

Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler 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 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 parts catalogue/parts microfiche.
- 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 other than genuine Triumph parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification.

Tightening Procedures

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 causing 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, anti-freeze, 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, de-grease 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 during 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.

Cleaning Components

A high flash-point 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.

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 re-use 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.

General Information

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 overtightening 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 re-use 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 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 re-used, providing resistance can be felt when the locking portion passes over the thread of the bolt or stud.

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

Encapsulated Bolt

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 re-used 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 re-used, 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.

Press or drift seals to the depth of its housing, with the sealing lip facing the lubricant to be retained if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

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 of 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 gasses 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:

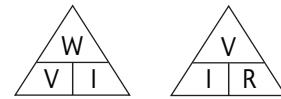
- the current flowing in the circuit can be calculated by using -

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

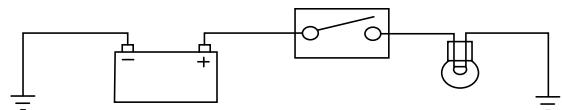
- the bulb resistance can be calculated by using -

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

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 to circuit diagram components and wiring colour codes.

Circuit diagrams also depict the inner workings of a switch cube (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 multi-plug 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



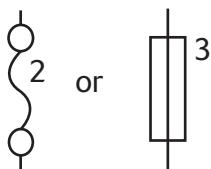
An electrical one-way valve. Diodes allow current to flow in one direction but will not allow it to return. The arrow, which forms part of the diode symbol, indicates the direction of current flow.

Electromagnetic Winding (solenoid)



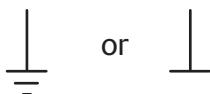
An electromagnetic winding (or solenoid) is used to convert an electrical current into a lateral movement. This can then be used to operate switches (as used in relays) or other components such as fuel injectors or secondary air injection solenoids.

Fuse



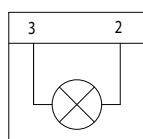
A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' should a short circuit occur, protecting that circuit from further damage. The number next to the fuse on the circuit diagram indicates the position of the fuse in the fusebox.

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



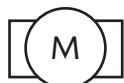
This symbol is used to show all types of light bulbs. The numbers in the box relate to the terminal numbers of the connector pins. An additional number outside the box will identify the component.

LED (Light Emitting Diode)



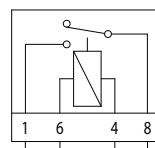
Triumph use LEDs for the alarm warning light, instrument illumination and warning lights, gear change lights and rear light/brake lights on various models.

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

Normally
Closed

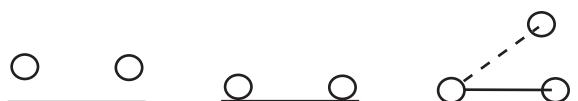
Change
Over



or

or

or



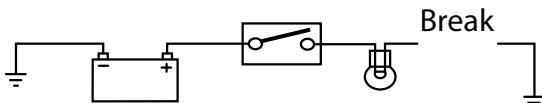
A mechanical device for completing or breaking a circuit. There are three common types of switch: Normally open, normally closed and change-over.

General Information

Tracing Circuits

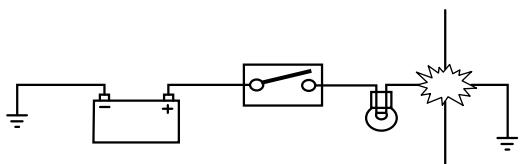
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

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:

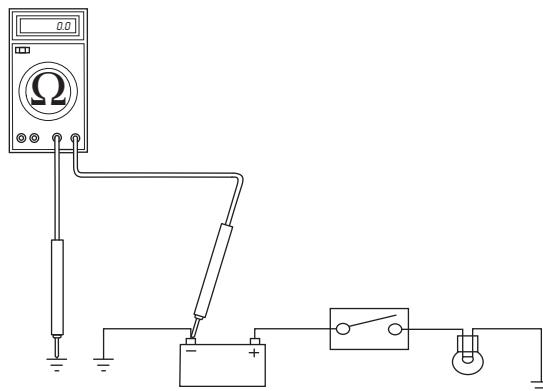
- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the bike. It is a schematic diagram of the circuits.
- 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.

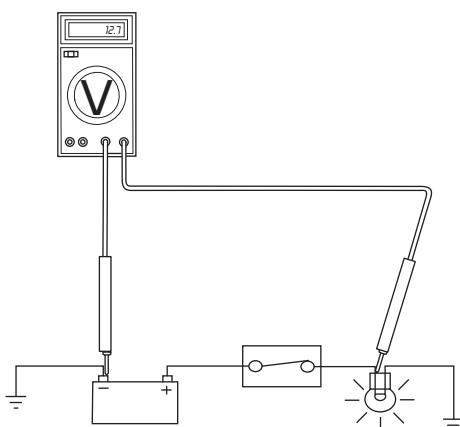


Continuity (Resistance) Check

- 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.

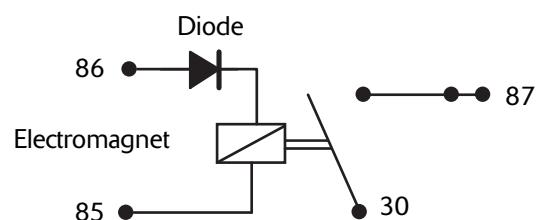
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or earths to become 'dead'.

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 multi meter (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

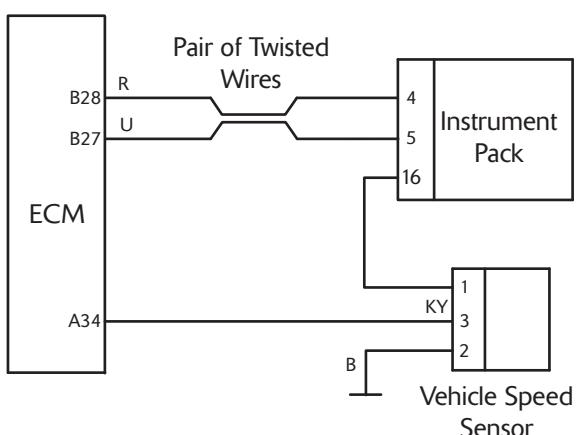
CAN (Controller Area Networking)

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.

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 use CAN for communication between the engine ECM and the instruments.



**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).

Alternator/Charging System

The charging system consists of an alternator and 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 4000-5000 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

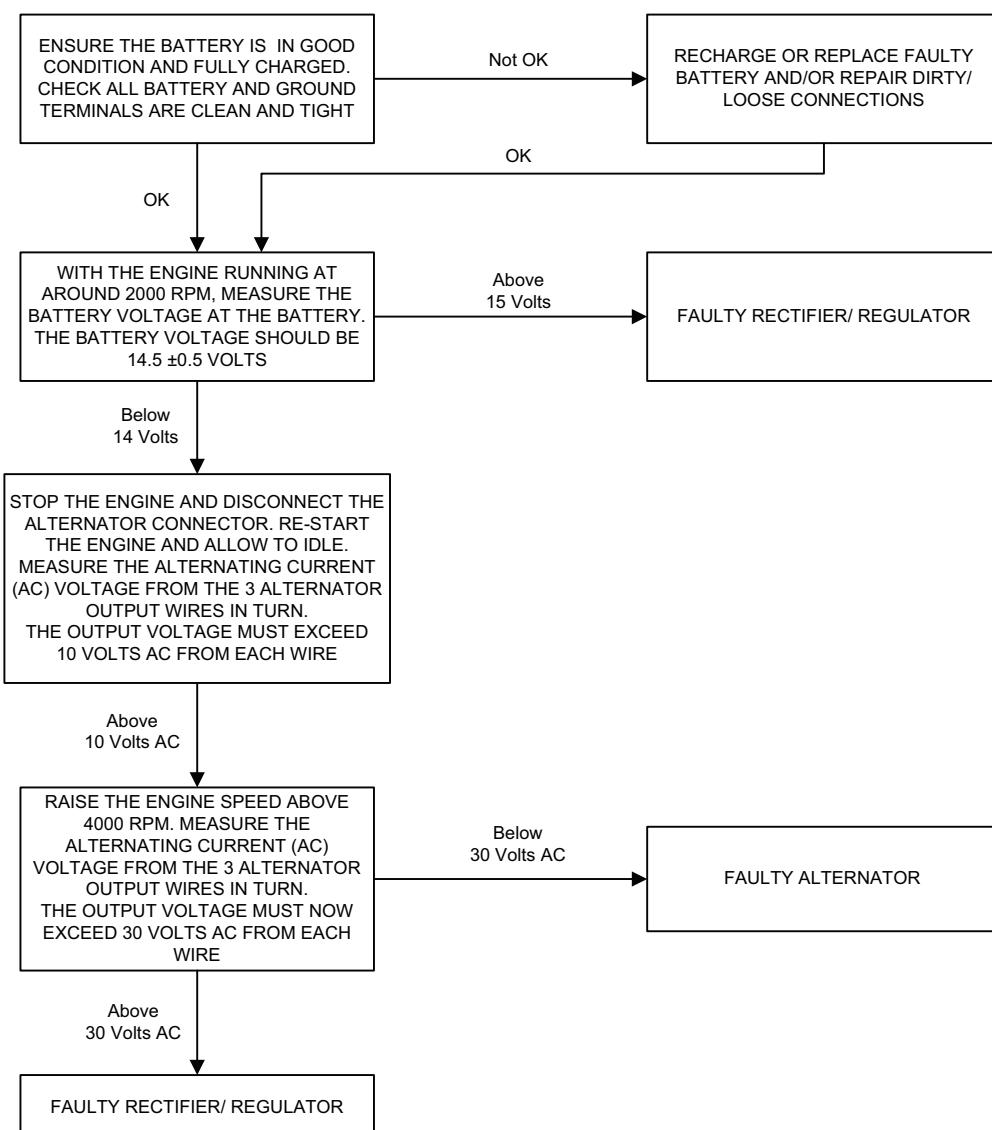
convert the alternator output to dc volts and limit the resulting output to the correct figure required for optimal battery charging.

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 17-21).

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, sidestand 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 sidestand 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), sidestand and clutch switches.

Note:

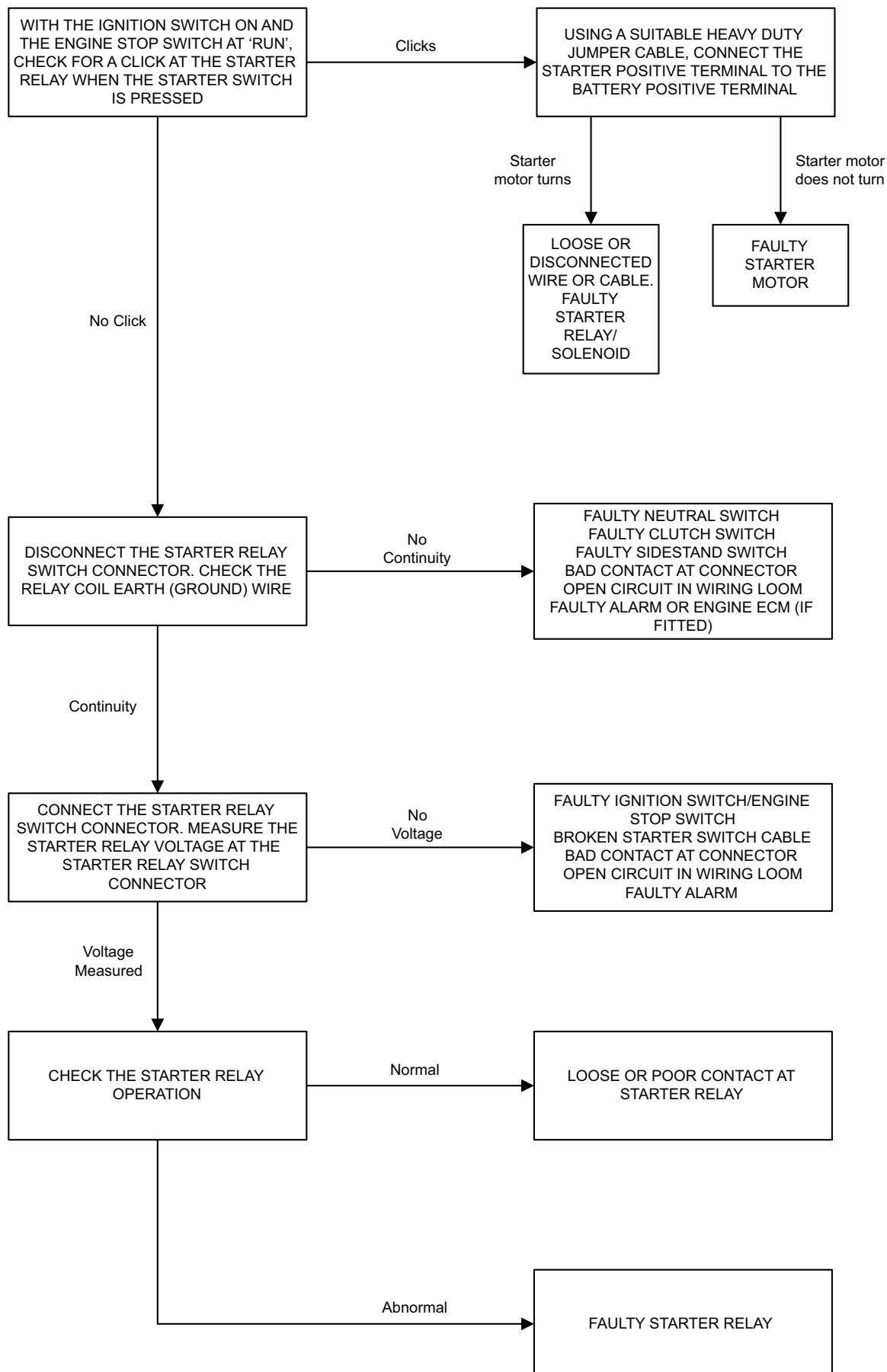
- **On all new models from Daytona 675 onwards, which use a CAN connection between the instruments and the ECM, the engine will not crank if the instruments are disconnected.**

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 sidestand, transmission and clutch lever are positioned for engine starting I.E. transmission in neutral, clutch lever pulled in and the sidestand 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	Defective sprag clutch Defective idler gear, reduction gear or starter motor

Diagnosis - Starter Circuit



General Information

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.

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.

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.

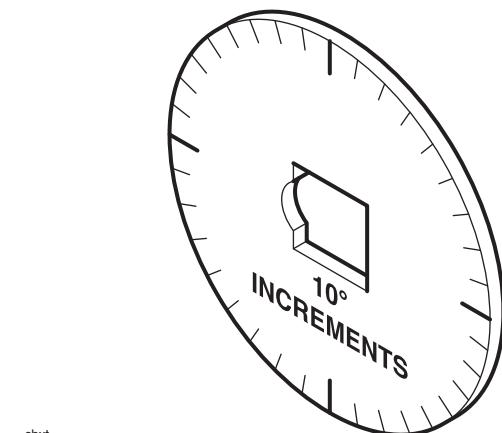
Authorised Triumph Dealers are not agents of Triumph and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

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.

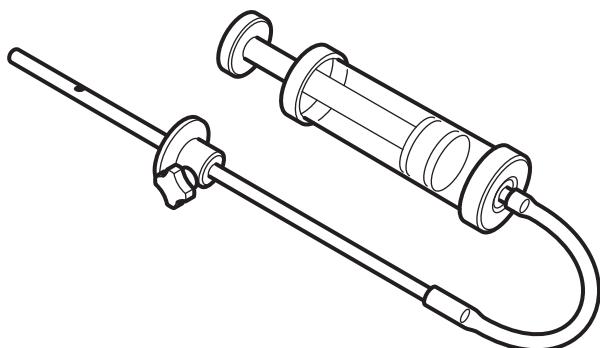
Special Service Tools:

T3880105 - Angular Torque Guage



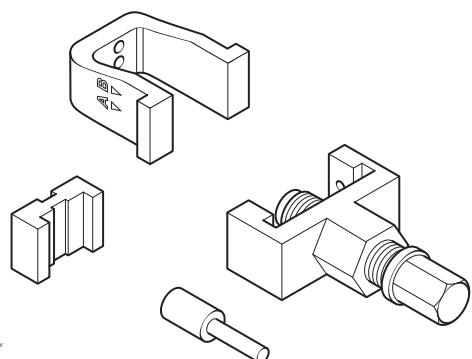
cbxt

T3880160 - Fork Filler/Evacuator



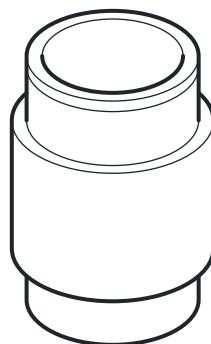
ocha

A9938017 - Chain Link Tool Kit

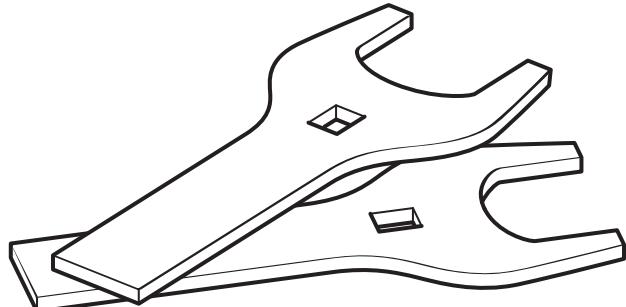


camr

388080-T0301 - Fork Seal/Bearing Drift

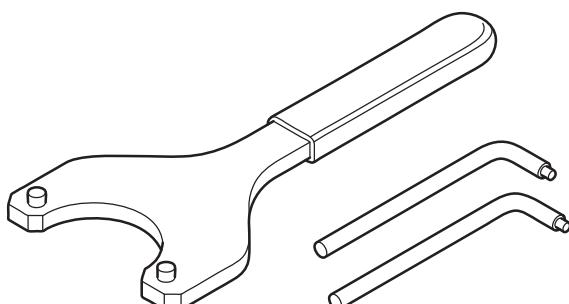


T3880140 - Head Race Adjusters



kagf

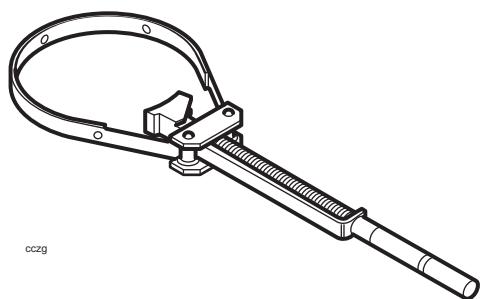
T3880330 - Camshaft Backlash Gear Locking Pins and Wrench



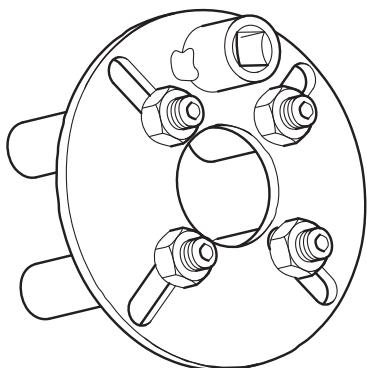
T3880330

General Information

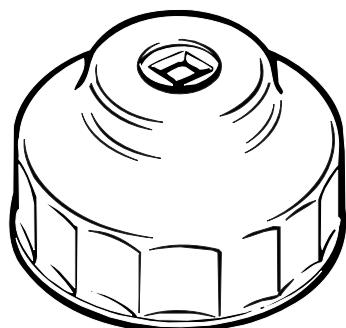
T3880375 - Alternator Rotor Holder



T3880360 - Clutch Holding Tool

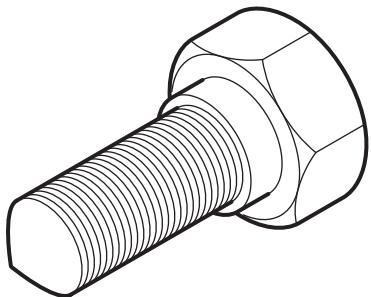


T3880313 - Oil Filter Wrench

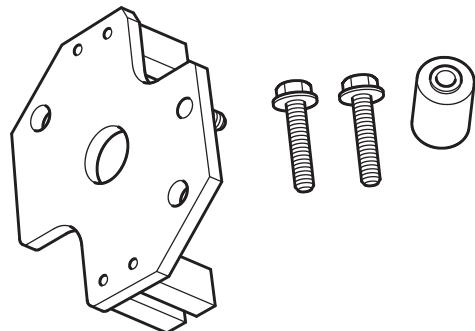


gahc

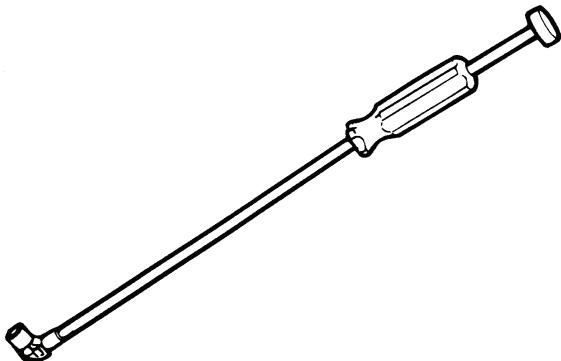
T3880203 - Puller, Alternator Rotor



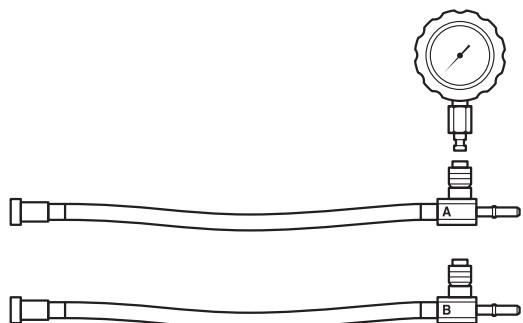
T3880014 - Clutch Alignment Jig



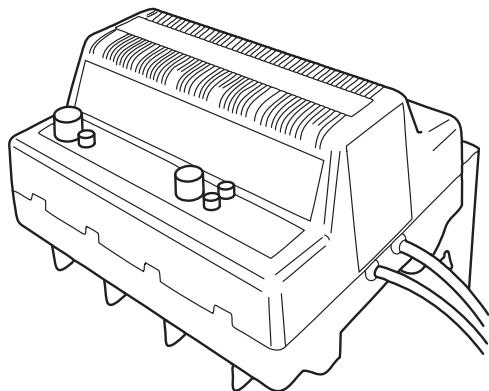
3880015-T0301 - Carburettor Adjustment Tool



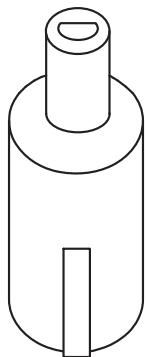
T3880001 - Fuel Pressure Gauge



BatteryMate Battery Charger - see Latest Parts Catalogue for Part Number Information

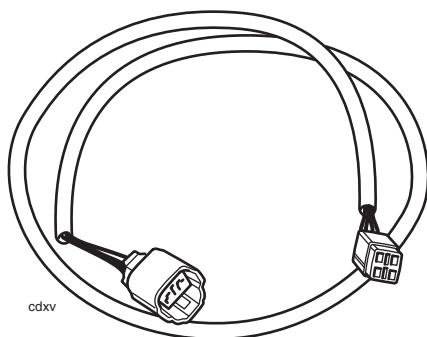


T3880107 - Adaptor, Carburettors

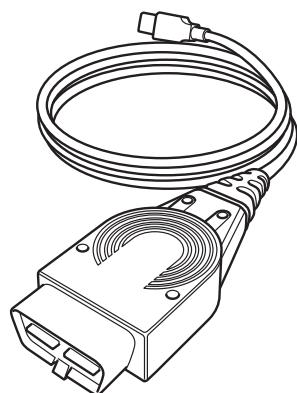


T3880107

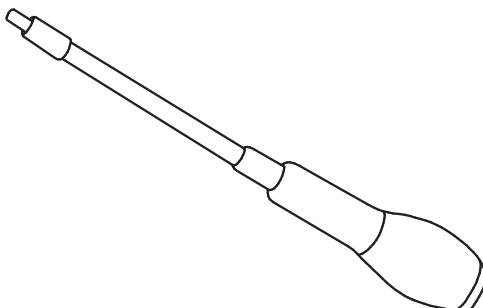
T3880124 - Extension cable



T3880057 - Triumph diagnostic tool



T3880089 - Idle Mixture Adjuster Tool Carburettors



T388008

General Information

Full Specification - Bonneville with Carburetors

Full Specification	790 cc Bonneville/T100 with Carburetors	865 cc Bonneville/T100 with Carburetors
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Engine	Twin Cylinder 8 Valve DOHC	Twin Cylinder 8 Valve DOHC
Arrangement	Transverse In-line	Transverse In-line
Displacement	790 cc	865 cc
Bore x Stroke	86 mm x 68 mm	90 mm x 68 mm
Compression Ratio	9.2:1	9.2:1
Cylinder Numbering	Left to Right	Left to Right
Firing Order	1-2	1-2
Firing Angle	360°	360°
Max. Power (DIN 70020)	62 PS @ 7,400 rpm	64 PS @ 7,250 rpm
Max. Torque	60 Nm @ 3,500 rpm	68 Nm @ 6,000 rpm

General Information

Full Specification

790 cc Bonneville/T100 with Carburettors

865 cc Bonneville/T100 with Carburettors

Cylinder Head

Valve Head Dia.	In.	31.0 mm	31.0 mm
	Ex.	26.0 mm	26.0 mm
Valve Lift	In.	9.5 mm	9.5 mm
	Ex.	9.4 mm	9.4 mm
Valve Stem Dia.	In	5.463 to 5.478 mm (std)	5.463 to 5.478 mm (std)
Service limit		5.453 mm	5.453 mm
	Ex.	5.451 to 5.466 mm (std)	5.451 to 5.466 mm (std)
Service limit		5.441 mm	5.441 mm
Valve Guide Bore Dia.		5.500 to 5.515 mm (std)	5.500 to 5.515 mm (std)
Service limit		5.543 mm	5.543 mm
Valve Seat Width (in head)		0.9 to 1.1 mm (std)	0.9 to 1.1 mm (std)
Service limit		1.5 mm	1.5 mm
Valve Seat Width (valve)		1.27 to 1.56 mm (std)	1.27 to 1.56 mm (std)
Service limit		1.56 mm	1.56 mm
Valve Seat Angle		45°	45°
Valve Spring Free Length		42.4 mm (std)	42.4 mm (std)
Service limit		41.7 mm	41.7 mm
Valve Clearance	In.	0.15 to 0.20 mm	0.15 to 0.20 mm
	Ex.	0.25 to 0.30 mm	0.25 to 0.30 mm
Tappet Bucket Bore Dia.		28.015 to 28.035 mm (std)	28.015 to 28.035 mm (std)
Service limit		28.050 mm	28.050 mm
Tappet Bucket Dia.		27.978 to 27.993 mm (std)	27.978 to 27.993 mm (std)
Service limit		27.970 mm	27.970 mm
Valve Timing	In.	Open 22° BTDC (@ 1.0 mm Lift)	Open 4° BTDC (@ 1.0 mm Lift)
		Close 46° ABDC (@ 1.0 mm Lift)	Close 48° ABDC (@ 1.0 mm Lift)
		Duration 248°	Duration 232°
	Ex.	Open 41° BBDC (@ 1.0 mm Lift)	Open 33° BBDC (@ 1.0 mm Lift)
		27° ATDC (@ 1.0 mm Lift)	Close 7° ATDC (@ 1.0 mm Lift)
		Duration 248°	Duration 220°
Camshaft Journal Dia.		22.930 to 22.960 mm (std)	22.930 to 22.960 mm (std)
Camshaft Journal Clearance		0.040 to 0.091 mm (std)	0.040 to 0.091 mm (std)
Service limit		0.12 mm	0.12 mm
Camshaft Journal Bore Dia.		23.000 to 23.021 mm	23.000 to 23.021 mm (std)
Camshaft Endfloat		Less than 0.2 mm	Less than 0.2 mm
Camshaft Run-out		Less than 0.05 mm	Less than 0.05 mm

General Information

Full Specification

790 cc Bonneville/T100 with Carburettors

865 cc Bonneville/T100 with Carburettors

Barrels and Pistons

Cylinder Bore Dia.	85.991 to 86.009 mm (std)	89.991 to 90.009 mm (std)
Service limit	86.034 mm	90.034 mm
Piston Diameter - standard	85.975 to 85.990 mm	89.972 to 89.988 mm
Piston Diameter - service limit	85.935 mm	89.933 mm
Piston Ring to Groove Clearance	0.02 to 0.06 mm (std)	0.02 to 0.06 mm (std)
Service limit	0.075 mm	0.075 mm
Piston Ring Groove Width	Top	1.01 to 1.03 mm
	Second	1.01 to 1.03 mm
	Oil	2.01 to 2.03 mm
Piston Ring End Gap in Bore	Top	0.15 to 0.30 mm
	Second	0.30 to 0.45 mm
	Oil	0.20 to 0.70 mm
Gudgeon Pin Bore Dia. in Piston	19.002 to 19.008 mm (std)	19.002 to 19.008 mm (std)
Service limit	19.036 mm	19.030 mm
Gudgeon Pin Dia.	18.995 to 19.000 mm (std)	18.995 to 19.000 mm (std)
Service limit	18.985 mm	18.990 mm

Primary Drive

Primary Drive	Type	Gear	Gear
Reduction Ratio		1.74:1 (62/108)	1.74:1 (62/108)

Clutch

Steel Plate Warpage Limit	Less than 0.15 mm	Less than 0.15 mm
Friction Plate Thickness	3.22 to 3.38 mm (std)	3.22 to 3.38 mm (std)
Service limit	3.1 mm	3.1 mm
Clutch Actuation Method	Cable	Cable
Cable Free Play (at lever)	2 to 3 mm	2 to 3 mm

General Information

Full Specification
**790 cc Bonneville/T100
with Carburettors**
**865 cc Bonneville/T100
with Carburettors**
Crankshaft/Connecting Rod

Big End Journal Dia.	40.946 to 40.960 mm (std)	40.946 to 40.960 mm (std)
Service limit	40.932 mm	40.932 mm
Big End Bearing Clearance	0.036 to 0.066 mm (std)	0.036 mm to 0.066 mm (std)
Service limit	0.1 mm	0.1 mm
Main Bearing Journal Dia.	37.960 to 37.976 mm (std)	37.960 to 37.976 mm (std)
Service limit	37.936 mm	37.936 mm
Main Bearing Clearance	0.019 to 0.044 mm (std)	0.019 mm to 0.044 mm (std)
Service limit	0.1 mm	0.1 mm
Crankshaft Endfloat	0.05 to 0.20 mm (std)	0.05 to 0.20 mm (std)
Service limit	0.40 mm	0.40 mm
Connecting Rod Small End Dia.	19.016 to 19.034 mm (std)	19.016 to 19.034 mm (std)
Service limit	19.040 mm	19.040 mm
Connecting Rod Big End Side Clearance	0.15 to 0.30 mm (std)	0.15 to 0.30 mm (std)
Service limit	0.50 mm	0.50 mm

Transmission

Type	5 Speed Constant Mesh	
Gear Ratios	1 st	2.73:1 (41/15)
	2 nd	1.95:1 (37/19)
	3 rd	1.55:1 (34/22)
	4 th	1.29:1 (31/24)
	5 th	1.07:1 (29/27)
Gear Selector Fork Thickness	5.8 to 5.9 mm (service limit 5.7 mm)	
Gear Selector Groove Width	6.0 to 6.1 mm (service limit 6.2 mm)	
Final Drive	Chain	
Final Drive Ratio	2.53:1 (17/43)	
Chain Type	DID 525 VM2 (104 link)	
20 Link Length	Less than 321 mm	
Drive Chain Freeplay	20-30 mm	
Chain Lubrication	Mobil chain spray	

General Information

Full Specification

790 cc Bonneville/T100 with Carburettors

865 cc Bonneville/T100 with Carburettors

Lubrication

Oil Capacity (approximate)		
Dry fill	4.5 litres	4.5 litres
Oil & filter change	3.8 litres	3.8 litres
Oil change only	3.3 litres	3.3 litres
Recommended Oil	See lubrication section	See lubrication section
Oil Pressure (in main gallery)	40 psi @4,000 rpm (@80°C Oil Temp)	40 psi @4,000 rpm (@80°C Oil Temp)
Oil Pump Rotor Tip Clearance	Less than 0.15 mm (std)	Less than 0.15 mm (std)
Service limit	0.20 mm	0.20 mm
Oil Pump Body Clearance	0.15 to 0.22 mm (std)	0.15 to 0.22 mm (std)
Service limit	0.35 mm	0.35 mm
Oil Pump Rotor End Float	0.02 to 0.07 mm (std)	0.02 to 0.07 mm (std)
Service limit	0.10 mm	0.10 mm

Ignition System

Type	Digital Inductive	Digital Inductive
Electronic Rev-Limiter	7,400 rpm	8,000 rpm
Pick Up Coil Air Gap	1.0 mm ±0.2 mm	1.0 mm ±0.2 mm
Spark Plug Type	NGK DPR8EA-9	NGK DPR8EA-9
Spark Plug Gap	0.8 to 0.9 mm	0.8 to 0.9 mm

Fuel System

Fuel Type	Unleaded, 95 RON (U.S. 89 CLC/AKI)	Unleaded, 95 RON (U.S. 89 CLC/AKI)
Fuel Tank Capacity	16.0 litres	16.0 litres
Idle Speed	1,000 ±50 rpm	1,000 ±50 rpm
Idle Mixture Adjustment	See Section 9	See Section 9

Carburettors

Type	Keihin CVK 36	Keihin CVK 36
Main Jet	110	110
Pilot Jet	40	40
Starter Jet	52	52
Main Air Jet	80	80
Needle	NAGB	NBZT
Float Height	17.0 ±1 mm	17.0 ±1 mm
Fuel Level	2.0 ±1 mm above float chamber surface	2.0 ±1 mm above float chamber surface

General Information

Full Specification

790 cc Bonneville/T100 with Carburettors

865 cc Bonneville/T100 with Carburettors

Suspension

Front Fork Travel	120 mm	120 mm
Recommended Fork Oil Grade	Kayaba G10	Kayaba G10
Oil Level (fork fully compressed)	120 mm below inner tube upper surface	120 mm below inner tube upper surface
Oil Volume (dry fill)	484 cc	484 cc
Rear Wheel Travel	105 mm	105 mm
Rear Suspension Bearing Grease	Grease to NLGI 2 specification	Grease to NLGI 2 specification

Brakes

Pad Friction Material Min. Thickness	1.5 mm (front and rear)	1.5 mm (front and rear)
Front Disc Dia.	310 mm	310 mm
Front Disc Thickness	5.0 mm (service limit 4.5 mm)	5.5 mm (service limit 5.0 mm)
Front Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Front Disc Run-out - service limit	0.30 mm	0.30 mm
Rear Disc Thickness	6.0 mm (service limit 5.0 mm)	6.0 mm (service limit 5.0 mm)
Rear Disc Dia.	255 mm	255 mm
Rear Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Rear Disc Run-out - service limit	0.30 mm	0.30 mm
Recommended Fluid	DOT 4	DOT 4

Wheels and Tyres

Wheel Rim Axial Run-out	1.0 mm	1.0 mm
Wheel Rim Radial Run-out	1.0 mm	1.0 mm
Tyres	See owner's handbook	See owner's handbook
Tyre Pressures	See section 14	See section 14
Front Tyre Tread Depth min.	2.0 mm	2.0 mm
Rear Tyre Tread Depth min.	2.0 mm (3.0 mm > 80 mph/130 kmh)	2.0 mm (3.0 mm > 80 mph/130 kmh)



Warning

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.

General Information

Full Specification

790 cc Bonneville/T100 with Carburettors

865 cc Bonneville/T100 with Carburettors

Frame

Overall Length	2,230 mm	2,230 mm
Overall Width	840 mm	840 mm
Overall Height	1,100 mm	1,105 mm
Wheelbase	1,500 mm	1,500 mm
Seat Height	775 mm	775 mm
Castor	29°	29°
Trail	117 mm	117 mm
Dry Weight	205 kg	205 kg
Max. Payload (rider, passenger, luggage & accessories)	200 kg	200 kg

Electrical Equipment

Battery Type	Sealed	Sealed
Battery Rating	12 V-10 Ah	12 V-10 Ah
Alternator Rating	27 A	27 A
Fuses	See chapter 17	See chapter 17

Full Specification - Bonneville with Electronic Fuel Injection (EFI)

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Engine	Twin Cylinder 8 Valve DOHC
Arrangement	Transverse In-line
Displacement	865 cc
Bore x Stroke	90 mm x 68 mm

Models with Cable Driven Speedometer:

Compression Ratio	9.2:1
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Models with Electronic Speedometer:

Compression Ratio	10.2:1
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All Models

Cylinder Numbering	Left to Right
Firing Order	1-2
Firing Angle	360°

Models with Cable Driven Speedometer:

Max. Power (95/1/EC)	66.1 PS @ 7,500 rpm
Max. Torque	67.8 Nm @ 5,800 rpm

Models with Electronic Speedometer:

Max. Power (95/1/EC)	68 PS @ 7,400 rpm
Max. Torque	68 Nm @ 5,800 rpm

General Information

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Cylinder Head

Valve Head Dia.	In.	31.0 mm
	Ex.	26.0 mm
Valve Lift	In.	9.5 mm
	Ex.	9.4 mm
Valve Stem Dia.	In	5.463 to 5.478 mm (std)
Service limit		5.453 mm
	Ex.	5.451 to 5.466 mm (std)
Service limit		5.441 mm
Valve Guide Bore Dia.		5.500 to 5.515 mm (std)
Service limit		5.543 mm
Valve Seat Width (in head)		0.9 to 1.1 mm (std)
Service limit		1.5 mm
Valve Seat Width (valve)		1.27 to 1.56 mm (std)
Service limit		1.56 mm
Valve Seat Angle		45°
Valve Spring Free Length		42.4 mm (std)
Service limit		41.7 mm
Valve Clearance	In.	0.15 to 0.20 mm
	Ex.	0.25 to 0.30 mm
Tappet Bucket Bore Dia.		28.015 to 28.035 mm (std)
Service limit		28.050 mm
Tappet Bucket Dia.		27.978 to 27.993 mm (std)
Service limit		27.970 mm
Valve Timing	In.	Open 4° BTDC (@ 1.0 mm Lift)
		Close 48° ABDC (@ 1.0 mm Lift)
		Duration 232°
	Ex.	Open 33° BBDC (@ 1.0 mm Lift)
		Close 7° ATDC (@ 1.0 mm Lift)
		Duration 220°
Camshaft Journal Dia.		22.930 to 22.960 mm (std)
Camshaft Journal Clearance		0.040 to 0.091 mm (std)
Service limit		0.012 mm
Camshaft Journal Bore Dia.		23.000 to 23.021 mm
Camshaft Endfloat		Less than 0.2 mm
Camshaft Run-out		Less than 0.05 mm

General Information

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Barrels and Pistons

Cylinder Bore Dia.	89.991 to 90.009 mm (std)	
Service limit	90.034 mm	
Piston Diameter - standard	89.972 to 89.988 mm	
Piston Diameter - service limit	89.933 mm	
Piston Ring to Groove Clearance	0.02 mm to 0.06 mm (std)	
Service limit	0.075 mm	
Piston Ring Groove Width	Top	1.01 to 1.03 mm
	Second	1.01 to 1.03 mm
	Oil	2.01 to 2.03 mm
Piston Ring End Gap in Bore	Top	0.15 to 0.30 mm
	Second	0.30 to 0.45 mm
	Oil	0.20 to 0.70 mm
Gudgeon Pin Bore Dia. In Piston	19.002 to 19.008 mm (std)	
Service limit	19.030 mm	
Gudgeon Pin Dia.	18.995 to 19.000 mm (std)	
Service limit	18.990 mm	

Primary Drive

Primary Drive	Type	Gear
Reduction Ratio	1.74:1 (62/108)	

Clutch

Steel Plate Warpage Limit	Less than 0.15 mm
Friction Plate Thickness	3.22 to 3.38 mm (std)
Service limit	2.72 mm
Clutch Actuation Method	Cable
Cable Free Play (at lever)	2 to 3 mm

General Information

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Crankshaft/Connecting Rod

Big End Journal Dia.	40.946 to 40.960 mm (std)
Service limit	40.932 mm
Big End Bearing Clearance	0.036 to 0.066 mm (std)
Service limit	0.1 mm
Main Bearing Journal Dia.	37.960 to 37.976 mm (std)
Service limit	37.936 mm
Main Bearing Clearance	0.019 to 0.044 mm (std)
Service limit	0.1 mm
Crankshaft Endfloat	0.05 to 0.20 mm (std)
Service limit	0.40 mm
Connecting Rod Small End Dia.	19.016 to 19.034 mm (std)
Service limit	19.040 mm
Connecting Rod Big End Side Clearance	0.15 to 0.30 mm (std)
Service limit	0.50 mm

Transmission

Type	5 Speed Constant Mesh
Gear Ratios	1 st 2.73:1 (41/15)
	2 nd 1.95:1 (37/19)
	3 rd 1.55:1 (34/22)
	4 th 1.29:1 (31/24)
	5 th 1.07:1 (29/27)
Gear Selector Fork Thickness	5.8 to 5.9 mm (service limit 5.7 mm)
Gear Selector Groove Width	6.0 to 6.1 mm (service limit 6.2 mm)
Final Drive	Chain
Final Drive Ratio	2.39:1 (18/43)
Chain Type	DID 525 VM2 (104 link)
20 Link Length	Less than 321 mm
Drive Chain Freeplay	20-30 mm
Chain Lubrication	Chain spray suitable for O-ring chains

General Information

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Lubrication

Oil Capacity (approximate)	
Dry fill	4.5 litres
Oil & filter change	3.8 litres
Oil change only	3.3 litres
Recommended Oil	See lubrication section
Oil Pressure (in main gallery)	40 psi @ 4,000 rpm (@ 80°C Oil Temp)
Oil Pump Rotor Tip Clearance	Less than 0.15 mm (std)
Service limit	0.20 mm
Oil Pump Body Clearance	0.15 to 0.22 mm (std)
Service limit	0.35 mm
Oil Pump Rotor End Float	0.02 to 0.07 mm (std)
Service limit	0.10 mm

Ignition System

Type	Digital Inductive
Electronic Rev-Limiter	8,000 rpm
Pick Up Coil Air Gap	1.0 mm ±0.2 mm
Spark Plug Type	NGK DPR8EA-9
Spark Plug Gap	0.8 to 0.9 mm

Fuel System

Fuel Type	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity	16.0 litres
Idle Speed	1,000 ±50 rpm
Idle Mixture Adjustment	Not Applicable

Fuel Injection System

Type	Sequential electronic fuel injection
Idle Speed	1,000 ±50 rpm
Injector Type	Twin jet, solenoid operated plate valve
Throttle	Cable/twist grip/electronic throttle potentiometer
Control Sensors	Barometric pressure, manifold absolute pressure (2 off), throttle position, oil temperature, crankshaft position, lambda (oxygen) (2 off), induction air temperature

General Information

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Suspension

Front Fork Travel	120 mm
Recommended Fork Oil Grade	Kayaba G10

Bonneville up to VIN 380776 and Bonneville T100 including Steve McQueen™ and Bonneville T100 110th Edition

Oil Level (fork fully compressed)	120 mm below inner tube upper surface
Oil Volume (dry fill)	484 cc
Rear Wheel Travel	105 mm

Bonneville and Bonneville SE from VIN 380777

Oil Level (fork fully compressed)	106 ±4 mm below inner tube upper surface
Oil Volume (dry fill)	499 cc
Rear Wheel Travel	100 mm

All Models

Rear Suspension Bearing Grease	Grease to NLGI 2 specification
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Brakes

Pad Friction Material Min. Thickness	1.5 mm (front and rear)
Front Disc Dia.	310 mm
Front Disc Thickness	5.5 mm (service limit 5.0 mm)
Front Disc Run-out - standard	Less than 0.15 mm
Front Disc Run-out - service limit	0.30 mm
Rear Disc Dia.	255 mm
Rear Disc Thickness	6.0 mm (service limit 5.0 mm)
Rear Disc Run-out - standard	Less than 0.15 mm
Rear Disc Run-out - service limit	0.30 mm
Recommended Fluid	DOT 4

Wheels and Tyres

Wheel Rim Axial Run-out	1.0 mm
Wheel Rim Radial Run-out	1.0 mm
Tyres	See owner's handbook
Tyre Pressures	See section 14
Front Tyre Tread Depth min.	2.0 mm
Rear Tyre Tread Depth min.	2.0 mm (3.0 mm > 80 mph/130 kmh)



Warning

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.

Full Specification

**865 cc Bonneville, Bonneville SE and Bonneville T100
(including Steve McQueen™ and Bonneville T100 110th Editions)
with Electronic Fuel Injection (EFI)**

Frame - Bonneville up to VIN 380776 and Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th Editions)

Overall Length	2,230 mm
Overall Width	740 mm
Overall Height	1,100 mm
Wheelbase	1,500 mm
Seat Height	775 mm
Castor	28°
Trail	117 mm
Wet Weight	230 kg
Max. Payload (rider, passenger, luggage & accessories)	200 kg

Frame - Bonneville from VIN 380777 and Bonneville SE

Overall Length	2,115 mm
Overall Width	790 mm
Overall Height	1,130 mm
Wheelbase	1,490 mm
Seat Height	740 mm
Castor	27.5°
Trail	106.5 mm
Wet Weight	225 kg
Max. Payload (rider, passenger, luggage & accessories)	200 kg

Electrical Equipment

Battery Type	Sealed
Battery Rating	12 V-10 Ah
Alternator Rating	23 A @ 2,000 rpm 25 A @ 4,000 rpm
Fuses	See chapter 17

General Information

Full Specification - Scrambler

Full Specification	Scrambler with Carburetors	Scrambler with Electronic Fuel Injection (EFI)
Engine	Twin Cylinder 8 Valve DOHC	Twin Cylinder 8 Valve DOHC
Arrangement	Transverse In-line	Transverse In-line
Displacement	865 cc	865 cc
Bore x Stroke	90 mm x 68 mm	90 mm x 68 mm
Compression Ratio	9.2:1	9.2:1
Cylinder Numbering	Left to Right	Left to Right
Firing Order	1-2	1-2
Firing Angle	270°	270°
Max. Power (95/1/EC)	55 PS @ 7,000 rpm	59 PS @ 6,800 rpm
Max. Torque	69 Nm @ 5,000 rpm	68 Nm @ 4,750 rpm

Full Specification		Scrambler with Carburetors	Scrambler with Electronic Fuel Injection (EFI)
Cylinder Head			
Valve Head Dia.	In.	31.0 mm	31.0 mm
	Ex.	26.0 mm	26.0 mm
Valve Lift	In.	9.5 mm	9.5 mm
	Ex.	9.4 mm	9.4 mm
Valve Stem Dia.	In	5.463 to 5.478 mm (std)	5.463 to 5.478 mm (std)
Service limit		5.453 mm	5.453 mm
	Ex.	5.451 to 5.466 mm (std)	5.451 to 5.466 mm (std)
		5.441 mm	5.441 mm
Valve Guide Bore Dia.		5.500 to 5.515 mm (std)	5.500 to 5.515 mm (std)
Service limit		5.543 mm	5.543 mm
Valve Seat Width (in head)		0.9 to 1.1 mm (std)	0.9 to 1.1 mm (std)
Service limit		1.5 mm	1.5 mm
Valve Seat Width (valve)		1.27 to 1.56 mm (std)	1.27 to 1.56 mm (std)
Service limit		1.56 mm	1.56 mm
Valve Seat Angle		45°	45°
Valve Spring Free Length		42.4 mm (std)	42.4 mm (std)
Service limit		41.7 mm	41.7 mm
Valve Clearance	In.	0.15 to 0.20 mm	0.15 to 0.20 mm
	Ex.	0.25 to 0.30 mm	0.25 to 0.30 mm
Tappet Bucket Bore Dia.		28.015 to 28.035 mm (std)	28.015 to 28.035 mm (std)
Service limit		28.050 mm	28.050 mm
Tappet Bucket Dia.		27.978 to 27.993 mm (std)	27.978 to 27.993 mm (std)
Service limit		27.970 mm	27.970 mm
Valve Timing	In.	Open 6° ATDC (@ 1.0 mm Lift)	Open 6° ATDC (@ 1.0 mm Lift)
		Close 142° BTDC (@ 1.0 mm Lift)	Close 142° BTDC (@ 1.0 mm Lift)
		Duration 212°	Duration 212°
	Ex.	Open 142° ATDC (@ 1.0 mm Lift)	Open 142° ATDC (@ 1.0 mm Lift)
		Close 7° BTDC (@ 1.0 mm Lift)	Close 7° BTDC (@ 1.0 mm Lift)
		Duration 212°	Duration 212°
Camshaft Journal Dia.		22.930 to 22.960 mm (std)	22.930 to 22.960 mm (std)
Camshaft Journal Clearance		0.03 to 0.07 mm (std)	0.03 to 0.07 mm (std)
Service limit		0.012 mm	0.012 mm
Camshaft Journal Bore Dia.		23.000 to 23.021 mm	23.000 to 23.021 mm
Camshaft Endfloat		Less than 0.2 mm	Less than 0.2 mm
Camshaft Run-out		Less than 0.05 mm	Less than 0.05 mm

General Information

Full Specification	Scrambler with Carburettors	Scrambler with Electronic Fuel Injection (EFI)
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Barrels and Pistons

Cylinder Bore Dia.	89.991 to 90.009 mm (std)	89.991 to 90.009 mm (std)
Service limit	90.034 mm	90.034 mm
Piston Diameter - standard	89.972 to 89.988 mm	89.972 to 89.988 mm
Service limit	89.933 mm	89.933 mm
Piston Ring to Groove Clearance	0.02 to 0.06 mm (std)	0.02 to 0.06 mm (std)
Service limit	0.075 mm	0.075 mm
Piston Ring Groove Width	Top	1.01 to 1.03 mm
	Second	1.01 to 1.03 mm
	Oil	2.01 to 2.03 mm
Piston Ring End Gap in Bore	Top	0.15 to 0.30 mm
	Second	0.30 to 0.45 mm
	Oil	0.20 to 0.70 mm
Gudgeon Pin Bore Dia. In Piston	19.002 to 19.008 mm (std)	19.002 to 19.008 mm (std)
Service limit	19.030 mm	19.030 mm
Gudgeon Pin Dia.	18.995 to 19.000 mm (std)	18.995 to 19.000 mm (std)
Service limit	18.990 mm	18.990 mm

Primary Drive

Primary Drive	Type	Gear	Gear
Reduction Ratio		1.74:1 (62/108)	1.74:1 (62/108)

Clutch

Steel Plate Warpage Limit	Less than 0.15 mm	Less than 0.15 mm
Friction Plate Thickness	3.22 to 3.38 mm (std)	3.22 to 3.38 mm (std)
Service limit	2.72	2.72
Clutch Actuation Method	Cable	Cable
Cable Free Play (at lever)	2 to 3 mm	2 to 3 mm

General Information

Full Specification
**Scrambler
with Carburetors**
**Scrambler with
Electronic Fuel Injection (EFI)**
Crankshaft/Connecting Rod

Big End Journal Dia.	40.946 to 40.960 mm (std)	40.946 to 40.960 mm (std)
Service limit	40.932 mm	40.932 mm
Big End Bearing Clearance	0.036 to 0.066 mm (std)	0.036 to 0.066 mm (std)
Service limit	0.1 mm	0.1 mm
Main Bearing Journal Dia.	37.960 to 37.976 mm (std)	37.960 to 37.976 mm (std)
Service limit	37.936 mm	37.936 mm
Main Bearing Clearance	0.019 to 0.044 mm (std)	0.019 to 0.044 mm (std)
Service limit	0.1 mm	0.1 mm
Crankshaft Endfloat	0.05 to 0.20 mm (std)	0.05 to 0.20 mm (std)
Service limit	0.40 mm	0.40 mm
Connecting Rod Small End Dia.	19.016 to 19.034 mm (std)	19.016 to 19.034 mm (std)
Service limit	19.040 mm	19.040 mm
Connecting Rod Big End Side Clearance	0.15 to 0.30 mm (std)	0.15 to 0.30 mm (std)
Service limit	0.50 mm	0.50 mm

Transmission

Type	5 Speed Constant Mesh	
Gear Ratios	1 st	2.73:1 (41/15)
	2 nd	1.95:1 (37/19)
	3 rd	1.55:1 (34/22)
	4 th	1.29:1 (31/24)
	5 th	1.07:1 (29/27)
Gear Selector Fork Thickness	5.8 to 5.9 mm (service limit 5.7 mm)	
Gear Selector Groove Width	6.0 to 6.1 mm (service limit 6.2 mm)	
Final Drive	Chain	
Final Drive Ratio	2.39:1 (18/43)	
Chain Type	DID 525 VM2 (106 link)	
20 Link Length	Less than 321 mm	
Drive Chain Freeplay	30-40 mm	
Chain Lubrication	Chain spray suitable for O-ring chains	

General Information

Full Specification	Scrambler with Carburetors	Scrambler with Electronic Fuel Injection (EFI)
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Lubrication

Oil Capacity (approximate)		
Dry fill	4.5 litres	4.5 litres
Oil & filter change	3.8 litres	3.8 litres
Oil change only	3.3 litres	3.3 litres
Recommended Oil	See lubrication section	See lubrication section
Oil Pressure (in main gallery)	40 psi @ 4,000 rpm (@ 80°C Oil Temp)	40 psi @ 4,000 rpm (@ 80°C Oil Temp)
Oil Pump Rotor Tip Clearance	Less than 0.15 mm (std)	Less than 0.15 mm (std)
Service limit	0.20 mm	0.20 mm
Oil Pump Body Clearance	0.15 to 0.22 mm (std)	0.15 to 0.22 mm (std)
Service limit	0.35 mm	0.35 mm
Oil Pump Rotor End Float	0.02 to 0.07 mm (std)	0.02 to 0.07 mm (std)
Service limit	0.10 mm	0.10 mm

Ignition System

Type	Digital Inductive	Digital Inductive
Electronic Rev-Limiter	8,000 rpm	8,000 rpm
Pick Up Coil Air Gap	0.8 mm ±0.2 mm	0.8 mm ±0.2 mm
Spark Plug Type	NGK DPR8EA-9	NGK DPR8EA-9
Spark Plug Gap	0.8 to 0.9 mm	0.8 to 0.9 mm

Fuel System

Fuel Type	Unleaded, 95 RON (U.S. 89 CLC/AKI)	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity	16.0 litres	16.0 litres
Idle Speed	1,000 ±50 rpm	1,000 ±50 rpm
Idle Mixture Adjustment	See Section 9	Not Applicable

Carburetors

Type	Keihin CVK 36
Main Jet	120
Pilot Jet	40
Starter Jet	55
Main Air Jet	100
Needle	N3RL
Float Height	17.0 ±1 mm
Fuel Level	2.0 ±1 mm above float chamber surface

General Information

Full Specification

Scrambler with Carburetors

Scrambler with Electronic Fuel Injection (EFI)

Fuel Injection System

Type	Sequential electronic fuel injection
Idle Speed	1,000 ±50 rpm
Injector Type	Twin jet, solenoid operated plate valve
Throttle	Cable/twist grip/electronic throttle potentiometer
Control Sensors	Barometric pressure, manifold absolute pressure (2 off), throttle position, oil temperature, crankshaft position, lambda (oxygen) (2 off), induction air temperature

Suspension

Front Fork Travel	120 mm	120 mm
Recommended Fork Oil Grade	Kayaba G10	Kayaba G10
Oil Level (fork fully compressed)	123 mm below inner tube upper surface	123 mm below inner tube upper surface
Oil Volume (dry fill)	517 cc	517 cc
Rear Wheel Travel	105 mm	105 mm
Rear Suspension Bearing Grease	Mobil Grease HP 222	Mobil Grease HP 222

Brakes

Pad Friction Material Min. Thickness	1.5 mm (front and rear)	1.5 mm (front and rear)
Front Disc Dia.	310 mm	310 mm
Front Disc Thickness	5.5 mm (service limit 5.0 mm)	5.5 mm (service limit 5.0 mm)
Front Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Front Disc Run-out - service limit	0.30 mm	0.30 mm
Rear Disc Dia.	255 mm	255 mm
Rear Disc Thickness	6.0 mm (service limit 5.0 mm)	6.0 mm (service limit 5.0 mm)
Rear Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Rear Disc Run-out - service limit	0.30 mm	0.30 mm
Recommended Fluid	DOT 4	DOT 4

General Information

Full Specification	Scrambler with Carburettors	Scrambler with Electronic Fuel Injection (EFI)
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Wheels and Tyres

Wheel Rim Axial Run-out	1.0 mm	1.0 mm
Wheel Rim Radial Run-out	1.0 mm	1.0 mm
Tyres	See owner's handbook	See owner's handbook
Tyre Pressures	See section 14	See section 14
Front Tyre Tread Depth min.	2.0 mm	2.0 mm
Rear Tyre Tread Depth min.	2.0 mm (3.0 mm > 80 mph/130 kmh)	2.0 mm (3.0 mm > 80 mph/130 kmh)

! Warning

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.

Frame

Overall Length	2,215 mm	2,213 mm
Overall Width	865 mm	860 mm
Overall Height	1,202 mm	1,202 mm
Wheelbase	1,500 mm	1,500 mm
Seat Height	825 mm	825 mm
Castor	27.8°	27.8°
Trail	105 mm	105 mm
Wet Weight	230 kg	230 kg
Max. Payload (rider, passenger, luggage & accessories)	200 kg	200 kg

Electrical Equipment

Battery Type	Sealed	Sealed
Battery Rating	12 V-10 Ah	12 V-10 Ah
Alternator Rating	24 A @ 2,000 rpm 26 A @ 4,000 rpm	24 A @ 2,000 rpm 26 A @ 4,000 rpm
Fuses	See chapter 17	See chapter 17

Full Specification - Thruxton

Full Specification	Thruston with Carburetors	Thruston with Electronic Fuel Injection (EFI)
Engine	Twin Cylinder 8 Valve DOHC	Twin Cylinder 8 Valve DOHC
Arrangement	Transverse In-line	Transverse In-line
Displacement	865 cc	865 cc
Bore x Stroke	90 mm x 68 mm	90 mm x 68 mm
Compression Ratio	9.2:1	10.2:1
Cylinder Numbering	Left to Right	Left to Right
Firing Order	1-2	1-2
Firing Angle	360°	360°
Max. Power (95/1/EC)	70 PS @ 7,250 rpm	69 PS @ 7,400 rpm
Max. Torque	72 Nm @ 5,750 rpm	69 Nm @ 5,800 rpm

General Information

Full Specification	Thruxtion with Carburettors	Thruxtion with Electronic Fuel Injection (EFI)
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Cylinder Head

Valve Head Dia.	In.	31.0 mm	31.0 mm
	Ex.	26.0 mm	26.0 mm
Valve Lift	In.	9.5 mm	9.5 mm
	Ex.	9.4 mm	9.4 mm
Valve Stem Dia.	In	5.463 to 5.478 mm (std)	5.463 to 5.478 mm (std)
Service limit		5.453 mm	5.453 mm
	Ex.	5.451 to 5.466 mm (std)	5.451 to 5.466 mm (std)
Service limit		5.441 mm	5.441 mm
Valve Guide Bore Dia.		5.500 to 5.515 mm (std)	5.500 to 5.515 mm (std)
Service limit		5.543 mm	5.543 mm
Valve Seat Width (in head)		0.9 to 1.1 mm (std)	0.9 to 1.1 mm (std)
Service limit		1.5 mm	1.5 mm
Valve Seat Width (valve)		1.27 to 1.56 mm (std)	1.27 to 1.56 mm (std)
Service limit		1.56 mm	1.56 mm
Valve Seat Angle		45°	45°
Valve Spring Free Length		42.4 mm (std)	42.4 mm (std)
Service limit		41.7 mm	41.7 mm
Valve Clearance	In.	0.15 to 0.20 mm	0.15 to 0.20 mm
	Ex.	0.25 to 0.30 mm	0.25 to 0.30 mm
Tappet Bucket Bore Dia.		28.015 to 28.035 mm (std)	28.015 to 28.035 mm (std)
Service limit		28.050 mm	28.050 mm
Tappet Bucket Dia.		27.978 to 27.993 mm (std)	27.978 to 27.993 mm (std)
Service limit		27.970 mm	27.970 mm
Valve Timing	In.	Open 6° ATDC (@ 1.0 mm Lift)	Open 6° BTDC (@ 1.0 mm Lift)
		Close 50° ABDC (@ 1.0 mm Lift)	Close 50° ABDC (@ 1.0 mm Lift)
		Duration 235°	Duration 235°
	Ex.	Open 33° BBDC (@ 1.0 mm Lift)	Open 33° BBDC (@ 1.0 mm Lift)
		Close 8° ATDC (@ 1.0 mm Lift)	Close 8° ATDC (@ 1.0 mm Lift)
		Duration 221°	Duration 221°
Camshaft Journal Dia.		22.930 to 22.960 mm (std)	22.930 to 22.960 mm (std)
Camshaft Journal Clearance		0.040 to 0.091 mm (std)	0.040 to 0.091 mm (std)
Service limit		0.012 mm	0.012 mm
Camshaft Journal Bore Dia.		23.000 to 23.021 mm	23.000 to 23.021 mm
Camshaft Endfloat		Less than 0.2 mm	Less than 0.2 mm
Camshaft Run-out		Less than 0.05 mm	Less than 0.05 mm

General Information

Full Specification

ThruXTON with Carburetors

ThruXTON with Electronic Fuel Injection (EFI)

Barrels and Pistons

Cylinder Bore Dia.	89.991 to 90.009 mm (std)	89.991 to 90.009 mm (std)
Service limit	90.034 mm	90.034 mm
Piston Diameter - standard	89.972 to 89.988 mm	89.972 to 89.9898 mm
Service limit	89.933 mm	89.933 mm
Piston Ring to Groove Clearance	0.02 to 0.06 mm (std)	0.02 to 0.06 mm (std)
Service limit	0.075 mm	0.075 mm
Piston Ring Groove Width	Top	1.01 to 1.03 mm
	Second	1.01 to 1.03 mm
	Oil	2.01 to 2.03 mm
Piston Ring End Gap in Bore	Top	0.15 to 0.30 mm
	Second	0.30 to 0.45 mm
	Oil	0.20 to 0.70 mm
Gudgeon Pin Bore Dia. In Piston	19.002 to 19.008 mm (std)	19.002 to 19.008 mm (std)
Service limit	19.030 mm	19.030 mm
Gudgeon Pin Dia.	18.995 to 19.000 mm (std)	18.995 to 19.000 mm (std)
Service limit	18.990 mm	18.990 mm

Primary Drive

Primary Drive	Type	Gear	Gear
Reduction Ratio		1.74:1 (62/108)	1.74:1 (62/108)

Clutch

Steel Plate Warpage Limit	Less than 0.15 mm	Less than 0.15 mm
Friction Plate Thickness	3.22 to 3.38 mm (std)	3.22 to 3.38 mm (std)
Service limit	2.72 mm	2.72 mm
Clutch Actuation Method	Cable	Cable
Cable Free Play (at lever)	2 to 3 mm	2 to 3 mm

General Information

Full Specification

ThruXTON with Carburettors

ThruXTON with Electronic Fuel Injection (EFI)

Crankshaft/Connecting Rod

Big End Journal Dia.	40.946 to 40.960 mm (std)	40.946 to 40.960 mm (std)
Service limit	40.932 mm	40.932 mm
Big End Bearing Clearance	0.036 to 0.066 mm (std)	0.036 to 0.066 mm (std)
Service limit	0.1 mm	0.1 mm
Main Bearing Journal Dia.	37.960 to 37.976 mm (std)	37.960 to 37.976 mm (std)
Service limit	37.936 mm	37.936 mm
Main Bearing Clearance	0.019 to 0.044 mm (std)	0.019 to 0.044 mm (std)
Service limit	0.1 mm	0.1 mm
Crankshaft Endfloat	0.05 to 0.20 mm (std)	0.05 to 0.20 mm (std)
Service limit	0.40 mm	0.40 mm
Connecting Rod Small End Dia.	19.016 to 19.034 mm (std)	19.016 to 19.034 mm (std)
Service limit	19.040 mm	19.040 mm
Connecting Rod Big End Side Clearance	0.15 to 0.30 mm (std)	0.15 to 0.30 mm (std)
Service limit	0.50 mm	0.50 mm

Transmission

Type	5 Speed Constant Mesh	5 Speed Constant Mesh
Gear Ratios	1 st 2.73:1 (41/15)	2.73:1 (41/15)
	2 nd 1.95:1 (37/19)	1.95:1 (37/19)
	3 rd 1.55:1 (34/22)	1.55:1 (34/22)
	4 th 1.29:1 (31/24)	1.29:1 (31/24)
	5 th 1.07:1 (29/27)	1.07:1 (29/27)
Gear Selector Fork Thickness	5.8 to 5.9 mm (service limit 5.7 mm)	5.8 to 5.9 mm (service limit 5.7 mm)
Gear Selector Groove Width	6.0 to 6.1 mm (service limit 6.2 mm)	6.0 to 6.1 mm (service limit 6.2 mm)
Final Drive	Chain	Chain
Final Drive Ratio	2.39:1 (18/43)	2.39:1 (18/43)
Chain Type	DID 525 VM2 (104 link)	DID 525 VM2 (106 link)
20 Link Length	Less than 321 mm	Less than 321 mm
Drive Chain Freeplay	30-40 mm	30-40 mm
Chain Lubrication	Chain spray suitable for O-ring chains	Chain spray suitable for O-ring chains

General Information

Full Specification
**ThruXTON
with Carburetors**
**ThruXTON with
Electronic Fuel Injection (EFI)**
Lubrication

Oil Capacity (approximate)		
Dry fill	4.5 litres	4.5 litres
Oil & filter change	3.8 litres	3.8 litres
Oil change only	3.3 litres	3.3 litres
Recommended Oil	See lubrication section	See lubrication section
Oil Pressure (in main gallery)	40 psi @ 4,000 rpm (@ 80°C Oil Temp)	40 psi @ 4,000 rpm (@ 80°C Oil Temp)
Oil Pump Rotor Tip Clearance	Less than 0.15 mm (std)	Less than 0.15 mm (std)
Service limit	0.20 mm	0.20 mm
Oil Pump Body Clearance	0.15 to 0.22 mm (std)	0.15 to 0.22 mm (std)
Service limit	0.35 mm	0.35 mm
Oil Pump Rotor End Float	0.02 to 0.07 mm (std)	0.02 to 0.07 mm (std)
Service limit	0.10 mm	0.10 mm

Ignition System

Type	Digital Inductive	Digital Inductive
Electronic Rev-Limiter	8,000 rpm	8,000 rpm
Pick Up Coil Air Gap	1.0 mm ±0.2 mm	1.0 mm ±0.2 mm
Spark Plug Type	NGK DPR8EA-9	NGK DPR8EA-9
Spark Plug Gap	0.8 to 0.9 mm	0.8 to 0.9 mm
Fuel System		
Fuel Type	Unleaded, 95 RON (U.S. 89 CLC/AKI)	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity	16.0 litres	16.0 litres
Idle Speed	1,000 ±50 rpm	1,000 ±50 rpm
Idle Mixture Adjustment	See Section 9	Not Applicable

Carburetors

Type	Keihin CVK 36
Main Jet	120
Pilot Jet	40
Starter Jet	55
Main Air Jet	100
Needle	N3RL
Float Height	17.0 ±1 mm
Fuel Level	2.0 ±1 mm above float chamber surface

General Information

Full Specification	ThruXTON with Carburettors	ThruXTON with Electronic Fuel Injection (EFI)
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Fuel Injection System

Type	Sequential electronic fuel injection
Idle Speed	1,000 ±50 rpm
Injector Type	Twin jet, solenoid operated plate valve
Throttle	Cable/twist grip/electronic throttle potentiometer
Control Sensors	Barometric pressure, manifold absolute pressure (2 off), throttle position, oil temperature, crankshaft position, lambda (oxygen) (2 off), induction air temperature

Suspension

Front Fork Travel	120 mm	120 mm
Recommended Fork Oil Grade	Kayaba G10	Kayaba G10
Oil Level (fork fully compressed)	143 mm below inner tube upper surface	143 mm below inner tube upper surface
Oil Volume (dry fill)	466 cc	466 cc
Rear Wheel Travel	105 mm	105 mm
Rear Suspension Bearing Grease	Mobil Grease HP 222	Mobil Grease HP 222

Brakes

Pad Friction Material Min. Thickness	1.5 mm (front and rear)	1.5 mm (front and rear)
Front Disc Dia.	310 mm	320 mm
Front Disc Thickness	5.5 mm (service limit 5.0 mm)	5.0 mm (service limit 4.5 mm)
Front Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Front Disc Run-out - service limit	0.30 mm	0.30 mm
Rear Disc Dia.	255 mm	255 mm
Rear Disc Thickness	6.0 mm (service limit 5.0 mm)	6.0 mm (service limit 5.0 mm)
Rear Disc Run-out - standard	Less than 0.15 mm	Less than 0.15 mm
Rear Disc Run-out - service limit	0.30 mm	0.30 mm
Recommended Fluid	DOT 4	DOT 4

Full Specification

ThruXTON with Carburetors

ThruXTON with Electronic Fuel Injection (EFI)

Wheels and Tyres

Wheel Rim Axial Run-out	1.0 mm	1.0 mm
Wheel Rim Radial Run-out	1.0 mm	1.0 mm
Tyres	See owner's handbook	See owner's handbook
Tyre Pressures	See section 14	See section 14
Front Tyre Tread Depth min.	2.0 mm	2.0 mm
Rear Tyre Tread Depth min.	2.0 mm (3.0 mm > 80 mph/130 kmh)	2.0 mm (3.0 mm > 80 mph/130 kmh)



Warning

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.

Frame

Overall Length	2,150 mm	2,150 mm
Overall Width	695 mm	695 mm (with low handlebars) 950 mm (with high handlebars)
Overall Height	1,095 mm	1,095 mm (with low handlebars) 1,120 mm (with high handlebars)
Wheelbase	1,490 mm	1,490 mm
Seat Height	790 mm	820 mm
Castor	27°	27°
Trail	97 mm	97 mm
Wet Weight	230 kg	230 kg
Max. Payload (rider, passenger, luggage & accessories)	200 kg	200 kg

Electrical Equipment

Battery Type	Sealed	Sealed
Battery Rating	12 V-10 Ah	12 V-10 Ah
Alternator Rating	24 A @ 2,000 rpm 26 A @ 4,000 rpm	24 A @ 2,000 rpm 26 A @ 4,000 rpm
Fuses	See chapter 17	See chapter 17

General Information

Torque Wrench Settings

Cylinder Head/Camshafts

Application	Torque (Nm)	Notes
Camshaft cover to cylinder head bolts	14	Apply engine oil to seals. Refer to section 3
Camshaft bearing caps to head bolts	10	Lubricate threads with engine oil. Refer to section 3
Camshaft oil feed pipe to bearing cap bolts	8	
Camshaft chain tensioner body to crankcase bolts	9	
Camshaft chain tensioner centre bolt	20	
Camshaft chain drive gear shaft retaining bolt	10	Prior to engine number 186916
Camshaft chain drive gear shaft retaining bolt	28	From engine number 186916
Cylinder head nuts	*	Refer to section 3
Cylinder head studs	10	
Camshaft chain guide blade to cylinder head bolts	10	
Camshaft chain tensioner blade to cylinder head nut	10	Apply ThreeBond 1305 to threads
Oil cooler feed pipe to cylinder head banjo bolts	30	
Low oil pressure warning light switch (oil feed pipe to cylinder head)	13	Fit new sealing washer
Spark plug	20	
Exhaust pipe stud	10	Fit new stud

Clutch

Application	Torque (Nm)	Notes
Clutch cover to crankcase bolts	10	
Gearchange lever clamp bolt	8	
Clutch centre nut	105	Fit a new nut
Clutch release plate to pressure plate bolts	9	
Clutch lever mounting clamp bolts	12	Tighten upper bolt first then lower bolt
Starter (sprag) clutch housing to crankshaft bolts	16	Use new fixing(s)
Centrifugal breather to crankshaft screws (up to engine number 221606)	12	Use new fixing(s)
Clutch lever pivot bolt	1	
Clutch lever pivot nut	6	

Engine mountings

Application	Torque (Nm)	Notes
Front and rear upper mounting bolts	80	
Frame-downtube to frame bolts - up to VIN 333839 (coloured black)	45	See Technical News 99
Frame-downtube to frame bolts - from VIN 333840 (coloured silver)	40	See Technical News 99
Frame-tube brace bolts	22	
Cylinder head to frame mounting bracket bolts		
Frame bolt	27	
Cylinder head bolt	80	

Crankshaft/Connecting Rods

Application	Torque (Nm)	Notes
Crankcase bolts	*	Refer to section 7
Connecting rod big end bolt nuts	*	Refer to section 7
Centrifugal breather to crankshaft screws - if fitted	12	Use new fixing(s)
Crankshaft spacer - if fitted	12	Use new fixing(s)
Starter (sprag) clutch housing to crankshaft bolts	16	Use new fixing(s)
Balancer shaft lock washer to crankcase screw	12	Use new fixing(s)
Crankcase dry seal plug	15	
Lower breather plate	9	Use new fixing(s)
Breather drain pipe	9	Use new fixing(s)

Transmission

Application	Torque (Nm)	Notes
Gearchange mechanism cover bolts	8	
Selector fork shaft retaining plate screw	12	Use new fixing(s)
Selector drum cam retaining bolt	12	Use new fixing(s)
Gearchange shaft abutment bolt	18	Use new fixing(s)
Detent arm retaining bolt	12	Use new fixing(s)
Neutral switch	10	
Sprocket cover to crankcase	10	
Chainguard front fixing to swinging arm	7	
Chainguard rear fixing to swinging arm	10	Use new fixing(s)
Gearchange rod lock nuts	6	
Gearchange lever pinch bolt	8	
Gear pedal pivot bolt - Thruxton	22	
Output sprocket to output shaft	132	

General Information

Lubrication System

Application	Torque (Nm)	Notes
Sump drain plug	25	
Oil filter	10	
Oil filter adaptor to crankcase	10	Apply ThreeBond 1305 to threads
Low oil pressure warning light switch	13	
Oil cooler mounting bolts	9	
Oil feed pipe to cylinder head banjo bolts (M14 bolts, upper pipe)	30	
Oil feed pipe to oil cooler banjo bolt (M18 bolt, upper pipe)	45	
Oil return pipe to sump banjo bolt to cooler (M18 bolt, lower pipe)	45	
Oil return pipe union to sump adapter	15	
Oil return pipe union sump adapter	45	
Oil pick-up strainer screws	6	Use new fixing(s)
Sump to crankcase bolts	12	
Oil pump to crankcase bolts	12	
Oil pressure relief valve	2	Apply ThreeBond 1305 to threads
Oil temperature sensor	18	Apply ThreeBond 1305 to threads
Sight glass oil level	30	
Oil filler plug	3	
Oil feed pipe for input shaft	8	
Oil pipe feed to cylinder head banjo bolt (crankcase end)	25	

Fuel System/Exhaust

Application	Torque (Nm)	Notes
Fuel tank mounting bolts	9	
Airbox mounting bolts	6	
Secondary air injection system control valve to frame screws	8	
Exhaust header pipe to cylinder head nuts	19	
Exhaust header pipe mounting bolts	22	Except Scrambler
Exhaust header pipe mounting bolts	19	Scrambler
Exhaust header balance pipe clamp	15	Except Scrambler
Silencer mounting (passenger footrest) nut	27	Except Scrambler
Silencer mounting plate to frame	19	Scrambler
Exhaust silencer to bracket	15	Scrambler
Exhaust pipe covers	4	Scrambler
Exhaust silencer heatshields	7	Scrambler
Silencer clamp	15	Except Scrambler
Silencer clamp	10	Scrambler
Fuel tank badge to tank	4.5	
Fuel pump plate	5	
Fuel pressure relief valve	4	
Fuel pump bracket to pump plate	10	Use new fixing(s)
Fuel pump baffle clip	3	
Carburettor 865 cc engine/Throttle body transition pieces	12	
Carburettor 790 cc engine transition piece to cylinder head	-	Refer to section 10A
MAP sensor	3	
Barometric pressure sensor	3	
Intake air temperature sensor	5	
Fall detection switch	3	Use new fixing(s)
Oxygen sensors	25	
Road speed sensor	10	
Carburettor/Throttle body to transition piece clip	1.5	
Secondary air injection pipe to cylinder head	18	
Crankshaft position (EFI models)	10	Use new fixing(s)
Ignition sensor (carburettor models)	10	Use new fixing(s)
Air filter	3	
Venturi clip	1.5	
Evaporative canister bracket - if fitted	12	
Engine temperature sensor	18	
Fuel tap - carburettor models	9	
Throttle position sensor	3.5	

General Information

Fuel System/Exhaust (continued)

Application	Torque (Nm)	Notes
Throttle bodies	6	
Throttle cable guide	3	

Braking System

Application	Torque (Nm)	Notes
Brake caliper bleed nipple	6	
Front brake caliper mounting bolts	28	
Front brake caliper pad retaining pin	18	
Front brake caliper pad retaining pin plug	3	
Front brake hose banjo bolts	25	Fit new sealing washer
Front brake master cylinder mounting clamp bolts	12	Tighten upper bolt first then lower bolt
Front brake master cylinder cover screws	1	
Front brake disc bolts	22	Use new fixing(s)
Rear brake fluid reservoir mounting screw	5	Except Scrambler
Rear brake fluid reservoir mounting screw	7	Scrambler
Rear brake master cylinder reservoir bracket	7	
Rear brake caliper mounting bolts	40	
Rear brake caliper pad retaining pins	18	
Rear brake hose to caliper banjo bolt	25	Fit new sealing washer
Rear brake master cylinder mounting bolts	23	Except Scrambler
Rear brake master cylinder mounting bolts	16	Scrambler
Rear brake master cylinder pushrod clevis lock nuts	18	
Rear brake light switch	15	Fit new sealing washer
Rear brake disc retaining bolts	22	Use new fixing(s)
Rear brake hose clamp to swinging arm	6	
Rear brake pedal pivot	22	Thruxton
Rear brake pedal pivot	27	Bonneville/ Bonneville SE/ Bonneville T100/ Scrambler
Rear brake pad retaining pin	18	
Rear brake caliper bleed screw	6	Thruxton
Rear brake switch adaptor	20	

Front Suspension/Steering

Application	Torque (Nm)	Notes
Top yoke fork clamp bolt	26	
Bottom yoke fork clamp bolt	27	
Fork top cap	22	
Fork damper rod bolt	30	
Handlebar clamp bolts	26	For tightening sequence refer to Chapter 16
Handlebar end weight screw	3	
Steering head bearing adjuster nut lock nut	40	Refer to section 12
Steering stem top nut	90	
Handlebar mounting clamp to top yoke nut	35	
Mirror	10	Bonneville T100 and Thruxton
Mirror	25	Bonneville and Scrambler
Front fork gaiter clip	3	Bonneville T100, Scrambler and Thruxton

Rear Suspension

Application	Torque (Nm)	Notes
Rear suspension unit mounting bolts	28	Refer to section 13
Swinging arm spindle nut	110	
Swinging arm clamp bolts	40	
Chain adjuster	5	
Chain rubbing strip	7	Use new fixing(s)

General Information

Frame/Bodywork

Application	Torque (Nm)	Notes
Seat to frame screws	8	
Seat side fixings	3	Steve McQueen™ Edition only
Luggage rack	9	Steve McQueen™ Edition only
Grab rail	18	Bonneville T100 110 th Edition only
Seat cowl	3	Thruxton
Front mudguard to stay bolts	3	Bonneville/T100
Front mudguard stay to fork bolts	8	Bonneville/T100
Front mudguard to bracket bolts	3	Thruxton/Scrambler
Front mudguard bracket to fork bolts	24	
Rear mudguard mounting screws	10	
Rear reflector	5	
Side stand pivot bolt	25	
Side stand pivot bolt locknut	25	
Side stand switch	5	Use new fixing(s)
Bank angle indicator to footrest	10	
Outrigger pinch bolts - up to VIN 333830	45	Black bolt - see Technical News 99
Outrigger pinch bolts - from VIN 333831	40	Silver bolt - see Technical News 99
Outrigger to frame bolts (coloured black)	45	All models except Scrambler's right hand side from VIN 333830 - see Technical News 99
Outrigger to frame bolts - Scrambler only from VIN 333831	40	Only Scrambler right hand, with silver bolts - see Technical News 99
Footrest to outrigger lock nuts	27	Bonneville, Bonneville SE, Bonneville T100
Footrest rubber to rear footrest	4	Thruxton
Footrest rubber to front footrest	10	Thruxton
Front heel guard	16	Thruxton
Rear footrest clevis	27	
Sump guard	18	Bonneville T100 110 th Edition only

Wheels

Application	Torque (Nm)	Notes
Front wheel spindle fixing	60	
Front wheel spindle clamp bolt	27	
Rear wheel spindle nut	85	

Final Drive

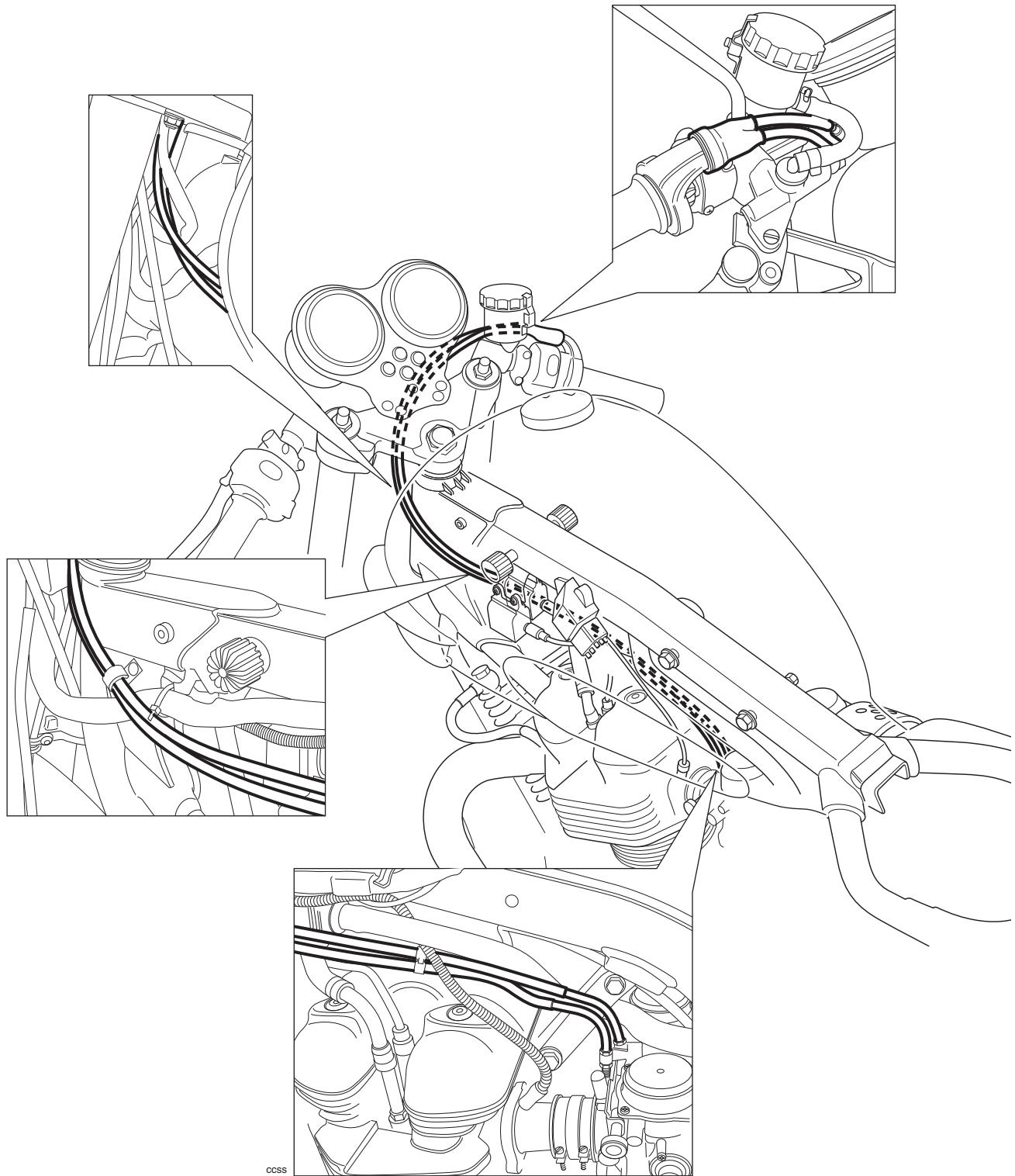
Application	Torque (Nm)	Notes
Rear wheel spindle nut	85	
Chainguard to swinging arm screws	7	
Chainguard to swinging arm rear screw	10	Use new fixing(s)
Front sprocket cover bolts	10	
Front sprocket nut	132	Use lockwasher
Rear sprocket nuts	55	

General Information

Electrical System/Ignition

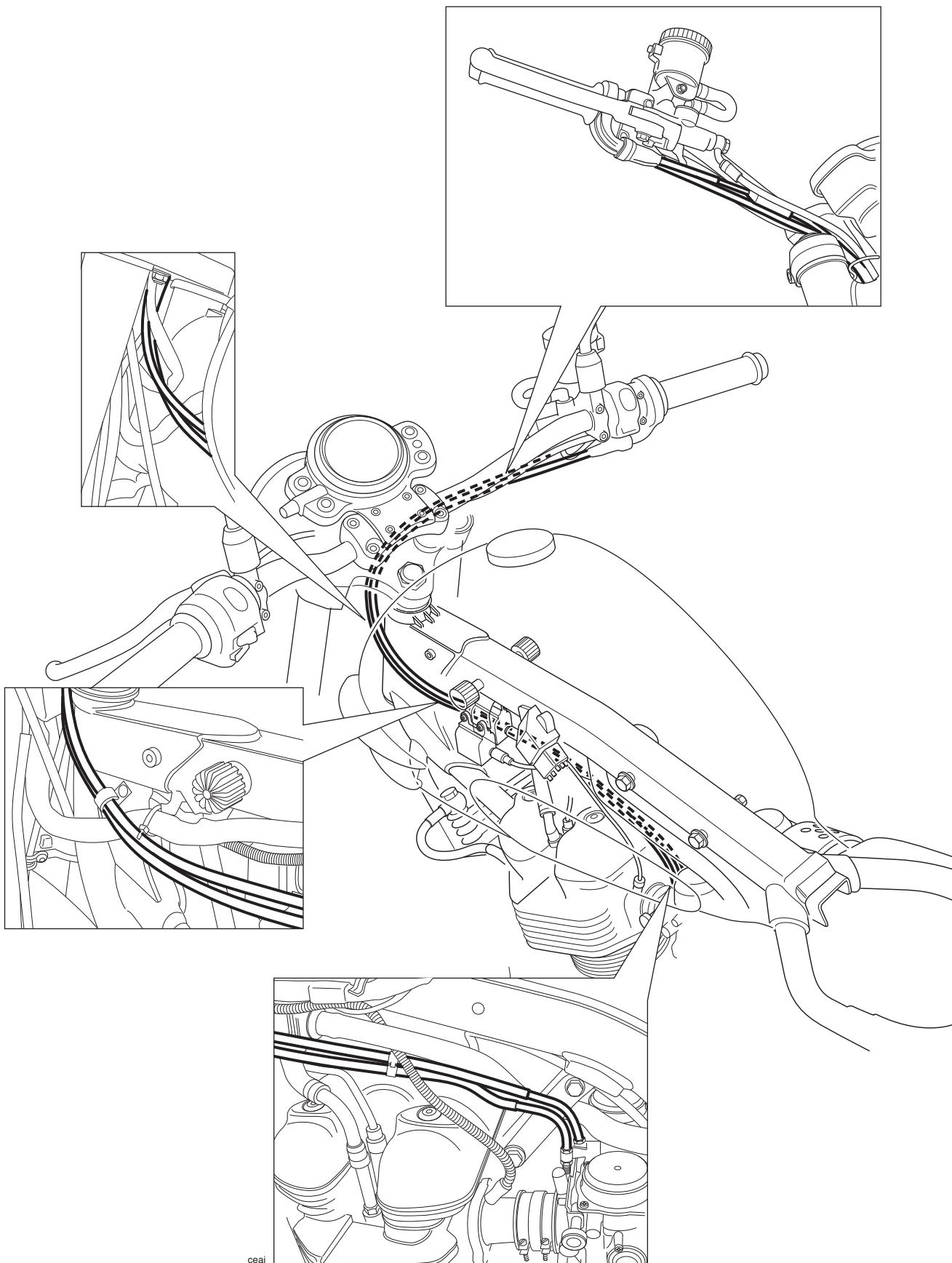
Application	Torque (Nm)	Notes
Headlight mounting bolts	10	
Rear light fixings	9	
Front indicator mounting nuts	8	
Horn bracket	24	
Handlebar switch retaining screws	2.5	
Ignition switch screws	5	Except Scrambler
Ignition switch screws	7	Scrambler
Alternator rotor bolt M10 bolt	98	
M12 bolt	120	
Alternator stator to cover bolts	12	
Alternator stator wiring clamp to cover screw	12	
Alternator cover to crankcase bolts	10	
Regulator/rectifier fixings	9	
Starter motor to crankcase bolts	10	
Starter motor lead terminal nut	7	
Starter solenoid lead terminal nut	5	
Ignition pick-up coil screws	10	Use new fixing(s) Ensure coil air gap is correctly set
Igniter unit retaining nut	8	
Crankshaft position sensor (EFI models)	6	
Ignition coils	9	

Throttle Cable Routing - Thruxton

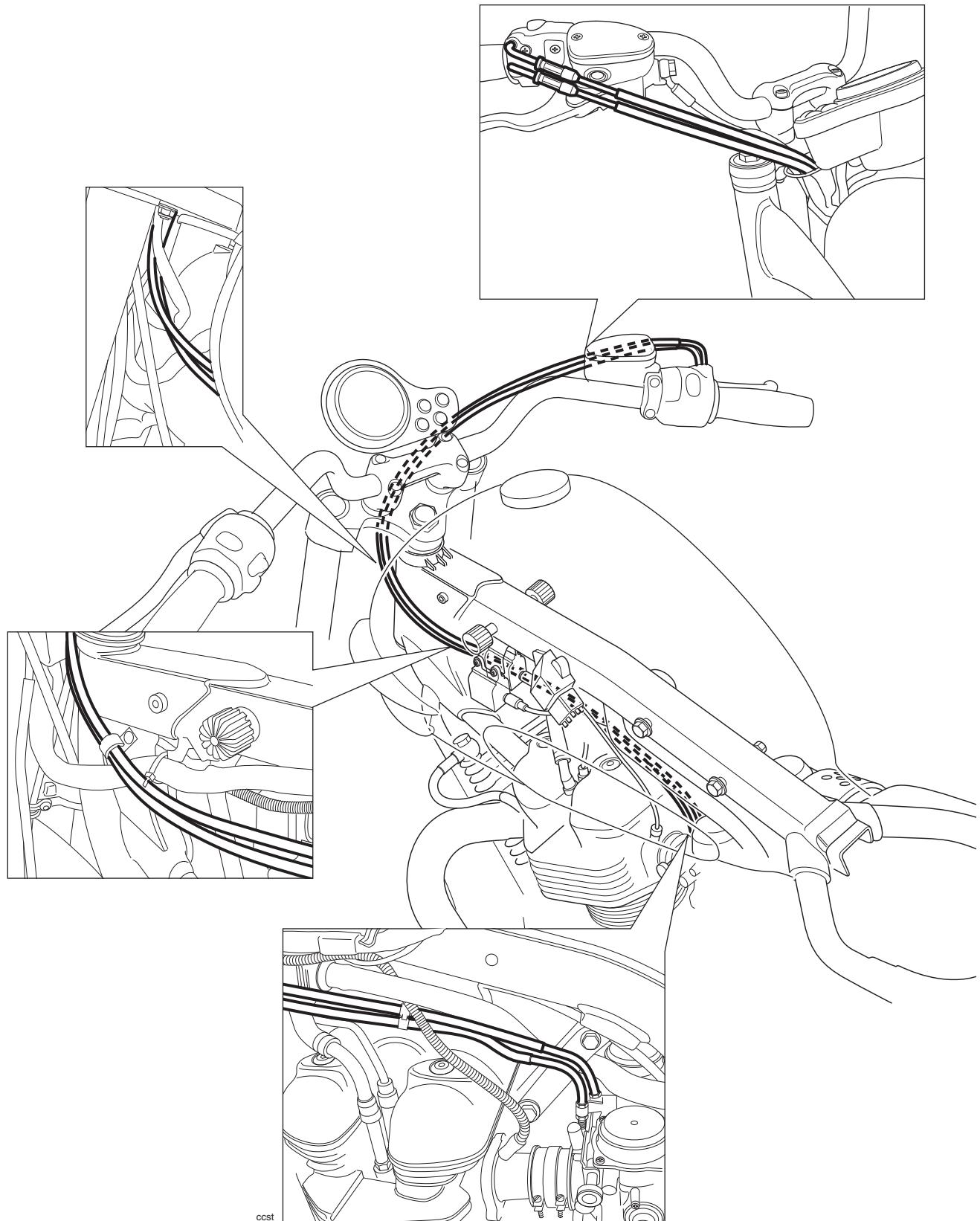


General Information

Throttle Cable Routing - Scrambler

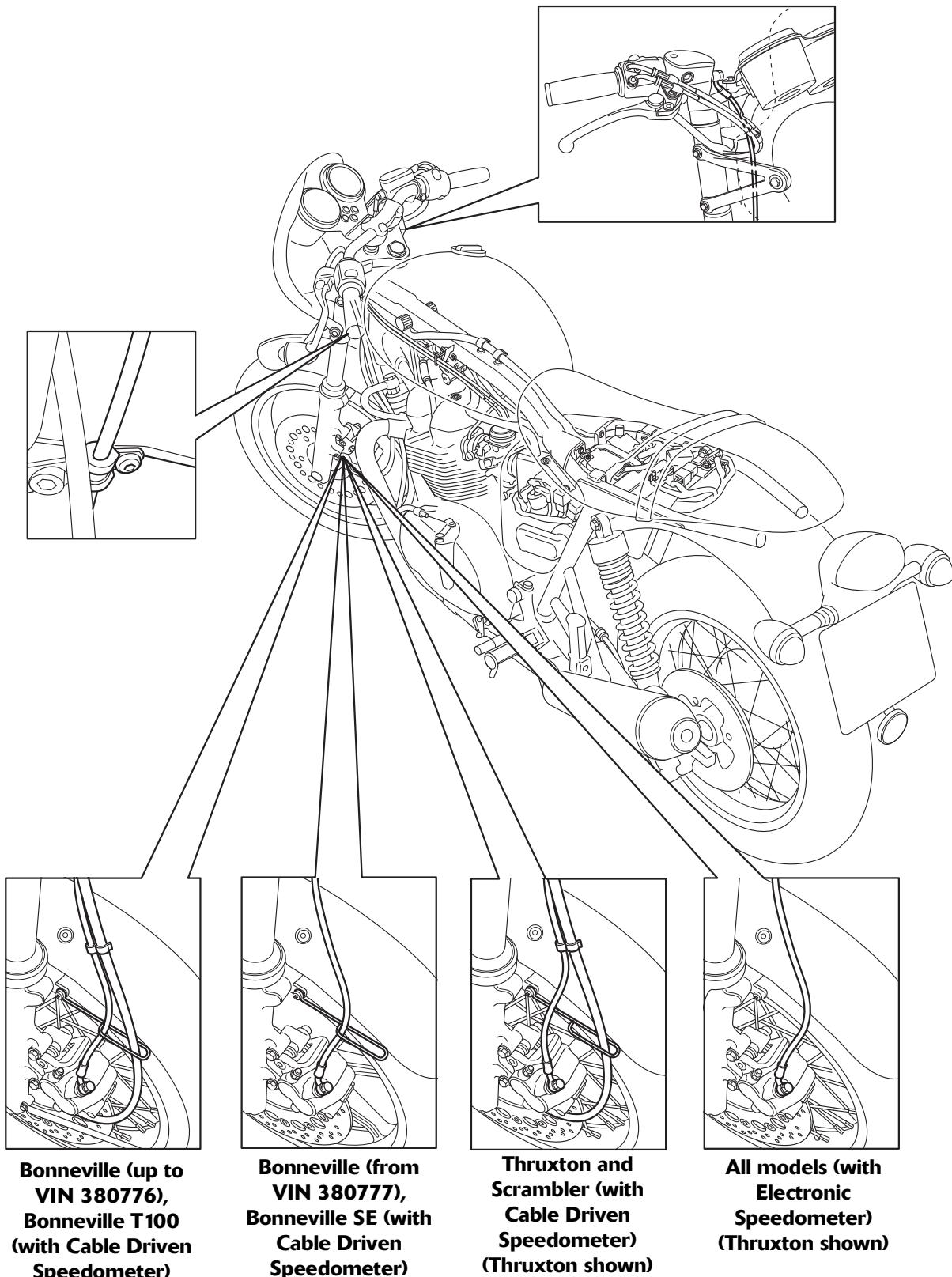


Throttle Cable Routing - Bonneville/Bonneville T100

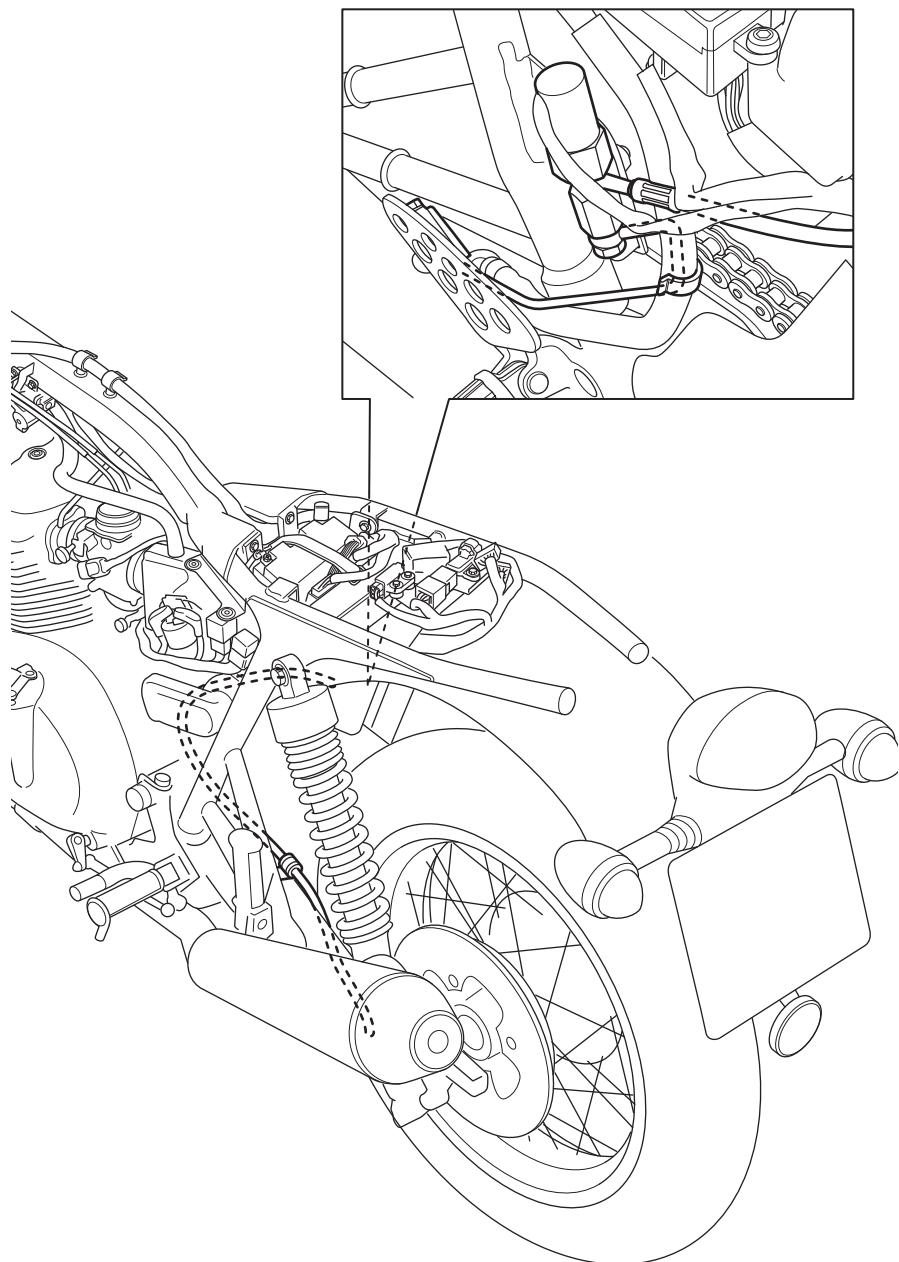


General Information

Front Brake Hose Routing - All Models (Thruxton Shown)

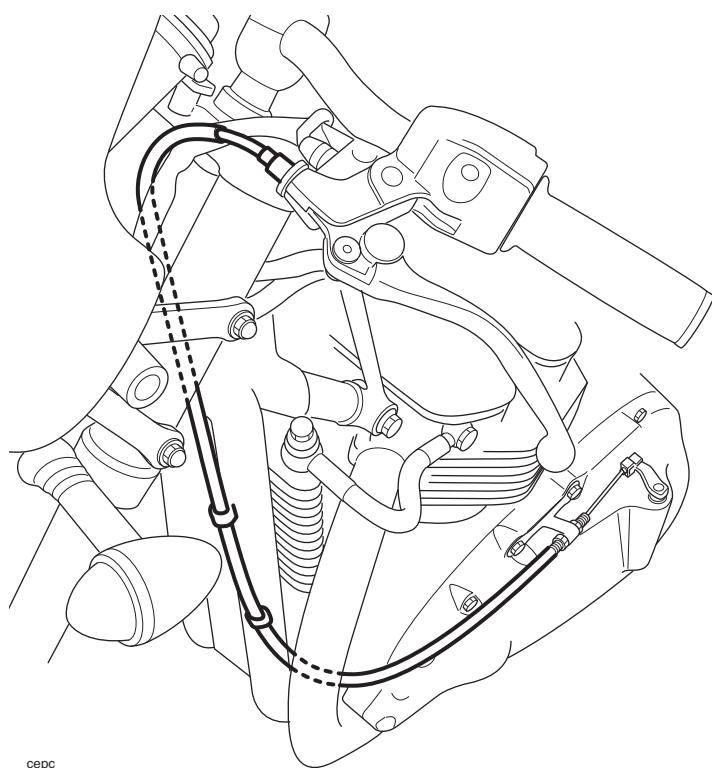


Rear Brake Hose Routing - All Models (Thruston Shown)



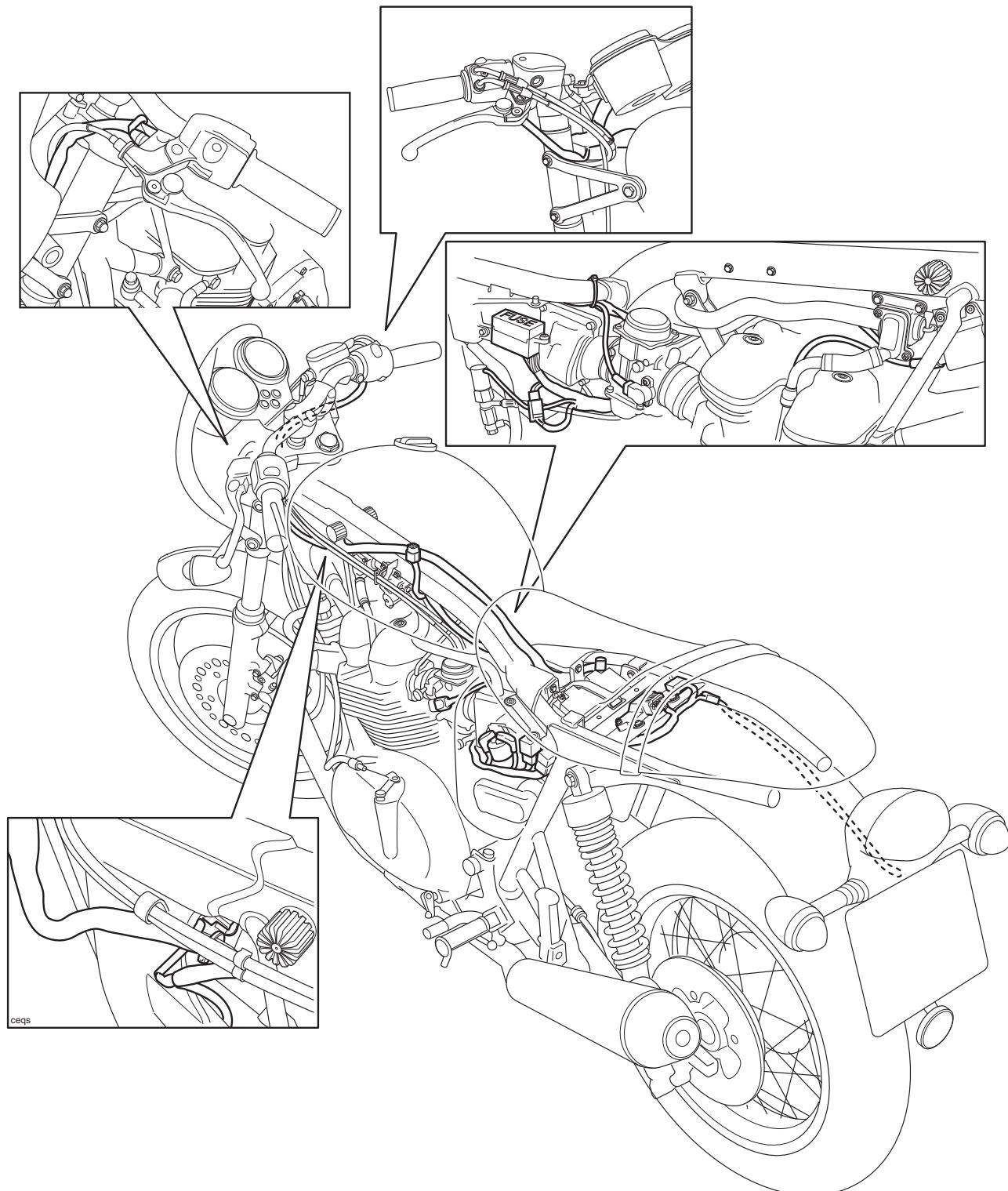
General Information

Clutch Cable Routing - All Models (Thruston Shown)



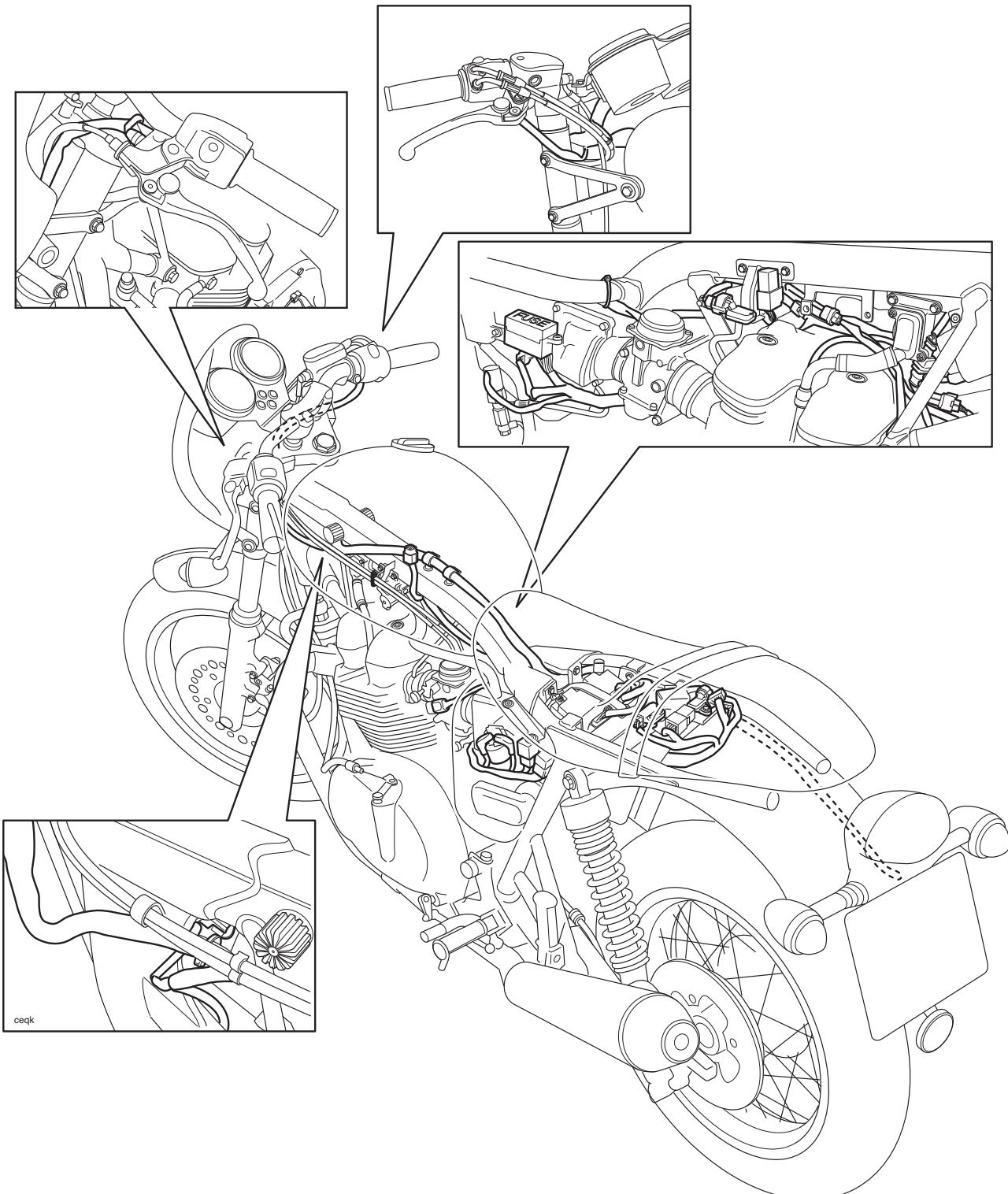
cepc

Main Harness Routing - All Carburetor Models (Thruston Shown)



General Information

Main Harness Routing - All Fuel Injected Models (Thruston Shown)



2 Scheduled Maintenance

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Scheduled Maintenance Chart	2.3

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 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 per year must have the annual maintenance and the specified mileage based items carried out together.
- Motorcycles travelling more than 6,000 miles 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.

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



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 (Kms) 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 (40000)	
Engine & oil cooler - check for leaks	Day	•	•	•	•	•
Engine oil - renew	-	•	•	•	•	•
Engine oil filter - renew	-	•	•	•	•	•
Valve clearances - check	-			•	•	•
Air cleaner - renew	-			•	•	•
Spark plugs - check	-			•		
Spark plugs - renew	-				•	•
Autoscan - carry out a full Autoscan using the Triumph diagnostic tool (print a customer copy)*	-	•	•	•	•	•
Fuel filter - renew*	-				•	•
Fuel system - check for leaks, chafing etc.	Day	•	•	•	•	•
Throttle body plate (butterfly) - check/clean*	-			•	•	•
Throttle bodies - balance*	-			•	•	•
Carburettors - balance (carburettor models only)	-		•	•	•	•
Throttle cables - check/adjust	Day	•	•	•	•	•
Lights, instruments and 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, regardless of mileage				
Brake pad wear - check	Day	•	•	•	•	•
Brake master cylinders - check for leaks	-	•	•	•	•	•
Brake calipers - check for leaks and seized pistons	-	•	•	•	•	•
Brake light - check operation	Day	•	•	•	•	•
Drive chain - lubricate		Every 200 miles (300 kms)				
Drive chain - wear check		Every 500 miles (800 kms)				
Drive chain slack - check/adjust	Day	•	•	•	•	•
Drive chain rubbing strip - check	-		•	•	•	•
Fasteners - inspect visually for security	Day	•	•	•	•	•

Scheduled Maintenance

Operation Description	Odometer Reading in Miles (Kms) 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 (40000)
Wheels - inspect for damage	Day	•	•	•	•	•
Spokes (where fitted) - check wheels for broken or damaged spokes/check spoke tightness	Day	•	•	•	•	•
Wheel bearings - check for wear/smooth operation	-	•	•	•	•	•
Tyre wear/tyre damage - check	Day	•	•	•	•	•
Tyre pressures - check/adjust	Day	•	•	•	•	•
Clutch cable - check/adjust	Day	•	•	•	•	•
Stand – check operation	Day	•	•	•	•	•
Secondary exhaust clamp bolt - check/adjust	-	•	•	•	•	•
Secondary air injection system - check	-				•	•
Fuel and evaporative loss** hoses - renew	Every 4 years, regardless of mileage					

* fuel injected models only

** Evaporative system fitted to models for certain markets only

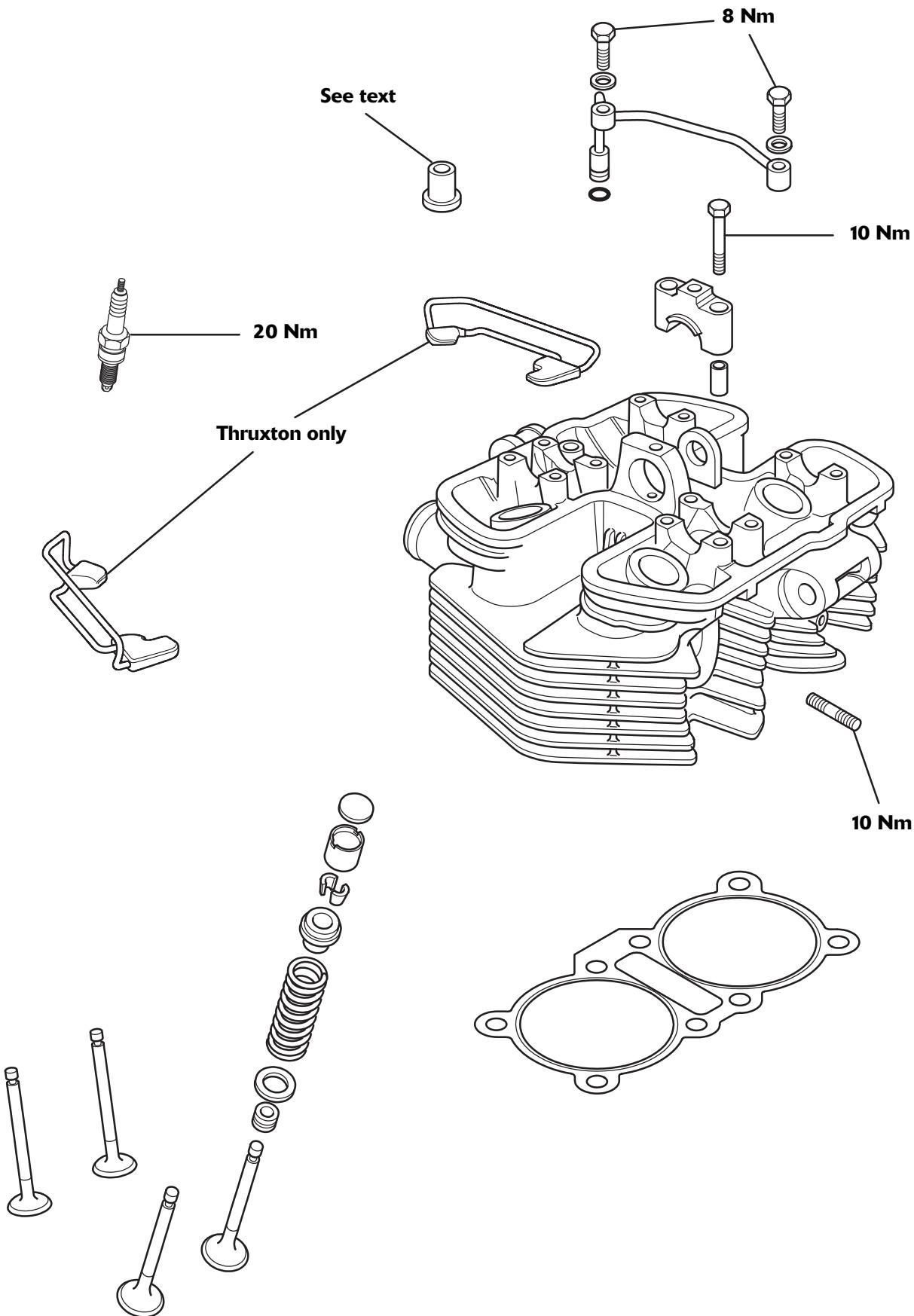
3 Cylinder Head & Camshafts

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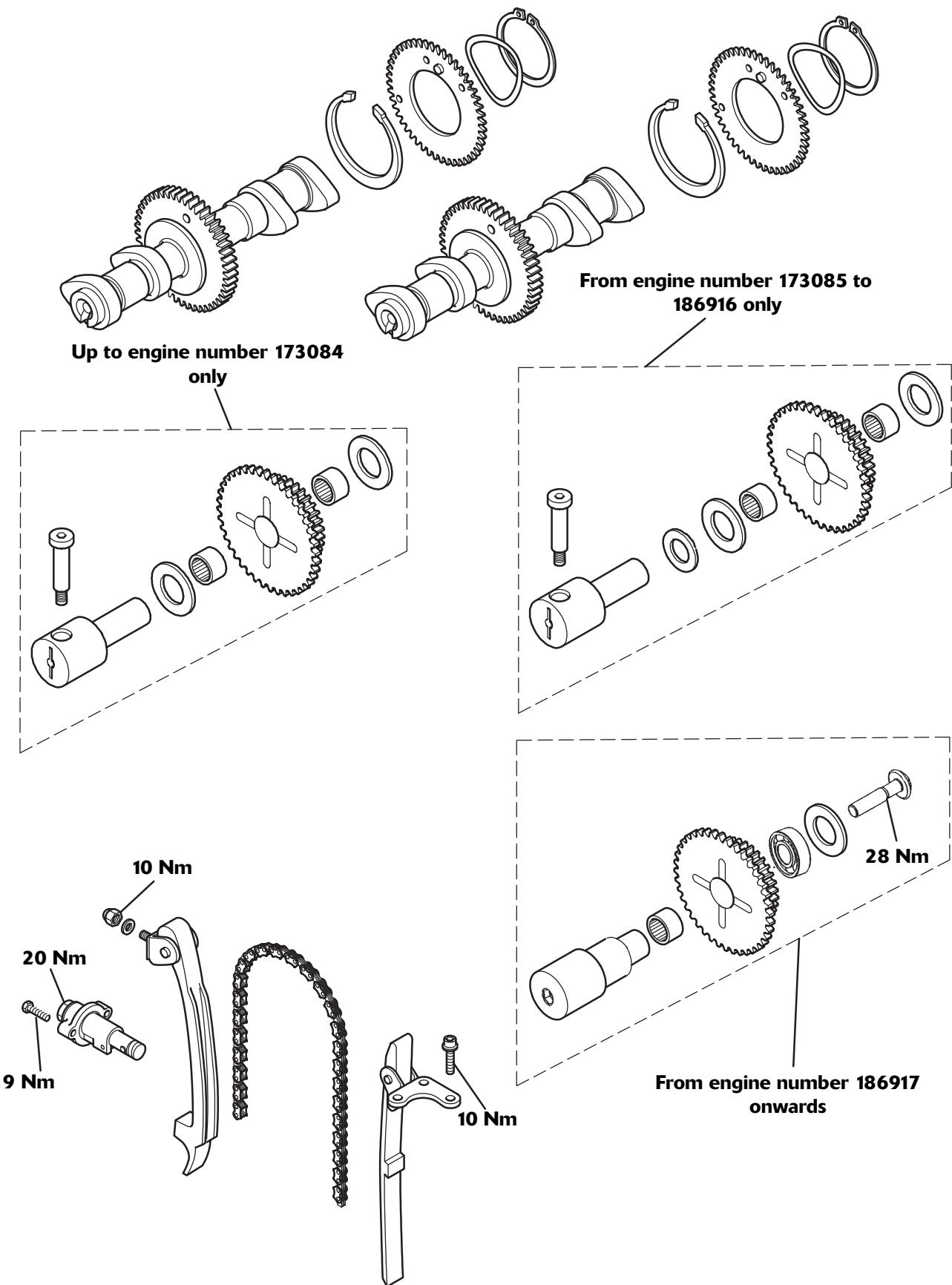
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Cylinder Head & Camshafts

Exploded View - Cylinder Head and Valves



Exploded View - Camshafts and Camshaft Drive



Cylinder Head & Camshafts

General Description

The engine is fitted with an aluminum alloy cylinder head which carries the camshafts, camshaft drive gear, valves and spark plugs.

The camshafts run directly in the cylinder head without additional bearings and are driven by the drive gear. The drive gear runs on needle roller bearings and is chain-driven off the crankshaft. The cam chain is tensioned by a self-adjusting, spring-loaded tensioner which is fitted to the upper crankcase half.

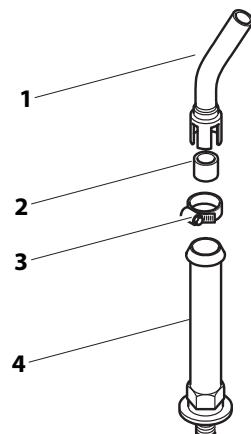
The inlet and exhaust valves are fitted with single springs. Valve clearances are adjusted by changing variable thickness shims which sit between the cam lobe and tappet bucket.

Both the tip and seating face of the valves are hardened to give a long service life. Due to methods used in assembly, the valve seats and valve guides cannot be replaced.

Camshaft Cover

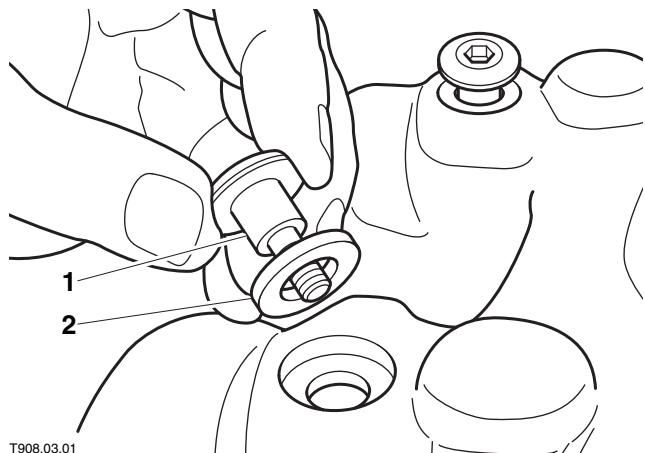
Removal

1. If the engine is in the frame carry out the following:
 - Remove the seat.
 - Disconnect the battery, negative (black) lead first.
 - Remove fuel tank and secondary air injection system control valve (see fuel system & exhaust section).
2. Release the clips and remove the secondary air injection pipes and seals from the cylinder head adaptors.



1. **Pipe**
2. **Seal**
3. **Clip**
4. **Adaptor**

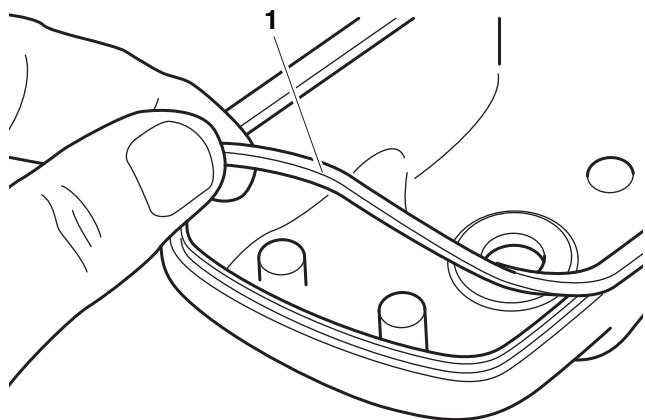
- Evenly and progressively release the bolts securing the camshaft cover to the cylinder head. Recover the bolts and seals from the cover.



- Camshaft cover bolt**
- Seal**
- Remove the camshaft cover and seal from the cylinder head.

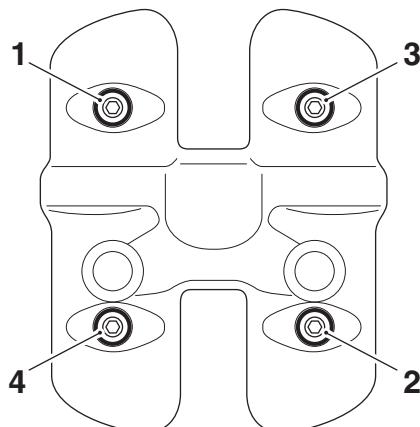
Installation

- Install a new camshaft cover seal and cover bolt seals.
- Ensure the cover seal groove and cylinder head mating surfaces are clean and dry then fit the seal to the cover.



- Camshaft cover seal**

- Fit the camshaft cover to the cylinder head ensuring the seal remains correctly seated in its groove.
- Lubricate the new camshaft cover bolt seals with clean engine oil.
- Fit the cover bolt seals with their steel sides upwards then fit the cover bolts.
- Tighten the camshaft cover bolts to **14 Nm** in the sequence shown below.



Camshaft Cover Bolts Tightening Sequence

- Seat the secondary air injection pipes and seals back on the cylinder head adaptors and secure in position with the retaining clips.
- Refit all components removed for access.

Cylinder Head & Camshafts

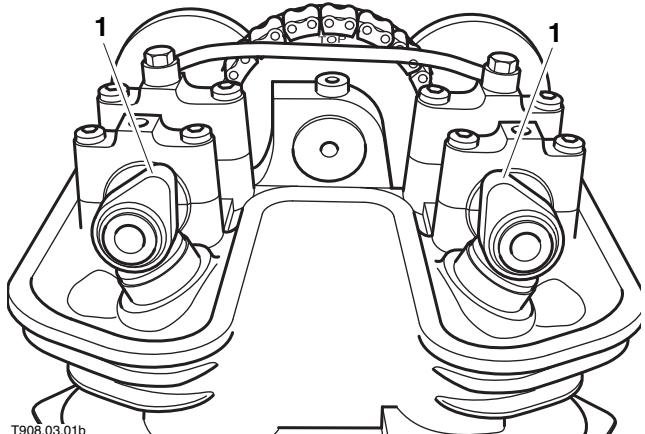
Camshafts

Removal

Note:

- The camshafts can be removed from the cylinder head without disturbing the cam chain.
- Service tool kit T3880330 (consisting of a wrench and two locking pins) will be needed to remove/install the camshafts.

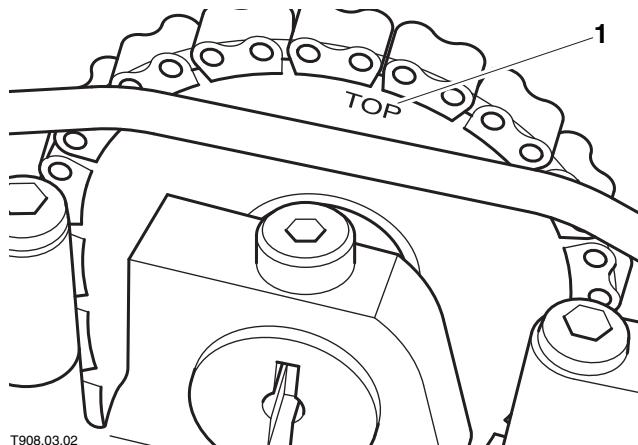
- Remove the camshaft cover (see page 3-4).
- Remove the alternator cover from the right hand side of the crankcase (see page 17-35).
- Using a socket on the alternator rotor bolt, rotate the crankshaft clockwise until the camshaft lobes of the right hand cylinder are positioned as shown and the TOP mark on the camshaft drive gear is uppermost.



1. Right hand cylinder camshaft lobe positions - Models with 360° firing angle (All except Scrambler)

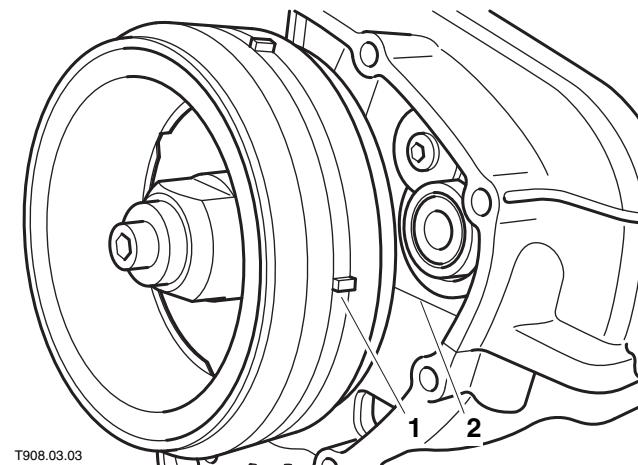


1. Right hand cylinder camshaft lobe positions - Models with 270° firing angle (Scrambler)



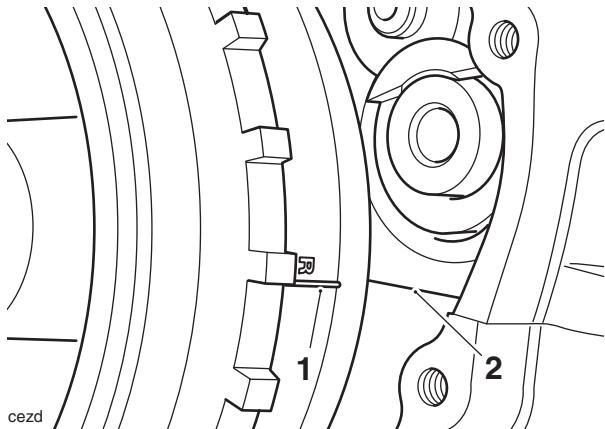
1. Camshaft drive gear TOP mark

- All models except Scrambler with Carburetors: The alternator rotor has one timing mark and is not marked with a letter. Align the timing mark with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark
2. Crankcase joint

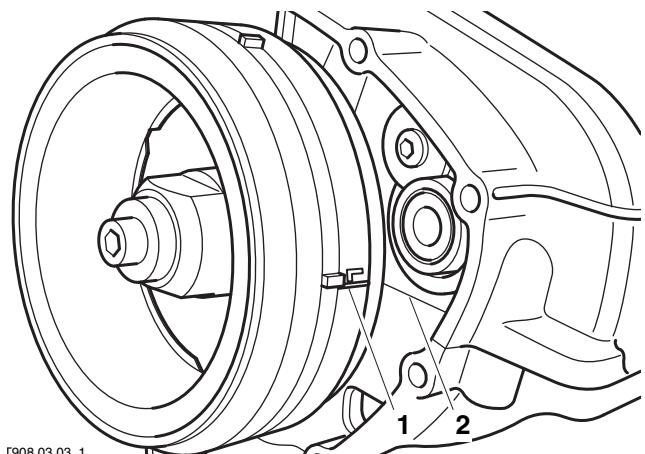
5. **All models except Scrambler with Fuel Injection (EFI):** The alternator rotor has one timing mark and is marked with the letter "R". Align the timing mark "R" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "R"

2. Crankcase joint

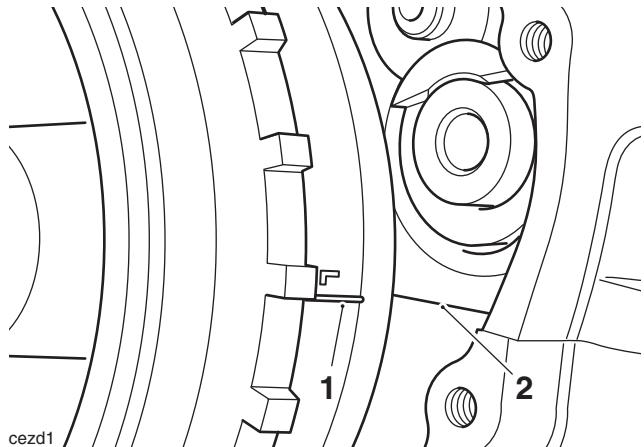
6. **Scrambler with Carburetors:** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "L"

2. Crankcase joint

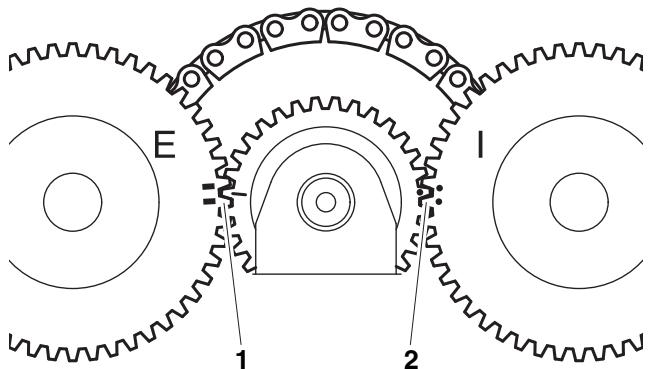
7. **Scrambler with Fuel Injection (EFI):** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "L"

2. Crankcase joint

8. Check the position of the timing marks on the left hand side of the camshaft gears and drive gear. The drive gear line should be positioned between the two lines on the exhaust camshaft gear and its dot should be positioned between the two dots on the inlet camshaft gear.



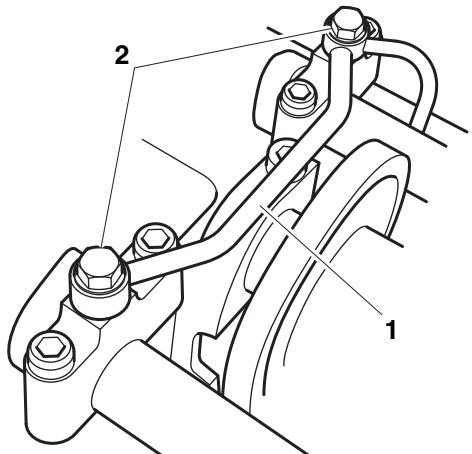
T908.03.04

1. Exhaust camshaft timing marks

2. Inlet camshaft timing marks

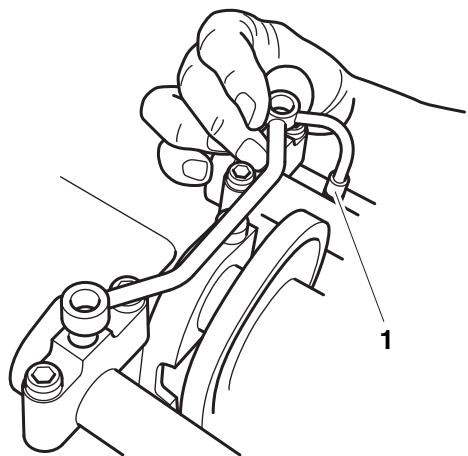
Cylinder Head & Camshafts

9. Unscrew the banjo bolts securing the oil pipe to the top of the camshaft bearing caps. Recover the sealing washer from each bolt and discard them.



1. Oil pipe
2. Banjo bolts

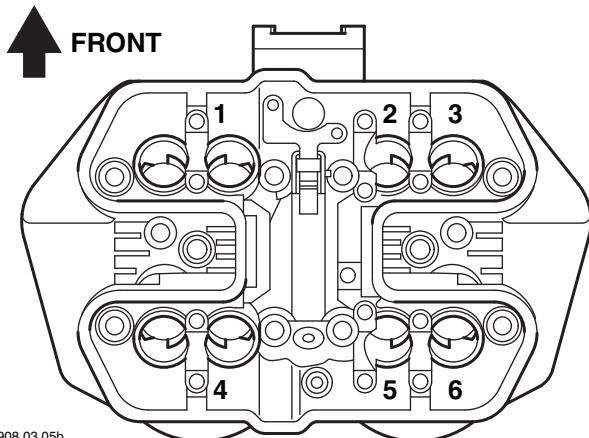
10. Ease out the oil feed pipe along with its O-ring.



1. Oil pipe O-ring

11. Insert a locking pin from tool T3880330 into the camshaft gear to secure the backlash gear in position.

12. Note the identification marks on the camshaft caps and head. They are numbered 1 to 6 and each cap should have an arrow on it to indicate its correct fitted orientation. If the marks are not clearly visible, mark each cap with a marker pen to ensure they are refitted in their original locations.



Cylinder Head/Camshaft Cap Markings

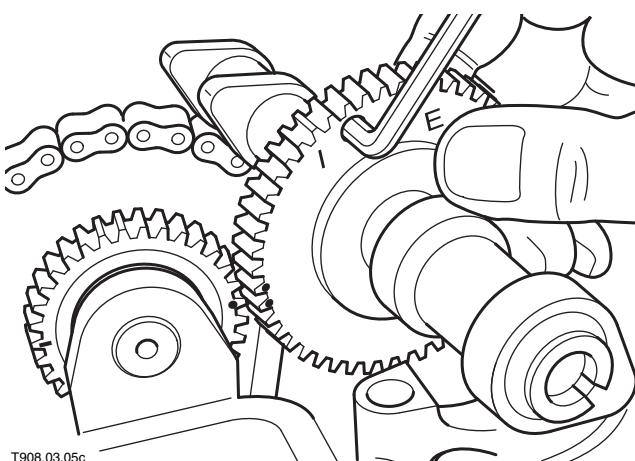
13. Evenly and progressively slacken the camshaft cap bolts by half-a-turn at a time until valve spring pressure is released from the caps.



Caution

Ensure all camshaft caps are released evenly and squarely from the cylinder head and do not stick on the locating dowels. Failure to do so could result in damage to one or more of the caps. The camshafts caps are only available as part of the cylinder head assembly and cannot be supplied separately.

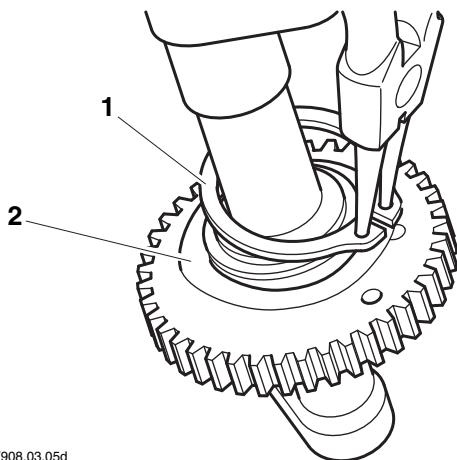
14. Remove the bolts and lift off the camshaft caps, taking care not to lose the locating dowels.
15. Lift the camshaft out of position.



Removing the Inlet Camshaft

Note:

- The inlet and exhaust camshafts are different and are not interchangeable (see installation).
- If the backlash gear is to be removed, remove the locking pin from the camshaft gear to release the spring tension. Remove the circlip and remove the spring washer, backlash gear and spring from the camshaft.



T908.03.05d

1. Circlip
2. Spring washer

Inspection

- Inspect the camshaft gears for damaged and/or worn teeth. Replace as necessary.
- Check the diameter of the camshaft journals. If any journal diameter exceeds the specified limits, the camshaft must be renewed.

Camshaft Journal Diameter

Standard	22.930 to 22.960 mm
-----------------	----------------------------

- Inspect the camshaft bearing surfaces in the cylinder head and the camshaft caps for wear and/or damage. If wear and/or damage is found renew the cylinder head assembly.
- Check each camshaft journal to camshaft cap clearance using Plastigauge (Triumph part number 3880150-T0301) as follows:
 - Place the camshaft in the cylinder head (in its correct position). Ensure that the camshaft gear timing marks are correctly positioned as for removal.
 - Ensure all the locating dowels are in position then fit the camshaft caps in their correct locations.
 - Lubricate the threads of the camshaft cap bolts with a drop of clean engine oil then fit the bolts.

- Evenly and progressively tighten the bolts to draw the camshaft caps evenly and squarely down onto the cylinder head. Once all the caps are in contact with the head, go around and tighten the bolts to **10 Nm**.



Caution

Ensure the camshaft caps are drawn evenly and squarely down onto the cylinder head and do not stick on the locating dowels. Failure to do so could result in damage to one or more of the caps. The camshafts caps are only available as part of the cylinder head assembly and cannot be supplied separately.

- Unscrew the bolts from one camshaft cap and remove the cap. Wipe the exposed areas of the camshaft journal and cap.
- Apply a thin smear of grease to the exposed part of the camshaft journal and a small quantity of silicone release agent to the camshaft cap.
- Size a piece of Plastigauge to fit across the exposed camshaft journal.
- Fit the Plastigauge to the exposed camshaft journal using the grease to hold it in place.
- Refit the camshaft cap and progressively tighten its bolts to **10 Nm**.
- Unscrew the bolts and remove the camshaft cap.
- Using the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge and obtain the journal clearance.



1. Compressed Plastigauge

- Once the clearance has been measured, refit the cap. Progressively tighten the cap bolts to **10 Nm** then repeat the check on the remaining camshaft bearings.
- If any of the clearances measured exceed the specified tolerance, the cylinder head assembly must be replaced.

Cylinder Head & Camshafts

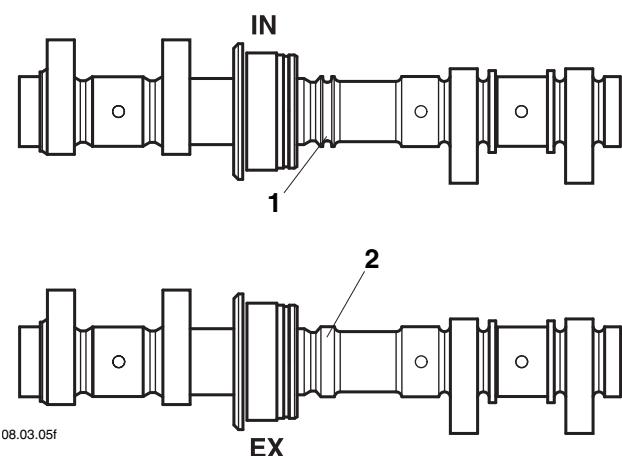
Camshaft Bearing Journal Clearance

Standard	0.040 to 0.091 mm
Service limit:	0.12 mm

Installation

Note:

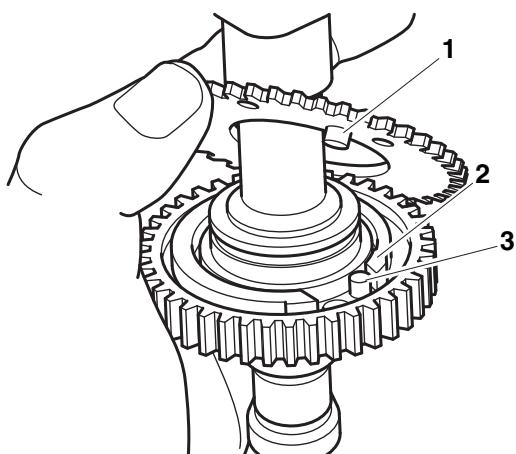
- The inlet and exhaust camshafts are different and are not interchangeable. The inlet camshaft has a groove in its machined surface whereas the exhaust camshaft has no groove.



1. Inlet camshaft identification groove

2. Exhaust camshaft plain surface

- If the backlash gear was disassembled, fit the spring to camshaft gear, positioning the spring ends on either side of the peg. Fit the backlash gear, ensuring its peg is located to the right of the camshaft gear peg and between the spring ends. Fit the wave washer and secure all components in position with the circlip.

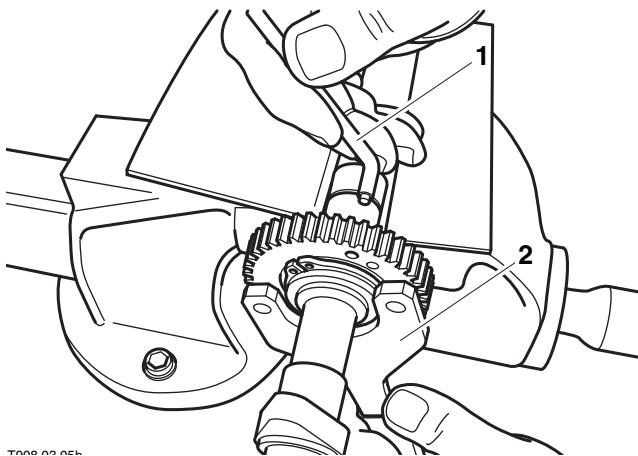


1. Backlash gear peg

2. Spring

3. Camshaft gear peg

- Carefully clamp the camshaft in a vice equipped with soft jaws. Engage the wrench with the backlash gear and rotate the gear clockwise to pretension the spring. Align the holes in the backlash and camshaft gear and insert the locking pin from tool T3880330 to hold it in position.



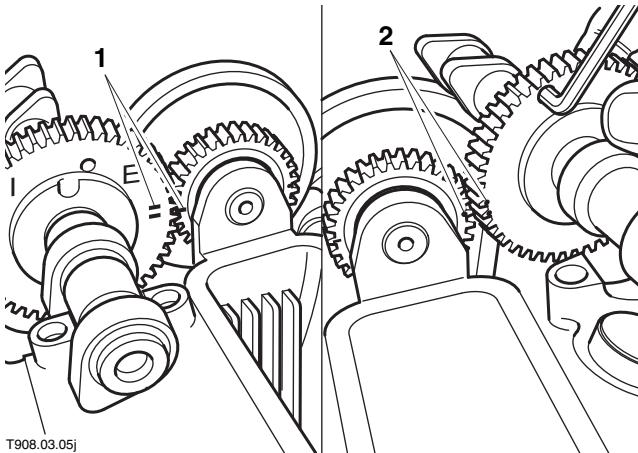
1. Locking pin

2. Wrench

- Ensure the crankshaft is still positioned at TDC (alternator rotor mark facing forwards and aligned with crankcase joint) and the drive gear is correctly positioned with its TOP mark uppermost.
- Ensure all the tappet buckets and shims are correctly fitted.
- Thoroughly clean the camshafts, bearing caps and cylinder head bearings. Lubricate the bearing and lobe areas with clean engine oil. Each camshaft is installed individually as follows.
- With the backlash gear correctly pretensioned and locked in position, engage the camshaft with the drive gear. If the inlet camshaft is being fitted, ensure the two dots on the camshaft gear are positioned on either side of the dot on the drive gear. If the exhaust camshaft is being fitted ensure the two lines on the camshaft gear are positioned on either side of the line on the drive gear.

Note:

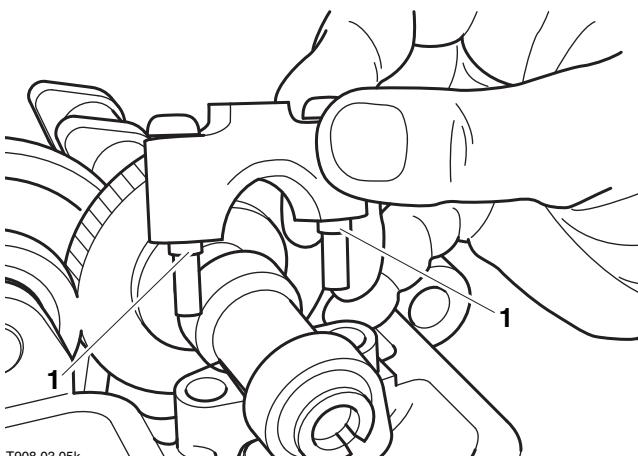
- Ensure the timing marks are correctly aligned before proceeding.



1. Exhaust camshaft timing marks

2. Inlet camshaft timing marks

7. Ensure all locating dowels are in position then refit the camshaft caps. Use the marks to ensure each cap is fitted in its original position (cap and cylinder head numbers must match and all the arrows must point forwards).



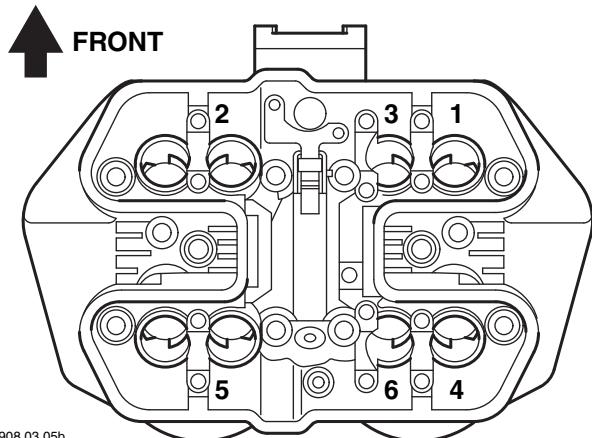
1. Locating dowels

8. Lubricate the camshaft cap bolt threads with a drop of clean engine oil then fit the bolts. Refit the cam cap bolts.
9. Evenly and progressively tighten the bolts to draw the camshaft caps evenly and squarely down onto the cylinder head. Once all the caps are in contact with the head, go around and tighten the bolts to **10 Nm** in the sequence shown.



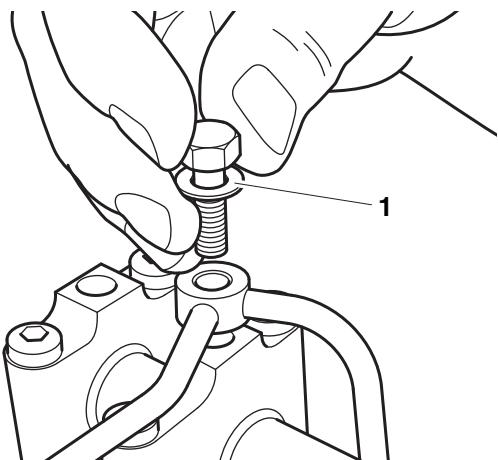
Caution

Ensure the camshaft caps are drawn evenly and squarely down onto the cylinder head and do not stick on the locating dowels. Failure to do so could result in damage to one or more of the caps. The camshafts caps are only available as part of the cylinder head assembly and cannot be supplied separately.



Cam Cap Tightening Sequence

10. Once the caps are correctly tightened, remove the service tool to release the backlash gear.
11. Repeat the procedure and install the remaining camshaft.
12. Check that the timing marks are correctly set then check the valve clearances. Adjust as necessary.
13. Fit a new O-ring to the end of the oil feed pipe.
14. Lubricate the O-ring with clean engine oil then fit the oil feed pipe to the cylinder head.
15. Fit a new sealing washer to each oil feed pipe banjo bolt. Fit the bolts and washers to the pipe and tighten to **8 Nm**.



1. Sealing washer

16. Refit the camshaft cover (see page 3-5) and alternator cover (see page 17-36).

Cylinder Head & Camshafts

Valve Clearances

Check

Camshaft, 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 shim, causing engine noise and improper running. If the valve clearances become too small, permanent damage to the valve and valve seat will take place. If the valve clearance becomes too great, the engine will become noisy and will not run efficiently.

Note:

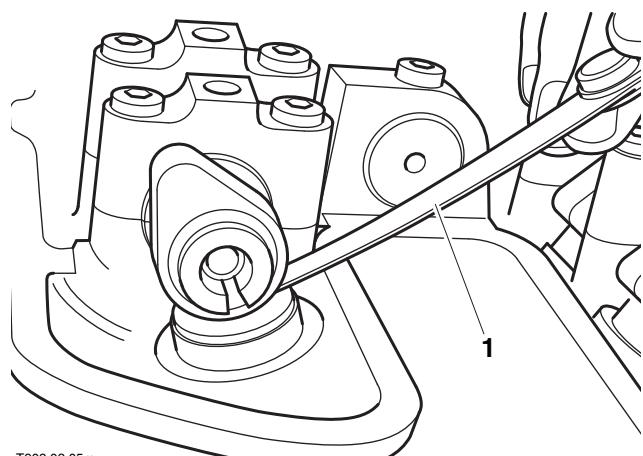
- **Valve clearance adjustment must be carried out with the engine cold.**

1. Remove the camshaft cover (see page 3-4).
2. Remove the alternator cover from the right hand side of the crankcase (see page 17-35).
3. Using a socket on the alternator rotor bolt, rotate the crankshaft clockwise until a pair of camshaft lobes are pointing directly away from their valves.
4. Using feeler gauges, measure and record the clearances of both valves.

Note:

- **The correct valve clearances are in the range given below:**

Inlet	0.15 to 0.20 mm
Exhaust	0.25 to 0.30 mm



1. Feeler gauge

5. Repeat the process until the clearance of all valves have been checked.
6. If any of the measurements taken do not fall within the specified tolerances, adjust the relevant clearance as described in "adjustment".
7. Once all clearances are correctly set, refit the camshaft cover and alternator cover.

Adjustment

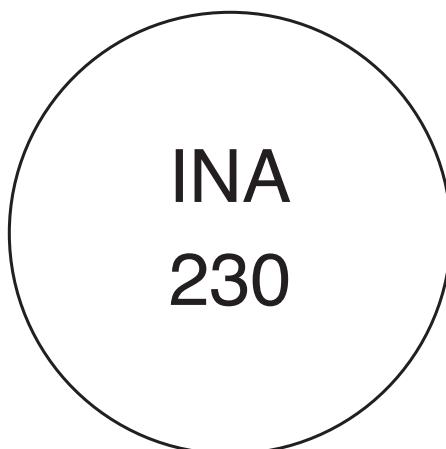
Note:

- **The camshaft must be removed to enable the shims to be removed from the tappet buckets.**

1. Remove the camshafts (as necessary) (see page 3-6).
2. Remove the shim from the top of the tappet bucket.
3. Measure the thickness of the removed shim with a micrometer.

Note:

- **The shim thickness is marked on one of the shim faces (this may no longer be visible on used shims).**



**Shim Identification Marking
(2.30 mm Shim Shown)**

4. Using the measured clearance and the thickness measurement of the original shim, calculate the correct thickness of shim required.

Note:

- **If the clearance is too small, a thinner shim will be required, and if the clearance is too large a thicker shim will be required. Shims are available in sizes ranging from 2.00 mm to 3.20 mm in increments of 0.025 mm.**
5. Fit the correct shim to the tappet bucket with its marked face downwards. Ensure the shim is correctly located in the bucket.
 6. Repeat the adjustment procedure on all other valves requiring adjustment then refit the camshaft(s) (see page 3-10).
 7. Once adjustment is complete, rotate the crankshaft through a couple of rotations to settle all shims in position then recheck the valve clearances.

Cam Chain Tensioner

Removal



Caution

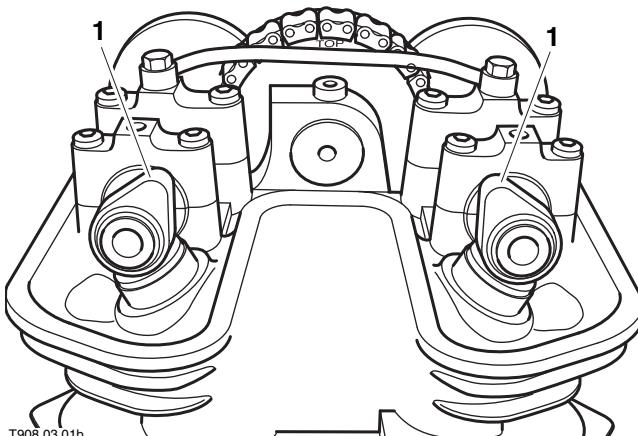
Never rotate the crankshaft whilst the cam chain tensioner is removed. If the tensioner is not fitted, the cam chain could jump on its sprockets which could allow the valves to contact the pistons, resulting in serious engine damage.



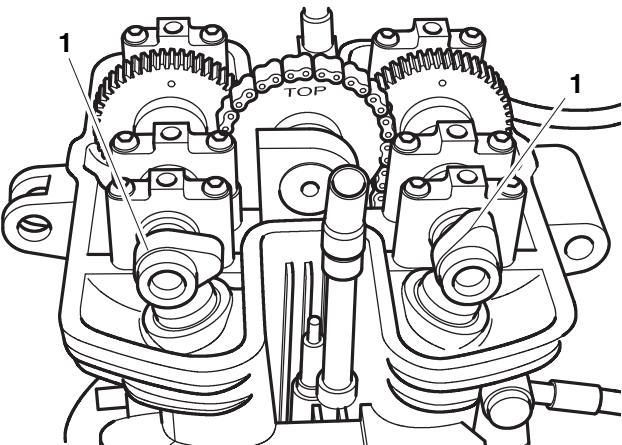
Caution

The tensioner is of the spring-loaded type and has a non-return mechanism. If the tensioner mounting bolts are slackened, the tensioner assembly must be removed and its plunger reset before being refitted. Never slacken the mounting bolts slightly and retighten them without resetting the plunger. This will lead to the cam chain being overtensioned, resulting in serious engine damage.

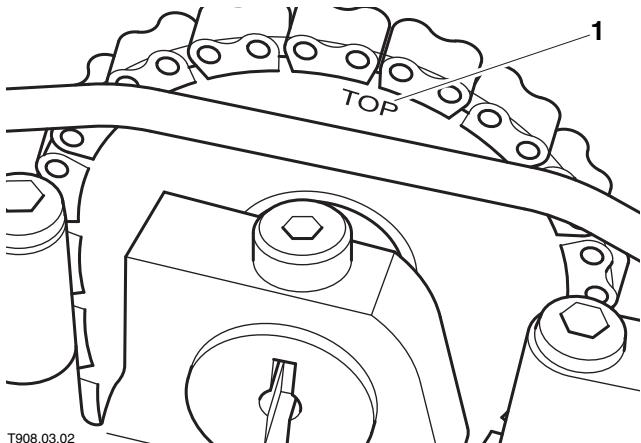
1. Remove the camshaft cover (see page 3-4).
2. Remove the alternator cover from the right hand side of the crankcase (see page 17-35).
3. Using a socket on the alternator rotor bolt, rotate the crankshaft clockwise until the camshaft lobes of the right hand cylinder are positioned as shown and the TOP mark on the camshaft drive gear is uppermost.



1. Right hand cylinder camshaft lobe positions - All models except Scrambler - 360° firing angle

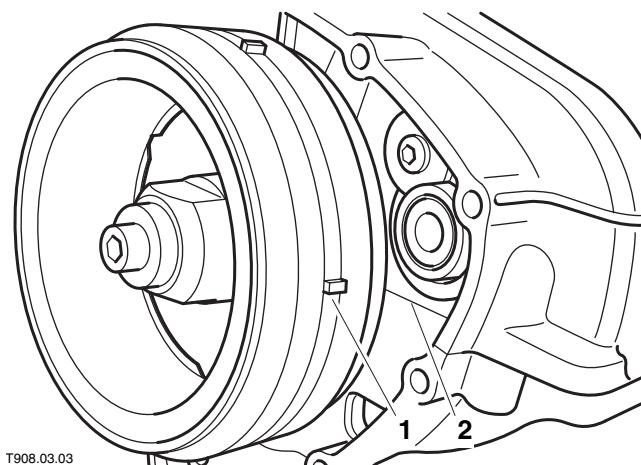


1. Right hand cylinder camshaft lobe positions - Scrambler - 270° firing angle



1. Camshaft drive gear TOP mark

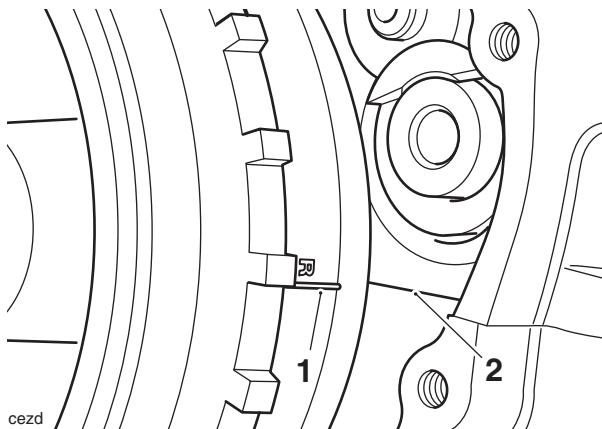
4. All Models except Scrambler with Carburetors: The alternator rotor has one timing mark and is not marked with a letter. Align the timing mark with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark
2. Crankcase joint

Cylinder Head & Camshafts

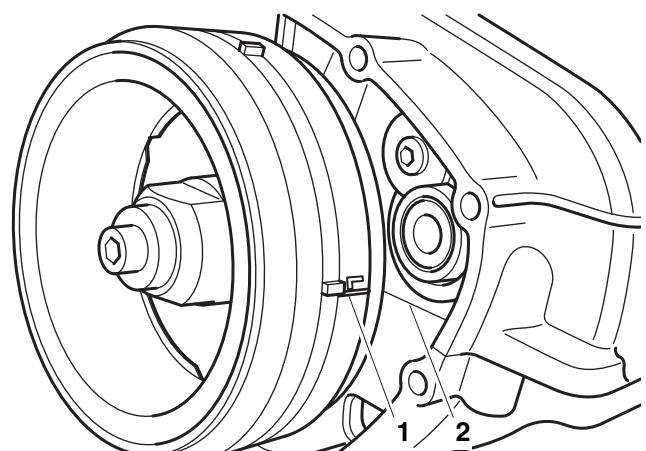
5. **All Models except Scrambler with Fuel Injection (EFI):** The alternator rotor has one timing mark and is marked with the letter "R". Align the timing mark "R" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "R"

2. Crankcase joint

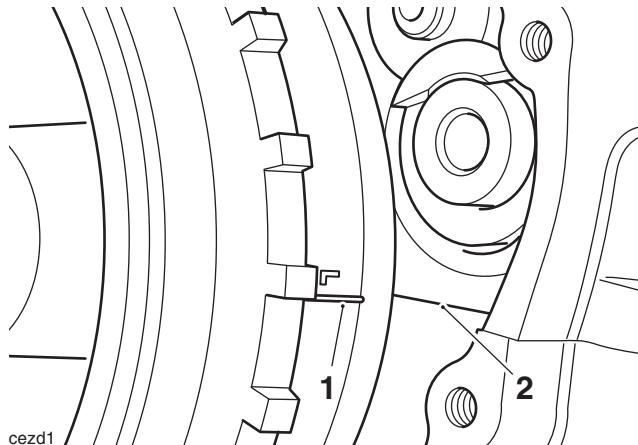
6. **Scrambler with Carburetors:** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "L"

2. Crankcase joint

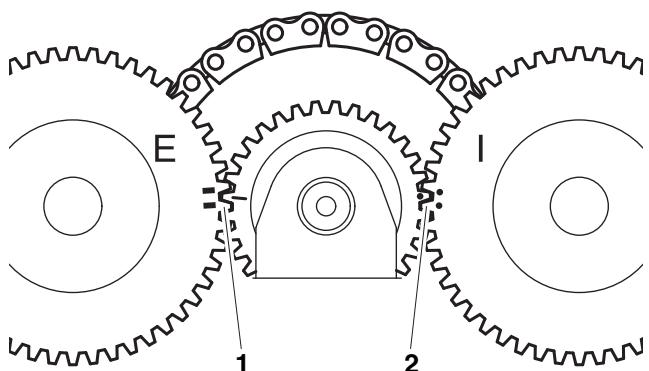
7. **Scrambler with Fuel Injection (EFI):** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



1. Alternator rotor timing mark "L"

2. Crankcase joint

8. Check the position of the timing marks on the left hand side of the camshaft gears and drive gear. The drive gear line should be positioned in between the lines on the exhaust camshaft gear and its dot should be positioned in between the dots on the inlet camshaft gear.



T908.03.04

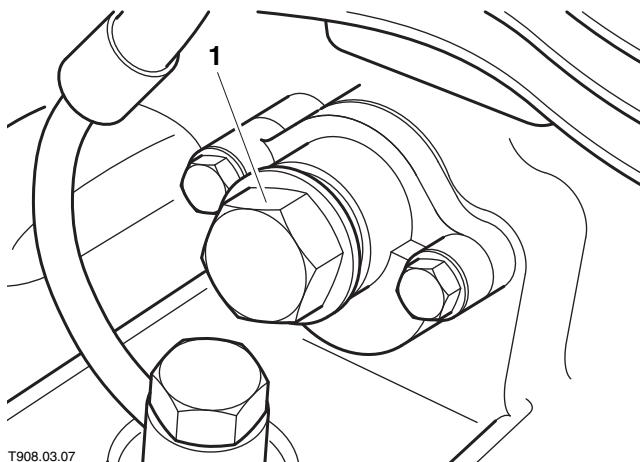
1. Exhaust camshaft timing marks

2. Inlet camshaft timing marks

Warning

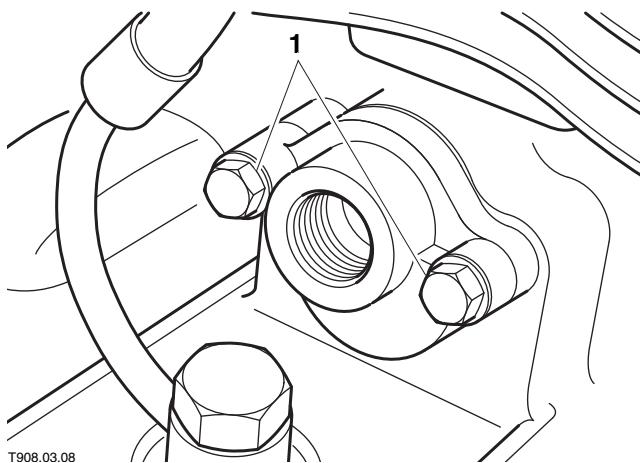
The cam chain tensioner centre bolt is under spring tension. Always wear hand, eye and face protection when unscrewing the centre bolt. Take great care to minimise the risk of personal injury and loss of components.

9. Unscrew the centre bolt from the cam chain tensioner and remove the bolt along with its washer and the tensioner spring.



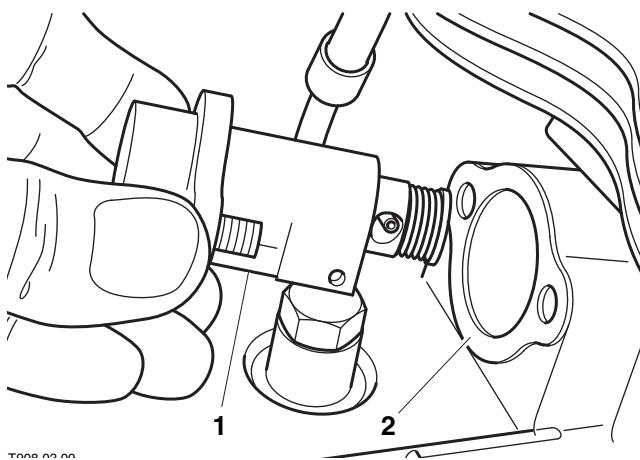
1. Tensioner centre bolt

10. Remove the bolts securing the tensioner body to the crankcase.



1. Tensioner body bolts

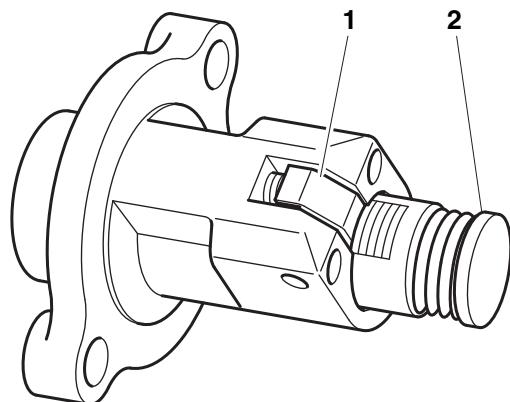
11. Remove the tensioner body and gasket.



1. Tensioner body
2. Gasket

Inspection

- Release the ratchet pawl and push the plunger back into the tensioner body. Slowly extend the plunger and check that the pawl "clicks" securely into each of the grooves of the ratchet and prevents the plunger from being pushed back into the body. If the non-return mechanism is faulty, the tensioner assembly must be renewed.



T908.03.10

1. Ratchet pawl
2. Plunger

Installation



Warning

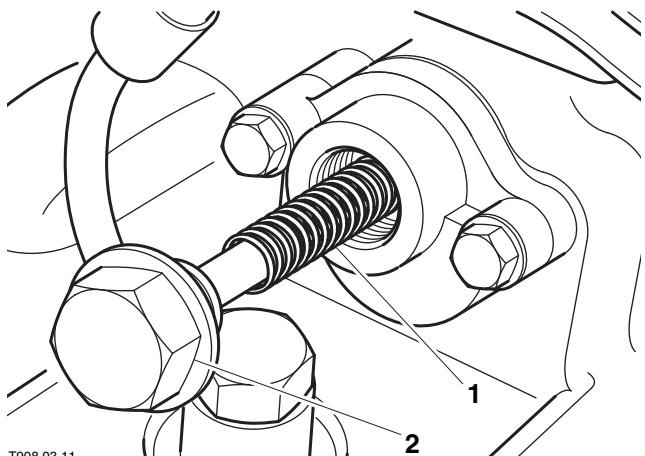
The cam chain tensioner centre bolt is under spring tension. Always wear hand, eye and face protection when fitting the centre bolt. Take great care to minimise the risk of personal injury and loss of components.

Note:

- If fitting a new tensioner, observe the following:
 - Remove the new tensioner assembly from the packaging. On examination, it can be seen that the tensioner nut will not be tightened fully into the tensioner body and that the tensioner "nose" (i.e., the part which actually contacts the chain rubbing strip) is fully retracted into the housing.
 - Prior to assembly into the engine it is necessary to disassemble the tensioner nut, washer and spring. To do this without damaging the internal components, turn the tensioner nut at least a half turn clockwise (i.e. tighten it further into the housing) until the plunger springs outwards. The tensioner nut can then be withdrawn safely without causing internal damage to tensioner components.

Cylinder Head & Camshafts

1. Check that the crankshaft and camshaft timing marks are all still correctly aligned. If necessary, remove all slack from the cam chain by inserting a screwdriver in through the tensioner aperture and pushing gently on the rear of the tensioner blade.
2. Ensure the tensioner and crankcase mating surfaces are clean and dry.
3. Release the ratchet pawl and push the plunger back fully into the tensioner body. Extend the plunger slightly so the pawl is set on the first notch of the plunger ratchet.
4. Fit a new gasket then install the tensioner body. Fit the mounting bolts and tighten to **9 Nm**.
5. Insert the spring into the tensioner then refit the centre bolt and washer. Tighten the centre bolt to **20 Nm**.



1. Spring

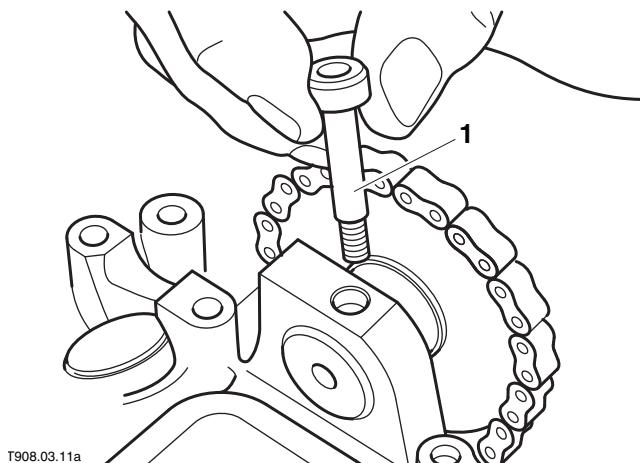
2. Centre bolt

6. Using a socket on the rotor bolt, rotate the crankshaft clockwise through four complete rotations.
7. Align the rotor timing mark with the crankcase joint to bring the pistons back to TDC then check the camshaft timing marks are correctly positioned.
8. If the timing marks are all correctly aligned, refit the camshaft cover (see page 3-5) and alternator cover (see page 17-36).

Camshaft Drive Gear

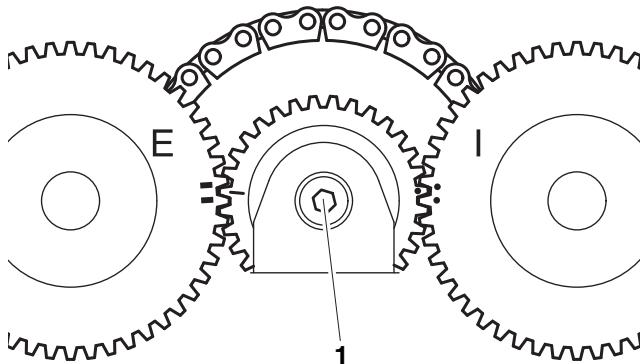
Removal

1. Remove the camshafts (see page 3-6).
2. Remove the cam chain tensioner (see page 3-13).
3. On models with engine numbers up to 186916, remove the drive gear shaft bolt from the top of the cylinder head.



1. Drive gear shaft bolt (early type)

4. On models from engine number 186916, unscrew the bolt from the end of the drive gear shaft.



1. Shaft bolt (later type)

Note:

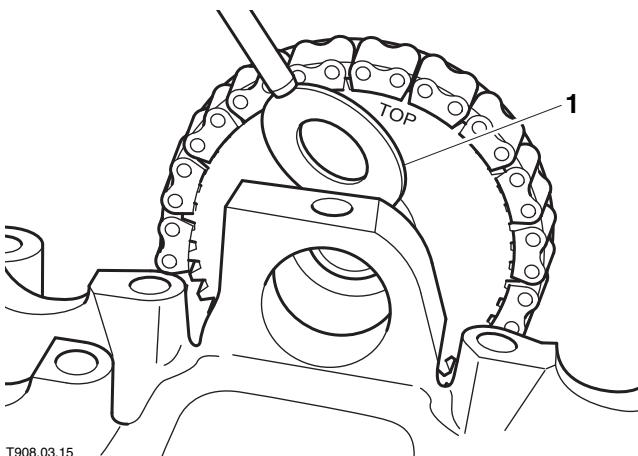
- Models prior to engine number 186916 were fitted with a thrust washer on both sides of the drive gear.
- Models from engine number 186916 are fitted with a single thrust washer on the left hand side of the idler gear.

- Note the position of the thrust washer(s), support the drive gear and withdraw its shaft. Recover the thrust washer(s) from the drive gear as it is released from the shaft. DO NOT ALLOW THE THRUST WASHER(S) TO FALL DOWN INTO THE CRANKCASE.



Caution

If a thrust washer is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.



1. Drive gear thrust washer (early type)

- Free the camshaft drive gear from the chain.

Note:

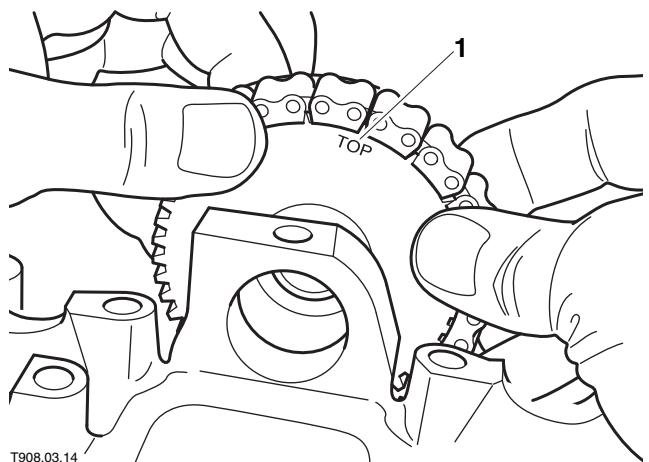
- Secure the cam chain to ensure that it does not fall into the crankcase during removal of the drive gear.**

Inspection

- Inspect the drive gear needle roller bearings, drive gear teeth and the shaft contact surfaces for signs of wear or damage. If necessary renew both the gear and the shaft.

Installation

- Ensure the crankshaft is still positioned at TDC (alternator rotor mark facing forwards and aligned with crankcase half joint).
- Lubricate the needle roller bearings with clean engine oil then manoeuvre the drive gear into position.
- Ensure the cam chain is correctly engaged with the crankshaft sprocket then engage the drive gear with the chain so that its TOP mark is uppermost.



1. Drive gear TOP mark

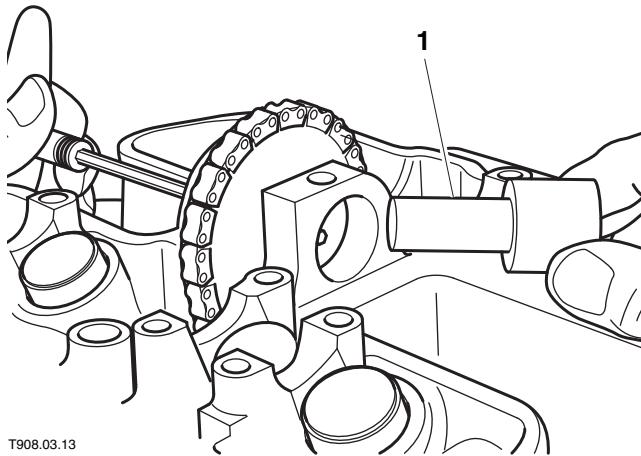
- Align the drive gear with its mountings and check the position of its timing marks. The marks must be parallel with the cylinder head upper surface with the line facing forwards and the dot facing backwards.
- Once the drive gear is correctly engaged with the chain, position the thrust washer(s) as noted earlier and slide the drive gear shaft into position. DO NOT ALLOW THE THRUST WASHERS TO FALL DOWN INTO THE CRANKCASE.

Cylinder Head & Camshafts



Caution

If a thrust washer is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.



T908.03.13

1. Drive gear shaft

6. Push on the rear of the tensioner blade to remove all slack from the cam chain and check the drive gear timing marks are correctly positioned.
7. On models with engine numbers up to 186916, align the drive gear shaft hole with the bolt hole. Insert the bolt and tighten to **10 Nm**.
8. On models with engine numbers from 186917 onwards, insert the bolt into the end of the shaft and tighten to **28 Nm**.
9. Refit the cam chain tensioner (see page 3-15) and the camshafts (see page 3-10).

Cylinder Head

Removal



Caution

Ensure the engine is completely cold before removing the cylinder head.

If the engine is in the frame carry out the following:

- Remove the seat.
 - Disconnect the battery, negative (black) lead first.
 - Remove fuel tank, exhaust system, carburetors/throttle bodies and the secondary air injection system control valve (see fuel system & exhaust section).
1. Remove the camshafts (see page 3-6), cam chain tensioner (see page 3-13) and the camshaft drive gear (see page 3-16).
 2. Lift out the tappet buckets complete with shims.

Note:

- **Store all tappet buckets and shims in such a way that ensures they will be refitted in their original locations. Interchanging of the buckets and shims will upset the valve clearances.**



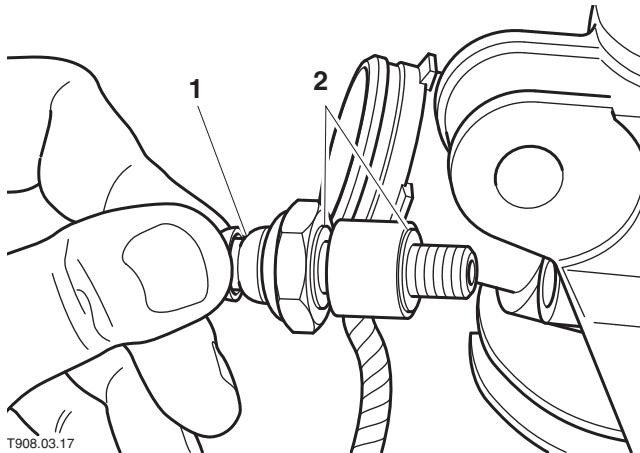
T908.03.16

1. Tappet bucket with fitted shim

3. Remove the spark plugs.
4. Peel back the rubber cover then remove the screw and disconnect the wiring connector from the low oil pressure warning light switch.

Cylinder Head & Camshafts

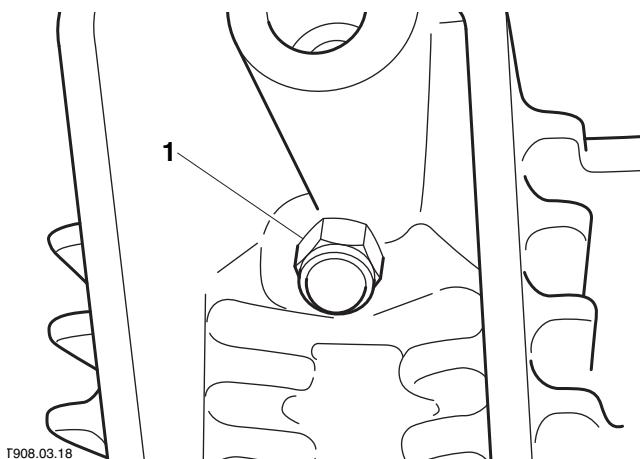
5. Unscrew the low oil pressure warning light switch and disconnect the oil feed pipe from the rear of the cylinder head. Recover the sealing washers and discard them.



1. Low oil pressure warning light switch

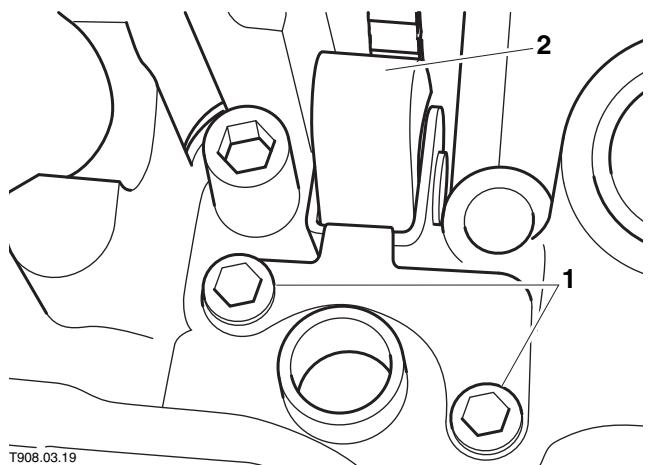
2. Sealing washers

6. Unscrew the banjo bolts securing the oil cooler feed pipes to the cylinder head. Recover the sealing washers and discard them.
7. Remove the nut and washer and lift out the cam chain tensioner blade from the rear of the cylinder head.



1. Tensioner blade nut

8. Remove the two bolts and lift out the cam chain guide blade from the front of the cylinder head.

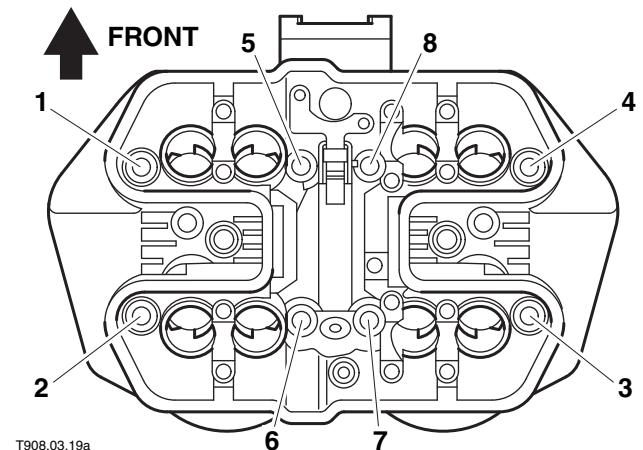


T908.03.19

1. Guide blade bolts

2. Guide blade

9. Unscrew the nuts securing the mounting brackets to the rear of the cylinder head and the frame. Withdraw the bolts and remove the brackets.
10. Unscrew the nut and withdraw the engine front upper engine mounting bolt from the cylinder head.
11. Evenly and progressively slacken the cylinder head nuts in the order shown below until all are loose.



Cylinder Head Nut Slackening Sequence

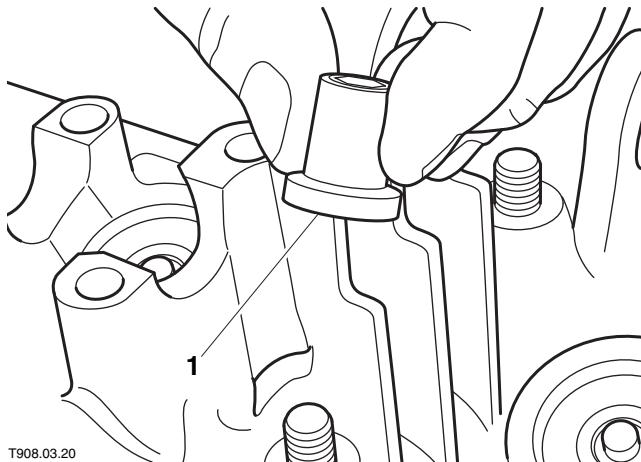
12. Remove the cylinder head nuts from their studs. DO NOT ALLOW THE NUTS TO FALL DOWN INTO THE CRANKCASE.

Cylinder Head & Camshafts



Caution

If a cylinder head nut is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.



T908.03.20
1. Cylinder head nut

13. Carefully break the seal of the head gasket.



Caution

Do not strike or lever against the cylinder head cooling fins to break the seal as the fins are easily damaged.

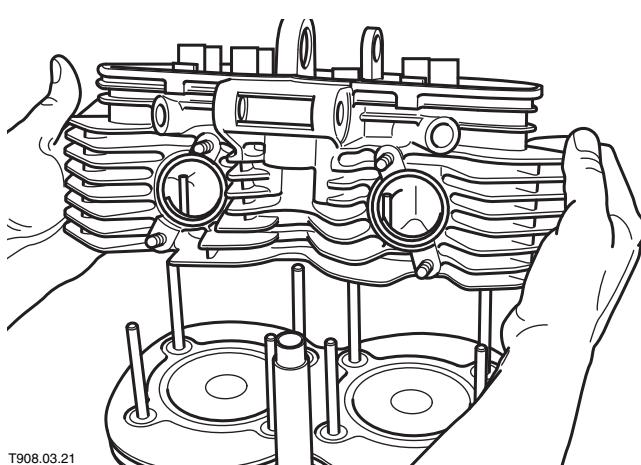
Note:

- Take care not to disturb the barrels when breaking the head gasket seal. If the barrel-to-crankcase gasket seal is broken, the barrels will have to be removed and the base gasket renewed to prevent oil leakage.

14. Remove the cylinder head taking care not to lose the locating dowels.

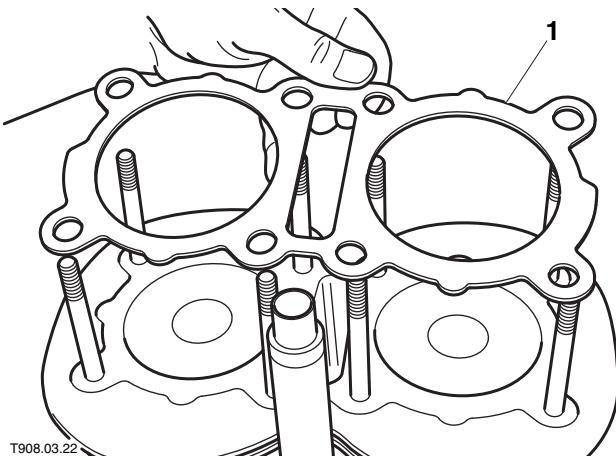
Note:

- Secure the cam chain to ensure that it does not fall into the crankcase during removal of the cylinder head.



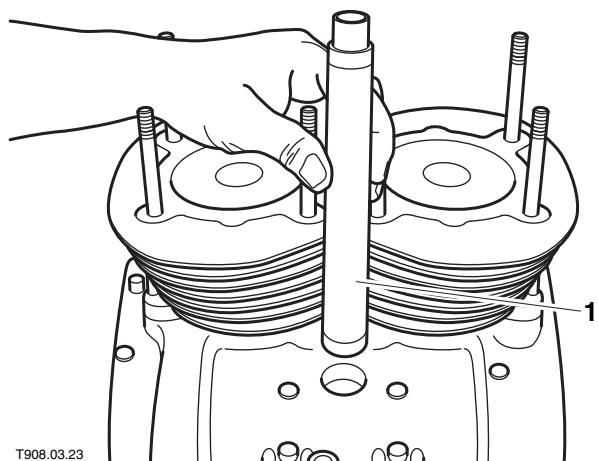
T908.03.21
Removing the Cylinder Head

15. Remove the cylinder head gasket and discard it.



T908.03.22
1. Cylinder head gasket

16. Wipe clean the area around the base of the breather tube then remove the tube from the crankcase. Discard the O-rings from the tube.



T908.03.23
1. Breather tube



Caution

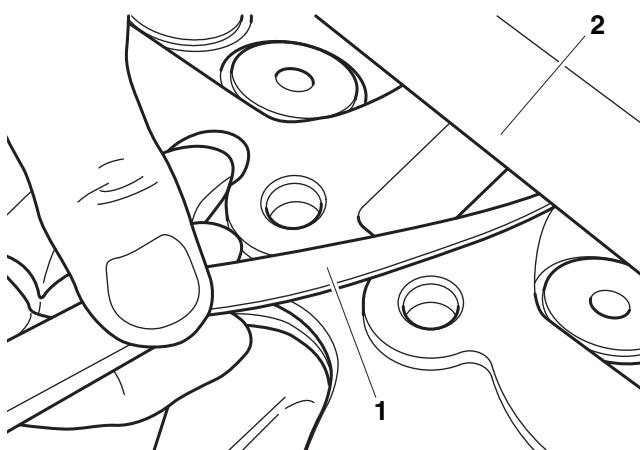
It is strongly recommended that, when the cylinder head is removed, the barrels are also removed in order to renew the base gasket. For details, refer to the barrels and pistons section.

Failure to renew the base gasket could cause an oil leak which could lead to engine damage.

Inspection

1. Thoroughly clean the surface of the cylinder head and check for damage and/or pitting of the combustion chambers.

- Using a straight edge, check the cylinder head gasket face for warp which could lead to gasket failure. Replace the cylinder head if warpage exceeds the specified limit.



- 1. Feeler gauge**
- 2. Straight edge**

Cylinder Head Gasket Face Warpage

Standard	Less than 0.03 mm
Service limit	0.07 mm

- Check each tappet bucket outer surface for signs of wear. Renew any damaged bucket.

Note:

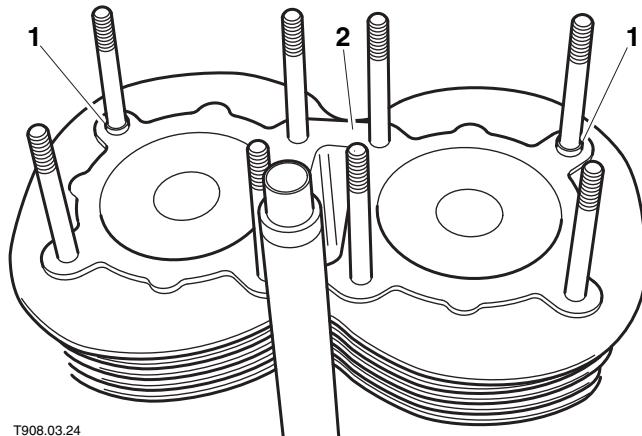
- If a damaged tappet bucket is found, closely examine the cylinder head. If the tappet bucket bore is damaged, the cylinder head must be renewed.
- Check the cam chain tensioner and guide blades. Renew if worn or damaged.
 - Inspect the cylinder head studs and nuts closely for signs of damage. Renew the studs and nuts if their threads show any sign of damage or tapering (due to overtightening).

Installation

- Thoroughly clean the mating surfaces of the cylinder head and barrels taking care not to damage the mating surfaces.
- Fit a new O-ring to the groove at each end of the breather tube. Lubricate the O-rings with clean engine oil then refit the breather tube to the crankcase.
- Fit a new cylinder head gasket ensuring that the locating dowels are correctly in place. The gasket must be fitted with its TOP marking facing upwards at the rear.

Note:

- When new, the cylinder head gasket may appear slightly warped. This is due to the manufacturing process and is perfectly normal.



- Locating dowels**
- TOP marking location**

- Carefully lower on the cylinder head, passing the cam chain up through the head. Align the breather tube with the head and locate the head on its dowels.

Note:

- Secure the cam chain to ensure that it does not fall into the crankcase during installation of the cylinder head.
- Screw the cylinder head nuts onto their studs and tighten them all by hand. DO NOT ALLOW THE NUTS TO FALL DOWN INTO THE CRANKCASE.



Caution

If a cylinder head nut is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.

- The cylinder head nuts are tightened in three stages. This is to ensure that the cylinder head gasket seals correctly to the cylinder head and barrels. The three stages are as follows:

Note:

- In all three stages a torque wrench of known and accurate calibration must be used.
 - Tighten the cylinder head nuts in the sequence shown to **20 Nm**.
 - Tighten the cylinder head nuts in the sequence shown to **26 Nm**.
 - Finally tighten the cylinder head nuts in the sequence shown to **28 Nm**, followed by a further **120°**.

Cylinder Head & Camshafts

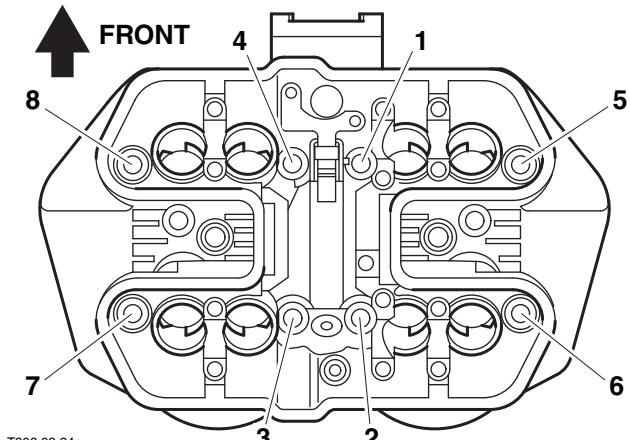
Note:

- Use service tool 3880105-T0301 to ensure accuracy when angle-tightening.



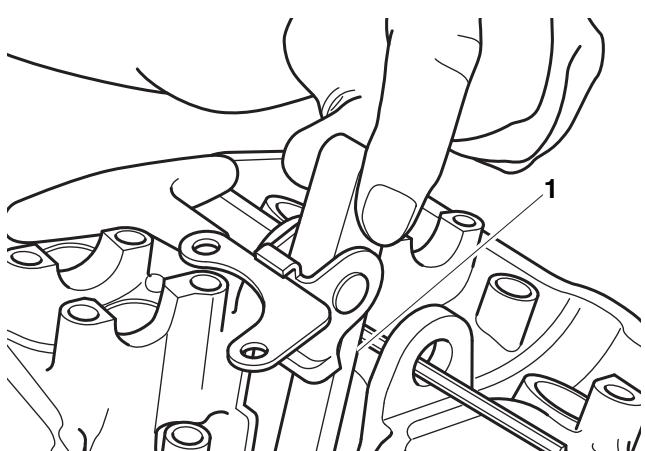
Caution

Failure to use the correct procedure to tighten the cylinder head nuts could result in failure of the cylinder head gasket.



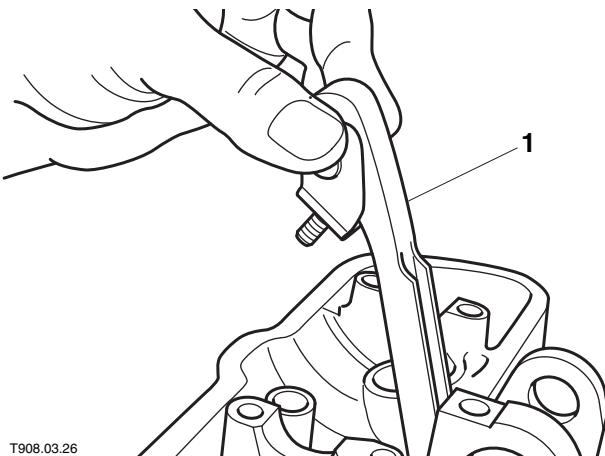
Cylinder Head Nut Tightening Sequence

7. Fit the engine front upper mounting bolt and nut and tighten to **80 Nm**.
8. Refit the cylinder head to frame mounting brackets and fit the bolts and nuts. Tighten the bracket to cylinder head bolt to **27 Nm** and the bracket to frame bolt to **27 Nm**.
9. Fit the cam chain guide blade to the front of the cylinder head and tighten its retaining bolts to **10 Nm**.



1. Guide blade

10. Fit the cam chain tensioner blade to the rear of the cylinder head. Fit the washer and nut to the blade and tighten to **10 Nm**.



1. Tensioner blade

11. Position a new sealing washer on each side of the oil cooler feed pipe end fittings then secure the pipes to the cylinder head with the banjo bolts. Tighten the bolts to **30 Nm**.
12. Position a new sealing washer on each side of the oil feed pipe end fitting then screw in the low oil pressure warning light switch. Tighten the switch to **13 Nm** then securely reconnect the wiring connector and seat the rubber boot over the switch.
13. Lubricate the tappet buckets with clean engine oil then fit the bucket and shim assemblies to the cylinder head.

Note:

- Ensure all tappet buckets and shims are refitted in their original locations. Interchanging of the buckets and shims will upset the valve clearances.
14. Refit the camshaft drive gear (see page 3-17), the cam chain tensioner (see page 3-15) and the camshafts (see page 3-10).
 15. Fit the spark plugs and tighten to **20 Nm**.
 16. Refit all components removed for access.

Valves

Removal

Note:

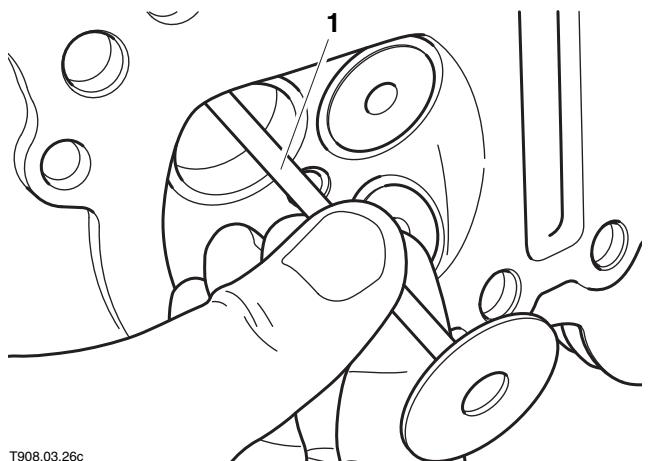
- Store each valve and its associated components together in such a way that ensures all components are refitted in their original locations.**
1. Remove the cylinder head (see page 3-18). Each valve can then be removed as follows.
 2. Using a valve spring compressor, compress the spring retainer sufficiently until the collets can be removed.



Warning

Always wear hand, eye and face protection when using a valve spring compressor. Take great care to minimise the risk of personal injury and loss of components.

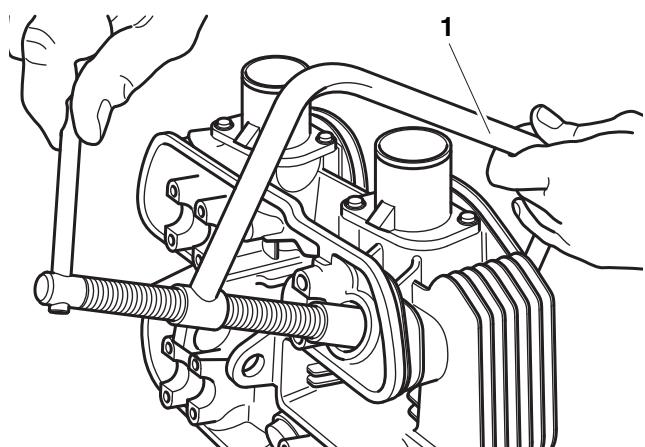
4. Lift off the spring retainer, valve spring and spring seat.
5. Slide the valve out of its guide. If necessary, deburr the valve before removal.



T908.03.26c

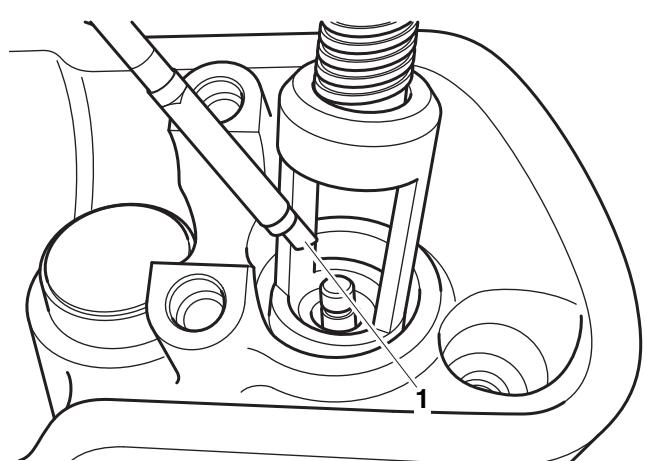
1. Valve

6. Remove the valve stem seal from the guide.



1. Valve spring compressor

3. With the collets removed, carefully release the spring compressor.



1. Collet (on the end of a magnet)

Inspection

1. Remove any carbon build-up from the face of the valve and closely inspect the valve head and seat face. If any sign of cracking or pitting is found renew the valve.
2. Measure the valve stem diameter at several points along its length. If the stem diameter is outside the specified limits, renew the valve.

Valve Stem Diameter

Inlet

Standard	5.463 to 5.478 mm
Service limit	5.453 mm

Exhaust

Standard	5.451 to 5.466 mm
Service limit	5.441 mm

3. Measure the valve guide bore diameter at several points along its length. If the guide bore diameter is outside the specified limits, the cylinder head must be renewed.

Valve Guide Bore Diameter

Standard	5.500 to 5.515 mm
Service limit	5.543 mm

4. Calculate the valve stem to guide clearance. If the clearance exceeds the specified limits, the cylinder head will have to be renewed.

Cylinder Head & Camshafts

Valve Stem to Guide Clearance

Inlet

Standard	0.01 to 0.04 mm
Service limit	0.07 mm

Exhaust

Standard	0.03 to 0.06 mm
Service limit	0.09 mm

5. Measure the valve seat width in the cylinder head at several points. If the seat width is outside the specified limits, the valve seat will have to be repaired (if possible) or the cylinder head will have to be renewed.

Valve Seat Width in Head

Standard	0.9 to 1.1 mm
Service limit	1.5 mm

Valve Seat Width on Valve

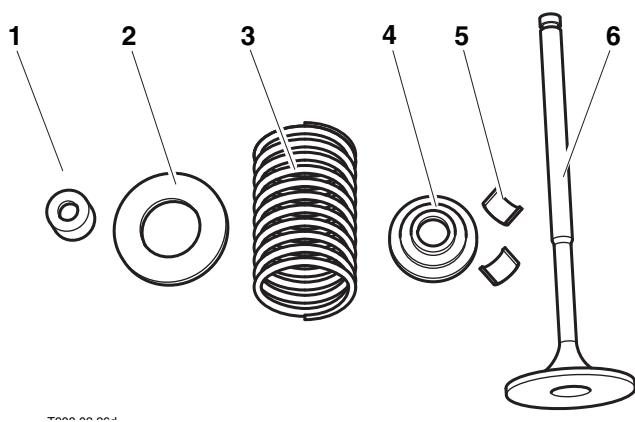
Standard	1.27 to 1.56 mm
Service limit	1.56 mm

6. Measure the free length of each valve spring. If the spring length is outside the specified limits it must be renewed.

Valve Spring Free Length

Standard	42.4 mm
Service limit	41.7 mm

Installation



1. **Valve stem seal**
2. **Spring seat**
3. **Spring**
4. **Spring retainer**
5. **Collets**
6. **Valve**

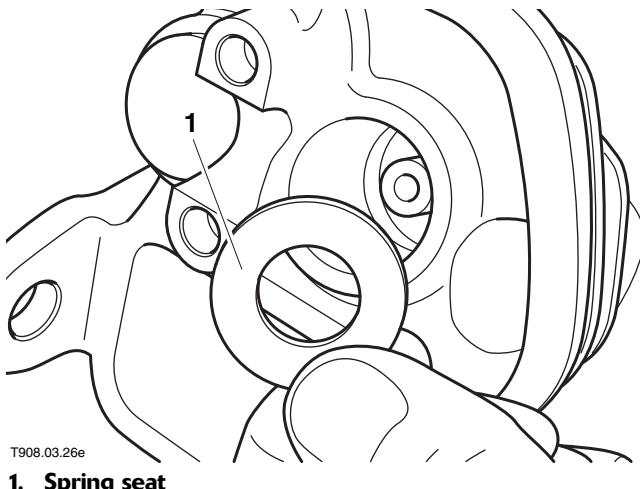
1. Locate the new valve stem seal on the end of the valve guide. Press the seal fully onto the guide, taking care not to damage its sealing lip or ring.



Caution

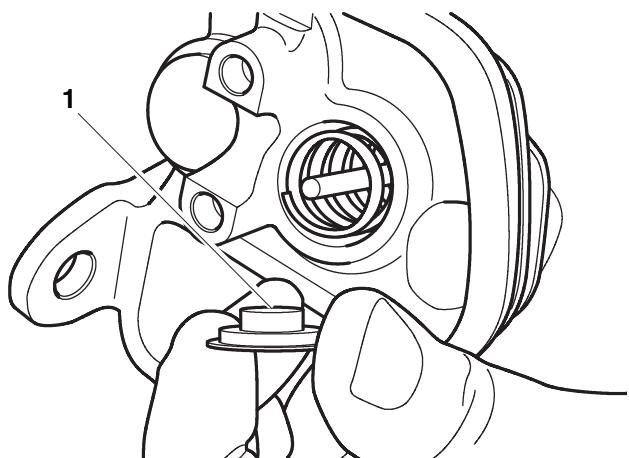
Incorrect fitment of the valve stem oil seals could lead to high oil consumption and blue smoke emissions from the exhaust system. Do not use excessive force in fitting the seal as this may break the seal ring.

2. Apply a thin coat of molybdenum disulphide grease to the valve stem.
3. Install the valve into the valve guide, easing it gently through the seal.
4. Fit the spring seat.



1. **Spring seat**

- Fit the valve spring then fit the spring retainer to the top of the spring.



- Spring retainer**

- Using the spring compressor, compress the spring retainer sufficiently to expose the collet groove.

! Warning

Always wear hand, eye and face protection when using a valve spring compressor. Take great care to minimise the risk of personal injury and loss of components.

- Install the collets, ensuring they are correctly located in the collet groove, then carefully release the spring compressor.

! Caution

Ensure both collets are correctly located in the valve and spring retainer. If not, they could become dislodged when the engine is running resulting in serious engine damage.

- Refit the cylinder head (see page 3-21).

Cylinder Head & Camshafts

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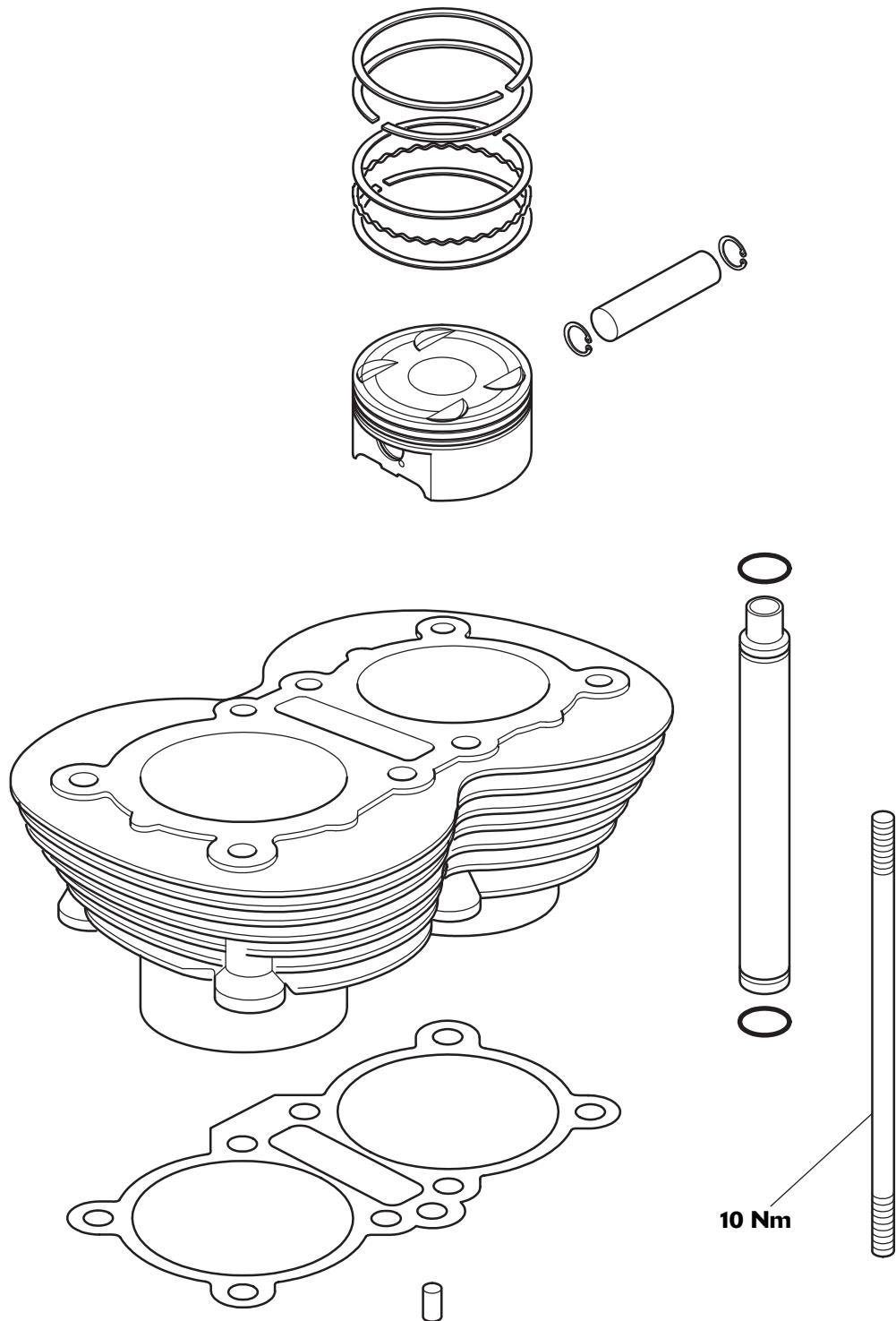
4 Barrels & Pistons

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Installation	4.7

Barrels & Pistons

Exploded View - Barrels and Pistons



Barrels

Removal

1. Remove the cylinder head (see page 3-18).
2. Clean the area around the barrel base gasket joint to prevent dirt falling into the crankcase when the barrels are removed.
3. Ensure the pistons are level with each other then break the seal of the base gasket joint.



Caution

Do not strike or lever against the barrel cooling fins to break the seal as the fins are easily damaged.

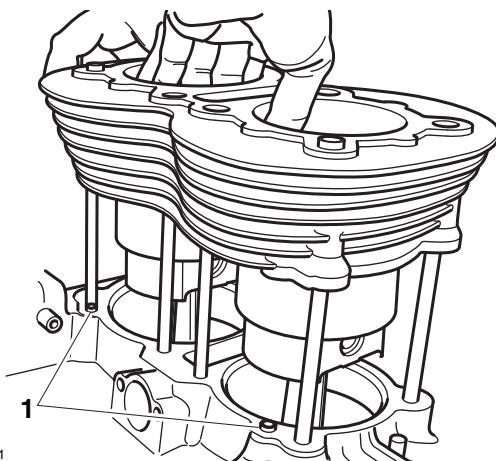
Note:

- **Secure the cam chain to ensure that it does not fall into the crankcase during removal of the barrels.**
- 4. Lift off the barrels, taking care not to lose the locating dowels.



Caution

Support the pistons as the barrels are removed to prevent piston damage.



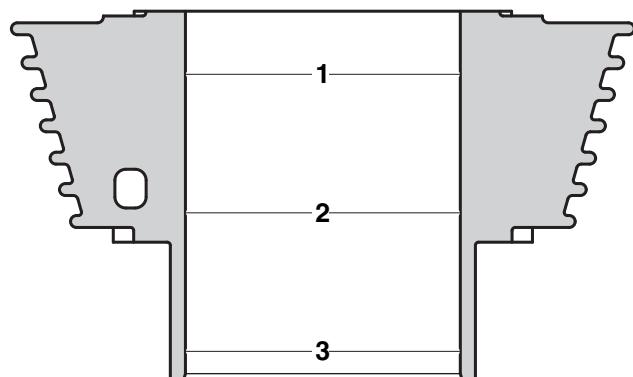
T908.04.01

1. Locating dowels

5. Remove the base gasket and discard it.

Inspection

1. Measure the diameter of each cylinder bore using an internal micrometer or similar accurate measuring equipment.



T908.04.01a

Cylinder Bore Diameter Measurement Points

Note:

- Check the diameter at points 1, 2 and 3.
- If any readings are outside the service limit, replace the barrels and pistons.

Cylinder Bore Diameter - 790 cc Engines

Standard	85.991 to 86.009 mm
Service Limit	86.034 mm

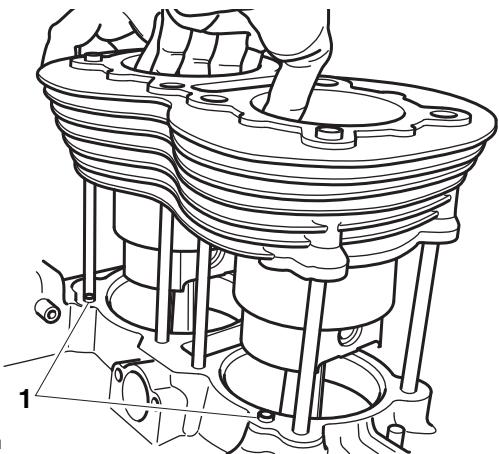
Cylinder Bore Diameter - 865 cc Engines

Standard	89.991 to 90.009 mm
Service Limit	90.034 mm

Barrels & Pistons

Installation

1. Thoroughly clean the mating surfaces of the crankcase and barrels taking care not to damage the mating surfaces.
2. Fit a new base gasket ensuring that the locating dowels are correctly in position.



T908.04.01

1. Locating dowels

3. While supporting the pistons to prevent contact with the crankcase, position the pistons level with each other.



Caution

Do not allow the pistons to fall against the crankcase when turning the engine. Piston and/or crankcase damage could occur if the pistons are not supported while turning the engine.

4. Ensure the piston ring end gaps are correctly positioned (see pistons and rings installation).
5. Ensure the barrels are completely clean.
6. Lubricate the piston rings and the cylinder bores with clean engine oil.
7. Carefully lower the barrels onto the pistons, passing the cam chain up through the barrels.

Note:

- **Secure the cam chain to ensure that it does not fall into the crankcase during installation of the barrels.**
- **Installation will be considerably easier with the aid of an assistant.**



Caution

Do not allow the full weight of the barrels to rest unsupported on the pistons. Failure to support the barrels is likely to result in piston ring breakage.

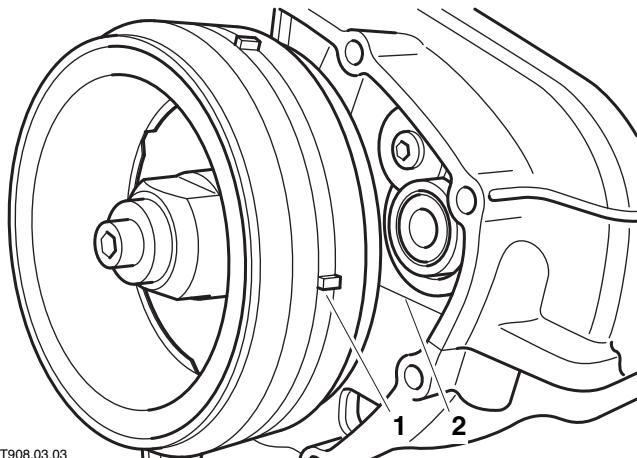
8. Ease the barrels carefully down over the pistons whilst guiding the piston rings into the base of the cylinder bores.



Caution

Do not force the pistons into their bores. The base of each bore is chamfered to ease installation and excess force should not be needed. If either piston jams, lift the barrels slightly and check the rings are correctly located in their grooves before continuing. The use of force is likely to result in piston ring breakage.

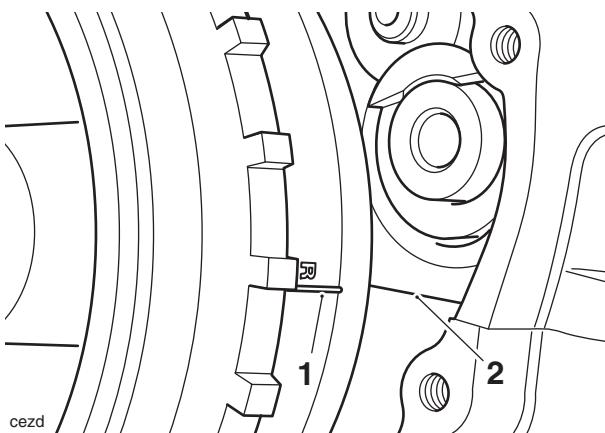
9. Slide the barrels fully down and locate on the dowels.
10. **All Models except Scrambler with Carburetors:** The alternator rotor has one timing mark and is not marked with a letter. Align the timing mark with the front of the crankcase joint to bring the engine to its timing position.



T908.03.03

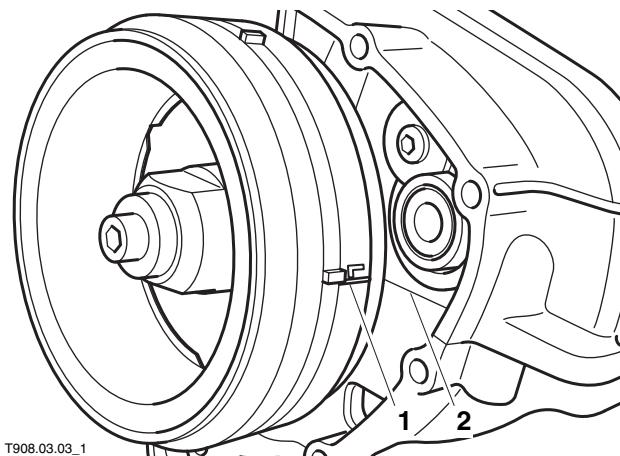
1. Alternator rotor timing mark
2. Crankcase joint

11. **All Models except Scrambler with Fuel Injection (EFI):** The alternator rotor has one timing mark and is marked with the letter "R". Align the timing mark "R" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



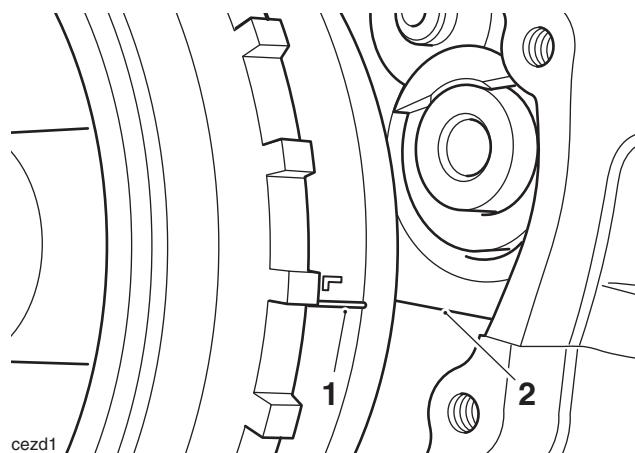
1. Alternator rotor timing mark "R"
2. Crankcase joint

12. **Scrambler with Carburetors:** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



- 1. Alternator rotor timing mark "L"**
2. Crankcase joint

13. **Scrambler with Fuel Injection (EFI):** The alternator rotor has two timing marks, which are marked with the letters "L" & "R". Align the timing mark "L" on the alternator rotor with the front of the crankcase joint to bring the engine to its timing position.



- 1. Alternator rotor timing mark "L"**
2. Crankcase joint

14. Refit the cylinder head (see page 3-21).

Pistons and Rings

Removal

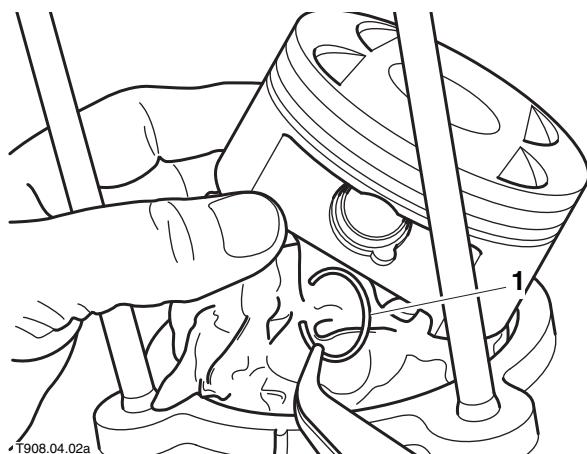
1. Remove the barrels (see page 4-3).
2. Position each piston at TDC. Each piston can be removed as follows.
3. Remove the gudgeon pin circlip from the outside of the piston. Discard the circlip.

Note:

- Place a cloth between the piston and crankcase to ensure the circlip does not fall into the crankcase.

! Caution

If a circlip is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.



- 1. Circlip**

4. Push the gudgeon pin out from the inside of the piston and withdraw the piston from the connecting rod.
5. Remove the remaining circlip from the piston and discard it.

Note:

- If both pistons are being removed, mark each piston in some way to ensure it is refitted in its original location.
- 6. Prior to removing the rings, check the ring-to-groove clearance of each compression ring (see inspection).
- 7. Ease the top compression ring out of its groove and remove it from the top of the piston.

Barrels & Pistons



Caution

Do not expand the piston rings any more than is necessary to allow them to be removed from the piston. The rings are brittle and will break if expanded too much.

8. Remove the second compression ring in the same way.

Note:

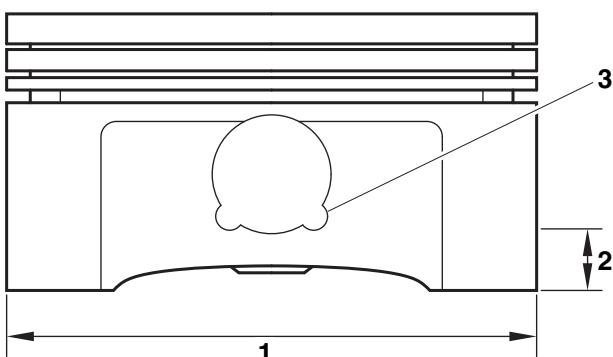
- The top and second compression rings are different and are not interchangeable (see installation).
9. Remove the oil control rings and expander.

Note:

- If the piston rings are going to be re-used, keep them with their respective piston to ensure they are refitted in their original locations.

Inspection

1. Remove any carbon build-up from the piston crown. Inspect the piston crown for signs of pitting and check the piston skirt and ring grooves for signs of wear or scuffing. If any sign of damage is found, renew the piston.
2. Measure the piston outside diameter 13 mm up from the bottom of the skirt. Measure at 90° from the axis of the gudgeon pin.



T908.04.02b

1. Piston outside diameter
2. Measurement point (13 mm up the piston skirt)
3. Gudgeon pin bore

Piston Outside Diameter - 790 cc Engines

Standard	85.975 to 85.990 mm
Service limit	85.935 mm

Piston Outside Diameter - 865 cc Engines

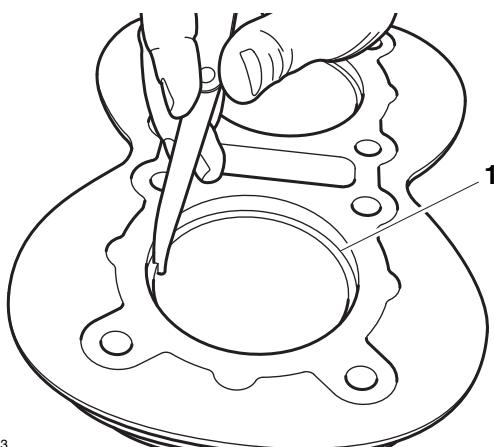
Standard	89.972 to 89.988 mm
Service limit	89.933 mm

Note:

- Replace the piston if the measured diameter falls outside the specified limit.
- 3. Check each piston ring end gap as follows.

Note:

- The piston ring end gap must be measured in the cylinder bore which the piston ring will be fitted to on installation.
 - a) Ease the piston ring into the top of the cylinder bore.
 - b) Using the piston crown, push the piston ring down into the bore (the piston will keep the piston ring square) until the third groove of the piston is level with the top of the bore.
 - c) Remove the piston and measure the gap between the ends of the piston ring, using a feeler gauge.



T908.04.03
1. Checking piston ring (1) end gap

Piston Ring End Gap - 790 cc Engines

Top Ring End Gap

Standard	0.12 to 0.33 mm
----------	-----------------

Second Ring End Gap

Standard	0.27 to 0.48 mm
----------	-----------------

Oil Control Rings

Standard	0.17 to 0.73 mm
----------	-----------------

Piston Ring End Gap - 865 cc Engines

Top Ring End Gap

Standard	0.17 to 0.33 mm
----------	-----------------

Second Ring End Gap

Standard	0.32 to 0.48 mm
----------	-----------------

Oil Control Rings

Standard	0.17 to 0.73 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 barrels must be replaced.
- If the gap is too small, check the cylinder bore for distortion, replacing as necessary. **DO NOT FILE PISTON RINGS!**
- 4. With the piston rings correctly installed on the piston, check the ring-to-groove clearance of each compression ring, using a feeler gauge.



gafz

Piston Ring-to-Groove Clearance Check

Piston Ring-to-Groove Clearance - All Models

Standard	0.02 - 0.06 mm
----------	----------------

Note:

- If the ring-to-groove clearance is too large, replace the piston rings with a new set.
- If the gap remains too large with new piston rings, the piston must also be replaced.
- If the gap is too small, check the piston ring grooves closely for distortion, replacing the piston as necessary. **DO NOT FILE THE RING GROOVES!**

Installation

1. Ensure the piston ring grooves are clean.
2. Fit the oil control ring expander to the piston then install the upper and lower control rings (the oil control rings are both the same and can be fitted either way up).

Note:

- Ensure all piston rings are fitted in their original locations (if original rings are being reused) or to the piston/bore which the end gaps were checked (if new rings are being fitted).



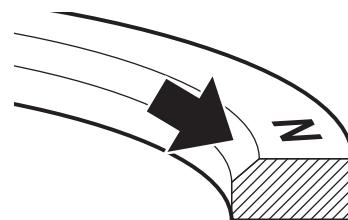
Caution

Do not expand the piston rings any more than is necessary to allow them to be installed on the piston. The rings are brittle and will break if expanded too much.

3. Fit the second compression ring carefully to the piston, ensuring its **N** (up to engine number 282963 (F2) or 273654 (F4)) or **2N** (from engine number 282964 (F2) or 273655 (F4)) mark is facing upwards.

Note:

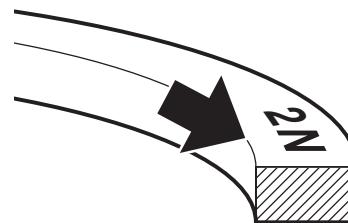
- The second and top compression rings are different and are not interchangeable. The top ring can be identified by the chamfer on its upper inside edge, the second ring has no chamfer. **ENSURE THE SECOND AND TOP COMPRESSION RINGS ARE CORRECTLY INSTALLED.**



Top Ring



Second Ring (up to
engine number
282963 (F2)
or 273654 (F4))



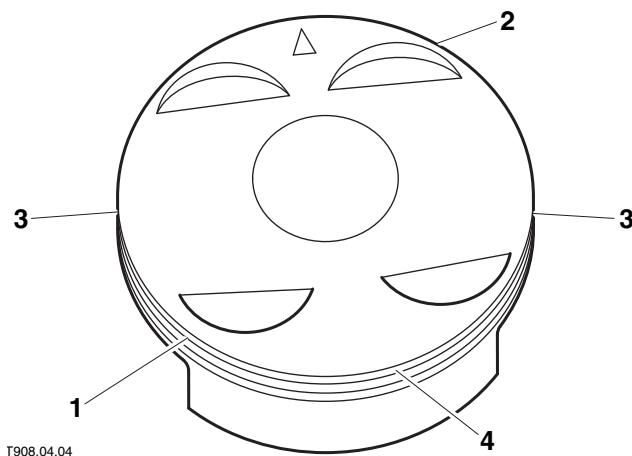
Second Ring (from
engine number
282964(F2)
or 273655 (F4))

Piston Ring Identification

4. Fit the top compression ring to the piston ensuring its **N** mark is facing upwards.
5. Ensure all piston rings move freely in their grooves.

Barrels & Pistons

- Position the piston ring end gaps as follows (piston viewed from above, triangular mark facing forwards).



Piston Ring End Gap Locations

- Top Ring
- Second Ring
- Steel Oil Control Rings
- Oil Control Ring Expander

Note:

- The top compression ring end gap should be in the 7 o'clock position.
 - The second compression ring end gap should be in the 1 o'clock position.
 - The oil control ring end gaps should be in the 3 and 9 o'clock positions (one in each position).
 - The oil control ring expander end gap should be in the 6 o'clock position.
- Fit a new circlip to the inside of the piston. Ensure the circlip is correctly located in the piston groove.



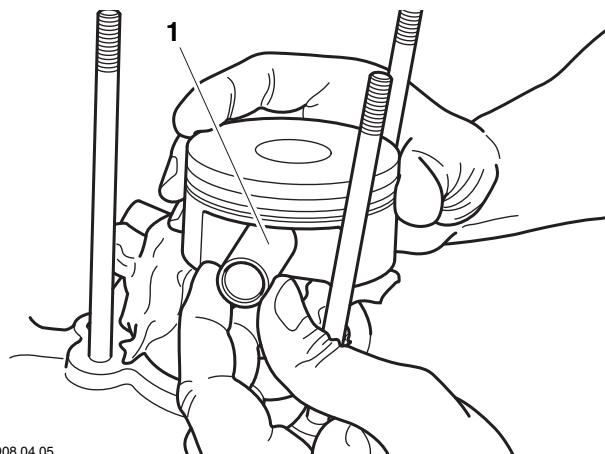
Warning

Failure to use new circlips could allow a gudgeon pin to work its way out from the piston. This could seize the engine and lead to an accident.

- Lubricate the connecting rod small-end and gudgeon pin with clean engine oil.
- Align the piston with the connecting rod, ensuring the triangular mark on the piston crown is facing towards the front of the engine.

Note:

- If the original pistons are being refitted, ensure they are fitted in their original locations.
- Insert the gudgeon pin into the piston and push it fully into position.



1. Gudgeon Pin

- Secure the gudgeon pin in position with the remaining new circlip. Ensure the circlip is correctly located in the piston groove.

Note:

- Place a cloth between the piston and crankcase to ensure the circlip does not fall into the crankcase.

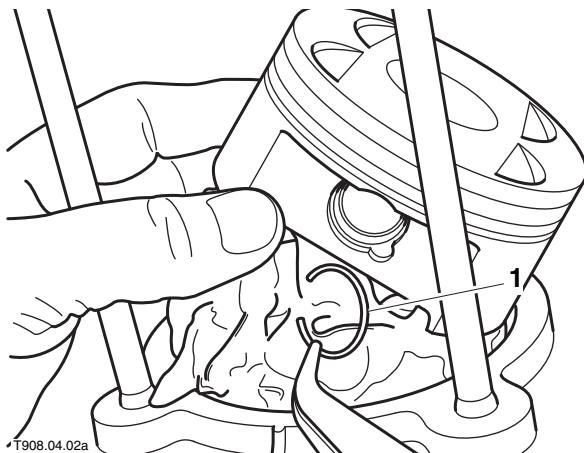


Circlip Fitment



Caution

If a circlip is dropped into the crankcase, it must be recovered before the crankshaft is rotated. Failure to do so will result in serious engine damage.



1. Circlip

12. Install the remaining piston then refit the barrels (see page 4-4).



Caution

Do not allow the pistons to fall against the crankcase when turning the engine. Piston and/or crankcase damage could occur if the pistons are not supported while turning the engine.

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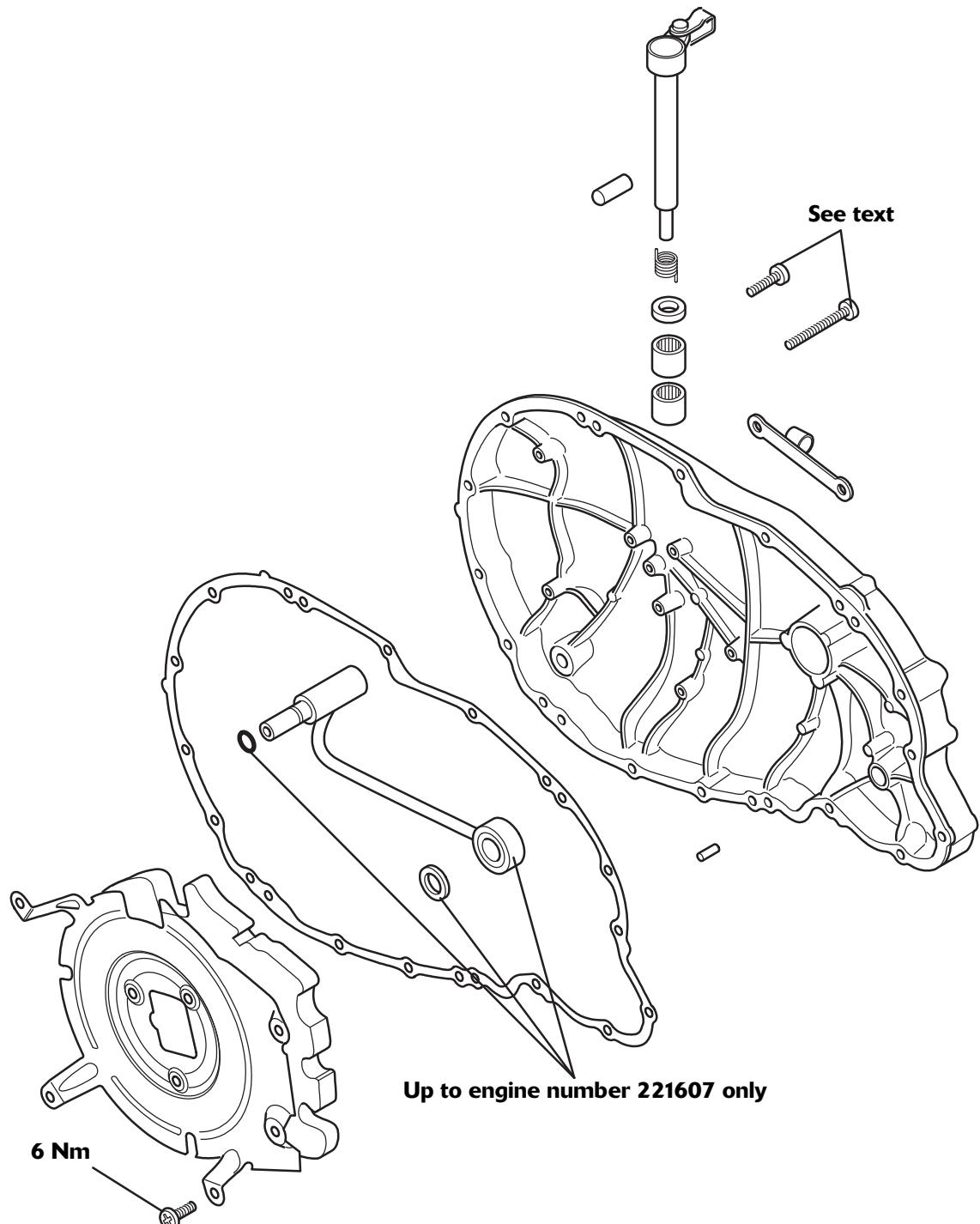
5 Clutch

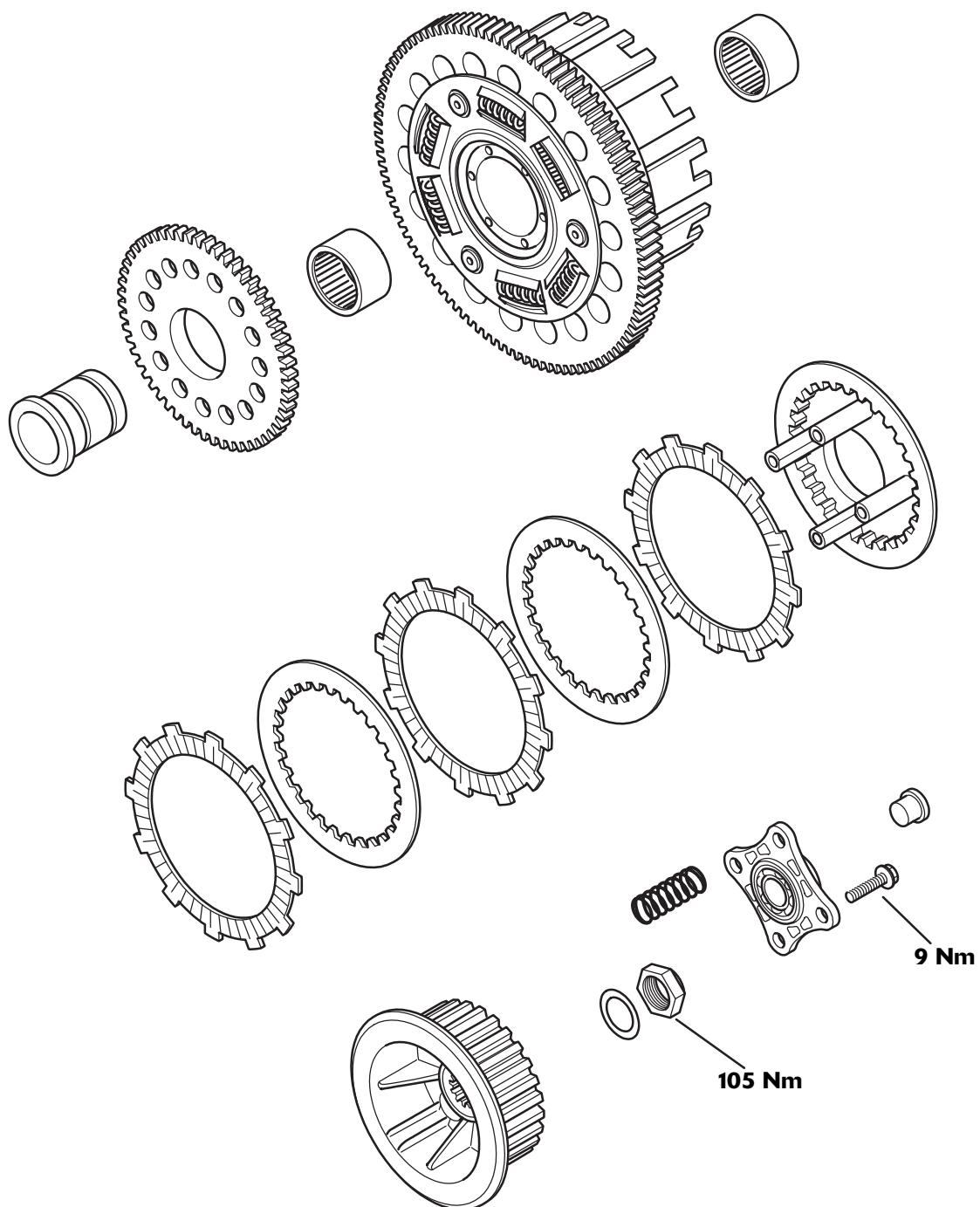
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Clutch

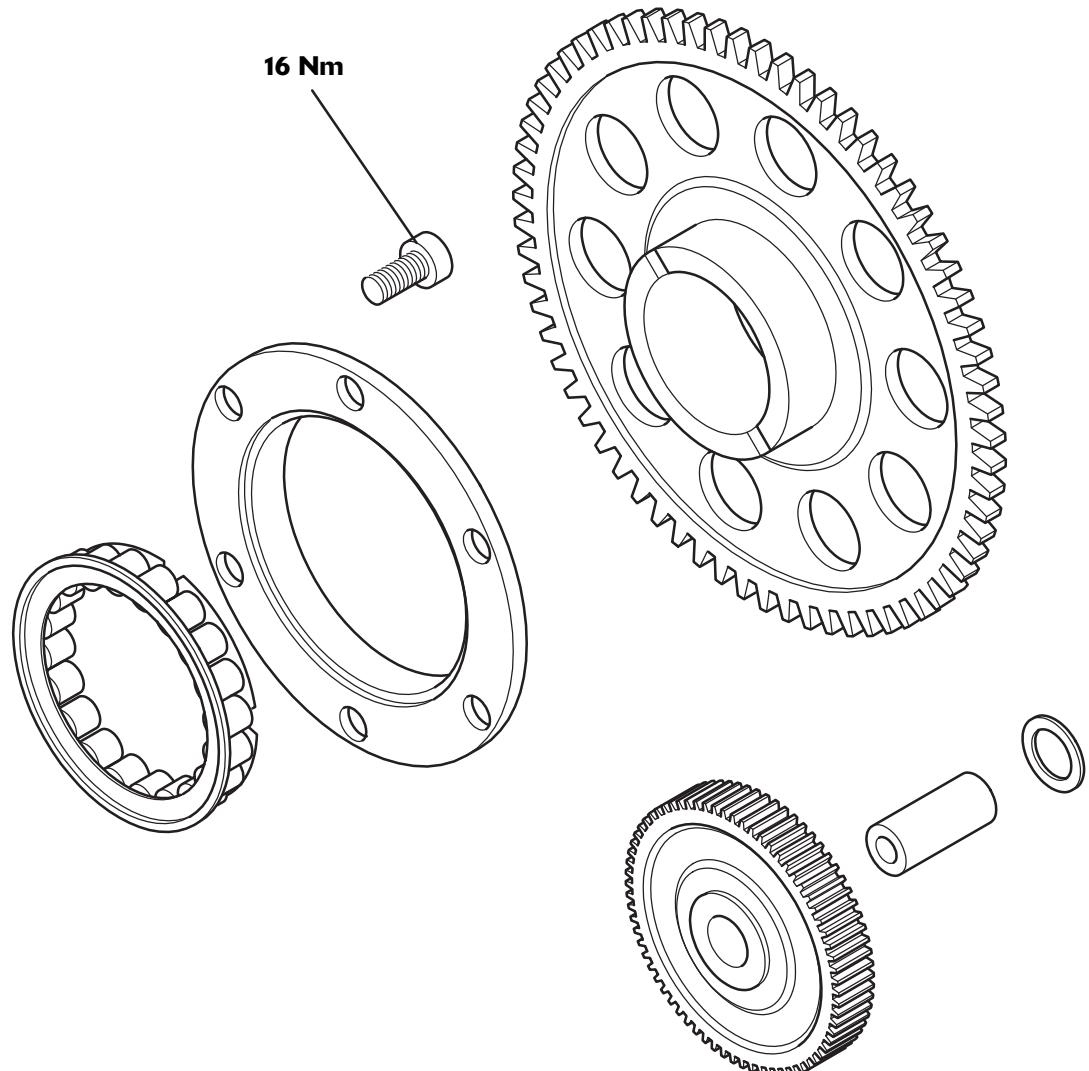
Exploded View - Clutch Cover and Release Mechanism



Exploded View - Clutch Assembly

Clutch

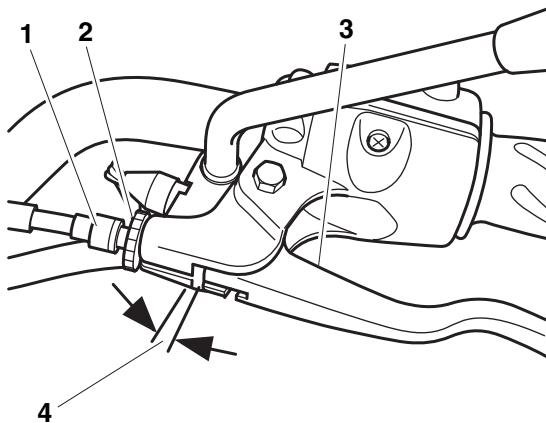
Exploded View - Starter Drive Components



Clutch Cable

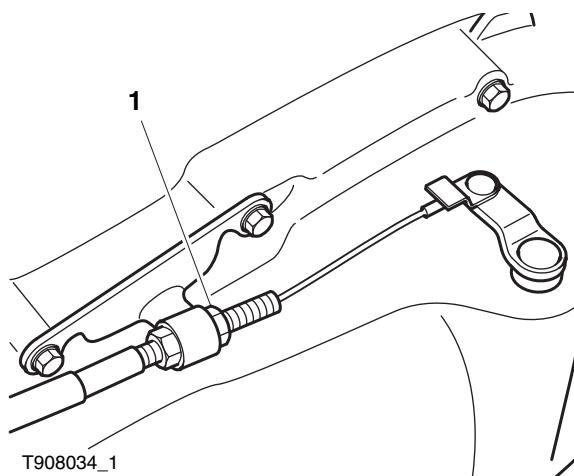
Adjustment

1. Clutch cable adjustment is checked by measuring the amount of freeplay at the lever. Adjustment is correct when 2 - 3 mm of freeplay is present between the clutch lever and its mounting bracket.



1. **Upper adjuster**
2. **Adjuster lock nut**
3. **Lever**
4. **Freeplay measurement**

2. To adjust the cable, slacken the lock nut and rotate the upper adjuster. Once the freeplay setting is correct, securely tighten the lock nut.
3. If there is insufficient adjustment available, screw the upper adjuster fully into the bracket then slacken the lower adjuster lock nut. Position the lower adjuster nut so that all but a small amount of freeplay is removed from the cable then securely tighten the lock nut. Carry out final adjustment with the upper adjuster.



1. **Lower adjuster**

Removal

1. Slacken the lock nut and screw the upper adjuster fully into the lever mounting bracket.
2. Slacken the lower adjuster lock nut and back off the adjuster nut to give maximum freeplay in the cable.
3. Free the inner cable from the release arm then free the outer cable from its mounting bracket.
4. Align the slots in the upper adjuster and lock nut then detach the cable from the handlebar lever.
5. Note the correct routing of the clutch cable then free the cable from its retaining clips and remove it from the motorcycle.

Inspection

1. Check the inner cable for free movement through the outer cable.
2. Examine the inner cable for damage, fraying etc.
3. Examine the two inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Installation

1. Fit the cable to the motorcycle. Ensure the cable is correctly routed and retained by all the necessary clips as noted during removal.
2. Connect the inner cable to the handlebar lever and seat the outer cable in the upper adjuster.
3. Locate the lower end of the outer cable in its mounting bracket and attach the inner cable to the release lever arm.
4. Ensure the upper adjuster is screwed fully into the lever mounting bracket.
5. Rotate the lower adjuster nut until only a small amount of freeplay is present in the cable then securely tighten the lock nut.
6. Operate the clutch lever several times to settle the cable in position then adjust the cable freeplay using the upper adjuster (see adjustment).

Clutch

Clutch Cover

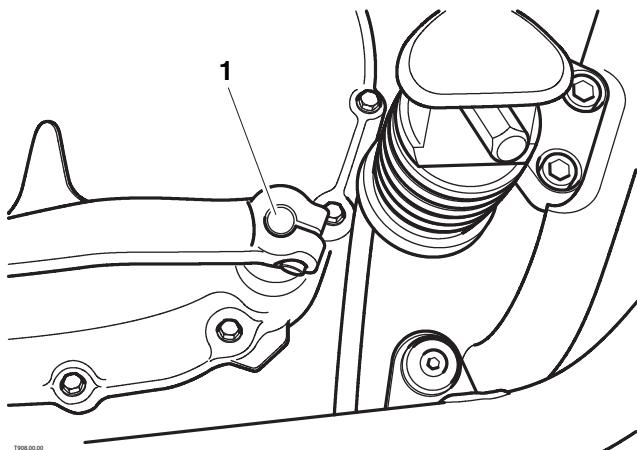
Removal



Warning

Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

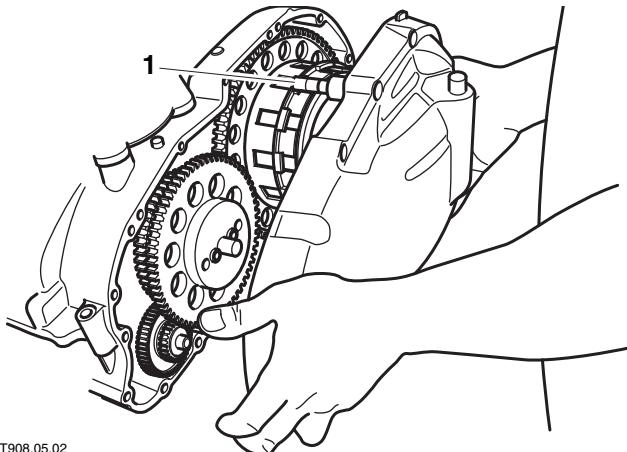
1. Position the motorcycle on its side stand.
2. Remove the seat (see page 16-11).
3. Disconnect the battery, negative (black) lead first.
4. Drain the engine oil (see page 9-9). Once the oil has drained refit the sump plug, with a new sealing washer and torque to **25 Nm**.
5. Note the position of the gear change lever on its shaft then unscrew the clamp bolt and remove the lever.



1. Gear change lever

6. Detach the lower end of the clutch cable from the release arm (see clutch cable removal).
7. Disconnect the crankcase breather hose from its union on the top of the crankcase.
8. Slacken and remove the clutch cover retaining bolts along with the cable mounting bracket.

9. Remove the clutch cover, freeing the breather pipe from the top of the crankcase (up to engine number 221607 only). Take care not to lose the cover locating dowels or the washer from the starter idler gear shaft.



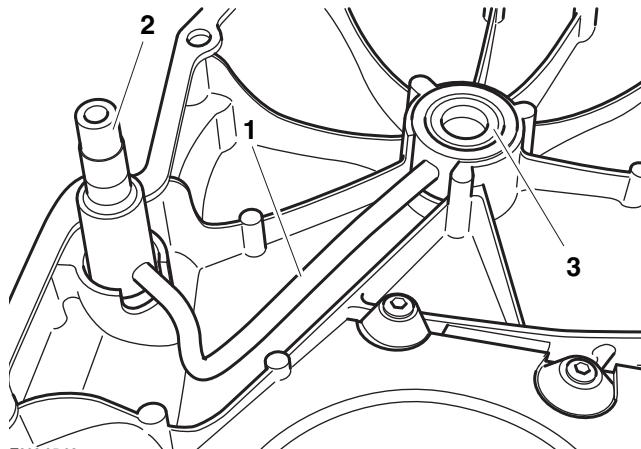
T908.05.02

1. Breather pipe

10. Remove the clutch cover gasket and discard it.

Inspection

1. Up to engine number 221607 only - Inspect the crankcase breather pipe seal and O-ring for damage and, if necessary, renew. Ensure the new seal is fitted the correct way around with its sealing lip facing inwards (towards the pipe).



1. Breather pipe

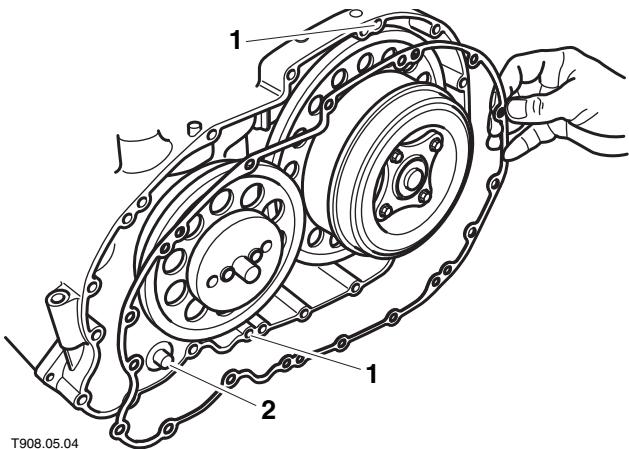
2. O-ring

3. Seal

2. All models - Inspect the gearchange shaft needle roller bearing and oil seal for signs of wear or damage and, if necessary, renew. Ensure the new seal is fitted the correct way around with its sealing lip facing inwards.

Installation

1. Ensure the clutch cover and crankcase mating surfaces are clean and dry.
2. Check the clutch release mechanism components are correctly installed.
3. Ensure the washer is in position on the starter idler gear shaft.
4. Fit a new clutch cover gasket ensuring that the locating dowels are correctly in place.



- 1. Locating dowels**
2. Idler gear washer

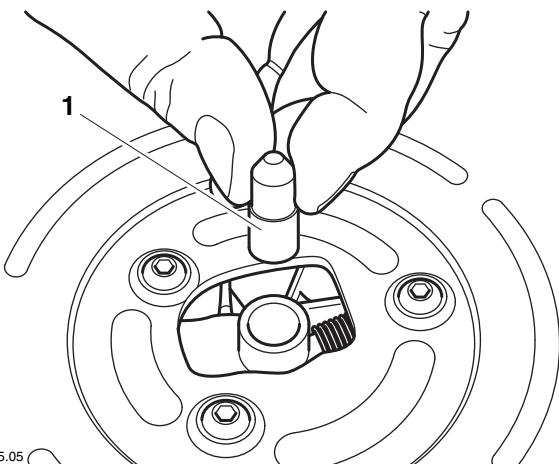
Note:

- **Keep the clutch cover square to the crankcase as it is fitted to avoid damaging the breather pipe seal. Great care must also be taken not to damage the oil seal on the gearchange shaft splines.**
5. If fitted, lubricate the breather pipe oil seal lip and O-ring and the gearchange shaft oil seal lip with a smear of clean engine oil then carefully fit the clutch cover.
 6. Install the clutch cover bolts in their original locations, ensuring the clutch cable mounting bracket is correctly positioned. Tighten all bolts hand-tight then go around and tighten them to **10 Nm**.
 7. Reconnect the crankcase breather hose securely to the breather pipe.
 8. Reconnect the clutch cable to the release arm.
 9. Position the gearchange lever as was noted prior to removal and fit it to the shaft. Tighten the gearchange lever clamp bolt to **8 Nm**.
 10. Fill the engine with the correct grade and type of engine oil (see page 9-10).
 11. Reconnect the battery, positive (red) lead first, then fit the seat (see page 16-11).

Clutch Release Mechanism

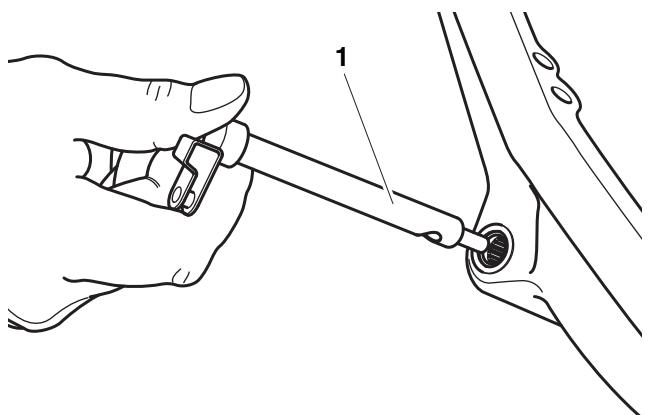
Removal

1. Remove the clutch cover (see page 5-6).
2. Withdraw the pushrod from the clutch cover, noting which way around it is fitted.



1. Pushrod

3. Withdraw the release arm from the clutch cover and recover its return spring.



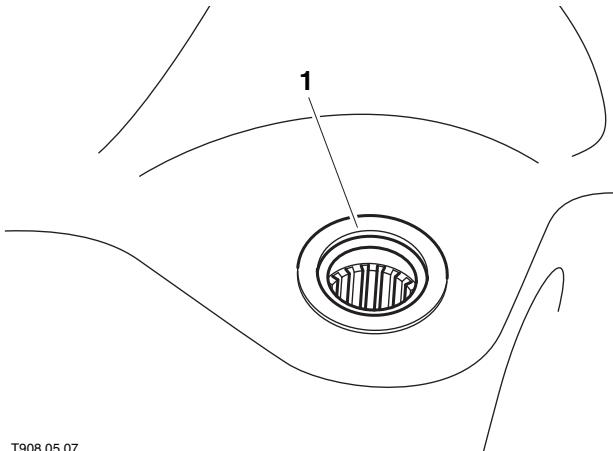
T908.05.06

1. Release arm

Clutch

Inspection

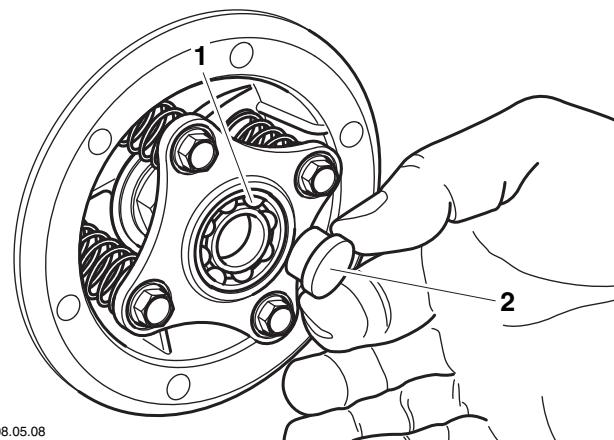
1. Inspect the release arm seal for signs of damage and, if necessary, renew. Carefully lever out the original seal and press the new seal into position, making sure its sealing lip is facing inwards.
2. Inspect the release arm needle roller bearings and the arm contact surfaces for signs of wear or damage. If necessary renew both needle roller bearings and the arm.



T908.05.07

1. Release arm bearing

3. Check the pushrod seat and release bearing (fitted to the clutch release plate) for signs of wear or damage. Renew as necessary.

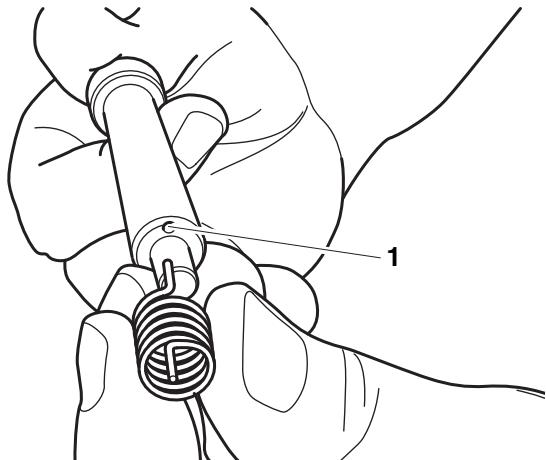


T908.05.08

1. Release bearing
2. Pushrod seat

Installation

1. Lubricate the seal lip, the needle roller bearings and the pushrod with molybdenum disulphide grease.
2. Fit the return spring to the release arm, locating its end correctly in the arm hole.



T908.05.09

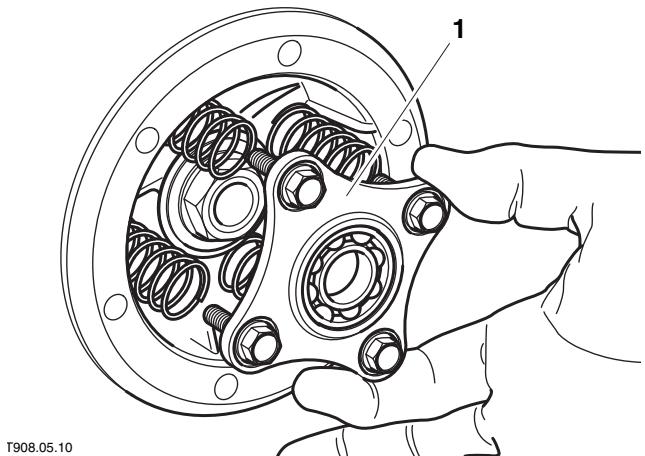
1. Release arm hole

3. Fit the release arm and spring assembly to the cover, taking care not to damage the seal lip. Ensure the return spring remains correctly fitted to the arm and align its lower end with the cover.
4. Ensure the cable fitting of the release arm is facing forwards then align the release arm shaft cut-out with the cover. Insert the pushrod with its flat end facing inwards (towards the arm) and engage it with the release arm.
5. Check the operation of the release arm mechanism before installing the clutch cover (see page 5-7).

Clutch

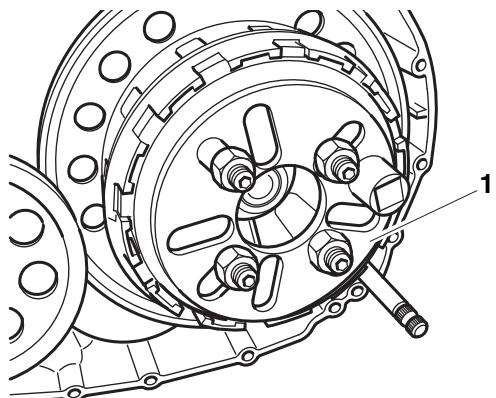
Removal

1. Remove the clutch cover (see page 5-6).
2. If the clutch drum is being removed, remove the starter clutch driven gear (see page 5-14).
3. Evenly and progressively slacken the four bolts securing the release plate to the clutch.
4. Remove the bolts and lift off the release plate (complete with the bearing and pushrod seat) and clutch springs.



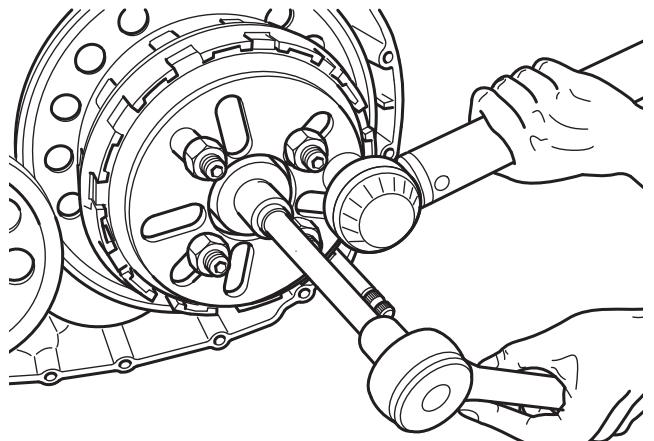
1. Release plate

5. Fit the service tool T3880360 to the clutch centre and pressure plate assembly, tightening its four retaining screws lightly only. Do not overtighten the service tool screws.



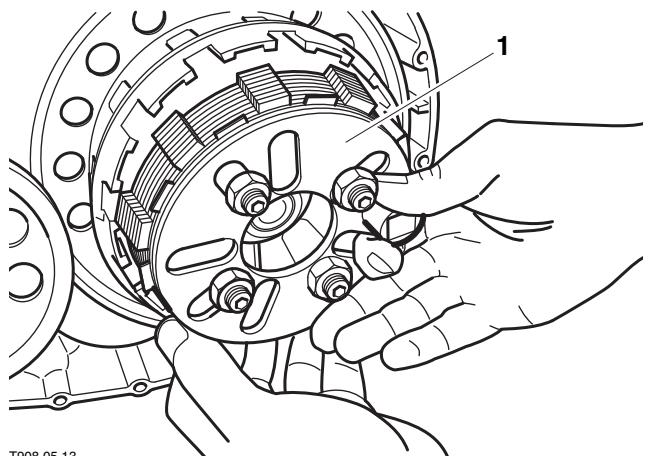
1. Service tool T3880360

6. Hold the service tool to prevent clutch rotation then slacken and remove the centre nut and dished washer from the input shaft.



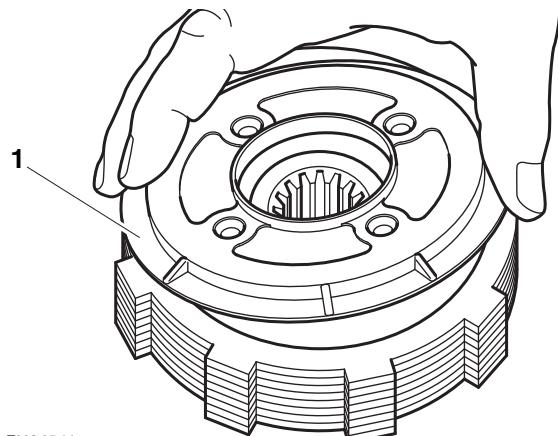
1. Retain the Service Tool and Slacken the Centre Nut

7. Withdraw the clutch centre and pressure plate assembly, complete with the service tool.



1. Clutch centre and pressure plate

8. Remove the service tool then invert the assembly and lift off the pressure plate from the rear of the clutch centre.



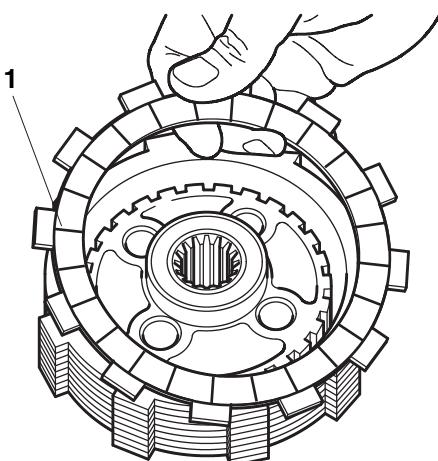
1. Pressure plate

Clutch

9. Noting their orientation, remove the friction plates and steel plates from the clutch centre.

Note:

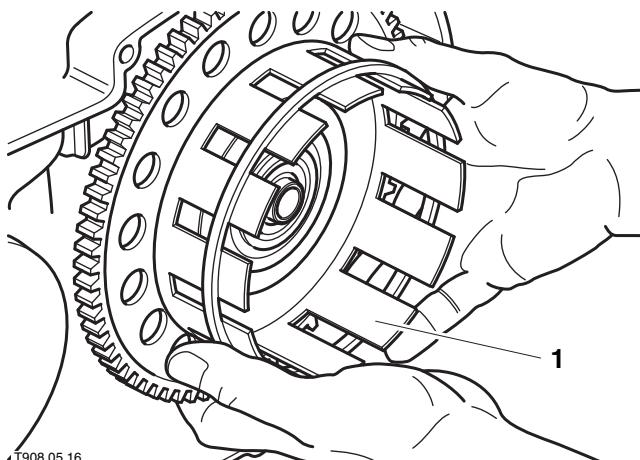
- The innermost and outermost friction plates and outermost steel plate are different from the other plates. Store all plates in their correct fitted order to avoid confusion on installation.



TQAR 05.15

1. Friction plate

10. Slide the clutch drum off the input shaft.

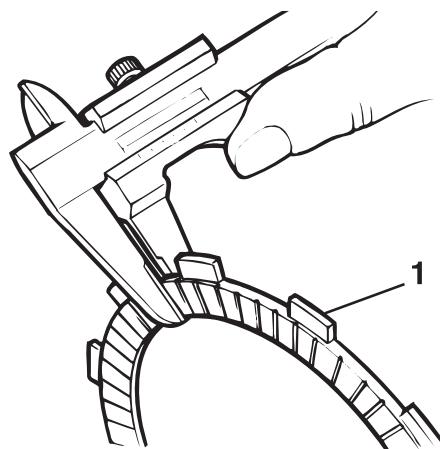


1. Clutch drum

11. Remove the oil pump drive gear and the shouldered bush from the input shaft.

Friction Plate Inspection

12. Check the thickness of all clutch friction plates and inspect all plates for signs of wear, damage or distortion. If any plate has signs of damage or is worn beyond the service limit, replace the friction plates as a set.



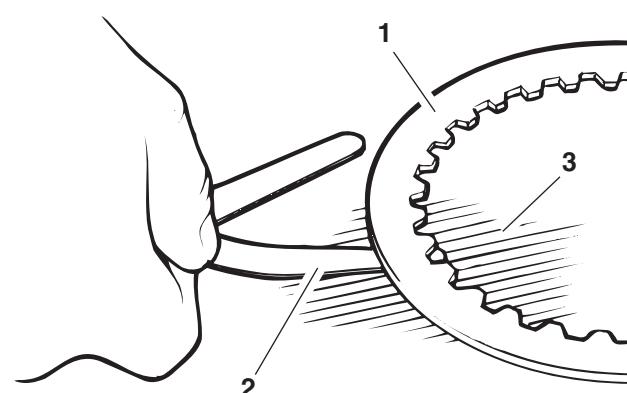
1. Friction disc

Friction Plate Thickness

Standard	3.22 to 3.38 mm
Service limit	3.1 mm

Steel Plate Inspection

13. Inspect all steel plates for signs of wear or damage. Place each plate on a clean surface plate and check for warpage at several points around the clutch plate, using feeler gauges. If any plate has signs of damage or is warped beyond the service limit, replace the steel plates as a set.



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

Service limit	0.15 mm warpage
---------------	-----------------

14. Inspect the grooves in the clutch centre for signs of wear or damage. Renew the clutch centre if damaged.
15. Inspect the clutch drum slots for signs of wear or damage. Renew the clutch drum if damaged.
16. Inspect the clutch drum needle roller bearing and shouldered bush for signs of wear or damage. If necessary, renew the bush and bearing as a set.
17. Inspect the release plate bearing for signs of wear and renew if necessary.

Clutch Pack Height

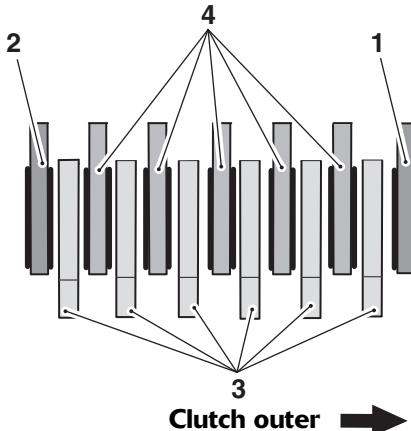
The clutch pack height should only be measured if the friction plates and the steel plates have been replaced.

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

If used steel 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.

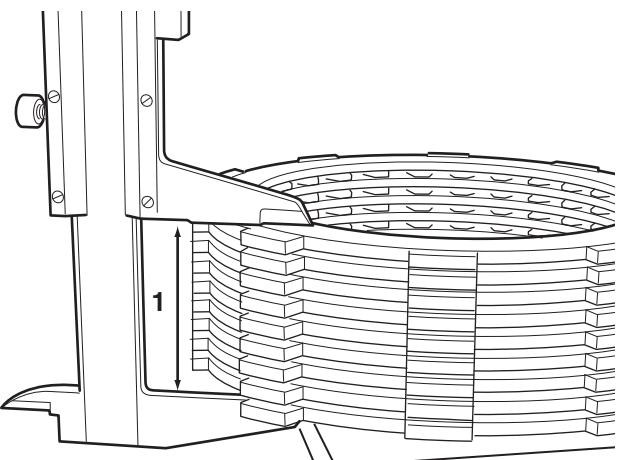
If building a new clutch pack its height must be correct. To achieve this, build the new clutch pack with the following:

- 1 x new outer friction plate;
 - 5 x new friction plates;
 - 1 x new inner friction plate;
 - 6 x steel plates, 1.4 mm thick.
1. Using a clean lint free cloth, wipe any excess oil from the clutch friction and steel plates.
 2. Arrange the new friction and new steel plates in a stack as shown below.



1. Outer friction plate
2. Inner friction plate
3. Steel plates
4. Friction plates

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



1. Clutch pack height

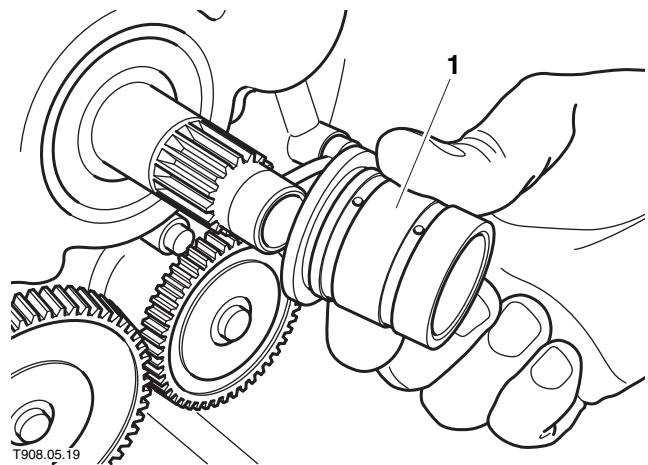
4. The correct clutch pack height for this clutch assembly is shown in the table below.

Standard height in mm	Tolerance in mm
35.10	+0.31 / -0.62

5. If the clutch pack height is incorrect, replace the friction plates and or steel plates as required.

Installation

1. Lubricate the input shaft with clean engine oil then slide on the shouldered bush (shoulder innermost).

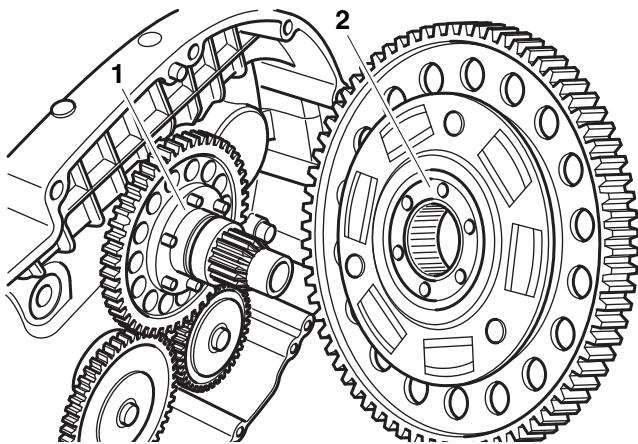


1. Shouldered bush

2. Fit the oil pump drive gear to the shouldered bush, ensuring its pegs are facing outwards. Engage the drive gear with both oil pump gears.
3. Lubricate the clutch drum needle roller bearing with clean engine oil.

Clutch

- Fit the clutch drum, engaging it with the primary drive gear. Slide the drum fully onto the shaft whilst rotating one of the oil pump gears; this will help the drum engage with the oil pump drive gear pegs.



1. Drive gear
2. Clutch drum

Note:

- Ensure that the clutch drum is correctly engaged with the oil pump drive gear before proceeding.**
- The innermost and outermost friction plates differ from the centre friction plates and the outermost steel plate differs from the other steel plates. Identification is as follows.
 - The innermost and outermost friction plates are darker in colour.
 - The outermost steel plate is darker in colour than the other steel plates.

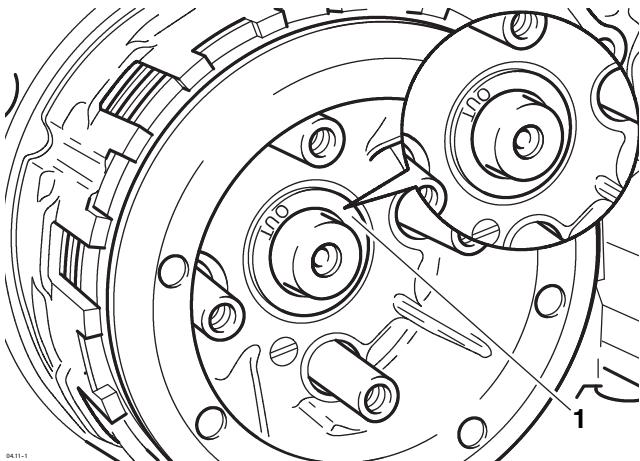


Caution

Ensure the clutch plates are all installed in the correct locations. Failure to do so will adversely affect the operation of the clutch.

- Coat all the friction and steel plates in clean engine oil.
- Fit the outermost friction plate, followed by the outermost steel plate then alternately install the remaining friction and steel plates until the innermost friction plate has been installed.
- Fit the pressure plate ensuring it engages correctly with the clutch centre.
- Invert the assembly and fit the service tool T3880360 to the pressure plate. Align all the friction plate tabs then lightly tighten the four service tool screws to hold them in position. Do not overtighten the service tool screws.

- Fit the clutch centre and pressure plate assembly, aligning the friction plate tabs with the clutch drum slots. Align the clutch centre splines with those of the input shaft and slide the assembly fully into position.
- Fit the dished washer with its OUT marking facing outwards.



1. Dished washer

- Screw on the centre nut and tighten it to **105 Nm** whilst holding the service tool to prevent rotation.
- Remove the service tool from the pressure plate.
- Fit the clutch springs.
- Ensure the bearing and pushrod seat are correctly installed in the release plate.



Caution

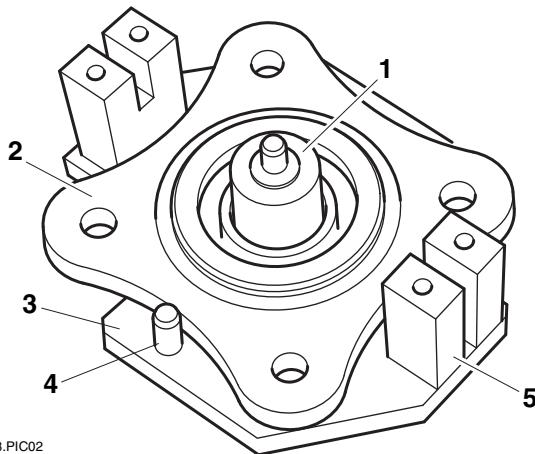
Always completely and accurately follow the remaining assembly sequence as failure to use tool T3880014, or incorrect use of this tool could lead to clutch/transmission problems and/or premature wear to components.

- Locate the release plate assembly (bearing and pushrod seat facing outwards from the clutch) to the underside of tool T3880014.

Note:

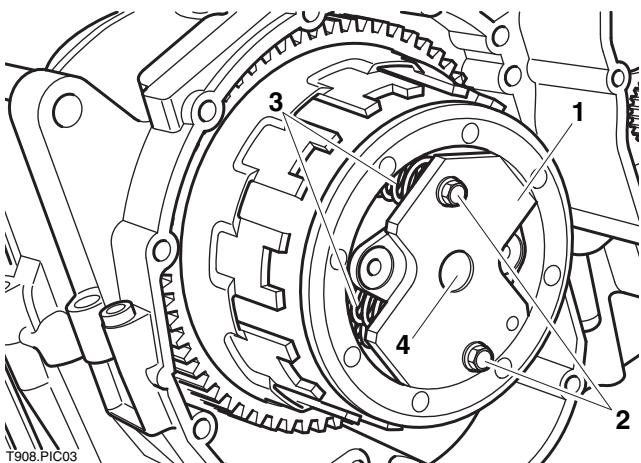
- There are two centralising mandrels provided with tool T3880014, one with a single tapered end, and one with two stepped ends (13 mm and 14 mm). Always select and use the mandrel which most closely fits the hole in the centre of the input shaft into which it will be inserted.**
- The 13 and 14 mm ends are VERY close fits in the input shaft. Always ensure you are using the correct end of the mandrel as use of the wrong end will result in transmission noise.**

17. Locate the mandrel from the tool into the centre of both the tool and release plate (tapered end first).



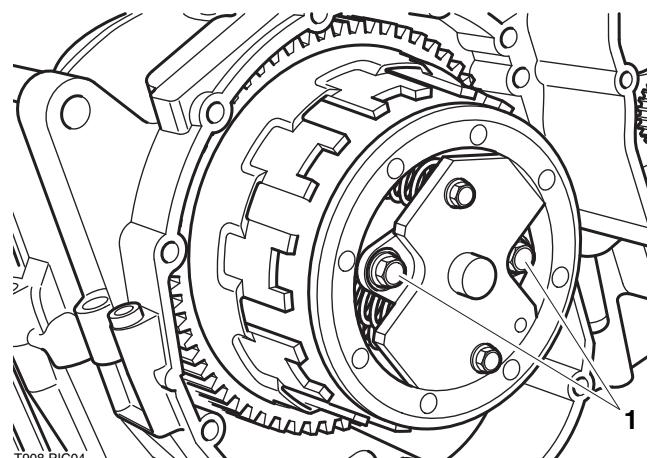
- 1. Mandrel**
- 2. Release plate**
- 3. Tool T3880014**
- 4. Location peg**
- 5. Tool feet**

18. Position the plate, mandrel and tool assembly to the clutch springs.
 19. Introduce the two bolts supplied through the holes in the tool, through two of the clutch springs, and loosely engage the bolt threads in the clutch inner drum. Ensure that the mandrel engages in the centre of the input shaft.



- 1. Tool T3880014**
- 2. Bolts**
- 3. Clutch springs**
- 4. Mandrel**

20. Locate and engage two of the original release plate bolts in the two release plate bolt locations exposed by the tool.
 21. Evenly and progressively tighten the two bolts engaged through the tool and release plate ensuring the following:
- that the feet of the tool align and engage with two of the webs in the clutch inner drum,
 - that the mandrel remains squarely and centrally located in the tool, release plate and input shaft,
 - that the location peg on the tool is located against the edge of the release plate.



1. Bolt locations

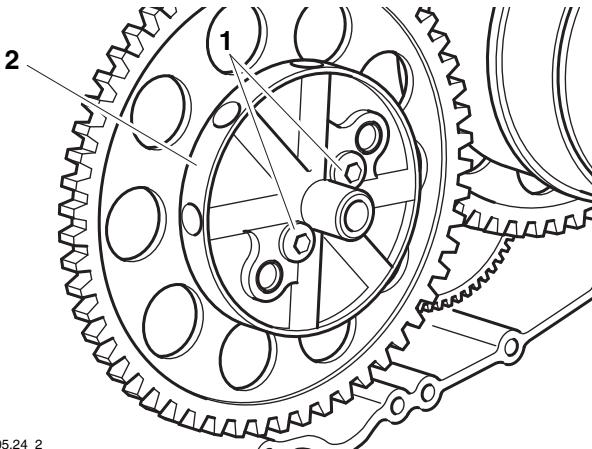
22. With the tool and release plate held securely, tighten the two bolts not engaged through the tool to **9 Nm**.
 23. Remove the tool and mandrel leaving the release plate securely held.
 24. Refit the original release plate bolts to the two remaining holes and tighten to **9 Nm**.
 25. Refit the starter driven gear (see page 5-15).
 26. Refit the clutch cover (see page 5-7).

Clutch

Starter Drive

Removal

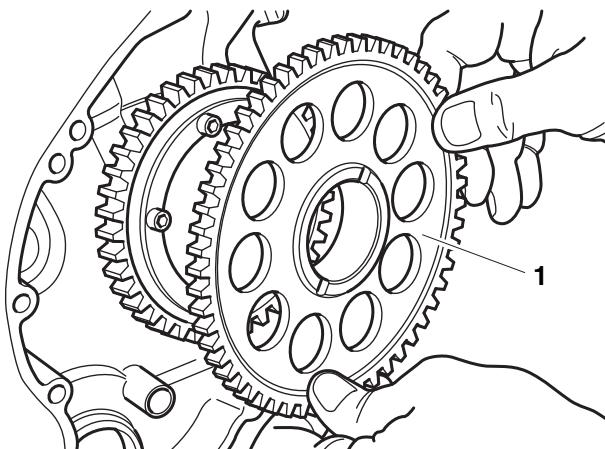
1. Remove the clutch cover (see page 5-6).
2. Slacken and remove the retaining screws and remove the centrifugal breather, if fitted, and the spacer plate from the crankshaft. Discard the screws.



T908.05.24_2

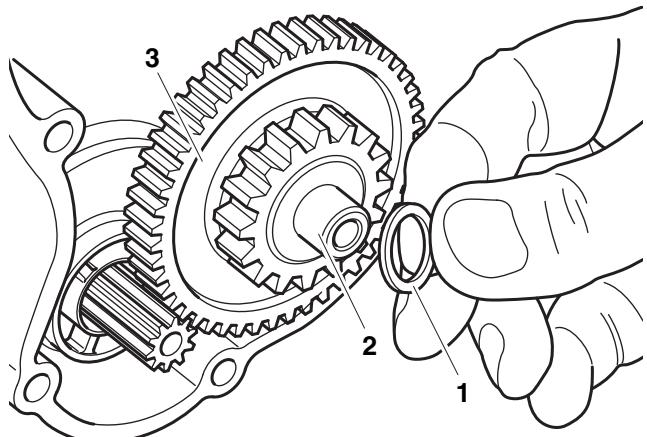
1. **Screws**
2. **Centrifugal breather - up to engine number 221608**

3. All engines - Rotate the driven gear in a clockwise direction and withdraw it from the end of the crankshaft.



T908.05.25
1. **Driven gear**

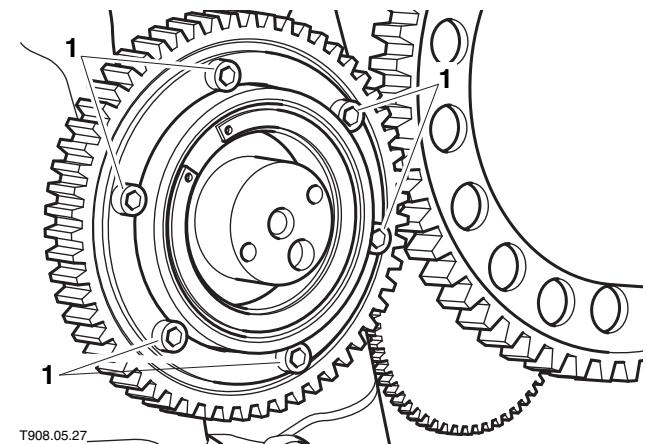
4. Remove the wavey washer from the idler gear shaft then remove the shaft and idler gear.



T908.05.26

1. **Washer**
2. **Shaft**
3. **Idler gear**

5. Evenly and progressively slacken and remove the bolts and remove the sprag clutch housing assembly. Discard the bolts.



T908.05.27

1. **Sprag clutch housing bolts**

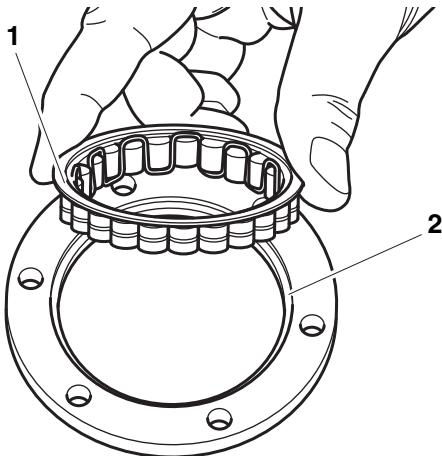
6. Separate the sprag clutch and housing.

Inspection

1. Check the sprag clutch rollers for overheating, wear and/or non-smooth operation. Renew the sprag clutch if overheating, wear and/or non-smooth operation is found.
2. Check the driven gear and idler gears for signs of wear or damage, paying particular attention to the sprag clutch bearing surface of the driven gear. Renew any worn components.

Installation

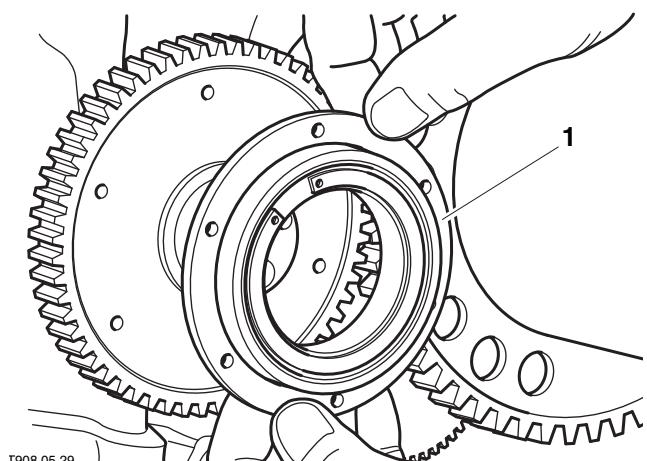
- Fit the sprag clutch to the rear of the housing. Push the clutch firmly into the housing until its lip is correctly seated in the housing recess.



T908.05.28

- Sprag clutch lip**
- Housing recess**

- Ensure the mating surfaces are clean and dry then fit the housing assembly to the crankshaft. Fit the new bolts, tightening them evenly and progressively to **16 Nm**.

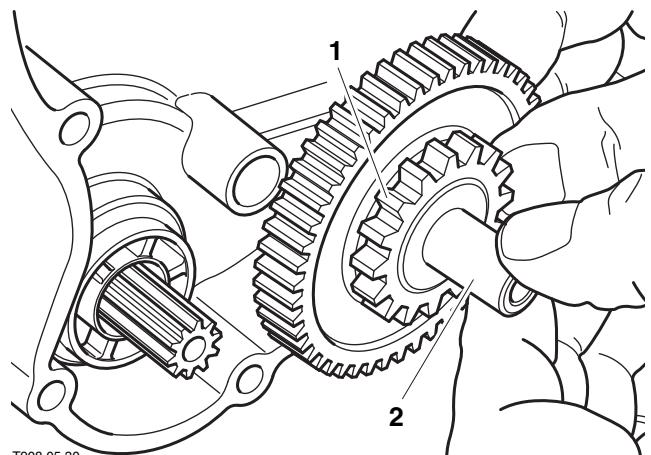


T908.05.29

- Housing assembly**

- Lubricate the sprag clutch and crankshaft end with clean engine oil.

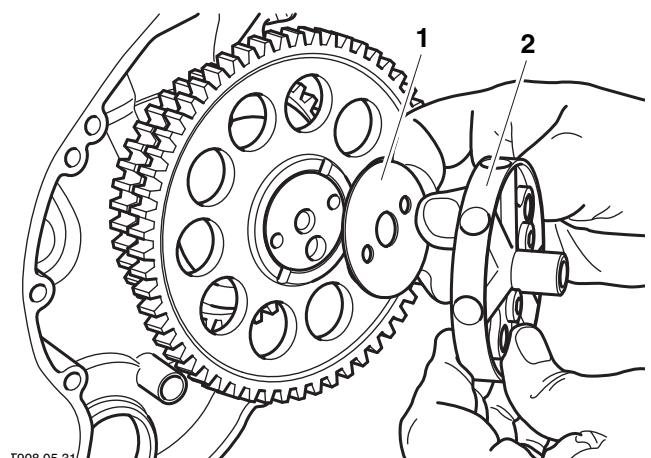
- Install the idler gear and shaft then fit the wavy washer.



T908.05.30

- Idler gear**
- Shaft**

- Fit the starter driven gear ensuring it engages correctly with the idler gear.
- Check the operation of the starter clutch before proceeding. The driven gear should rotate freely in a clockwise direction but lock firmly when anti-clockwise rotation is attempted.
- Fit the spacer plate and, if fitted, the centrifugal breather to the crankshaft. Fit the new retaining screws and tighten to **12 Nm**.



T908.05.31

- Spacer plate**
- Centrifugal breather - up to engine number 221608**

- All engines - Install the clutch cover (see page 5-7).

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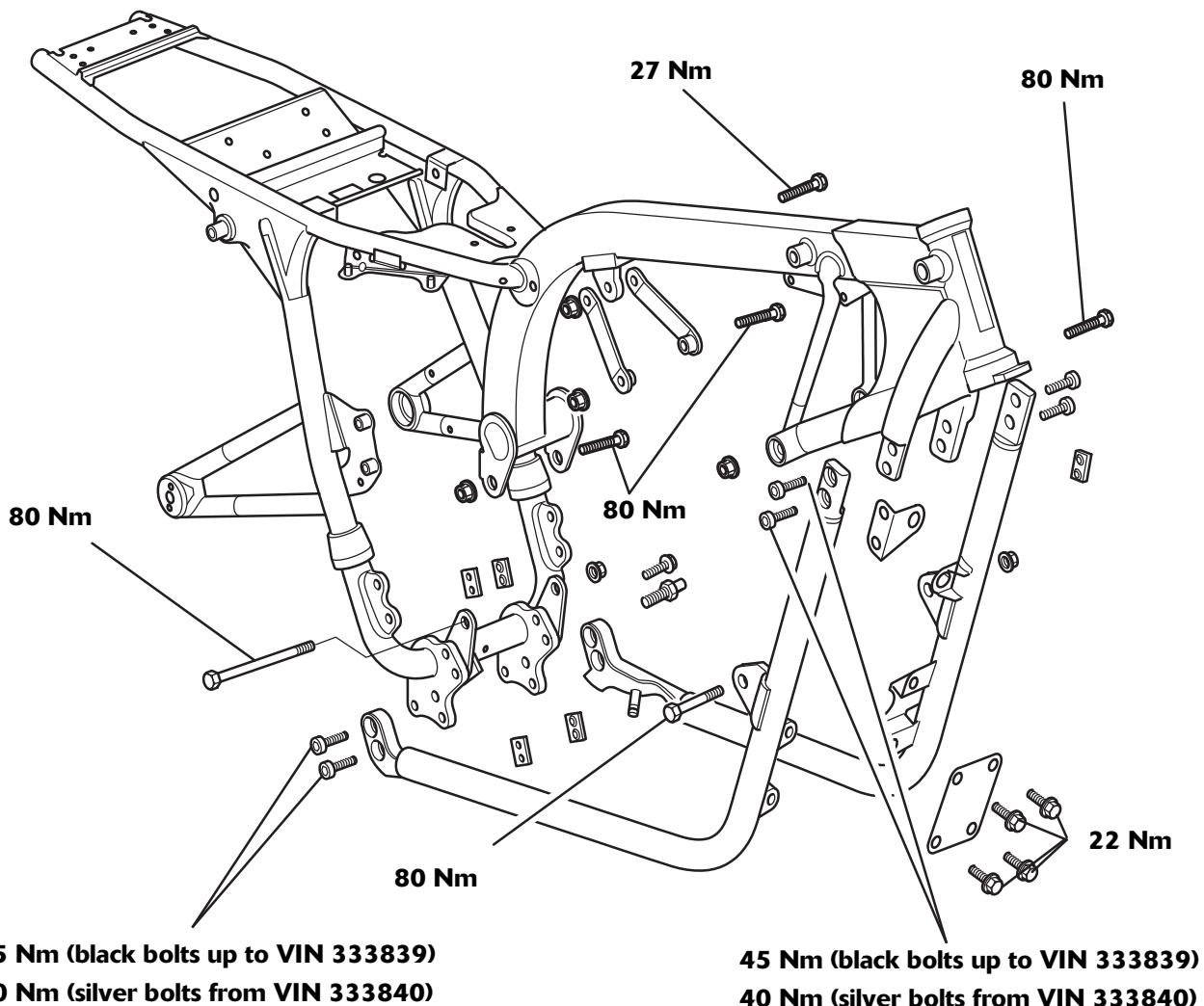
6 Engine Removal/Refit

Table of Contents

Exploded View - Engine Mountings	6.2
Engine - All Models.....	6.3
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Installation	6.5

Engine Removal/Refit

Exploded View - Engine Mountings



Engine - All Models

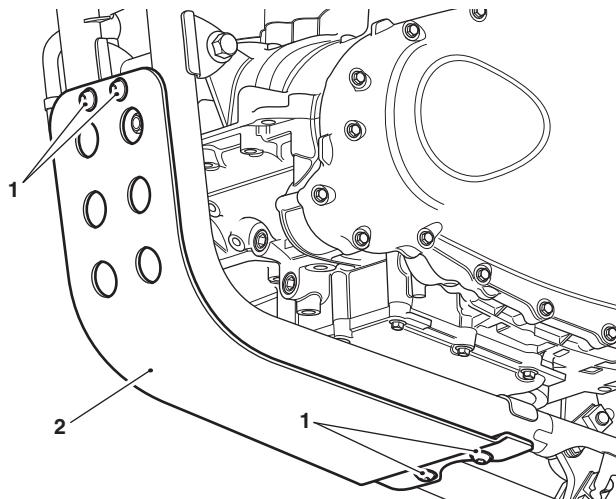
Removal

! Warning

Ensure that the motorcycle is stabilised and adequately supported to prevent the risk of personal injury from the motorcycle falling.

Carry out the following:

- Remove seat (see page 16-11).
- Disconnect battery, negative (black) lead first.
- Remove fuel tank (see page 10A-13 for carburettor models or page 10B-85 for fuel injected models).
- Remove the carburettors/throttle bodies (see page 10A-21 for carburettor models or page 10B-98 for fuel injected models).
- Remove the complete exhaust system (see page 10A-37 for carburettor models or page 10B-113 for fuel injected models).
- Remove the front sprocket (see page 14-9).
- Remove the swinging arm (see page 13-5).
- If fitted, remove the evaporative canisters.
- 1. If fitted, release the fixings and remove the skid pan.

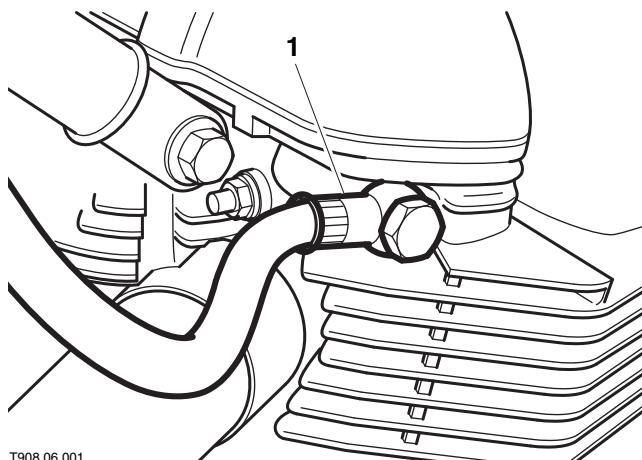


1. Fixings

2. Skid pan

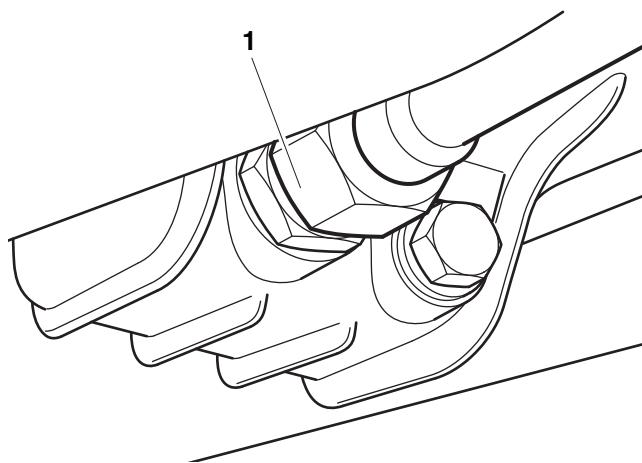
2. Drain the engine oil (see page 9-9). Once the oil has drained refit the sump plug, with a new sealing washer and torque to **25 Nm**.
3. Disconnect the spark plug caps from the plugs.
4. Remove the hoses connecting the secondary air system valve to the unions on the cylinder head.

5. Unscrew the banjo bolts securing the oil cooler feed pipes to the cylinder head. Discard the sealing washers.



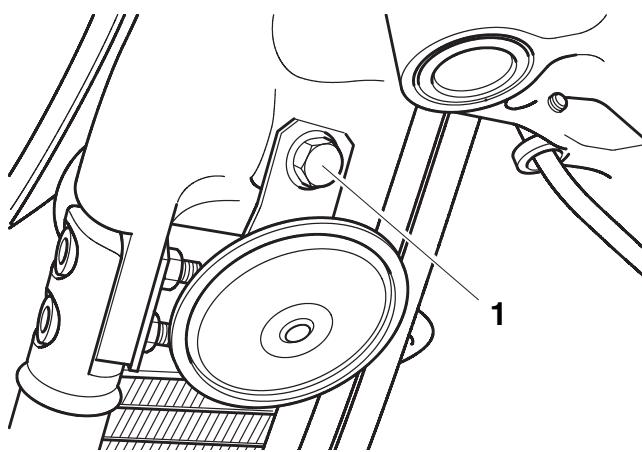
1. Oil cooler pipe connection (Bonneville shown)

6. Detach the oil cooler pipe from its connection with the sump. Discard the sealing washers if fitted.



1. Oil cooler sump connection

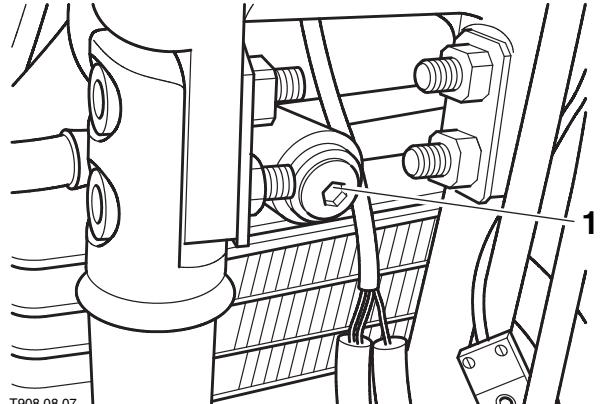
7. Unbolt the horn bracket from the frame and remove the horn, disconnect its wiring.



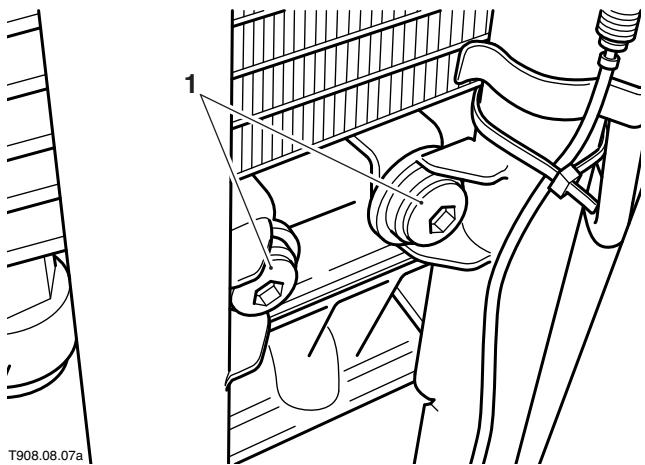
1. Horn bracket bolt

Engine Removal/Refit

8. Unscrew the oil cooler mounting screws then remove the oil cooler, complete with its hoses. Take care not to lose the collars from the cooler rubber mountings.

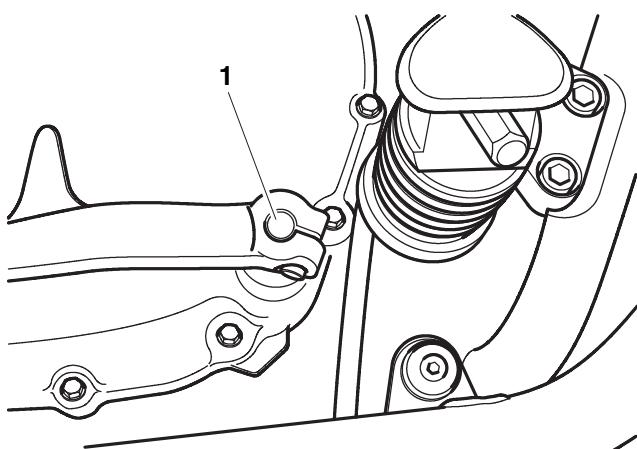


1. Oil cooler upper mounting screw



1. Oil cooler lower mounting screws

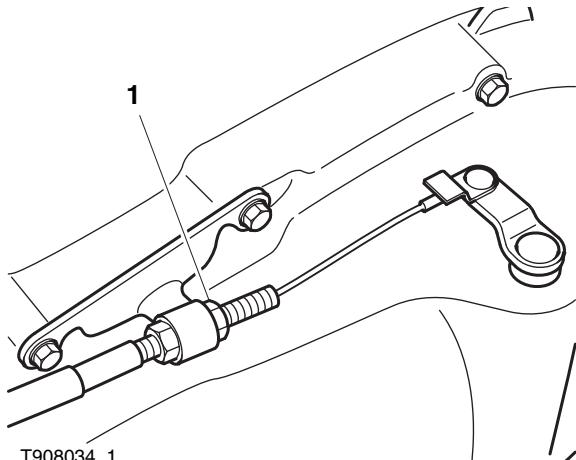
9. Note the position of the gearchange pedal/lever on its shaft then unscrew the clamp bolt and remove the pedal/lever.



1. Gearchange shaft (Bonneville)

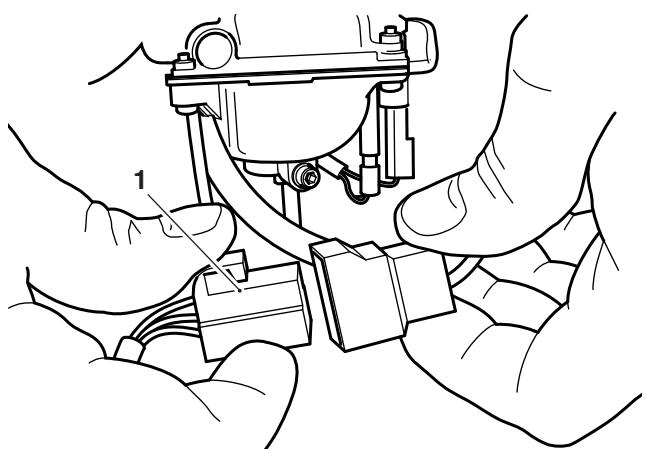
10. Slacken the lock nut and screw the clutch cable upper adjuster fully into the lever mounting bracket.

11. Slacken the clutch cable lower adjuster lock nut and back off the adjuster nut to give maximum freeplay in the cable.



1. Clutch cable lower adjuster

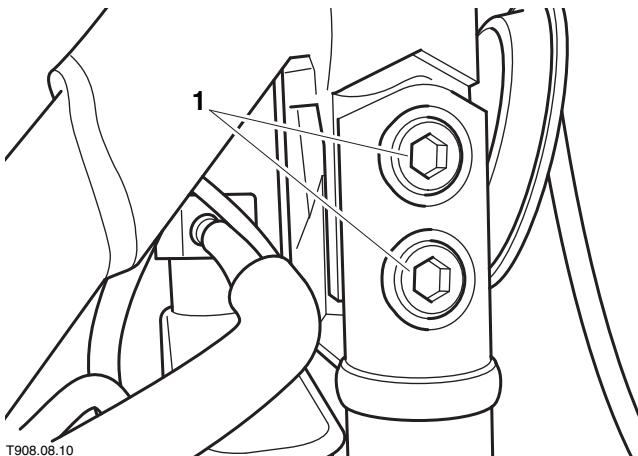
12. Free the clutch inner cable from the release arm then free the outer cable from its mounting bracket.
 13. Disconnect the breather hose from the top of the crankcase.
 14. Disconnect the following electrical connections from the engine:
 - Alternator
 - Low oil pressure warning light switch
 - Ignition pick-up coil
 - Neutral light switch
 - Earth lead



1. Alternator wiring connector

15. Unscrew the nut and detach the cable from the starter motor. Release the starter motor cable from the frame right downtube, noting its correct routing.
 16. Unscrew the nut and remove the front lower engine mounting bolt.
 17. Loosen the bolts securing the brace to the front of both downtubes.

- Unscrew the bolts (there are 8 in total) securing the downtubes to the frame. Recover the nut plate from each pair of bolts noting the correct location of the oil cooler bracket.



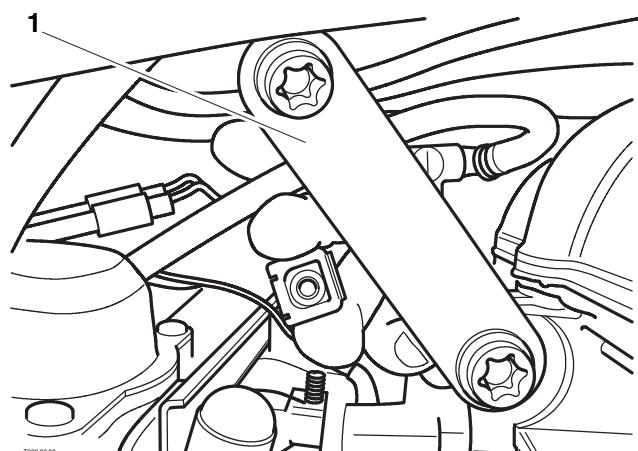
1. Downtube to frame bolts

- Remove the bolts and manoeuvre the downtube assembly away from the frame.
- Place a support beneath the engine and ensure that the motorcycle is still adequately and securely supported.

! Warning

Ensure both the frame and engine are securely supported before proceeding to prevent the risk of personal injury.

- Unscrew the nuts securing the mounting brackets to the rear of the cylinder head and the frame. Withdraw the bolts and remove both brackets.



1. Cylinder head to frame mounting bracket

- Unscrew the nut and withdraw the front upper engine mounting bolt from the cylinder head.
- Unscrew the nuts and withdraw the rear upper and lower engine mounting bolts.
- Lower the engine and release the earth cable from the rear.

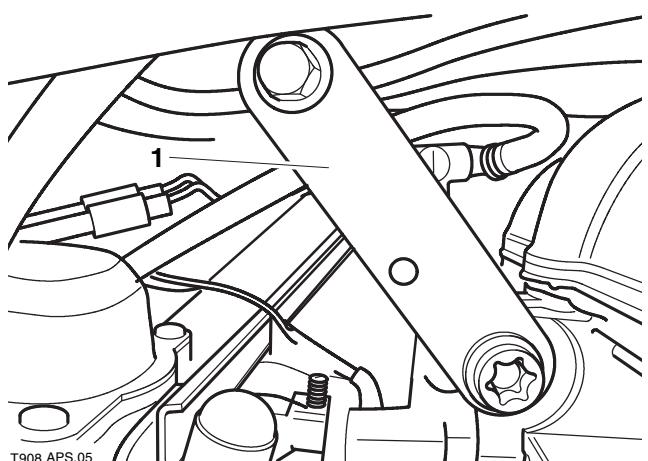
- With the aid of an assistant, manoeuvre the engine out from the frame.

Installation

! Warning

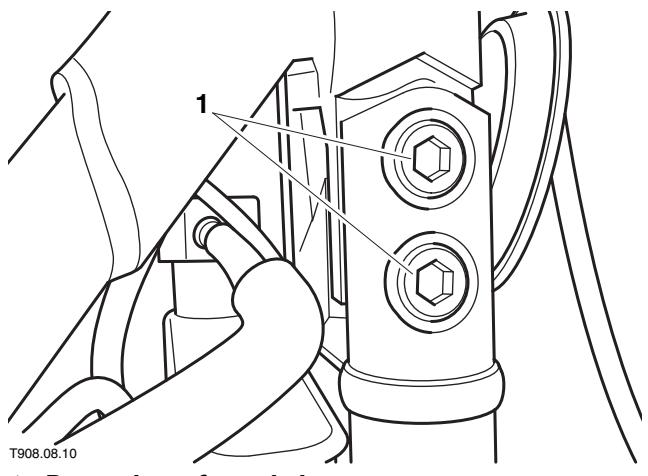
Ensure that the motorcycle is stabilised and adequately supported to prevent the risk of personal injury from the motorcycle falling.

- Position the engine beneath the frame.
- With the aid of an assistant, align the engine with its mountings and fit the rear upper and lower mounting bolts, from the right hand side. Fit the nuts to the bolts, tightening them hand-tight only.
- Fit the front upper engine mounting bolt from the right hand side and hand-tighten its nut.
- Refit the cylinder head to frame mounting brackets and fit the bolts and nuts, tightening them hand-tight only.



1. Cylinder head to frame mounting bracket

- Refit the downtube assembly and insert its mounting bolts. Fit the nut plates to the bolts, ensuring the oil cooler mounting bracket is correctly positioned, and hand-tighten all bolts.



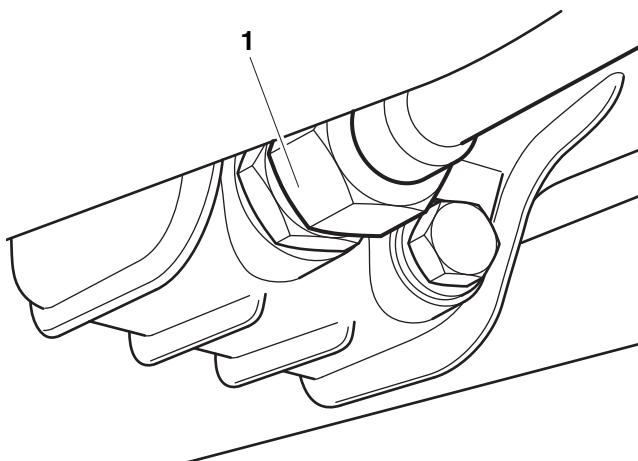
1. Downtube to frame bolts

Engine Removal/Refit

6. Insert the engine front lower mounting bolt from the right hand side and hand-tighten its nut.
7. Tighten the engine mounting bolts to the specified torque in the following order.
 - a) Tighten the frame downtube bolts to **45 Nm** if black bolts (T3050220) are fitted, and **40 Nm** if silver bolts (T3050224) are fitted.
 - b) Tighten the rear upper and lower bolts to **80 Nm**.
 - c) Tighten the front upper and lower bolts to **80 Nm**.
 - d) Tighten the bolt securing the mounting brackets to the cylinder head to **80 Nm** and the bolt securing the brackets to the frame to **27 Nm**.
 - e) Tighten the frame downtube brace bolts to **22 Nm**.
8. Ensure the starter motor cable is correctly routed and reconnect it to the motor. Tighten the terminal nut to **7 Nm**. Seat the rubber cap over the nut and secure the cable to the frame downtube.
9. Reconnect the alternator, ignition pick-up coil, low oil pressure warning light switch and neutral light wiring connectors and the earth lead. Ensure all wiring is correctly routed.
10. Reconnect the crankcase breather hose to the engine.
11. Reconnect and adjust the clutch cable (see page 5-5).
12. Position the gearchange pedal/lever as was noted prior to removal and fit it to the shaft. Tighten the clamp bolt to **8 Nm**.
13. Install the swinging arm (see page 13-6).
14. Refit the front sprocket (see page 14-9).
15. Manoeuvre the oil cooler assembly into position. Ensure the collars are fitted to the mounting rubbers then fit the cooler mounting screws and tighten to **9 Nm**.
16. Position a new sealing washer on each side of the oil cooler feed pipe end fittings then secure the pipes to the cylinder head with the banjo bolts. Tighten the bolts to **30 Nm**.
17. Check the condition of the O-ring in the sump to oil cooler pipe adaptor then locate the oil cooler pipe to the union and tighten to **15 Nm** while holding the adaptor.

Note:

- If a new oil cooler pipe adaptor is to be fitted, always use a new washer and tighten the adapter to **45 Nm**.
- If a banjo union is fitted, position a new sealing washer on each side of the oil cooler pipe end fitting and fit the banjo bolt. Ensure the hose is correctly positioned then tighten the banjo bolt to **45 Nm**.



1. Oil cooler sump connection

18. Reconnect the wiring connectors to the horn then seat the horn on the frame and tighten its mounting bolt to **24 Nm**.
19. Refit the hoses connecting the secondary air valve to the unions on the cylinder head.
20. Refit the HT leads to the spark plugs.
21. Install the exhaust system (see page 10A-37 for carburettor models or page 10B-111 for fuel injected models).
22. Install the carburettors/throttle bodies (see page 10A-22 for carburettor models or page 10B-99 for fuel injected models).
23. Install the fuel tank (see page 10A-13 for carburettor models or page 10B-88 for fuel injected models).
24. Fill the engine with the correct grade and type of engine oil (see page 9-10).
25. If removed, refit the skid pan and tighten its fixings to **18 Nm**.
26. Reconnect the battery, positive (red) lead first, then fit the seat (see page 16-11).

7 Crankshaft, Connecting Rods & Balancers

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Crankshaft, Connecting Rods & Balancers

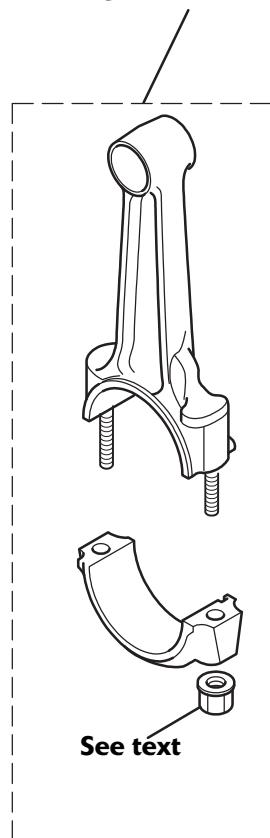
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Exploded View - Crankshaft and Connecting Rods - All Models except Scrambler

Up to engine number 197183

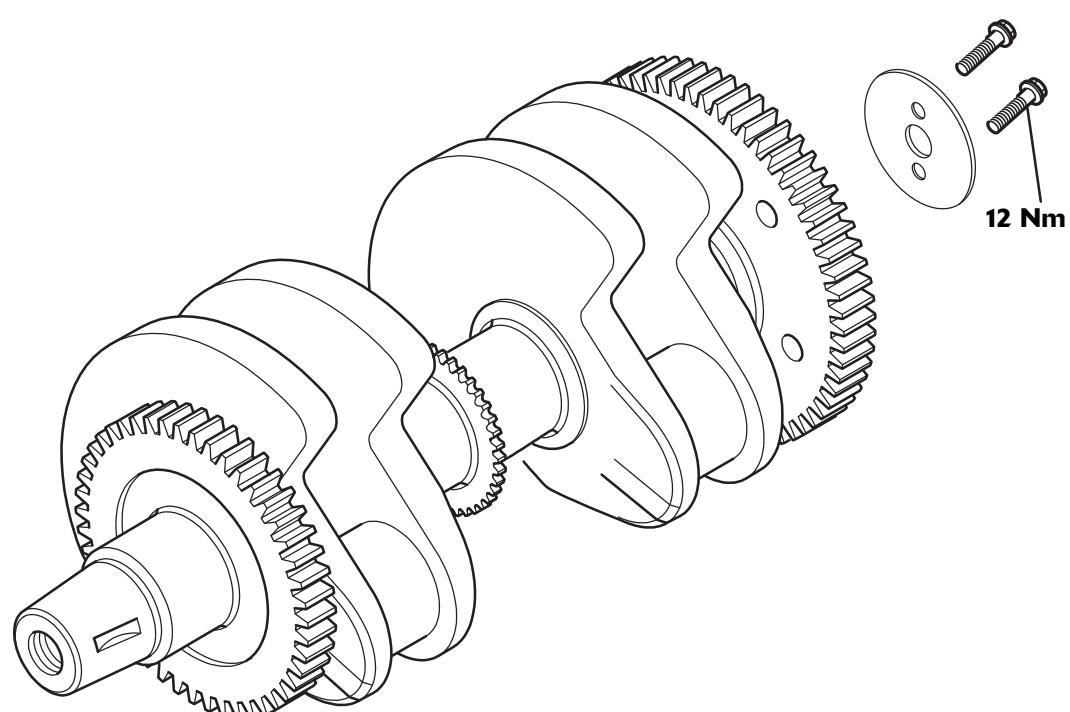
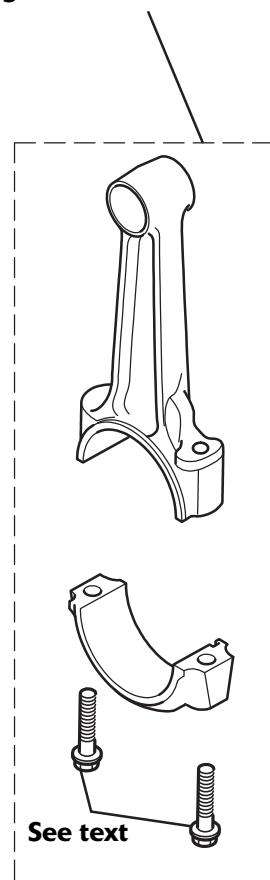
From engine number 253372 to 292625

From engine number 296931 onwards



Up to engine number 197184 to 253371

From engine number 292626 to 296930



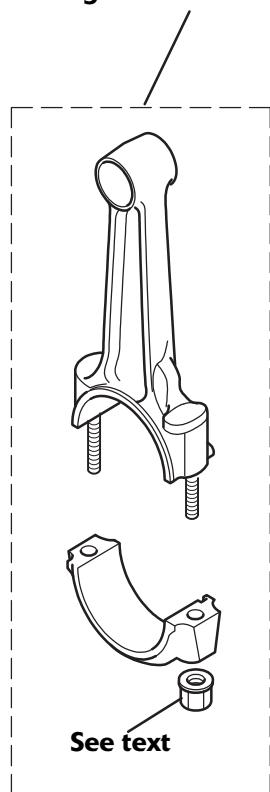
Crankshaft, Connecting Rods & Balancers

Exploded View - Crankshaft and Connecting Rods - Scrambler

Up to engine number 197183

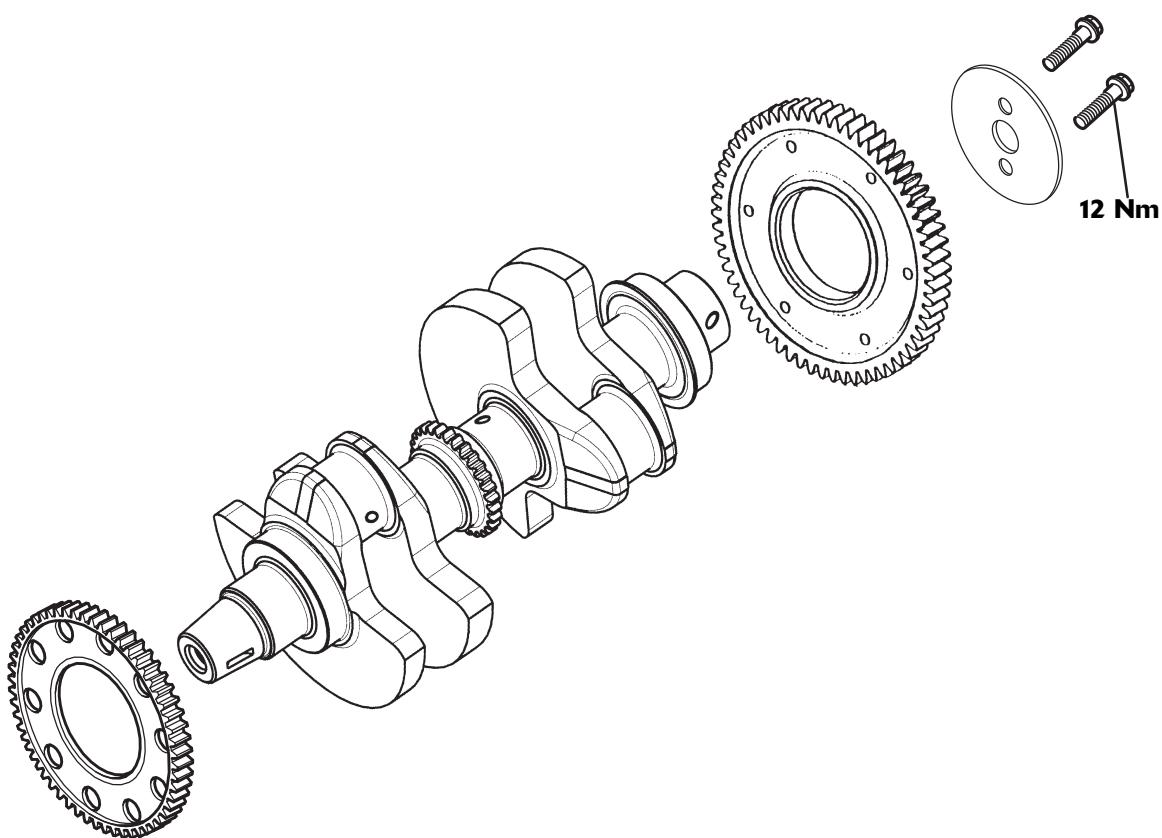
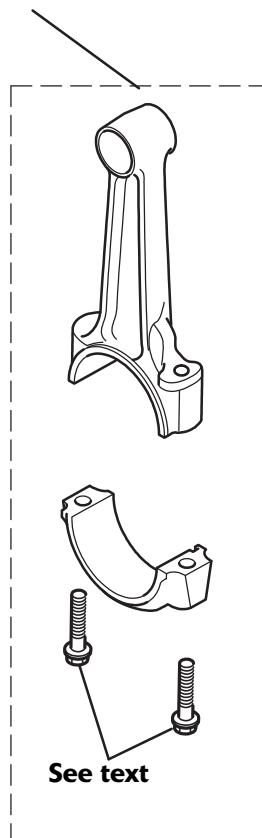
From engine number 253372 to 292625

From engine number 296931 onwards

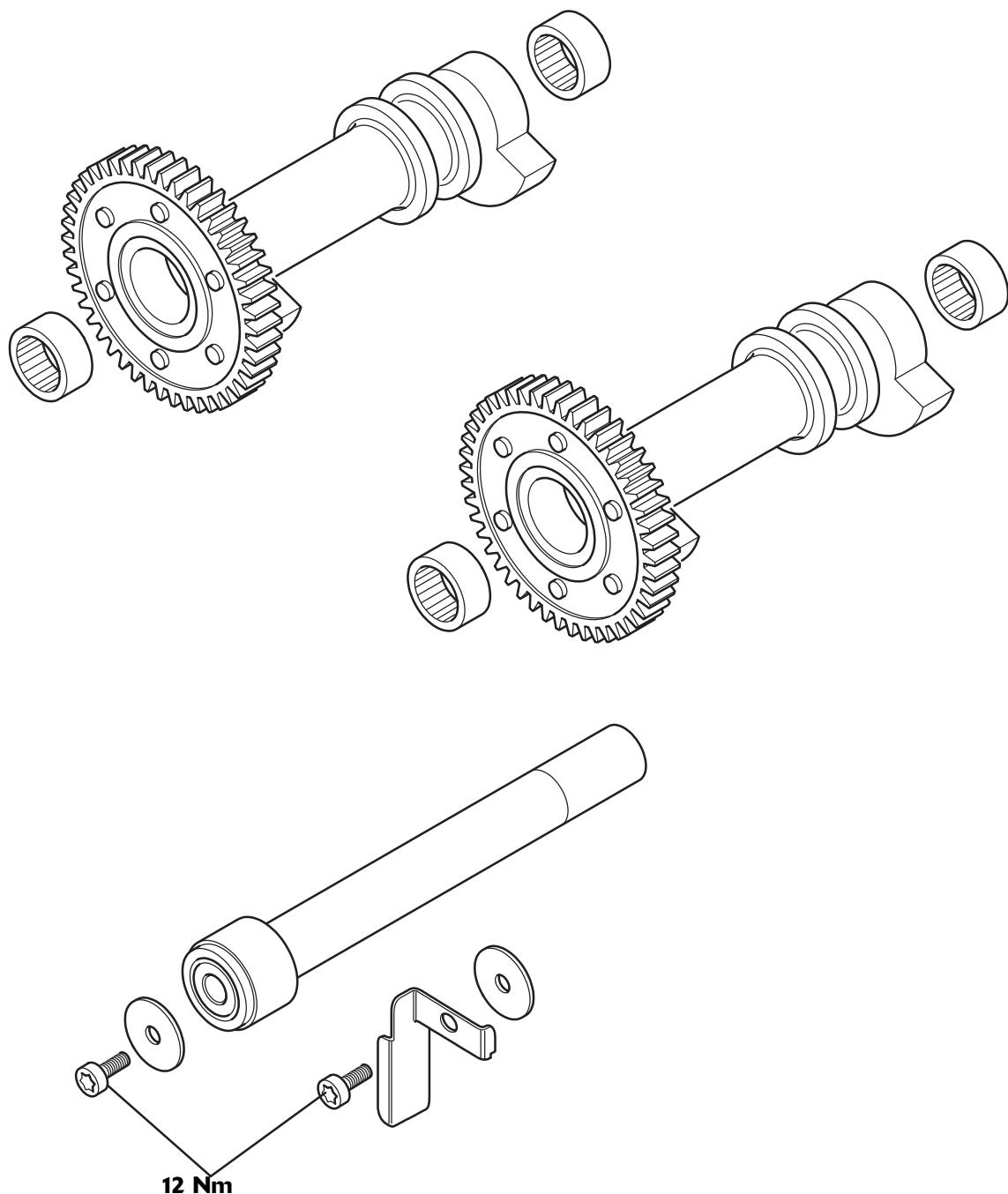


Up to engine number 197184 to 253371

From engine number 292626 to 296930



Exploded View - Balancers - All Models



Crankshaft, Connecting Rods & Balancers

Crankcases

Note:

- The crankcase consists of upper and lower halves which are machined as a matched set. They must never be assembled to non-matching halves.
- During production, three different sets of torque values have been used for crankcase bolts on this engine, depending on the plating finish used on the bolts. The tightening sequence has not changed. Pay particular attention to the crankcase bolts fitted to the engine you are working on and select the correct torque values. Refer to the table on page 7-8 for the correct torque values, then refer to the tightening sequence on page 7-9.

Disassembly

- Remove the engine from the frame (see page 6-3).
- Remove the following items (see relevant sections for removal details):
 - Alternator rotor (see page 17-35).
 - Clutch assembly (see page 5-9).
 - Starter motor (see page 17-42).
 - Sump and oil pick-up (see page 9-14).
 - Camshaft drive gear (only necessary if the crankshaft is to be removed) (see page 3-16).
 - Cylinder head (see page 3-18), barrels (see page 4-3) and pistons (see page 4-5) (only necessary if the connecting rods are to be removed).



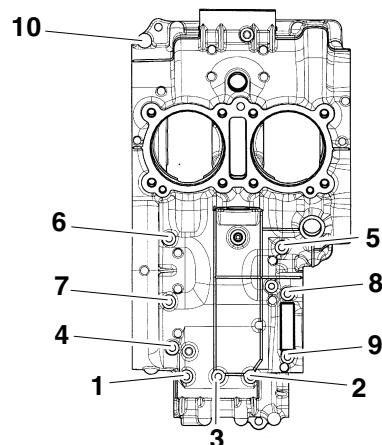
Caution

Failure to follow the correct bolt release sequence may result in permanent crankcase damage.

- With the engine upright, evenly and progressively slacken the upper crankcase bolts in the sequence shown. Once all bolts are loose, remove them.

Note:

- There are three different lengths of upper crankcase bolt (all bolts are M8).

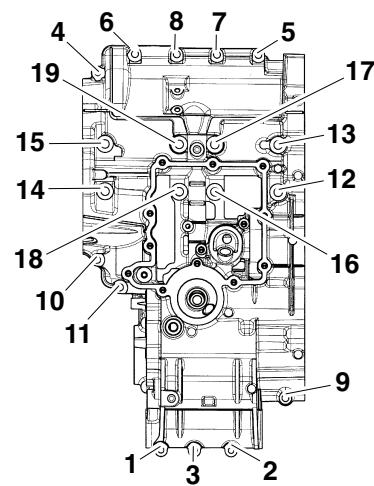


Upper Crankcase Bolt Slackening Sequence

- Invert the engine.
- Evenly and progressively slacken the lower crankcase bolts in the sequence shown. Once all bolts are loose, remove them.

Note:

- There are three different lengths of M8 lower crankcase bolt. The main bearing bolts are M10.



Lower crankcase bolt slackening sequence

- Lift the lower crankcase off from the upper crankcase, ensuring the transmission shafts remain in the upper crankcase. Take care not to lose the three locating dowels and the lower main bearing shells as the crankcase halves are separated. Store the lower main bearing shells in their correct fitted locations in the lower crankcase half.



Caution

Do not use levers to separate the upper and lower crankcase halves or damage to the crankcase halves could result.

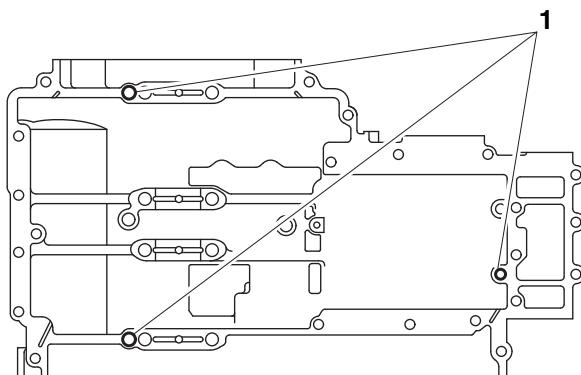


Caution

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

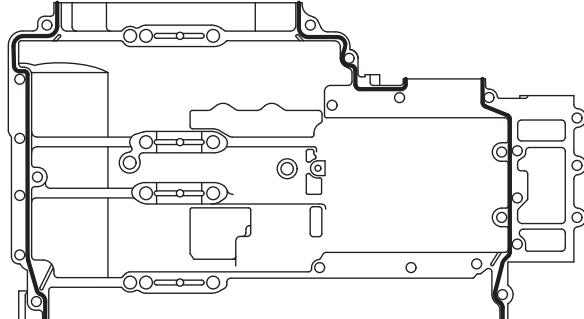
Assembly

1. Ensure that the balancer shafts (see page 7-18), transmission shafts (see page 8-4), crankshaft (see page 7-11) and connecting rods (see page 7-14) are all correctly fitted to the upper crankcase half.
2. Ensure the selector drum and forks (see page 8-7), oil pressure relief valve (see page 9-16) and lower main bearing shells (see page 7-12) are correctly fitted to the lower crankcase half.
3. Position the transmission shafts and the selector drum in the neutral position.
4. Ensure that the three locating dowels are located in the upper crankcase.



1. Dowels

5. Using a high-flash point solvent, clean the mating surfaces of both crankcase halves. Wipe the surfaces clean with a lint-free cloth.
6. Apply a thin (1.5 to 2 mm thick) bead of silicone sealant (such as ThreeBond 1216 liquid gasket) to the lower crankcase mating surface as shown in the diagram.



T908.06.01a

Sealer Areas Shown Bold

7. Lubricate the crankshaft journals, lower main bearing shells and selector forks with a 50/50 solution of engine oil and molybdenum disulphide grease.
8. Align the lower crankcase half with the upper half and lower it carefully onto the dowels, ensuring the lower main bearing shells remain in position.



Caution

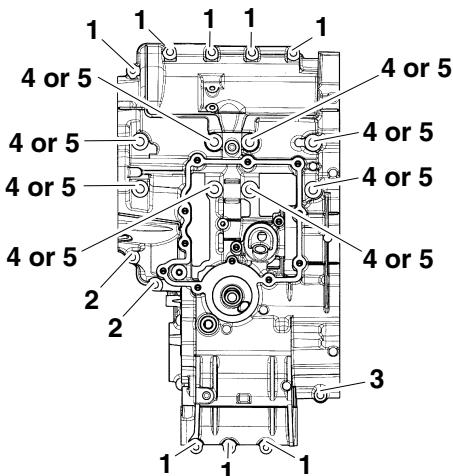
Do not force the lower crankcase half onto the upper half. If the lower half will not seat properly, lift it off again and check that the selector forks and gears are correctly positioned. NEVER USE THE BOLTS TO DRAW THE CRANKCASE HALVES TOGETHER.

Note:

- All crankcase bolt threads and under-head areas MUST be oil-free at the point of fitment.
- Check and note the colour of the M10 bolts as this detail will become important later on in the assembly procedure.

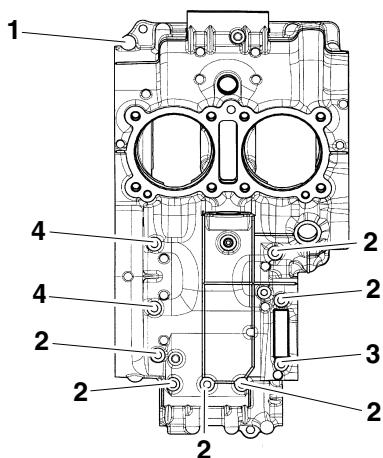
Crankshaft, Connecting Rods & Balancers

- Once the crankcase halves are correctly assembled, fit the lower crankcase bolts in their correct locations and hand-tighten them.



Lower Crankcase Bolt Locations

- M8 x 35 mm**
- M8 x 43 mm**
- M8 x 80 mm**
- M10 x 118.5 mm (up to engine number 307173 for Bonneville and T100, and up to engine number 326093 for Thruxton and Scrambler)**
- M10 x 120.5 mm (from engine number 307174 for Bonneville and T100, and from engine number 326094 for Thruxton and Scrambler)**
- Turn the crankcase assembly over and install the upper crankcase bolts in their correct locations and hand-tighten them.



Upper Crankcase Bolt Locations

- M8 x 35 mm**
- M8 x 80 mm**
- M8 x 105 mm**
- M8 x 130 mm**

Caution

The table on this page describes the torque values used on each of the crankcase bolts. The first two sets of values are selected according to the colour of the M10 size (main bearing) crankcase bolts, the third set of values are selected by engine number. Carefully check which M10 bolts are fitted to the engine being worked on before tightening and select the correct torque values.

Failure to use the correct tightening torques will result in a tight engine and premature wear of a range of engine components.

Model and main bearing bolt description	Stage 1 all bolts	Stage 2 M10 main bearing bolts	Stage 3 All M8 bolts
Carburettor models with silver M10 x 118.5 mm bolts	10 Nm	40 Nm	32 Nm
Carburettor models with olive green M10 x 118.5 mm bolts	10 Nm	75°	32 Nm
Carburettor and EFI Bonneville, Bonneville SE and Bonneville T100 models from engine number 307174 with silver M10 x 120.5 mm bolts	10 Nm	75°	32 Nm
Carburettor and EFI Scrambler and Thruxton models from engine number 326094 with silver M10 x 120.5 mm bolts	10 Nm	75°	32 Nm

Tightening Procedure

- Stage 1** - Invert the crankcase assembly then tighten the lower crankcase bolts to **Stage 1** (as described in the table on page 7-8) in the specified sequence.



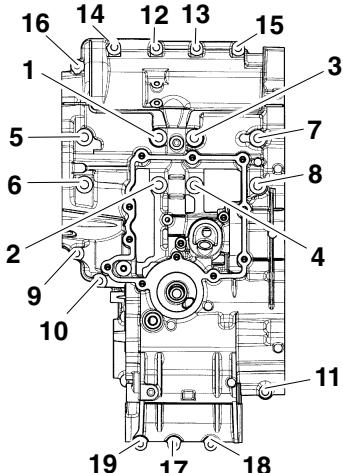
Caution

Failure to use the correct tightening torques will result in a tight engine and premature wear of a range of engine components.



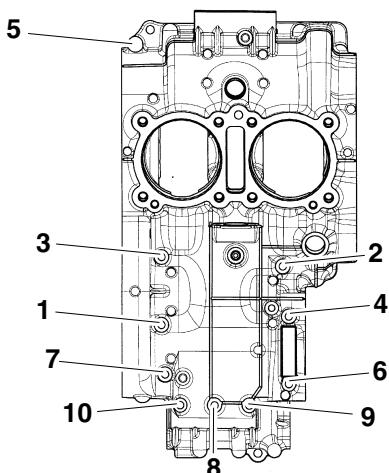
Caution

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



Upper Crankcase Bolt Tightening Sequence

- Turn the crankcase assembly over then tighten the upper crankcase bolts to **Stage 1** (as described in the table on page 7-8) in the specified sequence.

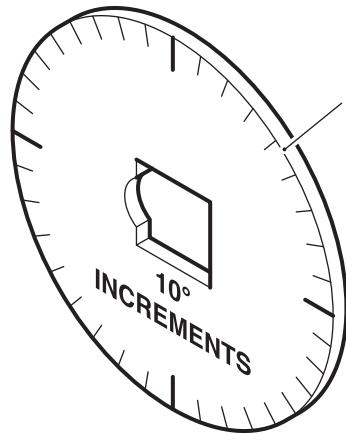


Lower Crankcase Bolt Tightening Sequence



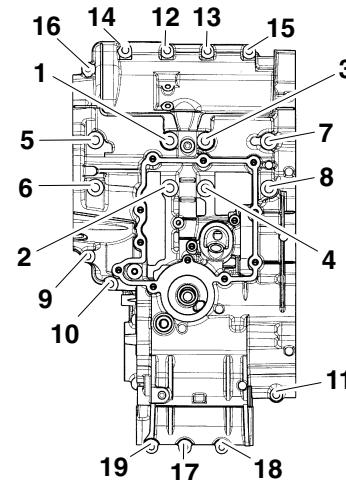
Note:

- Use service tool T3880105 to ensure accuracy when angle-tightening.**



Service Tool T3880105

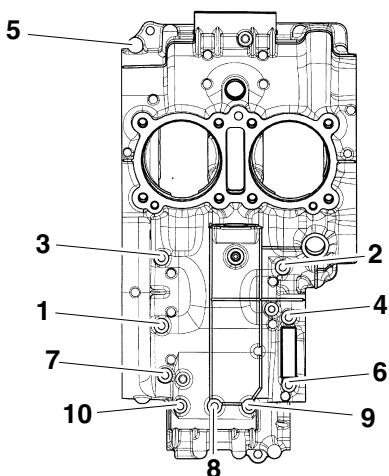
- Stage 2** - Turn the crankcase assembly over then tighten the M10 main bearing bolts in the lower crankcase (bolts 1 to 8) to **Stage 2** (as described in the table on page 7-8) in the specified sequence.
- Stage 3** - Tighten the remaining lower crankcase bolts (bolts 9 to 19) to **Stage 3** (as described in the table on page 7-8) in the specified sequence.



Lower Crankcase Bolt Tightening Sequence

Crankshaft, Connecting Rods & Balancers

- Turn the crankcase assembly over then tighten the upper crankcase bolts to **Stage 3** (as described in the table on page 7-8) in the specified sequence.



Upper Crankcase Bolt Tightening Sequence

- Check that the crankshaft and transmission shafts rotate smoothly. Investigate and rectify any problems before proceeding.
- Refit the following items (see relevant sections for installation details).
 - Alternator rotor (see page 17-36).
 - Clutch assembly (see page 5-11).
 - Starter motor (see page 17-42).
 - Sump and oil pick-up (see page 9-15).
 - Pistons (see page 4-7), barrels (see page 4-4) and cylinder head (see page 3-21) (where removed).
 - Camshaft drive gear (see page 3-17) (where removed).
- Refit the engine to the frame (see page 6-5).

Crankshaft

Note:

- New connecting rod big-end fixings will be required on installation.
- If the pistons have been removed, the crankshaft can be removed complete with connecting rods (if required).

Removal

- Disassemble the crankcase halves (see page 7-6).
- Remove the connecting rods (see page 7-13).

Caution

Support the connecting rods as they are freed from the crankshaft to prevent them falling against the cylinder bores and causing damage.

- Lift the crankshaft, complete with camshaft drive chain, out from the upper crankcase half. Ensure all upper main bearing shells remain in position in the crankcase.

Caution

Never move the connecting rods down past BDC. If a rod is moved too far down, the piston rings will be released from the base of their bore and the piston will become trapped between the barrels and crankcase.

Inspection

- Remove all main and big-end bearing shells. Inspect for damage, wear, overheating (blueing) and any other signs of deterioration. Fit a new set of main and/or big-end bearing shells if damage, wear, overheating or deterioration is found. If a new set of bearing shells are being fitted, use the bearing selection processes detailed later in this section.
- Inspect the crankshaft bearing surfaces for grooves or pitting and measure the diameter of each journal. If any grooving or pitting is found, or if any of the journals are worn beyond the specified limits, fit a new crankshaft.

Crankshaft, Connecting Rods & Balancers

Main Bearing Journal Diameter:

Standard	37.960 to 37.976 mm
Service limit	37.936 mm

Big-end Bearing Journal Diameter:

Standard	40.946 to 40.960 mm
Service limit	40.932 mm

- Check crankshaft end float. If the crankshaft end float is outside the specified service limits, the crankshaft and/or the crankcase must be renewed.

Crankshaft End Float:

Standard	0.05 to 0.20 mm
Service limit	0.4 mm

- Inspect the balancer gear, primary drive gear and cam chain gear for damage or wear. If either gear is damaged, the crankshaft must be renewed.

Installation



Caution

Always check the bearing journal clearances, as described later in this section, before final assembly of the crankshaft. Failure to select the correct bearing shells will result in severe engine damage.



Caution

Never re-use connecting rod fixings. If a connecting rod cap is disturbed, always discard the fixings and fit new ones. Using the original fixings may lead to big end bolt fractures causing severe engine damage.

- In order to enable the balancer timing to be easily set, remove the rear balancer.

Note:

- It is possible to time both balancers as the crankshaft is fitted but this is a more difficult procedure.**
- The balancer timing procedure is described later in this section.**

- Where connecting rods are fitted with nuts and bolts, install new bolts.

Note:

- Use a soft-faced mallet to remove the old bolts.**
- The new connecting rod big-end fixings are coated with an anti-rust solution which must not be removed.**
- Ensure each bolt is pressed fully into the connecting rod.**
- Ensure the upper big-end bearing shells are correctly fitted to the connecting rods and the upper main bearing shells are correctly installed in the crankcase.

Note:

- If new bearing shells are to be fitted, always follow the selection process described elsewhere in this section.**
- The bearing shells are keyed and can only be fitted one way.**
- Lubricate the running surfaces of all bearing shells in the connecting rods with a 50/50 solution of engine oil and molybdenum disulphide grease.
- Ensure that the crankshaft is clean and that the oilways within the crankshaft are free from blockages and debris.
- Fit the camshaft drive chain to the crankshaft and locate it on its sprocket.
- Lower the crankshaft and camshaft drive chain into position. As the gears mesh, align the timing mark on the crankshaft gear with the timing mark on the front balancer gear, then seat the crankshaft in the crankcase.
- Ensure the crankshaft and front balancer gears are correctly timed then install the rear balancer.
- Refit the connecting rods (see page 7-14).
- Assemble the crankcase upper and lower halves (see page 7-7).

Crankshaft, Connecting Rods & Balancers

Main Bearing Shell Selection and Journal Clearance Check

Shell Selection

- To allow for tolerances during manufacture, four different thicknesses of main bearing shell are produced. The shells are colour-coded for identification purposes (White, Red, Blue or Green); the identification mark being in the form of a paint marking on the edge of the shell. Bearing shell selection procedure is listed below.
- Measure each crankshaft main bearing journal diameter.
- Assemble the crankcase halves with the crankshaft and main bearing shells removed and measure each crankcase main bearing bore diameter.
- Select the correct thickness bearing shells required for each journal using the following table. The crankshaft journal diameter is given along the top and the crankcase bore size down the side; the correct bearing thickness required is given at the point of intersection.

	Crankshaft journal diameter (millimetres)	
Crankcase bore dia.	37.960 - 37.968	37.969 - 37.976
41.104 to 41.112 mm	Red	White
41.113 to 41.121 mm	Blue	Red
41.122 to 41.130 mm	Green	Blue

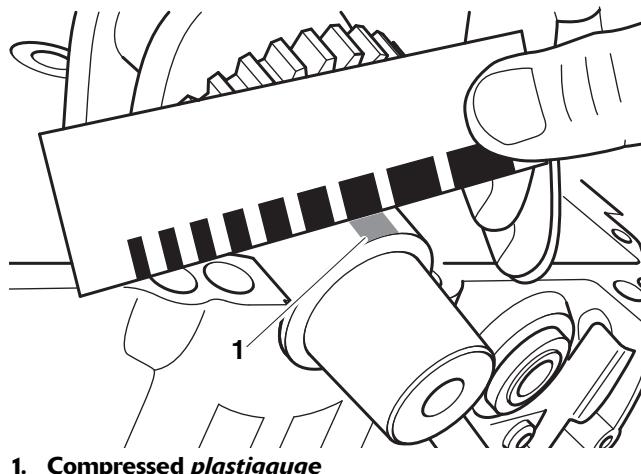
Journal Clearance Check

- The main bearing journal clearances are measured using *plastigauge* (Triumph part number 3880150-T0301) as follows.
 - Ensure all upper and lower main bearing shells are correctly fitted to the crankcase halves.
 - Wipe clean the bearing shells and crankshaft journals then lay the crankshaft in position in the upper crankcase.
 - Apply a thin smear of grease to the exposed part of each main bearing journal and a small quantity of silicone release agent to each lower bearing shell.
 - Size a piece of *plastigauge* to fit across each main bearing journal.

- Fit the *plastigauge* to each main bearing journal, using the grease to hold it in place.
- Carefully reassemble the crankcases, taking care not to rotate the crankshaft. Fit the M10 main bearing bolts and tighten the bolts to the specified torque in the specified sequence (see crankcase reassembly).

Note:

- Do not allow the crankshaft to rotate as the crankcases are assembled/separated. Any rotation of the crankshaft will distort the *plastigauge*, resulting in a false reading.**
- Remove the main bearing bolts and separate the crankcase halves, again taking care not to rotate the crankshaft.
- Using the gauge provided with the *plastigauge* kit, measure the width of the compressed *plastigauge* to obtain the journal clearance.



1. Compressed *plastigauge*

Main Bearing Journal Clearance:

Standard	0.019 to 0.044 mm
Service limit	0.10 mm

- If the clearance exceeds the specified limits, select a complete new set of bearing shells and repeat the check.
- If the clearance still exceeds the specified limits with new shells of the correct thickness, the crankshaft must be worn and will have to be renewed.

Connecting Rods



Warning

Two different types of connecting rod have been fitted to Bonneville, Bonneville T100, Thruxton and Scrambler models.

The two connecting rod types are not interchangeable and must be renewed as a set. Severe engine damage could result from mixing connecting rod types, leading to loss of motorcycle control and an accident.

Identification

Bonneville, Bonneville T100, Thruxton and Scrambler models have had two different types of connecting rod installed during manufacture. The two connecting rod types can be identified as follows:

- The first type used during manufacture can be identified by its size marking - letter markings (A or B) or numerical markings (4 or 5) - with big ends secured with nuts and bolts.
- The second type has no size markings; and uses a fracture split big end secured only with bolts.

Note:

- New connecting rod big-end fixings will be required on installation.**

Removal

- Disassemble the crankcase halves (see page 7-6).
- Rotate the crankshaft to bring each piston to BDC.

Note:

- This must be done one piston at a time on Scrambler engines.**
- Mark each connecting rod big-end cap to show its correct fitted location and orientation prior to removal (see installation for details of rod markings).

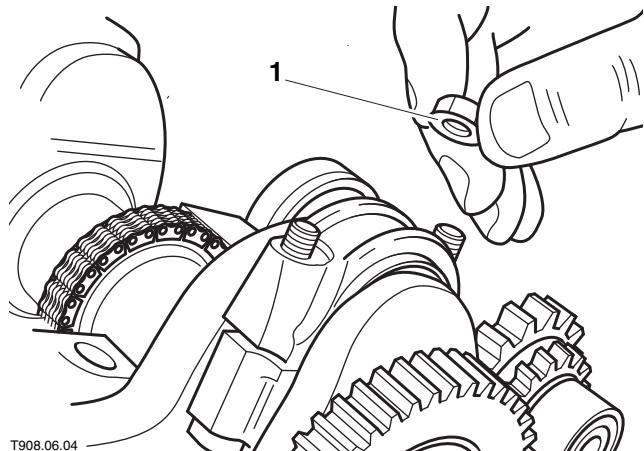


Caution

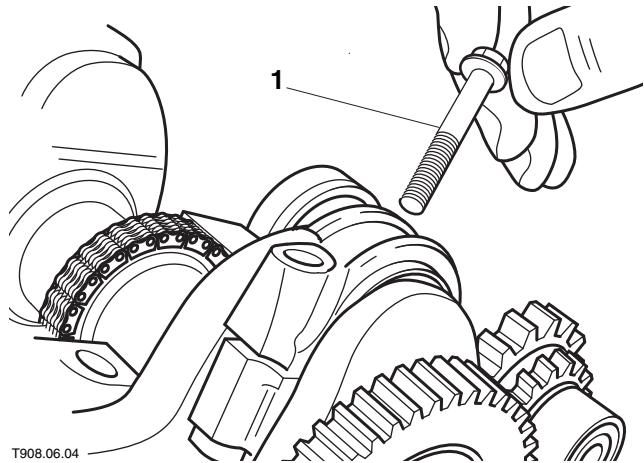
The big end caps and connecting rods on fracture split connecting rods have unique joint faces. The big end caps MUST be fitted in the same orientation as removal, and the big end caps must be installed to the connecting rods from which they are removed.

When correctly installed, the bearing shell locating notches will be adjacent to each other. Severe engine or connecting rod damage will result from incorrect fitment.

- Evenly and progressively slacken and remove the big-end cap nuts/bolts.

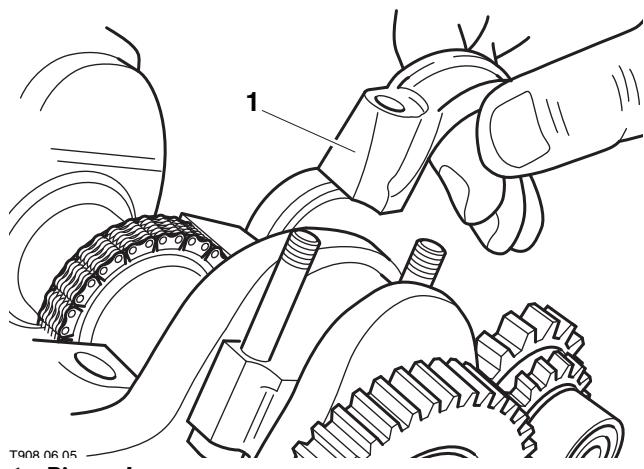


1. Big-end cap nut



1. Big-end cap bolt

- Remove the big-end cap, complete with the lower bearing shell and remove the connecting rod, complete with the upper bearing shell.



1. Big-end cap

Crankshaft, Connecting Rods & Balancers

- Reassemble the rod and cap, complete with bearings, to keep all components together.

Note:

- If both connecting rods are being removed, mark each rod in some way to ensure it is refitted in its original location.

Inspection

- Remove the bearing shells and inspect for damage, wear, overheating (blueing) and any other signs of deterioration. Fit a new set of big-end bearing shells if damage, wear, overheating or deterioration is found.

Installation



Caution

Always check the big-end bearing journal clearances, as described later in this section, before final assembly of the connecting rods. Failure to select the correct big-end bearing shells will result in severe engine damage.



Caution

Never re-use connecting rod fixings. If the connecting rod cap is disturbed, always discard the fixings and fit new ones. Using the original fixings may lead to severe engine damage.

- Where connecting rods are fitted with nuts and bolts, install new bolts.

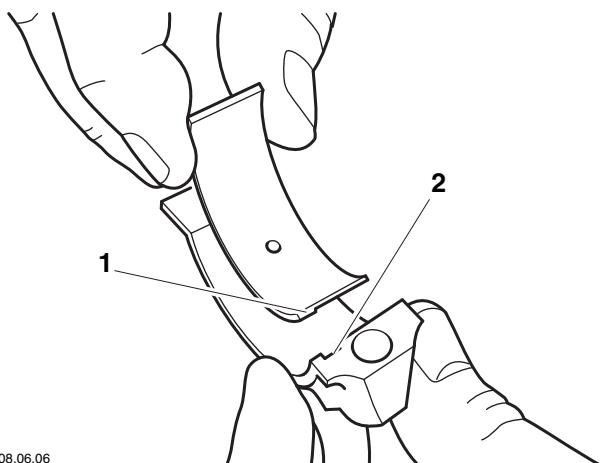
Note:

- Use a soft-faced mallet to remove the old bolts.
 - New connecting rod big-end fixings are coated with an anti-rust solution which must not be removed.
 - Ensure, if fitted, each bolt is pressed fully into the connecting rod.
- Set the crankshaft to BDC. Each connecting rod can then be installed as follows.

Note:

- This must be done one connecting rod at a time on Scrambler engines.

- Ensure the bearing shells are correctly fitted to the connecting rod and cap. Lubricate the surfaces of the shells and crankshaft journal with a 50/50 solution of engine oil and molybdenum disulphide grease.



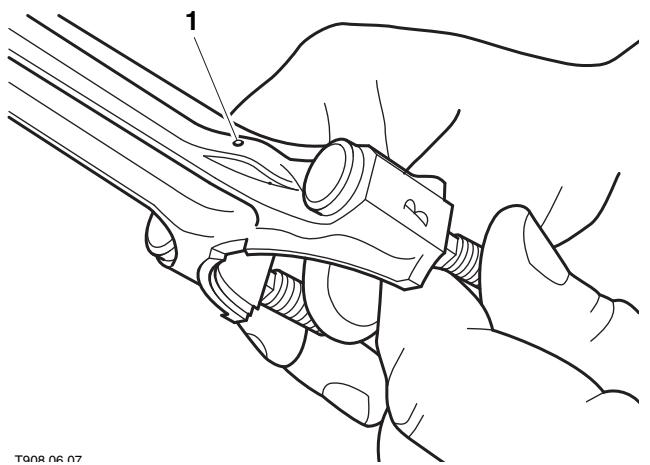
T908.06.06

1. Bearing shell tab

2. Cut-out

Note:

- If new bearing shells are to be fitted, always follow the selection process described elsewhere in this section.
 - The bearing shells are keyed and can only be fitted one way.
 - Where connecting rods are fitted with bolts only, when fitting the bearing shells to the connecting rods, it is normal for a shaving of shell material to be cut from the back of the shell. Ensure that this shaving is removed before the two halves of the connecting rod are assembled.
- Fit the connecting rod and upper bearing shell to the crankshaft ensuring the connecting rod oil hole is facing towards the rear of the engine.



T908.06.07

1. Connecting rod oil hole



Caution

The big end caps and connecting rods on fracture split connecting rods have unique joint faces. The big end caps MUST be fitted in the same orientation as removal, and the big end caps must be installed to the connecting rods from which they are removed.

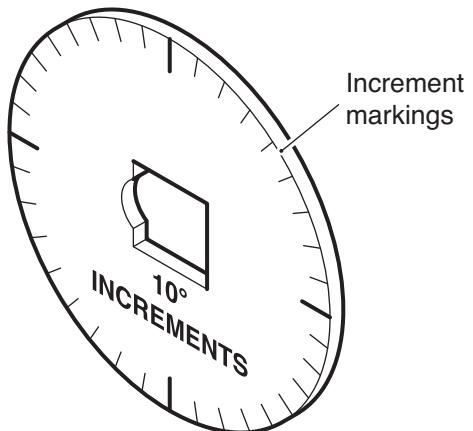
When correctly installed, the bearing shell locating notches will be adjacent to each other. Severe engine or connecting rod damage will result from incorrect fitment.

Note:

- If the connecting rod is being refitted, ensure it is fitted in its original location.
- Ensure that the big-end cap is fitted the right way around (the size group marking on the cap and the weight group marking on the rod should both be facing the rear).
- 5. Fit the big-end cap and lower bearing shell to the connecting rod.

Note:

- Use service tool T3880105 to ensure accuracy when angle-tightening.



cbxt

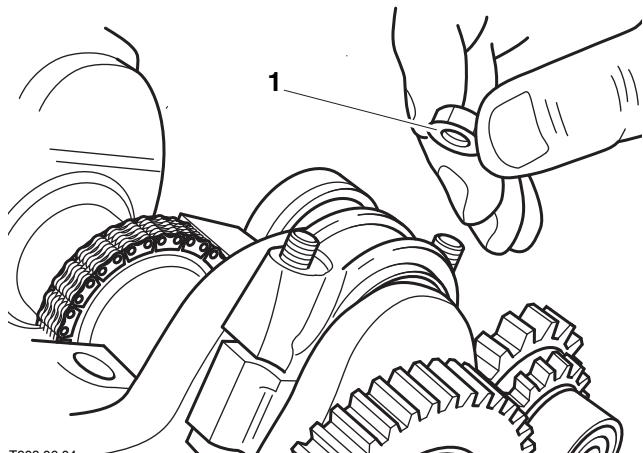
Service Tool T3880105



Caution

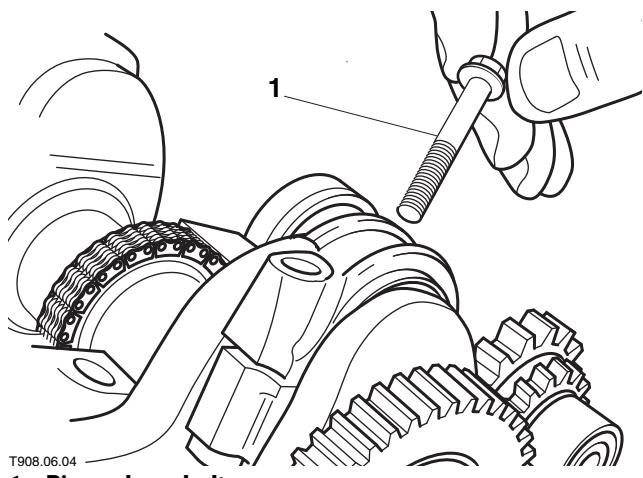
The procedure for tightening connecting rods secured with nuts and bolts and fracture split connecting rods secured only with bolts is different. Refer to the correct procedure as shown below/overleaf. Failure to use the correct procedure to tighten the connecting rod big-end fixings could result in failure of the fixings in service, leading to serious engine damage.

6. Where connecting rods are fitted with **nuts and bolts**, lubricate the threads and the face of the new nuts with molybdenum disulphide grease then fit the nuts to the big-end bolts.



T908.06.04
1. Big-end cap nut

7. Tightening the big end nuts is a five-stage process as follows:
 - a) Evenly and progressively tighten the big-end nuts to **22 Nm**.
 - b) Release (undo) the big-end nuts through **140°**.
 - c) Evenly and progressively tighten the big-end nuts to **10 Nm**.
 - d) Evenly and progressively tighten the big-end nuts to **14 Nm**.
 - e) Evenly and progressively tighten the big-end nuts through **120°**.
8. Where connecting rods are fitted with **bolts** only, lubricate the threads and under the head areas of the new bolts with molybdenum disulphide grease then fit the bolts to the big-end.



T908.06.04
1. Big-end cap bolt

Crankshaft, Connecting Rods & Balancers

9. Tightening big end bolts is a two-stage process as follows:
 - a) Evenly and progressively tighten both big-end bolts to **14 Nm**.
 - b) Evenly and progressively tighten both big-end bolts through **120°**.
10. Check the connecting rod is free to rotate smoothly on its journal. Investigate any problems before proceeding.
11. With both connecting rods correctly installed, assemble crankcase upper and lower halves (see page 7-7).

Big-end Bearing Shell Selection and Journal Clearance Check



Warning

Two different types of connecting rod have been fitted to Bonneville, Bonneville T100, Thruxton and Scrambler models.

The two connecting rod types are not interchangeable and must be renewed as a set. Severe engine damage could result from mixing connecting rod types, leading to loss of motorcycle control and an accident.

Identification

Bonneville, Bonneville T100, Thruxton and Scrambler models have had two different types of connecting rod installed during manufacture. The two connecting rod types can be identified as follows:

- The first type used during manufacture can be identified by its size marking - letter markings (A or B) or numerical markings (4 or 5) - with big ends secured with nuts and bolts.
- The second type has no size markings; and uses a fracture split big end secured only with bolts.

Shell Selection - with Big Ends Secured with Nuts and Bolts

- Models up to engine number 197183.
- Models from engine number 253372 to 292625.
- Models from engine number 296931 onwards.

Note:

- **To allow for tolerances during manufacture, THREE different thicknesses of big-end bearing shell are produced. The shells are colour-coded for identification purposes (White, Red or Blue); the identification mark being in the form of a paint marking on the edge of the shell. Bearing shell selection is as follows.**

1. Measure each crankshaft big-end bearing journal diameter.
2. Note the connecting rod big-end bearing bore size group marking (A or B) which is etched on the rear of the big-end cap.
3. Select the correct thickness bearing shells required for each connecting rod using the following table. The crankshaft big-end journal diameter is given along the top and the connecting rod size group down the side; the correct bearing thickness required is given at the point of intersection.

Crankshaft, Connecting Rods & Balancers

Models up to engine number 197183

Models from engine number 253372 to 292625

Models from engine number 296931 onwards

	Crankshaft journal diameter (millimetres)	
Rod size group	40.946 - 40.953	40.954 - 40.960
A	Red	White
B	Blue	Red

Shell Selection - Fracture Split Big Ends

Secured with Bolts

- Models from engine number 197183 to 253371.
- Models from engine number 292626 to 296930.

Note:

- To allow for tolerances during manufacture, TWO different thicknesses of big-end bearing shell are produced. The shells are colour-coded for identification purposes (White or Red); the identification mark being in the form of a paint marking on the edge of the shell. Bearing shell selection is as follows.

1. Measure each crankshaft big-end bearing journal diameter.
2. Select the correct thickness bearing shells required for each connecting rod using the following table.

Models from engine number 197183 to 253371

Models from engine number 292626 to 296930

	Crankshaft journal diameter (millimetres)	
	40.946 - 40.953	40.954 - 40.960
Bearing shell colour	Red	White

Journal Clearance Check

1. The big-end bearing journal clearances are measured using "plastigauge" (Triumph part number 3880150-T0301) as follows.

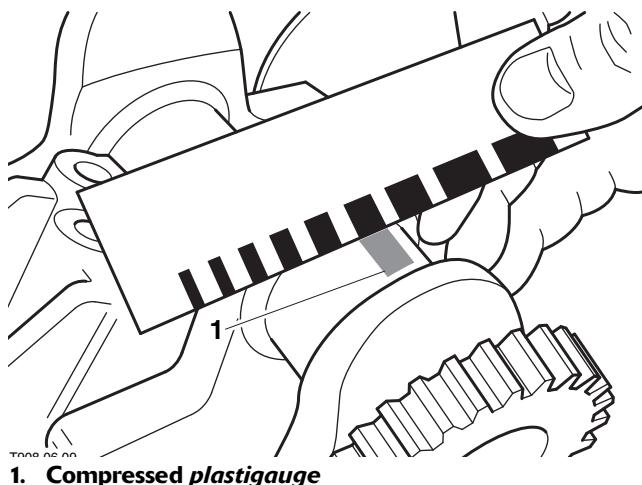
Note:

- Use the original big-end fixings for the check, not the new ones.

- a) Ensure the upper and lower bearing shells are correctly fitted to the connecting rod and cap.
- b) Wipe clean the bearing shells and crankshaft journal.
- c) Apply a thin smear of grease to the crankshaft journal and a small quantity of silicone release agent to the lower bearing shell.
- d) Size a piece of *plastigauge* to fit across the crankshaft journal.
- e) Fit the *plastigauge* to the crankshaft journal, using the grease to hold it in place.
- f) Carefully assemble the connecting rod and cap correctly on the crankshaft journal, positioning it so the *plastigauge* is in the centre of the lower bearing shell.

Note:

- Do not allow the connecting rod to rotate on the crankshaft journal. Any rotation of the rod will distort the *plastigauge*, resulting in a false reading.
- g) Remove the connecting rod and bearing cap, again taking care not to rotate the rod.
- h) Using the gauge provided with the *plastigauge* kit, measure the width of the compressed *plastigauge* to obtain the journal clearance.



Big-end Bearing Journal Clearance:

Standard	0.036 to 0.066 mm
Service limit	0.1 mm

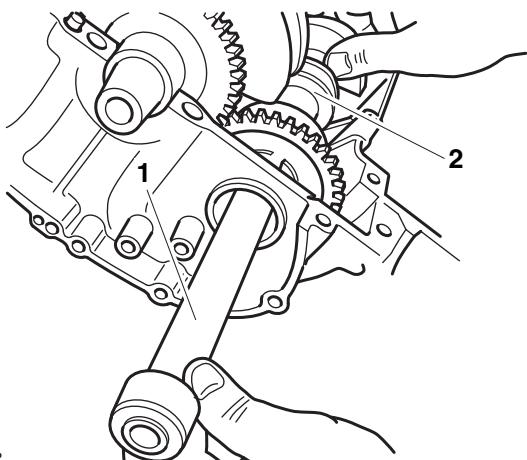
2. If the clearance exceeds the specified limits, select a new set of bearing shells and repeat the check.
3. If the clearance still exceeds the specified limits with new shells of the correct thickness, the crankshaft must be worn and will have to be renewed.

Crankshaft, Connecting Rods & Balancers

Rear Balancer

Removal

1. Disassemble the crankcase halves (see page 7-6).
2. Undo the rear balancer shaft retaining screw and remove the ignition pick-up coil wiring guide. Discard the screw and remove the locking washer from the balancer shaft.
3. Support the balancer then slide out the balancer shaft. The balancer can then be manoeuvred out of its position in the crankcase.



T908.06.12

1. Shaft
2. Balancer

Note:

- **The front and rear balancers are different and are not interchangeable (see installation).**

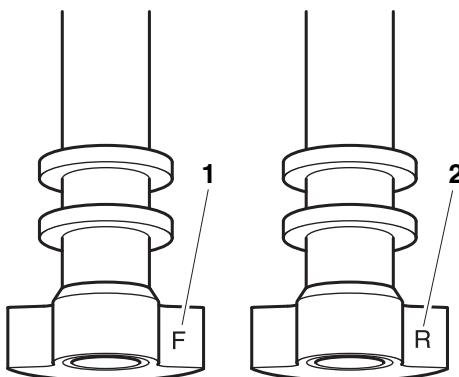
Inspection

1. Inspect the balancer gear for damaged and/or worn teeth. Replace the balancer if necessary.
2. Inspect the balancer needle roller bearings and the shaft contact surfaces for signs of wear or damage. If necessary renew both the balancer assembly and the shaft.

Installation

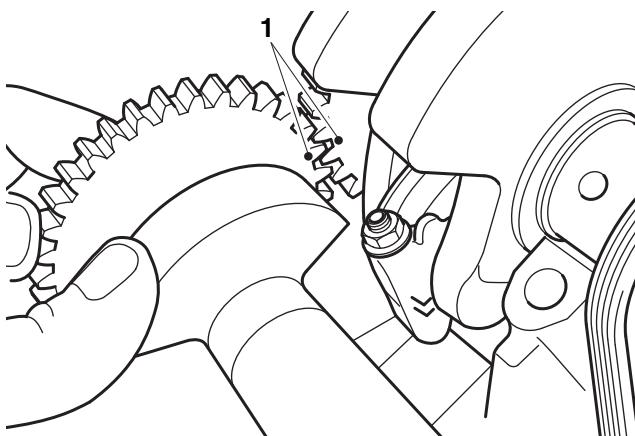
Note:

- **The front and rear balancers are different and are not interchangeable. Each balancer is stamped with an identification marking on the flat of its left hand end weight; the rear balancer is marked "R" and the front balancer "F".**



- T908.06.13
1. Front balancer marking
2. Rear balancer marking

1. Ensure the crankshaft and front balancer are correctly timed before installing the rear balancer (see front balancer section).
2. Rotate the crankshaft so its balancer timing mark is facing the rear.
3. Lubricate the balancer needle roller bearings with clean engine oil.
4. Manoeuvre the rear balancer into position, ensuring its timing mark aligns with the crankshaft gear mark as the gears mesh.



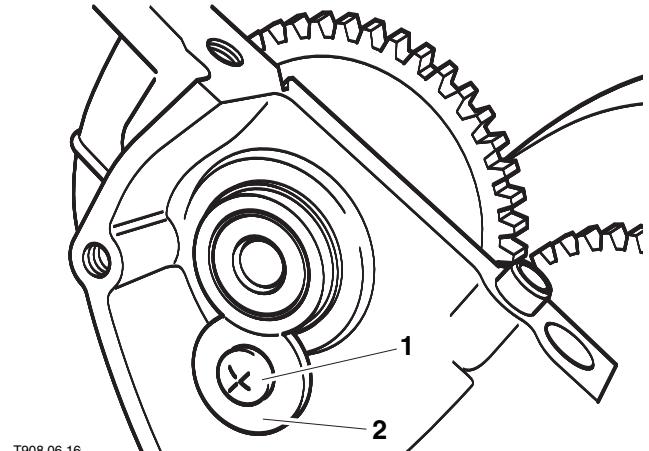
- T908.06.14
1. Timing marks

5. Insert the balancer shaft, positioning its locking washer cut-out next to the retaining screw hole.
6. Slide the locking washer into the balancer shaft cut-out then fit the wiring guide and new retaining screw. Ensure the pick-up coil wiring is correctly positioned behind the guide then tighten the screw to **12 Nm**.
7. Assemble the crankcase upper and lower halves (see page 7-7).

Front Balancer

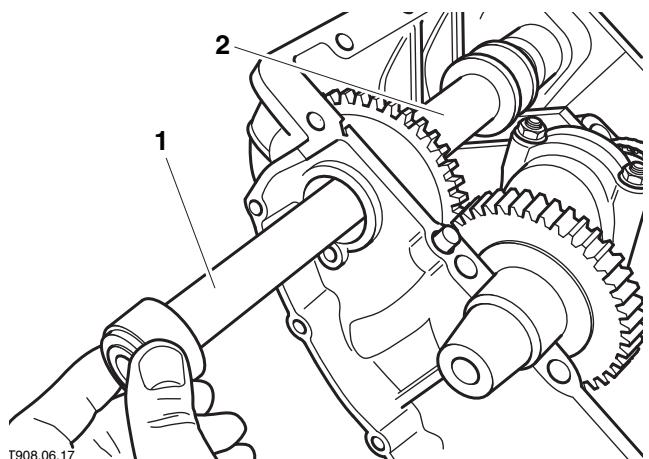
Removal

1. Disassemble the crankcase halves (see page 7-6).
2. Undo the front balancer shaft retaining screw and slide out the locking washer. Discard the screw.



1. Retaining screw
2. Locking washer

3. Slide out the balancer shaft then lift the front balancer out of the crankcase.



1. Shaft
2. Balancer

Note:

- The front and rear balancers are different and are not interchangeable (see installation).

Crankshaft, Connecting Rods & Balancers

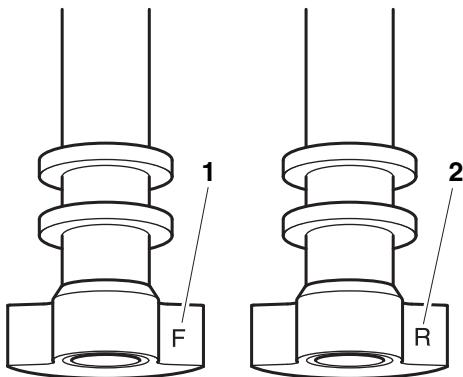
Inspection

1. Inspect the balancer gear for damaged and/or worn teeth. Replace the balancer if necessary.
2. Inspect the balancer needle roller bearings and the shaft contact surfaces for signs of wear or damage. If necessary renew both the balancer assembly and the shaft.

Installation

Note:

- **The front and rear balancers are different and are not interchangeable. Each balancer is stamped with an identification marking on the flat of its left hand end weight; the rear balancer is marked "R" and the front balancer "F".**

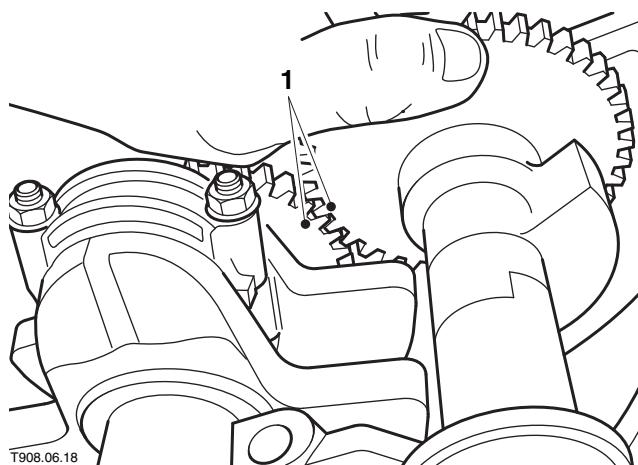


1. Front balancer marking

2. Rear balancer marking

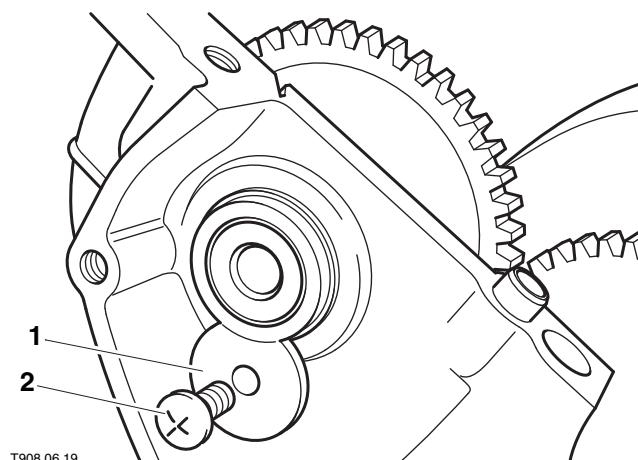
1. Ensure the crankshaft and rear balancer (if fitted) are correctly timed before installing the front balancer (see rear balancer section).
2. Rotate the crankshaft so its balancer timing mark is facing the front.
3. Lubricate the balancer needle roller bearings with clean engine oil.

4. Manoeuvre the front balancer into position, ensuring its timing mark aligns with the crankshaft gear mark as the gears mesh.



1. Timing marks

5. Insert the balancer shaft, positioning its locking washer cut-out next to the retaining screw hole.
6. Slide the locking washer into the shaft slot and fit the new retaining screw. Tighten the screw to **12 Nm**.



1. Locking washer

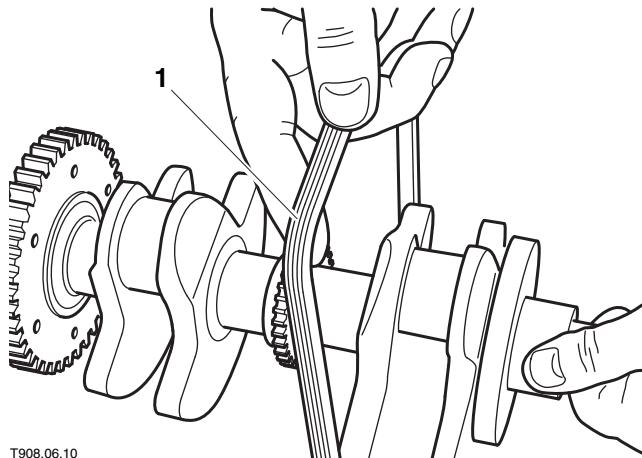
2. Retaining screw

7. Assemble the crankcase upper and lower halves (see page 7-7).

Cam Chain

Removal

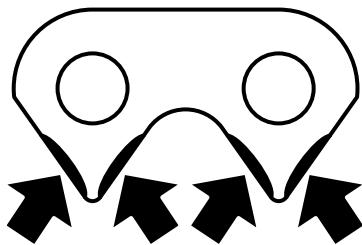
1. Remove the crankshaft (see page 7-10).
2. Remove the cam chain from the crankshaft.



Inspection

Visual in-situ checks can also be made as follows:

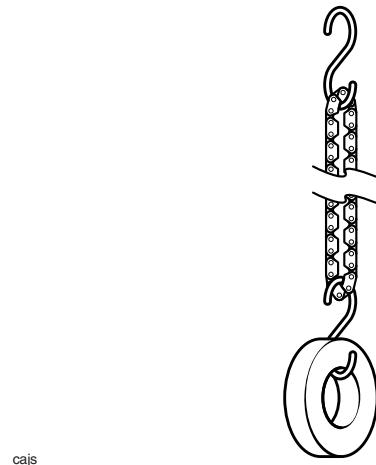
1. Check for significant blue discolouration of the chain plates indicating excessive heat build-up.
2. Examine all pins for signs of rotation.
3. Check for cracking or deep scratching of the chain plates.
4. Check for severe wear of the inner plates as indicated in the diagram below.



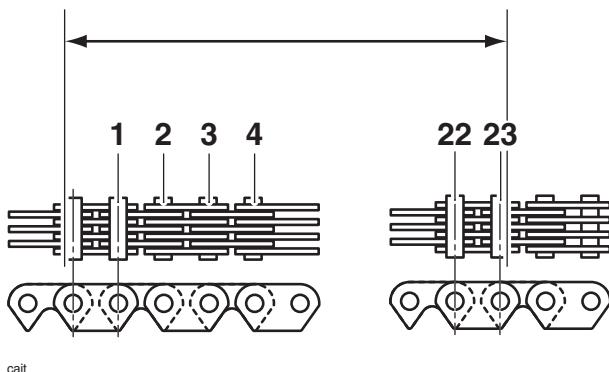
ccrv

For a more thorough check, proceed as follows:

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



3. Measure across 23 pins, from the outer edge of the first pin to the outer edge of the 23rd, as shown in the diagram below. 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.

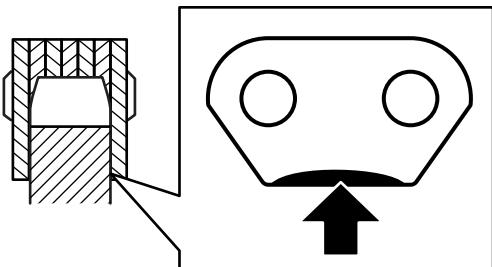


Crankshaft, Connecting Rods & Balancers

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

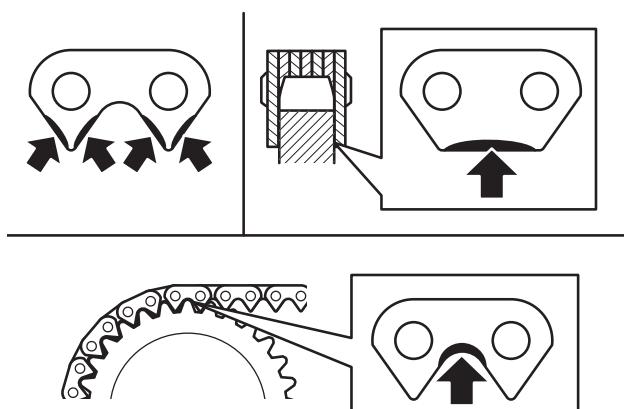
Installation

1. Fit the cam chain to the crankshaft sprocket.
2. Refit the crankshaft (see page 7-11).



ccru

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



caiu

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

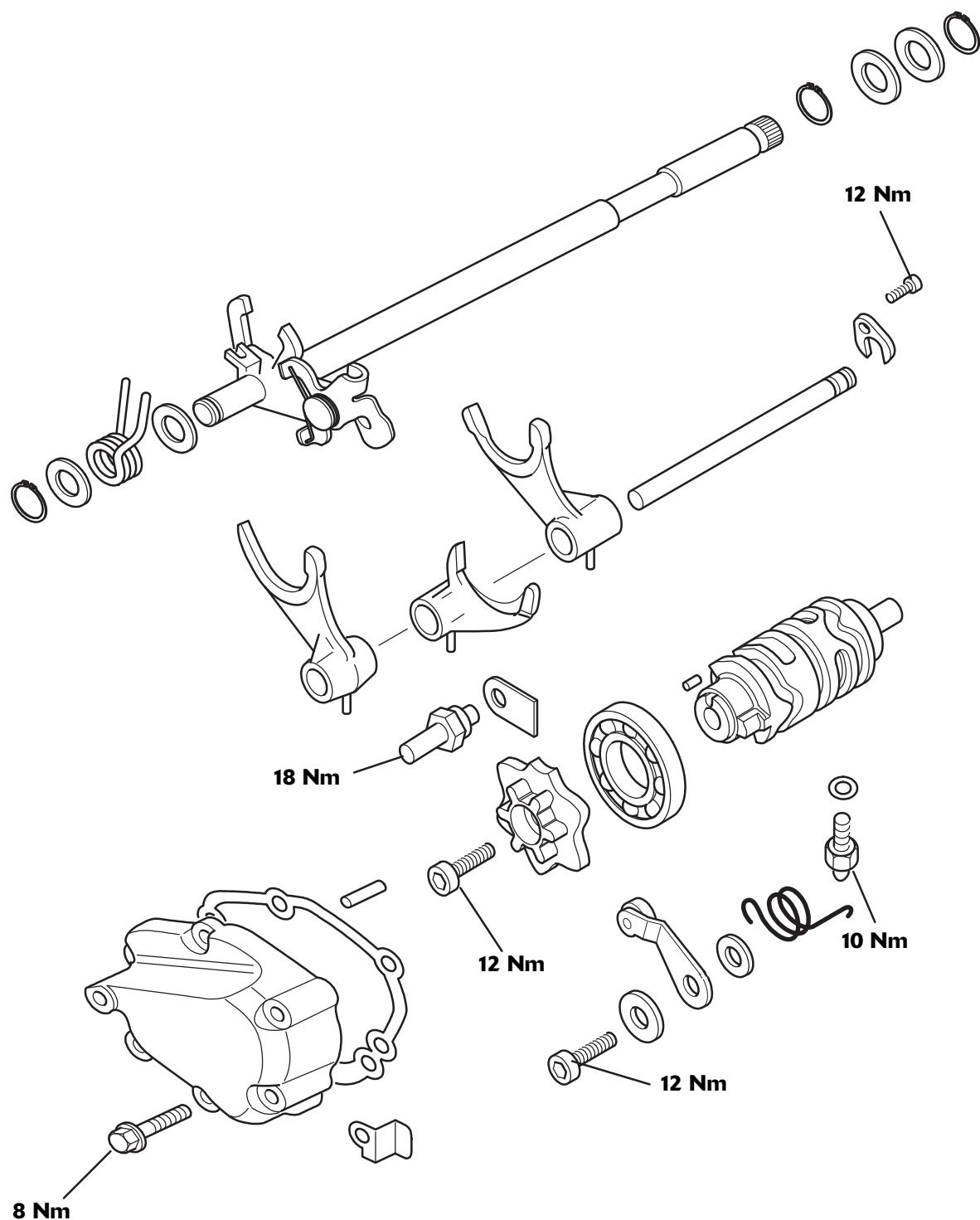
8 Transmission

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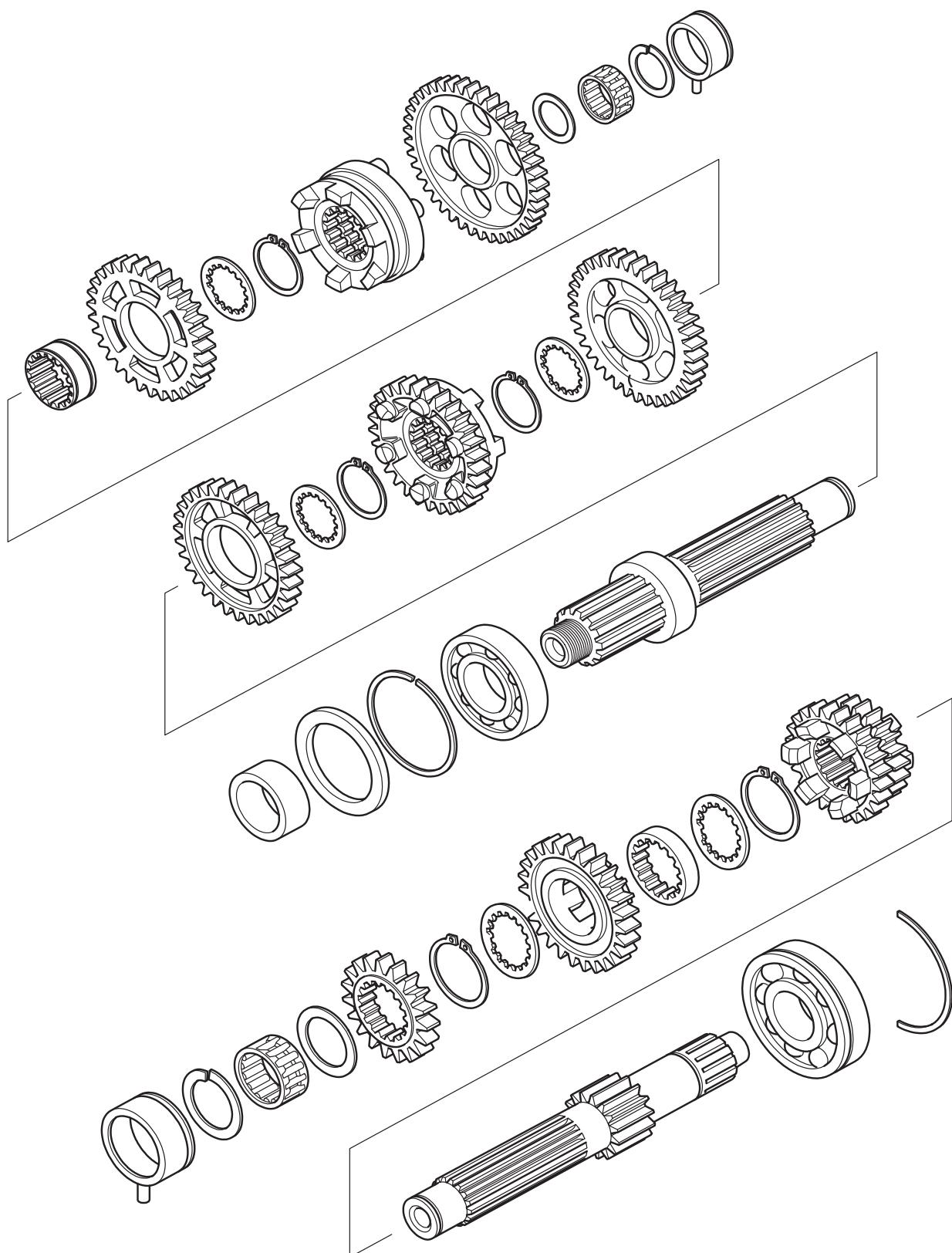
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Transmission

Exploded View - Gearchange and Selector Mechanism Components



Exploded View - Transmission Shafts



Transmission

Gearchange Shaft



Warning

Incorrect assembly of transmission components can lead to the transmission locking completely.

Always follow the instructions given fully and accurately to ensure the transmission is correctly assembled.

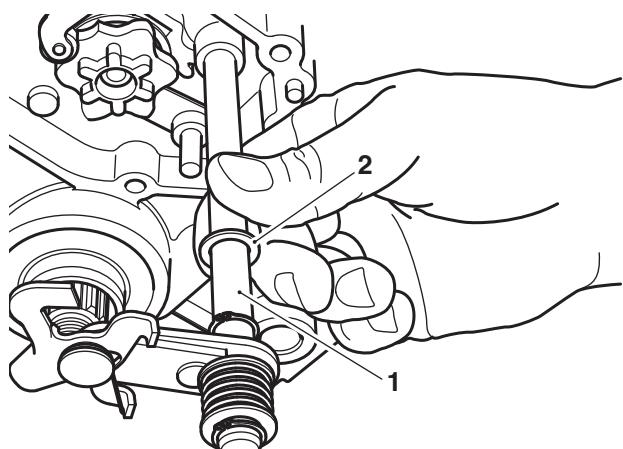
A locked transmission will lead to locking of the rear wheel causing loss of motorcycle control and an accident.

Note:

- The gearchange shaft can be removed with the clutch in position but access to the shaft circlip is very limited. To improve access, remove the clutch assembly.**

Removal

- Remove the clutch and clutch cover (see page 5-9).
- Remove the front sprocket (see page 14-9).
- Clean the area around the gearchange mechanism cover.
- Slacken and remove the gearchange mechanism cover bolts, noting the correct location of the wiring clamp.
- Remove the gearchange mechanism cover, taking care not to lose the locating pins. Discard the gasket.
- Remove the circlip and washer from the left hand end of the gearchange shaft.
- Slide out the gearchange shaft complete with the second washer.



3.07.01

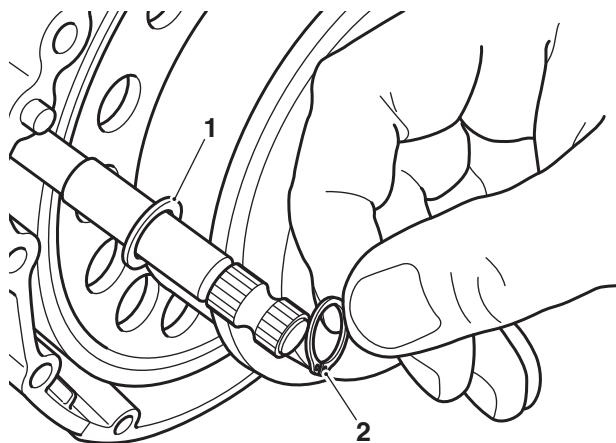
1. Gearchange shaft
2. Washer

Inspection

- Check the change mechanism for signs of wear or damage and check the shaft for run-out. If any damage is found, renew the shaft assembly.

Installation

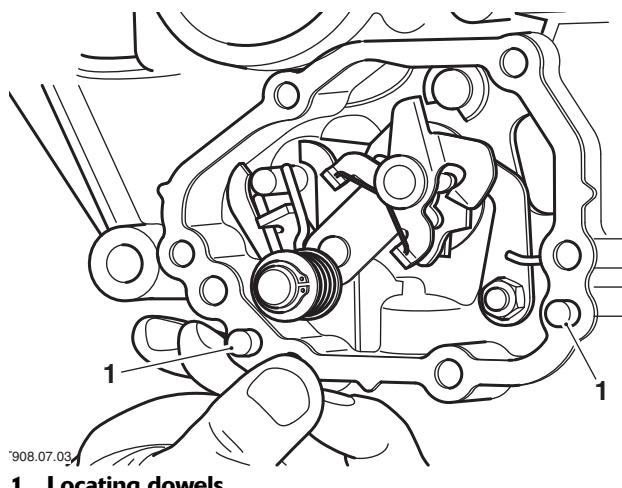
- Ensure the detent arm is correctly installed and the gearchange shaft centralising pin is tightened to the specified torque.
- Slide a washer onto the gearchange shaft then insert the shaft into the crankcase. Align the spring with the centralising pin and push the shaft fully into position.
- Slide the other washer onto the left hand end of the gearchange shaft then fit the circlip. Ensure the circlip is correctly located in the shaft groove.



8.07.02

1. Washer
2. Circlip

- Check the operation of the gearchange mechanism.
- Ensure the locating dowels are in position then fit a new gasket.



8.08.03

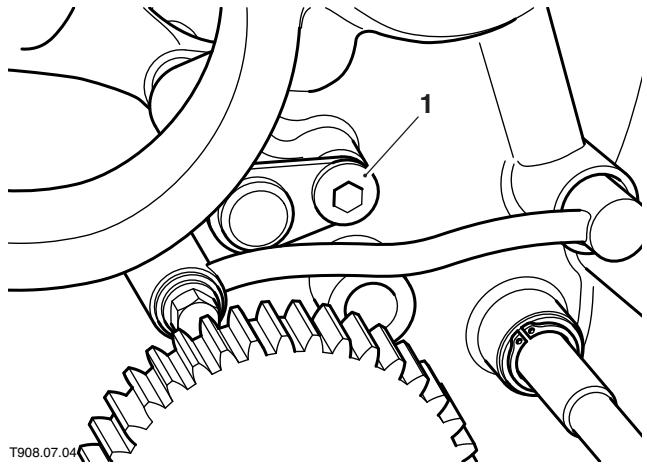
1. Locating dowels

6. Fit the gearchange mechanism cover and tighten its bolts to **8 Nm**. Ensure the wiring clip is fitted to the correct bolt.
7. Install the front sprocket (see page 14-9).
8. Refit the clutch and clutch cover (see page 5-11).

Selector Forks

Removal

1. Disassemble the crankcase halves (see page 7-6).
2. Remove the screw and slide out the retaining plate from the left hand end of the selector fork shaft. Discard the screw.

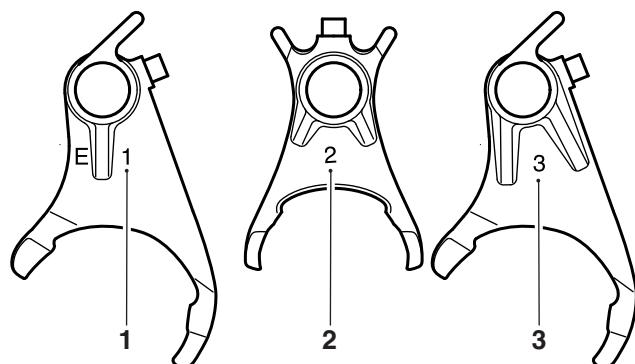


1. Retaining plate screw

3. Note the identification number on the right hand side of each selector fork; the forks are numbered 1 to 3 from left to right.

Note:

- If the numbers are not clearly visible, mark each fork with a marker pen to ensure it is refitted in its original location.
- Selector forks from engine number 128237 are not marked.

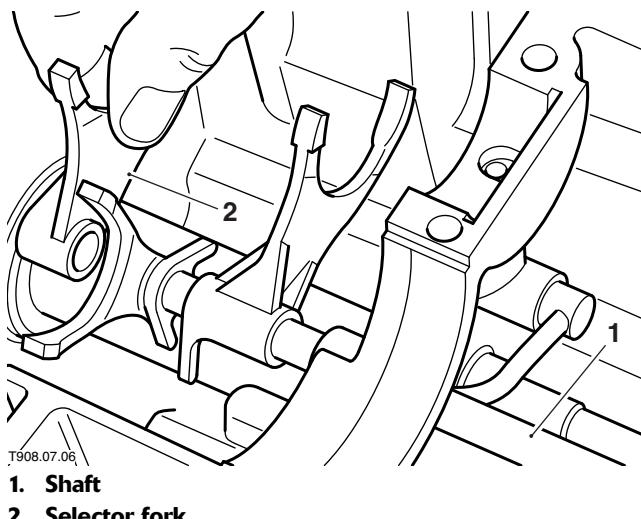


T908.07.05

1. Left fork marking
2. Centre fork marking
3. Right fork marking

Transmission

- Slide out the shaft and lift out each selector fork as it is released from the shaft end.



1. Shaft
2. Selector fork

Inspection

- Inspect the selector forks and shaft for signs of wear or damage and measure the width of the fork ends. Renew any worn components.

Selector Fork End Thickness

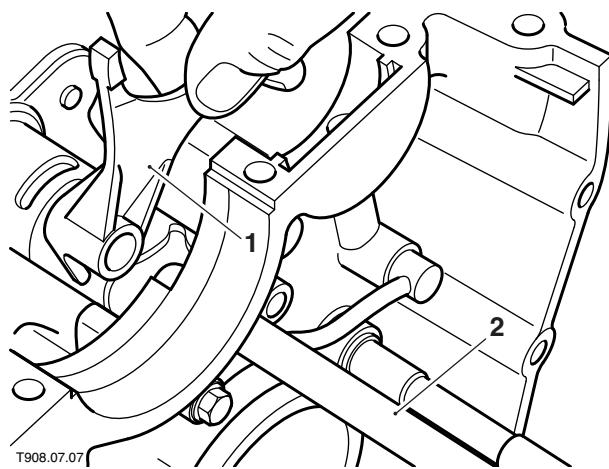
Standard	5.80 to 5.90 mm
Service limit	5.70 mm

Installation

Note:

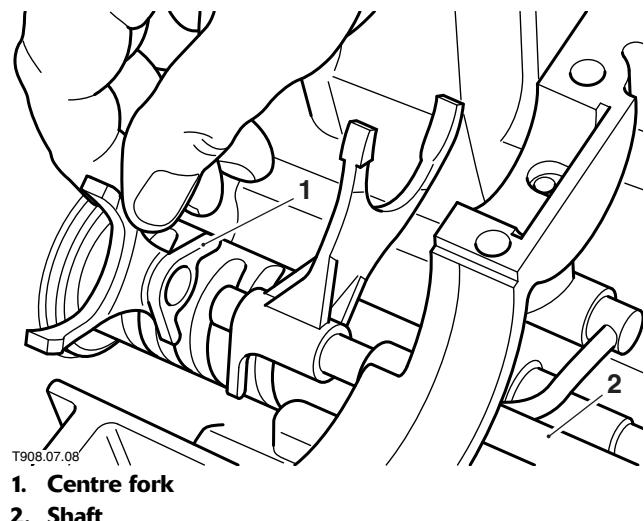
- The selector forks are all different and are not interchangeable.
- Always assemble the transmission in neutral.

- Fit the selector fork shaft to the crankcase, ensuring its slotted end is facing left.
- Fit the left hand selector fork to the drum in the orientation previously noted. Slide the shaft into the fork.



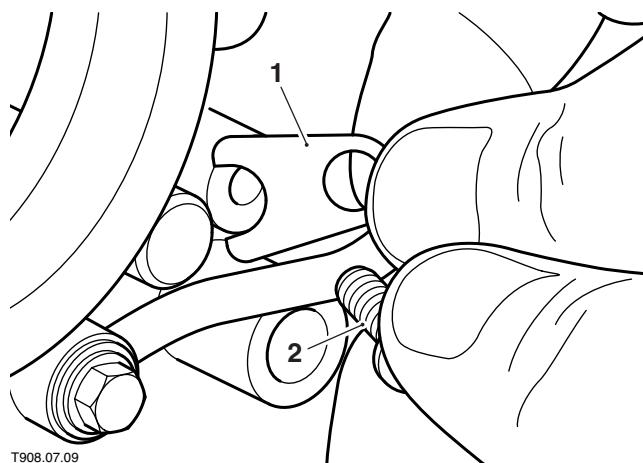
1. Left selector fork
2. Shaft

- Fit the centre selector fork to the drum in the orientation previously noted. Slide the shaft into the fork.



1. Centre fork
2. Shaft

4. Fit the right hand selector fork to the drum in the orientation previously noted. Slide the shaft into the fork.
5. Slide the selector fork shaft fully into position.
6. Engage the retaining plate with the groove in the selector fork shaft then fit the new retaining screw. Tighten the screw to **12 Nm**.



T908.07.09
1. Retaining plate
2. Screw

7. Reassemble the crankcase halves (see page 7-7).

Selector Drum

Removal

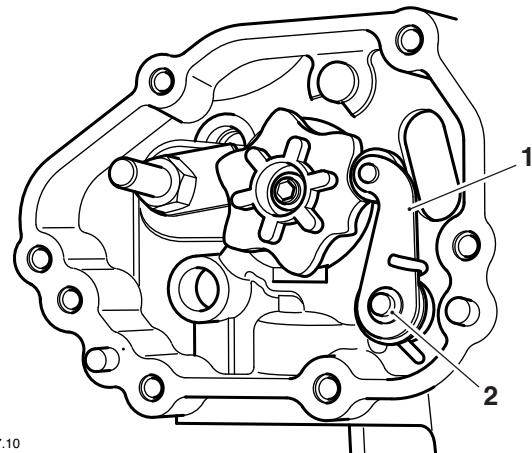
Note:

- **The detent arm components can be removed without disassembling the crankcase halves (if required).**

1. Disassemble the crankcase halves (see page 7-6).
2. Remove the gearchange shaft (see page 8-4).
3. Remove the selector forks (see page 8-5).
4. Unscrew the neutral switch from the base of the crankcase. Discard its sealing washer.

Note:

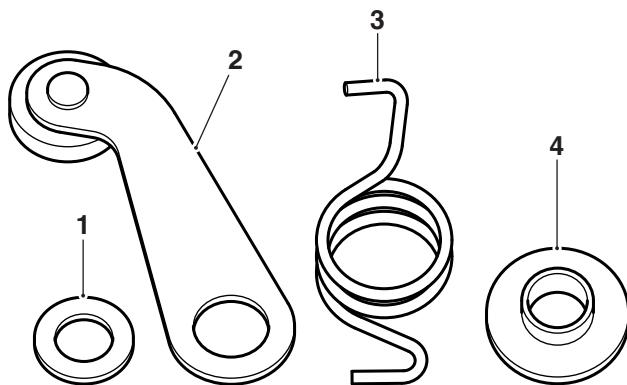
- **Note the orientation of the detent arm components as they are removed. The same orientation must be retained on assembly.**
- 5. Slacken the detent arm bolt a few turns then carefully free the detent arm from the selector drum cam to relieve the spring pressure.



T908.07.10
1. Detent arm
2. Bolt/stud (both have been fitted during current production)

Transmission

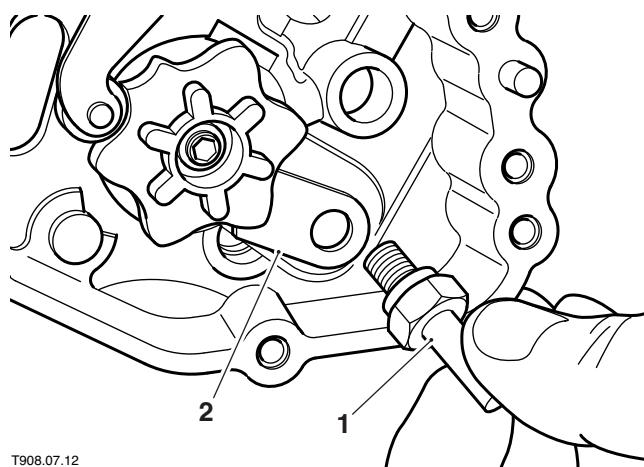
- Remove the bolt and washer then remove the detent arm, shouldered collar and spring. Discard the bolt.



T908.07.11

- Washer
- Detent arm
- Spring
- Shouldered collar

- Unscrew the gearchange shaft centralising pin and remove the selector drum retaining plate.



T908.07.12

- Centralising pin
- Retaining plate

- Prevent the drum from turning using a soft faced lever placed through the central hole in the drum itself. Slacken and remove the retaining bolt and remove the selector cam from the drum. Discard the bolt.
- Manoeuvre the selector drum and bearing out of position by sliding the drum assembly back and forth in its housing.

Inspection

- Check all components for signs of wear or damage, paying particular attention to the selector drum grooves. Renew any worn components.

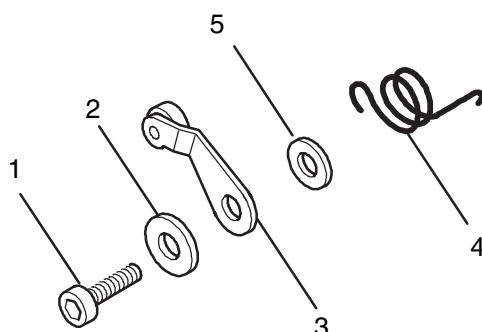
Installation

- Manoeuvre the selector drum into position in the crankcase then fit the bearing.
- Fit the selector cam. Ensure the cam is correctly engaged with the pin then fit a new bolt, prevent the drum from turning as for removal, and tighten the new bolt to **12 Nm**.
- Engage the retaining plate with the drum bearing then refit the centralising pin. Tighten the pin to **18 Nm**.
- Fit the spring ensuring its smaller end is facing outwards.



T908.07.13

- Spring
- Fit the shouldered collar to the inside of the detent arm.
- Engage the detent arm and collar with the spring then install the washer and new bolt. Screw the bolt in a few turns then locate the detent arm correctly on the selector drum cam. Ensure the arm is correctly engaged with the selector drum and shouldered collar then tighten the bolt to **12 Nm**.



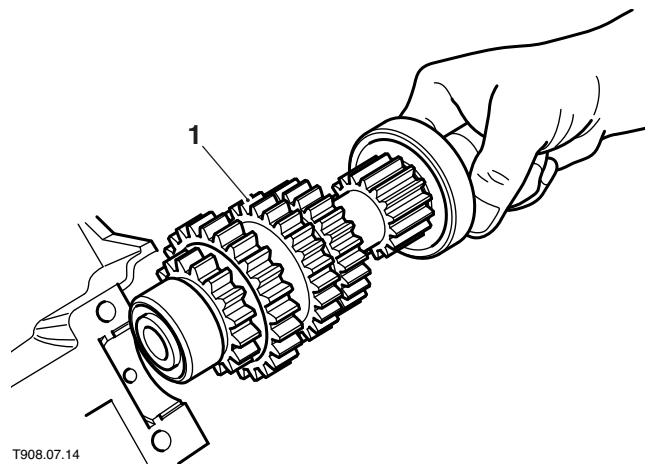
- Screw
- Washer
- Detent arm
- Spring
- Washer

7. Check the detent arm pivots smoothly and is securely held against the cam by the spring before proceeding.
8. Fit the neutral switch with a new sealing washer and tighten to **10 Nm**.
9. Install the selector forks (see page 8-6) and gearchange shaft (see page 8-4).
10. Reassemble the crankcase halves (see page 7-7).

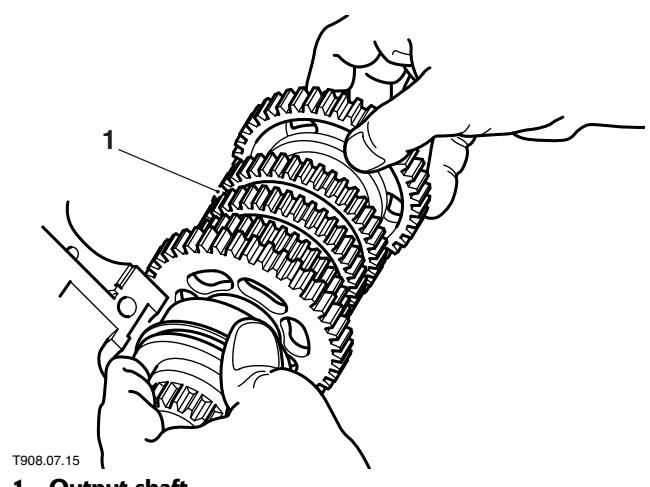
Transmission Shafts

Removal

1. Disassemble the crankcase halves (see page 7-6).
2. Lift out the input shaft. Take care not to lose the bearing outer race from the right end of the shaft or the half-ring from the left side of the crankcase.

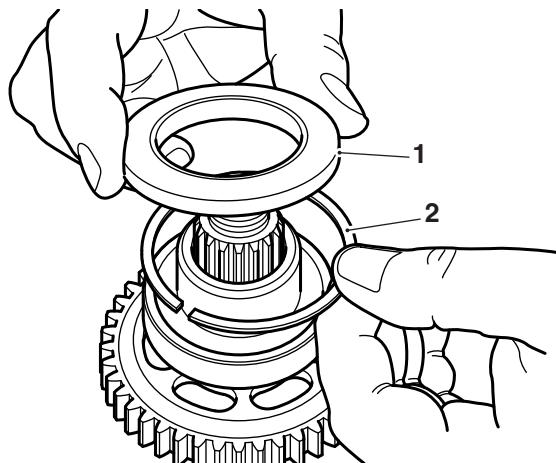


3. Lift out the output shaft taking care not to lose the bearing outer race from the left end of the shaft.



Transmission

- Remove the oil seal and retaining ring from the output shaft right end. Discard the seal.



T908.07.16

- 1. Oil seal**
- 2. Retaining ring**

Inspection

- Inspect the input and output shaft gears for signs of worn or damaged teeth, dogs or selector fork grooves. If any sign of damage is found, disassemble the shaft so that the affected components can be renewed.

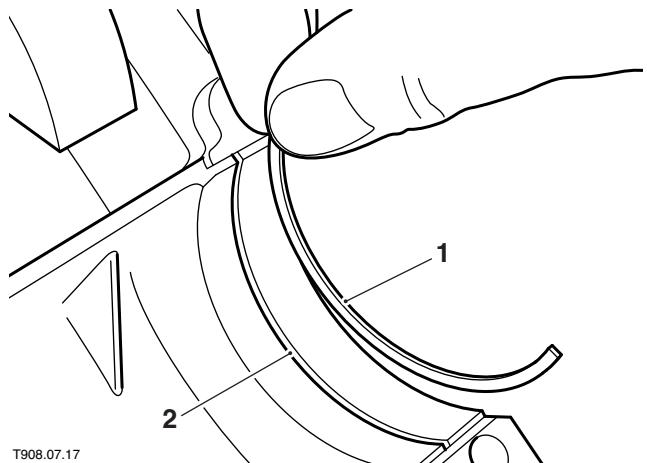
Installation

Note:

- Always assemble the transmission in neutral.**

- Fit the retaining ring to the right end of the output shaft.
- Lubricate the lip of the new oil seal with clean engine oil then ease the seal onto the output shaft spacer.
- Ensure the bearing outer races are fitted to the shafts with their chamfered edges outermost. Also ensure the locating pin is pushed securely into each race.
- Lower the output shaft assembly into position. As the shaft locates in the crankcase, align the pin in the bearing outer race with its hole and the retaining ring and oil seal lip with their crankcase grooves.
- Ensure the output shaft is correctly located.

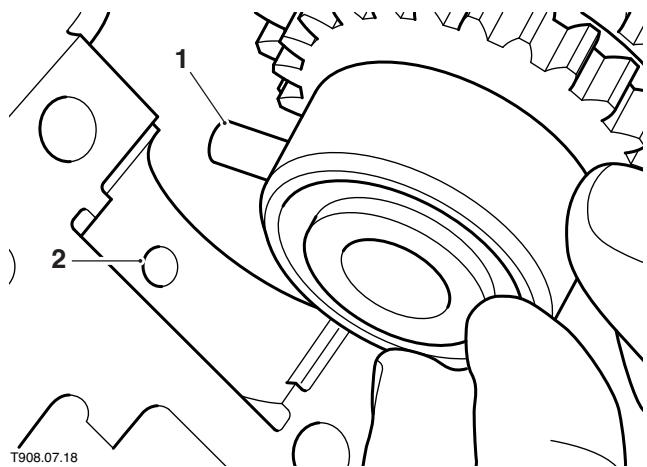
- Fit the input shaft bearing half-ring to its groove in the crankcase.



T908.07.17

- 1. Half-ring**
- 2. Crankcase groove**

- Lower the input shaft into position aligning the pin in the bearing outer race with the crankcase hole and the bearing groove with the half-ring.



T908.07.18

- 1. Outer race pin**
- 2. Crankcase hole**

- Ensure both the output and input shafts are correctly seated and their gears are correctly meshed before assembling the crankcase halves (see page 7-7).

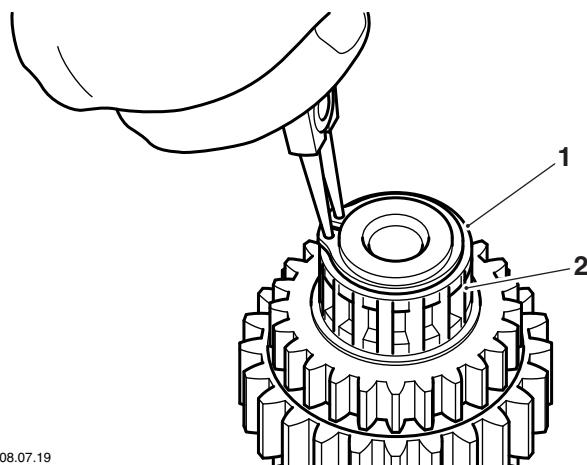
Input Shaft

Note:

- Note the orientation of all components as they are removed from the shaft. The same orientation must be retained on assembly.**

Disassembly

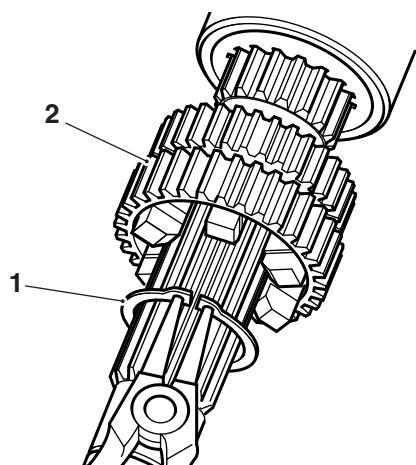
- Remove the input shaft from the crankcase (see page 8-9).
- Remove the bearing outer race from the right end of the shaft.
- Remove the circlip then slide off the needle roller bearing.



1. Circlip

2. Needle roller bearing

- Remove the washer followed by the 2nd gear.
- Remove the circlip then slide off the splined washer.
- Remove the 5th gear then slide off its splined bush and splined washer.
- Remove the circlip and slide off the combined 3rd/4th gear.



1. Circlip

2. 3rd/4th gear

- To separate the input shaft and bearing, support the bearing then press out the shaft.

Note:

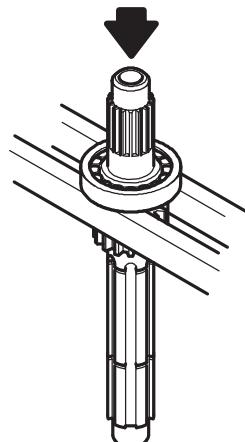
- The bearing must be renewed if it is removed from the shaft.**



Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings can 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.



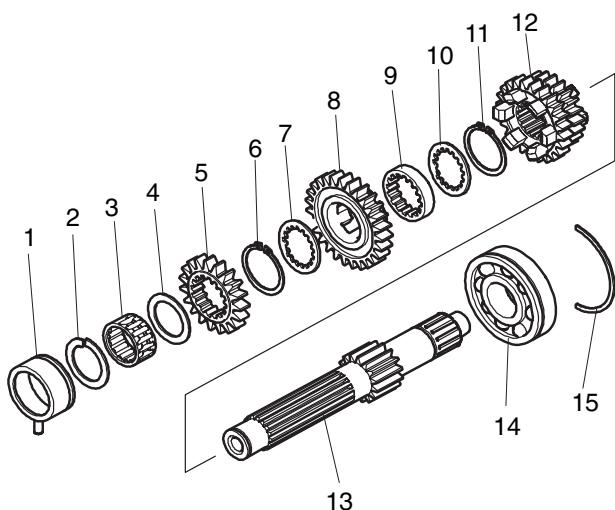
Pressing off the Input Shaft Bearing

Inspection

- Examine all gears, bearings and bushes for damage, chipped teeth and wear beyond the service limits. Replace all suspect components and always use new circlips to assemble the shaft.

Transmission

Assembly



Input Shaft Components

1. Outer race
2. Circlip
3. Needle roller bearing
4. Washer
5. 2nd gear
6. Circlip
7. Splined washer
8. 5th gear
9. 5th gear splined bush
10. Splined washer
11. Circlip
12. 3rd/4th gear
13. Input shaft
14. Bearing
15. Half-ring

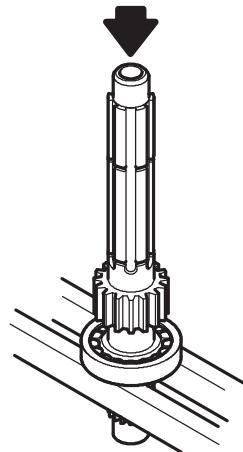
Note:

- Lubricate each gear and bush with clean engine oil during assembly.
 - The circlips used on the input shaft have a flat side and an angled side. Illustrations throughout the assembly text indicate which way the angled side should face.
2. Support the inner race of the new bearing, ensuring its ring groove is facing upwards.
 3. Locate the input shaft in the bearing, with its clutch end facing downwards. Press the shaft into position until its integral 1st gear contacts the bearing.

Warning

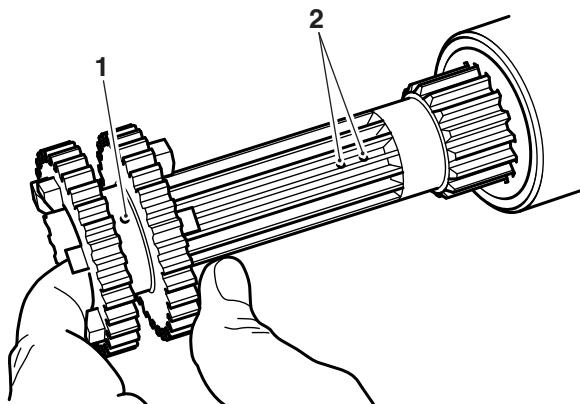
When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings can break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

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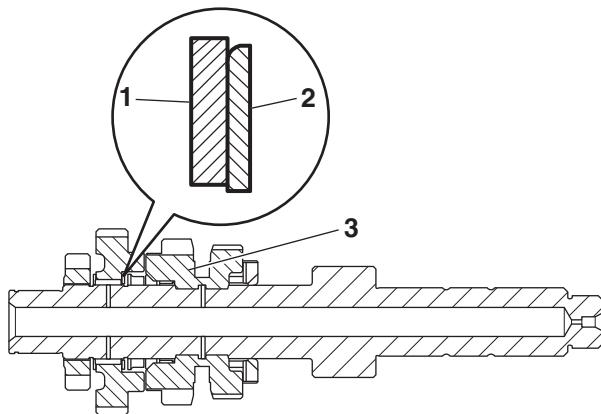
Pressing on the Bearing

4. Fit the combined 3rd/4th gear with its smaller 3rd gear facing the integral 1st gear. Ensure that, when engaging the gear with the shaft splines, the oil hole in the gear DOES NOT ALIGN with the oil holes in the shaft.

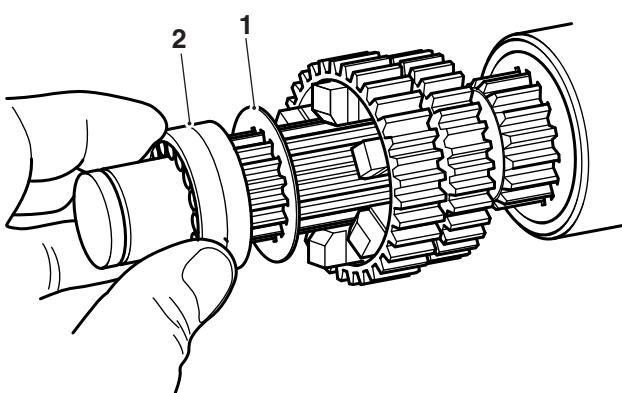


T908.07.21
1. 3rd/4th gear oil hole
2. Shaft oil holes

5. Secure the 3rd/4th gear in position with a new circlip, orientating the circlip as shown below.



6. Fit the splined washer then slide on the 5th gear splined bush taking care to ALIGN THE OIL HOLE IN THE SHAFT WITH THE CORRESPONDING HOLE IN THE BUSH.

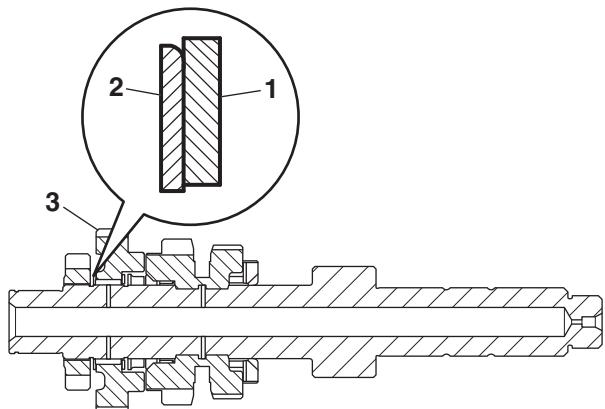


T908.07.22

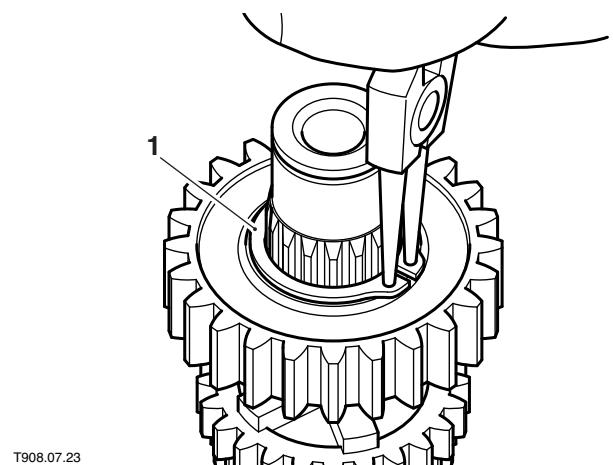
- 1. Splined washer**
2. 5th gear splined bush

7. Fit the 5th gear with its dogs facing the 3rd/4th gear and locate it on the bush.

8. Fit a splined washer and secure 5th gear in position with a new circlip, orientating the circlip as shown below.

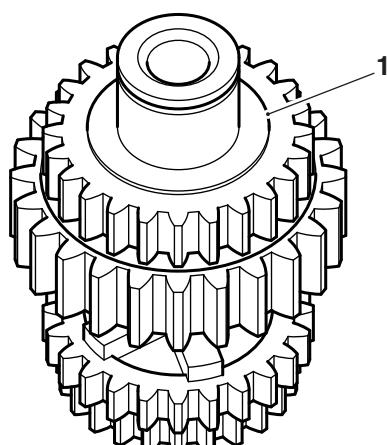


- 1. Splined washer**
2. Circlip
3. 5th gear



T908.07.23

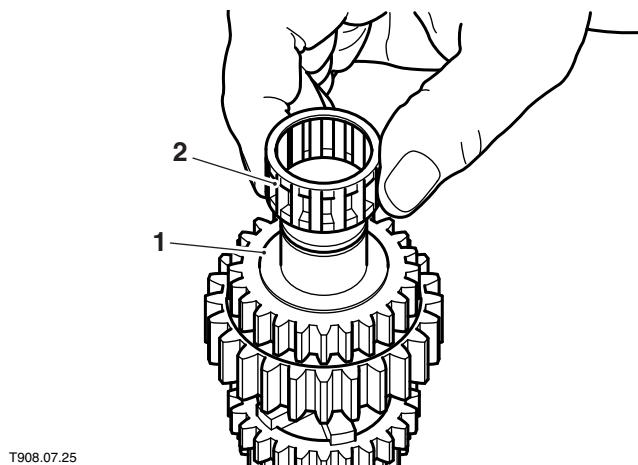
- 1. Circlip**
9. Fit the 2nd gear with its side with the slight protrusion facing away from the 5th gear.



T908.07.24
1. 2nd gear protrusion

Transmission

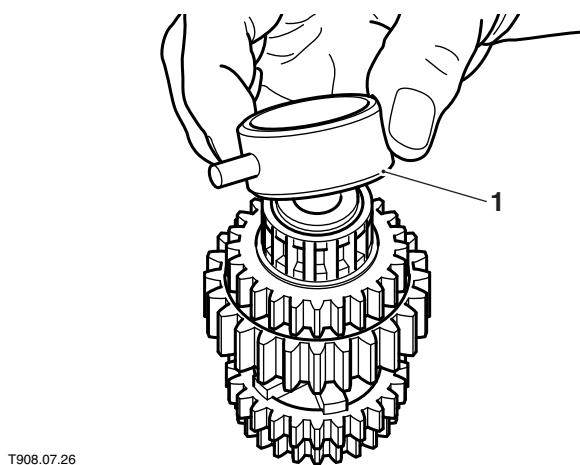
- Slide on the washer and fit the needle roller bearing.



1. Washer

2. Needle roller bearing

- Secure the needle roller bearing in position with a new circlip. Ensure the circlip is correctly located in the shaft groove.
- Fit the outer race to the needle roller bearing ensuring its chamfered edge is facing outwards.



1. Outer race chamfered edge

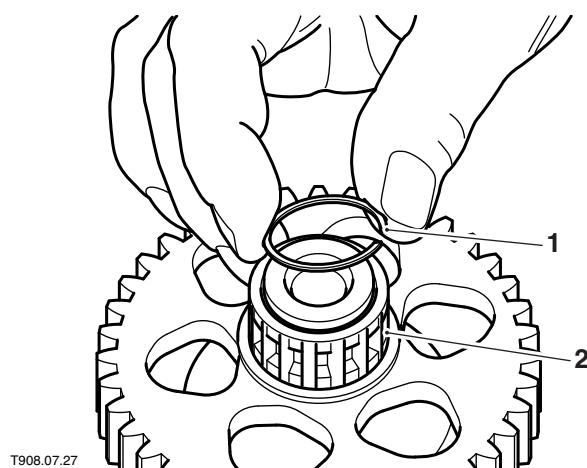
Output Shaft

Note:

- Note the orientation of all components as they are removed from the shaft. The same orientation must be retained on assembly.

Disassembly

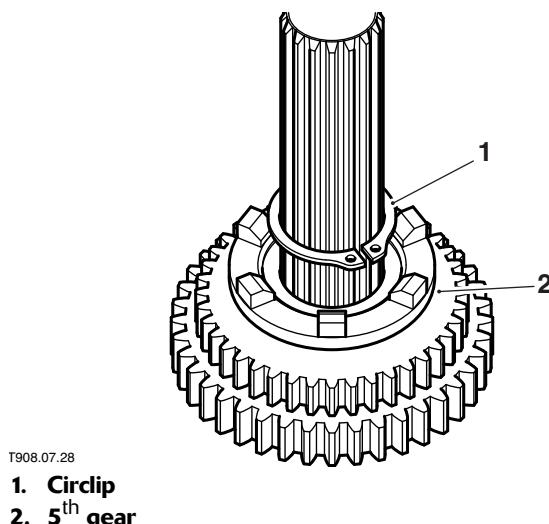
- Remove the output shaft from the crankcase (see page 8-9).
- Remove the bearing outer race from the left end of the shaft.
- Remove the circlip then slide off the needle roller bearing.



1. Circlip

2. Needle roller bearing

- Remove the washer followed by the 1st gear.
- Slide off 1st/3rd gear selector.
- Remove the circlip then slide off the splined washer.
- Remove the 3rd gear followed by the 4th gear then slide off the 3rd/4th gear splined bush and splined washer.
- Remove the circlip and slide off the 5th gear.



1. Circlip

2. 5th gear

9. Remove the circlip and splined washer then slide off the 2nd gear.
10. To separate the output shaft, bearing and spacer, support the bearing then press the shaft out of position.

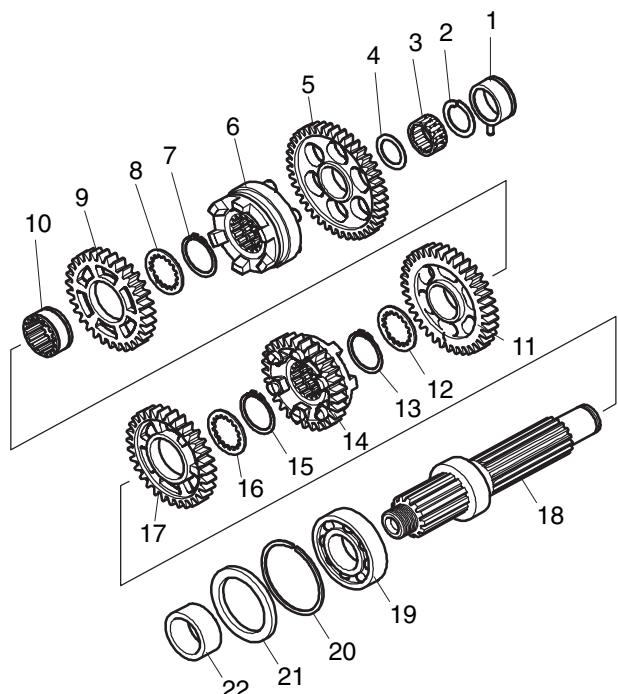
Note:

- **The bearing must be renewed if it is removed from the shaft.**

**Warning**

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings can 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.

Assembly**Output Shaft Components**

1. Outer race
2. Circlip
3. Needle roller bearing
4. Washer
5. 1st gear
6. 1st/3rd gear selector
7. Circlip
8. Splined washer
9. 3rd gear
10. 3rd/4th gear splined bush
11. 4th gear
12. Splined washer
13. Circlip
14. 5th gear
15. Circlip
16. Splined washer
17. 2nd gear
18. Output shaft
19. Bearing
20. Retaining ring
21. Oil seal
22. Spacer

Note:

- Lubricate each gear and bush with clean engine oil during assembly.
- The circlips used on the output shaft have a flat side and an angled side. Illustrations throughout the assembly text indicate which way the angled side should face.
- Always assemble the transmission in neutral.

Transmission

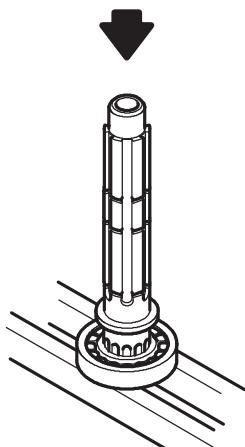
1. Support the inner race of the new bearing, and locate the output shaft in the bearing, with its sprocket end facing downwards. Press the shaft into position until its shoulder contacts the bearing.



Warning

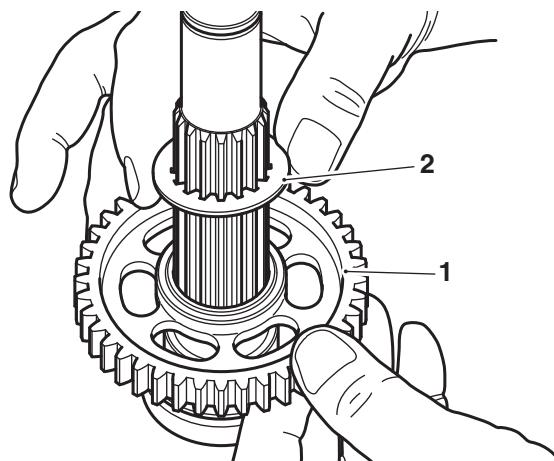
When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings can break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

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.



Pressing on the Bearing

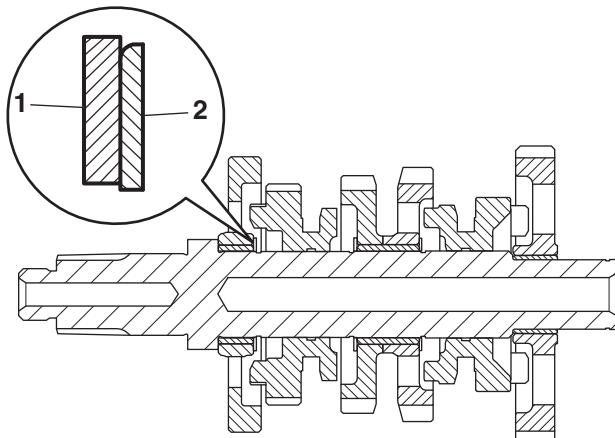
2. With the bearing correctly fitted, support the spacer then press the output shaft into position until the spacer contacts the bearing.
3. Slide the 2nd gear onto the shaft ensuring its recessed face is facing away from the bearing.



T908.07.29

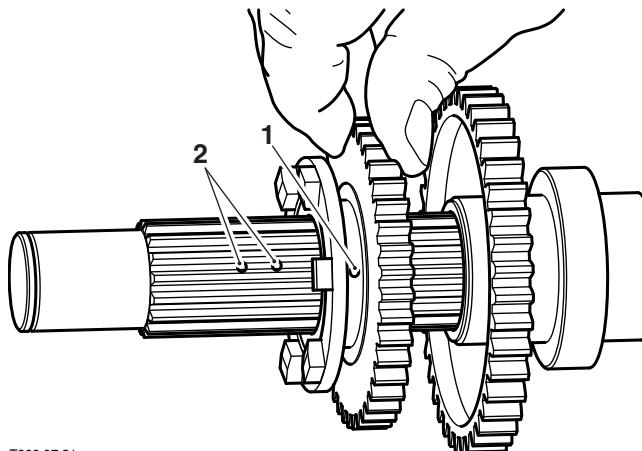
1. 2nd gear
2. Splined washer

4. Fit the splined washer and secure it in position with a new circlip, orientating the circlip as shown below.



- ccqj
1. Splined washer
2. Circlip

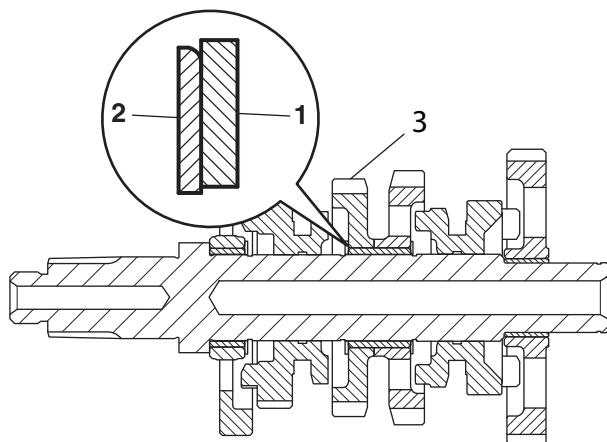
5. Fit the 5th gear with its selector fork groove facing away from the 2nd gear. Ensure that, when engaging the gear with the shaft splines, the oil holes in the gear DO NOT ALIGN with the oil holes in the shaft.



T908.07.31

1. 5th gear oil hole
2. Shaft oil holes

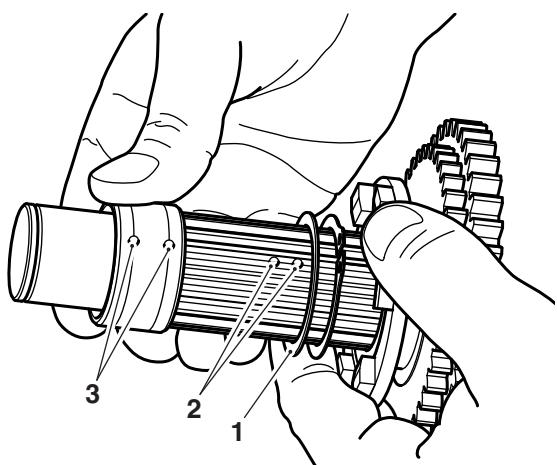
6. Fit a new circlip, orientating the circlip as shown below.



ccqk

- 1. Splined washer**
- 2. Circlip**
- 3. 5th gear**

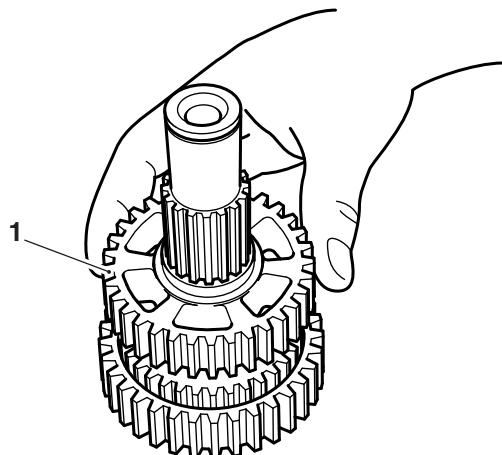
7. Fit the splined washer then slide on the 3rd/4th gear splined bush taking care to ALIGN the oil hole in the shaft with the corresponding hole in the bush.



T908.07.32

- 1. Splined washer**
- 2. Shaft oil holes**
- 3. 3rd/4th gear bush oil holes**

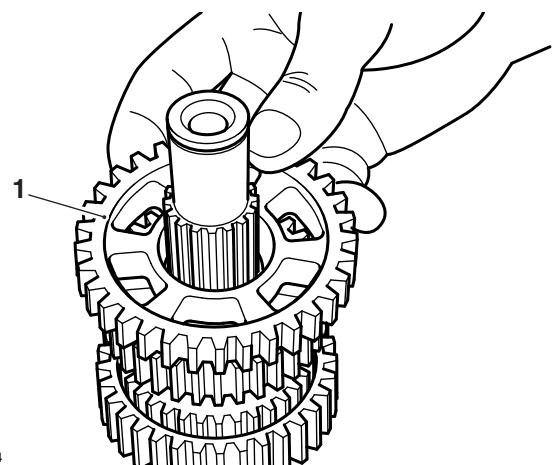
8. Slide the 4th gear onto the bush so its raised hub faces away from 5th gear.



T908.07.33

- 1. 4th gear**

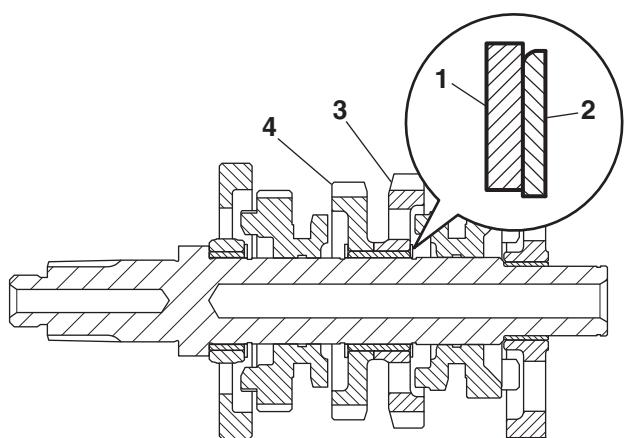
9. Fit the 3rd gear onto the bush with its raised hub facing towards 4th gear.



T908.07.34

- 1. 3rd gear**

10. Fit a splined washer then secure 3rd/4th gear in position with a new circlip, orientating the circlip as shown below.

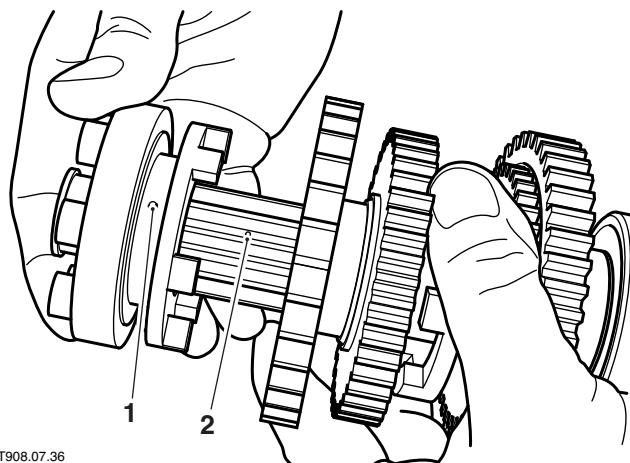


cqm

- 1. Splined washer**
- 2. Circlip**
- 3. 3rd gear**
- 4. 4th gear**

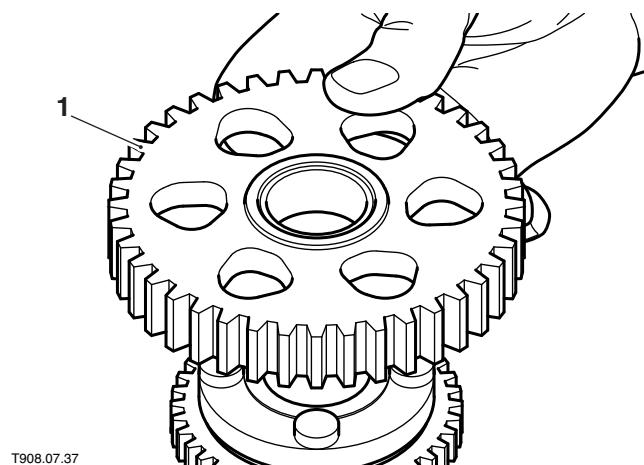
Transmission

11. Fit the 1st/3rd gear selector with its selector fork groove facing towards the 3rd gear. Ensure that the oil hole in the selector DOES NOT ALIGN with the oil hole in the shaft.



- 1. 1st/3rd gear selector oil hole
2. Shaft oil hole**

12. Fit the 1st gear with its recessed face towards the 1st/3rd gear selector.



- 1. 1st gear**

13. Slide on the washer and fit the needle roller bearing.
14. Secure the needle roller bearing in position with a new circlip. Ensure the circlip is correctly located in the shaft groove.
15. Fit the outer race to the needle roller bearing ensuring its chamfered edge is facing outwards.

9 Lubrication System

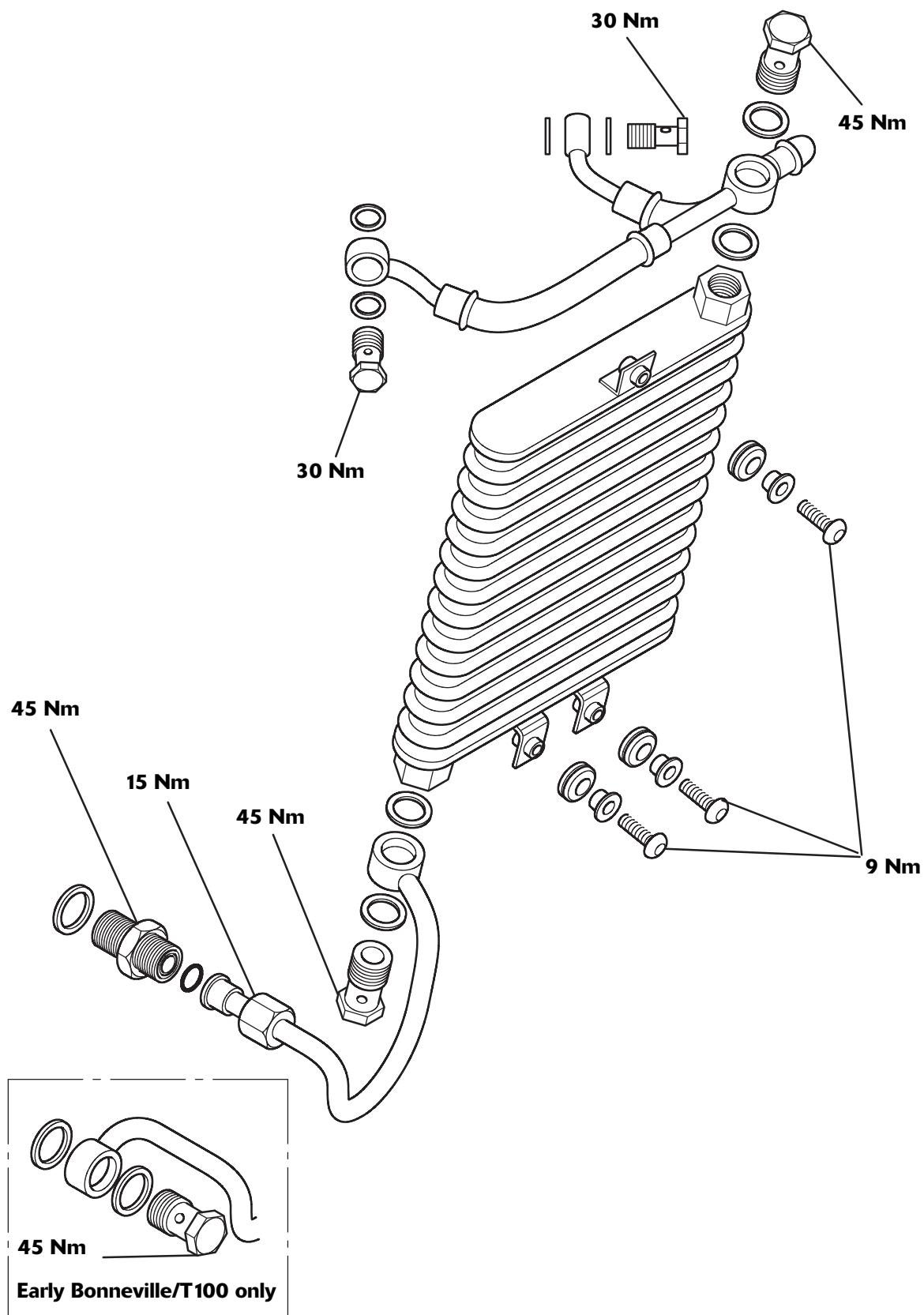
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Lubrication System

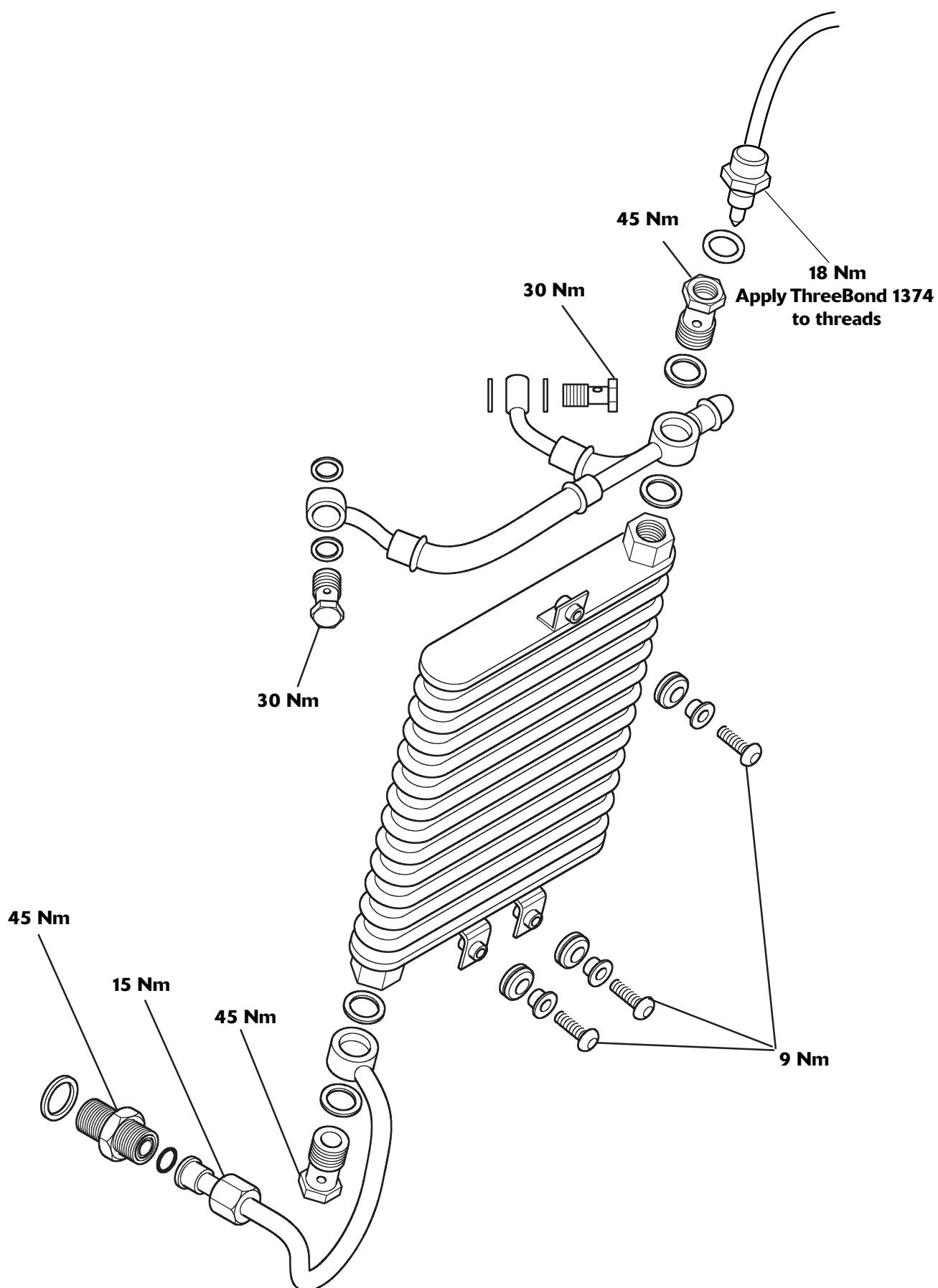
Oil Temperature Sensor - Fuel Injected Models Only	9.19
Removal	9.19
Installation	9.20

Exploded View - Oil Cooler and Fittings - Carburettor Models

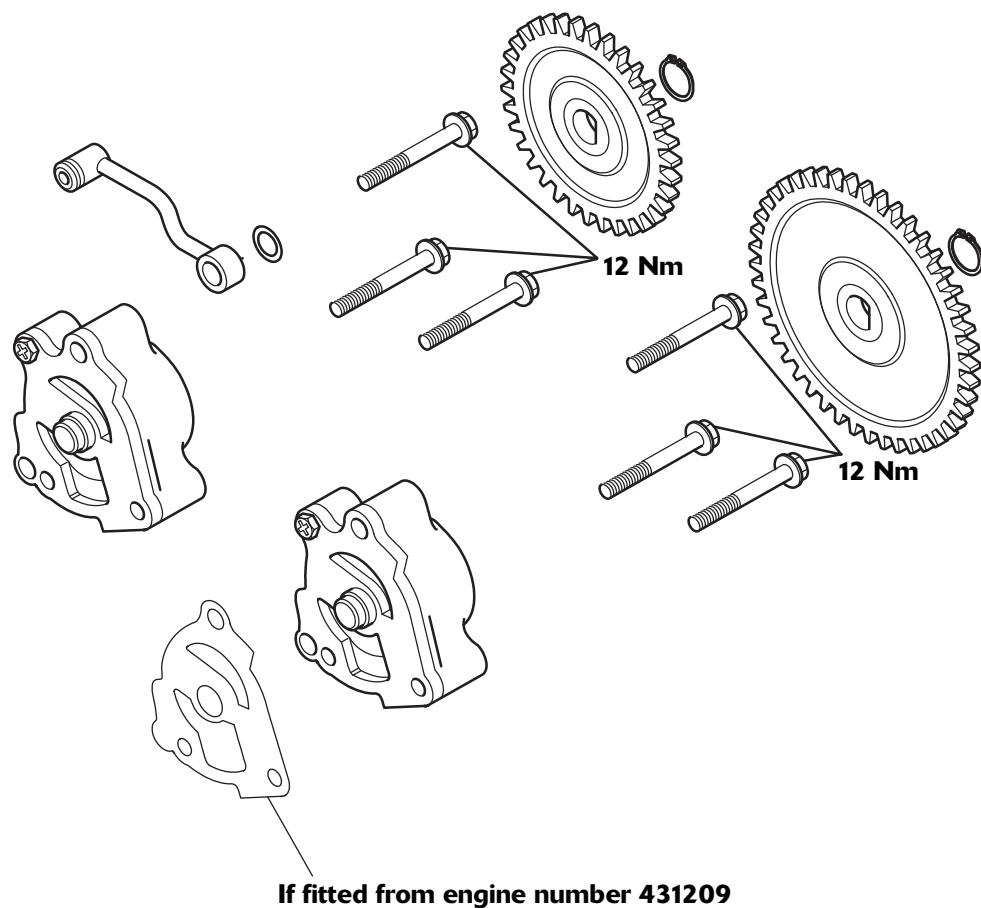


Lubrication System

Exploded View - Oil Cooler and Fittings - Fuel Injected Models

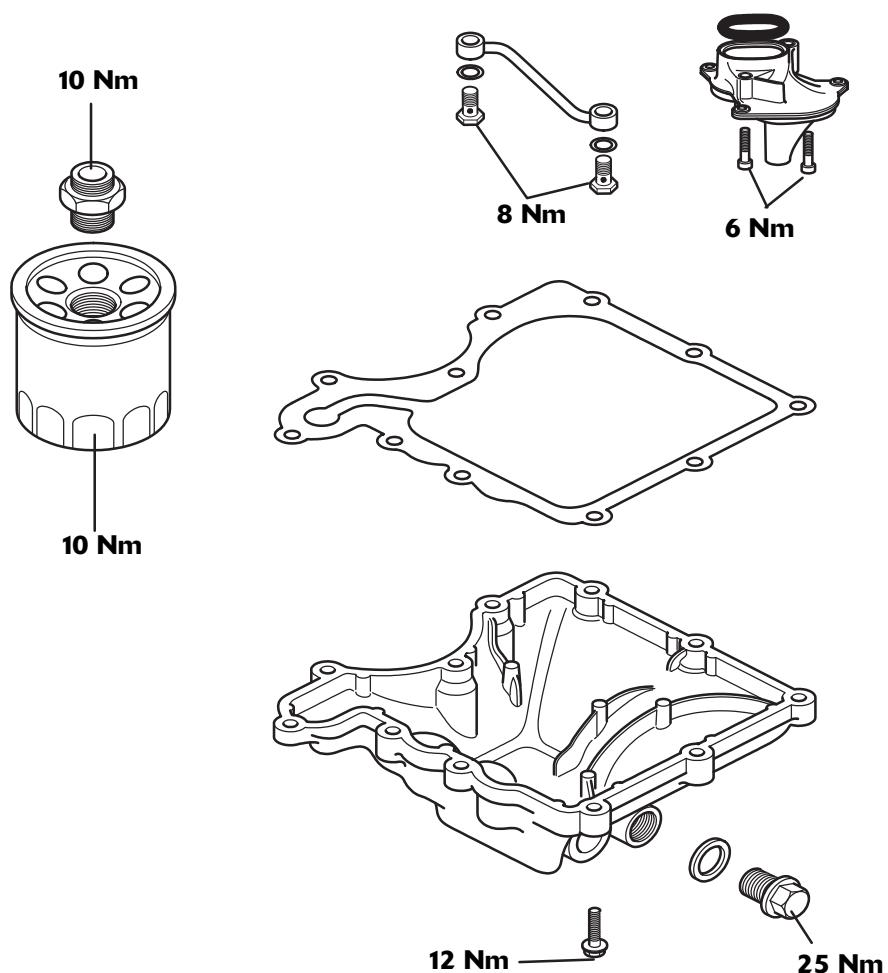


Exploded View - Oil Pumps



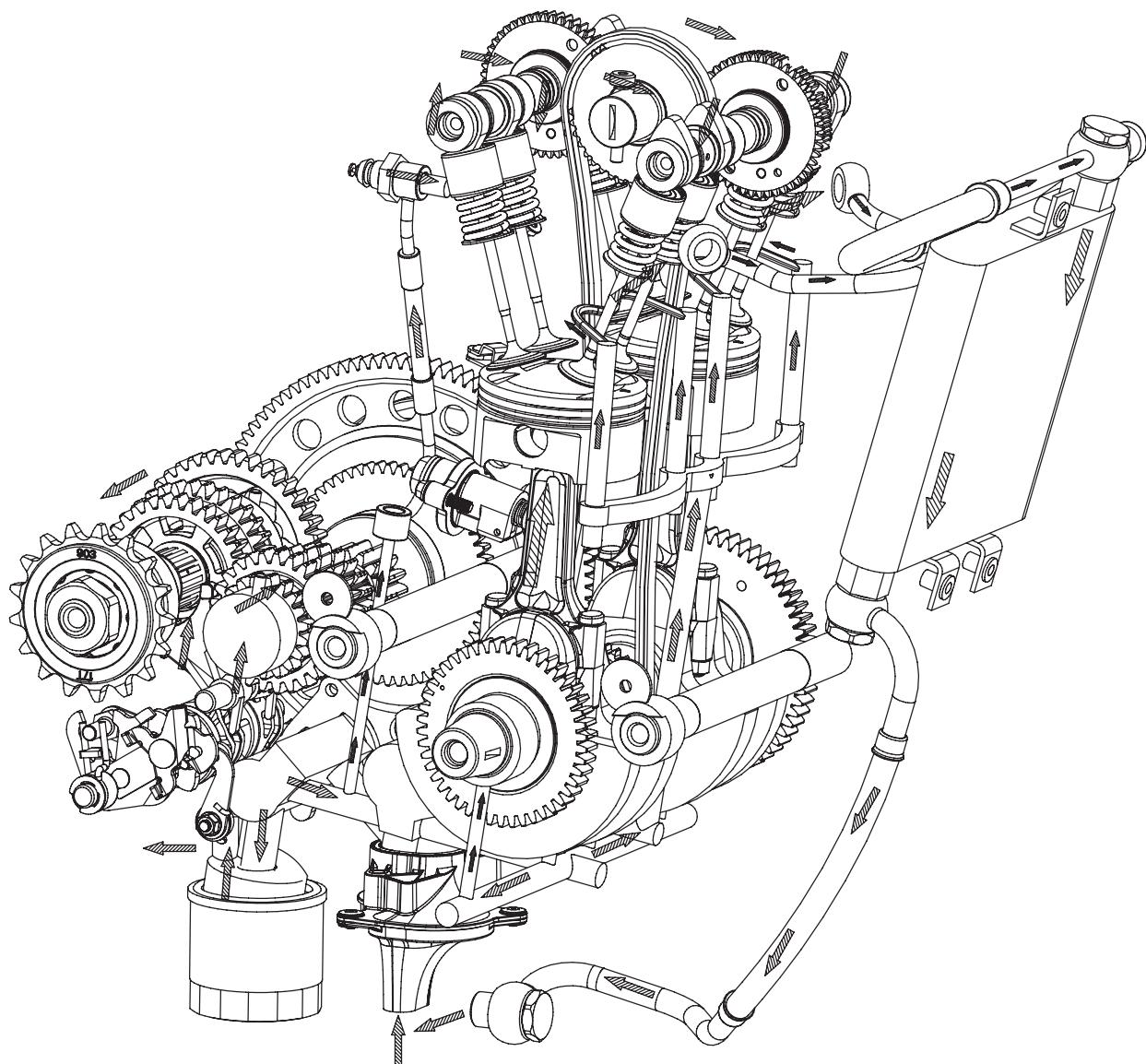
Lubrication System

Exploded View - Sump and Oil Filter



General Description

The lubrication system is operated by a dual oil pump arrangement; the rear oil pump is the main lubrication pump and the front pump lubricates the input shaft/clutch assembly and circulates oil around the oil cooler.



Lubrication System

Rear Oil Pump

The rear pump collects oil from the sump via the pick-up strainer and feeds pressurised oil along an internal passage to the oil filter. This passage houses the pressure relief valve which is screwed into the crankcase. The oil pressure relief valve is set to open at 5.2 bar (73 psi) and, when open, returns oil directly to the sump.

After leaving the oil filter, the oil enters the main oil gallery in the crankcase. From here, oil is distributed to the cylinder head and crankshaft.

Vertical drillings from the main oil gallery feed oil to the four main bearings. The crankshaft is cross-drilled to feed oil from the main bearings to the big-end bearings.

From the centre of the main oil gallery, oil is fed via an external pipe to the rear of the cylinder head. The low oil pressure warning light switch is located at the upper end of this pipe. Within the cylinder head, an oil pipe and drillings feed oil to the camshafts which lubricate the camshafts, tappet buckets and valves. Spill oil returns via the cam chain area to the sump, lubricating the cam chain in the process.

The transmission output shaft is fed with oil direct from the pump, via a metal pipe. The output shaft is both drilled through its length and cross-drilled, the drillings provide oil directly to the gears and bearings.

Front Oil Pump

The front pump collects oil from the sump via the pick-up strainer and feeds pressurised oil along an internal crankcase passage to the front of the barrels.

The oil is circulated around the passages on the outside of the cylinder bores then travels up the cylinder head stud bores to the cylinder head passages which are situated around the combustion chambers and exhaust ports. The oil cools the cylinder bores and head then exits the head through the drillings located directly above the exhaust ports.

From the cylinder head, the oil travels through the feed pipe to the top of the oil cooler. The oil then passes down through the oil cooler, where it is cooled by the passing airflow, and returns to the sump via the return pipe.

As well as circulating oil around the oil cooler, the front pump also lubricates the transmission input shaft. The feed to the shaft is taken off the crankcase passage via the metal pipe on the base of the lower crankcase. The input shaft is both drilled through its entire length and cross-drilled. The drillings provide oil directly to the gears and bearings. Oil flowing through the centre of the shaft exits at the clutch end providing oil to the clutch assembly.

Engine Oil Specification

Use semi or fully synthetic 10W/40 or 15W/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 which 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 crankcase 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.

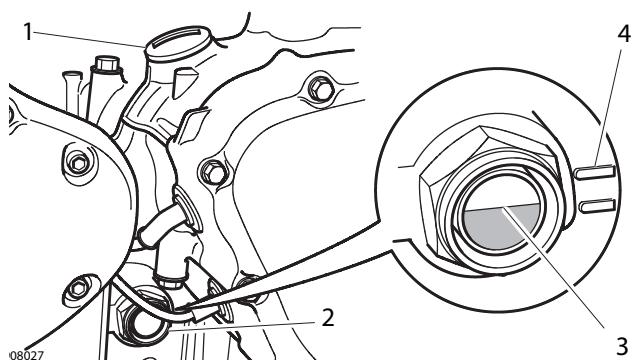
Castrol Power 1 Racing 4T (sold as Castrol Power RS Racing 4T in some countries) consistently performed well during our tests and has become our primary recommendation for the lubrication of all current Triumph motorcycle engines.

Castrol Power 1 Racing 4T (sold as Castrol Power RS Racing 4T in some countries), specially filled for Triumph, is available from your authorised Triumph dealer.

Oil Level Check

Note:

- The motorcycle must be level and upright when checking the oil level.
- 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.
 - Ensure the motorcycle is level and upright then check the oil level in the inspection window on the right hand side of the crankcase.
 - The oil level must be in-between the upper and lower level marks located at the side of the window.



- Oil filler cap
- Oil level inspection window
- Oil level (correct level shown)
- Level marks



Warning

On Scrambler, the oil filler cap is close to the exhaust system. 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 system to cool, as touching any part of a hot exhaust could cause burn injuries.

- If topping-up is necessary, unscrew the filler cap from the top of the crankcase. Add the specified oil a little at a time until the correct oil level is established. On Scrambler models, a suitable funnel may be required to add oil to the oil filler hole.



Caution

Do not overfill the engine with oil. If the oil level is above the upper level line, the excess oil must be drained off to prevent possible engine damage.

- Once the level is correct, securely refit the filler cap and O-ring to the crankcase.

Oil Draining & Refilling

Draining



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants which can cause cancer.

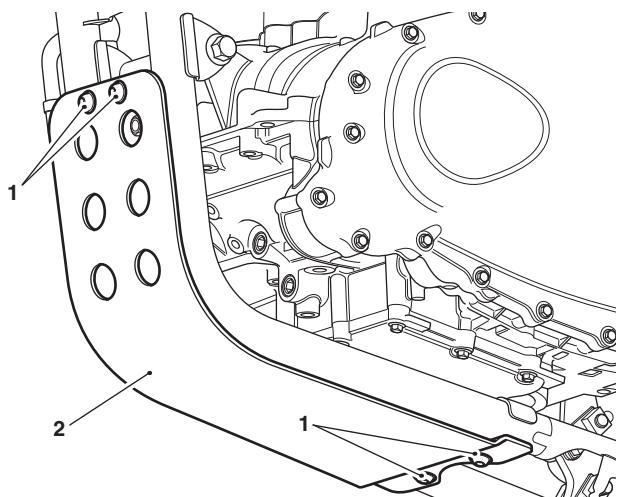
When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.



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 the engine has been running, allow it to stand for a few minutes to allow the oil and engine components to cool.
- Position the motorcycle on level ground.
- If fitted, release the fixings and remove the skid pan.



- Fixings
- Skid pan

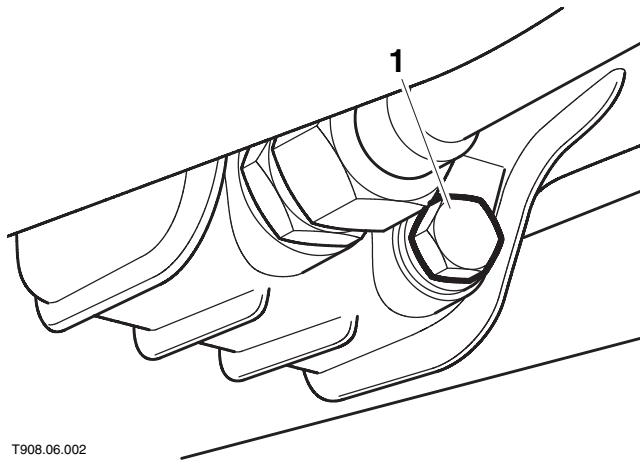
- Place a suitable container beneath the sump plug to collect the displaced oil.

Lubrication System



Warning

If the engine has been running, the exhaust pipes and oil may be hot. Take great care to avoid being scalded or burnt.



T908.06.002

1. Sump drain plug

5. Remove the sump drain plug and allow the oil to drain out completely. Discard the sealing washer. Hold the motorcycle upright whilst the oil drains.
6. When the oil has completely drained out, fit a new sealing washer to the sump plug. Refit the plug tightening it to **25 Nm**.



Caution

Do not pour engine 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.

7. If removed, refit the skid pan and tighten its fixings to **18 Nm**.

Refilling



Warning

On Scrambler, the oil filler cap is close to the exhaust system. 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 system to cool, as touching any part of a hot exhaust could cause burn injuries.

1. Remove the filler cap and fill the engine with oil of the correct specification and viscosity.

Note:

- **Add oil slowly to avoid overfilling or spillage over the outside of the engine.**
- 2. Once the oil level is up to the upper level mark on the inspection window, refit the filler cap and O-ring.
- 3. Start the engine and allow it to run for a short time at idle. Check that the low oil pressure warning light extinguishes shortly after starting.



Caution

Stop the engine if the low oil pressure warning light fails to extinguish.

Investigate and rectify the cause before restarting the engine. Running the engine with the low oil pressure warning light illuminated will cause engine damage.

4. Check for oil leaks then stop the engine.
5. Check the oil level and if necessary top-up (see page 9-9).

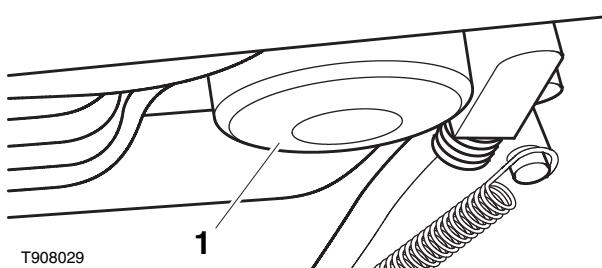
Oil & Filter Change



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. Drain the engine oil (see page 9-9).
2. Position the container beneath the oil filter.
3. Using tool T3880313, unscrew and remove the oil filter from the engine.



1. Oil filter

4. Apply a smear of clean engine oil to the seal of the new filter and fill the filter with clean engine oil.
5. Wipe clean the crankcase surface then fit the filter. Tighten the filter to **10 Nm** using tool T3880313.
6. Refill the engine with clean oil of the correct specification (see page 9-10).

Low Oil Pressure Warning Light Switch

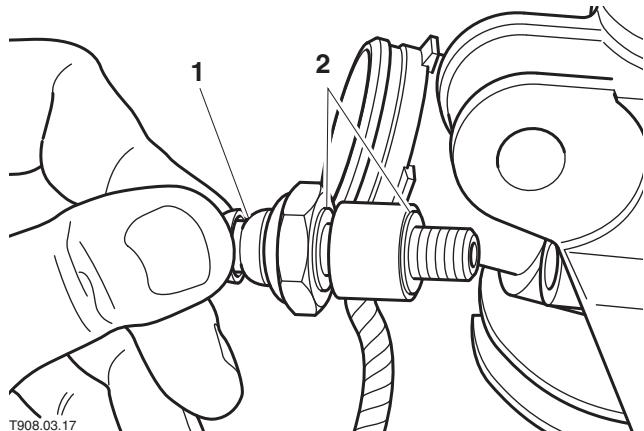
Removal



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 seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Peel back the rubber boot to gain access to the switch terminal.
4. Slacken and remove the screw and disconnect the wiring terminal from the switch.
5. Unscrew the switch from the rear of the cylinder head and remove it. Recover the sealing washers from the oil feed pipe and discard them.



1. Low oil pressure warning light switch
2. Sealing washers

Installation

1. Position a new sealing washer on each side of the oil feed pipe end fitting then screw in the oil pressure switch. Tighten the switch to **13 Nm**.
2. Securely reconnect the wiring connector to the switch, then seat the rubber boot in position.
3. Reconnect the battery, positive (red) lead first, then install the seat (see page 16-11).
4. Check the engine oil level and top-up if necessary (see page 9-9).
5. Start the engine and check for oil leaks.

Lubrication System

Oil Cooler



Warning

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants which 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 water courses. To prevent pollution of water courses etc., dispose of used oil sensibly. If in doubt contact your local authority.



Warning

If the engine has been running, the exhaust pipes and oil maybe hot. Take great care to avoid being scalded or burnt.

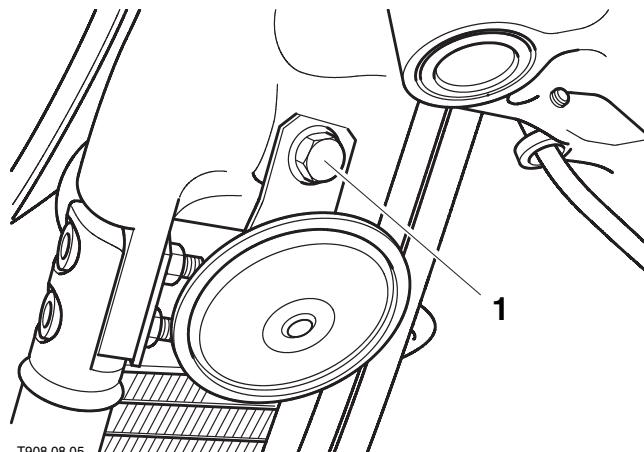
Removal



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 seat (see page 16-11) then disconnect the battery, negative (black) lead first.
2. Unbolt the horn bracket from the frame and remove the horn, disconnect its wiring.



1. Horn bracket bolt

3. Position a suitable clean container beneath the oil cooler to catch any oil.
4. Wipe clean the area around the oil cooler feed and return pipe fittings.
5. Slacken and remove the banjo bolts securing the feed and return pipes to the oil cooler. Discard all the sealing washers.

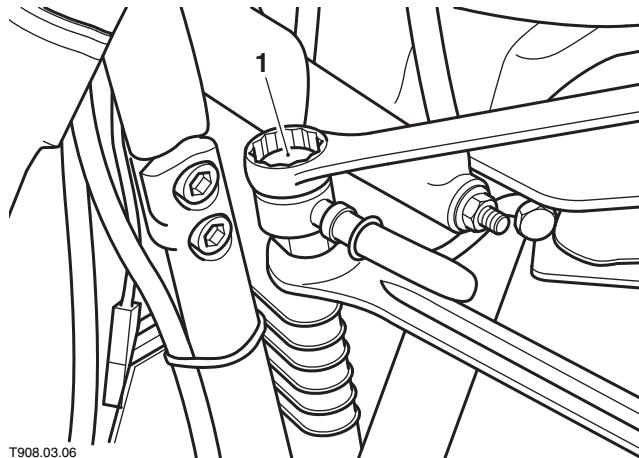
Note:

- On EFI models, disconnect the oil temperature sensor connector before removing the upper banjo bolt.



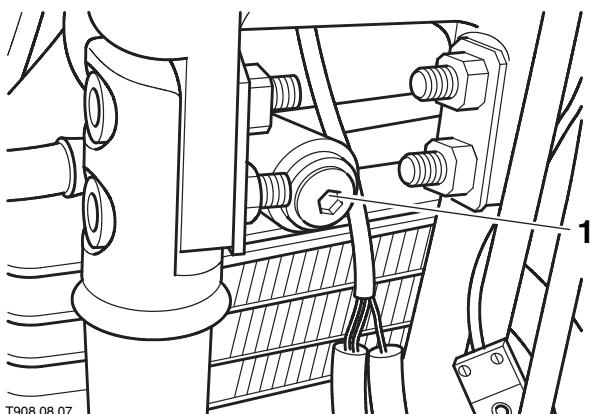
Caution

Use an open-ended spanner to counterhold the oil cooler union as each banjo bolt is slackened.

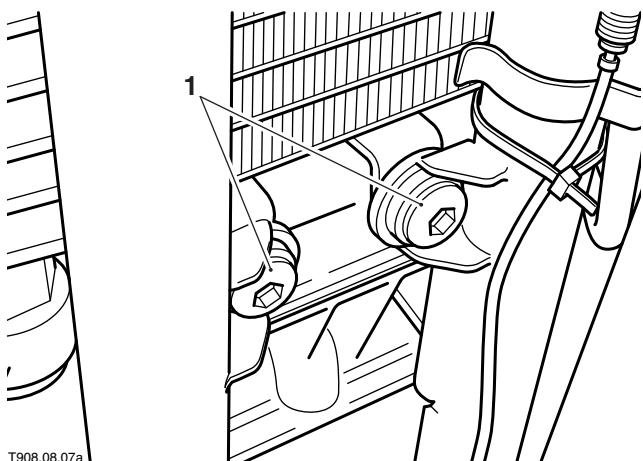


1. Banjo bolt

- Undo the mounting screws and remove the oil cooler from the motorcycle. Take care not to lose the collars from the cooler mounting rubbers.



1. Oil cooler upper mounting screw



1. Oil cooler lower mounting screws

Installation

- Ensure the collars are fitted to the mounting rubbers then manoeuvre the oil cooler into position. Fit the mounting screws and tighten to **9 Nm**.



Caution

Use an open-ended spanner to counterhold the oil cooler union as each banjo bolt is tightened.

- Position a new sealing washer on each side of the oil cooler feed and return pipe end fittings then secure the pipes to the cooler with the banjo bolts. Tighten the bolts to **45 Nm**.

Note:

- On EFI models, connect the oil temperature sensor connector after installing the upper banjo bolt.**
- Check the engine oil level and top-up if necessary.
- Reconnect the wiring connectors to the horn then seat the horn on the frame and tighten its mounting bolt to **24 Nm**.
- Reconnect the battery, positive (red) lead first, then install the seat (see page 16-17).
- Start the engine and check for leaks.
- Stop the engine and adjust the engine oil level (see page 9-9).

Inspection

- Check the oil cooler for stone damage and inspect the oil cooler core for damage to fins or obstructions. Any damage should be repaired or the oil cooler should be renewed.
- Check the mounting rubbers for signs of damage or deterioration. Renew the rubbers as a set if necessary.

Lubrication System

Sump

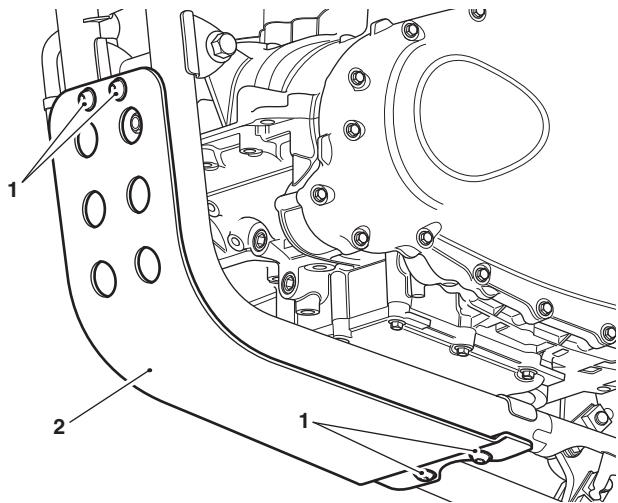
Removal



Warning

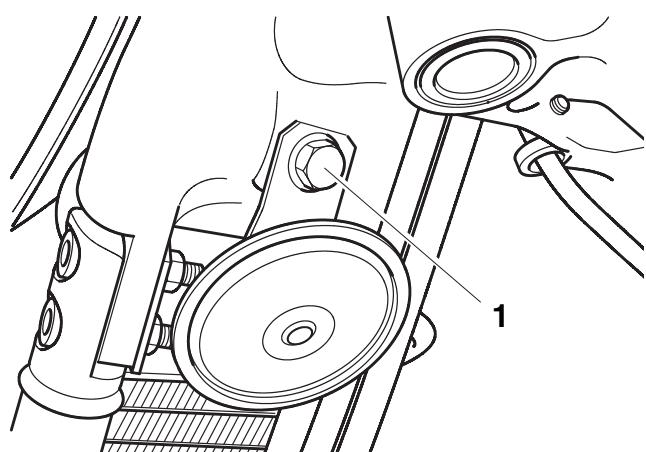
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Disconnect the battery, negative (black) lead first.
2. If fitted, release the fixings and remove the skid pan.



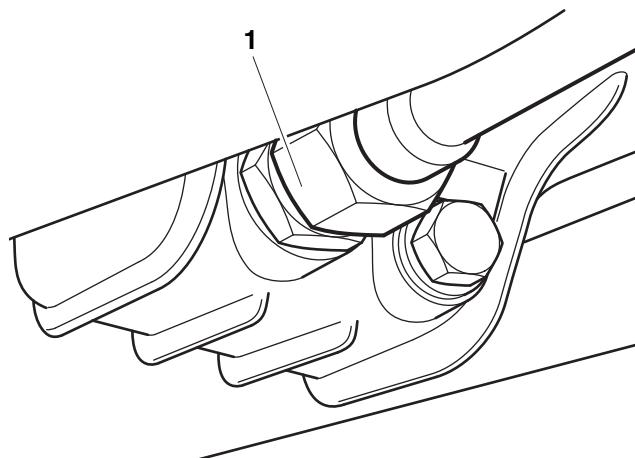
1. Fixings 2. Skid pan

3. Drain the engine oil (see page 9-9).
4. Remove the oil filter (see page 9-11).
5. Securely support the motorcycle on a stand.
6. **For all models except Scrambler only:** Remove the complete exhaust system (see page 10A-37 for carburetor models or page 10B-113 for fuel injected models).
7. Unbolt the horn bracket from the frame and remove the horn, disconnect its wiring.



1. Horn bracket bolt (Bonneville)

8. Remove the oil cooler as described earlier in this section.
9. Detach the oil cooler return pipe from the sump.



1. Oil cooler return pipe connection

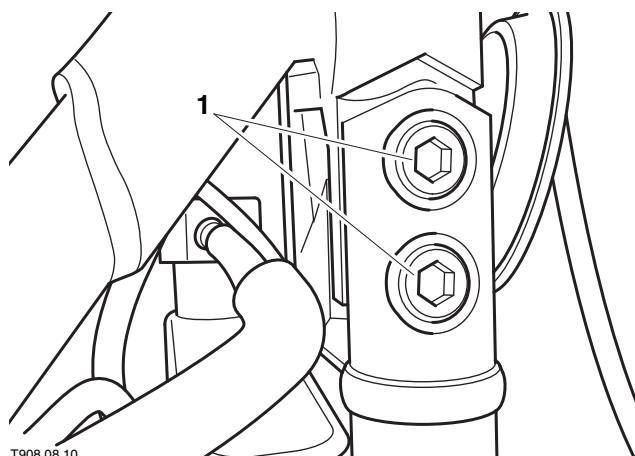


Caution

Use an open-ended spanner to counterhold the oil cooler union with the sump as the union is slackened.

Note:

- **On early Bonneville/T100 models, the oil cooler pipe's sump union was a banjo type.**
10. Release the starter motor cable from the frame right downtube, noting its correct routing.
 11. Release the clutch cable from the frame's left hand downtube, noting its correct routing.
 12. Unscrew the nut and remove the front lower engine mounting bolt.
 13. Remove the downtube brace plate.
 14. Unscrew the bolts (there are 8 in total) securing the downtubes to the frame. Recover the nut plate from each pair of bolts, noting the correct location of the oil cooler bracket.

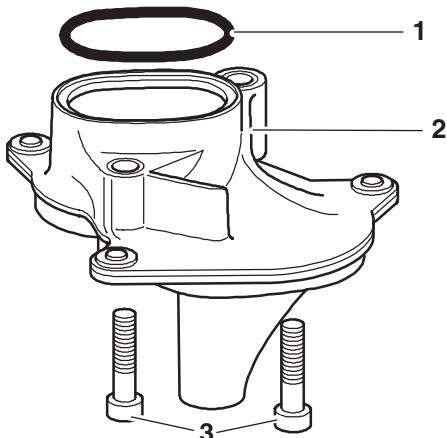


1. Downtube to frame bolts (right hand upper bolts shown)
T908.08.10

15. Remove the bolts and manoeuvre the downtubes assembly away from the motorcycle.
16. Wipe clean the area around the oil cooler return pipe end fitting. Release the union and place the pipe to one side.
17. Evenly and progressively slacken and remove the retaining bolts then remove the sump.
18. Remove the sump gasket and discard it.
19. Check the oil pick-up strainer for blockages or restrictions. If necessary, undo the screws and remove the pick-up for cleaning. Discard the pick-up O-ring.

Installation

1. Ensure the sump and crankcase mating surfaces are clean and dry and the oil pick-up strainer is clean and unblocked.
2. Clean the threads of the oil pick-up screws and apply a drop of locking compound (ThreeBond TB1360 is recommended) to each one.
3. Fit a new O-ring to the oil pick-up recess then fit the pick-up to the crankcase. Install the pick-up screws tightening them to **6 Nm**.



1. O-ring

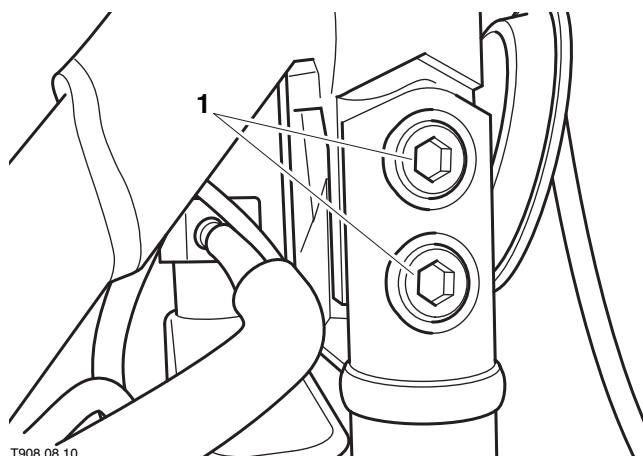
2. Oil pick-up

3. Screws

4. Fit a new gasket then fit the sump to the crankcase. Install the retaining bolts and tighten them evenly and progressively to **12 Nm**.
5. Check the condition of the O-ring in the sump to oil cooler pipe adaptor then locate the oil cooler return pipe to the union and tighten to **15 Nm** while holding the adaptor.

Note:

- If a new oil cooler pipe adaptor is to be fitted, always use a new washer and tighten the adapter to **45 Nm**.
- If a banjo union is fitted, position a new sealing washer on each side of the oil cooler pipe end fitting and fit the banjo bolt. Ensure the hose is correctly positioned then tighten the banjo bolt to **45 Nm**.
- 6. Refit the frame downtubes and secure with the mounting bolts. Fit the nut plates to the bolts, ensuring the oil cooler mounting bracket is correctly positioned. Hand-tighten all bolts.
- 7. Insert the engine front lower mounting bolt from the left hand side and hand-tighten its nut.
- 8. Tighten the frame downtube bolts to **45 Nm** if black bolts (T3050220) are fitted, and **40 Nm** if silver bolts (T3050224) are fitted.



1. Downtube to frame bolts (right hand upper bolts shown)

9. Tighten the engine front lower bolt to **80 Nm**.
10. Refit the frame downtube brace and secure with the fixings.
11. Tighten the brace bolts to **22 Nm**.
12. Ensure the starter motor cable is correctly routed and secure it to the frame downtube.
13. Ensure the clutch cable is correctly routed and secure it to the frame downtube.
14. Refit the oil cooler to the frame downtubes.
15. Ensure the collars are fitted to the mounting rubbers then position the cooler to the mounting points. Tighten the fixing(s) to **9 Nm**.
16. Position a new sealing washer on each side of the oil cooler feed pipe end fitting then secure the pipe to the cooler with the banjo bolt. Tighten the bolt to **45 Nm**.

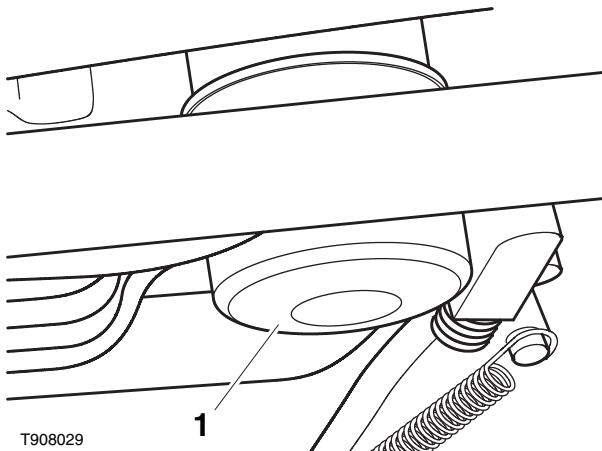
Lubrication System



Caution

Use an open-ended spanner to counterhold the oil cooler union as each banjo bolt is tightened.

17. Reconnect the wiring connectors to the horn then seat the horn on the frame and tighten its mounting bolt to **24 Nm**.
18. **For all models except Scrambler only:** Refit the exhaust system (see page 10A-37 for carburettor models or page 10B-111 for fuel injected models).
19. Apply a smear of clean engine oil to the seal of the new filter and fill the filter with clean engine oil.



1. Oil filter

20. Wipe clean the crankcase surface then fit the oil filter. Tighten the filter to **10 Nm** using tool T3880313.
21. Refill the engine with clean oil of the correct specification (see page 9-10).
22. Reconnect the battery, positive (red) lead first.
23. Start the engine and check for leaks.
24. Stop the engine and adjust the engine oil level (see page 9-9).
25. If removed, refit the skid pan and tighten its fixings to **18 Nm**.

Oil Pressure Relief Valve

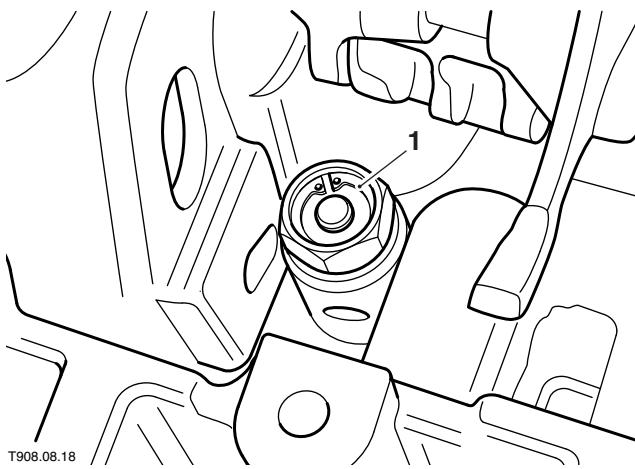
Removal



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. Disassemble the crankcase halves (see page 7-6).
2. Unscrew the oil pressure relief valve from the lower crankcase half.



1. Oil pressure relief valve

Inspection

1. Check the valve plunger moves smoothly and returns freely to its stop under spring pressure. If not renew the pressure relief valve.

Installation

1. Ensure the valve threads are clean and dry.
2. Apply a drop of thread locking compound (ThreeBond TB1305 is recommended) to the threads of the valve then fit it to the crankcase. Tighten the relief valve to **15 Nm**.



Caution

Ensure no thread locking compound enters the relief valve bore.

3. Assemble the crankcase halves (see page 7-7).

Oil Pumps

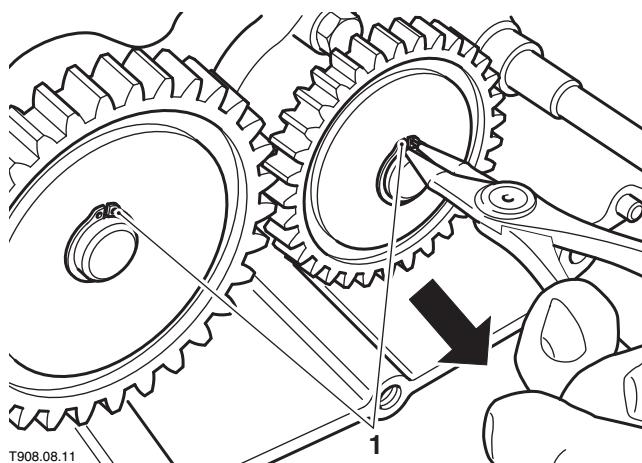
Removal



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. Drain the engine oil (see page 9-9).
2. Remove the clutch assembly (see page 5-9).
3. Remove the circlips and slide the driven gears off of the oil pump shafts.

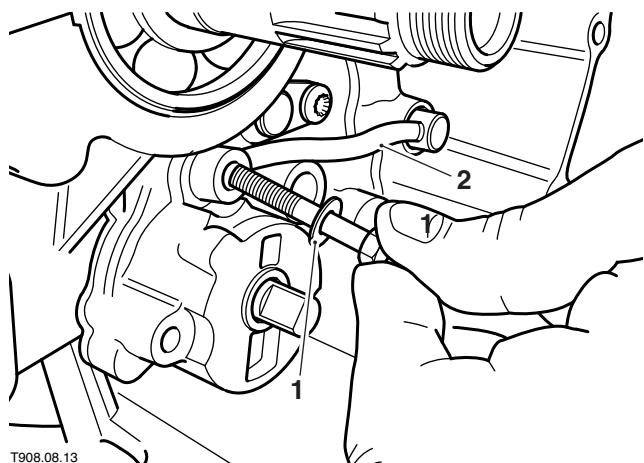


1. Oil pump driven gear circlips

Note:

- From engine number 431209, some engines are fitted with a steel gasket under the front oil pump. The rear oil pump does not have a steel gasket fitted.
- 4. To remove the front pump, unscrew the bolts then remove the pump from the crankcase. If fitted, collect the steel gasket from behind the pump.

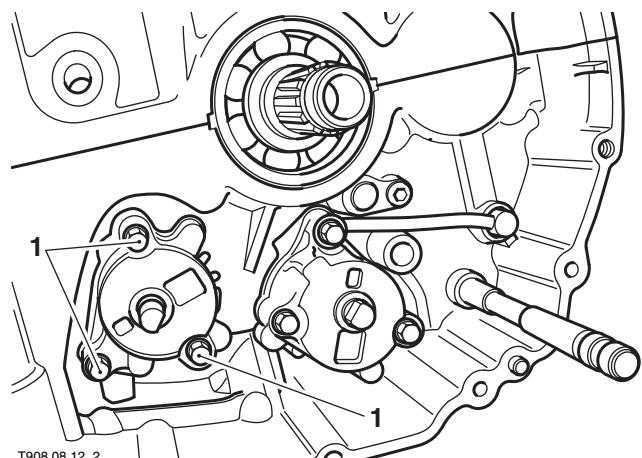
5. To remove the rear pump, unscrew the bolts and remove the output shaft oil pipe and pump from the crankcase. Discard the sealing washer which is fitted to the upper (oil pipe) bolt.



**1. Sealing washer
2. Oil pipe**

Note:

- The front and rear oil pumps are different and are not interchangeable (see installation).



1. Front oil pump bolts

Lubrication System

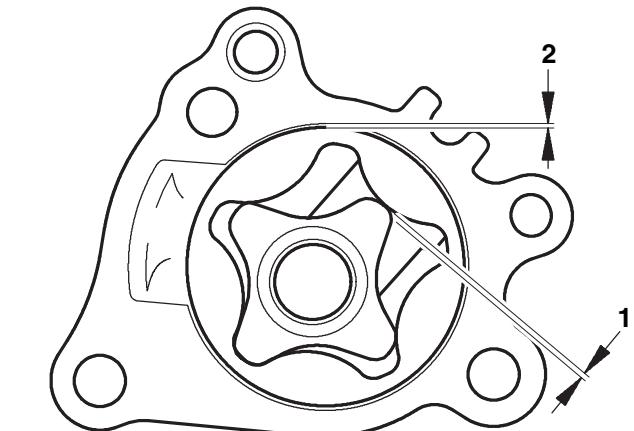
Inspection

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.

1. Inspect each pump assembly as follows.
2. Release the screw and withdraw the oil pump plate from the pump body.
3. Inspect the pump body and rotors for signs of visible wear or damage.
4. Measure the rotor tip clearance using feeler gauges.

Standard	Less than 0.15 mm
Service limit	0.20 mm



- 07.15-3
1. Rotor tip clearance
2. Pump body clearance

5. Measure the pump body clearance using feeler gauges.

Standard	0.15 to 0.22 mm
Service limit	0.35 mm

6. Measure the pump end clearance.

Standard	0.02 to 0.07 mm
Service limit	0.10 mm

7. If any of the measurements exceed the service limit, or the pump rotors or body are badly scored, renew the pump assembly.
8. If the pump is serviceable, liberally apply clean engine oil to all internal components and refit the plate to the oil pump body.
9. Inspect the driven gears for wear and/or damage and renew if necessary.

Installation

Note:

- The front and rear oil pumps are different and are not interchangeable. The rear oil pump has its upper bolt location recessed to allow the output shaft oil pipe to seat on the pump.

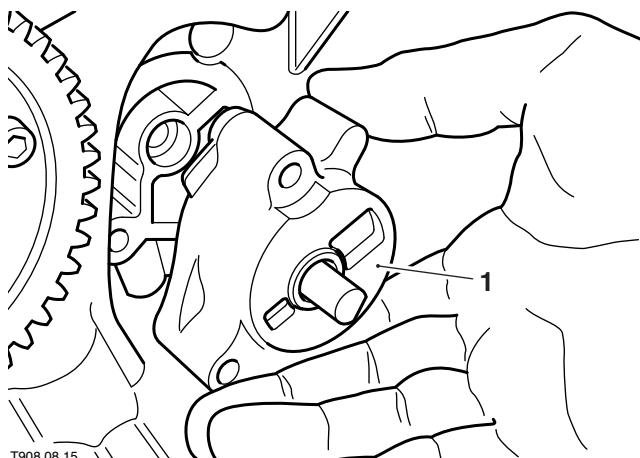
1. Fill each pump with clean engine oil and rotate the pump shaft a few times to prime the pump.

Caution

If an oil pump is not primed, it may fail to pick-up oil from the sump. This will cause the engine to run without oil pressure and will lead to severe engine damage.

Note:

- From engine number 431209, engines may be fitted with a steel gasket under the front oil pump. The rear oil pump does not have a steel gasket fitted.
- 2. Fit the front oil pump to the crankcase, installing the steel gasket if removed, and install its bolts. Evenly and progressively tighten the bolts to **12 Nm**.

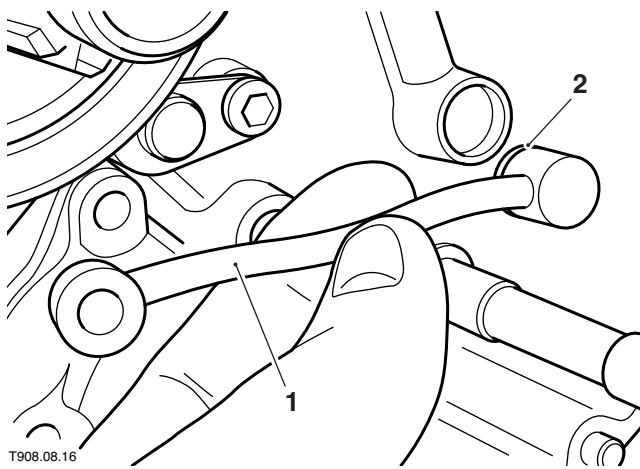


1. Front oil pump

Caution

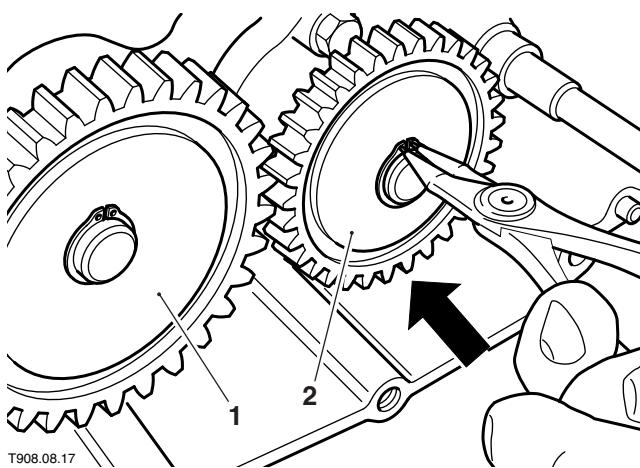
Only fit a steel gasket (fitted from engine number 431209), to the front oil pump, do not fit a steel gasket to the rear oil pump. Fitting a gasket to the rear pump may reduce oil flow to the engine, resulting in engine damage, loss of motorcycle control and an accident.

- Fit the rear oil pump to the crankcase and install its two lower bolts. Lubricate the output shaft oil pipe O-ring with oil then fit the pipe to the crankcase. Fit the pump upper mounting bolt, complete with a new sealing washer, then evenly and progressively tighten all the pump bolts to **12 Nm**.



1. Oil pipe
2. O-ring

- Fit the larger driven gear to the front pump and the smaller gear to the rear pump. Secure the gears in position with the circlips ensuring they are correctly located in the shaft grooves.



1. Larger gear
2. Smaller gear

- Install the clutch assembly (see page 5-11).
- Refill the engine with oil (see page 9-10).

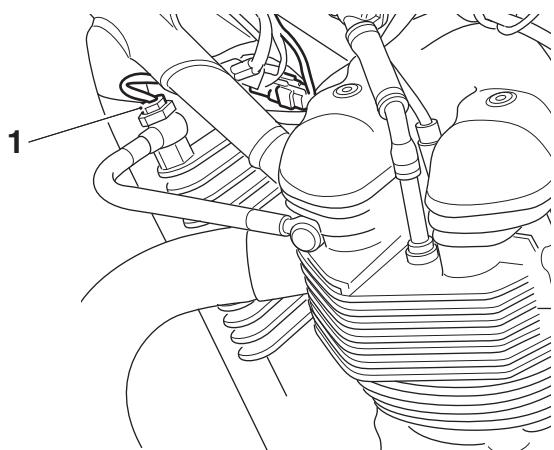
Oil Temperature Sensor - Fuel Injected Models Only

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 seat (see page 16-11).
- Disconnect the battery, negative (black) lead first.
- Disconnect the oil temperature sensor's multi-plug from the main harness, located under the front of the fuel tank.
- Peel back the rubber boot covering the sensor.
- Unscrew the sensor from the upper union on the right hand side of the oil cooler and remove it. Recover the sealing washer from the oil temperature sensor and discard it.



1. Oil temperature sensor

Lubrication System

Installation

1. Apply a few drops of ThreeBond 1374 to the threads of the oil temperature sensor.
2. Position a new sealing washer to the oil temperature sensor then screw in the sensor to the oil cooler union. Tighten the sensor to **18 Nm**.
3. Reconnect the oil temperature sensor multi-plug to the main harness connector under the fuel tank.
4. Refit the rubber boot to the oil temperature sensor.
5. Reconnect the battery, connecting the positive (red) terminal first.
6. Check the engine oil level and top-up if necessary.
7. Start the engine and check for oil leaks.
8. Refit the seat (see page 16-11).

10A Fuel System - Carburettor Models

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Fuel System - Carburettor Models

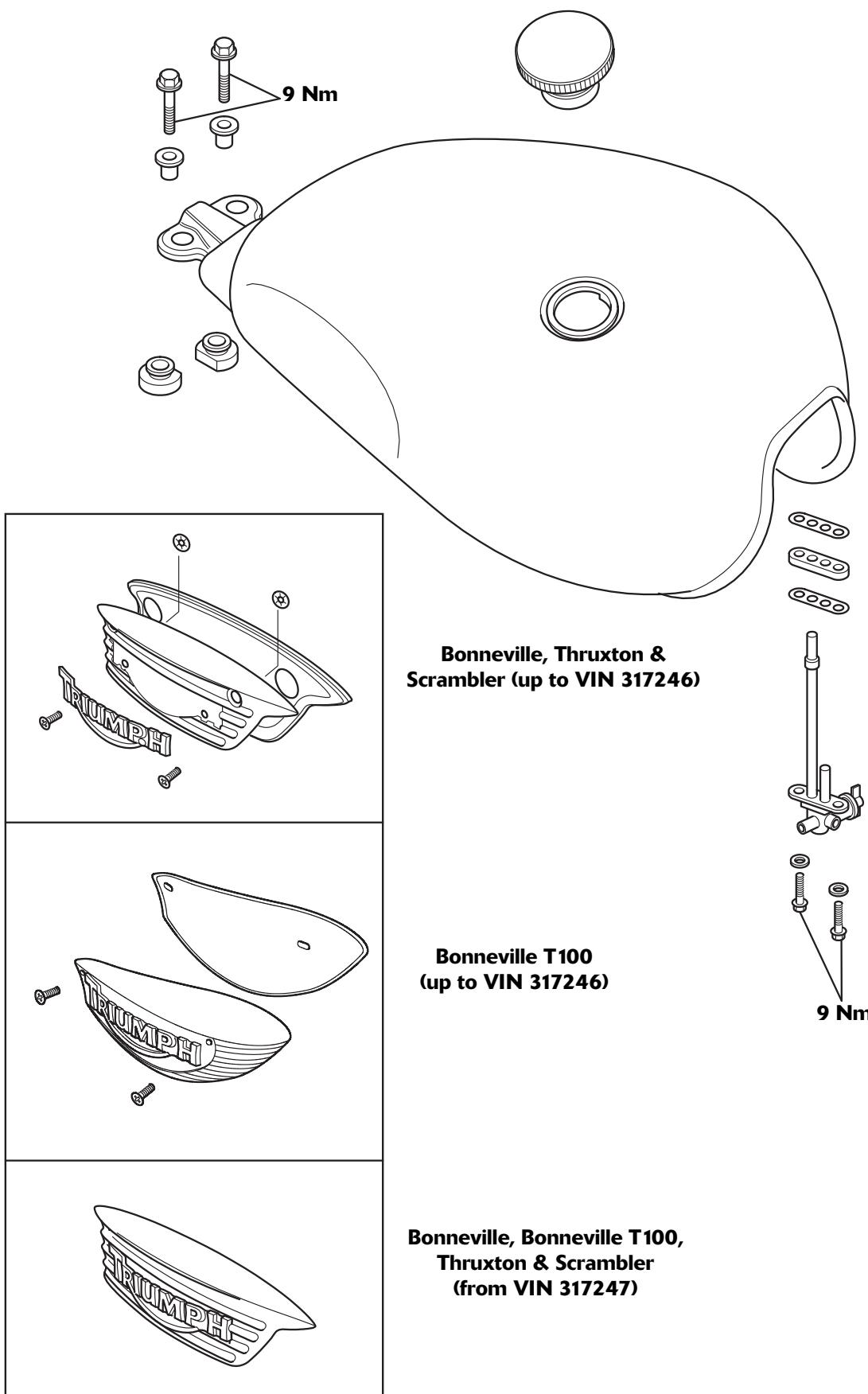
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Fuel System - Carburettor Models

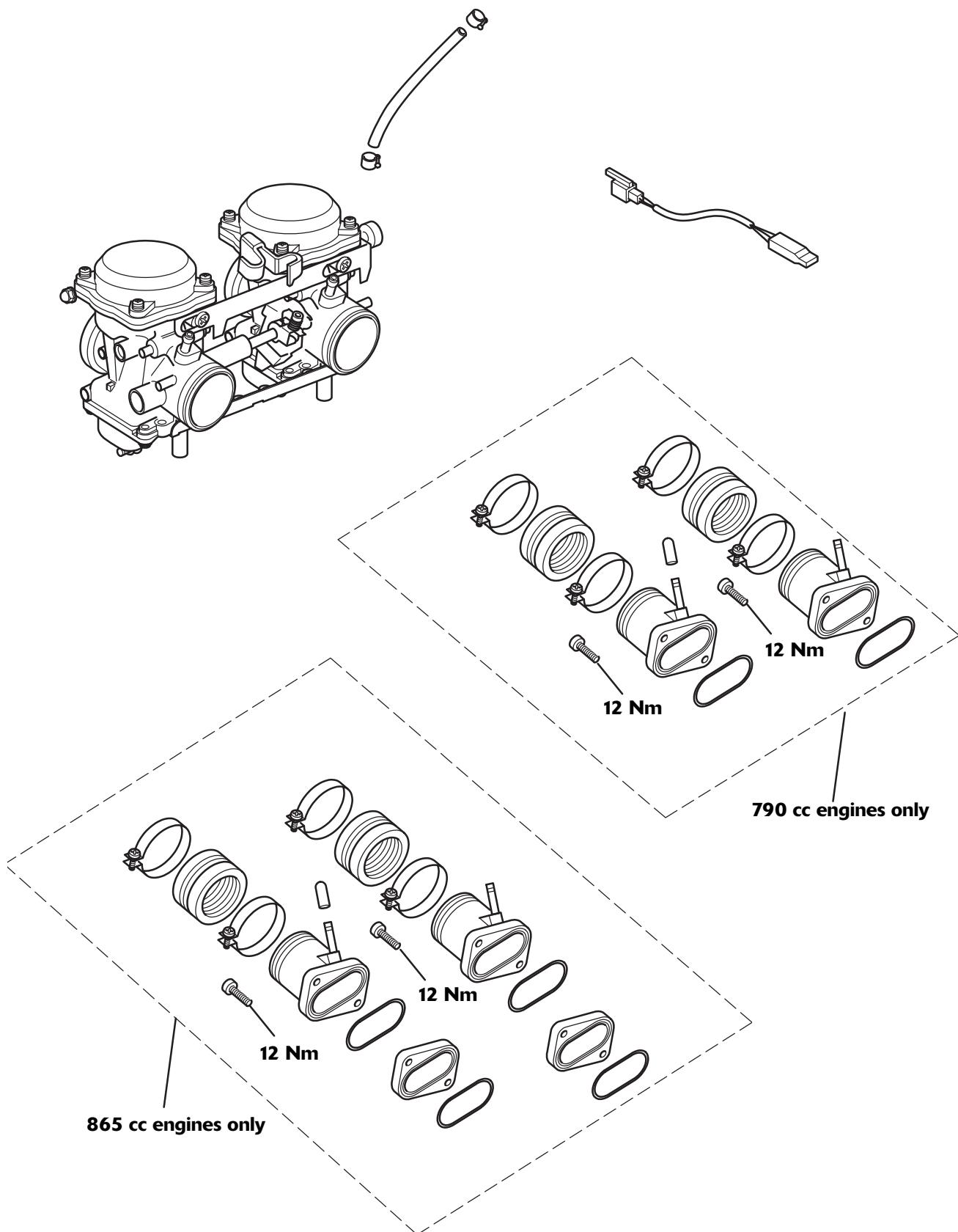
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Fuel System - Carburettor Models

Exploded View - Fuel Tank and Fittings

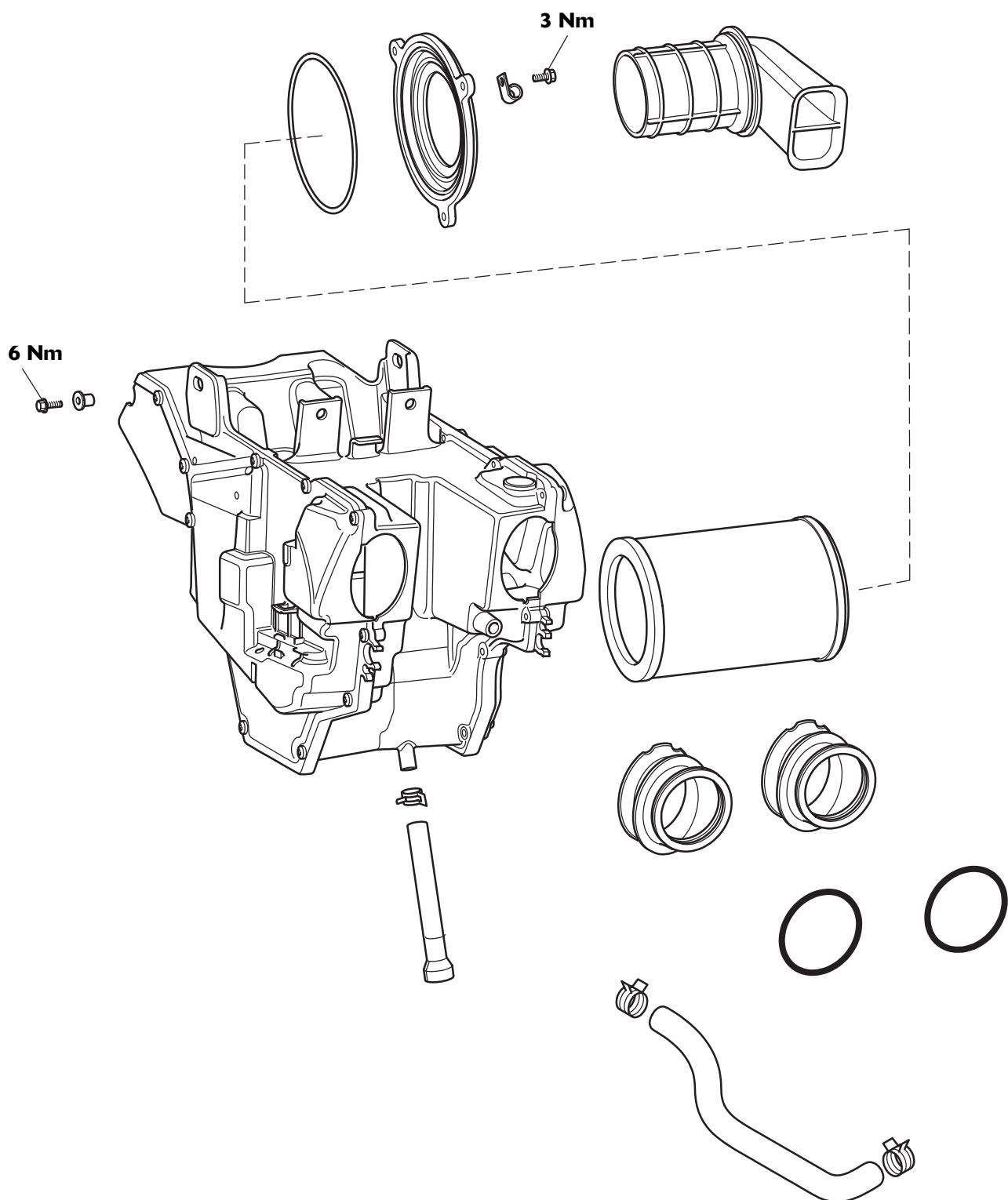


Exploded View - Carburetors and Fittings

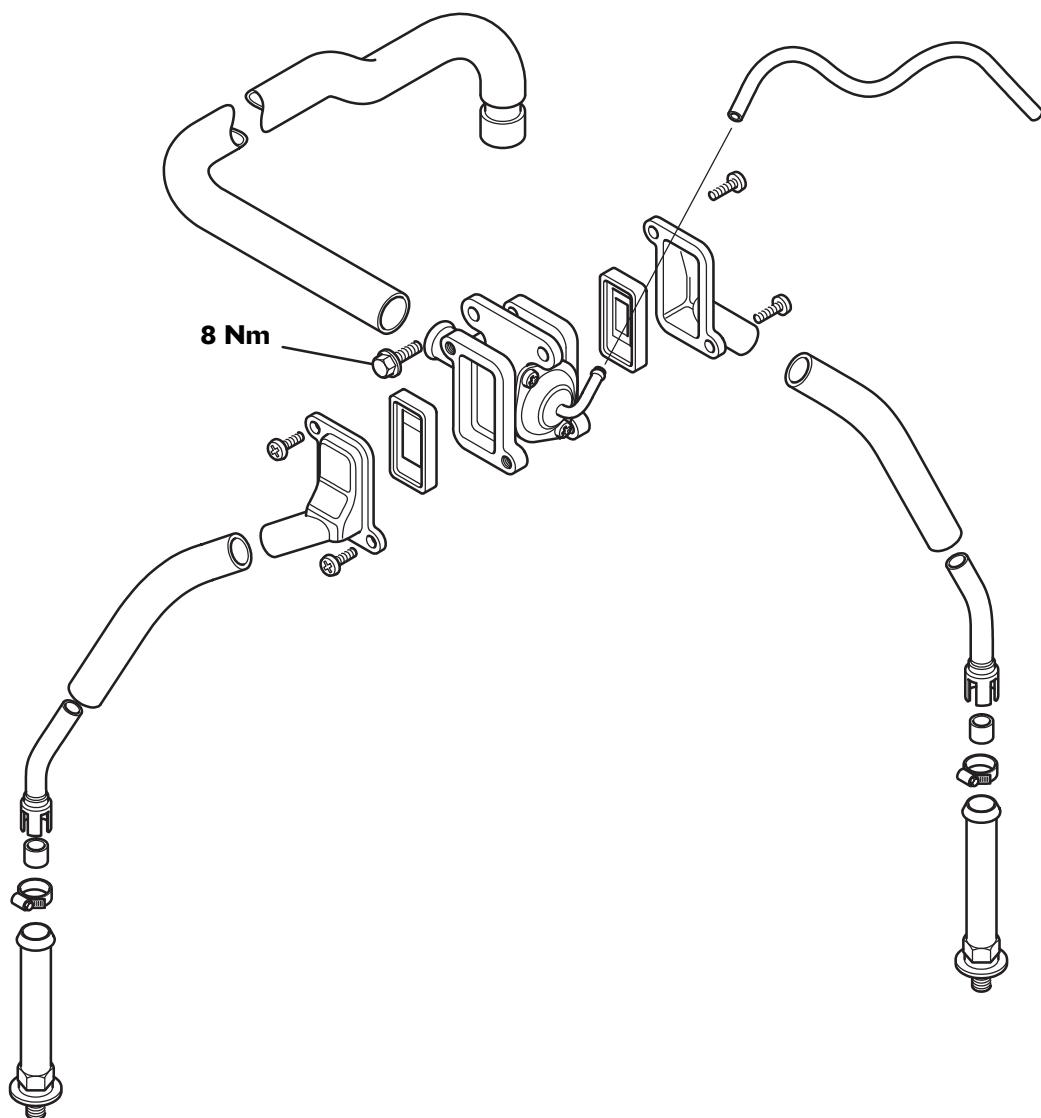


Fuel System - Carburettor Models

Exploded View - Airbox

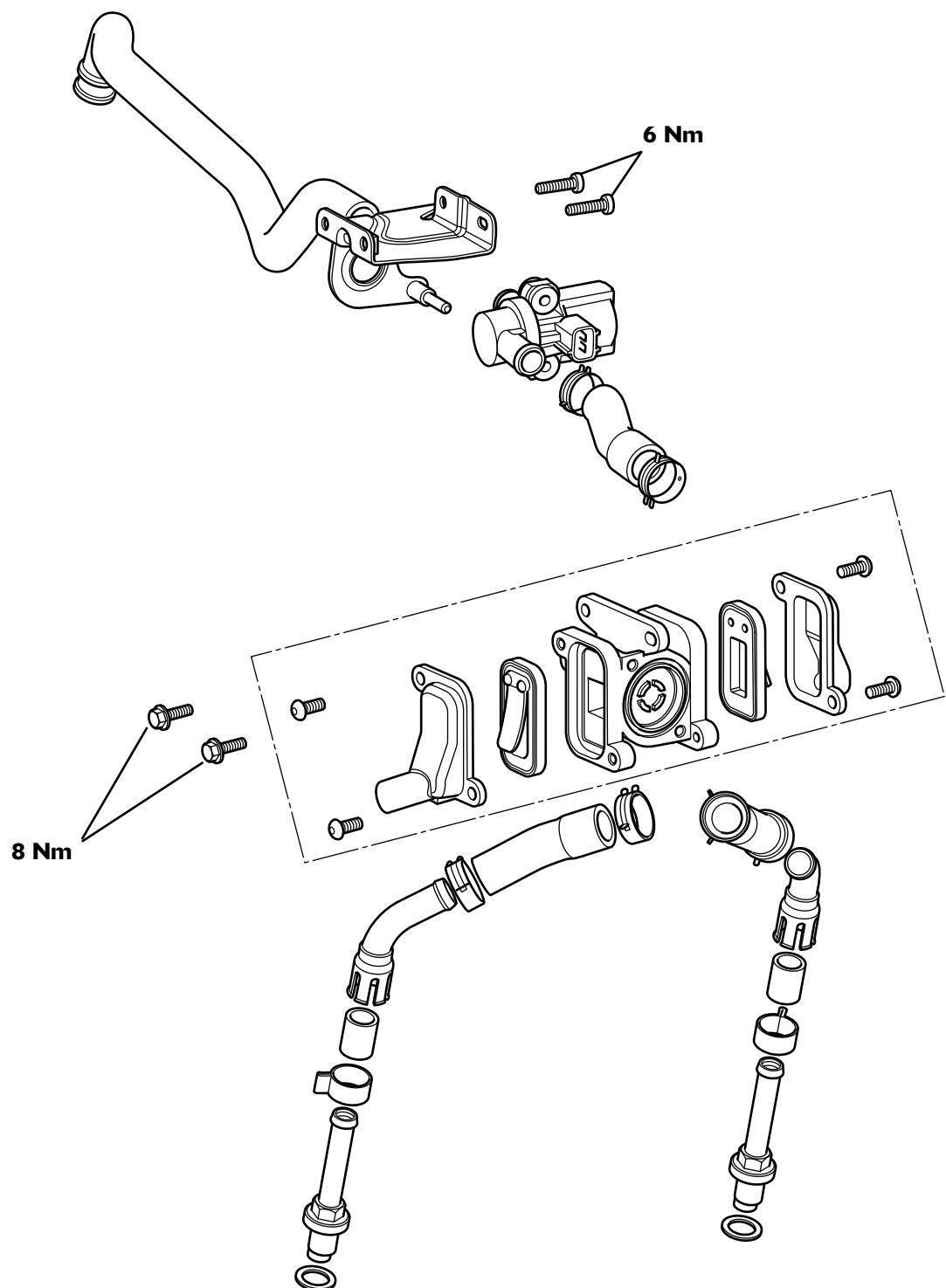


Exploded View - Secondary Air Injection System Components - up to 2007 Model Year

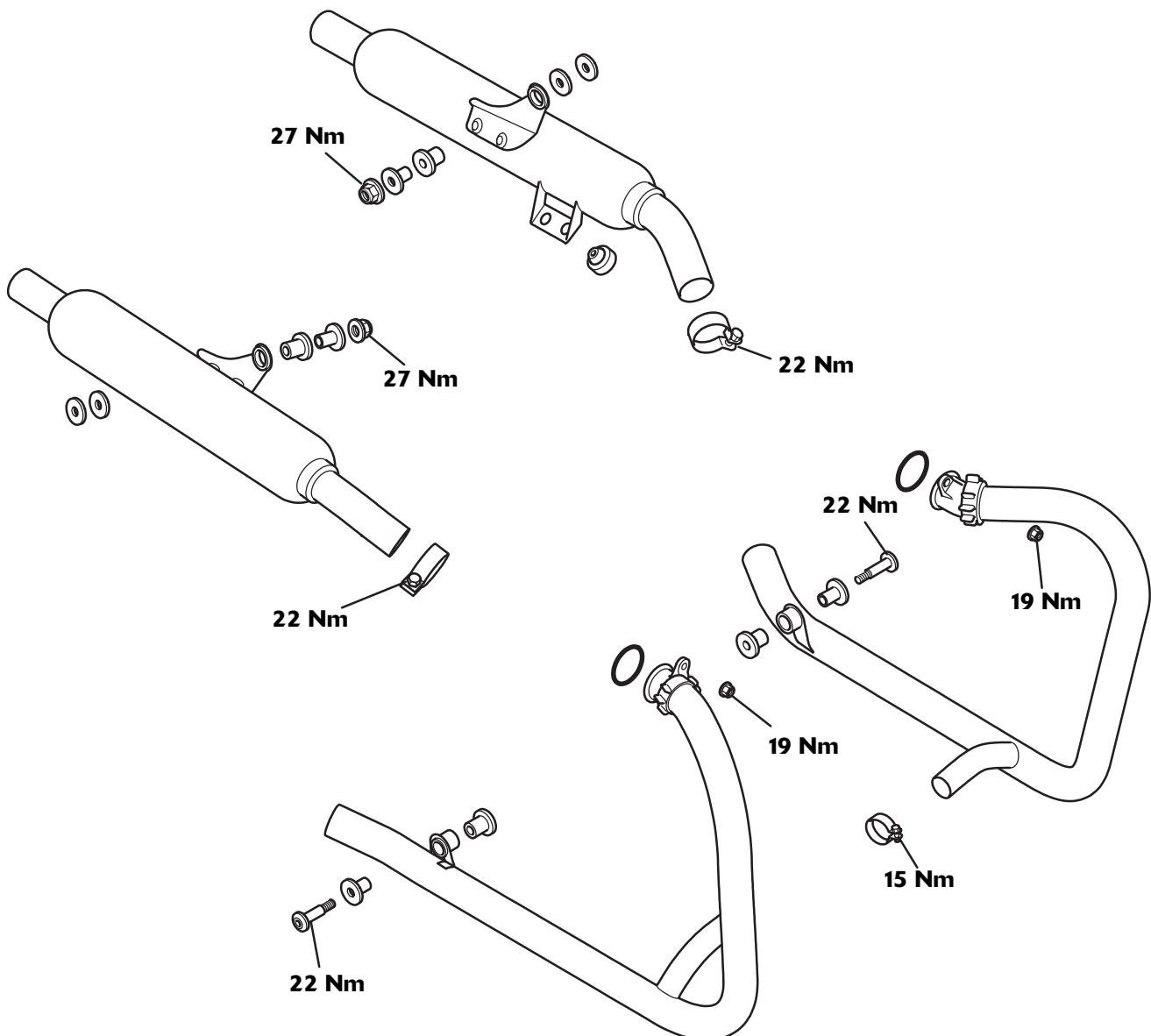


Fuel System - Carburettor Models

Exploded View - Secondary Air Injection System Components - from 2008 Model Year

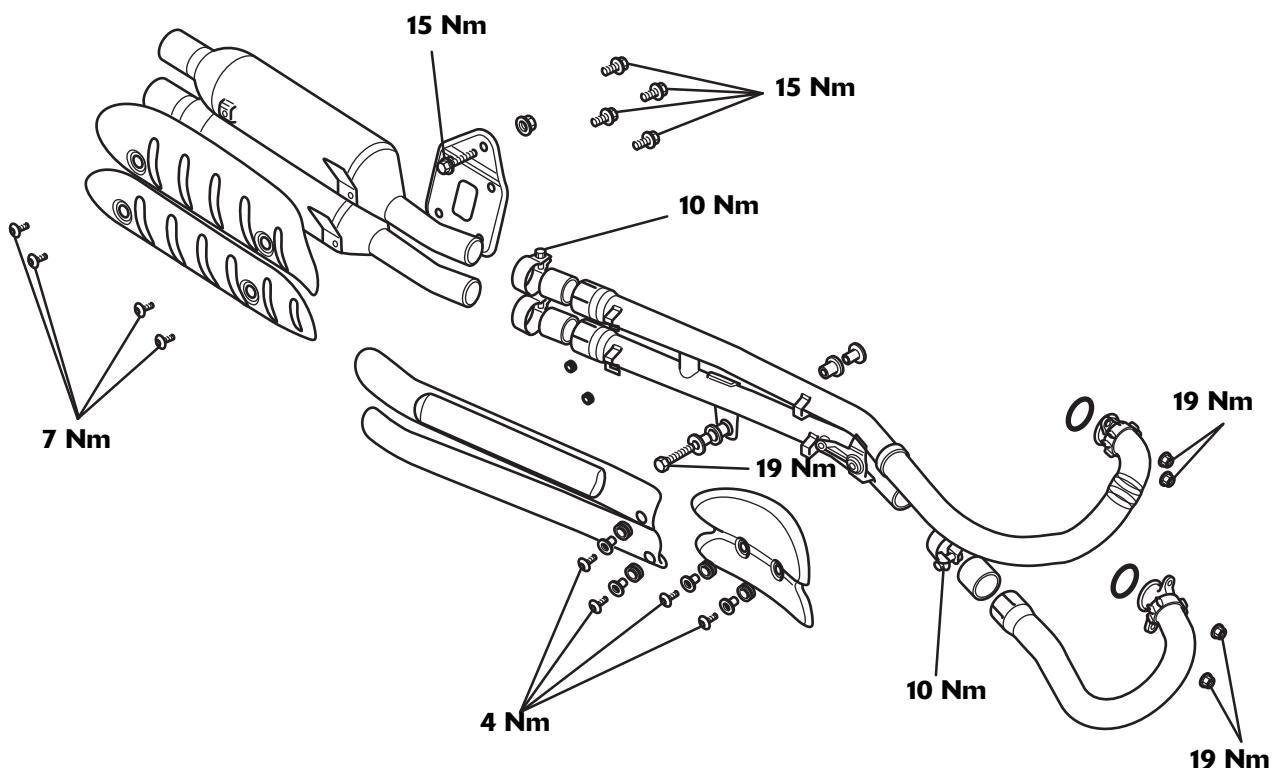


Exploded View - Exhaust System - Bonneville & Bonneville T100

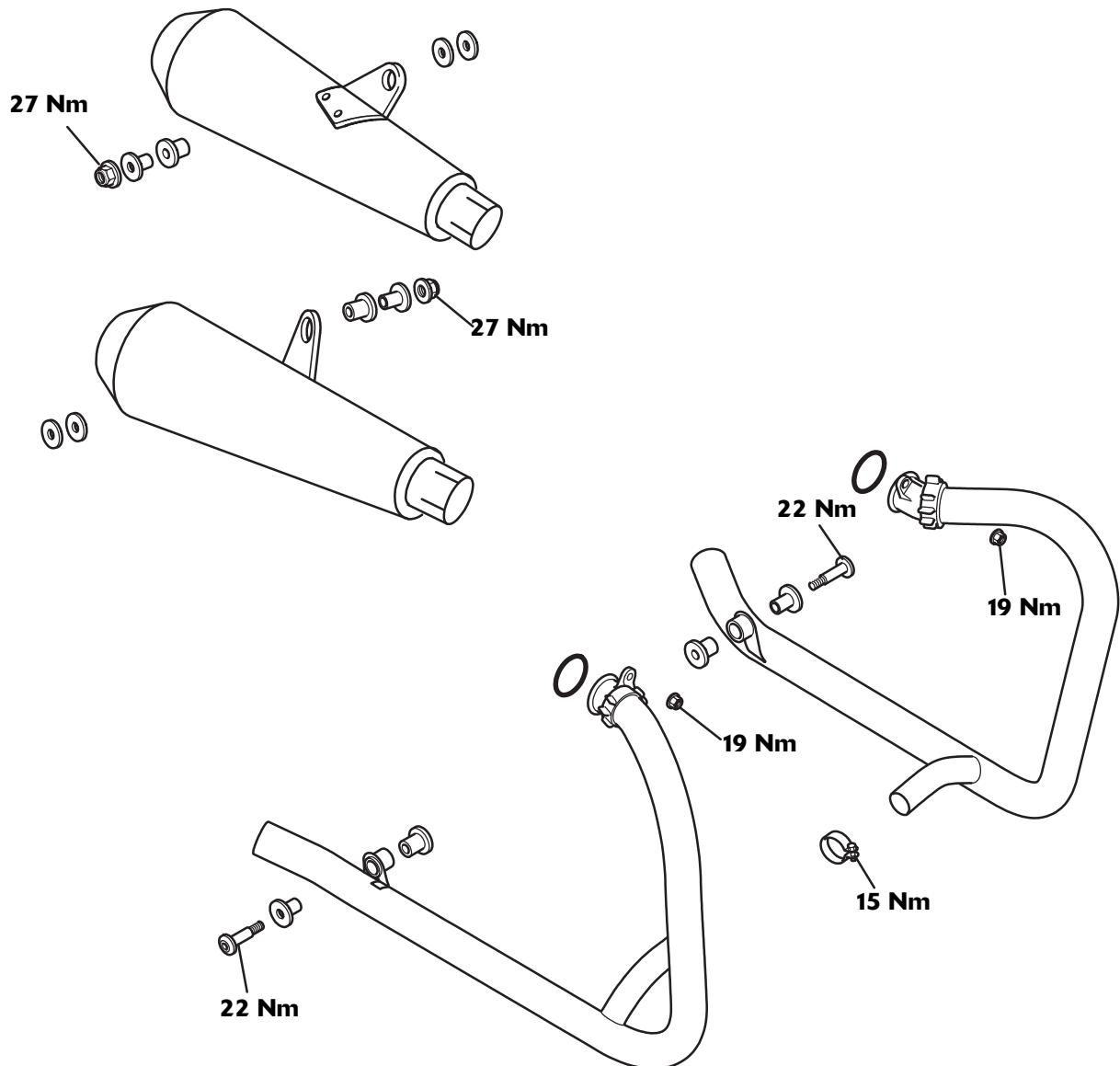


Fuel System - Carburettor Models

Exploded View - Exhaust System - Scrambler



Exploded View - Exhaust System - Thruxton



Fuel System - Carburettor Models

Fuel Requirements

All Countries Except USA

Outside America, all motorcycles are designed to be run on 95 RON unleaded fuel.



Caution

Most models are fitted with catalytic converters and therefore must be run on unleaded fuel. The use of leaded fuel will damage the catalytic converters.

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: Triumph motorcycles are designed to run on unleaded gasoline with a CLC or AKI octane rating (R+M)/2 of 89 or higher.



Caution

The use of leaded gasoline is illegal in some countries, states or territories. Check local regulations before using leaded gasoline.

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. Triumph motorcycles 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 Tank



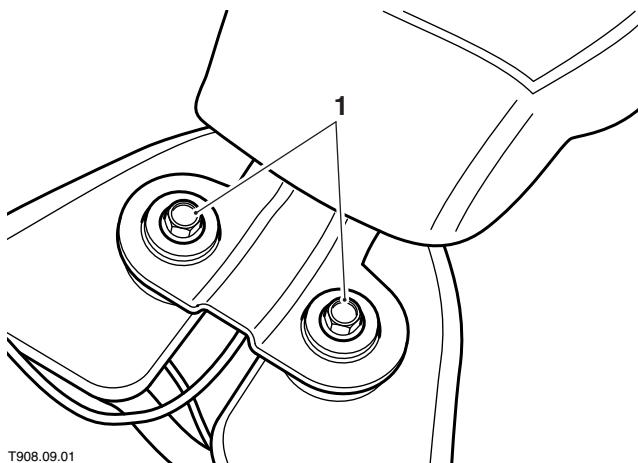
Warning

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.

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Ensure the fuel tap is turned OFF then disconnect the fuel hose from the tap.
4. Slacken and remove the mounting bolts from the rear of the fuel tank.



1. Fuel tank mounting bolts

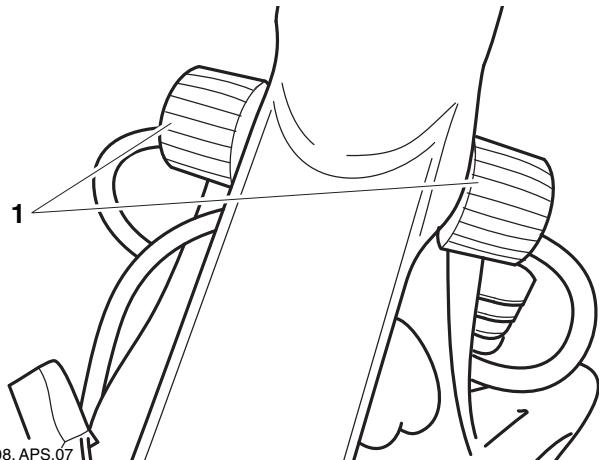
5. Disconnect the breather hose from the right hand side of the tank.

Note:

- On California models, this hose is the evaporative loss system hose. Plug the hose end whilst it is disconnected.
6. Lift the rear of the tank and slide the tank backwards to free it from the frame.
 7. Take care not to lose the front mounting rubbers and the rear mounting rubbers and collars. Renew any mounting rubber which shows signs of damage.

Installation

1. Ensure the front and rear mounting rubbers are correctly fitted.



1. Fuel tank front mounting rubbers

2. Manoeuvre the tank into position, engaging it with the front mounting rubbers.
3. Securely reconnect the fuel hose and breather hose. On California models connect the evaporative loss system hose.
4. Fit the collars and bolts to the rear mounting rubbers, tightening them to **9 Nm**.
5. Reconnect the battery, positive (red) lead first.
6. Install the seat (see page 16-11).
7. Turn the fuel tap ON and check for fuel leaks.

Fuel System - Carburettor Models

Fuel Tap Overhaul

Disassembly

1. Remove the fuel tank as described on page 10A-13.



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.

2. Drain the fuel tank into a suitable fuel proof container.



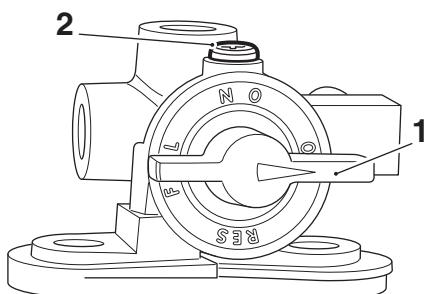
Caution

Damage to painted surfaces could result from inadequate care during this process.

3. Invert the fuel tank and place on a protective surface to prevent paint damage.
4. Ensure the fuel tap is in the OFF position.

Note:

- **The lever is under spring pressure and is held in position by the fixing.**
- 5. Lightly press in the fuel tap control and release the fixing.



qq1

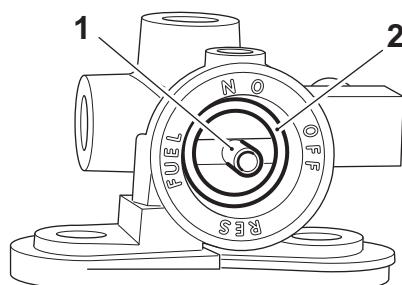
1. Fuel tap control
2. Fixing

6. Pull the fuel tap control out of the fuel tap.

Note:

- **Note the position of the spring to the fuel tap for assembly.**

7. Remove the spring and O-ring.



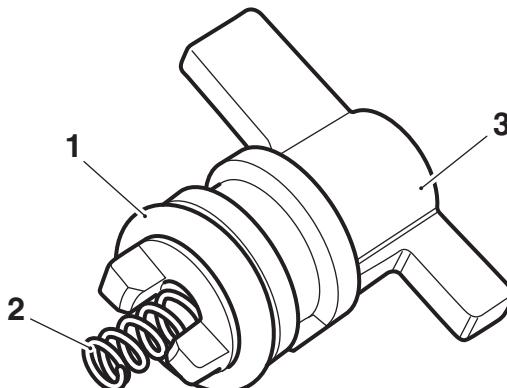
cfbs1

1. Spring
2. O-ring

8. Clean the fuel tap.

Assembly

1. Fit the new O-ring and spring to the new fuel tap control as shown below.



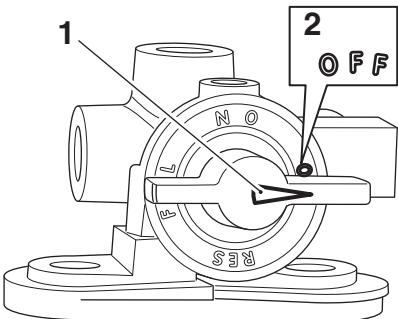
cfbt

1. O-ring
2. Spring
3. Fuel tap control

Note:

- **When fitting the fuel tap control, ensure the spring is correctly located to the fuel tap as noted on removal.**

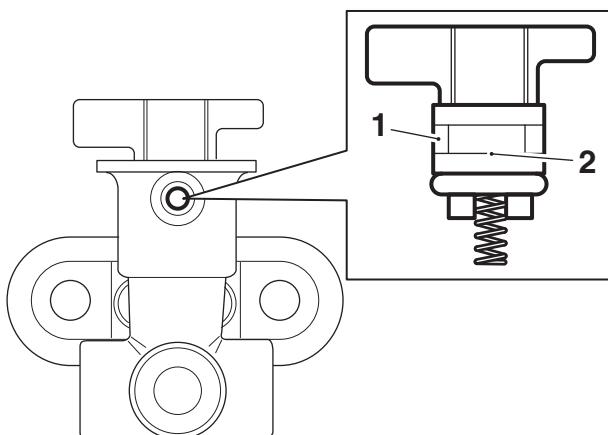
- Fit the fuel tap control to the fuel tap with the arrow pointing to the OFF position.



1

- Arrow**
- OFF position**

- Lightly press in the fuel tap control until the lower edge of the slot is below the hole for the fixing.



bu

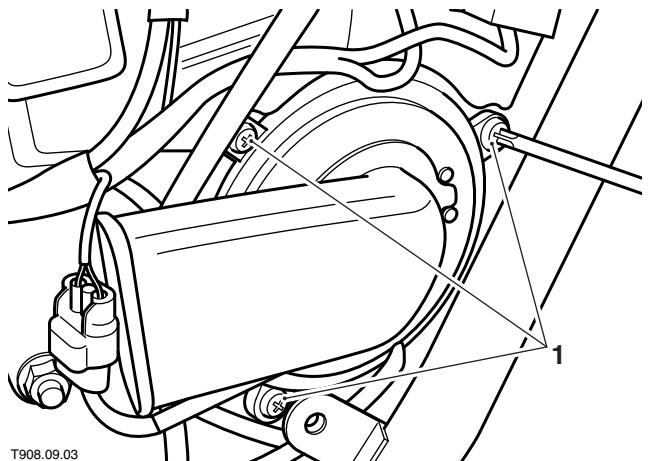
- Slot**
- Lower edge**

- While lightly pressing the fuel tap control fit and tighten the fixing to **2 Nm**.
- Refit the fuel tank as described on page 10A-13.
- Refill the fuel tank with the fuel drained earlier.
- Turn the fuel tap to the ON position and check for leaks.

Air Filter Element

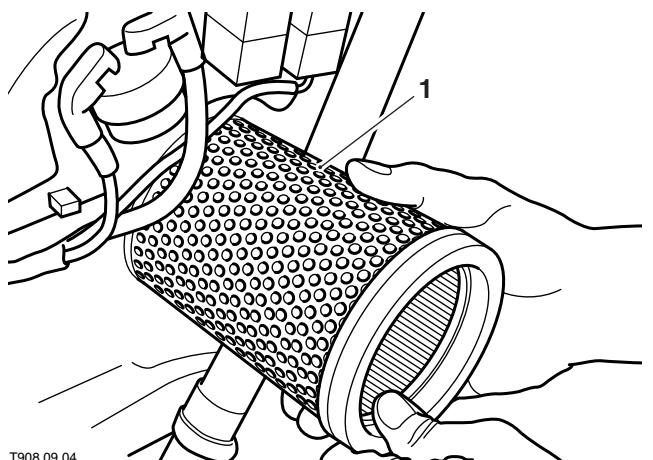
Removal

- Remove the left hand side cover (see page 16-14).
- Undo the three screws and remove the filter cover from the airbox.



- Air filter cover screws**

- Remove the air filter element from the airbox, taking care not to damage the painted surface of the frame.



- Air filter element**

Installation

- Insert the air filter element into the airbox, taking care not to damage the painted surface of the frame.
- Refit the cover to the airbox and tighten its screws to **3 Nm**.
- Refit the side cover (see page 16-14).

Fuel System - Carburettor Models

Airbox

Removal

1. Remove the fuel tank (see page 10A-13).
2. Remove the battery (see page 17-18).
3. Remove both side covers (see page 16-14) and the rear mudguard (see page 16-16).
4. Free all the electrical components and wiring from the airbox.
5. Release the clips securing the airbox rubbers to the carburettors.
6. Release the clip and disconnect the crankcase breather hose from the airbox.
7. Unscrew the mounting bolts and manoeuvre the airbox assembly out of position.

Installation

1. Locate the airbox to the frame and position it to the carburettors and fixing points. Ensure that the airbox rubbers correctly engage with the rear of the carburettors through 360° of BOTH rubbers. Fit the mounting bolts and tighten to **6 Nm**.
2. Ensure the rubbers are correctly seated on the carburettors and secure them in position with the clips.
3. Reconnect the breather hose to the airbox and secure it in position with the retaining clip.
4. Clip all electrical components and wiring correctly back onto the airbox.
5. Install the rear mudguard (see page 16-16) and side covers (see page 16-14).
6. Fit the fuel tank (see page 10A-13) and install the battery (see page 17-18).

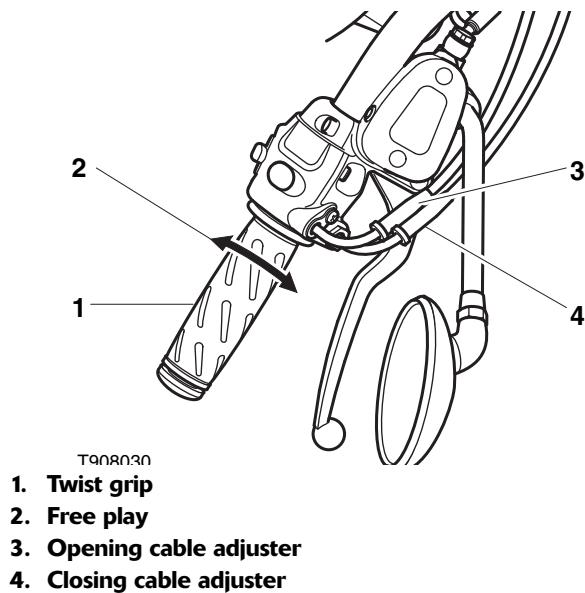
Draining

1. Regularly (see maintenance schedule) drain the airbox by removing the end of the drain tube fitted to the base of the box.

Throttle Cables - All Except Thruxton And Scrambler

Inspection

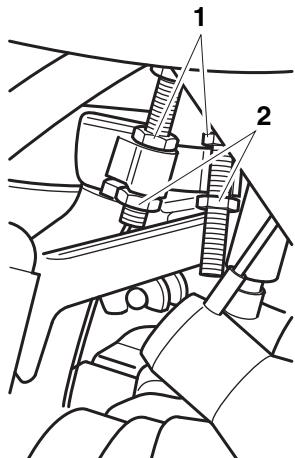
1. Throttle cable adjustment is checked by measuring the amount of free play at the twist grip. Adjustment is correct when 2 - 3 mm of free play movement is present.



Adjustment

1. To adjust the cables, slacken the lock nuts and back-off the opening and closing cable upper adjusters.
2. Set the opening cable adjuster to give 2 - 3 mm of free play at the twist grip then securely tighten the lock nut.

- If there is insufficient adjustment available, back-off the upper adjuster and adjust the free play at the carburettor end of the cable. Slacken the cable lock nuts and position them so all but a small amount of free play is removed from the cable. Securely tighten the lock nuts then carry out final adjustment with the upper adjuster.



- Lower adjusters**
- Lock nuts**

- Once the opening cable is correctly adjusted, repeat the procedure for the closing cable.
- With both cables correctly adjusted, move the handlebars from lock-to-lock whilst checking the throttle opens and closes smoothly and the cables do not foul the steering. Rectify any faults before riding the motorcycle.



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.

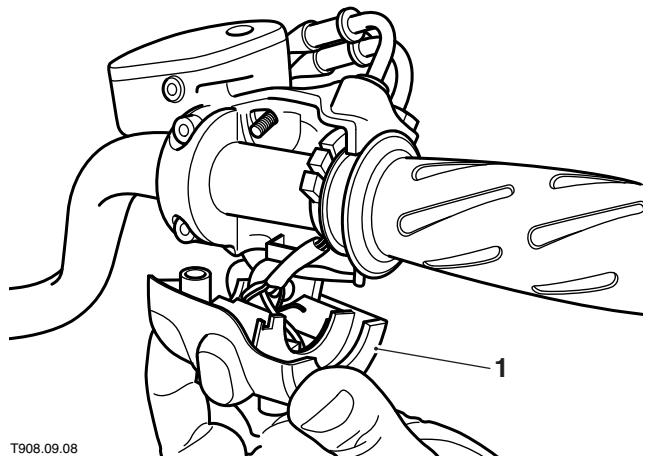


Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

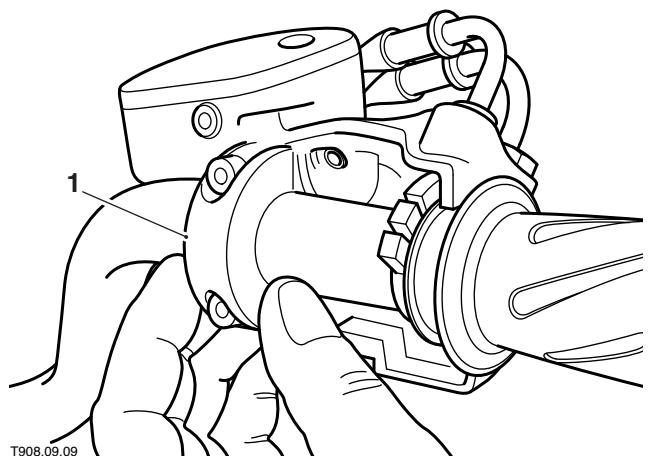
Removal

- Remove the fuel tank (see page 10A-13).
- Undo the screws and free the right switch gear assembly from the master cylinder.



1. Right hand switch gear assembly

- Slacken the nut and screw securing the throttle cable end fittings to the master cylinder.
- Unscrew the bolts and remove the mounting clamp from the master cylinder.



1. Master cylinder mounting clamp

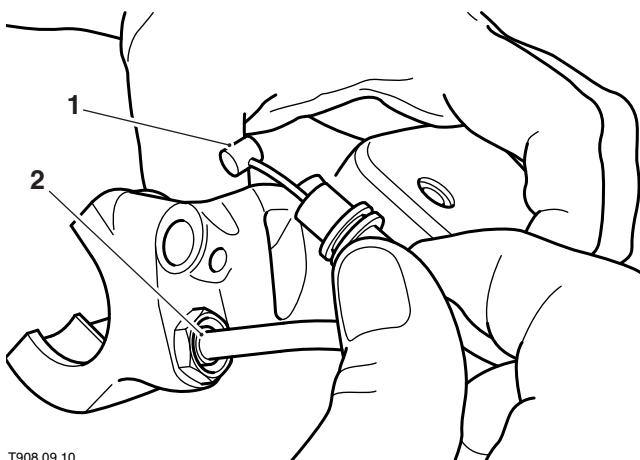
- Free the master cylinder from the handlebars and detach the cables from the twist grip.

Note:

- Ensure the master cylinder is securely supported so that no strain is placed on the hydraulic hose.
- If necessary, free the cables from the carburettor bracket to gain the necessary free play to allow them to be disconnected from the twist grip.

Fuel System - Carburettor Models

- Unscrew the nut and screw and free the throttle cables from the master cylinder.



- Opening cable**
- Closing cable**

- Slacken the lock nuts then detach each cable from the carburettor throttle linkage.

Note:

- Free the carburetors from the cylinder head to improve access to the throttle linkage.**
- Note the correct routing of each cable then free them from the retaining clips and remove them from the motorcycle.

Inspection

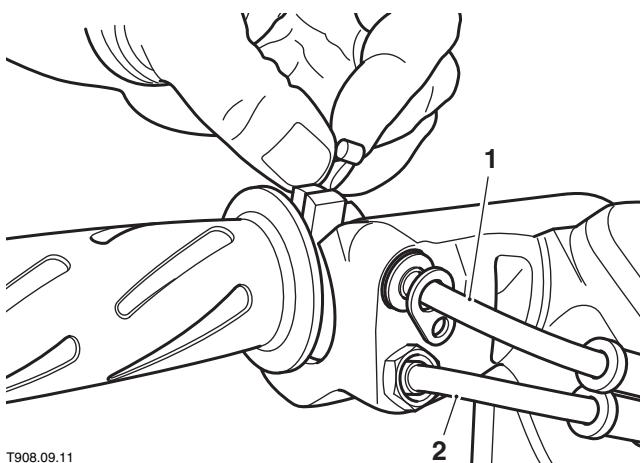
- Check each inner cable for free movement through the outer cable.
- Examine each inner cable for damage, fraying etc.
- Examine the inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Installation

Note:

- The opening and closing cables are different and are not interchangeable. The opening cable is secured to the master cylinder by a retaining plate and screw and the closing cable by a nut.**
- Route the throttle cables as shown in the General Information section of this manual.**

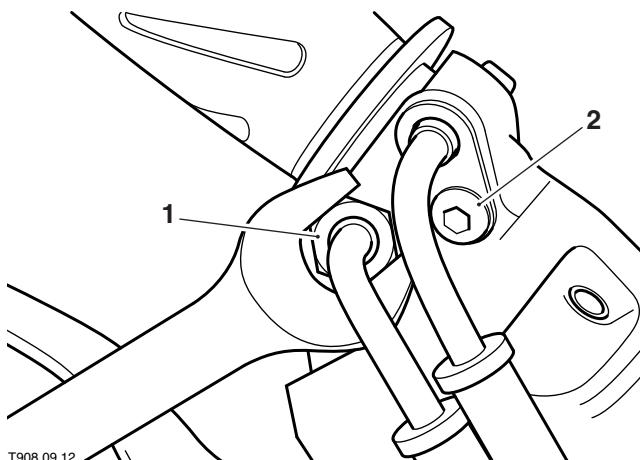
- Fit the cables to the motorcycle. Ensure each cable is correctly routed and retained by all the necessary clips as noted during removal.
- Connect both inner cables to the carburettor throttle linkage and seat the outer cables in the mounting bracket.
- Locate the outer cables in the master cylinder and attach them to the twist grip.



- Closing cable**
- Opening cable**

- Locate the master cylinder on the handlebars and fit the mounting clamp. Align the clamp upper split with the punch mark on the handlebar and tighten the upper clamp bolt to **12 Nm** then tighten the lower clamp bolt to **12 Nm**.
- Refit the switch gear assembly, tightening its screws to **2.5 Nm**.

- Securely tighten the nut and screw securing the throttle cables to the master cylinder.



- 1. Closing cable nut**
2. Opening cable screw

- Position the lower adjuster lock nuts so only a small amount of free play is present in each cable then tighten them securely.
- Operate the twist grip several times to settle the cables in position then adjust the cable free play using the upper adjusters (see adjustment).



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

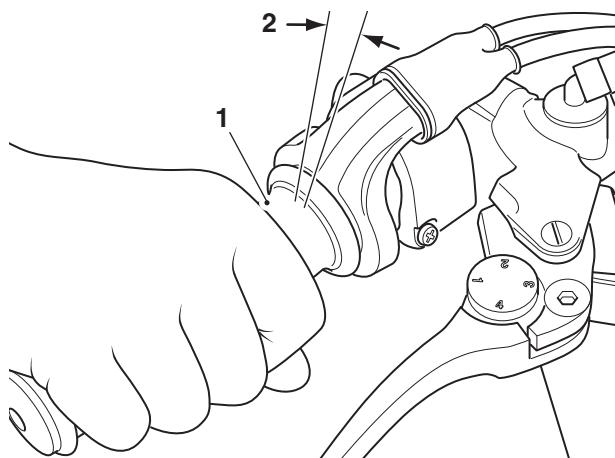
Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

- Install the fuel tank (see page 10A-13).

Throttle Cables - Thruxton & Scrambler

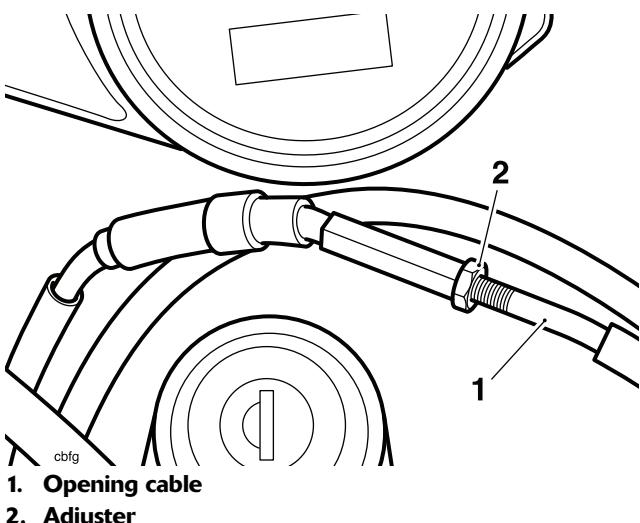
Adjustment

- Throttle cable adjustment is checked by measuring the amount of free play at the twist grip. Adjustment is correct when 2 - 3 mm of free play movement is present.



- 1. Twist grip (Thruxton shown)**
2. Free play

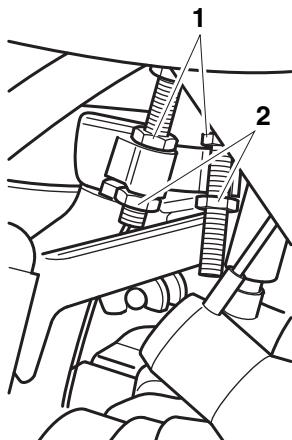
- Slide the cover off the opening cable adjuster at the twist grip end.
- Rotate the "opening" cable adjuster such that it has an equal amount of adjustment in each direction.



- 1. Opening cable**
2. Adjuster

Fuel System - Carburettor Models

- Slacken the lock nut and rotate the "opening" cable adjuster at the carburettor end of the cable to give 2 - 3 mm of play at the twist grip. Tighten the lock nut.



1. Lower adjusters

2. Lock nuts

- Make any minor adjustments as necessary to give 2 - 3 mm of play using the adjuster near the twist grip end of the cable. Tighten the lock nut.
- With the throttle fully closed, ensure that there is 2 - 3 mm of free play in the "closing" cable. Adjust as for the "opening" cable if necessary.
- With both cables correctly adjusted, move the handlebars from lock-to-lock whilst checking the throttle opens and closes smoothly and the cables do not foul the steering. Rectify any faults before riding the motorcycle.



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

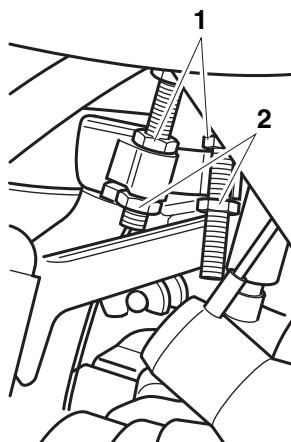
Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

Removal

Note:

- Prior to removal, clearly identify the opening and closing cables so that they may be refitted in the correct positions.

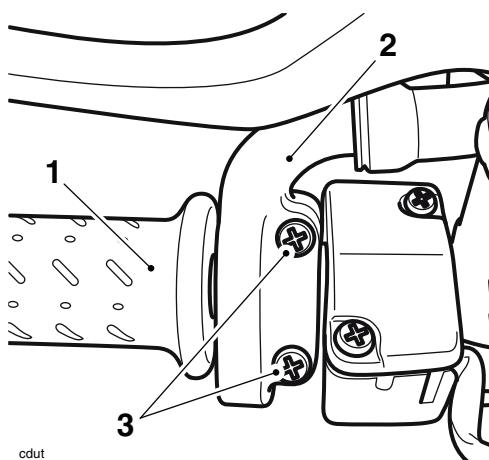
- Remove the seat and disconnect the battery, negative (black) lead first.
- Remove the fuel tank and airbox as described earlier in this section.
- Slacken the adjuster lock nuts at the carburettor end such that they will allow the outer cables to be detached from the cable brackets. Detach the inner cables from the carburettor cam.



1. Lower adjusters

2. Lock nuts

- At the twist grip end, slide off the rubber boot and release the screws which secure the two halves of the twist grip guide to each other.

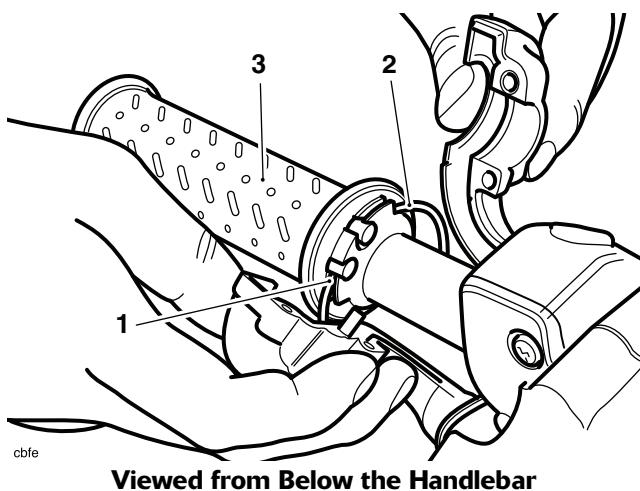


1. Twist grip (Thrushon shown)

2. Twist grip guide

3. Screws

- Separate the two halves of the guide. Release the throttle inner cables from the twist grip.



- Inner cable (opening cable)
- Inner cable (closing cable)
- Twist grip
- Note the routing of the throttle cables and remove them from the frame.

Inspection

- Check each inner cable for free movement through the outer cable.
- Examine each inner cable for damage, fraying etc.
- Examine the inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Installation

Note:

- The opening and closing cables must be correctly identified and fitted to the correct positions as noted prior to removal.
- Route the throttle cables as shown in the General Information section of this manual.

- Locate the cables to the frame following the routing noted prior to removal.
- Engage the nipples of the inner cables to the twist grip.
- Assemble the two halves of the cable guide ensuring that the outer cable is correctly located in the guide.
- Refit the boot to the cable guide.
- Attach the other end of the inner cables to the throttle cam and locate the outer cables to the cable bracket. Fit the cable lock nuts.
- Set the cable adjustment as described elsewhere in this section.

Carburettors

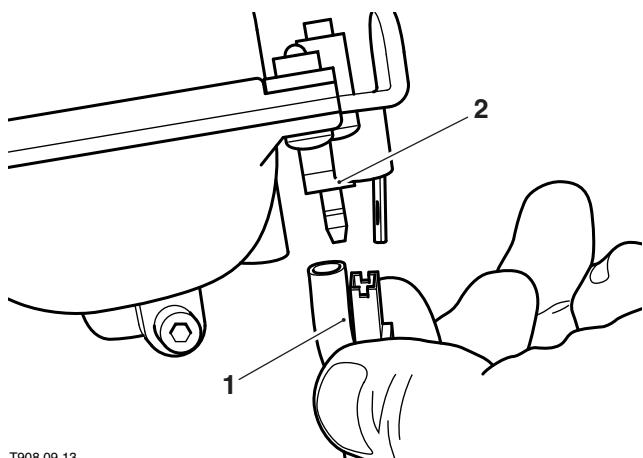
Warning

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.

Removal

- Remove the fuel tank. (see page 10A-13)
- Disconnect the wiring connectors from the carburettor heaters and the throttle position sensor.

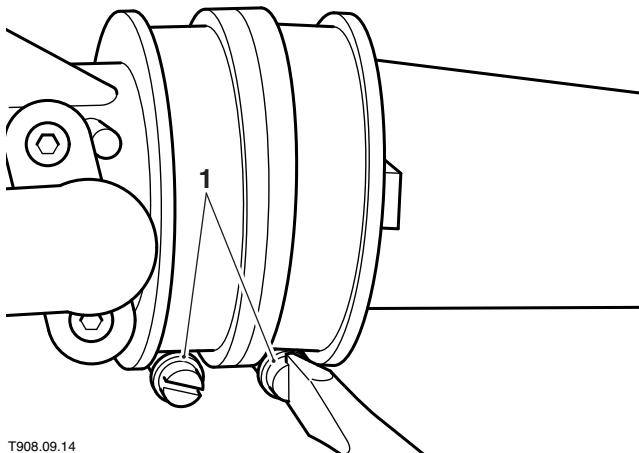


- Wiring connectors
- Carburettor heater

- On California models, disconnect the evaporative loss system pipes from the carburettors, noting the fitted location of each. Plug the hose ends.
- Release the retaining springs securing the airbox rubbers to the carburettors.

Fuel System - Carburettor Models

- Slacken the retaining clips securing the intake rubbers to the carburetors and cylinder head adaptors.



T908.09.14

1. Retaining clip screws

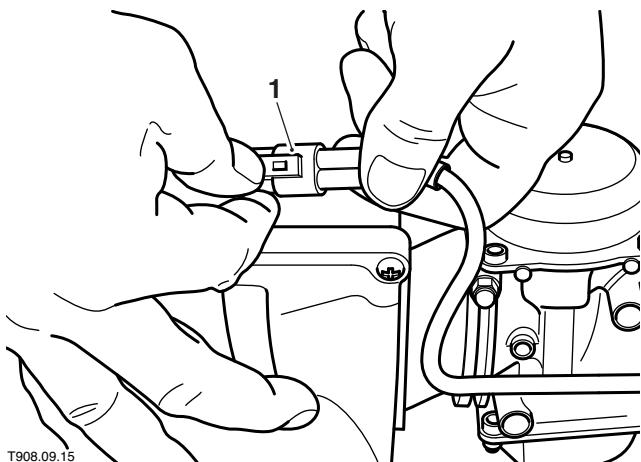
- Free the carburetors from the intake rubbers and manoeuvre them out of position.

Note:

- Lubricate the intake rubbers with a silicone-based spray lubricant to ease removal.
- Slacken the throttle cable lock nuts then detach both cables from the throttle linkage and remove the carburetors.

Installation

- Reconnect the throttle cables to the carburetors, ensuring they are connected the right way around. Adjust the cable free play then securely tighten the lock nuts.
- Ensure the clips are all in position then lubricate the intake and airbox rubbers with a silicone-based spray lubricant.
- Manoeuvre the carburetors into position and engage them correctly with the intake and airbox rubbers.
- Ensure the carburetors are correctly seated in the intake rubbers then securely tighten the retaining clips.
- Ensure the airbox rubbers are correctly seated on the carburetors then secure them in position with the spring clips.
- On California models correctly reconnect the evaporative loss system hoses.
- Reconnect the wiring connectors to the carburetor heaters and throttle position sensor.



T908.09.15

1. Throttle position sensor wiring connector

- Check the throttle cables are correctly adjusted then install the fuel tank (see page 10A-13).

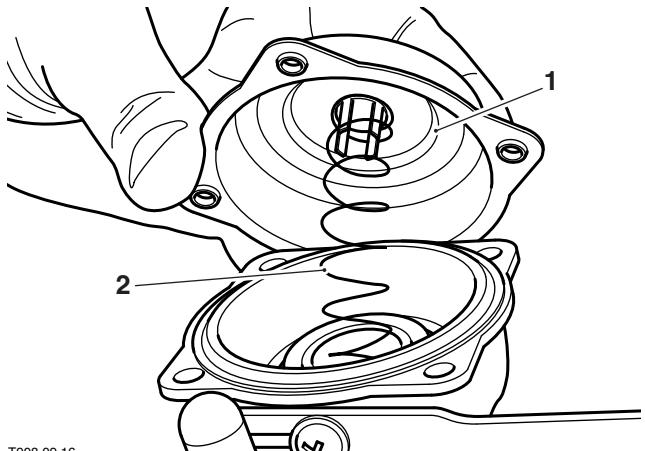
Carburettor Overhaul

Disassembly

Note:

- The carburetors can be overhauled without being separated.**
- Overhaul each carburettor individually to avoid interchanging parts.**

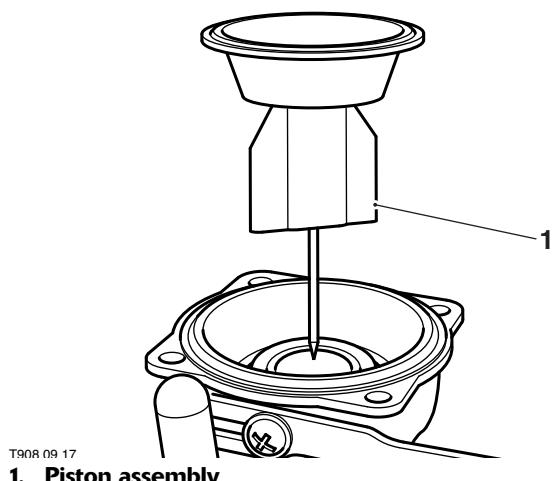
1. Remove the carburetors. Each carburettor can then be overhauled as follows.
2. Undo the screws and remove the vacuum chamber cover and spring.



T908.09.16

1. Vacuum chamber cover
2. Spring

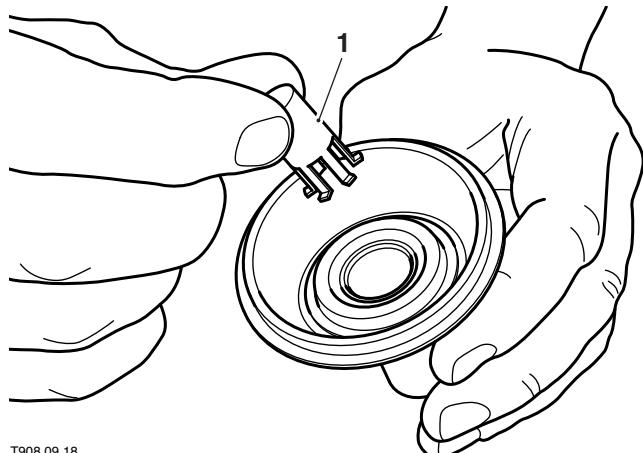
3. Free the diaphragm from the top of the carburettor and withdraw the piston assembly.



T908.09.17

1. Piston assembly

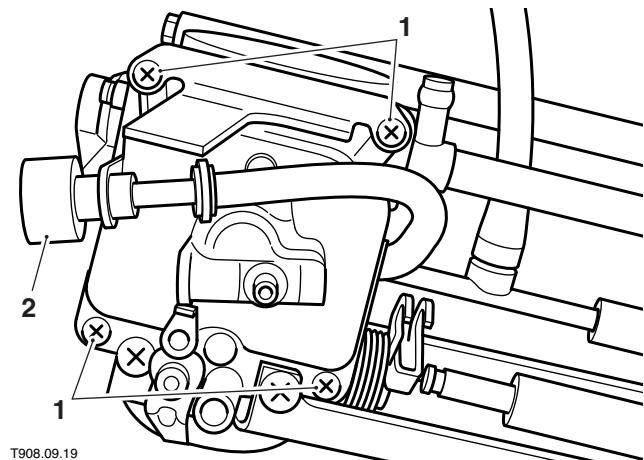
4. Remove the retainer from the piston and tip out the needle.



T908.09.18

1. Needle retainer

5. Undo the screws and remove the float chamber complete with its seal. Note the correct fitted location of the idle speed adjuster (left hand carburettor only).



T908.09.19

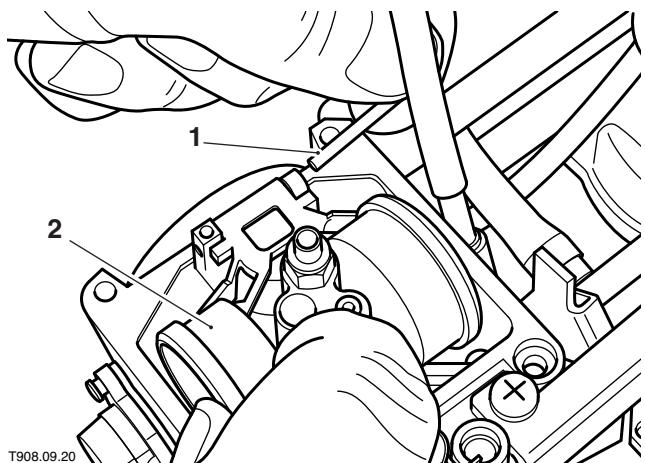
1. Float chamber screws
2. Idle speed adjuster

Fuel System - Carburettor Models

6. Remove the pivot pin and lift out the float and needle valve.

Note:

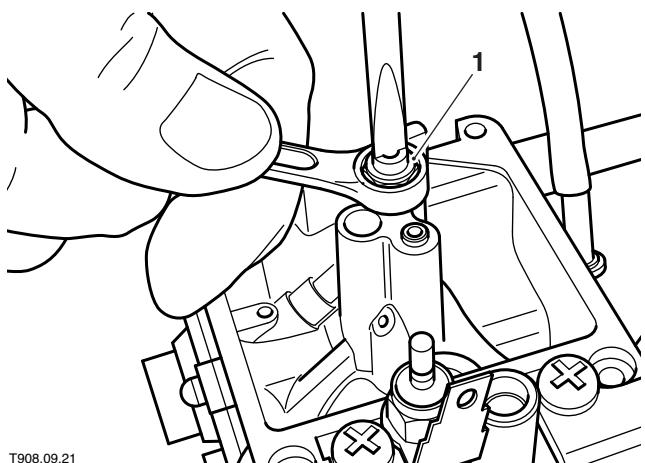
- The needle valve seat is bonded in position.



1. Pivot pin

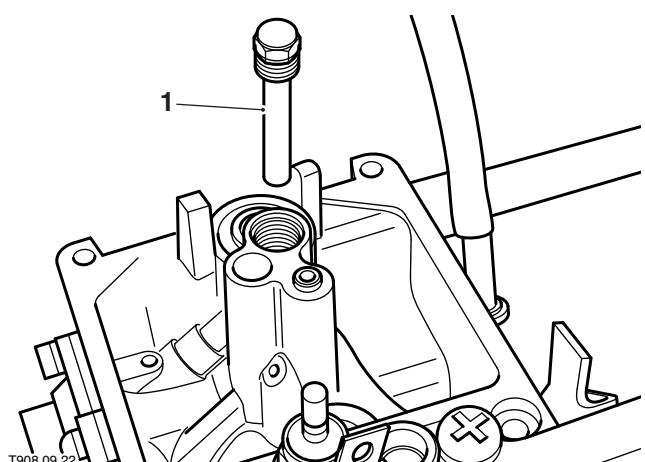
2. Float

7. Unscrew the main jet from the needle jet holder.



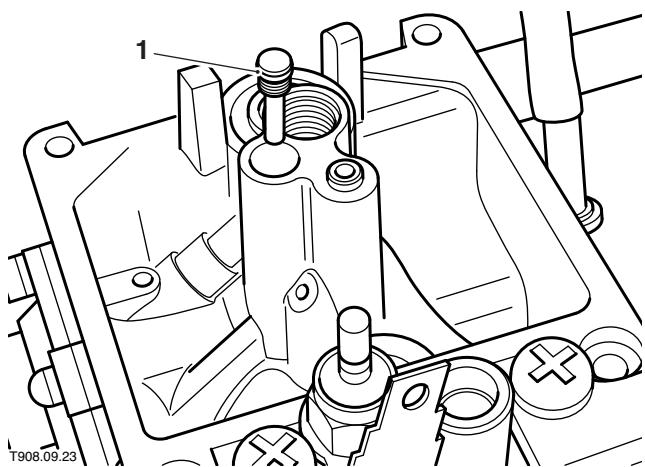
1. Main jet/holder

8. Unscrew the needle jet holder and tip out the needle jet, noting which way around it is fitted.



1. Needle jet holder

9. Using a small flat-bladed screwdriver, unscrew the pilot jet from the carburettor.

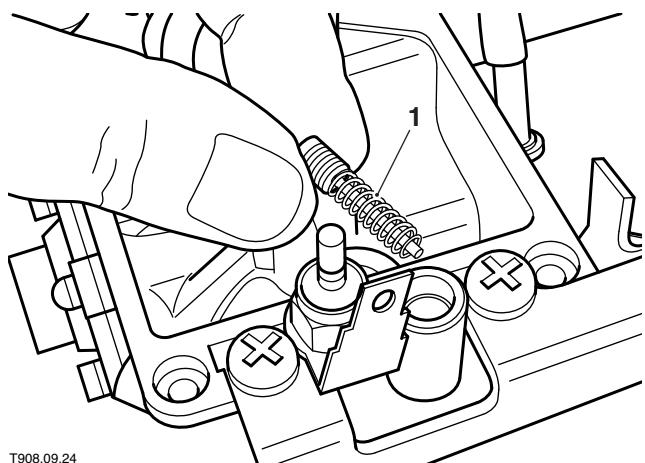


1. Pilot jet

10. Count the number of turns necessary to screw the pilot screw in until it gently seats (remember the number for use on assembly). Remove the pilot screw complete with its spring, washer and O-ring.

Note:

- On US and Canada models the screw is located behind an anti-tamper plug which will have to be removed to gain access to the screw.

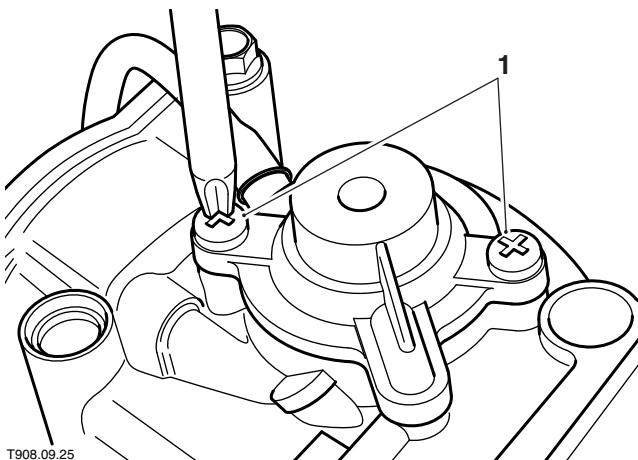


1. Pilot screw assembly

11. Undo the screws and washers securing the choke linkage rod to the carburetors. Remove the choke linkage rod and its return spring. Recover the washer fitted between the rod and each carburetor.
12. Unscrew the nut and remove the choke plunger mechanism from the carburettor.

Fuel System - Carburettor Models

13. On the left hand carburettor, undo the screws and remove the air cut-off valve cover. Remove the spring, diaphragm and O-ring.



1. Air cut-off valve cover screws

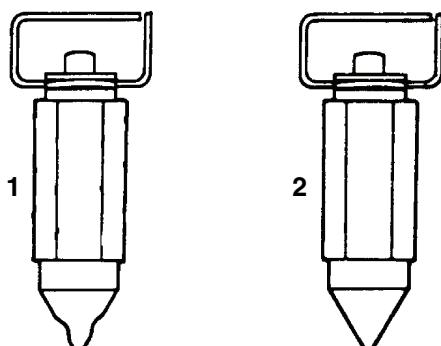
Inspection

1. Inspect all jets and passages for blockages. Clear any blockages using compressed air.

Warning

To prevent injury, always wear eye, face and ear protection when using compressed air.

2. Inspect the piston and air cut-off valve diaphragms closely for signs of damage or perforations. Renew if damaged.
3. Check the needle and needle jet for signs of wear/damage. Renew both items as a pair if wear is evident.
4. Inspect the needle valve for signs of wear or damage. Ensure the needle valve tip is undamaged and its spring-loaded rod operates correctly. Renew as necessary.

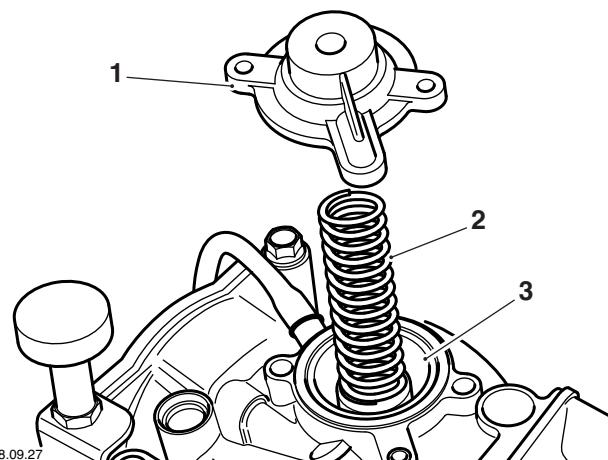


1. Worn needle valve tip
2. Serviceable needle valve tip

5. Check the pilot screw. Renew it if its tip is worn or bent.
6. Check the float assembly for signs of damage/leakage. Renew if necessary.
7. Check the choke plunger assembly for wear and renew as necessary.

Reassembly

1. On the left hand carburettor, fit the air cut-off valve diaphragm with its pin towards the carburettor, and fit the O-ring. Install the spring and valve cover and securely tighten its retaining screws. Ensure the connecting hose linking the valve cover to the right hand carburettor is securely connected.



1. Cover
2. Spring
3. Valve diaphragm

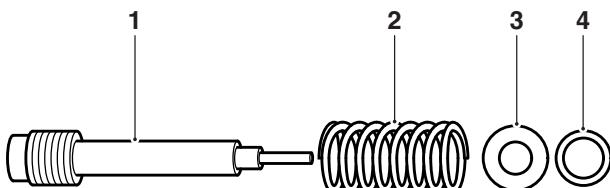
2. Insert the choke plunger assembly and securely tighten its retaining nut.
3. Fit a washer to each carburettor and install the choke linkage rod. Ensure the rod is correctly engaged with both choke plungers then fit the washers and screws, tightening them securely. Refit the return spring and check the operation of the choke linkage before proceeding.

Fuel System - Carburettor Models

- Fit the spring, washer and O-ring to the pilot screw then fit the screw assembly. Screw the pilot screw in until it seats lightly then back it off by the number of turns noted prior to removal.

Note:

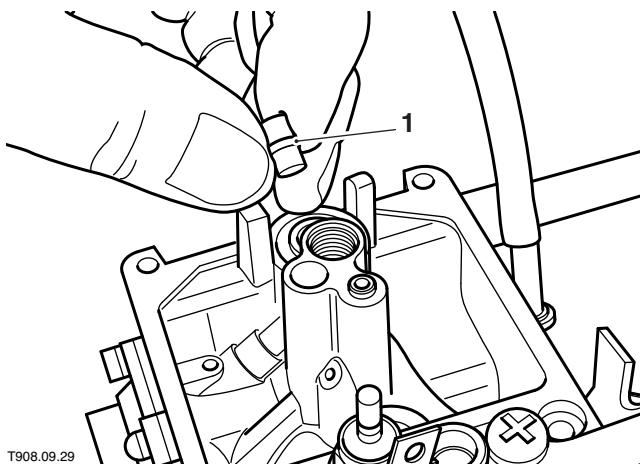
- On US and Canada models, fit a new anti-tamper plug over the screw.**



T908.09.28

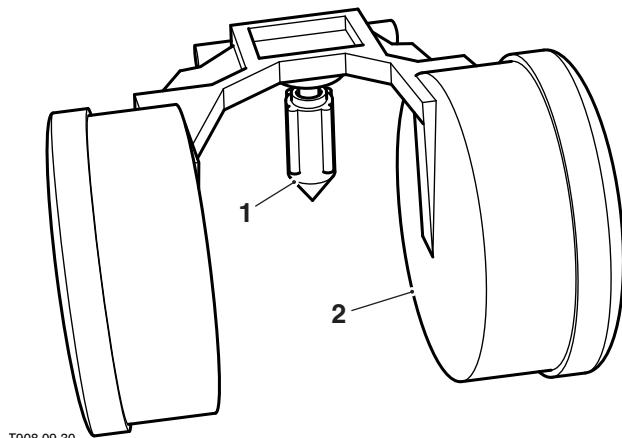
- Pilot screw**
- Spring**
- Washer**
- O-ring**

- Fit the pilot jet.
- Fit the needle jet to the carburettor. Ensure the jet is correctly seated (if it is not fitted the right way around it will not seat correctly) then screw in the needle jet holder.



T908.09.29
1. Needle jet

- Screw the main jet into the needle jet holder.
- Hook the needle valve onto the float tang and fit the assembly to the carburettor. Ensure the needle valve is correctly located in the seat then insert the pivot pin.

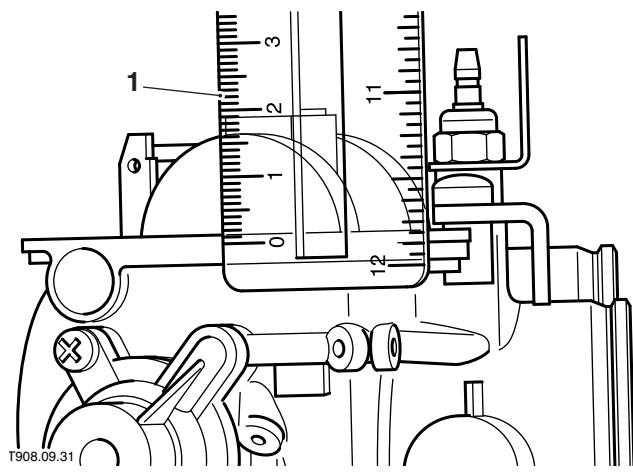


T908.09.30

1. Needle valve

2. Float

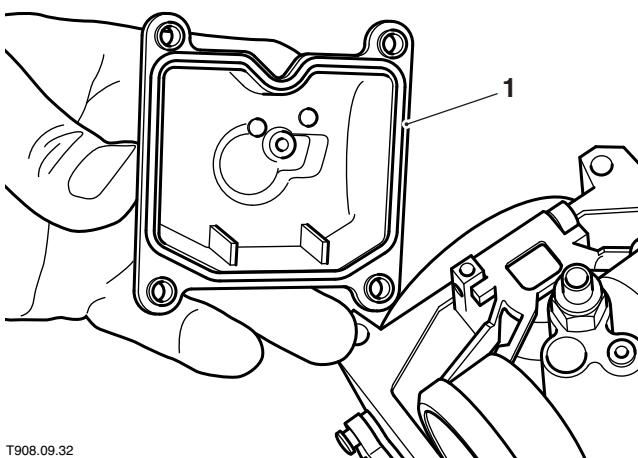
- Check the float height as follows. Slowly invert the carburettor until the float tang contacts the needle valve rod and the valve is in contact with the seat. Ensure the needle valve spring-loaded rod is not compressed at all then measure the distance from the carburettor surface to the base (top as seen inverted) of the float. Adjustment is made by carefully bending the float tang.



1. Ruler for measuring 17 mm float height

Correct float height	17 mm +/- 1 mm
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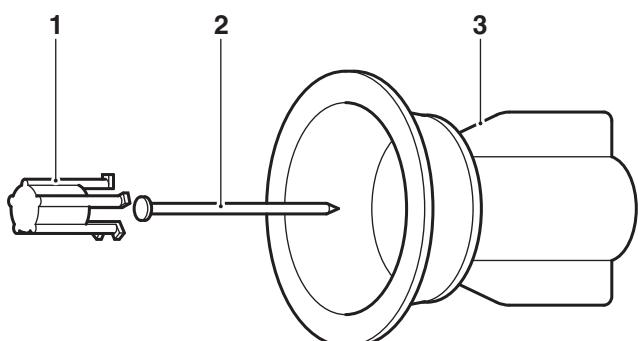
- Fit the seal and install the float chamber. Ensure the seal is correctly located then securely tighten the retaining screws. On the left hand carburettor ensure the idle speed adjuster is refitted to the screws.



T908.09.32

1. Seal

- Insert the needle into the piston and fit the retainer. Position the retainer so that it does not block the air hole in the piston.



T908.09.33

1. Retainer

2. Needle

3. Piston

- Fit the piston assembly (it will only fit one way) to the carburettor and seat the diaphragm in position.
- Insert the spring into the piston then fit the vacuum chamber cover. Ensure the diaphragm is correctly seated then securely tighten the cover screws.

Carburettor Adjustment

Note:

- All carburettor adjustment should be made with the engine warmed up to normal operating temperature.**

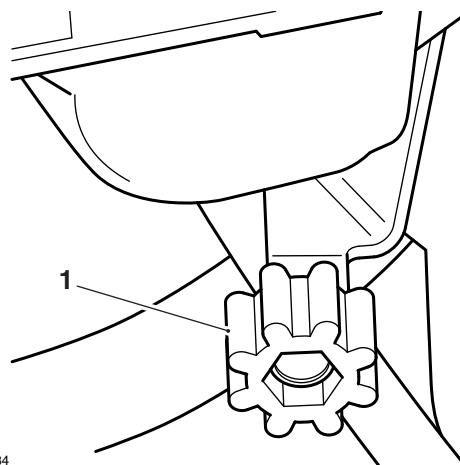
Idle Speed Adjustment

Note:

- A tachometer will be needed to accurately set the idle speed.**

Idle speed is adjusted with the adjuster on the left side of the carburetors. Rotate the adjuster clockwise to increase idle speed and anti-clockwise to decrease it.

Correct setting - 1000 ± 50 rpm



T908.09.34

1. Idle speed adjuster

Idle Mixture Adjustment



Warning

On US and Canada models anti-tamper plugs are fitted over the pilot screws to prevent adjustment. Any adjustment or deviation from the factory setting may cause the motorcycle to be in breach of State and Federal law. This would make the motorcycle illegal for road use and may also invalidate emission warranties.

The idle mixture adjustment is set during manufacture and should not be disturbed unless the carburetors have been overhauled.

Adjustment is made by altering the position of the pilot screws. Screw each pilot screw in until it seats lightly then back it out by the specified number of turns.

Note:

- Idle mixture adjustment on models fitted with anti-tamper type pilot screws requires the use of service tool T3880089. Earlier models may use tool 3880015-T0301.**

Fuel System - Carburettor Models

Pilot Screw Setting:

	Bonneville, Bonneville T100 & Thrushon
Turns Out	2.5
	Scrambler
Turns Out	1.5

Note:

- On models NOT fitted with a catalytic converter, if a gas analyser is available, the idle mixture can be checked by measuring the CO content of the exhaust gases at the silencer outlet.
- On Bonneville, Bonneville T100 and Thruxton models where a catalyst is fitted, in order to correctly check the CO content of the exhaust gases, the gas analyser probe must be inserted in the port on the exhaust header, not in the silencer outlet.
- On Scrambler models where a catalyst is fitted, it is not possible to accurately check the CO content of the exhaust gases.

Correct setting	0.45 to 3.0% at idle
------------------------	-----------------------------

Note:

- The CO content must be checked with both the secondary air injection hoses securely clamped.
- The engine must be warmed up but not left at idle for periods above 5 minutes.
- It is not possible to accurately gauge the setting of each individual cylinder since the exhaust header pipes are joined by a balance pipe.

Carburettor Synchronisation

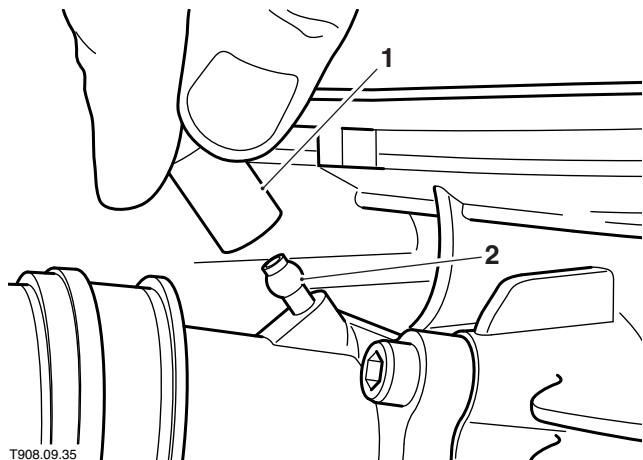
1. Warm the engine up to normal operating temperature and adjust the idle speed.
2. With the idle speed correctly set, switch off the engine.
3. Remove the rubber caps from the vacuum take-off points on the top of the intake adaptors.

Note:

- On California models, disconnect the evaporative loss system hoses from the carburettor take-off points and plug the hose ends.

Warning

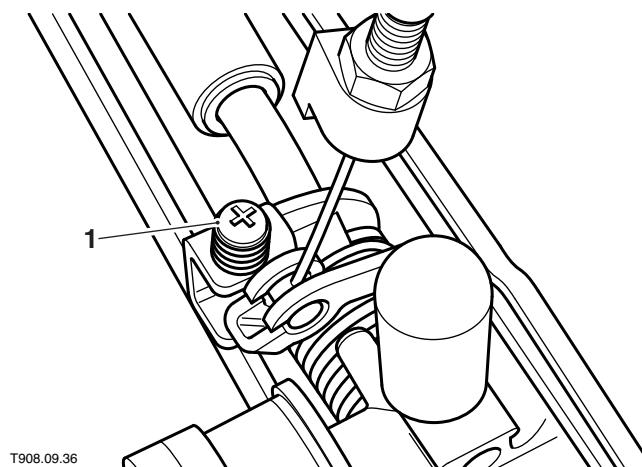
The engine will be hot. Take great care to avoid being scalded or burnt.



1. Rubber cap
2. Vacuum take-off point
4. Connect a pair of vacuum gauges to the carburettors.
5. Start the engine and allow it to idle.
6. Open the throttle slightly a couple of times then allow the engine to idle again. Note the readings obtained on the gauges whilst doing this; both gauges should give the same vacuum reading.
7. If adjustment is necessary, rotate the throttle linkage adjustment screw which is located on the inside of the left carburettor.

Note:

- **Adjustment is very sensitive. Each time the screw is moved allow time for the vacuum readings to stabilise before adjusting the screw further.**



1. Throttle linkage adjustment screw

8. Once the carburetors are correctly synchronised, stop the engine and disconnect the vacuum gauges.
9. Securely refit the rubber caps/hoses (as applicable) to the intake adaptors.

Fuel/Float Level Check

! Warning

Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

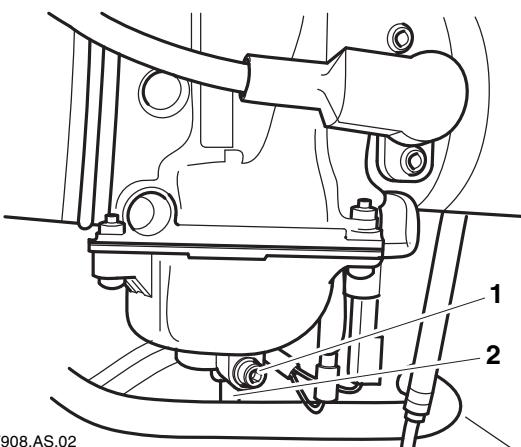
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

1. Place the motorcycle on level ground and securely support it in an upright position.

! Warning

Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

2. Turn the fuel tap OFF.
3. Slacken the drain screw and drain the fuel from the carburettor into a suitable container. When the carburettor is empty, retighten the drain screw.



1. Drain screw
2. Drain point

4. Attach a length of hose to the drain point on the base of the float chamber and fit the fuel level gauge 3880125-T0301 to the hose end.
5. Position the fuel level gauge vertically next to the carburettor with its scale above the float chamber.
6. Turn the fuel tap ON to refill the carburettor with fuel then slacken the drain screw.

Fuel System - Carburettor Models

7. Allow the level of the fuel to stabilise then slowly lower the gauge until the fuel level is visible. Ensure the gauge is vertical then measure the fuel level.

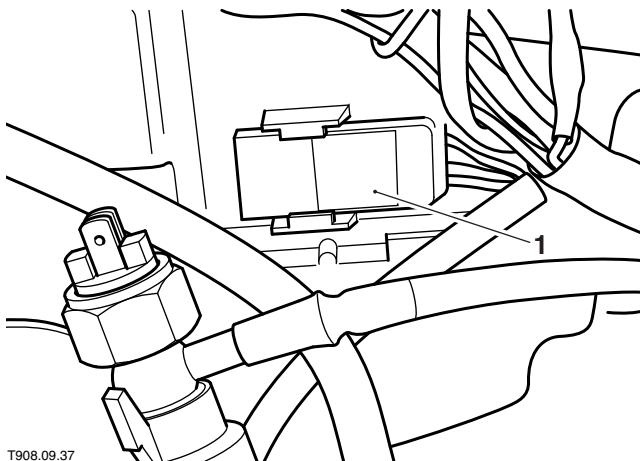
Note:

- **Never lower the gauge then raise it again as this will result in a false reading. If the gauge is lowered too far, tighten the drain screw then empty the contents of the tube and start again.**
 - **Fuel level 2 mm +/- 1 mm above float chamber mating surface.**
8. Once measurement has been obtained, securely tighten the drain screw and remove the fuel gauge and hose.
 9. Repeat the check on the other carburettor.
 10. If adjustment is necessary, remove the carburettors (see page 10A-21) and adjust the float height (see carburettor overhaul). Increasing the float height will lower the fuel level and decreasing it will raise the fuel level.

Carburettor Heating System

General information

Each carburettor is fitted with a heating element to prevent problems at low temperatures. The system is controlled by a temperature switch which is clipped to the right side of the airbox.



1. Carburettor heating system temperature switch

At low ambient temperatures (below approximately 10°C), the temperature switch supplies electrical current to the heating element on each carburettor. The heating elements then warm the carburettor bodies.

At higher ambient temperatures, no heating is required and the temperature switch cuts off the electrical supply to the heating elements.

Secondary Air Injection System

The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber:

Up to 2007 model year: When the engine is running, the vacuum present in the intake port opens up the control valve diaphragm. Every time there is a negative pulse in the exhaust port, the control valve then allows clean air to be drawn from the airbox into the port. This air causes secondary combustion of the exhaust gases in the exhaust ports, reducing the amount of unburnt hydrocarbons released into the atmosphere in the exhaust gases.

From 2008 model year: At certain specific engine speeds (determined by the factory programming of the engine ignition system), the secondary air injection relay valve is opened by the igniter and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the relay valve, through the open reed valves, into the exhaust port. This air causes secondary combustion of the exhaust gases in the exhaust ports, reducing the amount of unburnt hydrocarbons released into the atmosphere in the exhaust gases.

The control valve assembly contains two reed valve assemblies (one for each cylinder) to prevent the exhaust gases travelling from the exhaust port back to the airbox.

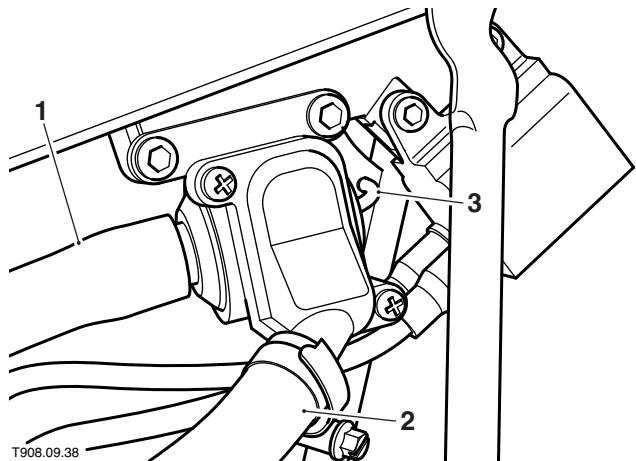
Check

- At regular intervals (see maintenance schedule), disassemble the control valve and inspect the reed valve assemblies. Renew the valves if there is any doubt about their condition.

Secondary Air Injection System Control Valve

Removal

- Remove the fuel tank (see page 10A-13).
- Disconnect all hoses from the valve, noting the correct fitted location of each hose.

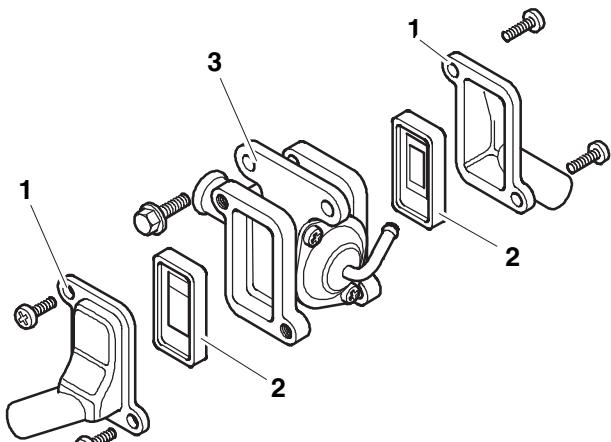


- Airbox hose
- Cylinder head hose
- Vacuum hose (up to 2007 model year only)

- Unscrew the mounting bolts and remove the control valve.
- Undo the screws and remove the covers and reed valve assemblies from the valve.

Note:

- The covers are different and are not interchangeable.



- Covers
- Reed valves
- Valve body

Fuel System - Carburettor Models

Inspection

1. Inspect each reed valve assembly for signs of wear or damage. If there are signs of exhaust gases blowing past the valve, it must be renewed.
2. Check that the control valve assembly only allows air to flow through the airbox union when a vacuum is applied to its diaphragm. If not, renew the valve.

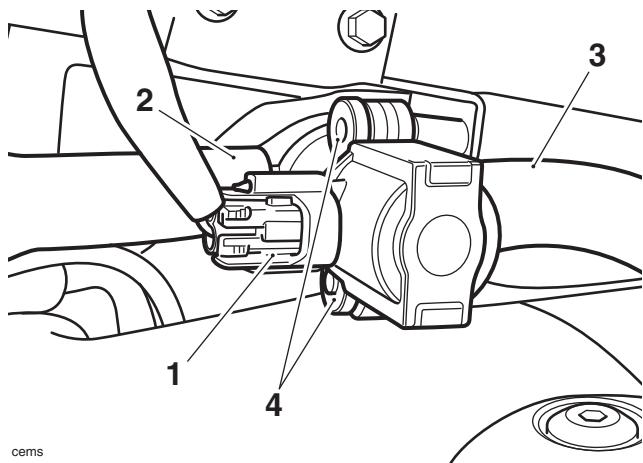
Installation

1. Seat the reed valve assemblies in the control valve (they will only fit one way) and install the covers. Ensure the covers are correctly fitted then securely tighten the retaining screws.
2. Fit the control valve to the frame and tighten its mounting bolts to **8 Nm**.
3. Securely reconnect all the hoses to the control valve.
4. Install the fuel tank (see page 10A-13).

Secondary Air Injection System Control Valve - From 2008 Model Year Only

Removal

1. Remove the fuel tank (see page 10A-13).
2. Disconnect the two hoses from the valve, noting the correct fitted location of each hose.
3. Disconnect the multi-plug.



cems

1. Multi-plug
2. Cylinder head hose
3. Airbox hose
4. Mounting studs

4. Gently ease the valve off the two mounting studs and remove from the motorcycle.

Installation

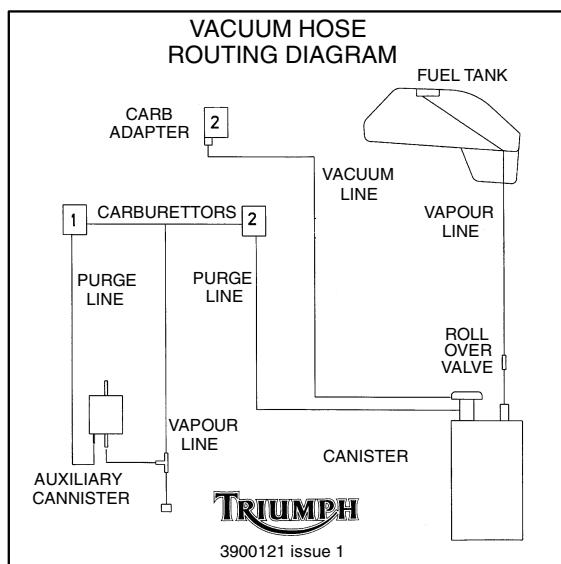
1. Align the valve to the mounting studs.
2. Reconnect the multi-plug.
3. Reconnect the two hoses.
4. Refit the fuel tank (see page 10A-13).

Evaporative Loss System - If Fitted

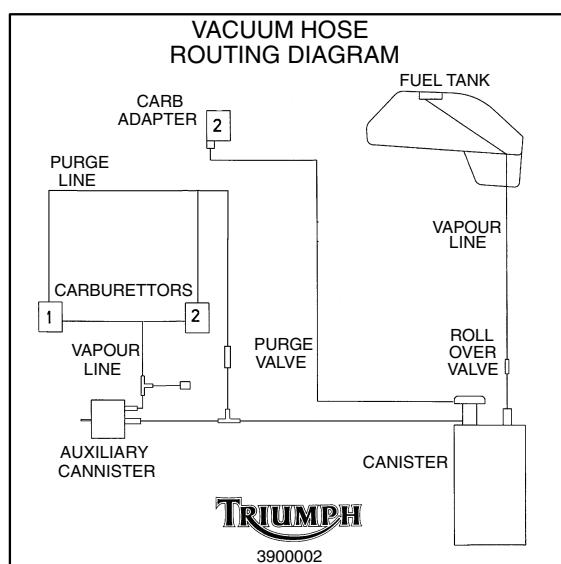
General Information

Some models for certain markets are fitted with an evaporative loss control system. The system is fitted to ensure that fuel vapour in the fuel tank or carburettor float chambers cannot escape to the atmosphere at any time. Instead, when the engine is not running, the vapour is "stored" in two charcoal canisters. Under certain engine conditions, fuel vapour is drawn by vacuum from the canisters into the engine combustion chambers.

A label, as shown below, can be found on all 790 cc models equipped with an evaporative control system.



A label, as shown below, can be found on all 865 cc models equipped with an evaporative control system.



Evaporative Loss System Operation - Engine Switched Off

When the engine is switched off, any pressure increase in the fuel tank due to a rise in ambient temperature will cause fuel vapour to pass down through the roll over valve, to the primary charcoal canister.

Because the float chamber vent solenoid is closed (to prevent vapour escaping to the atmosphere), fuel vapour will pass to the secondary canister.

Any liquid fuel which condenses in the system is collected in the liquid fuel collection point and is drained out at each service.

The canisters store fuel vapour until the engine is started.

Evaporative Loss System Operation - Engine Running

790 cc Engines

When the engine is started, vacuum is applied to the vacuum diaphragm on the primary charcoal canister. This causes the vacuum diaphragm to open which allows fuel vapour to be drawn from the primary canister into the engine to be burnt. At the same time any vapour stored in the secondary canister is also purged.

865 cc Engines

When the engine is at idle no fuel vapour is allowed into the engine from the primary canister. When the engine speed rises above a set level, valves open in the system to allow fuel vapour from the primary canister to be drawn into the engine to be burnt. At the same time any vapour stored in the secondary canister is also purged.

Both Engines

Restrictors in pipes limit the effective size of the pipes and help to maintain the balance of air being drawn into the carburettors.

To allow air to enter the float chambers, the float chamber vent solenoid valve opens. Because air is constantly being drawn into the chambers while the engine is running, no fuel vapour escapes.

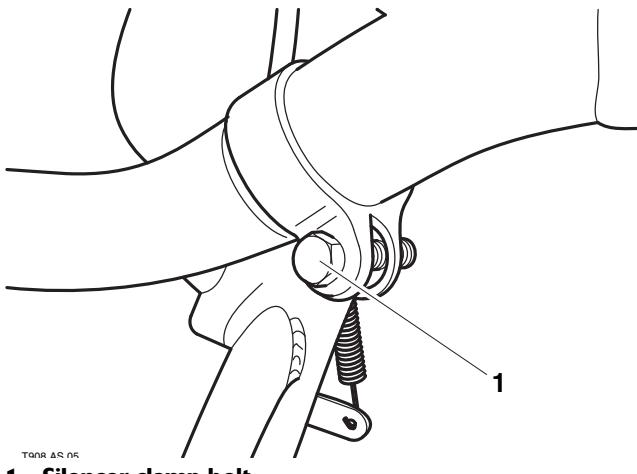
As the volume of fuel in the fuel tank reduces, air enters the tank through a one way valve in the filler cap. Because the valve opens in one direction only, it allows air to enter the tank but does not allow vapour to escape.

Fuel System - Carburettor Models

Silencers - Bonneville, Bonneville T100 & Thruxton

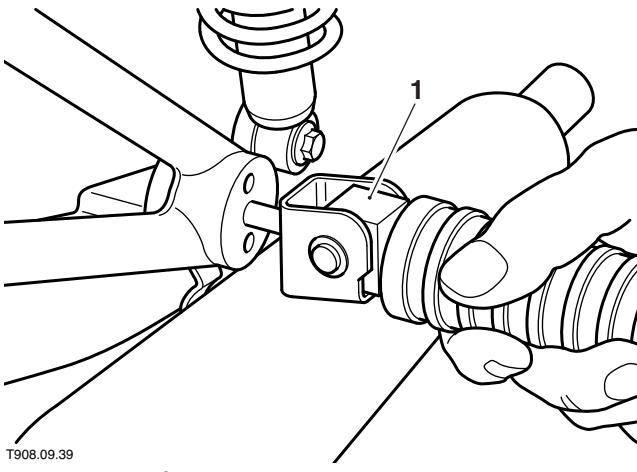
Removal

1. Slacken the clamp securing the silencer to the header pipe (on Thruxton models remove the clamp shield if retained by the clamp).



1. Silencer clamp bolt

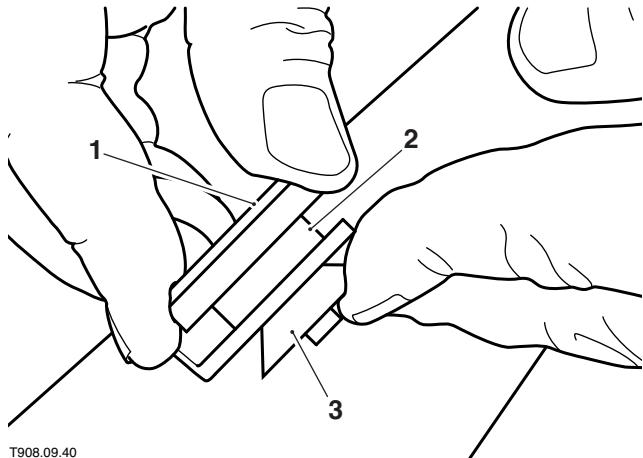
2. Slacken and remove the nut and washer from the rear passenger footrest.
3. Withdraw the passenger footrest and remove the silencer from the motorcycle. Recover the rubber washer, shouldered collar and mounting rubber from the silencer mounting bracket.



1. Passenger footrest

Installation

1. Ensure the rubber mounting, collar and rubber washer are correctly fitted to the silencer bracket.



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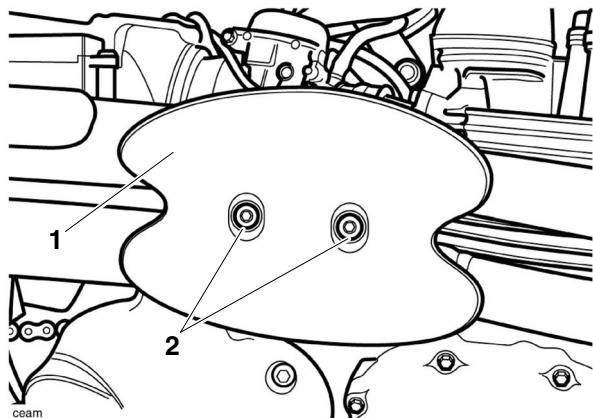
1. Collar
2. Rubber mounting
3. Rubber washer

2. Apply 4 cc of clear silicone sealer to each header pipe at the joint with the silencer. Spread the sealer evenly all round the joint.
3. Fit the mounting clamp (on Thruxton models, if removed, fit the clamp shield) then install the silencer.
4. Install the passenger footrest, ensuring its locating pegs are correctly seated in their holes. Fit the washer and nut to the footrest and tighten to **27 Nm**.
5. Position the silencer clamp correctly and tighten its bolt to **15 Nm**.

Silencers - Scrambler

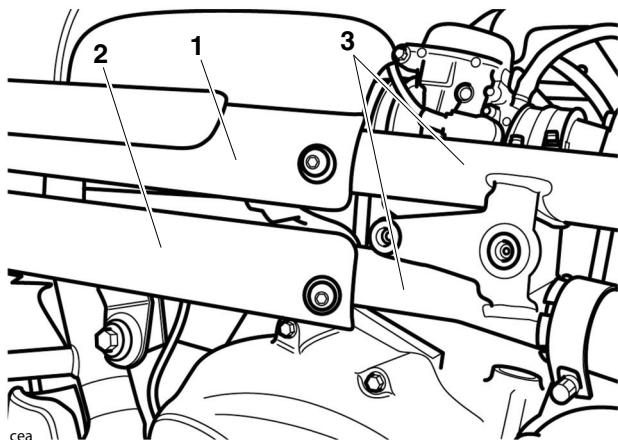
Removal

1. Undo and remove the two fixings securing the calf protector to the bracket on the header pipes. Remove the calf protector.



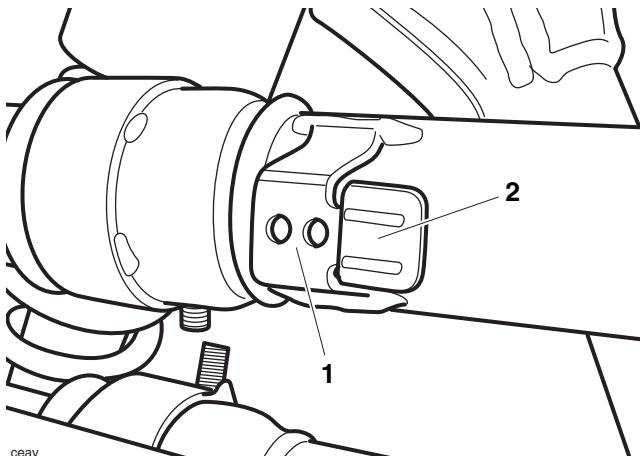
- 1. Calf protector**
2. Fixings

2. Undo and remove the fixing securing the upper side protector to the header pipes.



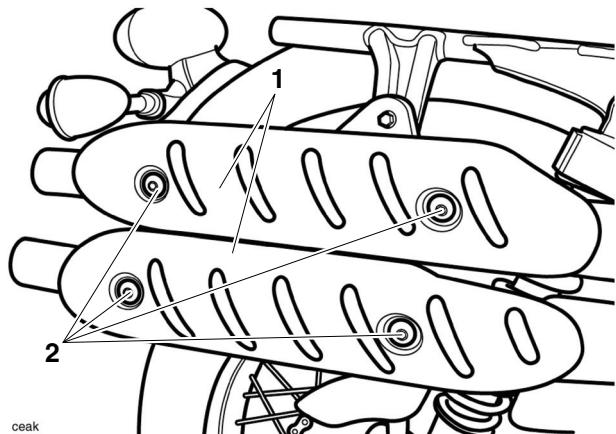
- 1. Upper side protector**
2. Lower side protector
3. Header pipes

3. Pull the side protector towards the front of the motorcycle to release it from its rear mounting point collecting the mounting point rubber as you do so.



- 1. Side protector rear mounting point**
2. Mounting point rubber

4. Remove the lower side protector in the same manner.
5. To help prevent damage, remove the fixings securing the silencer covers to the silencers. Remove the covers.



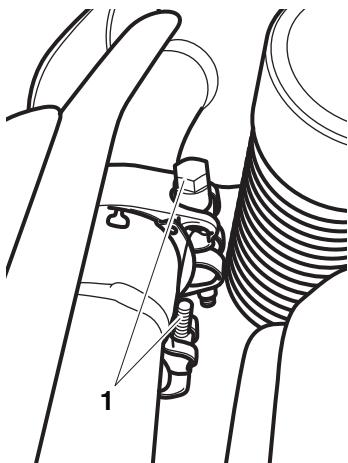
- 1. Silencer covers**
2. Fixings

Fuel System - Carburettor Models

- Slacken both clamps securing the silencers to the header pipes.

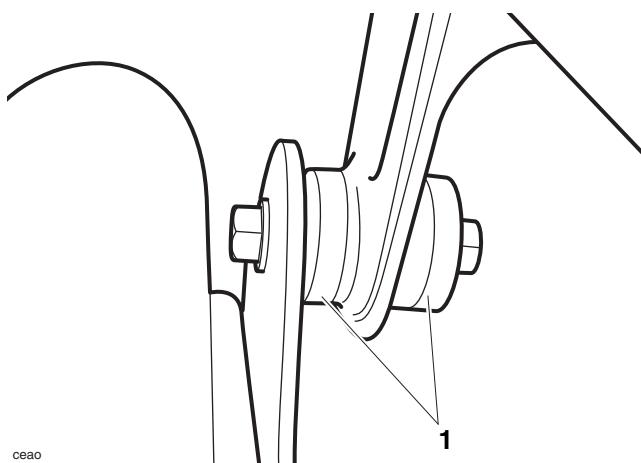
Note:

- Note the orientation of the clamps prior to removal.**



1. Silencer clamp bolts

- Noting the position of the spacers if fitted, slacken and remove the bolt, nut and spacers securing the silencer plate to the frame.



1. Spacers (if fitted)

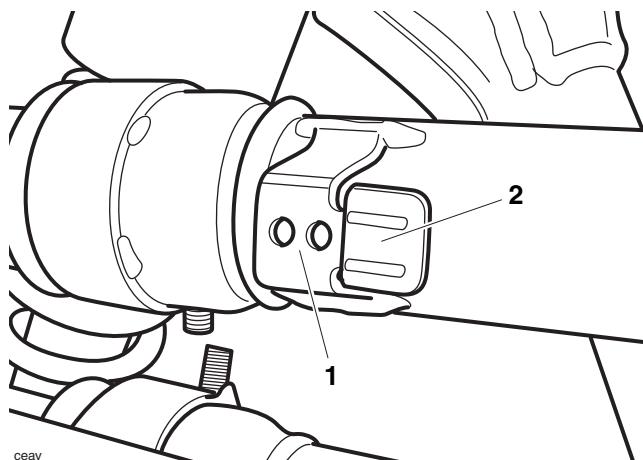
- Remove the silencers from the header pipes.
- To separate the silencers, undo and remove the fixings securing both silencers to the silencer plate.

Note:

- Note the orientation prior to removal.**

Installation

- Secure both silencers to the silencer mounting plate and tighten all four fixings to **15 Nm**.
- Apply 4 cc of clear silicone sealer to each silencer at the joints with the header pipes. Spread the sealer evenly around the joints.
- Position the silencers to the header pipes and secure the silencer plate to the frame, ensuring that the fixings are in the positions noted during removal. Tighten the bolt and nut to **19 Nm**.
- Position both silencer clamps as noted earlier and tighten their bolts to **10 Nm**.
- Fit the silencer covers and tighten their fixings to **7 Nm**.
- Fit the mounting point rubbers, collected during removal, to the rear mounting points.



1. Side protector rear mounting point

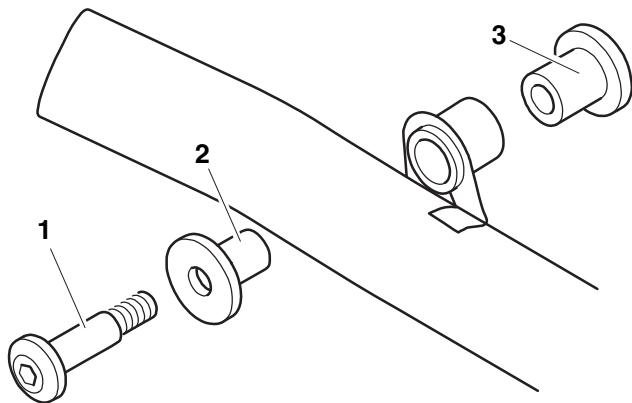
2. Mounting point rubber

- Secure the upper side cover to the frame ensuring that the hook at the rear of the cover engages in its rear mounting point. Tighten the front fixing to **4 Nm**.
- Fit the lower side cover in the same manner.
- Fit the calf protector to the bracket on the header pipes tightening the fixings to **4 Nm**.

Header Pipes - Bonneville, Bonneville T100 & Thruxton

Removal

1. Remove both silencers (see page 10A-34).
2. Remove the right hand side cover (see page 16-14).
3. Unscrew the bolts and remove the sprocket cover from the engine.
4. Remove the cap and slacken the swinging arm outrigger clamp bolt on the right side rider footrest bracket.
5. Unscrew the right side footrest bracket mounting bolts and the rear brake master cylinder mounting bolts.
6. Free the footrest bracket from the swinging arm outrigger and position it clear of the header pipe mounting bolt.
7. Slacken the clamp securing the header balance pipes together.
8. Unscrew the nuts securing both header pipes to the cylinder head.
9. Unscrew the mounting bolt from the rear of each header pipe.

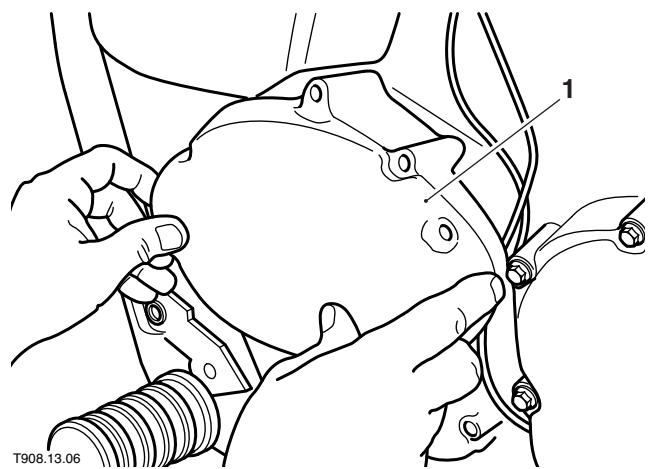


- 1. Mounting bolt**
2. Collar
3. Rubber mounting

10. Free the header pipes from the cylinder head, separate the balance pipe and remove both pipes from the motorcycle. Recover the rubber mountings from each header pipe rear mounting.
11. Remove the gasket from each cylinder head port and discard them.

Installation

1. Fit a new gasket to each cylinder head port.
2. Apply a light smear of silicone sealer to each header pipe at the joint with the head.
3. Ensure the rubber mountings are correctly fitted to the header mountings and fit the clamp to the balance pipe.
4. Fit both header pipes, joining the balance pipe whilst locating both headers correctly in the cylinder head ports. Fit the nuts to the cylinder head studs, and lightly tighten them.
5. Install the header mounting bolts and tighten to **22 Nm**.
6. Tighten the header pipe nuts evenly and progressively to **19 Nm**.
7. Position the balance pipe clamp correctly and tighten its bolt to **15 Nm**.
8. Locate the footrest bracket back on the outrigger and tighten the bracket mounting bolts to **22 Nm**. Tighten the clamp bolt to **45 Nm** up to VIN 333839, **40 Nm** from VIN 333840, then refit the cap.
9. Refit the master cylinder mounting bolts and tighten to **23 Nm**.
10. Install the sprocket cover, tightening the cover bolts to **10 Nm**.



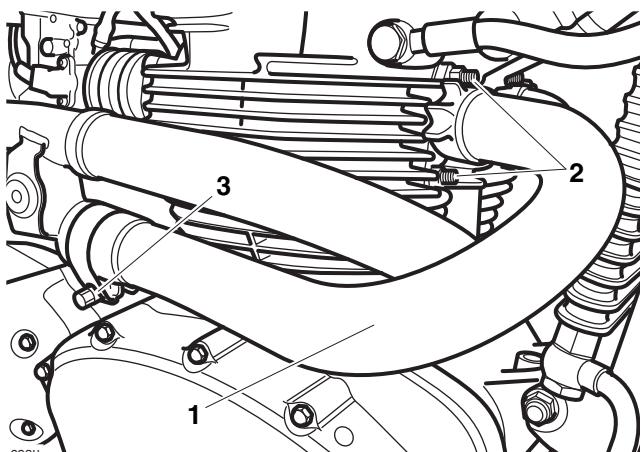
- 1. Sprocket cover**
11. Install the silencers (see page 10A-13) and side cover (see page 16-14).

Fuel System - Carburettor Models

Header Pipes - Scrambler

Removal

1. Remove the silencers (see page 10A-35).
2. Slacken and remove the two nuts securing the right hand header pipe to the cylinder head.

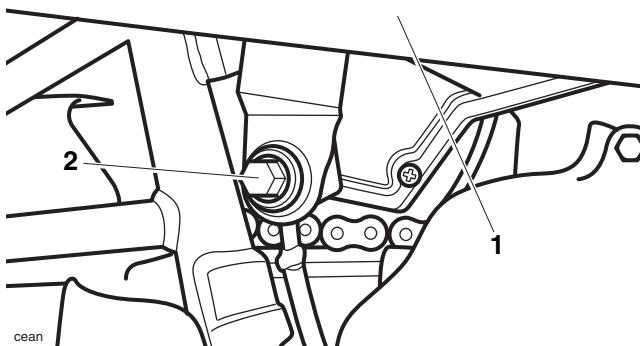


1. Right hand header pipe

2. Nuts

3. Header pipe clamp

3. Slacken the header pipe clamp.
4. Remove the right hand header pipe.
5. Slacken and remove the two nuts securing the left hand header pipe to the cylinder head.
6. Noting the position of the rubber washers, slacken and remove the fixing securing the left hand header pipe to the frame. Remove the header pipe.

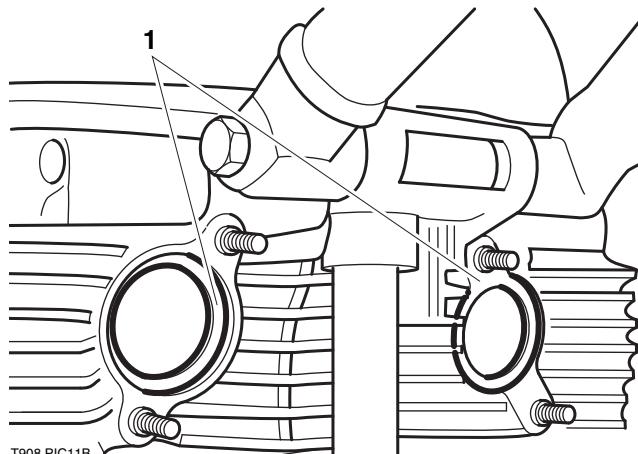


1. Left hand header pipe

2. Fixing

Installation

1. Fit a new gasket to each cylinder head port.



1. Gasket

2. Apply a light smear of silicone sealer to each header pipe at the joint with the head.
3. Position the left hand header pipe to the cylinder head. Secure to the frame tightening the fixing to **19 Nm**, ensuring that the rubber washers are fitted in the positions noted prior to removal.
4. Fit the nuts to the cylinder head studs on the left hand side. Tighten the nuts to **19 Nm**.
5. Position the right hand header pipe to the cylinder head and abut to the left hand header pipe.
6. Join both header pipes using the header pipe clamp. Tighten the clamp bolt to **10 Nm**.
7. Fit the nuts to the cylinder head studs on the right hand side. Tighten the nuts to **19 Nm**.
8. Refit the silencers (see page 10A-36).

10B Fuel System - Fuel Injection Models

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Fuel System - Fuel Injection Models

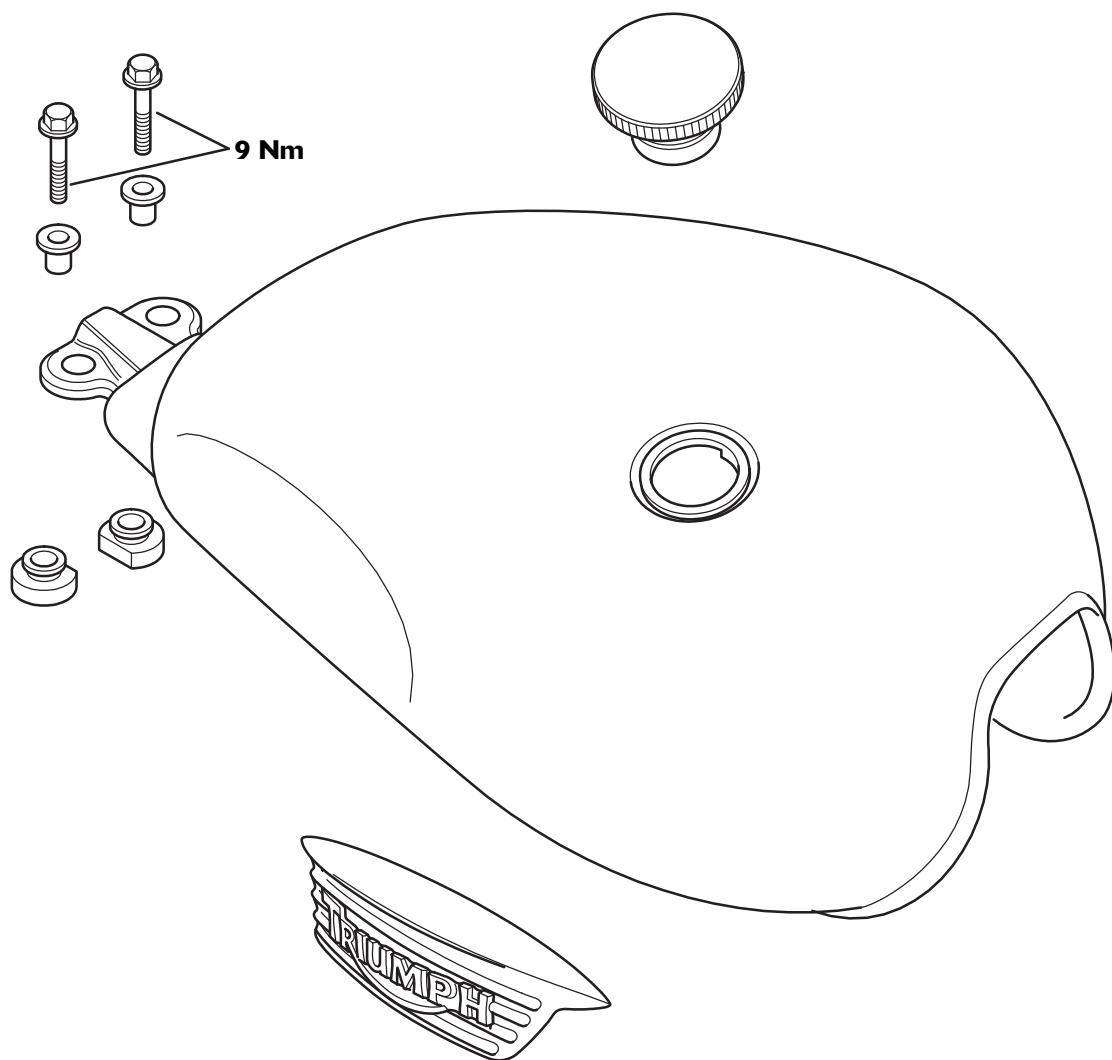
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Fuel System - Fuel Injection Models

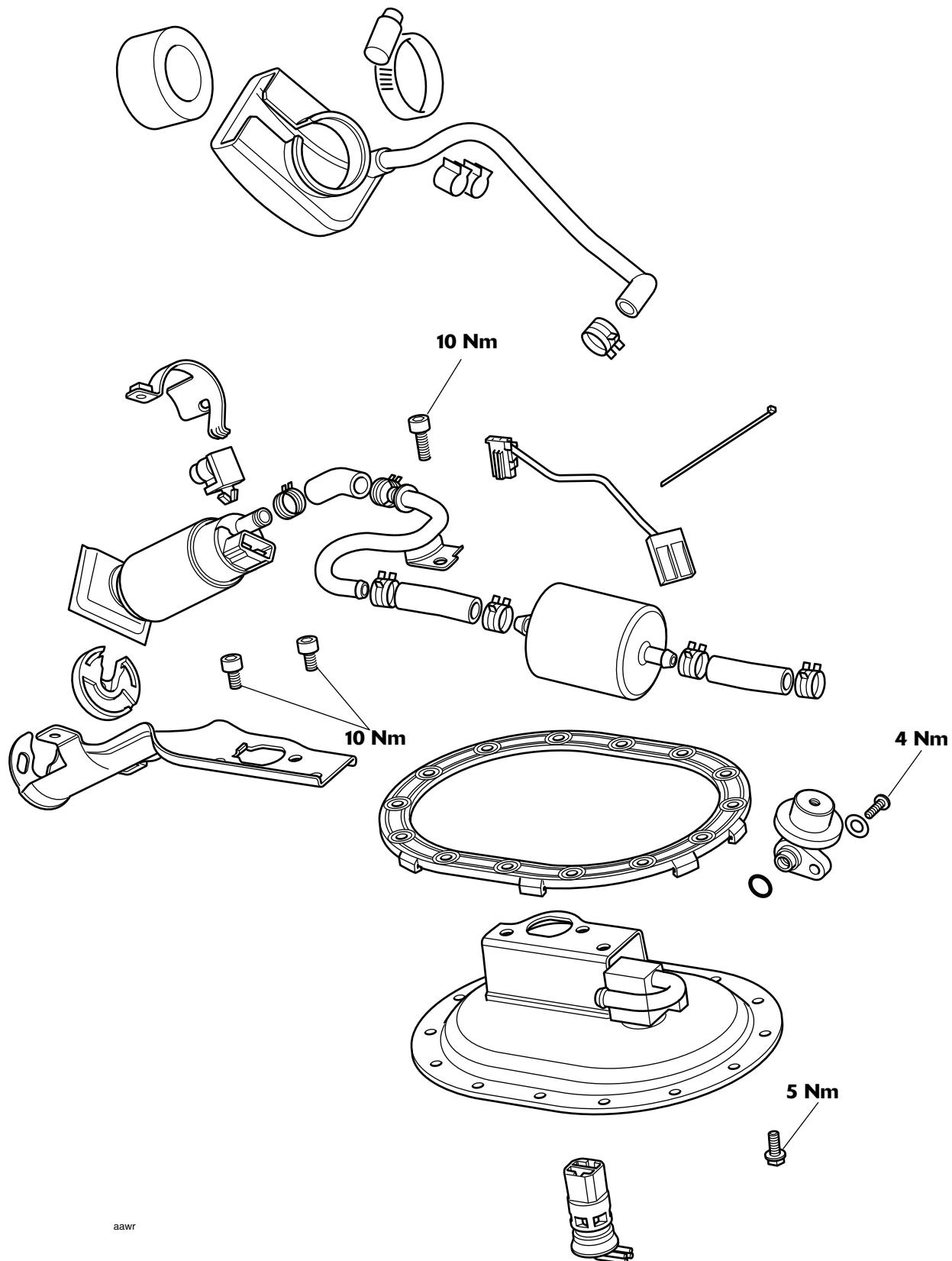
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Fuel System - Fuel Injection Models

Exploded View - Fuel Tank



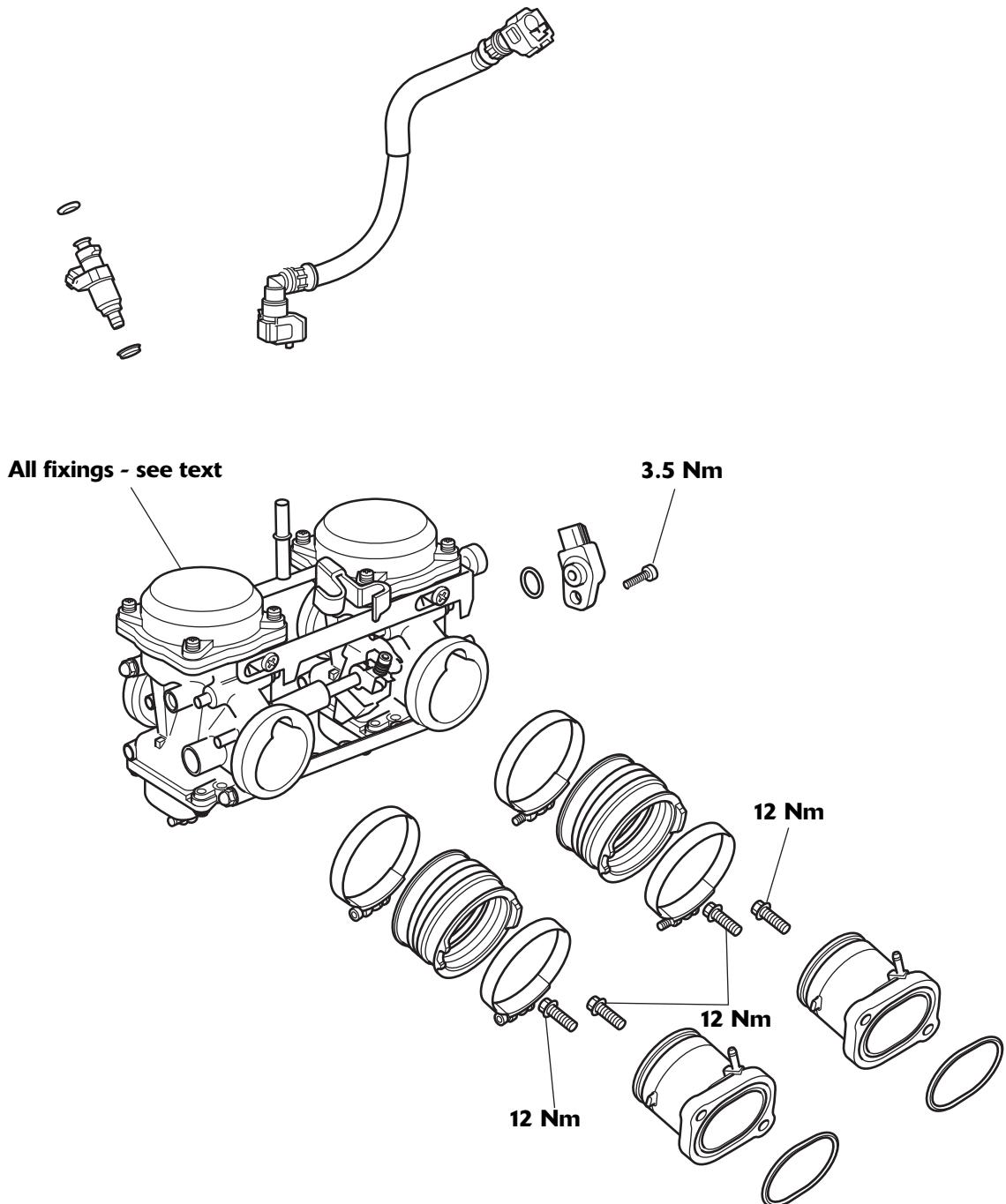
Exploded View - Fuel Pump



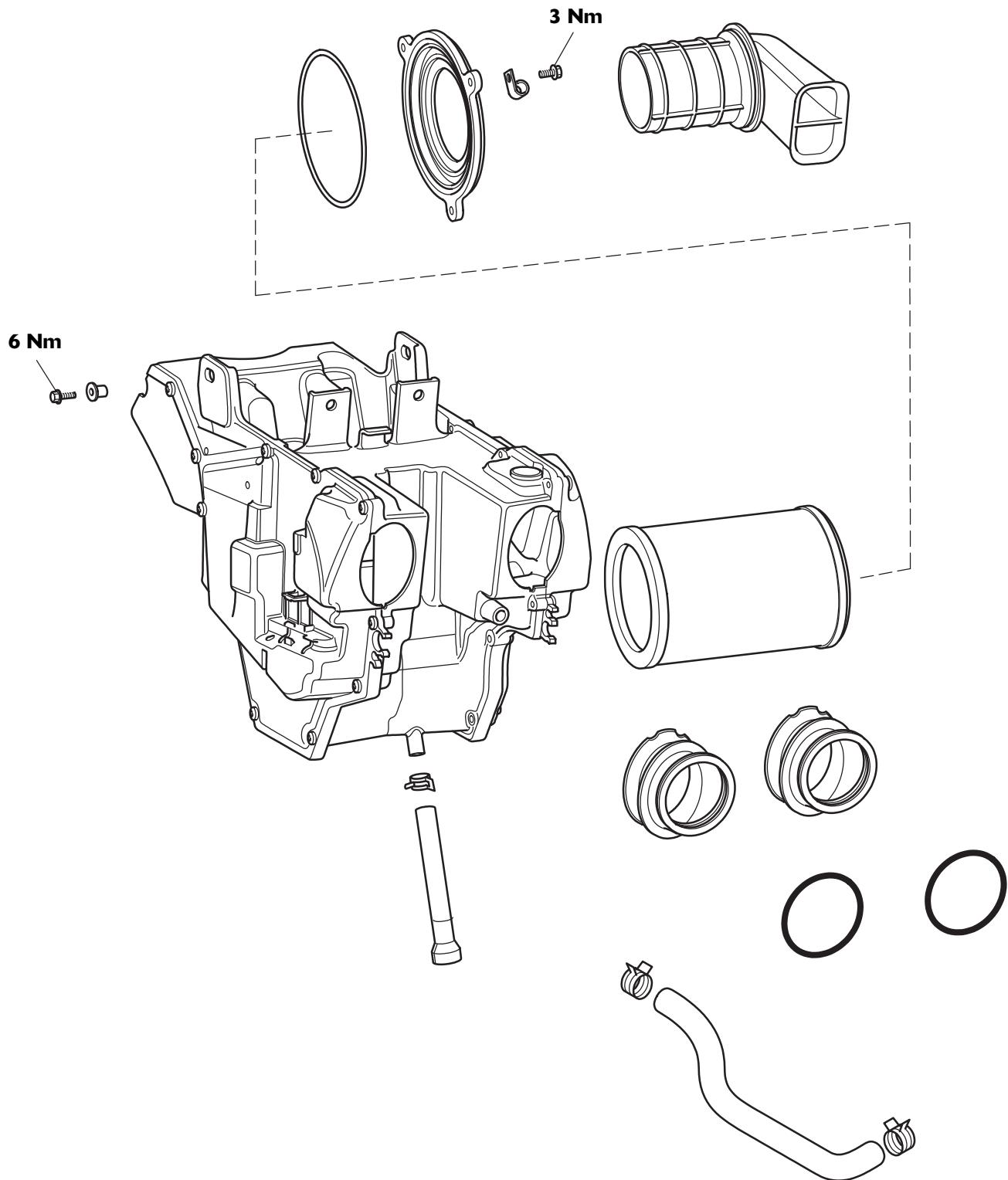
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Fuel System - Fuel Injection Models

Exploded View - Fuel Rail, Throttles and Injectors

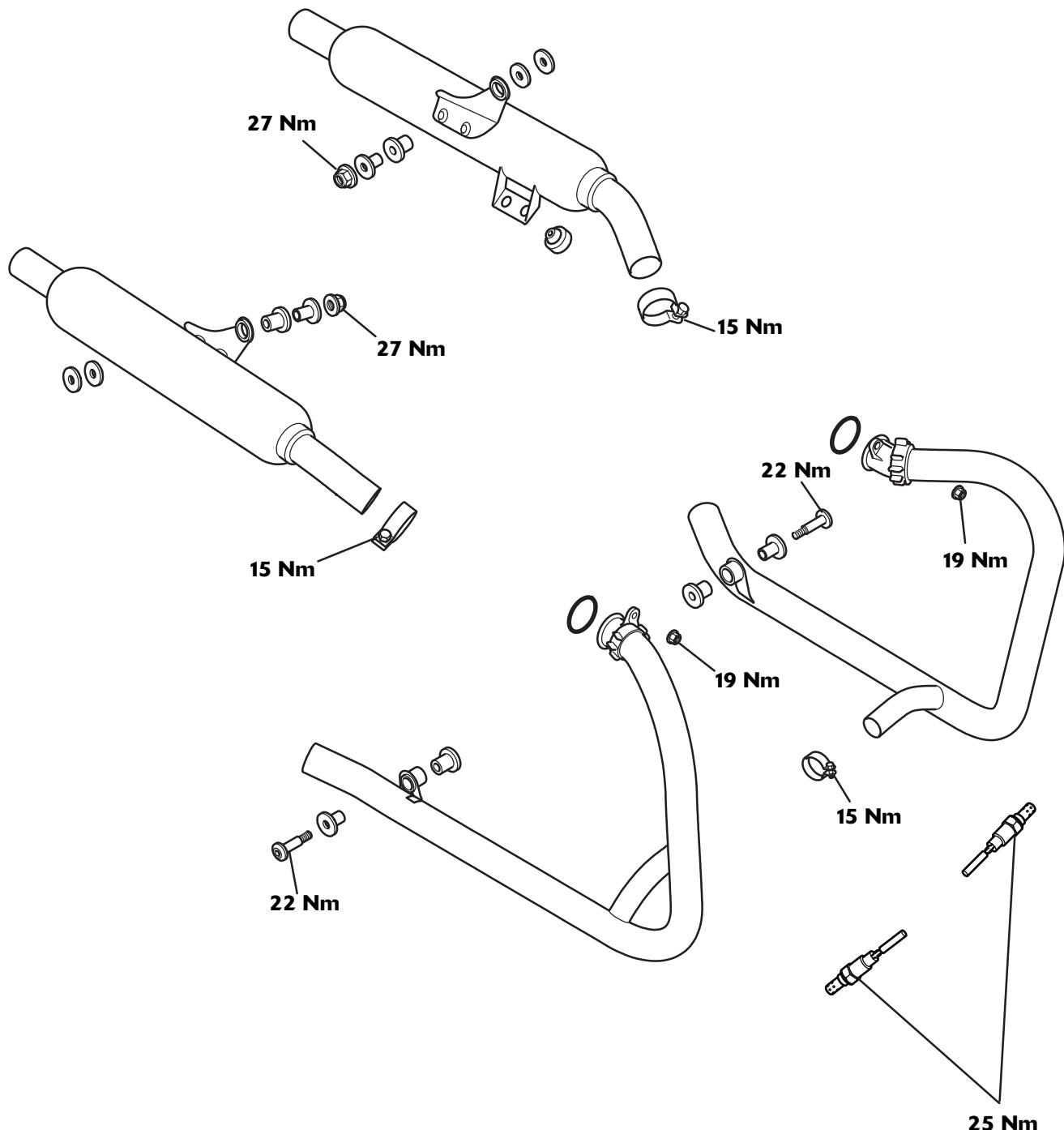


Exploded View - Airbox

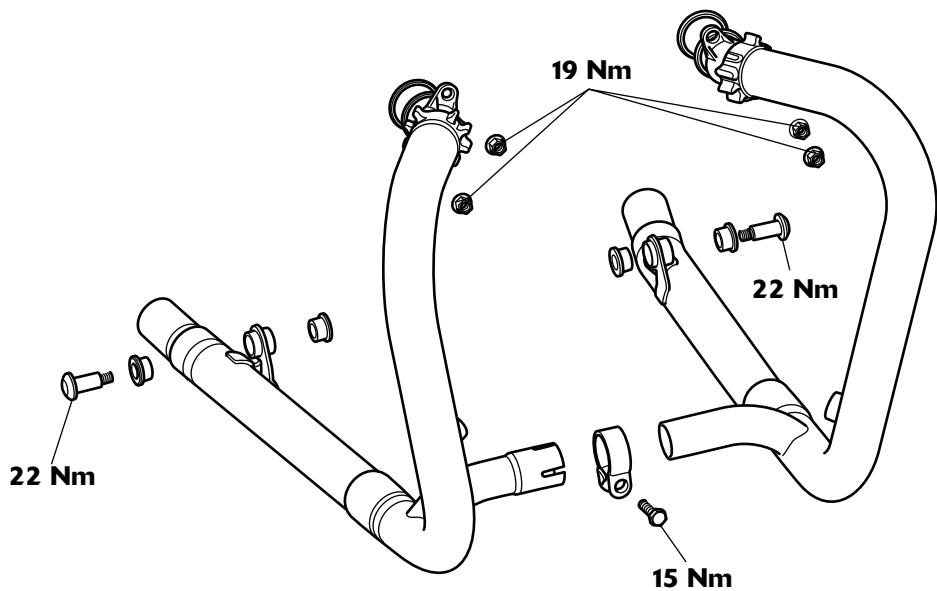
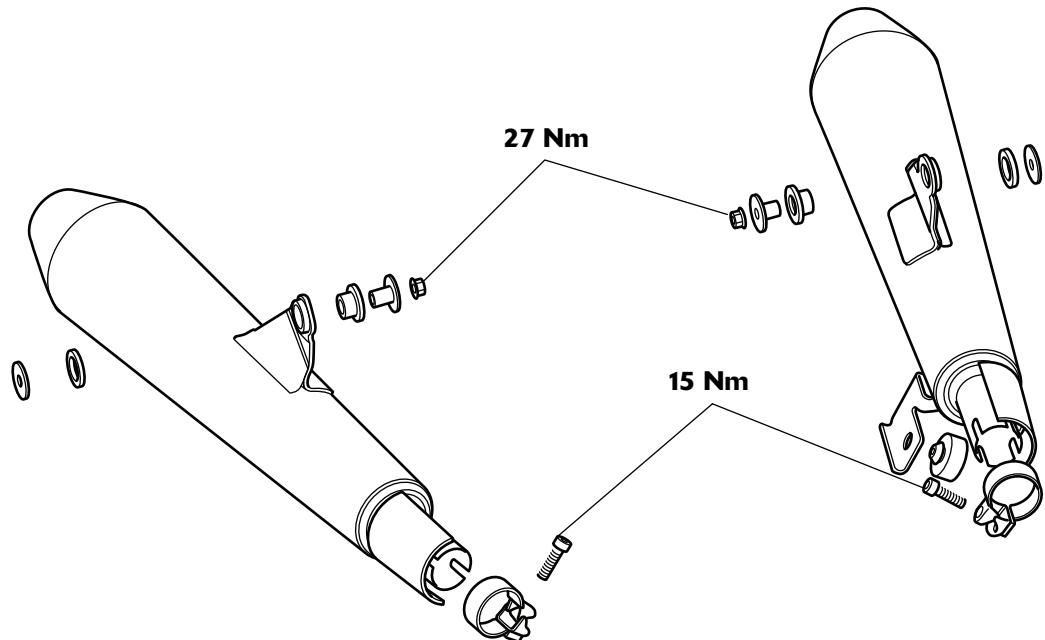


Fuel System - Fuel Injection Models

**Exploded View - Exhaust System - Bonneville (up to VIN 380776),
Bonneville T100 (including the Steve McQueen™ and Bonneville T100
110th Editions)**

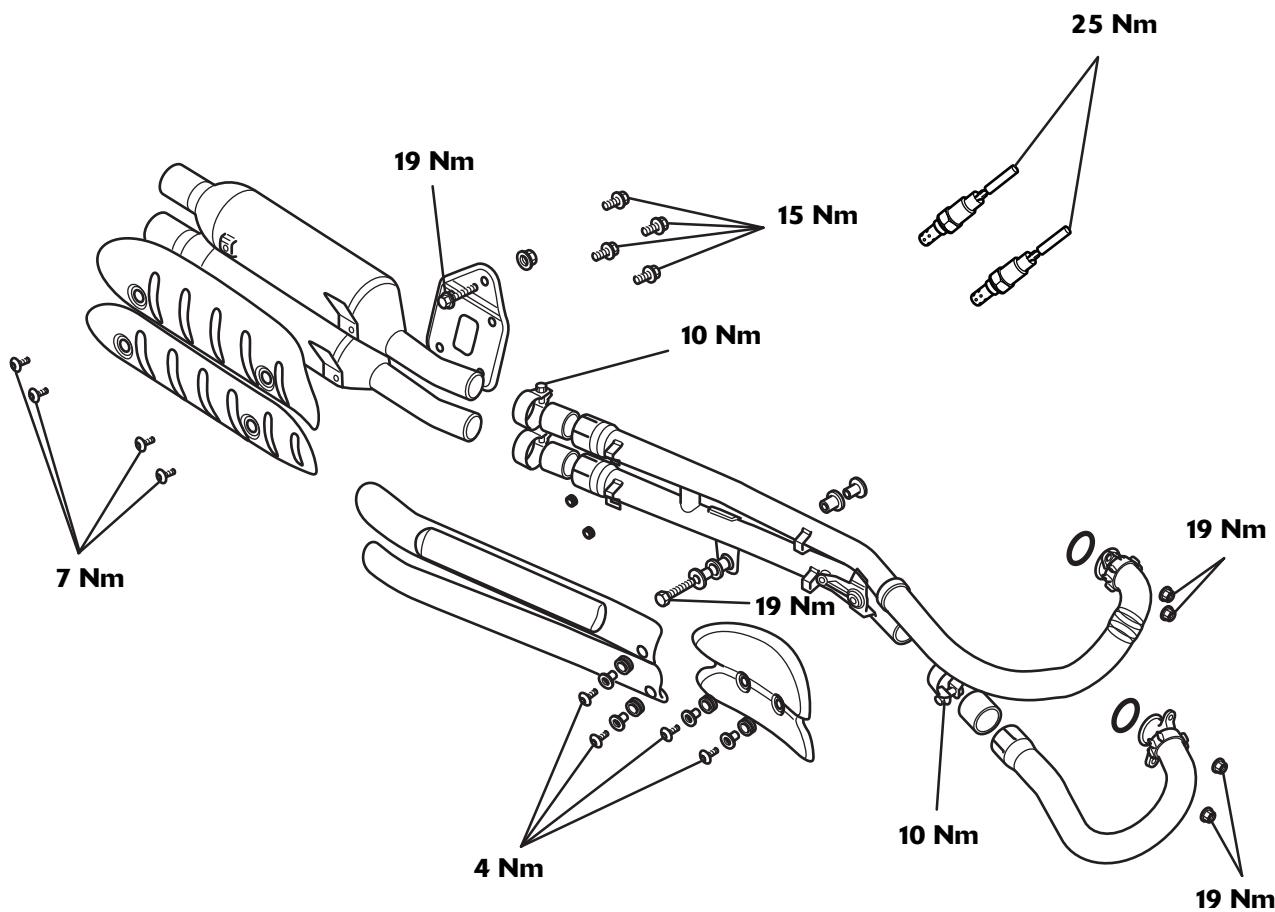


Exploded View - Exhaust System - Bonneville (from VIN 380777), Bonneville SE

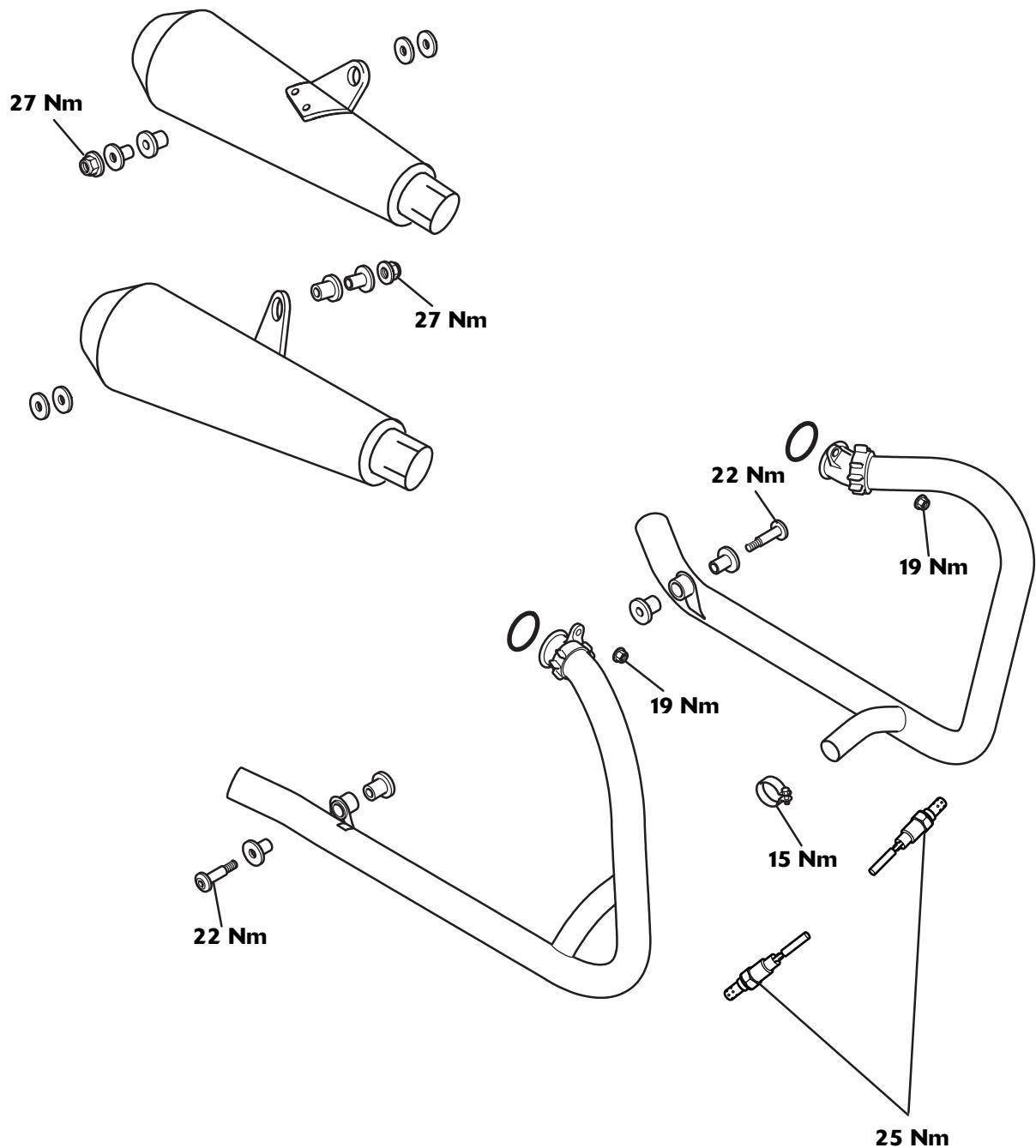


Fuel System - Fuel Injection Models

Exploded View - Exhaust System - Scrambler

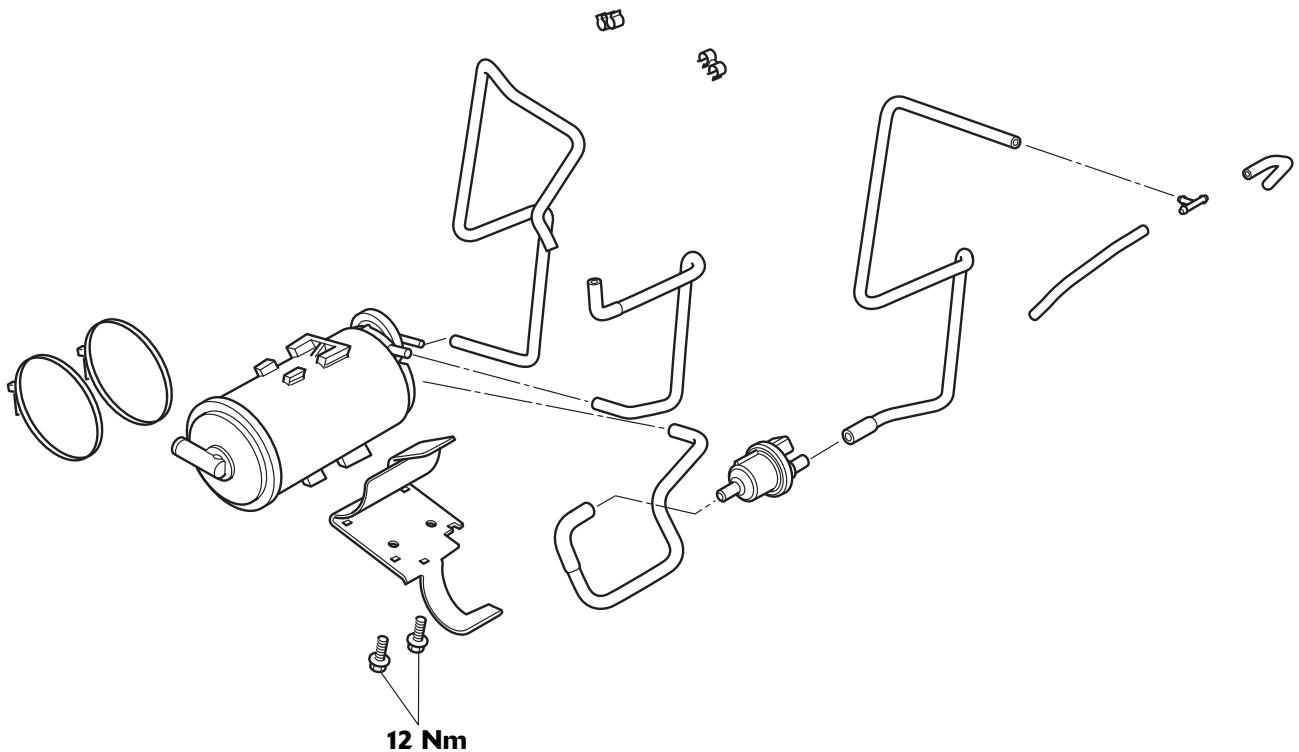


Exploded View - Exhaust System - Thruxton

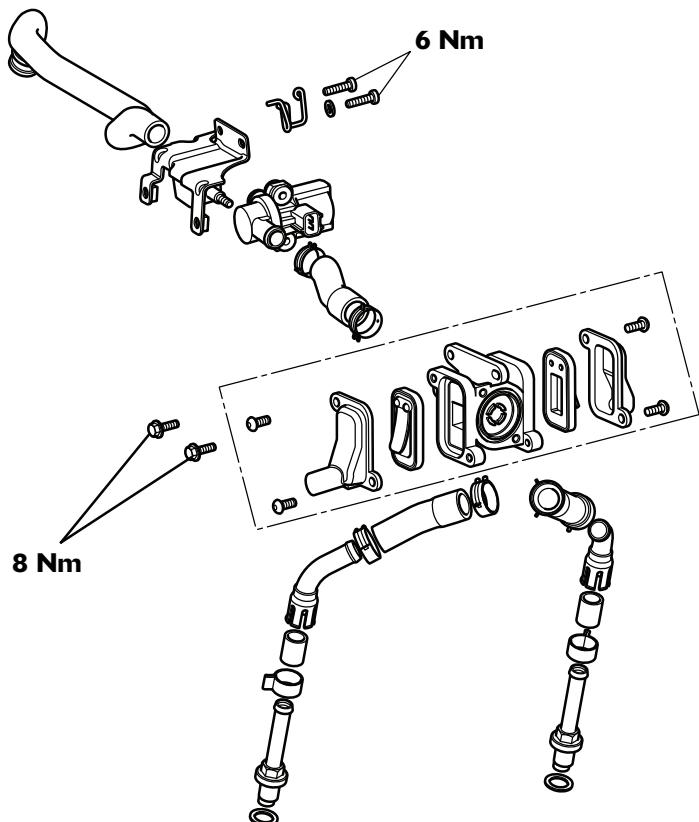


Fuel System - Fuel Injection Models

Exploded View - Evaporative System



Exploded View - Secondary Air Injection



Fuel Requirements

Fuel Requirements - all countries except USA

Outside of the United States of America, this model is designed to use unleaded fuel and will give optimum performance if the correct grade of fuel is used. Always use unleaded fuel with an octane rating of 91 RON or higher.

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: This model is 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. This model 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 - Fuel Injection Models

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 system.

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 Electronic 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.

Engine temperature

The oil temperature in the oil cooler.

Oil temperature sensor

Sensor which detects oil temperature.

DTC

Diagnostic Trouble Code.

ECM

Engine Control Module.

Engine speed

The crankshaft revolutions per minute.

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".

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 gear change.

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 Electronic 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.

Primary Throttle Position Sensor

Sensor for the primary (lower) throttle position.

Primary Throttle Stepper Motor

Stepper motor used to vary throttle opening at idle and when the engine is cold.

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 that is 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 by-passes 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 tool, fully open need not be 100% nor fully closed 0%.

Throttle voltage

Voltage at the throttle potentiometer.

Vbatt

Battery voltage.

Fuel System - Fuel Injection Models

Engine Management System

System Description

The Bonneville, Bonneville SE, Bonneville T100, Scrambler and Thruxton models are 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, oil 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. This ensures that, should a malfunction occur in the engine management system, the malfunction type, and engine data at the time the malfunction occurred, are stored in the ECM memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

System Sensors

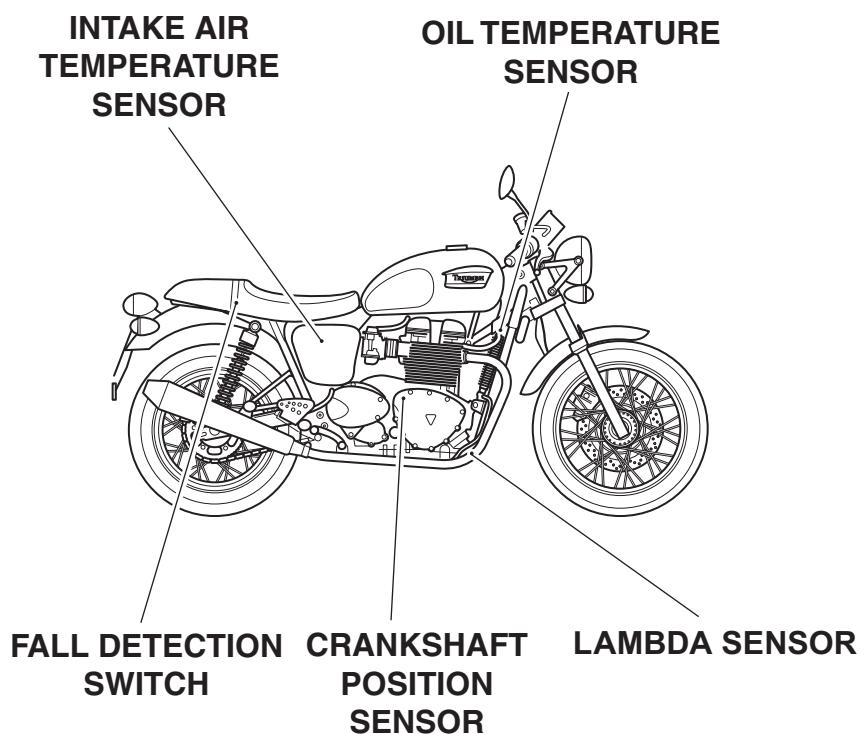
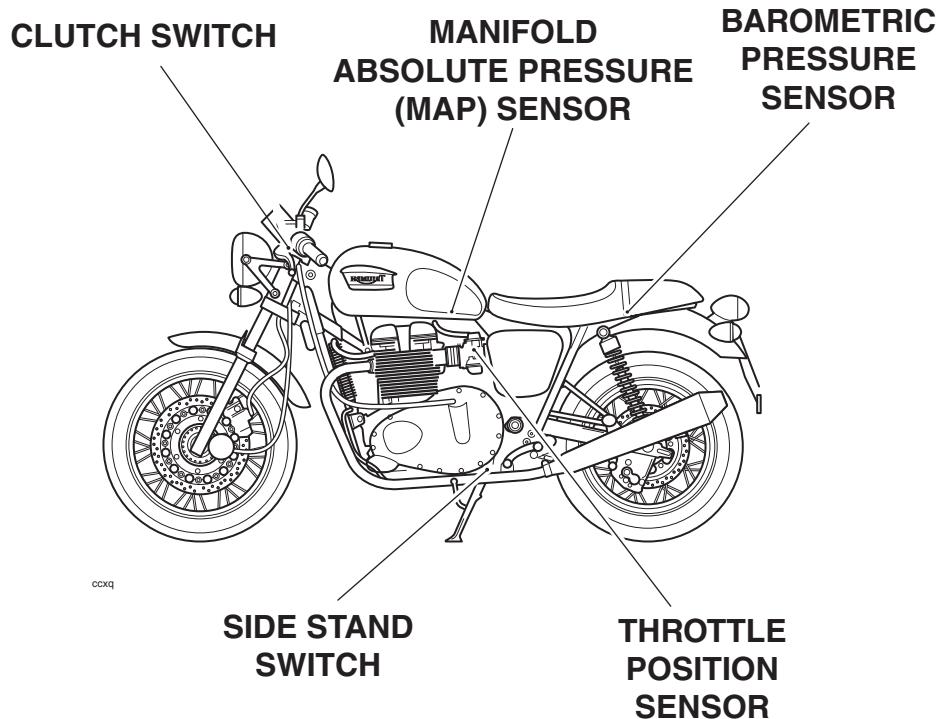
- **Intake air temperature sensor** - situated in the right side of the airbox. As the density of the air (and therefore the amount of oxygen available to ignite the fuel) changes with temperature, an intake air temperature sensor is fitted. Changes in air temperature (and therefore air density) are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Barometric pressure sensor** - situated under the seat. 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) sensors** - there are two fitted - attached to the frame spine above the throttle body, connected to each throttle body 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 crankcase, near the alternator cover. The crankshaft position sensor detects movement of a toothed wheel attached to the alternator rotor. The toothed wheel gives 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 oil temperature sensor** - situated at the oil cooler inlet union, on the upper left hand side of the oil cooler. Oil 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 at the left end of the throttle body. 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.
- **Oxygen sensors** - there are two fitted - situated in the exhaust header system upstream of the catalyst. 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.

IMPORTANT:

- 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.
- **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** - situated under the seat. 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.

Sensor Locations



Fuel System - Fuel Injection Models

System Actuators

In response to signals received from the sensors, the ECM controls and directs messages to a series of electronic and electro-mechanical actuators. The function and location of the actuators is given below.

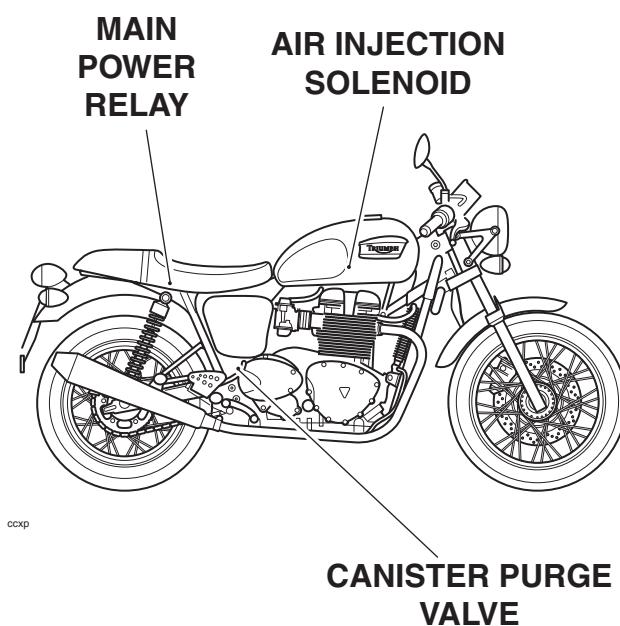
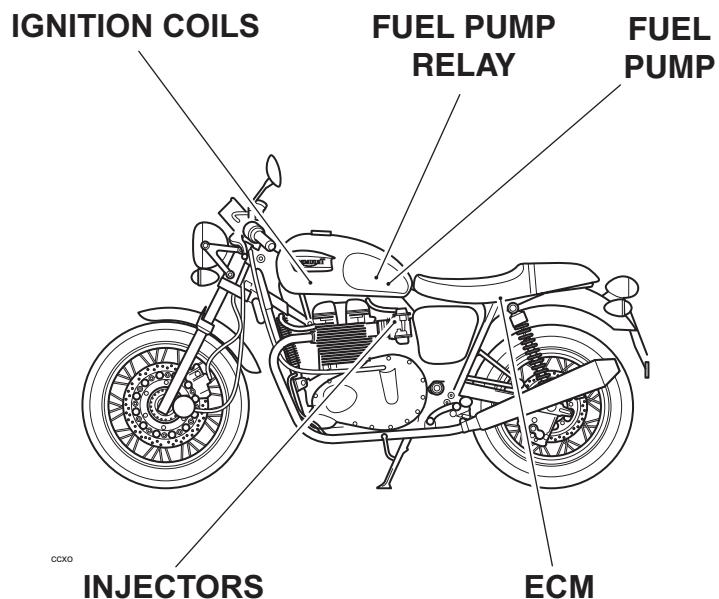
- **Canister purge valve (California models only)** - situated in the vapour return line between the carbon canister and the throttle bodies. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is "pulsed" by the ECM to give control over the rate at which the canister is purged.
- **Injectors** - located in the throttle body. 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 - Bonneville, Bonneville SE, Bonneville T100 & Thruxton** - the ignition coil is located above the cam cover, attached to the frame. The ignition coil is dual output with one output lead (HT lead) for each spark plug. The ECM controls the point at which the coil is switched on and off. In calculating the switch-on time, the ECM allows sufficient time for the coil to charge to a level where a spark can be produced. The coil is switched off at the point of ignition, the timing of which is optimised for good engine performance.
- **Ignition coils - Scrambler** - the ignition coils are located above the cam cover, attached to the frame. There are two coils fitted, one for each spark plug. 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 under the seat. 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 3 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 3 bar 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.
- **Fuel pump relay** - situated under the fuel tank on the left side of the frame spine. Power for the fuel pump is provided by the fuel pump relay, which is powered up by the ECM when the engine is running.
- **Secondary air injection solenoid** - located in front of the airbox. The secondary air injection solenoid controls airflow through the secondary air injection system.

Note:

- **In this system, the starter lockout system (clutch switch, neutral switch, side stand switch) all operate through the engine management ECM.**

Fuel System - Fuel Injection Models

Actuator Locations



Fuel System - Fuel Injection Models

Engine Management Circuit

Diagram - Bonneville, Bonneville SE, Bonneville T100, Thruxton - Models with Cable Driven Speedometer

Key To Wiring Circuit Diagram

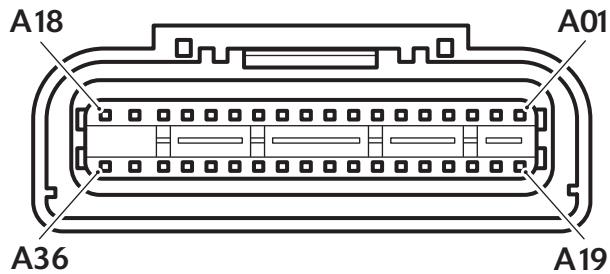
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Neutral Switch
4	Instrument Assembly
5	Instrument Warning LEDs
6	Clutch Switch
7	Starter Relay
8	Side Stand Switch
9	Fuel level Sender
10	Fall Detection Switch
11	Ambient Air Pressure Sensor
12	Intake Air Temperature Sensor
13	Left Hand MAP Sensor
14	Right Hand MAP Sensor
15	Oil Temperature Sensor
16	Oxygen Sensor - Cylinder 1
17	Throttle Position Sensor
18	Fuel Pump
19	Fuel Pump Relay
20	Power Ground
21	Logic (sensor) Ground
22	Ignition Coils
23	Fuel Injectors
24	Purge Valve
25	Exhaust Air Injection Solenoid
26	Crankshaft Sensor
27	Engine Management System Relay
28	Oxygen Sensor - Cylinder 2

Key To Wiring Colour Codes

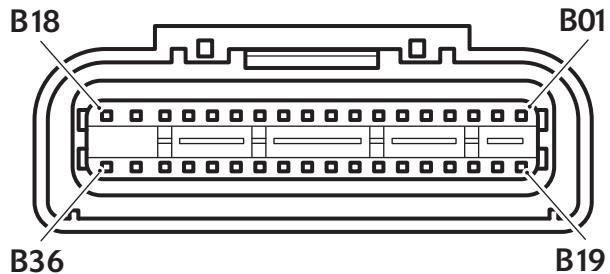
Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

ECM Connector Pin Numbering

Connector A (Black)



Connector B (Grey)

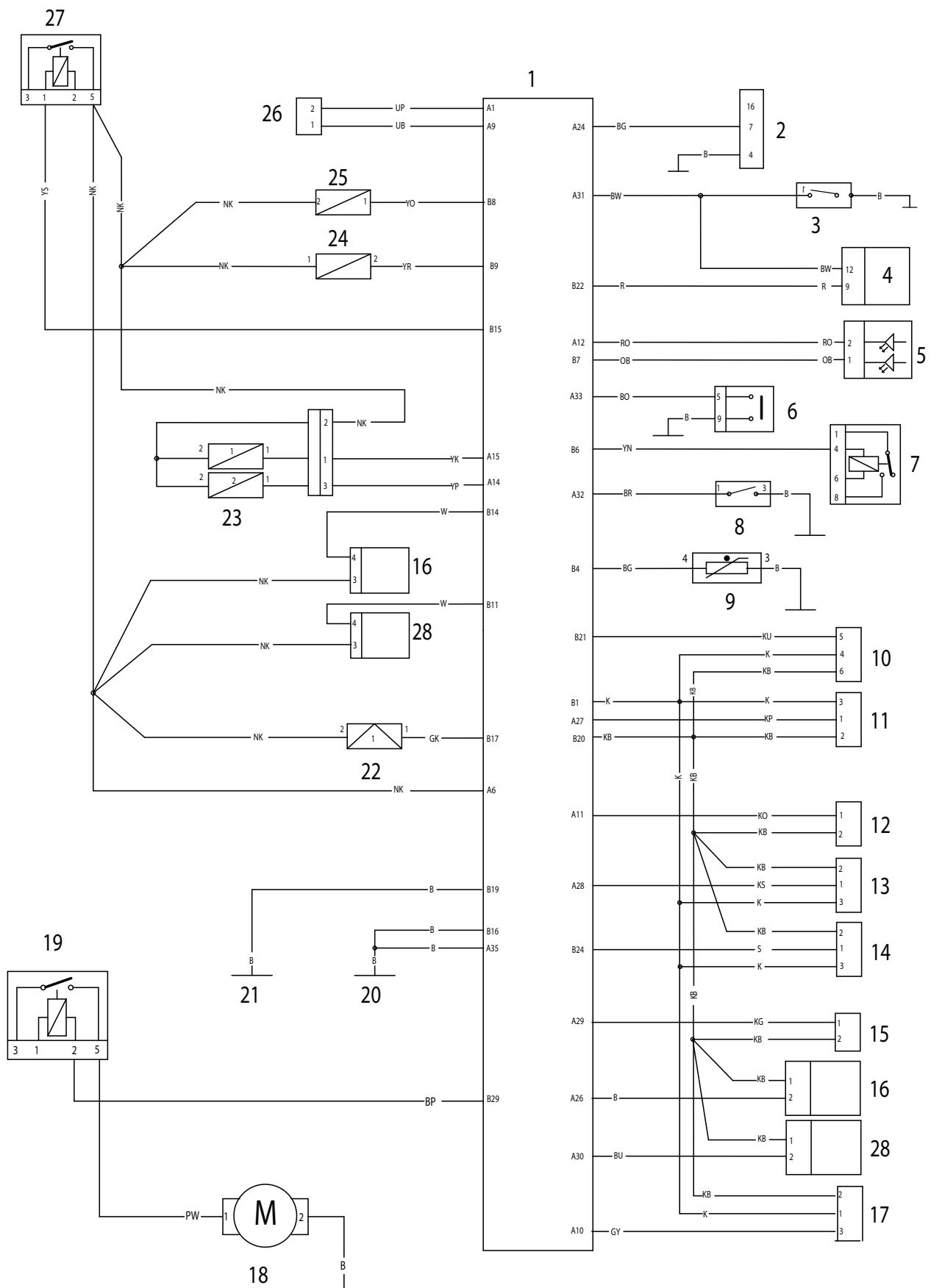


The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector's pins are prefixed A and the grey connector's 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.

Fuel System - Fuel Injection Models

Circuit Diagram - Engine Management System - Bonneville, Bonneville SE, Bonneville T100, Thruxton - Models with Cable Driven Speedometer



Fuel System - Fuel Injection Models

Engine Management Circuit Diagram - Scrambler - Models with Cable Driven Speedometer

Key To Wiring Circuit Diagram

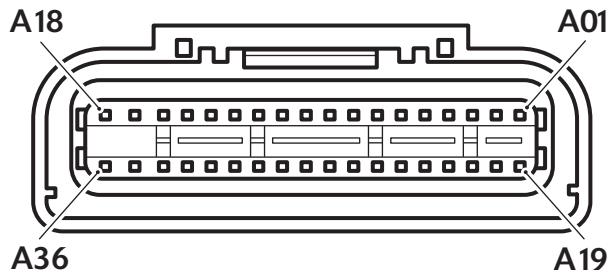
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Neutral Switch
4	Instrument Assembly
5	Instrument Warning LEDs
6	Clutch Switch
7	Starter Relay
8	Side Stand Switch
9	Fuel level Sender
10	Fall Detection Switch
11	Ambient Air Pressure Sensor
12	Intake Air Temperature Sensor
13	Left Hand MAP Sensor
14	Right Hand MAP Sensor
15	Oil Temperature Sensor
16	Oxygen Sensor - Cylinder 1
17	Throttle Position Sensor
18	Fuel Pump
19	Fuel Pump Relay
20	Power Ground
21	Logic Ground
22	Ignition Coils
23	Fuel Injectors
24	Purge Valve
25	Exhaust Air Injection Solenoid
26	Crankshaft Sensor
27	Engine Management System Relay
28	Oxygen Sensor - Cylinder 2
29	Accessory Tachometer (Connector A)

Key To Wiring Colour Codes

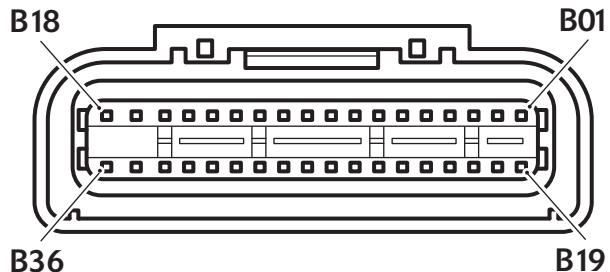
Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

ECM Connector Pin Numbering

Connector A (Black)



Connector B (Grey)

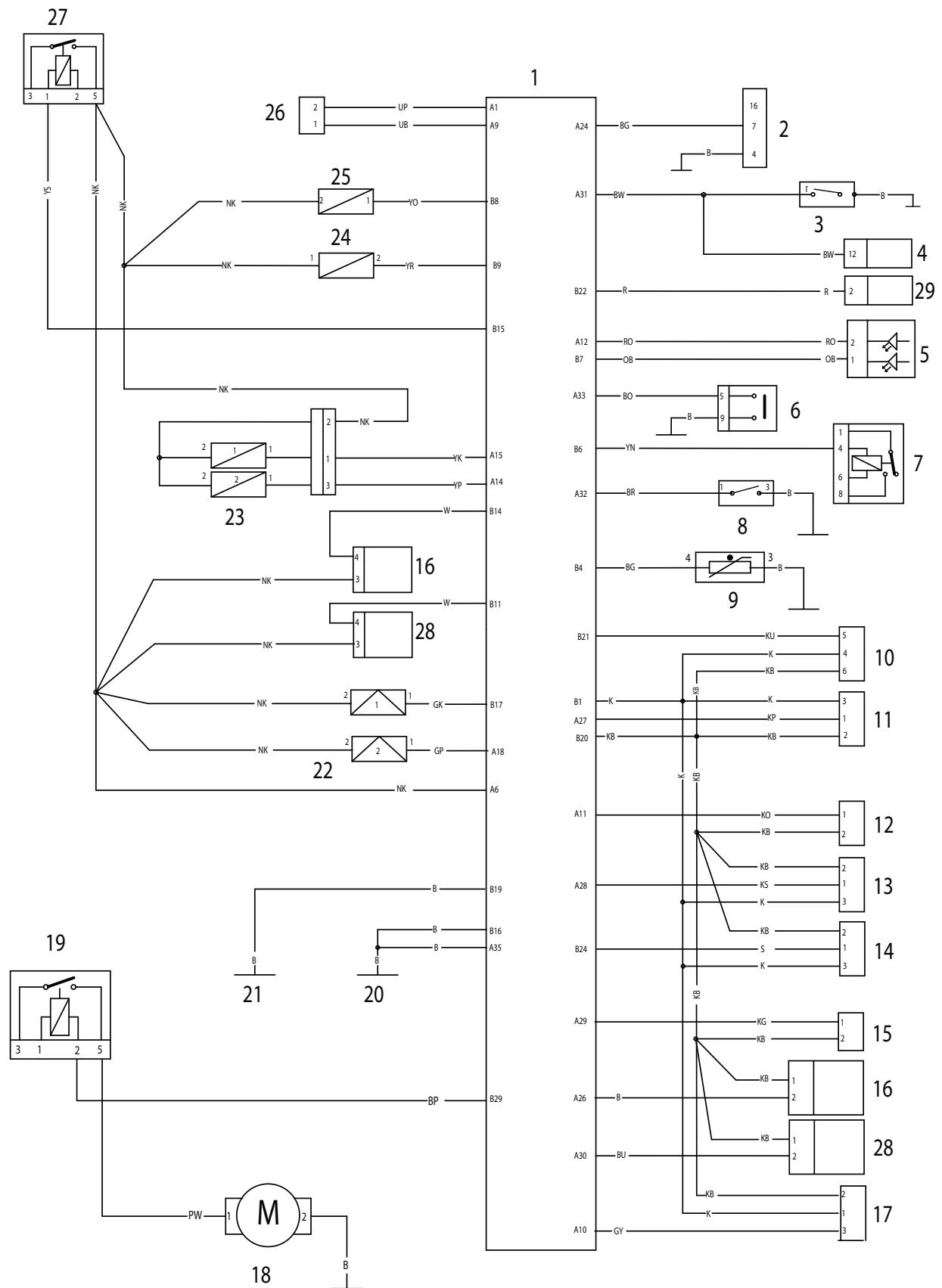


The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector's pins are prefixed A and the grey connector's 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.

Fuel System - Fuel Injection Models

Circuit Diagram - Engine Management System - Scrambler - Models with Cable Driven Speedometer



Fuel System - Fuel Injection Models

Engine Management Circuit

Diagram - Bonneville, Bonneville SE, Bonneville T100 (including the Steve McQueen™ and Bonneville T100 110th Editions), Thruxton and Scrambler - Models with Electronic Speedometer

Key To Wiring Circuit Diagram

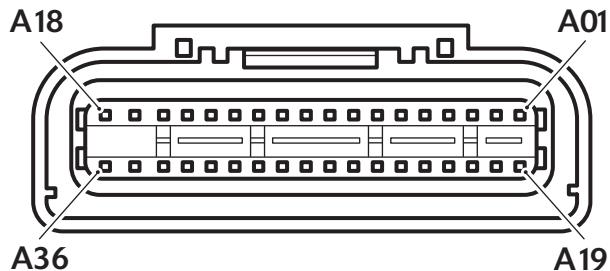
Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Instrument - Speedometer
4	Instrument - Tachometer
5	Vehicle Speed Sensor
6	Starter Relay
7	Clutch Switch
8	Intake Air Pressure Sensor
9	Throttle Position Sensor
10	Fall Detection Switch
11	Ambient Air Temperature Sensor
12	Right Hand MAP Sensor
13	Left Hand MAP Sensor
14	Oil Temperature Sensor
15	Oxygen Sensor - Cylinder 2
16	Oxygen Sensor - Cylinder 1
17	Neutral Switch
18	Side Stand Switch
19	Fuel Level Sender
20	Alarm Unit
21	Engine Stop Switch
22	Fuel Pump
23	Fuel Pump Relay
24	Fuse Box (Fuse 6)
25a	Ignition Coil Number 1
25b	Ignition Coil Number 2 (Scrambler Only)
26	Fuel Injectors
27	Crankshaft Sensor
28	Secondary Air Injection Solenoid
29	Purge Valve
30	Engine Management System Relay

Key To Wiring Colour Codes

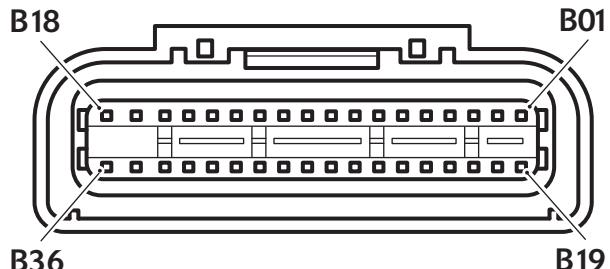
Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

ECM Connector Pin Numbering

Connector A (Black)



Connector B (Grey)

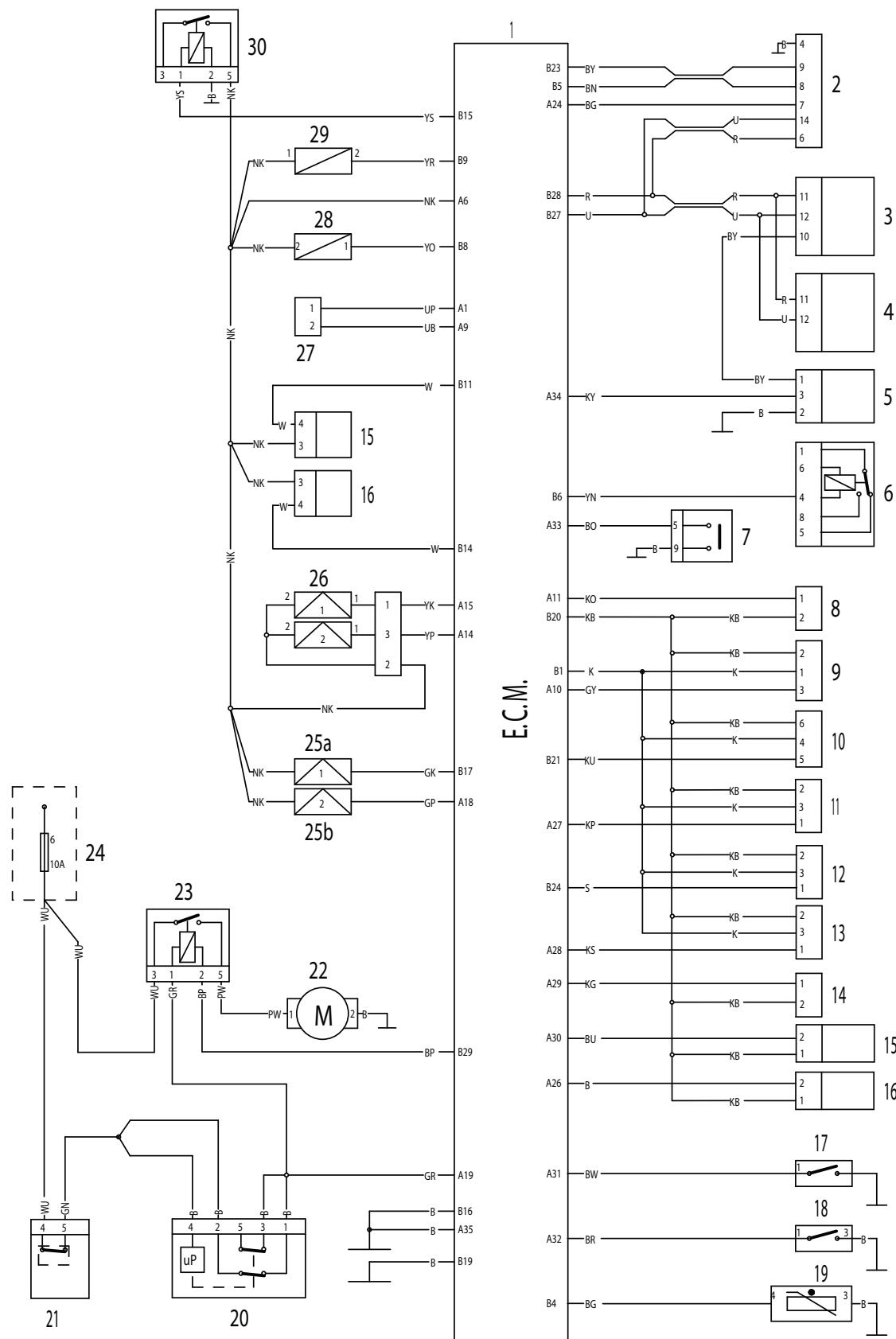


The above illustration shows the pin numbering system used in the engine management circuit diagram.

The black connector's pins are prefixed A and the grey connector's 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.

Fuel System - Fuel Injection Models

Circuit Diagram - Engine Management System - Bonneville, Bonneville SE, Bonneville T100 (including the Steve McQueen™ and Bonneville T100 110th Editions), Thruxton and Scrambler - Models with Electronic Speedometer



Fuel System - Fuel Injection Models

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 seat. 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 pre-determined 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 pre determined 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 engine temperature must be raised to 72°C or more.
- The engine 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.

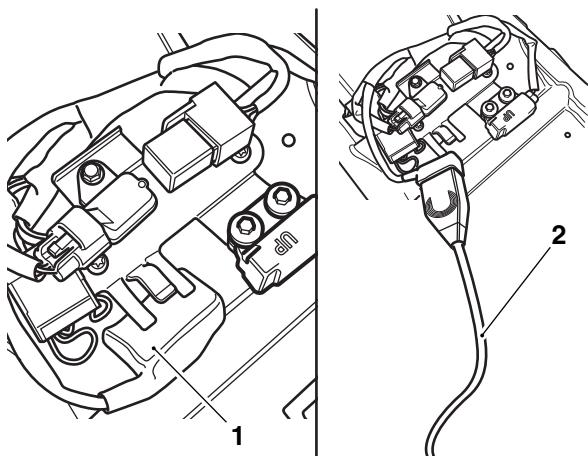
Note:

- 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 tool.

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



1. Connection to main harness
2. Triumph diagnostic interface

1. Remove the seat (see page 16-11) and release the diagnostic connector from its locating tang.
2. Connect the Triumph diagnostic interface to the dedicated multi-plug, located beneath the seat.
3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the seat (see page 16-11).

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 - Fuel Injection Models

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	%

Fuel System - Fuel Injection Models

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 ECU	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

Sensor Readings

The data available under Sensor Readings is:

Item Checked	Result Unit
Air temperature	°C
Coolant temperature	°C
Barometric pressure	mmHg
Cylinder 1 manifold absolute pressure	mmHg
Cylinder 2 manifold absolute pressure	mmHg
Low fuel light	on/off
Oxygen sensor 1 short term fuel trim	on/off
Oxygen sensor 2 short term fuel trim	on/off
Oxygen sensor 1 heater status	on/off
Oxygen sensor 2 heater status	on/off

Fuel System - Fuel Injection Models

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 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
Throttle position	% open
Secondary air injection status	SAI on/off

Inputs

The data available under Inputs is:

Item Checked	Result Unit
Starter button status	switch on/off
Side stand status	up/down
Fall detection status	normal/over
Clutch switch status	release/grip
Neutral switch status	gear/neutral
Vehicle speed	km/h
Calculated load	%

Outputs

The data available under Outputs is:

Item Checked	Result Unit
Purge valve duty cycle	%
Main relay status	relay on/off
Fuel pump relay status	on/off
Starter relay status	on/off
Malfunction indicator light status	MIL on/off

Fuel System - Fuel Injection Models

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 fuel quality, 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 - Fuel Injection Models

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
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*
Secondary air injection	Listen for valve operation/Stored fault code*

* If a fault is detected.

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.

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 *10B-107*.

To replace and adjust the throttle position sensor, see page *10B-104*.

To balance the throttles, see page *10B-106*.

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 - Fuel Injection Models

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 tool 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 tool.

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
P0201	Injector 1 circuit malfunction	3	40	Yes
P0202	Injector 2 circuit malfunction	3	40	Yes
P0335	Crankshaft sensor circuit malfunction	3	40	Yes
P0032	Oxygen sensor 1 heater short circuit to vBatt	3	40	Yes
P0031	Oxygen sensor 1 heater open circuit or short to ground	3	40	Yes
P0130	Oxygen sensor 1 heater circuit malfunction	3	40	Yes
P0052	Oxygen sensor 2 heater short circuit to vBatt	3	40	Yes
P0051	Oxygen sensor 2 heater open circuit or short to ground	3	40	Yes
P0150	Oxygen sensor 2 heater circuit malfunction	3	40	Yes
P1131	Oxygen sensor circuits reversed	3	40	Yes
P0122	Throttle position sensor 1 short circuit to ground or open circuit	3	40	Yes
P0123	Throttle position sensor 1 short circuit to vBatt	3	40	Yes
P0351	Ignition coil 1 malfunction	3	40	Yes
P0352	Ignition coil 2 malfunction	3	40	Yes
P0107	Manifold absolute pressure sensor 1 short circuit to ground	3	40	Yes
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	3	40	Yes
P1105	Manifold absolute pressure sensor 1 pipe malfunction	3	40	Yes
P1687	Manifold absolute pressure sensor 2 short circuit to ground	3	40	Yes
P1688	Manifold absolute pressure sensor 2 open circuit or short circuit to 5 Volt sensor supply	3	40	Yes
P1106	Manifold absolute pressure sensor 2 pipe malfunction	3	40	Yes
P1111	Manifold absolute pressure sensor pipes reversed	3	40	Yes
P1107	Ambient air pressure sensor circuit short circuit to ground	3	40	Yes

Fuel System - Fuel Injection Models

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
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	3	40	Yes
P0112	Intake air temperature sensor short circuit to ground	3	40	Yes
P0113	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes
P0117	Engine coolant temperature sensor short circuit to ground	3	40	Yes
P0118	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes
P0560	System voltage - battery circuit malfunction	3	40	Yes
P1231	Fuel pump relay short circuit to ground or open circuit	3	40	Yes
P1232	Fuel pump relay short circuit to vBatt	3	40	Yes
P0444	Purge valve short circuit to ground or open circuit	3	40	Yes
P0445	Purge valve short circuit to vBatt or over temp	3	40	Yes
P0414	Secondary air injection short circuit to vBatt	3	40	Yes
P0413	Secondary air injection short circuit to ground or open circuit	3	40	Yes
P0500	Vehicle speed sensor malfunction	3	40	Yes
P0616	Starter relay coil short to ground or open circuit	3	40	Yes
P0617	Starter relay short circuit to vBatt	3	40	Yes
P0654	Tachometer circuit malfunction	3	40	Yes
P1685	Main relay circuit malfunction	3	40	Yes
P1659	Ignition power supply malfunction	3	40	Yes
P1631	Fall detection circuit short circuit to ground	3	40	Yes
P1632	Fall detection circuit short circuit to vBatt	3	40	Yes
P0560	System voltage - battery circuit malfunction	3	40	Yes
P1610	Low fuel output circuit malfunction	3	40	Yes
P0603	EEPROM Error	0	40	No
P1690	CAN Fault	3	40	Yes
P1696	5 V sensor supply short circuit to ground	3	40	Yes
P1697	5 V sensor supply short circuit to vBatt	3	40	Yes
P1698	5 V sensor supply malfunction	3	40	Yes
P1605	ECM locked by the tune lock function	Only if Tune Lock is unlocked		Flashing

Fuel System - Fuel Injection Models

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 multi-plugs.

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

Note:

- Two different shaped connectors are used in the ECM, which ensures correct connection is always made.



Caution

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

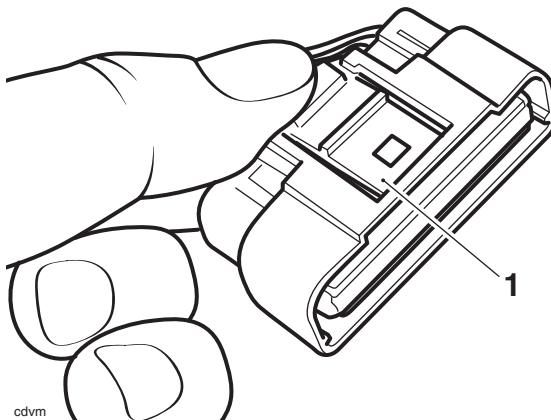


Caution

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. Remove the rubber battery strap and the ECM retaining bracket
3. Press down on the locking device and gently pull back on the connector to release it from the ECM.



1. Locking device

Note:

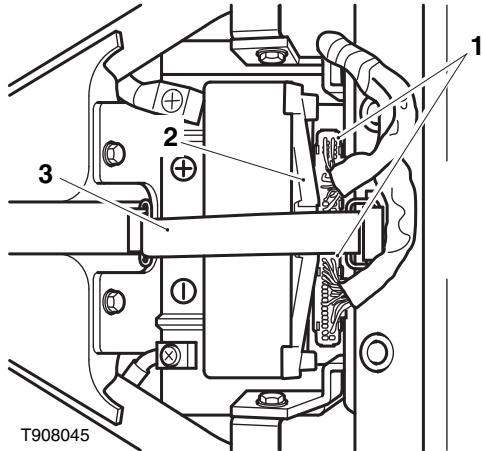
- The ECM is located under the seat, adjacent to the battery.

Reconnection of ECM Connectors



Caution

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.



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.

1. **ECM connectors**
2. **ECM retaining bracket**
3. **Rubber battery strap**

4. 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.

Fuel System - Fuel Injection Models

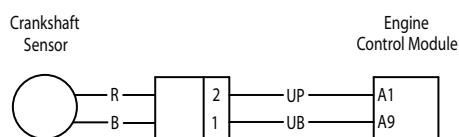
Crankshaft Sensor - Models with Cable Driven Speedometer

Fault Code	Possible cause	Action
P0335	Crankshaft sensor circuit malfunction	View & note diagnostic tool "freeze frame" data if available Ensure sensor is fitted correctly and connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A09 - ECM pin A01	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A09 to earth - ECM pin A01 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A09 to sensor pin 1 - ECM pin A01 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A09 to ECM pin A1	OK	Renew crankshaft sensor, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crank toothed wheel: - Damage to teeth - magnetic debris contamination	OK	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



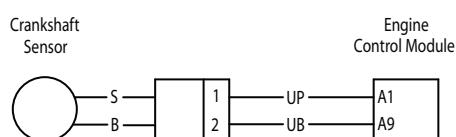
Crankshaft Sensor - Models with Electronic Speedometer

Fault Code	Possible cause	Action
P0335	Crankshaft sensor circuit malfunction	View & note diagnostic tool "freeze frame" data if available Ensure sensor is fitted correctly and connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A09 - ECM pin A01	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A09 to earth - ECM pin A01 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A09 to sensor pin 2 - ECM pin A01 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 A09 to ECM pin A1	OK	Renew crankshaft sensor, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crank toothed wheel: - Damage to teeth - magnetic debris contamination	OK	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 - Fuel Injection Models

Fuel Injectors

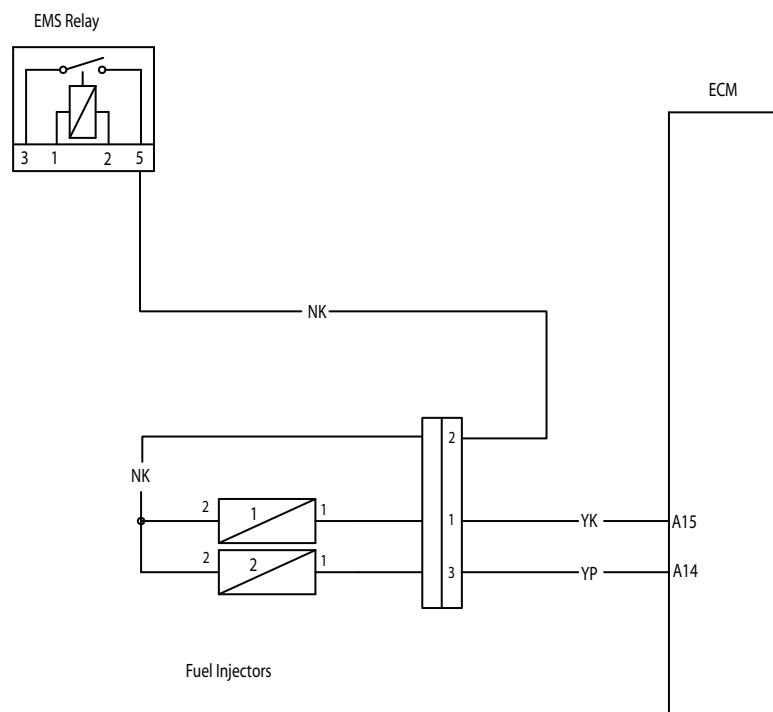
Fault Code	Possible cause	Action
P0201	Injector 1 circuit malfunction	View & note diagnostic tool "freeze frame" data if available
P0202	Injector 1 circuit malfunction - Misfire indicates open circuit - Flooding indicates short circuit	Ensure relevant injector connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A15 - ECM pin A14	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)	9.5Ω to 11.5Ω	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: - ECM pin A6 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 A6 to ECM pin A15 (inj 1) - ECM pin A6 to ECM pin A14 (inj 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	9.5Ω to 11.5Ω	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

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Throttle Position Sensor

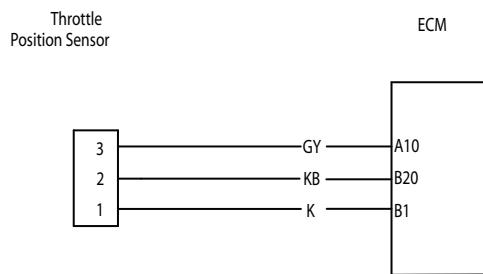
Fault Code	Possible cause	Action
P0122	Throttle position sensor 1 short circuit to ground or open circuit	View & note diagnostic tool "freeze frame" data if available
P0123	Throttle position sensor 1 short circuit to vBatt	View & note diagnostic tool "sensor" data Ensure sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B01 - ECM pin B20 - ECM pin A10	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 A10 to sensor pin 3 - ECM pin B20 to sensor pin 2 - ECM pin B01 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

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Purge Valve

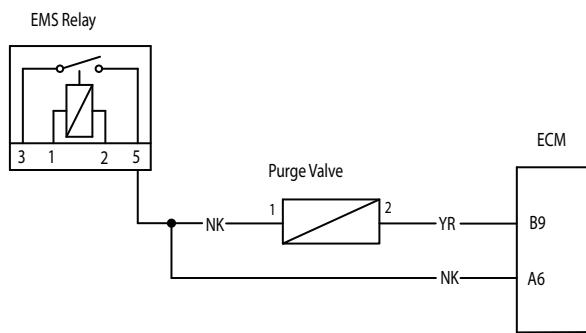
Fault Code	Possible cause	Action
P0444	Purge valve short circuit to ground or open circuit	View & note diagnostic tool "sensor" data Ensure purge valve connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0445	Purge valve short circuit to vBatt or over temp	Disconnect purge valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B09	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	Disconnect purge valve and proceed to test 3
	Open circuit	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 - ECM pin A06 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 tool function test to visually verify operation of purge valve	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Ignition Coil (Coils 1 and 2 for Scrambler)

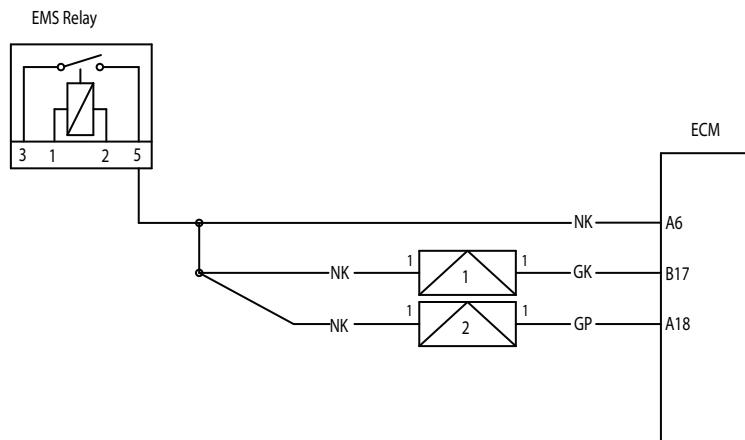
Fault Code	Possible cause	Action
P0351	Ignition coil 1 malfunction	View & note diagnostic tool "freeze frame" data if available
P0352	Ignition coil 2 malfunction	Ensure relevant ignition coil connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B17 - ECM pin A18	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: ECM pin A06 to: - ECM pin (ignition coil 1) B17 - ECM pin (ignition coil 2) A18	1.3Ω to 1.9Ω	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	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: ECM Main Relay pin 5 to any ignition coil pin 2 - ECM pin B17 to ignition coil 1 pin 1 - ECM pin A18 to ignition coil 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: ECM pin A06 to: - ECM pin (ignition coil 1) B17 - ECM pin (ignition coil 2) A18	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	1.3Ω to 1.9Ω	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

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Coolant/Oil Temperature Sensor

Fault Code	Possible cause	Action
P0118	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	View & note diagnostic tool "freeze frame" data if available View & note diagnostic tool "sensor" data Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0117	Engine coolant temperature sensor short circuit to ground	Disconnect sensor and proceed to 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 below)	OK	Disconnect temp sensor and 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 below)	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

Fuel System - Fuel Injection Models

Resistance data under typical conditions:

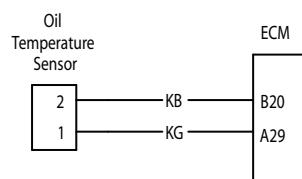
Warm engine: 200 to 400Ω

Cold engine:

20°C ambient 2.35 to 2.65KΩ

-10°C ambient 8.50 to 10.25KΩ

Circuit Diagram



Fuel System - Fuel Injection Models

Inlet Air Temperature Sensor

Fault Code	Possible cause	Action
P0113	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	View & note diagnostic tool "freeze frame" data if available View & note diagnostic tool "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 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	Disconnect temp sensor and 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 temp 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

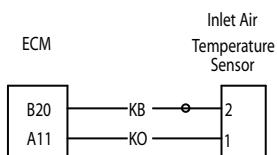
Fuel System - Fuel Injection Models

If engine is warm, remove sensor and allow time to cool to ambient prior to test.

Resistance data:

Ambient temp	Resistance value
80°C	290 to 390Ω
20°C	2.35 to 2.65KΩ
-10°C.	8.50 to 10.25KΩ

Circuit Diagram



Fuel System - Fuel Injection Models

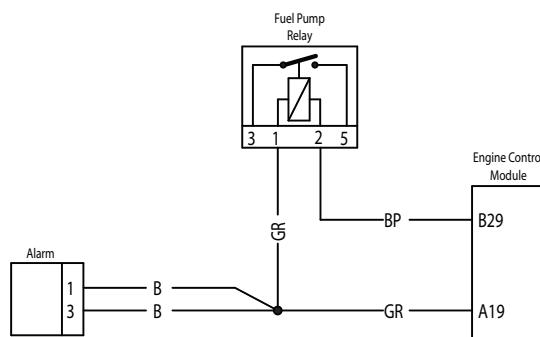
Fuel Pump Relay

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 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 earth	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	Renew fuel pump relay, proceed to test 5
	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	Renew fuel pump relay, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



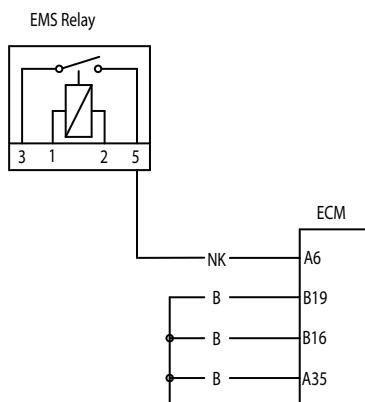
System Voltage

Fault Code	Possible cause	Action
P0560	System voltage - battery circuit malfunction	<p>View & note diagnostic tool "sensor" data</p> <p>Ensure voltage across battery is acceptable, note voltage</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A06	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 - Fuel Injection Models

Oxygen Sensor

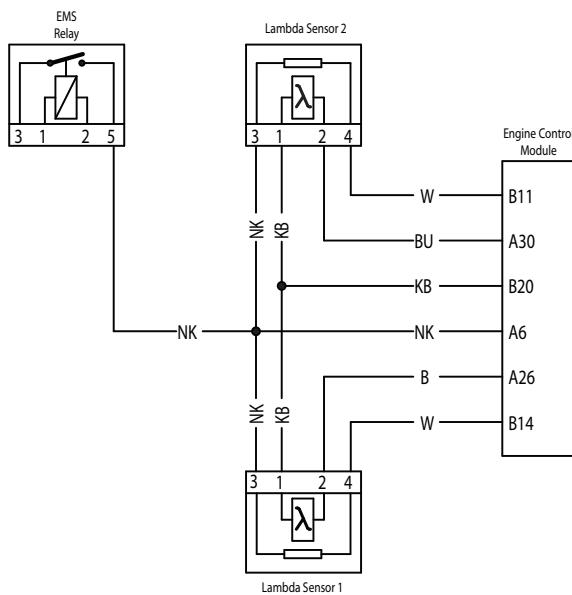
Fault Code	Possible cause	Action
P0130	Oxygen sensor 1 heater circuit malfunction	View & note diagnostic tool "freeze frame" data if available
P0150	Oxygen sensor 2 heater circuit malfunction	View & note diagnostic tool "sensor" data Ensure sensor connector is secure Disconnect ECM and proceed to pinpoint 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 ground - ECM pin A30 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 sensor 1, pin 2 - ECM pin A30 to sensor 2, 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 A26 (oxygen sensor 1) - ECM pin B20 to ECM pin A30 (oxygen sensor 2) - ECM pin A06 to ECM pin A26 (oxygen sensor 1) - ECM pin A06 to ECM pin A30 (oxygen sensor 2)	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 adaptation status	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Oxygen Sensor Heater

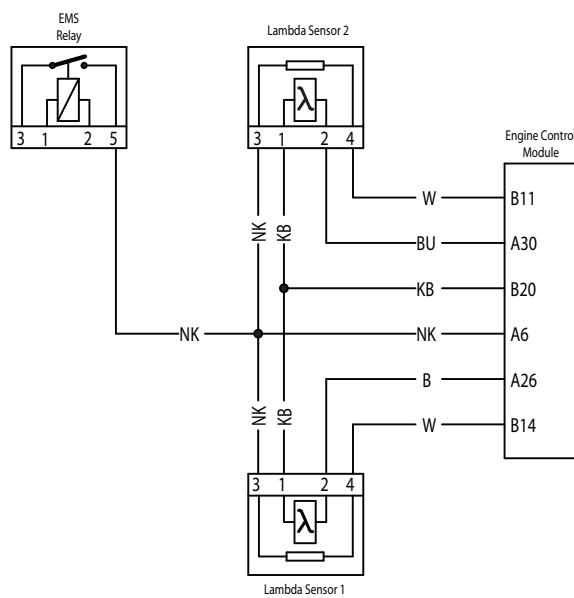
Fault Code	Possible cause	Action
P0031	Oxygen sensor 1 heater open circuit or short to ground	View & note "freeze frame" data if available
P0051	Oxygen sensor 2 heater open circuit or short to ground	View & note "sensor" data Ensure sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0032	Oxygen sensor 1 heater short circuit to vBatt	Disconnect ECM and oxygen sensors and proceed to pinpoint test 4:
P0052	Oxygen sensor 2 heater short circuit to vBatt	

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 earth - ECM pin B11 to earth - ECM pin B14 to ECM pin B20 - ECM pin B11 to ECM pin B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B14 to oxygen sensor 1 pin 4 - ECM pin B11 to oxygen sensor 2 pin 4 - EMS relay pin 5 to relevant oxygen sensor pin 3	OK	Renew relevant oxygen sensor, proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A06 to ECM pin B14 (oxygen sensor 1) - ECM pin A06 to ECM pin B11 (oxygen sensor 2)	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 - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

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	<p>View & note "freeze frame" data if available</p> <p>No tests available - contact Triumph service</p>

Fuel System - Fuel Injection Models

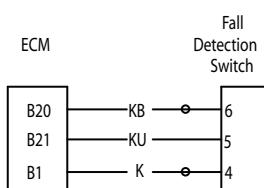
Fall Detection Switch

Fault Code	Possible cause	Action
P1631	Fall detection circuit short circuit to ground	View & note "freeze frame" data if available
P1632	Fall detection circuit short circuit to vBatt	View & note "sensor" data 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	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin B21 to ground - ECM pin B21 to ECM pin B01 - ECM pin B21 to pin B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
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 6
4 Check cable for short circuit: - Sensor pin 4 to sensor pin 5 - Sensor pin 4 to sensor pin 6	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check voltage (with ignition on): - Sensor pin 4	5 V	Renew fall detection switch and proceed to test 6
	Less than 4.8 V	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



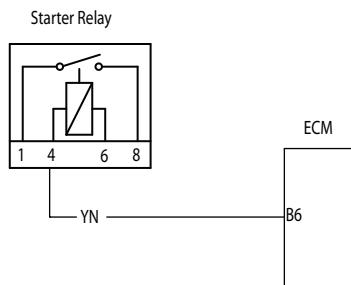
Starter Relay Circuit

Fault Code	Possible cause	Action
P0616	Starter relay short circuit to ground or open circuit	Check cable and terminal integrity: - ECM pin B06 - Starter Relay pin 2 Proceed to pinpoint test 1:
P0617	Starter relay short circuit to vBatt	Check cable and terminal integrity: - ECM pin B06 - Starter Relay pin 2 Proceed to pinpoint test 3:

Pinpoint Tests

Test	Result	Action
1 Check cable for short circuit: - ECM pin B06 to ground - Starter relay pin 4 to ground	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for continuity: - ECM pin B06 to Starter relay pin 4	OK	Proceed to test 4
	Faulty (open circuit)	Locate and rectify wiring fault, proceed to test 4
3 Check cable for short circuit: - ECM pin B06 to Battery + - Starter relay pin 4 to Battery +	OK	Renew starter relay and proceed to test 4
	Faulty	Rectify fault, proceed to test 4
4 Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System - Fuel Injection Models

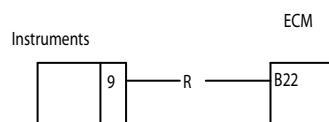
Tachometer - Models with Cable Driven Speedometer

Fault Code	Possible cause	Action
P0654	Tachometer circuit malfunction	<p>View & note "freeze frame" data if available</p> <p>View & 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 B22	OK	Disconnect instruments and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
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 4
3 Check cable continuity: - Instrument pin 9 to ECM pin B22 - Instrument pin 7 to ground - Instrument pin 8 to alarm control unit 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 B22 to ECM pin A06	OK	Renew instruments, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of tachometer	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



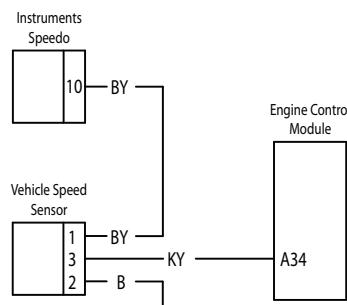
Vehicle Speed Sensor - Models with Electronic Speedometer

Fault Code	Possible cause	Action
P0500	Vehicle speed sensor malfunction	View & note diagnostic tool "freeze frame" data if available Ensure vehicle speed 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 A34	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 continuity: - Sensor pin 1 to instrument speedometer pin 10 - Sensor pin 2 to ground - Sensor pin 3 to ECM pin A34	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 instrument speedometer pin 10	OK	Renew vehicle speed 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 - Fuel Injection Models

Instrument Communication (CAN) - Models with Electronic Speedometer

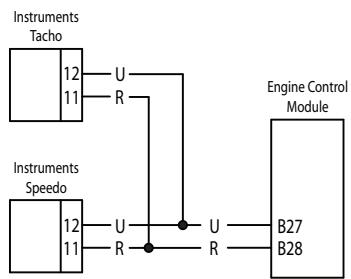
Fault Code	Possible cause	Action
P1690	CAN Fault	<p>View & note diagnostic tool "freeze frame" data if available</p> <p>Ensure instrument connector is secure</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B27 - ECM pin B28 - Instrument speedometer pin 11 - Instrument speedometer pin 12 - Instrument tachometer pin 11 - Instrument tachometer pin 12	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 earth - ECM pin B28 to earth	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 speedometer pin 12 - ECM pin B27 to instrument tachometer pin 12 - ECM pin B28 to instrument speedometer pin 11 - ECM pin B28 to instrument tachometer pin 11	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 to verify fault cleared	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

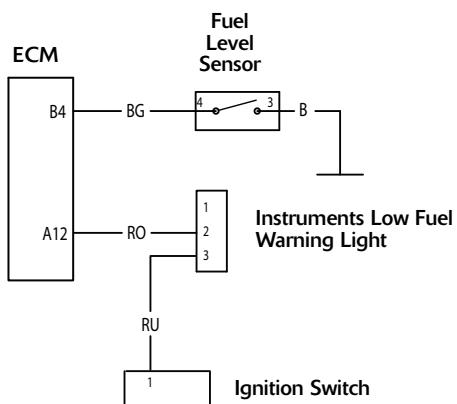
Fuel Level Warning Light Circuit - Models with Cable Driven Speedometer

Fault Code	Possible cause	Action
P1610	Low fuel output circuit malfunction	Ensure instrument connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B4 - ECM pin A12 - Instrument LED cluster pin 2	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A12 to ground - ECM pin B4 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A12 to instrument LED cluster pin 2 - Instrument LED cluster pin 3 to ignition switch pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check sensor for short circuit: - Sensor pin 3 to sensor pin 4	OK	Renew instruments and proceed to test 5
	Short circuit	Renew fuel level proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of instruments	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



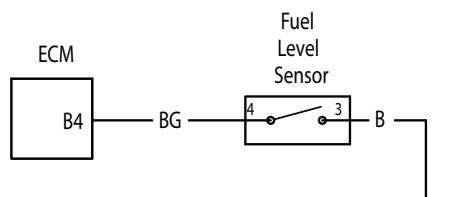
Fuel Level Warning Light Circuit - Models with Electronic Speedometer

Fault Code	Possible cause	Action
P1610	Low fuel output circuit malfunction	Ensure instrument connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B4	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - ECM pin B4 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - ECM pin B4 to sensor pin 4 - Sensor pin 3 to ground	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of instruments	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel System - Fuel Injection Models

Ambient Pressure Sensor

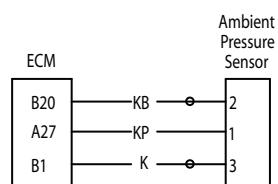
Fault Code	Possible cause	Action
P1107	Ambient air pressure sensor circuit short circuit to ground	View & note "freeze frame" data if available View & note "sensor" data Ensure sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	Disconnect ambient 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 ambient pressure sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A27 to ECM B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable for continuity: - ECM pin A27 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin B01 to sensor pin 3	OK	Renew ambient pressure sensor and proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A27 to ECM pin B01	OK	Renew ambient pressure 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	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Manifold Absolute Pressure (MAP) Sensor (cylinder number 1)

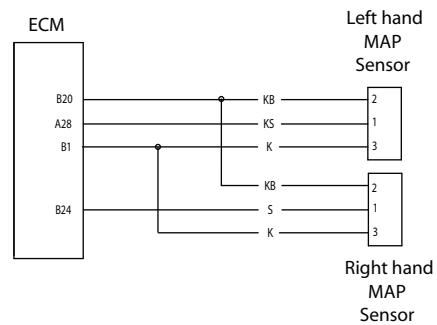
Fault Code	Possible cause	Action
P0107	Manifold absolute pressure sensor 1 short circuit to ground	View & note "freeze frame" data if available View & note "sensor" data Ensure sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	Disconnect MAP sensor and proceed to test 4:
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipe from MAP sensor to throttle body and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A28 - ECM pin B20 - ECM pin B01	OK	Disconnect MAP sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A28 to ECM B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable for continuity: - ECM pin A28 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin B01 to sensor pin 3	OK	Renew MAP sensor and proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A28 to ECM pin B01	OK	Renew MAP 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	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

Manifold Absolute Pressure (MAP) Sensor (cylinder number 2)

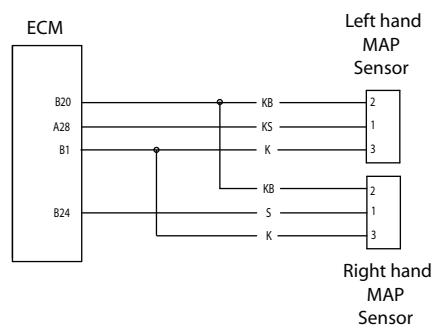
Fault Code	Possible cause	Action
P1687	Manifold absolute pressure sensor 2 short circuit to ground	<p>View & note "freeze frame" data if available</p> <p>View & note "sensor" data</p> <p>Ensure sensor connector is secure</p> <p>Disconnect ECM and proceed to pinpoint test 1:</p>
P1688	Manifold absolute pressure sensor 2 open circuit or short circuit to 5 Volt sensor supply	Disconnect MAP sensor and proceed to test 4:
P1106	Manifold absolute pressure sensor 2 pipe malfunction	Check connection/condition of pipe from MAP sensor to throttle body and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B24 - ECM pin B20 - ECM pin B01	OK	Disconnect MAP sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B24 to ECM B20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable for continuity: - ECM pin B24 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin B01 to sensor pin 3	OK	Renew MAP sensor and proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B24 to ECM pin B01	OK	Renew MAP 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	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Fuel System - Fuel Injection Models

Circuit Diagram



Fuel System - Fuel Injection Models

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

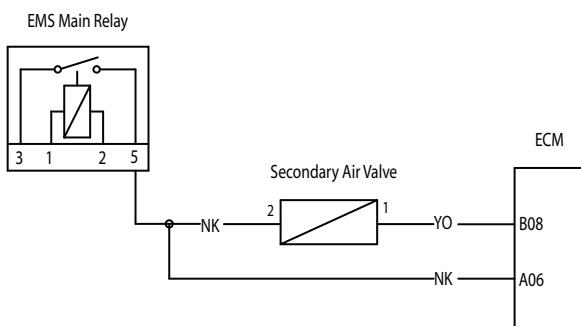
Secondary Air Injection Valve

Fault Code	Possible cause	Action
P0413	Secondary air injection short circuit to ground or open circuit	View & 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 SAI valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A06	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin B08 to ECM pin A06	18Ω to 25Ω	Disconnect SAI valve and proceed to test 3
	Open circuit	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 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin B08 to valve pin 1 - ECM pin A06 to valve pin 2	OK	Proceed to test 6
	Open Circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin B08 to ECM pin A06	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 25Ω	Proceed to test 7
	Faulty	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 - Fuel Injection Models

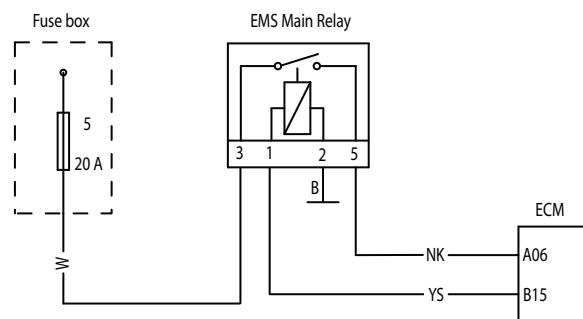
EMS Main Relay Circuit

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 Relay pin 5 - ECM pin B15 to Relay pin 1 - EMS Main Relay pin 2 to ground - 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 - Fuel Injection Models

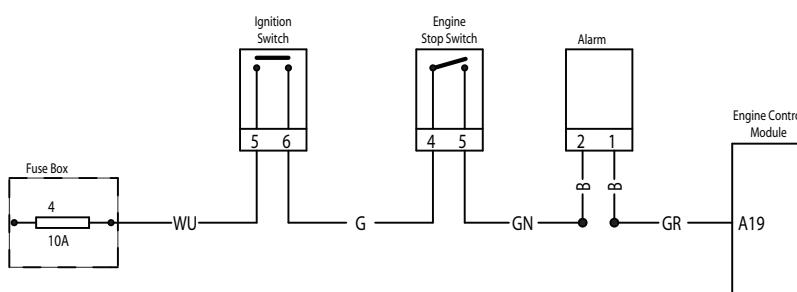
EMS Ignition Voltage Input Circuit - Models with Cable Driven Speedometer

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 4 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 4 and proceed to test 3
	Short circuit	Locate and rectify wiring fault, renew fuse 4 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 cube pin 4 - Right hand switch cube pin 5 - Ignition Switch pin 5 - ignition Switch pin 6	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4 Check cable continuity: - ECM pin A19 to Ignition switch pin 6 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



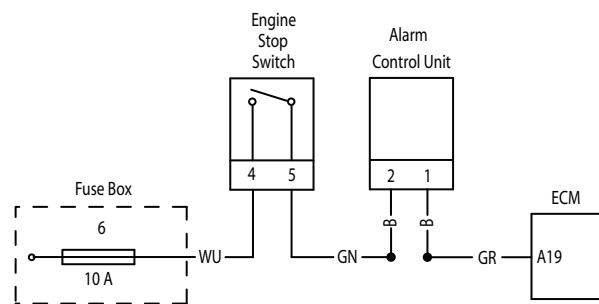
EMS Ignition Voltage Input Circuit - Models with Electronic Speedometer

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 6 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 6 and proceed to test 3
	Short circuit	Locate and rectify wiring fault, replace fuse 6 and proceed to test 5
3 Check cable and terminal integrity: - ECM pin A19 - Alarm Connector pin 1 - Alarm Connector pin 2 - Right hand switchcube pin 4 - Right hand switchcube pin 5	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4 Check cable continuity: - ECM pin A19 to right hand switch cube pin 4 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 - Fuel Injection Models

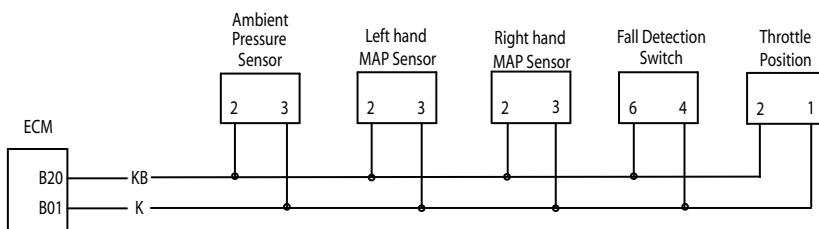
5 Volt Sensor Supply Circuit

Fault Code	Possible cause	Action
P1696	5 V sensor supply short circuit to ground	View & 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 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 sensor - Ambient pressure sensor - Throttle position switch - Fall detection sensor 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 service tool to check for correct sensor outputs and 5 V sensor supply voltage level	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Tune Lock

Fault Code	Possible cause	Action
P1605	ECM locked by the tune lock function	This is also identified by a fast flashing MIL indication, and a disabled engine management system. Unlock the ECM using the service tool and supplied unlock code from Triumph service

Fuel System - Fuel Injection Models

Fault Finding - Non Electrical

Symptom	Possible cause(s)
Poor throttle response at low RPM	Low fuel pressure caused by filter blockage/leaks
Cutting out at idle	Throttle bodies out of balance
	Low fuel pressure
	Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face
Idle speed too low/high	Incorrect closed throttle position setting
	Mechanical fault with the throttle linkage
Diagnostic tool 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 filter blockage/leaks
Abnormally high fuel pressure	Fuel pressure regulator inoperative

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.



Warning

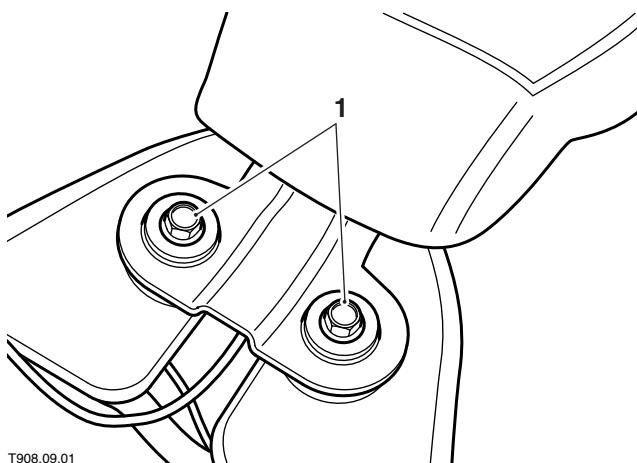
When disconnected, the fuel tank is self-sealing but a small amount of fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

6. Release the security clip from the fuel hose by sliding it outwards from the connector.
7. Disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from its spigot on the fuel pump plate.

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Slacken and remove the mounting bolts from the rear of the fuel tank.

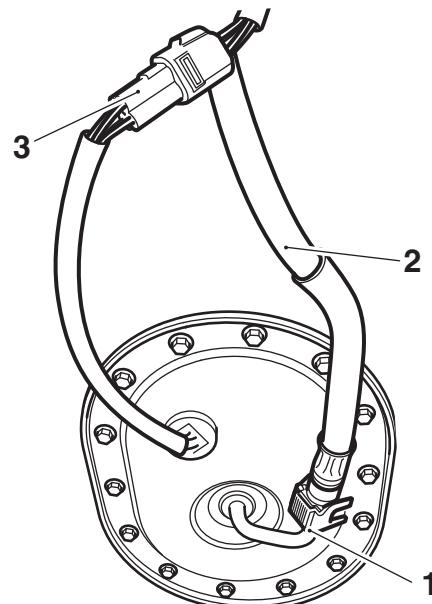


T908.09.01
1. Fuel tank mounting bolts

4. Disconnect the breather hose from the right hand side of the tank.

Note:

- **On California models, this hose is the evaporative loss system hose. Plug the hose end whilst it is disconnected.**
5. Raise the fuel tank and disconnect the electrical connection to the fuel pump and low fuel level sensor.



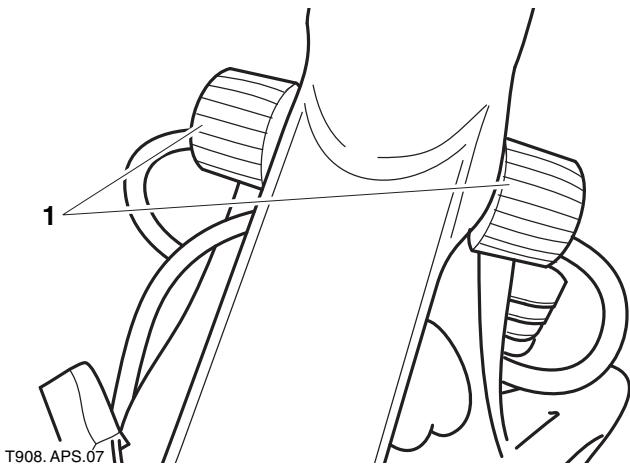
- cem1
1. Security clip
 2. Fuel hose
 3. Fuel pump & low fuel level sensor electrical connection

8. Slide the tank backwards to free it from the frame.
9. Take care not to lose the front mounting rubbers and the rear mounting rubbers and collars. Renew any mounting rubber which shows signs of damage.

Fuel System - Fuel Injection Models

Installation

1. Ensure the front and rear mounting rubbers are correctly fitted.



1. Fuel tank front mounting rubbers

2. Manoeuvre the tank into position, engaging it with the front mounting rubbers.
3. Reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.
4. Engage the security clip to the fuel hose by sliding it in towards the connector.
5. Reconnect the fuel pump and low fuel level sensor electrical connector and the breather hose. On California models connect the evaporative loss system hose.
6. Fit the collars and bolts to the rear mounting rubbers, tightening them to **9 Nm**.
7. Reconnect the battery, positive (red) lead first.
8. Install the seat (see page 16-11).
9. Start the engine and check carefully for fuel leaks.

Fuel Pump, Fuel Filter and Fuel Level Sender

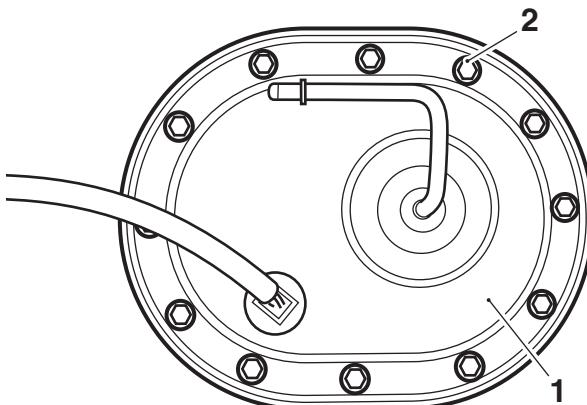
Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page 10B-85).
4. Drain the fuel tank into a suitable container.

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.

5. Invert the fuel tank and place on a protective surface to prevent paint damage.
6. Remove the fixings securing the fuel pump mounting plate to the tank.



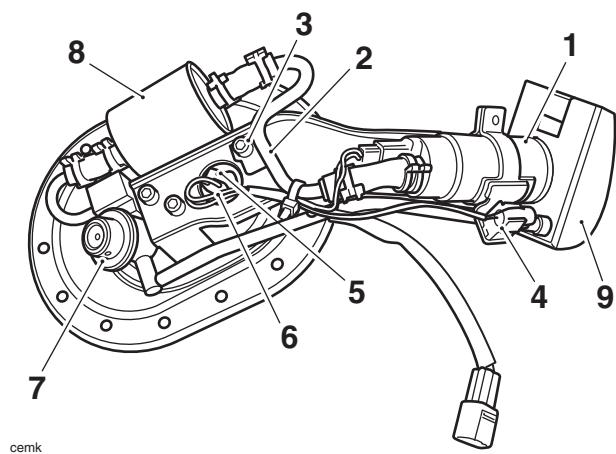
1. Mounting plate

2. Mounting plate fixings

7. Lift the fuel pump assembly and manoeuvre it from the tank aperture.
8. Remove the seal from the tank aperture.

Fuel System - Fuel Injection Models

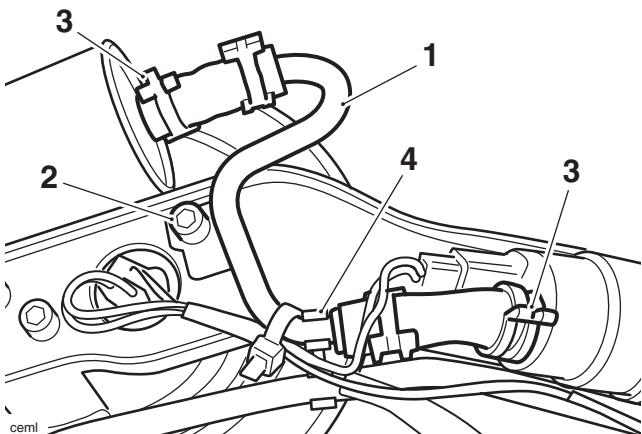
Disassembly



cemk

1. Fuel pump
2. Fuel pipe
3. Fuel pipe fixing
4. Fuel level sender
5. Fuel pump connection
6. Fuel level sender connection
7. Fuel pressure regulator
8. Fuel filter
9. Fuel pump baffle

1. Disconnect the electrical connections to the fuel pump and low fuel level sensor.
2. Remove the fixing from the fuel pipe bracket.
3. Release the hose clips from the pump and filter after first noting their positions.
4. Cut and discard the cable tie securing the fuel pump and low fuel level sensor wiring to the fuel pipe. Detach the fuel pump baffle hose clip.
5. Remove the fuel pipe together with the hoses leading from the pump and to the filter.

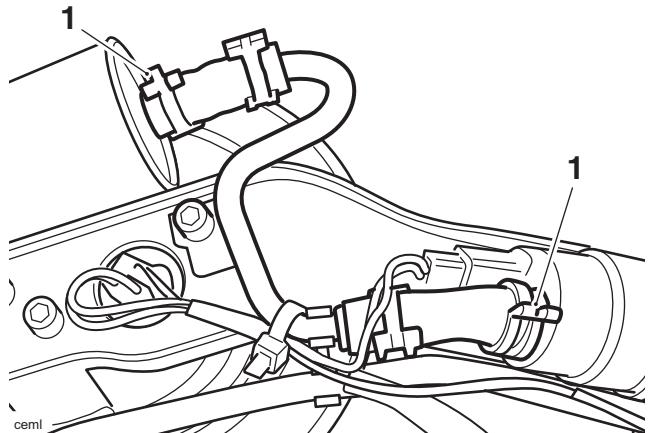


1. Fuel pipe
2. Fuel pipe fixing
3. Hose clips
4. Fuel pump baffle hose clip

6. To remove the fuel pump, detach the fuel pump baffle hose from the fuel pressure regulator. Remove the fixing from the pump clamp, release the clamp and collect the fuel pump.
7. If necessary, remove the fuel pump baffle and filter from the fuel pump by loosening the hose clip and sliding the baffle assembly clear of the pump.
8. To remove the fuel filter, release the clip after noting its position, then detach it from the upper part of its hose leading to the fuel pressure regulator.
9. To detach the low fuel level sender, release the clip securing it to the fuel pump bracket after noting its orientation.
10. To remove the fuel pressure regulator, detach the fuel pump baffle hose, release the fixing and remove the regulator. Remove and discard the O-ring.

Assembly

1. Fit a new O-ring to the fuel pressure regulator and refit the regulator to the fuel pump plate. Install the fixing and tighten to **4 Nm**.
2. Position the fuel filter to the hose leading to the pressure regulator. Ensure the filter is fitted with the arrow on its side pointing towards the fuel pressure regulator.
3. Locate the fuel pump to its bracket.
4. Refit the fuel pump clamp then fit and tighten the fixing to **4 Nm**. Connect the fuel pump baffle hose and secure with the clip.
5. Position the fuel pipe and hoses to the fuel pump and filter. Fully locate both hoses.
6. Secure the fuel pipe bracket with the fixing, tightening it to **10 Nm**.
7. Secure the fuel pump baffle hose to the clip on the fuel pipe.
8. Position the hose clips to ensure that both hoses are correctly retained.



1. Hose clips (correctly positioned)
9. Connect both electrical connections to the fuel pump mounting plate.

Fuel System - Fuel Injection Models

Installation

1. Inspect the fuel pump plate seal for damage, and renew if necessary.
2. Reposition the fuel pump plate seal to the tank aperture and ensure that it is correctly seated.
3. Taking care to ensure the fuel pump plate seal is not damaged or dislodged, manoeuvre the fuel pump assembly into the tank aperture.
4. Tighten the mounting plate fixings to **5 Nm**.
5. Refit the fuel tank (see page 10B-86).
6. Reconnect the battery, positive (red) lead first.
7. Refit the seat (see page 16-11).

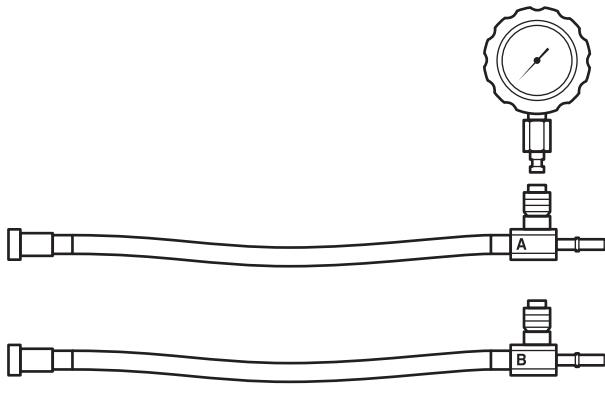
Fuel Pressure Checking



Warning

Observe the fuel handling precautions given in the general information system.

Fuel pressure is checked using service tool T3880001.



cdgh

Tool T3880001

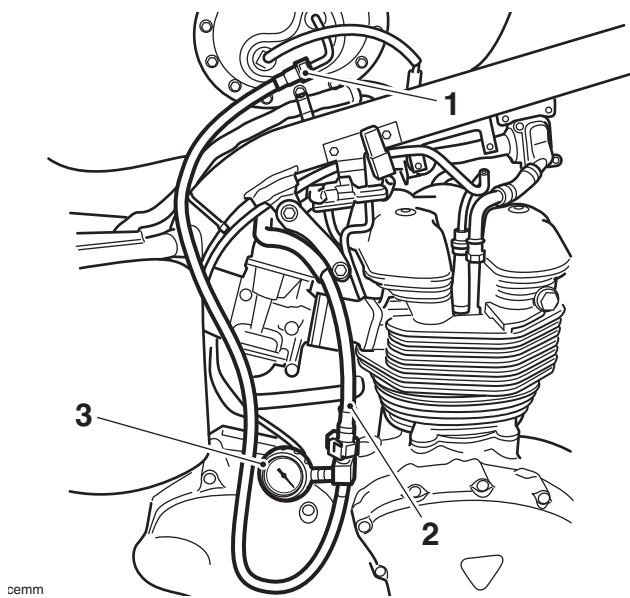
1. Release the fuel tank to gain access to the fuel pipe connections (see page 10B-85).
2. With the aid of an assistant, support the fuel tank and disconnect the fuel pipe from the fuel pump plate.
3. Select the fuel pressure gauge adapter marked "B" from service tool T3880001.



Warning

Always use the correct fuel pressure gauge adapter (**Adapter "B" for EFI Bonneville, Bonneville SE, Bonneville T100, Thruxton and Scrambler models**). 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.

- Connect the adapter between the fuel pump plate outlet and fuel hose as shown in the illustration below. Insert the gauge to the adapter also as shown in the illustration.



- 1. Fuel pump plate outlet**
- 2. Fuel hose**
- 3. Tool T3880001**

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.
 - To insert the gauge to the adapter, push the gauge spigot into the adapter until a click can be heard.
- Ensuring the gauge is visible to the side of the motorcycle, lower the fuel tank into position.
 - Start the engine and observe the fuel pressure reading on the gauge.

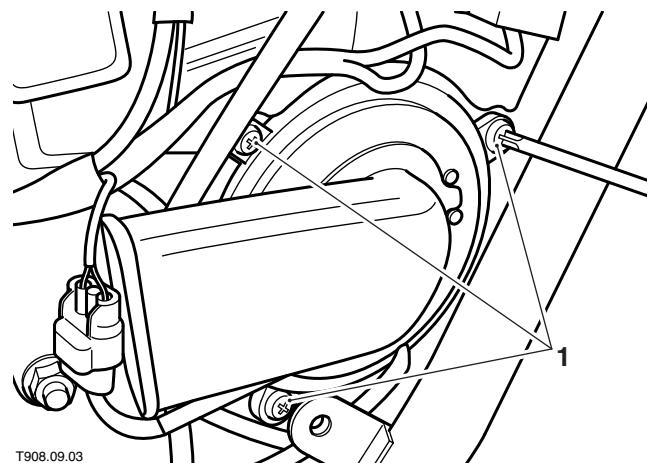
Note:

- The fuel pressure should be 3.0 bar nominally.
- When fuel pressure checking is complete, have an assistant raise the fuel tank and disconnect the fuel pressure gauge adapter.
 - Reconnect the fuel hose and refit the fuel tank (see page 10B-86).

Air Filter Element

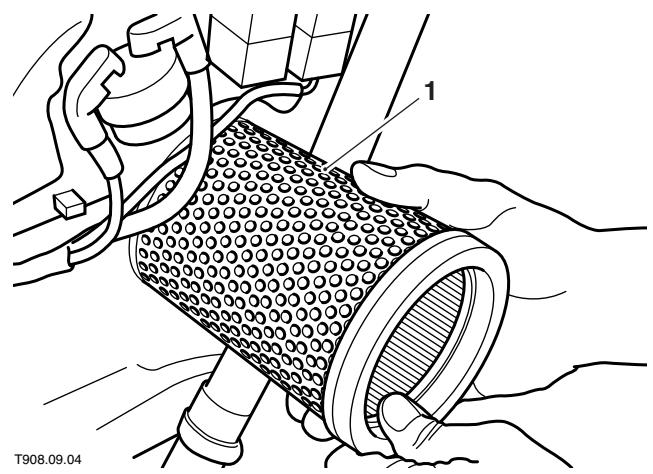
Removal

- Remove the left hand side cover (see page 16-14).
- Undo the three screws and remove the filter cover from the airbox.



1. Air filter cover screws

- Remove the air filter element from the airbox, taking care not to damage the painted surface of the frame.



1. Air filter element

Installation

- Insert the air filter element into the airbox, taking care not to damage the painted surface of the frame.
- Refit the cover to the airbox and tighten its screws to **3 Nm**.
- Refit the side cover (see page 16-14).

Fuel System - Fuel Injection Models

Airbox

Removal

1. Remove the fuel tank (see page 10B-85).
2. Remove the battery (see page 17-18).
3. Remove both side covers (see page 16-14) and the rear mudguard (see page 16-16).
4. Free all the electrical components and wiring from the airbox.
5. Release the clips securing the airbox rubbers to the carburettors.
6. Release the clip and disconnect the crankcase breather hose from the airbox.
7. Unscrew the mounting bolts and manoeuvre the airbox assembly out of position.

Installation

1. Locate the airbox to the frame and position it to the carburettors and fixing points. Ensure that the airbox rubbers correctly engage with the rear of the carburettors through 360° of BOTH rubbers. Fit the mounting bolts and tighten to **6 Nm**.
2. Ensure the rubbers are correctly seated on the carburettors and secure them in position with the clips.
3. Reconnect the breather hose to the airbox and secure it in position with the retaining clip.
4. Clip all electrical components and wiring correctly back onto the airbox.
5. Install the rear mudguard (see page 16-16) and side covers (see page 16-14).
6. Fit the fuel tank (see page 10B-86) and install the battery (see page 17-18).

Draining

1. Regularly (see maintenance schedule) drain the airbox by removing the end of the drain tube fitted to the base of the box.

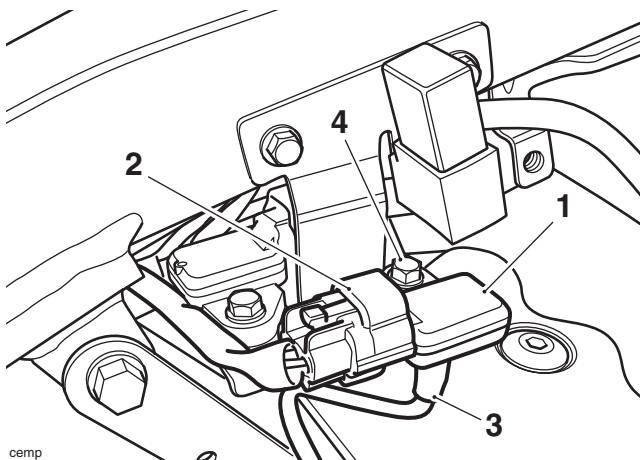
MAP Sensor

Note:

- The MAP sensor hoses and electrical connections must not be swapped between cylinders. If either of the hoses or connections are swapped over, engine malfunctions will occur.
- The left hand cylinder (Cylinder 1) harness is marked "Cylinder 1".
- The right hand MAP (Cylinder 2) sensor harness is marked with red tape.
- The right hand MAP (Cylinder 2) sensor hose is marked with a red dot.

Removal

1. Disconnect the battery, negative (black) lead first.
2. Remove the fuel tank (see page 10B-85).
3. Disconnect the vacuum hose from the sensor.
4. Disconnect the MAP sensor multi-plug.



1. **MAP sensor**
2. **Multi-plug**
3. **MAP sensor hose**
4. **Fixing**

5. Release the fixing screw securing the sensor to the frame and remove the sensor.

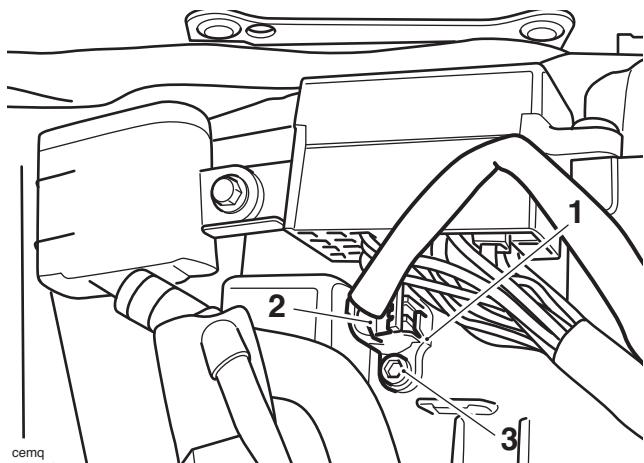
Installation

1. Fit the sensor to the frame, tightening the fixing to **3 Nm**.
2. Refit the vacuum hose.
3. Reconnect the MAP sensor multi-plug.
4. Refit the fuel tank (see page 10B-86).
5. Reconnect the battery, positive (red) lead first.

Intake Air Temperature Sensor

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Remove the right hand side cover (see page 16-14).
4. Disconnect the intake air temperature sensor multi-plug.



1. Intake air temperature sensor

2. Multi-plug

3. Fixing

5. Release the fixing screw securing the sensor to the airbox and remove the sensor.

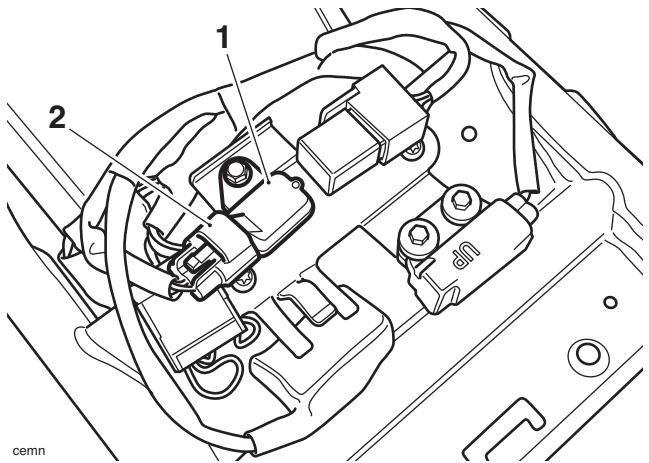
Installation

1. Fit the sensor to the airbox, tightening the fixing to **5 Nm**.
2. Reconnect the intake air temperature sensor multi-plug.
3. Refit the right hand side cover (see page 16-14).
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat (see page 16-11).

Barometric Pressure Sensor

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the barometric pressure sensor multi-plug.



1. Barometric pressure sensor

2. Multi-plug

4. Release the fixing screw securing the sensor to the frame and remove the sensor.

Installation

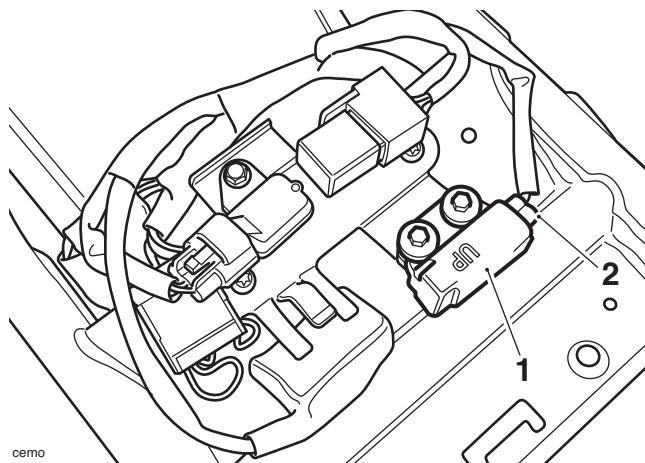
1. Fit the sensor to the frame, tightening the fixing to **3 Nm**.
2. Reconnect the barometric pressure sensor multi-plug.
3. Reconnect the battery, positive (red) lead first.
4. Refit the seat (see page 16-11).

Fuel System - Fuel Injection Models

Fall Detection Switch

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the fall detection switch multi-plug.



1. Fall detection switch

2. Multi-plug

4. Release the two fixings securing the sensor to the frame and remove the sensor.

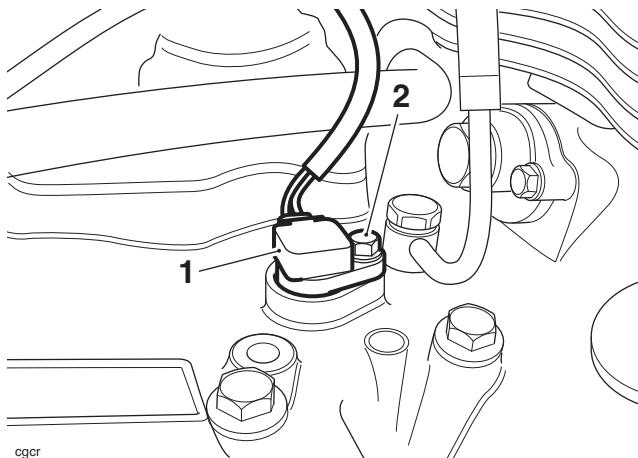
Installation

1. Fit the sensor to the frame, tightening the new fixings to **3 Nm**.
2. Reconnect the fall detection switch multi-plug.
3. Reconnect the battery, positive (red) lead first.
4. Refit the seat (see page 16-11).

Road Speed Sensor

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Remove the right hand side cover (see page 16-14).
4. Release the screw securing the sensor to the upper crankcase, below the throttle body.



1. Road speed sensor

2. Fixing

5. Ease the sensor out of the crankcase. Discard the sensor O-ring.
6. Noting its routing, trace the sensor wiring back to the connector. Disconnect the sensor and detach it from the motorcycle.

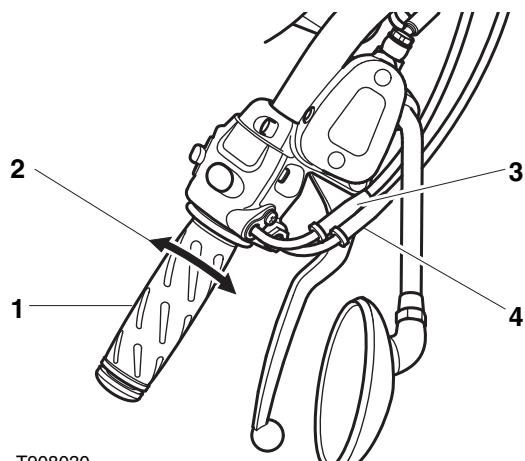
Installation

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 **10 Nm**.
3. Re-route the harness as noted during disassembly, and reconnect the sensor electrical connector to the harness.
4. Refit the right hand side cover (see page 16-14).
5. Reconnect the battery, positive (identified with red tape) lead first.
6. Refit the seat (see page 16-11).

Throttle Cables - Bonneville (up to VIN 380776), Bonneville T100 and Thruxton

Inspection

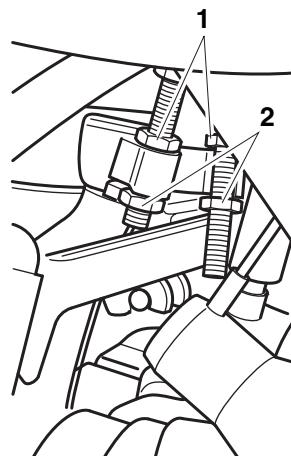
1. Throttle cable adjustment is checked by measuring the amount of free play at the twist grip. Adjustment is correct when 2 - 3 mm of free play movement is present.



1. Twist grip
2. Free play
3. Opening cable adjuster
4. Closing cable adjuster

Adjustment

1. To adjust the cables, slacken the lock nuts and back-off the opening and closing cable upper adjusters.
2. Set the opening cable adjuster to give 2 - 3 mm of free play at the twist grip then securely tighten the lock nut.
3. If there is insufficient adjustment available, back-off the upper adjuster and adjust the free play at the throttle body end of the cable. Slacken the cable lock nuts and position them so all but a small amount of free play is removed from the cable. Securely tighten the lock nuts then carry out final adjustment with the upper adjuster.



1. Lower adjusters
2. Lock nuts

4. Once the opening cable is correctly adjusted, repeat the procedure for the closing cable.
5. With both cables correctly adjusted, move the handlebars from lock-to-lock whilst checking the throttle opens and closes smoothly and the cables do not foul the steering. Rectify any faults before riding the motorcycle.



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.



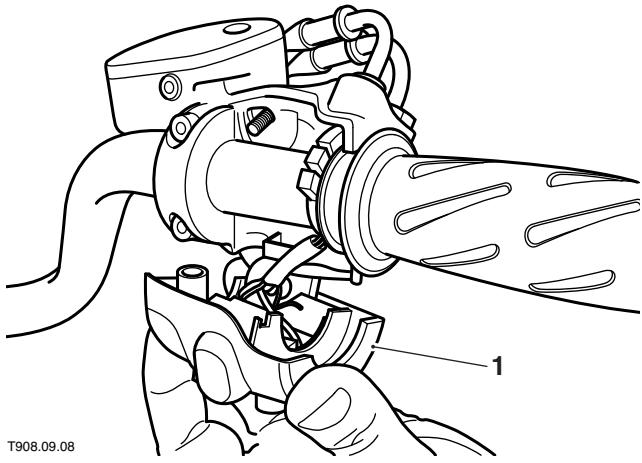
Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

Fuel System - Fuel Injection Models

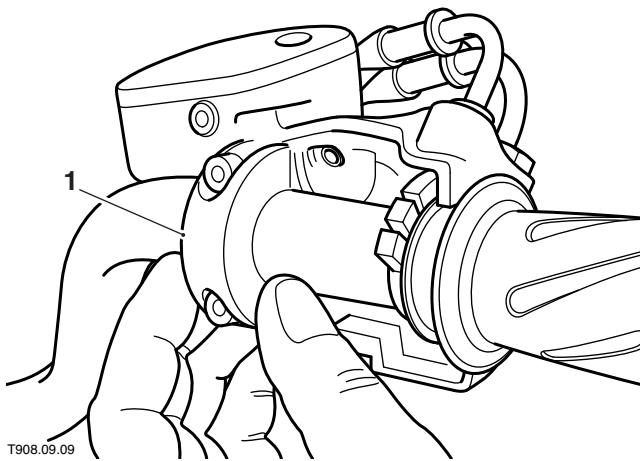
Removal

1. Remove the fuel tank (see page 10B-85).
2. Undo the screws and free the right switch gear assembly from the master cylinder.



1. Right hand switch gear assembly

3. Slacken the nut and screw securing the throttle cable end fittings to the master cylinder.
4. Unscrew the bolts and remove the mounting clamp from the master cylinder.



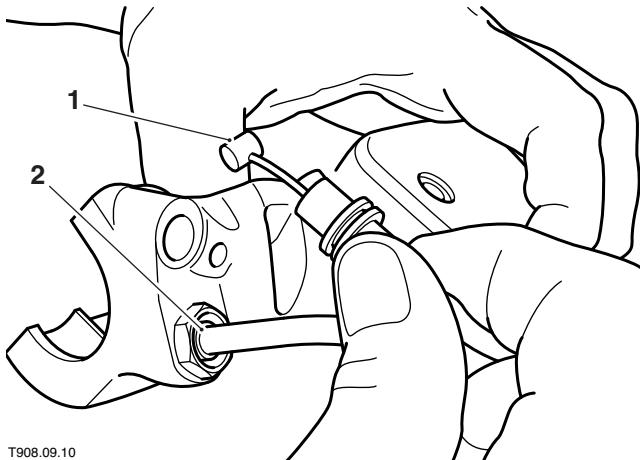
1. Master cylinder mounting clamp

5. Free the master cylinder from the handlebars and detach the cables from the twist grip.

Note:

- Ensure the master cylinder is securely supported so that no strain is placed on the hydraulic hose.
- If necessary, free the cables from the throttle body bracket to gain the necessary free play to allow them to be disconnected from the twist grip.

6. Unscrew the nut and screw and free the throttle cables from the master cylinder.



1. Opening cable

2. Closing cable

7. Slacken the lock nuts then detach each cable from the throttle linkage.

Note:

- Free the throttle bodies from the cylinder head to improve access to the throttle linkage.
- 8. Note the correct routing of each cable then free them from the retaining clips and remove them from the motorcycle.

Inspection

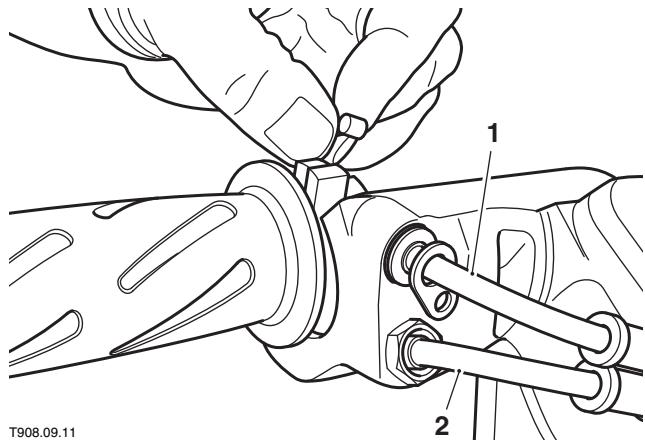
1. Check each inner cable for free movement through the outer cable.
2. Examine each inner cable for damage, fraying etc.
3. Examine the inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Installation

Note:

- The opening and closing cables are different and are not interchangeable. The opening cable is secured to the master cylinder by a retaining plate and screw and the closing cable by a nut.**
- Route the throttle cables as shown in the General Information section of this manual.**

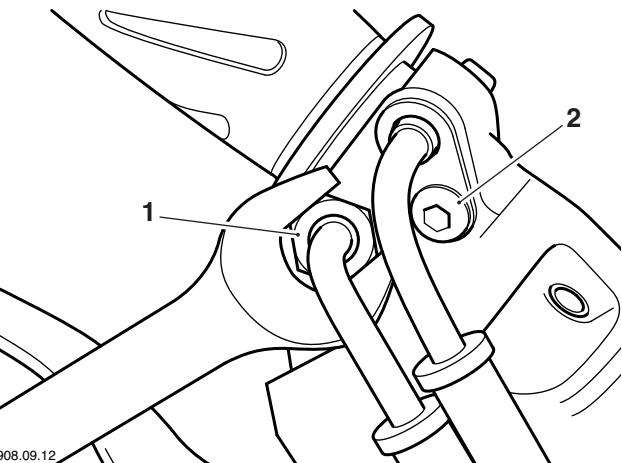
- Fit the cables to the motorcycle. Ensure each cable is correctly routed and retained by all the necessary clips as noted during removal.
- Connect both inner cables to the throttle body throttle linkage and seat the outer cables in the mounting bracket.
- Locate the outer cables in the master cylinder and attach them to the twist grip.



- Opening cable**
- Closing cable**

- Locate the master cylinder on the handlebars and fit the mounting clamp. Align the clamp upper split with the punch mark on the handlebar and tighten the upper clamp bolt to **12 Nm** then tighten the lower clamp bolt to **12 Nm**.
- Refit the switch gear assembly, tightening its screws to **2.5 Nm**.

- Securely tighten the nut and screw securing the throttle cables to the master cylinder.



- Closing cable nut**
- Opening cable screw**

- Position the lower adjuster lock nuts so only a small amount of free play is present in each cable then tighten them securely.
- Operate the twist grip several times to settle the cables in position then adjust the cable free play using the upper adjusters (see adjustment).



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. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

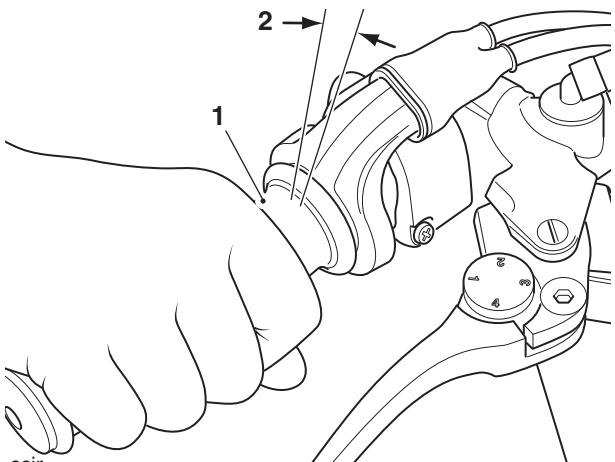
- Install the fuel tank (see page 10B-86).

Fuel System - Fuel Injection Models

Throttle Cables - Bonneville (from VIN 380777), Bonneville SE and Scrambler

Adjustment

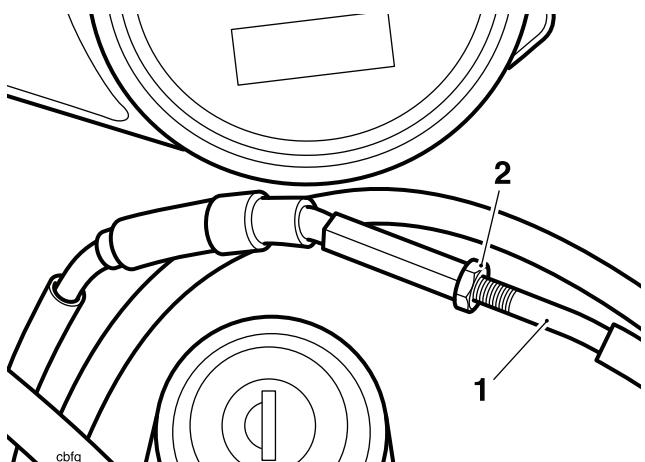
1. Throttle cable adjustment is checked by measuring the amount of free play at the twist grip. Adjustment is correct when 2 - 3 mm of free play movement is present.



1. Twist grip (Thruxton shown)

2. Free play

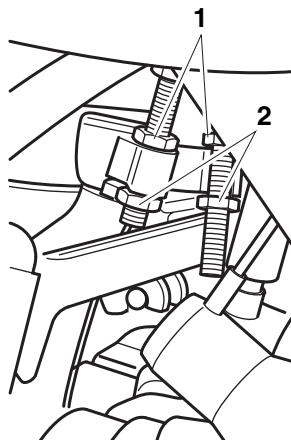
2. Slide the cover off the opening cable adjuster at the twist grip end.
3. Rotate the "opening" cable adjuster such that it has an equal amount of adjustment in each direction.



1. Opening cable

2. Adjuster

4. Slacken the lock nut and rotate the "opening" cable adjuster at the throttle body end of the cable to give 2 - 3 mm of play at the twist grip. Tighten the lock nut.



1. Lower adjusters

2. Lock nuts

5. Make any minor adjustments as necessary to give 2 - 3 mm of play using the adjuster near the twist grip end of the cable. Tighten the lock nut.
6. With the throttle fully closed, ensure that there is 2 - 3 mm of free play in the "closing" cable. Adjust as for the "opening" cable if necessary.
7. With both cables correctly adjusted, move the handlebars from lock-to-lock whilst checking the throttle opens and closes smoothly and the cables do not foul the steering. Rectify any faults before riding the motorcycle.



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.



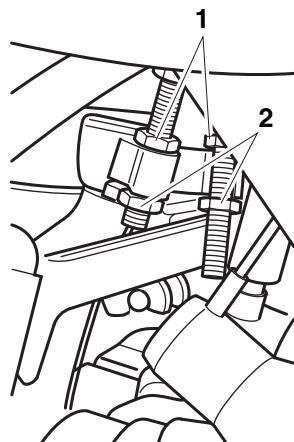
Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

Removal

Note:

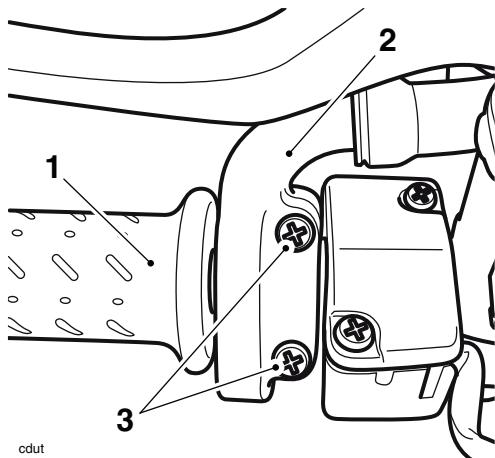
- Prior to removal, clearly identify the opening and closing cables so that they may be refitted in the correct positions.
1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
 2. Remove the fuel tank (see page 10B-85).
 3. Slacken the adjuster lock nuts at the throttle body end such that they will allow the outer cables to be detached from the cable brackets. Detach the inner cables from the throttle cam.



1. Lower adjusters

2. Lock nuts

4. At the twist grip end, slide off the rubber boot and release the screws which secure the two halves of the twist grip guide to each other.

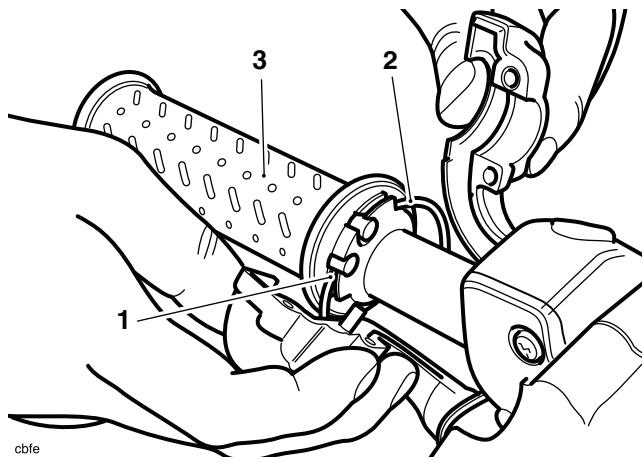


1. Twist grip (Thruston shown)

2. Twist grip guide

3. Screws

5. Separate the two halves of the guide. Release the throttle inner cables from the twist grip.



1. Inner cable (opening cable)

2. Inner cable (closing cable)

3. Twist grip

6. Note the routing of the throttle cables and remove them from the frame.

Inspection

1. Check each inner cable for free movement through the outer cable.
2. Examine each inner cable for damage, fraying etc.
3. Examine the inner cable nipples for signs of looseness and damage. Replace the cable if necessary.

Fuel System - Fuel Injection Models

Installation

Note:

- The opening and closing cables must be correctly identified and fitted to the correct positions as noted prior to removal.
- Route the throttle cables as shown in the General Information section of this manual.

1. Locate the cables to the frame following the routing noted prior to removal.
2. Engage the nipples of the inner cables to the twist grip.
3. Assemble the two halves of the cable guide ensuring that the outer cable is correctly located in the guide. Tighten the screws to **3 Nm**.
4. Refit the boot to the cable guide.
5. Attach the other end of the inner cables to the throttle cam and locate the outer cables to the cable bracket. Fit the cable lock nuts.
6. Set the cable adjustment as described elsewhere in this section.

Throttle Bodies

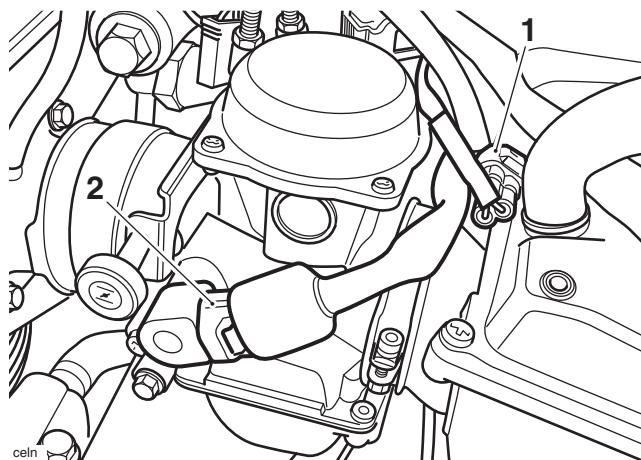
Warning

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.

Removal

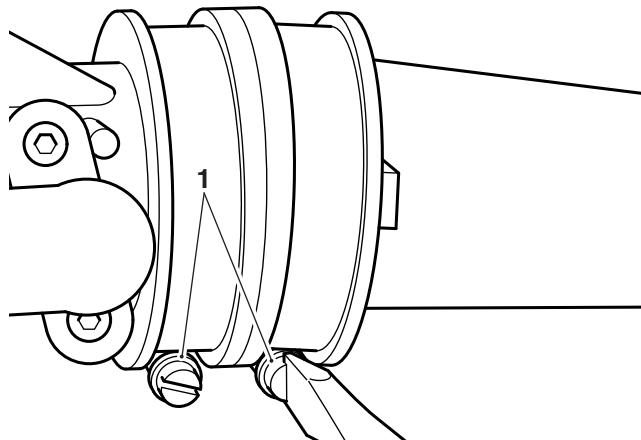
1. Remove the fuel tank (see page 10B-85).
2. Disconnect the wiring connectors from the fuel injectors and the throttle position sensor.



1. Injector connector

2. Throttle position sensor connector

3. Release the retaining clips securing the airbox rubbers to the throttle bodies.
4. Slacken the retaining clips securing the intake rubbers to the throttle bodies and cylinder head adaptors.



T908.09.14

1. Retaining clip screws

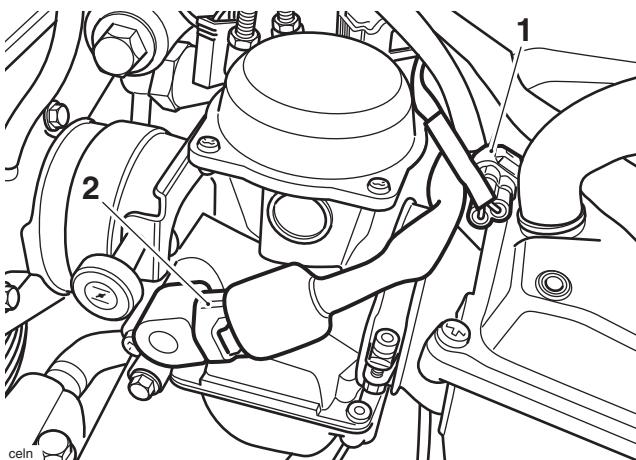
- Free the throttle bodies from the intake rubbers and manoeuvre them out of position.

Note:

- Lubricate the intake rubbers with a silicone-based spray lubricant to ease removal.**
- Slacken the throttle cable lock nuts and, noting their position, detach both cables from the throttle linkage.
- Remove the throttle bodies.

Installation

- Reconnect the throttle cables to the throttle bodies, ensuring they are connected the right way around. Adjust the cable free play then securely tighten the lock nuts.
- Ensure the clips are all in position then lubricate the intake and airbox rubbers with a silicone-based spray lubricant.
- Manoeuvre the throttle bodies into position and engage them correctly with the intake and airbox rubbers.
- Ensure the throttle bodies are correctly seated in the intake rubbers then securely tighten the retaining clips to **1.5 Nm**.
- Ensure the airbox rubbers are correctly seated on the throttle bodies then securely tighten the retaining clips to **1.5 Nm**.
- Reconnect the wiring connectors from the fuel injectors and the throttle position sensor.



- Injector connector
- Throttle position sensor connector
- Check the throttle cables are correctly adjusted and install the fuel tank (see page 10B-86).

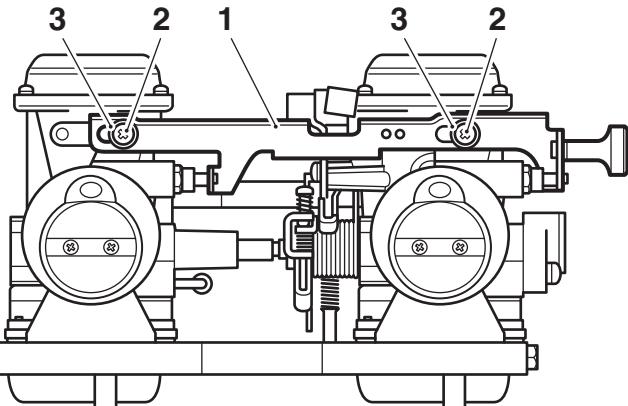
Throttle Body Overhaul

Disassembly

Note:

- It is permissible to renew the fuel injectors, the fuel injector seals, and the throttle position switch. Replacement of any other component requires replacement of the throttle bodies as an assembly.**
- During the following procedure four different sizes of spring will be removed. It is important these springs are correctly installed in their original positions during reassembly. Note the size and position of each spring before removal.**

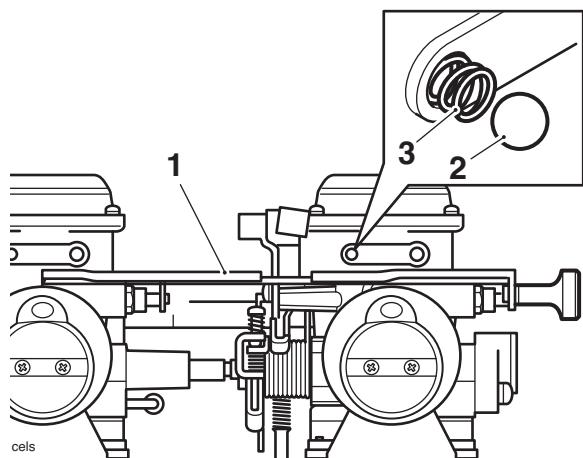
- Remove the throttle bodies (see page 10B-98). Renew the fuel injectors as follows:
- Remove the two choke rod screws and collect the nylon washers.



- Choke rod
- Screws
- Nylon washers

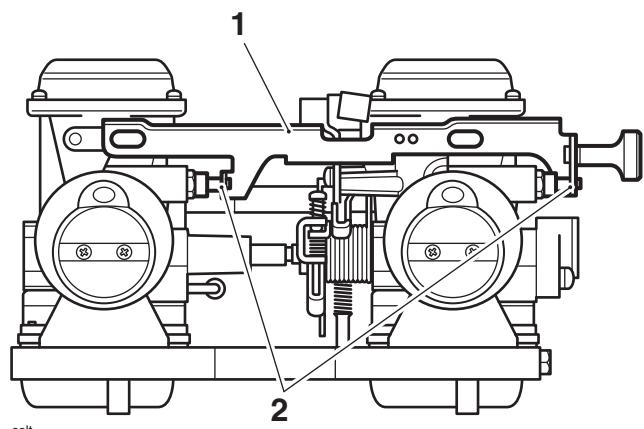
Fuel System - Fuel Injection Models

3. Rotate the choke rod carefully and slowly downwards and collect the detent ball and spring, and the remaining two nylon washers. Note the size and position of the spring before removal.



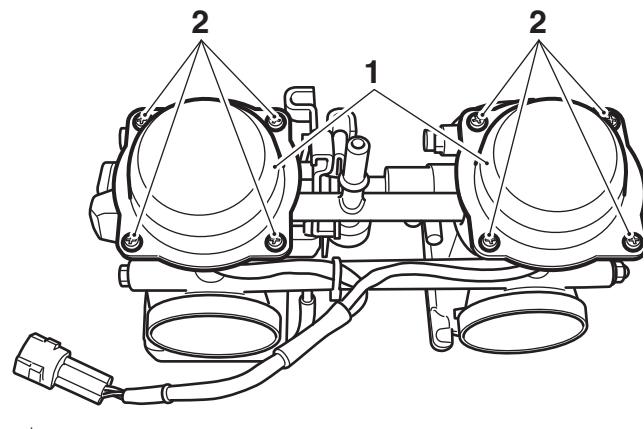
- 1. Choke rod**
- 2. Detent ball**
- 3. Spring**

4. Slide the choke rod upwards to remove it, collecting the two springs from the choke plungers as they are released. Note the size and position of each spring before removal.



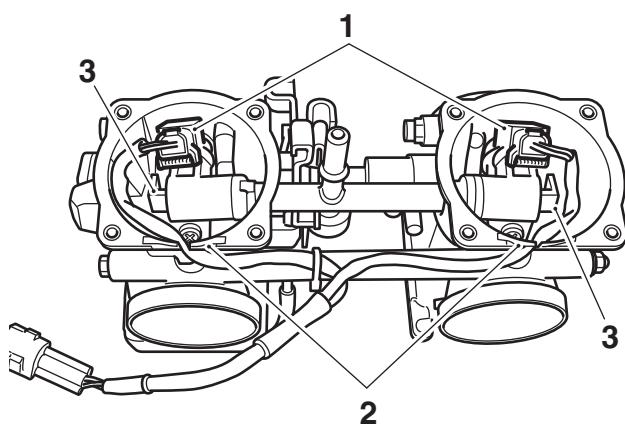
- 1. Choke rod**
- 2. Choke plunger springs**

5. Remove the eight fixings and remove the two upper chamber covers.



- 1. Upper chamber covers**
- 2. Fixings**

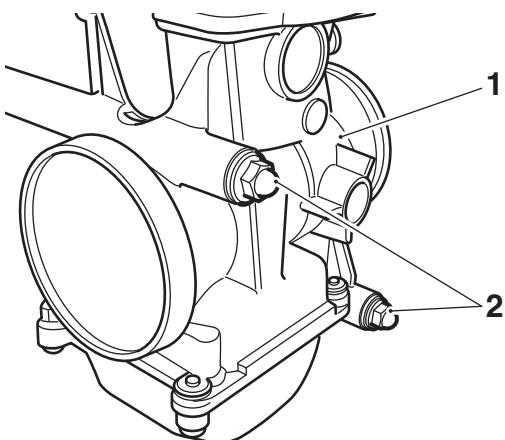
6. Disconnect the two injector electrical connectors and remove the two blanking plates. Release the harness from the cable guides on the fuel rail. It is not necessary to completely remove the injector sub-harness from the throttle body.



- 1. Fuel injector connectors**
- 2. Blanking plates**
- 3. Cable guides**

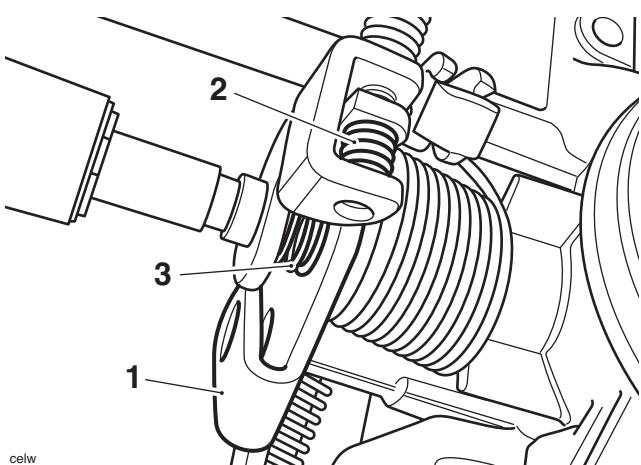
Fuel System - Fuel Injection Models

7. Remove the two nuts and withdraw the two long bolts from the left hand side of the throttle bodies.



- cely**
1. Right hand throttle body
2. Nuts

8. Gently ease the two throttle bodies apart until the two springs between the throttle linkage are released, taking care not to lose them. Remove the two springs noting the size and position of each before removal.



- celw**
1. Throttle cam
2. Throttle shaft balance spring
3. Throttle spindle thrust spring

9. Gently separate the two throttle bodies by easing the fuel rail out of the right hand fuel injector.

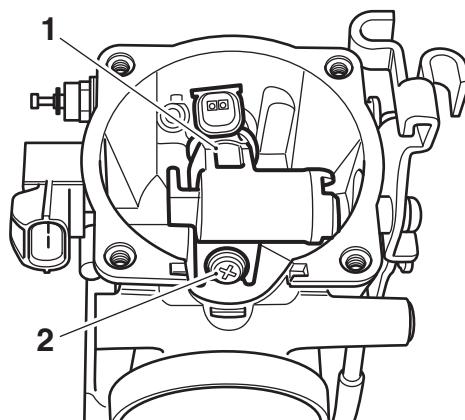
Note:

- The two aluminium throttle body spacer tubes may remain in either throttle body during disassembly, or may become detached during removal.

10. Gently ease the fuel rail out of the left hand fuel injector.
11. Working on one throttle body at a time, remove the screw and remove the fuel injector.

Note:

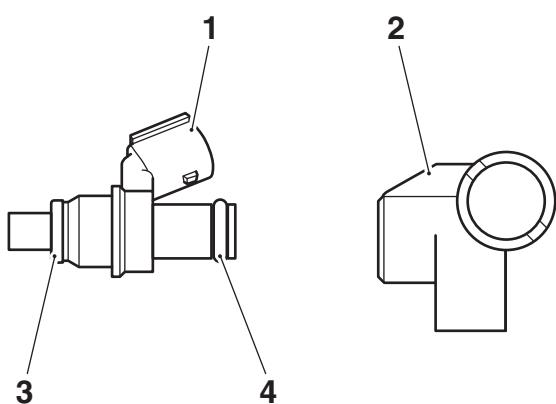
- The fuel injector seal may be removed with the fuel injector or may remain in the throttle body. If necessary, carefully remove the seal from the throttle body.



- celx**
1. Fuel injector
2. Fixing

Note:

- The fuel rail adaptors are different and are not interchangeable.
12. Remove the fuel rail adaptor and discard the injector seals.



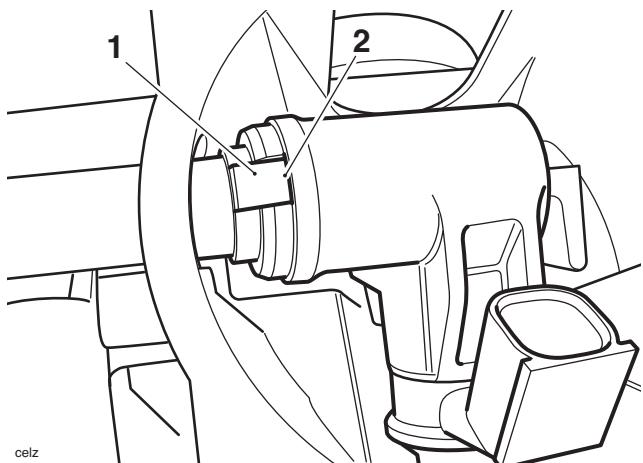
- cemf**
1. Fuel injector
2. Fuel rail adaptor (right hand shown)
3. Injector seal (front)
4. Injector seal (rear)

13. Repeat steps 11 and 12 for the remaining fuel injector.

Fuel System - Fuel Injection Models

Assembly

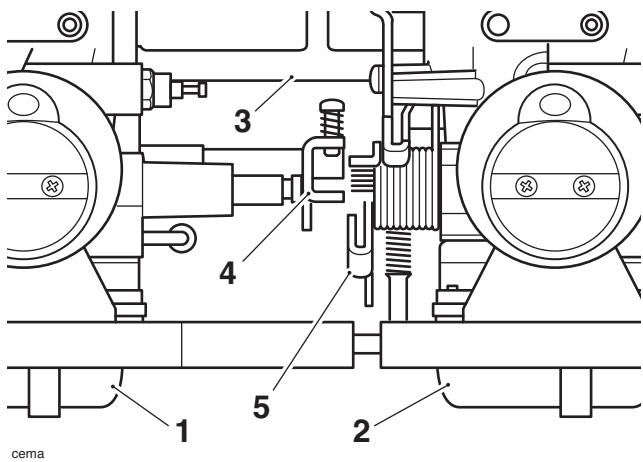
1. Install new seals to each fuel injector, ensuring the front seal is installed with its radiused edge facing towards the engine. Fit the fuel rail adaptor to the fuel injector as noted during removal.
2. Install the fuel injectors to the throttle bodies and secure with the screws. Tighten to **3.5 Nm**.
3. Lubricate the seals on the fuel rail with clean engine oil. Install the fuel rail into the left hand fuel injector, ensuring the two lugs locate in the corresponding slots in the injector.



1. Fuel rail lug (upper shown)

2. Fuel injector slots

4. Install the two long bolts to the left hand throttle body. Align the right hand throttle body to the bolts and install until the fuel rail begins to engage into the right hand fuel injector.



1. Right hand throttle body

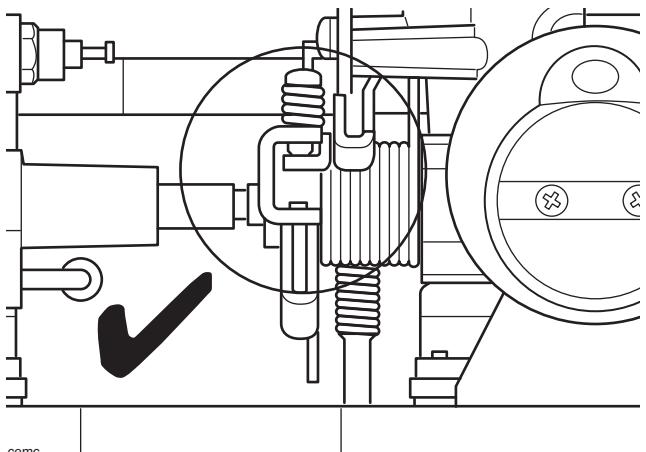
2. Left hand throttle body

3. Fuel rail

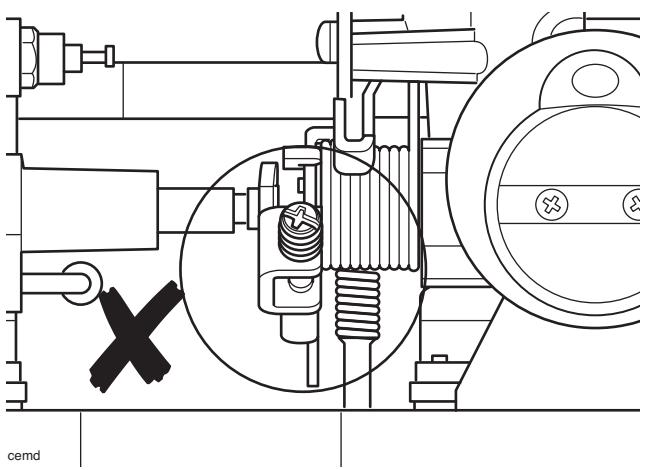
4. Throttle linkage

5. Throttle cam

5. Ensuring both throttles are fully closed, install the fuel rail fully into the right hand fuel injector. Check that the right hand throttle linkage is engaged into the left hand throttle cam as shown below.



Correct Assembly



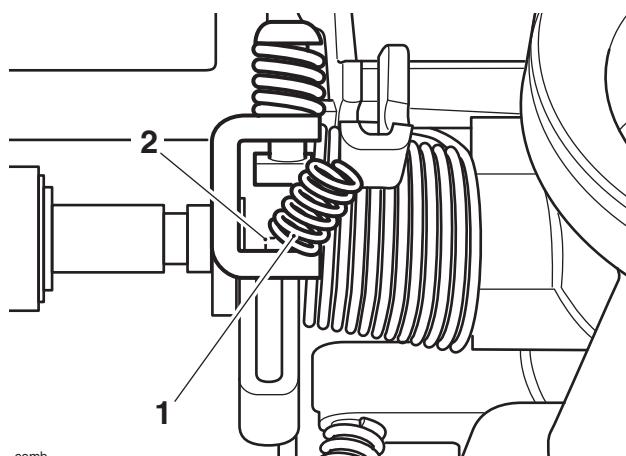
Incorrect Assembly

6. Refit the throttle body securing nuts, tightening to **6 Nm**.

Warning

To prevent injury, always wear eye and face protection when installing springs.

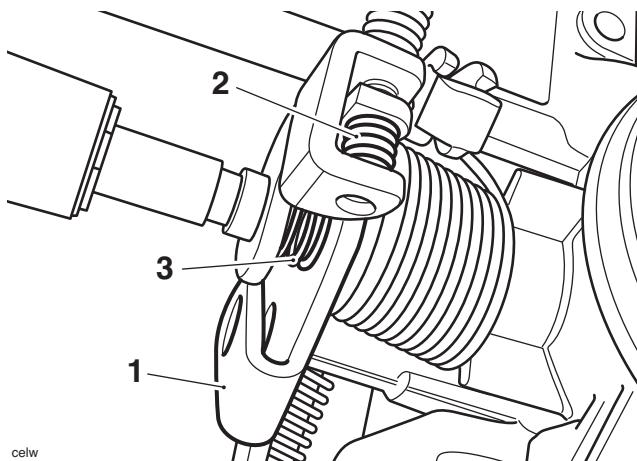
7. Fit the throttle shaft damper spring as shown below, ensuring the spring is installed over the lug on the throttle linkage.



1. Throttle shaft balance spring

2. Lug

8. Fit the throttle spindle end float spring as shown below.



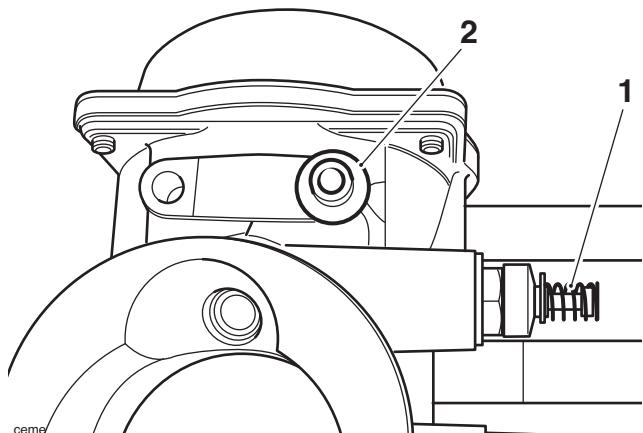
1. Throttle cam

2. Throttle shaft balance spring

3. Throttle spindle thrust spring

9. Reconnect the electrical connectors to the fuel injectors, ensuring the grey coloured cable is connected to the left hand injector.
10. Fit the blanking plates to the upper chambers, ensuring the injector harness is clipped into the cable guide on the fuel rail and the recess provided in each blanking plate.
11. Fit the upper chamber covers and secure with the screws. Tighten to **2 Nm**.
12. Ensuring both choke plungers are in the "OFF" position, fit the two springs to the plungers as noted during disassembly.

13. Fit the two nylon washers to the choke rod retaining bosses.



1. Choke plunger spring

2. Nylon washer

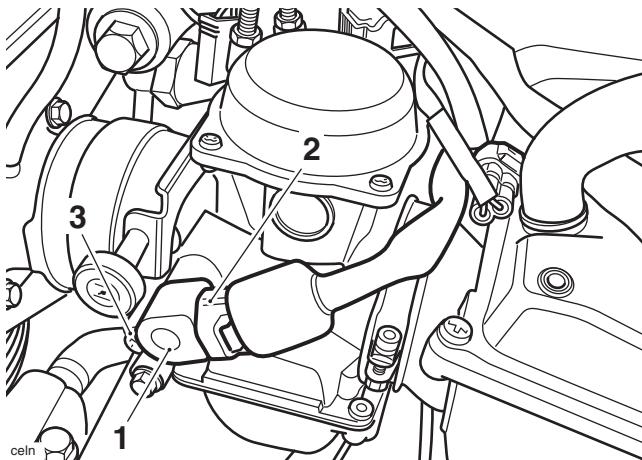
14. Carefully install the choke rod, ensuring the two choke plunger springs remain in position. Compress the springs with the choke rod, until the two slots on the rod will engage under the flanges on the choke plungers. If necessary, adjust the position of the springs such that they seat centrally on the choke rod.
15. Rotate the choke rod upwards into its fitted position, whilst ensuring the rod is still correctly engaged in both choke plungers.
16. Fit the two remaining washers and screws, tightening to **2 Nm**. Check the operation of the choke linkage before proceeding.
17. Refit the throttle bodies (see page 10B-99) and check the synchronisation (see page 10B-106).

Fuel System - Fuel Injection Models

Throttle Position Sensor

Removal

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the wiring connector from the throttle position sensor.
4. Release the screw and gently rotate the throttle position sensor anti-clockwise.
5. Remove the throttle position sensor from the left hand end of the throttle body. Collect the O-ring on disassembly.



1. Throttle position sensor
2. Throttle position sensor connector
3. Fixing

Installation

1. Lubricate the O-ring with clean engine oil. Fit the replacement throttle position sensor ensuring the O-ring is positioned correctly between the sensor and throttle body.
2. Rotate the throttle position sensor clockwise until the threaded hole in the throttle body aligns with the slot in the sensor. Engage the screws and part tighten such that the sensor can still be rotated.
3. Reconnect the battery, positive (red) lead first.
4. Attach the Triumph diagnostic tool to the dedicated plug, refer to the Triumph diagnostic tool User Guide for additional information.
5. On the diagnostic tool navigate to, and select the "ADJUST TUNE" option (see page 10B-34).

6. Warm the engine up to normal operating temperature and adjust the idle speed (see page 10B-105).
7. With the idle speed correctly set, switch off the engine.
8. Turn the ignition to the "ON" position.
9. At the next screen, select Throttle Position Sensor Renew (see below) then press the "ADJUST" button.
10. 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

Current Voltage: 0.59 V

Target Voltage Range: 0.58 V - 0.62 V

Adjusting parameter - Throttle Position Sensor Adjust

11. Gently rotate the new throttle position sensor until the voltage reading on the tool shows **0.6 volts ±0.02 volts**.

Note:

- This is a setting voltage only. Because of the adaptive nature of the engine management system, and the possible manual adjustment of the idle speed, the in-service voltage may vary from this setting figure.
12. 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.
 13. Press the **OK** button to return the throttle to normal control and return the diagnostic tool to the **Adjust Tune** menu.
 14. Disconnect the diagnostic tool.

- 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.

- Check and clear any stored faults using the same tool.
- Refit the seat (see page 16-11).

Idle Speed Adjustment

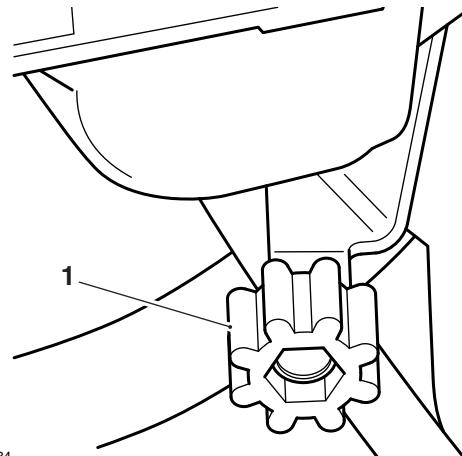
Note:

- The Triumph diagnostic tool will be needed to accurately set the idle speed.
- Adjustments should be made with the engine warmed up to normal operating temperature.

Idle speed is adjusted with the adjuster on the left hand side of the throttle bodies. Rotate the adjuster clockwise to increase idle speed and anti-clockwise to decrease it.

Idle Speed

1000 ±50 rpm



T908.09.34

1. Idle speed adjuster

Fuel System - Fuel Injection Models

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.
 - Adjustments should be made with the engine warmed up to normal operating temperature.
- Warm the engine up to normal operating temperature and adjust the idle speed.
 - With the idle speed correctly set, switch off the engine.
 - Remove the seat (see page 16-11).



Warning

If the engine has recently been running, the components beneath the fuel tank may be hot to the touch.

- Connect the diagnostic tool.
- Attach exhaust extraction hoses to the silencers.
- Start the engine.
- On the diagnostic tool navigate to 'ADJUST TUNE' (see page 10B-34).
- Select 'BALANCE THROTTLES'.

Adjust Tune Procedure

Adjust the throttle balance as described in the service manual until balanced
Press cancel to cancel the adjustment process
Press OK to finish

Throttle Status: Throttles Balanced

Cylinder 1 MAP Pressure: 450 mmHg

Cylinder 2 MAP Pressure: 451 mmHg

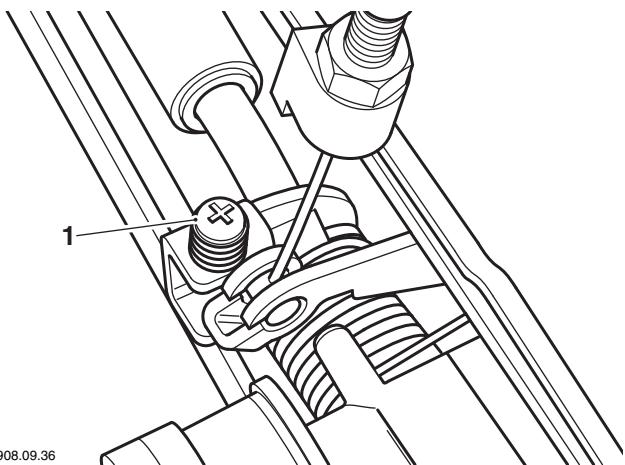
Adjusting parameter - Balance Throttles

Balance Throttles Screen

Note:

- The balance throttle 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 word '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 word 'THROTTLES UNBALANCED' in red text will appear on the right of the screen. At this point adjustment will be necessary.
 - Adjustment is very sensitive. Each time the screw is moved allow time for the vacuum readings to stabilise before adjusting the screw further.
- Using the service tool 3880015 - T0301 to adjust the throttle adjusters, 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 seat (see page 16-11).

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 changes in fuel quality, minor defects, 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

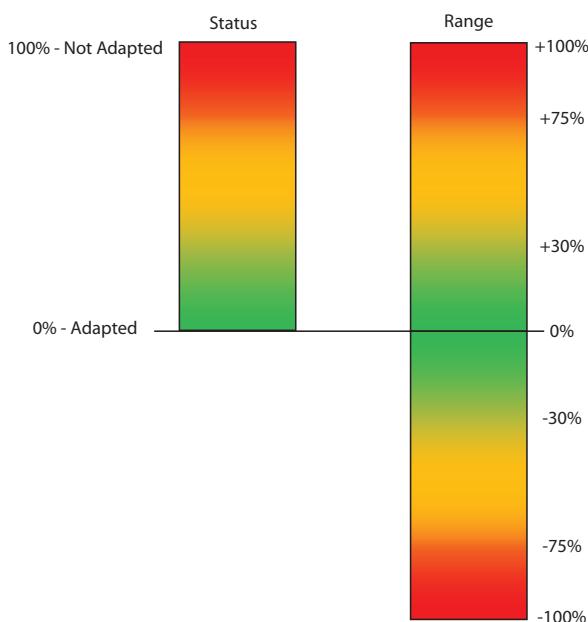
To see if a motorcycle has fully adapted, a facility named 'ADAPTION STATUS' is provided on the diagnostic tool. The following adaption details can be examined:

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%

Fuel System - Fuel Injection Models

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 to 60° C.
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.

Secondary Air Injection System

The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

At certain specific engine speeds (determined by the factory programming of the engine management system), the secondary air injection relay valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the relay valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and the header system.

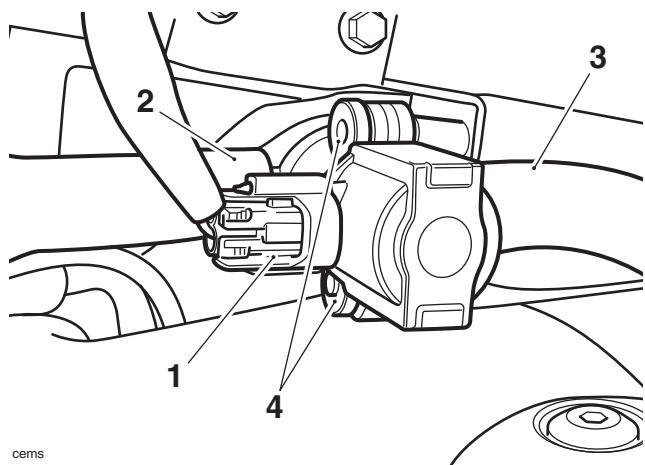
Check

1. At regular intervals (see maintenance schedule), disassemble the control valve and inspect the reed valve assemblies. Renew the valves if there is any doubt about their condition.

Secondary Air Injection System Control Valve

Removal

1. Remove the fuel tank (see page 10B-85).
2. Disconnect the two hoses from the valve, noting the correct fitted location of each hose.
3. Disconnect the multi-plug.



cerms

1. Multi-plug
2. Cylinder head hose
3. Airbox hose
4. Mounting studs

4. Gently ease the valve off the two mounting studs and remove from the motorcycle.

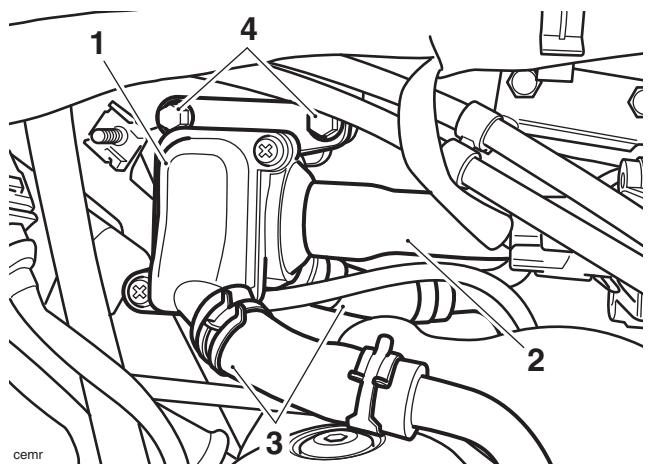
Installation

1. Align the valve to the mounting studs.
2. Reconnect the multi-plug.
3. Reconnect the two hoses.
4. Refit the fuel tank (see page 10B-86).

Secondary Air Injection System Reed Valve

Removal

1. Remove the fuel tank (see page 10B-85).
2. Disconnect all hoses from the valve, noting the correct fitted location of each hose.



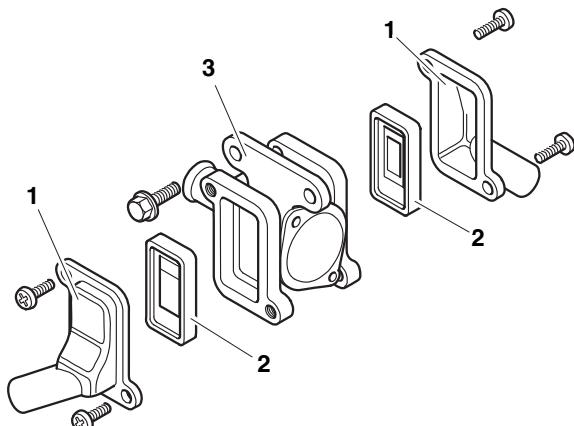
1. Secondary air injection reed valve

2. Airbox hose
3. Cylinder head hose
4. Fixings

3. Unscrew the mounting bolts and remove the control valve.
4. Undo the screws and remove the covers and reed valve assemblies from the valve.

Note:

- The covers are different and are not interchangeable.



1. Covers
2. Reed valves
3. Valve body

Fuel System - Fuel Injection Models

Inspection

1. Inspect each reed valve assembly for signs of wear or damage. If there are signs of exhaust gases blowing past the valve, it must be renewed.
2. Check that the control valve assembly only allows air to flow through the airbox union when a vacuum is applied to its diaphragm. If not, renew the valve.

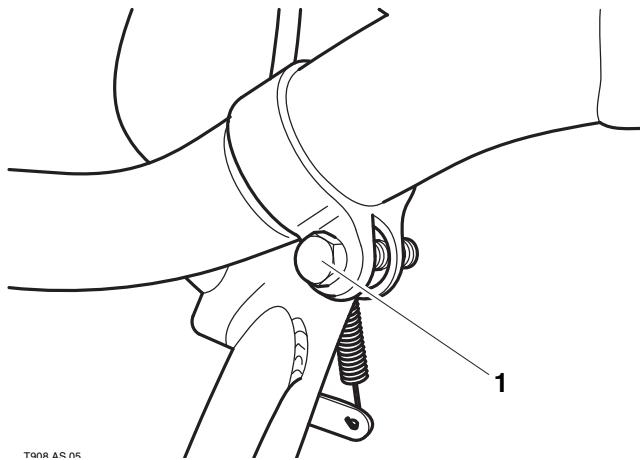
Installation

1. Seat the reed valve assemblies in the control valve (they will only fit one way) and install the covers. Ensure the covers are correctly fitted then securely tighten the retaining screws.
2. Fit the control valve to the frame and tighten its mounting bolts to **8 Nm**.
3. Securely reconnect all the hoses to the control valve.
4. Install the fuel tank (see page 10B-86).

Silencers - Bonneville, Bonneville SE, Bonneville T100 & Thruxton

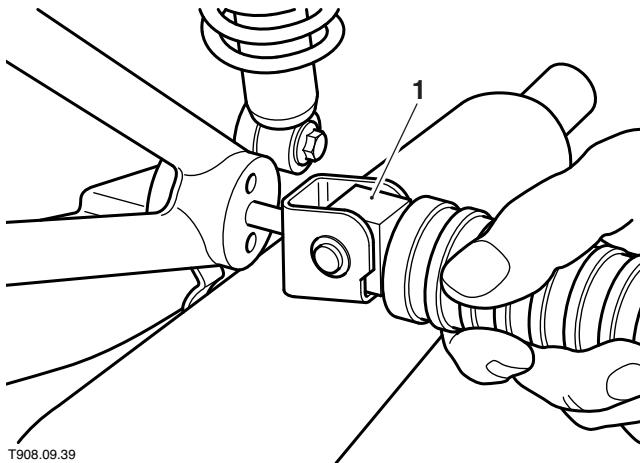
Removal

1. Slacken the clamp securing the silencer to the header pipe (on Thruxton models remove the clamp shield if retained by the clamp).



1. Silencer clamp bolt

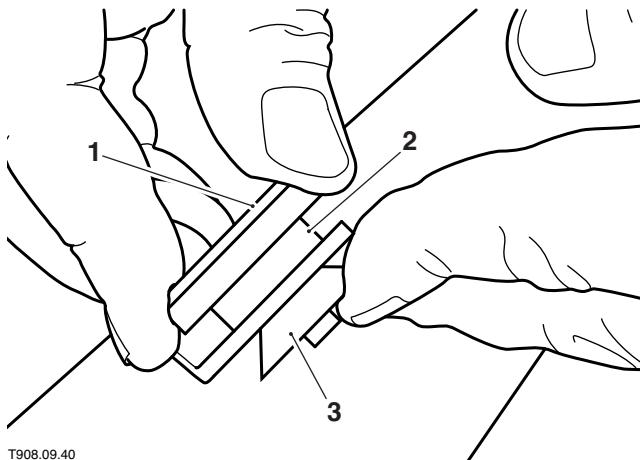
2. Slacken and remove the nut and washer from the rear passenger footrest.
3. Withdraw the passenger footrest and remove the silencer from the motorcycle. Recover the rubber washer, shouldered collar and mounting rubber from the silencer mounting bracket.



1. Passenger footrest

Installation

1. Ensure the rubber mounting, collar and rubber washer are correctly fitted to the silencer bracket.



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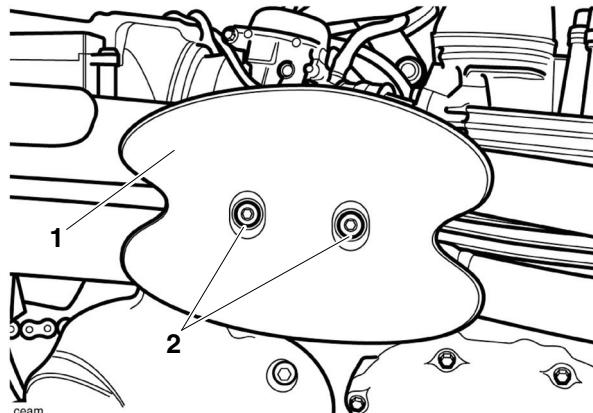
1. Collar
2. Rubber mounting
3. Rubber washer

2. Apply 4 cc of clear silicone sealer to each header pipe at the joint with the silencer. Spread the sealer evenly all round the joint.
3. Fit the mounting clamp (on Thruxton models, if removed, fit the clamp shield) then install the silencer.
4. Install the passenger footrest, ensuring its locating pegs are correctly seated in their holes. Fit the washer and nut to the footrest and tighten to **27 Nm**.
5. Position the silencer clamp correctly and tighten its bolt to **15 Nm**.

Silencers - Scrambler

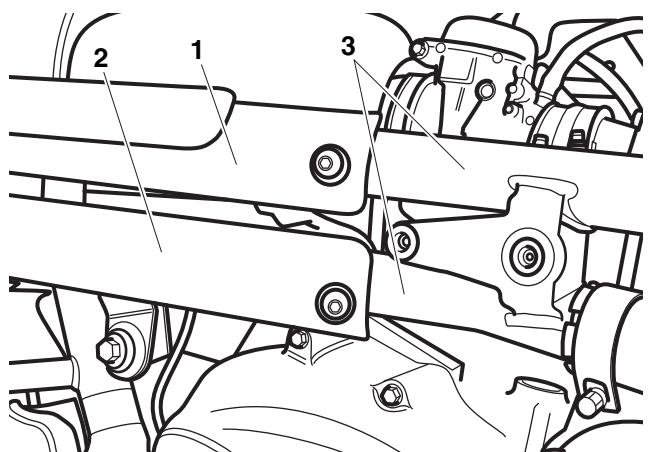
Removal

1. Undo and remove the two fixings securing the calf protector to the bracket on the header pipes. Remove the calf protector.



1. Calf protector
2. Fixings

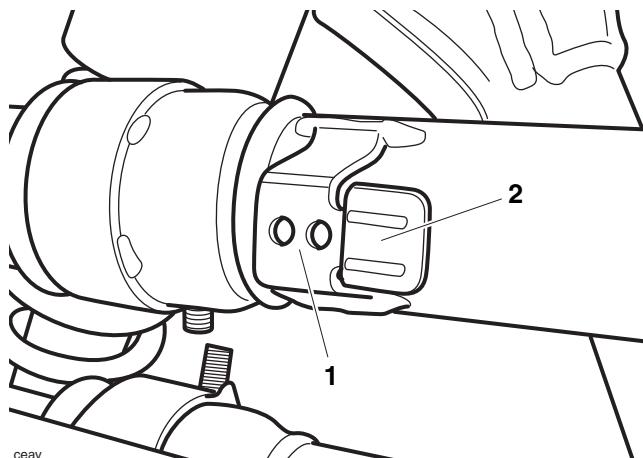
2. Undo and remove the fixing securing the upper side protector to the header pipes.



1. Upper side protector
2. Lower side protector
3. Header pipes

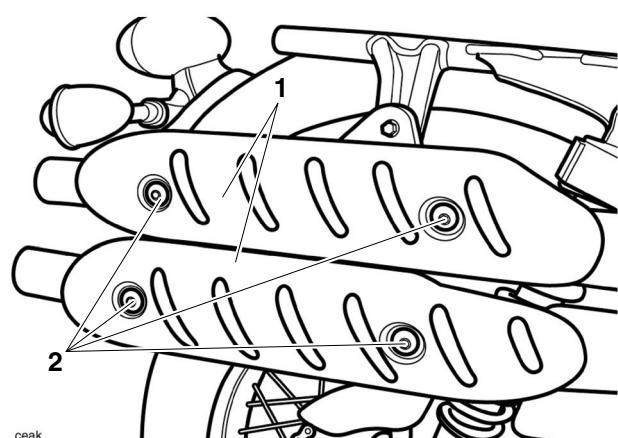
Fuel System - Fuel Injection Models

- Pull the side protector towards the front of the motorcycle to release it from its rear mounting point collecting the mounting point rubber as you do so.



- 1. Side protector rear mounting point**
- 2. Mounting point rubber**

- Remove the lower side protector in the same manner.
- To help prevent damage, remove the fixings securing the silencer covers to the silencers. Remove the covers.

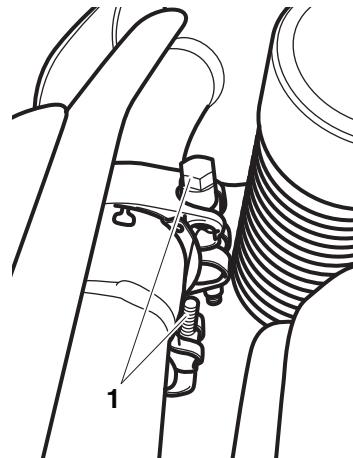


- 1. Silencer covers**
- 2. Fixings**

- Slacken both clamps securing the silencers to the header pipes.

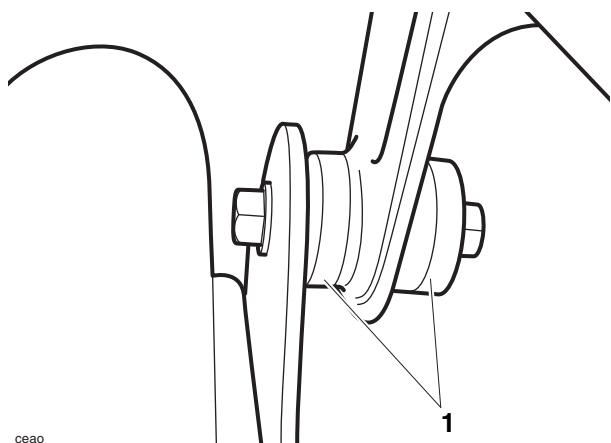
Note:

- Note the orientation of the clamps prior to removal.**



- 1. Silencer clamp bolts**

- Noting the position of the spacers if fitted, slacken and remove the bolt, nut and spacers securing the silencer plate to the frame.



- 1. Spacers (if fitted)**

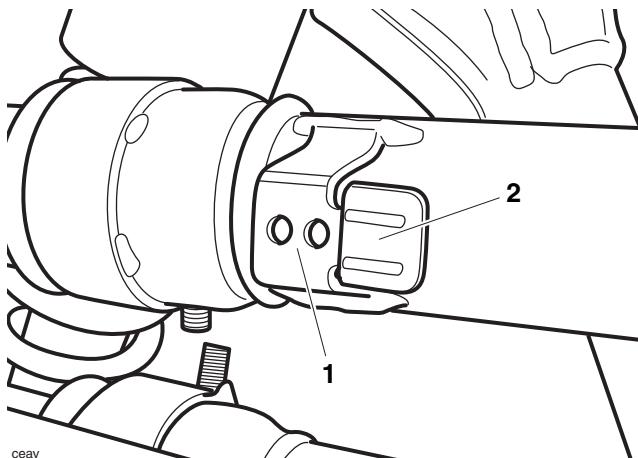
- Remove the silencers from the header pipes.
- To separate the silencers, undo and remove the fixings securing both silencers to the silencer plate.

Note:

- Note the orientation prior to removal.**

Installation

- Secure both silencers to the silencer mounting plate and tighten all four fixings to **15 Nm**.
- Apply 4cc of clear silicone sealer to each silencer at the joints with the header pipes. Spread the sealer evenly around the joints.
- Position the silencers to the header pipes and secure the silencer plate to the frame, ensuring that the fixings are in the positions noted during removal. Tighten the bolt and nut to **19 Nm**.
- Position both silencer clamps as noted earlier and tighten their bolts to **10 Nm**.
- Fit the silencer covers and tighten their fixings to **7 Nm**.
- Fit the mounting point rubbers, collected during removal, to the rear mounting points.



1. Side protector rear mounting point

2. Mounting point rubber

- Secure the upper side cover to the frame ensuring that the hook at the rear of the cover engages in its rear mounting point. Tighten the front fixing to **4 Nm**.
- Fit the lower side cover in the same manner.
- Fit the calf protector to the bracket on the header pipes tightening the fixings to **4 Nm**.

Header Pipes - Bonneville, Bonneville T100 & Thruxton

Removal

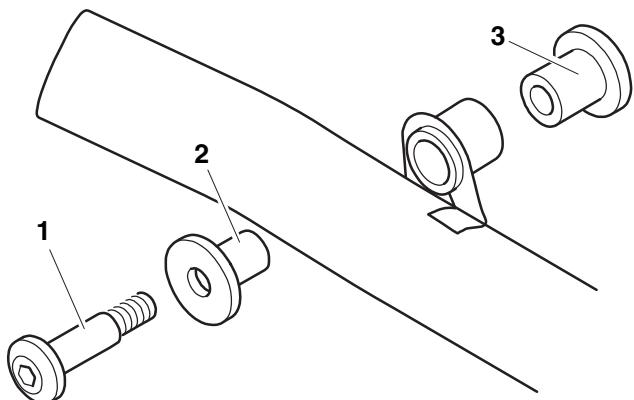
- Remove both silencers (see page 10B-110).

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.**
- Disconnect the oxygen sensor electrical connectors from the main harness, located above the oil cooler.
 - Remove the right hand side cover (see page 16-14).
 - Unscrew the bolts and remove the sprocket cover from the engine.
 - Remove the cap and slacken the swinging arm outrigger clamp bolt on the right side rider footrest bracket.
 - Unscrew the right side footrest bracket mounting bolts and the rear brake master cylinder mounting bolts.
 - Free the footrest bracket from the swinging arm outrigger and position it clear of the header pipe mounting bolt.
 - Slacken the clamp securing the header balance pipes together.
 - Unscrew the nuts securing both header pipes to the cylinder head.

Fuel System - Fuel Injection Models

10. Unscrew the mounting bolt from the rear of each header pipe.



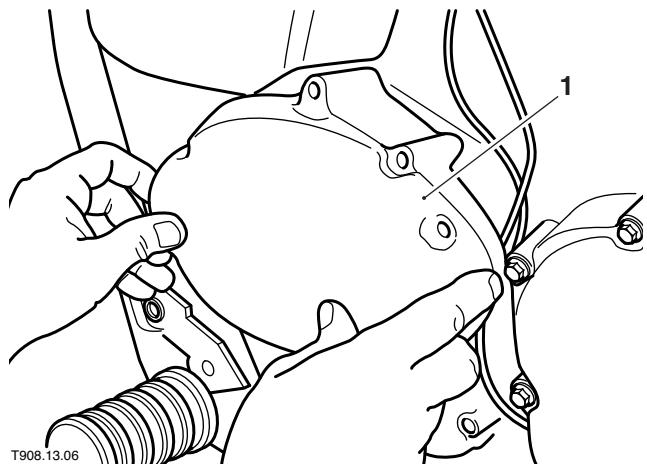
1. Mounting bolt
2. Collar
3. Rubber mounting

11. Free the header pipes from the cylinder head, separate the balance pipe and remove both pipes from the motorcycle. Recover the rubber mountings from each header pipe rear mounting.
12. Remove the gasket from each cylinder head port and discard them.

Installation

1. Fit a new gasket to each cylinder head port.
2. Apply a light smear of silicone sealer to each header pipe at the joint with the head.
3. Ensure the rubber mountings are correctly fitted to the header mountings and fit the clamp to the balance pipe.
4. Fit both header pipes, joining the balance pipe whilst locating both headers correctly in the cylinder head ports. Fit the nuts to the cylinder head studs, and lightly tighten them.
5. Install the header mounting bolts and tighten to **27 Nm**.
6. Tighten the header pipe nuts evenly and progressively to **19 Nm**.
7. Position the balance pipe clamp correctly and tighten its bolt to **15 Nm**.
8. Locate the footrest bracket back on the outrigger and tighten the bracket mounting bolts to **27 Nm**. Tighten the clamp bolt to **45 Nm** then refit the cap.

9. Refit the master cylinder mounting bolts and tighten to **23 Nm**.
10. Install the sprocket cover, tightening the cover bolts to **10 Nm**.



1. Sprocket cover

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.
11. Reconnect the oxygen sensor electrical connectors.
 12. Install the silencers (see page 10B-111) and side cover (see page 16-14).

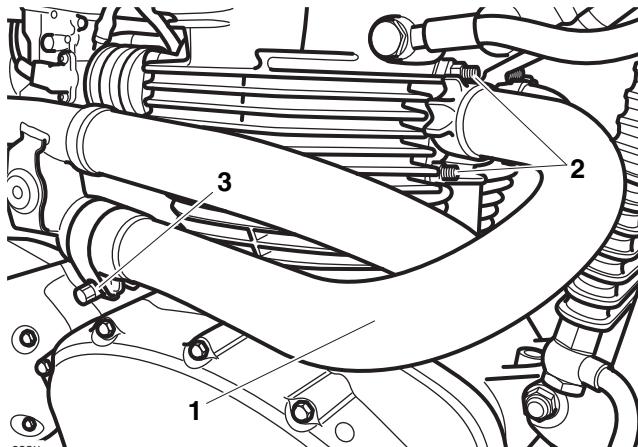
Header Pipes - Scrambler

Removal

1. Remove the silencers (see page 10B-111).

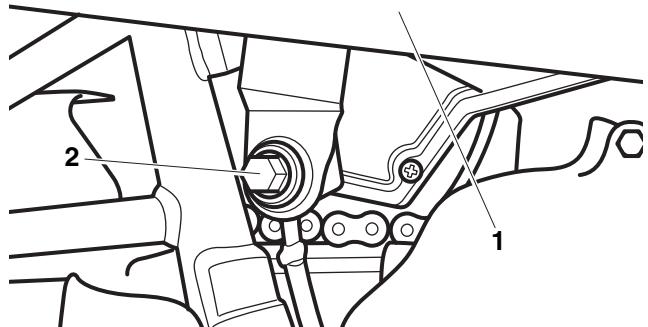
Note:

- 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.**
2. Disconnect the oxygen sensor electrical connectors from the main harness, located above the oil cooler.
 3. Slacken and remove the two nuts securing the right hand header pipe to the cylinder head.



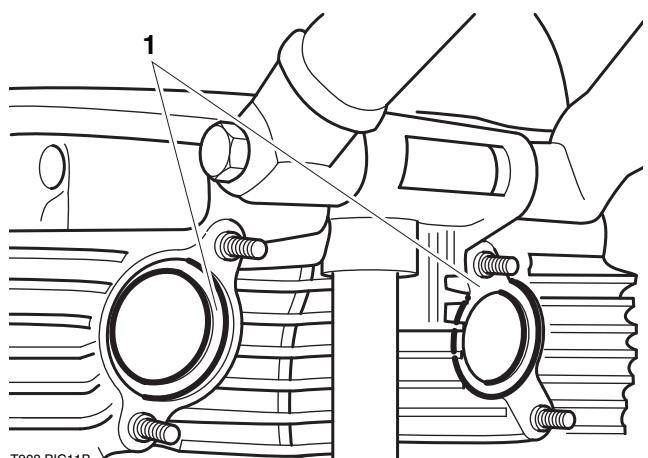
4. Slacken the header pipe clamp.
5. Remove the right hand header pipe.
6. Slacken and remove the two nuts securing the left hand header pipe to the cylinder head.

7. Noting the position of the rubber washers, slacken and remove the fixing securing the left hand header pipe to the frame. Remove the header pipe.



Installation

1. Fit a new gasket to each cylinder head port.



2. Apply a light smear of silicone sealer to each header pipe at the joint with the head.
3. Position the left hand header pipe to the cylinder head. Secure to the frame tightening the fixing to **19 Nm**, ensuring that the rubber washers are fitted in the positions noted prior to removal.
4. Fit the nuts to the cylinder head studs on the left hand side. Tighten the nuts to **19 Nm**.

Fuel System - Fuel Injection Models

5. Position the right hand header pipe to the cylinder head and abut to the left hand header pipe.
6. Join both header pipes using the header pipe clamp. Tighten the clamp bolt to **10 Nm**.
7. Fit the nuts to the cylinder head studs on the right hand side. Tighten the nuts to **19 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.
8. Reconnect the oxygen sensor electrical connectors.
 9. Refit the silencers (see page *10B-113*).

Evaporative Emissions Control System - If Fitted

Certain Markets Only

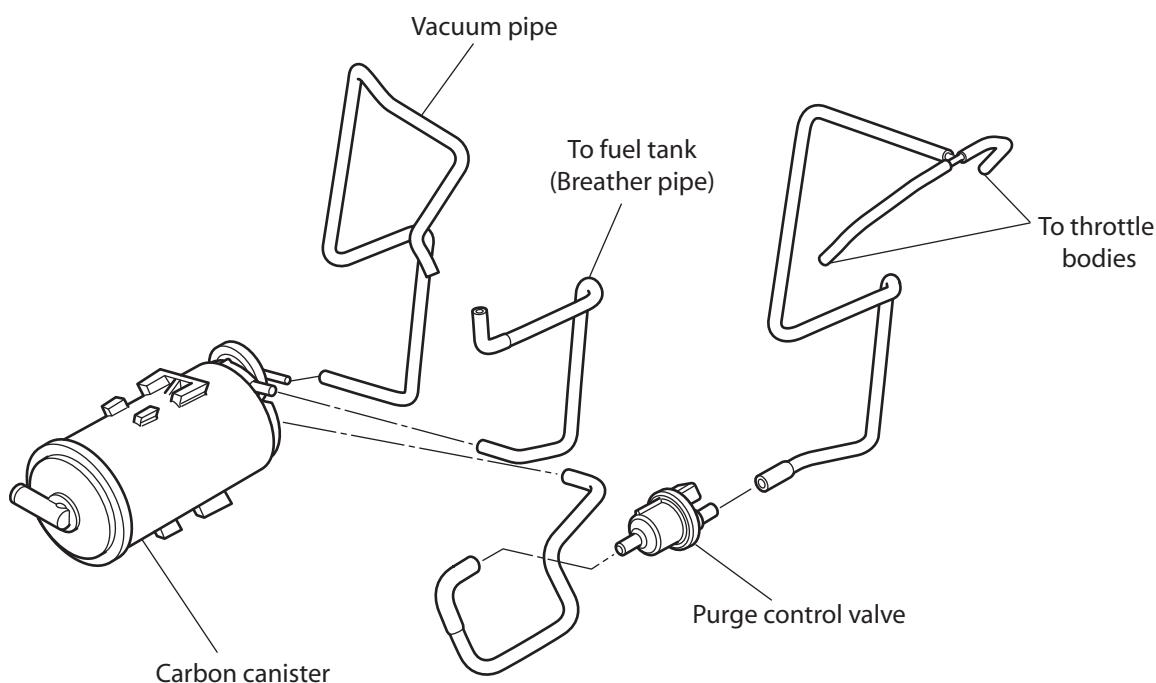
Some models for certain markets are fitted with a system to control the evaporation of fuel vapour to the atmosphere. A carbon canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and burnt.

There are two distinct phases to the system's operation, engine off and engine running. These two conditions are explained overleaf.

Component Locations

Carbon Canister - Beneath the swinging arm.

Purge Control Valve - Behind the carbon canister, mounted to the same bracket (electronically controlled by the ECM).

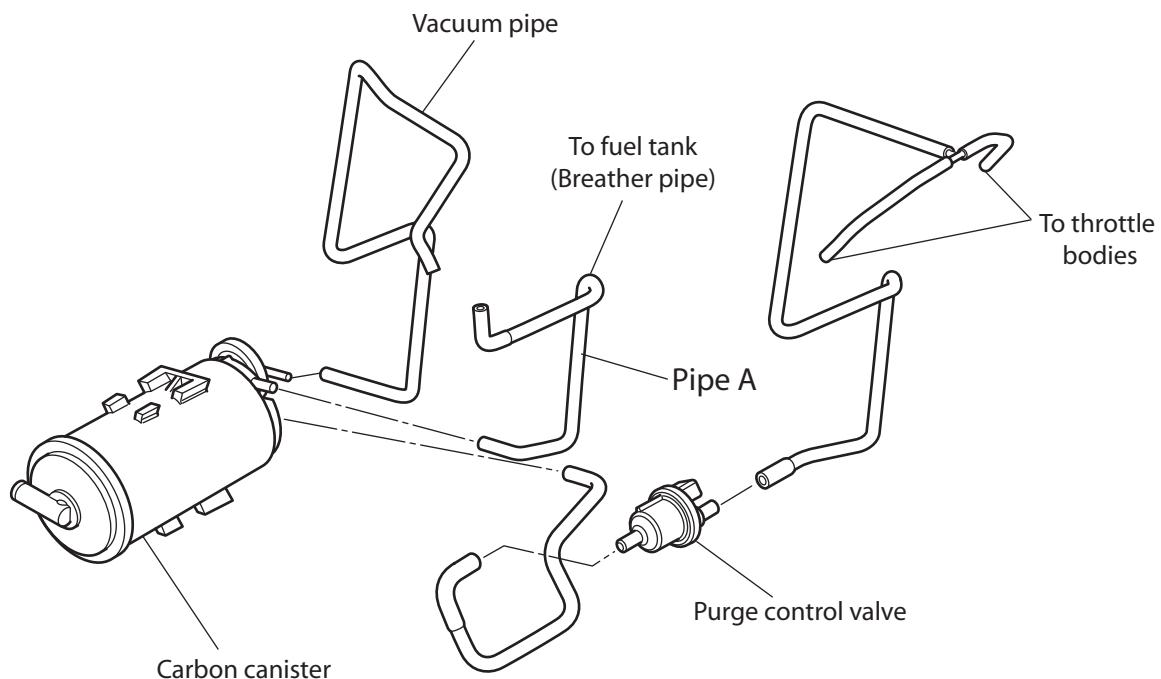


Fuel System - Fuel Injection Models

Evaporative Control System - Engine Off

When the engine is stationary any pressure increase in the fuel tank due to a rise in ambient temperature will cause the fuel vapour to pass down the breather pipe A to a carbon filled canister which stores the vapour.

Once in the canister, vapour cannot return to the fuel tank because of a one-way valve in the canister.

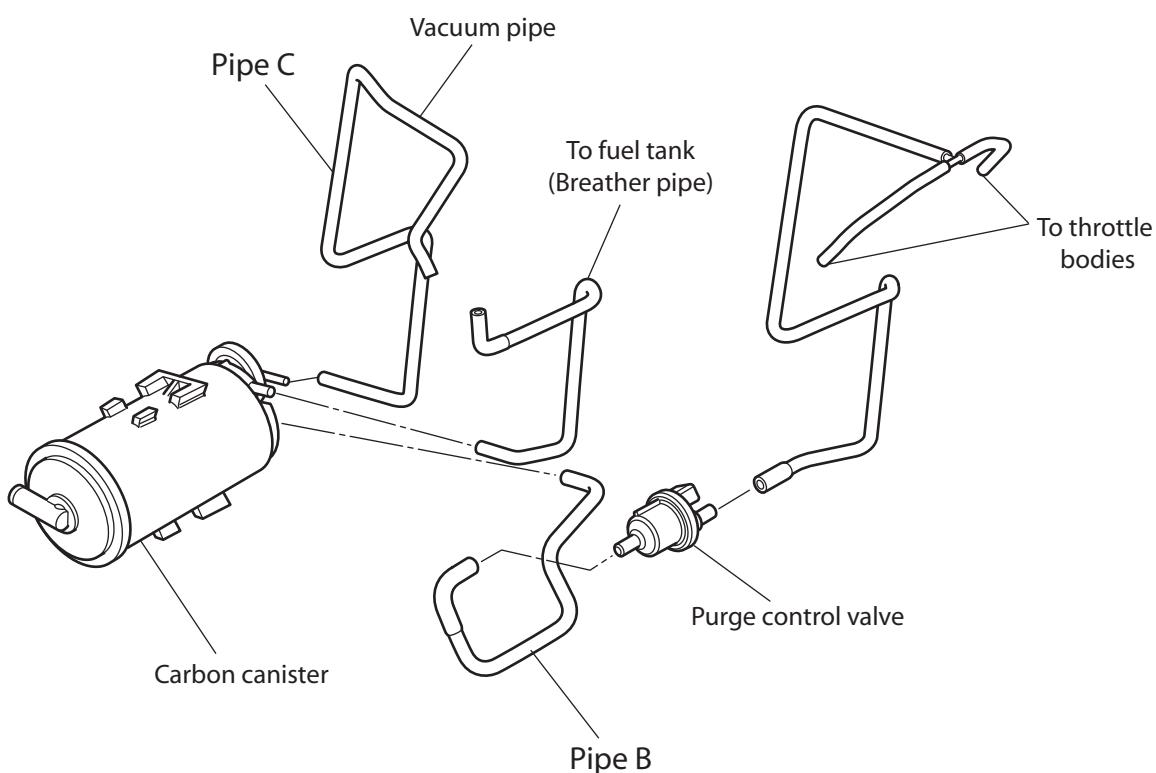


Evaporative Control System - Engine Running

When the engine is started, a vacuum is applied via the vacuum pipe C to a vent valve on the canister, causing it to open. Simultaneously, vacuum is applied along pipe B, via the purge control valve to the canister vent port.

Because the vent valve has been opened, the vacuum applied at point B begins to draw stored vapour from the carbon filled area of the canister via the vent port and returns it to the throttle bodies for burning in the engine.

In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between open and closed positions.



Fuel System - Fuel Injection Models

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11 Brakes

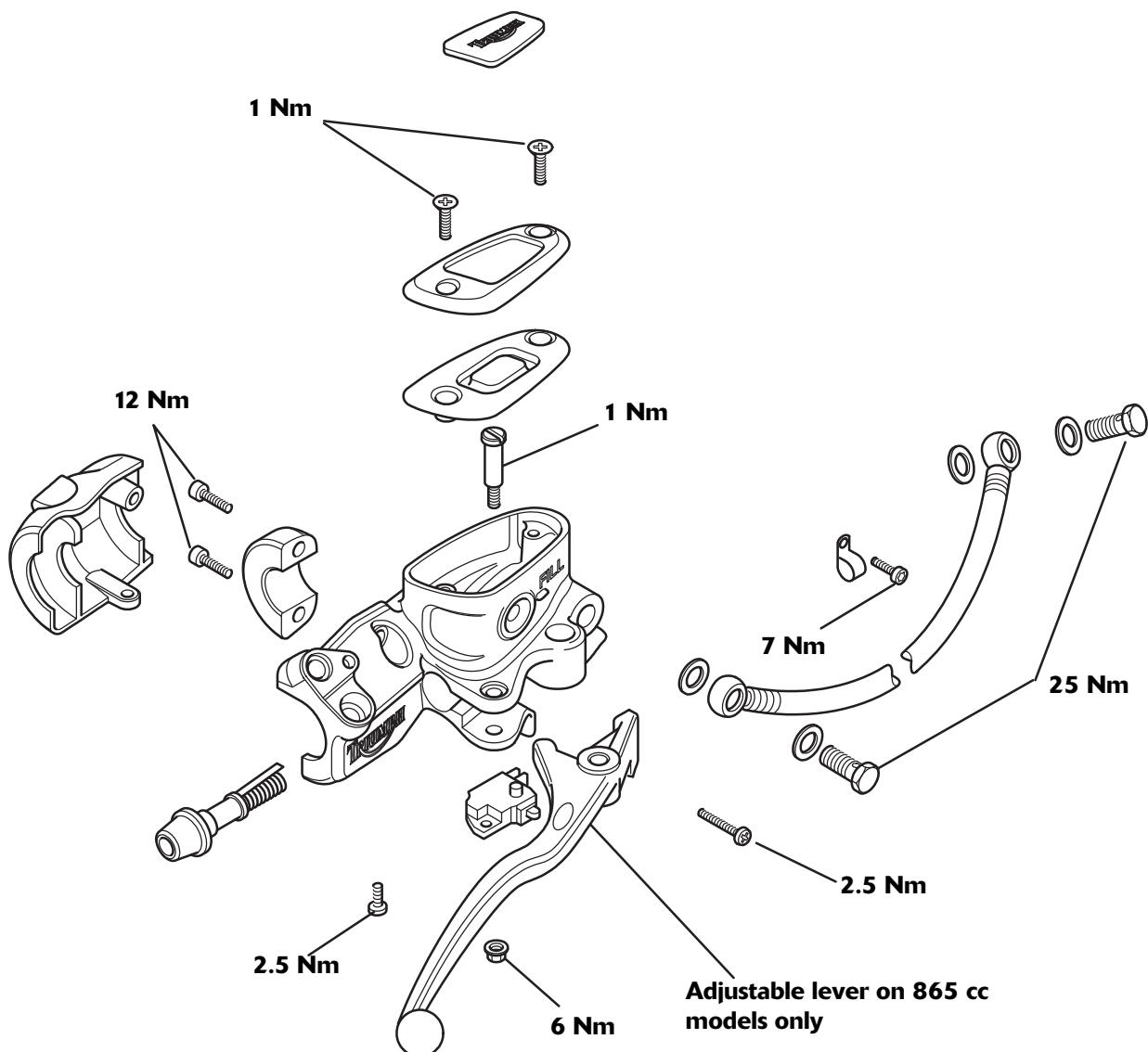
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Brakes

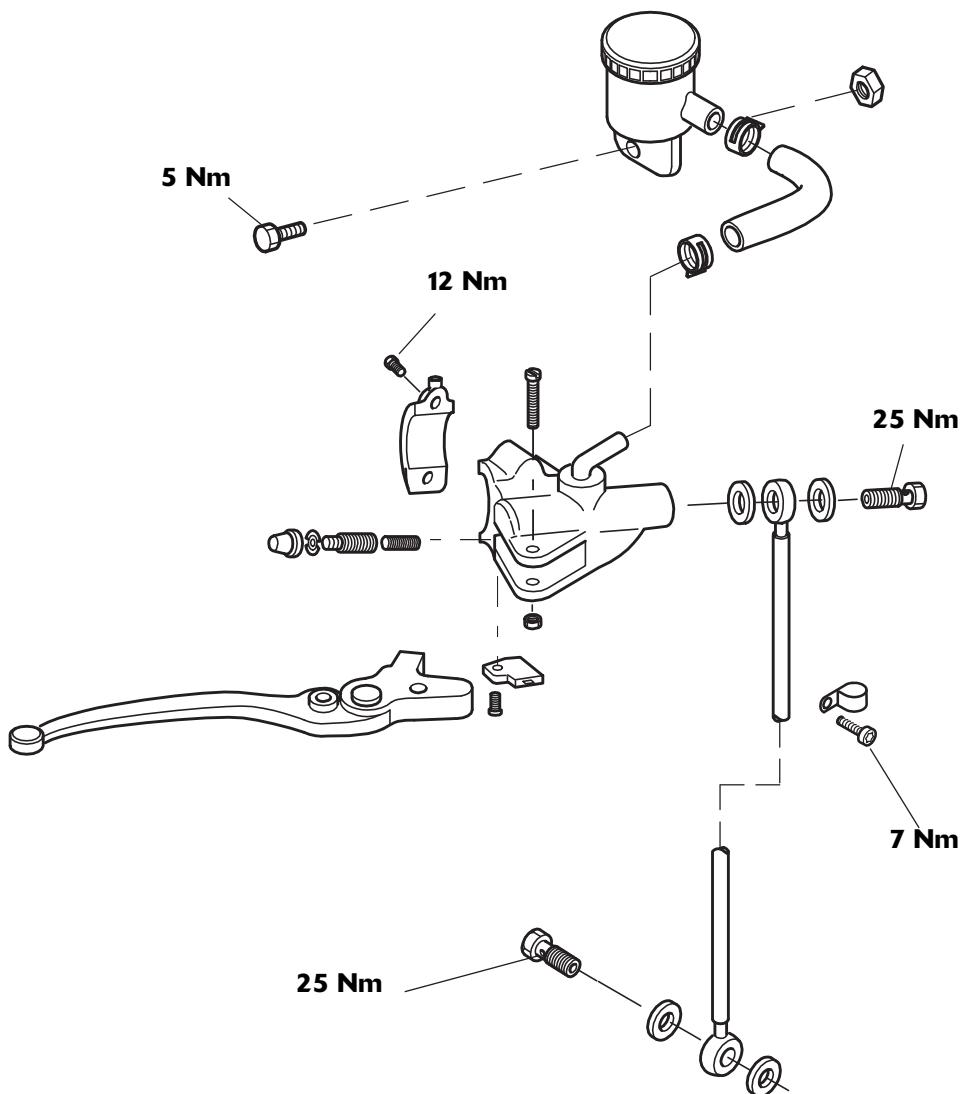
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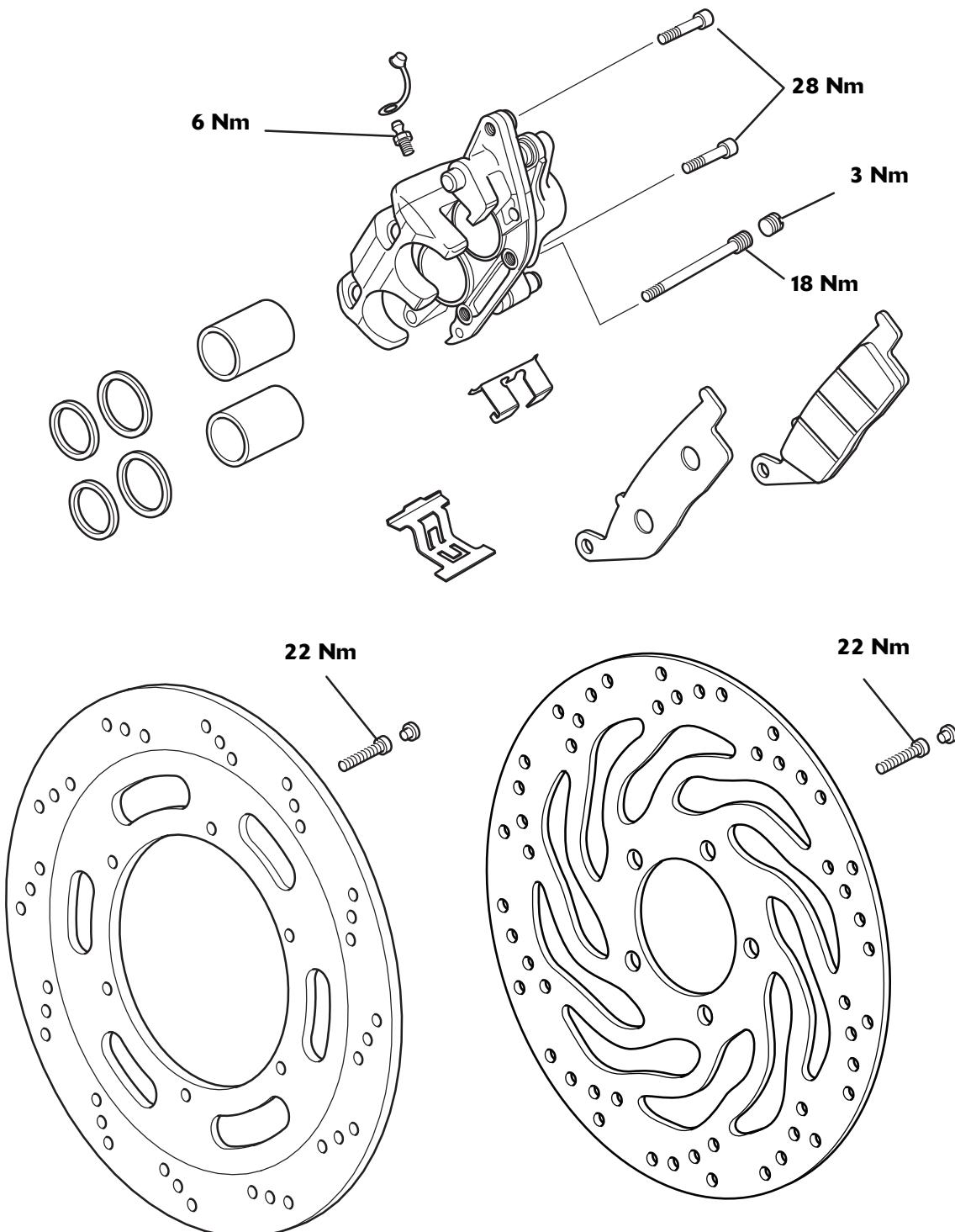
**Exploded View - Front Brake Master Cylinder and Hose - Bonneville
(up to VIN 380776), Bonneville T100 (including the Steve McQueen™
& Bonneville T100 110th Editions) and Thruxton (with high handlebars)**



Brakes

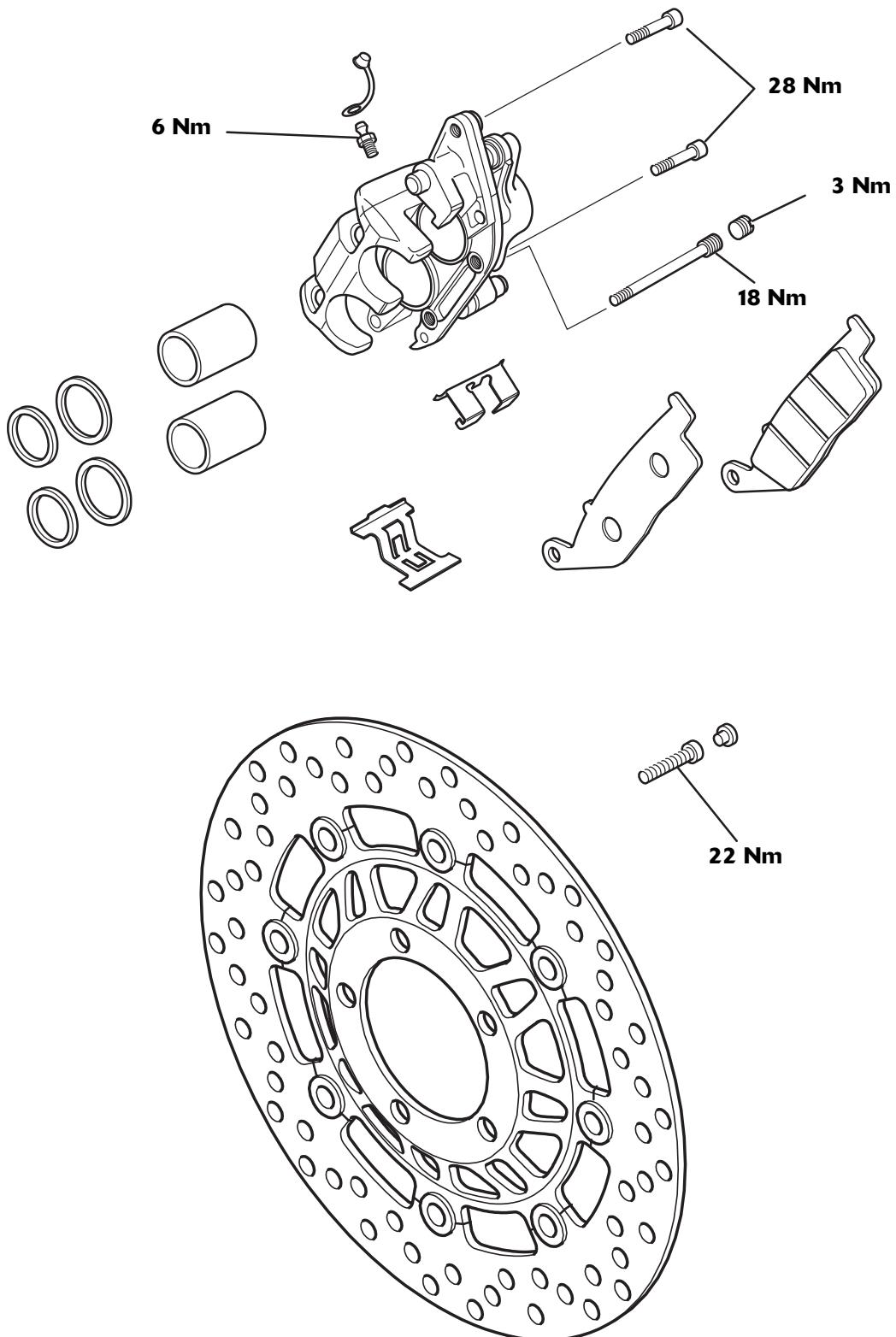
Exploded View - Front Brake Master Cylinder and Hose - Bonneville (from VIN 380777), Bonneville SE, Thruxton (with low handlebars) & Scrambler

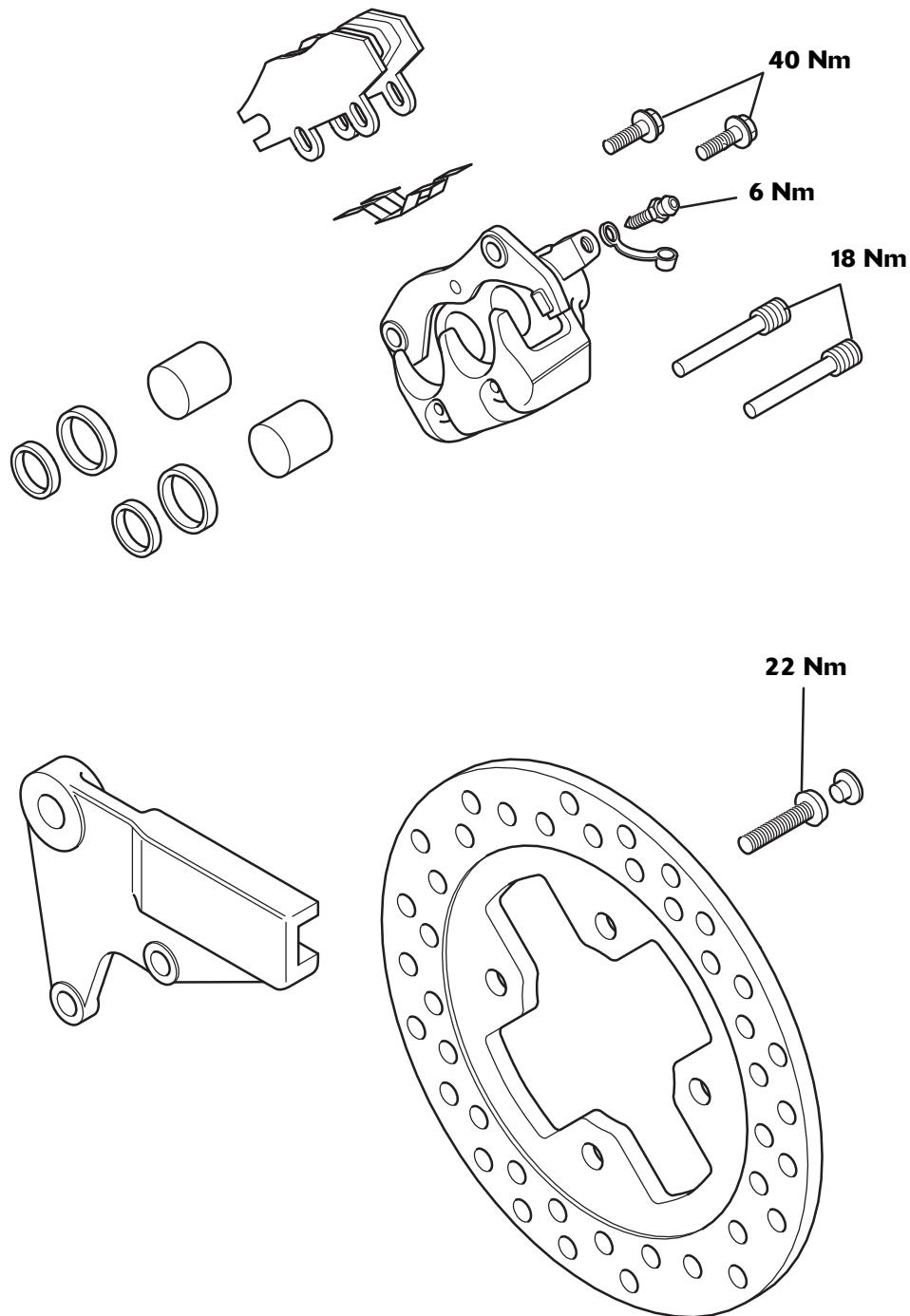


Exploded View - Front Brake Caliper and Disc - All Models Except Thruxton

Brakes

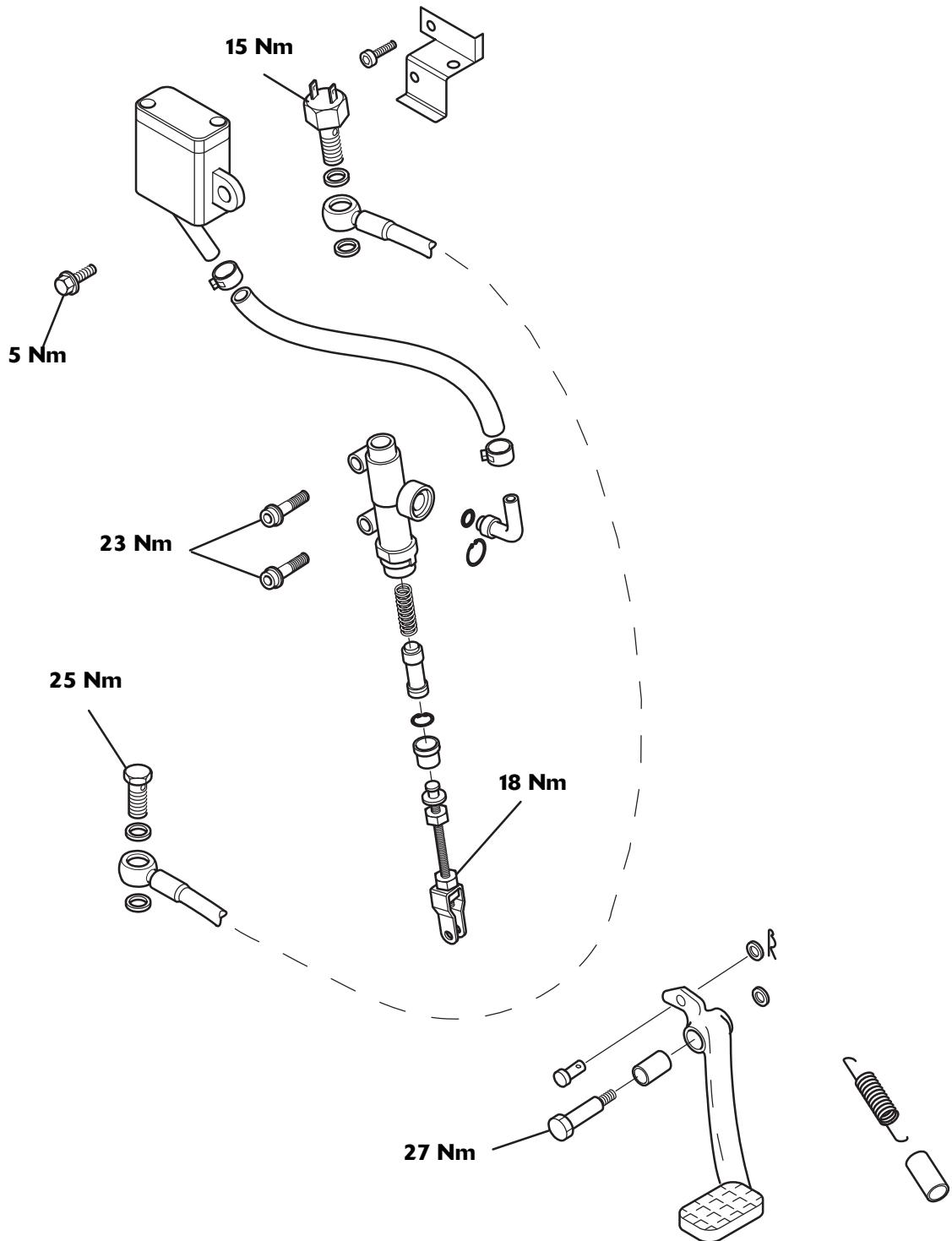
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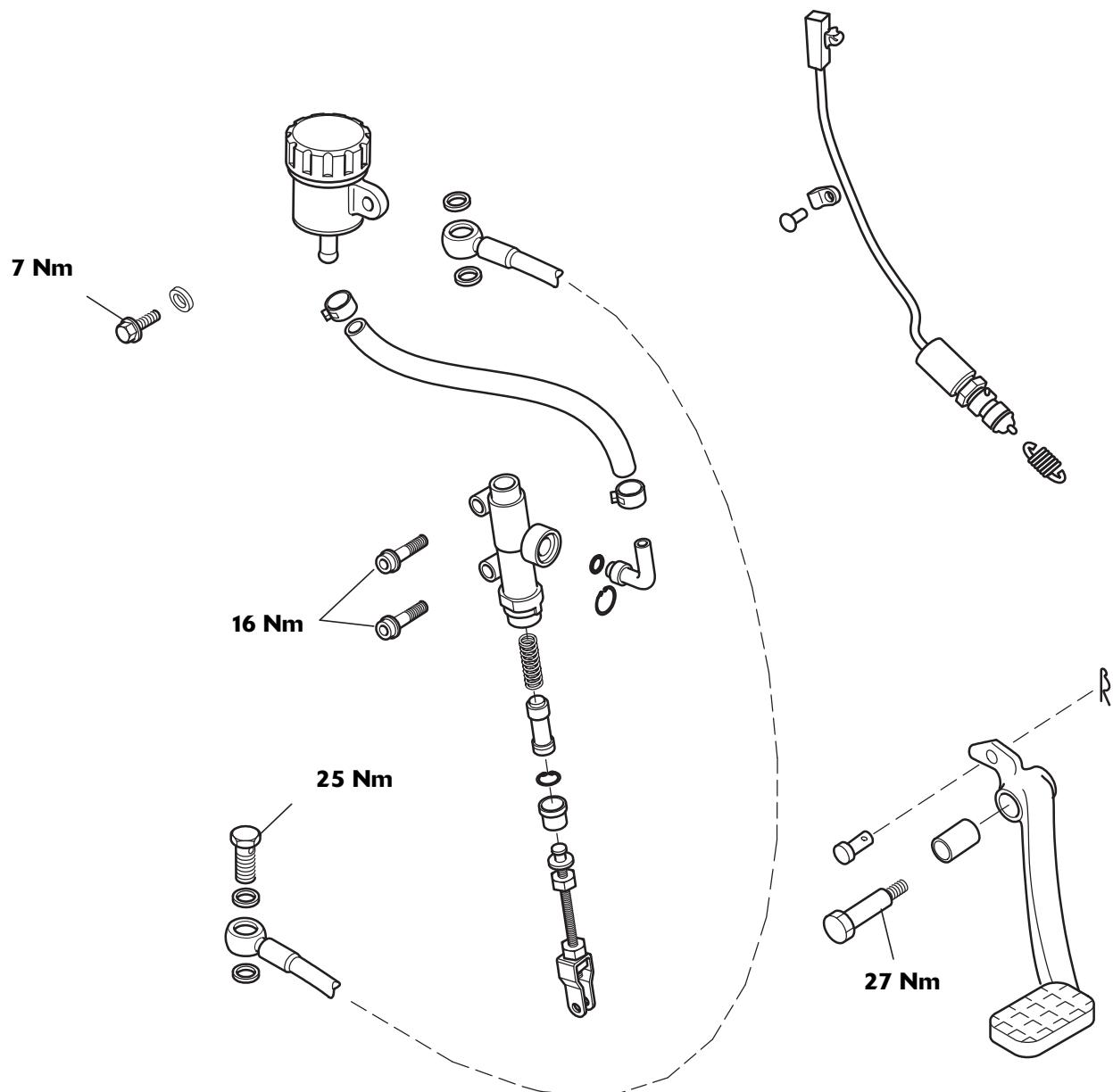


Exploded View - Rear Brake Caliper and Disc

Brakes

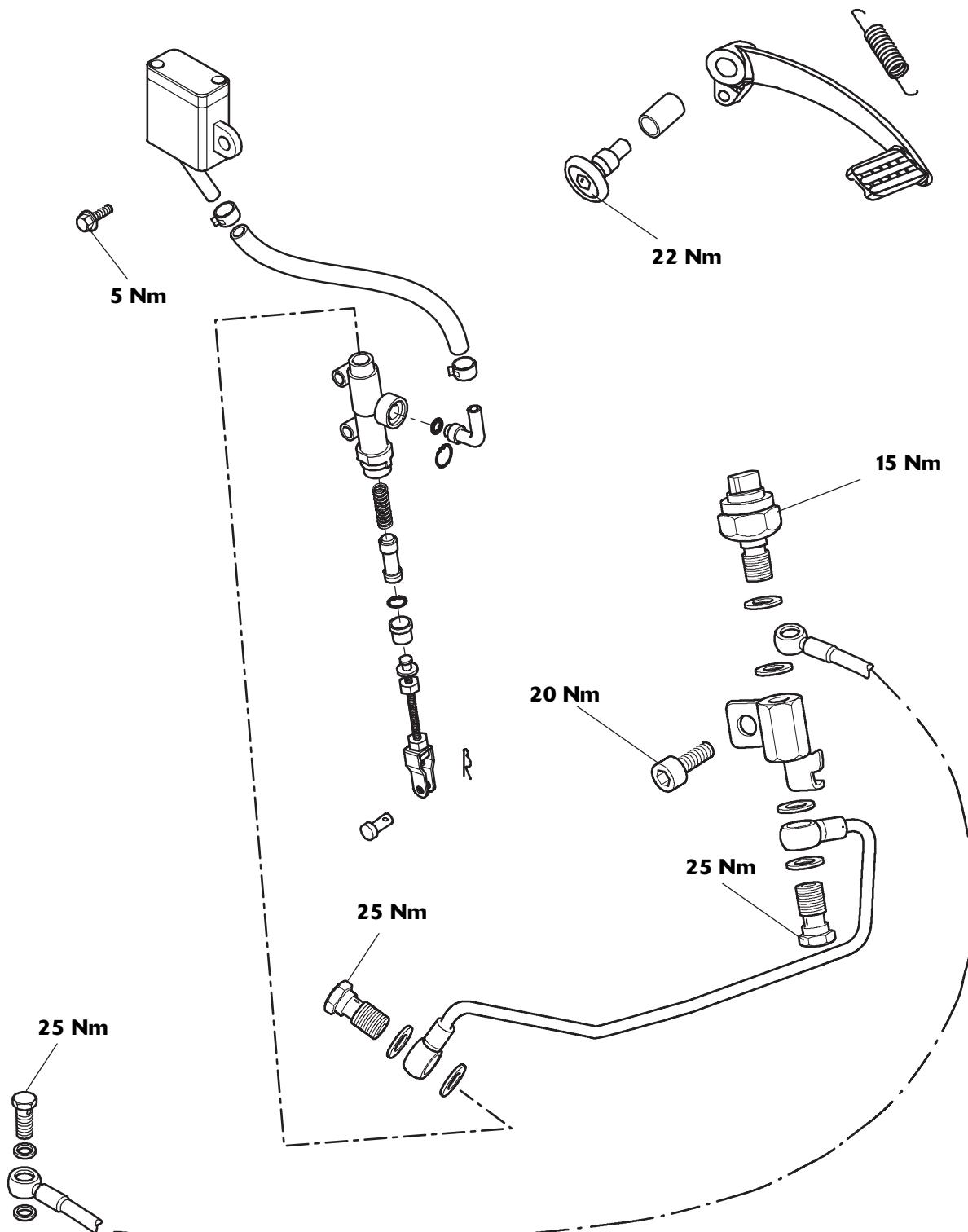
Exploded View - Rear Brake Master Cylinder and Hose - Bonneville, Bonneville SE & Bonneville T100



Exploded View - Rear Brake Master Cylinder and Hose - Scrambler

Brakes

Exploded View - Rear Brake Master Cylinder and Hose - Thruxton



Braking System Safety Precautions



Warning

FAILURE TO OBSERVE ANY OF THE FOLLOWING WARNINGS WILL LEAD TO A REDUCTION IN BRAKING EFFICIENCY WHICH COULD RESULT IN AN ACCIDENT.



Warning

Use only DOT 4 specification brake fluid in the front and rear brakes. When adding fluid, always use new brake fluid from a sealed container and ensure absolute cleanliness. Never use fluid from an unsealed container.



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. Because of this it is essential that the brake fluid is renewed at the specified intervals (see maintenance schedule).



Warning

Regularly check the fluid levels in both reservoirs. If the fluid level is noted to have dropped rapidly, carry out a thorough leak check of all components (the fluid level will drop slowly as the pads wear but should never decrease suddenly). Rectify any problems before riding the motorcycle.



Warning

If it is noted that the brake lever or pedal feel soft when applied, or the lever/pedal travel has become excessive, there may be air in the brake lines. Bleed the brake to remove the trapped air. If this fails to improve the situation, overhaul the master cylinder/brake caliper.



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.



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.



Caution

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface. In the event of a spill, wipe off the brake fluid immediately and wash the affected area with plenty of water to prevent cosmetic damage.

Brakes

Brake Fluid Level Check

Note:

- **Read through the safety precautions before proceeding.**
- **When checking or adjusting the brake fluid level, always keep the reservoir level and upright.**

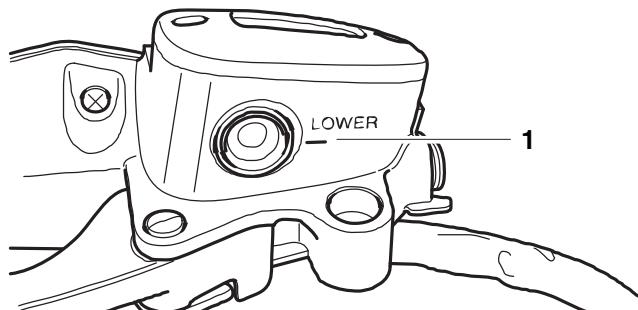
Front Brake

1. With the reservoir level and upright, check the level of brake fluid visible at the front of the reservoir body. The fluid level must be kept above the lower level mark.

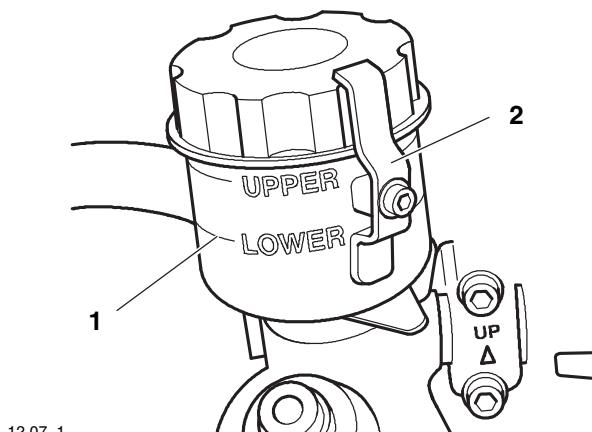


Warning

Never ride the motorcycle if the fluid level is below the lower level mark. If the fluid level is incorrect, braking efficiency will be adversely affected which could result in an accident.

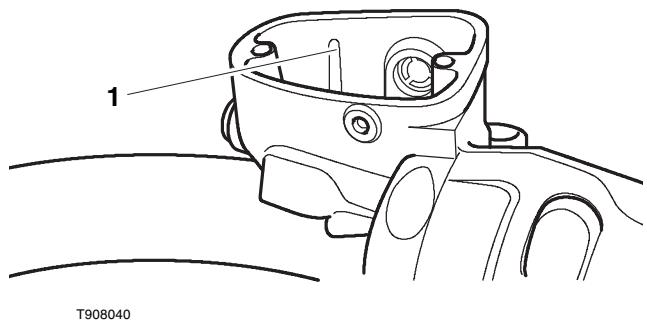


1. Lower level mark - Bonneville (up to VIN 380776), Bonneville T100, Thruxton (with high handlebars)



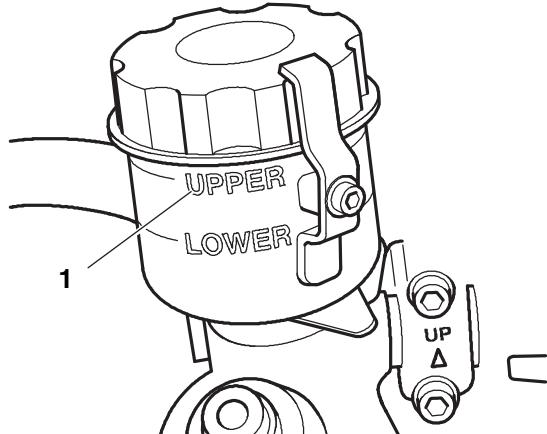
1. Lower level mark - Bonneville (from VIN 380777), Bonneville SE, Scrambler and Thruxton (with low handlebars)
2. Security clip

2. To adjust the fluid level, remove the reservoir cover (on Bonneville (from VIN 380777), Bonneville SE, Scrambler and Thruxton (with low handlebars), remove the security clip from the reservoir).
3. Remove the rubber diaphragm from the reservoir, taking care not to spill any fluid.
4. Top-up the fluid level to the upper level mark using only new DOT 4 fluid from a sealed container.



T908040

1. Upper level mark - Bonneville (up to VIN 380776), Bonneville T100, Thruxton (with high handlebars)



12.07-1

1. Upper level mark - Bonneville (from VIN 380777), Bonneville SE, Scrambler and Thruxton (with low handlebars)
5. Once the fluid level is correct, wipe clean the rubber diaphragm and seat it correctly in the top of the reservoir. Fit the cap to the reservoir (on Bonneville (from VIN 380777), Bonneville SE, Scrambler and Thruxton (with low handlebars), refit the security clip).

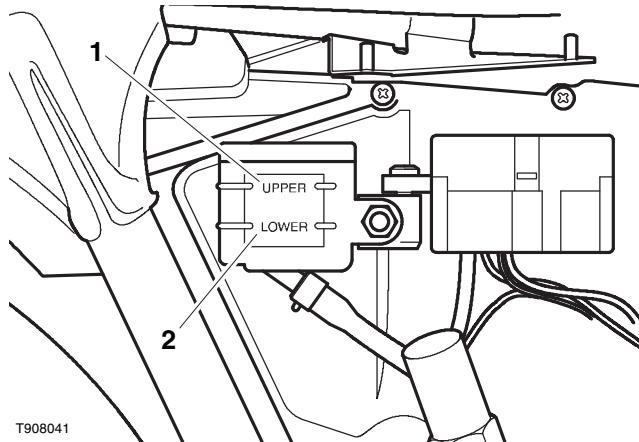
Rear Brake - All Models Except Scrambler

1. Remove the right hand side cover (see page 16-14).
2. With the reservoir level, check the brake fluid level. The fluid level must be kept between the upper and lower level marks.



Warning

Never ride the motorcycle if the fluid level is above the upper level mark or below the lower level mark. If the fluid level is incorrect, braking efficiency will be adversely affected which could result in an accident.



1. **Upper level mark**
2. **Lower level mark**

3. To adjust the fluid level, remove the reservoir mounting screw and free the reservoir from the airbox. Undo the screws then lift off the reservoir cover and remove the rubber diaphragm, taking care not to spill any fluid.
4. Top-up the fluid level using only new DOT 4 fluid from a sealed container.
5. Once the fluid level is correct, wipe clean the rubber diaphragm and seat it correctly in the top of the reservoir. Fit the cap to the reservoir, tightening the retaining screws securely, then refit the reservoir mounting screw and tighten to **5 Nm**.
6. Refit the side cover (see page 16-14).

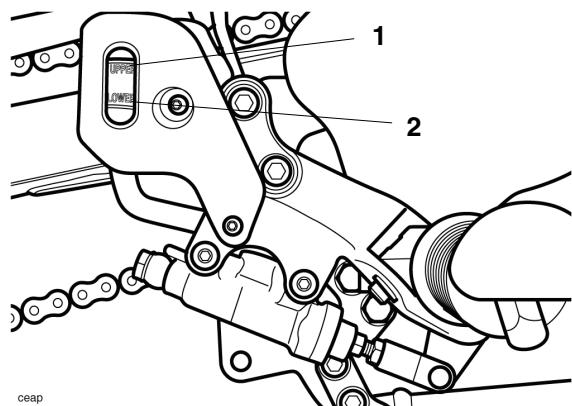
Rear Brake - Scrambler

1. With the reservoir level, check the brake fluid level. The fluid level must be kept between the upper and lower level marks.



Warning

Never ride the motorcycle if the fluid level is above the upper level mark or below the lower level mark. If the fluid level is incorrect, braking efficiency will be adversely affected which could result in an accident.



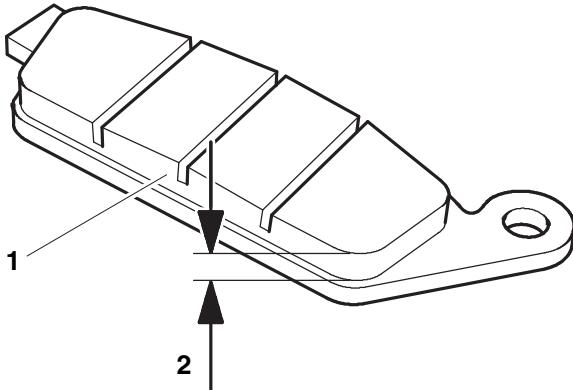
1. **Upper level mark**
2. **Lower level mark**

3. To adjust the fluid level, remove the screws securing the reservoir cover to the frame. Remove the cover, the reservoir cap and the rubber diaphragm, taking care not to spill any fluid.
4. Top-up the fluid level using only new DOT 4 fluid from a sealed container.
5. Once the fluid level is correct, wipe clean the rubber diaphragm and seat it correctly in the top of the reservoir. Fit the cap to the reservoir, then refit the reservoir cover to the frame tightening the screws to **3 Nm**.

Brakes

Brake Pad Wear Check

- Carry out a visual inspection of the front and rear brake pad friction material thickness. The minimum thickness of lining material for any brake pad is 1.5 mm.



- Brake pad**
- Friction material thickness (service limit 1.5 mm)**
- If any pad is worn beyond the specified limit, renew the pads as a set.

Brake Bleeding and Fluid Renewal

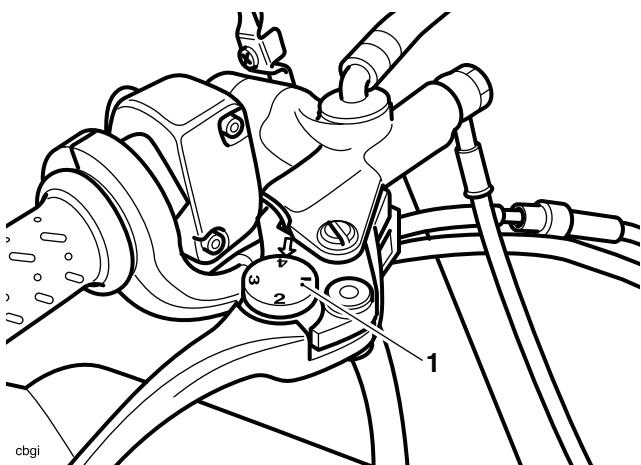
Front Brake Bleeding

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:

- Read through the safety precautions before proceeding.**
- On models fitted with an adjustable brake lever, note the original setting of the brake lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the brake lever adjuster to position No. 1.



1. Adjuster (Thruston shown)

- Turn the handlebars to bring the brake fluid reservoir to a level position.
- Remove the cap and rubber diaphragm from the reservoir, taking care not to spill any fluid.
- Top the fluid level up to the upper level mark using new DOT 4 fluid.



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 which has been previously opened.

Always check for fluid leakage around hydraulic fittings and for damage to hoses. Rectify faults as necessary before riding.

A dangerous riding condition leading to an accident could result if this warning is ignored.



Caution

To prevent body damage, do not spill brake fluid onto any area of the bodywork.

Note:

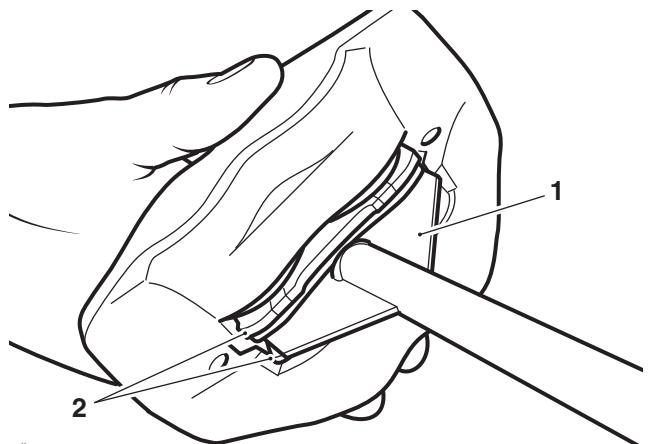
- **Ensure the fluid level is kept above the lower level mark at all times during bleeding. If the level is allowed to fall below the lower mark, air may enter the system and the bleeding operation will have to be restarted.**
- 5. Undo and remove the bolts securing the front brake caliper to the fork 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 then 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.**
- 10. Get an assistant to slowly pull the brake lever to the handlebar.
- 11. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
- 12. Repeat steps 10 to 12 until no more air appears in the bleed tube.
- 13. When all the air has been expelled from the system, hold the brake lever in and close the bleed nipple.
- 14. Remove the transparent bleed tube.
- 15. Using the flat metal plate, gently push the brake pads apart to allow clearance for the brake disc when the caliper is refitted.

Brakes



Warning

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 the wheel.

16. Secure the caliper to the front fork using the original fixings. Tighten the fixings to **28 Nm**.
17. Refit the transparent bleed tube and repeat steps 10 to 12 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.**
18. Remove the transparent bleed tube and tighten the bleed nipple to **6 Nm** then refit the rubber cap.
 19. Fill the reservoir to the upper 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 an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

20. Wipe clean the rubber diaphragm and seat it correctly in the top of the reservoir. Refit the reservoir cap.
21. On models fitted with an adjustable brake lever, reset the brake lever adjuster to the original setting.
22. Check that the brake operates correctly.



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.

Note:

- **If extensive bleeding fails to improve the feel of the brake lever, it is likely that the master cylinder seals are worn.**

Rear Brake Bleeding



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:

- **Refer to the safety precautions before proceeding.**
1. Remove the right hand side cover (Bonneville, Bonneville SE, Bonneville T100 & Thruxton only) (see page 16-14).
 2. Remove the reservoir mounting screw and free the reservoir from the airbox (Bonneville, Bonneville SE, Bonneville T100 & Thruxton only). On Scrambler, it is not necessary to remove the rear brake fluid reservoir to bleed the brakes.
 3. Whilst ensuring that the reservoir remains upright, remove the reservoir cover and diaphragm, taking care not to spill any fluid.
 4. On Scrambler, remove the screws securing the reservoir cover to the frame. Remove the cover, the reservoir cap and the rubber diaphragm, taking care not to spill any fluid.
 5. Remove the dust cap from the rear brake caliper bleed nipple.
 6. Attach a transparent tube to the bleed nipple.
 7. Place the other end of the tube in a container partially filled with new brake fluid. Keep the tube end below the level of fluid.
 8. Position the fluid reservoir so that it is level then top the fluid level up to the upper level mark using new DOT 4 fluid.



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 which has been previously opened.

Always check for fluid leakage around hydraulic fittings and for damage to hoses. Rectify faults as necessary before riding.

A dangerous riding condition leading to an accident could result if this warning is ignored.



Caution

To prevent body damage, do not spill brake fluid onto any area of the bodywork.

Note:

- **Ensure the fluid level is kept above the lower level mark at all times during bleeding. If the level is allowed to fall below the lower mark, air may enter the system and the bleeding operation will have to be restarted.**
- 9. Hold the brake pedal gently down then loosen the bleed nipple until fluid is expelled from the nipple.
- 10. Slowly pump the brake pedal a few times then hold it down and tighten the bleed nipple.
- 11. Repeat steps 9 and 10 until no more air is visible in the fluid exiting the bleed nipple.
- 12. Check the operation of the brake pedal. If the pedal feels soft, or there is excessive lever travel before the brake is applied, there is still air in the system. Repeat the bleeding procedure.



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.

Note:

- **If extensive bleeding fails to improve the feel of the brake pedal, it is likely that the master cylinder seals are worn.**
- 13. When the brake operation is correct, disconnect the tube. Tighten the bleed nipple to **6 Nm** and refit the dust cap.
- 14. Fill the reservoir to the upper 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 an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

15. Wipe clean the rubber diaphragm and seat it correctly in the top of the reservoir.
16. Fit the cap to the reservoir and securely tighten (on Bonneville, Bonneville SE, Bonneville T100 & Thruxton tighten the cap retaining screws).
17. Refit the side cover (Bonneville, Bonneville SE, Bonneville T100 & Thruxton only) (see page 16-14).

Brakes

Brake Fluid Renewal (front or rear brake)

1. The brake fluid must be regularly renewed (see maintenance schedule) to ensure safe braking.
2. Brake fluid renewal is essentially the same as bleeding. Prior to starting the procedure, empty the fluid reservoir and fill with new fluid. Repeat the bleeding process until new (clean) fluid is seen to be exiting the bleed nipple.

Front Brake Pads

Note:

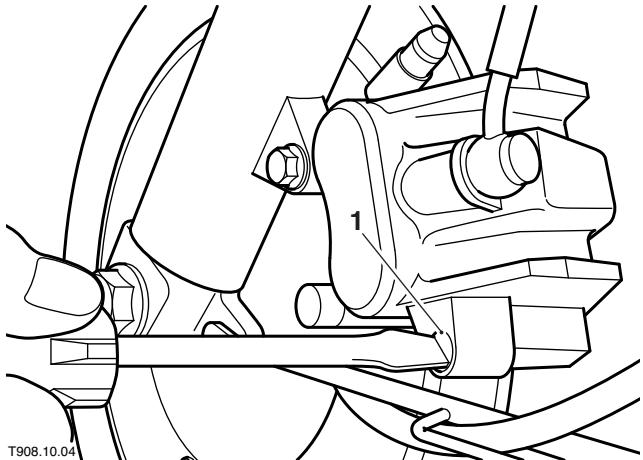
- **Read through the safety precautions before proceeding.**

Removal

! Warning

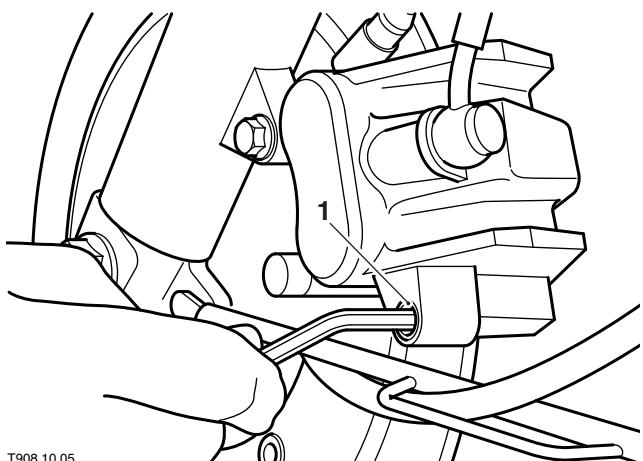
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Unscrew the pad retaining pin plug from the caliper.



1. Pad retaining pin plug

2. Loosen the pad retaining pin.

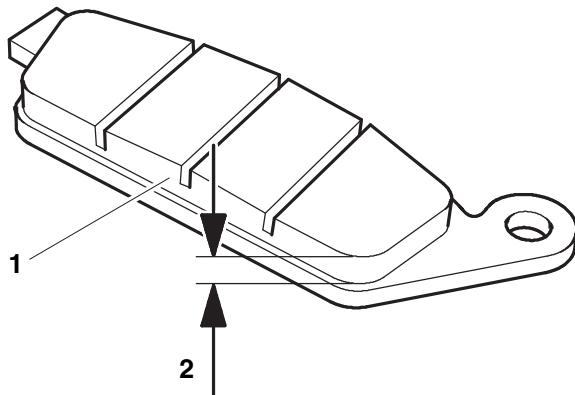


1. Pad retaining pin

3. Slacken and remove the caliper mounting bolts and slide the caliper off the disc.
4. Remove the pad retaining pin and remove the pads from the caliper. Take care not to lose the pad retainer from the mounting bracket or the anti-rattle spring from the caliper body.

Inspection

- Check the friction material of each pad for signs of contamination and measure its thickness. If the friction material of either pad is contaminated or has worn beyond the service limit, renew both pads as a set.



- Brake pad**
- Friction material thickness (service limit 1.5 mm)**

- Check the pad retainer, anti-rattle spring and retaining pin. Renew any component which shows signs of damage or corrosion.
- Check the caliper body slides easily on the mounting bracket pins and check there is no sign of leakage from the piston seals. Rectify any problems before installing the pads.

Installation

- If new pads are being installed, push the pistons fully back into the caliper body. Keep an eye on the fluid level in the reservoir whilst retracting the pistons to prevent fluid spillage.
- Ensure the pad retainer is correctly fitted to the mounting bracket and the anti-rattle spring is securely clipped onto the caliper body.
- Lubricate the pad retaining pin with a thin smear of proprietary high-temperature brake grease.

Warning

Do not apply more than a minimum coating of grease to the pad retaining pin. Excess grease may contaminate the brake pads, hydraulic seals and disc causing reduced braking efficiency which may lead to loss of control and an accident.

- Fit the pads to the caliper with their friction material surfaces facing each other. Locate the pad upper ends in the mounting bracket retainer then align them with the caliper body and insert the retaining pin.
- Slide the caliper onto the disc, ensure the pads pass either side, and fit the mounting bolts. Tighten the mounting bolts to **28 Nm**.
- Tighten the pad retaining pin to **18 Nm**.
- Fit the pad retaining pin plug to the caliper and tighten to **3 Nm**.
- Apply the front brake lever several times to force the pads back into contact with the disc.
- Check the front brake fluid level, adjust as necessary.

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.

Brakes

Front Brake Caliper

Note:

- **Read through the safety precautions before proceeding.**

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. Unscrew the banjo bolt and disconnect the brake hose from the caliper. Place the hose end in a suitable container to collect brake fluid and discard the sealing washers.
2. If the caliper is to be overhauled, remove the brake pads (see page 11-18) and remove the caliper from the motorcycle.
3. If not, unscrew the mounting bolts and remove the caliper complete with pads.

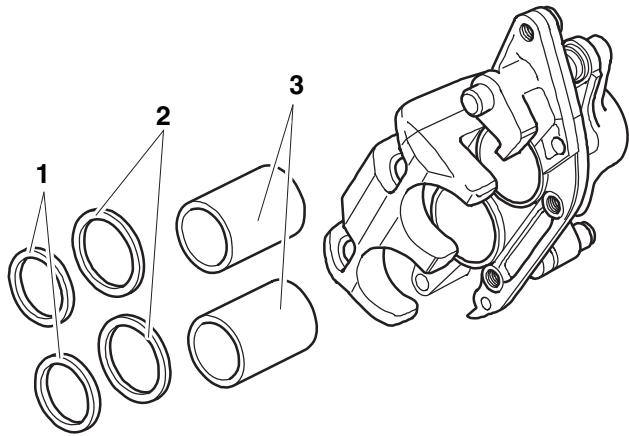
Overhaul

1. Separate the caliper and mounting bracket.
2. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, eject both pistons from the caliper at the same time.



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.



1. **Dust seals**
2. **Piston seals**
3. **Pistons**

3. Extract the dust seals and piston seals, taking care not to damage the caliper bores.
4. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.
5. If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows.



Warning

Always renew caliper seals after removal of the pistons. An effective hydraulic seal can only be made if new seals are fitted.

A dangerous riding condition leading to an accident could result if this warning is ignored.



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.

6. Ensure all components are clean and dry, then fit the new seals to their grooves in the caliper bores.
7. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
8. Ease the pistons squarely back into the bores, taking care not to displace the seals.



Warning

Never use mineral based grease (such as lithium or copper based greases) 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 and dust seals in the calipers and master cylinders. Damage caused by contact with mineral based grease may reduce braking efficiency resulting in an accident.

9. Lubricate the mounting bracket pins with silicone based grease (such as T2022021 supplied by Triumph) then reassemble the bracket and caliper. Ensure the pin gaiters are correctly located on both the bracket and caliper.

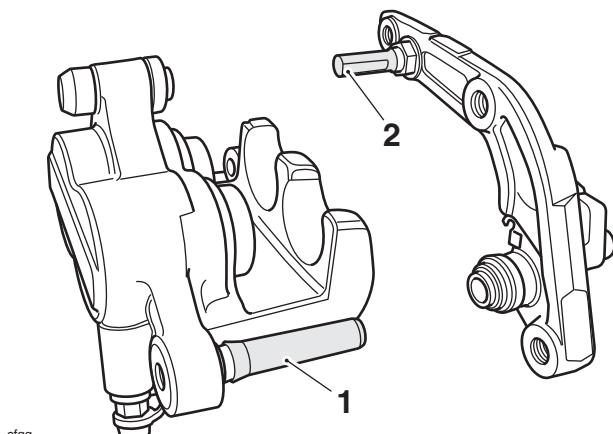
Installation

1. If the caliper has been overhauled, install the brake pads (see page 11-19).
2. Slide the caliper onto the disc, ensure the pads pass either side, and fit the mounting bolts. Tighten the mounting bolts to **28 Nm**.
3. Position a new sealing washer on each side of the brake hose end fitting then secure the hose to the caliper with the banjo bolt. Tighten the banjo bolt to **25 Nm**.
4. Bleed the front brake (see page 11-14).
5. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.



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.



1. Caliper sliding pin
2. Caliper bracket sliding pin

Brakes

Front Brake Master Cylinder - Bonneville (up to VIN 380776), Bonneville T100, Thruxton (with high handlebars)

Note:

- Read through the safety precautions before proceeding.

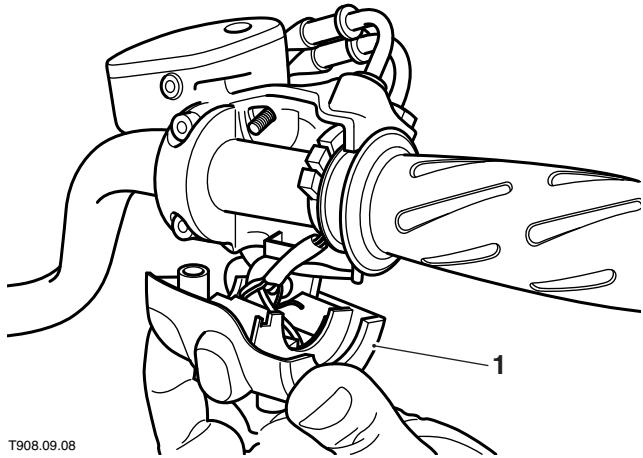
Removal



Warning

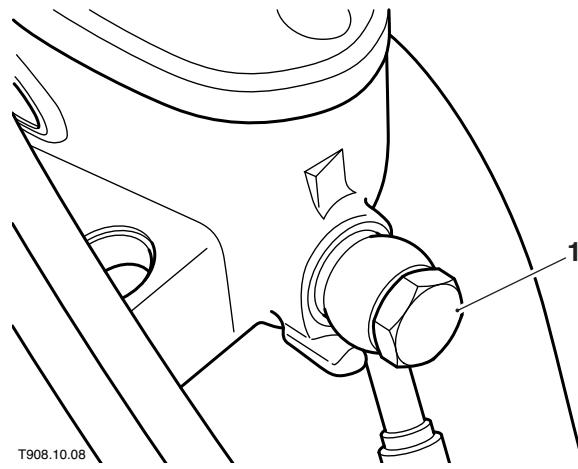
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the mirror (see page 16-28).
2. Undo the screws and free the right hand switch gear assembly from the master cylinder.



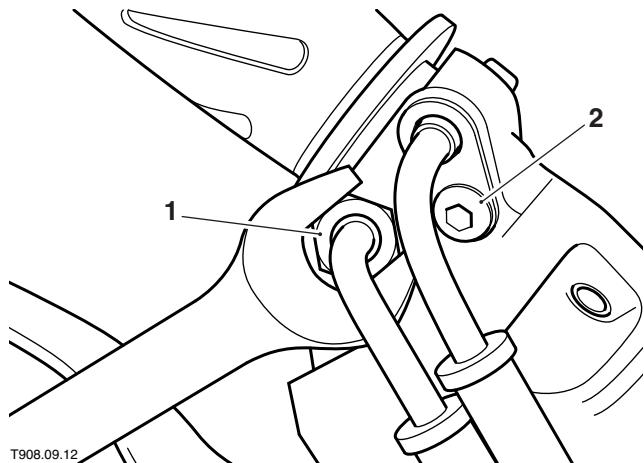
1. Right hand switch gear assembly

3. Disconnect the wiring from the front brake light switch.
4. Position a cloth beneath the hose to catch any spilt fluid then unscrew the banjo bolt and disconnect the brake hose from the master cylinder. Discard the sealing washers and keep the hose upright to minimise fluid loss.



1. Banjo bolt

5. Slacken the reservoir cover screws.
6. Slacken the nut and screw securing the throttle cables to the master cylinder.



1. Closing cable nut
2. Opening cable screw

7. Undo the screws and remove the master cylinder mounting clamp.
8. Free the throttle cables from the twist grip and free the master cylinder from the handlebars.

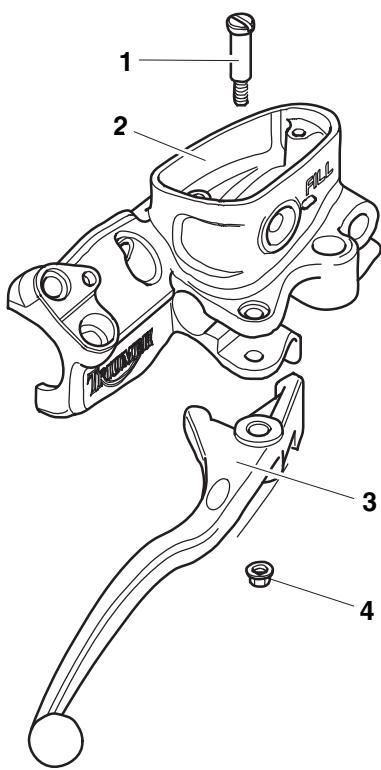
Note:

- Keep the master cylinder upright to prevent fluid spillage.
- If necessary, free the throttle cables from the carburettor bracket to gain the necessary freeplay to allow them to be disconnected from the twist grip.

9. Remove the screw and slacken the nut then detach the throttle cables from the master cylinder.
10. Remove the master cylinder then lift off the reservoir cover and diaphragm and empty its contents into a suitable container.

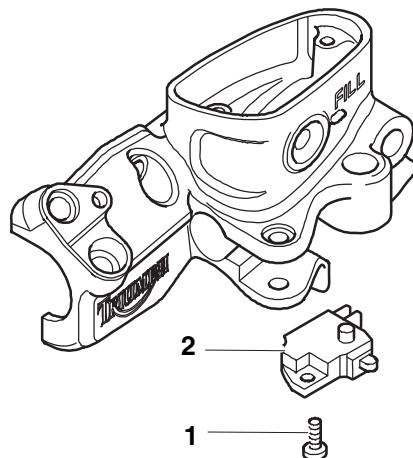
Overhaul

1. Unscrew the lock nut then unscrew the pivot bolt and remove the brake lever.



1. Pivot bolt
2. Master cylinder
3. Brake lever
4. Lock nut

2. Undo the screw and remove the brake light switch.



1. Screw
2. Brake light switch
3. Remove the boot from the end of the master cylinder bore.
4. Remove the circlip then withdraw the piston assembly and spring, noting the fitted position of all parts.
5. Check all components for signs of damage, paying particular attention to the cylinder bore and piston assembly. If the master cylinder bore is damaged, renew the complete assembly.
6. If the master cylinder is serviceable, obtain a new piston kit and reassemble as follows.



Warning

Always renew the piston assembly every time it is removed. An effective hydraulic seal can only be made if a new assembly is fitted.

A dangerous riding condition leading to an accident could result if this warning is ignored.



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.

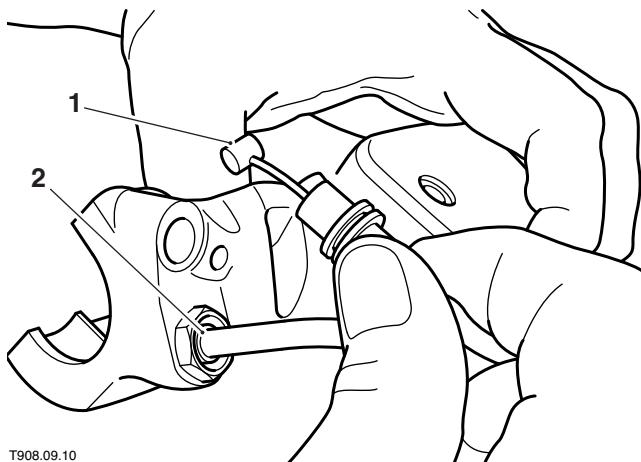
7. Ensure all components are clean and dry.
8. Lubricate the new piston assembly and the cylinder bore with clean DOT 4 brake fluid.

Brakes

9. Fit the new spring ensuring its tapered end is facing the piston assembly.
10. Ensure the piston assembly is the correct way around then ease it into the master cylinder with a twisting motion. Take great care not to displace the seals as they enter the bore.
11. Secure the piston assembly in position with the circlip, ensuring it is correctly located in the cylinder groove.
12. Lubricate the piston end with brake grease then fit the dust boot. Ensure the boot is correctly located in the cylinder bore and on the piston.
13. Refit the brake light switch.
14. Lubricate the brake lever pivot with brake grease and fit the lever. Insert the pivot bolt and tighten to **1 Nm** then fit the lock nut to the bolt and tighten it to **6 Nm**.

Installation

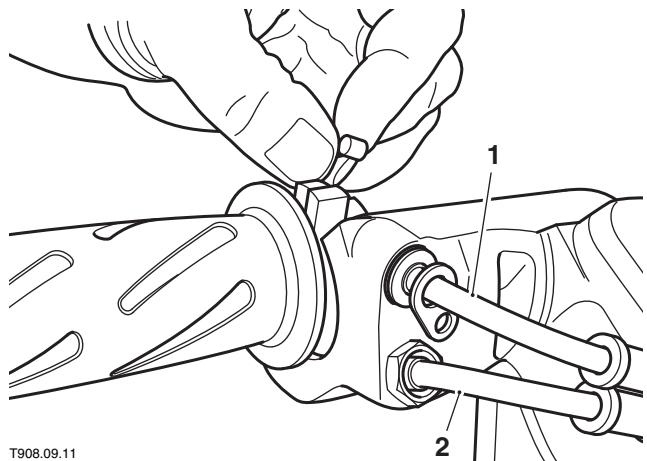
1. Fit the throttle cables to the master cylinder, tightening the retaining screw/nut securely.



T908.09.10

1. **Opening cable**
2. **Closing cable**

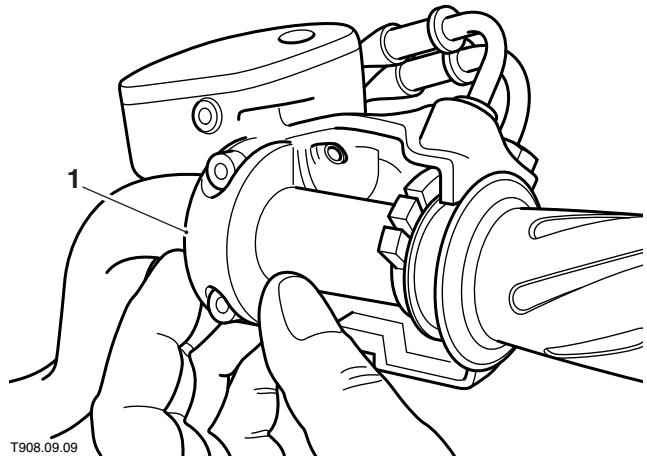
2. Connect the cables to the twist grip then seat the master cylinder on the handlebars.



T908.09.11

1. **Closing cable**
2. **Opening cable**

3. Fit the mounting clamp and bolts. Align the clamp upper split with the punch mark on the handlebar then evenly tighten the clamp bolts to **12 Nm**.



T908.09.09

1. **Master cylinder mounting clamp**

4. Refit the switch gear assembly to the master cylinder, tightening the screws to **2.5 Nm**.
5. Position a new sealing washer on each side of the brake hose end fitting then secure the hose to the master cylinder with the banjo bolt. Tighten the banjo bolt to **25 Nm**.
6. Fill the reservoir with clean DOT 4 brake fluid then bleed the front brake (see page 11-14).
7. Check the throttle cable operation and adjust the cable freeplay (see page 10A-16 for carburettor models or page 10B-93 for fuel injected models).



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 which binds will restrict the steering and may cause loss of control and an accident.

8. Install the rear view mirror tightening its screw to **10 Nm**.
9. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.



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 - Bonneville (from VIN 380777), Bonneville SE, Thruxton (with low handlebars) & Scrambler

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 mirror.



Caution

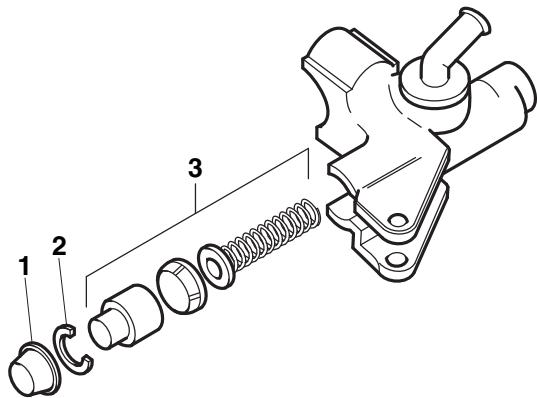
To prevent body/paint damage, do not spill brake fluid onto any area of the bodywork or other painted or plastic surface.

2. To drain the fluid from the master cylinder, attach a tube to the 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.
3. Note the setting of the brake lever adjuster to ensure it is returned to the same position when the overhaul operation is complete.
4. Remove the pivot lock nut and bolt securing the brake lever to the master cylinder. Remove the lever.
5. Disconnect from the master cylinder the:
 - brake hose
 - brake light switch connections
 - reservoir hose.
6. Release the clamp screws from the handlebar and collect the master cylinder.

Brakes

Disassembly

1. Detach the boot from the lever end of the cylinder.
2. Remove the circlip from beneath the boot.
3. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.



1. Boot
2. Circlip
3. Piston set

Inspection

1. Check the following for wear, damage, cracks or deterioration:
 - Cylinder bore
 - Dust cover
 - Spring
 - Piston
 - Pivot bolt
2. Always renew the piston and seal set if the cylinder is dismantled.
3. Check that the relief and supply ports on the cylinder are not blocked.

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 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 an accident could result from incorrect assembly of the master cylinder.



Warning

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

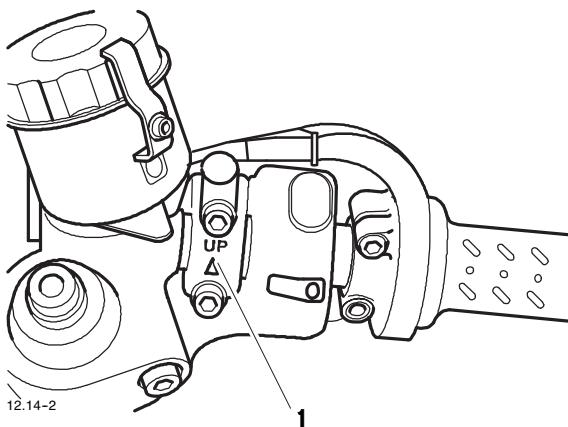
Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

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

2. Fit the new piston set into the master cylinder and retain with a new circlip.
3. Refit the master cylinder boot.

Installation

1. Locate the master cylinder to the handlebars and position the clamp with the "UP" arrow pointing upwards. Align the master cylinder to clamp split line with the dot mark on the handlebar.



1. 'Up' arrow mark (Thrushon shown)

2. Tighten the clamp bolts, upper first and then the lower, to **12 Nm**.
3. Connect the brake light switch.
4. Position the brake lever ensuring that the pivot boss is correctly aligned to the push rod. Fit and tighten the pivot bolt to **1 Nm**, and the lock nut to **6 Nm**.

- Connect the brake hose to the master cylinder incorporating new sealing washers. Tighten the banjo bolt to **25 Nm**.



Warning

To prevent brake fluid leaks from the reservoir hose, ensure the reservoir hose clip is correctly positioned over the joint with the master cylinder.

An incorrectly positioned hose clip could cause a brake fluid leak and impaired brake performance, resulting in loss of motorcycle control and an accident.

- Reconnect the reservoir hose.
- Fill the master cylinder reservoir with new DOT 4 brake 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 an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

- Bleed the front brakes as described earlier in this section.



Warning

Always return the lever adjuster to the original setting noted during removal. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

- Refit the mirror.
- Return the brake lever adjuster to the setting previously noted.
- Examine the system for correct operation and fluid leaks. 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 Disc

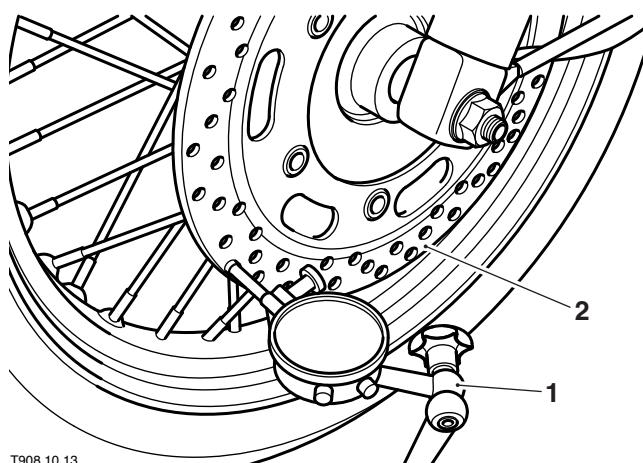
Inspection

- Support the motorcycle on a stand so the front wheel is raised clear of the ground. Using a dial gauge, rotate the wheel and measure the disc runout.



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.



T908.10.13

- Brake disc**
- Dial gauge**

Disc Run-out - All Except Thruxton

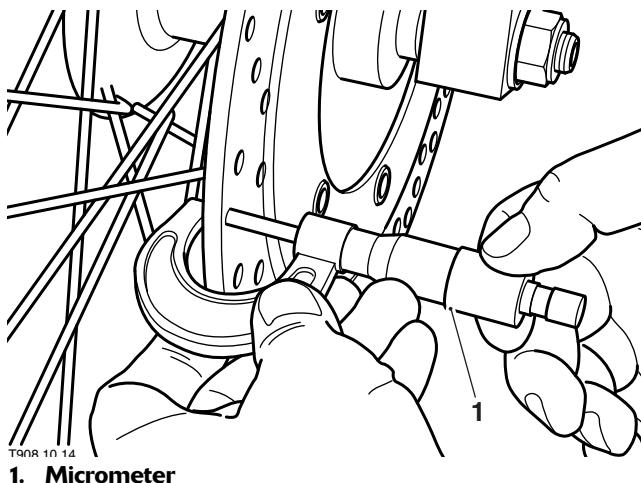
Standard	Less than 0.15 mm
Service limit	0.30 mm

Disc Run-out - Thruxton

Standard	Less than 0.10 mm
Service limit	0.30 mm

Brakes

- Using a micrometer, measure the disc thickness at several points.



Disc Thickness - All Except Thruxton

Standard	5.50 mm
Service limit	5.00 mm

Disc Thickness - Thruxton

Standard	5.00 mm
Service limit	4.50 mm

- If the disc is warped or worn beyond the specified service limit, it must be renewed.

Note:

- Always replace all the front brake pads when replacing discs.**

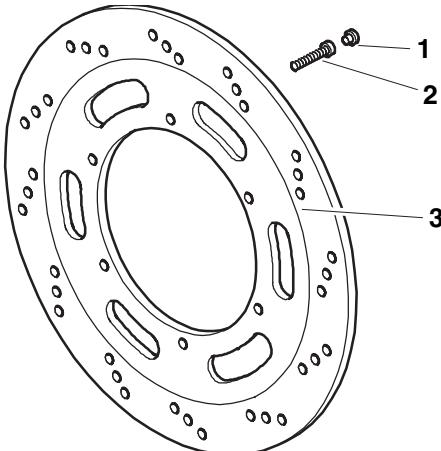
Removal

- Remove the front wheel (see page 15-10).

Caution

Never allow the weight of the wheel to rest on the disc as this could cause the disc to warp.

- Remove the trim caps from the disc retaining bolts.



1. Trim cap

2. Bolt

3. Disc

- Evenly and progressively slacken the retaining bolts then remove the disc from the wheel. Discard the bolts.

Installation

- Ensure the disc and wheel surfaces are clean.
- Fit the disc ensuring its marked surface is facing outwards.
- Fit the new retaining bolts and tighten them evenly and progressively to **22 Nm**.
- Fit a trim cap to each retaining bolt.
- Clean and degrease the disc(s) then refit the front wheel (see page 15-12).

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.

Rear Brake Pads

Note:

- Read through the safety precautions before proceeding.**

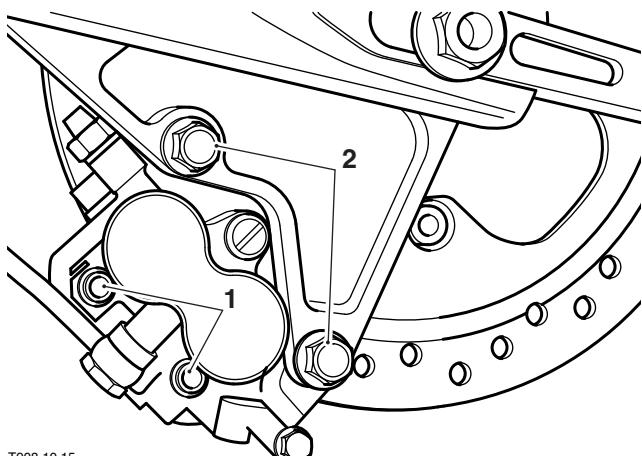
Removal



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 right hand side cover to gain access to the rear brake fluid reservoir (Bonneville, Bonneville SE, Bonneville T100 & Thruxton only) (see page 16-14).
2. Loosen the pad retaining pins.



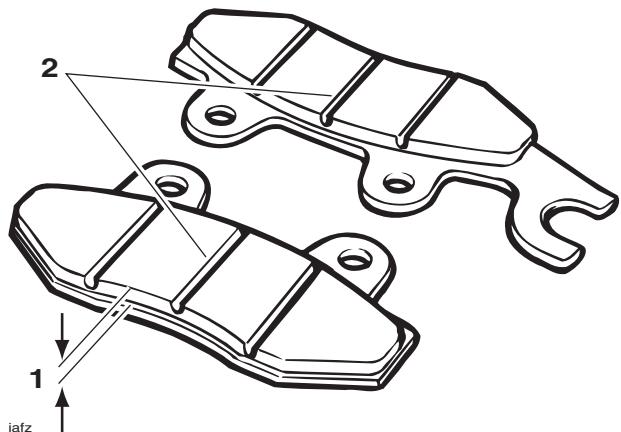
T908.10.15

1. Pad retaining pins
2. Caliper mounting bolts

3. Slacken and remove the caliper mounting bolts and slide the caliper off the disc.
4. Remove the pad retaining pins and withdraw the pads and anti-rattle spring from the caliper.

Inspection

1. Check the friction material of each pad for signs of contamination and measure its thickness. If the friction material of either pad is contaminated or has worn beyond the service limit, renew both pads as a set.



1. Friction material thickness (service limit 1.5 mm)

2. Brake pads

2. Check the anti-rattle spring and retaining pins. Renew any component which shows signs of damage or corrosion.
3. Check the caliper body slides easily on the mounting bracket pins and check there is no sign of leakage from the piston seals. Rectify any problems before installing the pads.

Installation

1. If new pads are being installed, push the pistons fully back into the caliper body. As the fluid level will rise when the pistons are retracted, keep an eye on the fluid level in the reservoir to prevent fluid spillage.
2. Lubricate the pad retaining pins with a thin smear of proprietary high-temperature brake grease.

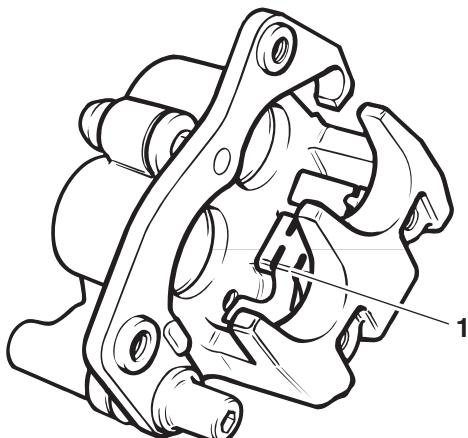


Warning

Do not apply more than a minimum coating of grease to the pad retaining pin. Excess grease may contaminate the brake pads, hydraulic seals and disc causing reduced braking efficiency which may lead to loss of control and an accident.

Brakes

- Fit the anti-rattle spring to the caliper.



gakw

1. Anti-rattle spring

- Fit the pads to the caliper with their friction material surfaces facing each other. Ensure both pads are correctly located then align them with the caliper body and insert the retaining pins.
- Slide the caliper onto the disc, ensure the pads pass either side, and fit the mounting bolts. Tighten the mounting bolts to **40 Nm**.
- Tighten the pad retaining pins to **18 Nm**.
- Apply the rear brake pedal several times to force the pads back into contact with the disc.
- Check the rear brake fluid level and adjust if necessary.
- Refit the side cover (Bonneville, Bonneville SE, Bonneville T100 & Thruxton only) (see page 16-14).
- Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.



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.

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.

Rear Brake Caliper

Note:

- Read through the safety precautions before proceeding.**

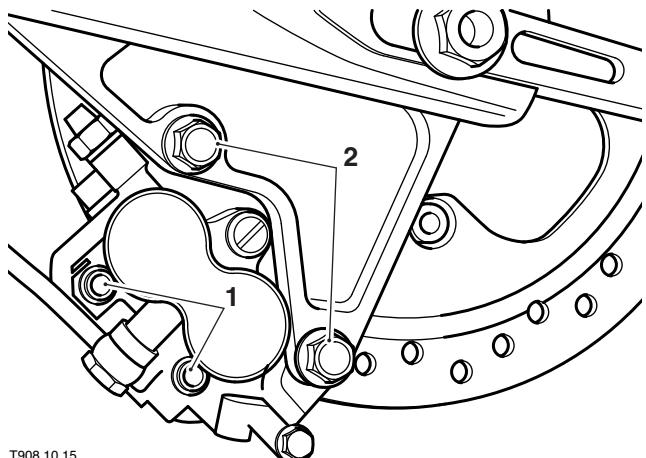
Removal



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.

- Unscrew the banjo bolt and disconnect the brake hose from the caliper. Place the hose end in a suitable container to collect brake fluid and discard the sealing washers.



T908.10.15

1. Pad retaining pins

2. Caliper mounting bolts

- If the caliper is to be overhauled, remove the brake pads and remove the caliper from the motorcycle.
- If not, unscrew the mounting bolts and remove the caliper complete with pads.

Overhaul

1. Separate the caliper and mounting bracket.
2. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, eject both pistons from the caliper at the same time.



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.

3. Extract the dust seals and piston seals, taking care not to damage the caliper bores.
4. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.
5. If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows.



Warning

Always renew caliper seals after removal of the pistons. An effective hydraulic seal can only be made if new seals are fitted.

A dangerous riding condition leading to an accident could result if this warning is ignored.



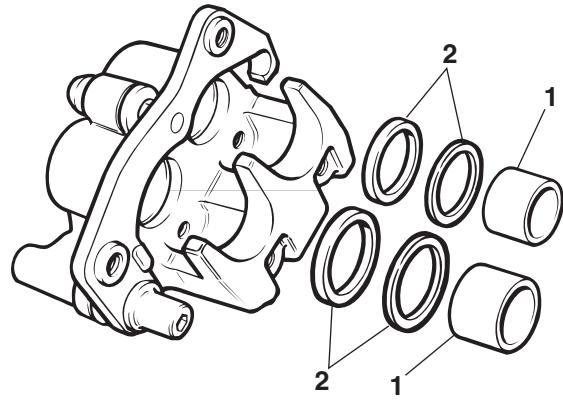
Warning

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.

6. Ensure all components are clean and dry then fit the new seals to their grooves in the caliper bores.



gaec

1. Pistons

2. Seals

7. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
8. Ease the pistons squarely back into the bores, taking care not to displace the seals.



Warning

Never use mineral based grease (such as lithium or copper based greases) 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 and dust seals in the calipers and master cylinders. Damage caused by contact with mineral based grease may reduce braking efficiency resulting in an accident.

9. Lubricate the mounting bracket pins with silicone based grease (such as T2022021 supplied by Triumph) then reassemble the bracket and caliper. Ensure the pin gaiters are correctly located on both the bracket and caliper.

Installation

1. If the caliper has been overhauled, install the brake pads.
2. Slide the caliper onto the disc, ensure the pads pass either side, and fit the mounting bolts. Tighten the mounting bolts to **40 Nm**.
3. Position a new sealing washer on each side of the brake hose end fitting then secure the hose to the caliper with the banjo bolt. Tighten the banjo bolt to **25 Nm**.
4. Bleed the rear brake (see page 11-16).
5. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.

Brakes

Rear Brake Master Cylinder

Note:

- **Read through the safety precautions before proceeding.**

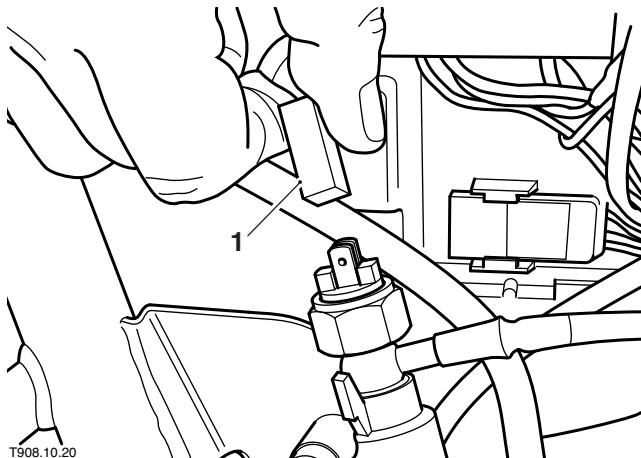
Removal - Bonneville, Bonneville SE & Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions)



Warning

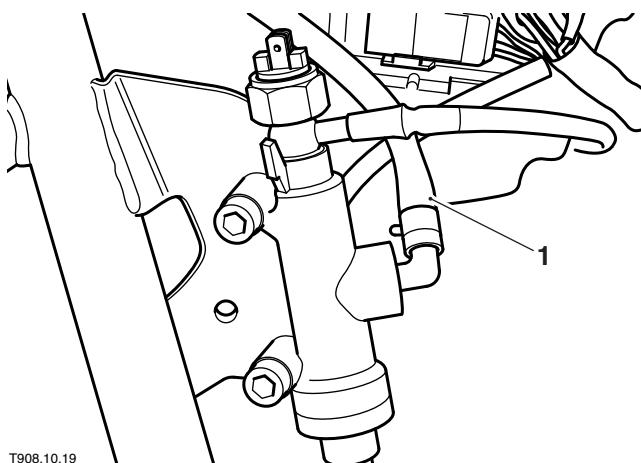
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the right hand side cover (see page 16-14).
2. Disconnect the wiring connectors from the rear brake light switch.



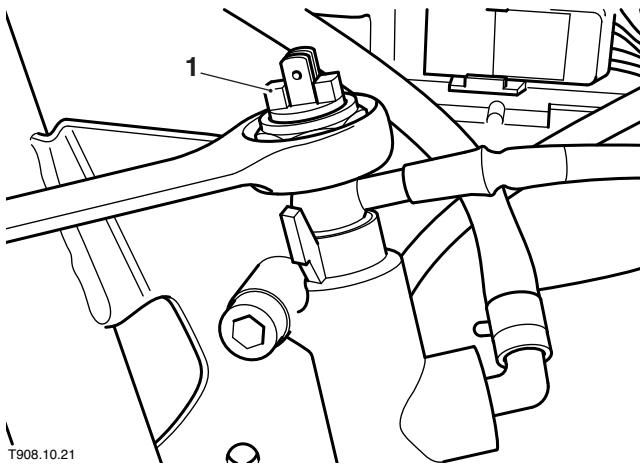
1. Wiring connector

3. Disconnect the reservoir hose from the master cylinder and drain the brake fluid into a container.



1. Reservoir hose

4. Position a cloth beneath the hose to catch any spilt fluid then unscrew the brake light switch. Disconnect the brake hose from the master cylinder and discard the sealing washers. Keep the hose end upright to minimise fluid loss.



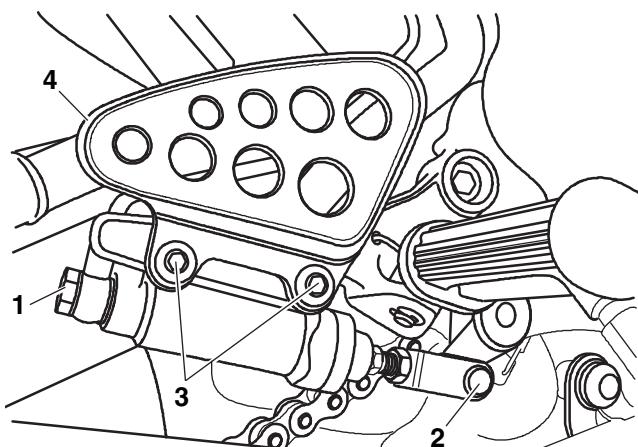
1. Rear brake light switch

5. Slide off the retaining clip and remove the clevis pin securing the master cylinder pushrod to the pedal.
6. Unscrew the mounting bolts and remove the master cylinder.

Removal - Thruxton**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 right hand side cover (see page 16-14).
2. Disconnect the reservoir hose from the master cylinder and drain the brake fluid into a container.
3. Position a cloth beneath the steel brake pipe to catch any spilt fluid then unscrew the banjo bolt. Disconnect the brake pipe from the master cylinder, without bending it, and discard the sealing washers.



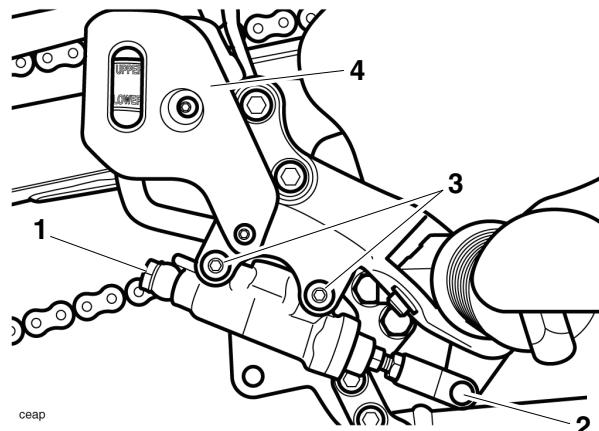
1. **Banjo bolt**
2. **Clevis pin**
3. **Mounting bolts**
4. **Heel guard**

4. Slide off the clip and remove the clevis pin securing the master cylinder pushrod to the pedal.
5. Unscrew the mounting bolts and remove the master cylinder together with the right hand heel guard.

Removal - Scrambler**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. Unscrew the bolts and remove the heel guard.



1. **Banjo bolt**
2. **Clevis pin**
3. **Master cylinder mounting bolts**
4. **Heel guard**
2. Disconnect the reservoir hose from the master cylinder and drain the brake fluid into a container.
3. Position a cloth beneath the brake pipe to catch any spilt fluid then unscrew the banjo bolt. Disconnect the brake pipe from the master cylinder and discard the sealing washers.
4. Slide off the clip and remove the clevis pin securing the master cylinder pushrod to the pedal.
5. Unscrew the mounting bolts and remove the master cylinder.

**Warning**

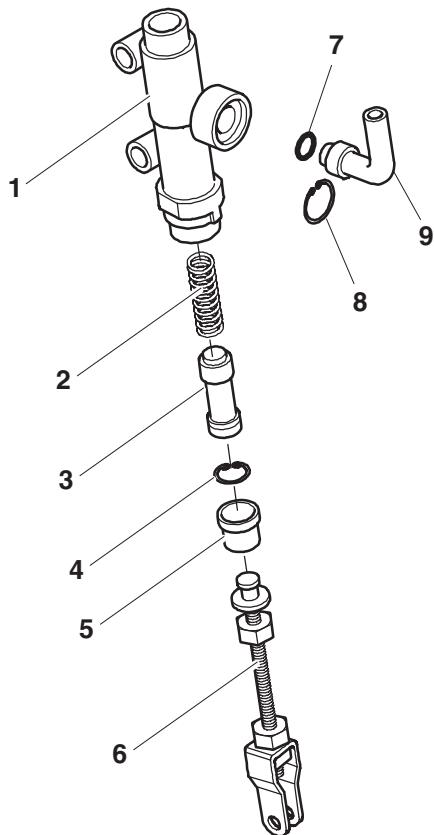
Do not bend the brake pipe to allow access to the master cylinder.

Bending the brake pipe could cause fluid restrictions or cracks in the pipe which could lead to reduced rear brake performance or rear brake failure.

Reduced rear brake performance and/or failure could lead to loss of motorcycle control and an accident.

Brakes

Overhaul



Rear Brake Master Cylinder Assembly

1. Master cylinder body
2. Spring
3. Piston assembly
4. Circlip
5. Dust boot
6. Pushrod assembly
7. O-ring
8. Circlip
9. Fluid reservoir union

1. Free the dust boot from the end of the master cylinder bore.
2. Remove the circlip then remove the pushrod assembly.
3. Withdraw the piston assembly and spring, noting all components correct fitted location and orientation.
4. Remove the circlip and remove the fluid reservoir union and O-ring from the master cylinder.
5. Check all components for signs of damage, paying particular attention to the cylinder bore and piston assembly. If the master cylinder bore is damaged, renew the complete assembly.
6. If the master cylinder is serviceable, obtain a new piston kit and reassemble as follows.

! Warning

Always renew the piston assembly every time it is removed. An effective hydraulic seal can only be made if a new assembly is fitted.

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

! Warning

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

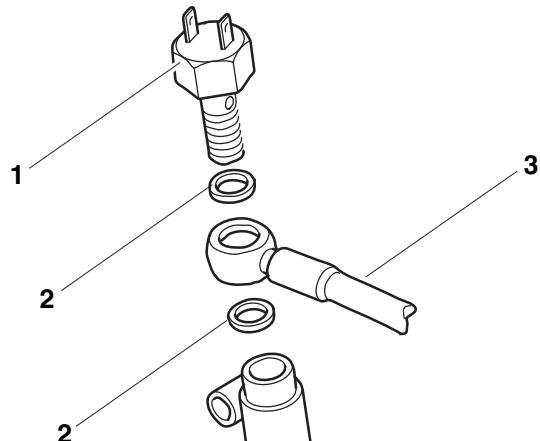
Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

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

7. Ensure all components are clean and dry.
8. Lubricate the new piston assembly and the cylinder bore with clean DOT 4 brake fluid.
9. Fit the new spring ensuring its tapered end is facing the piston assembly.
10. Ensure the piston assembly is the correct way around then ease it into the master cylinder with a twisting motion. Take great care not to displace the seals as they enter the bore.
11. Lubricate the pushrod and piston ends with brake grease then fit the pushrod assembly. Depress the piston and secure the pushrod in position with the circlip, ensuring it is correctly located in the cylinder groove.
12. Check the operation of the master cylinder then seat the dust boot correctly in the cylinder bore.
13. Ensure the O-ring is in position then fit the reservoir union. Secure it in position with the circlip, ensuring it is correctly located in the groove.

Installation - Bonneville, Bonneville SE & Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions)

1. Ensure the pushrod length is correctly set. The distance from the centre of the lower mounting bolt hole to the centre of the pushrod clevis pin hole should be 200.6 mm. If necessary, slacken the lock nuts and adjust the clevis position. Once the length is correct, tighten the lock nuts to **18 Nm**.
2. Fit the master cylinder and tighten its mounting bolts to **23 Nm**.
3. Align the pushrod clevis with the pedal and insert the clevis pin. Fit the retaining clip ensuring it is correctly located in the pin groove.
4. Position a new sealing washer on each side of the brake hose end fitting then secure the hose to the master cylinder with the brake light switch. Tighten the switch to **15 Nm**.



1. Rear brake light switch

2. Sealing washer

3. Brake hose

5. Reconnect the brake light switch wiring connectors.
6. Reconnect the reservoir hose to the master cylinder and secure it in position with the clip.
7. Fill the reservoir with clean DOT 4 brake fluid then bleed the rear brake (see page 11-16). Refit the side cover (see page 16-14).
8. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.

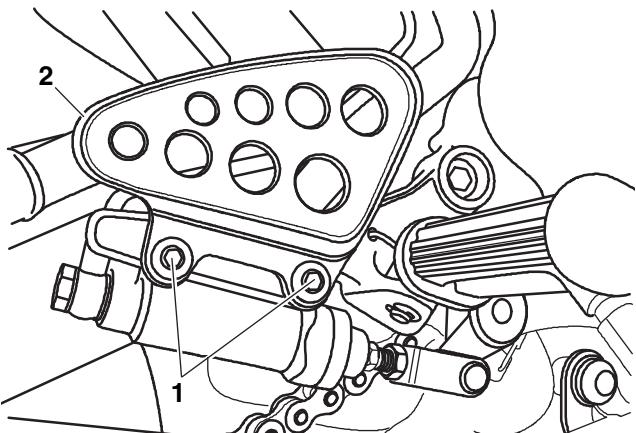


Warning

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.

Installation - Thruxton

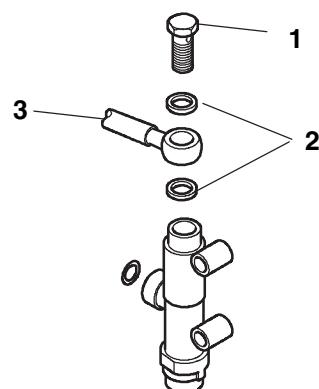
1. Ensure the pushrod length is correctly set. The distance from the centre of the lower mounting bolt hole to the centre of the pushrod clevis pin hole should be 82 mm. If necessary, slacken the lock nuts and adjust the clevis position. Once the length is correct, tighten the lock nuts to **18 Nm**.
2. Fit the master cylinder together with the right hand heel guard and tighten the mounting bolts to **16 Nm**.



1. Master cylinder mounting bolts

2. Heel guard

3. Align the pushrod clevis with the pedal and insert the clevis pin. Fit the retaining clip ensuring it is correctly located in the pin groove.
4. Position a new sealing washer on each side of the brake pipe end fitting then secure the pipe to the master cylinder with the banjo bolt. Tighten the banjo bolt to **25 Nm**.



1. Banjo bolt

2. Sealing washer

3. Brake hose

Brakes



Warning

Do not bend the brake pipe when reconnecting it to the master cylinder.

Bending the brake pipe could cause fluid restrictions or cracks in the pipe which could lead to reduced rear brake performance or rear brake failure.

Reduced rear brake performance and/or failure could lead to loss of motorcycle control and an accident.

5. Reconnect the reservoir hose to the master cylinder and secure it in position with the clip.
6. Fill the reservoir with clean DOT 4 brake fluid then bleed the rear brake (see page 11-16). Refit the side cover (see page 16-14).
7. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.

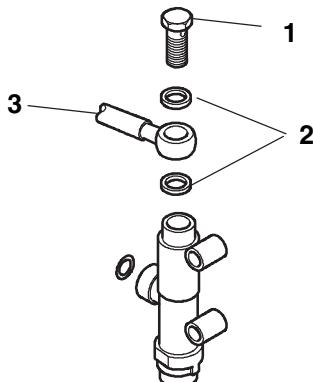


Warning

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.

Installation - Scrambler

1. Ensure the pushrod length is correctly set. The distance from the centre of the lower mounting bolt hole to the centre of the pushrod clevis pin hole should be 80 mm. If necessary, slacken the lock nuts and adjust the clevis position. Once the length is correct, tighten the lock nuts to **18 Nm**.
2. Fit the master cylinder and tighten its mounting bolts to **16 Nm**.
3. Align the pushrod clevis with the pedal and insert the clevis pin. Fit the retaining clip ensuring it is correctly located in the pin groove.
4. Position a new sealing washer on each side of the brake pipe end fitting then secure the pipe to the master cylinder with the banjo bolt. Tighten the banjo bolt to **25 Nm**.



1. Banjo bolt
2. Sealing washer
3. Brake hose

5. Reconnect the reservoir hose to the master cylinder and secure it in position with the clip.
6. Fit the heel guard and tighten its fixings to **3 Nm**.
7. Fill the reservoir with clean DOT 4 brake fluid then bleed the rear brake (see page 11-16).
8. Check the operation of the brake and carry out a thorough leak check before riding the motorcycle.



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

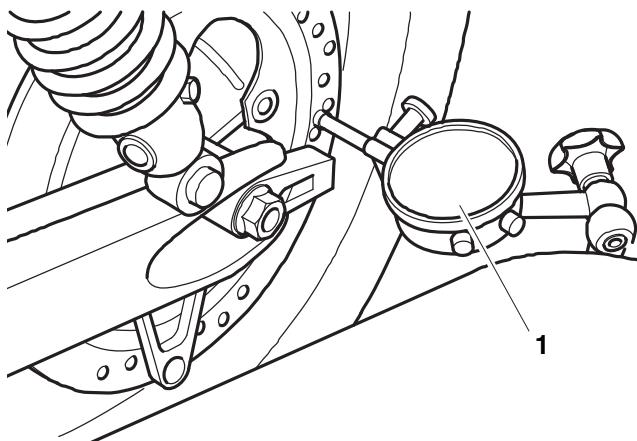
Inspection

- Support the motorcycle on a stand so that the rear wheel is raised clear of the ground. Using a dial gauge, rotate the wheel and measure the disc runout.



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.

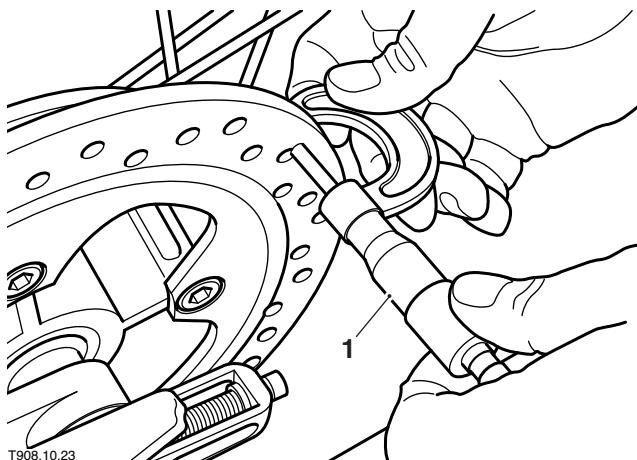


1. Dial gauge

Disc Runout

Standard	Less than 0.15 mm
Service limit	0.30 mm

- Using a micrometer, measure the disc thickness at several points.



T908.10.23
1. Micrometer

Disc Thickness

Standard	6.00 mm
Service limit	5.00 mm

- If the disc is warped or worn beyond the specified service limit, it must be renewed.

Removal

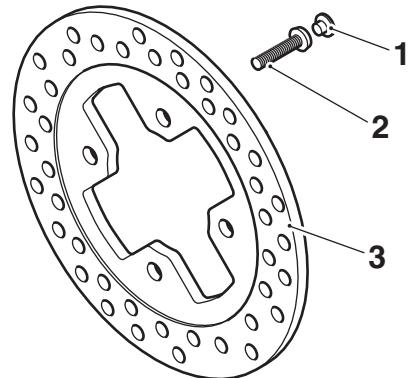
- Remove the rear wheel (see page 15-13).



Caution

Never allow the weight of the wheel to rest on the disc as this could cause the disc to warp.

- Remove the trim caps from the disc retaining bolts.



1. Trim cap

2. Bolt

3. Disc

- Evenly and progressively slacken the retaining bolts then remove the disc from the wheel. Discard the bolts.

Brakes

Installation

1. Ensure the disc and wheel surfaces are clean.
2. Fit the disc ensuring its marked surface is facing outwards.
3. Fit the new retaining bolts and tighten them evenly and progressively to **22 Nm**.
4. Fit a trim cap to each retaining bolt.
5. Clean and degrease the disc then refit the rear wheel (see page 15-14).

Note:

- **If a new disc has been fitted, ensure new brake pads are also installed.**

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.

12 Front Suspension & Steering

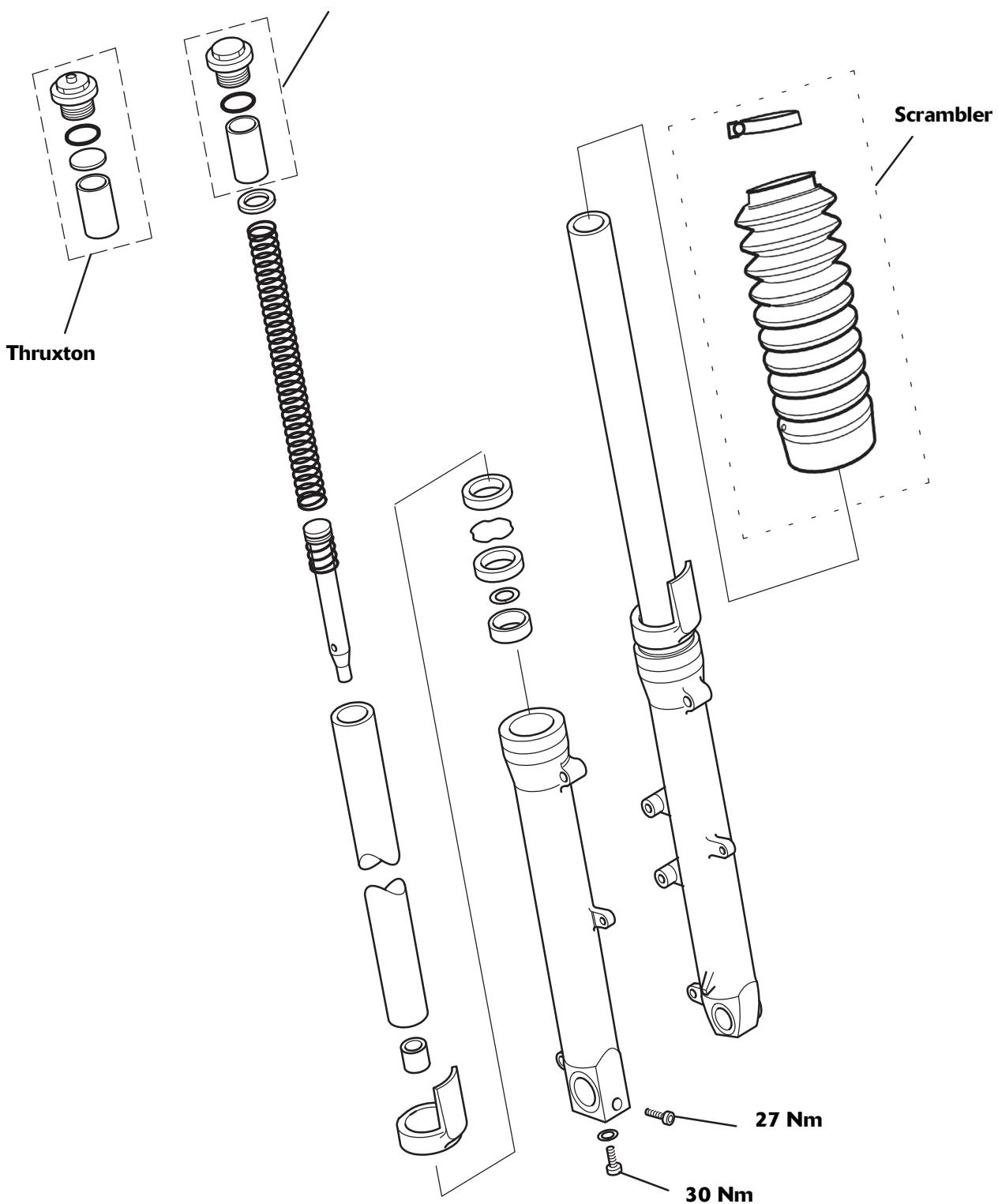
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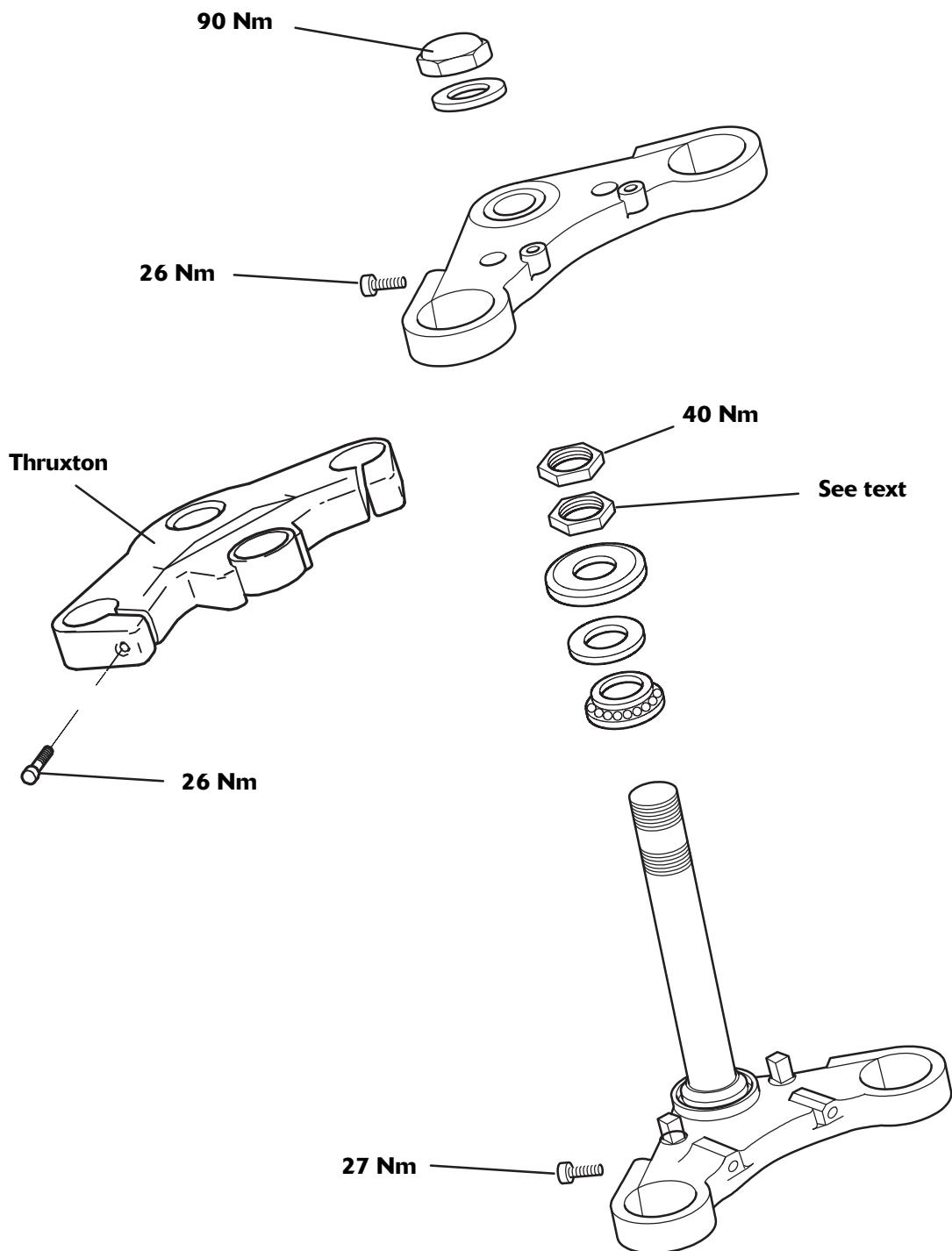
Front Suspension & Steering

Exploded View - Front Fork

Bonneville, Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions) & Scrambler



Exploded View - Top and Bottom Yokes/Steering Head Bearings



Front Suspension & Steering

Fork Inspection

1. Visually inspect the fork inner tube assembly for stone-chips and damage. Repair or replace as necessary.
2. Visually inspect the dust/oil seal areas for signs of damage and fluid leaks. If oil leaks are found, the fork must be stripped and overhauled or replaced completely.
3. Check for smooth operation of the forks as follows:
 - Place the motorcycle on level ground.
 - While holding the handlebars and applying the front brake, pump the forks up and down several times. The forks should operate smoothly with no excessive stiffness, roughness or tight spots.



Warning

If roughness or excessive stiffness is detected, investigate the cause and take the necessary remedial action before riding the motorcycle.

Riding the motorcycle with defective or damaged suspension can cause loss of control and an accident.

Front Fork

Removal - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton (with high handlebars)



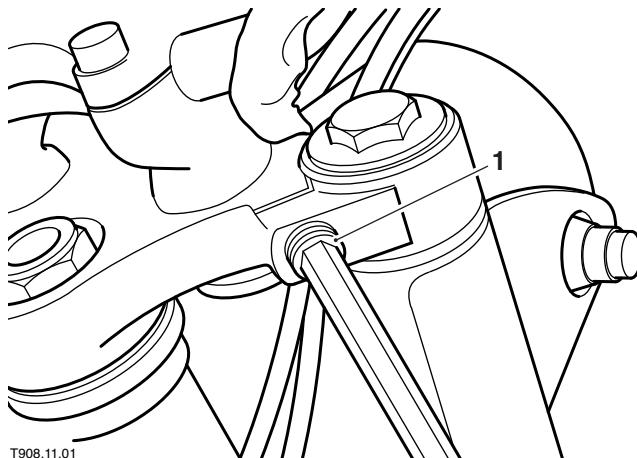
Warning

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 15-10).
2. Remove the front mudguard (see page 16-15).

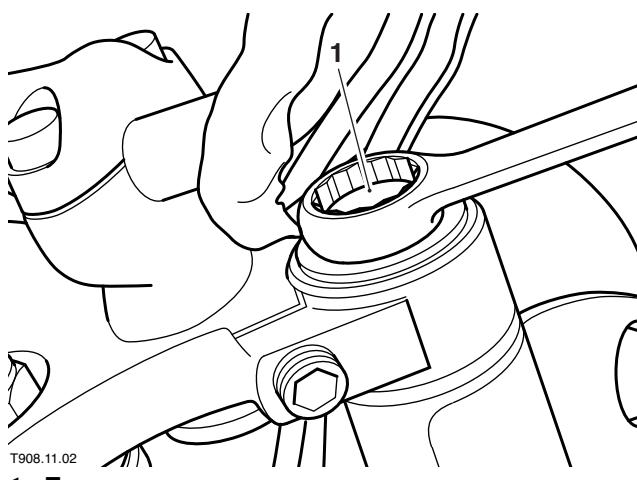
Each fork can be removed as follows.

3. Slacken the top yoke clamp bolt.



1. Top yoke clamp bolt

4. If the fork is to be dismantled, loosen the fork's top cap.

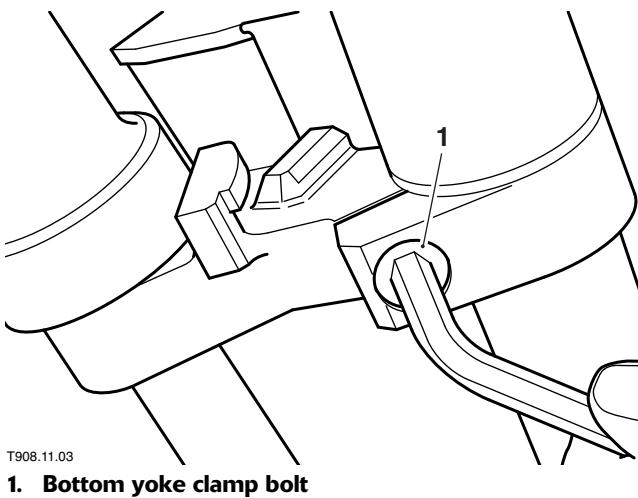


1. Top cap

- Slacken the bottom yoke clamp bolt and slide the fork out of the yokes.

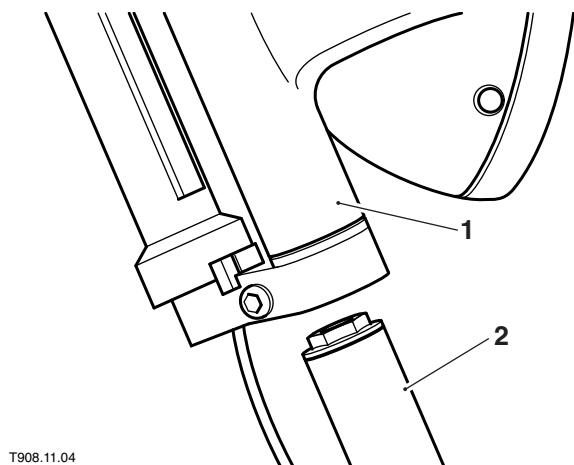
Note:

- If both forks are being removed, ensure the headlight assembly is securely supported.



Installation - Bonneville, Bonneville SE, Bonneville T100 (including Steve McQueen™ and Bonneville T100 10th editions), Scrambler & Thruxton (with high handlebars)

- Ensure the headlight brackets and mounting rubbers are correctly positioned then slide the fork into the yokes from below.



- T908.11.04
1. Headlight bracket
2. Fork

- Position the fork so that the fork upper surface is flush with the upper surface of the top yoke. Tighten the bottom yoke clamp bolt to **27 Nm**.
- If the fork has been dismantled, tighten the top cap to **23 Nm**.
- Tighten the top yoke clamp bolt to **26 Nm**.
- Refit the front mudguard (see page 16-15).
- Install the front wheel (see page 15-12).

Front Fork

Removal - Thruxton (with low handlebars)

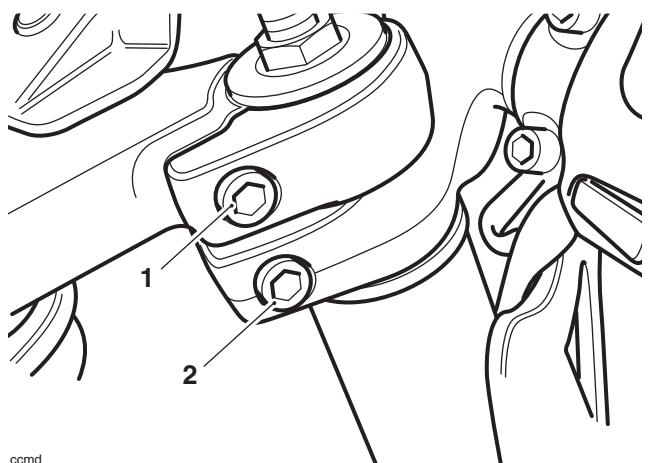
Warning

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.

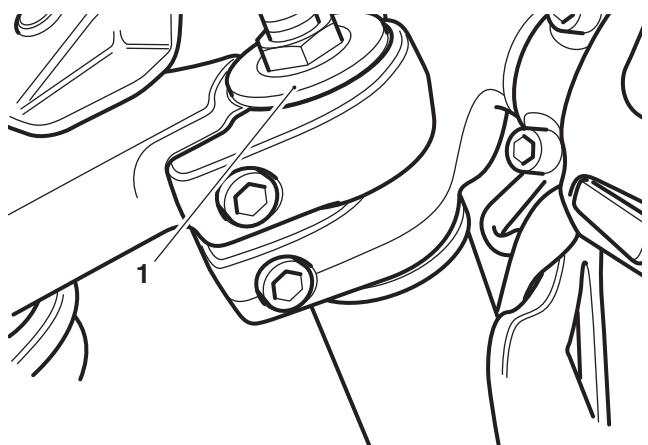
- Remove the front wheel (see page 15-10).
 - Remove the front mudguard (see page 16-15).
- Each fork can be removed as follows.
- Slacken the top yoke clamp bolt and the handlebar clamp bolt.

Note:

- It is not necessary to remove the handlebar.



- ccmd
1. Top yoke clamp bolt
2. Handlebar clamp bolt
- If the fork is to be dismantled, loosen the fork's top cap.

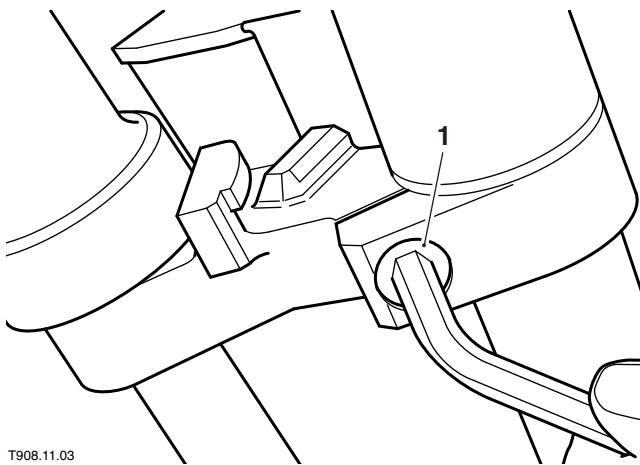


- ccmd
1. Top cap
- Slacken the bottom yoke clamp bolt and slide the fork out of the yokes.

Front Suspension & Steering

Note:

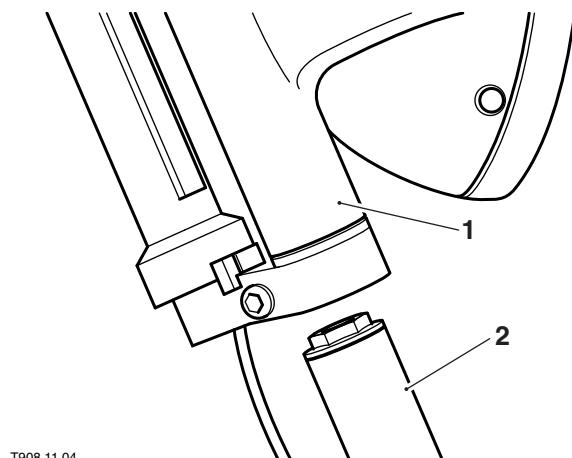
- If both forks are being removed, ensure the headlight assembly is securely supported.



T908.11.03
1. Bottom yoke clamp bolt

Installation - Thruxton (with low handlebars)

- Ensure the headlight tubes and mounting rubbers are correctly positioned then slide the fork into the yokes from below.



T908.11.04
1. Headlight bracket
2. Fork

- Position the fork so that the fork upper surface is flush with the upper surface of the top yoke. Tighten the bottom yoke clamp bolt to **27 Nm**.
- If the fork has been dismantled, tighten the top cap to **23 Nm**.
- Tighten the top yoke clamp bolt to **26 Nm**.
- Tighten the handlebar clamp bolt to **26 Nm**.
- Check the torque of the anti-rotation bolt found on the underside of the handlebar clamp. The correct torque is **11 Nm**.
- Refit the front mudguard (see page 16-15).
- Install the front wheel (see page 15-12).

Fork Oil Change

Oil Draining

- Remove the fork assembly (see page 12-4).
- Secure the fork inner tube upright in a soft jawed vice.

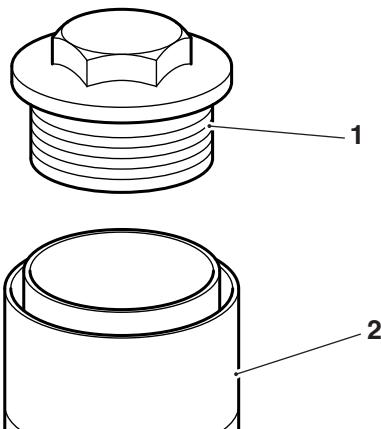
Caution

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.

- Carefully unscrew the top cap from the inner tube.

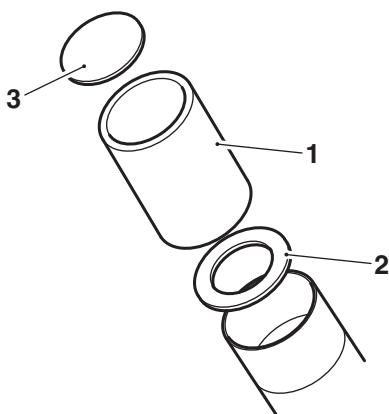
Warning

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.



1. Top cap (Bonneville)
2. Fork tube

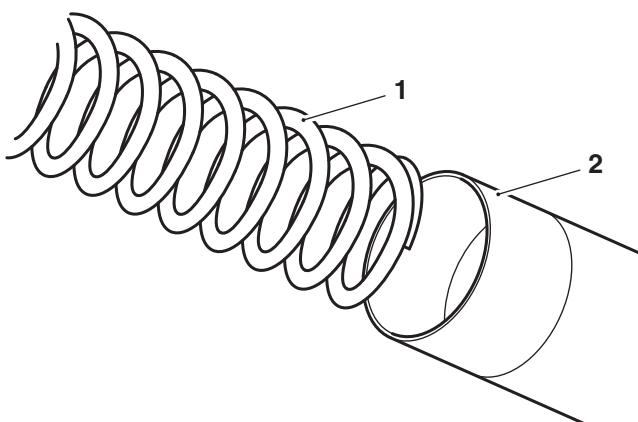
4. Remove the spacer and spring seat (on Thruxton models, also remove the disc washer).



T908.11.11

1. Spacer
2. Spring seat
3. Disc washer (Thruston only)

5. Lift out the spring.



T908.11.07

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

Bonneville (up to VIN 380776) & Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions)

Fork oil type	Kayaba G10
Fork oil capacity	484 cc
Fork oil level (fork fully compressed)	120 mm below inner tube upper surface

Bonneville (from VIN 380777) & Bonneville SE

Fork oil type	Kayaba G10
Fork oil capacity	499 cc
Fork oil level (fork fully compressed)	106 mm below inner tube upper surface

Thruston

Fork oil type	Kayaba G10
Fork oil capacity	466 cc
Fork oil level (fork fully compressed)	143 mm below inner tube upper surface

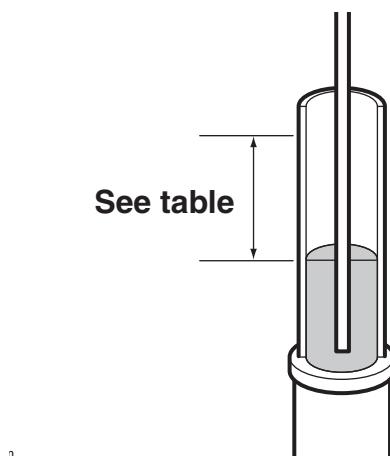
Scrambler

Fork oil type	Kayaba G10
Fork oil capacity	517 cc
Fork oil level (fork fully compressed)	123 mm below inner tube upper surface



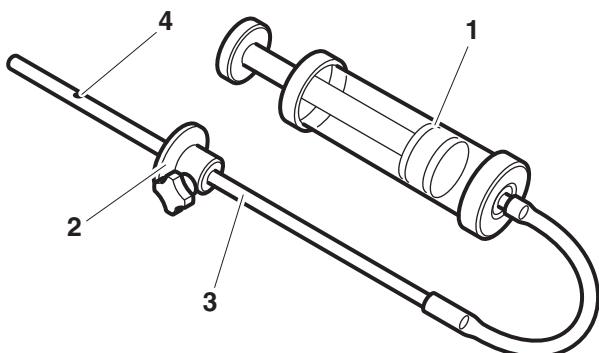
Warning

Any variation from the figures quoted above could result in an unsafe riding condition leading to loss of control and an accident.



Front Suspension & Steering

1. Upright the fork and fill it with the specified grade and type of fork oil until the oil level is slightly above the recommended level.
2. 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.
3. Set the scale on tool 3880160-T0301 to the specified level.
7. Extend the inner tube and insert the fork spring.
8. Fit the spring seat and spacer (on Thruxton models, also insert the disc washer).



ccha

1. **Tool 3880160-T0301**
2. **Adjuster plate**
3. **Scale area**
4. **Hole (zero position)**

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.**
4. Insert the scale end of the tool into the fork inner tube.
 5. 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).
 6. 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.

T908.11.11

1. Spring seat

9. 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.

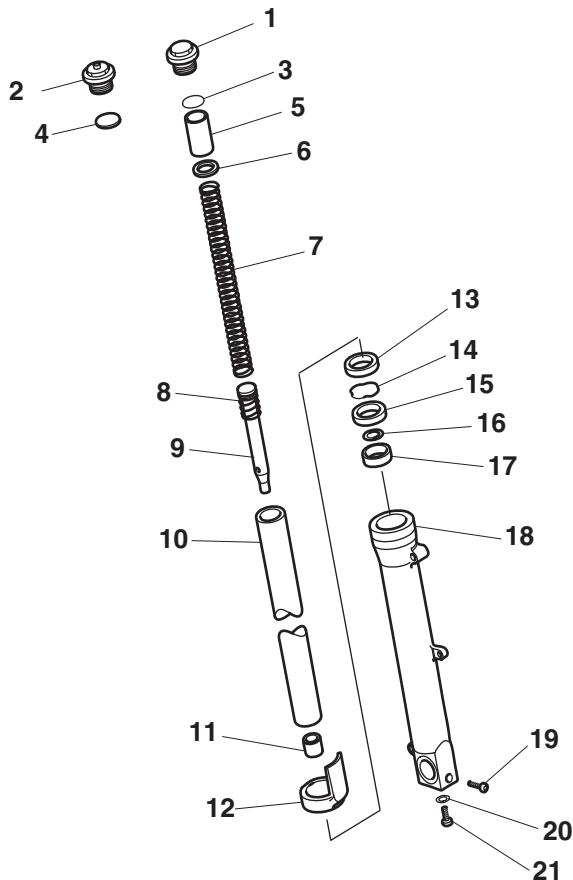
10. Refit the fork (see page 12-5) and tighten the top cap to **23 Nm**.

Note:

- **It is much easier to tighten the top cap when the fork is securely clamped in the bottom yoke.**

Front Fork

Disassembly - All Models



Fork Components

1. Top cap (all except Thruxton)
2. Top cap (Thruston only)
3. O-ring
4. Disc washer (Thruston only)
5. Spacer
6. Spring seat
7. Spring
8. Rebound spring
9. Damper rod
10. Inner tube
11. Damper rod seat
12. Fork protector (where fitted)
13. Dust seal
14. Circlip
15. Oil seal
16. Washer
17. Bush
18. Outer tube
19. Spindle clamp bolt (where fitted)
20. Sealing washer
21. Damper rod bolt

1. Remove the fork assembly (see page 12-4).
2. Prior to dismantling the fork, slacken the damper rod bolt a few turns.



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 12-6).
4. Slacken and remove the damper rod bolt and sealing washer from the base of the outer tube. Discard the sealing washer.
5. Invert the fork and tip out the damper rod and rebound spring.
6. Slacken the screw and remove the protector from the outer tube.
7. Ease the dust seal out of position and slide it off the inner tube.
8. Carefully ease the circlip out from the top of the outer tube.

Note:

- **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 is 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 from the top of the inner tube.



Caution

Do not attempt to remove the lower bush from the inner tube unless it is to be renewed.

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.

Front Suspension & Steering

Assembly



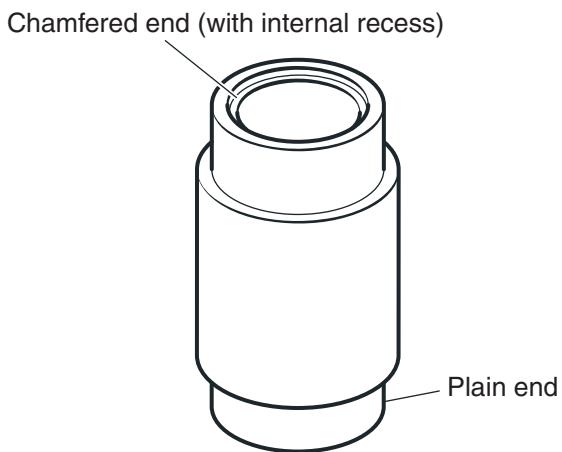
Warning

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.

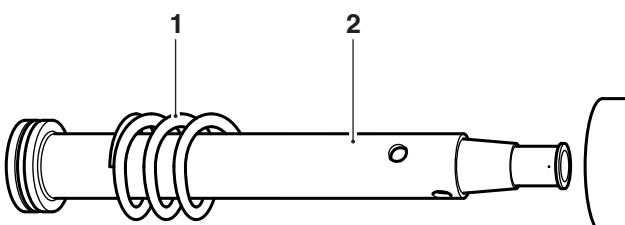
Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of control or an accident.

Note:

- During assembly of the fork, tool 3880080-T0301 will be used extensively. In the text, reference to a plain end and a chamfered end will be made. This describes the two ends of the tool as shown in the diagram below.



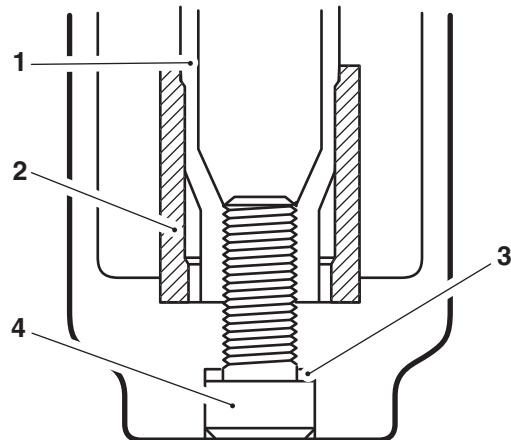
- Lubricate the damper rod piston ring and the upper and lower bushes with clean fork oil.
- Fit the rebound spring to the damper rod then insert the assembly into the inner tube.



T908.11.13

- Rebound spring
- Damper rod

- Fit the seat securely to the end of the damper rod then insert the inner tube assembly into the outer tube.
- Fit a new sealing washer to the damper rod bolt then apply locking compound (ThreeBond 1342) to the bolt threads.
- Ensure the damper rod and seat are correctly located in the outer tube then fit the damper rod bolt, tightening it to **30 Nm**.

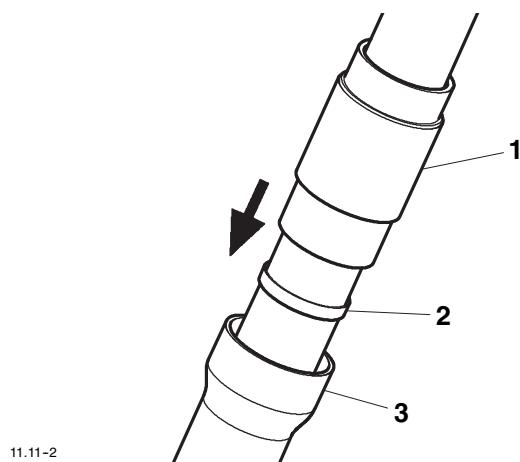


- Damper rod
- Seat
- Sealing washer
- Bolt

- Slide the top bush along the inner tube and locate it in the outer tube. Drift the bush into position using the plain end of tool 3880080-T0301.

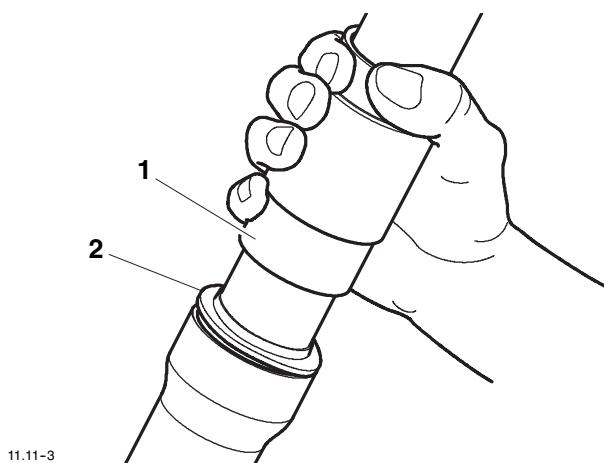
Note:

- 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.



- 11.11-2
- Tool 3880080-T0301
 - Top bush
 - Outer tube

7. Slide the washer along the inner tube and locate it in the outer tube.
8. 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 plain end of tool 3880080-T0301.
9. Secure the oil seal in position with the circlip, ensuring it is correctly located in its groove.
10. Fit the new dust seal onto the inner tube and drift it into position in the outer tube using the chamfered end of tool 3880080-T0301.
11. Refit the protector to the outer tube.
12. Refill the fork with new oil (see page 12-7).



1. Tool 3880080-T0301
2. Dust seal

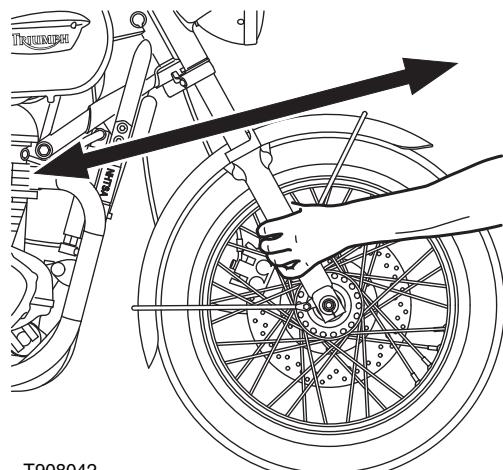
Steering Head Bearing Check and Adjustment

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 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 over-tightened).
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).



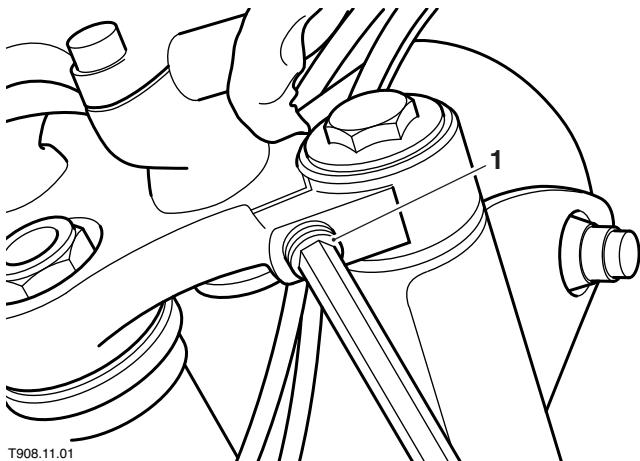
Checking for Free Play in Steering Head Bearings

4. Adjust as described below then lower the motorcycle to the ground.

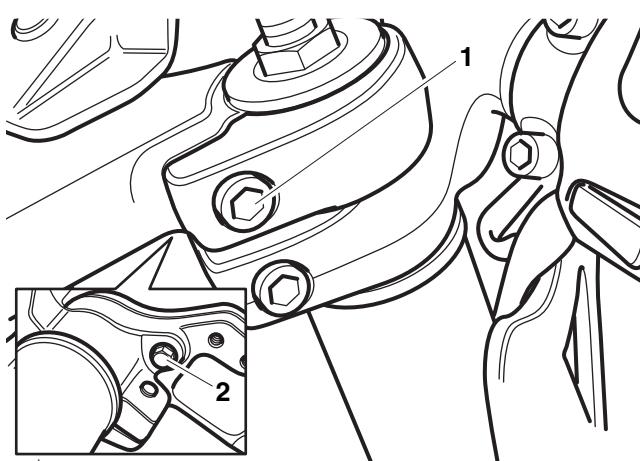
Front Suspension & Steering

Adjustment

- Slacken the top yoke clamp bolts.

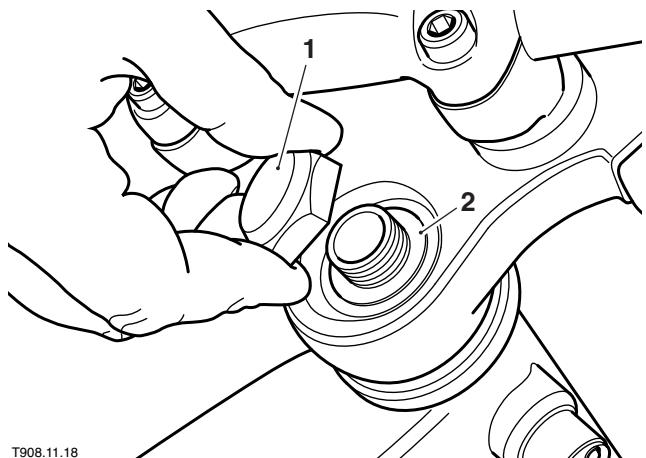


- On Thruxton models slacken the handlebar clamp bolts and remove the handlebar locating bolts.



- Handlebar clamp bolt
- Handlebar locating bolt

- Slacken and remove the top nut and washer from the steering stem. Lift the handlebar/top yoke assembly to gain access to the bearing lock nut and adjuster nut.



- Top nut
- Washer

- Slacken the lock nut and adjuster nut.
- Adjust the bearing free play as follows:-
 - Ensure that the threaded part of the steering stem is free from grease.
 - Tighten the adjuster nut to **40 Nm**.
 - Rotate the handlebars from lock to lock a few times to settle the bearings then loosen the adjuster nut again.
 - Retighten the adjuster nut to **3 Nm**.



Warning

It is essential that the adjuster nut is not over-tightened. If the adjuster is over-tightened it will cause a pre-load on the steering head bearings. This will introduce tight steering which will lead to premature bearing wear and could cause loss of motorcycle control and an accident.

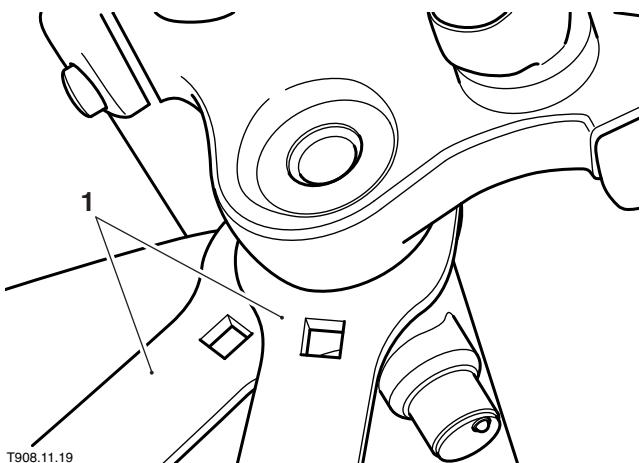
Note:

- Correct adjustment is attained when the bearing play is eliminated without preloading the bearings.**

- 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.**



1. Tool 3880140-T0301

- Seat the top yoke assembly in position then refit the washer and steering stem top nut, tightening it to **90 Nm**.
- Tighten the top yoke clamp bolts to **26 Nm**.
- On Thruxton, secure the handlebars to the upper yoke with the handlebar locating bolts, tighten the bolts to **11 Nm** then tighten the handlebar clamp bolts to **26 Nm**.
- 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. Re-adjust if necessary.

Steering Stem/Bottom Yoke

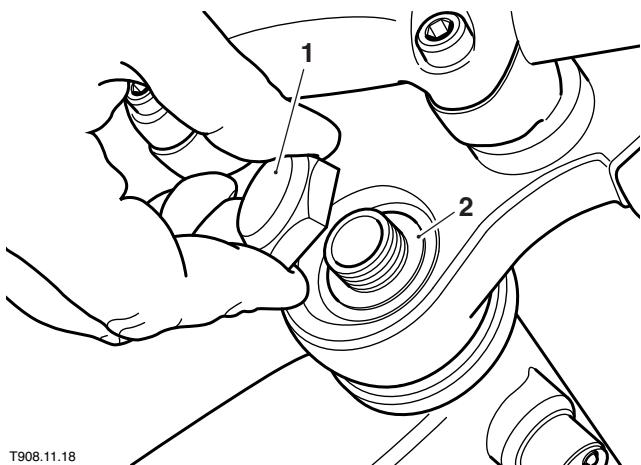
Removal



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 both forks (see page 12-4).
- Remove the fuel tank (see page 10A-13 for carburettor models or page 10B-85 for fuel injected models).
- Slacken and remove the top nut and washer from the steering stem. Lift off the handlebar/top yoke assembly and position it clear.



1. Top nut

2. Washer

- Unscrew the bolts and position the regulator/rectifier (and indicators on Thruxton models) clear of the bottom yoke.
- Unscrew the bolt securing the brake hose clamp to the bottom yoke.
- Unscrew the lock nut from the steering stem.
- Support the bottom yoke then remove the adjuster nut and dust seal from the steering stem.
- Lower the steering stem/bottom yoke out of position.
- Remove the upper bearing and inner race from the frame.

Note:

- Do not attempt to remove the bearing races unless they are to be renewed.**

Front Suspension & Steering

Inspection - All Models

1. Remove all traces of grease and check the bearings and races for signs of wear or damage. Renew both bearings and the dust seals if damage or wear is found.

Bearing Removal

1. Using a suitable drift, evenly and progressively drive the bearing outer races from the frame headstock.
2. Remove the inner race and dust seal from the bottom yoke using a press or puller.

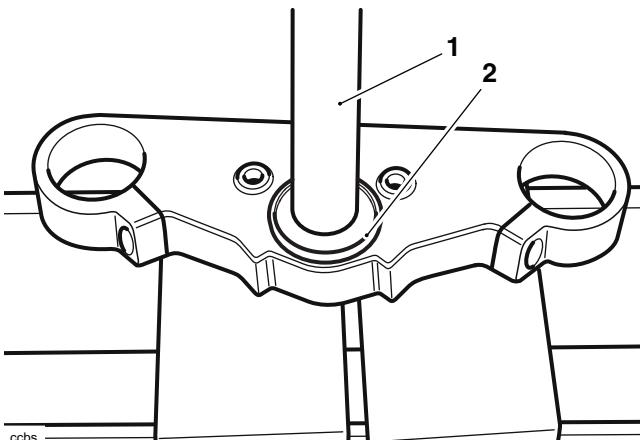


Caution

Protect the threads of the bottom yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

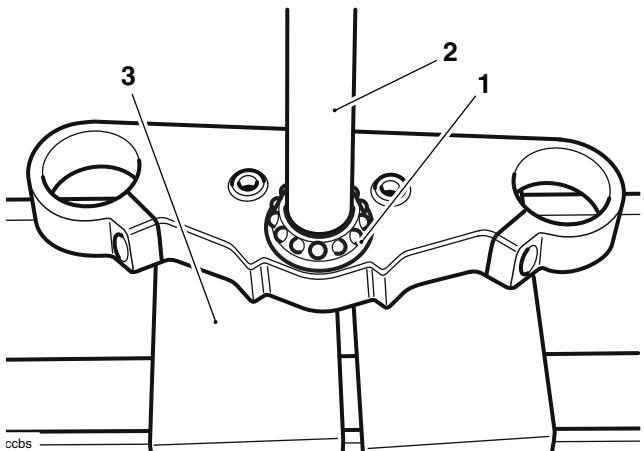
Bearing Installation

1. Fit a new dust shield to the steering stem on the bottom yoke.



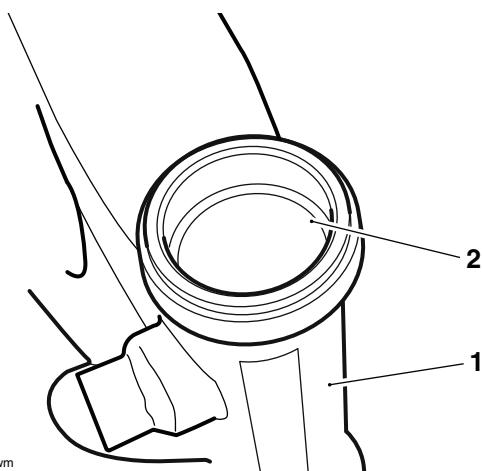
1. Steering stem
2. Dust shield

2. Press a new inner race onto the steering stem of the bottom yoke.



1. Bearing
2. Steering stem
3. Press bed

3. Evenly and progressively drive new bearing outer races into the frame headstock.

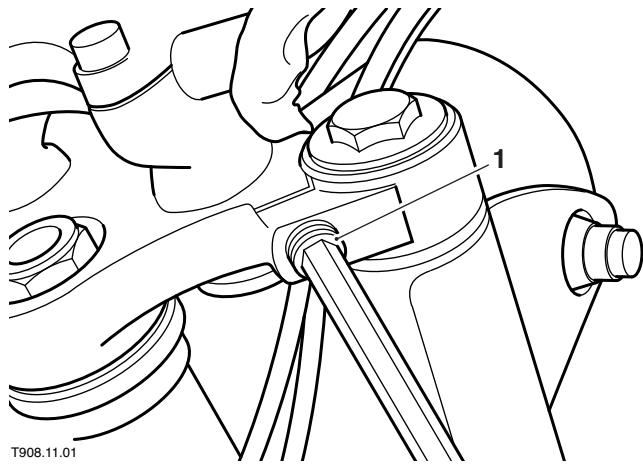


1. Headstock
2. Bearing outer race

Installation

1. Lubricate the bearings and races with fresh grease to NLGI 2 specification. Work the grease well into the bearings and smear the steering stem with grease.
2. Insert the steering stem into the headstock.
3. Fit the upper bearing, inner race and dust seal and screw on the adjuster nut.
4. Hand-tighten the adjuster nut then fit the lock nut.
5. Adjust the steering head bearing free play (see page 12-12).
6. Fit the regulator/rectifier and brake hose clamp (and indicators on Thruxton models) to the bottom yoke.
7. Ensure the headlight assembly is correctly positioned before installing the front forks.
8. On Thruxton (with low handlebars) only, position the handlebars on the forks.
9. Locate the top yoke assembly on the steering stem. Fit the washer and hand-tighten the top nut.
10. Tighten the steering stem top nut to **90 Nm**.
11. On Thruxton only, secure the handlebars to the upper yoke with the handlebar locating bolts, tighten the bolts to **11 Nm** then tighten the handlebar clamp bolts to **26 Nm**.

12. Tighten the top yoke clamp bolt to **26 Nm**.



1. Top yoke clamp bolt

13. Ensure all fasteners are correctly tightened then install the fuel tank (see page 10A-13 for carburettor models or page 10B-86 for fuel injected models).

Front Suspension & Steering

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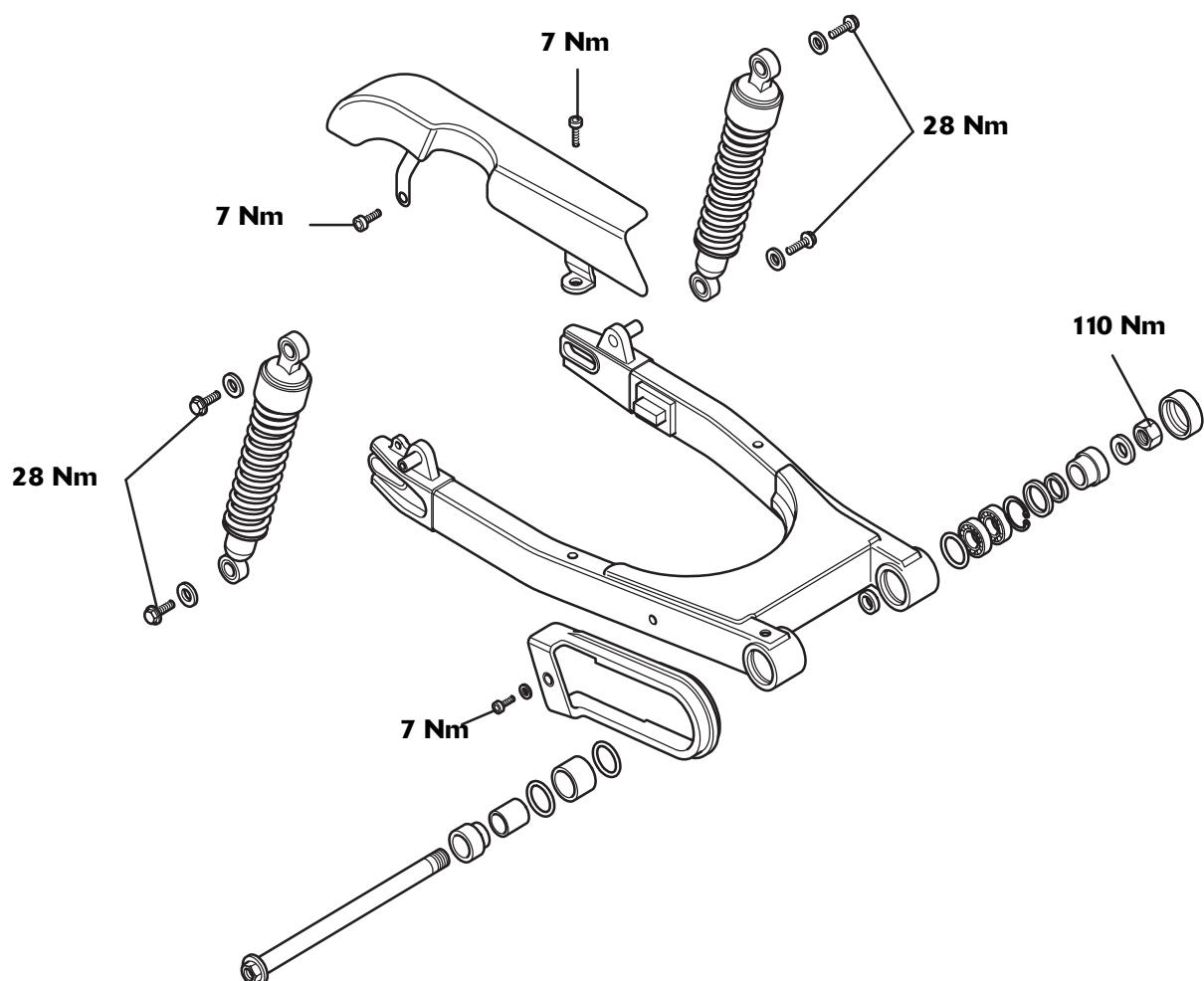
13 Rear Suspension

Table of Contents

Exploded View - Swinging Arm and Rear Suspension.....	13.2
Rear Suspension Unit	13.3
Adjustment.....	13.3
Removal	13.3
Inspection.....	13.4
Installation	13.4
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Removal	13.5
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Installation	13.6

Rear Suspension

Exploded View - Swinging Arm and Rear Suspension



Rear Suspension Unit

Adjustment

- The spring preload settings on the rear suspension units are adjustable. Each unit has a five-position adjuster collar fitted to the lower end of the spring.
- Set both rear suspension unit adjuster collars to the required position. Recommended settings are as follows.

Bonneville (up to VIN 380776) Bonneville T100 (including Bonneville T100 110th editions), Thruxton and Scrambler

Loading	Adjuster position
Solo riding - softer	1
Solo riding - standard	2
Solo riding - firmer	3
Rider and passenger	4 or 5

Bonneville T100 - Steve McQueen™

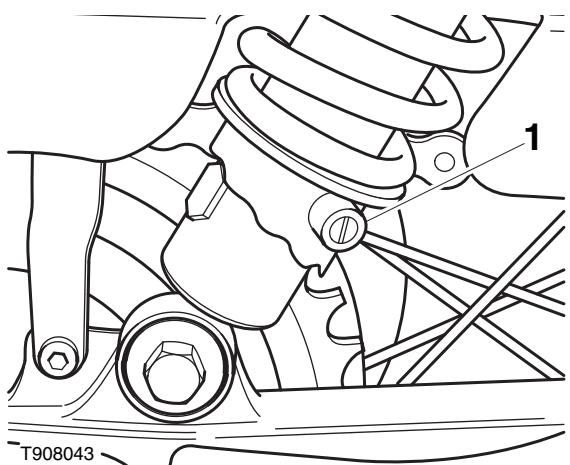
Loading	Adjuster position
Solo riding - softer	1
Solo riding - standard	2
Solo riding - firmer	3

Bonneville (from VIN 380777) and Bonneville SE

Loading	Adjuster position
Solo riding - standard	1
Solo riding - firmer	3
Rider and passenger	5

Warning

Ensure both rear suspension unit preload adjusters are set to the same setting. If the spring preload is not equally adjusted, the handling of the motorcycle will be adversely affected which could lead to loss of control, resulting in an accident.



1. Rear suspension preload adjuster

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.

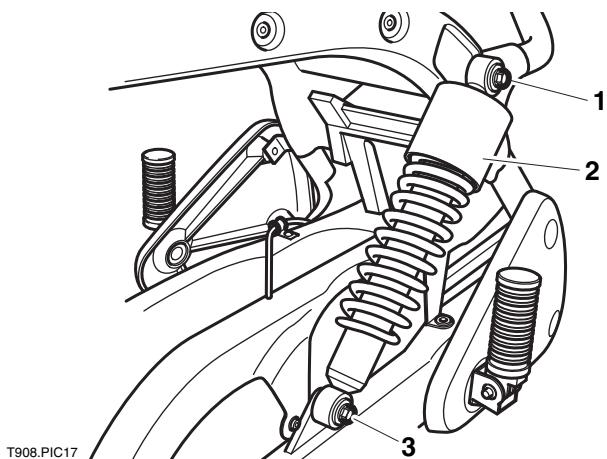
- Support the motorcycle so that the rear wheel is clear of the ground with no weight on the swinging arm/suspension units. Each rear suspension unit can be removed as follows.

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.
- On Thruxton only, remove the silencers as described in the Fuel/Exhaust section.

Rear Suspension

- Remove the upper and lower mounting bolts and washers, discard the bolts. Remove the suspension unit.



- Upper mounting bolts
- Rear suspension unit
- Lower mounting bolts

Note:

- The rear suspension units are each located on a spigot at their upper and lower mounting points.
- Repeat operations 1 to 3 for the other rear suspension unit (if required).

Inspection

- Remove all traces of dirt and inspect for damage/wear to the mountings and spring.
- Inspect the unit closely for fluid leaks from all parts of the unit. If there is any damage, or any leaks are evident, both rear suspension units must be renewed as a matched pair.

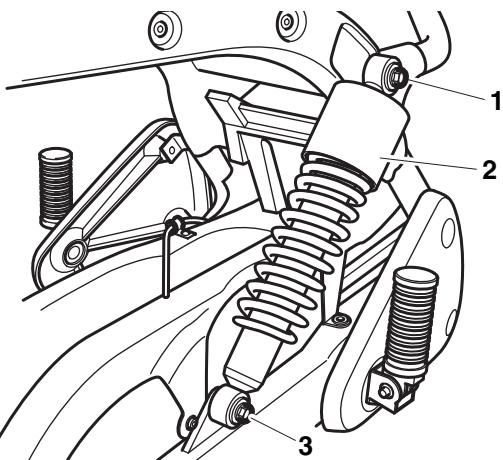


Warning

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 control and an accident.

Installation

- Locate the suspension unit on its mountings adjusting the swinging arm position if necessary to locate the upper and lower mountings.



- Upper mounting bolts
- Rear suspension unit
- Lower mounting bolts

- Secure the rear suspension unit with the washers and new mounting bolts. Tighten the bolts to **28 Nm**.
- On Thruxton only, refit the silencers as described in the Fuel/Exhaust section.
- Repeat operations 1 to 3 for the other rear suspension unit (if removed).
- Remove the wheel support block.

Swinging Arm

Removal

! Warning

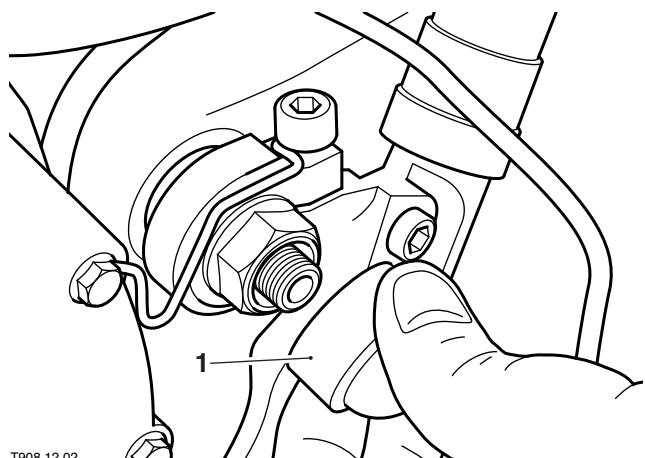
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Support the motorcycle so that the rear wheel is clear of the ground with no weight on the swinging arm/suspension units.
- Disconnect the battery, negative (black) lead first.
- Remove the rear wheel (see page 15-13).

! Caution

With the wheel removed, support the drive chain to prevent it from falling to the floor and picking up debris and other abrasive material which would accelerate chain wear leading to premature replacement.

- On Thruxton, remove the silencers as described in the Fuel section (see page 10A-34 for carburettor models or page 10B-110 for fuel injected models).
- Unscrew the bolts and remove the sprocket cover from the engine.
- Undo the screws and remove the chainguard.
- Undo the screw and free the rear brake hose clamp from the swinging arm.
- Remove the cap from the left end of the swinging arm pivot bolt.

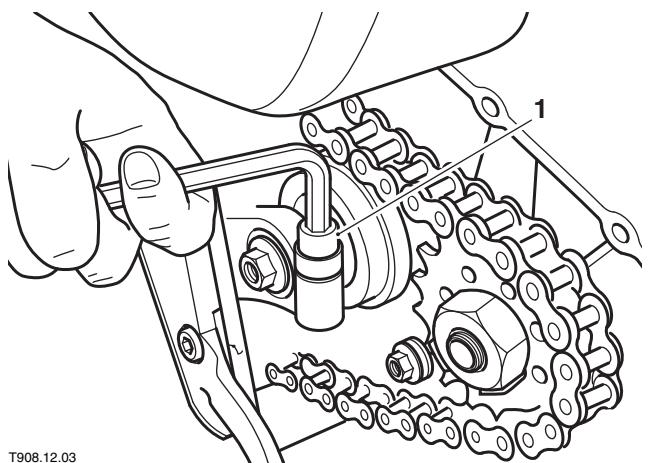


T908.12.02

1. Cap

- On Thruxton only, note the position of the gearchange lever. Undo the pinch bolt and remove the lever from the gearchange shaft.

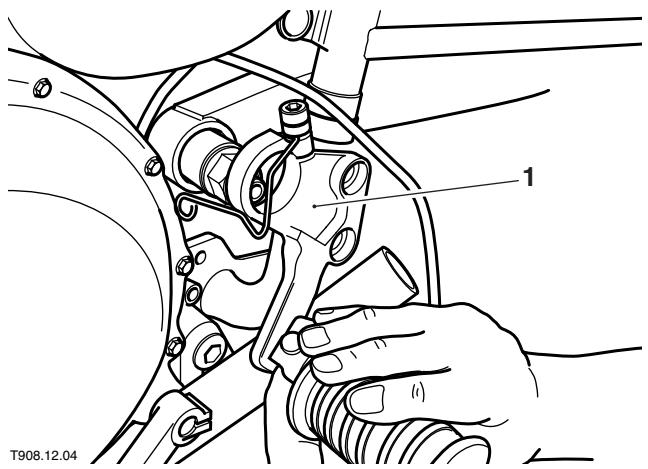
- Remove the caps and slacken the swinging arm outrigger clamp bolts on the left and right side rider footrest brackets.



T908.12.03

1. Outrigger clamp bolt

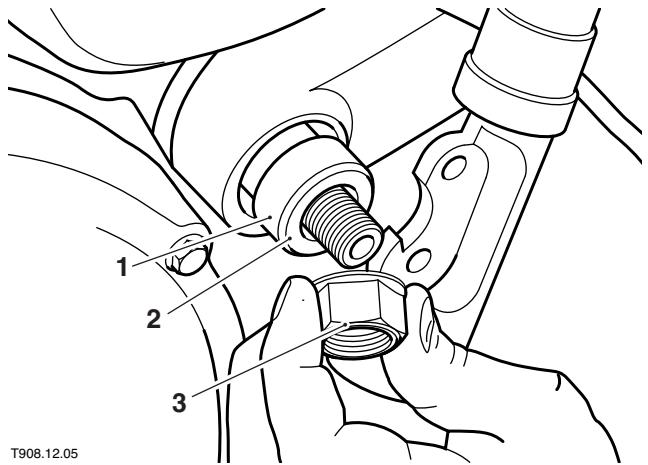
- Unscrew the mounting bolts and remove the left side control plate.



T908.12.04

1. Control plate

- Unscrew the nut from the swinging arm pivot bolt and slide off the washer and left side outrigger bush.



T908.12.05

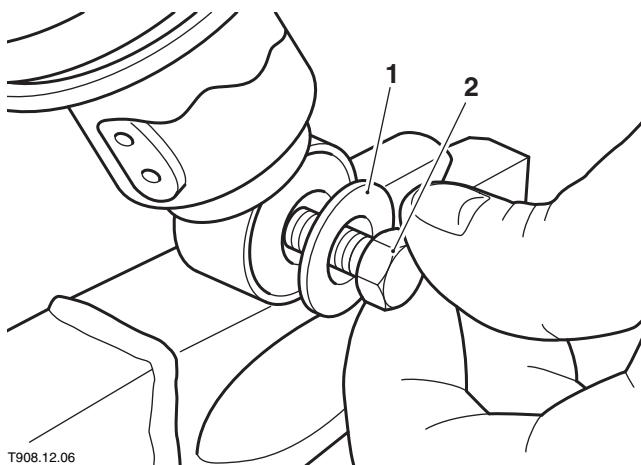
1. Outrigger bush

2. Washer

3. Nut

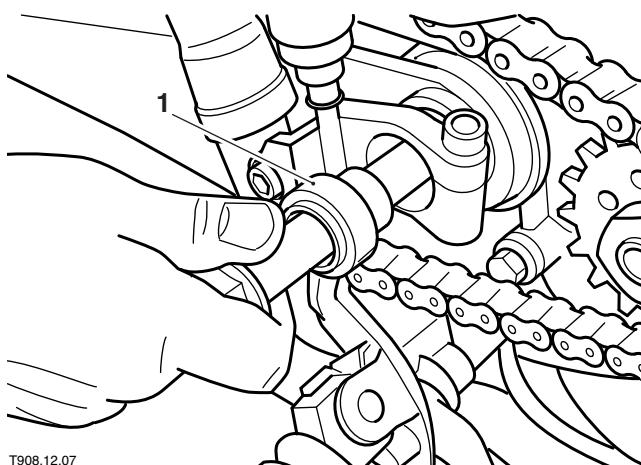
Rear Suspension

13. Unscrew the left and right rear suspension unit lower mounting bolts and washers and free the units from the swinging arm. Discard the bolts.



1. Washer
2. Mounting bolt

14. Withdraw the pivot bolt together with the outrigger bush.



1. Outrigger bush

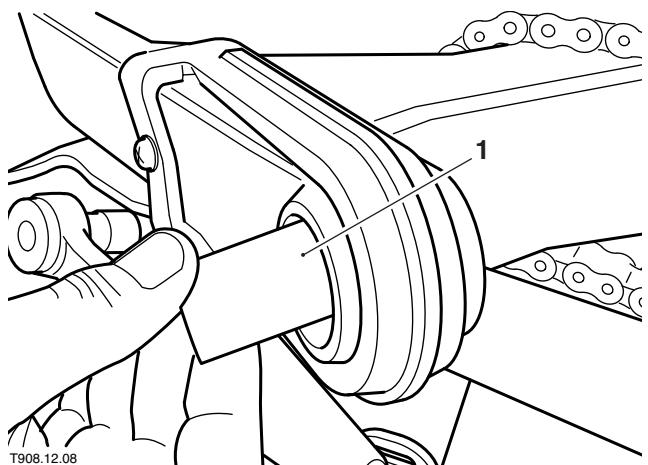
15. Manoeuvre the swinging arm assembly away from the motorcycle. Take care not to lose the spacers from the left pivot.

Inspection

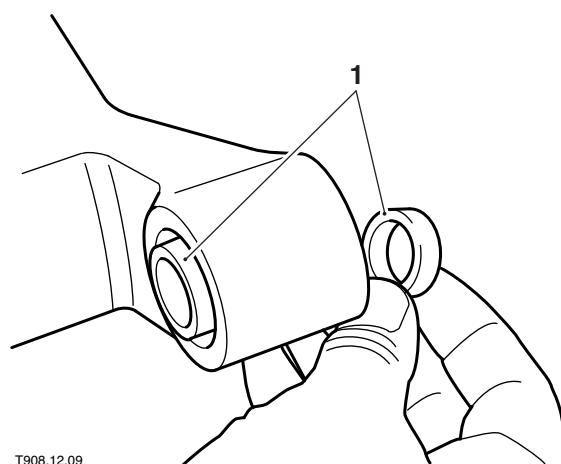
1. Slide out the inner sleeve from the swinging arm right pivot and remove the inner and outer spacers from the left pivot.
2. Check the right pivot dust seals, inner sleeve and needle roller bearing for signs of wear or damage. Renew all components if worn.
3. Check the left pivot dust seals and bearings for wear or damage. Renew all components if worn.

Installation

1. Remove all traces of grease from the right pivot. Lubricate the bearing and inner sleeve with fresh grease to NLGI 2 specification then insert the sleeve.

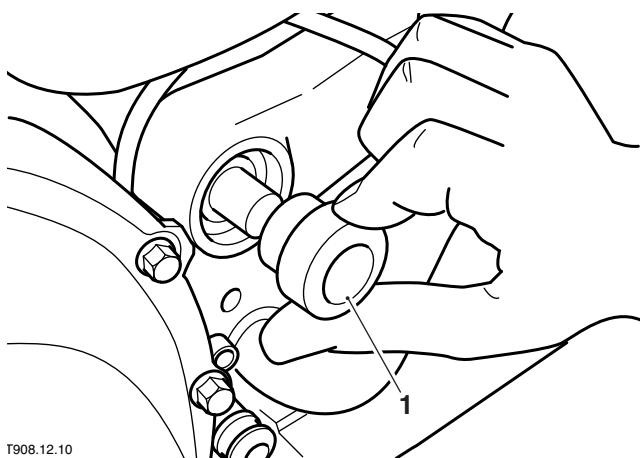


1. Inner sleeve
2. Lubricate the left pivot dust seal lips with a smear of grease and insert the inner and outer spacer.



1. Spacers
3. Manoeuvre the swinging arm assembly into position and locate it on the rear of the crankcase.
4. Ensure the spacers are all correctly positioned then insert the pivot bolt and outrigger bush from the right hand side.

- Slide the left outrigger bush onto the pivot bolt then fit the washer and nut.



1. Outrigger bush

- Locate the rear suspension units on the swinging arm and fit their washers and new mounting bolts. Tighten the bolts to **28 Nm**.
- Refit the left side outrigger and tighten the mounting bolts to **45 Nm**.
- Tighten the swinging arm pivot bolt to **110 Nm**.
- Tighten the left and right side swinging arm outrigger clamp bolts to **45 Nm** up to VIN 333839, **40 Nm** from VIN 333840, then fit the caps.
- Fit the cap to the left end of the swinging arm pivot bolt.
- On Thruxton only, refit the gearchange lever in the position noted prior to removal. Tighten the pinch bolt to **8 Nm**.
- Install the sprocket cover, tightening the cover bolts to **10 Nm**.
- Refit the chainguard and brake hose clamp to the swinging arm.
- On Thruxton only, refit the silencers as described in the Fuel/Exhaust section (see page 10A-34 for carburettor models or page 10B-110 for fuel injected models).
- Refit the rear wheel (see page 15-13).
- Secure the bike, lower and remove the support and park the bike on the side stand.
- Apply the rear brake lever several times to force the pads back into contact with the disc.
- Check the rear brake fluid level, adjust as necessary (see page 11-13).
- Reconnect the battery, positive (red) lead first.



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 earlier in this section of the manual.

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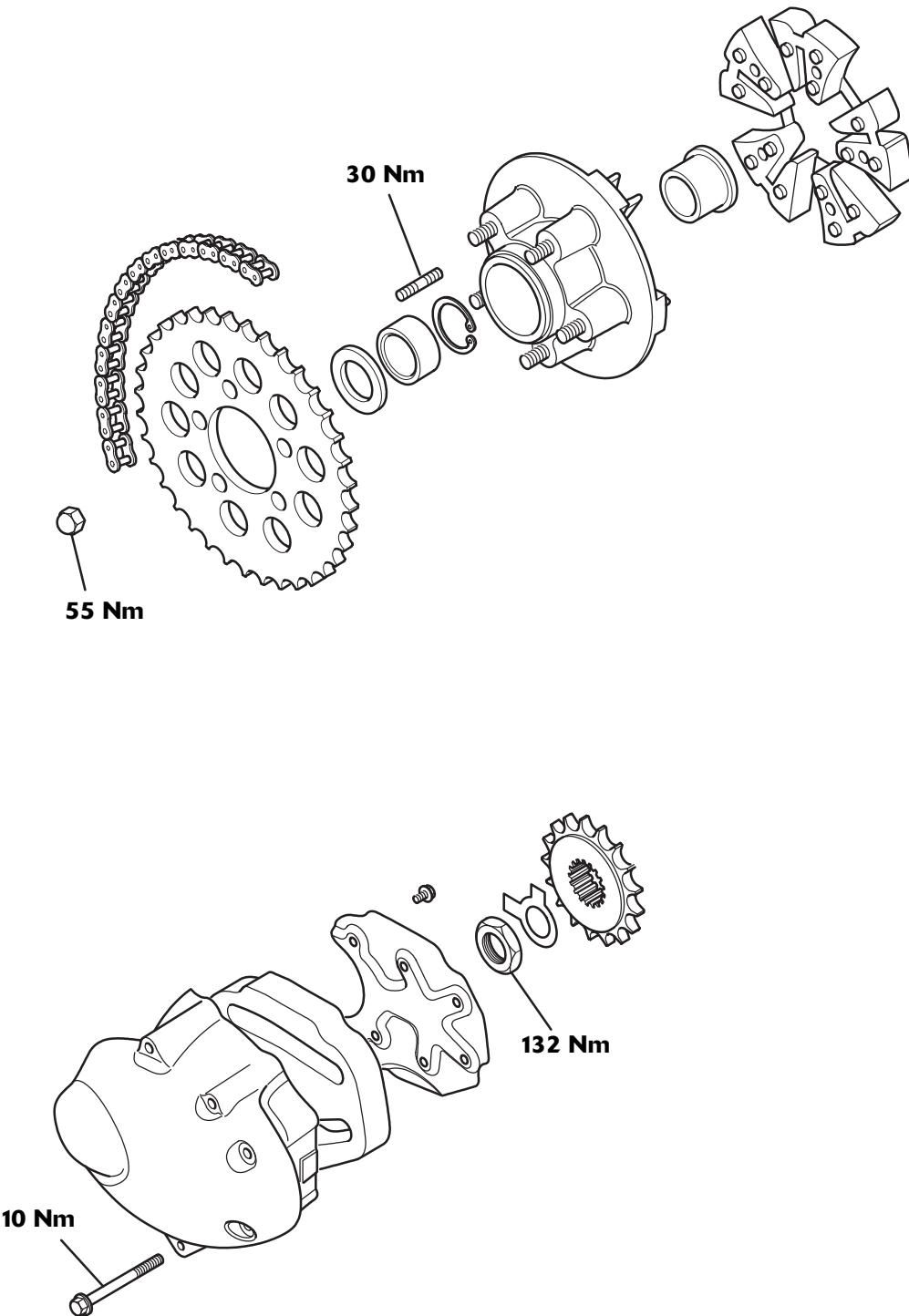
14 Final Drive

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Final Drive

Exploded View - Final Drive



Drive Chain Free Play Check, Adjustment & Lubrication

Free Play Check - All Models



Warning

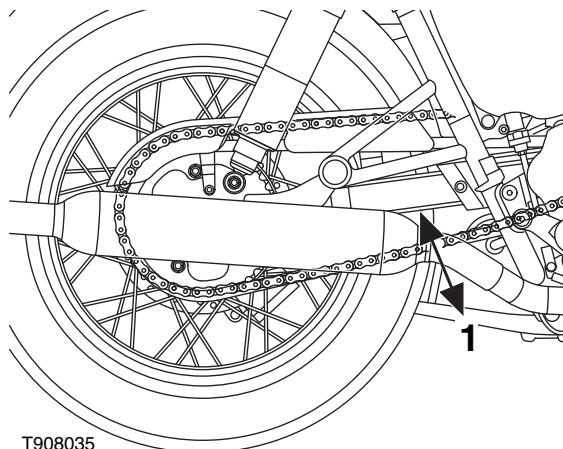
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Rotate the rear wheel to find the position where the chain has least slack.

Note:

- **Always check/adjust the drive chain free play at the point where the chain has least slack.**
- 2. Position the motorcycle on the side stand and measure the chain's vertical movement, mid-way between sprockets.
- 3. If correct, the vertical movement of the drive chain midway between the sprockets should be:

Model	Chain Slack
Bonneville, Bonneville SE, Bonneville T100	15 - 30 mm
Scrambler, Thruxton	30 - 40 mm



1. Drive chain free play measurement point

Adjustment

1. Rotate the rear wheel to find the position where the chain has least slack.

Note:

- **Always check/adjust the drive chain free play at the point where the chain has least slack.**
- 2. Position the motorcycle on the side stand.



Warning

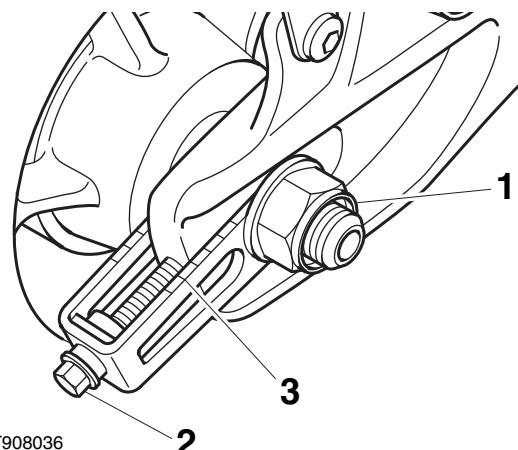
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

3. Slacken the rear wheel spindle nut.
4. Adjust the drive chain free play by rotating the adjuster bolts. Rotate the bolts clockwise to increase chain free play and anti-clockwise to reduce free play. Use the alignment marks on the adjusters to ensure equal adjustment and keep the adjusters in firm contact with the bolt shoulders during adjustment.



Warning

If the adjusters are not equally set, the wheel alignment will be incorrect. This will adversely affect the handling of the motorcycle which could result in an unsafe riding condition, leading to a loss of control and an accident.



1. When the free play is correctly set, tighten the rear wheel spindle nut to **85 Nm**.
2. Rotate the rear wheel and recheck the free play. Readjust if necessary.
7. Tighten the adjusters, anti-clockwise, to **5 Nm**.

Final Drive

Lubrication

1. If the chain is especially dirty, clean it using a degreaser before applying the lubricant.



Caution

Never use a power wash system to clean the chain as this may cause damage to the chain components.

2. Apply chain lubricant to the sides of the chain rollers, and also the seals. The lubricant will penetrate the rollers and bushes and will help prevent the seals from deteriorating.
3. Wipe off any excess oil.

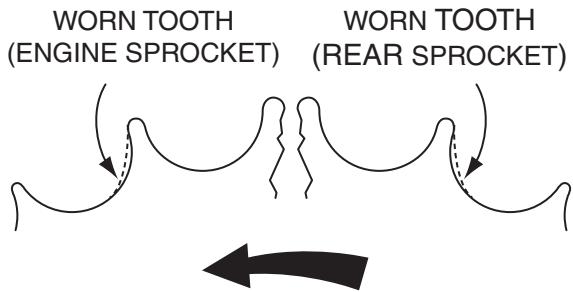
Drive Chain & Sprocket Wear Check



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.

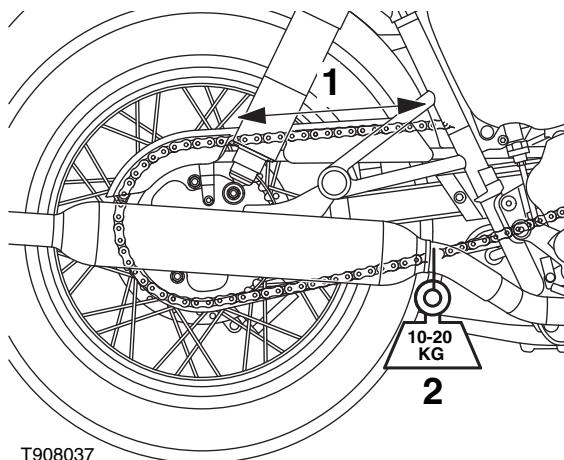
1. Position the motorcycle on the side stand.
2. Undo the screws and remove the chainguard from the swinging arm.
3. Unscrew the bolts and remove the sprocket cover from the engine.
4. Examine the whole length of the chain. If there are any excessively tight or loose sections, loose pins or damaged rollers, the chain and sprockets should be renewed.
5. Inspect sprockets for unevenly or excessively worn teeth. Also examine the sprockets for damaged teeth.



cool
Note:

- **Sprocket wear is exaggerated for illustration purposes.**
6. Stretch the chain taut by hanging a 10-20 kg (20-40 lb) weight from its bottom run.

- Measure the length of 20 links on the top run of the chain from the centre of the 1st link pin to the centre of the 21st link pin. Repeat the test at various points along the length of the chain (the chain may wear unevenly) and check if any length exceeds the service limit of 321 mm.



1. Drive chain length measurement point

2. Weight

- If there is any irregularity found in any of the components, or if the chain has worn beyond the service limit, renew the drive chain and both sprockets as a set.

Note:

- Always renew the drive chain and both sprockets as a set. Never fit a new chain to worn sprockets or new sprockets to a worn chain.**

! Warning

Use only Triumph recommended chain and sprockets as specified in the Triumph Parts Catalogue. The use of non-recommended items could lead to failure. Drive chain failure will cause serious damage to the motorcycle and could lead to loss of control, resulting in an accident.

- Also check the drive chain slider on the swinging arm for signs of wear or damage. Renew if necessary.
- Refit the sprocket cover, tightening its bolts to **10 Nm**.
- Refit the chainguard to the swinging arm, tightening its screws to **7 Nm**.

Drive Chain Replacement

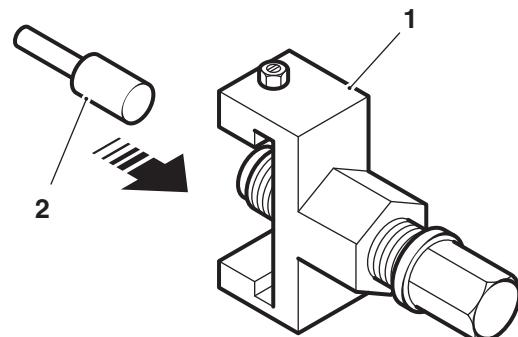
Rivet Link Type

The following instructions for the replacement of rivet link type drive chains requires the use of service tool A9938017.

! 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.

- Support the motorcycle on a stand so the rear wheel is clear of the ground.
- Insert the pin into the pin holder so its smaller diameter end (cutting point) is facing away from the holder as shown.



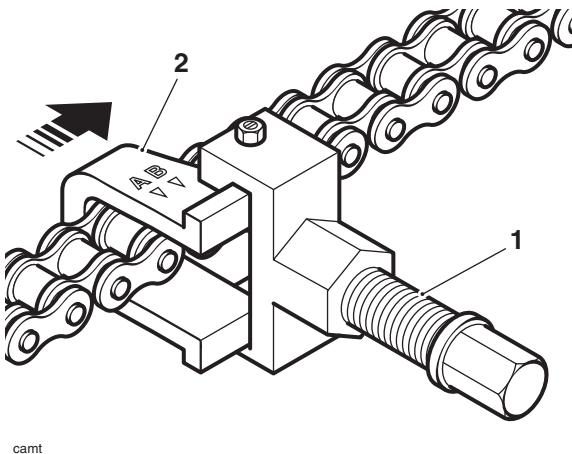
1. Tool body and pin holder

2. Pin

- Position the "U" shaped holder behind the chain ensuring its A and B marks are uppermost.

Final Drive

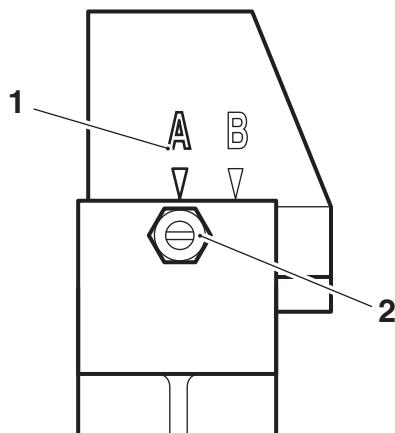
4. Slide the tool body assembly onto the "U" shaped holder ensuring its adjustment screw is uppermost.



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1. Tool body assembly
2. "U" shaped holder

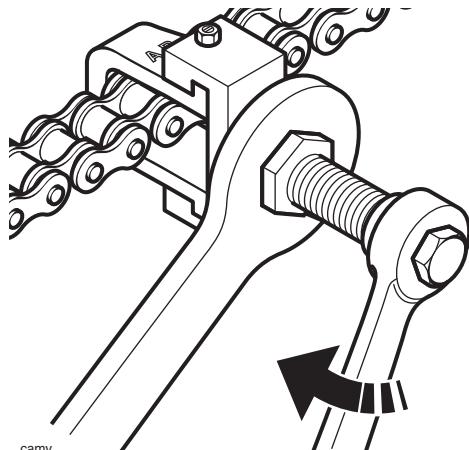
5. Align the A mark on the "U" shaped holder with the tool body adjustment screw ensuring the adjustment screw spring-loaded ball locates correctly in the holder indent.



1. "U" shaped holder A mark
2. Tool body adjustment screw and lock nut

6. Locate the chain link pin which is to be removed in the hole in the centre of the "U" shaped holder then screw the pin holder in until its pin contacts the link pin. Ensure that the holder pin is centralised on the link pin to be removed.

7. Retain the tool body with a wrench then tighten the pin holder until the link pin is pressed out from the chain.



8. Remove the tool and separate the two ends of the chain.

Note:

- The replacement chain is supplied in a split condition, complete with a link kit to join the two ends.



Caution

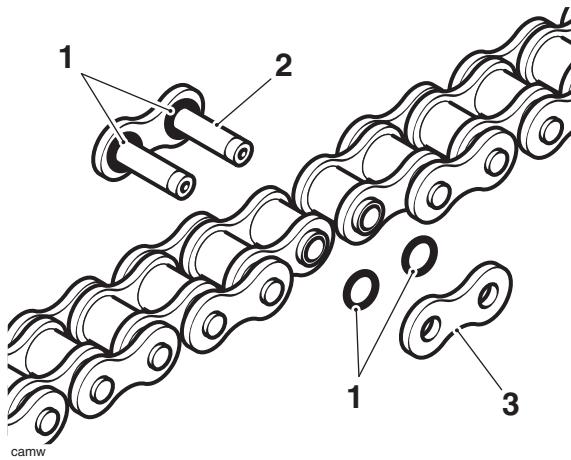
The component parts of the new link kit are coated with a special grease which must not be removed. Removal of this special grease will severely reduce the service life of the chain.

9. Use the old drive chain to pull the new chain into position as follows: Temporarily attach the end of the new chain to a free end of the old chain using the old connector link. Carefully pull the other end of the old chain to pull the new chain around the sprockets.

Note:

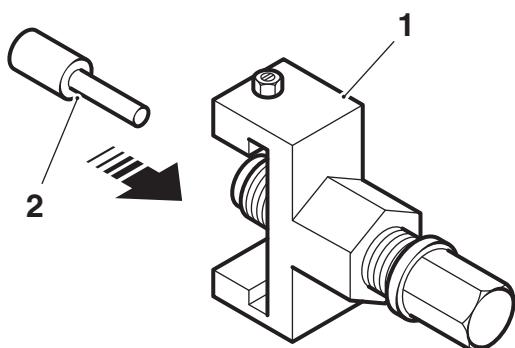
- Do not use the new connector link as the special grease on it may be removed.

10. Using the new link supplied with the chain kit, join the two ends of the chain. Ensure that the O-rings are positioned as shown below and the link plate is fitted with its markings facing outwards.



- 1. O-rings**
2. Link
3. Link plate

11. Insert the pin into the pin holder so its larger diameter end (riveting point) is facing away from holder as shown.

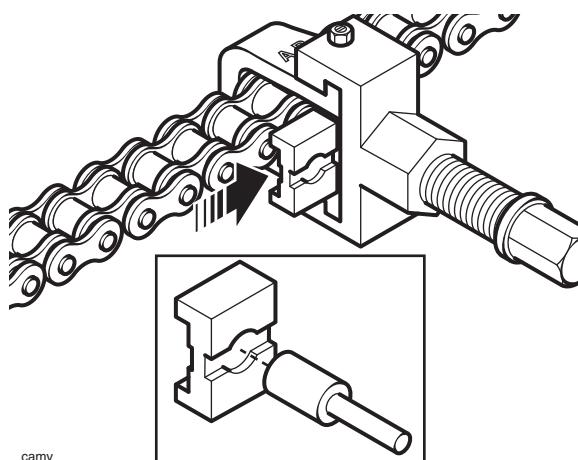


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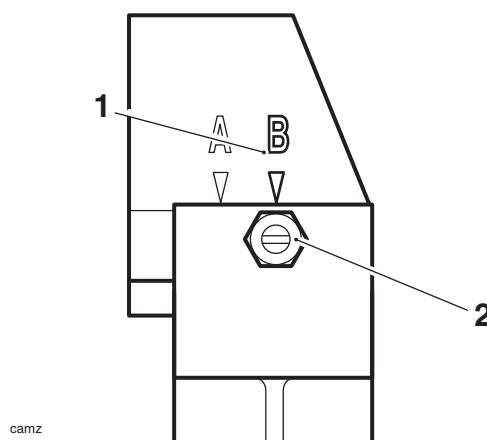
- 1. Tool body and pin holder**
2. Pin

12. Position the "U" shaped holder behind the chain ensuring its A and B marks are uppermost.
 13. Slide the tool body assembly onto the "U" shaped holder, ensuring its adjustment screw is uppermost.
 14. Align the A mark on the U-shaped holder with the tool body adjustment screw ensuring the adjustment screw spring-loaded ball locates correctly in the holder indent (see step 5).

15. Slide the link plate holder into the "U" shaped holder and locate it on the end of the pin. Ensure the pin is correctly located in the link plate holder circular cut-out.



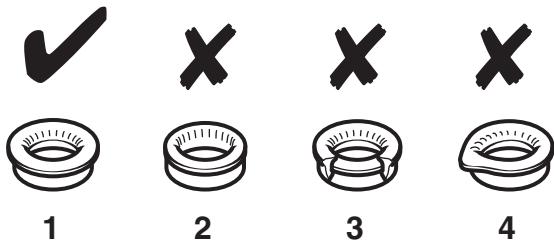
16. Locate both the split link pins in the circular cut-outs in the "U" shaped holder then screw the pin holder in until the plate holder contacts the link plate. Ensure both the split link and link plate are correctly located in their holders.
 17. Retain the tool body with a wrench then tighten the pin holder until the link plate is pressed fully onto the link.
 18. Back off the pin holder then slide the tool assembly to one side and check that the split link is correctly assembled.
 19. Remove the link plate holder from the tool.
 20. Slide the tool body along the "U" shaped holder until the B mark on the holder is aligned with the adjustment screw. Ensure the adjustment screw spring-loaded ball is correctly located in the holder indent.



- 1. "U" shaped holder B mark**
2. Tool body adjustment screw and lock nut

Final Drive

21. Locate one of the split link pins in the right hand circular cut-out of the "U" shaped holder then screw the pin holder in until its pin contacts the split link end. Ensure the split link pin is centrally located on the holder pin.
22. Retain the tool body with a wrench then tighten the pin holder until the split link end is riveted-over.
23. Back off the pin holder and rivet the remaining split link pin as described above.
24. Remove the tool from the chain and check that both the split link pins are correctly riveted as shown below.



cana

1. **Correct riveting**
2. **Insufficient riveting**
3. **Excessive riveting**
4. **Riveting off-centre**



Warning

If either split link pin is not correctly riveted, the split link must be removed and replaced with a new link. Never operate the motorcycle with an incorrectly riveted split link as the link could fail resulting in an unsafe riding condition leading to loss of control and an accident.

Endless Type



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 swinging arm (see page 13-5).
2. Free the chain from the front sprocket and remove it from the motorcycle.
3. Locate the new chain on the front sprocket.
4. Install the swinging arm (see page 13-6).

Front Sprocket

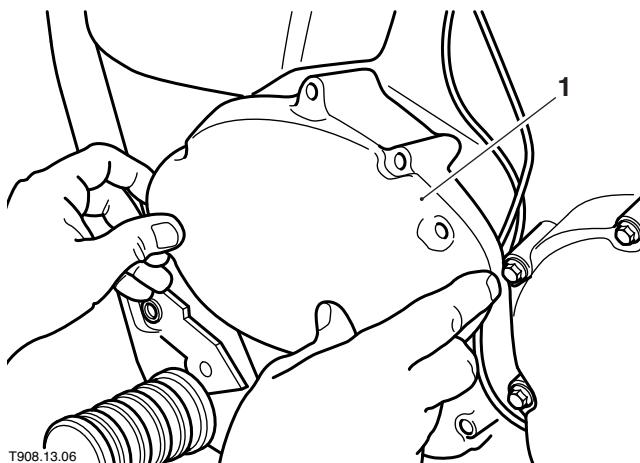
Removal



Warning

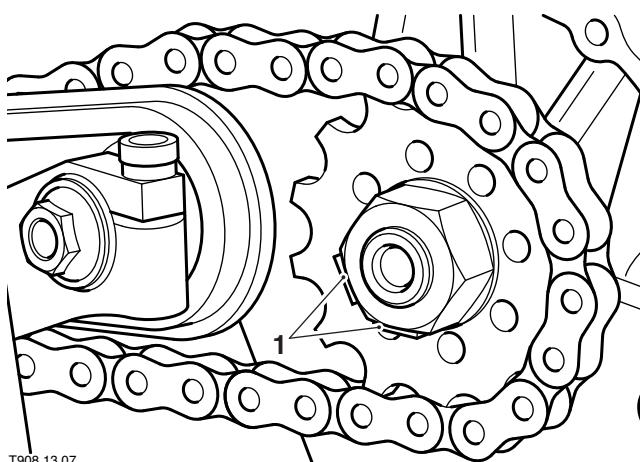
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the motorcycle on the side stand.
2. Unscrew the bolts and remove the sprocket cover from the engine.



1. Sprocket cover (Bonneville illustrated)

3. Bend back the tabs of the front sprocket lockwasher.



1. Lockwasher tabs

4. Have an assistant apply the rear brake hard, then loosen the sprocket nut.

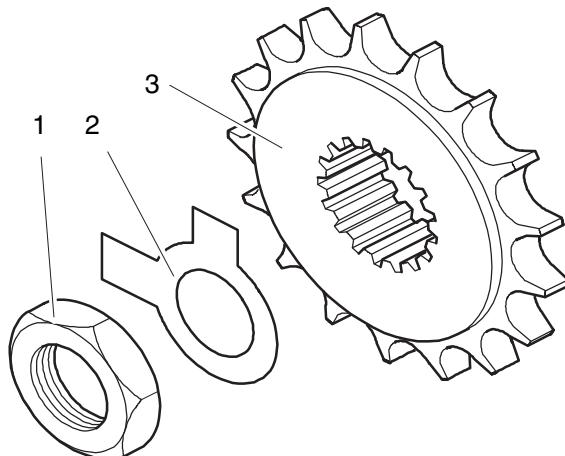
Note:

- If necessary, place the transmission in gear to help prevent rear wheel rotation.

5. Remove the sprocket nut and discard its lockwasher.
6. Set the drive chain adjustment to allow maximum free play in the chain.
7. Disengage the front sprocket from the chain and slide it off the output shaft, noting which way around it is fitted.

Installation

1. Fit the front sprocket, ensuring it is the correct way around, and engage it with the drive chain.
2. Fit a new lockwasher, engaging it with the output shaft splines, and fit the sprocket nut hand-tight.



1. Nut

2. Lockwasher

3. Sprocket

3. Have an assistant apply the rear brake hard, then tighten the front sprocket nut to **132 Nm**.

Note:

- If necessary, place the transmission in gear to help prevent rear wheel rotation.
- 4. Adjust the drive chain free play.
- 5. Secure the sprocket nut in position by bending down the lockwasher tabs so they firmly contact the nut flats.
- 6. Fit the sprocket cover and tighten its bolts to **10 Nm**.

Final Drive

Rear Sprocket

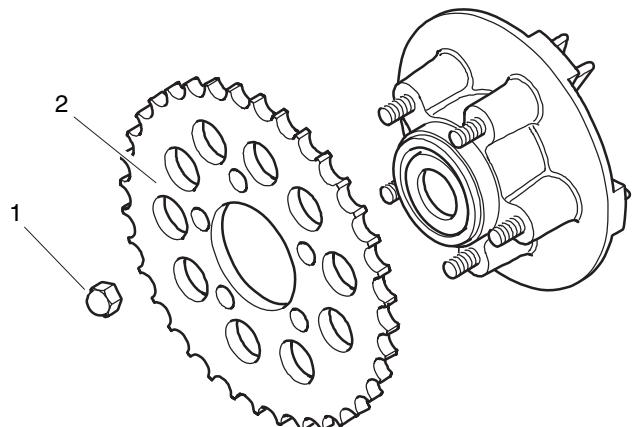
Removal



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 15-13).
2. Evenly and progressively slacken and remove the sprocket nuts.



1. Nut

2. Sprocket

3. Remove the sprocket from its carrier, noting which way around it is fitted.

Installation

1. Replace any sprocket stud which is loose, tightening the new stud to **30 Nm**.
2. Fit the rear sprocket, ensuring it is the correct way around.
3. Fit the sprocket nuts and evenly and progressively tighten them to **55 Nm**.
4. Refit the rear wheel (see page 15-14).

Rear Sprocket Carrier & Cush Drive

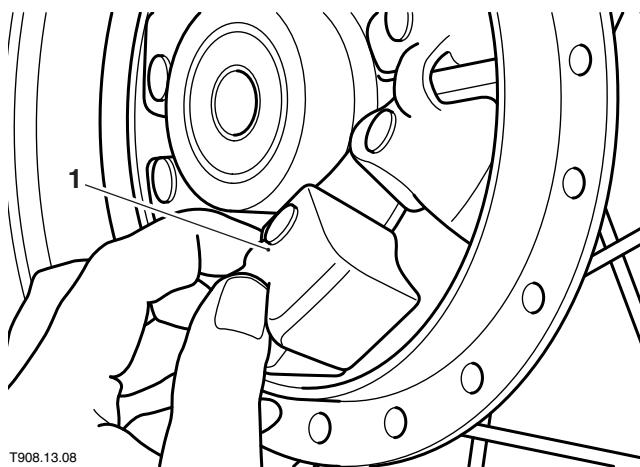
Removal



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 15-13).
2. Remove the sprocket carrier from the wheel, along with its spacer.
3. Remove the cushion drive rubbers from the wheel hub.



T908.13.08
1. Cush drive rubber

Inspection

1. Inspect all components for signs of wear or damage, paying particular attention to the cushion drive rubbers. Renew as necessary.

Installation

1. Fit the cushion drive to the rear wheel.
2. Ensure the spacer is correctly fitted to the inside of the bearing then fit the sprocket carrier assembly to the rear wheel.
3. Refit the rear wheel (see page 15-14).

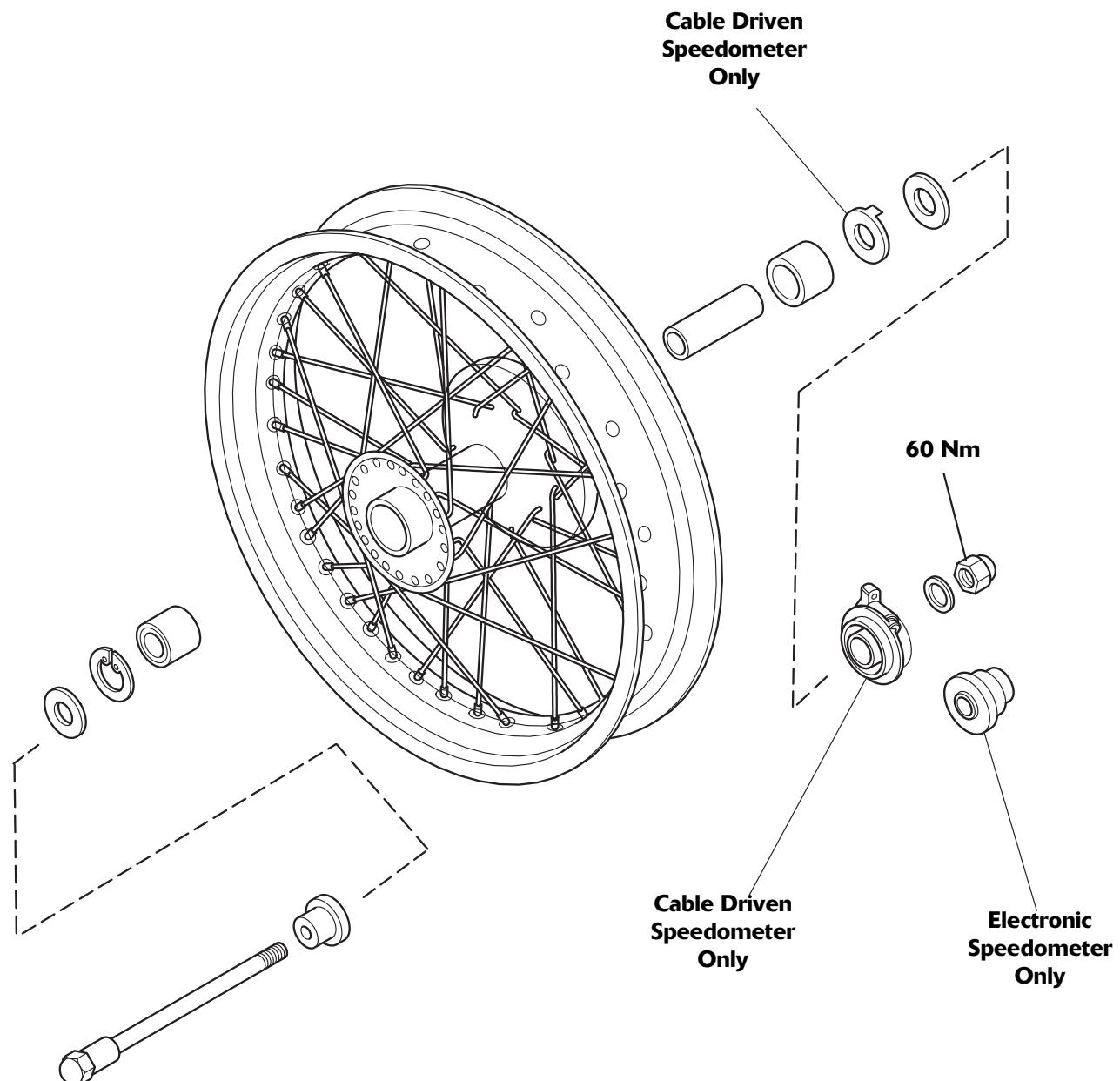
15 Wheels & Tyres

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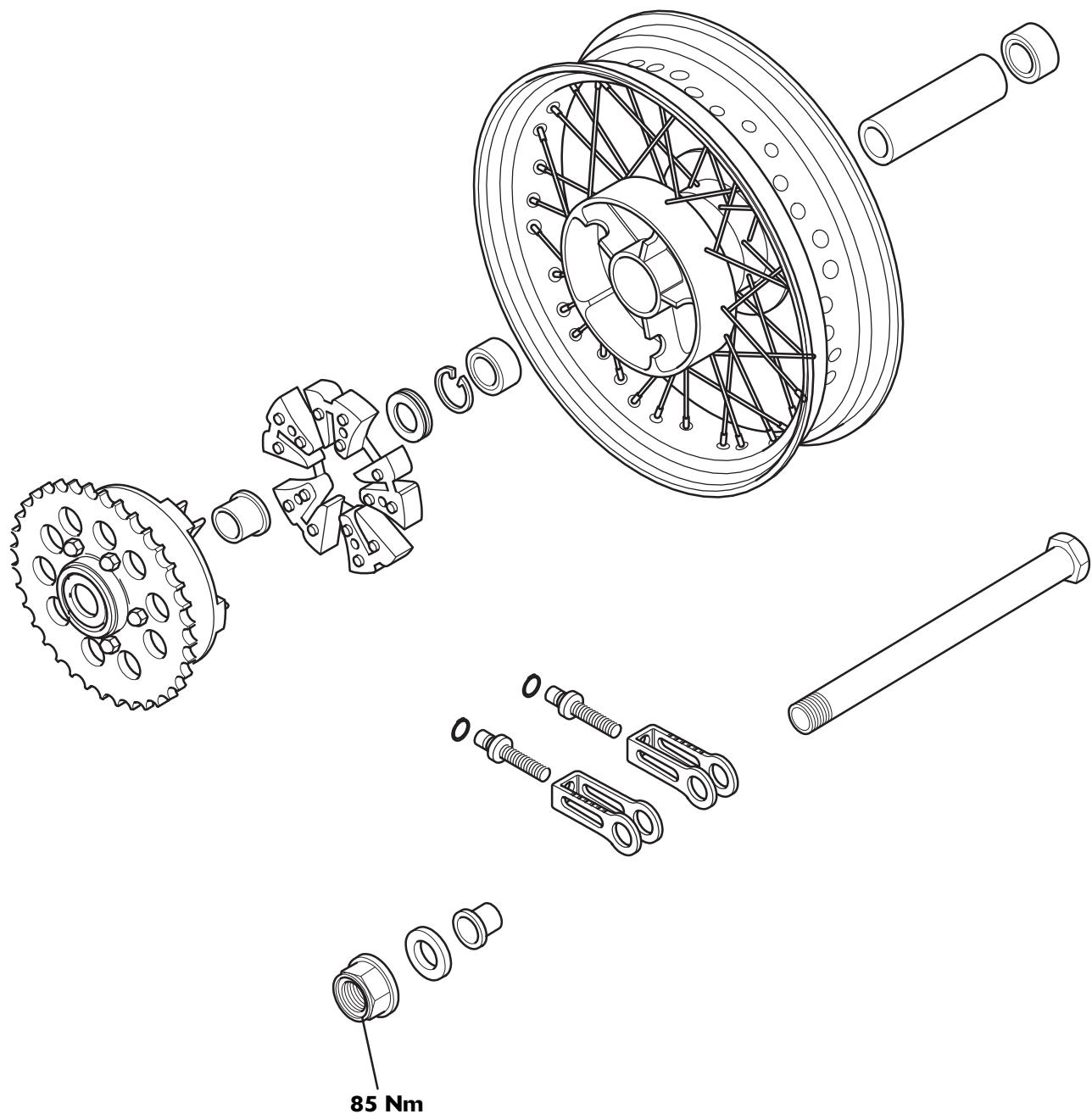
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Wheels & Tyres

**Exploded View - Front Wheel Assembly - Bonneville (up to VIN 380776),
Bonneville T100 (including the Steve McQueen™ & Bonneville T100
110th Editions), Thruxton and Scrambler**

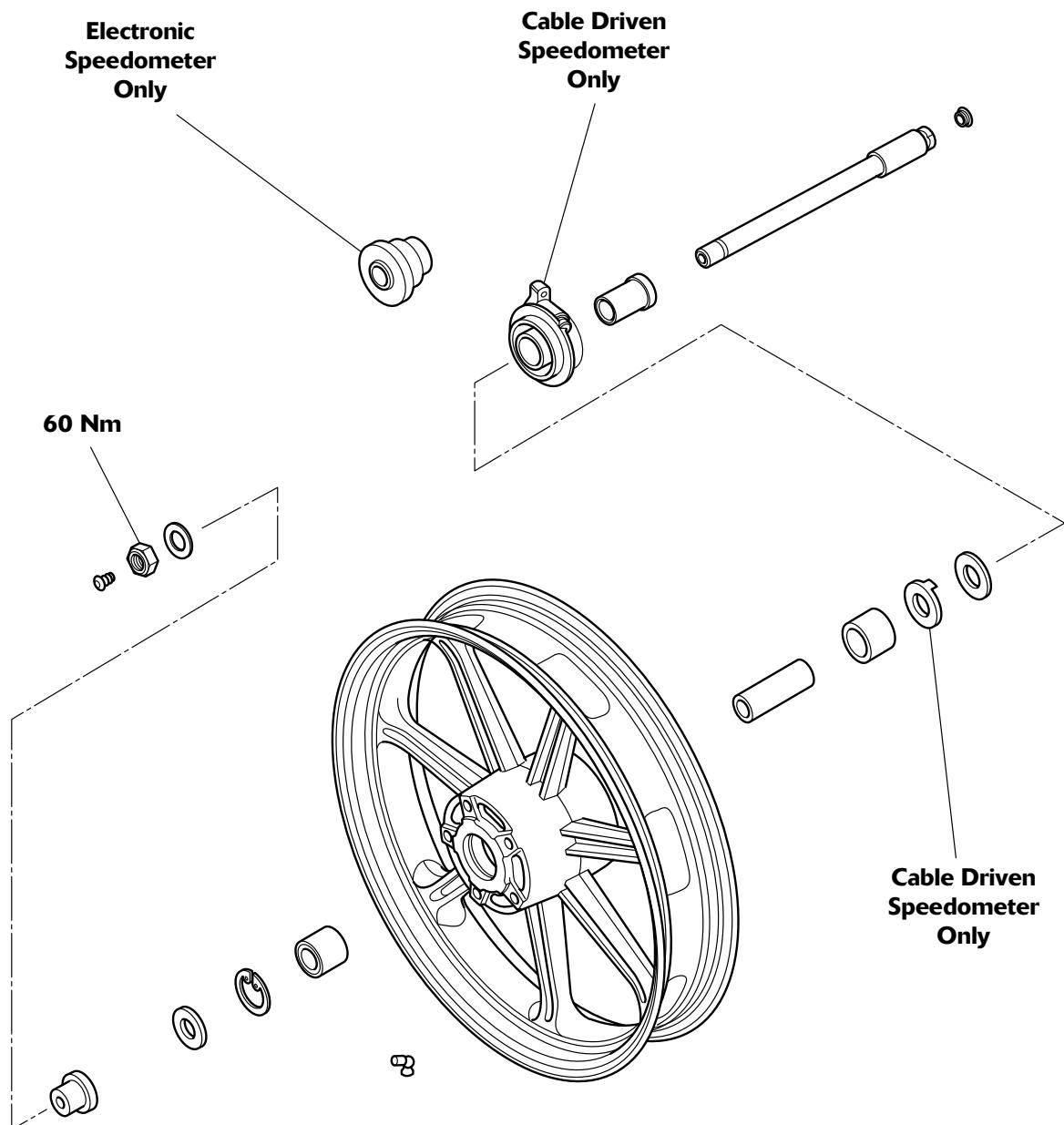


Exploded View - Rear Wheel Assembly - Bonneville (up to VIN 380776), Bonneville T100 (including the Steve McQueen™ & Bonneville T100 110th Editions), Thruxton and Scrambler

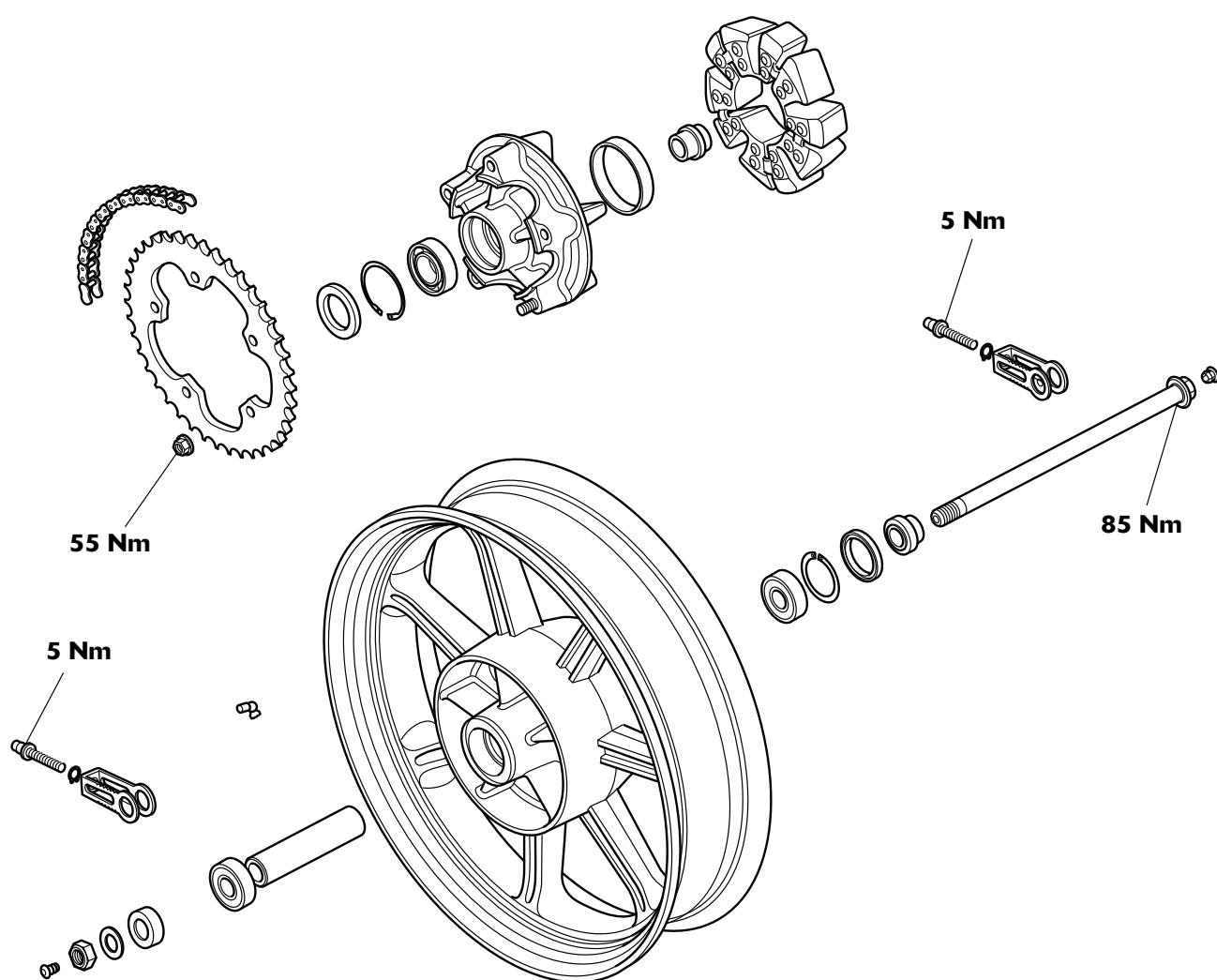


Wheels & Tyres

Exploded View - Front Wheel Assembly - Bonneville (from VIN 380777), Bonneville SE



Exploded View - Rear Wheel Assembly - Bonneville (from VIN 380777), Bonneville SE



Wheels & Tyres

Tyre Safety Precautions

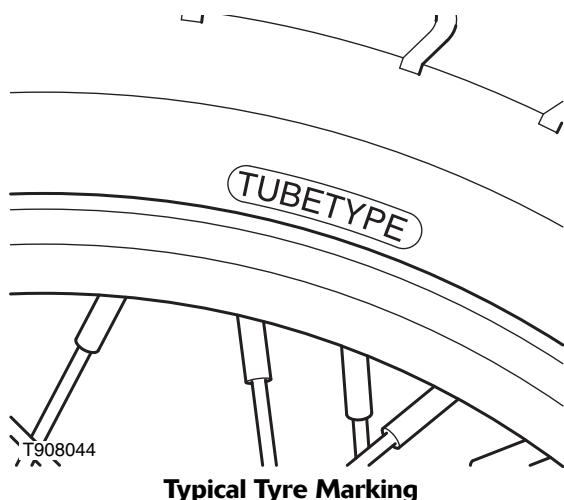
Tyres

Bonneville (up to VIN 380776), Bonneville T100, Thruxton and Scrambler models are fitted with spoked wheels which require a tyre suitable for use with an inner tube.



Warning

Failure to use an inner tube in a spoked wheel will cause deflation of the tyre resulting in loss of control and an accident.



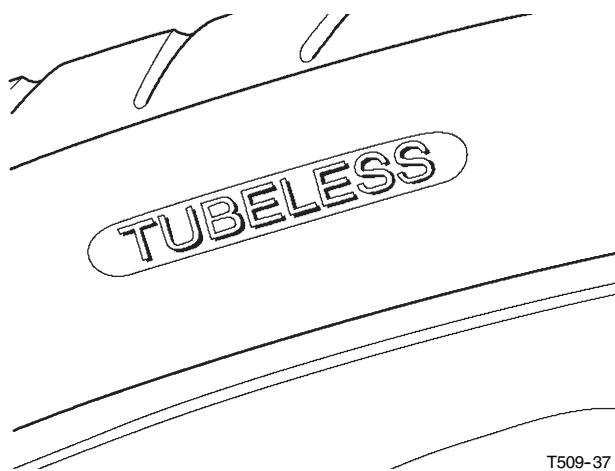
Typical Tyre Marking

Bonneville (from VIN 380777) and Bonneville SE models are equipped with tubeless tyres, valves and wheel rims. Use only tyres marked "TUBELESS" and tubeless valves on rims marked "SUITABLE FOR TUBELESS TYRES".

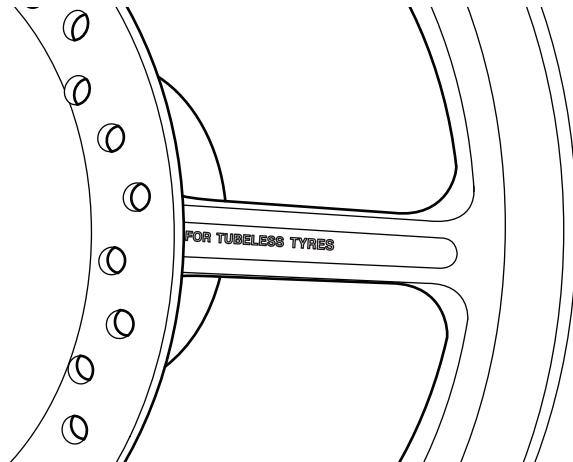


Warning

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.



Typical Tyre Marking



Wheel Marking - Tubeless Wheel

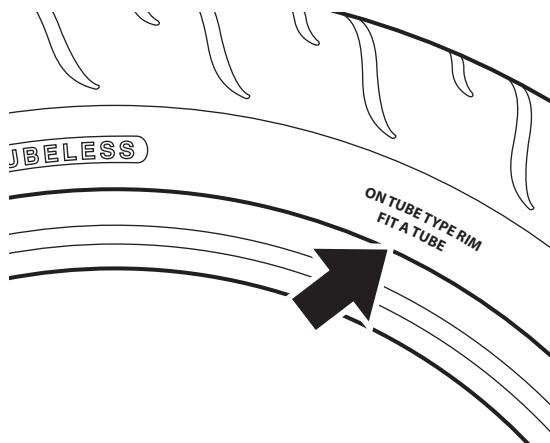


Warning

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked "TUBE TYPE".

Some brands of approved tyre 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 illustration below).

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

Tyre Pressures

Correct inflation pressure will provide maximum stability, rider comfort and tyre life. Tyre pressures should be checked frequently and adjusted as necessary. The tables below show the correct tyre pressures for each model.

Bonneville, Bonneville SE, Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions) & Thruxton

Loading condition	Solo	Fully laden
Front	2.27 Bar (33 lb/in ²)	2.27 Bar (33 lb/in ²)
Rear	2.82 Bar (41 lb/in ²)	2.82 Bar (41 lb/in ²)

Scrambler

Loading condition	Solo	Fully laden
Front	2.07 Bar (30 lb/in ²)	2.07 Bar (30 lb/in ²)
Rear	2.82 Bar (41 lb/in ²)	2.82 Bar (41 lb/in ²)



Warning

Incorrect tyre inflation will cause abnormal tread wear and instability problems which may lead to loss of control and an accident.

Under-inflation may result in the tyre slipping on, or coming off the rim. Over-inflation will cause instability and accelerated tread wear.

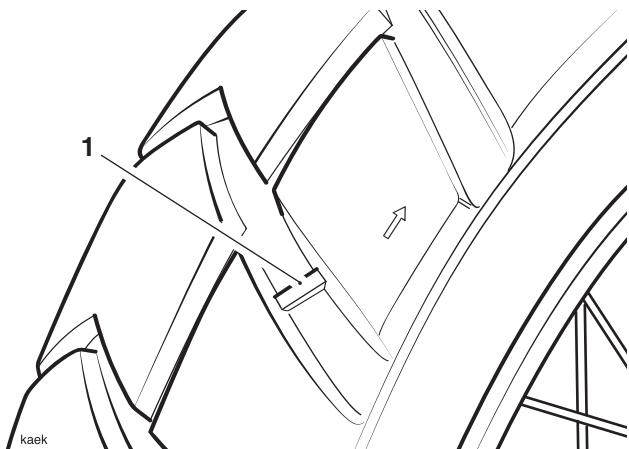
Both conditions are dangerous as they may cause loss of control leading to an accident.

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.



1. Tread wear indicator

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, kerb damage, dents and deformation. Check for loose or damaged spokes (on spoked wheels only). Always replace wheels that are suspected of being damaged.



Warning

Operation with excessively worn tyres or damaged/defective wheels is hazardous and will adversely affect traction, stability and handling which may lead to loss of control or an accident.

Check the tyres for cuts, embedded nails or other sharp objects. Replace any that are damaged or worn.

Check spokes (where fitted) for looseness and damage. Replace wheels where spoke damage/looseness is evident.

Check the wheel rims for cracks, splits, kerb damage, dents and deformation and replace any that show signs of being defective.

Always consult your Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

Minimum Recommended Tread Depth

The following chart can be used as a guide to the minimum safe 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.

Operation at high speed in closed-course conditions should only be undertaken by riders experienced in, and trained for such conditions.



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 or inner tube may lead to instability, loss of motorcycle control and an accident.

Important Tyre Information



Warning

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked "TUBETYPE".

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

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.

Note:

- Some brands of approved tyre 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.**



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 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 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.

Note:

- On Thruxton only, the rim band is glued in place around the wheel rim. If the rim band becomes detached from the wheel rim, re-secure with cyanoacrylate adhesive.**



Warning

Always check tyre pressures before riding when the tyres are cold. Operation with incorrectly inflated tyres may affect handling leading to loss of control and an accident.



Warning

Operation with excessively worn or damaged tyres will impair stability and handling leading to loss of control or 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 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.

For example, do not use option 1 front tyres with option 2 rear tyres.



Warning

Accurate wheel balance is necessary 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 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 resulting in tyre deflation, loss of control and an accident.



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 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) to become accustomed to the new handling characteristics.

After both 24 hours and 100 miles, 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 may lead to loss of control and an accident.

Front Wheel

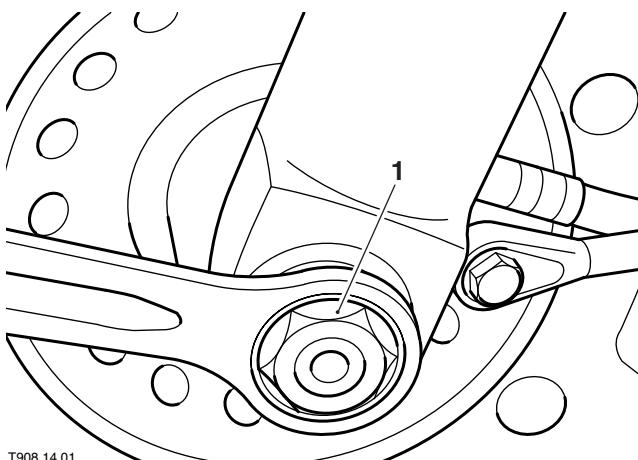
Removal



Warning

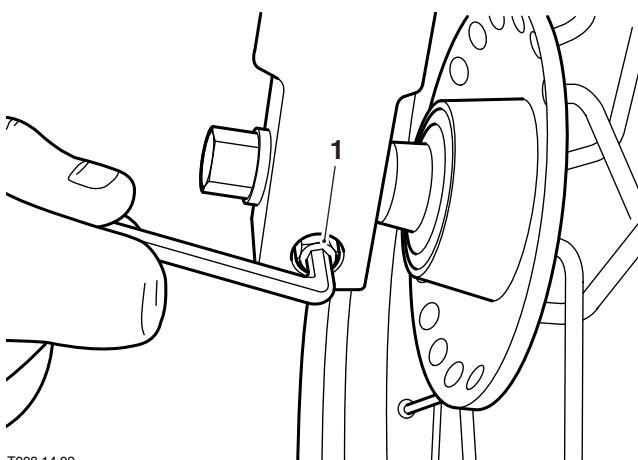
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Slacken the front wheel spindle nut.



T908.14.01 1. Front wheel spindle nut (Bonneville shown)

2. Slacken the spindle clamp bolt fitted to the right hand fork.

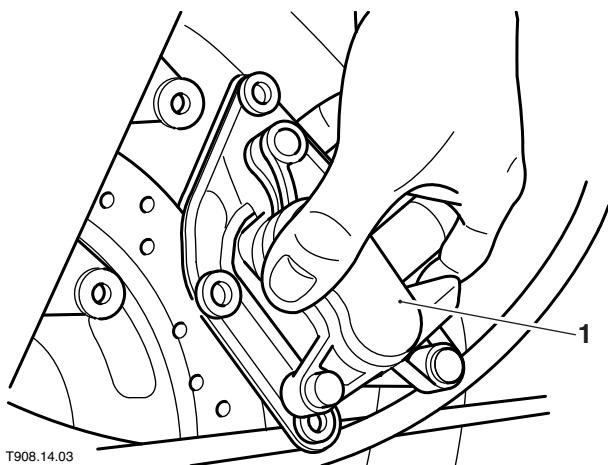


T908.14.02 1. Spindle clamp bolt

- Unscrew the front brake caliper mounting bolts and slide the caliper assembly off the disc.

Note:

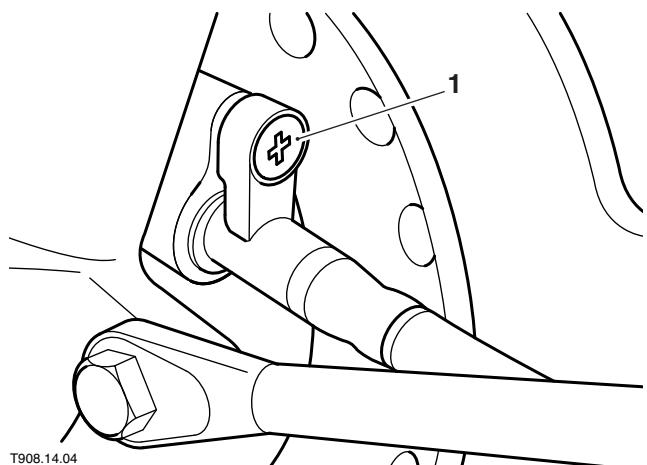
- Support the caliper to avoid placing any strain on the hydraulic hose.**



T908.14.03

1. Front brake caliper

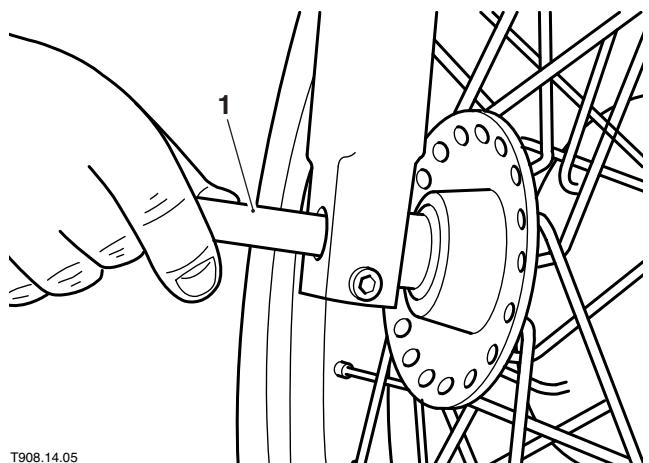
- Support the motorcycle so the front wheel is raised clear of the ground.
- Models with cable driven speedometer only:** Undo the screw and detach the speedometer cable from its drive.



T908.14.04

1. Speedometer cable screw (Bonneville shown)

- Remove the nut and washer from the front wheel spindle.
- Support the wheel and withdraw the spindle.



T908.14.05

1. Spindle

- Models with cable driven speedometer only:** Manoeuvre the wheel out from the forks and recover the spacer from the right side of the hub and the speedometer drive assembly from the left side of the hub.
- Models with electronic speedometer only:** Manoeuvre the wheel out from the forks and recover the small spacer from the right side of the hub and the large spacer from the left side of the hub.



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.

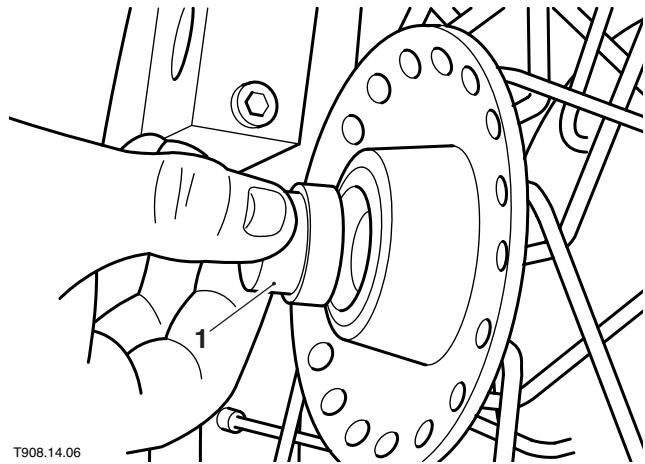
Inspection

- Check closely for signs of loose or broken spokes. Renew/tighten spokes as necessary.
- Check the wheel bearings spin smoothly with no signs of play. If not, renew both bearings.
- If fitted, inspect the speedometer drive and its driveplate for signs of wear or damage. Renew as necessary.

Wheels & Tyres

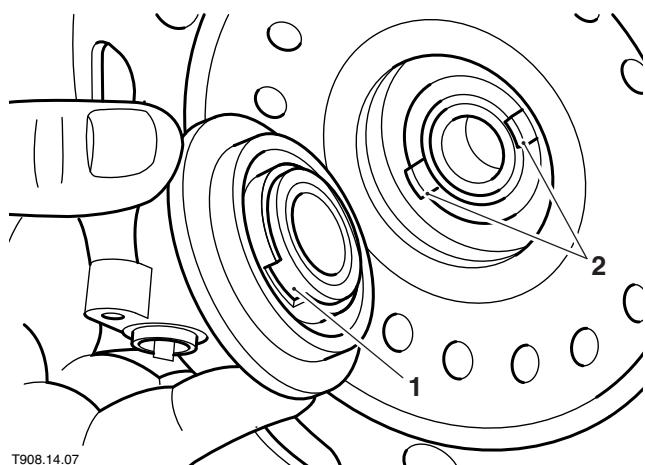
Installation

1. Lubricate the lips of the wheel bearing seals with a smear of multi-purpose grease.
2. Thoroughly clean both sides of the brake disc.
3. Fit the small spacer to the right side of the wheel.



T908.14.06
1. Spacer

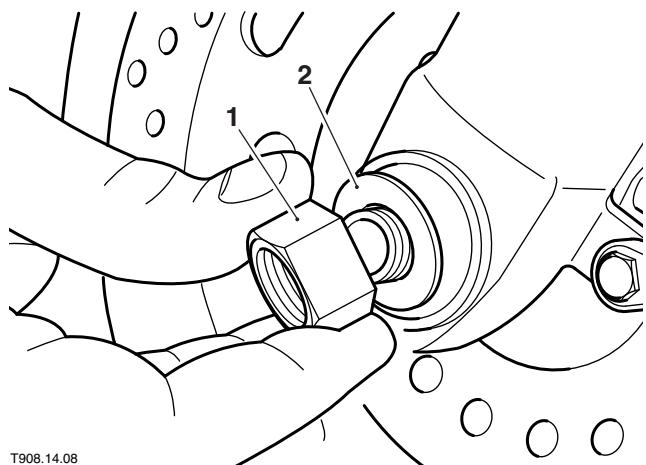
4. **Models with cable driven speedometer only:** Align the drive gear cut-outs with the driveplate tabs and fit the speedometer drive to the left side of the wheel.



T908.14.07
1. Drive gear cut-out
2. Driveplate tabs

5. **Models with electronic speedometer only:** Fit the large spacer to the left side of the wheel.
6. **All models:** Position the wheel in between the forks and insert the spindle from the right hand side.

7. Fit the washer and nut to the spindle and tighten.



T908.14.08

1. Nut
2. Washer

8. Slide the caliper into position, ensuring the pads pass either side of the disc, and tighten its mounting bolts to **28 Nm**. Operate the brake lever a few times to ensure the pads are in firm contact with the disc.
9. Lower the motorcycle to the ground and park on the side stand.
10. **Models with cable driven speedometer only:** Ensure the speedometer drive tab is tight against the rear of the lug on the left fork.
11. **All models:** Tighten the spindle nut to **60 Nm**.
12. **Models with cable driven speedometer only:** Reconnect the cable to the speedometer drive and securely tighten its retaining screw.
13. **All models:** Pump the front forks a few times to settle them in position then tighten the spindle clamp bolt to **27 Nm**.

Rear Wheel

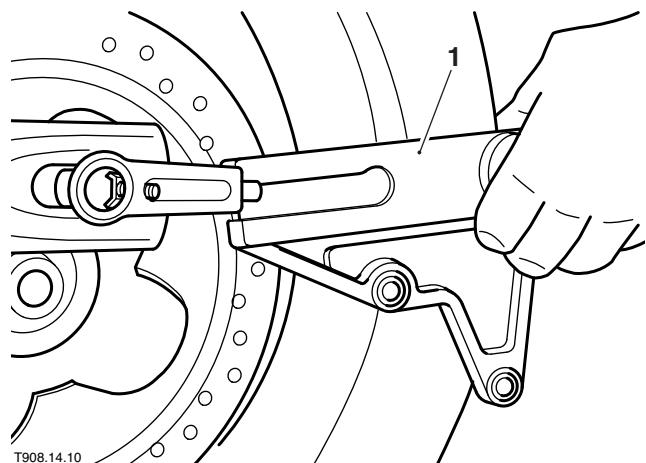
Removal

! 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. Remove both silencers (except Scrambler) (see page 10A-34 for carburettor models or page 10B-110 for fuel injected models).
3. Slacken the rear wheel spindle nut.
4. Unscrew the rear brake caliper mounting bolts and slide the caliper assembly off the disc.

6. Lower the wheel to the ground and collect the brake caliper mounting plate.

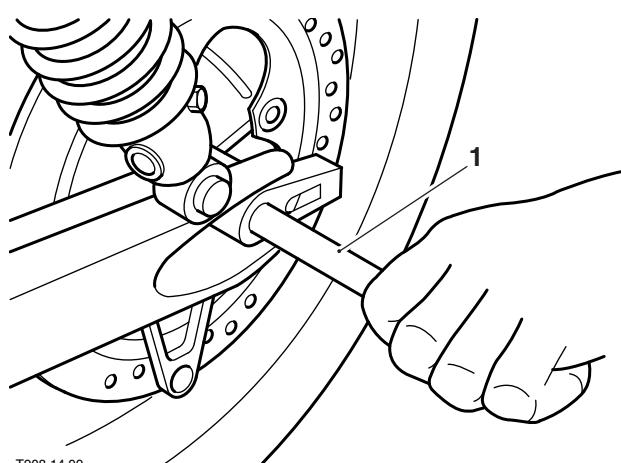


1. Brake caliper mounting plate

7. Disengage the chain from the rear sprocket and hang it on the swinging arm.
8. Manoeuvre the wheel out of position and recover the spacers from the left side of the hub and sprocket coupling.

! Caution

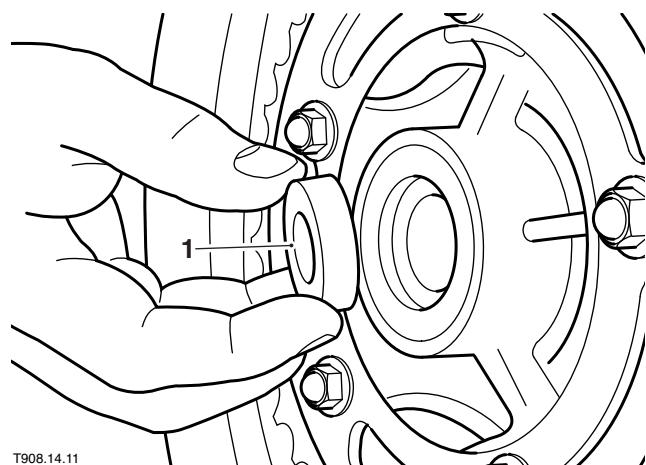
Do not allow the wheel to rest on the brake disc as this could damage the disc. To prevent bearing damage, ensure no dirt enters the wheel bearings whilst the wheel is removed.



1. Spindle

! Caution

Do not fully release the chain adjusters before removing the wheel spindle. A fully released adjuster bolt can drag on the wheel spindle during removal resulting in a scored and damaged spindle.



1. Spacer

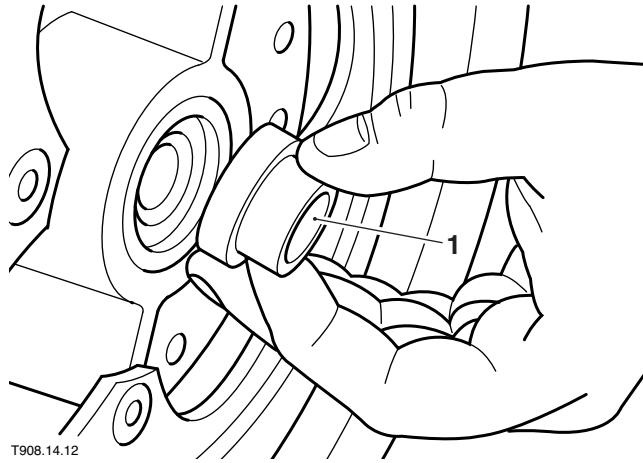
Inspection

1. Check closely for signs of loose or broken spokes. Renew/tighten spokes as necessary.
2. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings.

Wheels & Tyres

Installation

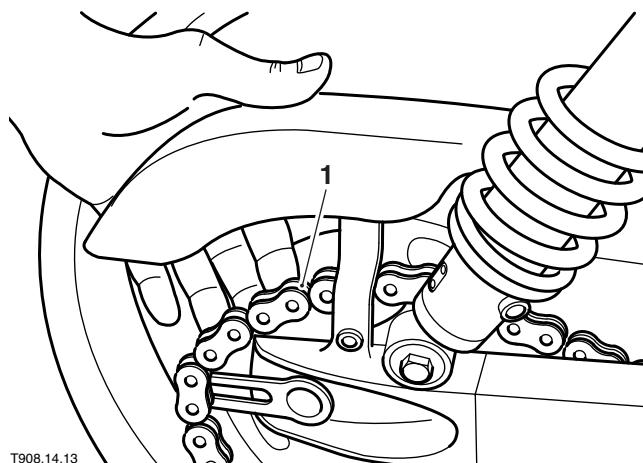
1. Lubricate the lips of the wheel bearing seals with a smear of multi-purpose grease.
2. Fit the spacers to the left side of the wheel and the sprocket coupling.



T908.14.12

1. Spacer

3. Position the wheel in between the swinging arm and engage the chain with the sprocket.



T908.14.13

1. Chain

4. Fit the brake caliper mounting plate locating its slot on the swinging arm lug.
5. Lift the wheel into position, ensuring the spacers and caliper mounting plate remain correctly positioned, and insert the spindle.
6. Fit the washer and nut to the spindle and hand-tighten.
7. Slide the caliper into position, ensuring the pads pass either side of the disc, and tighten its mounting bolts to **40 Nm**. Operate the brake pedal a few times to ensure the pads are in firm contact with the disc.
8. Lower the motorcycle to the ground and adjust the drive chain freeplay (see final drive section), tightening the spindle nut to **85 Nm**.
9. Tighten the adjusters, anti-clockwise, to **5 Nm**.
10. If removed, install the silencers (see page 10A-34 for carburettor models or page 10B-110 for fuel injected models).

16 Frame & Bodywork

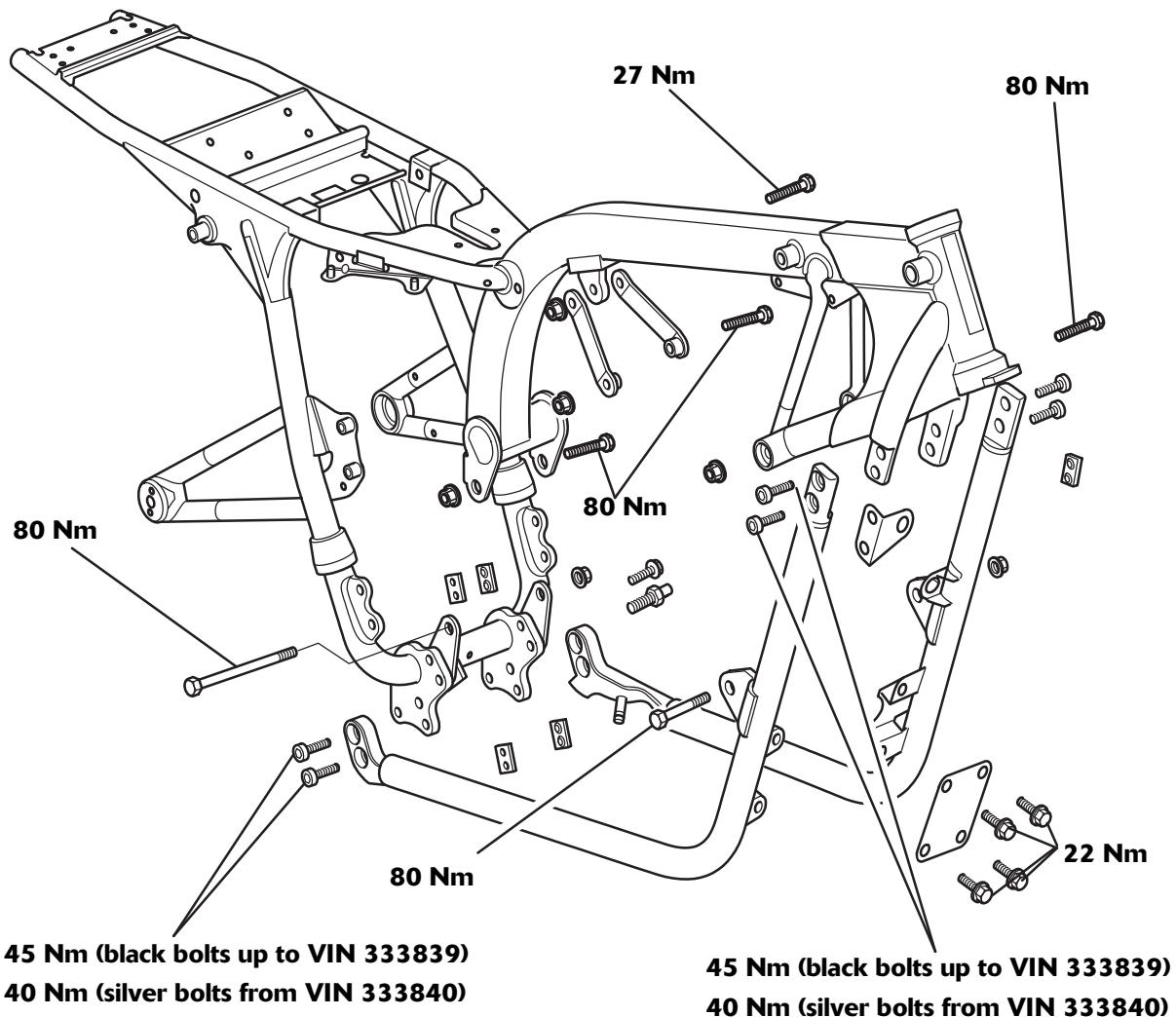
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Frame & Bodywork

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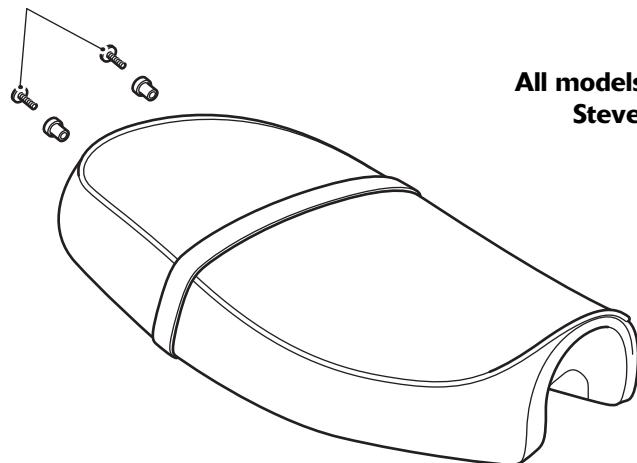
Exploded View - Frame and Fixings



Frame & Bodywork

Exploded View - Seats

8 Nm



All models except Bonneville T100
Steve McQueen™ Edition

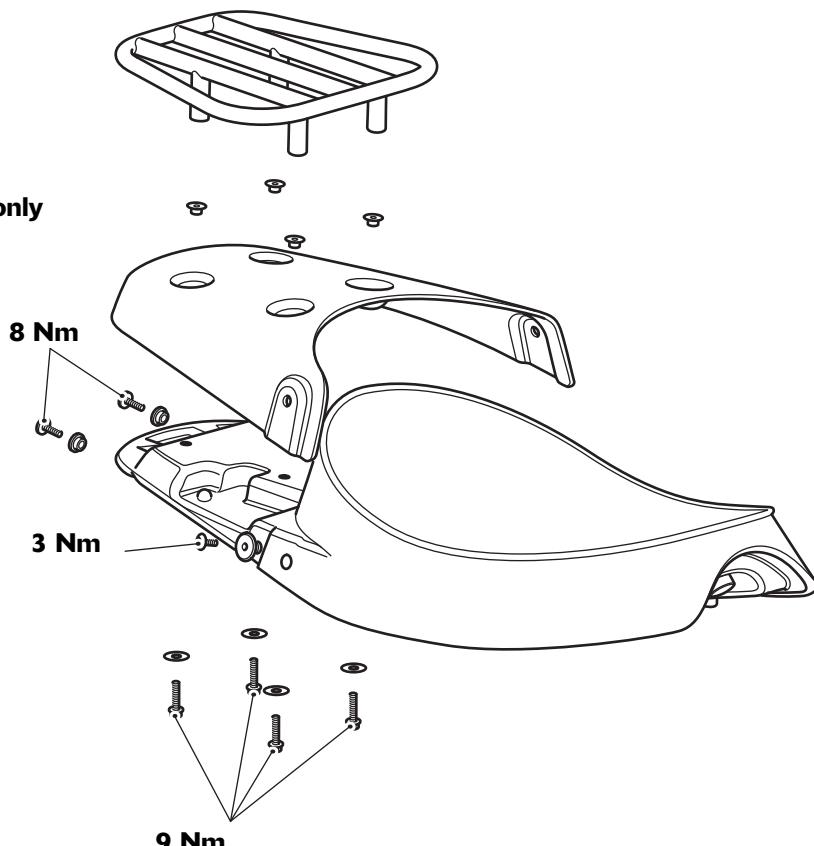
**Bonneville T100
Steve McQueen™ Edition only**

abgt

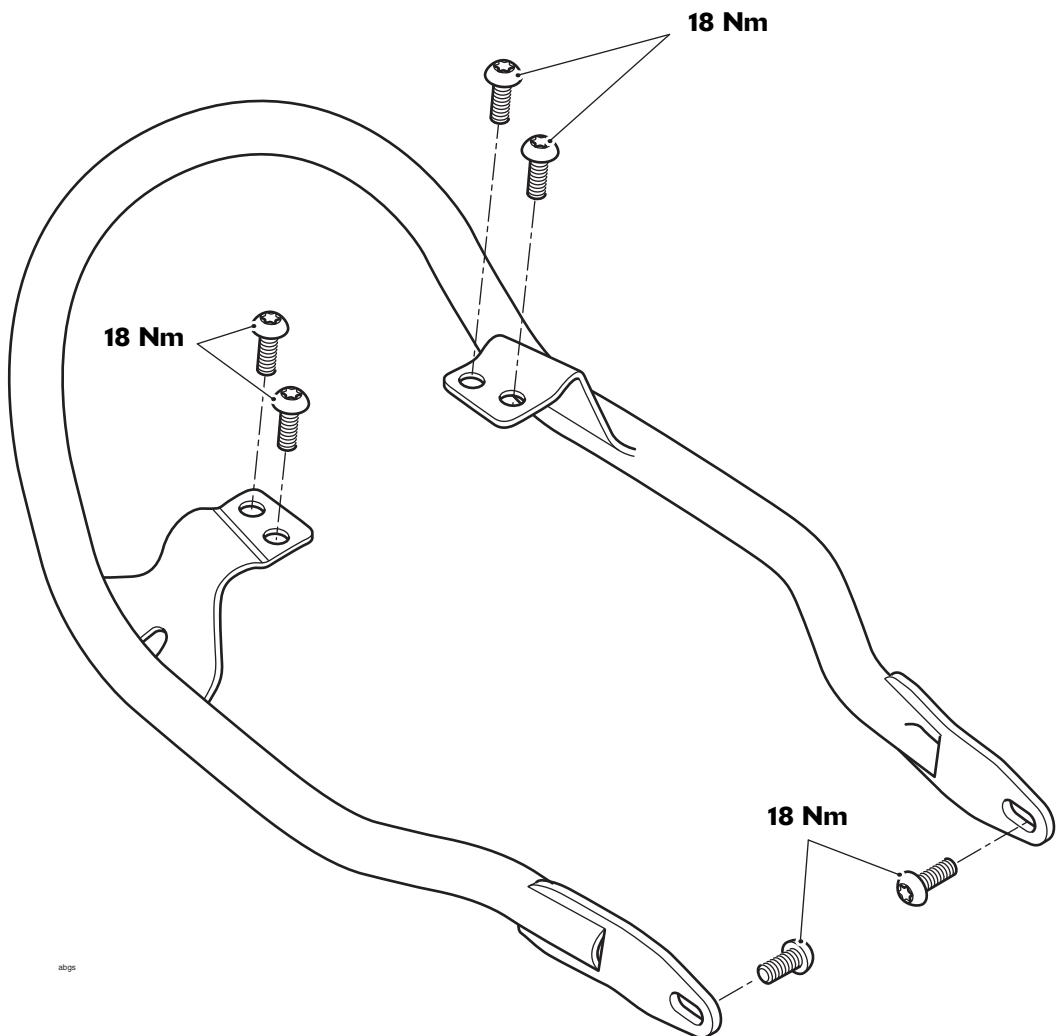
8 Nm

3 Nm

9 Nm

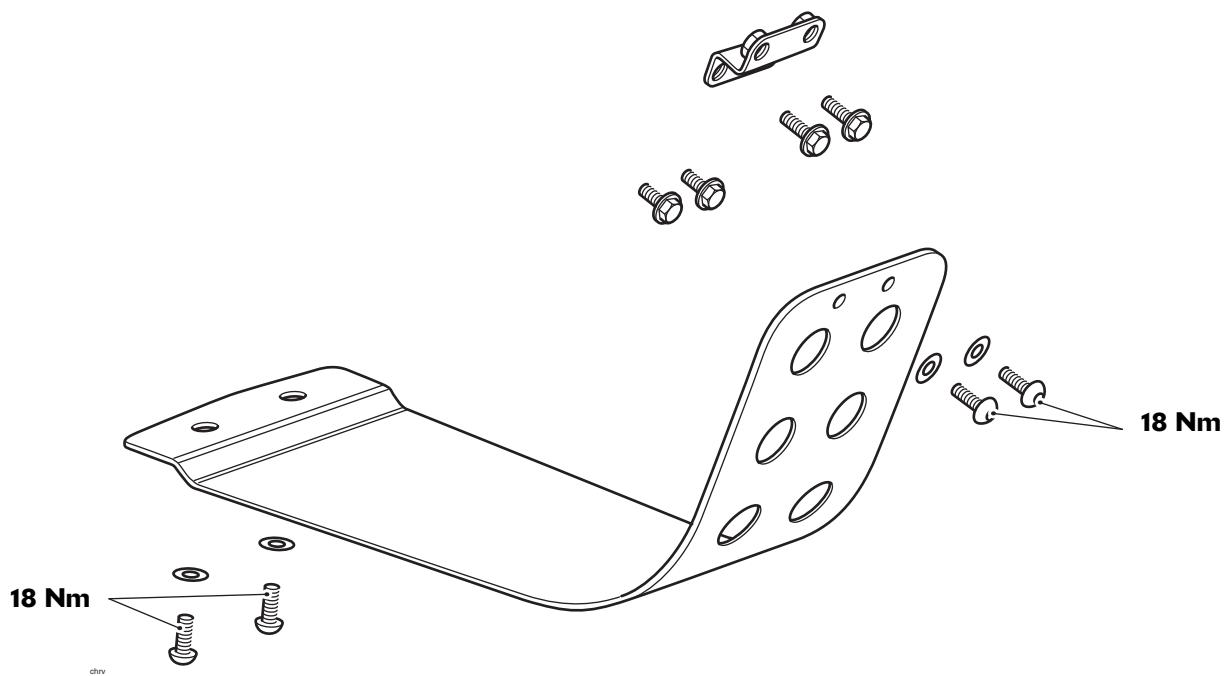


Exploded View - Grab Rail - Bonneville T100 110th Edition only

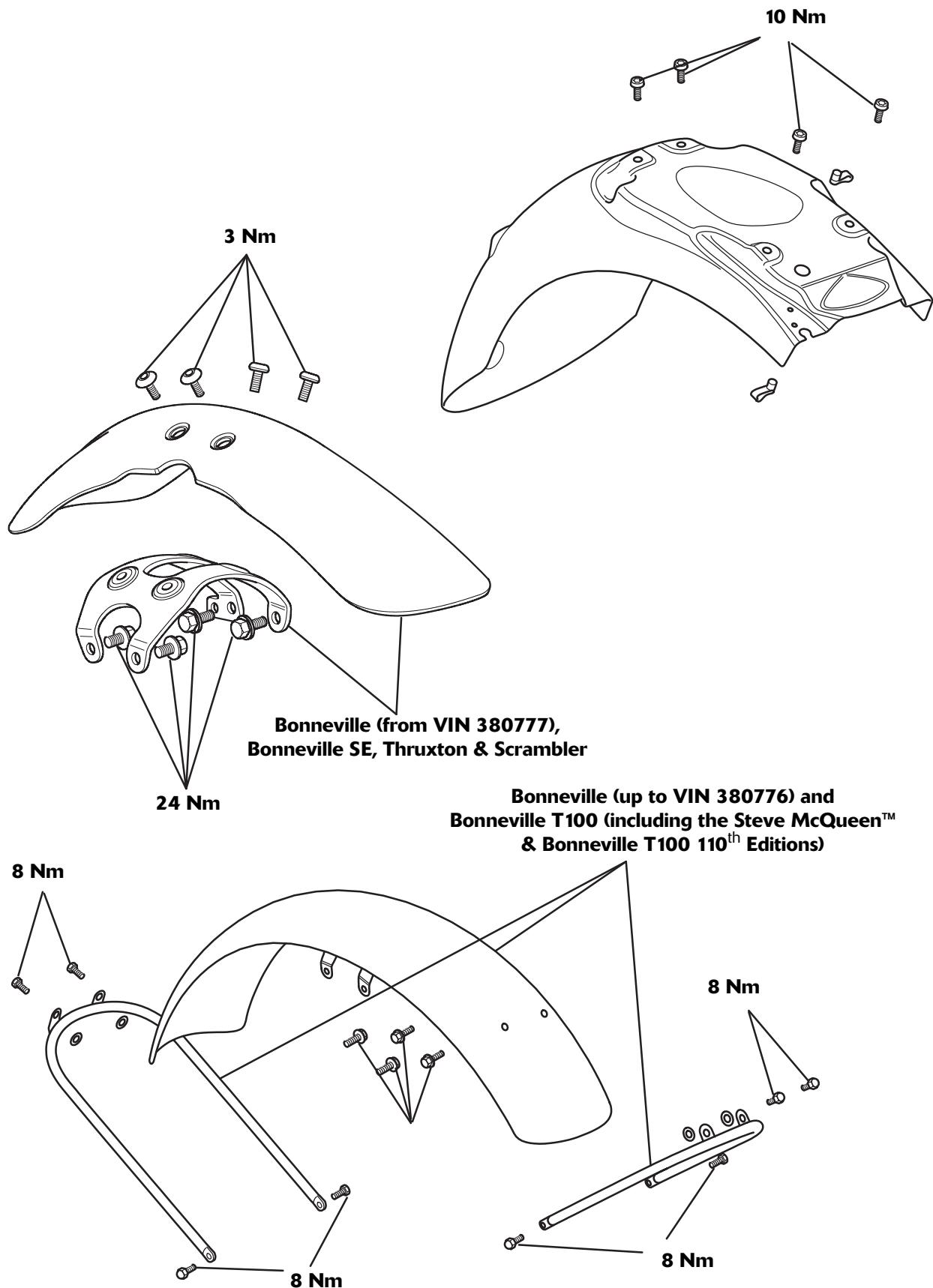


Frame & Bodywork

Exploded View - Sump Guard - Steve McQueen™ Edition only

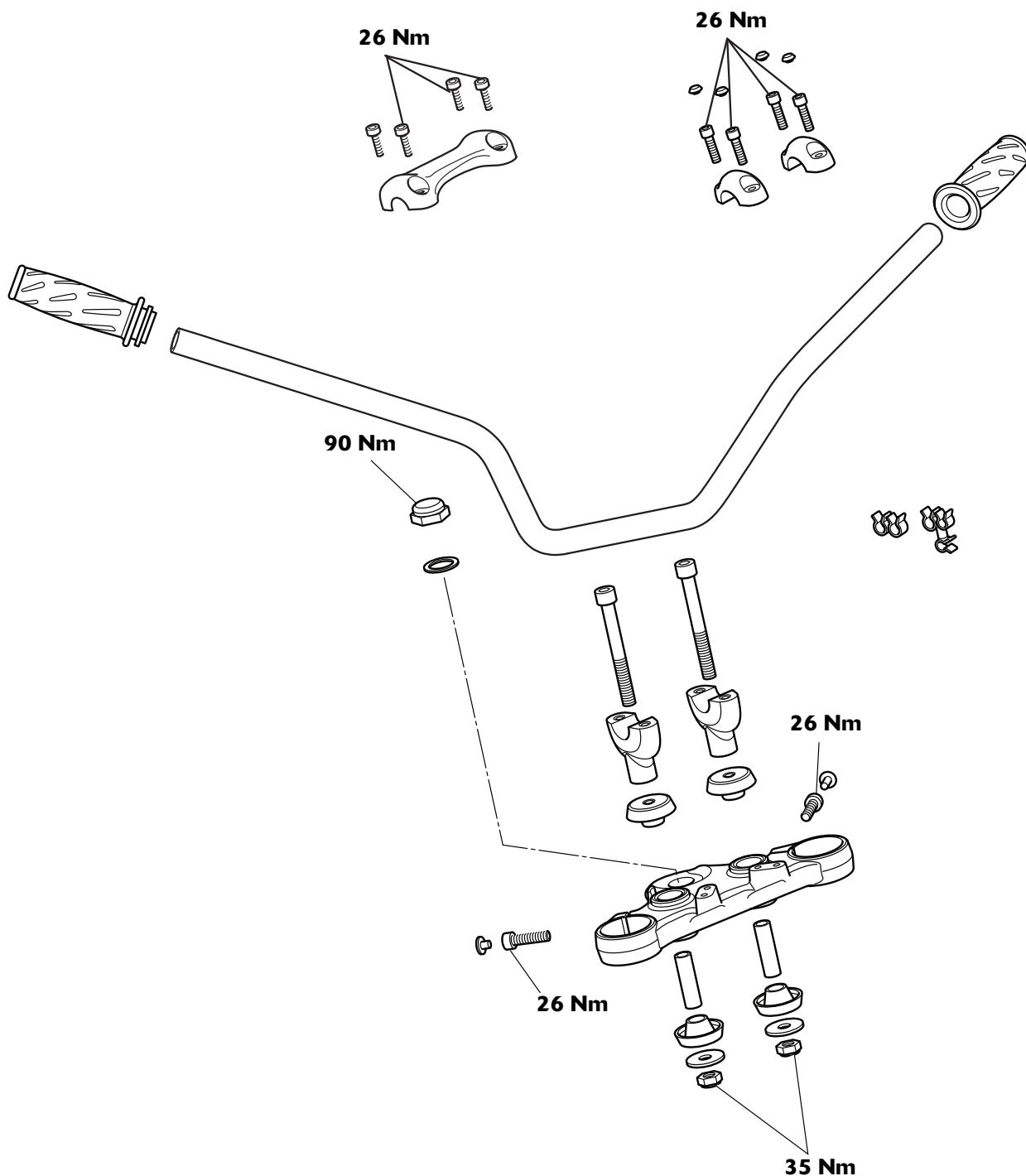


Exploded View - Front & Rear Mudguards

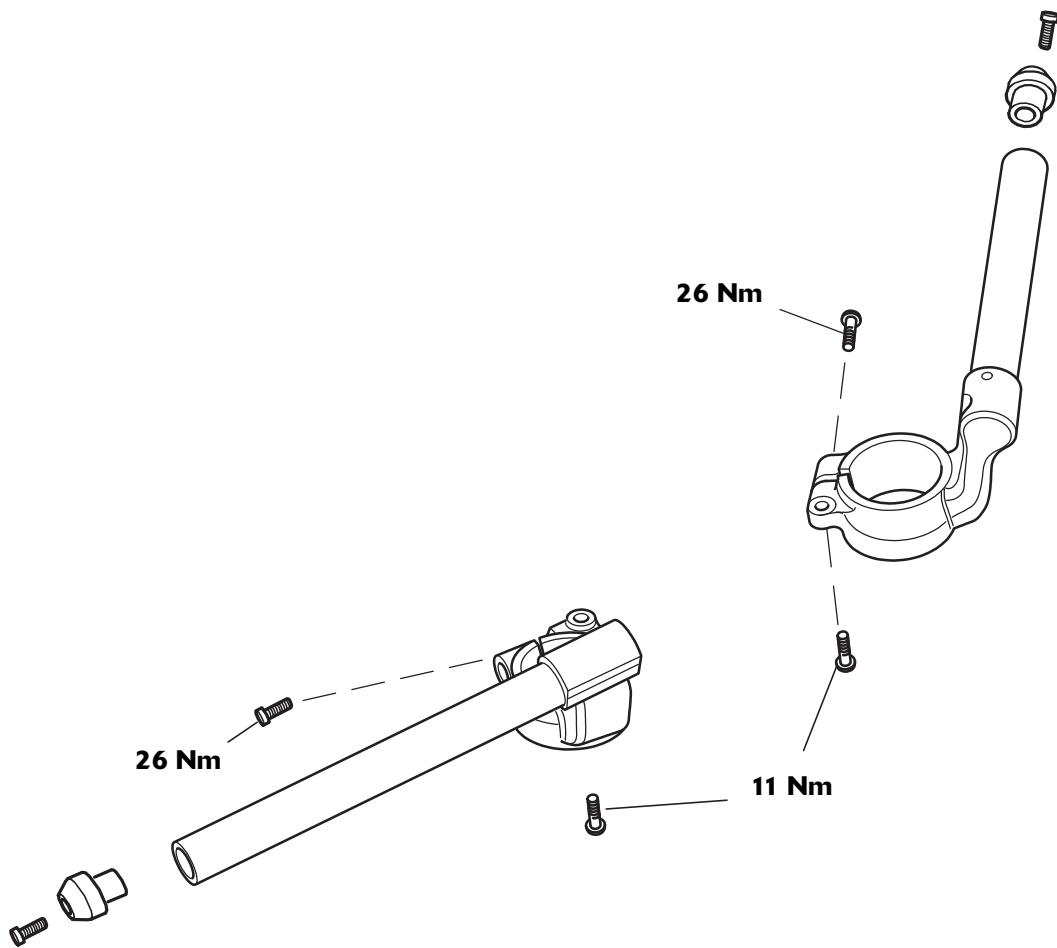


Frame & Bodywork

Exploded View - Handlebars - Bonneville, Bonneville SE, Scrambler & Bonneville T100 (including the Steve McQueen™ & Bonneville T100 110th Editions)

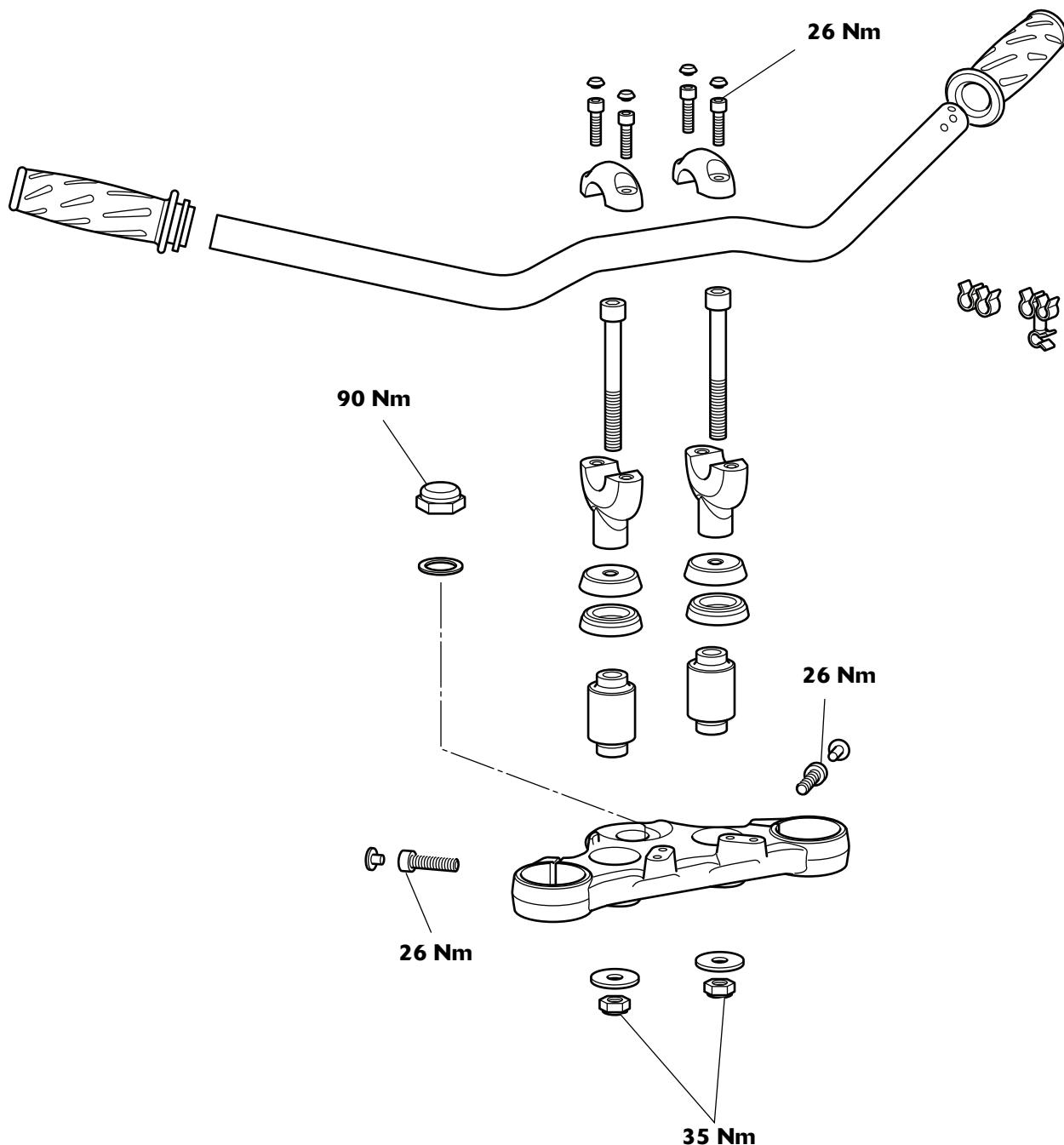


Exploded View - Low Handlebars - Thruxton



Frame & Bodywork

Exploded View - High Handlebars - Thruxton



General Frame Inspection

- Inspect the frame and footrests for damage, cracks, chafing and other dangerous conditions. Check all fixings for security.



Warning

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for inspection and repair.



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 and make sure it is securely held in the retracted position by the spring. Rectify any faults.



Warning

If the 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 control and an accident.

- Inspect the bank angle pegs on the rider's footrests for wear. If more than 50% of the radiused end is worn away, they must be replaced.



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 control and an accident causing injury or death.

Seat

Removal

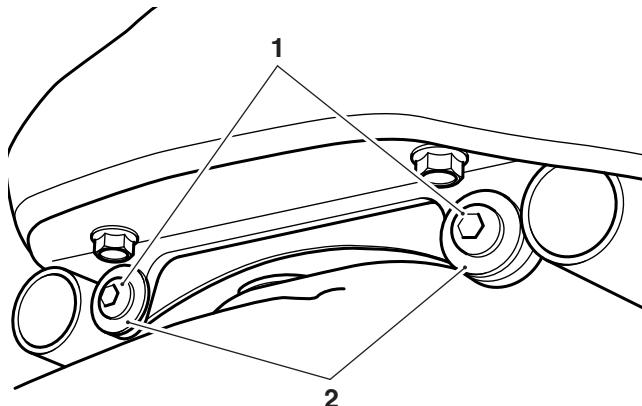


Warning

To prevent damage to the seat or seat cover, care must be taken not to drop the seat. Do not lean the seat against the motorcycle or any surface which may damage the seat or seat cover. Instead, place the seat, 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 seat which may cause damage or staining to the seat cover.

- Thrush ton only, if fitted remove the seat cowl.
- Slacken and remove the retaining screws (and stepped sleeves if fitted) located at the rear of the seat.



T908.15.01

- 1. Seat screws**
- 2. Stepped sleeves (if fitted)**
- Remove the seat.

Installation

- Fit the seat, ensuring it is correctly located behind the fuel tank, and tighten its retaining screws to **8 Nm**.
- Thrush ton only, refit the seat cowl. Tighten the fixings to **3 Nm**.

Frame & Bodywork

Seat Cowl and Luggage Rack - Steve McQueen™ Edition Only

Removal

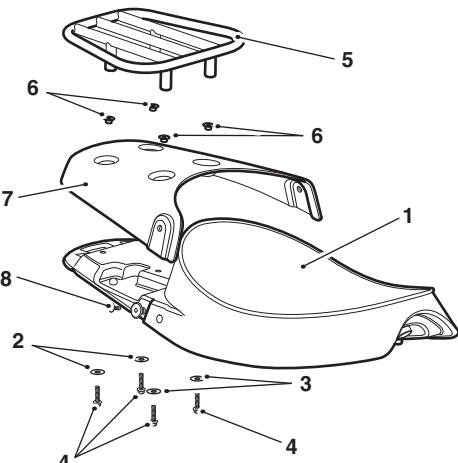
1. Remove the seat (see page 16-11).
2. Clean the seat and place it on a clean soft surface with the seat cover facing upwards.

Note:

- The rear fixings for the luggage rack has D shaped washers while the front fixings have the round washers.
 - Note the position and orientation of the D shaped washers for installation.
3. Release the four fixings and their washers securing the luggage rack to the seat cowl.
 4. Remove the luggage rack and collect the four flanged sleeves.

Installation

1. Align the seat cowl to the seat. Fit the two fixings and tighten to **3 Nm**.
2. Fit the flanged sleeves to the top of the seat cowl.
3. Position the luggage rack to the top of the seat cowl. Fit the fixings and washers as noted for removal, and tighten to **9 Nm**.
4. Refit the seat (see page 16-11).

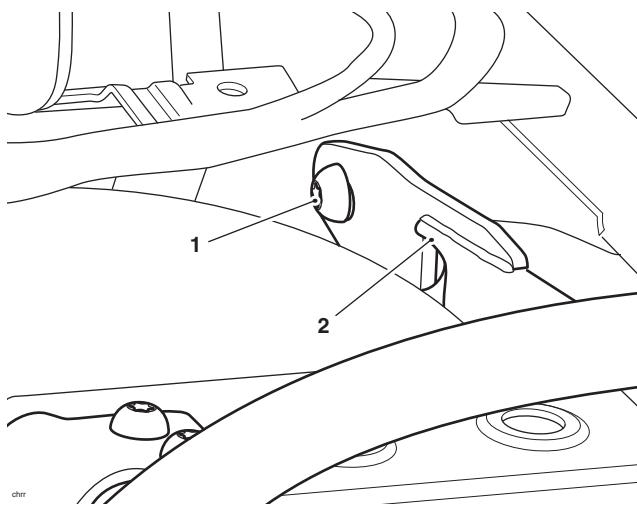


1. Seat
 2. D shaped washers
 3. Round washers
 4. Fixings, for luggage rack
 5. Luggage rack
 6. Flanged sleeves
 7. Seat cowl
 8. Fixing, for seat cowl, right hand side shown
5. To remove the seat cowl, release the two fixings and remove the seat cowl.

Grab Rail - Bonneville T100 110th Edition Only

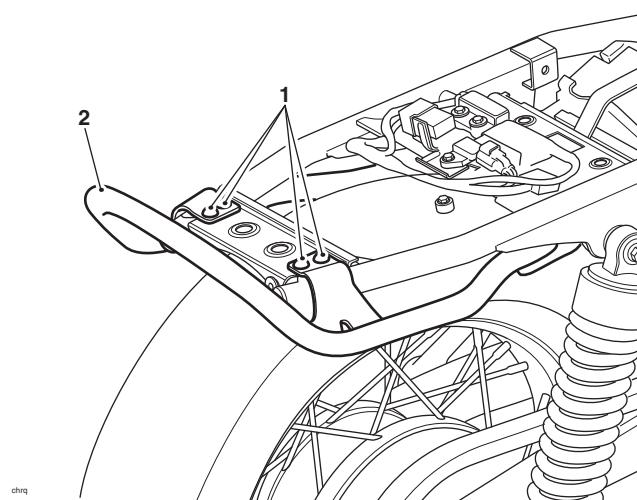
Removal

1. Remove the seat (see page 16-11).
2. Clean the seat and place it on a clean soft surface with the seat cover facing upwards.
3. Remove the rear mudguard (see page 16-11).
4. Remove the fixings securing the front of the grab rail to the frame.



- 1. Fixing**
2. Grab rail

5. Release the rear fixings and remove the grab rail.



- 1. Fixings**
2. Grab rail

Installation

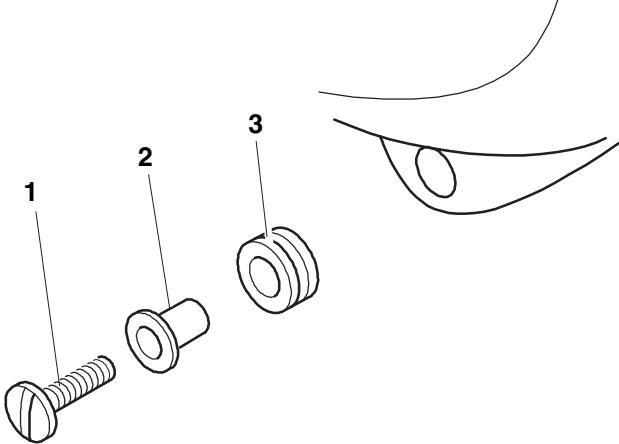
1. Position the grab rail on the motorcycle.
2. Fit the rear fixings but do not fully tighten at this stage.
3. Fit the front fixings and tighten to **18 Nm**.
4. Tighten the rear fixings to **18 Nm**.
5. Refit the rear mudguard (see page 16-16).
6. Refit the seat (see page 16-11).

Frame & Bodywork

Side Cover

Removal - All Models Except Scrambler Right Hand Side

- Slacken and remove the cover retaining screw and collar.



- Screw**
- Collar**
- Mounting rubber**

- Free the side cover from its upper mounting pegs and remove it from the bike.
- Inspect the cover mounting rubbers for signs of damage or deterioration. Renew as necessary.

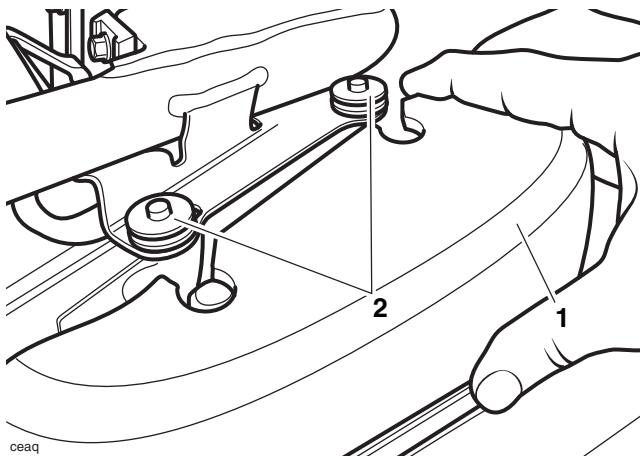
Installation - All Models Except Scrambler Right Hand Side

- Ensure the mounting rubbers are all correctly fitted.
- Install the cover, engaging its upper mounting rubbers with the mounting pegs.
- Refit the cover retaining screw and collar and tighten securely.

Side Cover

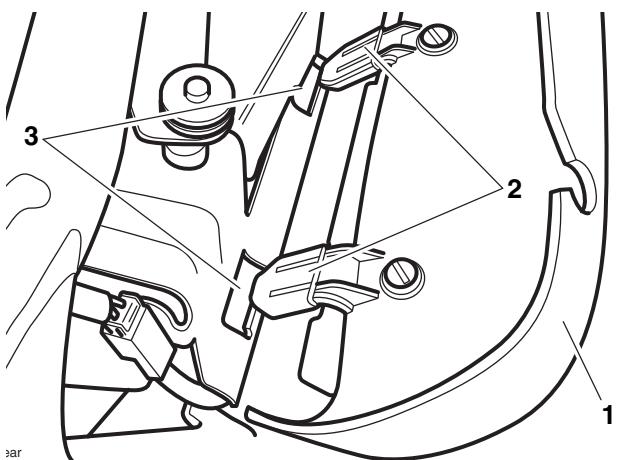
Removal - Scrambler (right hand side)

- Pull the top of the cover free from its rubber mountings.



- Right hand side cover**
- Rubber mountings**

- Tilt the cover back and pull the legs of the cover free from their mounting points.



- Left hand side cover**
- Cover legs**
- Mounting points**

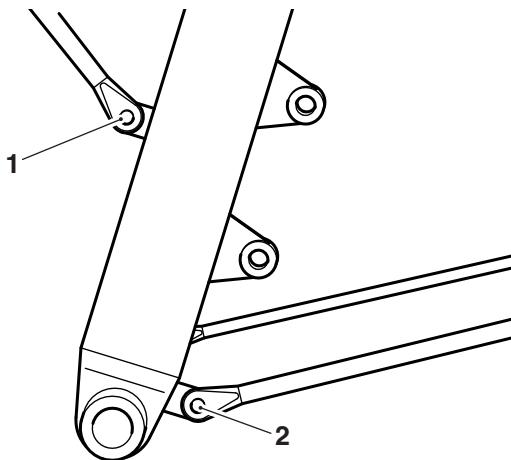
Installation - Scrambler (right hand side)

- Position the legs of the cover into their mounting points.
- Push the top of the cover onto its rubber mountings.

Front Mudguard

Removal

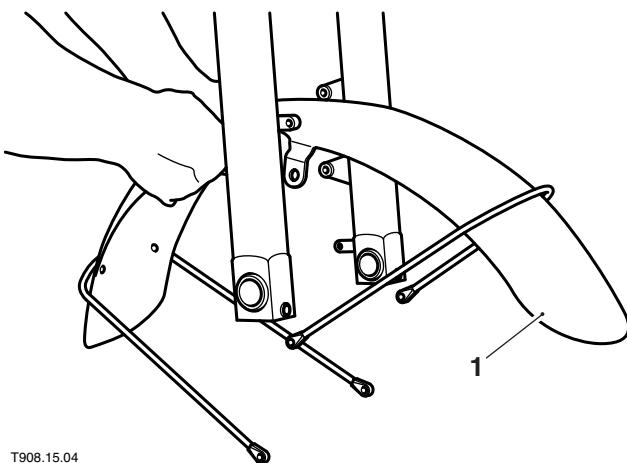
1. Remove the front wheel (see page 15-10).
2. On Bonneville (up to VIN 380776) & Bonneville T100, undo the bolts securing the front and rear mounting stays to the fork legs.



T908.15.02

1. **Front stay bolt**
2. **Rear stay bolt**

3. Undo the bolts securing the mudguard to the forks then remove the mudguard assembly from the motorcycle.



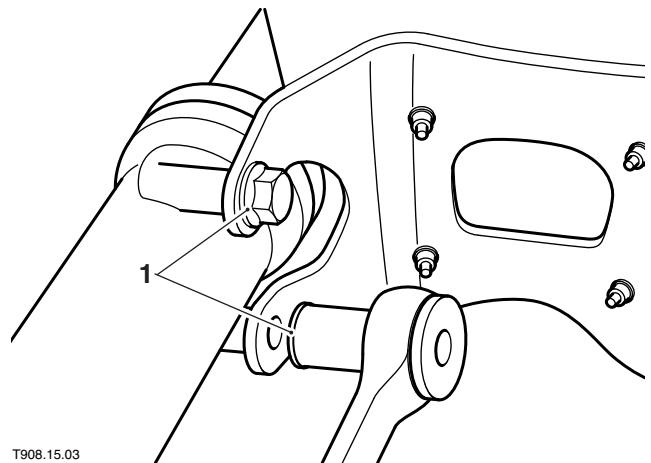
T908.15.04

1. **Front mudguard (Bonneville)**

4. On Bonneville (up to VIN 380776) & Bonneville T100, if necessary, undo the bolts and separate the stays and mudguard, recovering the nylon spacer washers.

Installation

1. Where necessary, assemble the mudguard and mounting stays, positioning the nylon washers between the stay and mudguard. Fit the bolts tightening them hand-tight only.
2. Manoeuvre the mudguard into position. Fit and hand-tighten all bolts then tighten the bolts securing the mudguard to the forks to **24 Nm**.
3. On Bonneville (up to VIN 380776) & Bonneville T100, tighten the stay bolts to **8 Nm**.



T908.15.03

1. **Mudguard to fork bolts**

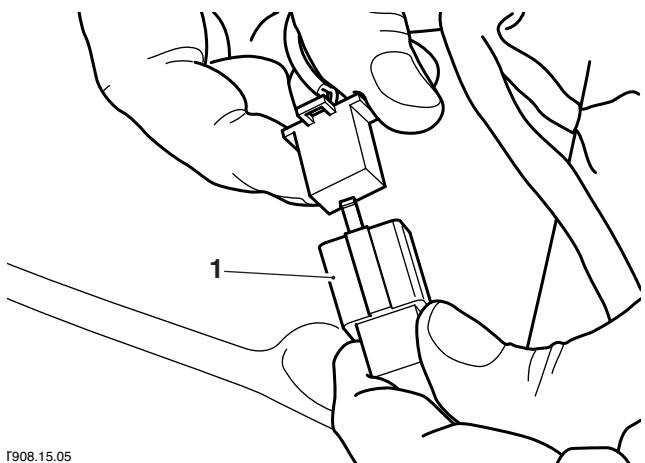
4. Refit the front wheel (see page 15-12).

Frame & Bodywork

Rear Mudguard

Removal

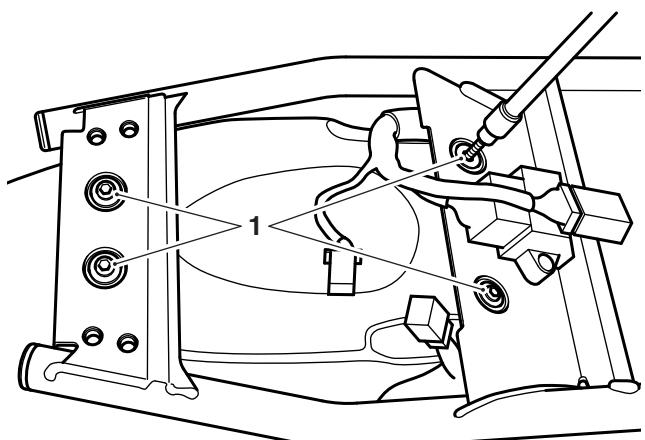
1. Remove the seat (see page 16-11).
2. Trace the wiring back from the rear light assembly and disconnect its wiring connector from the main harness.



T908.15.05

1. Rear light wiring connector

3. Unscrew the four screws and washers securing the mudguard assembly to the frame then remove the mudguard, complete with rear light.



T908.15.06

1. Rear mudguard screws

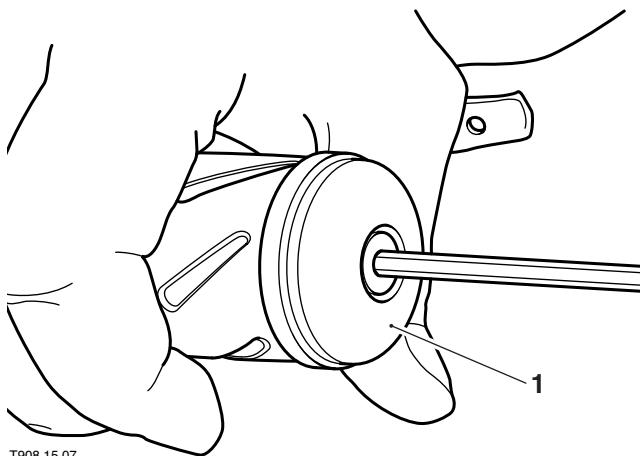
Installation

1. Ensure the rear light wiring is located in the clips on the underside of the mudguard and the grommet is located in the cut-out on the mudguard front edge.
2. Manoeuvre the mudguard into position, taking care not to damage its painted finish. Locate the mudguard correctly in the rear of the airbox assembly then fit the washers and mounting screws, tightening them to **10 Nm**.
3. Reconnect the rear light wiring connector.
4. Check the operation of the rear light and indicators then install the seat (see page 16-11).

Handlebars - Thruxton (with high handlebars only), Bonneville (up to VIN 380776) & Bonneville T100 (including Steve McQueen™ and Bonneville T100 110th editions)

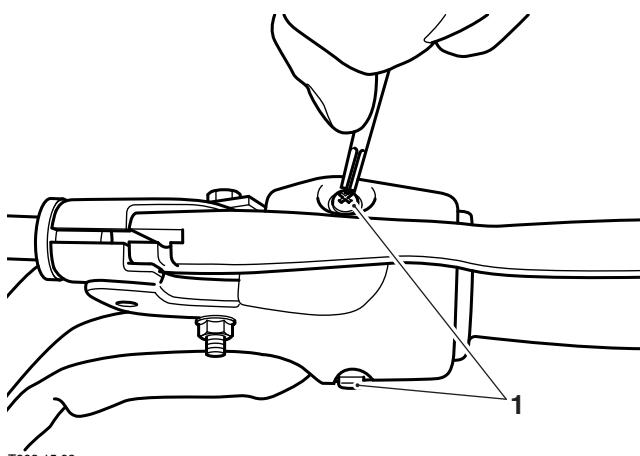
Removal

1. Undo the screws and remove the end weights from the handlebars.



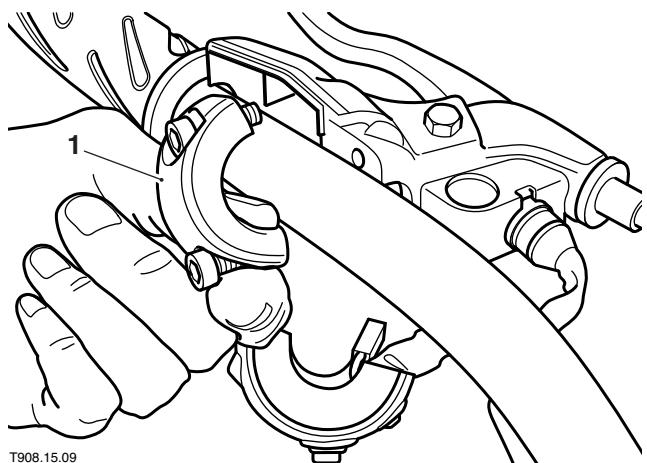
1. End weight

2. Release the wiring from its clips on either side of the handlebar.
3. Undo the screws and free the left switch gear assembly from the handlebar.



1. Switch screws

4. Unscrew the bolts and remove the mounting clamp from the clutch lever assembly. Position the lever clear.



1. Mounting clamp

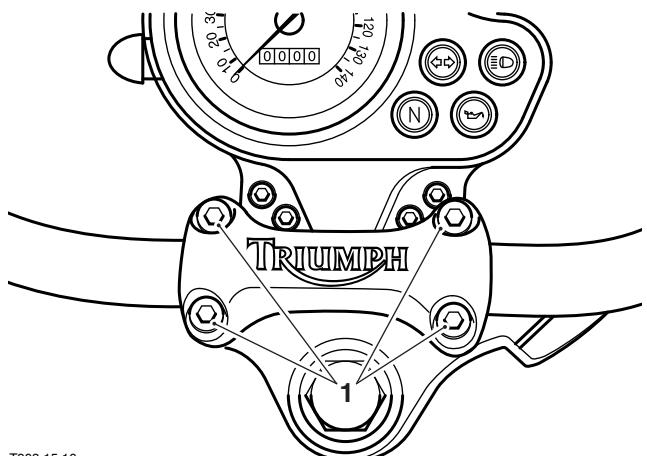
5. Undo the screws and free the right switch gear assembly from the master cylinder. Free the switch wiring from the handlebars.
6. Unscrew the bolts and remove the mounting clamp from the master cylinder.

Note:

- Bonneville T100 (up to VIN 353261) and Bonneville have a one piece clamp, Thruxton and Bonneville T100 (from VIN 353262) have two clamps.
- 7. Unscrew the bolts and lift off the handlebar upper clamp(s).

Note:

- Ensure the master cylinder is securely supported so no strain is placed on the hydraulic hose/throttle cables.



1. Handlebar clamp bolts (Bonneville shown)

8. Free the handlebar from the twist grip/master cylinder assembly and remove it from the motorcycle.

Frame & Bodywork

- To remove a lower clamp, remove the nut, washer and lower mounting rubber from the base of the top yoke then lift off the clamp, upper mounting rubber, bolt and spacer.

Installation

- Fit the upper mounting rubber and bolt to the lower clamp and fit the clamp to the top yoke. Fit the spacer, lower mounting rubber and washer then fit the nut and tighten to **35 Nm**.
- Fit the throttle twist grip assembly then locate the handlebars in the lower clamps.



Warning

Installing the upper handlebar clamp(s) in the wrong orientation, or tightening the handlebar clamp fixings in the incorrect sequence, will prevent correct clamping of the handlebars. This will cause an unsafe riding condition which could lead to loss of motorcycle control and an accident.

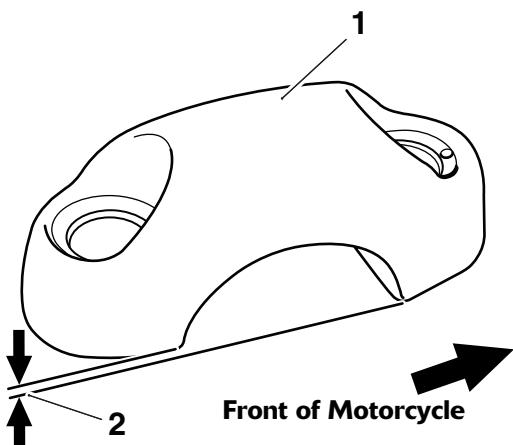


Caution

Installing the upper handlebar clamp(s) in the wrong orientation, or tightening the handlebar clamp fixings in the incorrect sequence, will cause damage to the upper and lower handlebar clamps or the fixings. Always install the upper clamps in the correct orientation and tighten the fixings in the correct sequence.

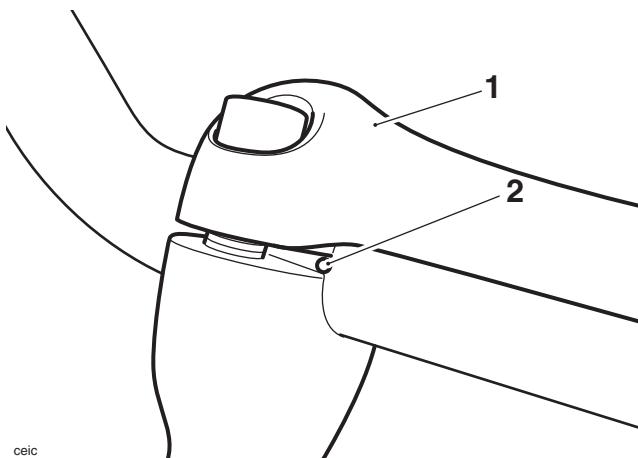
Note:

- Bonneville T100 (up to VIN 353261) and Bonneville have a one piece clamp, Thruxton and Bonneville T100 (from VIN 353262) have two clamps.**
- The mating surfaces of the handlebar upper clamp are offset, as shown below.**



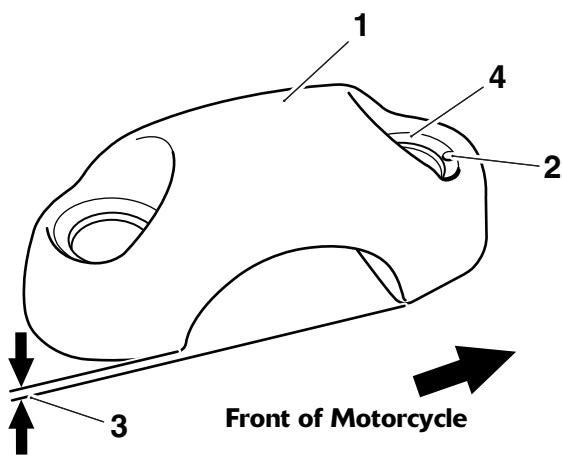
- Upper clamp (Thrushon shown)
- Offset

- Lubricate the threads of the clamp bolts with clean engine oil then fit the upper clamp(s) and bolts as follows:
- Bonneville T100 (up to VIN 353261), (including Steve McQueen™ and Bonneville T100 110th editions) and Bonneville:**
Fit the upper clamp, ensuring the text on the clamp's upper face is correctly orientated when viewed from the rider's seat.
- Install the fixings, but do not tighten at this stage.
- Align the punch mark on the handlebar with the split of the clamp and tighten the front clamp bolts, and then the rears, to **26 Nm**.



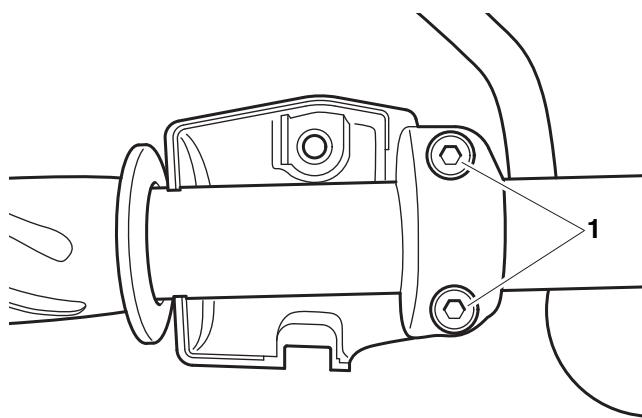
1. Clamp split line
2. Handlebar punch mark

7. **Thrushon & Bonneville T100 (from VIN 353261):** Fit the upper clamps, ensuring the "dot" mark on the clamp's bolt face (shown below) is facing towards the front of the motorcycle.



1. Upper clamp
2. 'Dot' mark
3. Offset
4. Bolt face

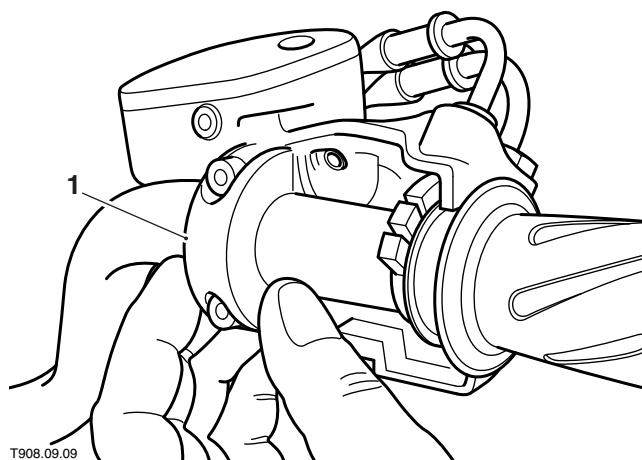
8. Align the handlebar punch mark with the inner split line, at the right hand front of the clamp.
9. Starting at either side, tighten both front clamp bolts to **26 Nm**.
10. Once both front clamp bolts have been fully tightened, tighten both rear clamp bolts to **26 Nm**.
11. **All models:** Locate the clutch lever assembly on the handlebar and fit the mounting clamp. Align the clamp upper split with the punch mark on the handlebar then evenly tighten the clamp bolts to **12 Nm**.



P6270006

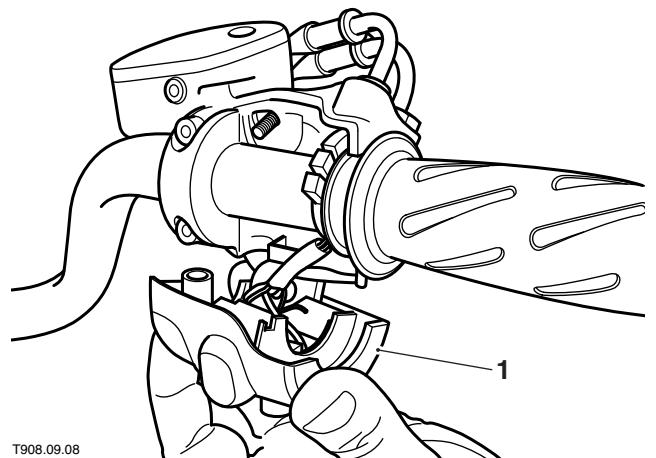
1. Clutch lever clamp bolts

12. Fit the mounting clamp to the master cylinder. Align the clamp upper split with the punch mark on the handlebar then evenly tighten the clamp bolts to **12 Nm**.



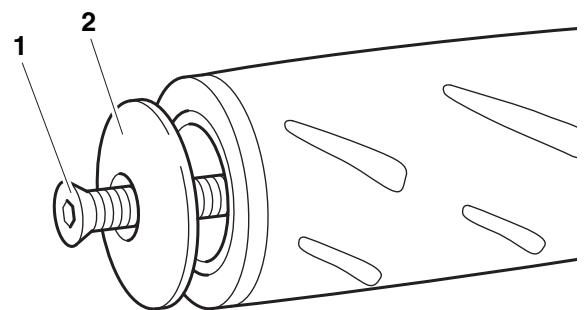
T908.09.09
1. Master cylinder mounting clamp

13. Refit the left and right switch gear assemblies, tightening their screws to **2.5 Nm**.



1. Right hand switch gear assembly

14. Insert the handlebar end weights into the handlebar ends and secure with the two M5 x 30 mm fixings. Tighten to **3 Nm**.



P6270008

1. Fixing
2. End weight

Frame & Bodywork

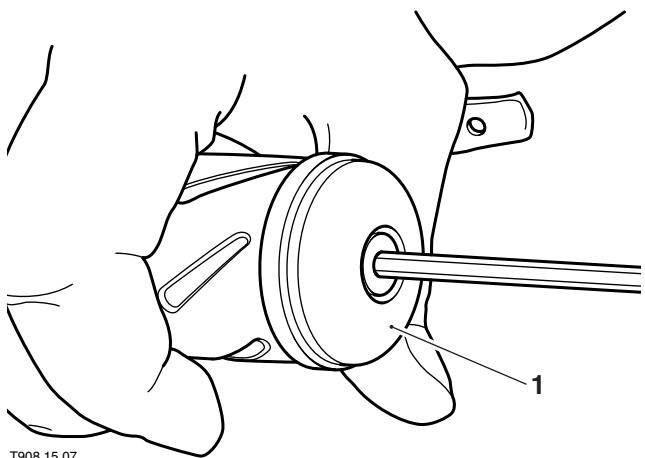
Handlebars - Thruxton (with low handlebars only)

Removal

Note:

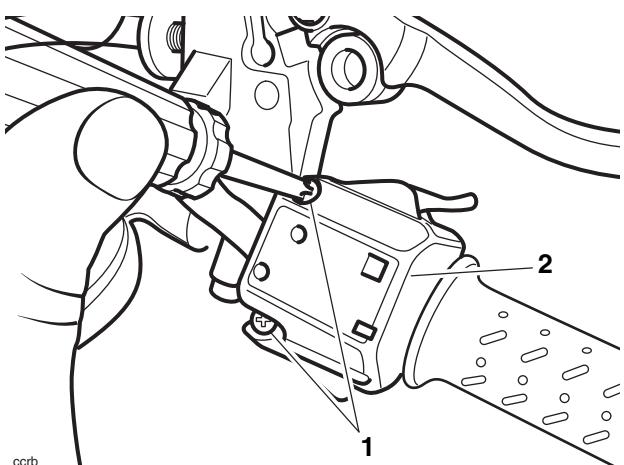
- The left hand and right hand handlebars can be removed independently.**

1. Undo the screws and remove the end weights from the handlebars.



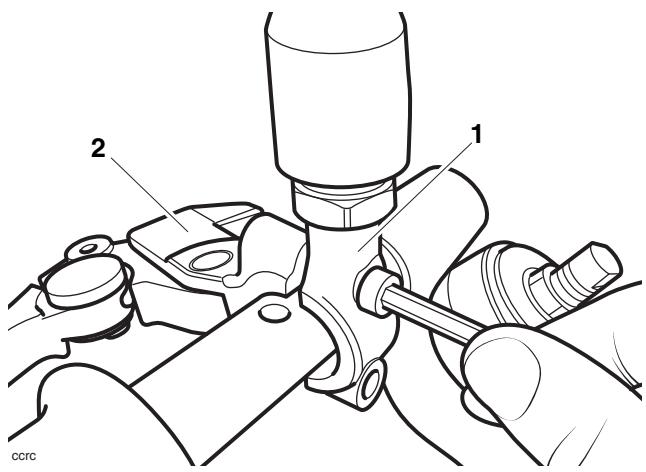
1. End weight

2. Undo the screws and free the left hand switch gear assembly from the handlebar. Free the wiring from the handlebar.



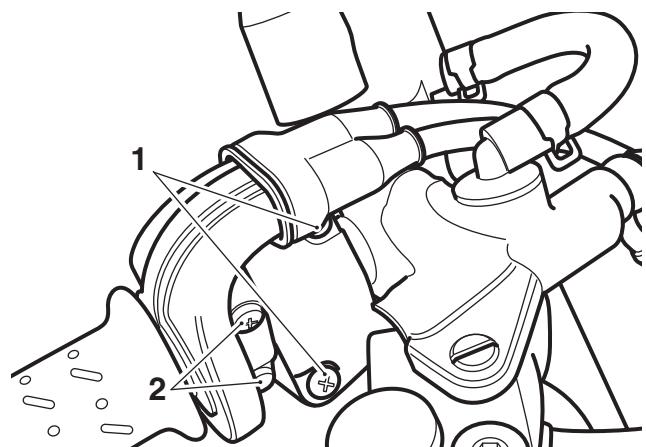
1. Switchcube screws
2. Switchcube

3. Unscrew the bolts and remove the clutch lever assembly together with the clamp/mirror from the handlebar.



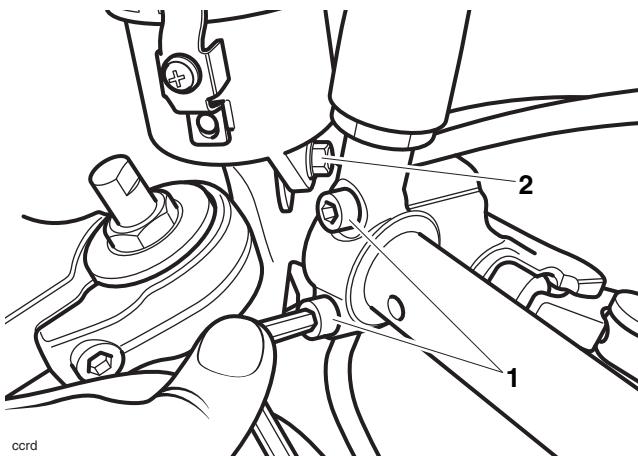
1. Clamp/mirror
2. Clutch lever assembly

4. Undo the fixings and remove the right hand switch gear assembly from the handlebar.



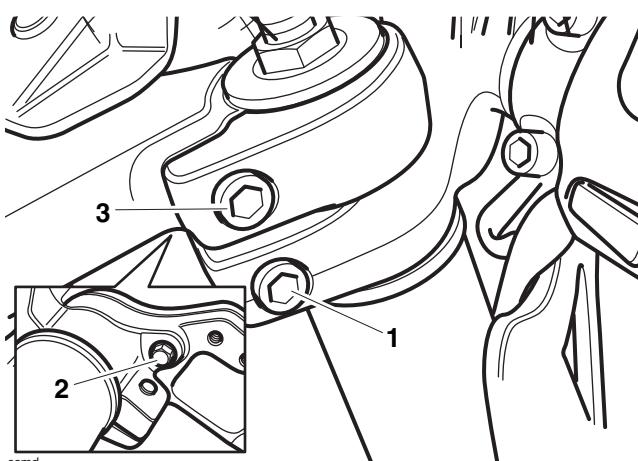
1. Switch Gear fixings
2. Twist grip fixings

5. Slacken but do not remove the twist grip fixings.
6. Undo and remove the master cylinder/mirror bolts and the front brake fluid reservoir fixing. Support both the master cylinder assembly and the reservoir ensuring that the reservoir is supported in an upright position.



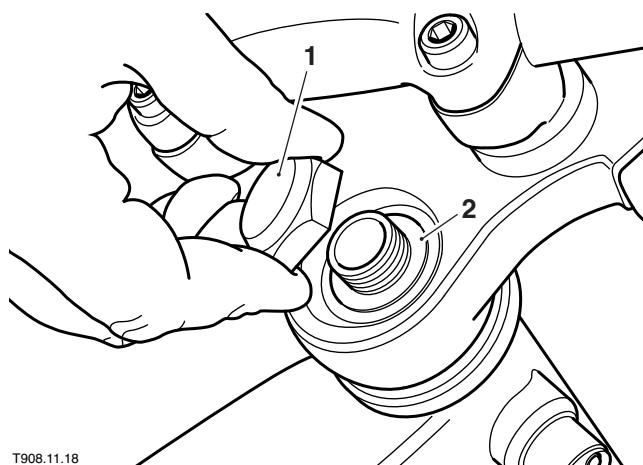
- 1. Master cylinder/mirror bolts**
- 2. Brake fluid reservoir fixing**

7. Slacken the top yoke clamp bolts and the handlebar clamp bolts.



- 1. Handlebar clamp bolt**
- 2. Handlebar locating bolt**
- 3. Top yoke clamp bolt**

8. Slacken and remove the handlebar locating bolts.
9. Slacken and remove the top nut and washer from the steering stem. Lift off the top yoke assembly and position it clear.

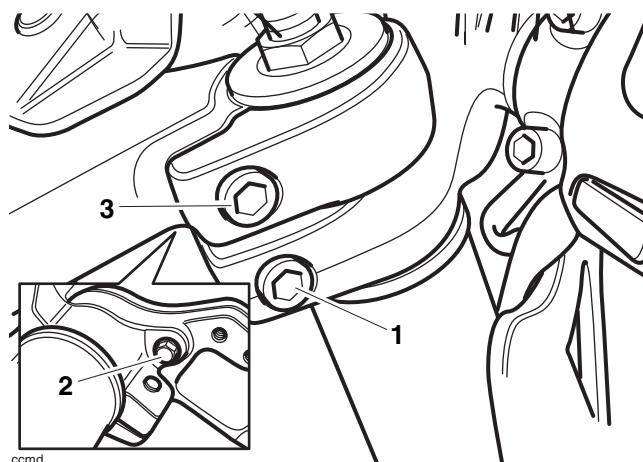


- 1. Top nut**
- 2. Washer**

10. Remove the right hand handlebar from the fork and slide the throttle twist grip assembly free.
11. Remove the left hand handlebar from the fork.

Installation

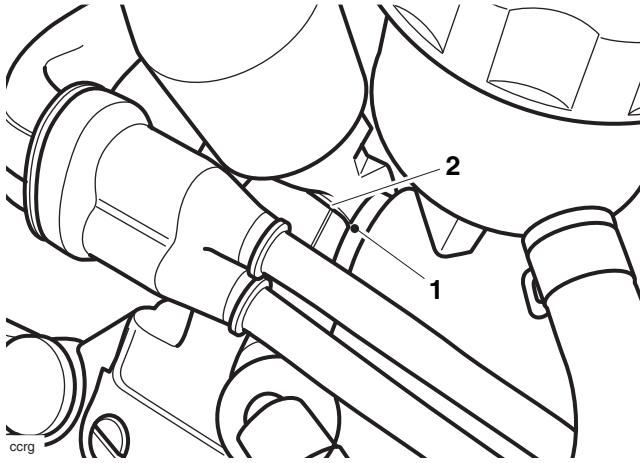
1. Slide the throttle twist grip onto the right hand handlebar and position the handlebar on the fork.
2. Position the left hand handlebar on the fork.
3. Refit the top yoke assembly together with the washer and top nut. Tighten the top nut to **90 Nm**.
4. Tighten the top yoke clamp bolts to **26 Nm**.
5. Align both handlebars to allow insertion of the handlebar locating bolts. Tighten the bolts to **11 Nm**.



- 1. Handlebar clamp bolt**
- 2. Handlebar locating bolt**
- 3. Top yoke clamp bolt**

Frame & Bodywork

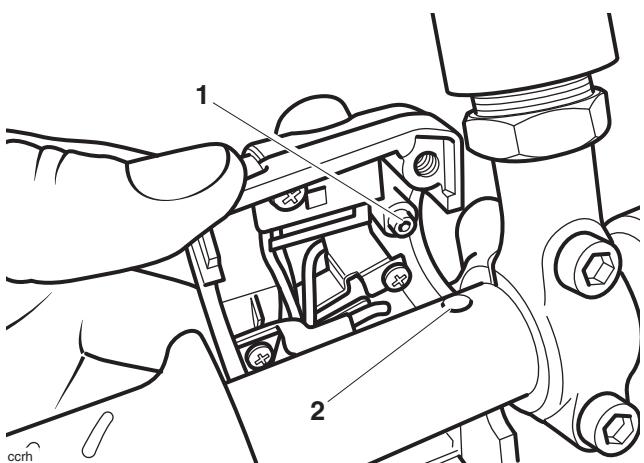
6. Tighten the handlebar clamp bolts to **26 Nm**.
7. Locate the clutch lever assembly on the handlebar and fit the clamp/mirror. Align the clamp/mirror upper split line with the punch mark on the handlebar. Evenly tighten the clamp bolts to **12 Nm**.



1. Handlebar punch mark

2. Clamp/mirror split line

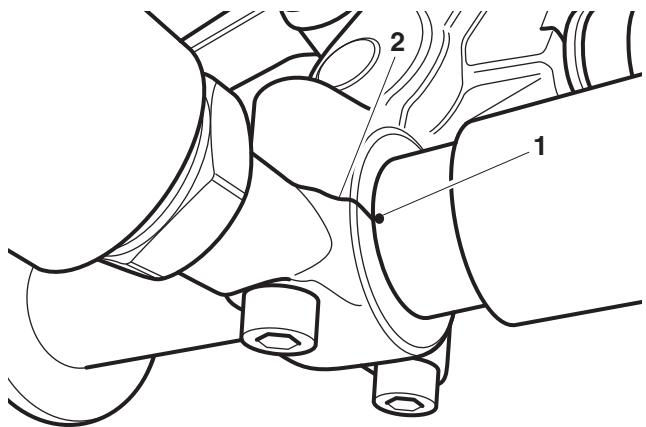
8. Position the left hand switch gear to the handlebar, ensure that the tab on the upper switch gear half locates with the hole in the handlebar.



1. Tab

2. Locating hole

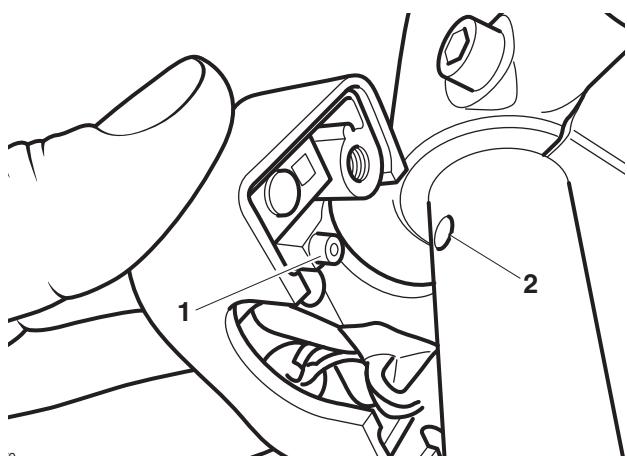
9. Secure the lower switch gear half to the upper. Tighten the fixings to **2.5 Nm**.
10. Locate the front master cylinder assembly on the handlebar and fit the clamp/mirror. Align the clamp/mirror upper split line with the punch mark on the handlebar. Evenly tighten the clamp bolts to **12 Nm**.



1. Handlebar punch mark

2. Clamp/mirror split line

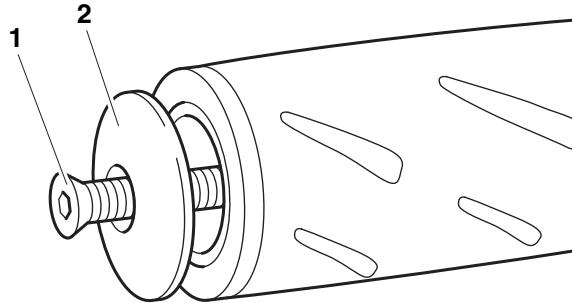
11. Position the throttle grip assembly so that the throttle cables do not rub against the mirror or the master cylinder. Tighten the fixings to **6 Nm**.
12. Secure the front brake fluid reservoir to the handlebar. Tighten the fixing to **12 Nm**.
13. Position the right switch gear to the handlebar, ensure that the tab on the upper switch gear half locates with the hole in the handlebar.



1. Tab

2. Locating hole

14. Secure the lower switch gear half to the upper. Tighten the fixings to **2.5 Nm**.
15. Insert the handlebar end weights into the handlebar ends and tighten the fixings to **3 Nm**.



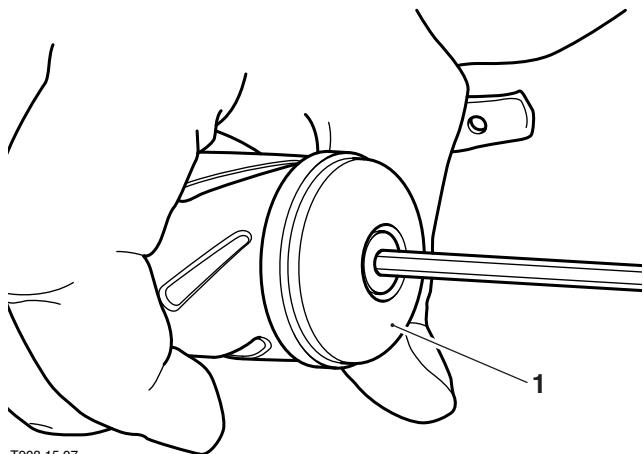
P6270008

1. Fixing
2. End weight

Handlebars - Scrambler, Bonneville (from VIN 380777) and Bonneville SE

Removal

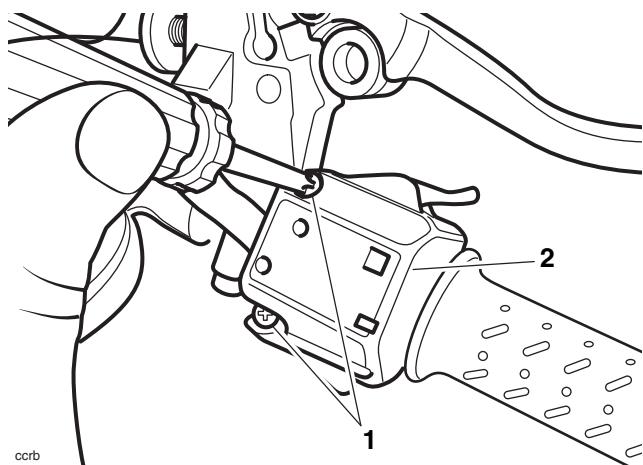
1. Undo the screws and remove the end weights from the handlebars.



T908.15.07

1. End weight

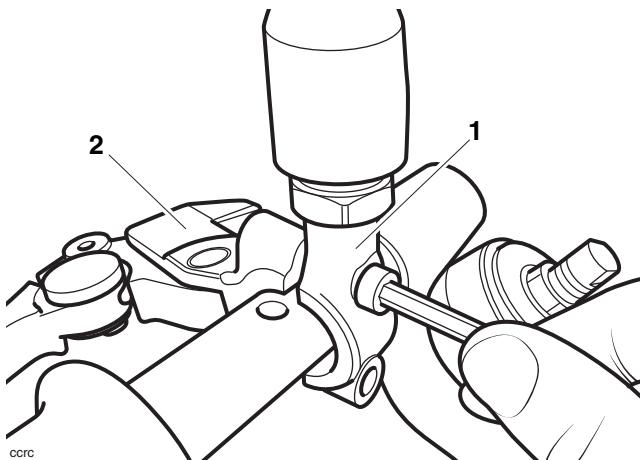
2. Undo the screws and free the left hand switch cube assembly from the handlebar. Free the wiring from the handlebar.



1. Switch cube screws
2. Switch cube

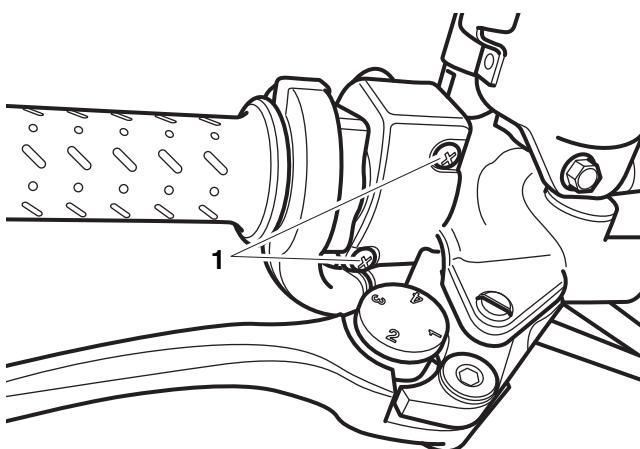
Frame & Bodywork

- Unscrew the bolts and remove the clutch lever assembly together with the clamp/mirror from the handlebar.



- Clamp/mirror
- Clutch lever assembly

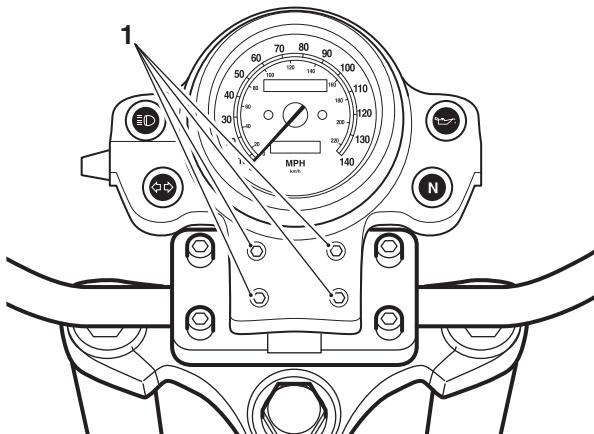
- Undo the fixings and remove the right hand switch cube assembly from the handlebar.



- Switch cube fixings

- Slacken but do not remove the twist grip fixings.
- Unscrew the bolts and remove the mounting clamp from the master cylinder. Support both the master cylinder assembly and the reservoir ensuring that the reservoir is supported in an upright position.

- Scrambler with cable driven Speedometer
only: Unscrew the screws securing the instruments to the handlebar clamp. Support the instruments clear of the handlebars.



- Instrument screws

Note:

- Scrambler (with cable driven speedometer) has a one piece clamp; Bonneville, Bonneville SE and Scrambler (with electronic speedometer) have two clamps.
- Unscrew the bolts and lift off the handlebar clamp(s).
- Free the handlebar from the twist grip assembly and remove it from the motorcycle.
- To remove a lower clamp, remove the nut, washer and lower mounting rubber from beneath the top yoke then lift off the clamp, upper mounting rubber, bolt and spacer.

Installation

- Fit the upper mounting rubber and bolt to the lower clamp and fit the clamp to the top yoke. Fit the spacer, lower mounting rubber and washer then fit the nut and tighten to **35 Nm**.
- Fit the throttle twist grip assembly then locate the handlebars in the lower clamps.



Warning

Installing the upper handlebar clamp(s) in the wrong orientation, or tightening the handlebar clamp fixings in the incorrect sequence, will prevent correct clamping of the handlebars. This will cause an unsafe riding condition which could lead to loss of motorcycle control and an accident.

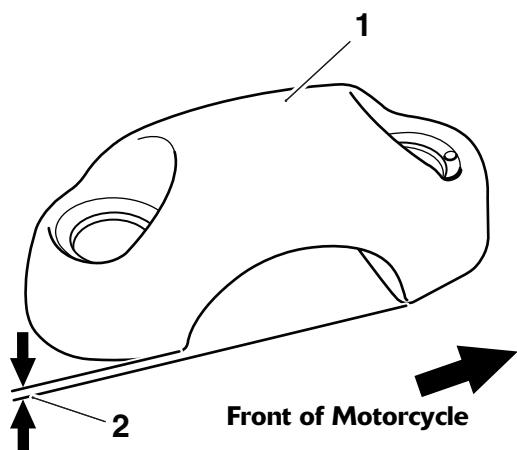


Caution

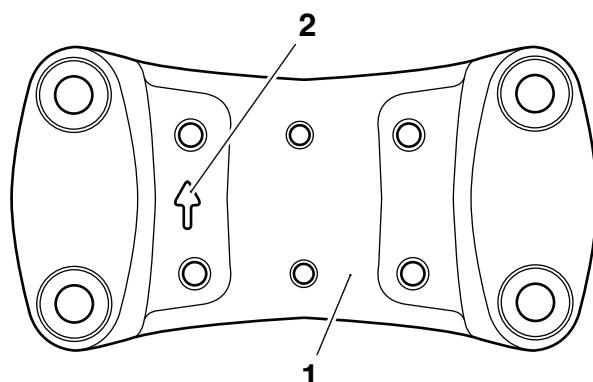
Installing the upper handlebar clamp(s) in the wrong orientation, or tightening the handlebar clamp fixings in the incorrect sequence, will cause damage to the upper and lower handlebar clamps or the fixings. Always install the upper clamps in the correct orientation and tighten the fixings in the correct sequence.

Note:

- Scrambler (with cable driven speedometer)** has a one piece clamp; Bonneville, Bonneville SE and Scrambler (with electronic speedometer) have two clamps.
- The mating surfaces of the handlebar upper clamp(s) are offset as shown below.

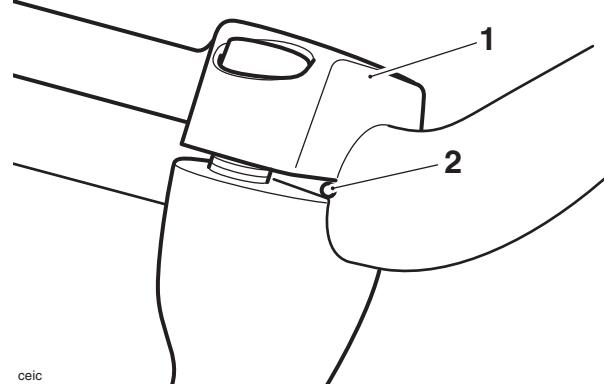


- Upper clamp (Bonneville shown)
- Offset
- Lubricate the threads of the clamp bolts with clean engine oil then fit the upper clamp(s) and bolts as follows:
- Scrambler (with cable driven Speedometer) only:** Ensure the arrow on the upper clamp points towards the front of the motorcycle.



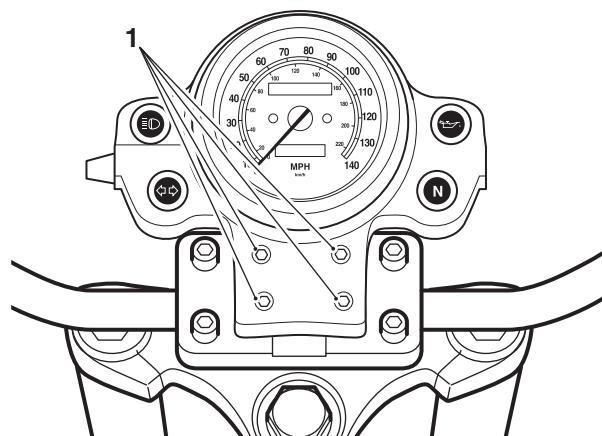
- Upper clamp
- Arrow

- Install the fixings, but do not tighten at this stage.
- Align the punch mark on the handlebar with the split of the clamp and tighten the front clamp bolts, and then the rears, to **26 Nm**.



- Clamp split line
- Handlebar punch mark

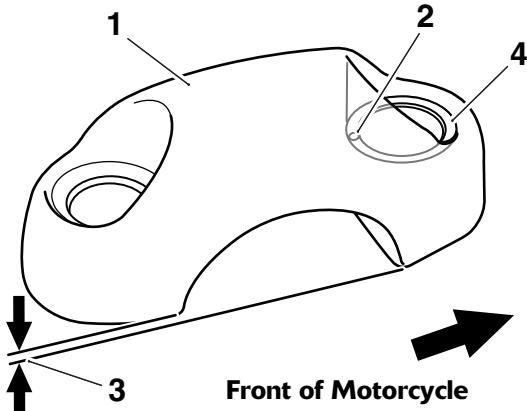
- Position the instruments to the handlebar clamp. Tighten the fixings to **7 Nm**.



- Instrument screws

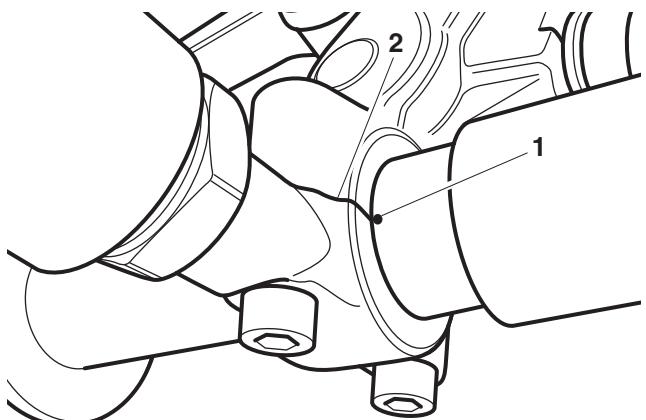
Frame & Bodywork

8. **Scrambler (with electronic speedometer), Bonneville (from VIN 380777) and Bonneville SE:** Fit the upper clamps, ensuring the "dot" mark on the clamp's bolt face (shown below) is facing towards the front of the motorcycle.



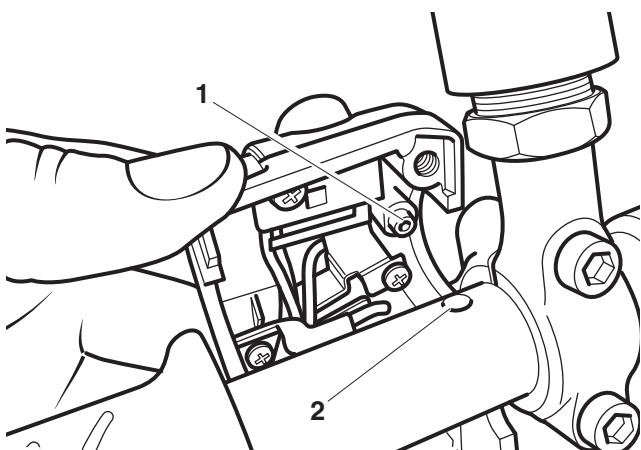
- 1. Upper clamp
- 2. 'Dot' mark
- 3. Offset
- 4. Bolt face

9. Align the handlebar punch mark with the inner split line, at the left hand front of the clamp.
10. Starting at either side, tighten both front clamp bolts to **26 Nm**.
11. Once both front clamp bolts have been fully tightened, tighten both rear clamp bolts to **26 Nm**.
12. **All models:** Locate the clutch lever assembly on the handlebar and fit the clamp/mirror. Align the clamp/mirror split line with the punch mark on the handlebar. Evenly tighten the clamp bolts to **12 Nm**.



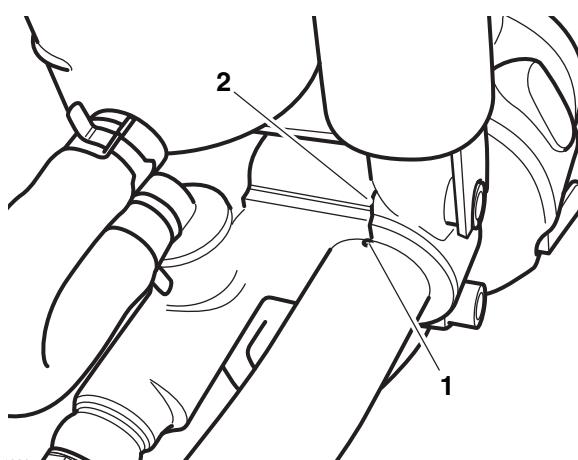
- 1. Handlebar punch mark
- 2. Clamp/mirror split line

13. Position the left hand switch gear to the handlebar, ensure that the tab on the upper switch gear half locates with the hole in the handlebar.



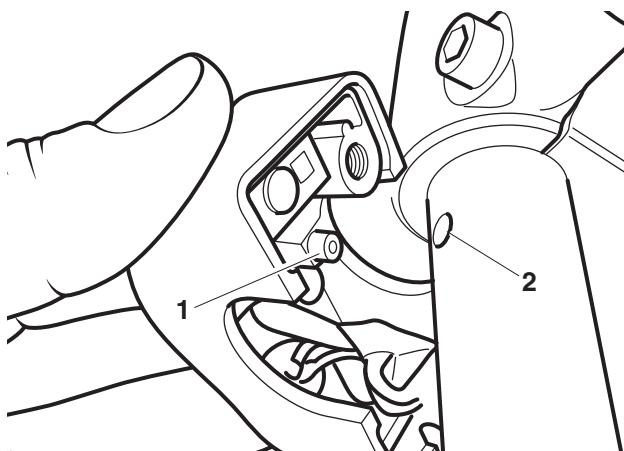
- 1. Tab
- 2. Locating hole

14. Secure the lower switch gear half to the upper. Tighten the fixings to **2.5 Nm**.
15. Locate the brake master cylinder assembly on the handlebar and fit the clamp/mirror. Align the clamp/mirror upper split line with the punch mark on the handlebar. Evenly tighten the clamp bolts to **12 Nm**.



- 1. Handlebar punch mark
- 2. Clamp/mirror split line

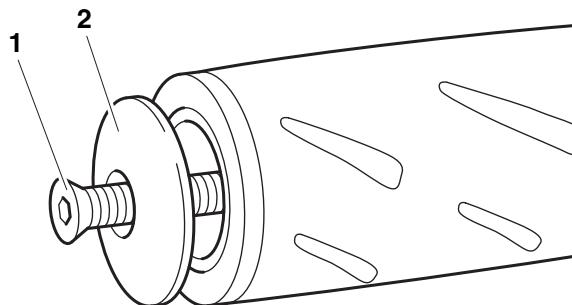
16. Tighten the fixings securing the throttle grip to **6 Nm**.
17. Secure the front brake fluid reservoir to the master cylinder. Tighten the fixing to **5 Nm**.
18. Position the right hand switch gear to the handlebar, ensure that the tab on the upper switch gear half locates with the hole in the handlebar.



1. Tab

2. Locating hole

19. Secure the lower switch gear half to the upper. Tighten the fixings to **2.5 Nm**.
20. Insert the handlebar end weights into the handlebar ends and tighten the fixings to **3 Nm**.



P6270008

1. Fixing

2. End weight

Side Stand - All Models

Removal

1. Securely raise and support the motorcycle.

Warning

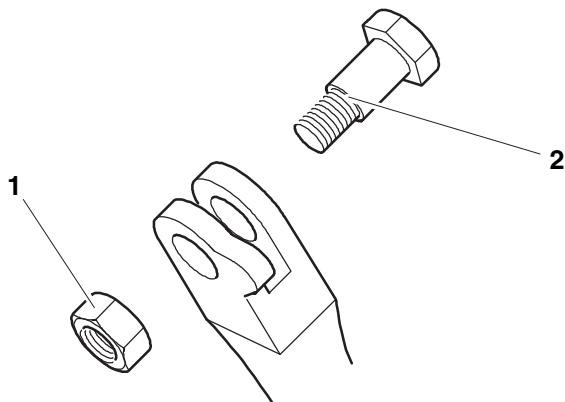
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

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.



1. Nut

2. Pivot bolt

4. Unscrew the pivot bolt and remove the stand from the bike.

Frame & Bodywork

Installation

1. Lubricate the pivot bolt shoulder and side stand pivot with multi-purpose grease.
2. Fit the stand to the motorcycle and insert the pivot bolt, tightening it **55 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

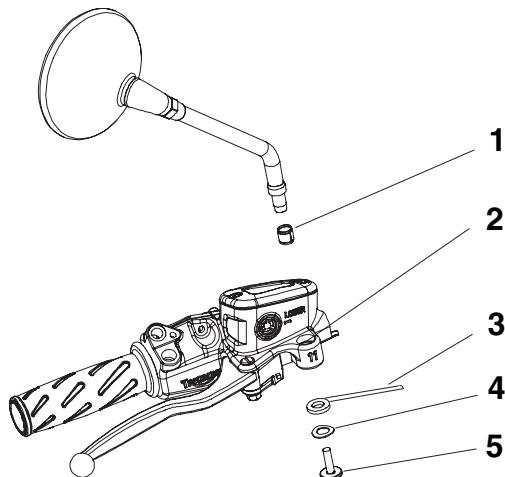
Wear hand, eye and face protection when fitting the stand spring. Take great care to minimise the risk of personal injury and loss of components.

5. Check the operation of the side stand before riding the motorcycle. Ensure the spring holds the stand securely in the retracted position.

Mirrors - Thruxton EFI, Bonneville (up to VIN 380776) and Bonneville T100

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. Tolerance ring
2. Mirror mounting location
3. Wavy washer
4. Tool T3880007
5. 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.
4. Fit and tighten the mirror screw to **10 Nm** whilst ensuring that the tolerance ring is drawn evenly into 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 re-tighten the mirror screw to **10 Nm**.

17 Electrical & Ignition Systems

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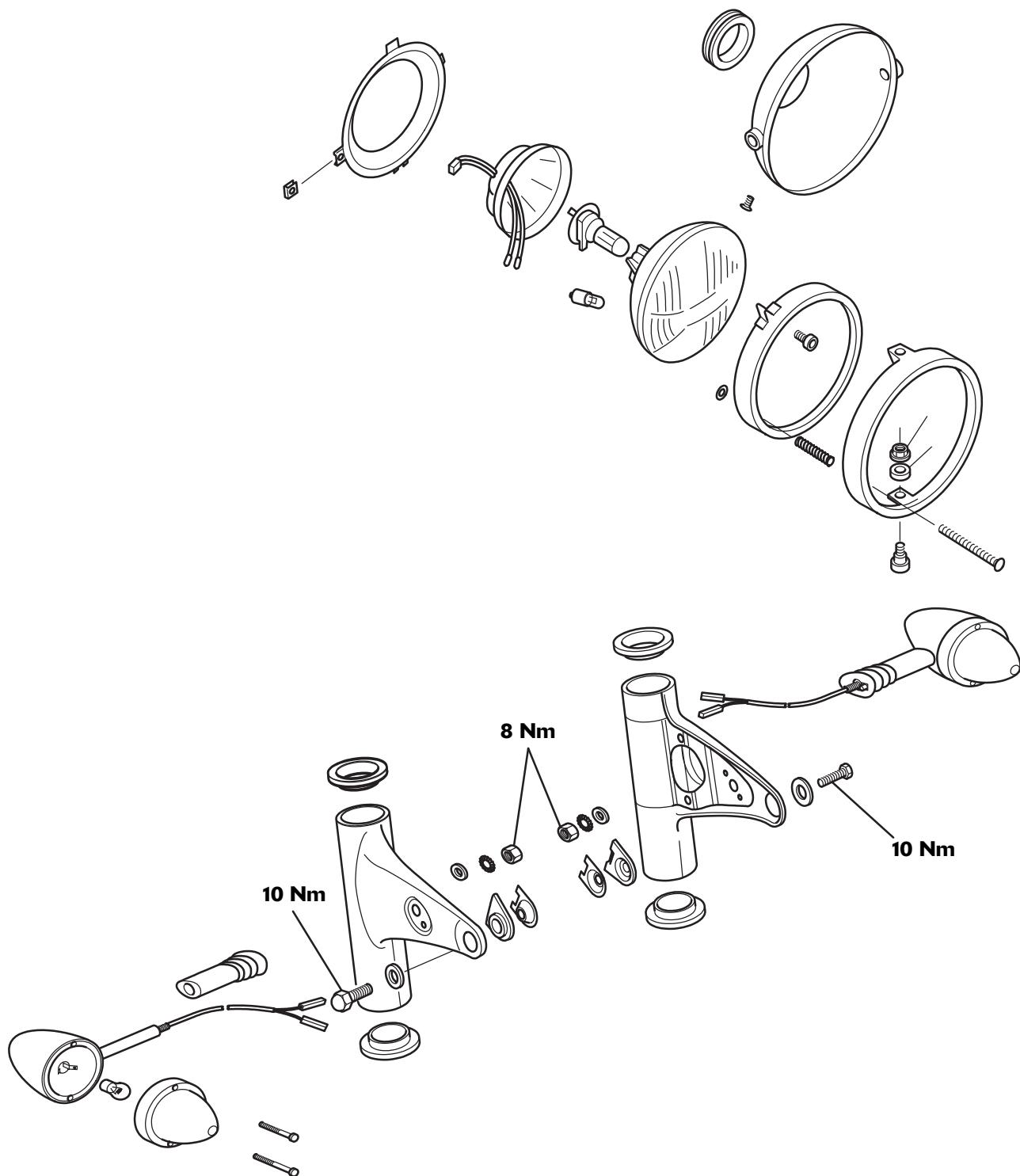
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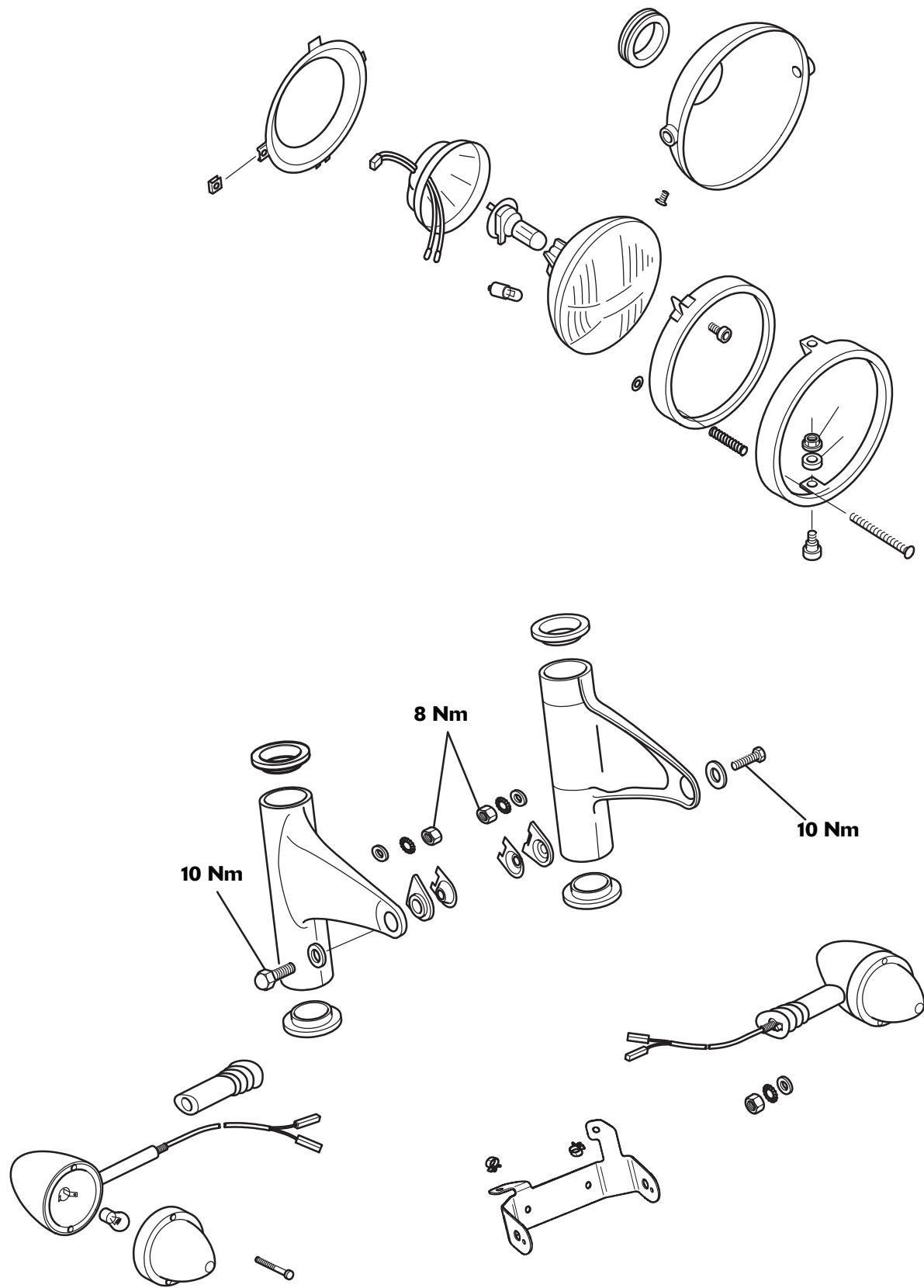
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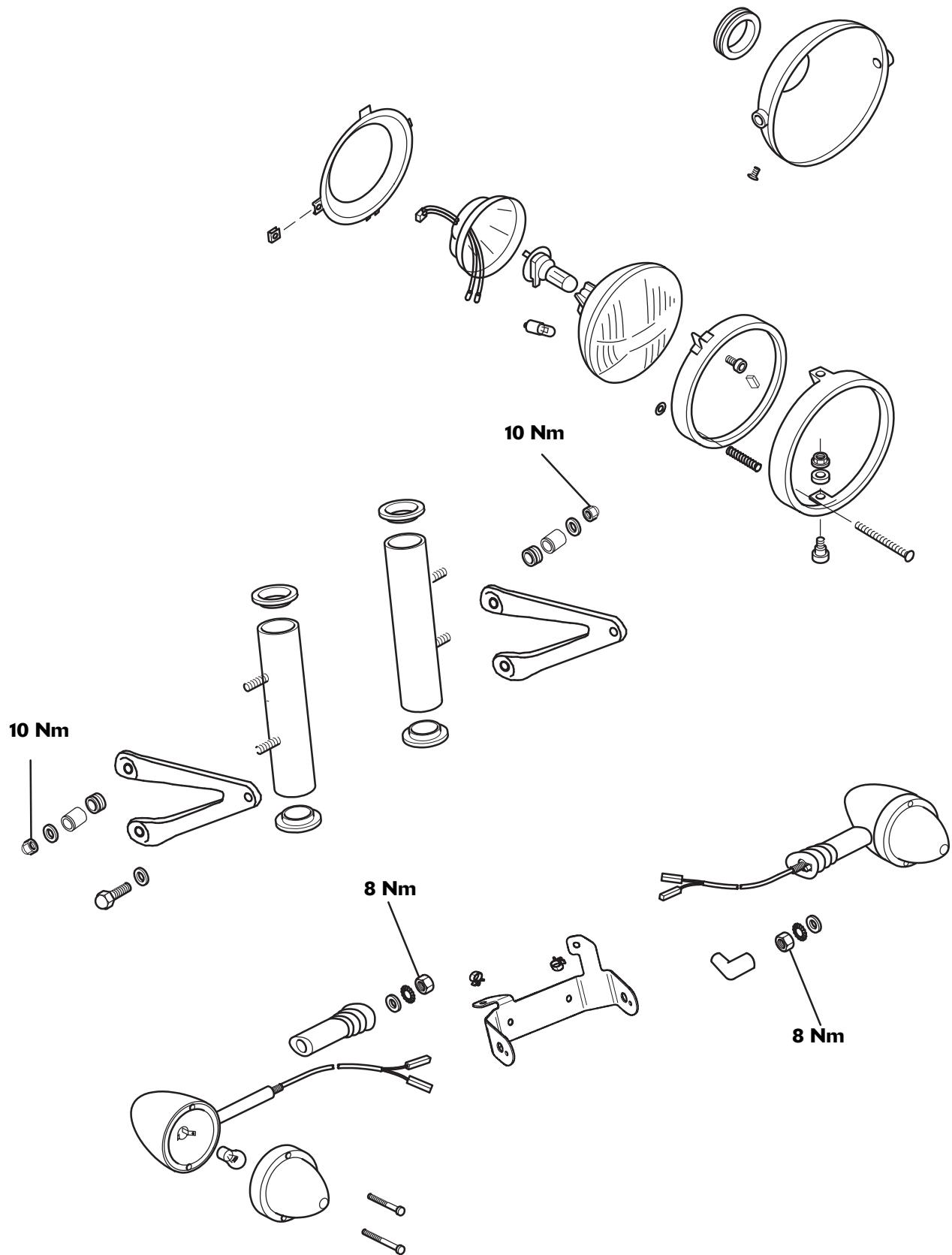


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Exploded View - Headlight and Front Indicators - Scrambler

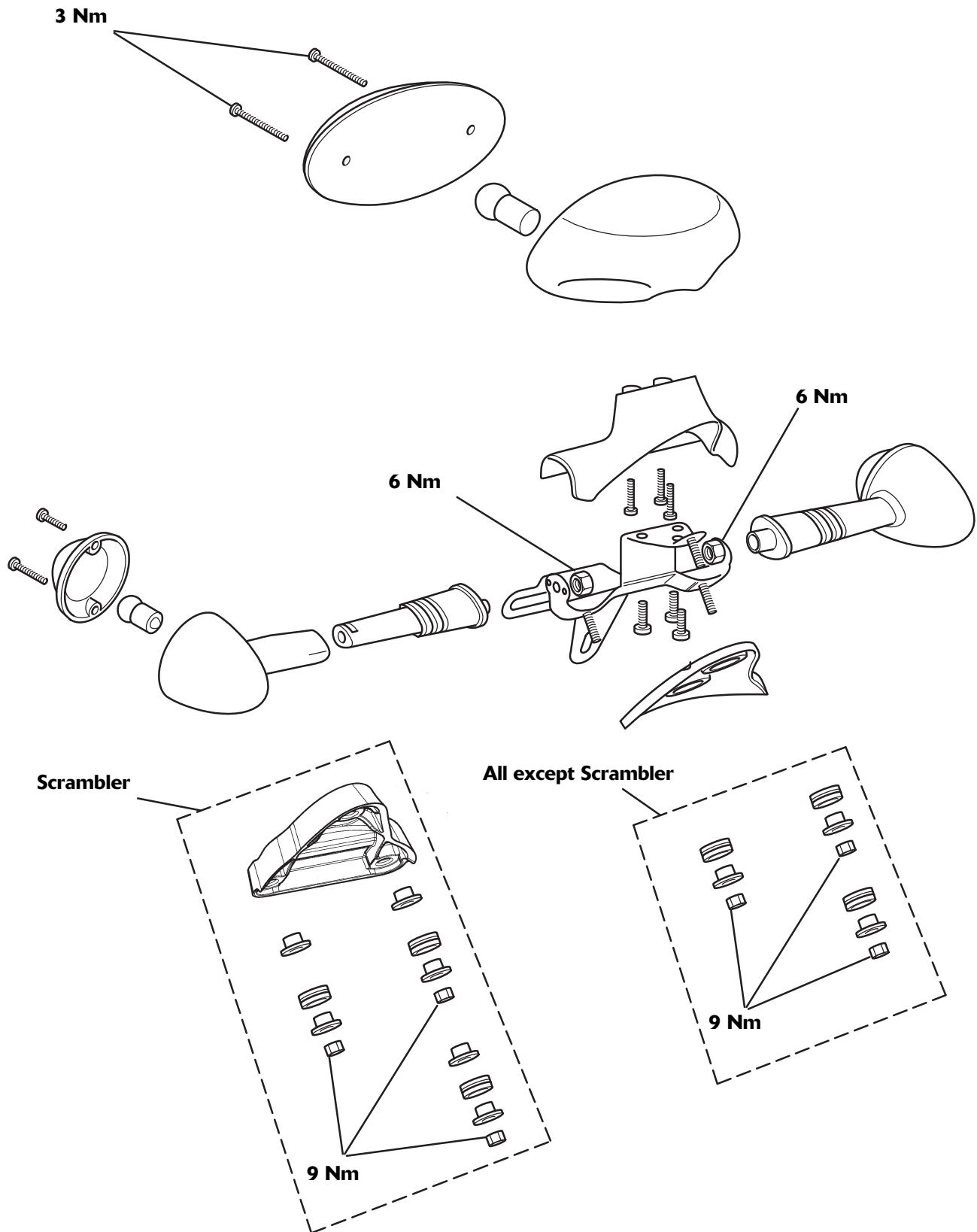


Exploded View - Headlight and Front Indicators - Thruxton



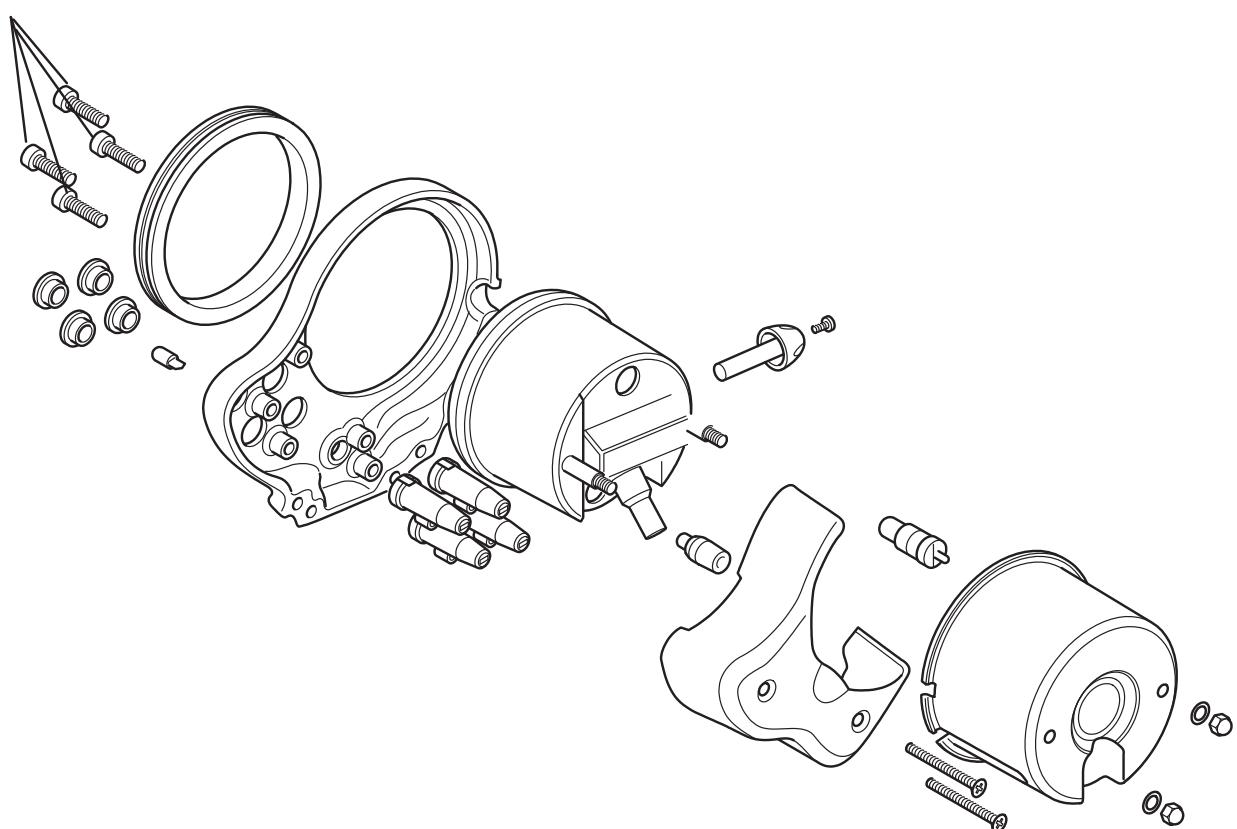
Electrical & Ignition Systems

Exploded View - Rear Light and Rear Indicators - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton



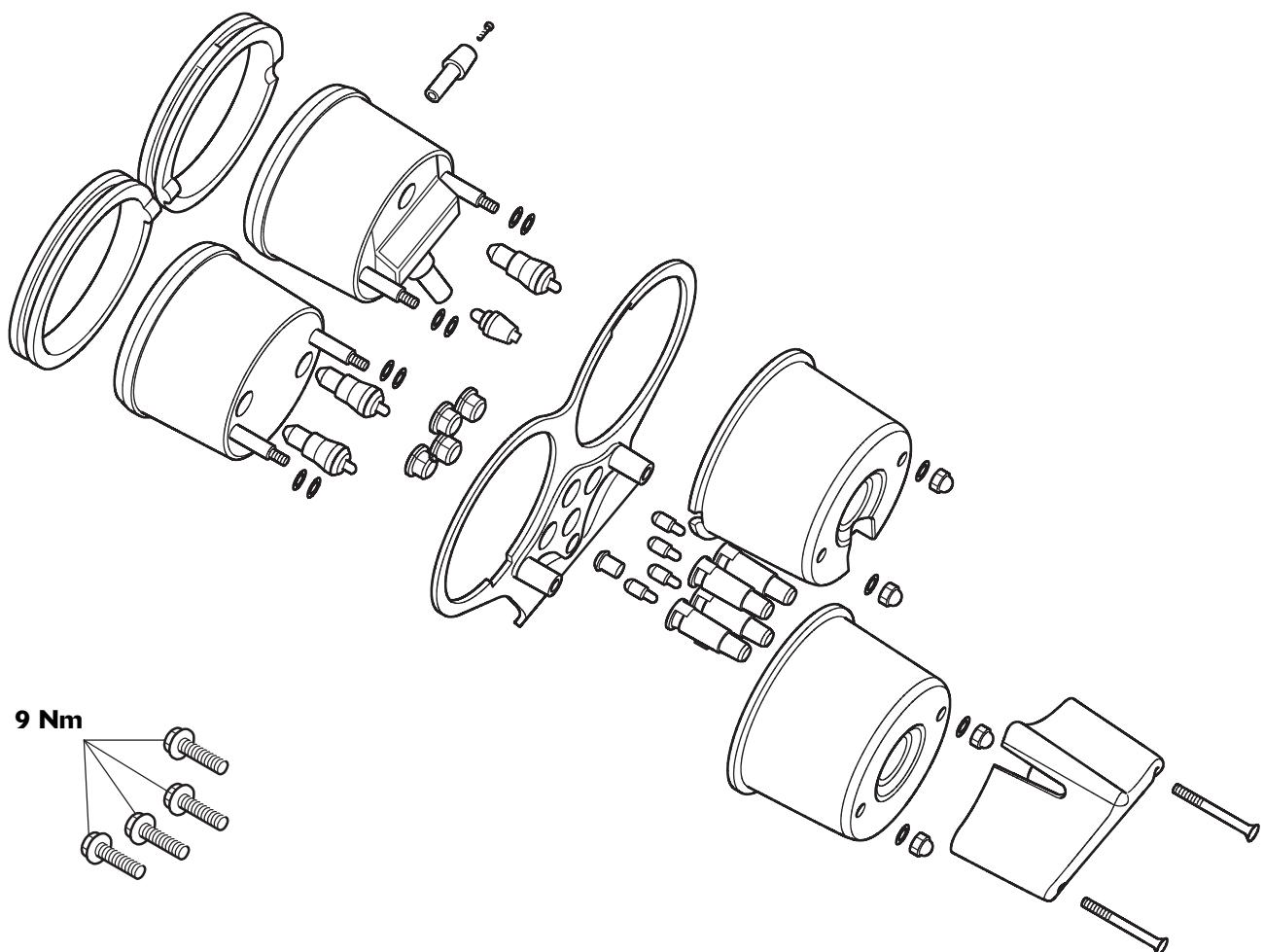
Exploded View - Speedometer Assembly - Bonneville - Models with Cable Driven Speedometer

8 Nm

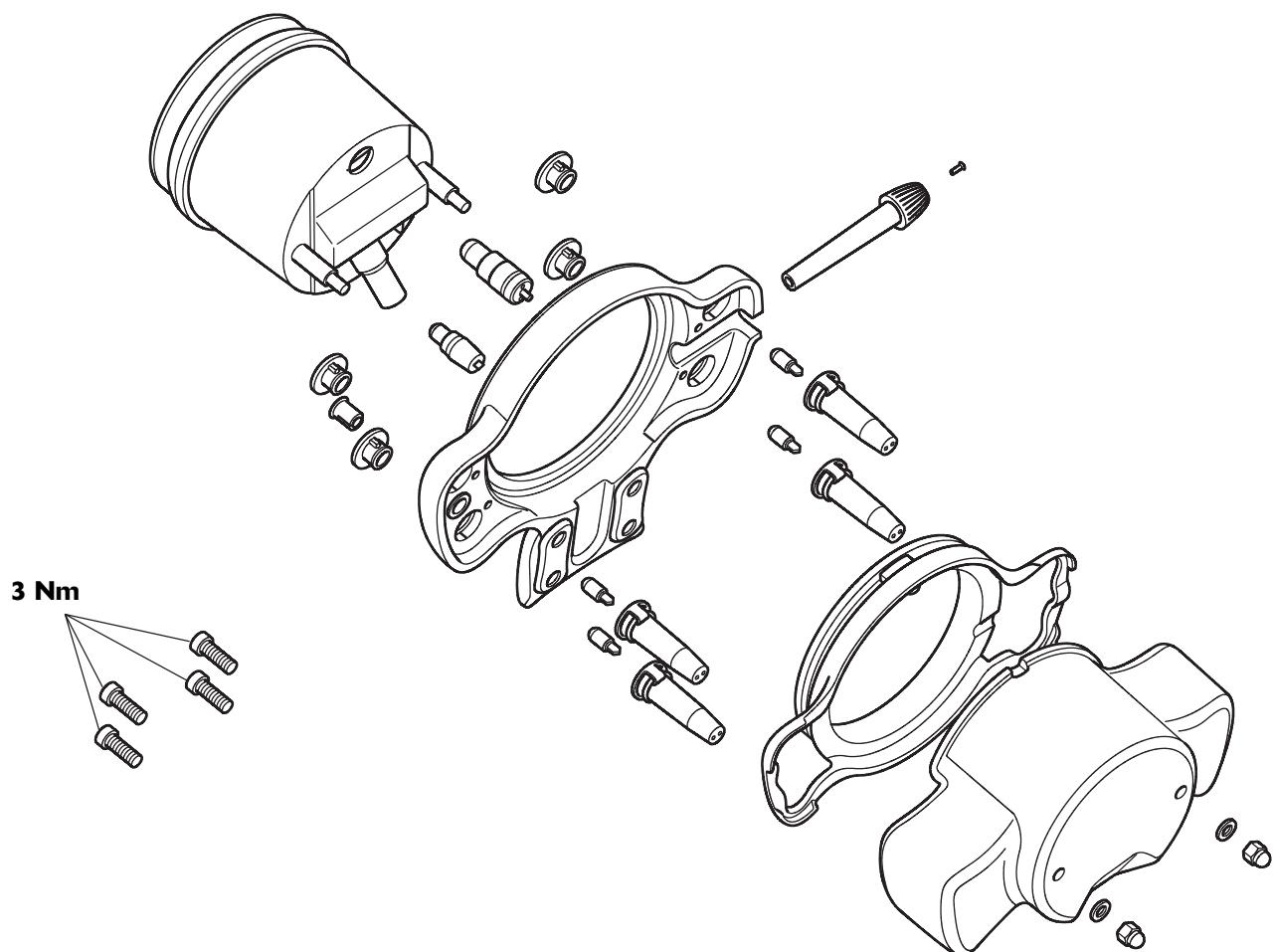


Electrical & Ignition Systems

Exploded View - Speedometer Assembly - Bonneville SE, Bonneville T100 & Thruxton - Models with Cable Driven Speedometer

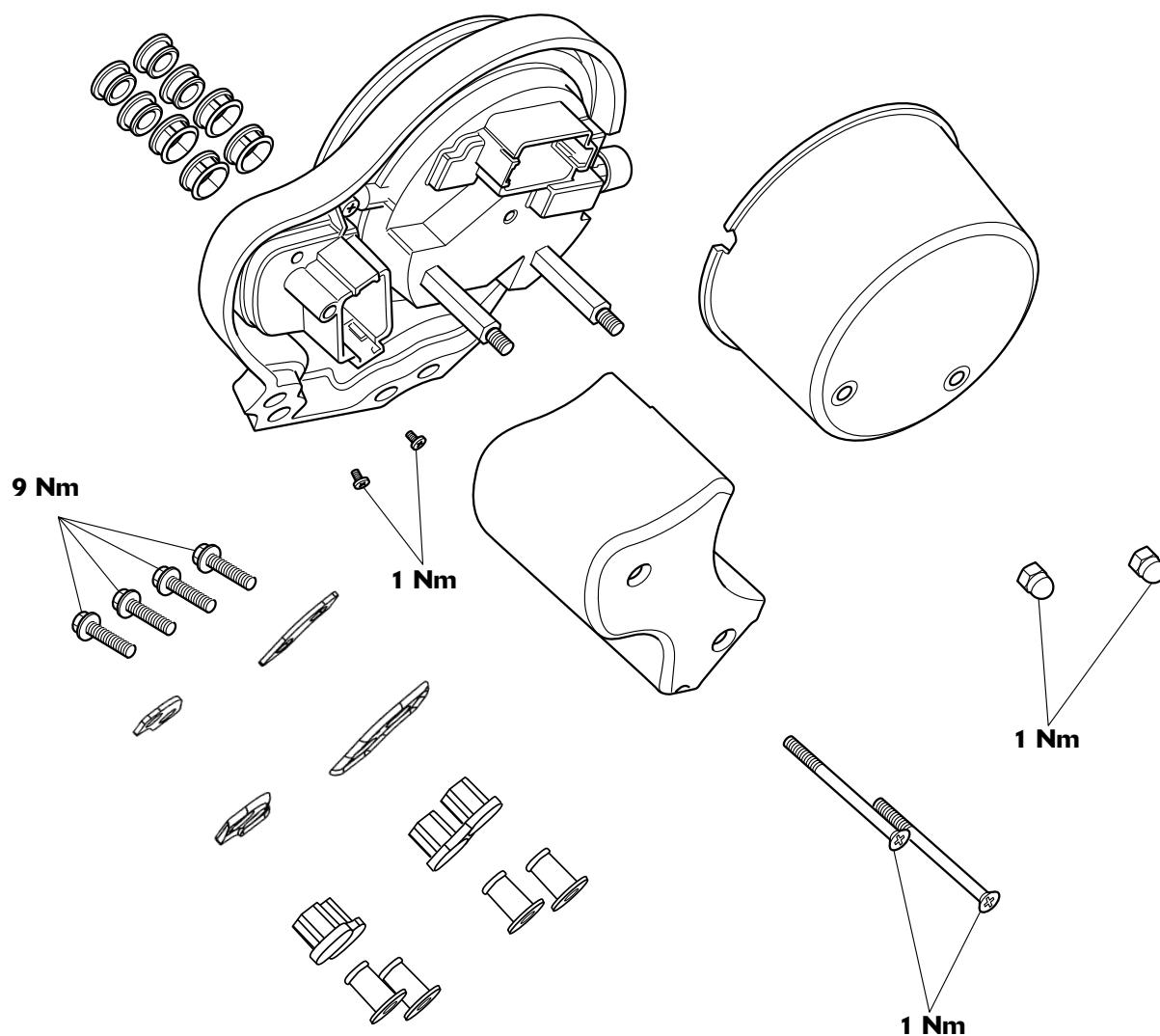


Exploded View - Speedometer Assembly - Scrambler - Models with Cable Driven Speedometer

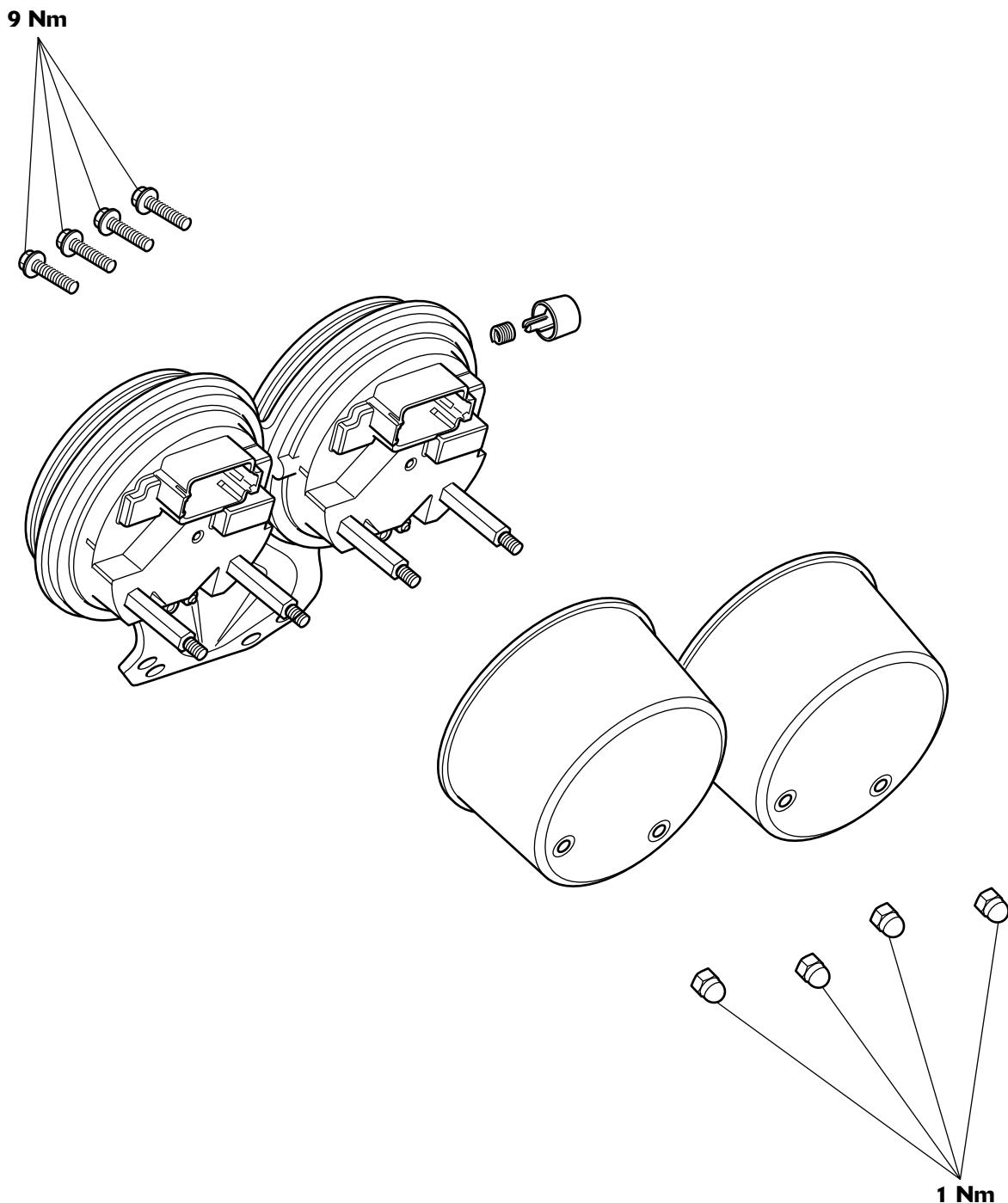


Electrical & Ignition Systems

Exploded View - Speedometer Assembly - Bonneville - Models with Electronic Speedometer

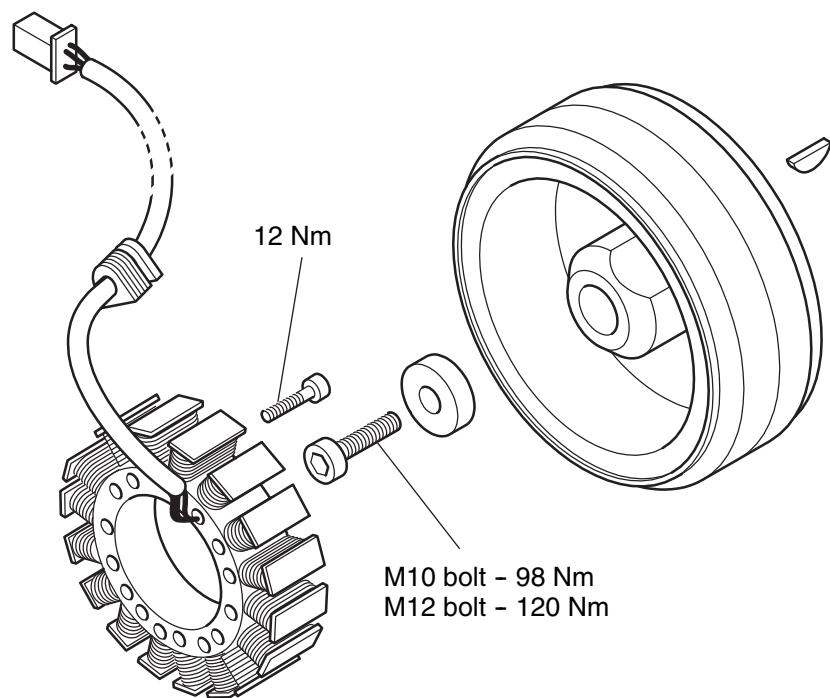


Exploded View - Speedometer Assembly - Bonneville SE, Bonneville T100, Thruxton and Scrambler - Models with Electronic Speedometer

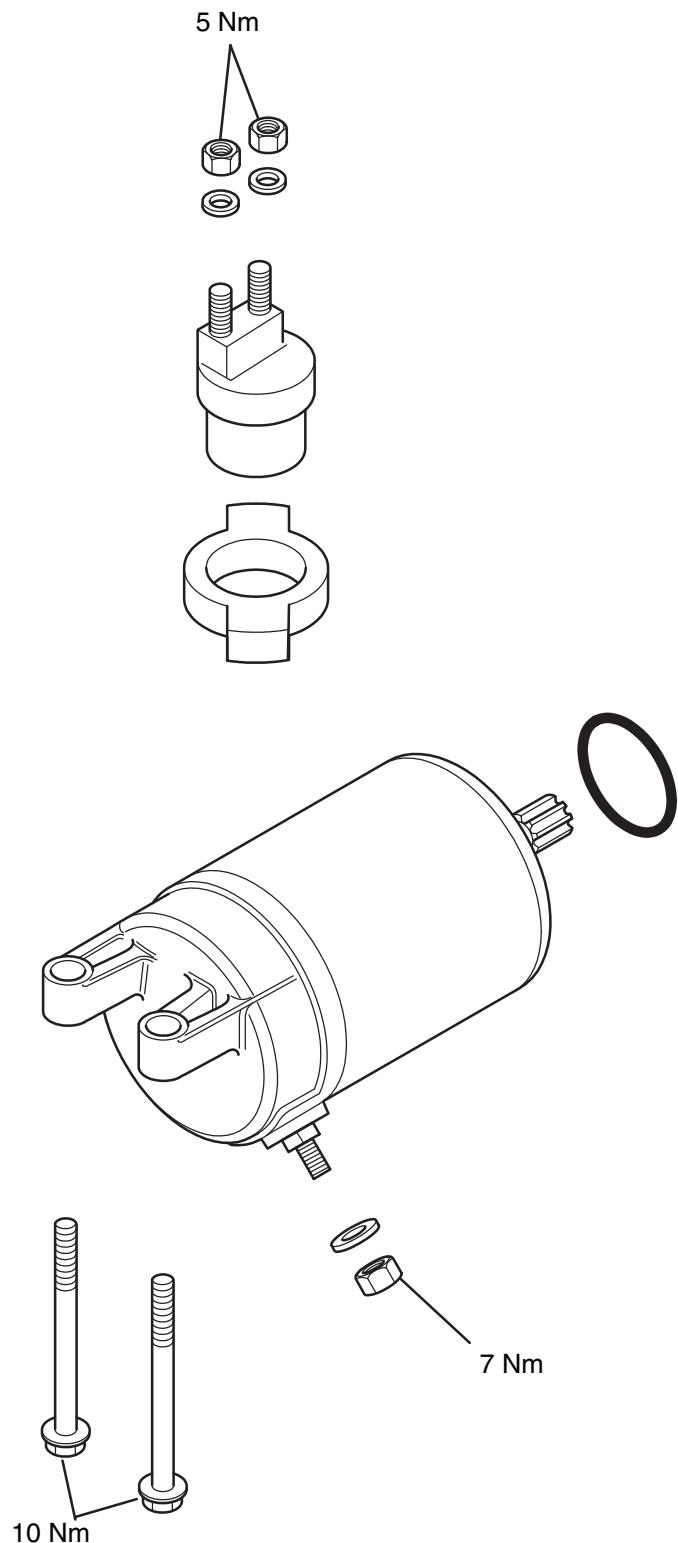


Electrical & Ignition Systems

Exploded View - Alternator and Starter - All Models

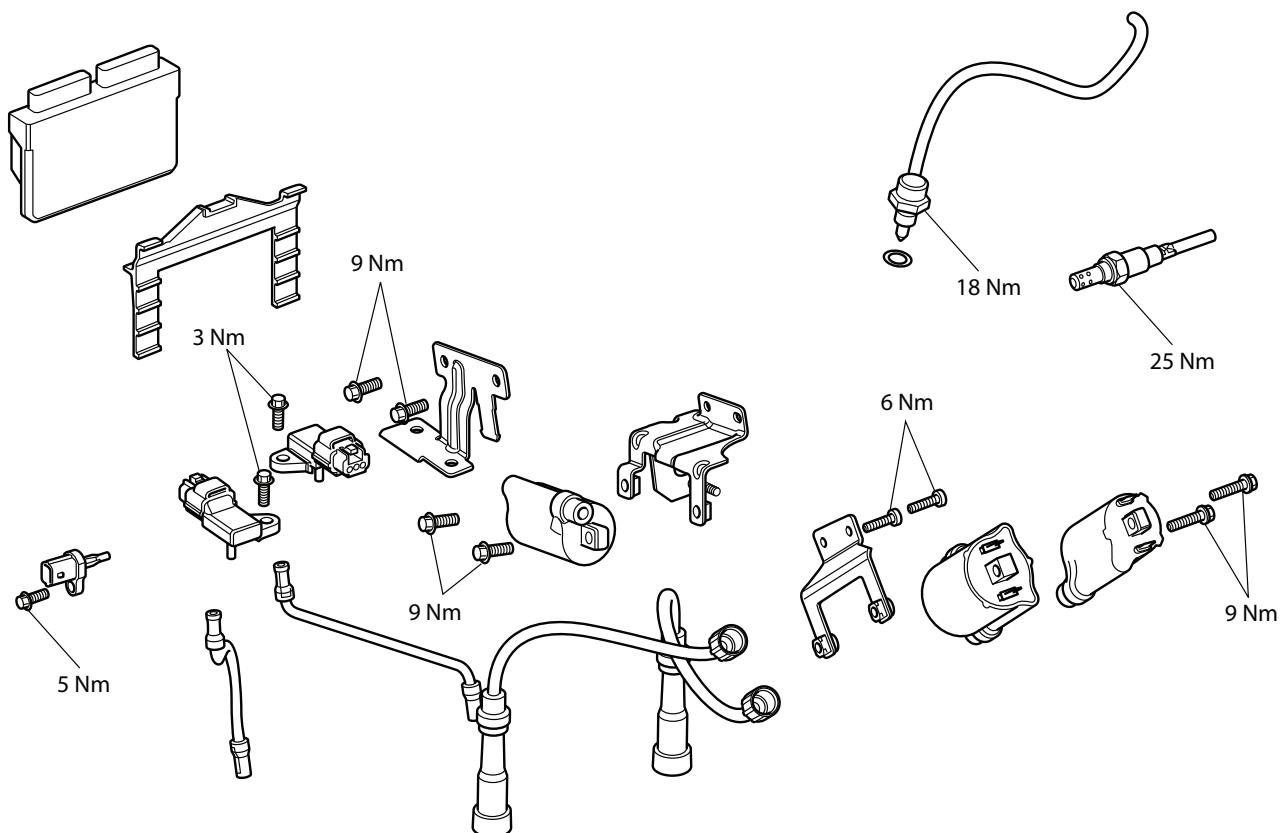


Exploded View - Starter Motor - All Models



Electrical & Ignition Systems

Exploded View - ECU - Fuel Injected Models



Electrical and Ignition System Safety Precautions



Warning

FAILURE TO OBSERVE ANY OF THE FOLLOWING WARNINGS COULD RESULT IN DAMAGE AND/OR PERSONAL INJURY.



Warning

Always disconnect the battery when carrying out any work on the electrical system, ensuring the negative (-) terminal is disconnected first. On completion of the work, reconnect the battery, connecting the positive (+) terminal first and the negative (-) terminal last. Ensure the insulating cover is correctly fitted over the positive (+) terminal before installing the seat.



Warning

The voltages produced by the ignition system are extremely high. Do not touch any part of the ignition system whilst the engine is running.



Warning

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits or diagnostic equipment whilst the engine is running. The voltages present may interrupt the normal operation of such devices causing illness or death.



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.



Warning

The battery contains sulphuric acid (electrolyte) which is corrosive and poisonous. Always wear eye and skin protection when handling electrolyte as contact with skin or eyes will cause severe burns. If electrolyte gets on your skin or in your eyes, flush with water immediately and seek urgent medical attention. If electrolyte is swallowed, drink large quantities of water and seek urgent medical attention. KEEP ELECTROLYTE OUT OF REACH OF CHILDREN.

Electrical & Ignition Systems

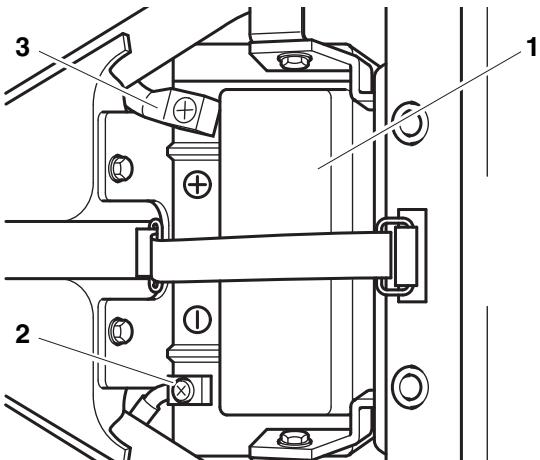
Battery

Note:

- Read through the safety precautions before proceeding.

Removal - Bonneville, Bonneville T100, Bonneville SE, Scrambler & Thruxton

1. Remove the seat (see page 16-11).
2. Disconnect the battery, negative (black) lead first.



1. Battery
 2. Negative (-) lead
 3. Positive (+) lead
3. Note the correct fitted location of the battery strap then unhook it from the frame.
 4. Lift the battery out of position.

Note:

- On models with Electronic Fuel Injection (EFI), the Engine Control Module (ECM) is located at the rear of the battery tray and is secured to the motorcycle by the battery. Ensure the ECM is not disturbed during the battery removal or installation process.

Installation

Warning

Ensure that the battery terminals do not touch the motorcycle frame as the battery is refitted.

1. On models with Electronic Fuel Injection (EFI) only, ensure the Engine Control Module (ECM) and its cover are correctly located behind the battery.
2. Refit the battery and secure it in position with the strap, ensuring it is fitted as was noted prior to removal.
3. Reconnect the battery, positive (red) lead first.
4. Apply a light coat of petroleum jelly to the battery terminals then seat the insulating cover over the positive (+) terminal.
5. Refit the seat (see page 16-11).



Warning

Ensure that the battery terminals do not touch the motorcycle frame as the battery is removed.

Battery Commissioning and Charging

Note:

- **Read through the safety precautions before proceeding.**

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.

1. Ensure the VIN number printed on the anti-tamper label attached to the battery matches the motorcycle VIN.
2. Read the instructions and warnings delivered with the battery.
3. 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.

4. Remove the battery sealing strip from the electrolyte container (if applicable) and save for later in this procedure. 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 manufacturer's 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.

Electrical & Ignition Systems

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 multi meter. 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 on the following page 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.**

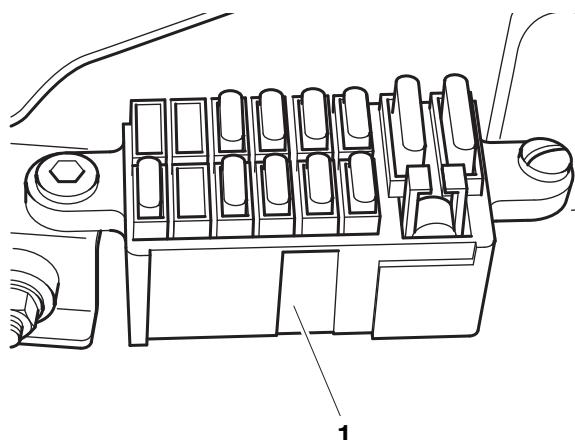
Table of Battery Charging Times

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. Re-test after recovery	20 hours

Fuses and Relays

Fuse Location

Fuses are located in the fuse box located behind the right side cover.



T908046

1. Fuse box

Fuses

If a fuse fails, inspect the electrical system to determine the cause, and then replace it with a new fuse of correct current rating.



Warning

Always replace blown fuses with new ones of the correct current rating (as specified on the fuse box cover) and never use a fuse of higher rating.

A blown fuse is indicated when all of the systems protected by that fuse circuit become inoperative. When checking for a blown fuse, use the tables below to establish which fuse has blown.

Note:

- The fuse identification numbers listed in the following tables correspond with those printed on the fuse box cover.**
- Spare fuses of all ratings should be carried on the motorcycle for use in case of emergency. Always replace a spare fuse if it is used.**

Fuse Identification - Bonneville, Scrambler & Bonneville T100 with Carburetors

Fuse No	Circuits Protected	Fuse Rating (Amp.)
1	Not used	-
2	Ignition switch main feed	30
3	Accessory socket	10
4	Alarm	5
5	Instruments, igniter unit, starter relay	15
6	Not used	-
7	Indicators, brake light, horn	10
8	Position light, instrument illumination	5
9	Headlight dip/main beam	10
10	Position lights	5
11	Main fuse	30

Fuse Identification - Thruxton with Carburetors

Fuse No	Circuits Protected	Fuse Rating (Amp.)
1	Not used	-
2	Ignition switch main feed	30
3	Accessory socket	10
4	Alarm	5
5	Instruments, igniter unit, starter relay	15
6	Not used	-
7	Indicators, brake light, horn	10
8	Instrument illumination	5
9	Headlight dip/main beam	10
10	Position lights	5
11	Main fuse	30

Electrical & Ignition Systems

Fuse Identification - All Electronic Fuel injection (EFI) Models with Cable Driven Speedometer

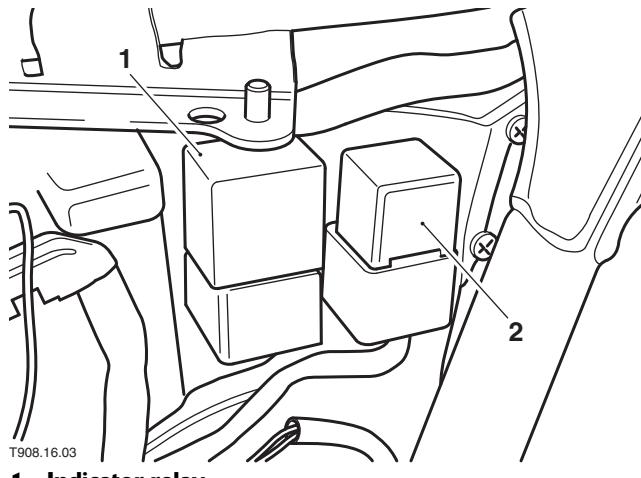
Fuse No	Circuits Protected	Fuse Rating (Amp.)
1	Not used	-
2	Alarm, Diagnostic connector	10
3	Accessory socket	10
4	Ignition switch main feed	10
5	Engine management system	20
6	Not used	-
7	Indicators, brake light, horn	10
8	Position light, instrument illumination	5
9	Headlight dip/main beam	10
10	Position lights	5
11	Main battery fuse	30

Fuse Identification - All Electronic Fuel injection (EFI) Models with Electronic Speedometer

Fuse No	Circuits Protected	Fuse Rating (Amp.)
1	Not used	-
2	Alarm, diagnostic connector	10
3	Accessory socket, GPS	10
4	Not used	-
5	Engine management system	20
6	Ignition switch main feed, instrument illumination	10
7	Indicators, brake light, horn	10
8	Position light,	5
9	Headlight dip/main beam	10
10	Position lights	5
11	Main battery fuse	30

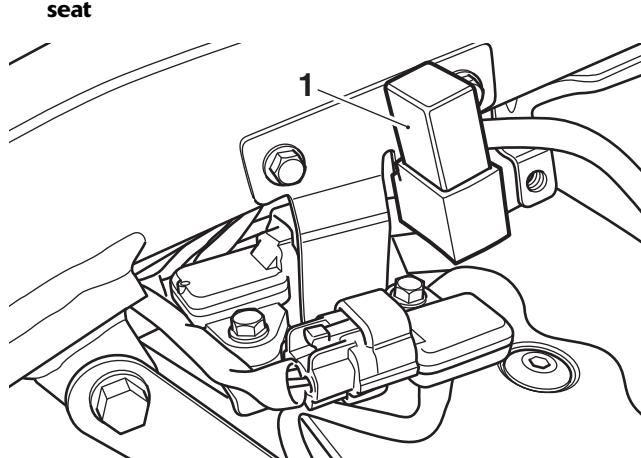
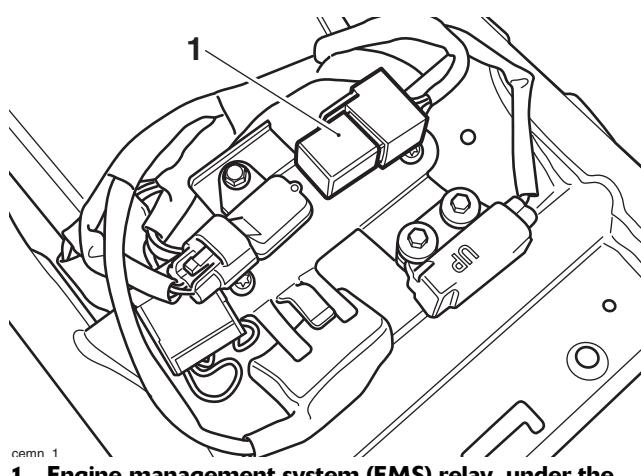
Relays - All Models

The headlight and indicator relays are located behind the left side cover.



EFI models

On fuel injected models there are additional relays located on the rear frame under the seat, and under the fuel tank on the right hand side.



Headlight Beam Adjustment



Warning

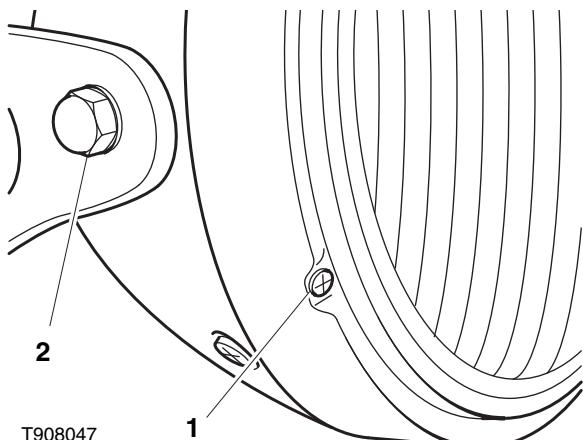
Never attempt to adjust the headlight beam when the motorcycle is in motion. Any attempt to adjust the headlight beam when the motorcycle is in motion may result in loss of control and an accident.



Warning

Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated. Ensure that the beam is adjusted to illuminate the road surface sufficiently far ahead, but without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing loss of motorcycle control and an accident.

1. Switch the headlight dipped beam on.
2. Vertical adjustment of the headlight beam is made by slackening its mounting bolts and repositioning the light unit on its mounting brackets. Once the beam is correctly set retighten the mounting bolts to **10 Nm**.



1. Headlight mounting bolt
2. Horizontal adjustment screw
3. Horizontal adjustment of the beam is made using the screw in the headlight rim. Rotate the adjustment screw clockwise to move the beam to the left and anti-clockwise to move it to the right.
4. Switch the headlight off when the beam is correctly set.

Headlight Bulb Replacement

Note:

- Read through the safety precautions before proceeding.

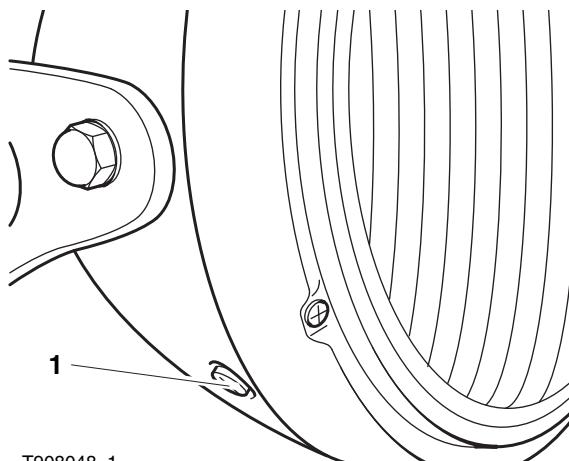


Warning

Bulbs become hot during use. Always allow sufficient time for the bulb to cool before handling.

Headlight/Sidelight

1. Undo the screws and free the headlight rim from the shell.



1. Headlight rim screw, one of two shown
2. Disconnect the wiring connectors from the headlight bulb and sidelight bulb and remove the headlight rim.
3. Free the rubber cover from the rear of the reflector.

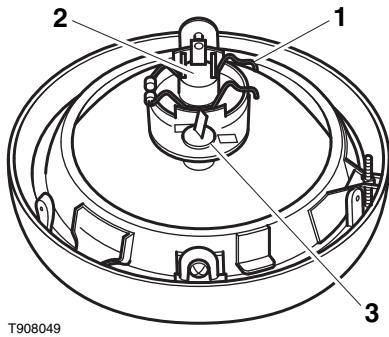


Caution

Avoid touching the headlight bulb glass. If the glass is touched or gets dirty, clean with alcohol before installation.

Electrical & Ignition Systems

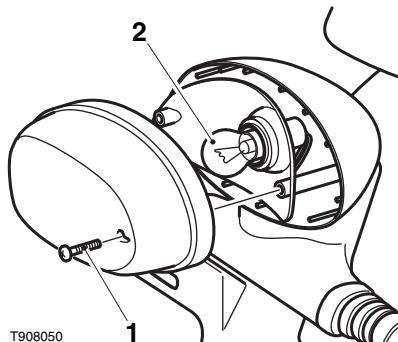
- To renew the headlight bulb, release the retaining clip and remove the bulb. Fit the new bulb, ensuring its tabs are correctly located in the reflector slots, and secure it in position with the retaining clip.



- Headlight bulb retaining clip**
- Headlight bulb**
- Sidelight bulbholder**
- To renew the sidelight bulb, release the retaining clip and remove the sidelight bulbholder. Press the bulb in and turn it anti-clockwise to release it from the holder. Fit the new bulb to the holder then clip the holder securely into the reflector.
- Securely fit the rubber cover to the rear of the reflector.
- Reconnect the wiring connectors to the headlight and sidelight bulbs.
- Seat the headlight rim correctly in its shell and securely tighten its screws.
- Check the headlight beam alignment (see page 17-23).

Rear Light Bulb Replacement

- Undo the screws and remove the lens from the light unit.

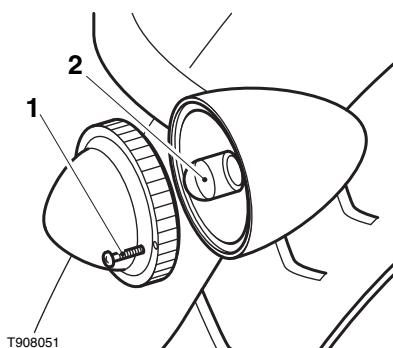


Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton

- Lens screw**
- Bulb**
- Push the bulb in and rotate it anti-clockwise to free it from its holder.
- Fit the new bulb (the bulb pins are offset) securely to the holder then refit the lens.

Indicator Bulb Replacement

- Undo the screws and remove the lens from the light unit.

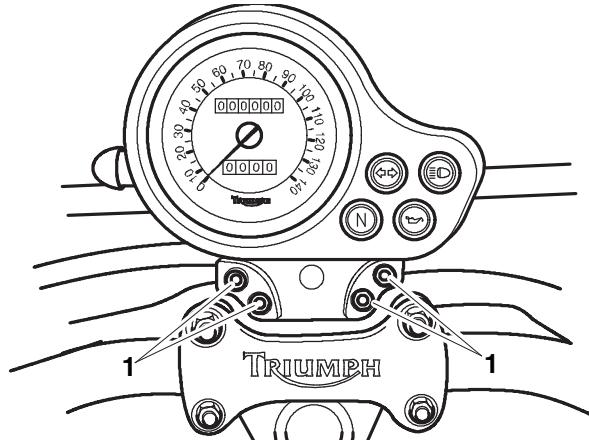


Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton

- Lens screw**
- Bulb**
- Push the bulb in and rotate it anti-clockwise to free it from its holder.
- Fit the new bulb securely to the holder then refit the lens.

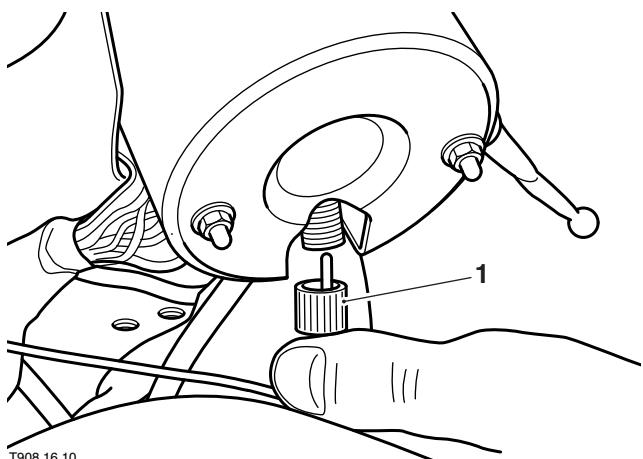
Warning Light Bulb Replacement - only Models with Cable Driven Speedometer

- Unscrew the mounting bolts and free the speedometer housing from the top yoke.



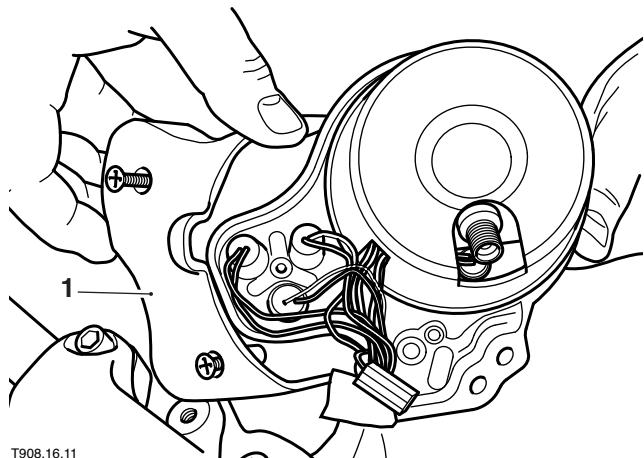
T908.A1.01

- Speedometer housing bolts (Bonneville shown)**
- To improve access, unscrew the retaining ring and disconnect the speedometer cable.



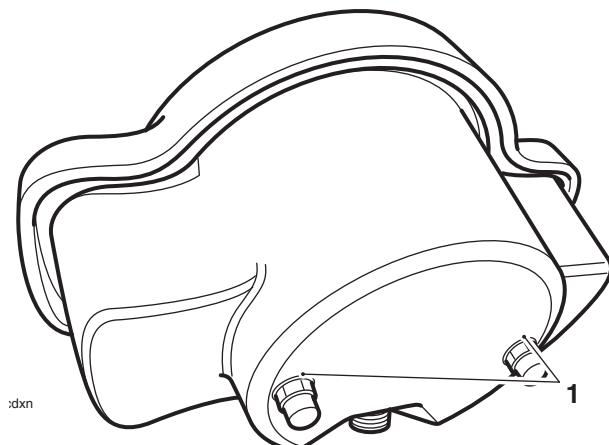
1. Speedometer cable retaining ring

- All except Scrambler - Undo the screws and remove the cover from the base of the housing to gain access to the bulbholders.



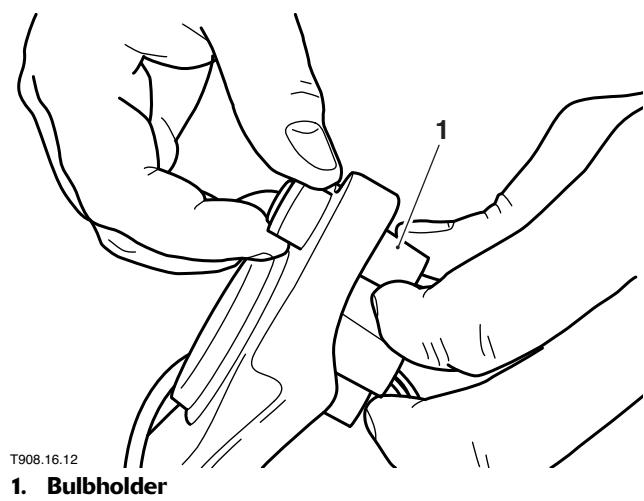
1. Bulbholder cover (Bonneville shown)

- Scrambler only - Undo the two domed nuts and washers and remove the instrument cover to gain access to the bulbholders.



1. Instrument cover nuts and washers (Scrambler)

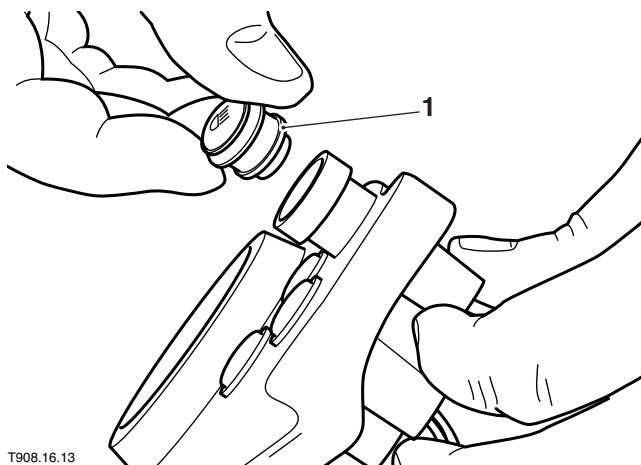
- All models - Push the relevant bulbholder out from the housing.



1. Bulbholder

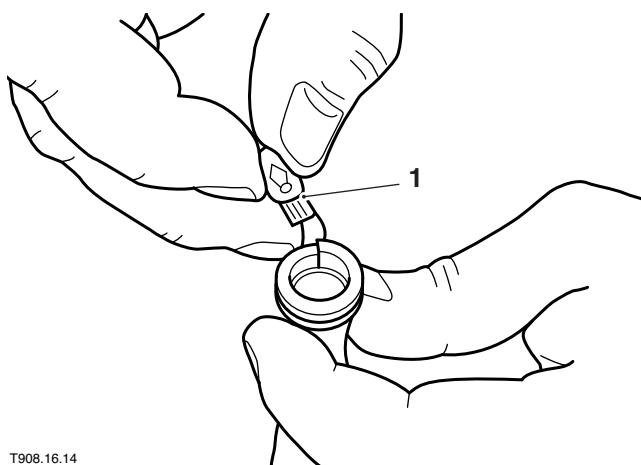
Electrical & Ignition Systems

- Remove the lens from the holder and pull out the bulb.



1. Bulbholder lens

- Fit the new bulb to the holder and refit the lens. Insert the holder into the housing ensuring it is correctly located.



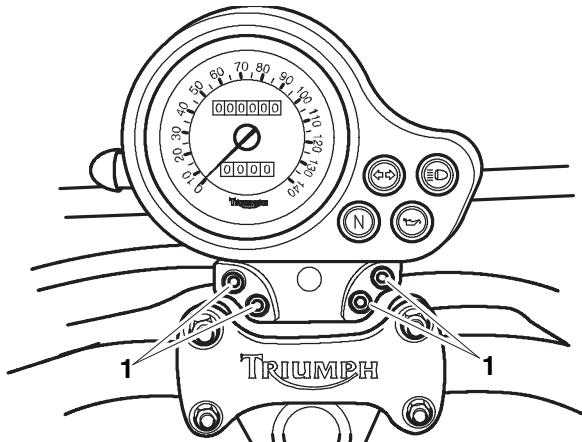
1. Bulb

- Check the operation of the bulb then refit the cover to the housing.
- Reconnect the speedometer cable then seat the housing on the top yoke, tightening its mounting bolts to **9 Nm**.

Speedometer Light Bulb Replacement - only Models with Cable Driven Speedometer

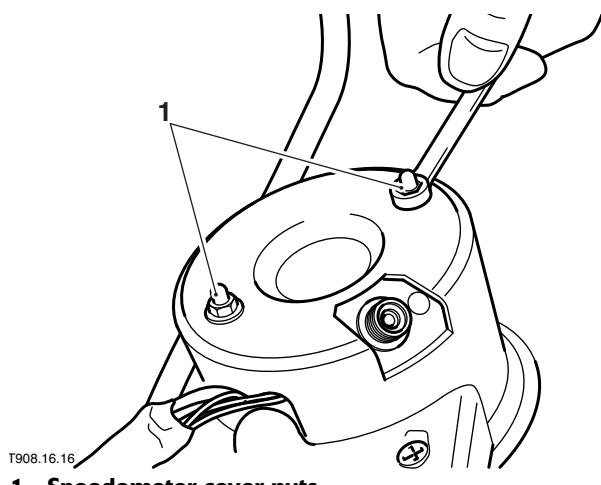
Note:

- Read through the safety precautions before proceeding.**
- Unscrew the mounting bolts and free the speedometer housing from the top yoke.



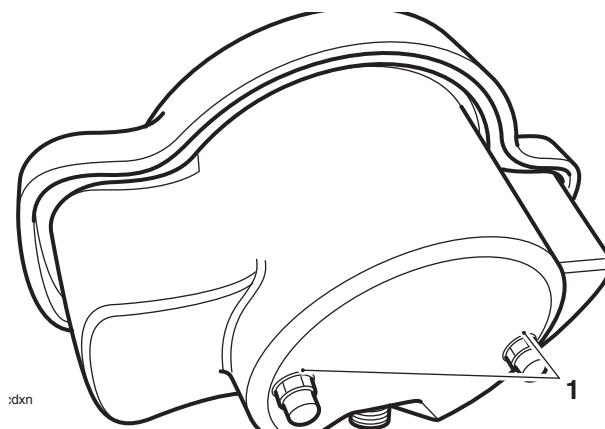
1. Speedometer housing bolts (Bonneville)

- Unscrew the retaining ring and detach the cable from the speedometer.
- All except Scrambler - Unscrew the nuts and washers and remove the cover from the base of the speedometer.



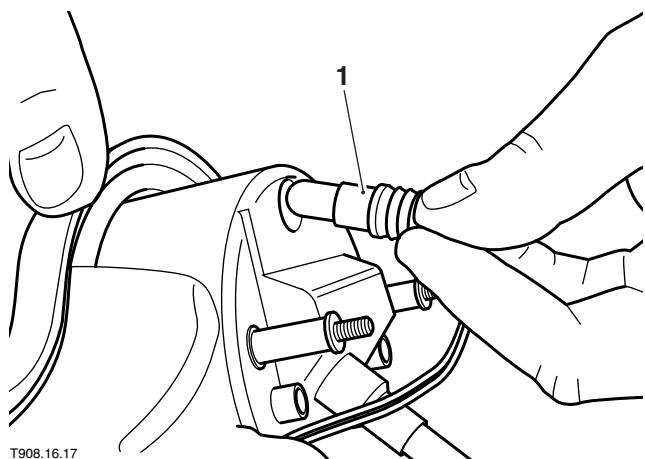
1. Speedometer cover nuts

- Scrambler only - Undo the two domed nuts and washers and remove the instrument cover to gain access to the bulbholders.



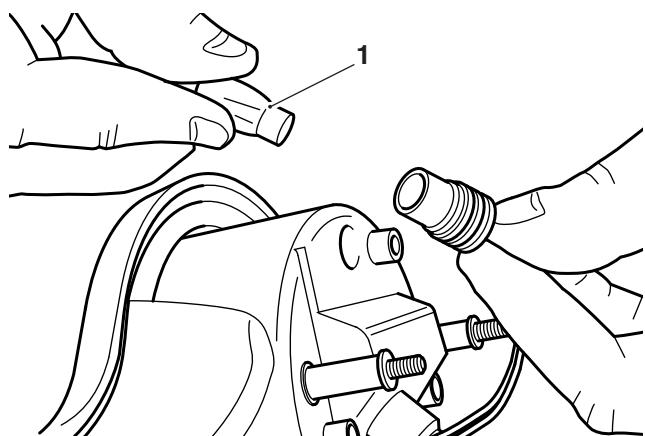
1. Instrument cover nuts and washers (Scrambler)

- All models - free the relevant bulbholder from the speedometer and remove the bulb.



1. Bulbholder

- Fit the new bulb to the holder and insert the holder into the speedometer.



1. Bulb

- Refit the cover to the speedometer.
- Seat the speedometer housing on the top yoke, tightening its mounting bolts to **9 Nm**.
- Reconnect the speedometer cable.

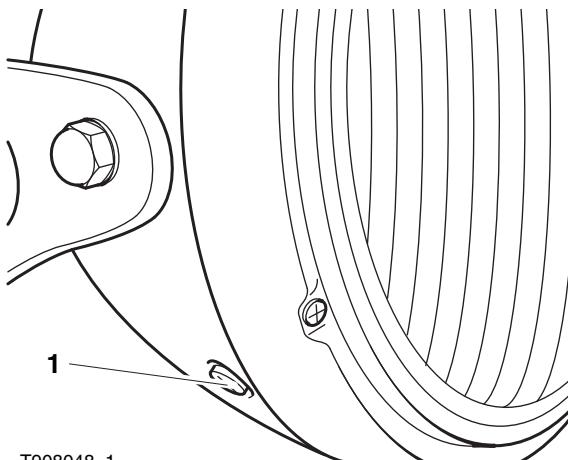
Headlight

Note:

- Read through the safety precautions before proceeding.**

Removal

- Undo the screws and free the headlight rim from the shell.



1. Headlight rim screw, one of two shown

- Disconnect the wiring connectors from the headlight bulb and sidelight bulb and remove the headlight.
- Unscrew the mounting bolts and washers and recover the mounting rubber and plate positioned between the headlight shell and each bracket.
- Free the headlight shell from the wiring and remove it from the motorcycle.
- If necessary, the headlight mounting brackets and rubbers can be removed once the forks have been removed.

Installation

- Ensure the rubber grommet is correctly fitted to the headlight shell then feed all the wiring into the rear of the shell.
- Ensure the mounting plate and rubber is correctly positioned between the headlight shell and each mounting bracket then fit the bolts and washers. Tighten the mounting bolts lightly only at this stage.
- Reconnect the wiring connectors to the headlight and sidelight bulbs.
- Seat the headlight rim correctly in its shell and securely tighten its screws.
- Adjust the headlight beam alignment (see page 17-23) then tighten the mounting bolts to **10 Nm**.

Electrical & Ignition Systems

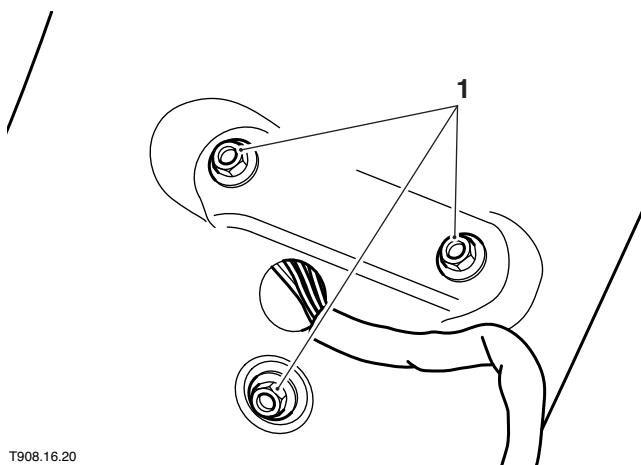
Rear Light

Note:

- **Read through the safety precautions before proceeding.**

Removal

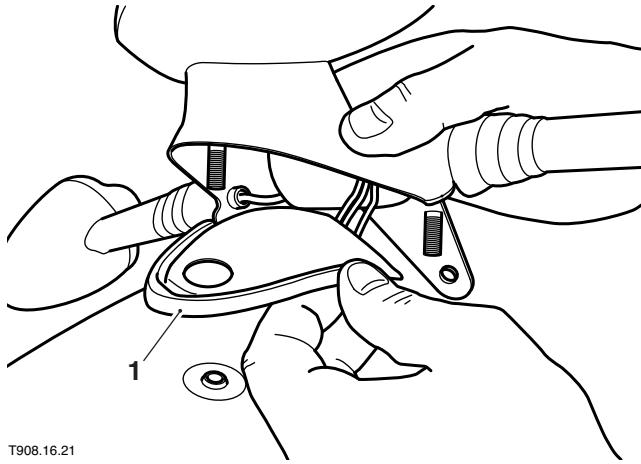
1. Remove the rear mudguard (see page 16-11).
2. Free the rear light wiring from the mudguard.
3. Unscrew the nuts and recover the collars from the rear light unit mounting rubbers.



T908.16.20

1. Rear light nuts

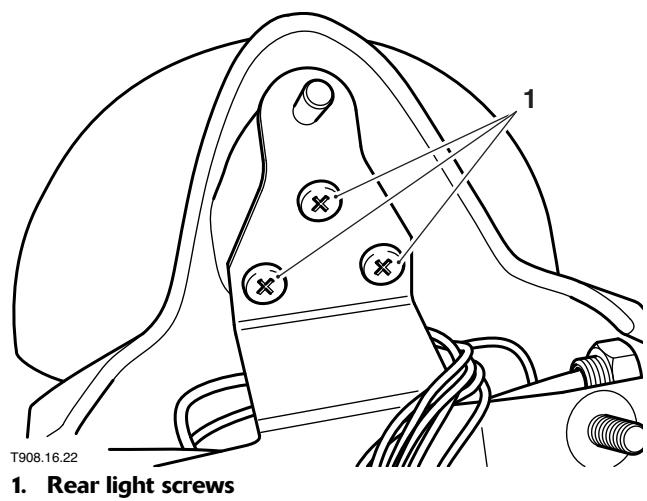
4. Remove the light unit from the mudguard and recover its rubber seal. On Scrambler remove the light unit spacer.



T908.16.21

1. Rubber seal

5. Undo the three screws and free the rear light unit from the mounting bracket. Disconnect the indicator wiring connectors from the rear light wiring harness and remove the light unit.

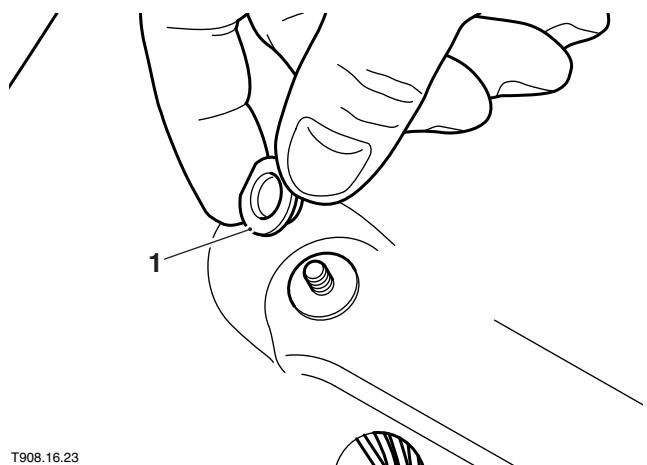


T908.16.22

1. Rear light screws

Installation

1. Where necessary, reconnect the indicator light wiring connectors to the rear light wiring harness. Locate the light unit on the bracket and securely tighten its retaining screws.
2. Ensure the three mounting rubbers are correctly fitted to the rear mudguard and fit the rubber seal to the mounting bracket. On Scrambler fit the light unit spacer.
3. Fit the rear light assembly to the mudguard. Fit the collars to the mounting rubbers and tighten the mounting nuts to **9 Nm**.



T908.16.23

1. Collar

4. Clip the wiring harness onto the underside of the mudguard then refit the rear mudguard (see page 16-16).

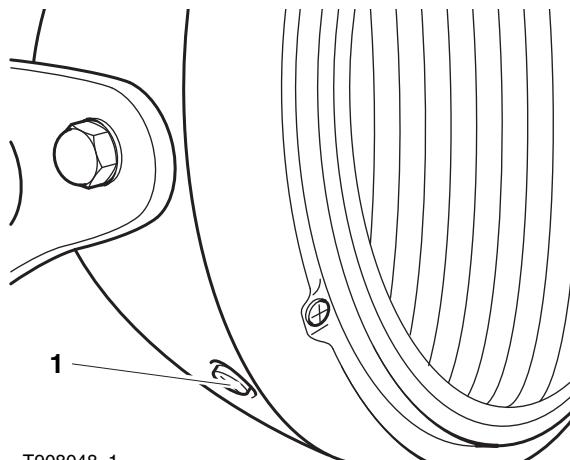
Front Indicator

Note:

- Read through the safety precautions before proceeding.**

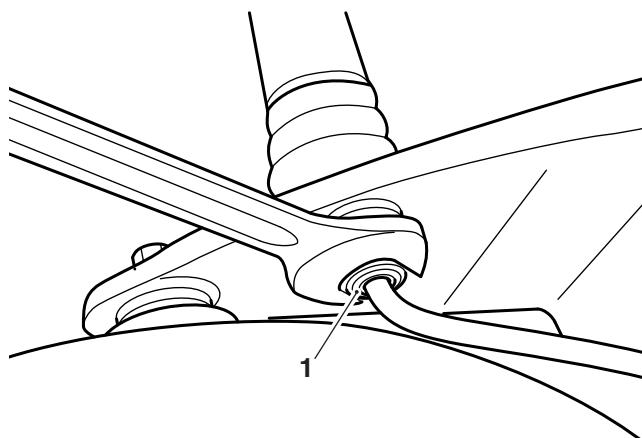
Removal

- Undo the screws and free the headlight rim from the shell.



1. Headlight rim screw, one of two shown

- Disconnect the wiring connectors from the headlight bulb and sidelight bulb and remove the headlight.
- Locate the indicator wiring connectors inside the headlight shell and disconnect them from the main harness.
- Thruston and Scrambler only, slide back the rubber boot covering the indicator fixings.
- Slacken and remove the mounting nut and washers then remove the indicator from its mounting position.



1. Indicator nut (Bonnieville)

Installation

- Install the indicator and fit the washers and mounting nut, tightening it to **8 Nm**.
- On Thruxton and Scrambler, cover the mounting nut with the rubber boot.
- Route the wiring into the headlight shell and reconnect it to the main wiring harness.
- Reconnect the wiring connectors to the headlight and sidelight bulbs.
- Seat the headlight rim correctly in its shell and securely tighten its screws.

Electrical & Ignition Systems

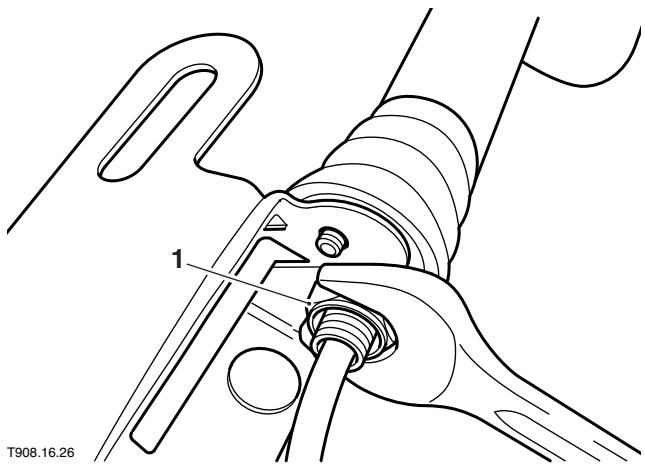
Rear Indicator

Note:

- Read through the safety precautions before proceeding.

Removal

1. Remove the rear light (see page 17-28) unit and separate it from the mounting bracket.
2. Slacken and remove the mounting nut, and washers then remove the indicator from the mounting bracket.



1. Indicator nut

3. Disconnect the indicator wiring.

Installation

1. Install the indicator and fit the washers and mounting nut, tightening it to **6 Nm**.
2. Refit the rear light unit (see page 17-28).
3. Test the indicator. Rectify any faults as necessary.

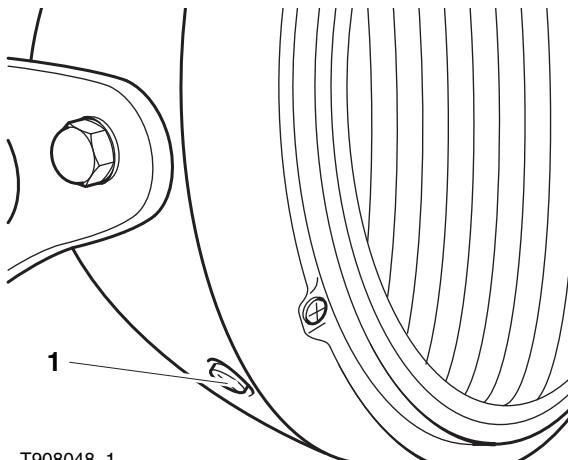
Speedometer Assembly - Models with Cable Driven Speedometer

Note:

- Read through the safety precautions before proceeding.

Removal

1. Undo the screws and free the headlight rim from the shell.

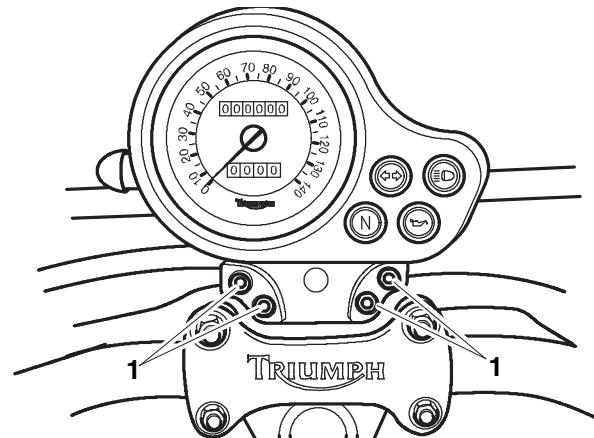


1. Headlight rim screw, one of two shown

2. Disconnect the wiring connectors from the headlight bulb and sidelight bulb and remove the headlight rim.

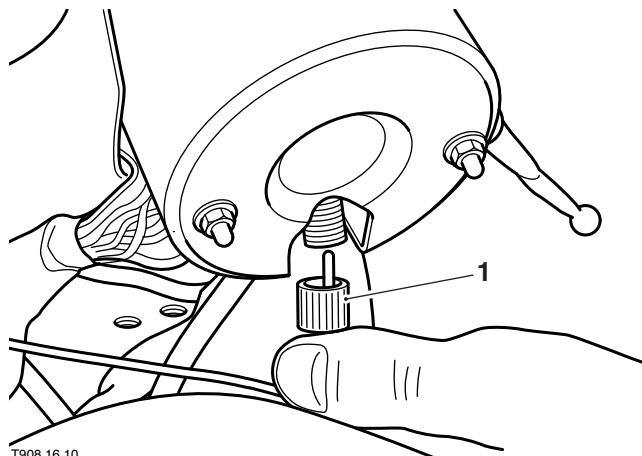
Note:

- Carburettor models have one connector, EFI models have two connectors.
3. Locate the speedometer housing wiring connector(s) inside the headlight shell and disconnect it from the main wiring harness.
 4. Unscrew the mounting bolts and free the speedometer housing from the top yoke.



1. Speedometer housing bolts (Bonnieville)

- Unscrew the retaining ring and disconnect the speedometer cable then remove the housing assembly.



1. Speedometer cable retaining ring

Installation

- Securely reconnect the cable to the speedometer.
- Locate the housing on the top yoke and tighten its mounting bolts to **9 Nm**.

Note:

- Carburettor models have one connector, EFI models have two connectors.**
- Route the wiring into the headlight shell and reconnect the connector(s) to the main harness.
- Reconnect the wiring connectors to the headlight and sidelight bulbs.
- Seat the headlight rim correctly in its shell and securely tighten its screws.

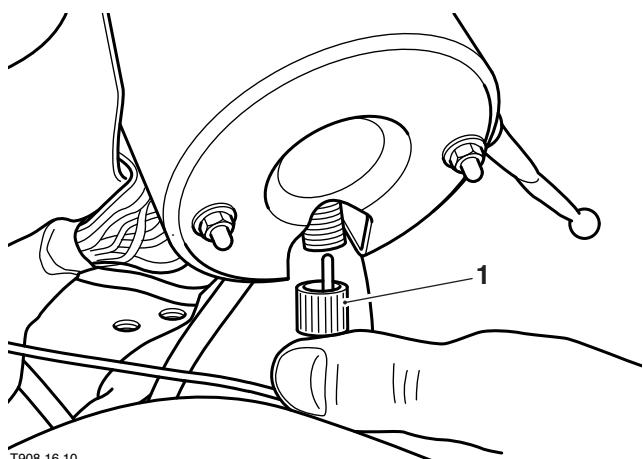
Speedometer - Models with Cable Driven Speedometer

Note:

- Read through the safety precautions before proceeding.**

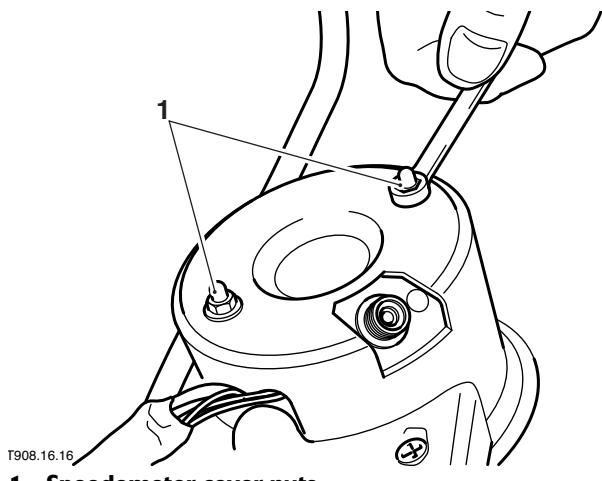
Removal

- Unscrew the mounting bolts and free the speedometer housing from the top yoke.
- Unscrew the retaining ring and detach the cable from the speedometer.



1. Speedometer cable retaining ring

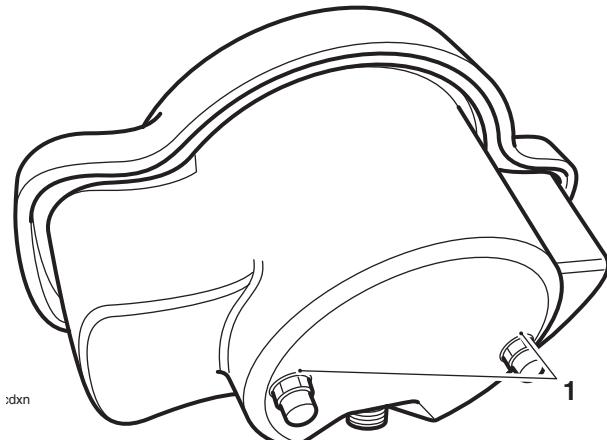
- All except Scrambler - Unscrew the nuts and washers and remove the cover from the base of the speedometer.



1. Speedometer cover nuts

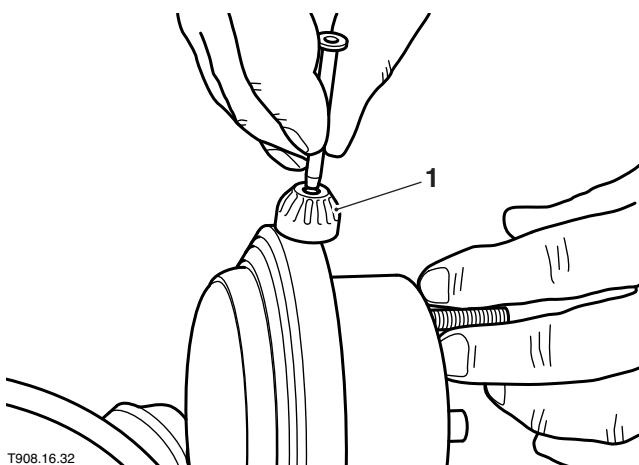
Electrical & Ignition Systems

4. Scrambler only - Undo the two domed nuts and washers and remove the instrument cover to gain access to the bulbholders.



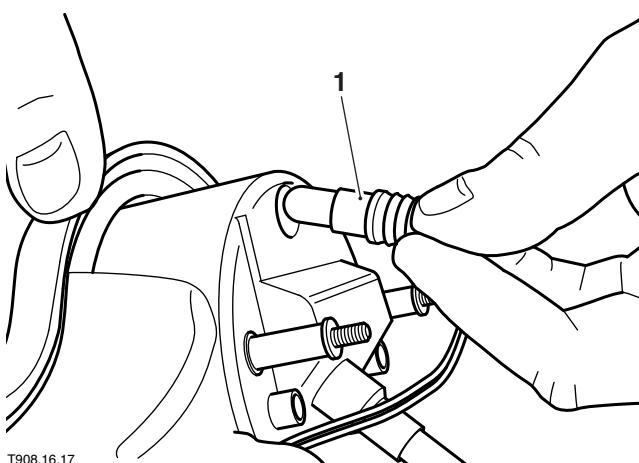
1. Instrument cover nuts and washers (Scrambler)

5. All models - Undo the retaining screw and remove the trip meter reset knob.



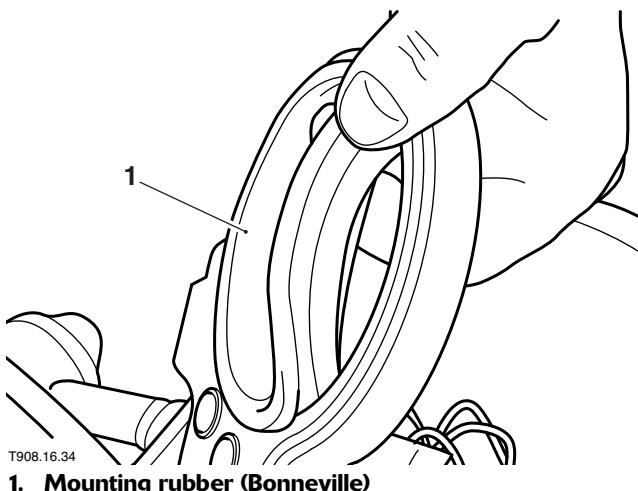
1. Trip meter reset knob

6. Free the relevant bulbholders from the speedometer and lift the speedometer out from the speedometer housing.



1. Bulbholder

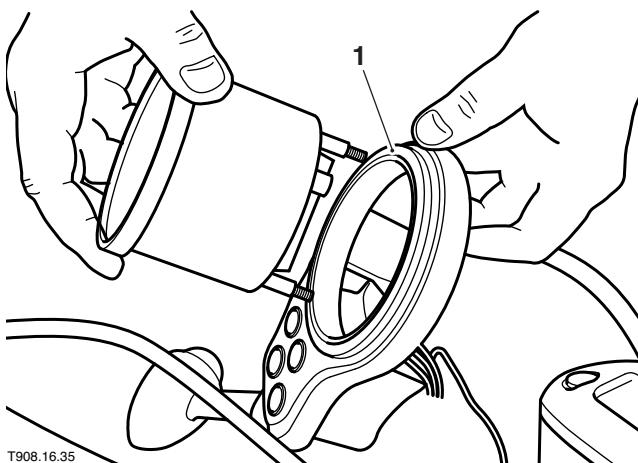
7. Remove the mounting rubber from the housing.



1. Mounting rubber (Bonneville)

Installation

1. Ensure the mounting rubber is correctly fitted then slide the speedometer into the housing.



1. Mounting rubber (Bonneville)

2. Fit the bulbholders then seat the cover on the speedometer. Refit the washer and nuts and tighten securely.
3. Reconnect the speedometer cable and refit the trip meter reset knob.
4. Seat the speedometer housing on the top yoke, tightening its mounting bolts to **9 Nm**.

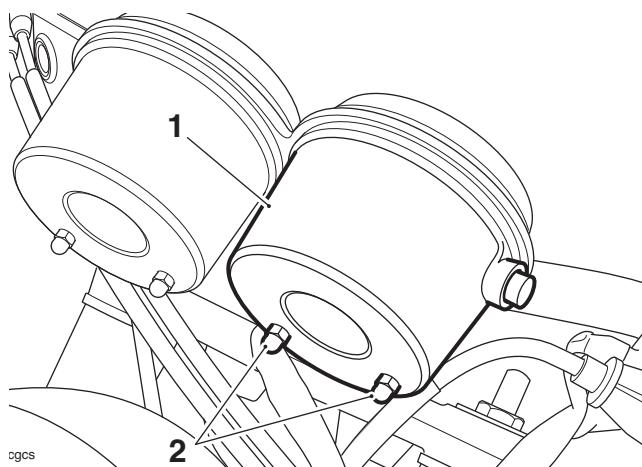
Speedometer or Tachometer (if fitted) - Models with Electronic Instruments

Note:

- The following procedure is identical for both the speedometer, and if fitted, the tachometer.

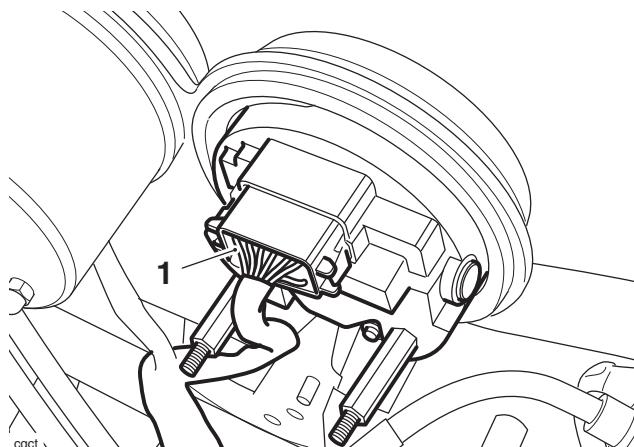
Removal

- Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
- Remove the two domed nuts and remove the instrument cover.



- Cover
- Domed nuts

3. Disconnect the electrical connector.



- Electrical connector

- Lift the speedometer/tachometer out from the bracket.
- To remove the instrument mounting bracket, remove both instruments as described above and remove the four bracket fixings. Remove the bracket from the top yoke.

Installation

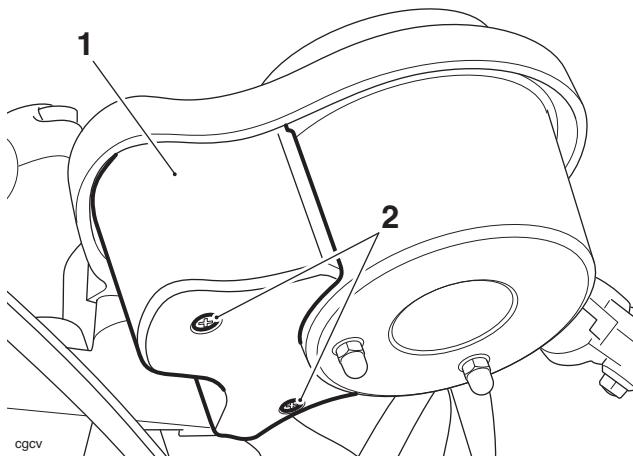
- If removed, align the instrument mounting bracket to the top yoke and secure with the four fixings. Tighten to **9 Nm**.
- Ensure the mounting rubbers are correctly fitted then slide the speedometer/tachometer into the bracket.
- Reconnect the electrical connector then seat the cover on the speedometer/tachometer.
- Apply one drop of ThreeBond 1360 to the threads of the domed nuts, refit the nuts and tighten to **1 Nm**.
- Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

Electrical & Ignition Systems

Warning Light Assembly - Bonneville with Electronic Speedometer Only

Removal

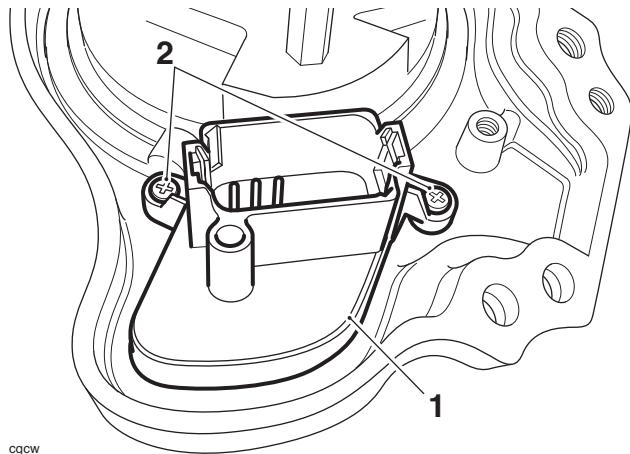
1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
2. Remove the two screws and remove the cover.



1. Cover

2. Screws

3. Disconnect the electrical connector.
4. Remove the two screws and remove the warning light assembly.



1. Warning light assembly

2. Screws

Installation

1. Align the warning light assembly to the instrument bracket and secure with the two screws.
2. Tighten the screws to **3 Nm**.
3. Reconnect the electrical connector.
4. Refit the warning light cover, ensuring the warning light harness is not trapped or damaged during assembly.
5. Apply one drop of ThreeBond 1360 to the threads of the cover screws, refit the screws and tighten to **1 Nm**.
6. Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

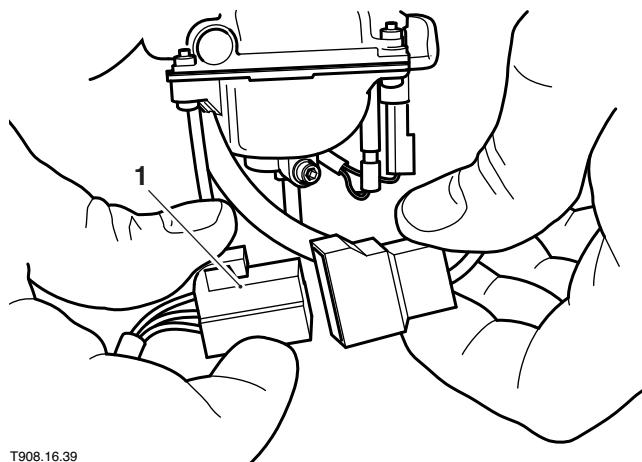
Alternator

Note:

- **Read through the safety precautions before proceeding.**
- **Service tools T3880375 (rotor holder) and T3880325 (rotor puller and protector button) will be required for this procedure.**

Removal

1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
2. Drain the engine oil (see page 9-9).
3. Trace the wiring back from the alternator and disconnect its connector from the main wiring harness.

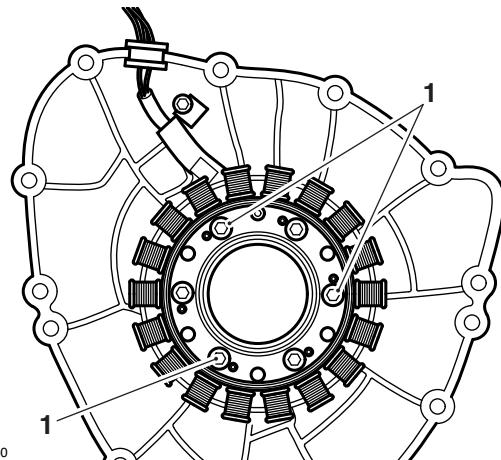


T908.16.39

1. Alternator wiring connector

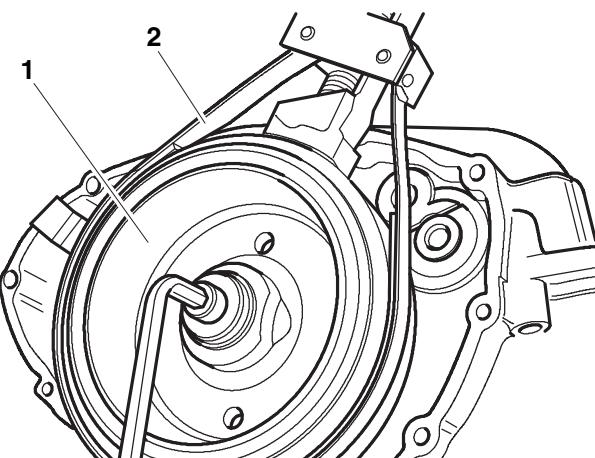
4. Slacken and remove the bolts securing the alternator cover to the right side of the crankcase.
5. Withdraw the cover from the crankcase, against the pull of the alternator rotor, taking care not to lose the locating pins.
6. Remove the cover gasket and discard it.

7. To remove the stator from the cover, unscrew the bolt and remove the wiring clamp then unscrew the three retaining bolts and lift out the stator.



T908.16.40
1. Alternator stator bolts

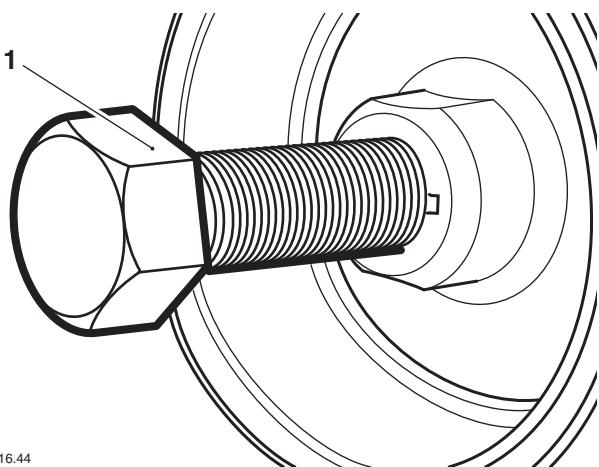
8. To remove the rotor, slacken and remove the rotor bolt and washer from the right hand end of the crankshaft. Retain the rotor with the holding tool (T3880375) whilst the bolt is slackened.



T908.16.41
1. Rotor
2. Tool T3880375

Electrical & Ignition Systems

9. With the rotor bolt removed, insert tool T3880203 to the centre of the alternator.



T908.16.44

1. Service tool T3880203

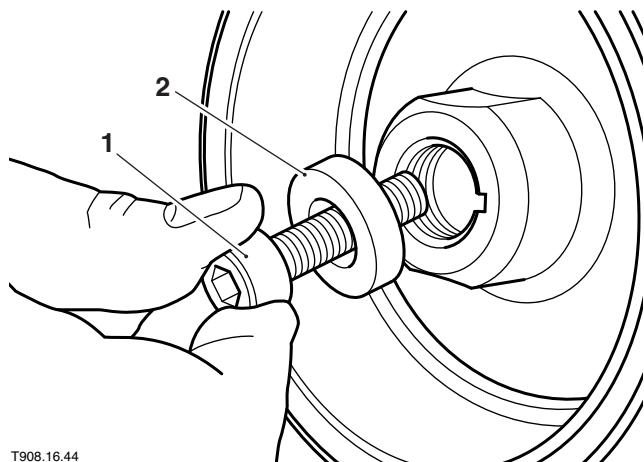
10. Tighten tool T3880203, while preventing the crankshaft from turning with tool T3880375, to release the taper seating of the rotor from the crankshaft.
11. Withdraw the rotor and tool T3880203 as an assembly. Unscrew the tool from the rotor.
12. Remove the Woodruff key from the crankshaft (if loose).

Installation

1. Ensure the crankshaft taper and rotor mating surfaces are clean and dry.
2. Ensure the Woodruff key is securely fitted to the crankshaft groove.
3. Refit the alternator rotor to the crankshaft, aligning its slot with the Woodruff key.

4. Measure the rotor bolt thread diameter to identify its size (it will either be M10 or M12) then refit the bolt and washer to the crankshaft. Use tool T3880375 to prevent crankshaft rotation then tighten the rotor bolt to the specified torque;

- where an M10 bolt is fitted the bolt must be tightened to **98 Nm**,
- if an M12 bolt is fitted it must be tightened to **120 Nm**.



T908.16.44

1. Bolt

2. Washer

5. Ensure the stator wiring grommet and its location in the cover are clean and dry. Apply silicone sealant (ThreeBond 1207B or equivalent) to the grommet then fit the stator to the cover. Locate the wiring grommet in its cut-out then tighten the stator bolts to **12 Nm**. Refit the wiring clamp and tighten its bolt to **12 Nm**.
6. Ensure the crankcase and cover mating surfaces are clean and dry. Apply silicone sealant to both the alternator stator and ignition pick-up coil wiring grommets.
7. Fit a new gasket, ensuring the locating pins are in position.
8. Refit the cover and install the bolts. Hand-tighten all bolts then evenly and progressively tighten them to **10 Nm**.

! Warning

Take great care not to trap your fingers between the cover and crankcase. The magnetic pull of the rotor will forcibly draw the cover into position.

9. Reconnect the alternator wiring connector, ensuring it is correctly routed.
10. Refill the engine with oil (see page 9-10).
11. Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

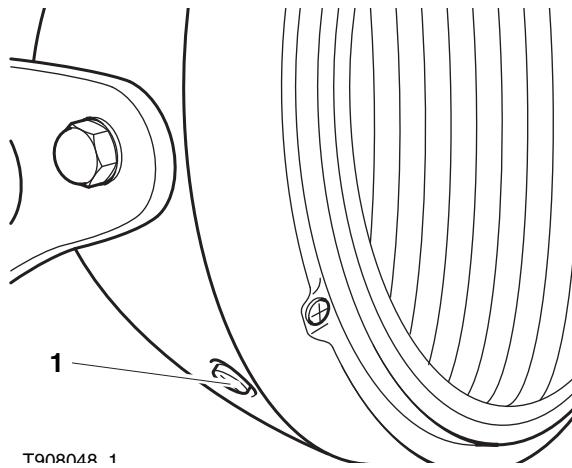
Regulator/Rectifier Unit

Note:

- Read through the safety precautions before proceeding.**

Removal

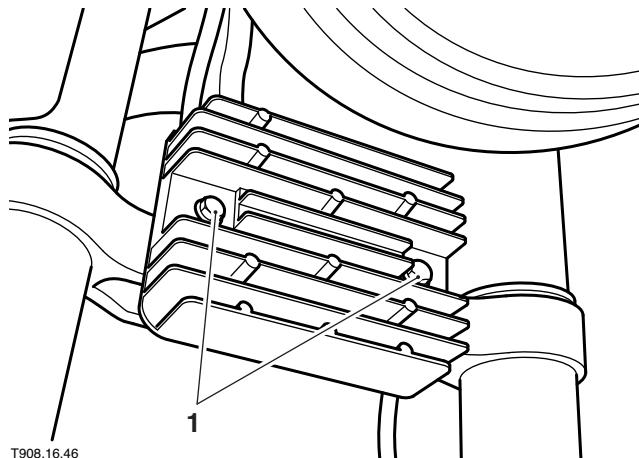
- Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
- Undo the screws and free the headlight rim from the shell. Support the headlight or disconnect the wiring and remove it.



T908.16.48.1

1. Headlight rim screw, one of two shown

- Locate the regulator/rectifier wiring connector inside the headlight. Disconnect the wiring connector and free it from the rear of the headlight shell.
- Unscrew the mounting bolts and remove the regulator/rectifier from the bottom yoke.
- On Thruxton, the mounting bolts also secure the front indicator bracket which must be supported to prevent damage to the indicator wiring.



T908.16.46

1. Mounting bolts (Bonneville)

Installation

- Locate the regulator/rectifier (together with the front indicator bracket on Thruxton models) on the bottom yoke and tighten its mounting bolts to **9 Nm**.
- Route the wiring back into the headlight shell and reconnect the connector.
- Seat the headlight rim correctly in its shell and securely tighten its screws.
- Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

Electrical & Ignition Systems

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 to earth.

Note:

- Only repairs to the stator harness between the connector and the harness entry point into the crankcase are permitted.
- 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 2000 rpm.
- Ensure all additional accessories (auxiliary lights, heated grips etc.) are switched off.

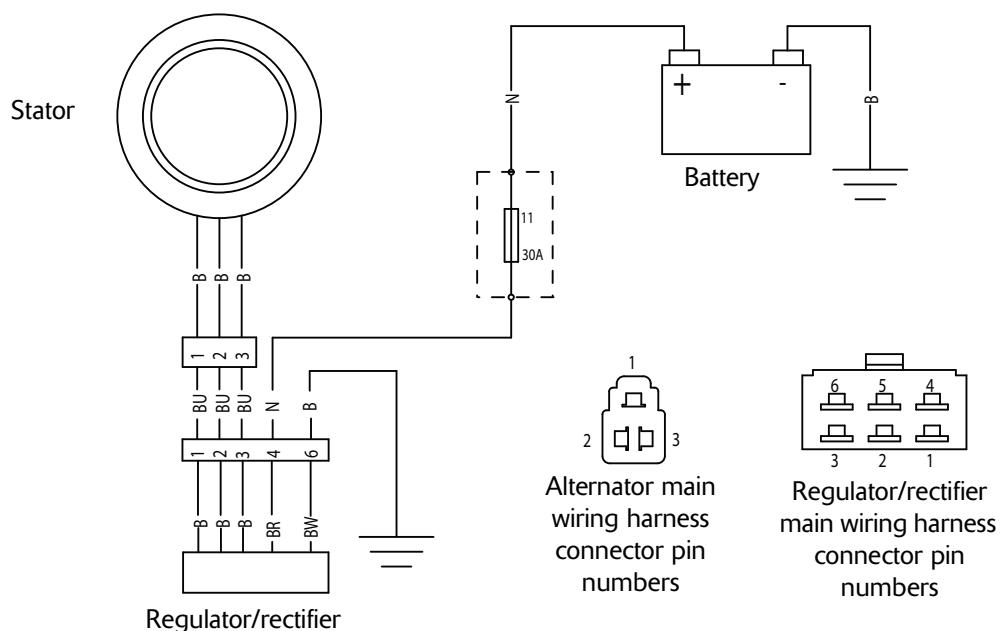
Fault Code	Possible cause	Action
Battery not charging	Main fuse	Check the condition of fuse Number 11
	Battery	Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable.
	Alternator	Proceed to pinpoint test 1.
	Regulator/rectifier	Test the regulator/rectifier (see page 17-40)

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Battery positive (+) - Battery negative (-) - Regulator/rectifier to main wiring harness connector pin 1 - Regulator/rectifier to main wiring harness connector pin 2 - Regulator/rectifier to main wiring harness connector pin 3 - Regulator/rectifier to main wiring harness connector pin 4 - Regulator/rectifier to main wiring harness connector pin 6	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable and terminal integrity: - alternator connector pin 1 - alternator connector pin 2 - alternator connector pin 3	OK	Disconnect the battery leads, negative (black) lead first. Disconnect regulator/rectifier to main wiring harness connector (6 pin). Disconnect the alternator connector (3 pin). Proceed to test 3
	Faulty	Rectify fault, proceed to test 6

Test	Result	Action
3 Check cable continuity: - Regulator/rectifier main harness connector pin 6 to battery lead negative - Regulator/rectifier main harness connector pin 4 to battery lead positive Regulator/rectifier main harness connector pin 1 to alternator main harness connector pin 1 Regulator/rectifier main harness connector pin 2 to alternator main harness connector pin 2 Regulator/rectifier main harness connector pin 3 to alternator main harness connector pin 3	OK	Reconnect the battery leads, positive (red) lead first. Reconnect the regulator/rectifier to main wiring harness connector (6 pin). Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check resistance through the coils: - Alternator harness pin 1 to 2 - Alternator harness pin 2 to 3 - Alternator harness pin 3 to 1	0.3Ω to 0.6Ω	Proceed to test 5
Open circuit or short circuit	If the fault is between the connector and the crankcase, repair the harness. Proceed to test 6 If the fault is after the crankcase, replace the unit. Proceed to test 6	
5 Check for short to earth: - Alternator harness pin 1 to metal frame - Alternator harness pin 2 to metal frame - Alternator harness pin 3 to metal frame	Open circuit	Proceed to test 6
Short circuit	Replace unit. Proceed to test 6	
6 Reconnect the harness and run the engine. Check the charging voltage at 2000 rpm:	13.5 V to 15 V	Action complete - quit test
	Fault still present	Test regulator/rectifier (see page 17-40) If regulator/rectifier is serviceable, contact Triumph service

Circuit Diagram



Electrical & Ignition Systems

Regulator/Rectifier

Internally the regulator/rectifier consists of:

- six diodes;
- a voltage controller and three thyristors.

The diodes are arranged with one diode connected between each black input wire and each black/red and black/white output wires.

The diodes convert the ac voltage to dc voltage.

Each black input wire is also connected to a thyristor which is in turn connected to ground. When the dc voltage at the battery reaches the required level, the voltage controller sends a signal to all three thyristors. The thyristors then conduct and effectively short circuit the stator until the dc voltage drops to an acceptable level.

It is possible for any number of these diodes to fail, reducing the power output of the unit. This may not be obvious until maximum power is required by the ignition, lighting and accessories etc.

The diodes can be checked using a multi meter on DIODE setting.

Note:

- **This test does not check for voltage regulation.**

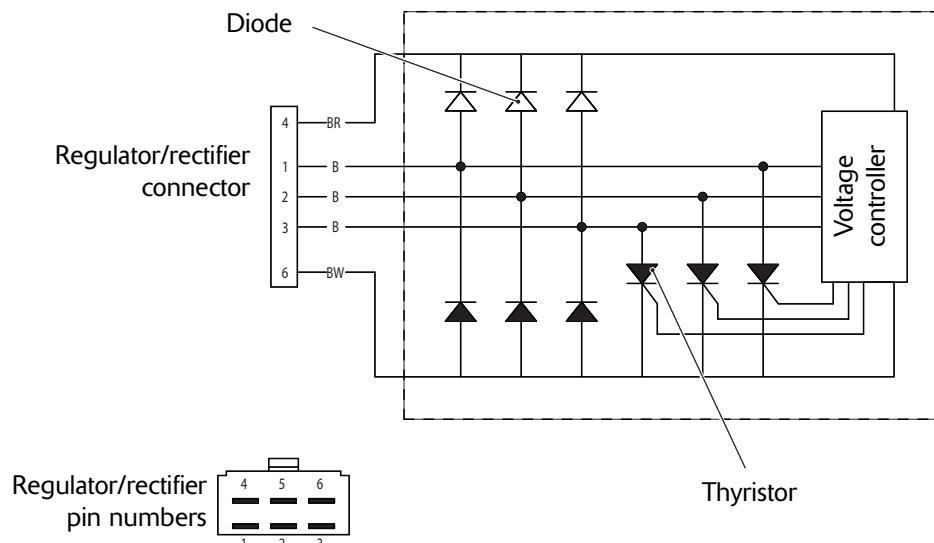
Fault Code	Possible cause	Action
Battery not charging	Main fuse	Check the condition of the fuse number 11
	Battery	Check the condition of the battery. Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9. Ensure the battery is serviceable
	Regulator/rectifier	Disconnect the regulator/rectifier connectors from the main wiring harness. Proceed to pinpoint test 1
	Alternator	Test the alternator stator (see page 17-38).

Pinpoint Tests

Test	Result	Action
1 Check diodes foward bias: - Positive (+) probe to regulator/rectifier connector pin 6 to: Negative (-) probe to regulator/rectifier connector pin 1 Negative (-) probe to regulator/rectifier connector pin 2 Negative (-) probe to regulator/rectifier connector pin 3	0.4 V to 0.7 V	Proceed to test 2
	Open or short circuit	Replace unit. Proceed to test 5

Test	Result	Action
2 Check diodes forward bias: - Negative (-) probe to regulator/rectifier connector pin 4 to: Positive (+) probe to regulator/rectifier connector pin 1 Positive (+) probe to regulator/rectifier connector pin 2 Positive (+) probe to regulator/rectifier connector pin 3	0.4 V to 0.7 V	Proceed to test 3
	Open or short circuit	Replace unit. Proceed to test 5
3 Check diodes reverse bias: - Positive (+) probe to regulator/rectifier connector pin 4 to: Negative (-) probe to regulator/rectifier connector pin 1 Negative (-) probe to regulator/rectifier connector pin 2 Negative (-) probe to regulator/rectifier connector pin 3	Open circuit or "OL" on meter	Proceed to test 4
	A voltage reading or short circuit	Replace unit. Proceed to test 5
4 Check diodes reverse bias: - Negative (-) probe to regulator/rectifier connector pin 6 to: Positive (+) probe to regulator/rectifier connector pin 1 Positive (+) probe to regulator/rectifier connector pin 2 Positive (+) probe to regulator/rectifier connector pin 3	Open circuit or "OL" on meter	Proceed to test 5
	A voltage reading or short circuit	Replace unit. Proceed to test 5
5 Reconnect the harness and run the engine. Check the charging voltage at 2000 rpm:	13.5 V to 15 V	Action complete - quit test
	Fault still present	Test alternator stator (see page 17-40)
		If alternator stator is serviceable, contact Triumph service

Circuit Diagram



Electrical & Ignition Systems

Starter Motor

Note:

- Read through the safety precautions before proceeding.
- Refer to the clutch section for information on the starter drive.

Removal

1. Disconnect the battery, negative (black) lead first.
2. Drain the engine oil (see page 9-9).
3. Peel back the rubber cap then unscrew the nut and detach the lead from the starter motor.
4. Unscrew the bolts securing the motor to the crankcase.
5. Slide the motor to the side to release it and remove it from the crankcase.

Installation

1. Inspect the starter motor O-ring for damage and deterioration and renew if necessary.
2. Lubricate the O-ring with clean engine oil then slide the starter motor into position, engaging it with the idler gear.
3. Fit the starter motor mounting bolts and tighten to **10 Nm**.
4. Connect the lead to the starter and tighten its nut to **7 Nm**. Seat the rubber cap back over the terminal.
5. Refill the engine with oil (see page 9-10).
6. Reconnect the battery, positive (red) lead first.

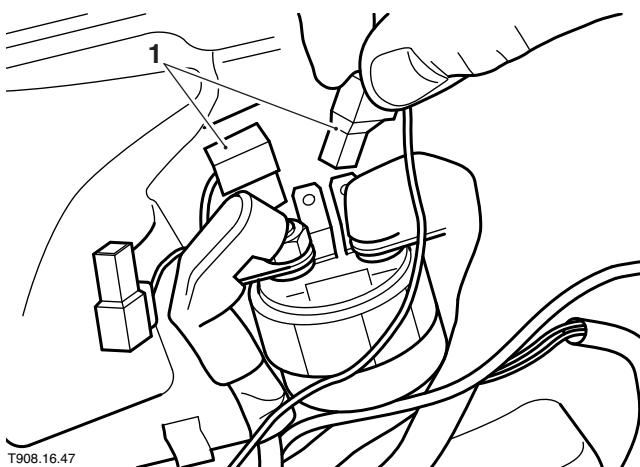
Starter Solenoid

Note:

- Read through the safety precautions before proceeding.

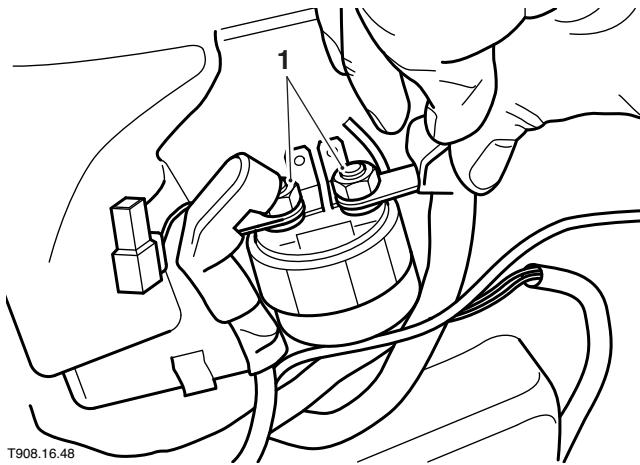
Removal

1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
2. Remove the left side cover (see page 16-14).
3. Disconnect the wiring connectors from the solenoid.



1. Wiring connectors

4. Slacken and remove the nuts and washers and detach the battery and starter leads from the solenoid.



1. Battery/starter lead nuts

5. Free the solenoid mounting rubber from the airbox and remove the solenoid from the motorcycle.

Installation

1. Fit the solenoid and mounting rubber, locating the rubber on the tabs on the airbox.
2. Reconnect the wiring connectors and leads to the relay, tightening the terminal nuts to **5 Nm**.
3. Refit the side cover (see page 16-14).
4. Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

Ignition System Description - Carburettor Models

The ignition system fitted to all models in this manual is a digital electronic type. Within the system there are four major components as follows.

- Pick-up Coil
- Throttle Position Sensor
- Igniter Unit
- Ignition HT Coil

There are two separate sections to the ignition system, the low voltage primary circuit which contains the pick-up coil, igniter unit and the wiring to the ignition HT coil, and the high voltage secondary circuit which consists of the ignition HT coil, the plug leads and caps and the spark plugs. The system operates as follows.

Pick-up coil

The pick-up coil is mounted on the right hand side of the crankcase and is operated by the raised projections on the outside of the alternator rotor. As each projection passes the coil, a signal of low voltage electricity is sent to the igniter unit.

Throttle position sensor

The throttle position sensor is mounted on the right hand side of the carburetors, on the end of the throttle valve spindle. The resistance of the sensor varies depending on the throttle valve spindle position.

Igniter unit

The igniter unit evaluates the signals received from the pick-up coil, which informs it of engine speed and piston position, and the throttle position sensor, which informs it of throttle valve position. From these signals, the igniter unit calculates the correct ignition timing and supplies the required charging voltage to the HT coil. The basis for the calculations come from pre-programmed ignition parameters within the igniter unit.

Ignition HT coil

A HT coil with a low resistance primary winding is fitted to allow a more rapid coil action than found in conventional coils. This rapid action allows the coil to function correctly at both low and high engine speeds.

The HT coil operates on the "wasted-spark" principle with both spark plugs being fired twice for each engine cycle (once on the compression stroke and once on the exhaust stroke).

Electrical & Ignition Systems

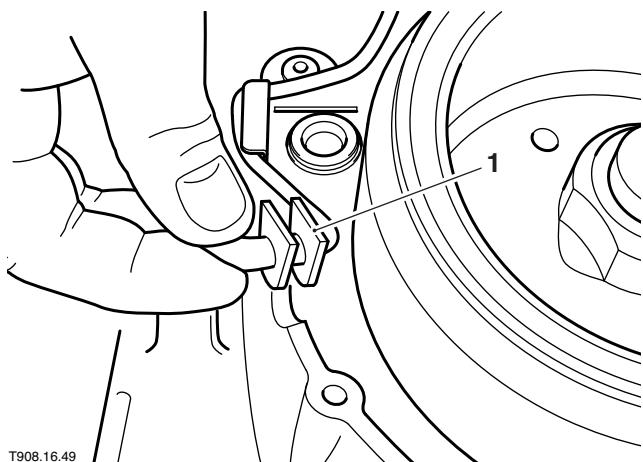
Ignition Pick-up Coil (Carburettor models) Crankshaft Position Sensor (EFI models)

Note:

- **Read through the safety precautions before proceeding.**

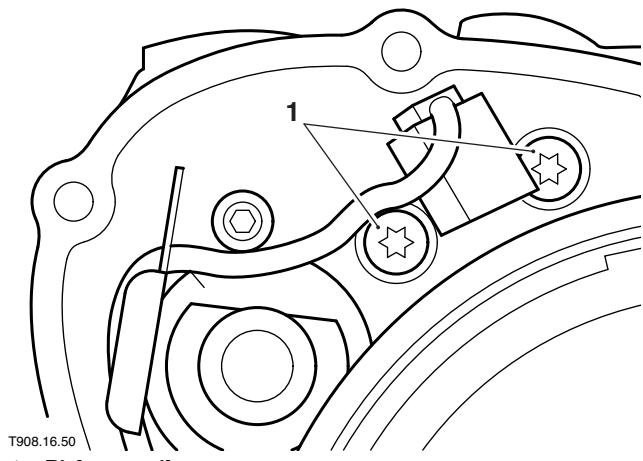
Removal

1. Disconnect the battery, negative (black) lead first.
2. Remove the alternator cover (see 17-35).
3. Trace the wiring back from the pick-up coil and disconnect its connector from the main wiring harness.
4. Free the pick-up coil wiring grommet from the case and unhook the wiring from behind its guide.



1. Wiring grommet

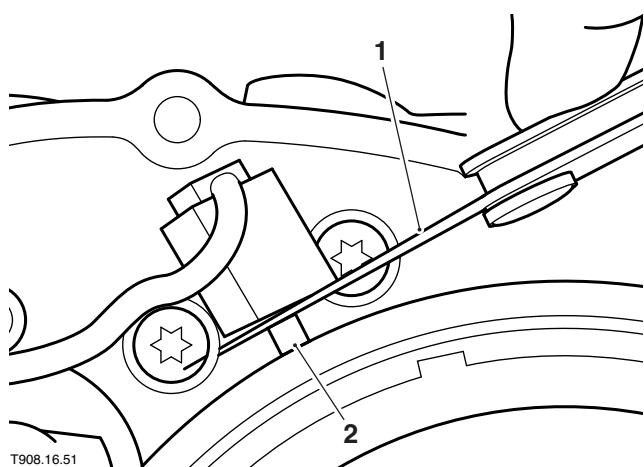
5. Undo the retaining screws and remove the pick-up coil from the crankcase.



1. Pick-up coil screws

Installation

1. Ensure the wiring grommet and crankcase cut-out are clean and dry.
2. Apply silicone sealant (ThreeBond 1207B is used at the factory) to the grommet then locate the grommet in its cut-out.
3. Route the wiring correctly behind the guide fitted to the rear balancer shaft screw then seat the coil on the crankcase. Fit the coil screws and hand-tighten.
4. Align one of the projections on the alternator rotor with the pick-up coil trigger. Set the clearance (air gap) between the projection and trigger to 0.8 mm +/- 0.2 mm then tighten the coil screws to **10 Nm**. Recheck the clearance and readjust, if necessary.



1. Feeler gauge
2. Rotor projection

5. Reconnect the pick-up coil wiring connector.
6. Install the alternator cover (see 17-36).
7. Reconnect the battery, positive (red) lead first.

Throttle Position Sensor

Carburettor Models

The throttle position sensor is an integral part of the carburetors and is not available separately. If the sensor is faulty, the carburetors must be renewed.



Warning

Never slacken the throttle position sensor screws (the sensor is retained by tamper-proof screws). If the screws are slackened, the sensor adjustment will be disturbed. This will result in an incorrect signal being sent to the igniter unit, which will affect the efficiency of the ignition system.

Fuel Injected Models

The throttle position sensor is available separately from the throttle body. See page 10B-104 of the fuel chapter for replacement instructions.

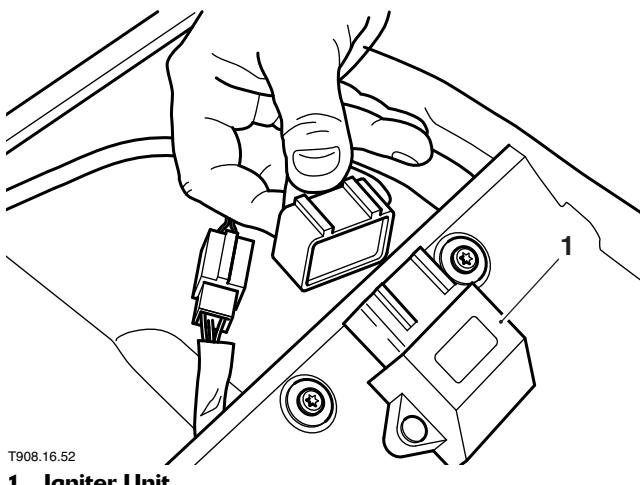
Igniter Unit - Carburettor Models

Note:

- **Read through the safety precautions before proceeding.**

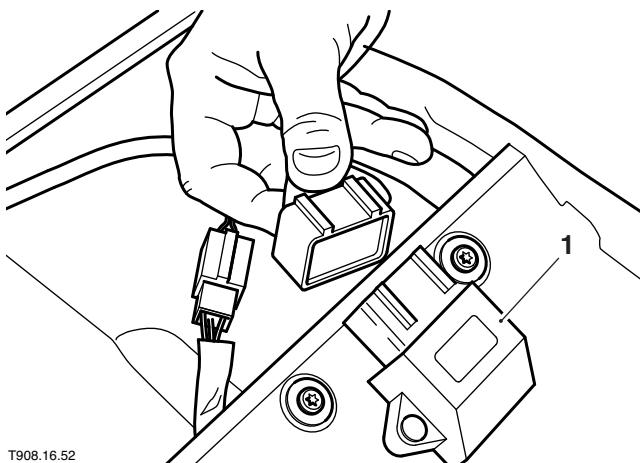
Removal

1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
2. Disconnect the wiring connector then unscrew the retaining nut and remove the igniter unit from the frame.



Installation

1. Locate the igniter unit on the frame and tighten its retaining nut to **9 Nm**.



2. Securely reconnect the igniter wiring connector.
3. Reconnect the battery, positive (red) lead first. Install the seat (see page 16-11).

Electrical & Ignition Systems

Pinpoint Tests - Igniter

Igniter Input Tests:

Disconnect the igniter and probe the pins of the harness connector with a multi meter.

The ignition key should be in the OFF position for the pinpoint tests. Only have the ignition key in the ON position if stated in the pinpoint test.

If the engine will not turn over when trying to start the engine, rectify the starter motor circuit fault first.

For the igniter circuit diagram, see page 17-48.

Test	Result	Action
1 Check continuity to ground: - Pin 1 to battery negative (-) terminal	OK	Proceed to test 2
	Open Circuit	Inspect and if necessary rectify fault in the wires, proceed to test 2
2 Check for 12 Volt supply: - Pin 2 to battery negative (-) terminal, with the ignition switch on	Battery voltage	Turn the ignition switch off. Proceed to test 3
	Below battery voltage	Turn the ignition switch off. Inspect and if necessary rectify fault in the wires. Proceed to test 3
3 Check resistance through the TPS sensor: - Pin 4 to pin 5	4.5KΩ to 5.5KΩ	Proceed to test 4
	Outside of range	Inspect and if necessary rectify fault in the wires or TPS sensor. Proceed to test 4
4 Check the crank sensor signal AC Voltage: - Pin 6 to pin 5	0.1 ACV - 0.2 ACV	Proceed to test 5
	Outside of range	Inspect and if necessary rectify fault in the wires or crank sensor. Proceed to test 5
5 Check the SAI valve connection and supply (if fitted): - Pin 7 to ground with the ignition switch on	Battery voltage	Proceed to test 6
	Below battery voltage	Inspect and if necessary rectify fault in the wires or SAI valve. Proceed to test 6
6 Check coil/s connection and supply: - Pin 8 to ground with the ignition switch on - Pin 14 to ground with the ignition switch on	Battery voltage	Proceed to test 7
	Below battery voltage	Turn the ignition switch off. Inspect and if necessary rectify fault in the wires or coil/s. Proceed to test 7
7 Check the side stand switch connection and continuity to ground: - Pin 9 to ground with the side stand up and the clutch released	OK	Proceed to test 8
	Open circuit	Inspect and if necessary rectify fault in the wires or side stand switch. Proceed to test 8
8 Check neutral switch to ground: - Pin 10 to ground	OK	Proceed to test 9
	Open circuit	Inspect and if necessary rectify fault in the wires or side stand switch. Proceed to test 9
9 Check switched purge valve connection and supply (if fitted): - Pin 16 to ground	Battery voltage	Proceed to test 10
	Below battery voltage	Inspect and if necessary rectify fault in the wires or purge valve. Proceed to test 10
10 Check the resistance through the TPS sensor: - Pin 17 to pin 4, open and close the throttle	500Ω to 6KΩ varying with throttle position	Proceed to test 11
	Outside of range	Inspect and if necessary rectify fault in the wires or TPS sensor. Proceed to test 11
11 Reconnect the harness, check gear, side stand and clutch positions, then start the engine	Engine operates correctly	Action complete, quit test
	Fault still present	Proceed to igniter output tests

Igniter Output Pinpoint Tests:

Only test the igniter outputs once the igniter inputs have been tested and found to be working correctly.

Ensure the ignition switch is off before removing/refitting or disconnecting/connecting any components.

Disconnect or remove each component for its test then refit or connect each component before moving on to next component test.

Perform each test with the ignition on unless otherwise stated.

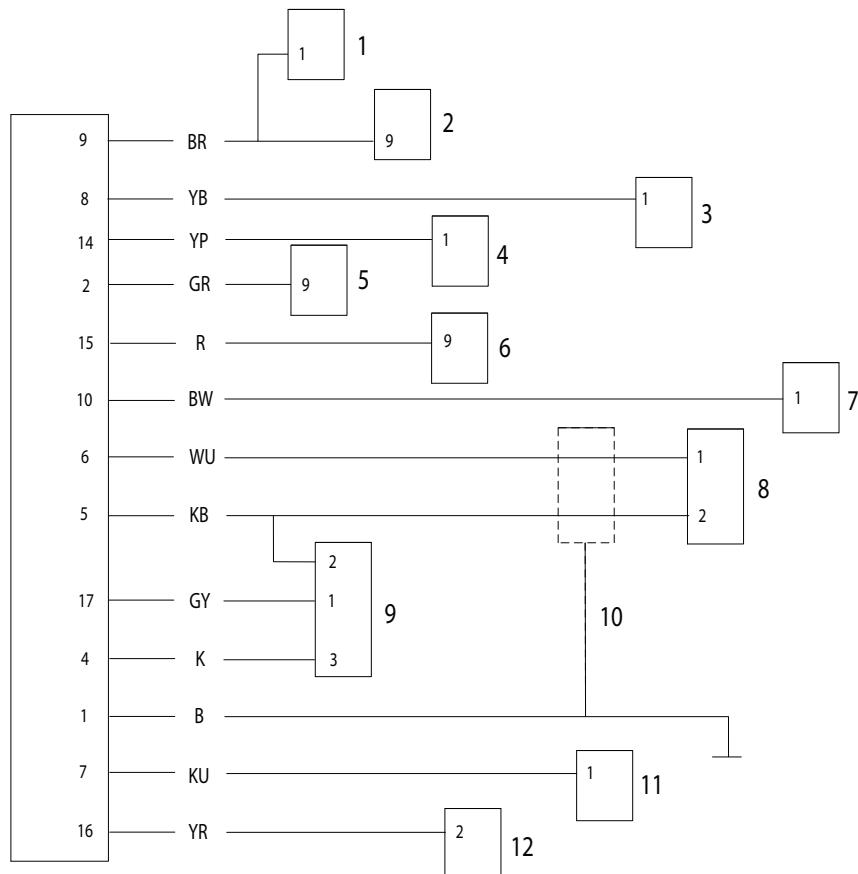
For the igniter circuit diagram, see page 17-48.

Test	Result	Action
1 Disconnect the TPS sensor. Check output to TPS sensor: - Pin 2 to pin 3	4.5 V to 5.5 V	Proceed to test 2
	Outside of range	Replace the igniter. Proceed to test 10
2 Disconnect the crank sensor. Check continuity to ground: - Pin 2 to ground with the ignition switch off	OK	Proceed to test 3
	Open circuit or resistance is read	Replace the igniter. Proceed to test 10
3 Disconnect the side stand switch. Check output to side stand switch: - Pin 1 to ground with the clutch lever released	4.5 V to 5.5 V	Proceed to test 4
	Outside of range	Replace the igniter. Proceed to test 10
4 Disconnect the left hand switch cube. Check output to clutch switch: - Pin 9 to ground with the side stand down	4.5 V to 5.5 V	Proceed to test 5
	Outside of range	Replace the igniter. Proceed to test 10
5 Disconnect the neutral switch. Check output to neutral switch: - Pin 1 to ground	Battery voltage	Proceed to test 6
	Below battery voltage	Replace the igniter. Proceed to test 10
6 Disconnect the instruments. Check tachometer output to instruments: - Pin 9 to ground with engine cranking or running	2 - 10 ACV	Proceed to test 7
	Outside of range	Replace the igniter. Proceed to test 10
7 Disconnect all coils. Check output to coil/s: - Pin 1 to battery positive terminal when cranking the engine. Ensure all coils are disconnected	Greater than 0.1 ACV	Proceed to test 8
	0 V	Replace the igniter. Proceed to test 10
8 Disconnect the SAI valve (if fitted). Check output to SAI valve: - Place a 1.7 W instrument type bulb across pin 1 and pin 2	Bulb lights when engine speed exceeds 4000 rpm	Proceed to test 9
	Bulb remains off when engine speed exceeds 4000 rpm	Replace the igniter. Proceed to test 10
9 Disconnect the switched purge valve (if fitted). Check output to switched purge: - Place a 1.7 W instrument type bulb across pin 1 and pin 2	Bulb lights when engine speed exceeds 2000 rpm	Proceed to test 9
	Bulb remains off when engine speed exceeds 2000 rpm	Replace the igniter. Proceed to test 10

Electrical & Ignition Systems

Test	Result	Action
10 Reconnect the harness, check gear, side stand and clutch positions, then start the engine	Engine operates correctly	Action complete, quit test
	Fault still present	Contact Triumph service

Igniter Circuit Diagram



1. Side stand switch
2. Clutch switch
3. Coil
4. Coil
5. Alarm
6. Instruments

7. Neutral switch
8. Crank sensor
9. Throttle potentiometer
10. Shielding
11. SAI solenoid
12. Switched purge valve

Ignition HT Coil(s)

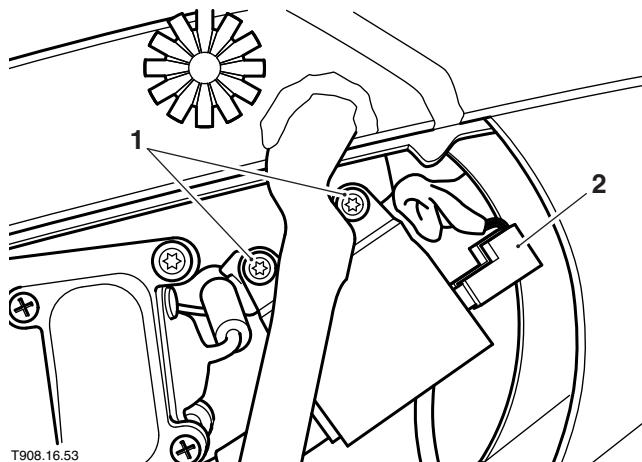
All Models

Note:

- **Read through the safety precautions before proceeding.**

Removal

1. Remove the seat (see page 16-11) and disconnect the battery, negative (black) lead first.
2. Remove the fuel tank (see page 10A-13 for carburettor models or page 10B-85 for fuel injected models).
3. Disconnect the wiring connectors from the coil(s).



1. **Mounting screws**
2. **Wiring connectors**

4. Free the plug caps from the spark plugs.
5. Undo the screws and remove the ignition HT coil(s).

Installation

1. Fit the coil(s) to the frame and securely tighten its screws.
2. Reconnect the wiring connectors to the coil(s) and reconnect the plug caps to the spark plugs.
3. Install the fuel tank (see page 10A-13 for carburettor models or page 10B-85 for fuel injected models).
4. Reconnect the battery, positive (red) lead first.

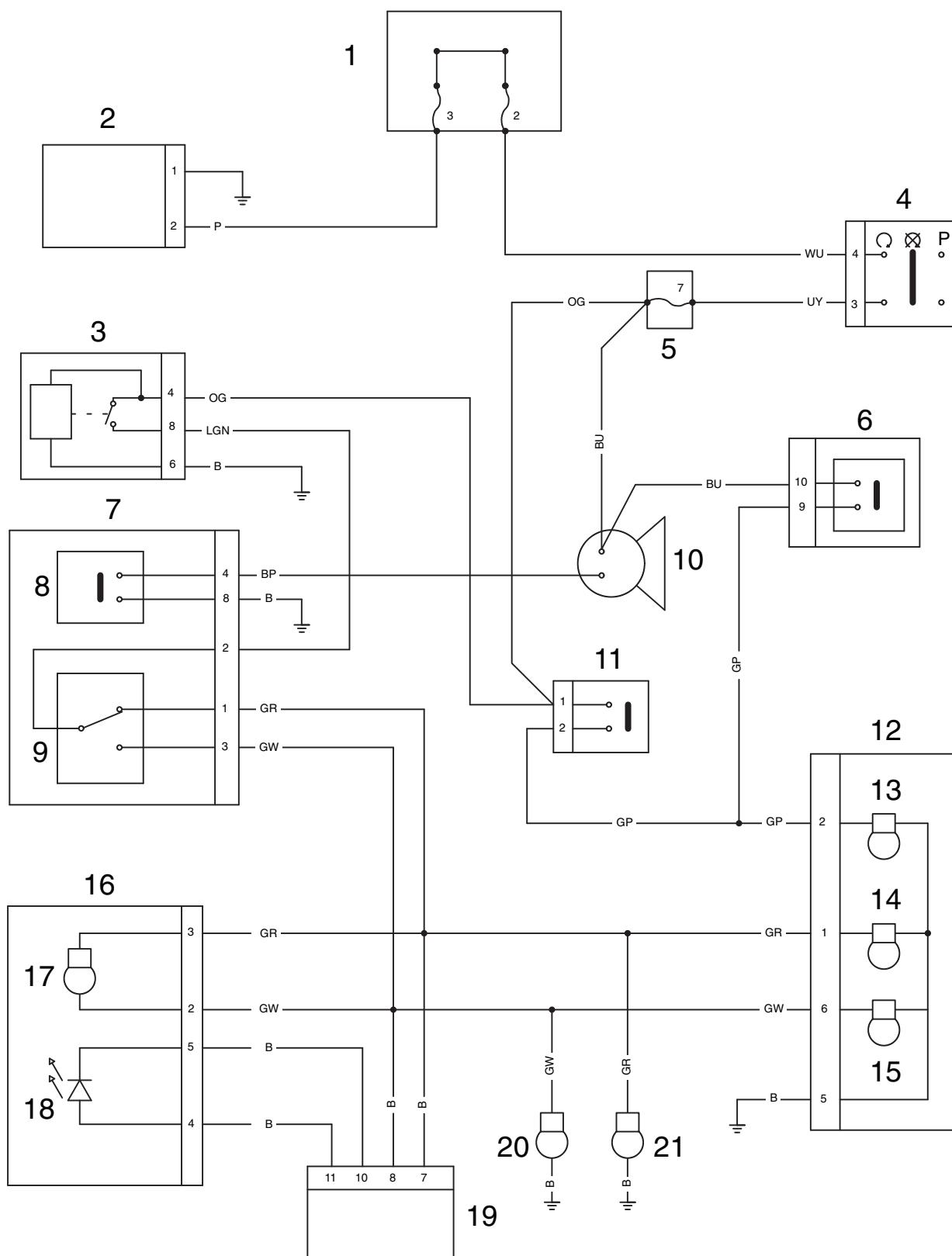
Electrical & Ignition Systems

Key to Auxiliary Circuit Diagram - Bonneville, Bonneville T100, Scrambler & Thruxton - Carburettor Models

Item number	Description
1	Fuses 2 & 3
2	Accessory socket
3	Direction indicator unit
4	Ignition switch
5	Fuse 7
6	Front brake lever switch
7	Left hand switch cube
8	Horn button
9	Direction indicator switch
10	Horn
11	Rear brake lever switch
12	Rear light
13	Brake light
14	Left hand rear direction indicator
15	Right hand rear direction indicator
16	Instrument assembly
17	Indicator warning light
18	Alarm LED
19	Alarm control unit
20	Right hand front indicator
21	Left hand front indicator

Wire colour codes	
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

Auxiliary Circuit - Bonneville, Bonneville T100, Scrambler & Thruxton - Carburettor Models



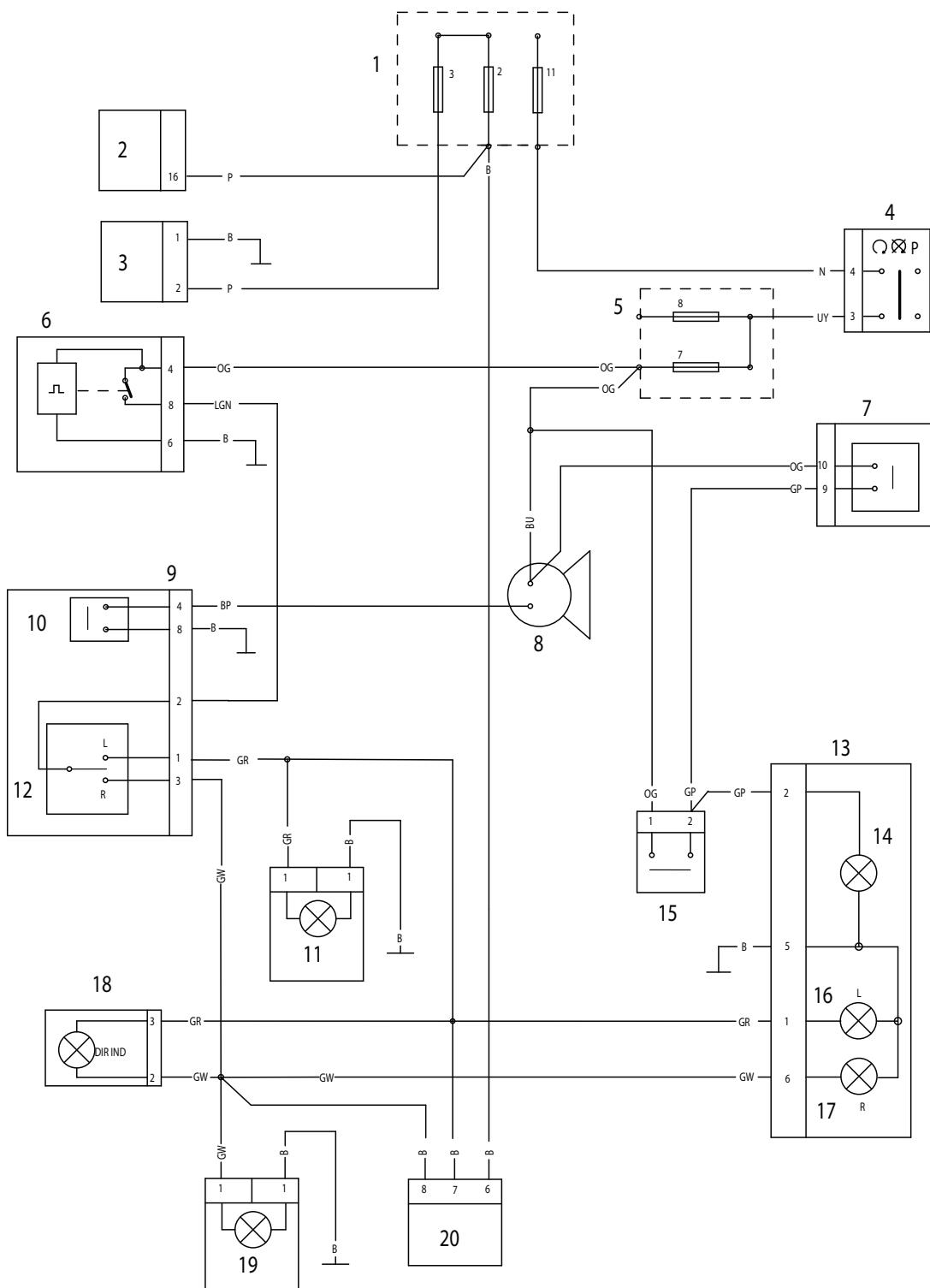
Electrical & Ignition Systems

Key to Auxiliary Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Cable Driven Speedometer

Item number	Description
1	Fuses 2, 3 and 11
2	Diagnostic connector
3	Accessory socket
4	Ignition switch
5	Fuse box (fuses 7 & 8)
6	Direction indicator unit
7	Front brake lever switch
8	Horn
9	Left hand switch cube
10	Horn button
11	Left hand front indicator
12	Direction indicator switch
13	Rear light
14	Brake light
15	Rear brake lever switch
16	Left hand rear indicator
17	Right hand rear indicator
18	Direction indicator (Instruments)
19	Front right direction Indicator
20	Alarm unit

Wire colour codes	
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

Auxiliary Circuit - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Cable Driven Speedometer



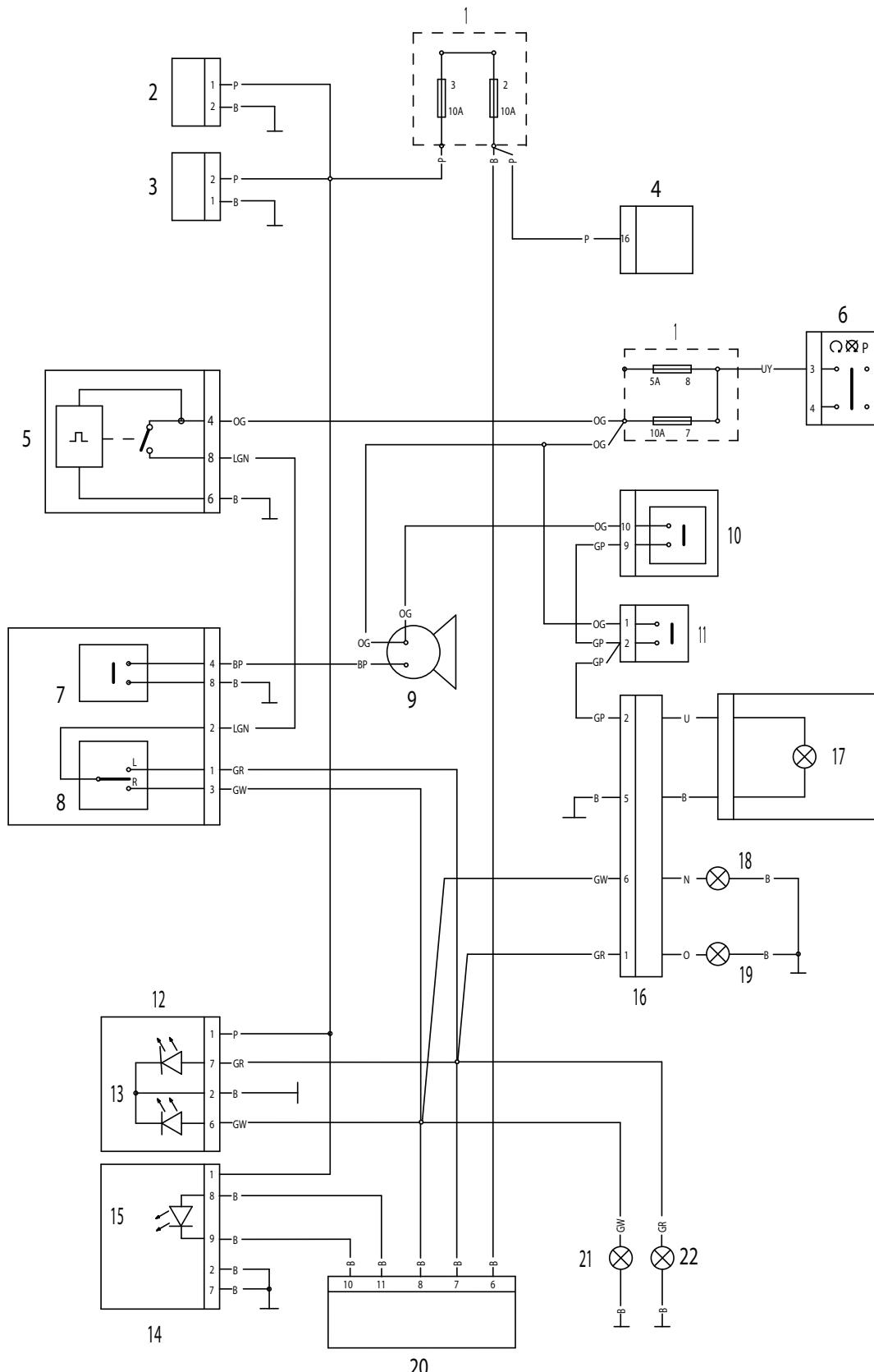
Electrical & Ignition Systems

Key to Auxiliary Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Electronic Speedometer - Up to VIN 521668

Item number	Description
1	Fuse box (fuses 2, 3, 7 & 8)
2	GPS socket
3	Accessory socket
4	Diagnostic connector
5	Direction indicator unit
6	Ignition switch
7	Horn button
8	Direction indicator switch
9	Horn
10	Front brake lever switch
11	Rear brake lever switch
12	Instruments - tachometer
13	Direction indicator (Instruments)
14	Instruments - speedometer
15	Alarm LED
16	Rear lighting sub-harness
17	Brake light
18	Right hand rear indicator
19	Left hand rear indicator
20	Alarm unit
21	Right hand front indicator
22	Left hand front indicator

Wire colour codes	
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

Auxiliary Circuit - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Electronic Speedometer - Up to VIN 521668



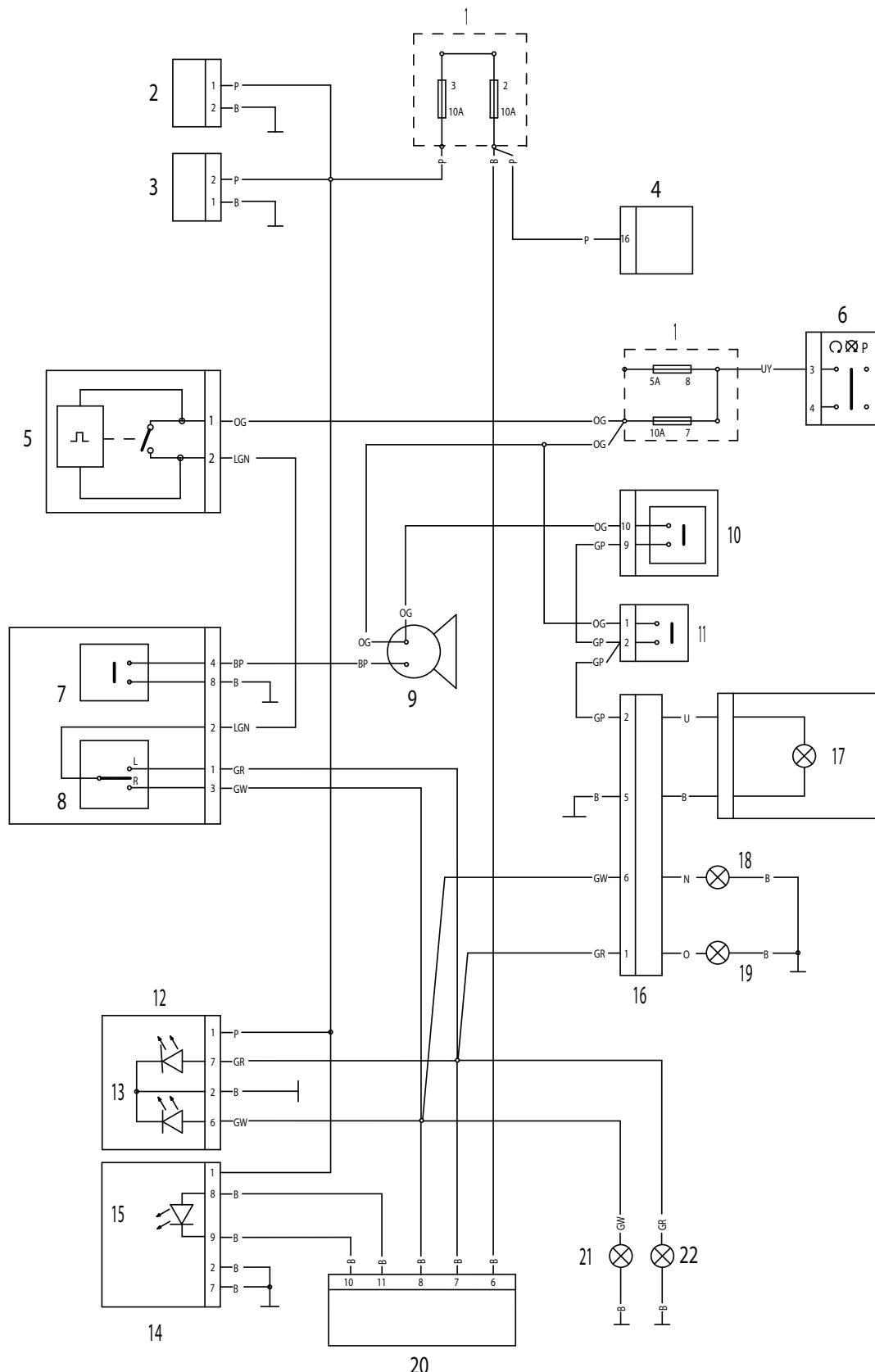
Electrical & Ignition Systems

Key to Auxiliary Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Electronic Speedometer - From VIN 521669

Item number	Description
1	Fuse box (fuses 2, 3, 7 & 8)
2	GPS socket
3	Accessory socket
4	Diagnostic connector
5	Direction indicator unit
6	Ignition switch
7	Horn button
8	Direction indicator switch
9	Horn
10	Front brake lever switch
11	Rear brake lever switch
12	Instruments - tachometer
13	Direction indicator (Instruments)
14	Instruments - speedometer
15	Alarm LED
16	Rear lighting sub-harness
17	Brake light
18	Right hand rear indicator
19	Left hand rear indicator
20	Alarm unit
21	Right hand front indicator
22	Left hand front indicator

Wire colour codes	
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

Auxiliary Circuit - Bonneville, Bonneville SE, Bonneville T100, Scrambler & Thruxton - Fuel Injected Models - with Electronic Speedometer - From VIN 521669



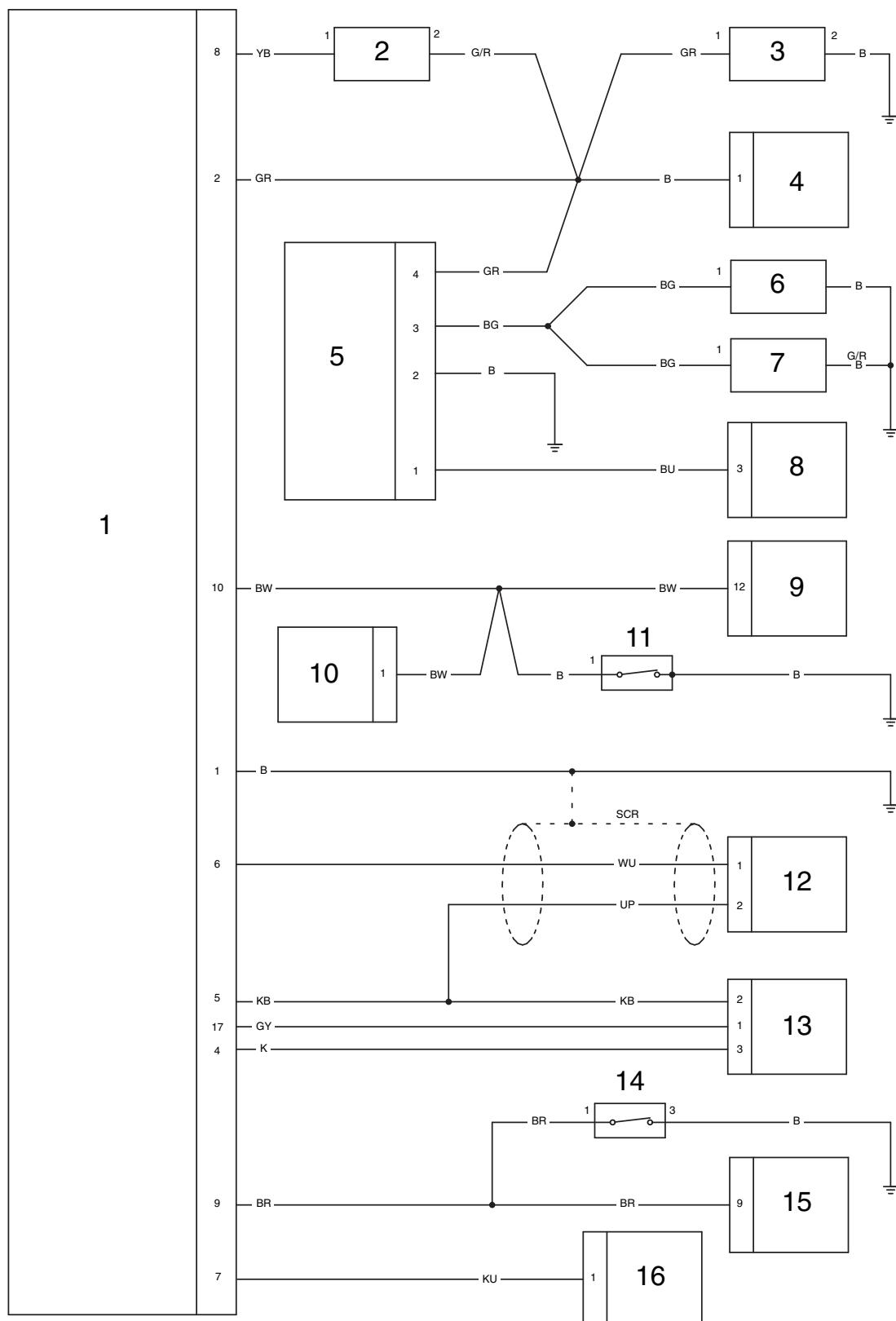
Electrical & Ignition Systems

Key to Ignition Circuit Diagram - Bonneville - Carburettor Models

Item number	Description
1	Igniter
2	Ignition coil
3	Carburettor vent valve
4	Alarm control unit
5	Carburettor thermostat switch
6	Carburettor heater 1
7	Carburettor heater 2
8	Alternator
9	Instrument assembly
10	Diode pack
11	Neutral switch
12	Crankshaft position sensor
13	Throttle position sensor
14	Side Stand switch
15	Clutch switch
16	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Ignition Circuit - Bonneville - Carburettor Models



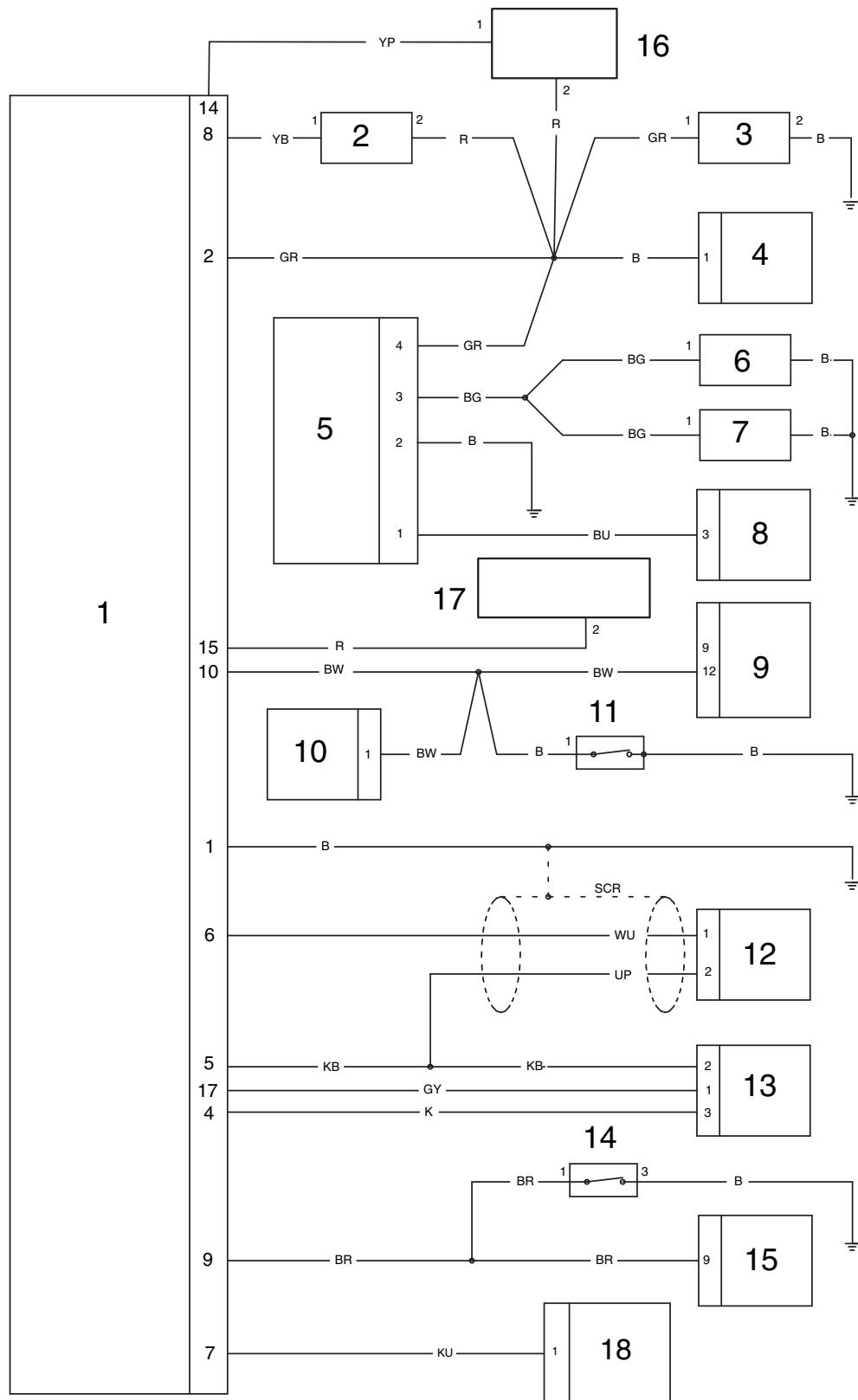
Electrical & Ignition Systems

Key to Ignition Circuit Diagram - Scrambler - Carburettor Models

Item number	Description
1	Igniter
2	Ignition coil number 1
3	Carburettor vent valve
4	Alarm control unit
5	Carburettor thermostat switch
6	Carburettor heater 1
7	Carburettor heater 2
8	Alternator
9	Instrument assembly
10	Diode pack
11	Neutral switch
12	Crankshaft position sensor
13	Throttle position sensor
14	Side Stand switch
15	Clutch switch
16	Ignition coil number 2
17	Accessory tachometer A
18	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Ignition Circuit - Scrambler - Carburettor Models



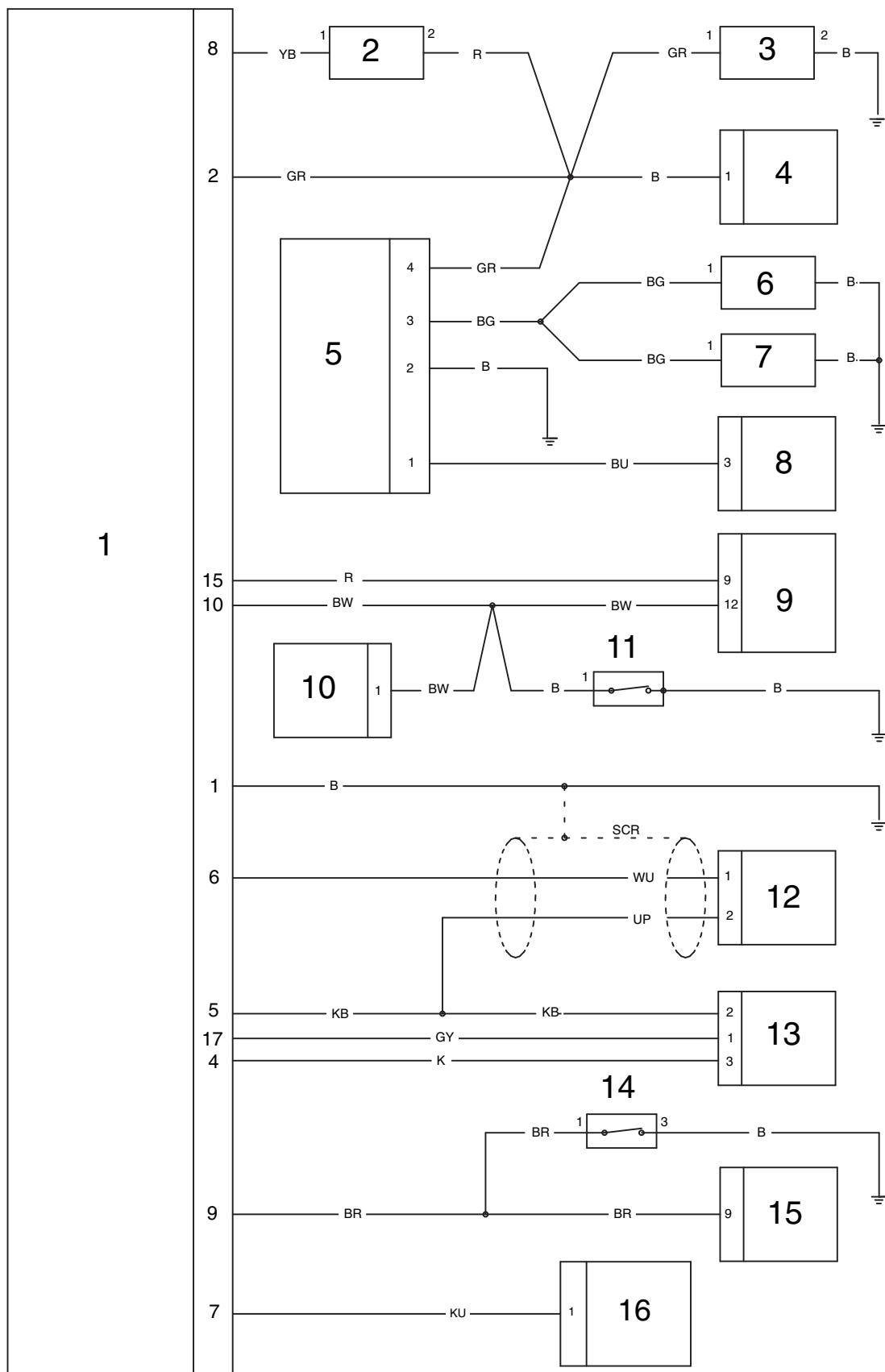
Electrical & Ignition Systems

Key to Ignition Circuit Diagram - Bonneville T100 & Thruxton - Carburettor Models

Item number	Description
1	Igniter
2	Ignition coil
3	Carburettor vent valve
4	Alarm control unit
5	Carburettor thermostat switch
6	Carburettor heater 1
7	Carburettor heater 2
8	Alternator
9	Instrument assembly
10	Diode pack
11	Neutral switch
12	Crankshaft position sensor
13	Throttle position sensor
14	Side Stand switch
15	Clutch switch
16	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Ignition Circuit - Bonneville T100 & Thruxton - Carburettor Models



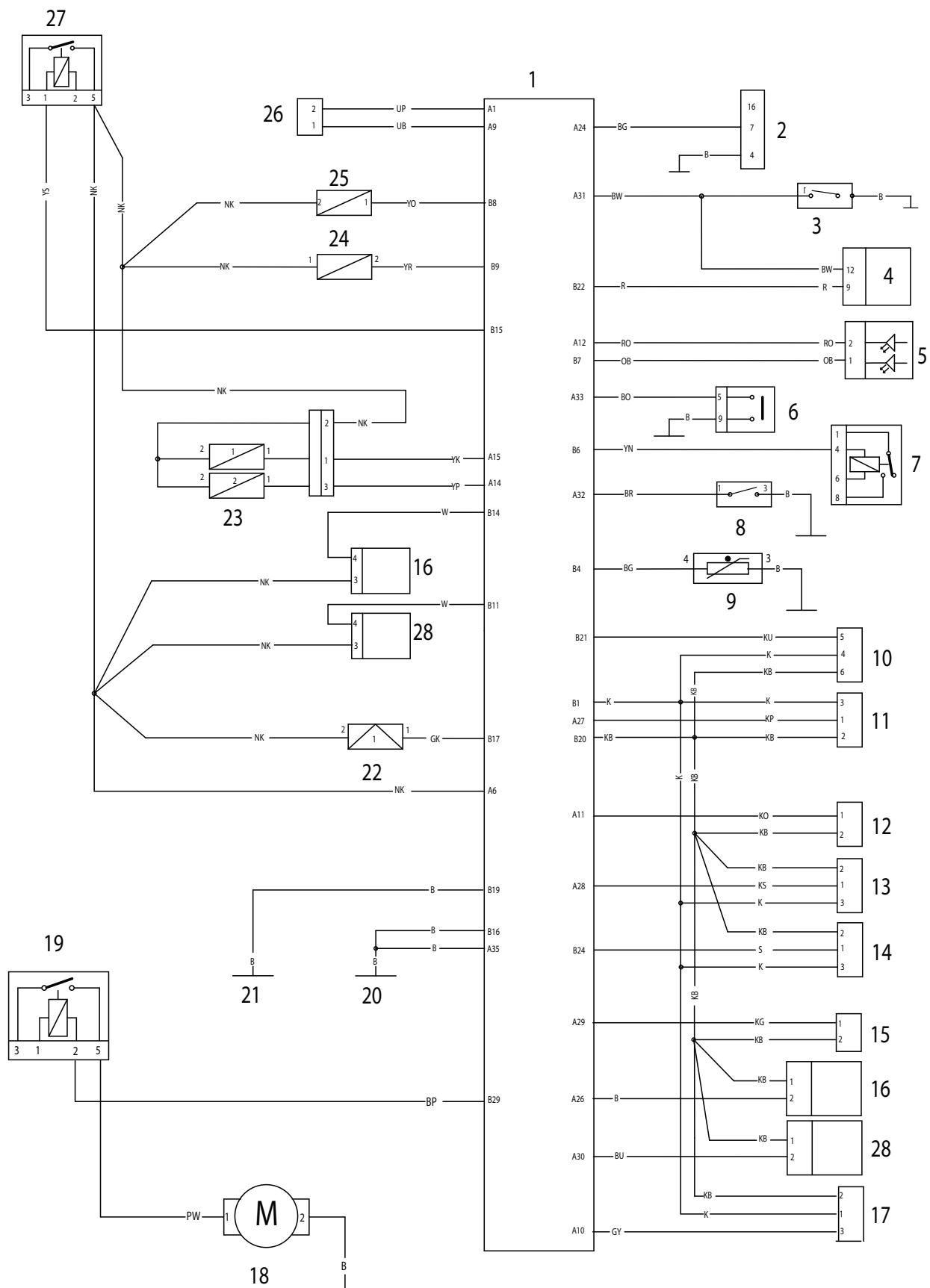
Electrical & Ignition Systems

**Key to Engine Management Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton -
Fuel Injected Models - with Cable Driven Speedometer**

Item number	Description
1	Engine control module
2	Diagnostic connector
3	Neutral switch
4	Instrument assembly
5	Instrument warning LEDs
6	Clutch switch
7	Starter relay
8	Side Stand switch
9	Fuel level sender
10	Fall detection switch
11	Ambient air pressure sensor
12	Intake air temperature sensor
13	Left hand MAP sensor
14	Right hand MAP sensor
15	Oil temperature sensor
16	Oxygen sensor - cylinder 1
17	Throttle position sensor
18	Fuel pump
19	Fuel pump relay
20	Power ground
21	Logic (sensor) ground
22	Ignition coils
23	Fuel injectors
24	Purge valve
25	Secondary air injection solenoid
26	Crankshaft sensor
27	Engine management system relay
28	Oxygen sensor - cylinder 2

Wire colour codes	
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

Engine Management Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Cable Driven Speedometer



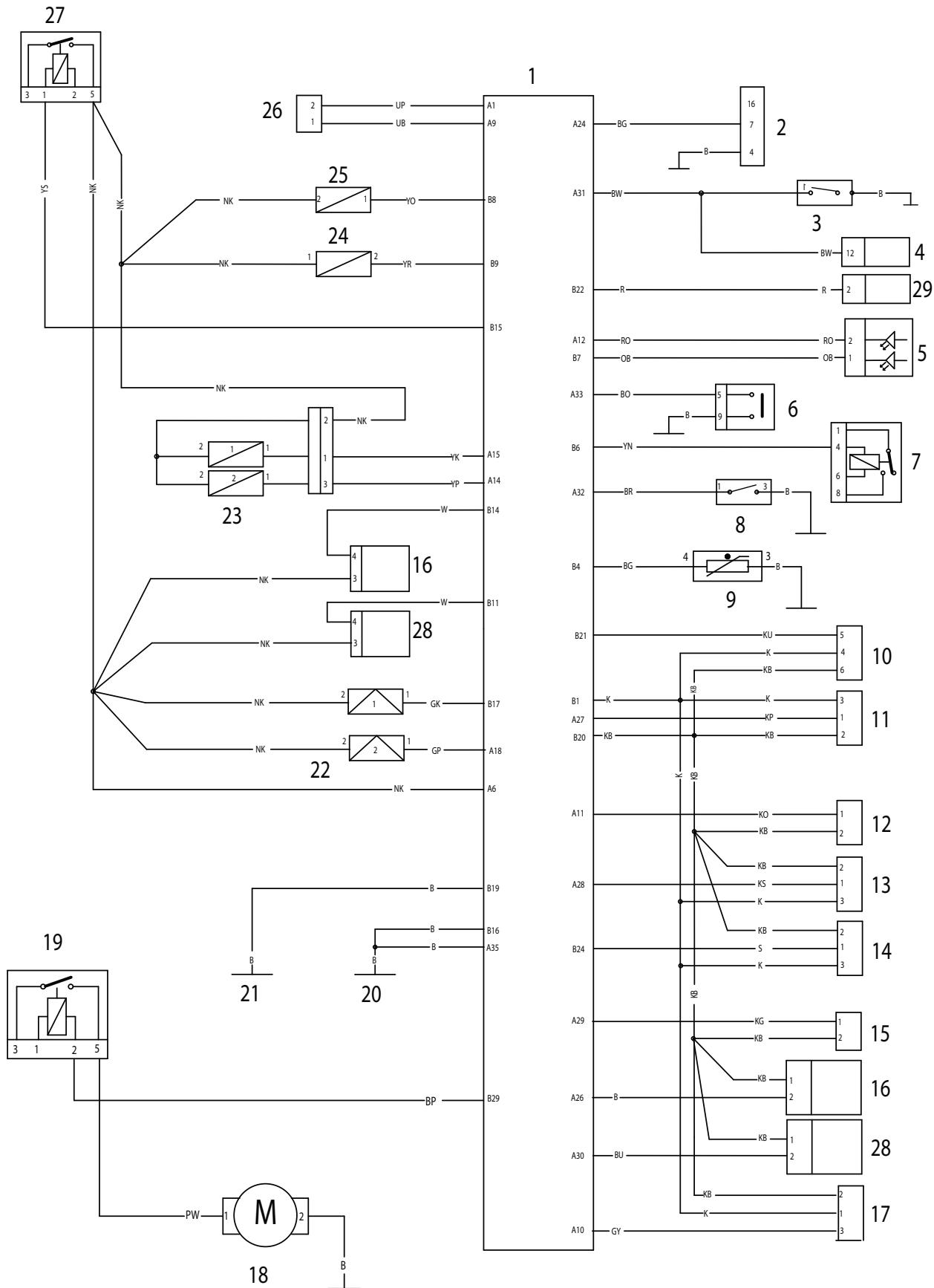
Electrical & Ignition Systems

Key to Engine Management Circuit - Scrambler - Fuel Injected Models - with Cable Driven Speedometer

Item number	Description
1	Engine control module
2	Diagnostic connector
3	Neutral switch
4	Instrument assembly
5	Instrument warning LEDs
6	Clutch switch
7	Starter relay
8	Side Stand switch
9	Fuel level sender
10	Fall detection switch
11	Ambient air pressure sensor
12	Intake air temperature sensor
13	Left hand MAP sensor
14	Right hand MAP sensor
15	Oil temperature sensor
16	Oxygen sensor - cylinder 1
17	Throttle position sensor
18	Fuel pump
19	Fuel pump relay
20	Power ground
21	Logic ground
22	Ignition coils
23	Fuel injectors
24	Purge valve
25	Secondary air injection solenoid
26	Crankshaft sensor
27	Engine management system relay
28	Oxygen sensor - cylinder 2
29	Accessory tachometer (connector A)

Wire colour codes	
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

Engine Management Circuit - Scrambler - Fuel Injected Models - with Cable Driven Speedometer



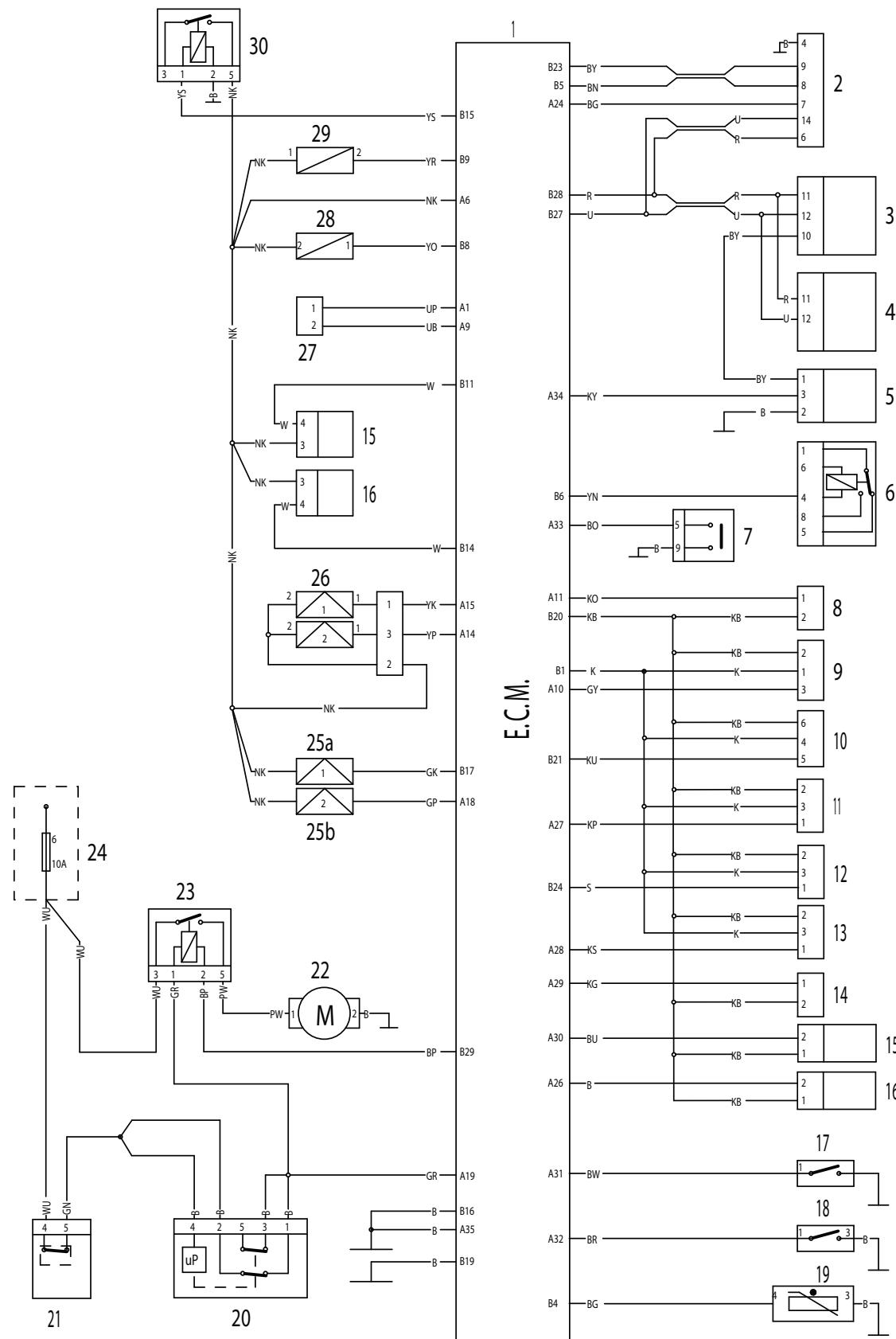
Electrical & Ignition Systems

**Key to Engine Management Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton -
Fuel Injected Models - with Electronic Speedometer**

Item number	Description
1	Engine control module
2	Diagnostic connector
3	Instrument - speedometer
4	Instrument - tachometer
5	Vehicle speed sensor
6	Starter relay
7	Clutch switch
8	Intake air temperature sensor
9	Throttle position sensor
10	Fall detection switch
11	Ambient air pressure sensor
12	Right hand MAP sensor
13	Left hand MAP sensor
14	Oil temperature sensor
15	Oxygen sensor - cylinder 2
16	Oxygen sensor - cylinder 1
17	Neutral switch
18	Side Stand switch
19	Fuel level sender
20	Alarm unit
21	Engine stop switch
22	Fuel pump
23	Fuel pump relay
24	Fuse box (fuse 6)
25a	Ignition coil number 1
25b	Ignition coil number 2 (Scrambler only)
26	Fuel injectors
27	Crankshaft sensor
28	Secondary air injection solenoid
29	Purge valve
30	Engine management system relay

Wire colour codes	
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

Engine Management Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Electronic Speedometer



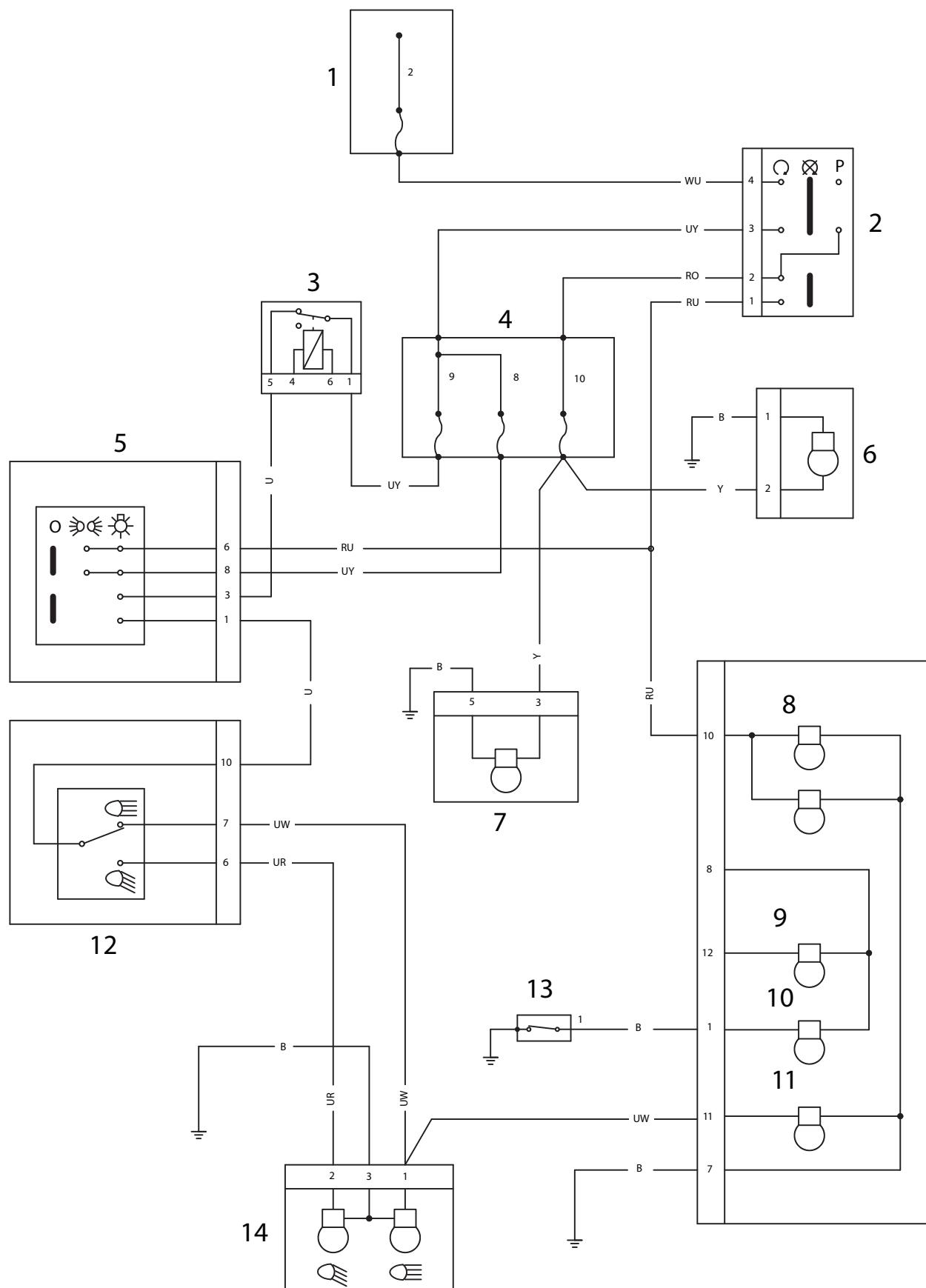
Electrical & Ignition Systems

Key to Lighting Circuit Diagram - Bonneville/T100 (fitted with headlight switch) - Carburettor Models

Item number	Description
1	Fuse 2
2	Ignition switch
3	Starter relay
4	Fuses 8, 9 and 10
5	Main lighting switch/Pass switch
6	Front position light
7	Rear light
8	Speedometer illumination
9	Neutral light
10	Low oil pressure warning light
11	Main beam warning light
12	Headlight dip switch
13	Low oil pressure warning light switch
14	Headlight

Wire colour codes	
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

Lighting Circuit - Bonneville/T100 (fitted with headlight switch) - Carburettor Models



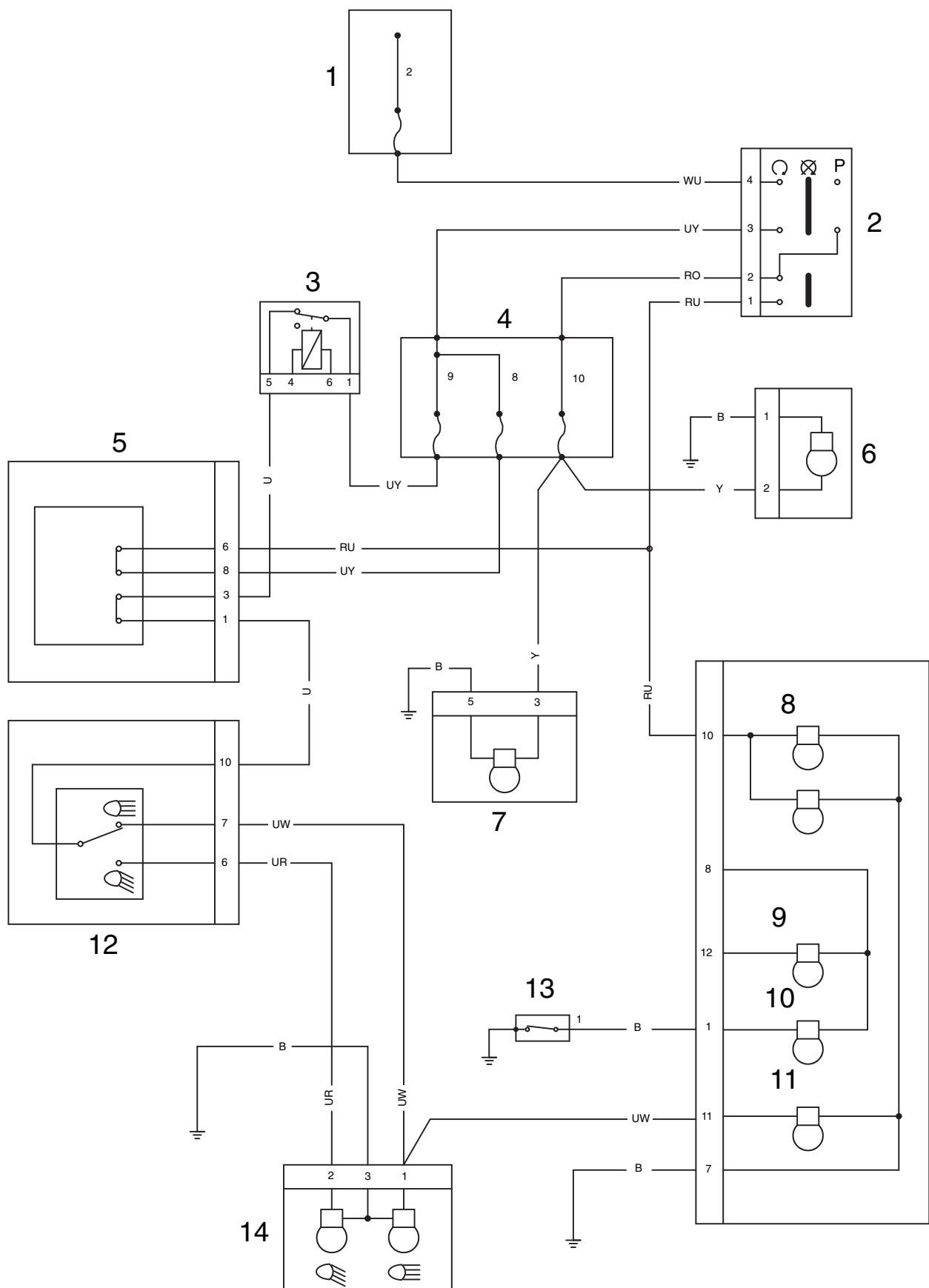
Electrical & Ignition Systems

Key to Lighting Circuit Diagram - Bonneville/T100 (headlights on) - Carburettor Models

Item number	Description
1	Fuse 2
2	Ignition switch
3	Starter relay
4	Fuses 8, 9 and 10
5	Right hand switch cube
6	Front position light
7	Rear light
8	Speedometer illumination
9	Neutral light
10	Low oil pressure warning light
11	Main beam warning light
12	Headlight dip switch
13	Low oil pressure warning light switch
14	Headlight

Wire colour codes	
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

Lighting Circuit - Bonneville/T100 (headlights on) - Carburettor Models



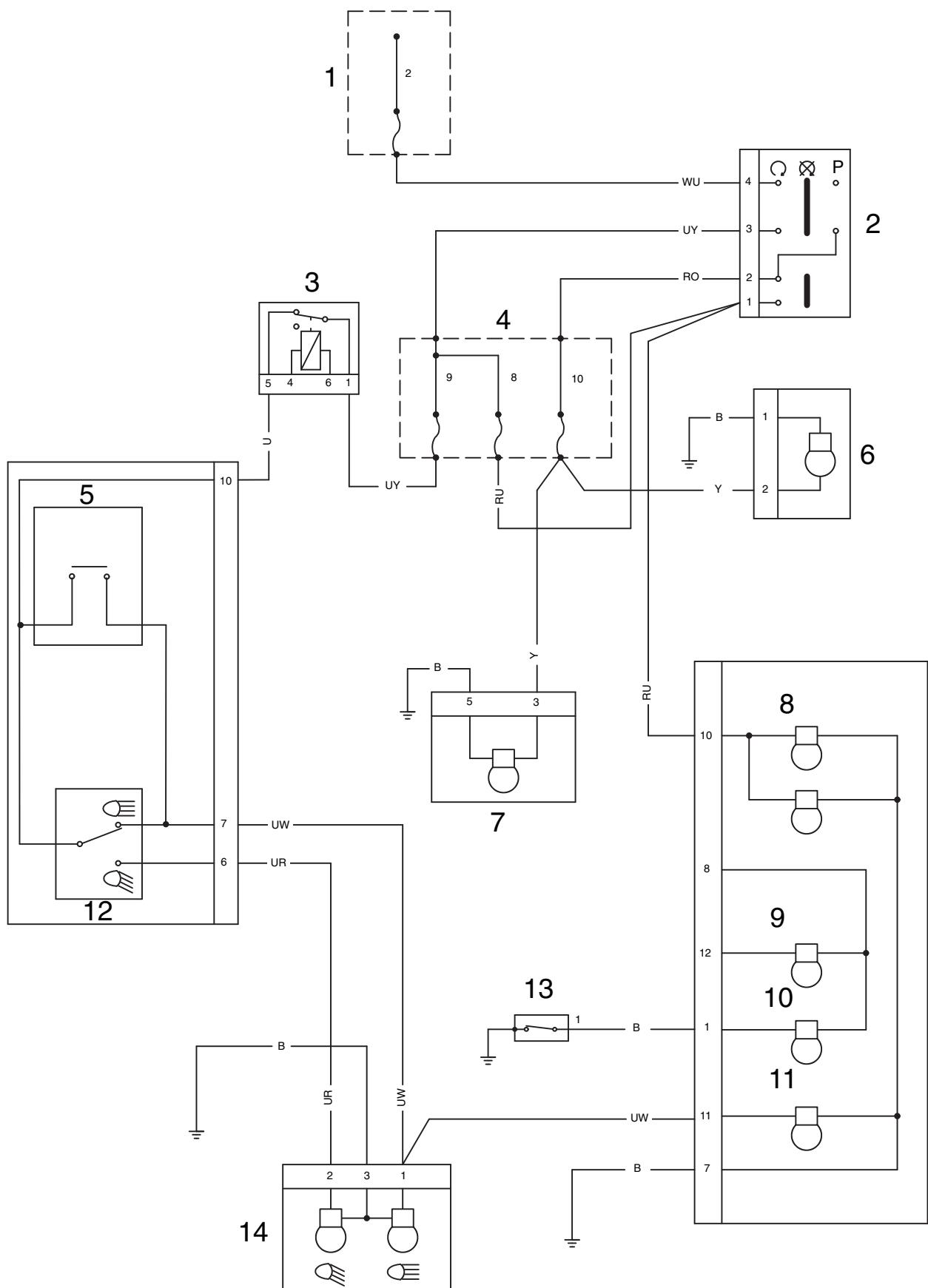
Electrical & Ignition Systems

Key to Lighting Circuit Diagram - Thruxton - Carburettor Models

Item number	Description
1	Fuse 2
2	Ignition switch
3	Starter relay
4	Fuses 8, 9 and 10
5	Pass switch
6	Front position light
7	Rear light
8	Speedometer illumination
9	Neutral light
10	Low oil pressure warning light
11	Main beam warning light
12	Headlight dip switch
13	Low oil pressure warning light switch
14	Headlight

Wire colour codes	
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

Lighting Circuit - Thruxton - Carburettor Models



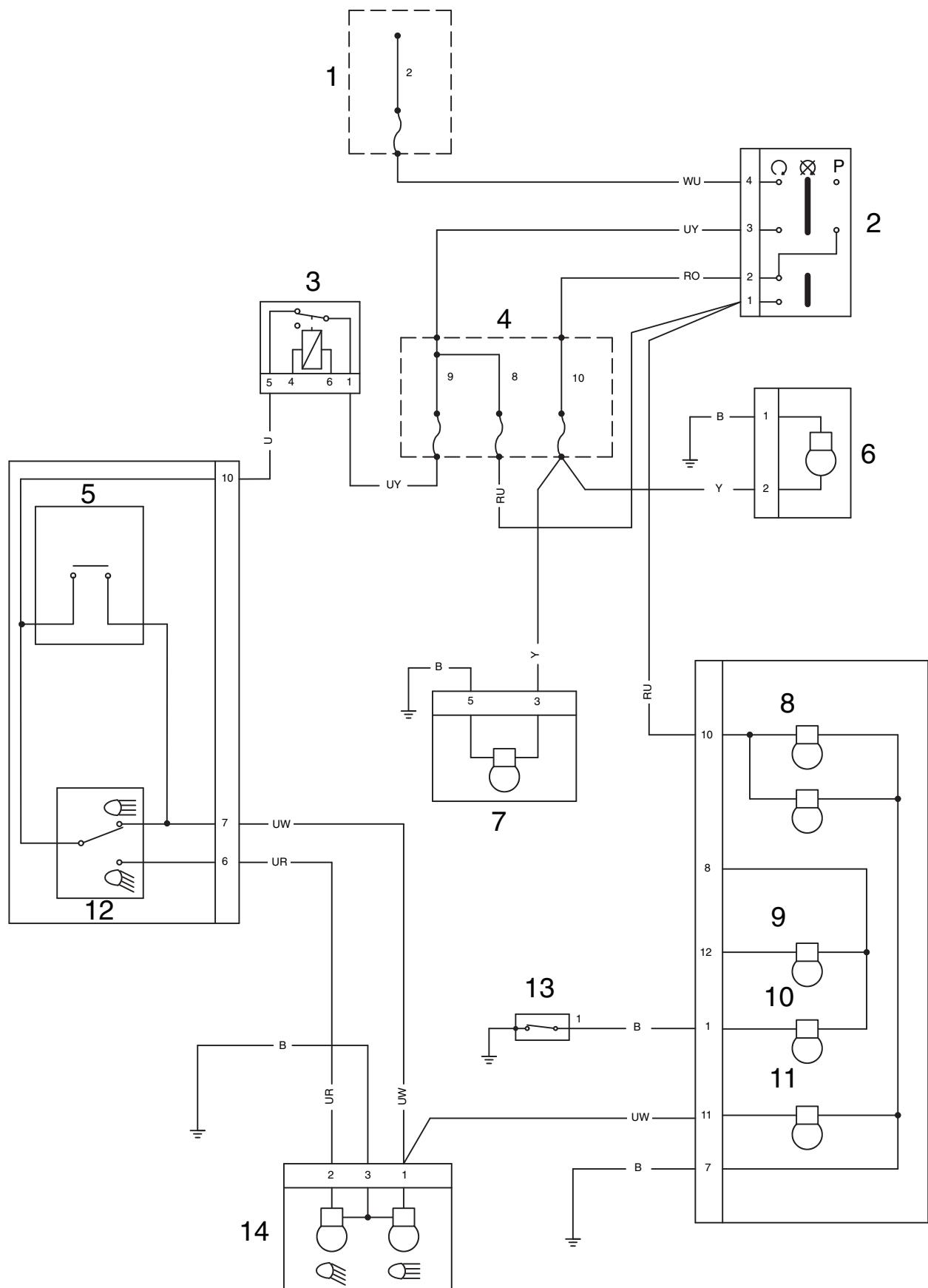
Electrical & Ignition Systems

Key to Lighting Circuit Diagram - Scrambler - Carburettor Models

Item number	Description
1	Fuse 2
2	Ignition switch
3	Starter relay
4	Fuses 8, 9 and 10
5	Pass switch
6	Front position light
7	Rear light
8	Speedometer illumination
9	Neutral light
10	Low oil pressure warning light
11	Main beam warning light
12	Headlight dip switch
13	Low oil pressure warning light switch
14	Headlight

Wire colour codes	
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

Lighting Circuit - Scrambler - Carburettor Models



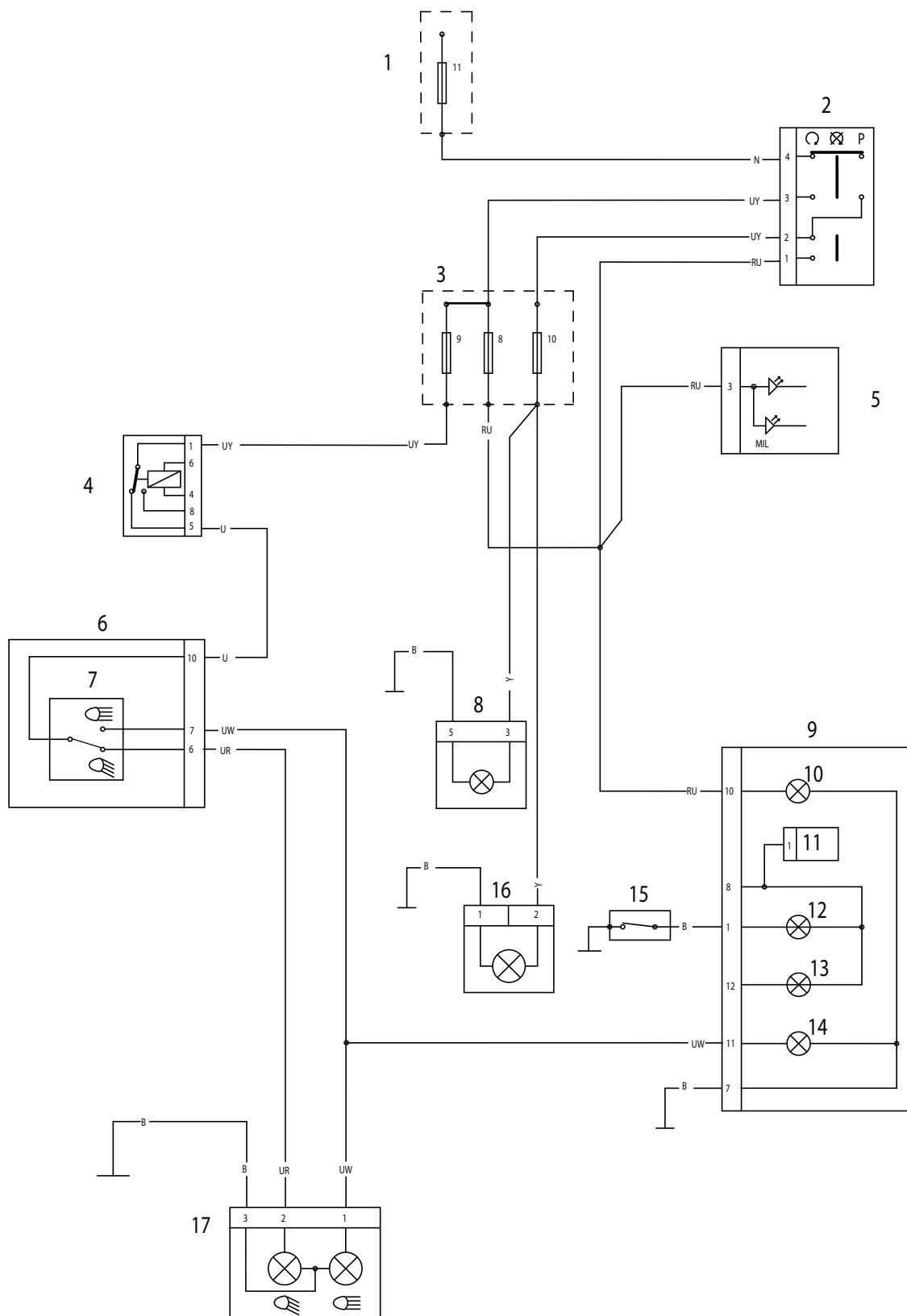
Electrical & Ignition Systems

**Key to Lighting Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100 & Thruxton -
Fuel Injected Models - with Cable Driven Speedometer**

Item number	Description
1	Fuse 11
2	Ignition switch
3	Fuses 8, 9 and 10
4	Starter relay
5	Instruments (LED warning lights)
6	Left hand switch cube assembly
7	Headlight dip switch
8	Rear light
9	Instrument assembly
10	Tachometer illumination
11	Tachometer
12	Low oil pressure warning light
13	Neutral light
14	Main beam warning light
15	Low oil pressure warning light switch
16	Front position light
17	Headlight

Wire colour codes	
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

Lighting Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Cable Driven Speedometer



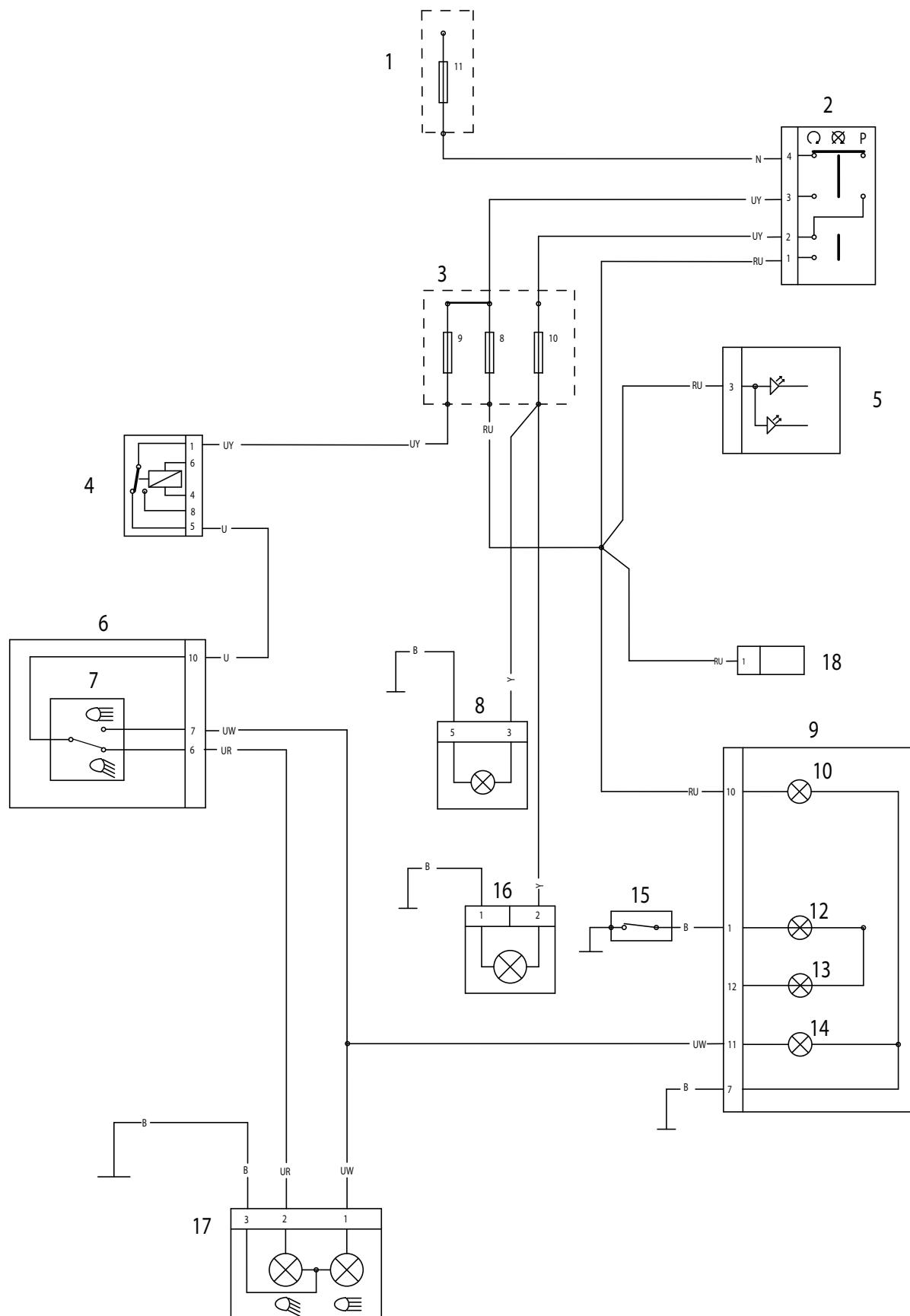
Electrical & Ignition Systems

Key to Lighting Circuit Diagram - Scrambler - Fuel Injected Models - with Cable Driven Speedometer

Item number	Description
1	Fuse 11
2	Ignition switch
3	Fuses 8, 9 and 10
4	Starter relay
5	Instruments (LED warning lights)
6	Left hand switch cube assembly
7	Headlight dip switch
8	Rear light
9	Instrument assembly
10	Tachometer illumination
11	Tachometer
12	Low oil pressure warning light
13	Neutral light
14	Main beam warning light
15	Low oil pressure warning light switch
16	Front position light
17	Headlight
18	Accessory tachometer illumination (connector B)

Wire colour codes	
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

Lighting Circuit - Scrambler - Fuel Injected Models - with Cable Driven Speedometer



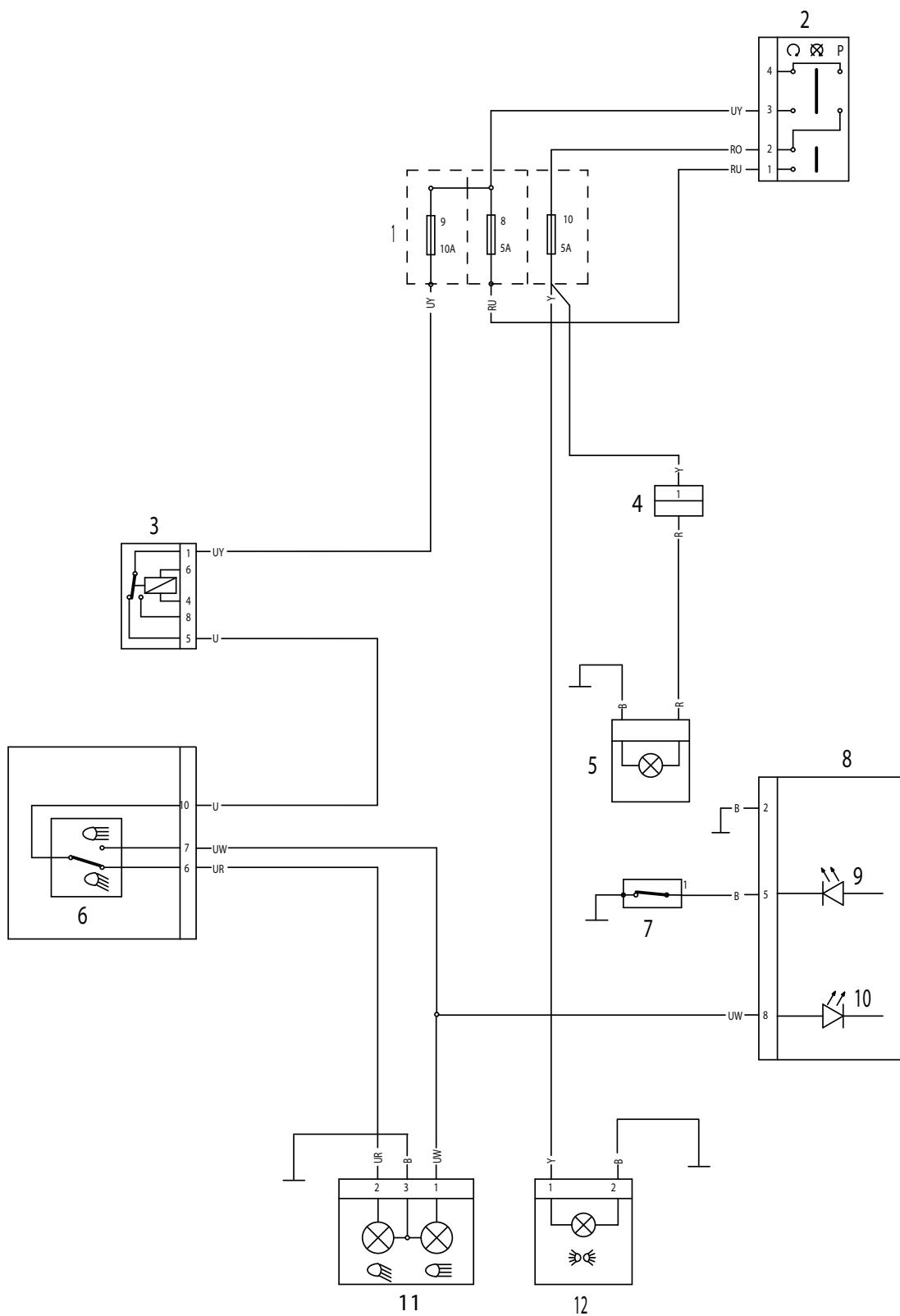
Electrical & Ignition Systems

**Key to Lighting Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100 & Thruxton -
Fuel Injected Models - with Electronic Speedometer**

Item number	Description
1	Fuses 8, 9 and 10
2	Ignition switch
3	Starter relay
4	Rear lighting sub-harness
5	Rear light
6	Headlight dip switch
7	Low oil pressure warning light switch
8	Instrument - tachometer
9	Low oil pressure warning light
10	Main beam warning light
11	Headlight
12	Front position light

Wire colour codes	
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

Lighting Circuit - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Electronic Speedometer



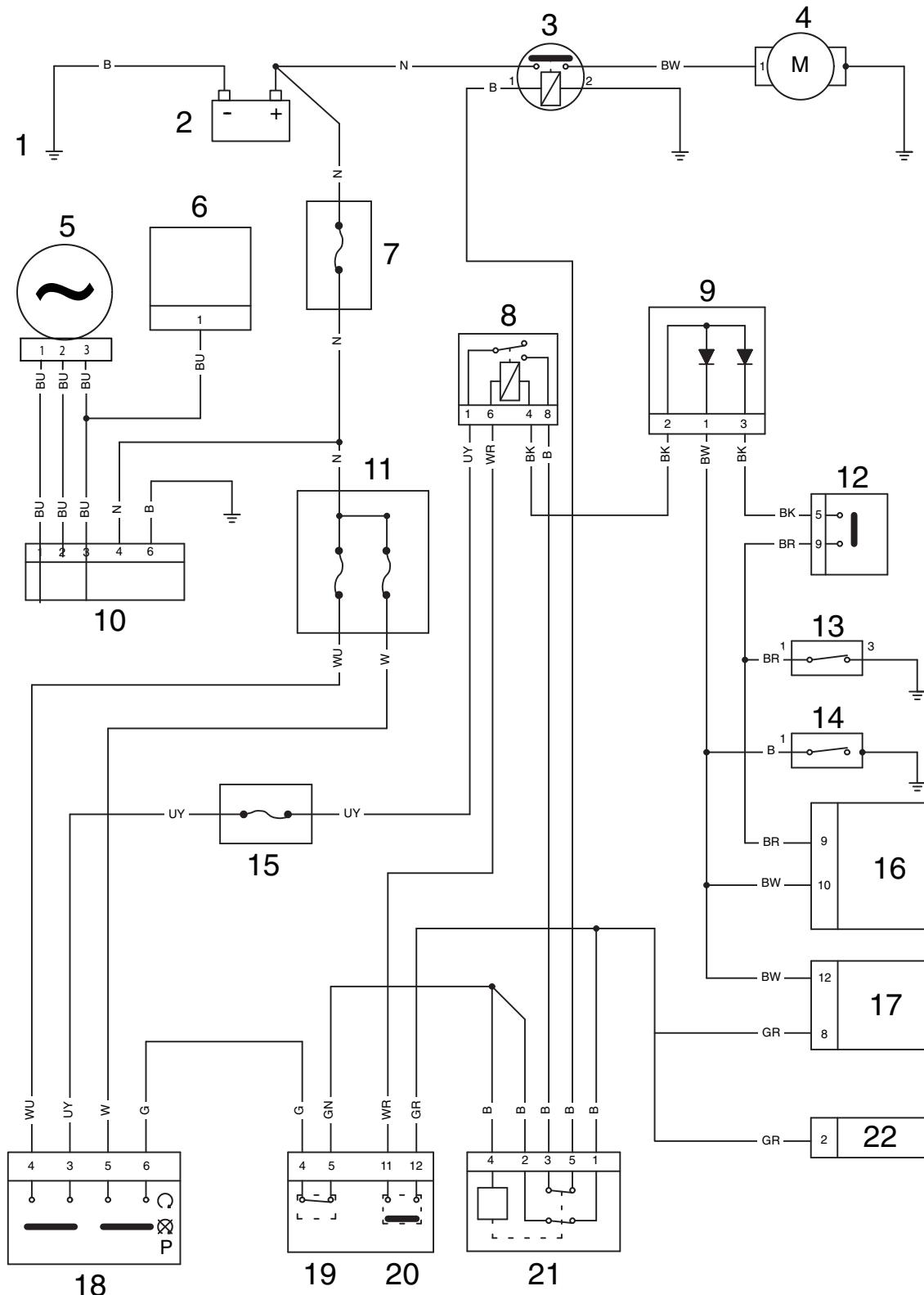
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Bonneville - Carburettor Models

Item number	Description
1	Engine earth
2	Battery
3	Starter solenoid
4	Starter motor
5	Alternator
6	Carburettor thermostat switch
7	Fuse 11
8	Starter relay
9	Diode pack
10	Regulator/rectifier
11	Fuses 2 and 5
12	Clutch switch
13	Side Stand switch
14	Neutral switch
15	Fuse 9
16	Igniter
17	Instrument assembly
18	Ignition switch
19	Engine stop switch
20	Starter button
21	Alarm control unit
22	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Starting/Charging - Bonneville - Carburettor Models



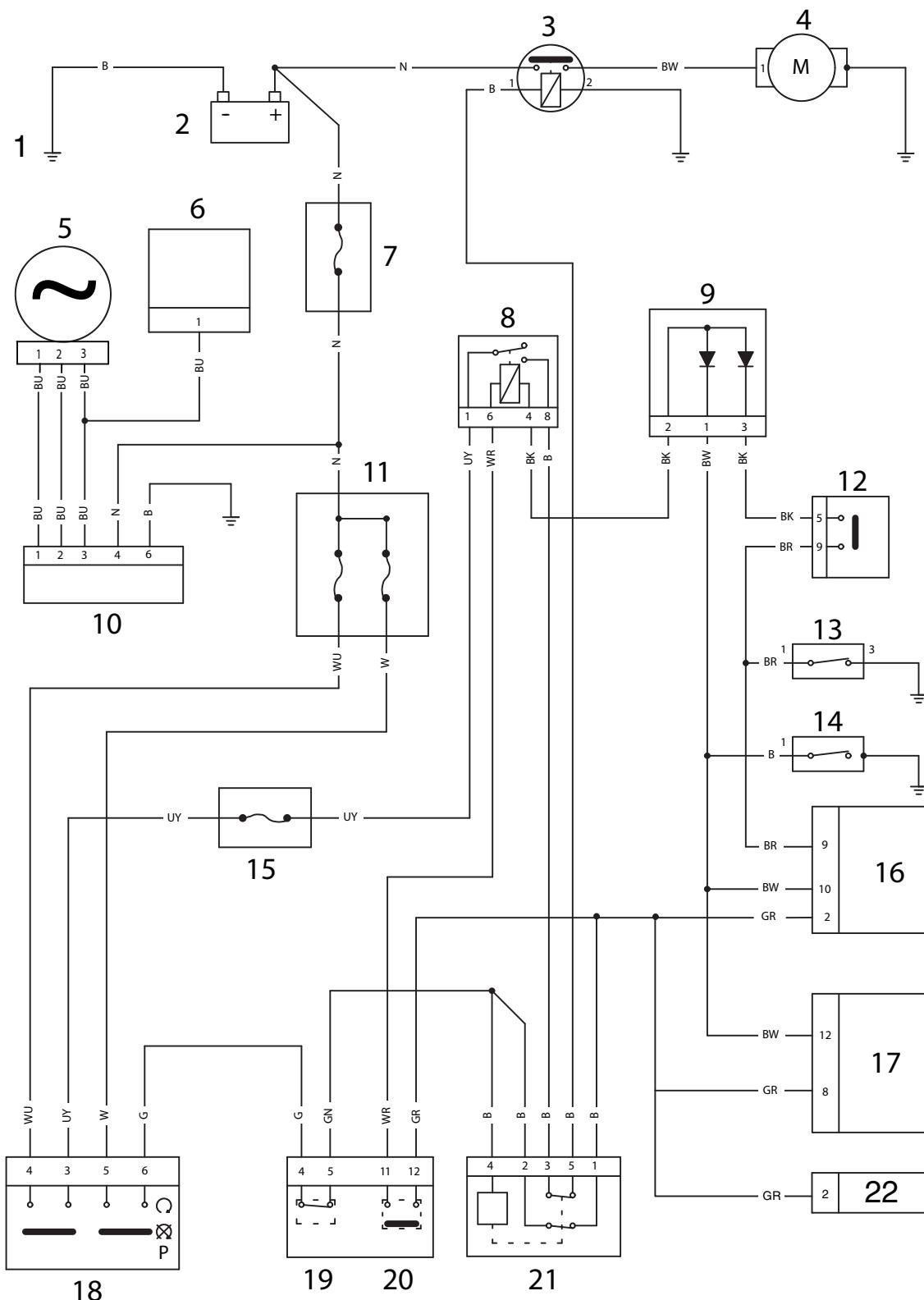
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Thruxton and Scrambler - Carburettor Models

Item number	Description
1	Engine earth
2	Battery
3	Starter solenoid
4	Starter motor
5	Alternator
6	Carburettor thermostat switch
7	Fuse 11
8	Starter relay
9	Diode pack
10	Regulator/rectifier
11	Fuses 2 and 5
12	Clutch switch
13	Side Stand switch
14	Neutral switch
15	Fuse 9
16	Igniter
17	Instrument assembly
18	Ignition switch
19	Engine stop switch
20	Starter button
21	Alarm control unit
22	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Starting/Charging - Thruxton and Scrambler - Carburettor Models



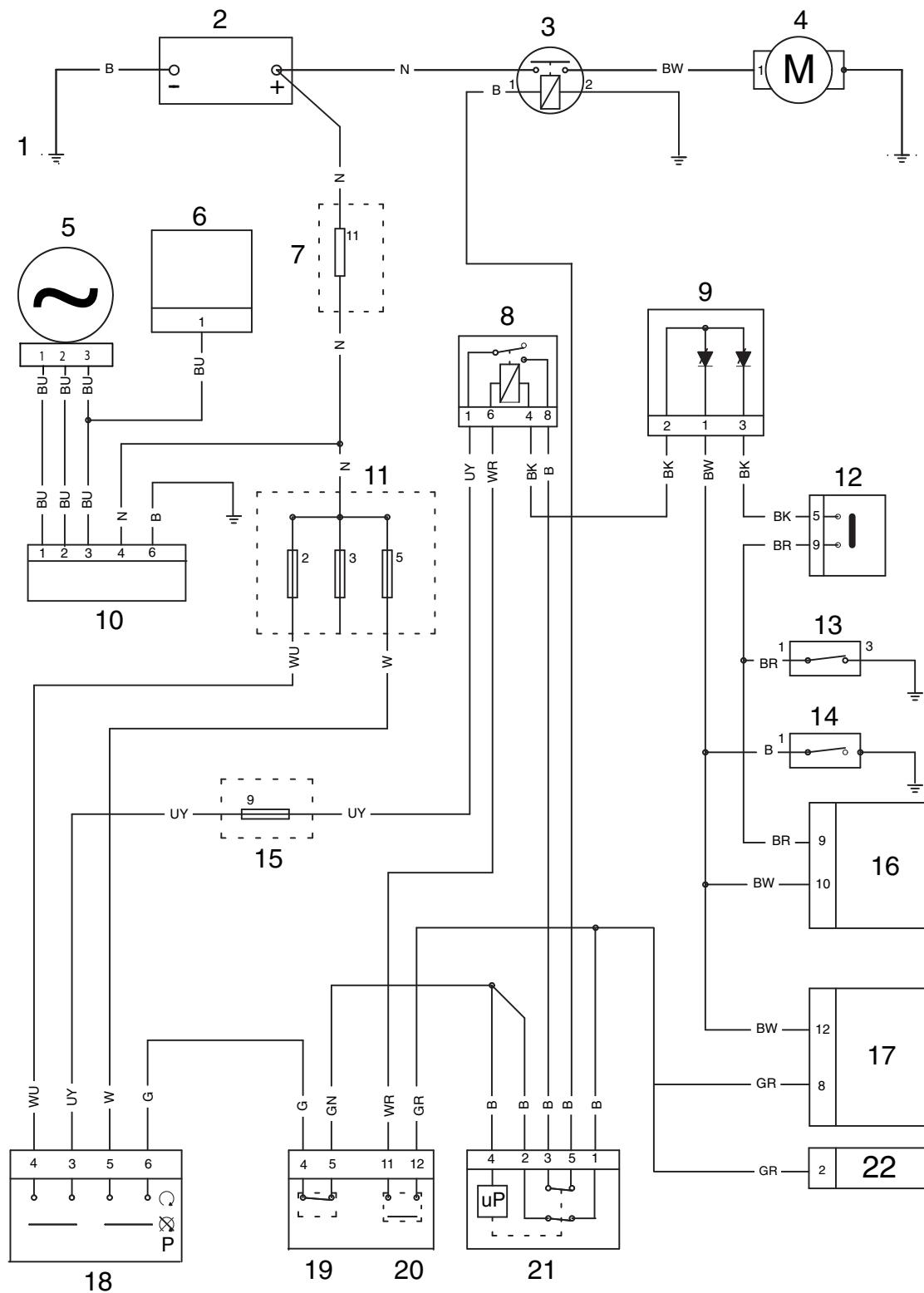
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Bonneville T100 - Carburettor Models

Item number	Description
1	Engine earth
2	Battery
3	Starter solenoid
4	Starter motor
5	Alternator
6	Carburettor thermostat switch
7	Fuse 11
8	Starter relay
9	Diode pack
10	Regulator/rectifier
11	Fuses 2, 3 and 5
12	Clutch switch
13	Side Stand switch
14	Neutral switch
15	Fuse 9
16	Igniter
17	Instrument assembly
18	Ignition switch
19	Engine stop switch
20	Starter button
21	Alarm control unit
22	Secondary air injection solenoid (from VIN 317248)

Wire colour codes	
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

Starting/Charging - Bonneville T100 - Carburettor Models



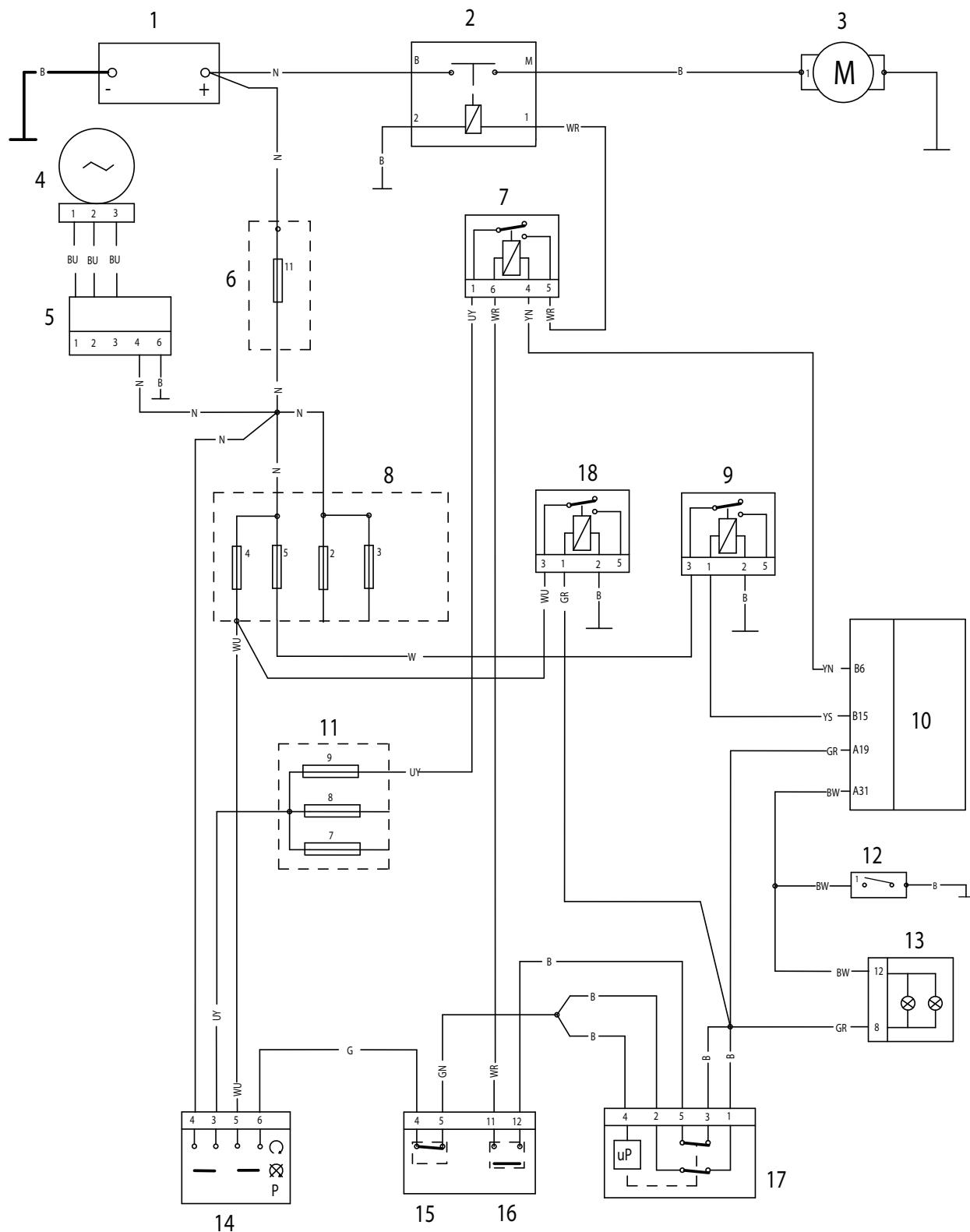
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Cable Driven Speedometer

Item number	Description
1	Battery
2	Starter solenoid
3	Starter motor
4	Alternator
5	Regulator/rectifier
6	Fuse 11
7	Starter relay
8	Fuse box (Fuses 2, 3, 4 & 5)
9	Engine control module relay
10	Engine control module
11	Fuses 7, 8 and 9
12	Neutral switch
13	Instrument assembly
14	Ignition switch
15	Engine stop switch
16	Starter button
17	Alarm control unit
18	Fuel pump relay

Wire colour codes	
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

Starting/Charging - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Cable Driven Speedometer



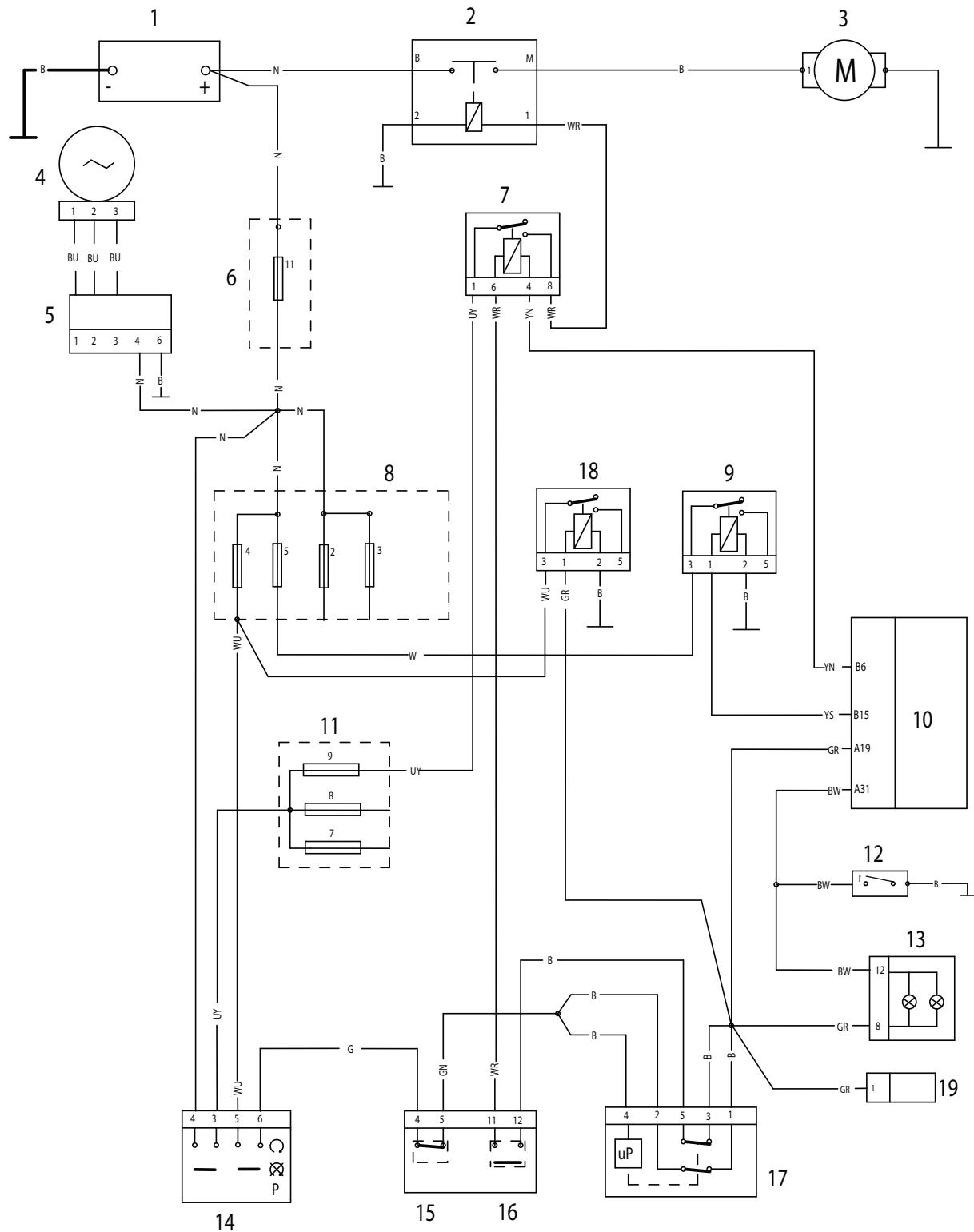
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Scrambler - Fuel Injected Models - with Cable Driven Speedometer

Item number	Description
1	Battery
2	Starter solenoid
3	Starter motor
4	Alternator
5	Regulator/rectifier
6	Fuse 11
7	Starter relay
8	Fuse box (Fuses 2, 3, 4 & 5)
9	Engine control module relay
10	Engine control module
11	Fuses 7, 8 and 9
12	Neutral switch
13	Instrument assembly
14	Ignition switch
15	Engine stop switch
16	Starter button
17	Alarm control unit
18	Fuel pump relay
19	Accessory tachometer (connector A)

Wire colour codes	
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

Starting/Charging - Scrambler - Fuel Injected Models - with Cable Driven Speedometer



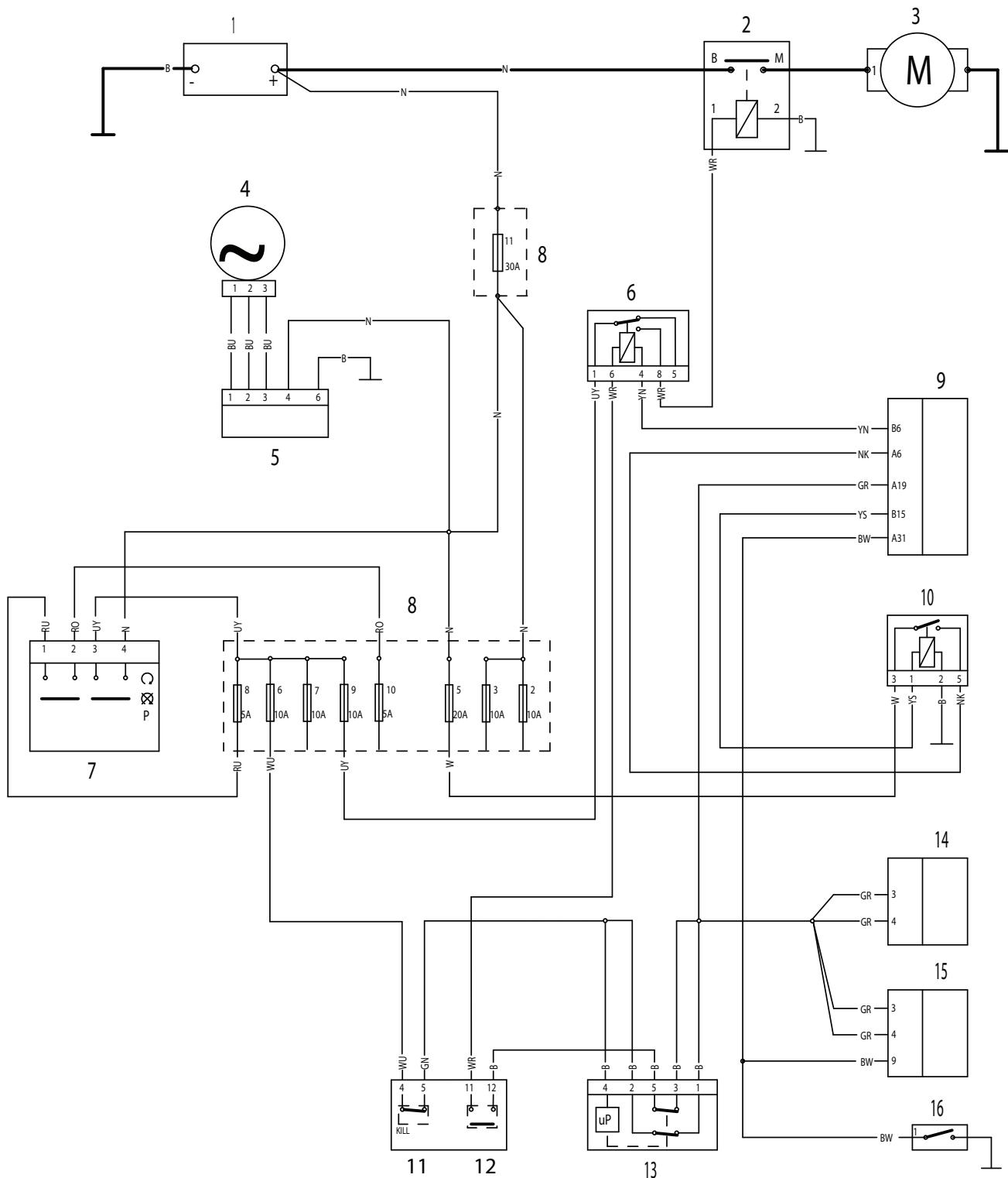
Electrical & Ignition Systems

Key to Starting/Charging Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Electronic Speedometer

Item number	Description
1	Battery
2	Starter solenoid
3	Starter motor
4	Alternator
5	Regulator/rectifier
6	Starter relay
7	Ignition switch
8	Fuse box
9	Engine control module
10	Engine control module relay
11	Engine stop switch
12	Starter button
13	Alarm unit
14	Instrument - speedometer
15	Instrument - tachometer
16	Neutral switch

Wire colour codes	
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

Starting/Charging - Bonneville, Bonneville SE, Bonneville T100 & Thruxton - Fuel Injected Models - with Electronic Speedometer



Electrical & Ignition Systems

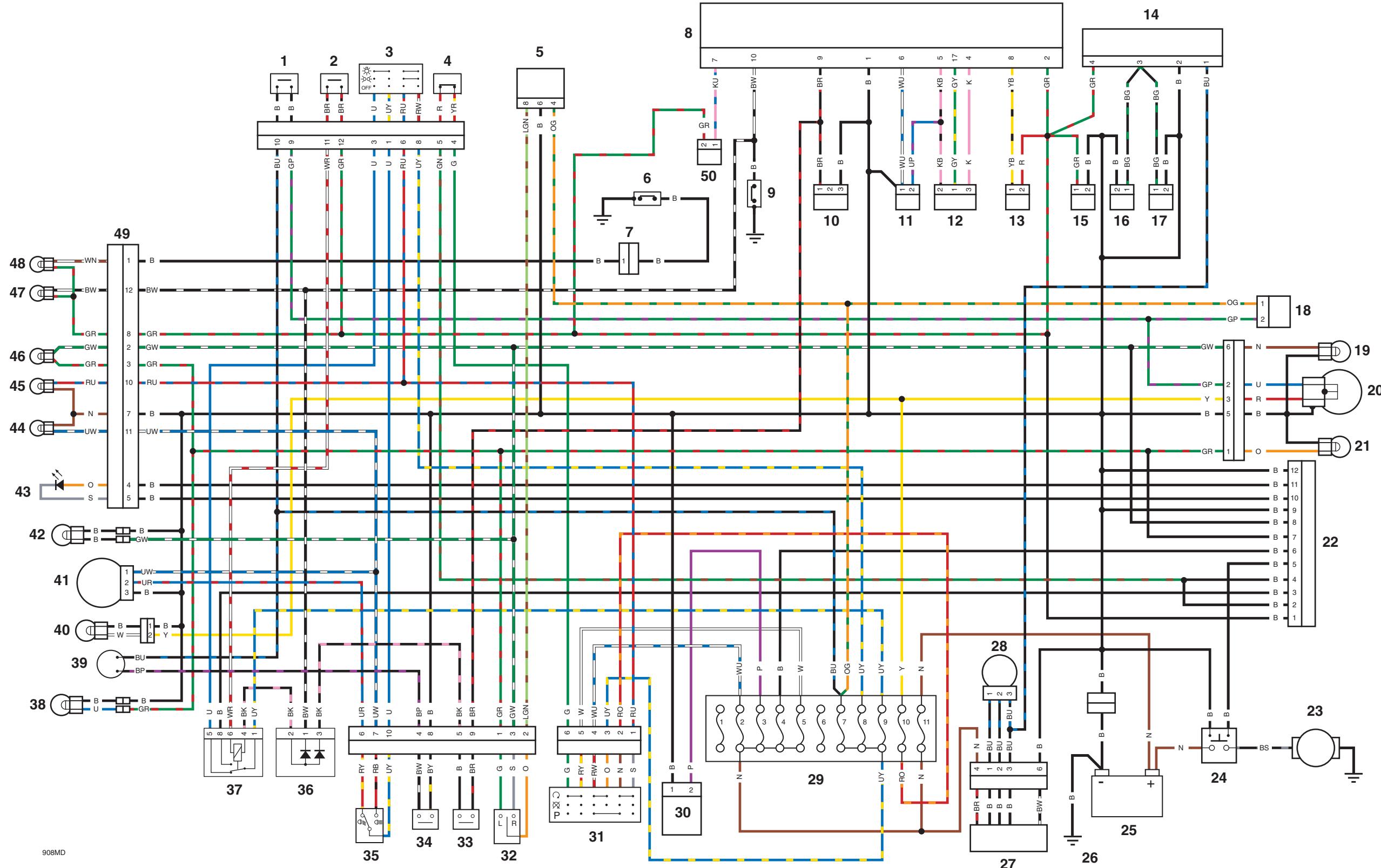
Key to Main Circuit Diagram - Bonneville - Carburettor Models

Item Number	Description
1	Front brake lever switch
2	Starter button
3	Main lighting switch
4	Engine stop switch
5	Flasher unit
6	Oil pressure switch
7	Oil pressure switch sub-harness
8	Igniter
9	Neutral switch
10	Side Stand switch
11	Crankshaft sensor
12	Throttle position sensor
13	Ignition coil
14	Carburettor heater thermostat switch
15	Carburettor vent valve
16	Carburettor heater 1
17	Carburettor heater 2
18	Rear brake pedal switch
19	Right hand rear indicator
20	Rear light
21	Left hand rear indicator
22	Alarm connector
23	Starter motor
24	Starter solenoid
25	Battery
26	Engine earth
27	Regulator/rectifier
28	Alternator
29	Fuse Box
30	Accessory socket
31	Ignition switch
32	Direction indicator switch
33	Clutch switch

Item Number	Description
34	Horn button
35	Headlight dip switch
36	Diode pack
37	Starter switch
38	Left hand front indicator
39	Horn
40	Front position light
41	Headlight
42	Right hand front indicator
43	Alarm LED
44	Main beam warning light
45	Speedometer illumination
46	Indicator warning light
47	Neutral light
48	Low oil pressure warning light
49	Instrument connector
50	Secondary air injection solenoid (only from VIN 317248)

Wire colour codes	
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 - Complete System - Bonneville - Carburettor Models



Electrical & Ignition Systems

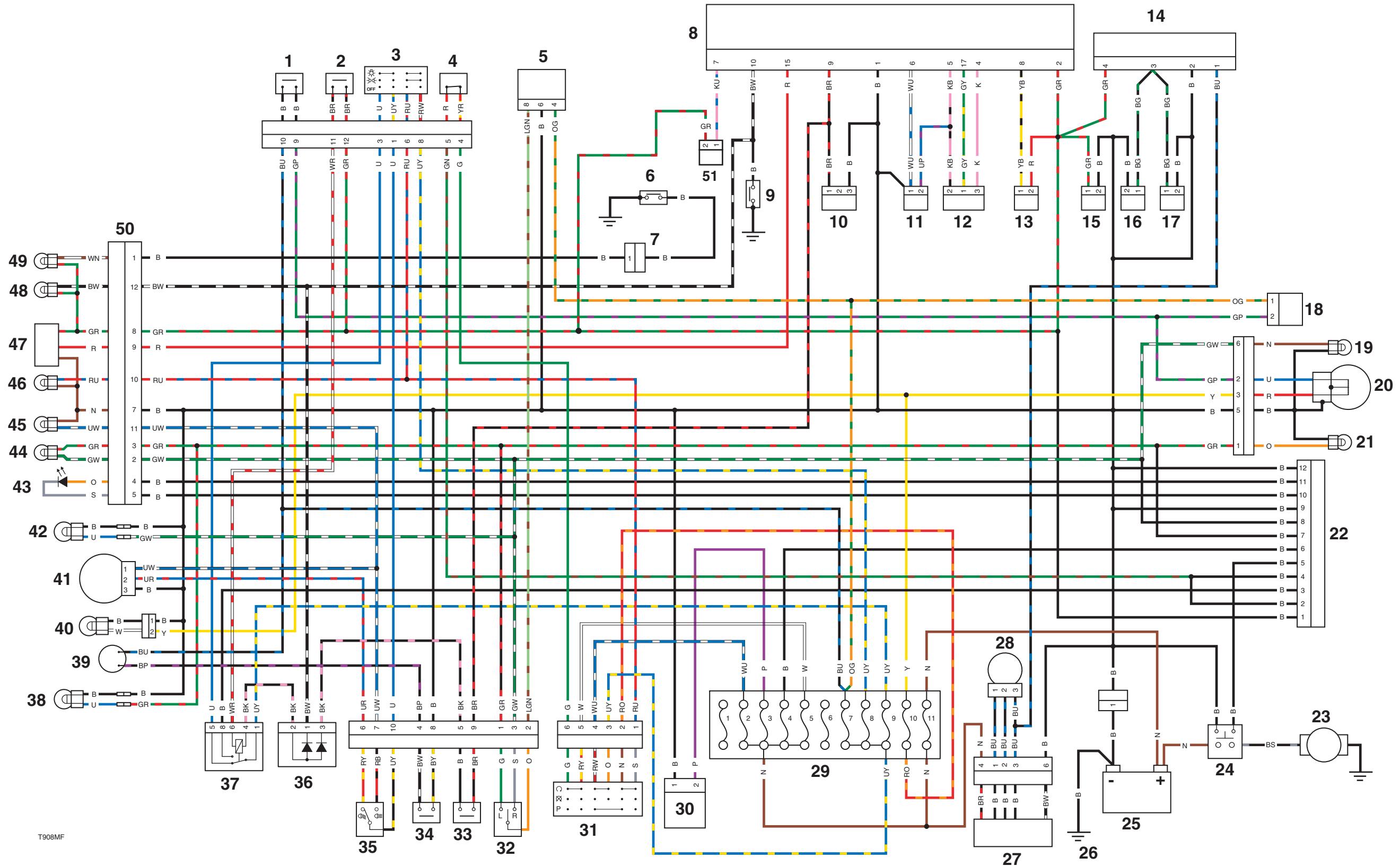
Key to Main Circuit Diagram - Bonneville T100 - Carburettor Models

Item Number	Description
1	Front brake lever switch
2	Starter button
3	Main lighting switch
4	Engine stop switch
5	Flasher unit
6	Oil pressure switch
7	Oil pressure switch sub-harness
8	Igniter
9	Neutral switch
10	Side Stand switch
11	Crankshaft sensor
12	Throttle position sensor
13	Ignition coil
14	Carburettor heater thermostat switch
15	Carburettor vent valve
16	Carburettor heater 1
17	Carburettor heater 2
18	Rear brake pedal switch
19	Right hand rear indicator
20	Rear light
21	Left hand rear indicator
22	Alarm connector
23	Starter motor
24	Starter solenoid
25	Battery
26	Engine earth
27	Regulator/rectifier
28	Alternator
29	Fuse Box
30	Accessory socket
31	Ignition switch
32	Direction indicator switch
33	Clutch switch
34	Horn button

Item Number	Description
35	Headlight dip switch
36	Diode pack
37	Starter switch
38	Left hand front indicator
39	Horn
40	Front position light
41	Headlight
42	Right hand front indicator
43	Alarm LED
44	Indicator warning light
45	Main beam warning light
46	Instrument illumination
47	Tachometer
48	Neutral light
49	Low oil pressure warning light
50	Instrument connector
51	Secondary air injection solenoid (only from VIN 317248)

Wire colour codes	
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 - Complete System - Bonneville T100 - Carburetor Models



Electrical & Ignition Systems

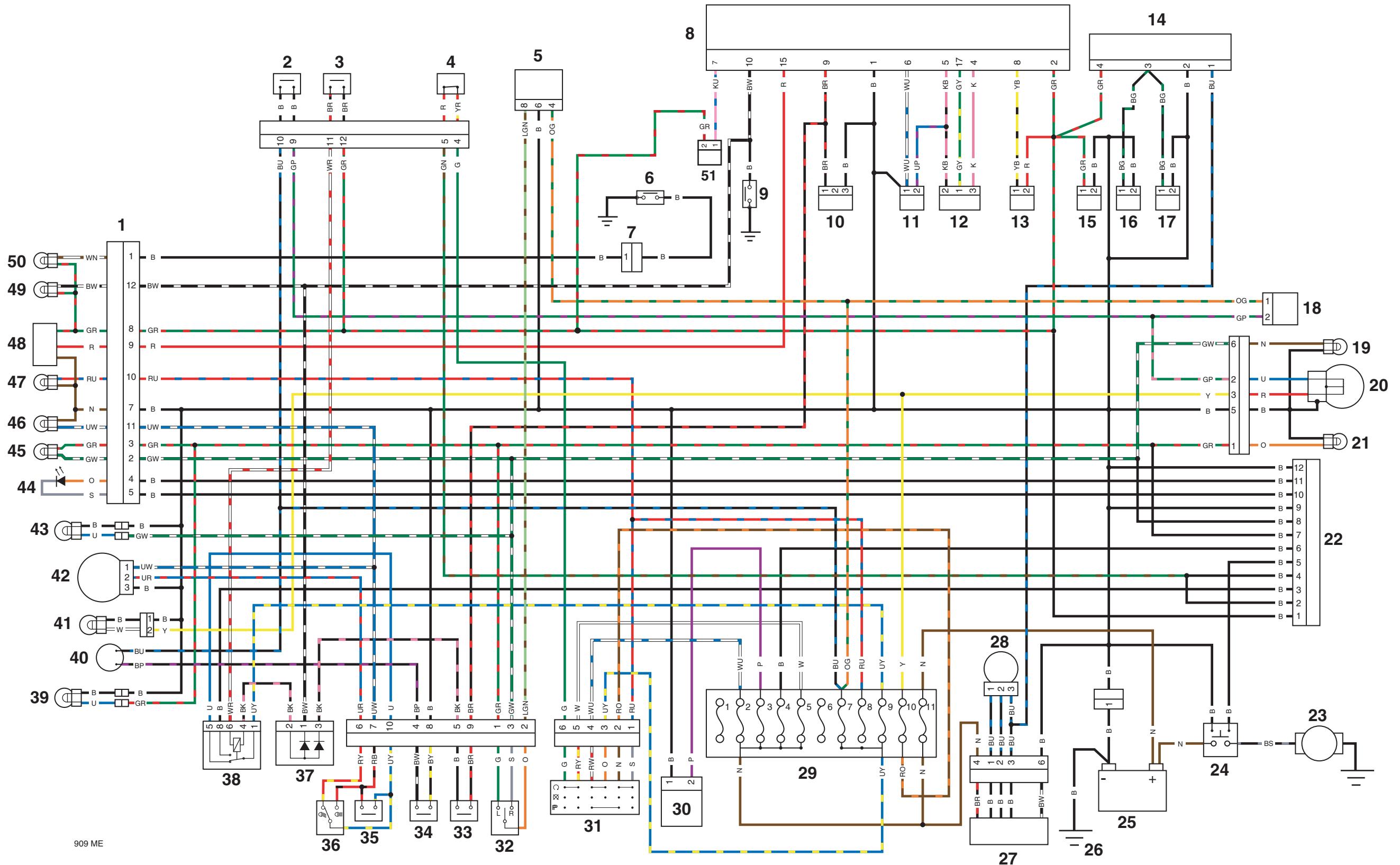
Key to Main Circuit Diagram - Thruxton - Carburettor Models

Item Number	Description
1	Instrument assembly
2	Front brake lever switch
3	Starter button
4	Engine stop switch
5	Direction Indicator Control Unit
6	Oil pressure switch
7	Oil pressure switch sub-harness
8	Igniter
9	Neutral switch
10	Side Stand switch
11	Crankshaft position sensor
12	Throttle position sensor
13	Ignition coil
14	Carburettor heater thermostat switch
15	Carburettor vent valve
16	Carburettor heater 1
17	Carburettor heater 2
18	Rear brake pedal switch
19	Right hand rear indicator
20	Rear light
21	Left hand rear indicator
22	Alarm connector
23	Starter motor
24	Starter solenoid
25	Battery
26	Engine earth
27	Regulator/rectifier
28	Alternator
29	Fuse Box
30	Accessory socket
31	Ignition switch
32	Direction indicator switch
33	Clutch switch

Item Number	Description
34	Horn button
35	Pass switch
36	Headlight dip switch
37	Diode pack
38	Starter relay
39	Left hand front indicator
40	Horn
41	Front position light
42	Headlight
43	Right hand front indicator
44	Alarm LED
45	Indicator warning light
46	Main beam warning light
47	Instrument illumination
48	Tachometer
49	Neutral light
50	Low oil pressure warning light
51	Secondary air injection solenoid (only from VIN 317248)

Wire colour codes	
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 - Complete System - Thruxton - Carburettor Models



Electrical & Ignition Systems

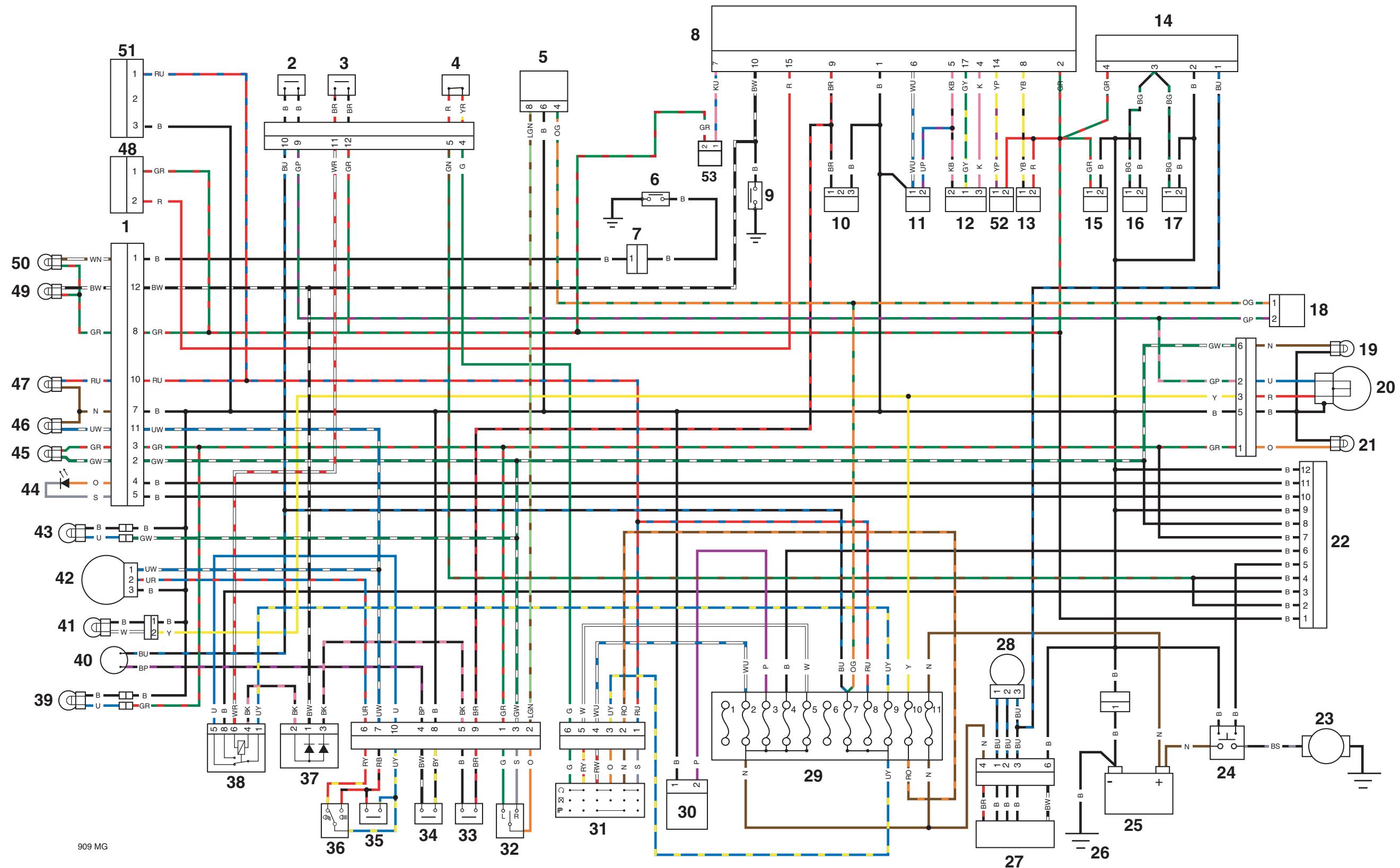
Key to Main Circuit Diagram - Scrambler - Carburettor Models

Item Number	Description
1	Instrument assembly
2	Front brake lever switch
3	Starter button
4	Engine stop switch
5	Direction indicator control unit
6	Oil pressure switch
7	Oil pressure switch sub-harness
8	Igniter
9	Neutral switch
10	Side Stand switch
11	Crankshaft position sensor
12	Throttle position sensor
13	Ignition coil number 1
14	Carburettor heater thermostat switch
15	Carburettor vent valve
16	Carburettor heater 1
17	Carburettor heater 2
18	Rear brake pedal switch
19	Right hand rear indicator
20	Rear light
21	Left hand rear indicator
22	Alarm connector
23	Starter motor
24	Starter solenoid
25	Battery
26	Engine earth
27	Regulator/rectifier
28	Alternator
29	Fuse Box
30	Accessory socket
31	Ignition switch
32	Direction indicator switch
33	Clutch switch
34	Horn button

Item Number	Description
35	Pass switch
36	Headlight dip switch
37	Diode pack
38	Starter relay
39	Left hand front indicator
40	Horn
41	Front position light
42	Headlight
43	Right hand front indicator
44	Alarm LED
45	Indicator warning light
46	Main beam warning light
47	Instrument illumination
48	Accessory tachometer A
49	Neutral light
50	Low oil pressure warning light
51	Accessory tachometer B
52	Ignition coil number 2
53	Secondary air injection solenoid (only from VIN 317248)

Wire colour codes	
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 - Complete System - Scrambler - Carburetor Models



Electrical & Ignition Systems

Key to Main Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Cable Driven Speedometer

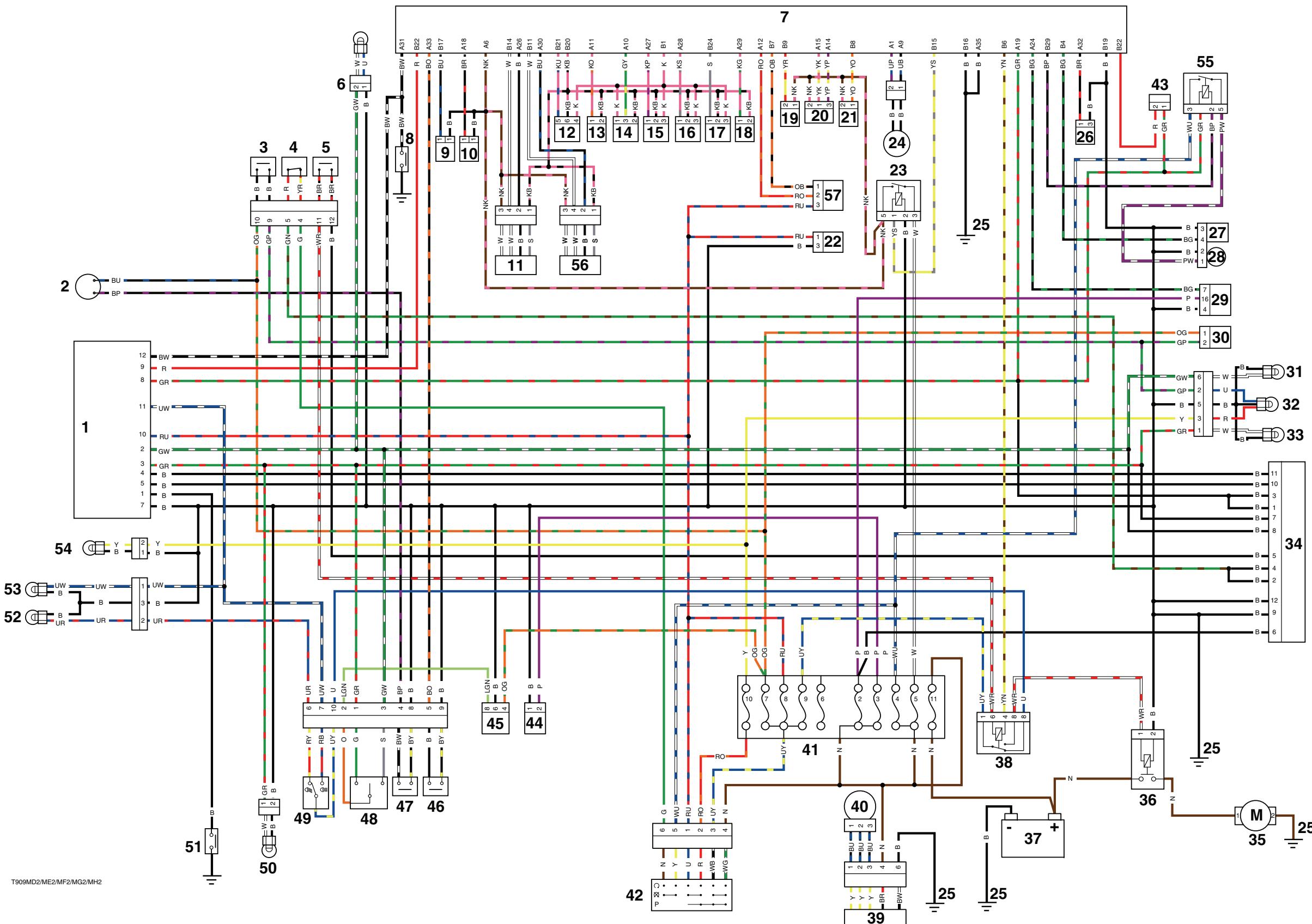
Item Number	Description
1	Instrument assembly
2	Horn
3	Front brake lever switch
4	Engine stop switch
5	Starter button
6	Right hand front indicator
7	Engine control module
8	Neutral switch
9	Ignition coil number 1
10	Ignition coil number 2 (Scrambler only)
11	Oxygen sensor (cylinder 1)
12	Fall detection switch
13	Inlet air temperature sensor
14	Throttle position sensor
15	Ambient pressure sensor
16	MAP sensor left hand
17	MAP sensor right hand
18	Oil temp sensor
19	Purge valve
20	Fuel Injectors 1 & 2
21	Secondary air injection solenoid
22	Accessory tachometer B (Scrambler only)
23	Engine management relay
24	Crankshaft position sensor
25	Engine earth
26	Side Stand switch
27	Fuel level sender
28	Fuel pump
29	Diagnostic connector
30	Rear brake pedal switch
31	Right hand rear indicator
32	Rear light
33	Left hand rear indicator
34	Alarm connector
35	Starter motor
36	Starter solenoid

Item Number	Description
37	Battery
38	Starter relay
39	Regulator/rectifier
40	Alternator
41	Fuse box
42	Ignition switch
43	Accessory tachometer A (Scrambler only)
44	Accessory lights connector
45	Direction indicator control unit
46	Clutch switch
47	Horn button
48	Direction indicator switch
49	Headlight dip switch
50	Left hand front indicator
51	Oil pressure switch
52	Headlight dip
53	Headlight main
54	Position light
55	Fuel pump relay
56	Oxygen sensor (cylinder 2)
57	Instrument warning LEDs (Low fuel & MIL)

Wire colour codes

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 - Complete System - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Cable Driven Speedometer



Electrical & Ignition Systems

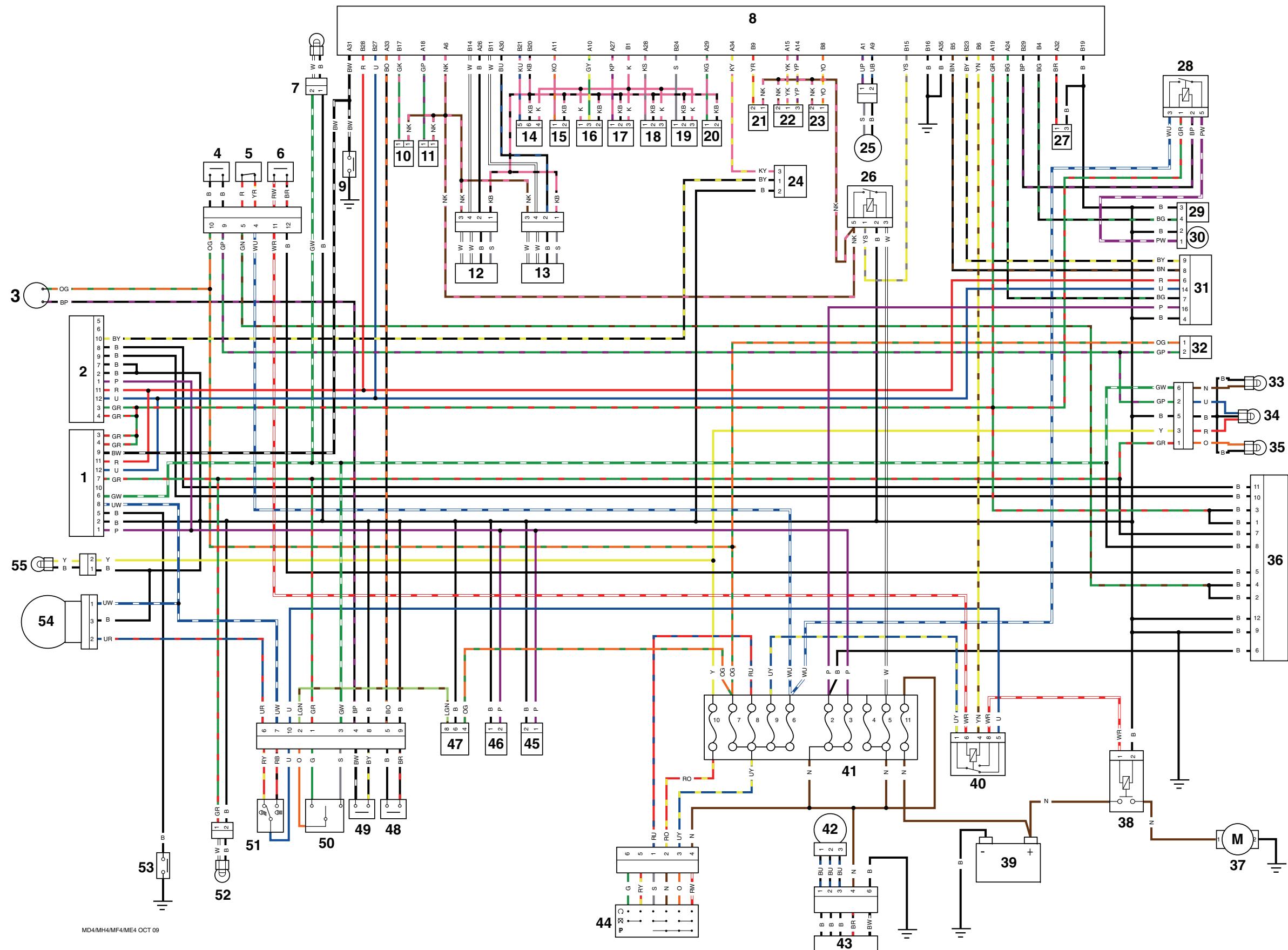
Key to Main Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Electronic Speedometer - Up to VIN 521668

Item Number	Description
1	Instrument - tachometer
2	Instrument - speedometer
3	Horn
4	Front brake lever switch
5	Engine stop switch
6	Starter button
7	Right hand front indicator
8	Engine control module
9	Neutral switch
10	Ignition coil number 1
11	Ignition coil number 2 (Scrambler only)
12	Oxygen sensor (cylinder 1)
13	Oxygen sensor (cylinder 2)
14	Fall detection switch
15	Inlet air temperature sensor
16	Throttle position sensor
17	Ambient pressure sensor
18	MAP sensor left hand
19	MAP sensor right hand
20	Oil temp sensor
21	Purge valve
22	Fuel Injectors 1 & 2
23	Secondary air injection solenoid
24	Vehicle speed sensor
25	Crankshaft position sensor
26	Engine management relay
27	Side Stand switch
28	Fuel pump relay
29	Fuel level sender
30	Fuel pump
31	Diagnostic connector
32	Rear brake pedal switch
33	Right hand rear indicator
34	Rear light
35	Left hand rear indicator
36	Alarm connector

Item Number	Description
37	Starter motor
38	Starter solenoid
39	Battery
40	Starter relay
41	Fuse box
42	Alternator
43	Regulator/rectifier
44	Ignition switch
45	GPS connector
46	Accessory socket
47	Direction indicator control unit
48	Clutch switch
49	Horn button
50	Direction indicator switch
51	Headlight dip switch
52	Left hand front indicator
53	Oil pressure switch
54	Headlight dip/main beam
55	Position light

Wire colour codes	
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 - Complete System - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Electronic Speedometer - Up to VIN 521668



Electrical & Ignition Systems

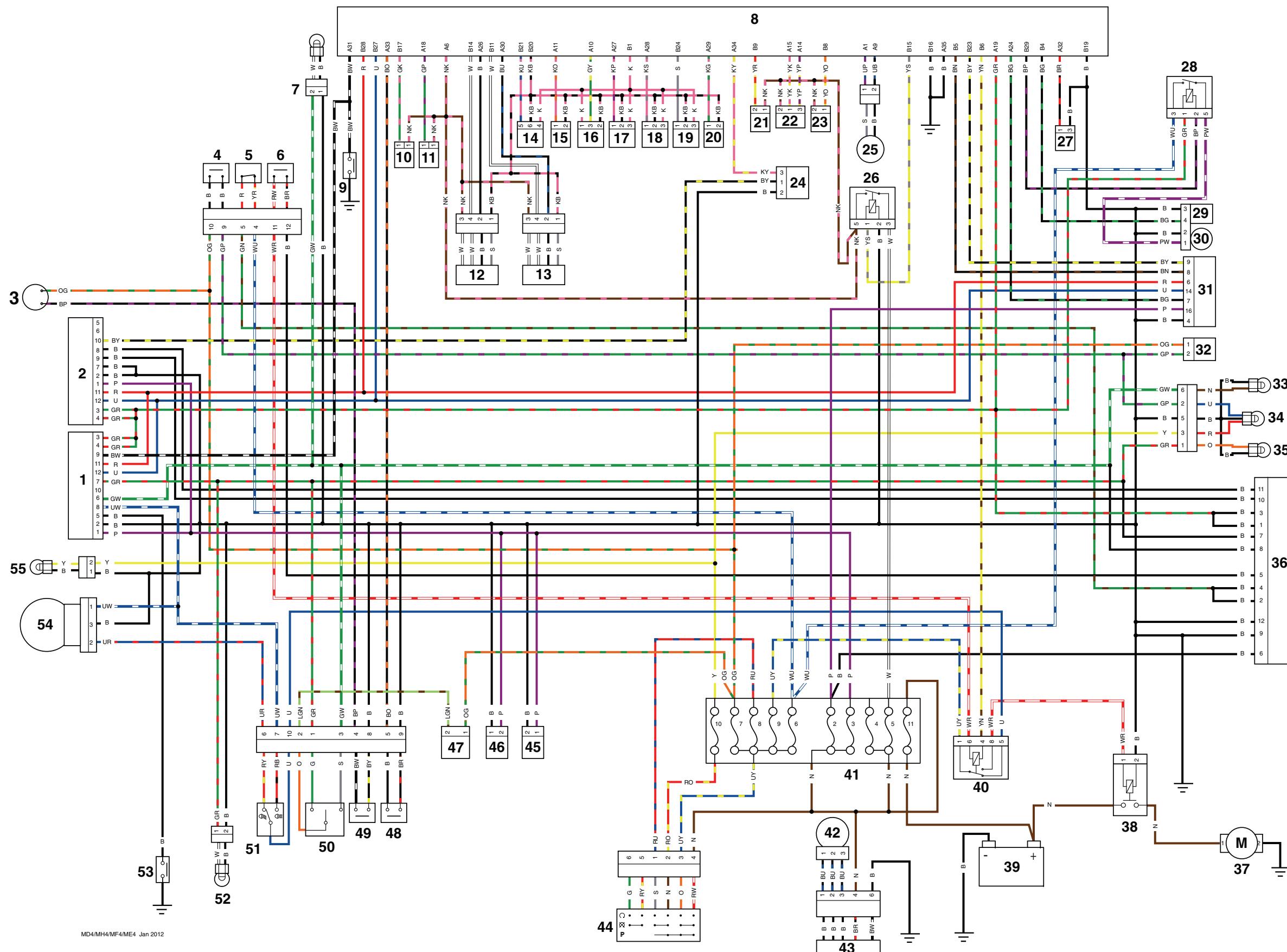
Key to Main Circuit Diagram - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Electronic Speedometer - From VIN 521669

Item Number	Description
1	Instrument - tachometer
2	Instrument - speedometer
3	Horn
4	Front brake lever switch
5	Engine stop switch
6	Starter button
7	Right hand front indicator
8	Engine control module
9	Neutral switch
10	Ignition coil number 1
11	Ignition coil number 2 (Scrambler only)
12	Oxygen sensor (cylinder 1)
13	Oxygen sensor (cylinder 2)
14	Fall detection switch
15	Inlet air temperature sensor
16	Throttle position sensor
17	Ambient pressure sensor
18	MAP sensor left hand
19	MAP sensor right hand
20	Oil temp sensor
21	Purge valve
22	Fuel Injectors 1 & 2
23	Secondary air injection solenoid
24	Vehicle speed sensor
25	Crankshaft position sensor
26	Engine management relay
27	Side Stand switch
28	Fuel pump relay
29	Fuel level sender
30	Fuel pump
31	Diagnostic connector
32	Rear brake pedal switch
33	Right hand rear indicator
34	Rear light
35	Left hand rear indicator
36	Alarm connector

Item Number	Description
37	Starter motor
38	Starter solenoid
39	Battery
40	Starter relay
41	Fuse box
42	Alternator
43	Regulator/rectifier
44	Ignition switch
45	GPS connector
46	Accessory socket
47	Direction indicator control unit
48	Clutch switch
49	Horn button
50	Direction indicator switch
51	Headlight dip switch
52	Left hand front indicator
53	Oil pressure switch
54	Headlight dip/main beam
55	Position light

Wire colour codes	
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 - Complete System - Bonneville, Bonneville SE, Bonneville T100, Thruxton & Scrambler - Fuel Injected Models - with Electronic Speedometer - From VIN 521669



Electrical & Ignition Systems

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