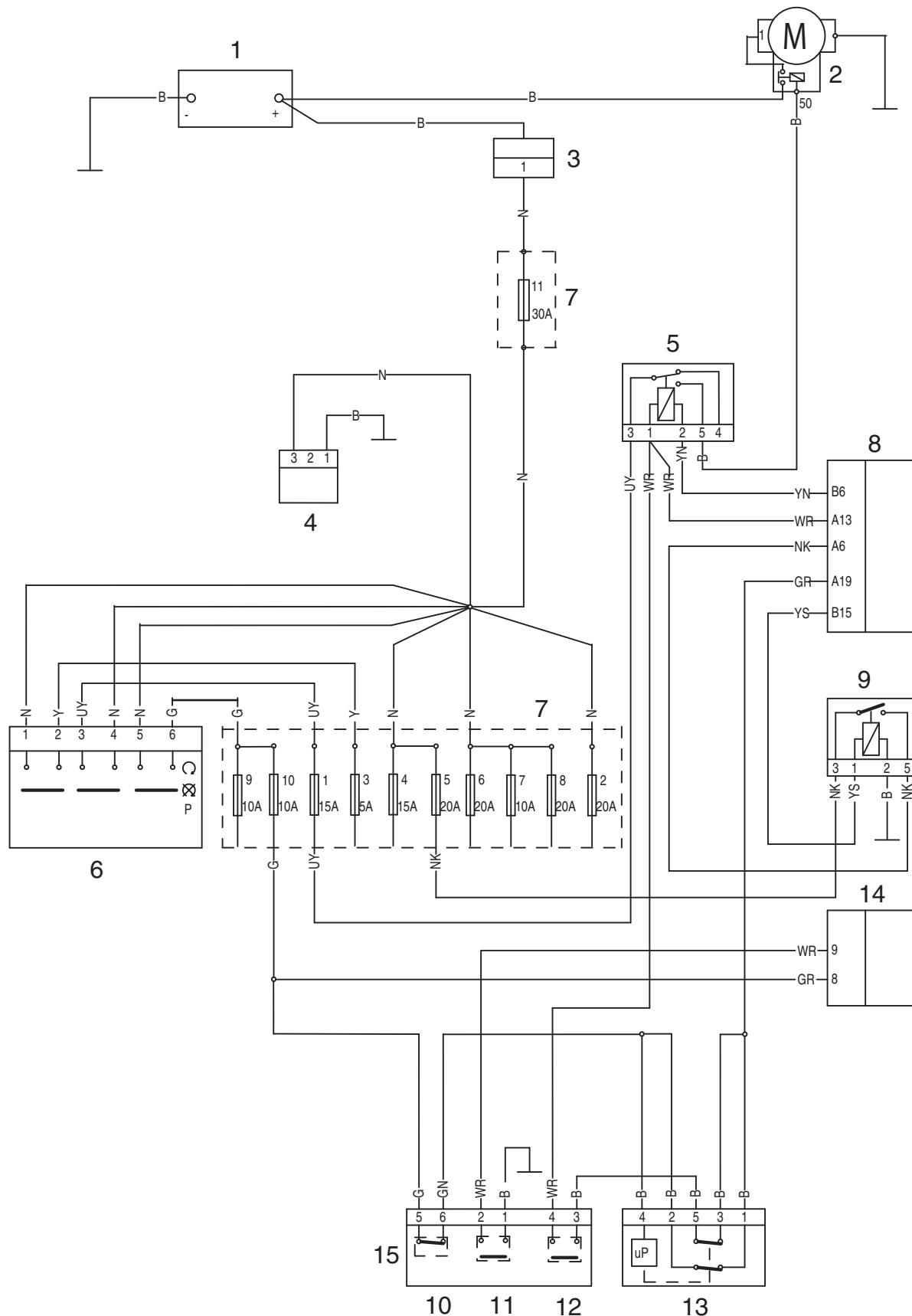
Key to Circuit Diagram

Key	Item Description
1	Battery
2	Starter Motor
3	Battery Connector
4	Rectifier/Regulator
5	Starter Relay
6	Ignition Switch
7	Fuse Box
8	Engine Control Module
9	Engine Management System Relay
10	Engine Stop Switch
11	Scroll Switch
12	Starter Switch
13	Alarm Control Unit Or Harness Link Connector
14	Instrument Assembly
15	Right Hand Switch Cube

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Starting and Charging Circuit – All Models with ABS Except Thunderbird Commander and Thunderbird LT



Electrical System

Starting and Charging Circuit – Thunderbird Commander

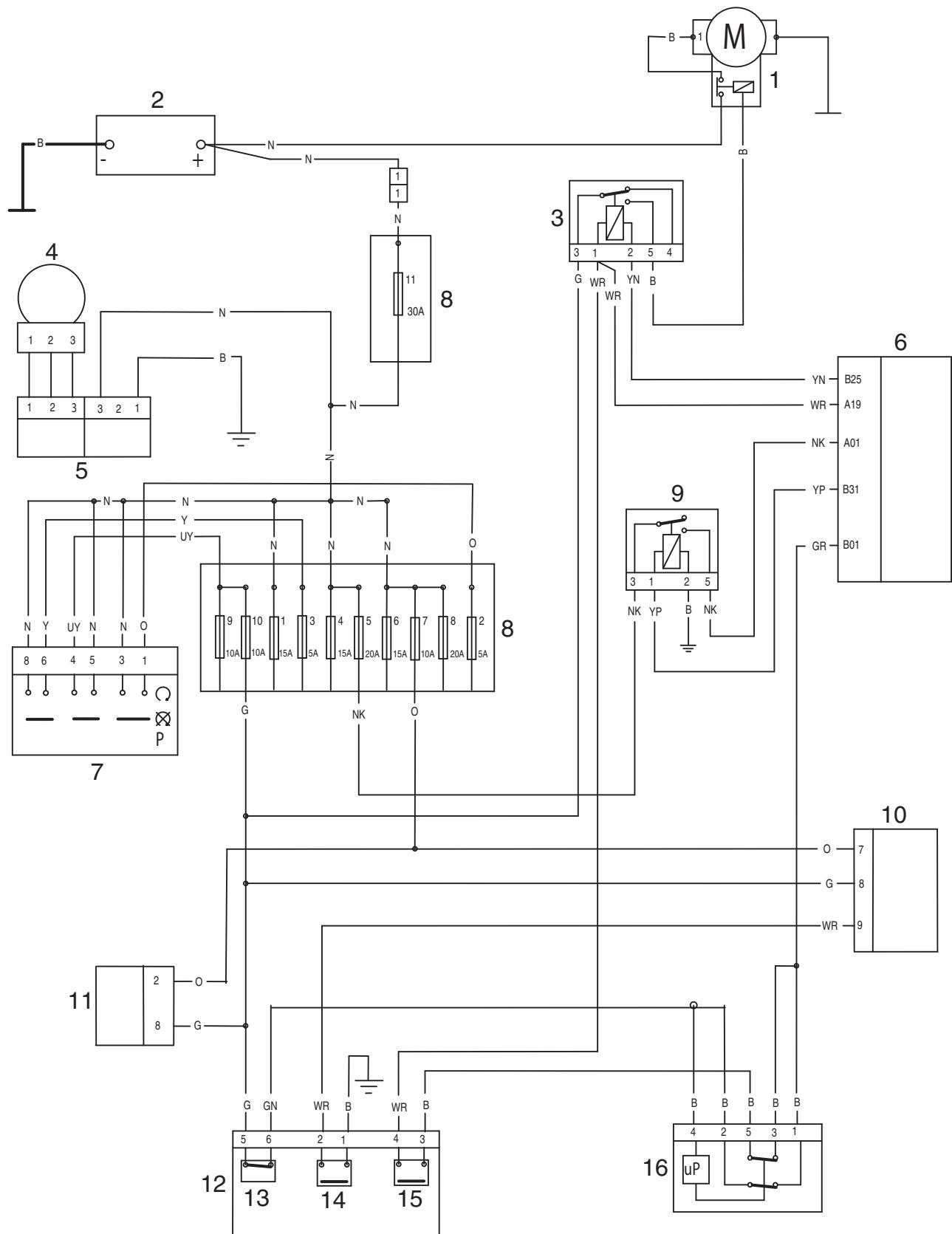
Key to Circuit Diagram

Key	Item Description
1	Starter Motor
2	Battery
3	Starter Relay
4	Alternator
5	Rectifier/Regulator
6	Engine Control Module
7	Ignition Switch
8	Fuse Box
9	Engine Management System Relay
10	Instrument Assembly
11	Immobiliser
12	Right Hand Switch Housing
13	Engine Stop Switch
14	Scroll Button
15	Start Button
16	Alarm Connector

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Starting and Charging Circuit – Thunderbird Commander



Electrical System

Starting and Charging Circuit – Thunderbird LT

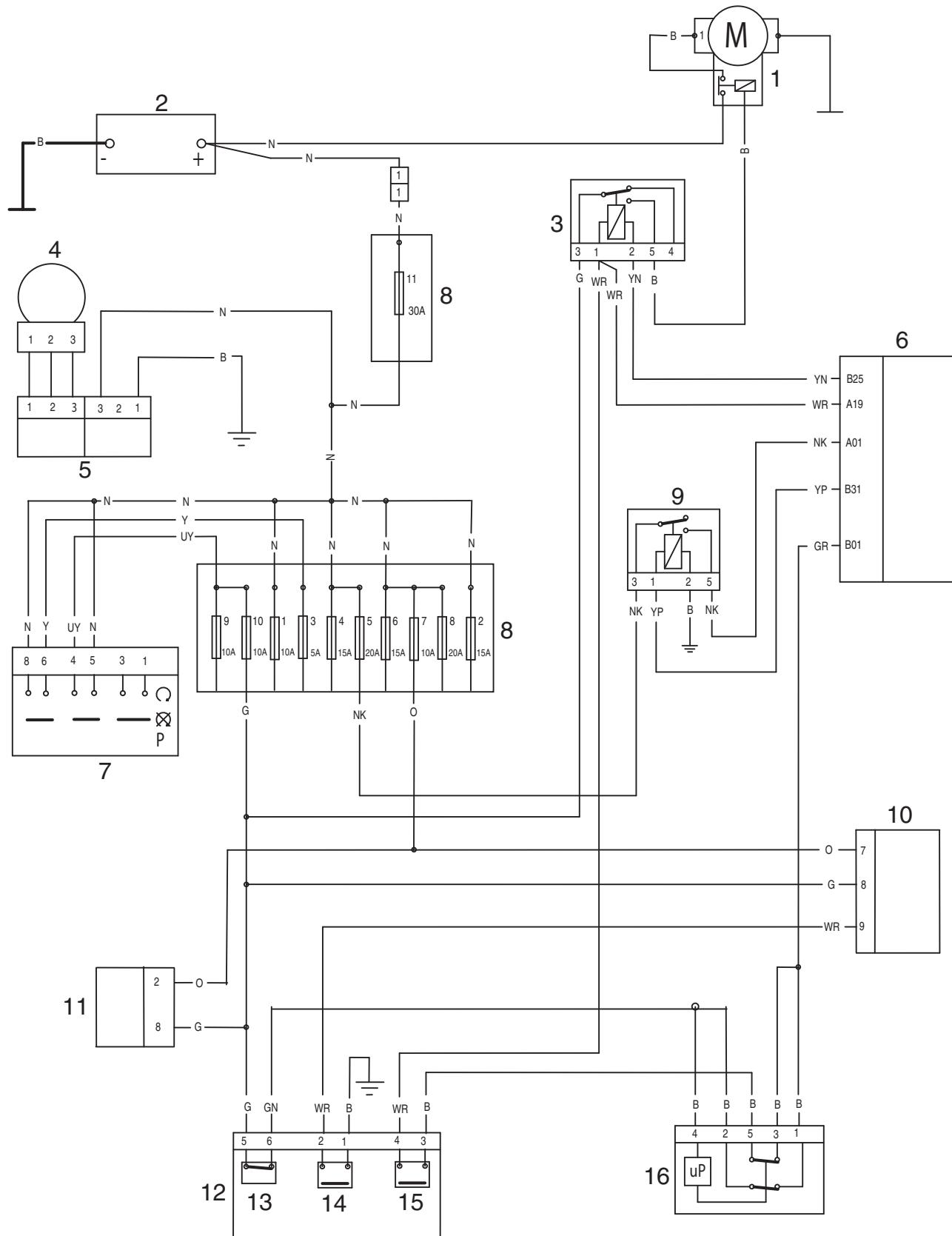
Key to Circuit Diagram

Key	Item Description
1	Starter Motor
2	Battery
3	Starter Relay
4	Alternator
5	Rectifier/Regulator
6	Engine Control Module
7	Ignition Switch
8	Fuse Box
9	Engine Management System Relay
10	Instrument Assembly
11	Immobiliser
12	Right Hand Switch Housing
13	Engine Stop Switch
14	Scroll Button
15	Start Button
16	Alarm Connector

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Starting and Charging Circuit – Thunderbird LT



Electrical System

Auxiliary and Accessory Circuit – All Models without ABS

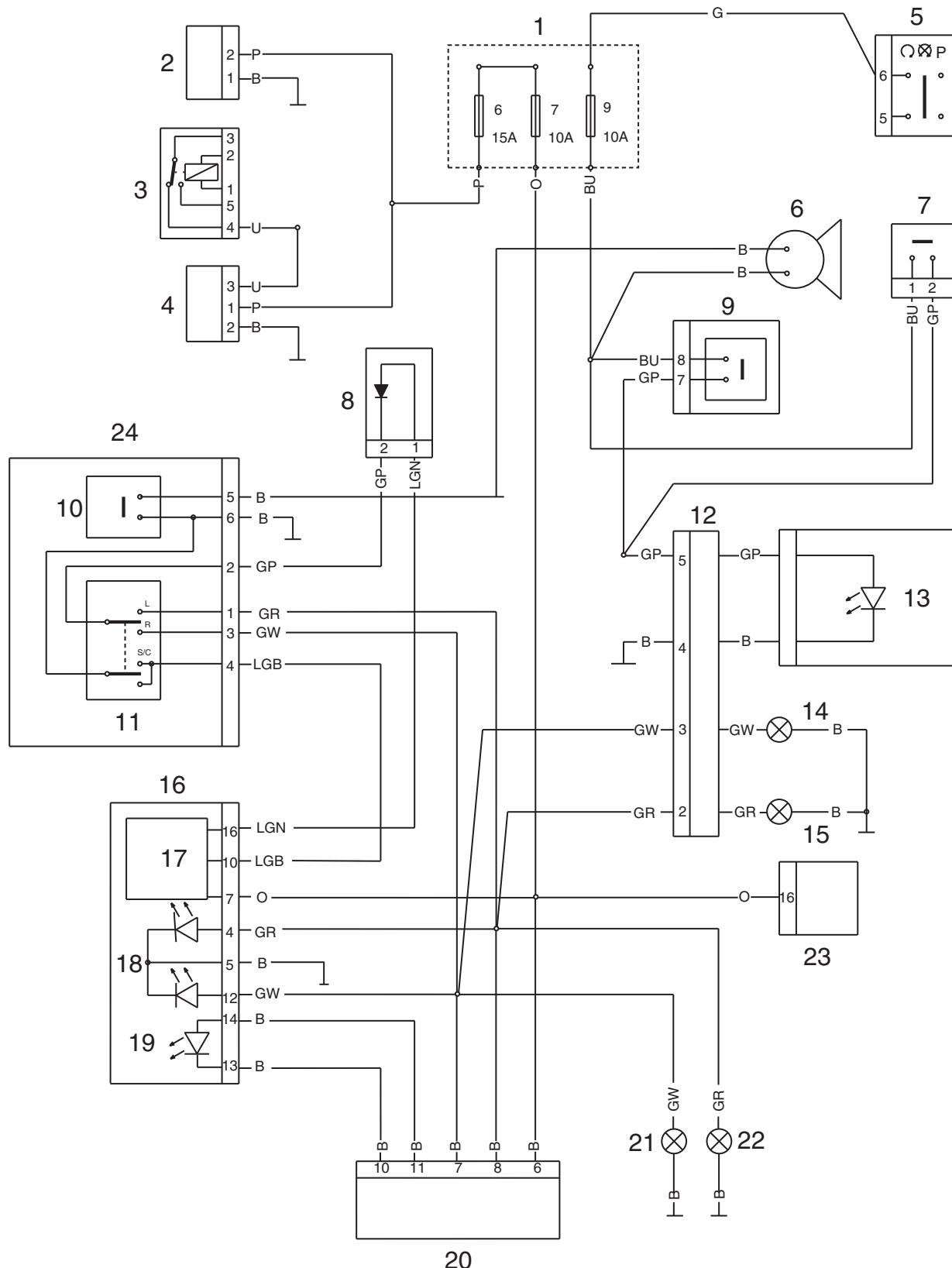
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (6, 7 and 9)
2	Accessory Socket
3	Starter Relay
4	Accessory Heated Handlebar Grips
5	Ignition Switch
6	Horn
7	Rear Brake Light Switch
8	Diode Pack
9	Front Brake Light Switch
10	Horn Switch
11	Direction Indicator Switch
12	Rear Lighting Subharness
13	Brake Light
14	Rear Right Direction Indicator
15	Rear Left Direction Indicator
16	Instrument Assembly
17	Indicator Relay
18	Direction Indicator (Instrument)
19	Alarm LED
20	Accessory Alarm Control Unit
21	Front Right Direction Indicator
22	Front Left Direction Indicator
23	Diagnostic Connector
24	Left Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Auxiliary and Accessory Circuit – All Models without ABS



Electrical System

Auxiliary and Accessory Circuit – All Models with ABS with a 15 amp fuse at position number 6 – Except Thunderbird Commander and Thunderbird LT

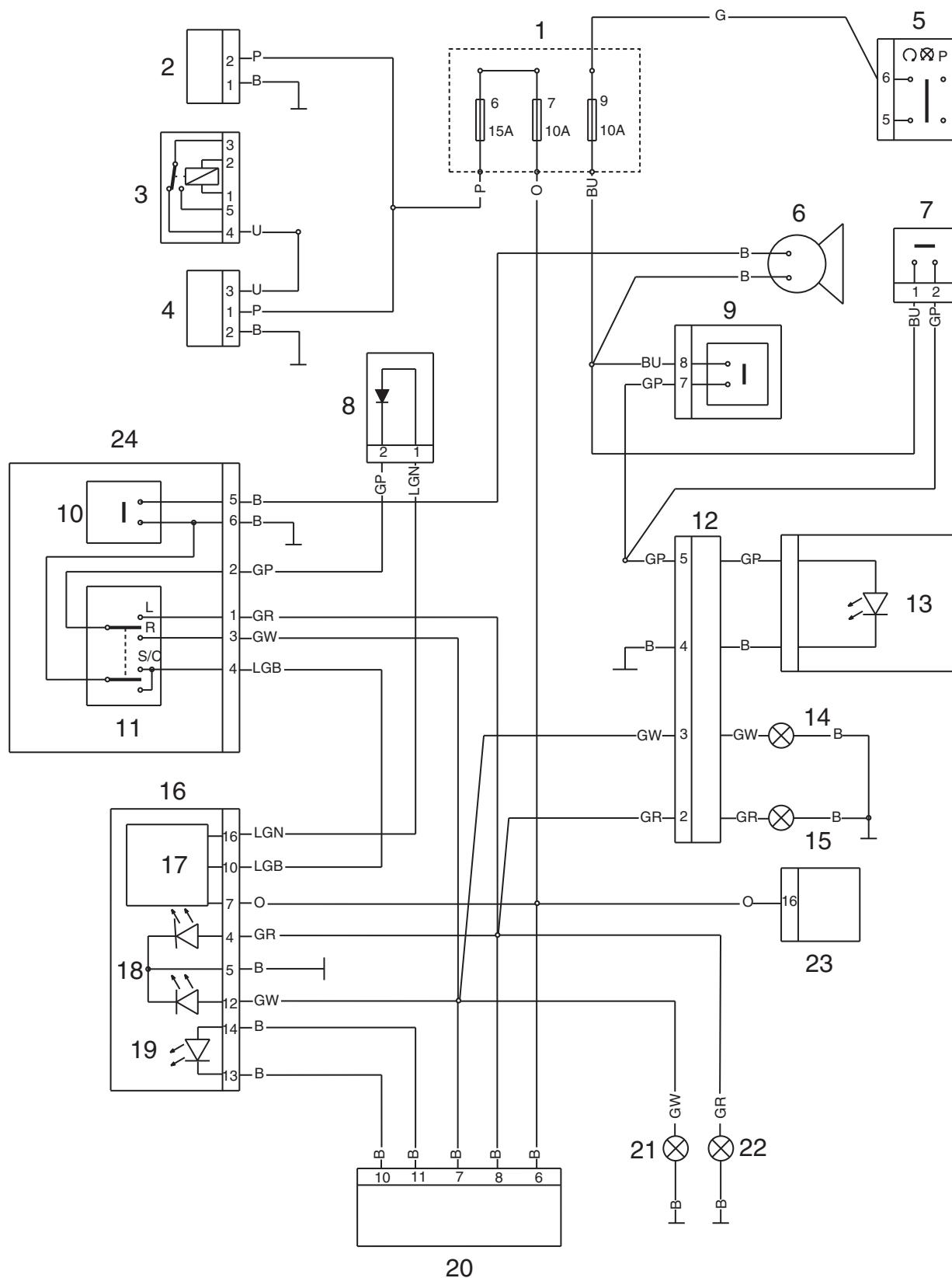
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (6, 7 and 9)
2	Accessory Socket
3	Starter Relay
4	Accessory Heated Handlebar Grips
5	Ignition Switch
6	Horn
7	Rear Brake Light Switch
8	Diode Pack
9	Front Brake Light Switch
10	Horn Switch
11	Direction Indicator Switch
12	Rear Lighting Subharness
13	Brake Light
14	Rear Right Direction Indicator
15	Rear Left Direction Indicator
16	Instrument Assembly
17	Indicator Relay
18	Direction Indicator (Instrument)
19	Alarm LED
20	Accessory Alarm Control Unit
21	Front Right Direction Indicator
22	Front Left Direction Indicator
23	Diagnostic Connector
24	Left Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Auxiliary and Accessory Circuit – All Models with ABS with a 15 amp fuse at position number 6 – Except Thunderbird Commander and Thunderbird LT



Electrical System

Auxiliary and Accessory Circuit – All Models with ABS with a 20 amp fuse at position number 6

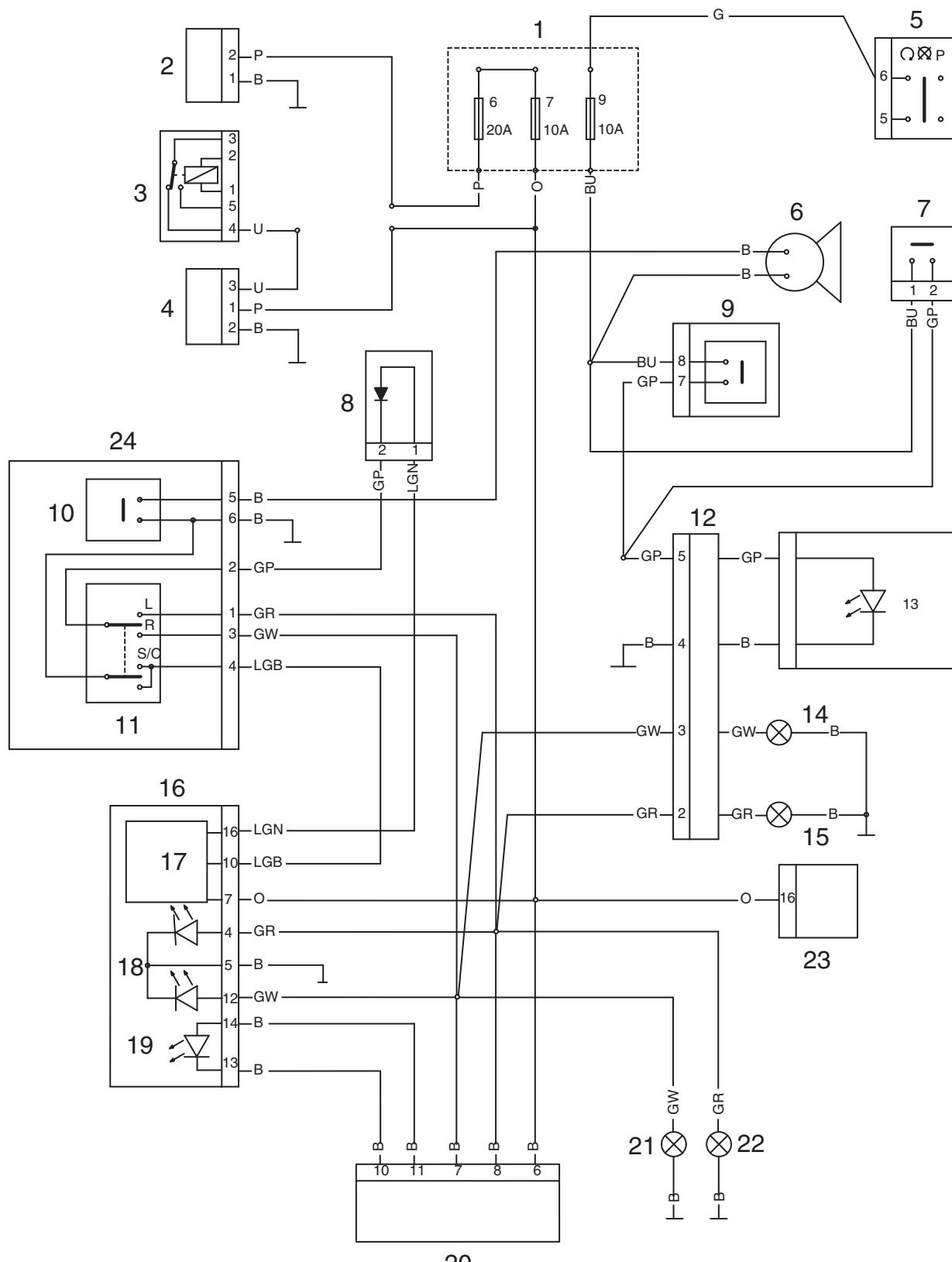
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (6, 7 and 9)
2	Accessory Socket
3	Starter Relay
4	Accessory Heated Handlebar Grips
5	Ignition Switch
6	Horn
7	Rear Brake Light Switch
8	Diode Pack
9	Front Brake Light Switch
10	Horn Switch
11	Direction Indicator Switch
12	Rear Lighting Subharness
13	Brake Light
14	Rear Right Direction Indicator
15	Rear Left Direction Indicator
16	Instrument Assembly
17	Indicator Relay
18	Direction Indicator (Instrument)
19	Alarm LED
20	Accessory Alarm Control Unit
21	Front Right Direction Indicator
22	Front Left Direction Indicator
23	Diagnostic Connector
24	Left Hand Switch Housing

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Auxiliary and Accessory Circuit – All Models with ABS with a 20 amp fuse at position number 6



Electrical System

Auxiliary and Accessory Circuit – Thunderbird Commander

Key to Circuit Diagram

Key	Item Description
1	Ignition Switch
2	Accessory Socket 1
3	Accessory Socket 2
4	Fuse Box (6, 7 and 9)
5	Accessory Heated Handlebar Grips
6	Left Hand Switch Housing*
7	Horn Switch
8	Direction Indicator Switch
9	Horn 1
10	Horn 2
11	Rear Brake Light Switch
12	Diode Pack
13	Front Brake Light Switch
14	Instrument Assembly
15	Direction Indicator (Instrument)
16	Alarm Indicator
17	Diagnostic Connector
18	Immobiliser
19	Rear Light Assembly
20	Rear Right Direction Indicator
21	Rear Left Direction Indicator
22	Number Plate Light
23	Rear Position Light
24	Brake Light
25	Accessory Alarm Control Unit
26	Front Right Direction Indicator
27	Front Left Direction Indicator

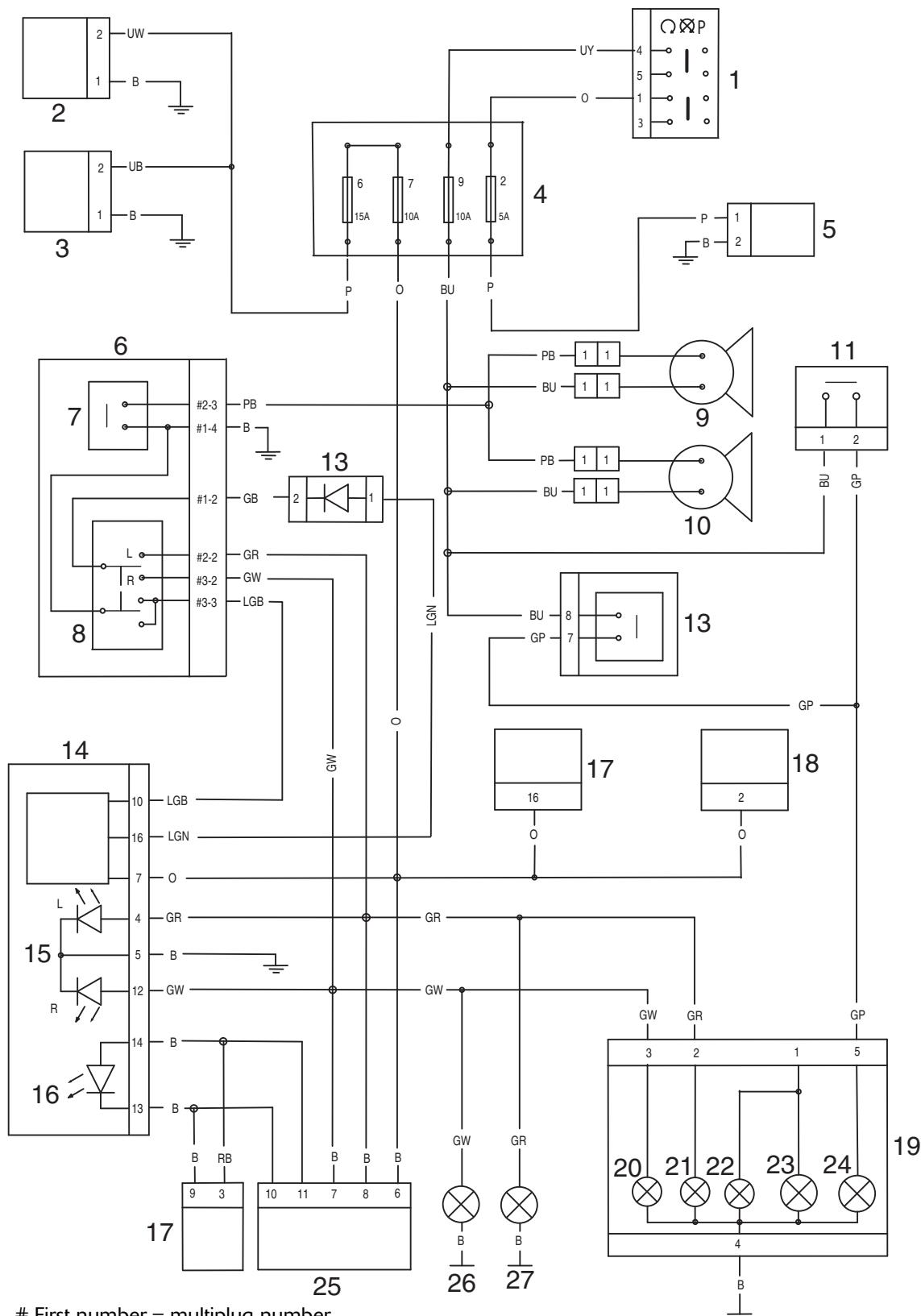
* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Auxiliary and Accessory Circuit – Thunderbird Commander



Electrical System

Auxiliary and Accessory Circuit – Thunderbird LT

Key to Circuit Diagram

Key	Item Description
1	Ignition Switch
2	Accessory Socket 1
3	Accessory Socket 2
4	Fuse Box (6, 7 and 9)
5	Accessory Heated Handlebar Grips
6	Left Hand Switch Housing*
7	Horn Switch
8	Direction Indicator Switch
9	Horn 1
10	Rear Brake Light Switch
11	Diode Pack
12	Front Brake Light Switch
13	Instrument Assembly
14	Direction Indicator (Instrument)
15	Alarm Indicator
16	Diagnostic Connector
17	Immobiliser
18	Rear Light Assembly
19	Rear Right Direction Indicator
20	Rear Left Direction Indicator
21	Number Plate Light
22	Rear Position Light
23	Brake Light
24	Accessory Alarm Control Unit
25	Front Right Direction Indicator
26	Front Left Direction Indicator

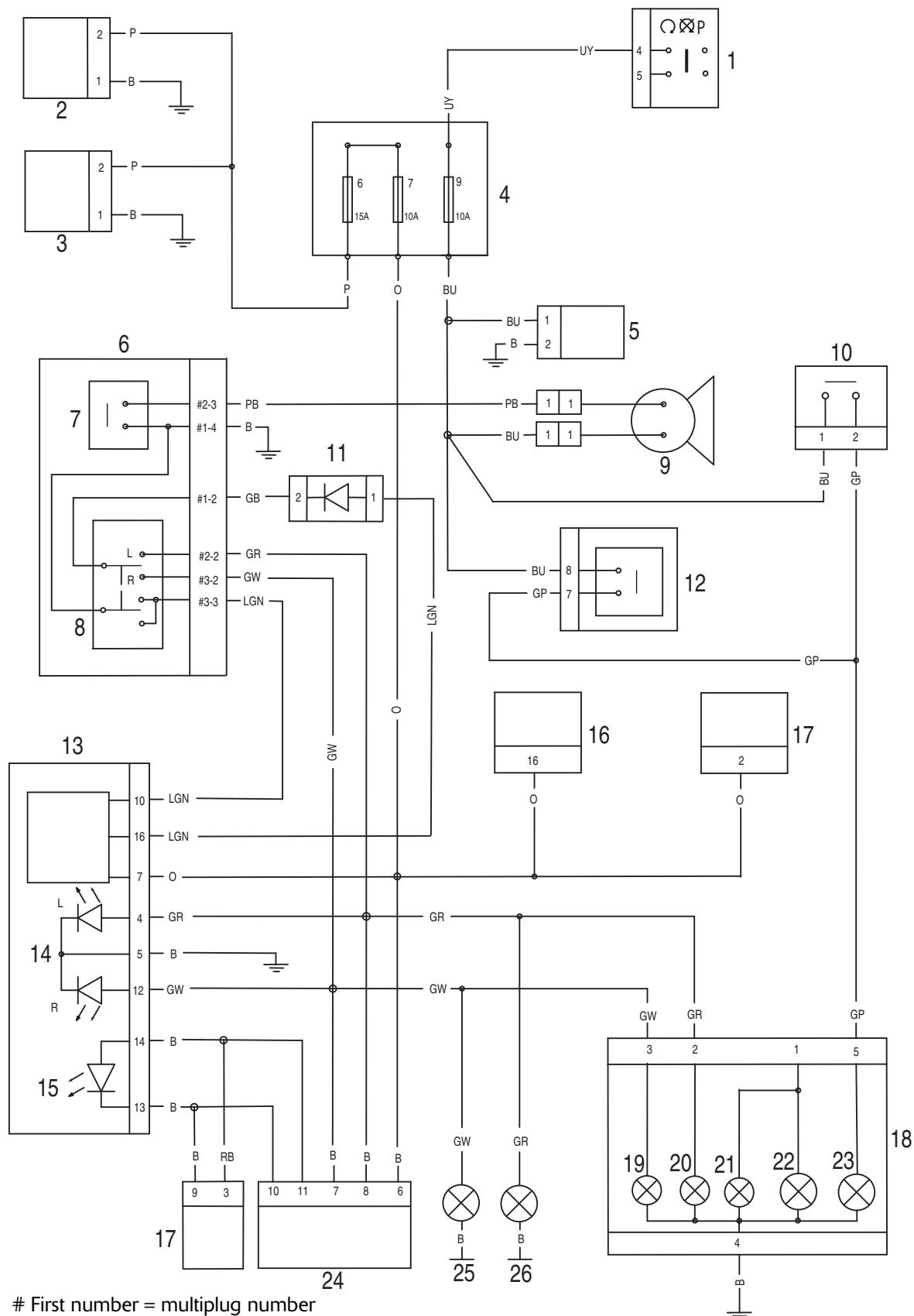
* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Auxiliary and Accessory Circuit – Thunderbird LT



Electrical System

Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – Up To Engine Number 596480

Key to Circuit Diagram

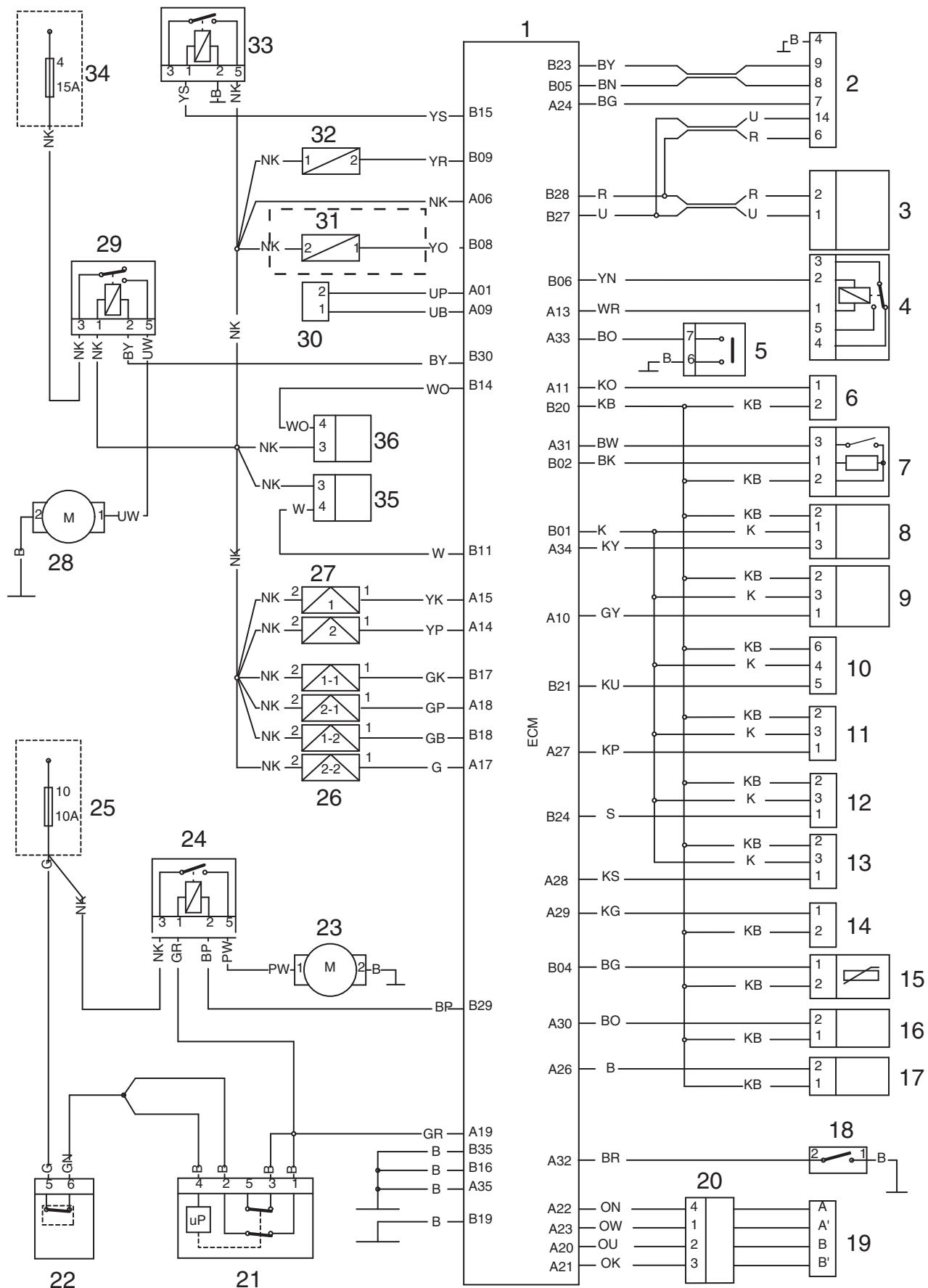
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	Right Hand MAP Sensor
13	Left Hand MAP Sensor
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Right Hand Oxygen Sensor
17	Left Hand Oxygen Sensor
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)
35	Right Hand Oxygen Sensor Heater*

36	Left Hand Oxygen Sensor Heater*
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – Up To Engine Number 596480



Electrical System

Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596481

Key to Circuit Diagram

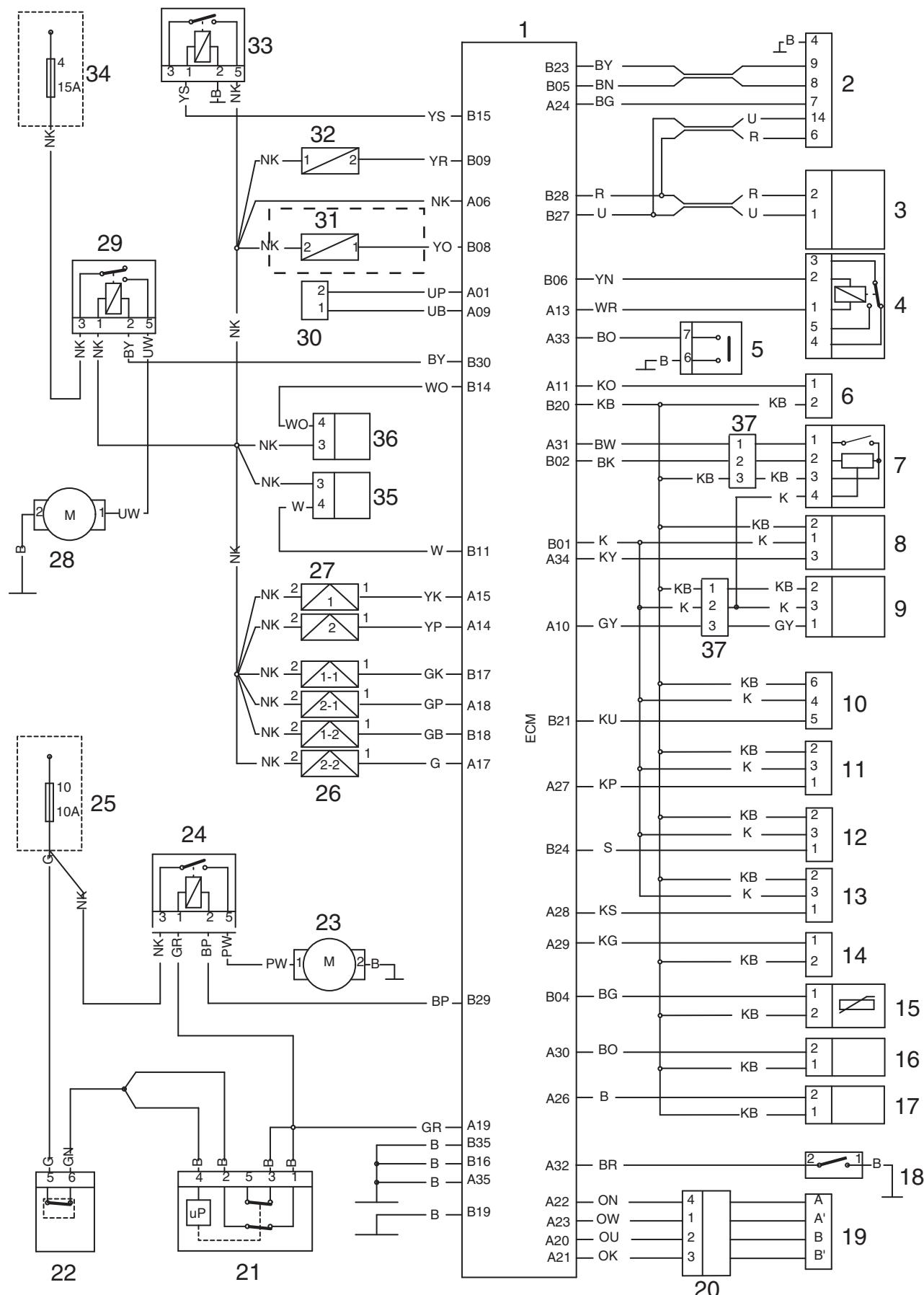
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	Right Hand MAP Sensor
13	Left Hand MAP Sensor
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Right Hand Oxygen Sensor
17	Left Hand Oxygen Sensor
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)
35	Right Hand Oxygen Sensor Heater*

36	Left Hand Oxygen Sensor Heater*
37	Gear Position Sensor Fly Lead
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596481



Electrical System

Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596481 – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Vehicle Speed Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Pressure Sensor
12	Right Hand MAP Sensor
13	Left Hand MAP Sensor
14	Coolant Temperature Sensor
15	Fuel Level Sensor
16	Right Hand Oxygen Sensor
17	Left Hand Oxygen Sensor
18	Side Stand Switch
19	Idle Speed Control Stepper Motor
20	Idle Speed Control Subharness
21	Alarm Unit
22	Engine Stop Switch
23	Fuel Pump
24	Fuel Pump Relay
25	Fuse Box (fuse 10)
26	Ignition Coils
27	Fuel Injectors
28	Cooling Fan
29	Cooling Fan Relay
30	Crankshaft Sensor
31	SAI Valve < VIN 449624
32	Purge Valve
33	Engine Management System Relay
34	Fuse Box (Fuse 4)

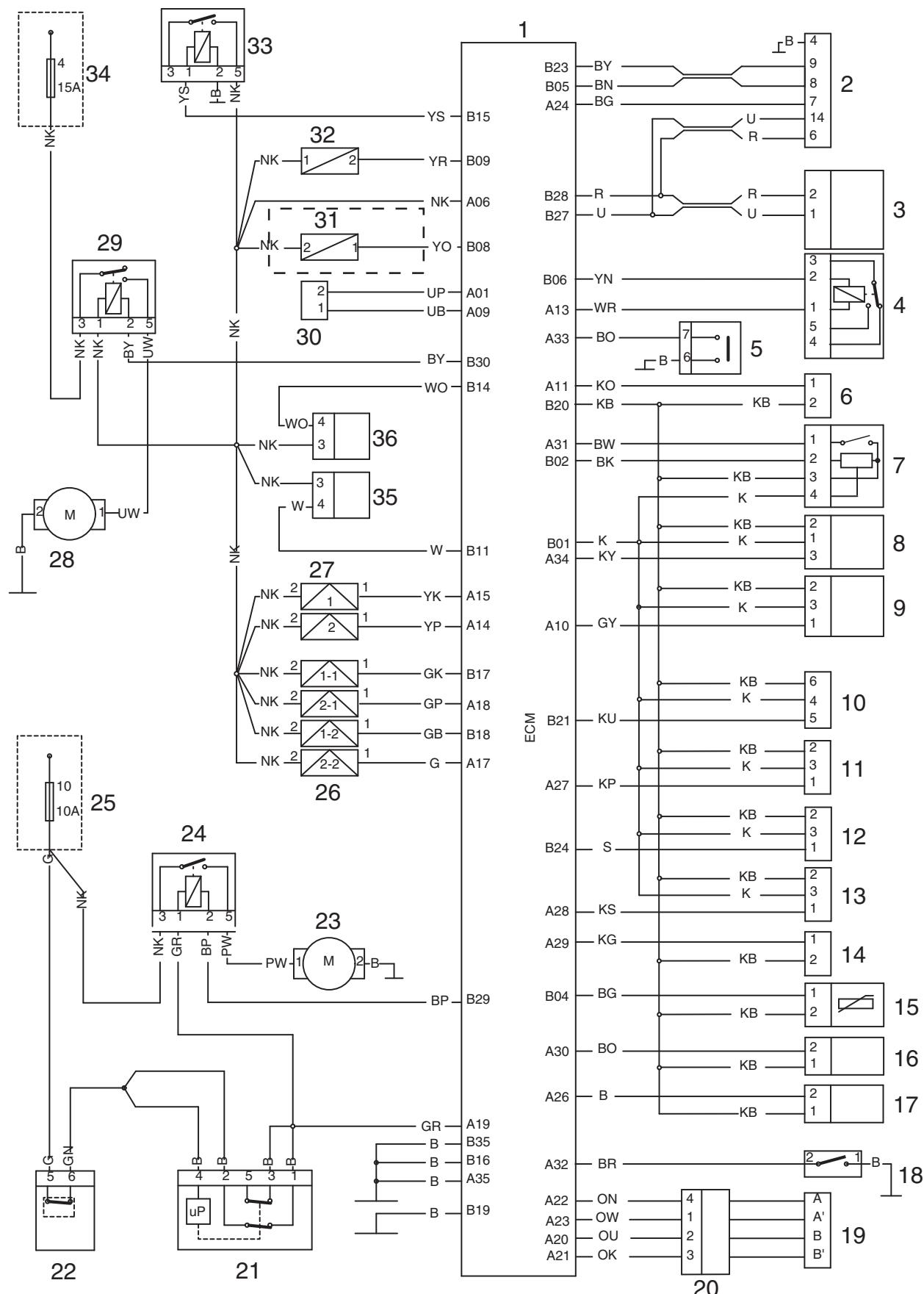
35	Right Hand Oxygen Sensor Heater*
36	Left Hand Oxygen Sensor Heater*

* The oxygen sensor heater is an integral part of the oxygen sensor assembly

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Engine Management Circuit – All Models Except Thunderbird Commander and Thunderbird LT – From Engine Number 596481 – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

Engine Management Circuit – Thunderbird Commander and Thunderbird LT

Key to Circuit Diagram

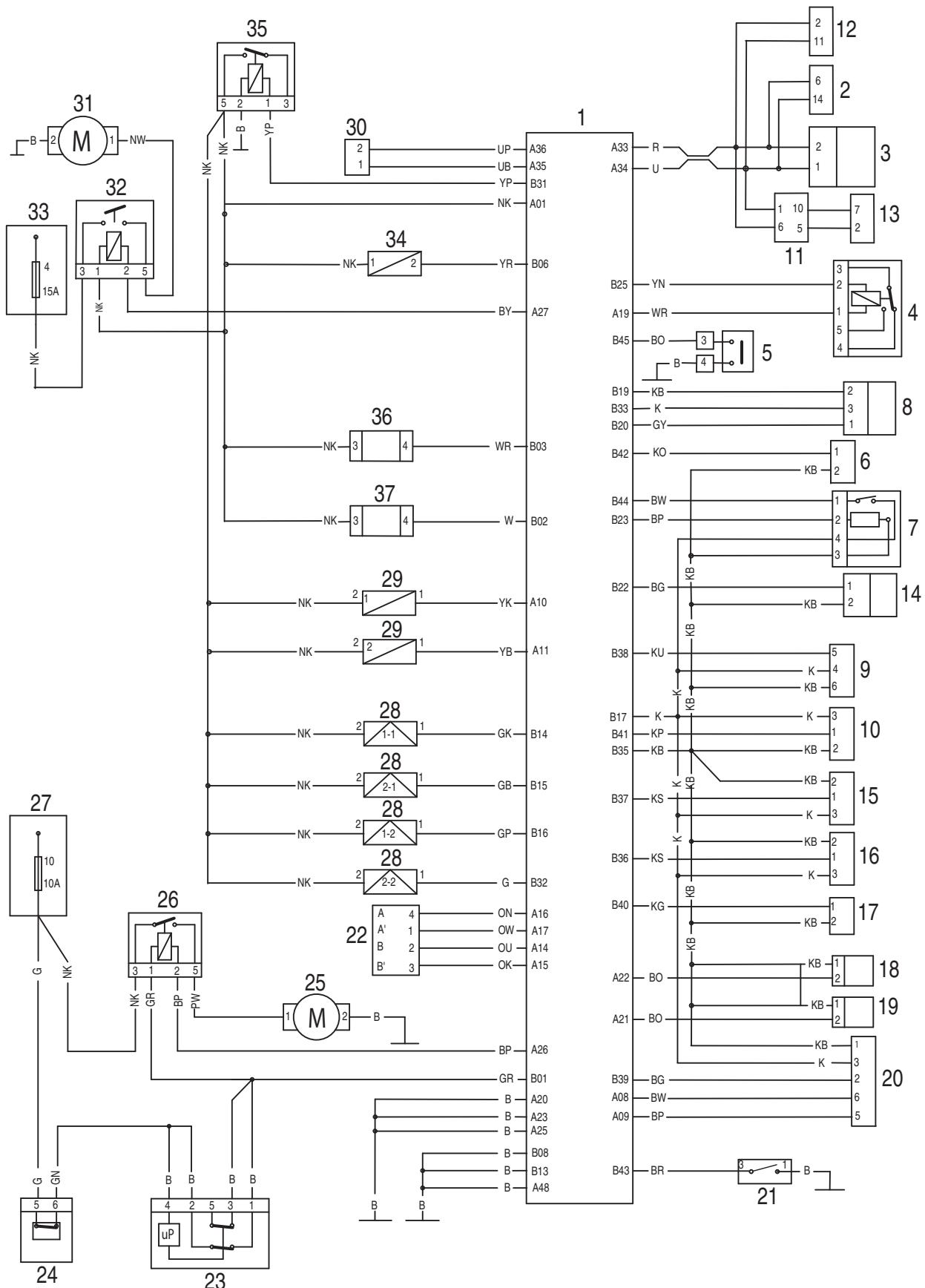
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument Assembly
4	Starter Relay
5	Clutch Switch
6	Intake Air Temperature Sensor
7	Gear Position Sensor
8	Throttle Position Sensor
9	Fall Detection Switch
10	Ambient Pressure Sensor
11	Immobiliser
12	ABS Module
13	Ignition Switch
14	Fuel Level Sensor
15	Right Hand MAP Sensor
16	Left Hand MAP Sensor
17	Coolant Temperature Sensor
18	Right Hand Oxygen Sensor
19	Left Hand Oxygen Sensor
20	Exhaust Valve Actuator
21	Side Stand Switch
22	Idle Speed Control Stepper Motor
23	Alarm Unit
24	Engine Stop Switch
25	Fuel Pump
26	Fuel Pump Relay
27	Fuse Box (fuse 10)
28	Ignition Coils
29	Fuel Injectors
30	Crankshaft Sensor
31	Cooling Fan
32	Cooling Fan Relay
33	Fuse Box (Fuse 4)
34	Purge Valve
35	Engine Management System Relay

36	Right Hand Oxygen sensor heater*
37	Left Hand Oxygen sensor heater*
* The oxygen sensor heater is an integral part of the oxygen sensor assembly	

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – Engine Management Circuit – Thunderbird Commander and Thunderbird LT



Electrical System

ABS Circuit – All Models with ABS Except Thunderbird Commander and Thunderbird LT

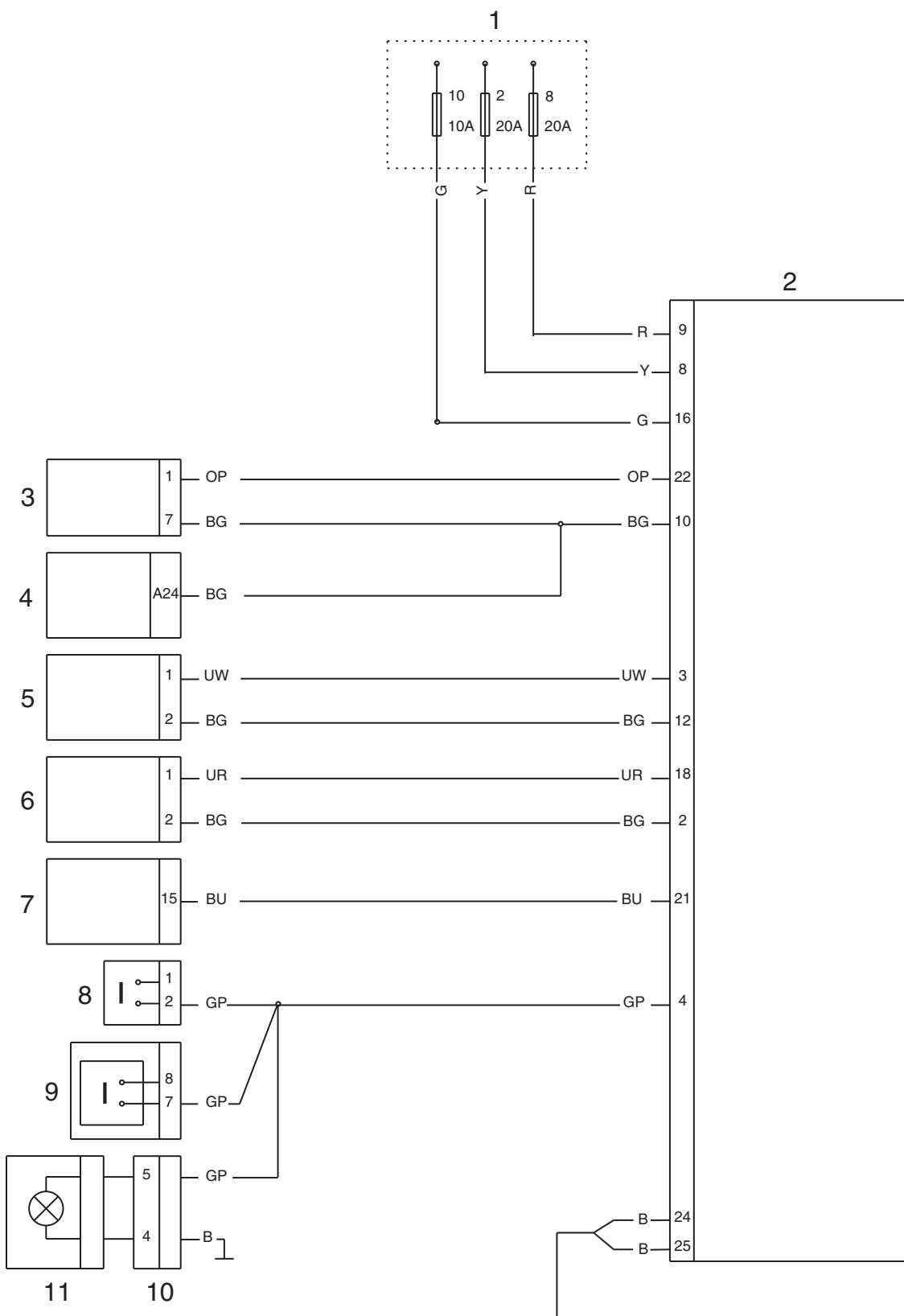
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (Fuse 2, 8 and 10)
2	ABS Module
3	Diagnostic Connector
4	Engine Control Module
5	Front Wheel Speed Sensor
6	Rear Wheel Speed Sensor
7	Instrument Assembly
8	Rear Brake Light Switch
9	Right Hand Switch Housing
10	Rear Lighting Subharness
11	Brake Light

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – ABS Circuit – All Models with ABS Except Thunderbird Commander and Thunderbird LT



Electrical System

ABS Circuit – Thunderbird Commander and Thunderbird LT

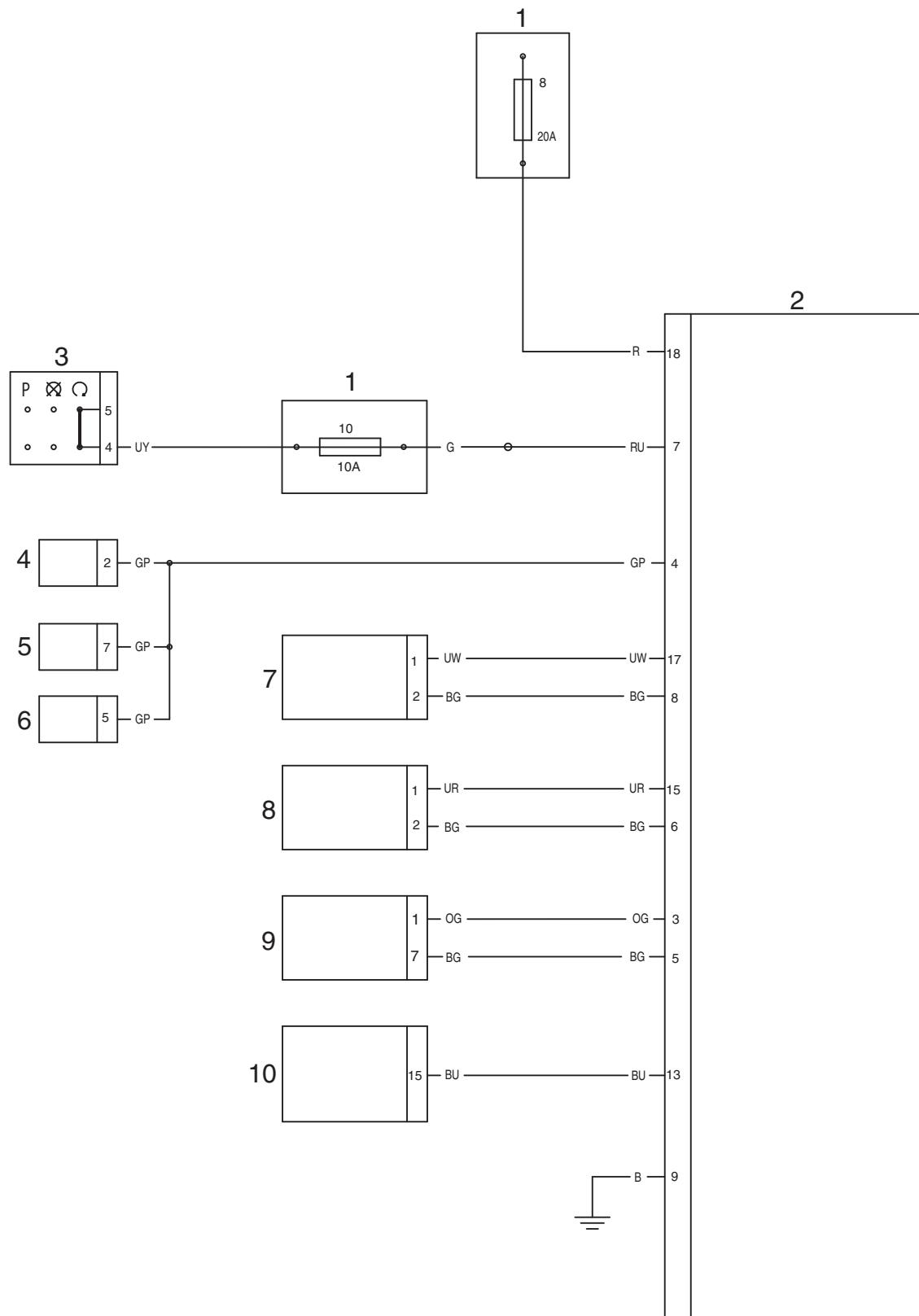
Key to Circuit Diagram

Key	Item Description
1	Fuse Box (Fuse 8 and 10)
2	ABS Module
3	Ignition Switch
4	Front Brake Light Switch
5	Rear Brake Light Switch
6	Rear Lighting Subharness
7	Front Wheel Speed Sensor
8	Rear Wheel Speed Sensor
9	Diagnostic Connector
10	Instruments

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Circuit Diagram – ABS Circuit – Thunderbird Commander and Thunderbird LT



Electrical System

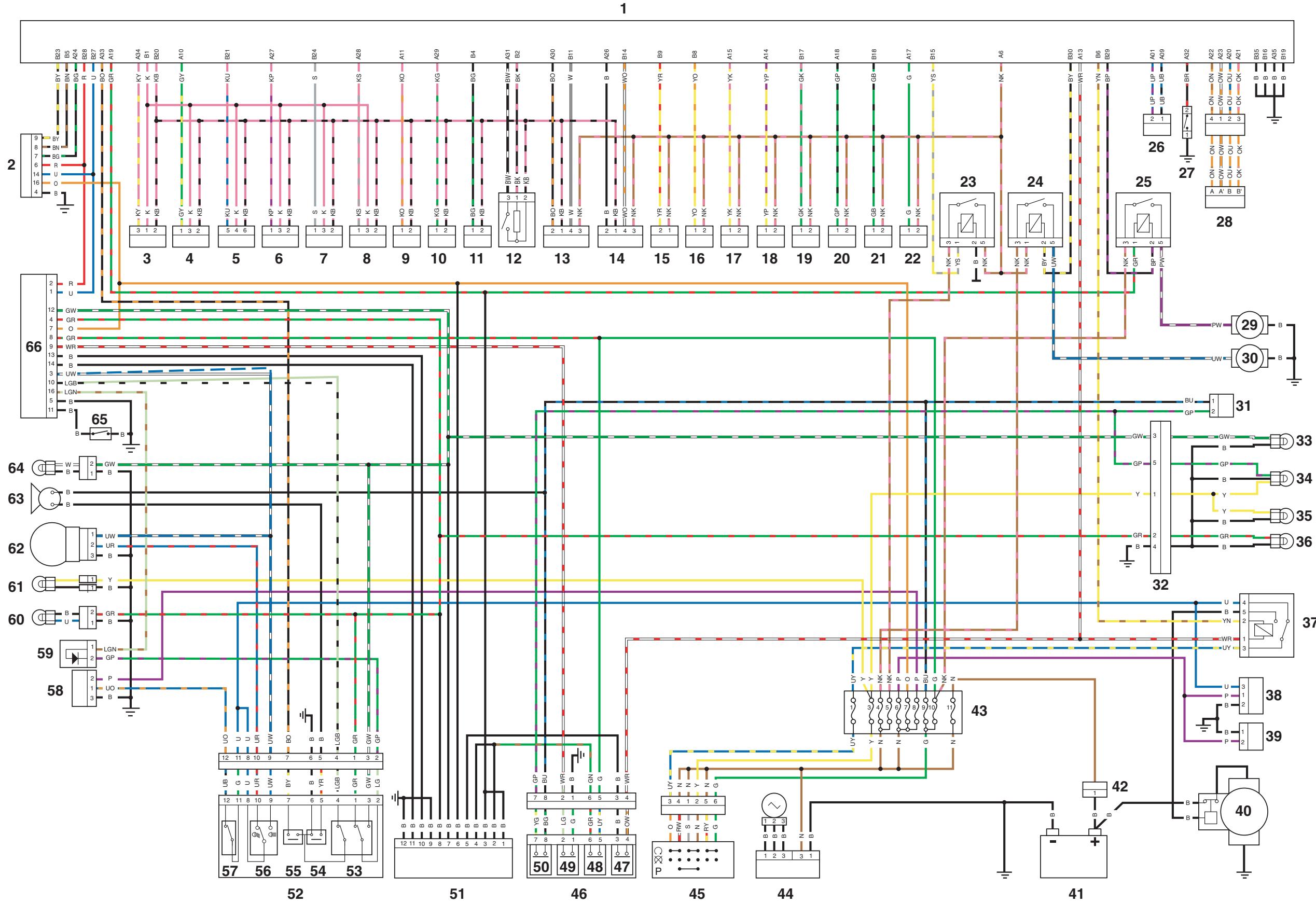
Complete System – Thunderbird without ABS

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator

Key	Item Description
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Horn
64	Front Right Hand Indicator
65	Oil Pressure Switch
66	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird without ABS



Electrical System

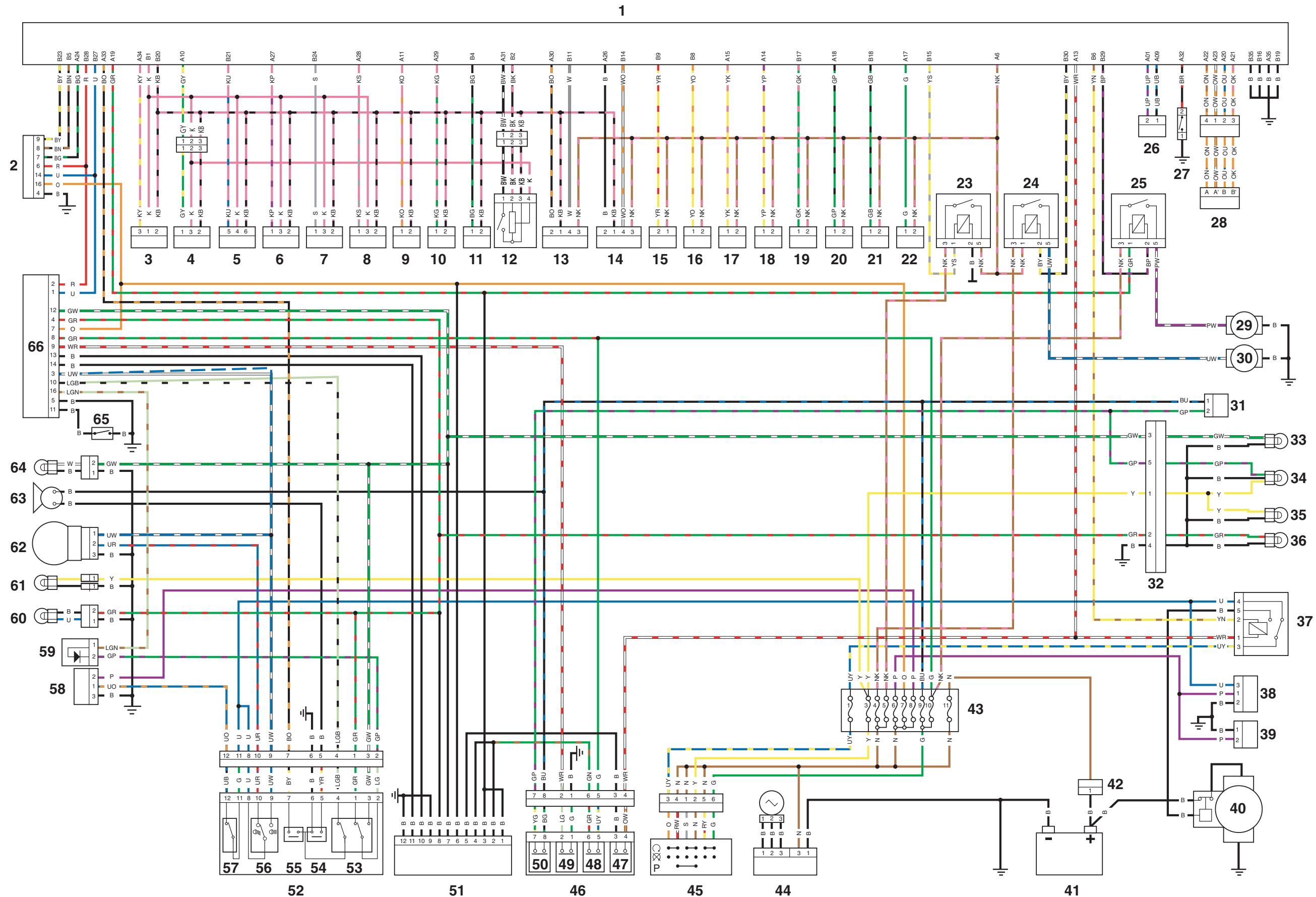
Complete System – Thunderbird without ABS – From Engine Number 596481

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator

Key	Item Description
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Horn
64	Front Right Hand Indicator
65	Oil Pressure Switch
66	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird without ABS – From Engine Number 596481



Electrical System

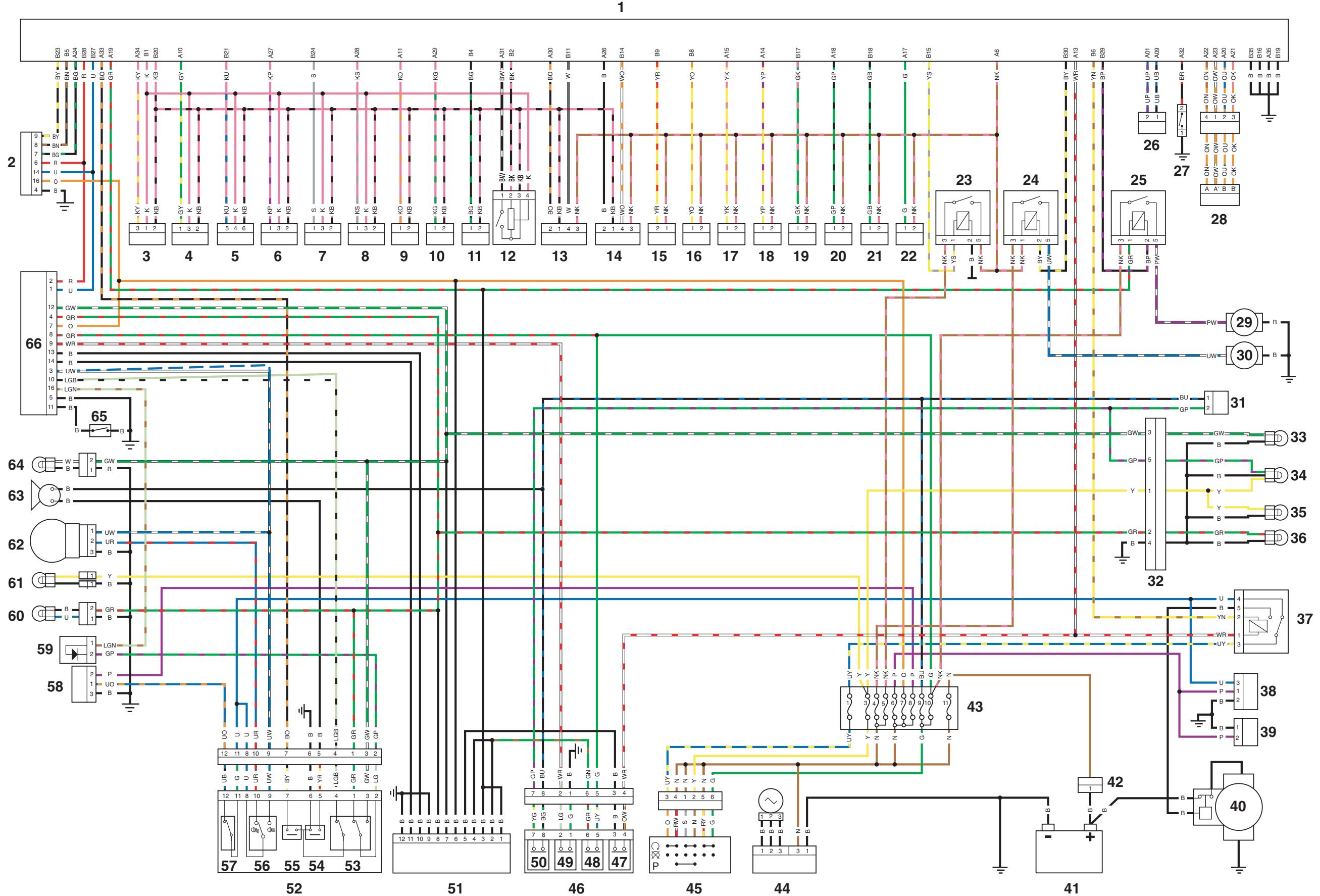
Complete System – Thunderbird without ABS – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator

Key	Item Description
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Horn
64	Front Right Hand Indicator
65	Oil Pressure Switch
66	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird without ABS – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

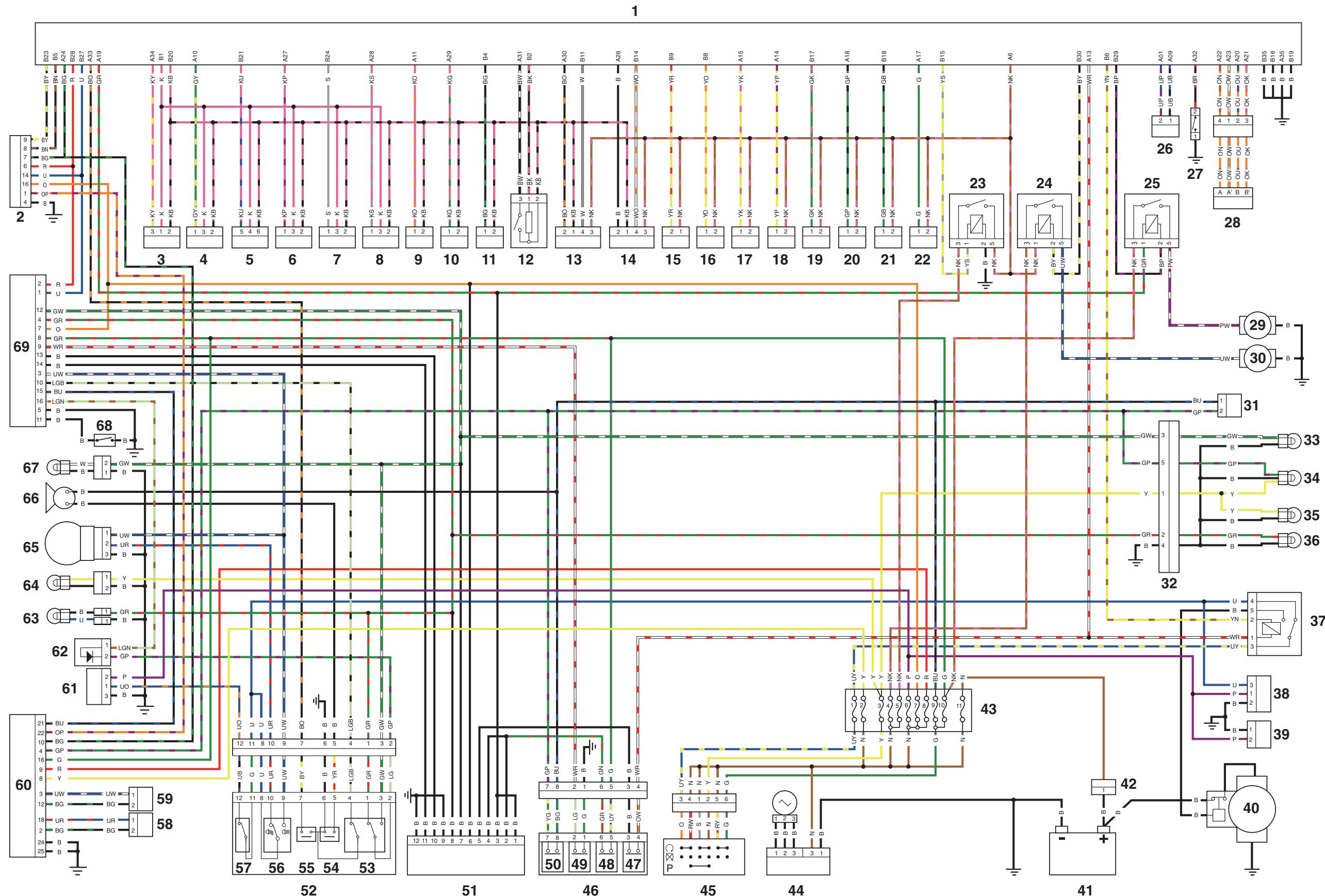
Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6



Electrical System

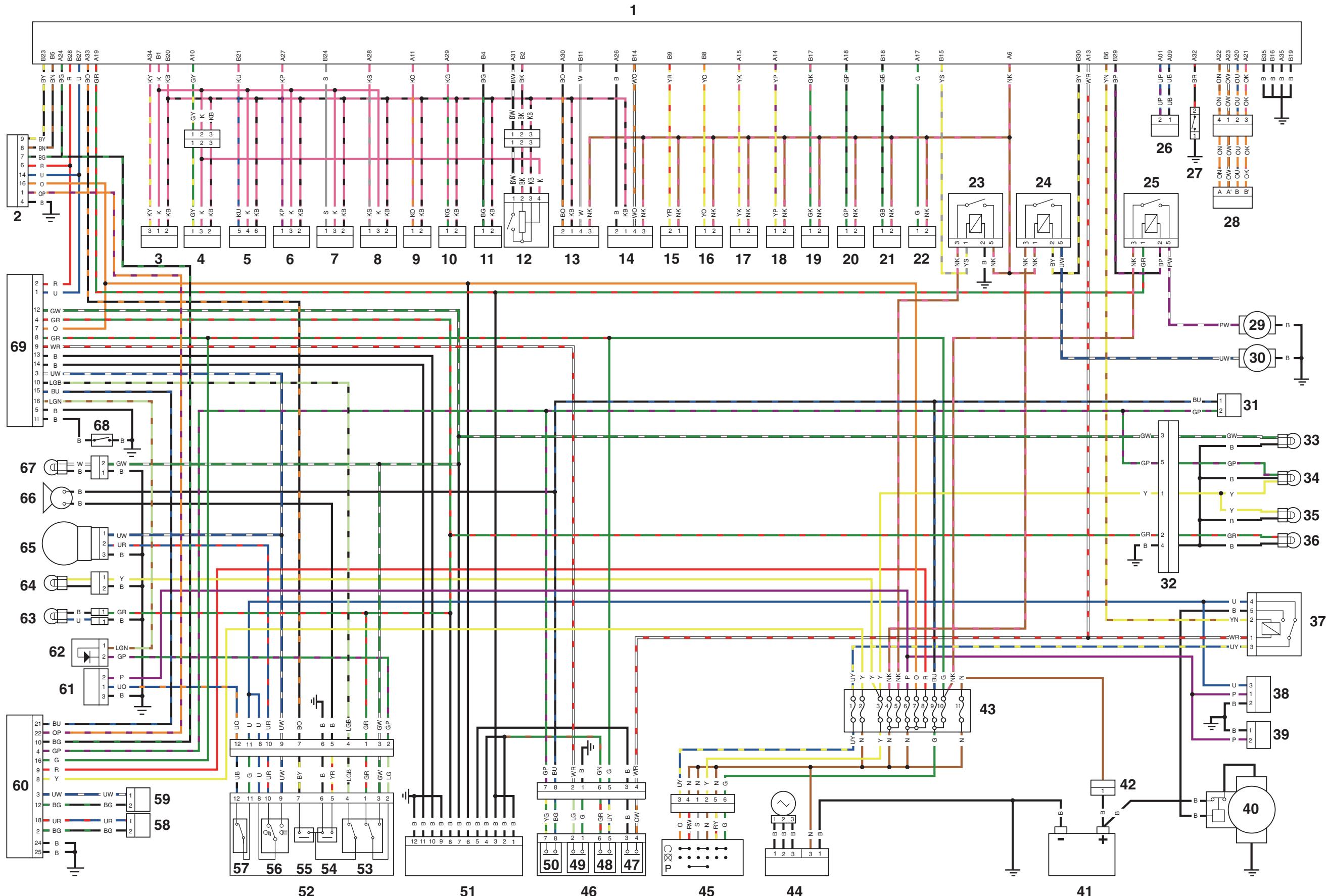
Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6 – From Engine Number 596481

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6 – From Engine Number 596481



Electrical System

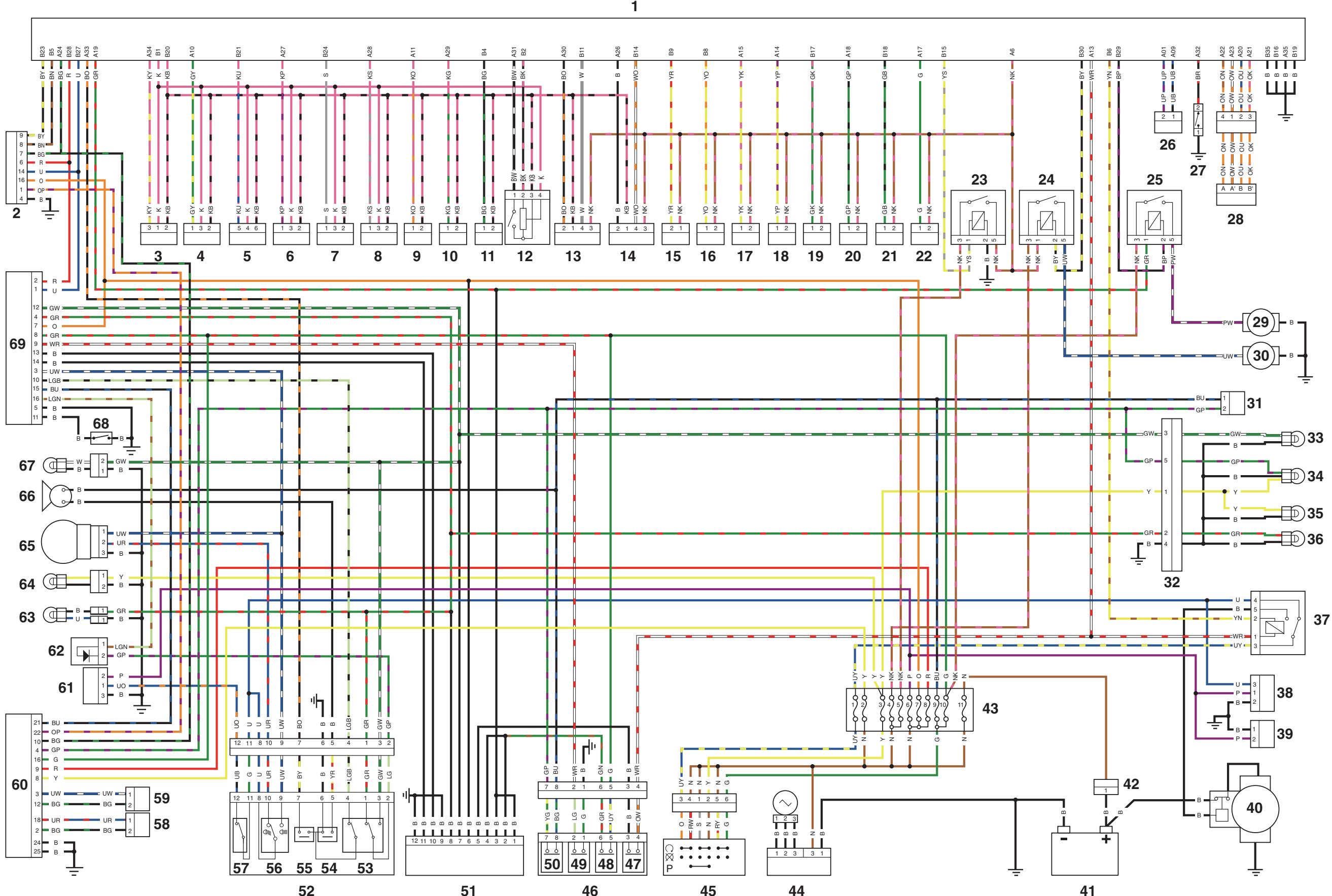
Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6 – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 15 amp fuse at position number 6 – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

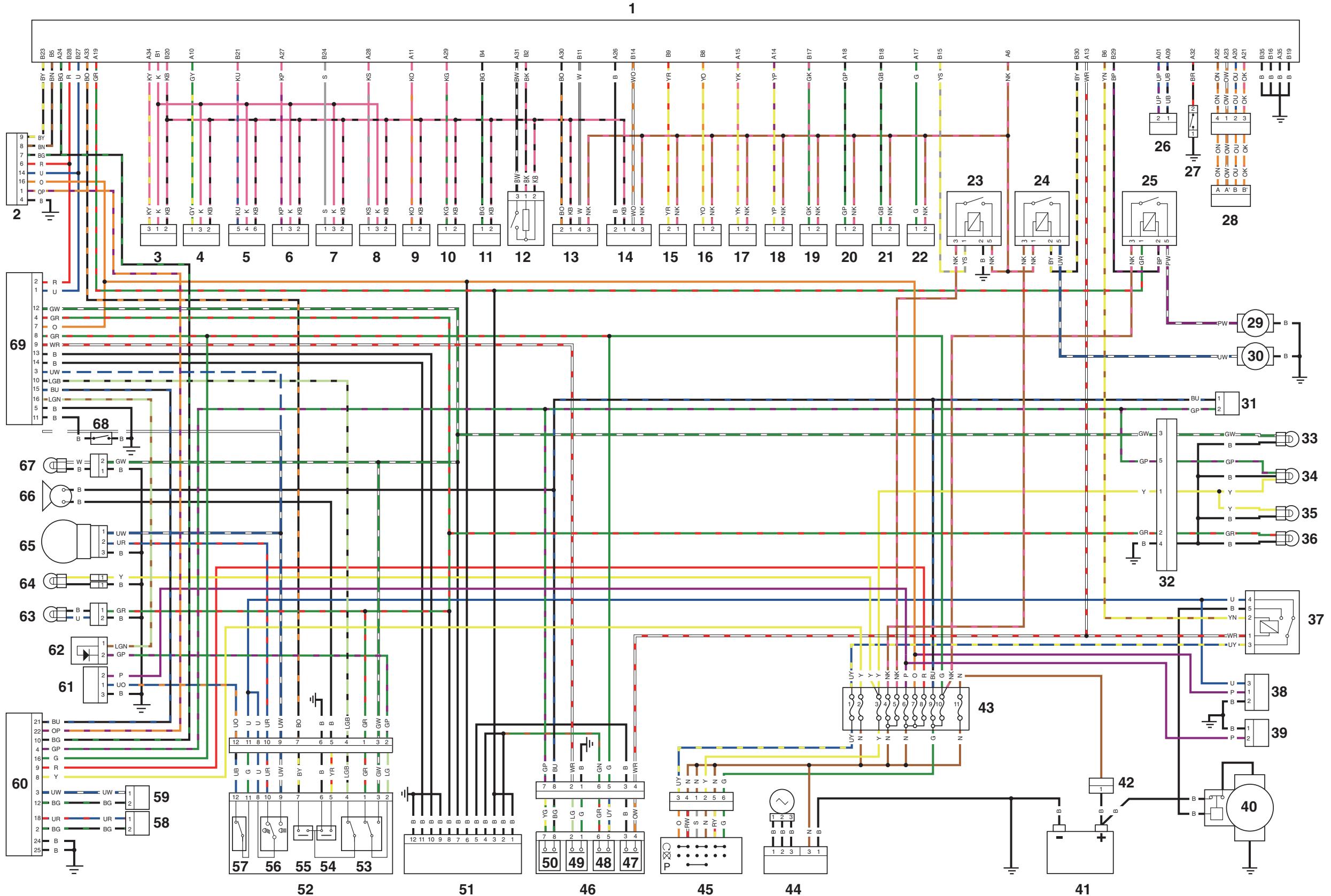
Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6



Electrical System

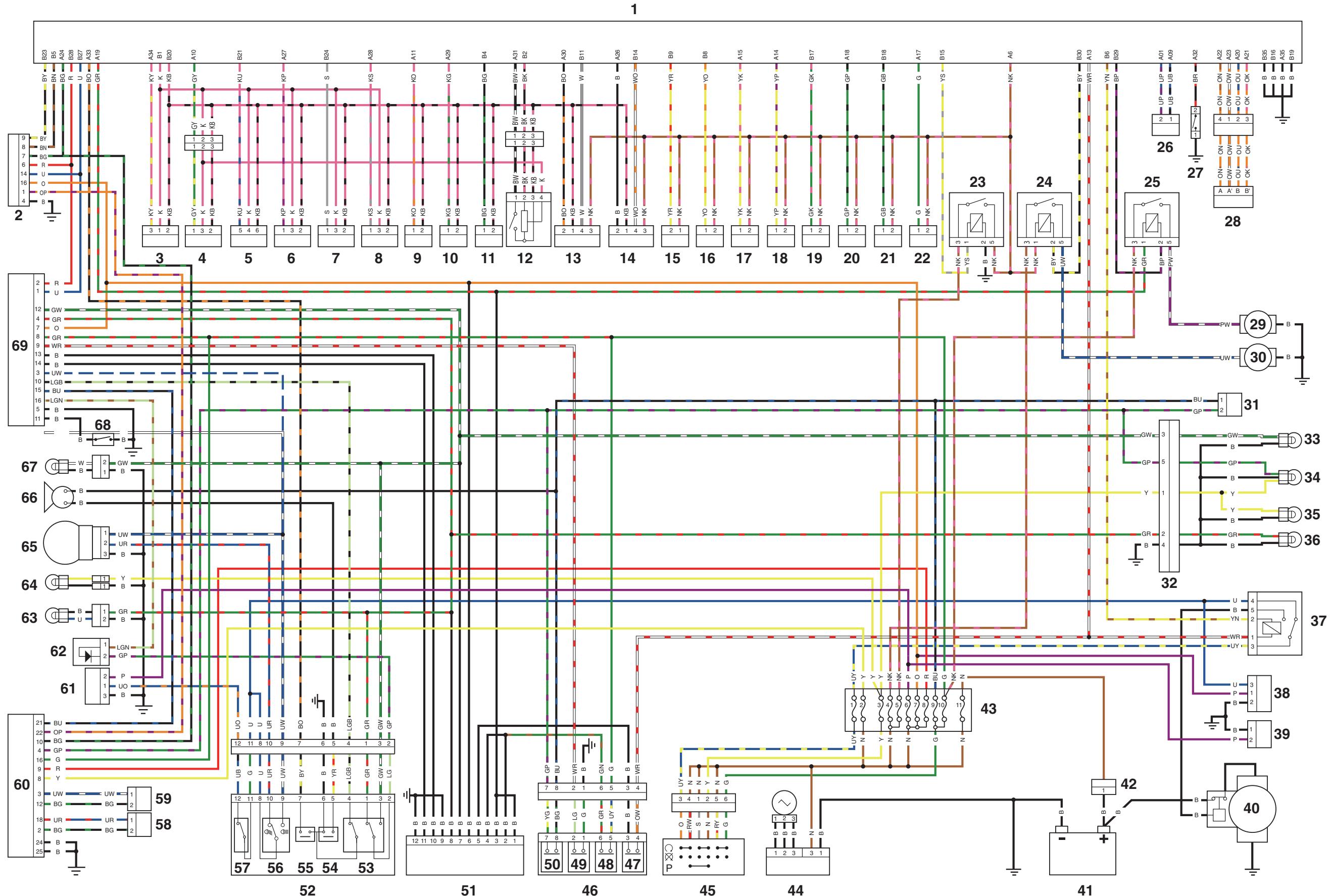
Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6 – From Engine Number 596481

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
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19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
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24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6 – From Engine Number 596481



Electrical System

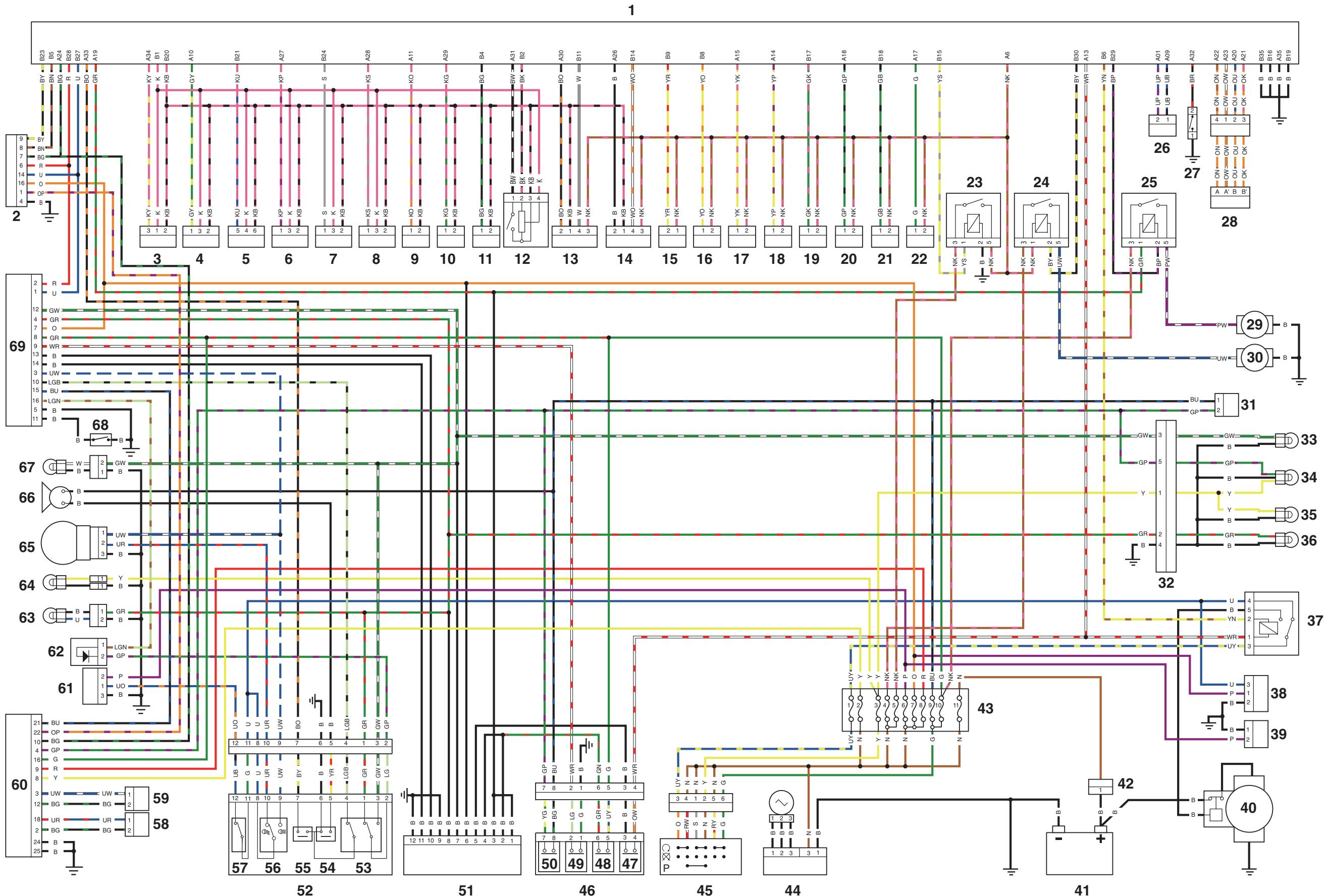
Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6 – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Horn
67	Front Right Hand Indicator
68	Oil Pressure Switch
69	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird with ABS and Thunderbird SE – With a 20 amp fuse at position number 6 – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

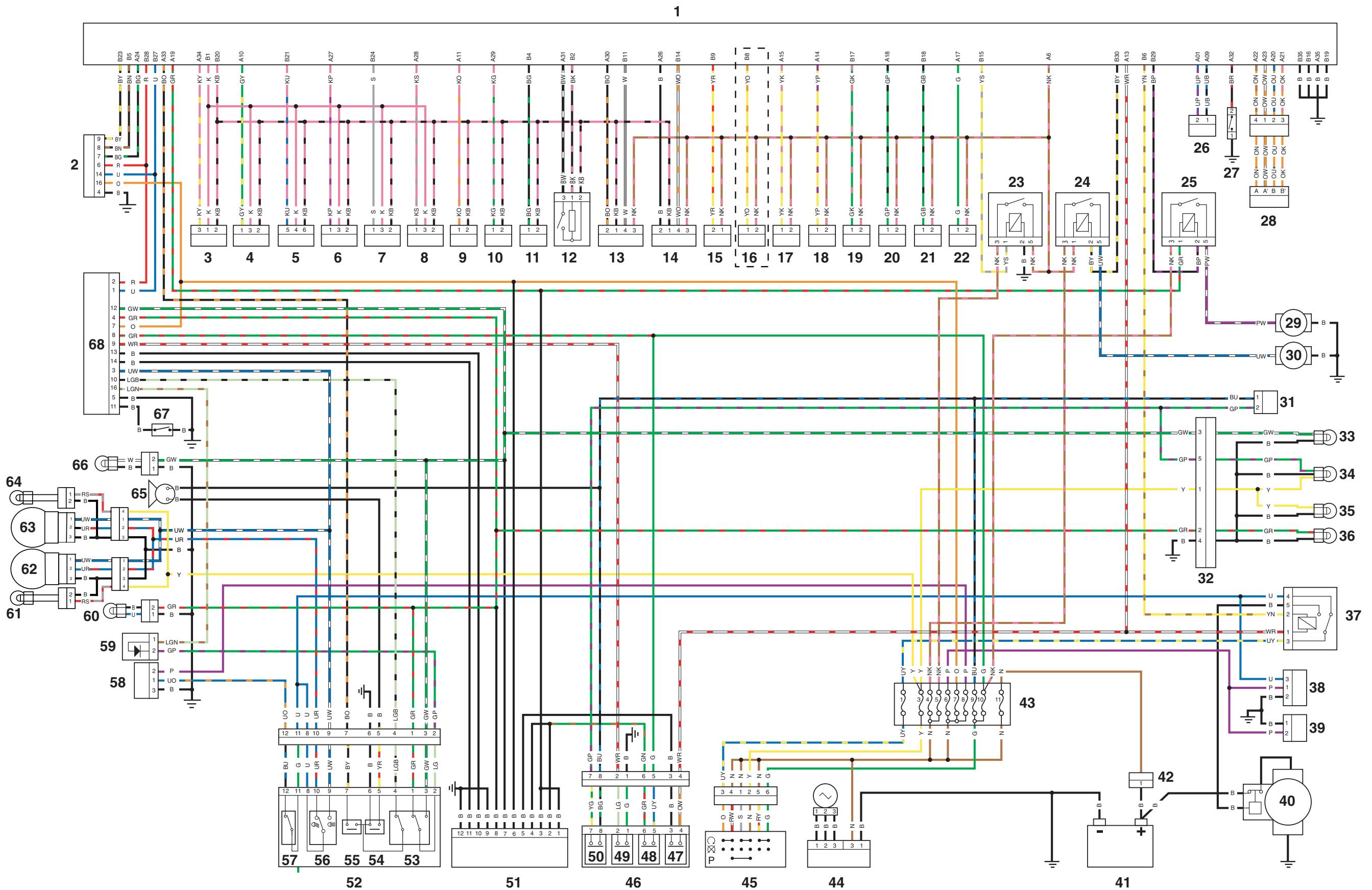
Complete System – Thunderbird Storm without ABS

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light

Key	Item Description
35	Number Plate Light
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Headlight
64	Position Light
65	Horn
66	Front Right Hand Indicator
67	Oil Pressure Switch
68	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm without ABS



Electrical System

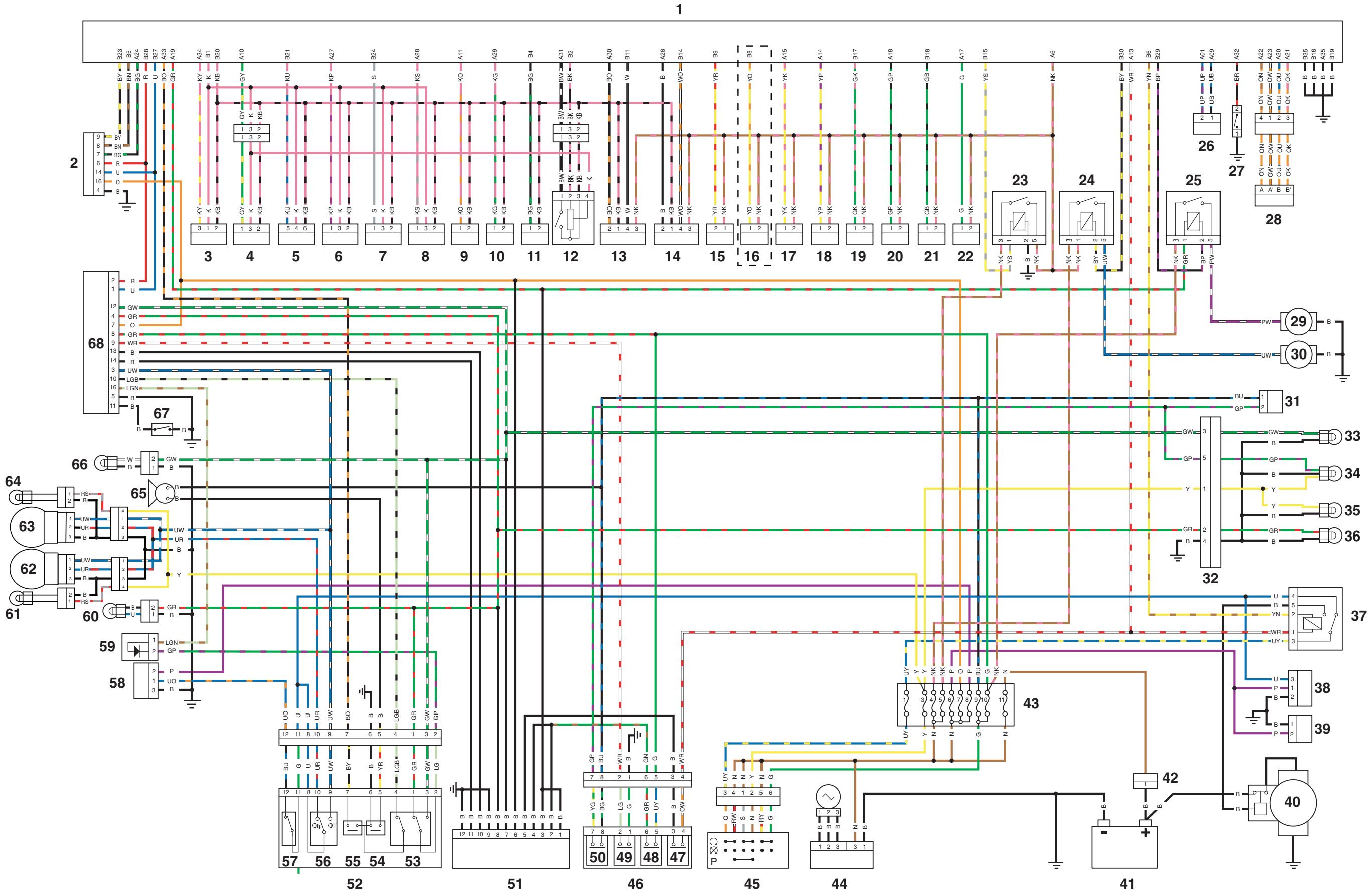
Complete System – Thunderbird Storm without ABS – From Engine Number 596481

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Headlight
64	Position Light
65	Horn
66	Front Right Hand Indicator
67	Oil Pressure Switch
68	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm without ABS – From Engine Number 596481



Electrical System

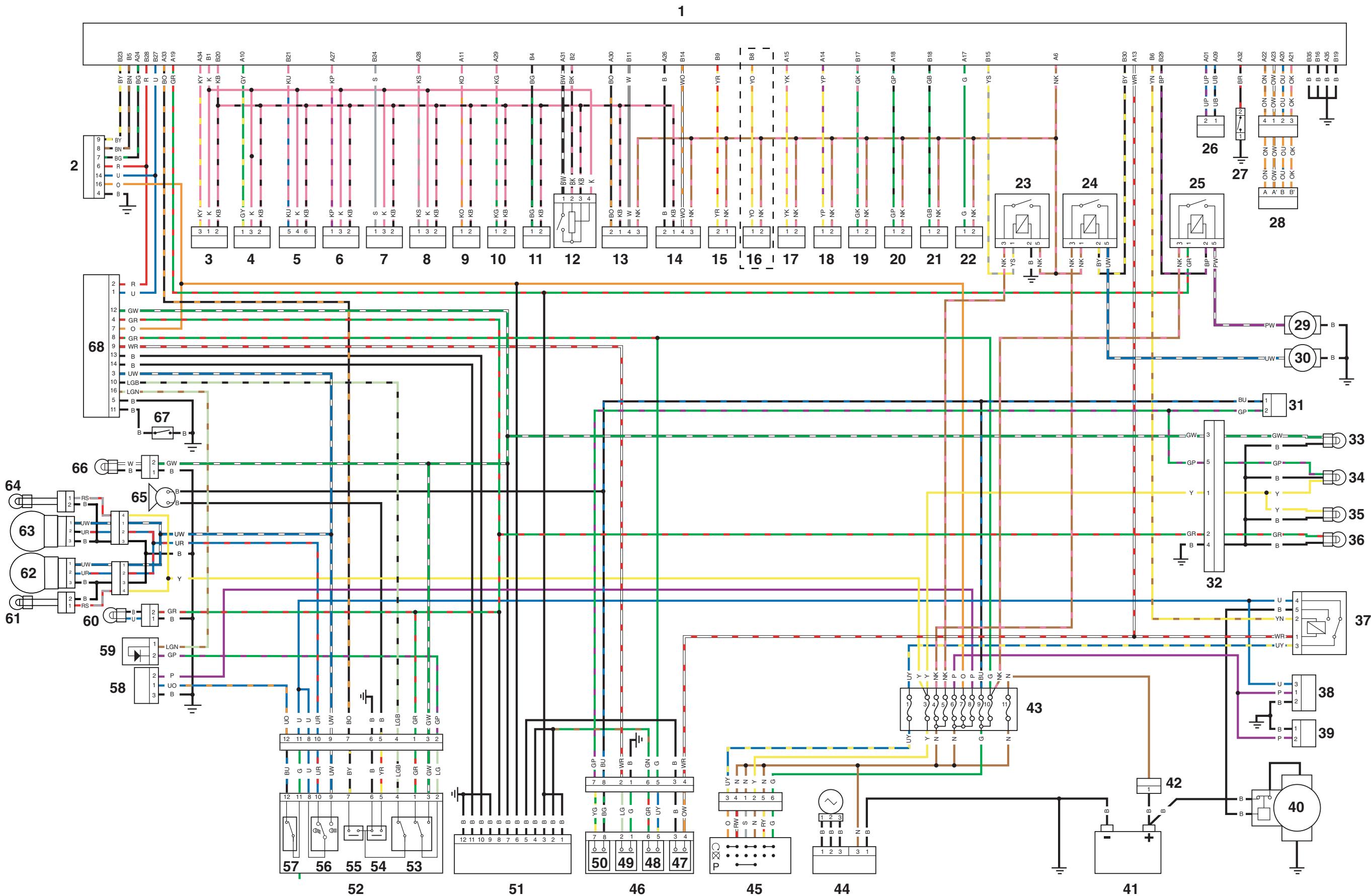
Complete System – Thunderbird Storm without ABS – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light

Key	Item Description
36	Rear Left Hand Indicator
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Accessory Light
59	Diode Pack
60	Front Left Hand Indicator
61	Position Light
62	Headlight
63	Headlight
64	Position Light
65	Horn
66	Front Right Hand Indicator
67	Oil Pressure Switch
68	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm without ABS – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

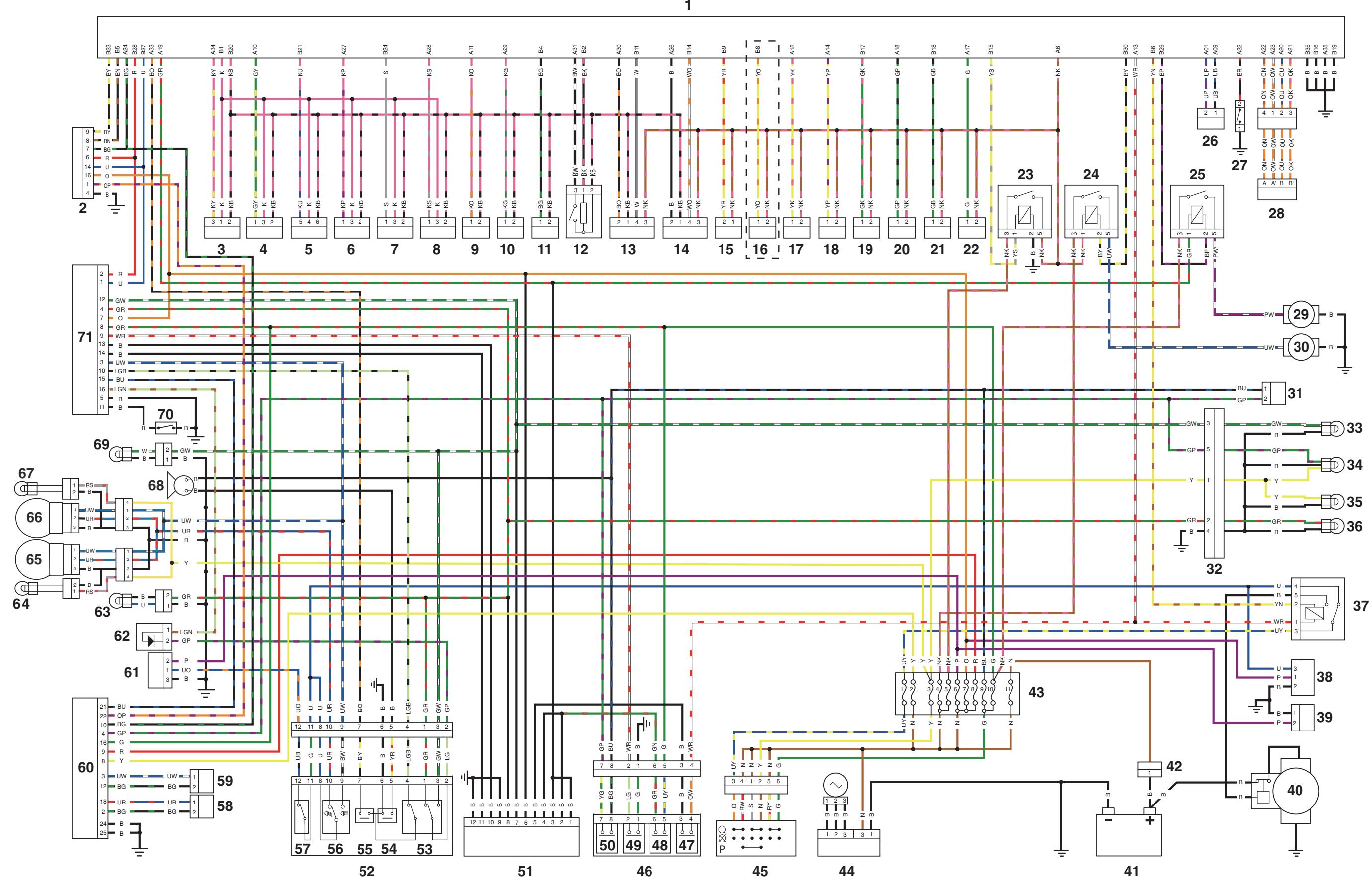
Complete System – Thunderbird Storm with ABS

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator

Key	Item Description
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Headlight
67	Position Light
68	Horn
69	Front Right Hand Indicator
70	Oil Pressure Switch
71	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm with ABS



Electrical System

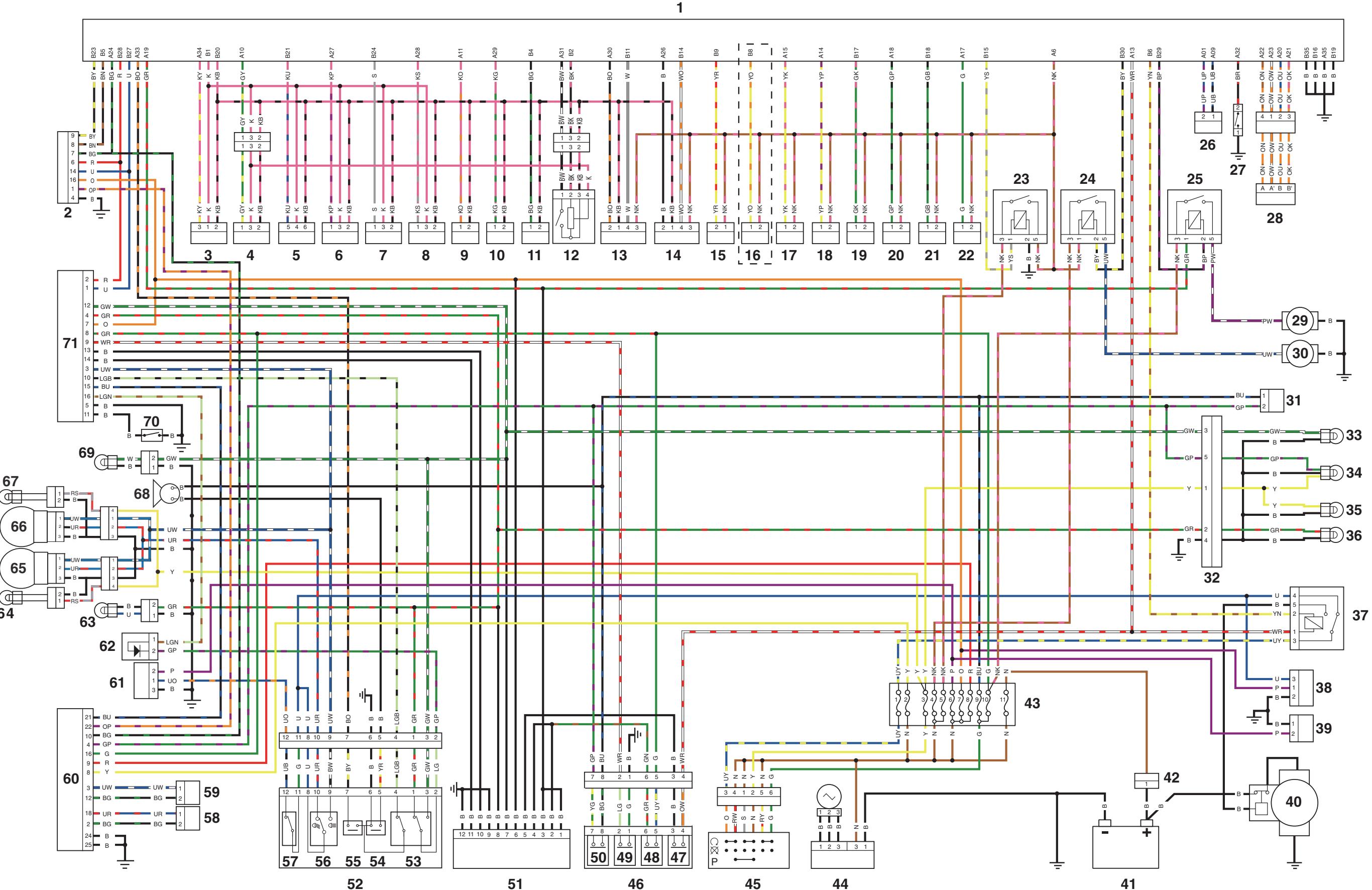
Complete System – Thunderbird Storm with ABS – From Engine Number 596481

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator

Key	Item Description
37	Starter Relay
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Headlight
67	Position Light
68	Horn
69	Front Right Hand Indicator
70	Oil Pressure Switch
71	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm with ABS – From Engine Number 596481



Electrical System

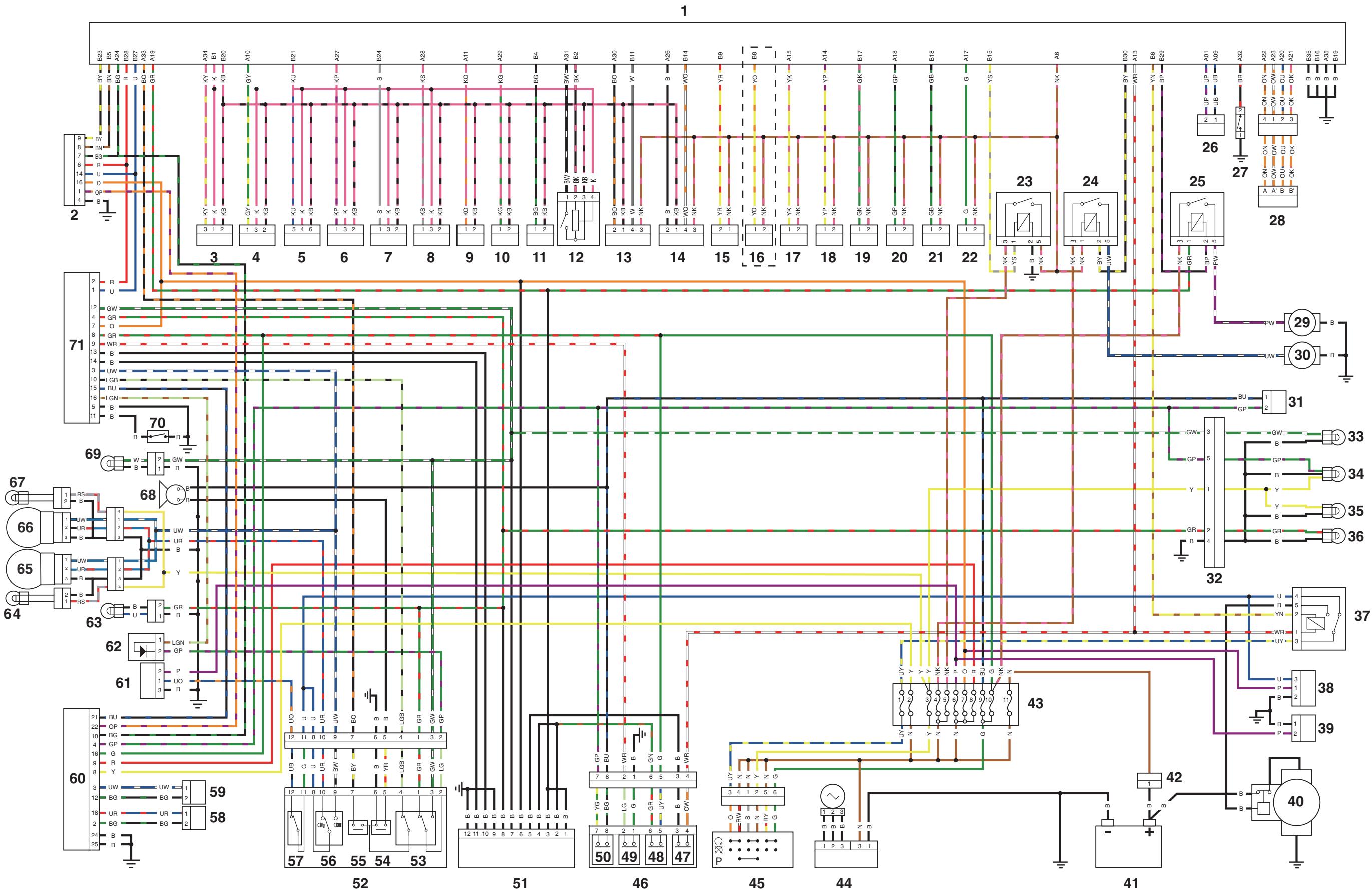
Complete System – Thunderbird Storm with ABS – With Four Pin Gear Position Sensor without Fly Lead

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Throttle Position Sensor
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Right Hand Oxygen Sensor
14	Left Hand Oxygen Sensor
15	Purge Valve
16	SAI Valve < VIN 449624
17	Fuel Injector 1
18	Fuel Injector 2
19	Ignition Coil 1
20	Ignition Coil 3
21	Ignition Coil 2
22	Ignition Coil 4
23	Engine Management System Relay
24	Cooling Fan Relay
25	Fuel Pump Relay
26	Crankshaft Sensor
27	Side Stand Switch
28	Idle Speed Control Actuator
29	Fuel Pump
30	Cooling Fan
31	Rear Brake Lever Switch
32	Rear Lighting Subharness
33	Rear Right Hand Indicator
34	Tail/Brake Light
35	Number Plate Light
36	Rear Left Hand Indicator
37	Starter Relay

Key	Item Description
38	Heated Handlebar Grips (Accessory)
39	Accessory Socket
40	Starter Motor
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Rear Wheel Speed Sensor
59	Front Wheel Speed Sensor
60	ABS Module
61	Accessory Light
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Headlight
67	Position Light
68	Horn
69	Front Right Hand Indicator
70	Oil Pressure Switch
71	Instrument Assembly

Circuit Diagram – Complete System – Thunderbird Storm with ABS – With Four Pin Gear Position Sensor without Fly Lead



Electrical System

Complete System – Thunderbird Commander

Key to Circuit Diagram

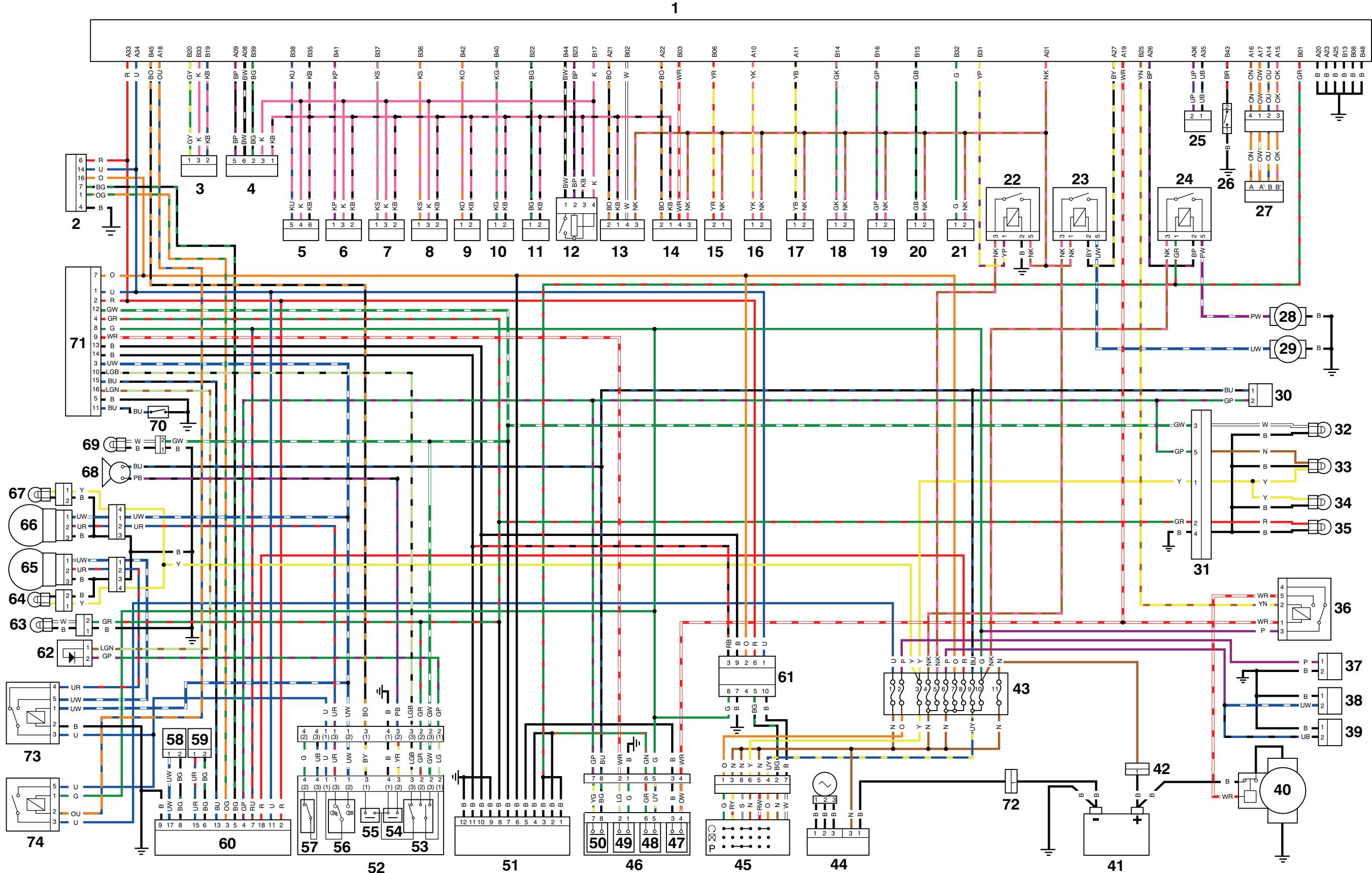
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Throttle Position Sensor
4	Exhaust Valve Actuator
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Left Hand Oxygen Sensor
14	Right Hand Oxygen Sensor
15	Purge Valve
16	Fuel Injector 1
17	Fuel Injector 2
18	Ignition Coil 1
19	Ignition Coil 3
20	Ignition Coil 2
21	Ignition Coil 4
22	Engine Management System Relay
23	Cooling Fan Relay
24	Fuel Pump Relay
25	Crankshaft Sensor
26	Side Stand Switch
27	Idle Speed Control Actuator
28	Fuel Pump
29	Cooling Fan
30	Rear Brake Lever Switch
31	Rear Lighting Subharness
32	Right Hand Rear Indicator
33	Tail/Brake Light
34	Number Plate Light
35	Left Hand Rear Indicator
36	Starter Relay
37	Heated Handlebar Grips (Accessory)
38	Accessory Socket 1
39	Accessory Socket 2
40	Starter Motor

Key	Item Description
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing* (the number in brackets indicates connector number)
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Front Wheel Speed Sensor
59	Rear Wheel Speed Sensor
60	ABS Module
61	Immobiliser
62	Diode Pack
63	Front Left Hand Indicator
64	Position Light
65	Headlight
66	Headlight
67	Position Light
68	Horn
69	Front Right Hand Indicator
70	Oil Pressure Switch
71	Instrument Assembly
72	Battery Connector Negative
73	Headlight Dip/Main Relay
74	Headlight Relay

* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Circuit Diagram – Complete System – Thunderbird Commander



Electrical System

Complete System – Thunderbird LT

Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Throttle Position Sensor
4	Exhaust Valve Actuator
5	Fall Detection Switch
6	Ambient Pressure Sensor
7	Right Hand MAP Sensor
8	Left Hand MAP Sensor
9	Inlet Air Temperature Sensor
10	Coolant Temperature Sensor
11	Fuel Level Sensor
12	Gear Position Sensor
13	Left Hand Oxygen Sensor
14	Right Hand Oxygen Sensor
15	Purge Valve
16	Fuel Injector 1
17	Fuel Injector 2
18	Ignition Coil 1
19	Ignition Coil 3
20	Ignition Coil 2
21	Ignition Coil 4
22	Engine Management System Relay
23	Cooling Fan Relay
24	Fuel Pump Relay
25	Crankshaft Sensor
26	Side Stand Switch
27	Idle Speed Control Actuator
28	Fuel Pump
29	Cooling Fan
30	Rear Brake Lever Switch
31	Rear Lighting Subharness
32	Right Hand Rear Indicator
33	Tail/Brake Light
34	Number Plate Light
35	Left Hand Rear Indicator
36	Starter Relay
37	Heated Handlebar Grips (Accessory)
38	Accessory Socket 1
39	Accessory Socket 2
40	Starter Motor

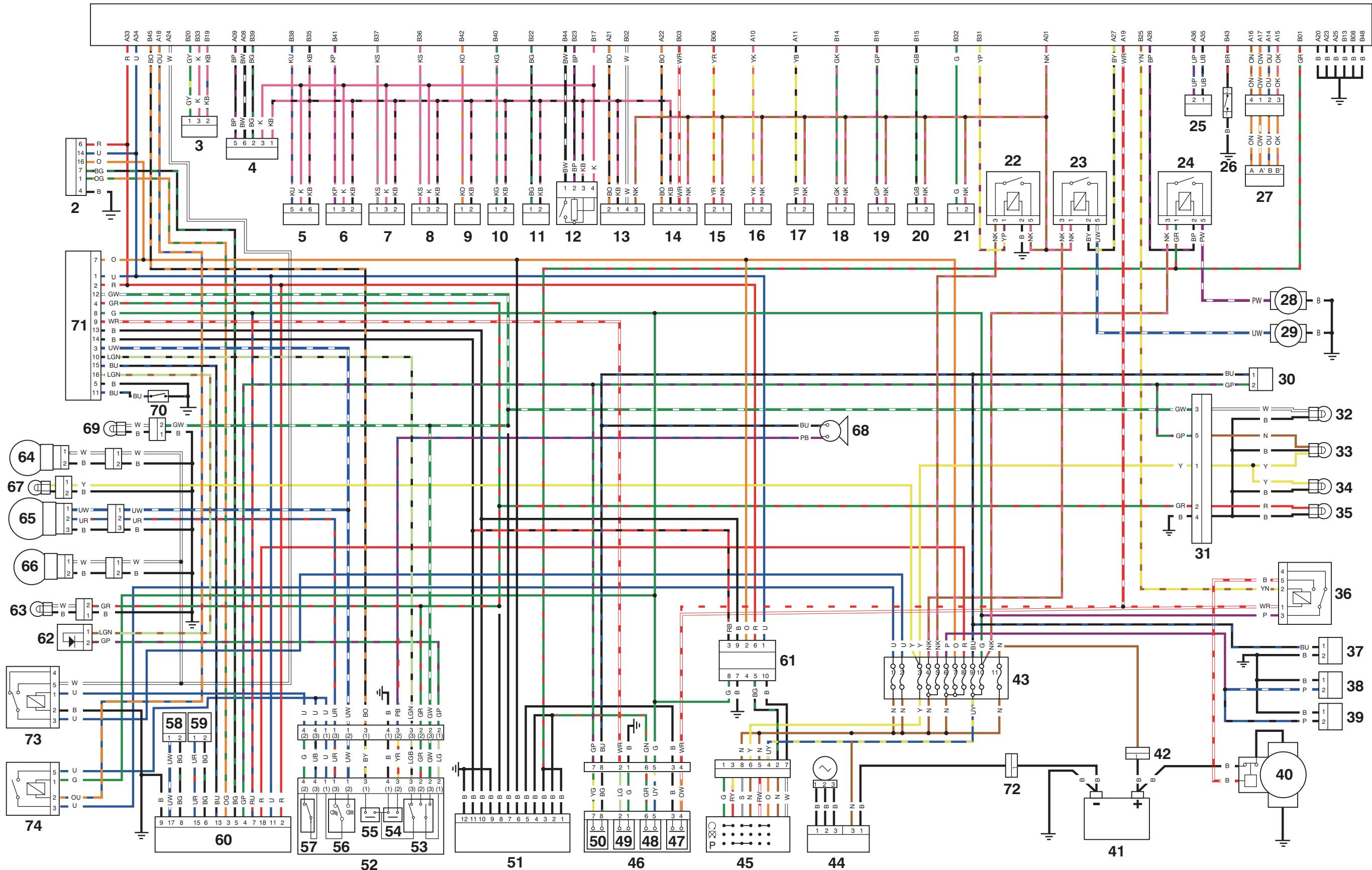
Key	Item Description
41	Battery
42	Battery Connector
43	Fuse Box
44	Rectifier/Regulator
45	Ignition Switch
46	Right Hand Switch Housing
47	Starter Switch
48	Engine Stop Switch
49	Scroll Switch
50	Front Brake Lever Switch
51	Alarm Unit
52	Left Hand Switch Housing* (number in brackets indicates connector number)
53	Direction Indicator Switch
54	Horn Switch
55	Clutch Lever Switch
56	Headlight Dip Switch
57	Accessory Light Switch
58	Front Wheel Speed Sensor
59	Rear Wheel Speed Sensor
60	ABS Module
61	Immobiliser
62	Diode Pack
63	Front Left Hand Indicator
64	Fog Light
65	Headlight
66	Fog Light
67	Position Light
68	Horn
69	Front Right Hand Indicator
70	Oil Pressure Switch
71	Instrument Assembly
72	Battery Connector Negative
73	Fog Lights Relay
74	Headlight Relay

* The left hand switch housing has three multiplugs and can be identified as follows:

- Multiplug 1 - No identification tape.
- Multiplug 2 - Green identification tape.
- Multiplug 3 - Red identification tape.

Circuit Diagram – Complete System – Thunderbird LT

1



Electrical System

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