Operator's Manual

MT500E - Maintenance

MT 515E
MT 525E
MT 535E
MT 545E

AutoPower IV - AutoPower VI

Beauvais
AGCO S.A.S. - 41 avenue Blaise Pascal - 60000
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Original Operator's Manual

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CALIFORNIA
Proposition 65 Warning

WARNING: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, or other reproductive harm.

WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash hands after handling.

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1.1 Introduction

1.1.1 Introduction - Safety instructions

Operator's Manual

NOTE: *This Operator's Manual is widely published and distributed and the availability of the attachments indicated, whether fitted to the basic tractor or as an accessory, may vary depending on the country or region in which the tractor is used. To find out which attachments are available in a given region, contact a Challenger dealer.*

The purpose of this manual is to enable the owner and the operator to operate the tractor appropriately under normal conditions of use. Providing they follow the instructions carefully, the tractor will give many years of service in the Challenger tradition.

Use for any other activity (particularly forestry work) is considered to be contrary to the intended use.

The commissioning of equipment by the Challenger dealer on the user's premises enables the dealer to ensure that these operating and service instructions are properly understood. Always consult the Challenger dealer if there is any part of this manual that you do not understand. It is important that these instructions are understood and followed.

This manual does not cover all operation and safety instructions relevant to the implements and accessories that may be fitted at the time of tractor delivery or later. It is essential that operators use and understand the Operator's Manuals relating to these implements and accessories.

IMPORTANT: *This manual must always be kept with the tractor. For extra copies, contact your Challenger dealer.*

This chapter in the Operator's Manual highlights certain basic safety-related situations that may be encountered during normal operation and servicing of the tractor and provides the information needed to handle these situations.

This chapter supplements any safety instructions given in other chapters of this manual.

It may be necessary to take additional precautions, depending on the implements and accessories used and the working conditions on-site or in the service area. Challenger can under no circumstances exercise direct control over the commissioning, operation, inspection, lubrication or servicing of the tractor. It is therefore YOUR responsibility to take suitable safety precautions in such areas.

WARNING:
It is your responsibility to read and understand the instructions that appear in this chapter before using the tractor.
They must then be strictly adhered to throughout the working day.

Servicing, spare parts, accessories and conditions of use

Daily servicing should become a routine, and a logbook of operating hours should be kept.

When spare parts are required, it is important to use only genuine Challenger parts. Challenger dealers supply genuine parts and can offer advice concerning their fitting and use. The use of lower quality parts may cause serious damage. Customers are advised only to purchase their spare parts from an approved Challenger dealer. In the same way, you must only use accessories specifically adapted to your tractor.

Owing to the considerable variation in operating conditions, it is not possible for the manufacturer to formulate complete or absolute assertions in its publications concerning the performance or operating methods of its machines or to accept liability for any loss or damage which may result from such assertions or possible errors or omissions.

If the tractor is to be used in abnormal conditions which could cause damage (use in deep water or in paddy fields for instance), you should consult your Challenger dealer to obtain special instructions to prevent the warranty from becoming void.

These tractors are designed only for usual farming activities (intended use). Use for any other activity (particularly forestry work) is considered to be contrary to the intended use.

Strict compliance with the repairs, service and operating conditions as specified by Challenger is also an essential component of the intended use.

IMPORTANT: *Challenger accepts no responsibility in the event of damage to equipment or personal injury resulting from improper use.*

The tractor must only be used, serviced and repaired by personnel who have full knowledge of its specific features and who are aware of the applicable safety measures (prevention of accidents).

Customers are strongly advised to contact a Challenger dealer in the event of after-sales problems and for any adjustments which may be necessary.

1.2 Safety — Symbols and terms

1.2.1 Safety — Symbols and terms

Signal

This safety alert symbol means CAUTION! BE ALERT! YOUR SAFETY DEPENDS ON IT!

The safety alert symbol identifies important safety notices on machines, safety signs, in instruction books or elsewhere. When you see this symbol, be alert to the risk of injury or death. Follow the instructions in the safety notice.

SAFETY is paramount! Why?

- ACCIDENTS DISABLE AND KILL
- ACCIDENTS ARE COSTLY
- ACCIDENTS CAN BE AVOIDED

Terms

The terms **DANGER**, **WARNING** and **CAUTION** are used with the safety alert symbol. It is essential to learn how to recognize these safety messages and to follow the recommended safety measures and instructions.

DANGER:
indicates an imminently hazardous situation which, if not avoided, will result in DEATH or VERY SERIOUS INJURY.

WARNING:
indicates a potentially hazardous situation which, if not avoided, could result in DEATH or SERIOUS INJURY.

CAUTION:
indicates a potentially hazardous situation which, if not avoided, may result in MINOR or MODERATE INJURY.

The terms **IMPORTANT** and **NOTE** are not directly related to personal safety, but are used to provide additional information and advice on the operation or maintenance of equipment.

IMPORTANT: *identifies specific instructions or procedures which, if not strictly applied, could damage or destroy the tractor, its equipment or the surrounding area.*

NOTE: *identifies points of particular interest for the most effective and suitable operation or repair.*

1.3 Safety decals and instructions

1.3.1 Checking and replacing the safety decals and instructions

WARNING:
Never remove or obscure the safety decals and instructions.

Replace any safety decals and instructions that are illegible or missing. Replacement decals are available from the dealer in the event of loss or damage. If a second-hand tractor has been purchased, check that all safety and instruction decals are correct, legible and in the correct location: To do this, refer to the section on the presentation and location of decals.

1.3.2 Presentation and location of the safety decals and instructions

Fig. 1

	• **4296950M1** ((A)) • **DANGER:** General safety Read the servicing manual and the safety advice before start-up and observe their contents during operation.
	• **4296958M1** ((B)) • **WARNING:** Overturning of the tractor - Roll Over Protective Structure (ROPS) Fasten your seat belt once you are in the seat (operator and instructor) and before the tractor moves.
	• **4296946M1** ((C)) • **WARNING:** Risk of being crushed or run over by the tractor. Stop the engine and remove the key before you commence any maintenance or repair operation.
	• **4297924M1** ((D)) • **DANGER:** Risk of the front loader coming into contact with overhead power lines. Risk of extremely serious or fatal injuries. Tractors fitted with a front loader: Exercise extreme caution to avoid coming into contact with power lines. • Keep a safe distance from the overhead power lines whenever you use the front loader. Refer to any current national regulations concerning safe distances from power lines.
	• **4356345M1** ((E)) • **WARNING:** Possible inhalation of dangerous substances. • Read the instructions in the Operator's Manual and refer to the safety instructions provided by the product manufacturer. Wear personal protective equipment where necessary.
	• **4349217M1** ((F)) • **WARNING:** Towing • Carefully read the specific instructions from the Operator's Manual before towing the tractor.

	• **4352953M2** ((H)) for Deluxe/Premium versions only • **DANGER:** Road safety. • Road traffic: Deactivate the automatic guidance system and the SpeedSteer system.
	• **4350591M1** ((I)) • **WARNING:** Long axle shafts. • Remain at a safe distance from persons and objects when driving with long axle shafts.
	• **523251D1** or **ACW0232290** ((K)) • **DANGER:** Risk of engine explosion. • Never spray ether toward the engine air intake.
	• **4298645M2** ((L)) • **WARNING:** High-temperature liquid in the reserve. Risk of skin burns. Stop the engine, remove the key and wait for the assembly to cool before commencing any maintenance or repair operation.
	• **4296967M1** ((M)) • **WARNING:** Burn hazard – hot surfaces. Keep away from hot engine components when engine has been running. Shut off engine, remove key and wait for system to cool before performing maintenance or repair work.
	• **4296985M1** ((O)) • **DANGER:** Crushing of fingers or hands. • Never work in an area where there is a risk of crushing while parts could move.

	• **ACW0018280** ((P)) • **DANGER:** Explosion hazard. The hydraulic accumulator contains pressurised gas and oil. • The hydraulic accumulator contains pressurised gas and oil. Refer to the instructions in the technical manual when removing and reconditioning.
	• **4375856M1** ((Q)) • **DANGER:** Entanglement hazard in a PTO shaft connected to an instrument. • Do not mount the moving part of the PTO.
	• **4297148M1** ((R)) • **WARNING:** Falling hazard Maintain a safe distance in relation to the tractor.
	• **3786812M1** ((U)) • **WARNING:** Batteries • Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**
	• **4392020M1** ((V)) • **WARNING**: Danger of torso being crushed: force directed sideways. • Remain out of the vertical movement area while the swivel arm is moving.
	• **4392000M1** ((W)) • **DANGER:** Rear overturn hazard Never pull from above rear axle centerline. Consult the Operator's Manual for more information.

	• **4354351M1** ((X)) • **WARNING:** Risk of fire Read the safety instructions in the Operator's Manual.
	• **4296944M1** ((Y)) • **WARNING:** Entanglement hazard in belt drives Keep hands clear of rotating parts and belts while engine is running. Switch off the ignition and remove the key before working on the tractor.
	• **4296971M1** ((Z)) • **WARNING:** Shearing hazard – engine fan. Keep your hands away from the fan and the belts when the engine is running. Shut off engine and remove key before performing maintenance or repair work.

1.4 General safety instructions

1.4.1 Awareness of the safety instructions and symbols

Remember that you alone are responsible for safety. Good safety practices protect not only you, but also bystanders. Before using the tractor, study the instructions given in this book with care, as well as all of the safety decals and instructions fixed to the tractor: Make them an integral part of your safety procedure. Also note all the usual protective measures that should be taken when working and above all, don't forget:

Safety depends on you. You can prevent accidents which could cause serious injury or death.

WARNING:

In some of the illustrations in this book, the safety panels and guards have been removed for reasons of clarity. Never use the tractor if these parts are not in place. If some of these parts have been removed for repair purposes, they must be refitted before use.

1.4.2 Operator familiarity in the use of the tractor

WARNING:
The operator must not drink alcohol or take any medication that may affect his concentration or co-ordination.
If taking medication, whether prescribed or not, the operator must seek medical advice with regard to his ability to operate machinery safely.

Fig. 2

- To be able to use your tractor, it is first necessary:
  - to be familiar with operating an agricultural tractor
  - to have been trained in the operation of the tractor that you have just purchased
  - to have read and understood this entire book — to always consult the dealer as soon as there is any doubt or lack of understanding
  - find out about the rules and safety regulations applicable to the work you are doing. Some regulations specify that no one under the age of 16 may operate power machinery, for example. This includes tractors. It is your responsibility to know what these regulations are and to observe them in the operating area or situation. These rules include, but are not limited, to the safety instructions relating to correct operation of the tractor as described in this book.
- Do not allow children or unqualified persons to operate the tractor.
- Do not allow children to use the instructor seat.
- The instructor seat is only intended for short periods of use.

WARNING:
In poor conditions, slow down and be extra careful, and engage 4-wheel drive if fitted.

It is important to have good knowledge of the operation of the tractor as well as all of its accessories and attached implements.

Remember that rain, snow, ice, loose gravel or soft ground can change the performance of the tractor.

1.4.3 Filling the fuel tank

WARNING:

- **Always switch off the engine before filling up.**
- **Do not smoke while refueling the tractor. Keep away from naked flames .**
- **Proceed with care to prevent any splashes.**

Fig. 3

Filling with DEF

WARNING:
Avoid all contact with the eyes, skin and clothing.

- **Proceed with care to prevent any splashes.**
- **If large quantities of the product are ingested, seek immediate medical attention. Do NOT induce vomiting unless indicated to do so by medical staff. Do not administer liquid to a person who is unconscious.**
- **In case of contact with skin, rinse with plenty of water and remove contaminated clothing.**
- **In case of contact with the eyes, rinse immediately under running water. In the event of irritation, seek medical advice.**
- **If fumes are inhaled, breathe in fresh air and seek medical advice, if necessary.**
- **Prevent DEF from coming into contact with other chemical products.**
- **Urea spillages must not be discharged into the drains.**

Fig. 4

1.4.4 Mounting and dismounting the operator's seat

- Always use three-point contact with the tractor and face the tractor when mounting and dismounting the operator's seat. (Three-point contact means that both hands and one foot or one hand and both feet are in contact with the tractor at all times when getting on and off).
- Clean your shoes and wipe your hands before getting in the tractor.
- Use handrails, grab handles, ladders or steps (if fitted) when getting on and off.
- Do not use the control levers as a handhold.

- Do not step on pedals when getting in and out.
- Never attempt to mount or dismount a moving tractor.
- Never jump off a tractor when it is running except in an emergency.

1.4.5 Mandatory procedure before dismounting the tractor

Before getting out of the operator's seat, whether during the course of or at the end of the working day, always:

Procedure

1. Immobilize the tractor by applying the parking brake or engaging ParkLock in the locked position (closed padlock symbol) (depending on option).

   DANGER:
   Position the shuttle lever or depending on option, the PowerShuttle lever, in neutral position.

2. Immobilize the tractor by applying the parking brake.
3. Disengage the front and rear PTO.
4. Lower the implements to the ground.
5. Switch off the engine (see the Operation chapter of the Operator's Manual). Make sure that the engine is not running at idling speed and that it has stopped.
6. Remove the ignition key.

1.5 Special safety instructions for preparing the tractor for use

1.5.1 Protective clothing

Wear all the protective clothing and equipment with which you are provided or which is appropriate for certain working conditions.

For example, you may need:

- A safety helmet
- Safety glasses
- A protective mask
- Ear protection
- A respirator or filter mask
- Inclement weather clothing
- Reflective clothing
- Gloves suitable for the work to be carried out
- Safety footwear

Fig. 5

DANGER:
Do not wear loose clothing, jewelry or other items and tie up long hair which could catch on controls or other parts of the tractor.

1.5.2 Activated carbon filter information

WARNING:
Due to the risk of contaminants entering the cab when the door is opened to enter or exit, use of a carbon filter is intended to supplement but not necessarily replace the use of personal protective equipment when operating in an environment containing aerosols and/or vapors, such as pesticides.
The specific chemical manufacturer's instructions regarding personal protective equipment (PPE) must be followed. If the cab being fitted with this filter does not already have a safety sign like the one included with this filter, install the safety sign in a prominent place inside the cab in view of the operator.

This filter is designed to reduce the concentration of aerosols and vapors entering the cab. To be effective, it must have an effective seal to prevent leakage around the filter and must be used in a cab air system that does not have leaks, especially in the zone between the filter and the fan. In addition, the cab and its ventilation system must be capable of maintaining a positive pressure inside the cab and an air flow of at least 30 cubic meters per hour (18 cubic feet per minute).

The cab with carbon filter is intended to be used as only one part of a managed system of occupational health and safety, as noted below:

Operator Enclosures as Part of an Occupational Health and Safety Management System (OHSMS)

Many self-propelled agriculture vehicles have operator enclosures (cabs) for comfort and protection of the operator and riders. The cab can provide an effective physical barrier between the occupants and the environment, but that barrier must, by necessity of occupant respiration, allow air to enter and exhaust the cab. This requirement is met by the cab's heating, ventilation and air conditioning (HVAC) system.

The HVAC system should employ a filter through which air entering the cab is first passed for contaminant reduction. Filters should also be provided in the recirculation air-stream to reduce airborne contaminants already in the cab air space. In either application, these filters must be designed specifically for the HVAC system within which they are operating. The filters must also incorporate the correct media required to remove the specific air-born contaminant for which it is being employed.

For such applications, the HVAC system must be of robust design, manufacture and maintenance. In such a system, fresh air and cab pressurization requirements are provided by an air supply drawn through a filter with negligible filter bypass.

Even with an appropriate cab and HVAC system, there are other opportunities for contaminates to enter the cab. While outside the cab, a person can become contaminated on his/her body or clothing. Contaminated objects can be brought into the cab. Another potential for cab contamination exists when doors or windows are open in a contaminated environment.

In any case, whenever the cab interior has been contaminated, the effectiveness of the cab to provide contamination protection will be diminished. Health and safety for agricultural machine operators as well as others working in, on or around these machines can only be addressed through a comprehensive program. Such a program is defined as an Occupational Health and Safety Management System (OHSMS). While cabs may be used as an effective engineering control within an OHSMS, this is not intended to imply that the cab alone is appropriate for any specific application.

That determination can only be made by those responsible for the OHSMS in a specific application. It is the responsibility of those charged with managing the use of the vehicle on which the cab is attached to define and manage an appropriate OHSMS, and ensure that all federal, state and local regulatory requirements are followed.

Cabs should not be used as a replacement for any other engineering control or PPE that has been specifically required by federal, state or local regulatory authorities.

Hierarchy of Controls

The Hierarchy of Controls, in their preferred order of action:

1. Elimination
2. Substitution of less hazardous materials, processes, operations or equipment
3. Engineering controls
4. Warnings
5. Administrative controls
6. Personal protective equipment (PPE)

Continuous Improvement Cycle

Cabs should only be used to control operator air contaminant exposures within an OHSMS. This management system must consider occupational safety and health as a continuous improvement cycle that includes these on-going processes:

1. Management, Leadership and Employee Participation: This step in the cycle involves the formulation of the management system, the establishment of policy, statements of responsibility and the integration of the employees into the management system.
2. Planning: This step is based upon initial and going reviews of the management system and numerous factors affecting occupational safety and health within an organization. Included in these reviews is a review of the hazard, risks and controls and data collected to evaluate the hazards and the efficacy of the control measures. In explanatory comments, exposure measurements are included as part of the assessment processes. The results of audits and measurements are also to be reviewed.
3. Implementation and Operation: This section describes the organization components of a occupational safety and health program. It describes the hierarchy of controls mentioned above and several broad classes of management function. Among these requirements are employee training and evaluation of employee training. Furthermore, this section requires a written, clearly documented occupational safety and health program.
4. Evaluation and Corrective Actions: The section specifically requires management processes to monitor and evaluate hazards, risks and their controls. Explanatory comments note that this includes quantitative measures of worker exposure. Practically, this involves physically testing the efficiency of the cab being used as an engineering control within an OHSMS.

5. Management System Review: Management is required to review the management system to ensure its suitability, adequacy and effectiveness. This cycle includes provisions for exposure monitoring and the monitoring of control measure performance. It is the responsibility of the manager of the safety and health program to determine how worker exposure to air contaminants and other hazards are to be controlled. It is also the responsibility of this manager to take whatever actions are needed to control work-place hazards. This includes but is not limited to exposure assessment, audits of varies programs such respiratory protection, ventilation system maintenance, etc.

Limitations of Cabs Used in Hazardous Environments:

While it may seem that respiration (breathing) exposure would present the greatest risk for personal exposure to contaminants, this is not the case when working with pesticides. The most prevalent method of exposure for applicators and those working around agricultural pesticides is through dermal (skin) contact.

Dermal contact with contaminants may occur directly from air-borne contaminants. It may also happen when contaminants are transferred from one object to another or when air-borne contaminants settle on objects that are subsequently contacted. Any surfaces in or out of the cab that have been contaminated are potential hazards for dermal exposure.

Within the cab, seats, upholstery, controls and other surfaces that become contaminated will pose such a hazard. In addition to dermal exposure, a contaminated cab interior will also pose a respiration hazard as the contaminant may, after settling on a surface, become air-borne once again whereby it may be inhaled.

Recirculation filters can be used to help reduce these contaminates from the cab interior air space. When a vehicle is operated in an environment where air-born contaminants exist, the cab can be an effective engineering control for reduction of exposure risk to persons within it.

In order for a cab to be used for this purpose, it must be of appropriate design. It must also be manufactured, maintained, tested and operated according to the specific requirements defined by evaluation of the hazards.

No cab should ever be considered an effective engineering control unless it has been qualified as such within a comprehensive OHSMS. While the cab manufacturer can design and manufacture a cab to physical specifications, the cab manufacturer can not qualify the cab as an appropriate engineering control for any specific application.

Site-specific information is needed to evaluate the appropriateness of control measures. To use the cab to control hazards, the managers of the OHSMS must carefully consider and evaluate the effectiveness of all engineering controls in their specific application.

The Cab as an Engineering Control

The engineering control requirements of the respiratory protection regulation may be fulfilled by the application of a cab, but this can only be done properly within an OHSMS. Elements of such a program are:

1. Assessment of the hazard with identification of the risk involved.
2. A survey of the machine and the cab involved in the hazardous operation.
3. Reviewing the cab ventilation system and the filter to ensure the filter provides the reduction in contaminants required.
4. Defining how long the filter can be used in this application.
5. Testing the cab ventilation system to ensure it provides the protection required for the operation to be performed. This also includes a review of any monitoring equipment to ensure it is working properly.
6. Repair and/or replacement of any defects or defective equipment found.
7. Retesting of the cab air system as required.
8. Recording in the appropriate log book all information regarding the test results, and repairs and replacement of parts and/or components.
9. Assessment of the effectiveness of the program at a specified time in the cycle of the activity.

1.5.3 Safety devices and items

Ensure that all safety devices and items are fitted as required and are in good condition.

WARNING:
The location of all these safety devices and items must be known and their use mastered. Never take off, remove or disconnect any of them.

Standard safety devices and items according to country regulations

- ROPS (Roll Over Protective Structure)
- Seat belt
- Power take-off guard
- SMV warning triangle
- Signaling lights
- Safety signs
- Fire extinguisher
- First aid kit

WARNING:
Also make sure you know the emergency numbers.

Fig. 6

Additional devices and items

Depending on the work to be carried out, other safety devices and items may be required; for example, guards or additional lights and signs.

1.5.4 Checking the tractor

Check the tractor and ensure that all systems are in good operational condition before beginning the working day. Pay particular attention to the points mentioned below.

- Check for loose, broken, missing or damaged parts. Ensure that everything has been properly repaired.
- Check that the seat belt is in good condition. If it is not, replace it.
- Check that implements are correctly installed.
- Check that the PTO output speed is in keeping with the implement PTO input speed.
- Ensure that all PTO shaft locking devices are engaged.
- Ensure that the tractor PTO guard and the shaft guards are in place and operating correctly.
- Check to ensure that the tractor is correctly balanced.

WARNING:
An unbalanced tractor could overturn and cause serious injury or death.
Ensure that front frame counterweights, wheel weights and wheel ballasts are used as recommended by the manufacturer. Do not add extra counterweights to compensate for an overloaded tractor; the load must be reduced instead.

- Check the condition and pressure of tires (absence of cuts and bulges). Replace worn or damaged tires.
- Check the correct operation of the brake pedals and the parking brake. Adjust if necessary.
- Check the hydraulic system for the tractor and the implement as well as the tractor fuel system: Correct tightening of all the unions; no damage to the lines, pipes and hoses; hydraulic systems do not cross one another.

WARNING:

Leaks of pressurized fluid may not be visible. Diesel fuel or hydraulic fluid under pressure can penetrate the skin or eyes and cause serious physical injury, blindness or death. Use a piece of cardboard or wood to detect leaks. DO NOT USE YOUR BARE HANDS. Wear safety goggles for eye protection. If any fluid penetrates the skin, seek medical advice within a few hours from a doctor familiar with this type of injury.

Fig. 7

WARNING:
Release the pressure of the hydraulic or fuel systems before disconnecting them.

- Have any leakages or damaged parts repaired or replaced. Do this before each working day
- Check the engine cooling system and add coolant if required.

WARNING:
The liquid cooling system builds up pressure as the temperature increases. Stop the engine and let the system cool before removing the radiator filler plug.

- All maintenance procedures must have been complied with.
- Check that the weight of the tractor/implement assembly is less than the tractor total permissible load.

1.6 Specific safety instructions for starting the tractor

1.6.1 Protection of persons other than the operator

Procedure

1. Before starting up, walk all the way round the tractor and any attached equipment. Ensure that no one is under it, on it or close to it.
2. Warn anyone nearby that the tractor is about to start.
3. Only start up if there is nobody in the vicinity of the tractor/implement assembly. Pay particular attention to looking out for children.

1.6.2 Start up safely

General instructions

WARNING:

Before starting the engine, ensure there is plenty of ventilation in the area. The exhaust fumes may cause asphyxiation. Do not operate the engine in an enclosed space.

IMPORTANT:

For tractors equipped with an electromechanically controlled brake on the steering column (ParkLock) For safety reasons, when the engine is stopped, the ParkLock engages automatically regardless of the position of the control. After the engine is started, it is necessary to initialise the ParkLock control in order to deactivate it. If this is not carried out, when a gear is shifted, a beep will sound and the padlock symbol on the instrument panel indicates that the ParkLock remains engaged.

- Always start the engine from the operator's seat.
- Adjust the seat before using the tractor to ensure it is correctly positioned in relation to the controls and to minimize vibration (see description of seat).
- For road use, ensure that the tractor brake pedals are locked together.
- Fasten the seat belt.
- Check that the parking brake is applied or that ParkLock is engaged.
- For tractors with a PowerShuttle, position the PowerShuttle lever in neutral.
- For tractors with mechanical reverse shuttle, position the reverse shuttle lever and the gear shift lever in neutral.
- Deactivate the power take-off (PTO) controls.
- Follow the start-up procedures described in the chapter Operation of this book.

DANGER:
Start the engine with the ignition key and from the operator's seat only.

Do not attempt to start the engine by short-circuiting the starter terminals: The tractor may start in gear and this can cause serious injury or death to anyone in the vicinity.

Fig. 8

Starting assistance

WARNING:
Never use any starter fluid or aerosol sprays.

This could cause an explosion and very serious injuries.

Fig. 9

1.6.3 Starting the tractor with jump start cables

IMPORTANT:

- *Do not attempt to boost a damaged battery.*
- *Do not touch the connectors on the jump start cables.*
- *Do not allow your body to touch the vehicle (chassis frame) when making the connections.*
- *Do not use a damaged battery or a damaged booster.*
- *Only use a battery or a booster with a similar voltage.*
- *To avoid accidental hazards when working near the battery, remove all jewellery or metal accessories, such as rings or bracelets.*
- *Do not disconnect the damaged battery — this can damage the vehicle's electrical system.*

Procedure

1. The ignition key must be in the OFF position.

ATTENTION:
The tractor engine must not start up or move accidentally.

2. Connect the clamp of the red cable to the positive terminal (+) of the flat battery.

3. Connect the other clamp of the red cable to the positive terminal (+) of the battery in good condition or to the positive terminal (+) of a recovery vehicle.

4. Connect the clamp of the black cable to the negative terminal (-) of the battery in good condition.

5. Finally, connect the other black clamp to any part of the engine block or chassis frame (metal part).

ATTENTION:
To avoid the risk of a spark and potential explosion due to hydrogen from the battery, never make this final connection to the negative terminal (-) of the damaged battery.

6. Leave the flat battery to recharge for a few minutes, or even longer if possible, before attempting to start.

7. Start the engine of the vehicle. Once started, leave the engine running for a few minutes.

8. Without turning off the engine you have helped to start, disconnect the jump start cables from the battery or the booster in reverse order.

ATTENTION: *At the end of the operation, make sure that the red and black cables do not touch each other when they are still connected to a battery.*

IMPORTANT: *Corroded battery terminals may interfere with, or even prevent the tractor from starting.*

1.6.4 Checks to be carried out after start-up

Controls and indicator lights

After having started the engine, check all the controls and all the indicator lights again. Ensure everything is functioning correctly.

WARNING:
In case of malfunction of a control or an indicator light, resolve the problem before using the tractor.

Mastering of the tractor

Move slowly until you are sure that everything is operating correctly. Be certain that you have full control of the steering and brakes. If the differential is locked, unlock it before continuing your route.

1.7 Specific safety instructions for using the tractor

1.7.1 General instructions

- Tractors and implements are not toys. Always comply with the conditions of use defined by the manufacturers.
- Never bring a heat source close to the tractor.
- Never exceed the tractor total permissible weight.
- When using the tractor, always consider the fact that the centre of gravity of the tractor/implement assembly changes according to the load being transported or towed.
- Check that the emergency exits open correctly.
- Check to ensure that the tractor is correctly balanced.

WARNING:
An unbalanced tractor could overturn and cause serious injury or death.
Ensure that front frame counterweights, wheel weights and wheel ballasts are used as recommended by the manufacturer. Do not add extra counterweights to compensate for an overloaded tractor; the load must be reduced instead.

- Check that the PTO output speed is in keeping with the implement PTO input speed.
- Keep all parts of your body inside the safety zone defined by the ROPS arch for platform tractors.
- Operate the controls smoothly — do not jerk the steering wheel or other controls.
- Always operate the controls from the operator's seat.
- Keep a firm grip on the steering wheel at all times, with your thumbs clear of the spokes when driving the tractor.
- Operate the tractor smoothly: avoid jerky turns, starts or stops.
- Do not turn at high speed.
- Avoid driving close to ditches and banks.
- Avoid slopes that are too steep.
- Reduce speed when negotiating turns and slopes and on rough, slippery or muddy surfaces.
- Carefully observe the areas surrounding the route.
- Never remain, or allow anyone else to remain, between the tractor and the towed or trailed vehicle when the tractor is in use.
- Ensure that you have adequate clearance in all directions for the tractor and the implement.
- When using chemicals, follow the chemical manufacturer's instructions for use and storage carefully.
- Adapt the tractor speed according to visibility, weather conditions and the type of terrain.

WARNING:
If a part breaks, loosens or does not operate correctly:

- **stop work**
- **Immobilise the tractor using the park brake or ParkLock**
- **switch off the engine**
- **check the machine and make the necessary adjustments and repairs before resuming work.**

DANGER:
Do not attempt to unplug the hydraulic connections or adjust an implement with the engine running or the PTO in operation.
To do so may result in serious injury or death.

1.7.2 Protection of persons other than the operator

WARNING:

A tractor is a machine with a single operator. Do not permit anyone to ride on the tractor or implements, including trailers, unless the implements are specially designed to carry passengers during field work. In the latter case, transport is permitted only for field work, but not for traveling on the road. In all cases, never allow a child to ride on the tractor or implements.

Fig. 10

- When operating, attention to the environment of the tractor/implement assembly.
- Never lift loads above someone.
- Do not allow anyone to stand or pass in front of, under or behind an implement.

Fig. 11

- Do not allow anyone to stand between the tractor and the implement.
- Keep other people away from the working area.
- Beware of the load and implement falling in the event of unexpected lowering of the loader.

1.7.3 Overturning

Overturning angle

DANGER:
For your safety, never exceed the maximum angle limits listed in the table below.

NOTE:
These angle limits assume a maximum oil level in the rear axle.
The recommendation is to add 15 liters of oil when working on maximum-gradient slopes.

Models	Speed	Maximum angle: Roll/pitch/combined
AutoPower IV	>15 kph	15°/15°
	<15 kph	22°/22°
AutoPower VI	>15 kph	15°/15°
	<15 kph	22°/22°

WARNING:
The following list is not exhaustive.
Do not use the tractor beyond its ground gradient and stability limits, as indicated later in this manual. Exceeding these limits may cause overturning or tipping of the tractor. Follow the recommendations provided in this Manual when driving down slopes with the tractor loaded.

- **Do not use the tractor near or on the edges of channels or streams or on banks and borders dug by rodents. The tractor may overturn and tip**
- **Do not use the tractor on unstable footbridges and fragile platforms. These structures may collapse and cause the tractor to overturn. Always examine the condition and the permissible load of bridges and ramps before crossing.**
- **Do not use the tractor without a safety belt system during operations that involve a risk of tilting or overturning.**
- **Do not use the tractor beyond its dynamic stability limits. High speed, abrupt maneuvers and sudden, tight turns increase the risk of overturning.**
- **Do not use the tractor for towing if you do not know whether the load will yield, for example for transporting stumps. The tractor is at risk of tipping backward if the stumps are impossible to tow.**
- **Exercise extreme caution when working with the tractor on forage silos without concrete walls.**
- **Do not forget that the tractor center of gravity may increase when loads on the front loader or the three-point hitch are lifted. In these conditions, the tractor may overturn earlier than expected**

Procedure to follow if the tractor overturns

If the tractor should overturn, keep the safety belt fastened, hold the steering wheel firmly and do not attempt to leave the seat until the tractor has come to a complete stop.

For tractors fitted with a cab, if the doors are obstructed, leave through the rear window or roof hatch.

Fig. 12

Preventing a lateral overturn

- Set the track width to the most appropriate width for the work being carried out.
- Lock the brake pedals together before driving at transport speed.
- Adapt the tractor speed according to visibility, weather conditions and the type of terrain for the implement in use.
- If the tractor is fitted with a front-end loader, carry the bucket and load as low as possible.

- Make wide turns at reduced speed.
- Do not allow the tractor to bounce as this may cause you to lose control.
- Never exceed the tractor total permissible weight.
- Do not brake suddenly. Apply brakes smoothly and gradually.
- **WARNING:**

  Risk of overturning. Do not disengage the clutch or attempt to shift gear after you have started downhill.

  When driving down a slope, use the engine brake to slow the tractor down and choose the same gear ratio as used when climbing a slope.
- Engage four-wheel drive (if fitted) to enable four-wheel braking.
- Do not work near the edge of ditches and banks as there is a risk of them collapsing. The tractor must always be kept a distance from the edge that is equal to or greater than the height of the bank or ditch .

Fig. 13

Preferably, climb or descend a slope in a straight line, but do not cross it. When this is not possible, adhere to the following precautions:

- Avoid holes and dips when driving downhill
- Avoid stumps, stones and raised areas when driving uphill
- when turning, avoid turning toward the top of the slope; always slow down and take a wide turn
- keep the heavier end of the tractor facing toward the top of the slope when driving up and down it.

When driving across a slope with a tractor fitted with implements on one side, these implements must:

- always be facing toward the top of the slope
- never be raised,
- be left as close as possible to the ground

When towing a load at road speed, lock the drawbar in the center position and use a safety chain.

Do not use the tractor to round up livestock.

Preventing a rear overturn

- **WARNING:**

  Risk of overturning. Hitching a load to the rear axle or on any other part located above the rear axle may cause a rear overturn.
- Do not pull anything using the top link connection or from any point above the center line of the rear axle. Always use a Challenger-approved drawbar and only use a lockable drawbar pin.
- When using a drawbar for a three-point hitch, use the stabilizers and keep the drawbar in the bottom position.
- Use front weights to increase tractor stability when towing heavy loads or to counterbalance the weight of a heavy rear-mounted implement.
- Start off slowly and then gradually increase speed.
- Do not release the clutch suddenly.

- If a heavy load or immovable object is attached to the tractor, incorrect use of the clutch may cause the tractor to overturn.
- If the front end of the tractor starts to lift, disengage the clutch.
- If the tractor is bogged down in mud or frozen to the ground:
  - Do not attempt to drive forward as the tractor could then rotate around its rear wheels and overturn
  - Lift any attached implements and attempt to reverse If this is not possible, tow the tractor out with another vehicle.
- If the tractor is stuck in a ditch, if possible, attempt to reverse out. If you must go forward, do so slowly and carefully.
- A bare tractor or a tractor fitted with a rear implement must climb a slope in reverse gear and descend the slope in forward gear.
- A tractor fitted with a full loader at the front must climb a slope in forward gear and descend the slope in reverse gear. The loader must be kept as close to the ground as possible.
- Always engage a gear when driving downhill. Do not allow the tractor to coast down the slope with the clutch disengaged or the transmission in neutral.
- When parking on a slope, turn the wheels in the opposite direction to the slope.

1.7.4 Tractor towing

Comply with the instructions described in the "Operation" chapter of this book.

1.7.5 Regulatory data on maximum permitted trailed weights

Drawbars and towing equipment

IMPORTANT:
Before attaching a trailed implement, read the following carefully.

Maximum permitted towed weight

The equipment identification number plate provides important information on tractor and towed equipment weight combinations. The figures represent the maximum weights authorized for the vehicle and towed equipment which should not be exceeded so as not to affect tractor safety.

Fig. 14

Before transporting towed equipment, read the equipment's Operator's Manual. Check that the equipment is properly installed, find out how to safely transport it, and determine the maximum permitted transport speed. Check that the tractor/towed equipment combination is in compliance with local and national legislation.

Never transport at speeds higher than the equipment's maximum transport speed. By exceeding the maximum transport speed of the equipment, there is a risk of reducing the braking performance and/or losing control of the tractor and its towed equipment.

Unless otherwise specified by the equipment manufacturer or the legislation, observe the following rules when towing.

For towed equipment:

Do not tow equipment:

- Without brakes and which, when fully loaded, weighs over 3000 kg (6614 lb)
- With independent brake and which, when fully loaded weighs over 6000 kg (13228 lb)
- With overrun brake and which, when fully loaded weighs over 16000 kg (35274 lb)
- With assisted braking (hydraulic or pneumatic) and which, when fully loaded, exceeds 32000 kg (70547 lb)

Total permitted weight of tractor-implement combination

	Weight technically permissible for the tractor/trailer assembly		
	MT515E AutoPower IV/ MT525E AutoPower IV AutoPower VI/ MT535E MT545E AutoPower VI **40 km/h (25 mph) Standard braking**	**MT525E MT535E MT545E AutoPower VI** **40 km/h (25 mph) High-pressure braking**	**MT525E MT535E MT545E AutoPower VI** **50 km/h (31 mph)**
With trailer without brakes	12250 kg (27006 lb)	14000 kg (30864 lb)	12250 kg (27006 lb)
With trailer equipped with independent brake	15250 kg (33620 lb)	17000 kg (37478 lb)	15250 kg (33620 lb)
With trailer equipped with overrun brake	25250 kg (55666 lb)	27000 kg (59524 lb)	25250 kg (55666 lb)
With trailer with hydraulic braking	41250 kg (90940 lb)	43000 kg (94798 lb)	41250 kg (90940 lb)

Load and ballast distribution per axle

Axle load distribution

		4-wheel drive	
		MT515E/MT525E/MT535E/MT545E	
Weights of unladen vehicle based on optional equipment		min.	max.
		5900 kg (13007 lb)	8000 kg (17637 lb)
Total weight distribution	Front axle	2400 kg (5291 lb)	3600 kg (7937 lb)
	Rear axle	3600 kg (7937 lb)	5200 kg (11464 lb)

Ballast distribution per axle

		4-wheel drive		
		MT515E AutoPower IV/MT525E AutoPower IV AutoPower VI/MT535E MT545E AutoPower VI **40 km/h (25 mph) Standard braking**	**MT525E MT535E MT545E AutoPower VI** **40 km/h (25 mph) High-pressure braking**	**MT525E MT535E MT545E AutoPower VI** **50 km/h (31 mph)**
Maximum technically permissible loaded weights of the vehicle		9250 kg (20393 lb)	11000 kg (24251 lb)	9250 kg (20393 lb)
Maximum distribution of weight per axle	Front axle	5400 kg (11905 lb)	5400 kg (11905 lb)	5400 kg (11905 lb)
	Rear axle	8000 kg (17637 lb)	9000 kg (19841 lb)	8000 kg (17637 lb)
Minimum percentage of maximum permissible distribution of weight between axles	Front axle	58%	49%	58%
	Rear axle	86%	81%	86%

When ballasting the tractor, observe the following conditions:

- The minimum load on the front axle must be more than 20% of the unladen tractor weight.
- The load capacity of the rear tires must be taken into account. Do not overload the rear axle. (Refer to the load capacity table).

1.7.6 Road use

WARNING:
Never allow any passengers to ride on the tractor and implements.

WARNING:
Do not use the work lights when traveling on a road because rear white lights are illegal except when reversing and may confuse following drivers.

WARNING:
When using a towed vehicle ensure you are always outside of the area lying between the tractor and the towed vehicle.

- Ensure that all clearance flags and rotary beacons that indicate an abnormal load are in position and are in working order.
- Clean all the reflectors and the front and rear lights. Ensure that they are visible and in working order.

- Ensure that the tractor and implements are fitted with SMV warning triangles and other markings recommended to improve visibility when driving on roads (unless the regulations state otherwise).

Fig. 15

- Place all implements in the transport position (as specified in the national road traffic regulations) so that they take up minimum space and lock them in position.
- Lock the brake pedals together.
- Disengage the power take-off and the differential lock.
- Observe all current local and national regulations regarding the use of a tractor on the road.
- Depending on the equipment fitted to the tractor and unless regulations state otherwise, use the rotary beacons or the hazard warning lights day and night.
- Familiarize yourself with the road you will be traveling on.
- Exercise the utmost caution when driving on snow-covered or slippery roads.
- Wait for traffic to clear before entering a public road.
- Beware of blind intersections: Slow down until you have a clear view.
- Do not attempt to push your way through at any intersection.
- Slow down for turns and curves.
- Make wide turns at a moderate speed.
- Signal your intention to slow down, stop or turn.
- Shift to a lower gear before going up or down hills.
- Always drive the tractor in gear. Do not coast with the clutch disengaged or transmission in neutral.
- Do not overlap the lane of traffic for vehicles traveling the other way.

  Stay in your lane, as close as possible to the roadside.
- If a traffic jam forms behind the tractor, pull off the road and allow the vehicles behind to pass.
- Drive carefully. Anticipate what other drivers might do.

If towing a load

- Always anticipate obstacles, especially if the trailed implement is not fitted with brakes.
- Start braking much earlier than usual and slow down gradually.
- Ensure that the load is not concealing the lights or the rotary beacons.
- Take account of your load, especially for high obstacles.

1.7.7 Parking brake

If the brakes fail and in an emergency situation, use the park brake located to the left of the operator.

NOTE:
For tractors equipped with a ParkLock, this function acts as a parking brake. Its control is located on the steering wheel.

IMPORTANT:
If the brakes fail, contact your dealer to resolve the problem.

Fig. 16

1.7.8 Power take-off

DANGER:

Do not attempt to unplug the hydraulic connections or adjust an implement with the engine running or the PTO in operation. To do so may result in serious injury or death. To avoid any accidents, do not stand on the implement or between the implement and the tractor when external linkage or PTO controls are being used.

- Ensure that all the PTO shaft guards are in place and check the presence of all safety decals .

Fig. 17

- Ensure that the PTO cap (1) is fitted when the PTO shaft is not in use .
- Before hitching, unhitching, cleaning or adjusting the implements driven by the PTO, follow the "mandatory procedure before dismounting the tractor" .
- Ensure that there is nobody in the vicinity of the implement before engaging the PTO.
- For stationary PTO operation, place the transmission lever and/or the shuttle lever (both if the tractor is fitted with them) in neutral, apply the hand brake or engage ParkLock (depending on option) and chock the wheels of the tractor and the implement.

Fig. 18

- Do not use PTO adapters, reducers or extensions as they extend the PTO coupler beyond the protection offered by the guard.

(1) Correct assembly
(2) Incorrect assembly

IMPORTANT:
To prevent any rotation problems or damage to the PTO guard, observe the correct fitting position of the transmission shaft.
Make sure that the shaft does not collide with the surrounding area when the implement hitched to the tractor moves (this is a particular risk for short type 3 PTO shafts with a shield measuring 290 mm (11.4 in) wide, as this limits the space available for the assembly).

Fig. 19 Transmission shaft

1.7.9 Implements

WARNING:
The special implements are not supplied with the tractor.

Tractors and implements are not toys. Always comply with the conditions of use defined by the manufacturers.

DANGER:
To avoid serious injury or death due to falling loads resulting from inadvertent raising or roll-back of the loader, do not connect loader hydraulics to any tractor auxiliary valve that has detents which cannot be locked out or removed, except for the float function in the loader lower circuit.
If the tractor is equipped with such a valve, a dedicated, properly configured loader valve must be installed.

DANGER:
A front-end loader with a bucket or forks must be fitted with a holding device.
This device must prevent the load (bales, fence posts, rolls of fence, wire, etc.) from rolling down the length of the loader arms when the loader is raised, as it could crush the operator.
Objects that are incorrectly secured may also fall and injure people in the vicinity of the tractor.

- When using a loader, avoid sudden stops, starts, turns or changes in direction. Keep loads close to the ground when transporting.
- Never lift loads above someone.
- Implements fitted to the three-point hitch or to the side of the tractor make a much larger arc when turning than trailed implements. Ensure there is enough room to maneuver in complete safety.
- Always use implements suitably adapted to the desired conditions of use (load to transport, speed, slope etc.) to ensure that work is carried out in complete safety.
- Always read the implement instruction books fully for implements to be used with the tractor and comply with the safety instructions they contain. If these instructions cannot be observed in full, do not use the tractor fitted with the machine or trailer.
- Do not modify nor remove any parts of an implement.
- Do not touch the mechanism of an implement nor lean over it or attempt to reach it. Do not allow anyone else to do this either.
- Do not allow anyone (including yourself) to stand or pass in front of, under or behind an implement.

- If the tractor is not immobilized in accordance with the mandatory procedure before dismounting the tractor, never stand or allow any person to stand between the tractor and the implement.
- Always use implements that are capable of safely carrying the load that you wish to place in it.

  (See the information on the name plate and the chapter about the hitch.)
- Do not overload a trailed implement. Use appropriate weights to maintain tractor stability.
- The top link and the lift rods must never be taken beyond the point where the thread starts to appear.
- When using chemicals, follow the chemical manufacturer's instructions for use and storage carefully.
- All trailed implements and trailers should be connected to the tractor by a safety chain (1) .

  Should a trailed implement accidentally become separated from the drawbar during transport, this safety chain will help to retain the trailed implement. Using the appropriate adapter parts, attach the chain to the tractor's drawbar anchor or any other specified anchor point. Leave only enough slack in the chain to allow for maneuvering.

  The safety chain must have a strength equal or greater than the weight of the trailed implement: Contact your Challenger dealer to obtain a suitable chain.
- Only tow using the drawbar. Attaching the trailed implement to another location could cause the tractor to overturn.

Fig. 20

Fig. 21

Towing: permissible load and speed

WARNING:

The stopping distance increases with the speed and weight of the trailed implements, and also on a slope. Whether they are fitted with a brake system or not, trailed implements that are too heavy for the tractor or that are towed at too high a speed may lead to a loss of control. Take account of the total weight of the trailed implement (including the load).

The maximum permitted trailed weights are indicated on the name plate. In particular, comply with the following loads:

- Trailed weight without brakes: 3000 kg (6614 lb)
- Trailed weight with independent brake system: 6000 kg (13228 lb)
- Inertia braked trailed weight: 16000 kg (35274 lb)
- Trailed weight with braking assistance (hydraulic or pneumatic): 32000 kg (70547 lb)

Towed equipment without brakes:

Do not tow equipment that does not have brakes:

- at speeds of more than 32 km/h (20 mph); or
- at speeds above those recommended by the manufacturer; or
- with a weight that is greater than 1.5 t (1.65 US ton) when fully loaded and is more than 1.5 times the mass (weight) of the tractor.

Towed equipment with brakes:

Do not tow equipment that has brakes:

- at speeds of more than 50 km/h (31 mph); or
- at speeds above those recommended by the manufacturer; or
- with a mass (weight) more than 4.5 times the mass (weight) of the tractor when fully loaded;
- at speeds of more than 40 km/h (25 mph) if, when fully loaded, it has a mass (weight) more than 3.0 times the mass (weight) of the towing unit.

1.7.10 Front-end loader

WARNING:
The tractor must be fitted with a FOPS (Falling Object Protection Structure) roof if using a loader.
The programmable functions of the joystick or any other control MUST NOT be used to operate a loader. In order to prevent involuntary loader movement, the loader joystick controller must be of the self-cancelling type. When the operator releases his grip on the joystick, the joystick must return to a non-operational neutral position - except for float detent position in the loader lower direction.
Always read the implement instruction books fully for implements to be used with the tractor and comply with the safety instructions they contain.
For the attachment points, refer to the specifications chapter.

DANGER:
The use of front-end loaders involves the risk of falling objects; if used for forestry work there is a risk of objects penetrating into the passenger compartment.
This tractor is not designed for forestry applications; its use is prohibited unless a FORESTRY KIT is installed.
Contact the dealer to find out if a forestry kit is available for this tractor model.
Only a specific forestry kit can provide the necessary protection against falling trees and the penetration of objects.

Protection offered by the FOPS roof of the tractor

WARNING:

The use of sprayers fitted on the tractor or towed involves the risk of exposure to hazardous substances. The FOPS roof does not guarantee protection against dust, aerosols and fumes. In the event of application of crop protection products (e.g. pesticides, fungicides, herbicides etc.), see the chemical manufacturer's instructions as well as those supplied by the sprayer manufacturer. Personal protective equipment should be used if it is recommended by these instructions for tractors without a cab.

1.8 Specific safety instructions for servicing the tractor

1.8.1 Pollution warning to observe when servicing the tractor

IMPORTANT:
It is illegal to pollute drains, water courses or soil.
Use authorized waste disposal facilities for the collection and treatment of waste; public refuse tips or garages providing facilities for the disposal of used oil.
If in doubt, ask local authorities for advice.

1.8.2 General instructions

- Never bring a heat source close to the tractor
- Never service the tractor while the engine is running or hot or if the tractor is in motion .

  The operator must ensure that potentially hot parts have cooled down before carrying out any work

Fig. 22

- Before making adjustments to or servicing the electrical system, disconnect the battery cables, negative (-) terminal first.
- To prevent risks of fire or explosion, keep batteries and cold weather starting aids away from naked flames.
- To prevent sparks which could cause explosions, use jump leads according to instructions.
- Consult your Challenger dealer for repairs or adjustments and have the work carried out by trained personnel.
- The implement and/or tractor must be supported on suitable blocks or stands and not on a hydraulic jack, see the relevant chapter (installation points of the axle stands).

  The blocks and supports must be adapted to the load carried and must be sufficiently stable to prevent tilting.

  The blocks and supports must be approved and regularly checked by the appropriate authorities.

  Place the blocks and supports on solid ground that can support the load.
- Check all nuts and bolts periodically for tightness, especially wheel hub and rim nuts. Tighten to the torque values stipulated.
- Regularly check the brakes.

  Ensure that the brakes are uniformly adjusted, especially if a trailer is used.

  In case of malfunction, consult your dealer.

- Accumulators.

  The accumulators contain nitrogen and are pressurized.

  They may become hot and cause burns.

  Modifications must not be made to the accumulators (by welding, drilling, attempting to open, cutting etc.).

  The repair, maintenance and commissioning of the accumulators must only be carried out by trained personnel.

  Consult your Challenger dealer regarding any maintenance.

1.8.3 Handling instructions

The implement and/or tractor must be supported on suitable blocks or stands and not on a hydraulic jack.

The blocks and supports must be adapted to the load carried and must be sufficiently stable to prevent tilting.

Place the blocks and supports on solid ground that can support the load.

The blocks and supports must be approved and regularly checked by the appropriate authorities.

Positioning axle stands at the front of the tractor

Depending on the requirements of the removal procedure, the axle stands must be placed under one of the following locations:

- (1) Under the low point of the front linkage
- (2) Under the front axle final drives
- (3) Under the engine oil sump (if the front axle is to be removed)
- (4) and (5) Under the front axle beam

Fig. 23

Fig. 23

Positioning axle stands at the rear of the tractor

- (6) and (7) Under the rear axle beams

Fig. 24

Front sling points

- (8) On the side fixing holes of the front linkage
- (9) On the weight support hole

Fig. 25

Fig. 25

Cab sling points

Fig. 26

1.8.4 Special instructions for cleaning the tractor

- Before cleaning the tractor, always:
  - Follow the mandatory procedure before dismounting the tractor
  - remove or put away implements, buckets, chains and hooks.
- Clean steps, pedals and floor. Remove grease or oil. Brush away dust and mud. In winter, scrape away snow and ice. Remember — slippery surfaces are hazardous.
- When washing the tractor with a jet of water, do not direct the jet straight onto electrical components.
- If using a high-pressure cleaning device, maintain a sufficient distance so as not to damage the paintwork and the sealed sections.
- Keep work surfaces and engine compartments clean.
- After washing, grease the lubrication points, the hinged sections and the bearings.

1.9 Protective structures

1.9.1 Protective structures - Use and accreditation

The protective structures (ROPS, seat belts) limit injuries as far as possible in case of an accident or if the tractor overturns.

They comply with all the regulations in force for agricultural tractors.

1.9.2 Cab

- The cab has been designed to be suitable for this tractor series and meet all the legal requirements in terms of safety
- Never weld parts onto the cab
- Never bend or straighten the cab
- Never drill or modify the cab to fit accessories or implements.

  If other controls or displays have to be fitted in the operator's area of maneuver, contact your dealer to find out what to do
- Do not attach chains or ropes to the cab in order to pull or tow anything
- If the cab has been removed, refit it and tighten the fixings to the specified torque before using the tractor again

WARNING:
A cab damaged as a result of an accident, overturning or other incident must be replaced before using the tractor again.

1.9.3 Seat belt

- Wearing the seat belt is an important part of this protection.
- Always wear the seat belt adjusted correctly.

WARNING:

A damaged seat belt must be replaced before using the tractor again. The seat belt approval number is visible after the seat belt has been completely unraveled.

Fig. 27

1.9.4 Instructor seat

- Use of the instructor seat is exclusively reserved for an instructor or technician. The seat is NOT suitable for children.
- The seat belt must always be worn and correctly adjusted when using the instructor seat.

Fig. 28

1.10 Warranty

1.10.1 General

When selling new products to its dealers, the manufacturer provides a warranty which, subject to certain conditions, guarantees that the goods are free from defects in material and workmanship. Since this book is published worldwide, it is impossible to detail the exact terms and conditions of warranty that apply to all retail customers in all countries. Purchasers of new Challenger equipment should therefore request full details from their supplying dealer.

In accordance with the manufacturer's policy of continuous improvement of its products, the manufacturer reserves the right to make alterations to the specifications of machines at any time without notice. The manufacturer disclaims all liability for discrepancies which may occur between the specifications of its products and the descriptions thereof contained in its publications.

1.10.2 Pre-delivery inspection and commissioning on the user’s premises

The dealer is required to carry out certain activities when supplying a new tractor. These consist of carrying out a full pre-delivery inspection to ensure that the tractor supplied is ready for immediate use, and providing full instructions to the user on the basic principles of operation and servicing of the tractor. These instructions will cover instruments and controls, and routine servicing and safety precautions. All persons who will be involved in the operation and servicing of the tractor should be present when these instructions are given.

IMPORTANT:
Challenger disclaims all liability in the event of any claim resulting from the fitting of non-approved parts, accessories, implements or attachments or unauthorized modifications or alterations.

1.10.3 Warranty procedure

Correct commissioning on the user's premises and routine servicing help to prevent breakdowns. However, if operating problems do occur during the warranty period, follow this procedure:

- Immediately inform the dealer you purchased the tractor from, stating the model and serial number. It is very important not to delay, as even if the defect is covered by the original warranty, the coverage may no longer apply if the repair is not carried out immediately.
- Provide the dealer with as much information as possible. The dealer will need to know how many hours the tractor has been in service, what type of work it is used for and the symptoms of the problem.

Routine service operations not covered by the warranty

It should be noted that routine service operations such as tuning, brake and clutch adjustment, and the supplies used for the tractor service (oil, filters, seals, fuel, antifreeze etc.), are not covered by the warranty.

Warning concerning spare parts

Parts other than Challenger parts are likely to be of lower quality. Challenger disclaims all liability in the event of loss or damage arising as a result of such parts being fitted. The manufacturer's warranty may also become void if such parts are fitted during the normal warranty period.

1.10.4 Procedure to follow if changing region

Only the dealer from whom the tractor was purchased is liable for the protection provided by the warranty. Any repairs should, wherever possible, always be carried out by this dealer. If, however, the owner moves to another region or if the tractor is to be used temporarily at a location a long way from the dealer from whom it was bought, it is advisable to ask this dealer for the name and address of the dealer closest to the new address and arrange to have the obligations remaining to be fulfilled under the warranty transferred to this dealer.

If the customer leaves the region covered by the original dealer without having taken these steps, the new dealer will offer its services if needed, but may invoice them at the normal rate unless:

- the customer has clearly stated that the warranty period has not expired, and
- the repair dealer has been given the possibility of taking the necessary steps with the selling dealer.

1.10.5 Servicing during and after the warranty period

During the warranty period, all service and repair work must be carried out by the dealer, who will carefully carry out detailed checks of the progress and performance of the new tractor.

To obtain best results from a Challenger tractor, it is important to continue regular servicing and periodic inspections after the warranty has expired. All major service work on the tractor must be carried out by a local dealer; an experienced technician will detect any problems which may arise between one service and the next. Technicians regularly follow training courses to update their knowledge of the product and service and repair techniques, and the use of special tools and modern diagnostic equipment. They receive regular Service Bulletins and have access to all the workshop manuals and technical publications required to carry out repairs or services in accordance with the quality standards required by Challenger.

1.10.6 California emission control warranty statement

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The **California Air Resources Board (CARB)** and AGCO are pleased to explain the **emission control system warranty** on your **2012** and later engine. In California, new heavy-duty off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. AGCO must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel-injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, AGCO will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts, and labor.

MANUFACTURER'S WARRANTY COVERAGE:

The emission related devices on your 2012 and later heavy-duty off-road engines are warranted for five (5) years or 3000 hours of operation for all engines 19KW or greater, whichever occurs first from the date of delivery of the engine to the initial purchaser.

If any emission-related part on your engine is defective, the part will be repaired or replaced by AGCO within the warranty period.

1. General Emissions Warranty Coverage

   AGCO warrants to the ultimate purchaser and each subsequent purchaser of each off-road compression-ignition engine that the engine is:

   a. Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code; and
   b. Free from defects in materials and workmanship that lead to the replacement of a faulty part under warranty by another part that is identical in all material respects to the part as described in the engine manufacturer's application for certification for a period of five years or 3000 hours of operation, whichever occurs first, for all engines rated at 19 KW and above, except as noted below. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years.

2. Warranty on emissions-related parts shall be interpreted as follows:
   a. Any warranted part which is not scheduled for replacement as required maintenance shall be warranted for the warranty period defined in Subsection (A)(2). If any such part fails during the period of warranty coverage, it shall be repaired or replaced by the engine manufacturer according to Subsection (4) below. Any such part repaired or replaced under the warranty shall be warranted for the remaining warranty period.
   b. Any warranted part which is scheduled only for regular inspection shall be warranted for the warranty period defined in Subsection (A)(2). A statement in such written instructions to the effect of "repair or replace as necessary" shall not reduce the period of warranty coverage. Any such part repaired or replaced under the warranty shall be warranted for the remaining warranty period.
   c. Any warranted part which is scheduled for replacement as required maintenance shall be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by the engine manufacturer according to Subsection (4) below. Any such part repaired or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
   d. Repair or replacement of any warranted part under the warranty provisions of this article shall be performed at no charge to the owner at a warranty station.
   e. Notwithstanding the provisions of Subsection (4) above, warranty services or repairs shall be provided at all manufacturer distribution centers that are franchised to service the subject engines.
   f. The owner shall not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at a warranty station.
   g. The engine manufacturer shall be liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.
   h. Throughout the engine's warranty period defined in Subsection (A)(2), the engine manufacturer shall maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
   i. Any replacement part, as defined in Section 1900(b)(13), Title 13, may be used in the performance of any maintenance or repairs and must be provided without charge to the owner. It is not necessary for replacement parts to be the same brand or by the same manufacturer as the original part sold with the engine. Such use shall not reduce the warranty obligations of the engine manufacturer.
   j. Add-on or modified parts, as defined in Section 1900(b)(1) and (b)(10), Title 13, that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts shall be grounds for disallowing a warranty claim made in accordance with this article. The engine manufacturer shall not be liable under this article to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.
   k. The Executive Officer may request and, in such case, the engine manufacturer shall provide, any documents which describe that manufacturer's warranty procedures or policies.

3. Each manufacturer shall include a copy of the following emission warranty parts list with each new engine, using those portions of the list applicable to the engine.
   a. Fuel Metering System

      (A) Fuel injection system

      (B) Air/fuel ratio feedback and control system

      (C) Cold start enrichment system
   b. Air Induction System

      (A) Controlled hot air intake system

      (B) Intake manifold

      (C) Turbocharger/Supercharger Systems

      (D) Charge Air Cooling Systems
   c. Catalyst or Thermal Reactor System

      (A) Catalytic converter

      (B) Diesel Oxydation Catalyst (DOC)

      (C) Exhaust manifold
   d. Particulate Controls

      (A) Smoke Puff Limiters
   e. Advanced Oxides of Nitrogen (NOx) Controls

      (A) NOx Absorbers

      (B) Selective Catalyst Reduction (SCR)

      (C) Reluctant (urea/fuel) containers/dispensing systems
   f. Positive Crankcase Ventilation (PCV) System

      (A) PCV Valve

      (B) Oil Filler Cap
   g. Miscellaneous items Used in Above Systems

      (A) Vacuum, temperature, and time sensitive valves and switches

      (B) Electronic control units, sensors, solenoids, and wiring harnesses

      (C) Hoses, belts, connectors, assemblies, clamps, fittings, tubing, sealing gaskets or devices, and mounting hardware

      (D) Pulleys, belts and idlers

      (E) Emission Control Information Labels

      (F) Any other part with the primary purpose of reducing emissions or that can increase emissions during failure without significantly degrading engine performance

OWNER'S WARRANTY RESPONSIBILITIES

As the heavy-duty off-road engine owner, you are responsible for the performance of the **required maintenance listed in your owner's manual.**

AGCO recommends that you retain all receipts covering maintenance on your heavy-duty off-road engine, but AGCO cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the heavy-duty off-road engine owner, you should however be aware that AGCO may deny you warranty coverage if your heavy-duty off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements.

You are responsible for initiating the warranty process. The ARB suggests that you present your heavy-duty off-road engine to an AGCO dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

EMISSION WARRANTY EXCLUSIONS

This warranty shall not cover any of the following:

- Conditions resulting from tampering, misuse, abuse, improper adjustment, engine alteration, use of modified parts, use of replacement parts that are not the same in performance and durability as genuine replacement parts, failure to use the recommended fuel or oil, use of unapproved fuel or oil additives, or failure to perform required maintenance
- Consequential damages such as loss of time, inconvenience, or loss of use of this engine or equipment
- Damages or repair costs caused by the owner's unreasonable delay in making the engine available for warranty inspection and repair
- Repairs not covered by this warranty, and diagnosis or inspection fees that do not result in eligible warranty service being performed
- Any replacement with non-genuine parts or malfunction of genuine parts due to use of non-approved parts
- The use of any non-exempted add-on or modified parts shall be grounds for disallowing a warranty claim
- Travel Time and Mileage
- Freight
- Unless mandated by State or Provincial laws

OBTAINING WARRANTY SERVICE

To obtain warranty service, owner should take the engine to the nearest Dealer or service center authorized by AGCO or the equipment manufacturer. If available, the original purchase receipt (showing the initial date of purchase) and all available maintenance records should be presented.

The authorized AGCO dealer will contact AGCO Warranty Department for confirmation of coverage.

The authorized Dealer or service center may perform the necessary repairs or adjustments within a reasonable time and furnish owner with a copy of the repair order. AGCO wants to assist in providing the services applicable under this warranty. If you need assistance in locating the nearest authorized Dealer or service center, or have any questions about your warranty rights and responsibilities, you should contact AGCO Answers at **1-877-525-4384** or email **agcoanswers@agcocorp.com**

1.10.7 Emission reduction warranty statement for the United States and Canada

APPLICABILITY

This section shall apply to new 1996-999 model year and heavy duty off road compression-ignition engines and new 2000 and later model year compression-ignition engines. The warranty period shall begin on the date the engine or equipment is delivered to an ultimate purchaser. The use of alternative fuels shall not void the warranties on any engine certified to use such fuel.

Warranty statement

AGCO warrants to the ultimate purchaser and each subsequent owner that the compression-ignition engine and emission related parts in this equipment are designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board (ARB) pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code provided there has been no abuse, neglect, or improper maintenance of the engine. AGCO also warrants to the ultimate purchaser and each subsequent owner that the compression-ignition engine and emission related parts in the equipment are

designed, built, and equipped so as to conform with all applicable regulations adopted by the US Environmental Protection Agency, pursuant to its authority under the Federal Clean Air Act provided there has been no abuse, neglect, or improper maintenance of the engine. This warranty is effective in all states of the U.S.A. and all provinces and territories of Canada.

WARRANTY PERIOD

The warranty period for this engine's emission related parts to be free from defects in materials and workmanship which cause the failure of a warranted part to be identical in all material respects to the parts as described in the engine manufacturer's application for certification begins on the date the engine or equipment is delivered to an ultimate purchaser and continues for a period of five (5) years or 3,000 hours for 19 to 560 kW emission related parts except as noted below. In the absence of a device to measure hours of use, the engine emissions related parts shall be warranted for a period of five (5) years.

For all engines rated less than 19 kW, and for constant-speed engines rated under 37 kW with rated speeds higher than or equal to 3000 rpm, the period of two (2) years or 1500 hours of operation, whichever occurs first. In the absence of a device to measure hours of use, the engine shall be warranted for a period of two years. If any emission related part on your engine fails within the warranty period, the part will be repaired or replaced by AGCO.

AGCO'S WARRANTY RESPONSIBILITY

Listed below are the parts covered by this warranty. Any part listed below that is subject to scheduled maintenance during the warranty period is warranted up to the first scheduled replacement point for that part. A part repaired or replaced under this warranty is warranted for the remainder of the warranty period. Parts replaced under this warranty become the property of the manufacturer. The warranted parts could include:

POWER RANGE	WARRANTY TERM	COVERED COMPONENTS
Below or equal to 19 kw	2 years or 1500 hours	Rubber Flanges, Fuel Injection Pump, Fuel Injectors, Intake Manifold, Exhaust Manifold, Nozzle Assembly, Turbo Charger (if applicable), Controlled Hot air Intake System. Miscellaneous Vacuum, temperature, and time sensitive valves and switches, Electronic control units, sensors, solenoids and wiring harnesses. Hoses, belts, connectors, assemblies, clamps, fitting, tubing, sealing , pulleys, belts and idlers, Emission Control Information Labels, Any other part with the primary purpose of reducing emissions or that can increase emissions during failure without significantly degrading engine performance.
19-37 kw	5 years or 3000 hours	Rubber Flanges, Fuel Injection Pump, Fuel Injectors, Intake Manifold, Exhaust Manifold, Nozzle Assembly, Turbo Charger (if applicable), Controlled Hot Air Intake system, Miscellaneous Vacuum, temperature, and time sensitive valves and switches, Electronic control units, sensors, solenoids, and wiring harnesses. Hoses, belts, connectors, assemblies, clamps, fitting, tubing, sealing , pulleys, belts and idlers, Emission Control Information Labels, Any other part with the primary purpose of reducing emissions or that can increase emissions during failure without significantly degrading engine performance.
37kw-Up	5 years or 3000 hours	Fuel Injection Pump, Nozzle Assembly, Injection Pipe, Connector of Fuel Line, Intake manifold, Fuel pipe Assembly, Inlet Pipe, Inlet Pipe band, air cleaner element, fuel filter element, turbocharger systems, exhaust manifold, hoses, clamps, connectors, and sealing gaskets of devices used in systems above, catalysts, Electronic control units

POWER RANGE	WARRANTY TERM	COVERED COMPONENTS
		and sensors**, cold start enrichment system, charge air cooling system, controlled hot air intake system, catalytic converter, exhaust manifold, regenerators, oxidizers, fuel additive devices, and any other device used to regenerate or aid in the regeneration of the particulate control device, smoke puff limiters, selective catalyst reduction, reductant (DEF) containers/dispensing systems, Miscellaneous Vacuum, temperature, and time sensitive valves and switches, solenoids, and wiring harnesses. Hoses, belts, connectors, assemblies, clamps, fitting, tubing, sealing, gaskets or devices and mounting hardware, pulleys, belts and idlers, Emission Control Information Labels, Any other part with the primary purpose of reducing emissions or that can increase emissions during failure without significantly degrading engine performance.

NOTE: *Filters that are replaced as part of normal scheduled maintenance are NOT covered by emissions warranty. These parts are listed as, but not limited to, engine air filter, oil filter, fuel filter, DEF filters, etc.*
***** SENSORS RELATING TO EMISSION COMPONENTS ONLY***
Repair or replacement of any warranted part under the warranty provisions of this statement shall be performed at no charge to the owner at an authorized warranty station.
The owner shall not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at an authorized warranty station.

OWNER MAINTENANCE AND REPAIR RESPONSIBILITY

The engine owner is responsible for the proper use and maintenance of the engine, as specified in the Operator's Manual. AGCO reserves the right to deny coverage under this warranty if the owner has not properly maintained the engine and/or emission related parts and failure occurs due to neglect, abuse, and/or unapproved modifications.

AGCO is not responsible for resultant damage to an emission-related part or component resulting from:

- Any application or installation AGCO deems improper
- Attachments, accessory items or parts not sold nor approved by AGCO
- Improper engine maintenance, repair or abuse
- Owner's unreasonable delay in making the product available after being notified of a potential product problem

AGCO shall be liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.

This warranty is in addition to AGCO Standard Warranty.

AGCO recommends that the original owner keep the original purchase receipt (with the date of initial purchase), and all repair receipts and maintenance records, and transfer them to any subsequent owner.

However, AGCO will not deny warranty claims solely for the lack of receipts or failure to document the performance of all scheduled maintenance. The engine owner is responsible for presenting the engine to the nearest Dealer or service station authorized by AGCO when a problem exists.

Subject to the limitations above, non-warranty maintenance or repair of emission control parts on this engine may be performed by the owner, or by any repair establishment or individual, without affecting coverage under this warranty; however, reimbursable warranty repairs must be performed by a dealer or service center authorized by AGCO or the manufacturer of this equipment.

The use of parts that are not equivalent in performance and durability to genuine parts may impair the effectiveness of the emission control system and prevent coverage under this warranty. If non-genuine

AGCO parts are used for maintenance or replacement on this engine, you should assure yourself that such parts are warranted by their manufacturer to be equivalent to genuine parts in performance and durability.

EMISSION WARRANTY EXCLUSIONS

This warranty shall not cover any of the following:

- Conditions resulting from tampering, misuse, abuse, improper adjustment, engine alteration, use of modified parts, use of replacement parts that are not the same in performance and durability as genuine replacement parts, failure to use the recommended fuel or oil, use of unapproved fuel or oil additives, or failure to perform required maintenance
- Consequential damages such as loss of time, inconvenience, or loss of use of this engine or equipment
- Damages or repair costs caused by the owner's unreasonable delay in making the engine available for warranty inspection and repair
- Repairs not covered by this warranty, and diagnosis or inspection fees that do not result in eligible warranty service being performed
- Any replacement with non-genuine parts or malfunction of genuine parts due to use of non-approved parts. The use of any non-exempted add-on or modified parts shall be grounds for disallowing a warranty claim.
- Travel Time and Mileage *
- Freight *

NOTE: ** Unless mandated by State or Provincial laws.*

OBTAINING WARRANTY SERVICE

All repairs qualifying under this limited warranty must be performed by a Dealer or service center authorized by AGCO or the manufacturer of this equipment.

To obtain warranty service, owner should take the engine to the nearest Dealer or service center authorized by AGCO or the equipment manufacturer. If available, the original purchase receipt (showing the initial date of purchase) and all available maintenance records should be presented.

The authorized AGCO dealer will contact AGCO Warranty Department for confirmation of coverage.

The authorized Dealer or service center may perform the necessary repairs or adjustments within a reasonable time and furnish owner with a copy of the repair order. AGCO wants to assist in providing the services applicable under this warranty. If you need assistance in locating the nearest authorized Dealer or service center, or have any questions about this warranty, you may contact an AGCO Warranty representative at:

AGCO Corporation

Technical Services and Support

P.O. Box 4300

Hesston, KS 67062-2002

678-534-3199

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2.1 Service Guide

2.1.1 Service guide

Interpretation of the table

Initial service marked °°: this maintenance instruction is to be carried out by your dealer as part of the service defined in the Service Record Book.

Intervals marked °: regular service intervals marked ° are to be carried out at regular intervals (for example: every day, every 50 hours, every 600 hours etc.).

Intervals marked *: For intervals marked *, refer to the relevant chapter in this manual.

Frequency	50 hrs	600 hrs[1]	1200 hrs[1]	1800 hrs[2]	2400 hrs[2]	Every day
General						
Lubricate all points with grease or oil as specified in the Operator's Manual.	°°	°				
Check the accumulator pressures.	Once a year					
Check that all guards are in place and that the safety decals are secure and legible.	°°	°				
Road test the tractor to check all instruments and systems for correct operation.	°°	°				
Road test the tractor to check the steering and brakes for correct operation.	°°	°				
After the road test, check for any leaks of oil, fuel or coolant.	°°	°				
Enquire if the operator has any operational difficulties and correct or demonstrate the solution as necessary.	°°	°				
Complete the owner's Service Record Book.	°°	°				
Cab						
Check and top up the windscreen washer bottle.	°°	°				
Clean the cab air filter element.	Every week or every day in difficult working conditions					
Change the cab air filter element.			°			
Check the air conditioning system for correct operation.	°°	°				
Check the cab tightening torque.	°°	°				
Replace the front rubber mountings	4800 hrs					
Replace the shock absorbers (mechanical or active mechanical suspension option)	4800 hrs					
Engine						
Check the engine oil level.						°
Change the engine oil.		°				
Change the engine oil filter.	°°	°				
Bleed the water from the fuel prefilter.	°					

Frequency	50 hrs	600 hrs[1]	1200 hrs[1]	1800 hrs[2]	2400 hrs[2]	Every day
Change the fuel prefilter.	○○		○			
Change the fuel filter.	○○		○			
Bleed the water from the fuel/water separator.	○					
Change the water/fuel separator.	○○	○				
Drain any water from the fuel tank.		○				
Check/adjust the valve clearance, replace the cover seal		○[3]			○	
Check the operation of the injectors.					○	
Change the DEF main filter.			○			
Check/clean the dry air filter elements.	If the indicator light comes on					
Change the dry air main filter element.	After the fifth time the indicator light has lit up or once a year					
Change the dry air safety filter element.	Every other time the main filter is replaced					
Check the radiator coolant level.						○
Drain, flush and refill the radiator with coolant.			○[1]			
Check/clean the radiator/cooler fins.		100 hrs[4]				
Check/clean the air conditioning condenser.		100 hrs[4]				
Check the tension and condition of the alternator/fan/air conditioning compressor belts.	○○	○				
Change the alternator/fan/air conditioning compressor belts.			○[5]			
Transmission and auxiliary hydraulics						
Check the transmission/hydraulics oil level.						○
Change the transmission/hydraulic oil.				○[6]		
Change the transmission suction strainer.	○○			○[6]		
Change the transmission high-pressure filter.	○○	○				
Check/clean the transmission oil cooler.		100 hrs[4]				
Lubricate the trumpet housing bearings (depending on model)		○				
Replace the 60-micron PowerShuttle filter element.	○○			○		
Change the hydraulic/transmission oil system breather.				○		
Brakes						
Check the clutch pedal and transmission for correct operation.	○○	○				
Check the condition and the brake pipes/ compressed air tank.	○○			○		
Bleed the brakes.				○		

Frequency	50 hrs	600 hrs[1]	1200 hrs[1]	1800 hrs[2]	2400 hrs[2]	Every day
Check the operation of the hand brake.	°°	°				
Replace the circuit closer filter for the brake system.	°°	°				
Check the trailer brake valve for correct operation.	°°		°			
Check the regulator filter (pneumatic trailer braking option)		°				
Check the level of WABCOTHYL fluid in the compressed air system.						°
Bleed the air from the pneumatic accumulators of the trailer brake system (if fitted).						°
Front axle and steering						
Check the oil level in the front axle and the front axle final drives.	°°	200 hrs				
Change the oil in the front axle and final drives.	°°		°			
Check the front wheel hubs/steering pivots.		°				
Lubricate the non-suspended front axle.	°[7]	200 hrs				
Lubricate the front axle drive shaft.	°					
Check the steering and wheel alignment (including tire wear and damage).				°		
Calibrate the suspended front axle.				°		
Power take-off						
Check the PTO for correct operation.	°°	°				
Change the ZUIDBERG front PTO oil.	°°	°[4]				
Clean the "ZUIDBERG" front PTO strainer.	°°	°				
Check/clean the front PTO cooler.		100 hrs[4]				
Hitch/linkage						
Check the auto-hitch for correct operation (if fitted).	°°			°		
Check/lubricate the auto-hitch (if fitted).	Once a week					
Lubricate the front and rear linkages/hitches.	Once a week					
Electrical equipment						
Check the condition of the battery and the electrolyte level.	°°	°				
Check the tightness of the battery connections and battery safety.	°°	°				
Check all the neutral start switches for correct operation.	°°	°				
Check all the indicator lights, instruments and acoustic alarms for correct operation.	°°	°				

Frequency	50 hrs	600 hrs[1]	1200 hrs[1]	1800 hrs[2]	2400 hrs[2]	Every day
Check all lights for correct operation and adjustment.	°°	°				
Check all electrically-powered devices (heater/ fan, radio, windscreen wipers etc.) for correct operation.	°°	°				
Check all electronically controlled systems for correct operation.	°°	°				
Check that the battery circuit breaker is working correctly.	°°	°				
Reset the service parameters on theSetup and Information Screen.	°°	°				
Wheels and tires						
Check the torque of all wheel and rim nuts and bolts.	Every day until the tightening torque stabilizes, then every 50 hours					

1. Or every year.
2. Or every two years.
3. The first time only
4. Depending on the working conditions.
5. Every 600 hours in difficult working conditions.
6. NA market: When AGCO Permatran 821XL 10W30 oil is used, the intervals must be reduced to 1000 hours.
7. Every 50 hours in difficult working conditions

2.2 Operator environment

2.2.1 Air conditioning system: condenser

Frequency

Check the condenser regularly and, if necessary, clean using compressed air.

Procedure

Clean the condenser grilles carefully.

NOTE:
Take care not to damage the various radiator grilles.

Fig. 1

2.2.2 Air-conditioning system: Checking the air conditioning system

DANGER:

In the event of a leak, wear safety goggles. Escaping refrigerant gas or liquid can cause severe injuries to the eyes. The R134a refrigerant used in the installation gives off a toxic gas if it comes into contact with a flame.

WARNING:

Do not disconnect any part of the air conditioning system. Consult your dealer or agent if a fault occurs.

Procedure

1. Operate the air conditioning system for a few minutes every week to keep the whole system in good condition and to lubricate the seals.
2. Add charge to the air conditioning system every year at the start of summer (consult your dealer).

2.2.3 Cab air filter

Frequency

Clean the cab air filter every week, or more frequently, if necessary.

In dusty conditions, clean the cab air filter every day.

Replace the cab air filter(s) every 1200 hours, or once a year, whichever occurs first.

2.2.3.1 Standard-roof air filter: Procedure

WARNING:
The air filter element does not provide protection from chemical products. Please ask your dealer for information concerning the availability of the specific particle filter.

Procedure

1. To gain access to the cab air filter, open the hatch on the left-hand side of the cab roof.
2. Turn the handle and lift out the filter element.
3. Clean the filter by blowing it with compressed air.
4. Before refitting the filter, wipe out the compartment with a damp cloth to remove dust.

Fig. 2

2.2.4 Cab attachment

Frequency

The cab is an integral part of the Roll Over Protection Structure (ROPS) and must be attached correctly for it to work effectively. Ask your dealer or agent to check the tightness of the cab attachment screws/bolts every 600 hours. Replace the rubber mountings for the suspended cab every 4800 hours.

Fig. 3

ATTENTION: *The cab conforms to the various international safety standards. The cab must never be drilled or modified to fit accessories or instruments. Welding any item to the cab or repairing the cab is not permitted. If any of the above operations is carried out, the cab may no longer comply with safety standards. Only genuine parts may be used, which must be fitted by your dealer or agent.*

2.2.5 Windscreen washer

The windscreen washer bottle is located between the tractor rear fenders.

Fig. 4

Frequency

Check there is fluid in the tank every day and top up if required.

IMPORTANT:
Use a fluid suitable for the lowest temperatures encountered to avoid any damage from freezing.

2.3 Engine

2.3.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Engine oil

AGCO oil corresponding to standards: API CJ4 (NA)

Oil characteristics

Engine oil	Type of oil	Temperature range
All year round	15W40	-10 °C (14 °F) and above
Winter conditions	10W40	-30 °C (-22 °F) to 20 °C (68 °F)
Extreme cold weather conditions	5W40	20 °C (68 °F) and below

	Volume/reference available from parts department				
Volume	9,46 l (249.9 gal (US))	18,9 l (49.9 gal (US))	208 l (55 gal (US))	416 l (109.9 gal (US))	1249 l (330 gal (US))
AGCO 5W40 CJ-4	79035076	79035077	79035078	N/A	N/A
AGCO 10W40 CJ-4	79035455	79035456	79035457	N/A	N/A
AGCO 15W40 CJ-4	79034597	79035353	79034598	ACP0022700	ACP0022710

Coolant

Antifreeze: Permanent, ethylene/glycol, complying with standard ASTM D6210 type III-FF.

When topping up the coolant or after draining the cooling system, use a product that complies with standard ASTM D6210 type III-FF.

Coolant specification:		
Criteria	Dilution of coolant by mass (% water / % coolant)	
	50/50	60/40
Specific heat at 20 °C (68 °F)	< or = 3.45 J/g.°C	N/A
Density at 20 °C (68 °F)	/m³	/m³
pH at 20 °C (68 °F)	8.6 < pH < 9.5	8.4 < pH < 9.5
Boiling point at 2 bar (29.01 psi) (relative)	> 141 °C (285.8 °F)	> 139 °C (282.2 °F)
Precautions against freezing	< or = -35 °C (-31 °F)	< or = -25 °C (-13 °F)

- Coolant with OAT (Organic Acid Technology) corrosion inhibitor.
- Coolant must be manufactured using a mixture of demineralised water and ethylene/glycol.
- pH stability: after 500 hours at 40 °C (104 °F) (coolant only - coolant with aluminum - coolant with steel - coolant with steel + cataphoresis): difference in pH < 0.45.

- Color: orange or blue.

2.3.2 Fuel

Reminder of the safety instructions

Before handling fuel, filling the tank etc., observe the following:

- Under no circumstances should petrol, alcohol, paraffin, dieselhol (a mixture of diesel and alcohol) or any other substance be added to diesel fuel as there is an increased risk of fire or explosion.

  In a closed container such as a fuel tank, these mixtures are more explosive than pure petrol. Do not use them. Additionally, dieselhol is not approved due to possible inadequate lubrication of the fuel injection system.
- Clean the filler plug area. Fill the fuel tank at the end of each working day to reduce overnight condensation.
- Never remove the plug or refuel when the engine is running.
- When filling the tank, keep control of the nozzle.
- Do not smoke.
- Do not fill the tank to its full capacity. Allow room for expansion and wipe up spilt fuel immediately.
- If the original plug is lost, replace it with an AGCO plug and tighten securely. A non-AGCO plug may not be guaranteed to seal.
- Ensure equipment is properly maintained.

CAUTION:

Diesel fuel is flammable. Handle fuel with care. Keep away from flammable sources. Do not smoke when filling the tank. Do not leave the tractor unattended when filling the tank. Clean up any spilt diesel after filling the tank. Any material which comes into contact with the fuel must be moved to a safe place. If high-pressure fuel comes into contact with eyes, wash immediately with clean water and seek medical help.

Compulsory fuel for Tier 4F/Stage IV SCR Technology engine engines

The diesel used must comply with standard EN 590:2009 or ASTM D 975-09b 1-D or 2-D.

To obtain the correct power and optimum engine performance, use only good quality fuel.

IMPORTANT:
If the type of diesel is not observed, the engine and depollution system will be subject to damage that will not be covered by the warranty.

Fuel recommended for other engines

In addition to fuels for Tier 4F/Stage IV SCR Technology engine engines, the diesel used must comply with standard EN 14214:2008 or ASTM D6751.

To obtain the correct power and optimum engine performance, use only good quality fuel.

Fuel storage

The utmost care must be taken to keep fuel clean.

- Never clean the inside of containers or other fuel system components with a fluffy cloth.

- The capacity of bulk storage tanks should not be too large. The shelf life of the fuel is approximately six months.
- The storage tank should be under cover and supported on a cradle high enough for the tractor fuel tank to be filled by gravity. It should have a suitable manhole to provide access for cleaning. The outlet tap should be about 75 mm (3 in) above the bottom of the tank to allow water and sludge to settle. It should have a removable screen. The storage tank should slope by about 4 cm per meter toward the rear (drain plug side).

Fig. 5

- Let the fuel settle in the storage tank for 24 hours before use after any servicing or refilling the tank.
- Clean out the storage tanks regularly; normally every five years, more frequently in cold climates.
- Bleed the tanks frequently to drain off any water formed by condensation.
- Rotate fuel stocks to prevent deterioration of old fuel and the accumulation of water or foreign matter.
- Bring in fresh supplies without waiting for stocks to run out; refueling from the bottom of the tank may cause a blockage.

Advice on the use of fuel in cold weather:

- In cold weather, diesel fuel increases in viscosity and wax particles form. This may lead to operating problems if precautions are not taken.
- **IMPORTANT:**
  Environmental protection — you must comply with local regulations in force relating to underground storage.

  Underground storage is preferable.

  If this is not possible, place the storage tank in a location which is protected from the cold, wind and damp.
- After filling the storage tank, drain the first 5 liters into a drum before filling the fuel tank. Then return the fuel in the drum to the storage tank.
- Insulate all exposed pipework. Ensure that any pipework is short in length and designed to be disassembled if necessary.
- Only stock "winter" quality fuel during the cold weather season.
- Frequently clean the fuel filter bowl.
- Do not puncture the fuel filter.
- Ensure a spare filter is always available. If a blockage occurs, due to fuel waxing, changing the fuel filter will enable restarting.

2.3.3 Biodiesel fuel

Recommended fuel specification

1st generation biodiesel fuels

1st generation biodiesel fuel is permitted for AGCO Power engines. It must comply with the EN 14214:2008 or ASTM D6751 standard. Rape methyl esters (RME), vegetable oil methyl esters (VOME) and soy methyl esters, together known as fatty acid methyl esters (FAME), are all included in these standards.

EN 590:2009 diesel fuels (or superior) can contain up to 10% FAAE/FAME type biodiesel corresponding to standard EN 14214:2008. ASTM D975-10b diesel fuels (or superior) can contain up to 10% FAAE/FAME type biodiesel corresponding to standard ASTM D6751-08. Please contact your dealer for more information.

IMPORTANT: *Using diesel fuels containing 10 to 20% biodiesel is allowed; the following service intervals and frequencies for changing consumables are then divided by 2:*

- *Draining the engine oil and replacing the engine oil filters*
- *Replacing the fuel filters and the fuel prefilters*

IMPORTANT: *Using diesel fuels containing 10 to 20% FAAE/FAME type biodiesel is allowed; the following equipment is then essential:*

- *Addition of an extra fuel prefilter*
- *Addition of a water separator between the tank and the engine; the water separator must be maintained on a regular basis and must meet AGCO Power specifications.*

NOTE:
Unrefined, cold-pressed rapeseed oil, other unesterified vegetable oils or types of fuel such as ethyl alcohol and methanol MUST NOT BE USED in these products. This fuel requires a different type of engine design, with precombustion chambers or a specific type of injection system. Moreover, "domestic fuel" must not be used as its quality has been reduced by the refineries. It can no longer provide sufficient lubrication and the amount of heavy polycyclic aromatic hydrocarbons has been increased to a critical level.

2nd generation biodiesel fuels

2nd generation biodiesel fuel is permitted for AGCO Power engines without restriction. It must comply with the EN 15940 specifications.

IMPORTANT:
The use of 2nd generation biodiesel fuel (synthetic diesel) does not change the normal service intervals for AGCO Power engines that are listed in this manual.

Fuel storage

The biodiesel must be stored in compliance with the recommended standards to avoid any water absorption or deterioration. Fuel must never be stored for more than 12 months. Under certain conditions, biodiesel deterioration may lead to corrosion of the metal components and cause the seals to split prematurely. Never store fuel in a tank with a painted inner surface, as biodiesel dissolves many types of paint.

When you fill up the tractor, make sure that the fuel does not run down the side of the filler neck. If there is any spillage, wipe up any traces of fuel immediately. Avoid splashing the hoses with fuel and wipe off any spillage as quickly as possible.

General information

- If the oil level exceeds the **Max** mark on the dipstick, the engine oil must be replaced.
- If a fuel leak (oil increase/dilution) suddenly worsens, the cause must be identified and corrected.
- Biodiesel can be used at start-up temperatures down to approximately -16°C.
- If the tractor needs to remain immobilized for at least 4 weeks, use pure diesel during the last hour of operation to avoid clogging various components and filters or damaging seals with a weaker resistance to biodiesel.
- As biodiesel is a very powerful solvent, any residue in the fuel system may become dislodged after using biodiesel. The fuel filters must therefore be replaced promptly after the first few times the tank is filled with biodiesel.
- The low combustion value of biodiesel may lead to a drop in performance of 5% or an increase in fuel consumption of approximately 10%.
- All older models must be carefully inspected by an approved dealer before using biodiesel. Low compression, a leak from the injectors and coolant temperatures that are too low may lead to dilution of the engine oil. All the hoses and pipes must be checked at least once a year by an approved dealer.

Possible consequences of using diesel fuels containing 10 to 20% FAAE/FAME type biodiesel

To protect the engine and the fuel system, the tractor must be serviced at the recommended shorter intervals.

- Loss of power and reduced performance
- Fuel leaks from the seals and hoses
- Corrosion of the biodiesel injection equipment
- Reduced lubrication of the injection pump
- Carbonisation/obstruction of the injectors, leading to diminished biodiesel spraying
- Filter blockage
- Coating/seizing of the internal injection system components
- Build-up of mud and sediments
- Reduced operating life

Warranty application

The normal warranty for the machine remains the same on condition that the information and standards given above are complied with and the machine is serviced by an approved dealer according to the servicing schedule. Warranty claims are not accepted for paint damage caused by biodiesel. All claims regarding exhaust fume emissions, increased fuel consumption or reduced performance due to the use of biodiesel are also excluded. Faults caused by the use of any type of fuel are not considered to be manufacturing or materials faults and are not covered by the warranty.

2.3.4 AdBlue™ or DEF

Recommendation

DEF is a urea-based fluid sold under the brand name DEF.

DEF must comply with standard ISO 22241-1 or DIN 70070.

DEF is not a hazardous product, but it must be handled with care. In the event of spillage of DEF on the vehicle, rinse off with water and wipe with paper or a cloth.

Low temperatures: DEF freezes at -11°C.

Take the necessary storage precautions to avoid the product freezing and to ensure the vehicle can be topped up at all times.

Constant ambient temperature	Retention limit/months
Below or equal to 10°C	36
Below or equal to 25°C[1]	18
Below or equal to 30°C	12
Below or equal to 35°C	6
Above 35°C	- [2]

NOTE:
The main factors taken into account to define the limits in this table are the ambient temperature and initial alkalinity of the DEF. The evaporation difference between storage in a ventilated container and an unventilated container is an additional factor.
For quick and accurate measurement of the concentration of DEF, use a refractometer for DEF.
For further information regarding storage and handling conditions, refer to standard ISO 22241.

1. To prevent decomposition of DEF, avoid prolonged storage or transport at a temperature of approximately -25 °C (-13 °F).
2. Check that the product is homogeneous before each use.

IMPORTANT: *If the DEF is modified or replaced by another fluid, which does not comply with standards ISO 22241-1 or DIN 70070, there is a risk that it will not provide the intended result and it may damage the SCR Technology.*

Fuel storage

WARNING:
DEF fluid must be stored at a temperature below 30°C and away from direct sunlight.

2.3.5 6-cylinder SisuDiesel engine

(1) Engine oil filter
(2) Oil filler plug
(3) Engine oil dipstick
(4) Fuel prefilter
(5) Fuel filter
(6) Water separator prefilter

Fig. 6

(7) Engine oil drain plug

Fig. 7

2.3.6 Engine oil level check

Frequency

Check the engine oil level daily.

AGCO Power engine dipstick
(1) Minimum
(2) Maximum

Fig. 8

2.3.6.1 Procedure

NOTE:
This operation is to be carried out when the engine is cold.

NOTE:

- *To avoid unnecessarily heavy oil consumption:*
  - *Do not exceed the MAX mark on the dipstick.*
  - *Do not refill until the level reaches the MIN mark on the dipstick.*

Procedure

1. Stand the tractor on level ground, with the front axle suspension disengaged. Stop the engine.
2. Check the oil level using the dipstick. (A)

Fig. 9

3. Top up with oil if necessary.

2.3.7 Draining the engine oil

Frequency

Drain the engine oil at least every 600 hours.

In difficult working conditions, the oil may need changing more frequently (every 300 hours for example).

Procedure

1. Drain the oil when the engine is warm.
2. Stand the tractor on level ground, with the front axle deactivated. Stop the engine.
3. Undo and remove the plug(s) from the engine sump.

   NOTE: *If there are two drain plugs, it is recommended to undo them to achieve more efficient drainage, as there is a separating panel that traps the oil on each side of the sump.*
4. **IMPORTANT:** *Do not dispose of the oil in the environment. Always store oil in suitable containers so that it can be collected and processed by specialist organizations.*

   Collect the used oil in a container of sufficient size.
5. Refit and tighten the drain plugs to a torque of 35 Nm (26 lbf ft).
6. Refill with a recommended oil to the "max" mark.

   NOTE: *Allow time for the oil to settle in the sump before checking the level.*
7. Start the engine and check that there are no leaks from the drain plug(s).

2.3.8 Replacing the engine oil filter

Frequency

Change the engine oil filter every 600 hours.

Fig. 10

Procedure

1. With the engine switched off, drain the engine oil before replacing the oil filter.
2. Unscrew and discard the complete filter and worn seal.
3. Fill the new filter slowly with clean oil.
4. Smear a few drops of clean engine oil on the new seal ring, then place the ring in the housing on top of the new filter.
5. Screw on the filter until the seal ring touches the filter head. Then tighten the filter a further half-turn by hand only (do not overtighten).
6. **IMPORTANT:**
   When starting the engine after changing the oil and filter, avoid depressing the throttle pedal and let the engine run at idle speed for several minutes with no load until oil pressure is obtained. Wait for the indicator light to go out.

   Recheck the oil level and top up if necessary.
7. Restart the engine and check that there are no leaks.

2.3.9 Draining the DEF tank

2.3.9.1 Procedure

If the DEF tank is contaminated, it is necessary to drain the tank.

Procedure

1. Stand the tractor on level ground, with the front axle deactivated. Stop the engine.
2. Loosen and remove the plug (1) from the DEF tank.
3. **IMPORTANT:**
   Do not dispose of DEF in the environment. Always store DEF in suitable containers so that it can be collected and processed by specialist organizations.

   Collect the used DEF in a container of sufficient size.

Fig. 11

4. Refit and tighten the drain plug (tightening torque 8 Nm (6 lbf ft)).
5. Refill with a recommended DEF to the "max" mark.
6. Start the engine and check that there are no leaks from the drain plugs.

2.3.10 Replacing the DEF filter

Frequency

Replace the DEF filter every 1200 hours.

2.3.10.1 Procedure

CAUTION:
As this fluid may be corrosive, wear protective gloves and safety goggles when carrying out these operations.

Procedure

1. Remove the two mounting screws (2) and remove the dosing control unit cover (1).

Fig. 12

2. Unlock the connector (3), then disconnect the dosing control unit.

Fig. 13

3. Remove the three screws (4) located at the front of the dosing control unit.

Fig. 14

4. Carefully raise the dosing control unit to gain access to the DEF suction line (5), the DEF supply line (7) and the DEF return line (6).

5. Disconnect the DEF pipes.

Fig. 15

6. Take the dosing control unit out of its housing.

   NOTE:
   Ensure that the ends of the pipes are well blocked to prevent dirt or debris from entering.

Fig. 16

7. Remove the metering module.
8. Remove the cover plate (4)
9. Extract and discard the part (3)
10. Extract and discard the filter (2)
11. **IMPORTANT:**
    Before refitting, the contact surfaces of the different elements must be clean and undamaged. Do not reuse worn or wet elements. Do not use mineral oil, silicone or grease when fitting filter seals as the seals are Teflon-coated to facilitate assembly.

    Fit a new filter (2)
12. Fit a new part (3)
13. Refit the cover plate (4) and tighten it to a torque of 20 Nm (15 lbf ft) to 25 Nm (18 lbf ft)
14. Refit the dosing control unit .
15. **IMPORTANT:**
    If any DEF has crystallized on the pipe fittings, ensure that the DEF pipes are cleaned prior to installation.

    Fit the dosing control unit into its housing. Raise the front of the dosing control unit and install the DEF pipes (5), (6) and (7).

Fig. 17

Fig. 18

16. Fit and tighten the three mounting screws (4) for the dosing control unit and tighten to a torque of 15 Nm (11 lbf ft) to 22 Nm (16 lbf ft).

Fig. 19

17. Connect the connector (3) and close the lock.

Fig. 20

18. Fit the cover of the dosing control unit (1), and fit and tighten the two mounting screws (2).

Fig. 21

2.3.11 Fuel system: Fuel prefilter

Draining the water: Frequency

Every 50 hours or once a week.

IMPORTANT:
Frequently clean the fuel prefilter bowl. Do not puncture the fuel prefilter.

NOTE:
To avoid water condensation in the fuel tank, refill with fuel at the end of the working day.
Ensure that a spare prefilter is always available. If a blockage occurs, due to fuel waxing, changing the fuel filter will enable restarting.

2.3.11.1 Draining the water: Procedure

Procedure

1. Place a container underneath the fuel prefilter.
2. Drain the water by opening the valve at the base of the prefilter. Collect the water and dispose of properly in accordance with directives on environmental protection.
3. Re-close the valve and then bleed the system .

2.3.11.2 Replacing the filter element: Frequency

Replace the filter element every 1200 hours.

2.3.11.3 Replacing the filter element: Procedure

IMPORTANT:
Frequently clean the fuel prefilter bowl. Do not puncture the fuel prefilter.

NOTE:
To avoid water condensation in the fuel tank, refill with fuel at the end of the working day.
Ensure that a spare prefilter is always available. If a blockage occurs, due to fuel waxing, changing the fuel filter will enable restarting.

Procedure

1. Disconnect the connection under the prefilter 1
2. Drain the prefilter 2

Fig. 22

3. Remove and discard the filter element
4. Fill the new filter element with fuel and refit it (also lubricate the seal with fuel)
5. Reconnect the connection under the prefilter
6. Bleed the system .

2.3.12 Fuel system: fuel filter

Frequency

Replace the filter element every 1200 hours

Procedure

1. Place a container underneath the filter
2. Drain the filter
3. Remove the filter element (1) and discard it in accordance with current environmental legislation.
4. Fill the new filter element with clean fuel and refit it (also lubricate the seal with fuel)

Fig. 23

5. Bleed the system .

2.3.13 Checking and cleaning the fuel cooler

Frequency

Check the cooler every day and, if necessary, clean using compressed air.

Procedure

IMPORTANT:
Take care not to damage the various radiator grilles.

Procedure

Clean the fuel cooler (1) with compressed air.

Fig. 24

2.3.14 Fuel system: Water separator prefilter

Draining the water: Frequency

Every 50 hours:

IMPORTANT:
Frequently clean the fuel prefilter bowl. Do not puncture the fuel prefilter.

NOTE:
To avoid water condensation in the fuel tank, refill with fuel at the end of the working day. Ensure that a spare prefilter is always available. If a blockage occurs, due to fuel waxing, changing the fuel filter will enable restarting.

2.3.14.1 Procedure for draining the water

Procedure

1. Place a container underneath the fuel prefilter
2. Drain the water by opening the valve (1) at the base of the prefilter Collect the water and dispose of properly in accordance with directives on environmental protection.
3. Close the valve again.

Fig. 25

4. Bleed the system.

2.3.14.2 Replacing the filter element: Frequency

Replace the filter element every 600 hours.

2.3.14.3 Replacing the filter element: Procedure

Procedure

1. Drain the prefilter by opening the screw of the filter bowl (1).
2. Remove the bowl (2).
3. Unscrew the filter element (3) and discard it.
4. Refit a new element (lubricate the seal with fuel).
5. Refit the bowl (lubricate the seal with fuel).
6. Bleed the system .

Fig. 26

2.3.15 Fuel system: bleeding

Procedure

To ensure correct operation of the engine, the fuel system must be in perfect condition and free of air.

Procedure

1. Place a container under the prefilter to collect the fuel
2. Undo the bleed screw (1) and fit a transparent pipe onto the port
3. Operate the pump (2) until the liquid flows through the bleed screw without any air
4. Retighten the bleed screw
5. Start the engine and allow it to run at idle for several minutes to completely bleed the system

   NOTE:
   Never activate the starter for more than 30 seconds in one go to avoid overheating the starter and discharging the battery.
6. Check that there are no leaks
7. Repeat the operation if required.

Fig. 27

2.3.16 Fuel system: Injector pump, regulator and injectors

The injection pump, regulator and injectors must be checked and adjusted by the dealer or agent (in accordance with the service guide).

2.3.17 Fuel system: 3rd generation T4F SCR engine injection

The injection system must be checked and adjusted by the dealer or agent (in accordance with the service guide).

2.3.18 Air filter

Cleaning and replacement: Frequency

Main filter

- Only clean the main filter if the blockage indicator light comes on
- Replace the main filter (2) after the blockage indicator light has lit up five times, or once a year.

Secondary filter:

- Only clean the secondary filter if the blockage indicator light comes on
- Replace the secondary filter (3) once for every two main filter changes, or every two years.

CAUTION:
Do not use tractor exhaust fumes to blow the main filter or secondary filter out. Never put oil in the main filter or secondary filter. Never use petrol, paraffin or solvents to clean the main filter or secondary filter.
Before installing the main or secondary filter, visually check that there are no cuts, tears or damage on the surface of the seals; do not install the filter if such damage is visible.

2.3.18.1 Cleaning and replacement of the main filter: Procedure

IMPORTANT:
Stop the engine before starting work on the filter system.

NOTE:
Although the model shown may not fully correspond to your model, the procedure is identical.

Procedure

1. Lift the engine cover.
2. Remove the main filter (2). To access the filter, unlock and remove the cover plate (1).
3. Clean the main filter, depending on its condition:
   - Gently tap the filter on a hard surface to knock out as much dust as possible, then blow through the top of the filter with compressed air at a maximum pressure of 5 bar (73 psi) while keeping the filter at a suitable distance away from the nozzle (0.50 m (2 ft) minimum).
   - After cleaning, check to ensure that the secondary filter (3) is not damaged by illuminating the inside to check that there are no holes, and check the condition of the seals.
4. Carry out the operations in reverse order to refit.

Fig. 28

2.3.18.2 Cleaning and replacement of the secondary filter: Procedure

IMPORTANT:
Stop the engine before starting work on the filter system.

NOTE:
Although the model shown may not fully correspond to your model, the procedure is identical.

CAUTION:
Do not use tractor exhaust fumes to blow the main filter or secondary filter out. Never put oil in the main filter or secondary filter. Never use petrol, paraffin or solvents to clean the main filter or secondary filter.
Before installing the main or secondary filter, visually check that there are no cuts, tears or damage on the surface of the seals; do not install the filter if such damage is visible.

Procedure

1. Remove the main filter to access the secondary filter.
2. Remove the secondary filter (3) and carry out the cleaning.
3. **IMPORTANT:**
   To clean the secondary filter, do not tap it against a hard surface.
4. Carry out the operations in reverse order to refit.

2.3.19 Cooling system

Coolant quality

- The coolant quality can have a great effect on the efficiency and life of the cooling system

- **IMPORTANT:**
  Never use pure water as a coolant. If an incorrect mixture is used, AGCO cannot be held responsible for damage caused. Precautions against freezing: Check the protection level of the mix before the cold season.

  The antifreeze/water ratio must always be 40-50% antifreeze to 60-50% water. The minimum 40% antifreeze/60% coolant mixture must be used even in "non-cold" regions to raise the boiling point and protect the system against corrosion. The water used should be clean, soft and non acidic. Avoid adding pure water to the system, as this will dilute the mixture.

2.3.19.1 Checking the level and quality of the coolant

Procedure

1. **Cold engine**, visually check the coolant level daily.
2. **CAUTION:**
   The quality of the coolant must be checked when the engine is cold.

   Check the quality of the mixture regularly, especially before the cold season.

2.3.19.2 Filling to top up the coolant level

CAUTION:
If the engine is very hot, loosen the plug to the first notch before removing it to lower the expansion tank pressure.

IMPORTANT:
If the correct procedures are not used, AGCO cannot be held responsible for damage caused.

Procedure

1. Lift the bonnet to access the expansion tank.
2. Open the expansion tank plug.
3. Fill the expansion tank with coolant up to mid-way between the max/min witness marks .
4. After filling, open the heater valve fully and run the engine at 1000 rpm for several minutes.
5. Switch off the engine, check the level and top up if necessary, without exceeding the mid-way point on the tank. Refit the plug.

Fig. 29

2.3.19.3 Draining the cooling system

Drain the system every 1200 hours according to the following procedure.

CAUTION:
Wait until the system has completely cooled before draining.

Procedure

1. Lift the bonnet to access the expansion tank.
2. Open the expansion tank plug.
3. Place a drip pan underneath the pipe (1) of the radiator.
4. Open the drain valve (2) of the radiator and allow the fluid to drain out completely.
5. Close the drain valve (2) of the radiator and fill the system.
6. Fill the system via the expansion tank and then after filling, open the heater tap fully and run the engine at 1000 rpm for several minutes.

Fig. 30

7. Switch off the engine, check the level and top up if necessary, without exceeding the mid-way point on the expansion tank. Refit the plug.

2.3.19.4 Cleaning the radiator: Frequency

Clean the radiator fins using compressed air every 100 hours. Clean the radiator fins using compressed air every day in dusty conditions.

2.3.19.5 Procedure for cleaning the radiator

IMPORTANT:
Take care not to damage the various radiator grilles.

Procedure

1. Clean the engine cooler (1) with compressed air.
2. Clean the engine air intake cooler (2) with compressed air.

Fig. 31

2.3.20 Check and replace the main fan/alternator Poly-V belt

Frequency

Check the belt tension every 600 hours.

Replace the belt at the first signs of wear or every 1200 hours (600 hours in dusty conditions).

Appearance

- Examine the appearance of the belt (on a daily basis or whenever refueling).
  - Cross cracks (running across the breadth of the belt) are permissible.
  - Longitudinal cracks (running along the length of the belt) that intersect cross cracks are not permissible.

Replace the belt if it is cracked in an unacceptable way, frayed or if pieces have come off.

Fig. 32

2.3.20.1 Tension of the Poly-V main belt

NOTE:
A new belt will have a tendency to slacken after approximately half an hour of operation.

Procedure

The tension of the belt (A) is manual and requires adjustment. Please contact your dealer for this adjustment.

Fig. 33

2.3.20.2 Replacing the Poly-V main belt

NOTE:
A new belt will have a tendency to slacken after approximately half an hour of operation.

Procedure

Contact your dealer to replace main belt (A).

Fig. 34

2.3.21 Check and replace the air conditioning/alternator Poly-V accessories belt

Frequency

Check the belt tension every 600 hours.

Replace the belt as soon as it shows signs of wear or every 1200 hours (every 600 hours in difficult conditions).

Appearance

- Examine the appearance of the belt (on a daily basis or whenever refueling).
  - Cross cracks (running across the breadth of the belt) are permissible.
  - Longitudinal cracks (running along the length of the belt) that intersect cross cracks are not permissible.

Replace the belt if it is cracked in an unacceptable way, frayed or if pieces have come off.

Fig. 35

2.3.21.1 Tension of the Poly-V accessories belt

Procedure

The tension of the belt (B) is automatic and requires no adjustment.

Fig. 36

2.3.21.2 Replacing the Poly-V accessory belt

Procedure

1. With the engine switched off, manually press on the accessories belt (B) to check the tension.
2. If the accessory belt is worn or loose, contact your AGCO dealer to replace it.

Fig. 37

2.3.22 Check and replace the air compressor (pneumatic braking) Poly-V accessories belt

Frequency

Check the belt tension every 600 hours.

Replace the belt as soon as it shows signs of wear or every 1200 hours (every 600 hours in difficult conditions).

Appearance

- Examine the appearance of the belt (on a daily basis or whenever refueling).
  - Cross cracks (running across the breadth of the belt) are permissible.
  - Longitudinal cracks (running along the length of the belt) that intersect cross cracks are not permissible.

Replace the belt if it is cracked in an unacceptable way, frayed or if pieces have come off.

Fig. 38

2.3.22.1 Tension of the Poly-V accessories belt

Procedure

The tension of the belt (C) is automatic and requires no adjustment.

Fig. 39

2.3.22.2 Replacing the Poly-V accessory belt

Procedure

1. With the engine switched off, manually press on the accessories belt (C) to check the tension.
2. If the accessory belt is worn or loose, contact your AGCO dealer to replace it.

   NOTE:
   A specific tool for removing and fitting the belt is required in order to replace the belt.

Fig. 40

2.4 Transmission

2.4.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Transmission

	Volume/reference available from parts department					
Volume	9.46 l (2.5 gal (US))	18.9 l (4.99 gal (US))	113.5 l (29.99 gal (US))	208 l (55 gal (US))	416 l (109.9 gal (US))	1249 l (330 gal (US))
AGCO Permatran 821 XL (10W30)	841743M1	841813M1	79014714	79014715	79016502	79015650
AGCO Permatran 821 XL Plus (15W40)	79035449	N/A	N/A	79035450	N/A	79035451

IMPORTANT:
When AGCO Permatran 821 XL 10W30 oil is used, the intervals must be reduced to 1000 hours.

Rear final drives

All models: SAE 85W140 API GL5.

	Volume/reference available from parts department		
Volume	9.46 l (2.5 gal (US))	208 l (55 gal (US))	416 l (109.9 gal (US))
AGCO Gear Lube 715 (80W90)	79014722	79014723	79016501
AGCO Gear Lube 775 (85W140)	79014724	79022322	N/A
AGCO Gear Lube (75W140)	79034596	N/A	N/A

2.4.2 Checking the transmission oil level

Frequency

Check the transmission oil level every day.

Procedure

GPA23 and 23+ transmission

Check that the oil level is between the minimum and maximum marks on the dipstick.

Fig. 41

IMPORTANT:
When continuously using hydraulic implements taking a large quantity of oil out of the transmission (hydraulic motors, large capacity cylinders), top up oil to the maximum level on the gage and then add 10 liters.

2.4.3 Draining the transmission oil

Frequency

Drain and replace the transmission oil every 1800 hours or every two years, depending on whichever occurs first.

Procedure

NOTE:
Do not drain until the transmission oil is hot.

Procedure

1. Stand the tractor on level ground, with the front axle suspension disengaged.
2. Place the bottom links in the lowest position. Stop the engine.
3. Remove the drain plug(s) (1) and the filler plug (A). Wait until the oil has drained out completely.
4. Refit the drain plug(s) (1), then refill the transmission with a recommended oil to the correct level.

   NOTE:
   Allow time for the oil to settle in the transmission and the rear axle before rechecking the level. After changing the transmission oil, you MUST bleed the hydraulics and brake systems. If necessary, consult your nearest dealer.

Fig. 42

2.4.4 Transmission breather

The breather is located behind the hydraulic spool valves on the transmission.

Replace the breather every 1800 hours.

Regularly check that the breather hole is not obstructed.

Fig. 43

2.4.5 Filtering the transmission system

Replacing the suction strainer (depending on model): Frequency

Replace the transmission suction strainer every 1800 hours.

Replacing the suction strainer: Procedure

Procedure

1. Unscrew the strainer and discard it.
2. Lightly oil the rubber seal of the new strainer; screw on the new strainer until the seal just comes into contact. Tighten a further half-turn. Do not overtighten.

Fig. 44

2.4.6 Filtering the Open Center hydraulic system

Changing the 150-micron suction strainer and the 15-micron filter: Frequency

1. Change the 150-micron suction strainer (4) every 1800 hours.
2. Change the 15-micron filter (5) every 600 hours.

Fig. 45

(A) 57 l (15.1 gal (US)) Open Center
(B) 100 l (26.4 gal (US)) Open Center

2.4.6.1 Replacing the additional 15-micron filter: Procedure

If the tractor is equipped with an Open Center type hydraulic system and a suspended front axle, you must replace an additional 15-micron filter.

This filter is located on the left-hand side of the rear axle on the hydraulic cover plate.

Fig. 46

ATTENTION: *The replacement of this filter is carried out at the same time as the other 15 micron filter, which is every 600 hours.*

2.4.6.2 Changing the 150-micron suction strainer: Procedure

Procedure

1. Unscrew the strainer (4) and discard it.
2. Lightly oil the rubber seal.
3. Screw on the new strainer until the seal touches it. Tighten a further half-turn. Do not overtighten.

2.4.6.3 Changing the 15-micron filter: Procedure

Procedure

1. Unscrew the bowl, remove the filter (5), drain it well and discard it.
2. Replace the seal every 1200 hours or as necessary.

   NOTE:
   Wait 6 minutes for the seal to retract before refitting the bowl.
3. Slide the new filter (5) into the filter head.

   NOTE:
   To avoid contamination of the new filter by foreign material (mud etc.), do not completely remove the protective plastic until the filter element is in place.
4. Refit the filter bowl and screw hand-tight until it locks.

2.4.7 Filtering the Closed Center hydraulic system

Changing the 150-micron suction strainer and the 15-micron filter: Frequency

1. Change the 150-micron suction strainer (4) every 1800 hours.
2. Change the 15-micron filter (5) every 600 hours.

Fig. 47

(B) Closed center:

2.4.7.1 Changing the 150-micron suction strainer: Procedure

Procedure

1. Unscrew the strainer (4) and discard it.
2. Lightly oil the rubber seal.
3. Screw on the new strainer until the seal touches it. Tighten a further half-turn. Do not overtighten.

2.4.7.2 Changing the 15-micron filter: Procedure

Procedure

1. Unscrew the bowl, remove the filter (5), drain it well and discard it.
2. Replace the seal every 1200 hours or as necessary.

   NOTE:
   Wait 6 minutes for the seal to retract before refitting the bowl.
3. Slide the new filter (5) into the filter head.

   NOTE:
   To avoid contamination of the new filter by foreign material (mud etc.), do not completely remove the protective plastic until the filter element is in place.
4. Refit the filter bowl and screw hand-tight until it locks.

2.4.8 PowerShuttle filtration

Frequency

Change the 60-micron filter strainer of the PowerShuttle (3) every 1800 hours.

NOTE:
After changing the oil, the filter or the strainer, run the engine until oil pressure is obtained; wait for the indicator light 5 bar (73 psi) to go out and check for leaks.

Procedure

1. Unscrew the filter bowl (3).
2. Remove the filter element, allow it to drain fully and discard it.
3. Slide the new filter element into the filter head.
4. Replace the filter bowl (3) and screw hand-tight until it locks.
5. Top up the oil.

Fig. 48

2.4.9 25-micron filtration for the high-pressure braking

Frequency

Every 600 hours, replace the filter located on the right-hand side of the rear axle housing/gearbox assembly.

Fig. 49

2.4.10 Lubricating the rear axle shaft bearings

Procedure

1. Remove the plugs (1). Replace them with grease nipples.
2. Operate the grease gun 2 or 3 times.
3. Refit the plugs.

Fig. 50

2.4.11 Checking and cleaning the transmission oil cooler

Frequency

Check the cooler every day and, if necessary, clean using compressed air.

Procedure

IMPORTANT:
Take care not to damage the various radiator grilles.

Procedure

Clean the transmission oil cooler (2) with compressed air.

Fig. 51

2.4.12 Lubricating the rear PTO shaft

DANGER:
Stop the engine before lubricating the rear PTO shaft.

Lubricate the rear PTO shaft every 50 hours. This lubrication protects the rear PTO shaft from corrosion and assists implement hitching.

2.5 Brakes

2.5.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the products used comply with the following classifications and no other products are used.

Pneumatic brake

For the winter period, use **wabcothyl** anti-freeze (reference: 79019149)

2.5.2 Checking the regulator filter

Frequency

Check the regulator filter every 600 hours.

Replace the regulator filter if necessary (e.g. if it is heavily blocked).

Procedure

1. Remove the screw (2) from the filter access
2. Extract the filter (1) and clean it. Blow through with compressed air before refitting the assembly

   NOTE:
   Bleed the hydraulic system after carrying out any maintenance on the brake system (see the chapter: Bleeding the brake system).

Fig. 52

2.5.3 Bleeding the brake system

Frequency

Bleed the brake/piston system every 1800 hours and after every service operation.

Bleed screw locations

The brake bleed screws are located on the right- and left-hand sides of the center housing.

Fig. 53

Pneumatic trailer brake bleed

NOTE:
If work is carried out on the pneumatic brake system, bleed the trailer brake hydraulic system

Fig. 54

NOTE:
Each day, bleed the air from the pneumatic accumulators of the trailer brake system by pulling on the cable located on the side of the right-hand step.

Fig. 55

2.5.4 Compressed air system protection

Frequency

If there is a risk of freezing, protect the system by filling the tank with anti-freeze.

2.5.4.1 Procedure

Procedure

1. Open the cap of the anti-freeze tank
2. Open the system by placing the pump lever (1) in position (I)
3. Fill the tank (2) with the recommended anti-freeze
4. Replace the cap of the anti-freeze tank
5. After the winter, close the system by placing the pump lever in position (O).

   NOTE:
   Regularly check for anti-freeze in the tank throughout the winter.

Fig. 56

2.6 Front power take-off

2.6.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Front power take-off

You must use Autran DX III/Fluid 9 oil.

2.6.2 Checking and cleaning the oil cooler of the front PTO

Frequency

Check the cooler every 100 hours and, if necessary, clean using compressed air.

Check the cooler every day and, if necessary, clean using compressed air in dusty conditions.

Procedure

IMPORTANT:
Take care not to damage the various radiator grilles.

Procedure

Clean the PTO oil cooler (1) with compressed air.

Fig. 57

2.6.3 Draining oil

Frequency

NOTE:
The front PTO functions hydraulically in a separate, independent system. The entire system is cooled by an oil cooler.

Drain the front PTO at 50 hours and then every 600 hours or every six months.

2.6.3.1 Procedure

Procedure

1. Remove the two drain plugs (1).

Fig. 58

2. Remove the circlip and loosen the screw holding the filter cover plate (2). Remove and clean the pump filter at each draining.
3. Refit the assembly with a new circlip.

Fig. 59

4. To fill with oil, pour the oil via the port (3). The oil level is filled level with the filler cap threadlock, as shown:
5. In the event of a leak, check the oil level after unscrewing the plug (3). Top up and consult your dealer.

Fig. 60

2.6.4 Lubricating the front PTO shaft

DANGER:
Stop the engine before lubricating the front PTO shaft.

Lubricate the front PTO shaft once a week.

This lubrication protects the front PTO shaft from corrosion and assists implement hitching.

2.7 Live PTO

2.7.1 Lubricating the rear PTO shaft

DANGER:
Stop the engine before lubricating the rear PTO shaft.

Lubricate the rear PTO shaft every 50 hours. This lubrication protects the rear PTO shaft from corrosion and assists implement hitching.

2.8 Front axle and steering

2.8.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Front axle

Oil for DANA front axle: Final drives: API GL5; SAE 80W90 (85W90)

Assembled center housing: API GL5; SAE 80W90 (85W90)

Grease

Super Lithium AGCO No. 2 grease, 410 g (14.46 oz) tube - reference 79014728

2.8.2 4-wheel drive front axle: Checking the front axle beam oil level

Frequency

Check the front axle beam oil level every 200 hours.

2.8.2.1 Procedure

Procedure

1. Stand the front axle on level ground.
2. Unscrew the plug (1) and check the level. The oil should be level with the lower rim of the filler plug port. Top up if necessary.

Fig. 61

2.8.3 4-wheel drive front axle: Draining the front axle beam oil

Frequency

Change the front axle beam oil every 1200 hours.

2.8.3.1 Procedure

IMPORTANT:
Do not dispose of the oil in the environment. Always store oil in suitable containers so that it can be collected and processed by specialist organizations.

NOTE:
Do not drain until the front axle beam oil is hot.

Procedure

1. Stand the tractor on level ground.
2. Unscrew the drain plug (2) and the filler plug (1). Allow the oil to drain out.
3. Collect the used oil in a container of sufficient size.
4. Refit and retighten the drain plug.
5. Top up with the recommended oil type to the lower level of the filler port.
6. Refit and retighten the filler plug.
7. Check there are no leaks

Fig. 62

2.8.4 4-wheel drive front axle: Checking the oil level in the final drives

Frequency

Check the oil level in the front final drives every 200 hours.

2.8.4.1 Procedure

Procedure

1. Turn the wheel until the plug (1) is horizontally aligned with the center of the hub.
2. Remove the plug and check that the oil level is flush with the plug port.

Fig. 63

2.8.5 Draining the oil from the final drives of the 4-wheel drive front axle

Frequency

Drain the oil from the front final drives every 1200 hours.

2.8.5.1 Procedure

Procedure

1. Turn the wheel until the plug is located at the bottom of the hub (A).
2. Remove the plug (1) to drain the oil.

Fig. 64

3. Horizontally align the plug with the centreline of the hub (B) and then fill to the correct level.
4. Refit the plug (1) and tighten to a torque of 90 Nm (66 lbf ft).

Fig. 65

2.8.6 Lubrication of the 4-wheel drive front axle

Frequency

Check/lubricate the front axle every 200 hours.

IMPORTANT: *In difficult working conditions, the front axle must be re-lubricated every 50 hours.*

Lubrication points

(1) Non-suspended front axle bearing

Fig. 66

(2) Front axle drive shaft

Fig. 67

2.9 Rear linkage

2.9.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Grease nipples

Super Lithium AGCO No. 2 grease, 410 g (14.46 oz) tube - reference 7901 4728

2.9.2 Lubricating the three-point linkage

Frequency

Check/lubricate the linkage mechanism once a week.

Grease points

IMPORTANT:
The threaded parts and hitch pins must be correctly protected with grease.

(1) Lift rams

Fig. 68

(2) Lift rods

Fig. 69

(3) Top link

Fig. 70

(4) Top link

Fig. 71

(5) Stabilizer

Fig. 72

2.10 Front linkage

2.10.1 Recommended products

IMPORTANT:
The warranty remains valid only as long as the lubricants used comply with the following classifications, and no other products are used.

Grease nipples

Super Lithium AGCO No. 2 grease, 410 g (14.46 oz) tube - reference 7901 4728

2.10.2 Lubricating the front linkage

Frequency

Check/lubricate the front linkage joints once a week.

IMPORTANT:
During extended storage, ram rods should not come into contact with the air (risk of corrosion and subsequent leakage) Rams should be fully retracted or greased.

Lubrication points

(1) Ram upper joints

Fig. 73

(2) Ram lower joints

Fig. 74

(3) Linkage arm pin

Fig. 75

2.11 Electrical equipment

2.11.1 Batteries

The tractor's electrical circuit operates on 12 V. The negative terminal is the earth.

Wipe the battery top and smear the terminals with liquid paraffin every 600 hours.

WARNING:
Batteries produce explosive gasses.
Sparks, flames, lit cigarettes or any flammable source must be kept at a distance.
Wear suitable safety goggles when working near batteries.

WARNING:
Repair: If connecting to another battery or a remote start aid, respect the battery voltage.

Fig. 76

2.11.2 Alternator

Ask your dealer or agent to check the alternator every 1200 hours or once a year.

IMPORTANT:
The alternator wiring must be disconnected before any arc welding is carried out on the tractor or on an implement which is attached to it.
Do not disconnect or reconnect the battery cables when the engine is running.
Never operate the engine when the cable linking the alternator and battery is disconnected.
Do not attempt to connect any additional electrical equipment, as this may damage components of the existing electrical circuit.

2.11.3 Power socket (ASAE)

Rear power socket (ASAE)

Fig. 77

Reference	ASAE circuit	Maximum electrical charge	Fuses
(1)	Earth	-	-
(2)	Rear work light	2x 55 W	F17
(3)	Left-hand indicator and hazard warning light	4x 21 W	F15
(4)	Stop lights	NC	F46
(5)	Right-hand indicator and hazard warning light	4x 21 W	F15
(6)	Rear side lights	4x 6 W	F36
(7)	Accessories	20 A	NC

ASAE/ISO front power socket (rear view)

Reference	System	Maximum electrical charge
(1)	+ Battery[1]	25 A
(2)	Work lights	NC
(3)	Earth	-
(4)	+ 12 V APC[2]	10 A
(5)	Side lights	NC
(6)	Rotary beacon	NC
(7)	Side lights	NC

Fig. 78

[1] + BAT = + 12 V battery
[2] + APC = + 12 V accessories

2.11.4 Adjusting the headlights

Adjustment diagram

(A) Distance between the headlights and a wall or a screen
(B) Height from the center of the headlights to the ground
(C) Center-to-center distance between headlights
(D) Vertical offset

Fig. 79

Procedure

1. **NOTE:** *Do not let your fingers come into direct contact with the iodine bulbs.*

   Position the tractor on a level surface, facing a wall or screen at a distance of 7.5 m (25 ft).
2. Trace a horizontal line (1) on the wall, corresponding to the height (B).
3. Trace two vertical lines on the wall corresponding to the width (C).
4. Trace a horizontal line (2) on the wall under line (1) at a distance of (D) = 0.1x(B).
5. Adjust each headlight individually by masking the opposite light. Align the upper edge of the lit zone with line (2). Align the center of the lit zone with the corresponding vertical line traced during this step.

2.11.5 Description of the main fuse box

Description of the main fuse box

Functions of the fuse box elements

F	Fuse
SH	Shunt (shunts are fuses)
K	Relay
X	Connector

Fuse power and size

Amperage	Size	Color
3	Small	
5	Small	
7.5	Small	
10	Small	
15	Small	
15	Average	
20	Average	
25	Average	
30	Average	
50	Large	
60	Large	

Main fuse box

Fig. 80

For AutoPower IV/AutoPower VI transmissions

Number	Amperage	Size	Protected function
F1	5A	Small	Fuse board earth
F2	3 A	Small	Functions • K6 relay control circuit supplying the +ACC for the tractor
F3	10 A	Small	+ACC **X395** - Radio supply
F4	15 A	Small	+ ACC • **X403** - Rear windscreen wiper motor • **X411** - Rear windscreen wiper switch • **X453** - Extreme cold weather pump motor
F5	25 A	Average	+ACC • **X58** - Windscreen wiper and direction indicator control unit • **X65** - Front windscreen wiper motor
F6	25 A	Average	Main beam lights on hand rail and grille
F7	15 A	Small	Dipped beam lights on hand rail and grille
F8	30 A	Average	+BAT **X250** - Power socket in cab (on the right-hand console)
F9	10 A	Small	K17 relay power circuit supplying +BAT for rear power take-off engagement
F10	15 A	Small	+BAT • **X336** - Battery isolator • **X646** - Battery isolator switch
F11	15 A	Small	K7 and K8 relay power circuit supplying +BAT to functions 3 and 4 of the **ENG109** - External connector for front-loader supply
F12	10 A	Small	Functions • K6 relay power circuit supplying the +ACC for the tractor
F13	5 A	Small	Auto-Guide™ antenna +BAT
F14	10 A	Small	+ APC • **X250** - Power socket in cab (on the right-hand console) • **X250** - Power socket in cab (on the front right-hand fender arch)
F15	30 A	Average	+BAT **X652** - Hazard warning light unit
F16	25 A	Average	• **X275** - Front accessories connection socket (work light) • **X365** - Hand-rail work light

Number	Amperage	Size	Protected function
F17	30 A	Average	• **X78** - Work light on rear right-hand fender • **X93** - Work light on rear left-hand fender • Work light on rear power socket (NA)
F18	20 A	Average	• **X270** - Front accessories connection socket (rotary beacon) • **X409** - Left-hand rotary beacon • **X410** - Right-hand rotary beacon
F19	25 A	Average	• **X385** - Rear left-hand work light on roof • **X386** - Rear right-hand work light on roof • **X387** - Rear left-hand work light on roof • **X388** - Rear right-hand work light on roof
F20	30 A	Average	• **X379** - Front left-hand work light on roof • **X380** - Front right-hand work light on roof • **X381** - Front left-hand work light on roof • **X382** - Front right-hand work light on roof
F21	30 A	Average	• **X351** - Front right-hand grille work light • **X352** - Front right-hand grille work light • **X353** - Front left-hand grille work light • **X354** - Front left-hand grille work light
F22	50 A	Large	• Roof ventilation supply • K27 relay power circuit
F23	60 A	Large	K28 relay power circuit supplying the + BAT to the Isobus connectors
F24	50 A	Large	+BAT **X218** - External Isobus implement connector
F25	50 A	Large	+ BAT • **X177** - Linkage controller • **X472** - Transmission controller 1 • **X473** - Transmission controller 2 • **X466** - Suspended-cab controller
F26	10 A	Small	+ APC • K29 relay power circuit • **X66** - Left-hand brake pedal sensor • **X67** - Right-hand brake pedal sensor • **X68** - Clutch pedal sensor
F27	15 A	Small	+ APC • **X104** - TECU controller • **X105** - TMC Display • **X106** - T-handle (only on Classic) • **X112** - Joystick (only on Classic)

Number	Amperage	Size	Protected function
			• **X122** - Hand throttle (only on Classic) • **X592** - Position switch for the rear PTO 540/1000 speed (only on models MT515E/ MT525E/MT535E/MT545E) • **X650** - Hydraulics flow rate change/memory switch • **X704** - Auxiliary hydraulics locking switch • **X719** - Hare/Tortoise mode or range shift switch
F28	15 A	Small	+APC • **X87** - Linkage lifting switch on right-hand fender • **X94** - Rear PTO external switch • **X97** - Linkage lifting switch on left-hand fender • **X124** - Pedal/Lever mode switch • **X127** - Rear PTO engagement switch • **X128** - Rear PTO engagement switch • **X135** - Braking pressure sensor • **X166** - Suspended front axle position sensor • **X235** - Front axle steering sensor (WAS sensor) • **X277** - Front linkage lifting switch • **X612** - Position switch for the creeper range (snail) lever (supply) • **X617** - Position switch for the economy PTO lever (supply) • **X618** - Parking brake sensor • **X619** - Upper and lower limits of the engine speed switch (only on Deluxe/Premium) • **X619** - Memorized speed A engagement switch(only on Classic) • **X658** - Front linkage lowering switch • **X664** - Linkage lowering switch on right-hand fender • **X665** - Linkage lowering switch on left-hand fender • **X732** - Position switch for the GSPTO lever (supply) (only on models MT515E/MT525E/ MT535E/MT545E) • **X733** - Position switch for the rear PTO 540/1000 rpm lever (supply) • **X815** - Panoramic cab + APC relay control circuit • **X884** - Hydraulic spool valve controls change-over switch
F29	10 A	Small	+APC • **X20** - Transmission filter blockage sensor • **X22** - Radar • **X33** - Connector for the electrohydraulic spool-valves supply • **X168** - Pneumatic brake system pressure sensor

Number	Amperage	Size	Protected function
			• **X488** - Range switch 1 • **X489** - Range switch 2 • **X490** - Range switch 3 • **X491** - Range switch 4 • **X492** - Senstronic sensor • **X493** - Lubrication switch • **X494** - Low-pressure switch • **X499** - NA PTO frequency sensor (only on models MT555E/MT565E/MT575E/MT585E/MT595E) • **X673** - ParkLock wear switch • **X674** - ParkLock status switch
F30	15 A	Small	+ APC **X191** - Fuel preheater
F31	15 A	Small	+ APC **X513** - Additional heater
F32	15 A	Small	+ APC **X739** - Sensor detecting presence of operator in seat
F33	50 A	Large	Tractor +APC
F34	5 A	Small	+BAT **X55** - Instrument panel
F35	7.5 A	Small	+BAT • **X104** - TECU controller • **X105** - TMC Display • **X594** - AgCommand™ unit
F36	7.5 A	Small	+ BAT • **X77** - Rear right-hand side light, brake light and direction indicator • **X215** - Trailer connection (right-hand side light) • **X257** - Side light and direction indicator on hand rail (right and left) • **X273** - Front accessories connection socket (side light) • **X414-A** - Left-hand number plate lighting supply • **X415-A** - Right-hand number plate lighting supply • **X643** - Right-hand marker lights • Instrument panel lighting
F37	10 A	Small	+ BAT • **X92** - Rear left-hand side light, brake light and direction indicator • **X220** - Trailer connection (left-hand side light) • **X257** - Side light and direction indicator on hand rail (right and left) • **X644** - Left-hand marker lights • **X712** - Number plate lights

Number	Amperage	Size	Protected function
			• **X819** - Triflash relay control circuit (only on panoramic cabs) • Right-hand console light
F38	3 A	Small	K33 relay control circuit + APC
F39	3 A	Small	K32 relay control circuit + APC
F40	3 A	Small	Not used
F41	5 A	Small	+ APC • **X185** - Engine controller
F42	10 A	Small	+ APC • **X58** - Windscreen wiper and direction indicator control unit • **X74** - Audible alarm supply (+12 V APC)
F43	10 A	Small	+ APC • **X55** - Instrument panel • **X717** - Linkage and PTO keypad on pillar
F44	5 A	Small	+ APC • **X345** - Supply for additional terminal (Mitron unit) • Aerial Auto-Guide™
F45	5 A	Small	Not used
F46	15 A	Small	K24 relay power circuit supplying the + APC to the brake lights
F47	20 A	Average	Not used
F48	30 A	Average	+ BAT • **X58** - Windscreen wiper and direction indicator control unit • **X250** - Power socket in cab(on the front right-hand wheel arch)
F49	30 A	Average	+ BAT • Trailer connector (NA) • **X815** - Panoramic cab + APC relay power circuit
F50	25 A	Average	+BAT **X271** - Front accessories connection socket (+12 V battery)
F51	30 A	Average	+ BAT • **X157** - Left-hand side power socket (power) • **X395** - Radio supply • **X407** - Interior light

Number	Amperage	Size	Protected function
			• **X439** - Air conditioning control module (blue connector) • **X811** - Triflash switch (only for panoramic cabs) • **X812** - Side windscreen wiper motor connection (only for panoramic cabs)
F52	15 A	Small	+ BAT • **X138** - Hazard warning lights indicator light and switch • **X155** - Cigarette lighter plug (power) • **X169** - Power-socket control switch • **X687** - Auto-Guide™ screen harness/pillar harness connection • **X717** - Linkage and PTO keypad on pillar • K16 relay control circuit
F53	10 A	Small	+ BAT • **X218** - External Isobus implement connector • **X344** - Isobus connector in cab
F54	3 A	Small	Not used
F55	7.5 A	Small	**X255** - Horn
F56	5 A	Small	**X68** - Clutch pedal sensor (start switch)
F57	15 A	Small	+ APC • **X472** - Transmission controller 1 • **X473** - Transmission controller 2
F58	10 A	Small	+ APC **X153** - Non-Isobus implement connector
F59	10 A	Small	+APC **X466** - Suspended-cab controller
F60	7.5 A	Small	+ APC • **X177** - Linkage controller • **X183** - Diagnostics connector • **X184** - Diagnostics connector • **X594** - AgCommand™ unit
F61	3 A	Small	+ APC • **X194** - D + alternator 1 • **X195** - D + alternator 2
F62	5 A	Small	K15 relay power circuit supplying +APC to the **X216** - Reversing light and reversing alarm and trailer connector
F63	10 A	Small	K26 relay power circuit supplying +APC to the air conditioning compressor

Number	Amperage	Size	Protected function
F64	10 A	Small	+ APC **X272** - Front accessories connection socket (+12 V APC)
F65	10 A	Small	+ APC • **X248** - Right- and left-hand electric rear-view mirror adjustment switch • **X249** - External rear-view mirror defroster switch
SH2	25 A	Average	High beam lamps on grille (present only without the high beam lamps/low beam lamps on hand rails option)
SH3	15 A	Average	Low beam lamps on grille (present only without the high beam lamps/low beam lamps on hand rails option)
K1			Relay for front windscreen wiper control unit and front windscreen wiper motor
K2			Not used
K3			Relay for high beam lamps on hand rail or grille (present only with the high beam lamps/low beam lamps on hand rails option)
K4			Relay for low beam lamps on hand rail or grille (present only with the high beam lamps/low beam lamps on hand rails option)
K5			Not used
K6			Relay supplying the +ACC for the tractor
K7			Relay for function 4 switch on Multi Function Joystick
K8			Relay for function 3 switch on Multi Function Joystick
K9			Auto-Guide™ antenna +BAT relay
K10			High beam lamps relay
K11			Not used
K12			Relay for work lights on fenders and the rear power socket
K13			Relay for rear roof work lights
K14			Relay for the lighting module for the work lights on the grille
K15			Relay for reversing lights and reversing alarm
K16			Power supply relay in +BAT of the right-hand console power socket
K17			Not used
K18			Power supply relay in +APC of the right-hand console power socket and the front right-hand fender arch power socket

Number	Amperage	Size	Protected function
K19			Low beam lamps relay
K20			Not used
K21			Relay for the hand rail work lights and the front implement accessories connector work light
K22			Relay for roof rotary beacon, front implement accessories connector rotary beacon
K23			Front roof work lights relay
K24			Brake lights relay
K25			Supply relay for fuse F3, fuse F4, fuse F5 and K27 relay control circuit
K26			Air conditioning compressor supply relay
K27			Supply relay for roof ventilation
K28			Isobus connectors +BAT relay
K29			Not used
K30			Supply relay for fuse F36 and fuse F37
K31			Supply relay for fuse F26, fuse F27, fuse F28 and fuse F29
K32			Supply relay for fuse F30, fuse F31 and fuse F32
K33			Tractor relay +APC

1. + ACC = + 12 V accessory
2. + APC = + 12 V ignition on
3. + BAT = + 12 V batteries

Rear view of fuse box

Fig. 81

2.11.6 Description of the secondary fuse box (depending on model)

Description of the secondary fuse box (depending on model)

Functions of the fuse box elements

F	Fuse
SH	Shunt (shunts are fuses)
K	Relay
X	Connector

Fuse power and size

Amperage	Size	Color
3	Small	
5	Small	
7.5	Small	
10	Small	
15	Small	
15	Average	
20	Average	
25	Average	
30	Average	
50	Large	
60	Large	

Secondary fuse box

A second fuse box is located above the batteries.

Fig. 82

Number	Amperage	Size	Protected function
1 - F110	225 A	Specific	+BAT **X241** - AGCO Power engine preheating supply (Grid Heater)
2 - F107	175 A	Specific	+BAT **X192** - B + alternator 1
3 - F108	200 A	Specific	Cab power supply + BAT
4 - F109	175 A	Specific	+BAT **X193** - B + alternator 2
5 - F105	70 A	Large	R2 start relay power circuit
6 - F101	30 A	Average	K101 relay power circuit

Number	Amperage	Size	Protected function
7 - F106	30 A	Average	**X887** - Supply relay for the NOX sensors, for the EGR valve and for the turbocharger wastegate power circuit
8 - F104	25 A	Average	**X185** - Engine controller +BAT
9 - F103	10 A	Average	Not used
10 - F102	30 A	Small	Earth protection
K101			Supply relay • **X289** - Denoxtronic supply module • **X577** - DEF pressure lines heater
K102			Not used
K103			Not used
K104			Not used
K105			Not used
R2			Starter relay

1. + BAT = + 12 V batteries

Additional fuses/relays

Fig. 83

Number	Amperage	Size	Protected function
1 - X867	10 A	Specific	EGR valve supply
2 - X559	3 A	Specific	**X185** - Engine controller earth protection
3 - X868	10 A	Specific	Turbocharger wastegate power supply
4 - X886	10 A	Specific	NOx sensors power supply
5 - X887			Power supply relay for engine sensors
6 - X558			**X185** - Engine controller earth relay

1. + BAT = + 12 V batteries

Fig. 84

Number	Protected function
X826	**X336** - Battery isolator supply relay
X711	**X646** - Battery isolator switch relay supplying **X336** - Battery isolator

Fig. 85

Number	Amperage	Size	Protected function
7 - X828	5 A	Specific	Power circuit for relay X826 and X711 supplying **X336** - Battery isolator
8 - X869	3 A	Specific	Control circuit for relay X826 supplying **X336** - Battery isolator

Fig. 86

Number	Amperage	Size	Protected function
9 - X955	5 A	Specific	+BAT of the **X466** - Suspended-cab controller

1. + BAT = + 12 V batteries

Fig. 87

Number	Protected function
X953	+APC relay for **X185** - Engine controller AGCO Power

2.11.7 Battery isolator

Battery isolator

A device isolates the battery/batteries (depending on assembly) from all the other electrical equipment on the tractor.

This isolator is programmed for automatic cut-off after a delay of 60 minutes after switching off the ignition. Therefore, the operator does not have to activate the device; this system is self-managed in terms of activation and cut-off, depending on the position of the ignition key.

The isolator timer control can vary according to the tractor configuration.

The temporary control conditions for the closed isolator are as follows:

1. the time required to drain the DEF system
2. the TMC Display standby time
3. power supply maintained on an ISOBUS or Auto-Guide™ implement

Whatever the status of the above conditions, the isolator will always open after a maximum period of 60 minutes after the ignition key has been set to the OFF position.

The permanent control condition for the closed isolator is as follows:

1. Activation of the hazard warning lights

   NOTE:
   The battery isolator will open once the hazard warning lights have been deactivated.

IMPORTANT:
In the event of electrical faults on the tractor or the implement, emergency cut-off of the isolator is possible via a switch located under the controllers housing cover plate in the cab, but only if the ignition key is in the OFF position. The DEF system is drained even after pressing the switch for the emergency cut-off of the battery isolator.

1. Open the cover plate (A) located on the cab floor (right-hand side).

Fig. 88

1. Press the switch (B) to execute an emergency cut-off of the battery isolator.

Fig. 89

2.12 Pressure washing

2.12.1 Pressure washing

When pressure washing, protect and do not direct the jet on the following components:

- Alternator
- Starter
- Radiator
- Front axle pivot pins
- Inspection cover
- Radar
- Harnesses and electrical connections
- Decals
- Cab door and window seals.
- **IMPORTANT:** *Exhaust outlet: When washing, it is strictly prohibited to allow water into the exhaust outlet.*

2.13 Storing your tractor

2.13.1 Storing your tractor

When the tractor is not used for several months, it is important to follow these precautions to provide proper protection:

1. If possible, it is preferable to protect the tractor from inclement weather by storing it under cover.
2. Each linkage must be fully lowered to avoid any pressure building up in the rams.
3. Fill the tank with fuel to prevent any water entering the fuel tank due to condensation.
4. Protect the air inlet and exhaust from humidity.
5. Remove the battery and store it in a dry location.
6. Clean the tractor.
7. Carry out the maintenance indicated in the Operator's Manual (oil changes, filters etc.)
8. Lubricate all the points as indicated in the Operator's Manual.
9. Use grease to protect metal parts that are not painted (ram rods).
10. If possible, slacken off the engine accessories belt tensioner.
11. Chock the tractor so that the wheels are no longer in contact with the ground.
12. Use cloth to protect the instrument panel and coverings from direct sunlight (only if the tractor is stored outside).
13. Use water-resistant products (e.g. wax) to protect the tractor from moisture (only if the tractor is stored outside).

2.13.2 Storing the DEF

1. In order to guarantee the stability of the DEF (as per DIN 70070 standard), the following storage recommendations should be followed:
   a. Use the original container for storage.
   b. Keep the container properly closed and in a cool, well-ventilated area.
   c. Keep away from heat and direct sunlight. If DEF is stored at high temperatures, the solution may crystallize and release an ammonia odor. When the tractor is in storage for a long period, the DEF tank vent must be plugged.

NOTE:
Freezing temperature: -11 °C (12 °F)

2.14 Faults and solutions

2.14.1 General table of faults

The table below gives a brief list of the various checks that can be carried out by the operator in the event of a system fault, prior to contacting the dealer. If the proposed solutions do not resolve the problem, it is recommended that you contact the dealer.

IMPORTANT:
***For all problems related to an electrical/electronic function**, check inside the fuse box to ensure that the fuse concerned is in good condition.*

The engine will not start.	
Cause	**Solution**
There is air inside the fuel system.	Contact the dealer.
The fuel system is blocked by impurities.	Clean the filter inlet. If necessary, change the filter cartridge.
In very cold conditions: defective cold start device.	Ensure that the preheating system is good working order. Contact the dealer.
In winter, below -5°C: fuel flow blocked by ice or fuel waxing.	Unblock the filter inlet and the diesel filter. Replace with winter fuel.
No starting contact/the starter is defective	Check the battery starter connection.
Electrical failure with no current.	Check the fuse and the connections.
Other	Contact the dealer.

The engine stops	
Cause	**Solution**
There is air inside the fuel system.	Contact the dealer.
The fuel system is blocked by impurities.	Clean the filter inlet. If necessary, replace the filter cartridge.
In winter, below -5°C: fuel flow blocked by ice or fuel waxing.	Unblock the filter inlet and the diesel filter. Replace with winter fuel.
Other	Contact the dealer.

The engine lacks power.	
Cause	**Solution**
Fuel filter and fuel prefilter blocked.	Replace the cartridge.
Air hose too flexible.	Contact the dealer.
Air filter blocked.	Clean the filter.
DEF problem	Refer to the relevant chapter (see information on the operating mode of Tier 4F/Stage IV SCR Technology engine in the Operation section of the Operator's Manual).
Other	Contact the dealer.

The tractor does not move forward	
Cause	**Solution**
ParkLock not disengaging.	Disengage manually and contact the dealer.
Other	Contact the dealer.

Transmission oil too hot	
Cause	**Solution**
Radiator blocked.	Clean the radiator.
Other	Contact the dealer.

The tractor does not reach maximum speed	
Cause	**Solution**
Fuel filter blocked.	Replace the cartridge.
Charge pressure too low.	Check the intake air pressure and check the air filter for blockages.
Other	Contact the dealer.

Zero pressure and hydraulic flow	
Cause	**Solution**
Insufficient oil in the transmission	Top up with oil
Other	Contact the dealer.

Charge indicator light comes on	
Cause	**Solution**
Defective alternator.	Check the alternator. Contact the dealer.
Belt slack.	Check the belt tension.
Other	Contact the dealer.

No display on the digital display	
Cause	**Solution**
Electrical failure.	Check the fuses and connections. Replace faulty fuses.
Other	Contact the dealer.

Significant noise from the hydraulic system	
Cause	**Solution**
The hydraulic oil is still cold.	Operate the engine at average speed for several minutes before operating the hydraulics.
No oil inside the hydraulic system.	Top up in accordance with the specifications.
Other	Contact the dealer.

Heater air-blowing function not working	
Cause	**Solution**
The air is not delivered to the fan.	Check the condition of the cab air filters.
Other	Contact the dealer.

The air conditioning is not working	
Cause	**Solution**
The refrigeration compressor is not working: the magnetic clutch is not engaging and the belt is slack or split.	Check the fuses
No liquid refrigerant R134a in the system.	Contact the dealer.
Check the drive belt.	Contact the dealer.
Other	Contact the dealer.

Air conditioning system lacks efficiency	
Cause	**Solution**
Radiator blocked.	Clean the radiator.
Fresh air filter/ambient air filter blocked.	Shake the fresh air filter. Blow air through the ambient air filter and replace it if necessary.
No liquid refrigerant R134a in the system.	Contact the dealer.
Other	Contact the dealer.

2.14.2 Indicator light panel

Front PTO engaged indicator light

Activating condition(s)

- Indicator light permanently on = front PTO engaged
- Indicator light flashing = front power take-off in safety mode

Suspended front axle engagement switch indicator light	
Activating condition(s) • Indicator light permanently on = front axle suspension active • Indicator light flashing = front axle suspension error	
Cause(s)	**Solution(s)**
Front axle overloaded	Remove load from the front axle.
Calibration in progress or failed	Contact the dealer.
Error in one of the components	Contact the dealer.

4WD front axle engaged indicator light	
Activating condition(s) • Indicator light permanently on = 4WD front axle engaged • Indicator light flashing = 4WD front axle error	
Cause(s)	**Solution(s)**
Error in one of the components	Contact the dealer.

High-pressure transmission oil filter blockage indicator light	
Activating condition(s) • Indicator light permanently on = filter blocked, if transmission oil temperature is above 49 °C (120 °F)	
Cause(s)	**Solution(s)**
Filter blocked	Change the filter element.
Transmission oil polluted	Check the quality of the oil.
High-pressure transmission oil filter blockage switch faulty (error code T4150)	Check the blockage switch.

Differential lock indicator light
Activating condition(s) • Indicator light permanently on = differential lock engaged

• Indicator light flashing quickly = differential lock error	
Cause(s)	**Solution(s)**
Error in one of the components	Contact the dealer.

Rear PTO engaged indicator light	
Activating condition(s) • Indicator light flashing slowly = rear PTO pre-engaged • Indicator light permanently on = rear PTO engaged • Indicator light flashing quickly = rear PTO error	
Cause(s)	**Solution(s)**
Error in one of the components	Contact the dealer.

Pressure light for brakes and pneumatic brakes	
Activating condition(s) • Indicator light permanently on = pressure in pneumatic or hydraulic brake system too low	
Cause(s)	**Solution(s)**
Pressure in pneumatic brake system lower than 4 bar (58 psi)	Check the condition of the air connection couplers with the implement, the implement braking system and the pneumatic braking system.
Braking pressure sensor faulty	Contact the dealer.

Engine oil pressure warning light	
Activating condition(s) • Indicator light flashing slowly = engine oil pressure low - warning • Indicator light permanently on = insufficient engine oil pressure (< 1 bar (15 psi)) - STOP alert • Indicator light flashing with general failure warning light = engine error	
Cause(s)	**Solution(s)**
Oil level too low	Stop the engine and check the oil level.
Problem in the lubrication system	Contact the dealer.
Engine error code	Contact the dealer.

Service indicator light	
Activating condition(s) • Indicator light permanently on = service due	
Cause(s)	**Solution(s)**
Service due	Perform required service. To switch off this indicator light, display the start-up screen, then press the OK key of the display selector switch on the Setup and Information Screen keypad for 6 seconds. The service schedule counter is set back to the number of hours indicated in the Service Guide Chart. Otherwise, contact the dealer.

General failure warning light	
Activating condition(s) • Indicator light flashing with engine oil pressure indicator light = engine error - stop the engine • Indicator light permanently on = major error - stop the tractor	
Cause(s)	**Solution(s)**
Engine error	Contact the dealer.
Major error	Contact the dealer.

Lubrication pressure indicator light	
Activating condition(s) • Indicator light permanently on = lubrication pressure lower than 0.45 bar (7 psi)	
Cause(s)	**Solution(s)**
Oil level too low	Check the transmission oil level.
Hydraulic system components faulty	Contact the dealer.

Transmission oil pressure indicator light	
Activating condition(s) • Indicator light flashing = transmission oil pressure lower than 9 bar (131 psi)	
Cause(s)	**Solution(s)**
Transmission oil level too low	Check the transmission oil level.
Transmission module faulty	Contact the dealer.

Alternator charge warning light	
Activating condition(s) • Indicator light flashing and engine speed greater than 1000 rpm = one of the two alternators is not working • Indicator light permanently on and engine speed greater than 1000 rpm = neither alternator is working	
Cause(s)	**Solution(s)**
Connection problems in the load circuit	Check the connections in the alternator load circuit back to the battery.
Belt slack or damaged	Check the condition and tension of the belts.
Battery faulty	Check the condition of the batteries.
Alternator faulty	Check the condition of the alternators.

Auxiliary hydraulic oil temperature indicator light	
Activating condition(s) • Indicator light permanently on = temperature above 95 °C (203 °F) - stop the engine • Indicator light flashing = temperature sensor disconnected or short-circuited	
Cause(s)	**Solution(s)**
Radiators blocked	Clean the radiators.
Unusual use of the tractor auxiliary hydraulics	Check operation and connections with the implement.
Sensor disconnected or short-circuited	Contact the dealer.

Auxiliary hydraulic oil filter blockage indicator light
Activating condition(s)

• Indicator light permanently on = filter blocked and auxiliary hydraulic oil temperature above 30 °C (86 °F)	
Cause(s)	**Solution(s)**
Filter blocked	Change the filter element.
Auxiliary hydraulic oil polluted	Check the quality of the oil.
Faulty auxiliary hydraulic oil filter blockage sensor	Contact the dealer.

Transmission oil temperature indicator light

Activating condition(s)

- Indicator light permanently on = temperature above 95 °C (203 °F) - stop the engine

Cause(s)	**Solution(s)**
Incorrect use of the transmission	Use the transmission in Tortoise range for field work.
Radiators blocked	Clean the radiators.
Faulty transmission oil temperature sensor	Contact the dealer.

Parking brake indicator light

Activating condition(s)

- Indicator light permanently on = parking brake engaged

Grid Heater indicator light

Activating condition(s)

- Indicator light permanently on = Grid Heater activated: Preheating when the ignition key is in the preheating position, then post-heating for 40 seconds after the engine has started.

Engine air filter blockage indicator light	
Activating condition(s) • Indicator light permanently on = engine air filter blocked	
Cause(s)	**Solution(s)**
Air filter blocked	Clean the air filter.
Air filter blockage switch faulty	Contact the dealer.

2.14.3 Indication of faults

Alarm and faults are indicated via the instrument panel.

Depending on the fault or the alarm recognized by the electronic systems, there may be different types of signal:

- Error code available in the screen list of the Setup and Information Screen
- Indicator light(s)
- Audible alarm
- A combination of the three types of signals mentioned above.

Indicator lights

Fig. 90

The electronic instrument panel comprises several indicator lights (see description in the Operation section of the Operator's Manual).

Error codes

In the event of a problem, all of the error codes can be seen in the screen list of the Setup and Information Screen on the instrument panel.

When a problem is detected by the electronic systems, an error code appears on the screen.

Under certain conditions, in addition to the error code displayed, a corresponding indicator light flashes and an audible signal can be heard.

Depending on the error displayed, you are advised to check certain major service operations or to contact your dealer (see tables of error codes below).

Fig. 91

NOTE:
Only error codes relating to the automatic air conditioning system are not displayed on the Setup and Information Screen. These error codes are only displayed on the air conditioning control module.

Failure of the Tier 4F/Stage IV SCR Technology engine system

When the system fails, an engine error code corresponding to this error appears on the instrument panel.

Final degraded mode is activated progressively, enabling only 50% of the engine power and limiting the engine to idle speed.

Reading the error code number

The code is represented by 3 sections of characters separated by dots.

Example: 8.1.22:

- **8**: Rear power lift function
- **1**: Severity level
- **22**: error code number

Type of function concerned	Display of error number on the Setup and Information Screen
Instrument panel	No. 0
Engine/Tier 4F/Stage IV SCR Technology engine	
Transmission	No. 4
4WD / differential lock / suspended front axle	No. 5
Rear power take-off (PTO)	No. 6
ParkLock	No. 13
Rear linkage	No. 8
Front linkage	No. 9
Hydraulic valves	No. A.Y
Suspended cab	No. 15
TMC Armrest	No. 3
Air conditioning	No. 10
Right-hand pillar keypad	No. 1B

2.14.4 Description of error code format

Reading the error code

The error code is composed of three parts separated by dots: the function, severity and fault code.

For example: 5.YX.31

- **5** corresponds to the function on the tractor that is faulty
- **YX** corresponds to the severity
  - **X** corresponds to the severity level of the error code
  - **Y** corresponds to the number of the hydraulic spool valve affected by the error code.

    If the error code does not relate to a hydraulic spool valve, the number displayed is 0

- **31** corresponds to the fault code

IMPORTANT:
*When describing error codes, the number corresponding to the severity is replaced by the letter **"X"** to cover a change in severity of the error code in the software.*

Function

A number is assigned to each of the tractor functions:

Function number	Function
0	Instrument panel
3	Armrest
4	Transmission
5	Front axle and differential lock
6	Rear power take-off (PTO)
7	Front power take-off
8	Rear linkage
9	Front linkage
A	Hydraulic spool valve
10	Automatic air conditioning
13	ParkLock (depending on model)
14	High-pressure braking
1B	Keypad in the pillar

Severity

3 severity levels change the way the alert is raised in the cab.

Severity	Alert in cab
0	Display on the instrument panel and audible alert
1	Display on the instrument panel
2	No display (but display possible via the Setup and Information Screen)

Severity level

IMPORTANT:
When an error code for a hydraulic spool valve is displayed, the severity level is preceded by a number. This figure corresponds to the number of the hydraulic spool valve that is faulty.

Fault code

The fault code indicates the fault and the faulty component.

2.14.5 Instrument panel error codes AutoPower IV/AutoPower VI

No.	Components concerned	Causes
0.X.30		Alternator regulator voltage too high or too low (filtered battery signal).
0.X.31	**X197** - Diesel fuel gage	Electrical signal too high or too low.
0.X.32		Battery voltage too high or too low (non-filtered battery signal)
0.X.33	**X68** - Clutch pedal sensor	Absence of calibration
0.X.34	**X71** - Throttle pedal sensor	Electrical signal too high or too low.
0.X.35	**X56** - PowerShuttle lever	Electrical signal too high or too low.
0.X.36	T-handle lever	Electrical signal too high or too low.
0.X.37	**X68** - Clutch pedal sensor	Electrical signal too high or too low.
0.X.38	**X481** - Engine speed sensor	Engine speed signal too high
0.X.39	**X68** - Clutch pedal sensor	Short circuit to +12 V
0.X.3A		Short circuit to +12 V
0.X.3B	**X56** - PowerShuttle lever	Electrical signal too high
0.X.3C		Electrical signal too low
0.X.3D		Electrical signal too high
0.X.3E		Electrical signal too low
0.X.3F		CAN network deactivated (CAN bus off)
0.X.40		CAN message lost
0.X.41		Tractor speed too high
0.X.42	**X55** - Instrument panel	Hourmeter error for engine maintenance
0.X.43		Configuration error
0.X.44		CAN communications from transmission controllers to instrument panel are faulty
0.X.45	**X55** - Instrument panel	Incorrect tractor code selected
0.X.46	**X68** - Clutch pedal sensor	TOC stuck open
0.X.47	**X56** - PowerShuttle lever	Switch error when in neutral position
0.X.48		Switch error when not in neutral position
0.X.49		Failure of CAN communications from EEM to the instrument panel
0.X.4A		Loss of CAN messages between the instrument panel and the engine controller
0.X.4B	Hand throttle	Signal in open circuit
0.X.4C	**X358** - Outside temperature sensor / **X541** - Temperature info shunt for automatic air conditioning	Outside temperature sensor connected to the instrument panel
0.X.4E	**X236** - Electrohydraulic Orbitrol (gray connector)	Error on the steering unit

No.	Components concerned	Causes
0.X.4F	**X55** - Instrument panel	Power output error
0.X.54	**X168** - Pneumatic brake system pressure sensor	Electrical signal too high or too low
0.X.5E	**X235** - Front axle steering sensor (WAS sensor)	Electrical signal too high or too low
0.X.5F	**X57** - Setup and Information Screen keypad	Electrical signal too high or too low
0.X.61	**X55** - Instrument panel	The 9.5 V output is too low or too high
0.X.63	**X55** - Instrument panel	Internal temperature electrical signal is too high or too low

2.14.6 AGCO Power Tier 3/Stage IIIA engine and Tier 4F/Stage IV SCR Technology engine error codes

Description of the protection modes

In order to protect the engine, the electronic system activates a protection mode when certain error codes appear.

Standard protection modes for all engines:

- **Flm** mode: fuel limited
- Mode 1: 75% of the engine power is available.
- Mode 2: 50% of the engine power is available and the engine speed is limited to 1800 rpm
- Mode 3: 50% of the engine power is available and the engine speed is limited to 1500 rpm

Additional protection modes specific to engines with SCR Technology systems:

- Degraded mode 1: The engine torque is limited to 75%.
- Final degraded mode: Once the maximum time delay for degraded mode 1 has been reached, the engine torque is limited to 50% and the engine speed is limited to idle speed.

For more information, refer to the following chapter: "Information about the various operating modes of the SCR Technology engine".

No.	FMI	Components concerned	Causes	Stand ard modes	modes
27	6	EGR valve	Overload of the EGR valve		
27	7	EGR valve	Difference between the current position and the commanded position		
27	11	EGR valve	The control is limited to avoid overheating		
27	12	EGR valve	Short circuit		
27	13	EGR valve	Mechanical error		X
29	3	Throttle sensor	Sensor above normal or in open circuit		
29	4	Throttle sensor	Sensor below normal		
51	3	Air dosing unit	Voltage above normal	1	
51	4	Air dosing unit	Voltage below normal	1	

No.	FMI	Components concerned	Causes	Stand ard modes	modes
51	13	Air dosing unit	Calibration error	1	
91.	3	Throttle sensor	Throttle sensor 1 (IDLE) above normal or in open circuit		
91.	4	Throttle sensor	Throttle sensor 1 (IDLE) below normal		
94	3	Fuel filter pressure sensor	Fuel filter pressure sensor voltage above normal or open circuit	1	
94	4	Fuel filter pressure sensor	Fuel filter pressure sensor voltage below normal	1	
94	16	Fuel filter pressure sensor	Fuel filter pressure ABOVE NORMAL	1	
94	18	Fuel filter pressure sensor	Fuel filter pressure BELOW NORMAL	1	
94	31	Fuel filter pressure sensor	Pressure value outside the range, ALARM	3	
97	31	Water sensor	Water in fuel	2	
100	1	Oil pressure sensor	Oil pressure LOW, ALARM		
100	3	Oil pressure sensor	Oil pressure sensor voltage above normal or open circuit	1	
100	4	Oil pressure sensor	Oil pressure sensor voltage below normal	1	
100	16	Oil pressure sensor	Oil pressure ABOVE NORMAL (9,5 bar (1378 psi)/30 °C (86 °F))	2	
100	18	Oil pressure sensor	Oil pressure LOW		
102	0	Boost pressure sensor	Boost pressure high	2	
102	2	Boost pressure sensor	Communication error	3	
102	11	Boost pressure sensor	Measured pressure too high	1	
102	12	Boost pressure sensor	Boost pressure inconsistent	2	
102	14	Boost pressure sensor	Boost pressure inconsistent	2	
102	(17)	Boost pressure sensor	Pressure too high at start-up		
102	18	Boost pressure sensor	Boost pressure LOW	2	
102	31	Boost pressure sensor	Inlet manifold pressure drop too HIGH at start-up		
105	16	Inlet manifold temperature sensor	Inlet manifold temperature ABOVE NORMAL (>90°C)	1	
107	18	Air filter pressure sensor	Air filter pressure BELOW NORMAL		
107	31	Air filter pressure sensor	Air filter pressure sensor activated at initial status		
108	3	Ambient pressure sensor	Sensor voltage above normal or open circuit		

No.	FMI	Components concerned	Causes	Standard modes	modes
108	4	Ambient pressure sensor	Sensor voltage below normal		
109	3	Coolant pressure sensor	Sensor voltage above normal or open circuit		
109	4	Coolant pressure sensor	Sensor voltage below normal		
110	0	Coolant T° sensor	Coolant temperature HIGH, ALARM (>113 °C (235 °F))	**Flm**	
110	3	Coolant T° sensor	Coolant temperature sensor voltage above normal or open circuit	1	
110	4	Coolant T° sensor	Coolant temperature sensor voltage below normal	1	
110	16	Coolant T° sensor	Coolant temperature HIGH, (>106 °C (223 °F))	**Flm**	
132	2	Air flow sensor	Inconsistent signal		X
132	13	Air flow sensor	Calibration of point 0 failed		
132	19	Air flow sensor	CAN communication error		X
157	0	Rail pressure sensor	Rail pressure above normal	3	
157	2	Rail pressure sensor	Intermittent rail pressure	3	
157	3	Rail pressure sensor	Rail pressure sensor voltage above normal or open circuit	3	
157	4	Rail pressure sensor	Rail pressure sensor voltage below normal	3	
157	15	Rail pressure sensor	Positive pressure difference in common rail	3	
157	16	Rail pressure sensor	Rail pressure ABOVE NORMAL	3	
157	(17)	Rail pressure sensor	Negative pressure difference in common rail	3	
157	20	Rail pressure sensor	The rail pressure value has exceeded the tolerance threshold when starting or after stopping the engine		
157	21	Rail pressure sensor	The rail pressure value is below the tolerance threshold when starting or after stopping the engine		
168	0	Battery voltage	Battery voltage VERY HIGH (>17 V)		
168	1	Battery voltage	Battery voltage VERY LOW (<7.8 V)		
171	3	Ambient temperature sensor	Temperature sensor voltage above normal or open circuit		
171	4	Ambient temperature sensor	Temperature sensor voltage below normal		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
171	10	Ambient temperature sensor	Temperature sensor voltage inconsistent		
171	19	Ambient temperature sensor	Loss of ambient temperature CAN signal		
174	0	Fuel temperature sensor	Fuel inlet temperature high, ALARM (> 85 °C (185 °F))	**FIm**	
174	3	Fuel temperature sensor	Fuel temperature sensor voltage above normal or open circuit	1	
174	4	Fuel temperature sensor	Fuel temperature sensor voltage below normal	1	
190	16	Engine protection	Engine speed above normal		
626	3	Grid Heater	Inlet air heater control, voltage above normal or short-circuited to +12 V		
626	5	Grid Heater	Inlet air heater control, voltage below normal or open circuit		
626	6	Grid Heater	Inlet air heater control, voltage above normal or short-circuited to earth (-)		
639	19	CAN bus	Vehicle CAN bus fault (250K)		
651	5	Injector no. 1	Current below normal: open circuit	3	
651	13	Injector no. 1	Injector not calibrated	3	
651	14	Injector no. 1	Short circuit	3	
652	5	Injector no. 2	Current below normal: open circuit	3	
652	13	Injector no. 2	Injector not calibrated	3	
652	14	Injector no. 2	Short circuit	3	
653	5	Injector no. 3	Current below normal: open circuit	3	
653	13	Injector no. 3	Injector not calibrated	3	
653	14	Injector no. 3	Short circuit	3	
654	5	Injector no. 4	Current below normal: open circuit	3	
654	13	Injector no. 4	Injector not calibrated	3	
654	14	Injector no. 4	Short circuit	3	
655	5	Injector no. 5	Current below normal: open circuit	3	
655	13	Injector no. 5	Injector not calibrated	3	
655	14	Injector no. 5	Short circuit	3	
656	5	Injector no. 6	Current below normal: open circuit	3	

No.	FMI	Components concerned	Causes	Standard modes	modes
656	13	Injector no. 6	Injector not calibrated	3	
656	14	Injector no. 6	Short circuit	3	
677	3	Starter relay	Low voltage side above normal or short-circuited to +12 V		
677	5	Starter relay	Voltage below normal or open circuit		
677	6	Starter relay	Low voltage side above normal		
723	2	Camshaft speed sensor	Number and/or position of pulses unlikely	2	
723	8	Camshaft speed sensor	Deviation of the signal between the camshaft sensor and crankshaft sensor	2	
723	31	Camshaft speed sensor	No signal	2	
729	3	Grid Heater	Voltage above normal		
729	4	Grid Heater	Voltage below normal		
898	8	CAN bus	Fan control time is exceeded		
974	3	Throttle sensor	Sensor above normal or in open circuit		
974	4	Throttle sensor	Sensor below normal		
977	3	Fan control	Output in short circuit		
977	5	Fan control	Output in open circuit		
977	6	Fan control	Current above normal		
1043	3	EEM4 controller	12 V internal voltage above normal		
1043	4	EEM4 controller	12 V internal voltage below normal		
1076	3	MPROP control	Upper level, short circuit to +12 V		
1076	4	MPROP control	Lower level, short circuit to earth (-)		
1076	5	MPROP control	Lower level, short circuit to +12 V		
1076	6	MPROP control	Upper level, short circuit to earth (-)		
1076	14	MPROP control	Open circuit		
1077	31	MPROP control	Temperature exceeded		
1083	3	Analog input 1	Voltage above normal or open circuit		
1083	4	Analog input 1	Voltage below normal		
1084	3	Analog input 2	Voltage above normal or open circuit		
1084	4	Analog input 2	Voltage below normal		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
1132	3	Inlet temperature sensor on the manifold	Signal voltage above normal or open circuit	1	
1132	4	Inlet temperature sensor on the manifold	Signal voltage below normal	1	
1136	0	EEM4 controller	Temperature too high: ALARM		
1136	3	EEM4 controller	Temperature sensor voltage above normal or open circuit		
1136	4	EEM4 controller	Temperature sensor voltage below normal		
1188	2	Wastegate actuator	Position deviation (error 3)		
1188	7	Wastegate actuator	Actuator fault (error 5)	2	
1188	11	Wastegate actuator	Maximum torque reached (error 22)		
1188	13	Wastegate actuator	Calibration error (error 4)	2	
1239	14	Rail pressure sensor	Leak detected at idle speed	3	
1240	14	Rail pressure sensor	Leak detected at high engine speed	3	
1321	3	Starter relay	High voltage side above normal		
1321	6	Starter relay	High voltage side above normal		
1378	31	Engine protection	Oil change interval excessive		
1381	3	Pressure sensor of the fuel suction pump	Signal voltage above normal or open circuit	1	
1381	4	Pressure sensor of the fuel suction pump	Signal voltage below normal	1	
1381	16	Pressure sensor of the fuel suction pump	Pressure above normal	1	
1381	18	Pressure sensor of the fuel suction pump	Pressure below normal	1	
1485	31	Starter relay	Advanced opening at previous starting		
1639	19	Vistronic fan	Fan speed request CAN signal absent		
1761	1	Tank gauge	Tank empty		X
1761	3	Tank gauge	Voltage above normal or open circuit		X
1761	4	Tank gauge	Voltage below normal		X
1761	11	Tank gauge	General error		
1761	15	tank gage	Level error		
1761	(17)	tank gage	Level error		
1761	18	tank gage	Low level		X
1761	31	tank gage	CAN message lost		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
2659	1	EGR valve	Quantity of exhaust gas below the normal level	1	
2791	0	EGR valve	Temperature alarm		
2791	9	EGR valve	Communication error	2	
2791	10	EGR valve	Torque limit	2	
2791	31	EGR valve	Absent	2	
2882	8	CAN bus	CAN message lost		
3031	2	DEF tank temperature sensor	Abnormal temperature change		X
3031	3	DEF tank temperature sensor	Voltage above normal or open circuit		X
3031	4	DEF tank temperature sensor	Voltage below normal		X
3031	10	DEF tank temperature sensor	Abnormal rate change during heating cycle		
3031	11	DEF tank temperature sensor	General error		
3031	14	DEF tank temperature sensor	Deicing time exceeded		X
3031	15	DEF tank temperature sensor	Temperature error		
3031	16	DEF tank temperature sensor	Temperature above normal		
3031	(17)	DEF tank temperature sensor	Temperature error		
3216	19	NOx sensor before DOC	Sensor not present		X
3218	14	NOx sensor before DOC	Supply voltage outside of tolerances		X
3219	2	NOx sensor before DOC	Heating time exceeded		X
3220	2	NOx sensor before DOC	Inconsistent value		X
3220	12	NOx sensor before DOC	Time required to stabilize the measurement has elapsed		X
3222	3	NOx sensor before DOC	Short circuit of the heating line		
3222	5	NOx sensor before DOC	Open circuit of the heating line		
3224	3	NOx sensor before DOC	Short circuit of signal line for NOx measurement		
3224	5	NOx sensor before DOC	Signal line for NOx measurement in open circuit		
3225	3	NOx sensor before DOC	Short circuit of signal line for O2 measurement		
3225	5	NOx sensor before DOC	Signal line for O2 measurement in open circuit		
3226	19	Exhaust outlet NOx sensor	Sensor not present		X
3228	14	Exhaust outlet NOx sensor	Supply voltage outside of tolerances		X
3229	2	Exhaust outlet NOx sensor	Heating time exceeded		X
3230	2	Exhaust outlet NOx sensor	Inconsistent value		X

No.	FMI	Components concerned	Causes	Standard modes	modes
3230	12	Exhaust outlet NOx sensor	Time required to stabilize the measurement has elapsed		X
3232	3	Exhaust outlet NOx sensor	Short circuit of the heating line		
3232	5	Exhaust outlet NOx sensor	Open circuit of the heating line		
3234	3	Exhaust outlet NOx sensor	Short circuit of signal line for NOx measurement		
3234	5	Exhaust outlet NOx sensor	Signal line for NOx measurement in open circuit		
3235	3	Exhaust outlet NOx sensor	Short circuit of signal line for O2 measurement		
3235	5	Exhaust outlet NOx sensor	Signal line for O2 measurement in open circuit		
3349	8	CAN bus	Torque and speed control delay has been exceeded		
3361	3	metering module	Low side short-circuited to +12 V		X
3361	4	DEF metering module	High side short-circuited		X
3361	5	DEF metering module	High side short-circuited to +12 V or open circuit		X
3361	6	DEF metering module	Low side short-circuited to earth (-) or open circuit		X
3361	7	DEF metering module	Blocked		X
3361	14	DEF metering module	Abnormal operation		X
3361	31	DEF metering module	Operating temperature too high		X
3363	3	DEF tank preheating liquid control valve	Short circuit to +12 V of the control section		
3363	4	DEF tank preheating liquid control valve	Short circuit to earth of the power section		
3363	5	DEF tank preheating liquid control valve	Open circuit of the control section		
3363	6	DEF tank preheating liquid control valve	Short circuit to earth of the control section		
3363	14	DEF tank preheating liquid control valve	Short circuit to +12 V of the power section		
3363	31	DEF tank preheating liquid control valve	Excessive temperature		
3509	31	EEM4 controller	5 V DC supply 1 out of range		
3510	31	EEM4 controller	5 V DC supply 2 out of range		
3511	31	EEM4 controller	5 V DC supply 3 out of range		
3512	3	EEM4 controller	12 V supply 1 above normal		
3512	4	EEM4 controller	12 V supply 1 below normal		
3515	3	DEF tank temperature sensor	Open circuit		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
3515	4	DEF tank temperature sensor	Short circuit		
3515	11	DEF tank temperature sensor	General error		
3515	15	DEF tank temperature sensor	Error		
3515	(17)	DEF tank temperature sensor	Error		
3516	2	quality sensor	DEF concentration error		
3516	11	quality sensor	General error		
3516	15	quality sensor	Incorrect concentration		
3516	(17)	quality sensor	Incorrect concentration		
3516	19	quality sensor	Loss of the CAN message from the quality sensor		
3519	3	DEF tank temperature sensor	Sensor in open circuit		
3519	4	DEF tank temperature sensor	Sensor short-circuited		
3521	14	quality sensor	Unknown liquid		
3521	16	quality sensor	Concentration of DEF too high		
3521	18	quality sensor	Concentration of DEF too low		
3521	31	quality sensor	Presence of fuel in the DEF tank		
3532	3	tank gage	Open circuit		
3532	4	tank gage	Short circuit		
3562	14	Boost pressure sensor 2	Boost pressure inconsistent	2	
3562	31	Boost pressure sensor 2	Boost pressure inconsistent	2	
3573	3	Air dosing unit 2	Voltage above normal	1	
3573	4	Air dosing unit 2	Voltage below normal	1	
3573	13	Air dosing unit 2	Calibration error	1	
4090	31	system	NOx limit exceeded, unknown reason		
4095	31	system	NOx limit exceeded due to stoppage of the DEF dosing module		X
4201	2	Crankshaft speed sensor	Irregular signal	2	
4201	31	Crankshaft speed sensor	No signal	2	
4332	0	system	Excess pressure detected		X
4332	11	system	Metering pump fault		X
4332	14	system	Pressure test fault		X
4332	16	system	Metering module pressure above normal		X
4332	18	system	Metering module pressure below normal		X
4332	31	system	Draining interrupted at previous stop		

No.	FMI	Components concerned	Causes	Standard modes	modes
4334	3	DEF pressure sensor	Voltage above normal or open circuit		X
4334	4	DEF pressure sensor	Voltage below normal		X
4340	3	DEF preheating suction line	Short circuit to +12 V		
4340	4	DEF preheating suction line	Short circuit to earth (-)		
4340	5	DEF preheating suction line	Open circuit		
4340	31	DEF preheating suction line	Excessive temperature		
4342	3	DEF preheating return line	Short circuit to +12 V		
4342	4	DEF preheating return line	Short circuit to earth (-)		
4342	5	DEF preheating return line	Open circuit		
4342	31	DEF preheating return line	Excessive temperature		
4344	2	DEF heating module	Invalid temperature signal		X
4344	3	DEF heating module	Short circuit to +12 V		
4344	4	DEF heating module	Short circuit to earth (-)		
4344	5	DEF heating module	Open circuit		
4344	8	DEF heating module	Fault with temperature range signal		X
4344	12	DEF heating module	No response from the temperature measurement		
4344	31	DEF heating module	Excessive temperature		
4346	3	DEF preheater pressure line	Short circuit to +12 V		
4346	4	DEF preheater pressure line	Short circuit to earth (-)		
4346	5	DEF preheater pressure line	Open circuit		
4346	31	DEF preheater pressure line	Excessive temperature		
4356	5	DEF module relay	Open circuit		
4360	2	DOC inlet temperature sensor	Incorrect temperature value		X
4360	3	DOC inlet temperature sensor	Voltage above normal or open circuit		X
4360	4	DOC inlet temperature sensor	Voltage below normal		X
4360	10	DOC inlet temperature sensor	Temperature value inconsistent		
4363	2	Exhaust outlet temperature sensor	Incorrect temperature value		X
4363	3	Exhaust outlet temperature sensor	Voltage above normal or open circuit		X
4363	4	Exhaust outlet temperature sensor	Voltage below normal		X
4363	10	Exhaust outlet temperature sensor	Temperature value inconsistent		
4374	8	DEF pump motor	Speed fault		X

No.	FMI	Components concerned	Causes	Stand ard modes	modes
4374	14	DEF pump motor	Permanent speed fault		X
4374	31	DEF pump motor	Not available		X
4375	3	DEF pump motor	Short circuit to +12 V		X
4375	4	DEF pump motor	Short circuit to earth (-)		X
4375	5	DEF pump motor	Current below normal or open circuit		X
4375	31	DEF pump motor	Excessive temperature		X
4376	3	Lower side pump control valve	Short circuit to +12 V		X
4376	4	Lower side pump control valve	Shortcut to Ground		X
4376	5	Lower side pump control valve	Current below normal or open circuit		X
4376	31	Lower side pump control valve	Excessive temperature		X
4753	3	DOC outlet temperature sensor	Voltage above normal or open circuit		
4753	4	DOC outlet temperature sensor	Voltage below normal		
4753	10	DOC outlet temperature sensor	Temperature value inconsistent		
4792	14	system	The catalytic converter temperature sensors are inverted		
5025	31	NOx sensor before DOC	Calibration value outside of the measurement range		X
5026	2	NOx sensor before DOC	Point 0 calibration error		X
5028	13	NOx sensor before DOC	Calibration value unavailable or incompatible with the sensor		X
5028	31	NOx sensor before DOC	Calibration value outside of the measurement range		X
5032	31	Exhaust outlet NOx sensor	Calibration value outside of the measurement range		X
5033	2	Exhaust outlet NOx sensor	Point 0 calibration error		X
5035	13	Exhaust outlet NOx sensor	Calibration value unavailable or incompatible with the sensor		X
5035	31	Exhaust outlet NOx sensor	Calibration value outside of the measurement range		X
5370	19	Wastegate actuator	Communication error (error 7)	2	
5372	0	Wastegate actuator	Excessive temperature (error 1)		
5372	16	Wastegate actuator	Excessive temperature (error 2)		
5451	4	Wastegate actuator	Short circuit (error 21)	2	
5451	14	Wastegate actuator	Initialisation error (error 6)	2	
5451	31	Wastegate actuator	Not present	2	
520200	16	Batteries	Voltage too high		
520200	18	Batteries	Voltage too low		

No.	FMI	Components concerned	Causes	Standard modes	modes
520201	19	CAN bus	CAN bus engine OFF (1M)		
520202	3	Main relay 1	Short circuit to +12 V		X
520202	4	Main relay 1	Short circuit to earth (-)		X
520203	3	Main relay 2	Short circuit to +12 V		
520203	4	Main relay 2	Short circuit to earth (-)		
520204	3	Main relay 3	Short circuit		
520205	31		Error in input torque measurement		
520206	31	Engine controller	Controller internal error		
520207	31	Rail pressure sensor	Pressure below normal		
520209	31	Injectors	Injection time error		
520210	12	Injectors	Error with start of opening angle		
520211	31	CY33X	Component fault		
520212	31	MOCSOP (redundant stop test)	Diagnostic error		
520213	31	MOCSOP (redundant stop test)	Diagnostic error		
520214	31	MOCSOP (redundant stop test)	Diagnostic error		
520215	31	MOCSOP (redundant stop test)	Diagnostic error		
520216	31	MOCSOP (redundant stop test)	Diagnostic error		
520217	31	MOCSOP (redundant stop test)	Diagnostic error		
520218	31	MOCSOP (redundant stop test)	Loss of message synchronization		
520219	31	MOCSOP (redundant stop test)	Error appeared when storing torque limitation in memory		
520220	31	MOCSOP (redundant stop test)	Incorrect response time		
520221	31	MOCSOP (redundant stop test)	Too many errors during execution		
520222	31	MOCSOP (redundant stop test)	Diagnostic error		
520223	31	MOCSOP (redundant stop test)	Diagnostic error		
520224	31	MOCSOP (redundant stop test)	Time exceeded		
520225	31	MOCSOP (redundant stop test)	Diagnostic error		
520226	31	MOCSOP (redundant stop test)	Diagnostic error		
520227	31	MOCSOP (redundant stop test)	Diagnostic error		
520228	12	CY320	Module multiple supply error		
520229	13	FADC	A/D fast converter calibration error	3	
520229	31	Rail pressure sensor	Negative deviation of the pressure		
520230	31	Engine protection	Specification fault		
520231	31	All applications	Power take-off input error		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
520232	31	All applications	Incorrect digital input configuration		
520233	31	Rail pressure sensor	Pressure below normal		
520237	31	User 1 error	Digital input		
520238	31	User 2 error	Digital input		
520239	3	DEF metering valve after cooler	Short circuit to +12 V		
520240	31	Injectors	Harness 0 short-circuited		
520241	31	Injectors	Harness 1 short-circuited		
520242	31	Injectors	Harness 2 short-circuited		
520243	3	Main relay of the light	Short circuit to +12 V		
520243	5	Main relay of the light	Open circuit		
520243	6	Main relay of the light	Short circuit to earth (-)		
520247	31	Cy146	SPI and COM error report on a Cy146		
520248	31	Engine controller	Controller internal error		
520249	31	Engine controller	Controller internal error		
520250	31	Engine controller	Controller internal error		
520251	31	Engine controller	Controller internal error		
520260	31	CY146	Error 1		
520261	31	CY146	Error 2		
520262	31	CY146	Error 3		
520263	31	CY146	Error 4		
520264	31	CY146	Error 5		
520293	31	Difference in bypass specification	Time expired	2	
520296	31	Pressure regulating valve	The average pressure in the rail is outside the permitted tolerance		
520297	31	CAN bus	Diagnostic error		
520298	31	CAN bus	Diagnostic error		
520307	31	Rail pressure sensor	Pressure above the pressure measurable by the sensor		
520309	31	Rail pressure sensor	The maximum number of overpressure events in the common rail is reached		
520312	31	Rail pressure sensor	Maximum time in over-pressure is exceeded		
520317	31	Rail pressure sensor	Reduction of pressure in the common rail without the injectors opening		
520318	31	Rail pressure sensor	Deviation of measured pressure in relation to engine speed		

No.	FMI	Components concerned	Causes	Stand ard modes	modes
520319	31	Rail pressure sensor	Pressure outside of the measurement range		
520320	31	Rail pressure sensor	Pressure above normal		
520327	31	Rail pressure sensor	Pressure above normal		
520336	31	Rail pressure sensor	Forced shutdown		
520337	31	Rail pressure sensor	Torque limited due to an overpressure		
520354	3	Pressure control valve	Short circuit of the command to +12 V		
520354	4	Pressure control valve	Short circuit of the command to earth		
520356	3	Pressure control valve	Short circuit of the power to +12 V		
520356	4	Pressure control valve	Short circuit of the power to earth		
520358	31	Pressure control valve	Excessive temperature		
520359	31	Pressure control valve	Opening of the relief valve		
520382	2	Air flow sensor	Voltage inconsistent		X
520382	14	Air flow sensor	Absolute pressure faulty		X
520383	14	Air flow sensor	Pressure difference is faulty		X
520384	14	Air flow sensor	Temperature measurement faulty		X
520384	16	Air flow sensor	Temperature exceeded		X
520388	31	Rail pressure sensor	Overpressure detected: Protection mode activated		
520389	31	Air flow sensor	Inconsistent value		X
520390	31	Air flow sensor	Initialisation time exceeded		X
520391	31	Air flow sensor	Value inconsistent top high		X
521000	2	module temperature	Invalid pump temperature signal		
521000	8	DEF module temperature	Fault with pump temperature signal		
521001	4	DEF heating main relay	Shortcut to Ground		
521001	5	DEF heating main relay	Open circuit		
521001	14	DEF heating main relay	Short circuit to +12 V		
521001	31	DEF heating main relay	Excessive temperature		
521002	31	system	Tractor stopped due to an excessive temperature		X
521003	3	DEF heating main relay	Control circuit short-circuited to +12 V		
521003	4	DEF heating main relay	Control circuit short-circuited to earth (-)		
521007	10	system	Return line blocked or impossible		X

No.	FMI	Components concerned	Causes	Standard modes	modes
521007	14	system	Pressure line or injector blocked		X
521007	31	system	Pressure stabilization fault		X
521008	0	system	Pressure relief fault		X
521008	1	system	Pressure fault		
521012	31	Exhaust outlet NOx sensor	Error of measured maximum value		X
521013	31	Exhaust outlet NOx sensor	No change in value		X
521016	31	NOx sensor before DOC	Error of measured maximum value		X
521017	31	NOx sensor before DOC	No change in value		X
521018	31	system	Threshold 1 exceeded		X
521019	31	system	Threshold 2 exceeded		X
521020	31	system	Threshold 3 exceeded		X
521022	31	system	Temperature sensor inverted or not connected		
521023	31	system	NOx sensor inverted or faulty		
521024	31	system	Error of O2 concentration between the NOx sensors		
521025	31	system	System ineffective		
521026	31	system	System ineffective after having filled the DEF tank		

2.14.7 Transmission error codes AutoPower IV/AutoPower VI

No.	Components concerned	Causes
4.X.04	**X68** - Clutch pedal sensor	Output signal outside limit
4.X.09	**X556** - Forward solenoid valve	Variable value between two different current measurements
4.X.0A	**X556** - Forward solenoid valve	Short circuit to +12 V
4.X.0B	**X556** - Forward solenoid valve	Measured current > 40 mA in relation to specified value
4.X.0C	**X556** - Forward solenoid valve	Current measured > maximum possible (1.4 A)
4.X.0D	**X556** - Forward solenoid valve	Open circuit
4.X.0E	**X556** - Forward solenoid valve	The setpoint for the current cannot be reached
4.X.0F	**X557** - Reverse solenoid valve	Variable value between two different current measurements
4.X.10	**X557** - Reverse solenoid valve	Short circuit to +12 V
4.X.11	**X557** - Reverse solenoid valve	Measured current > 40 mA in relation to specified value

No.	Components concerned	Causes
4.X.12	**X557** - Reverse solenoid valve	Current measured > maximum possible (1.4 A)
4.X.13	**X557** - Reverse solenoid valve	Open circuit
4.X.14	**X557** - Reverse solenoid valve	The setpoint for the current cannot be reached
4.X.15	**X494** - Low-pressure switch	No signal when engine speed is > 500 rpm
4.X.16		Electrical power supply (+APC < 7 V)
4.X.40	**X483** - Intermediate speed sensor **X482** - Theoretical forward speed sensor	Difference in value between the intermediate speed sensor and the forward travel speed sensor, depending on the range engaged
4.X.54	**X19** - Transmission hydraulic oil temperature sensor	Value > 150°C or < -24°C
4.X.61	**X484** - Range solenoid valve 1	Open circuit or short circuit to +12 V or 0 V
4.X.62	**X485** - Range solenoid valve 2	Open circuit or short circuit to +12 V or 0 V
4.X.69	**X486** - Range solenoid valve 3	Open circuit or short circuit to +12 V or 0 V
4.X.6A	**X487** - Range solenoid valve 4	Open circuit or short circuit to +12 V or 0 V
4.X.6B	**X488** - Range switch 1	Short circuit to 0 V
4.X.6C	**X489** - Range switch 2	Short circuit to 0 V
4.X.6D	**X490** - Range switch 3	Short circuit to 0 V
4.X.6E	**X491** - Range switch 4	Short circuit to 0 V
4.X.85	**X481** - Engine speed sensor/**X483** - Intermediate speed sensor	Slippage > 10% for more than 700 ms between engine speed and intermediate speed
4.X.90	**X483** - Intermediate speed sensor	No intermediate speed value and current forward speed > 0 kph
4.X.91	**X481** - Engine speed sensor	No engine speed value and current forward speed > 0 kph
4.X.92	**X482** - Theoretical forward speed sensor	No forward speed value and actual intermediate speed is > 0
4.X.95	**X484** - Range solenoid valve 1 **X488** - Range switch 1	Inconsistency between the switch and range solenoid valve
4.X.96	**X485** - Range solenoid valve 2 **X489** - Range switch 2	Inconsistency between the switch and range solenoid valve
4.X.97	**X486** - Range solenoid valve 3 **X490** - Range switch 3	Inconsistency between the switch and range solenoid valve
4.X.98	**X487** - Range solenoid valve 4 **X491** - Range switch 4	Inconsistency between the switch and range solenoid valve
4.X.99	**X478** - Powershift module solenoid valve P	Short circuit to +12 V Open circuit Measured current > 40 mA in relation to required value

No.	Components concerned	Causes
		Current measured > maximum possible (1.4 A) Measured current < 13 mA in relation to required value
4.X.9A	**X479** - Powershift module solenoid valve L	Short circuit to +12 V Open circuit Measured current > 40 mA in relation to required value Current measured > maximum possible (1.4 A) Measured current < 13 mA in relation to required value
4.X.9B	**X480** - Powershift module solenoid valve N	Short circuit to +12 V Open circuit Measured current > 40 mA in relation to required value Current measured > maximum possible (1.4 A) Measured current < 13 mA in relation to required value
4.X.9C	**X492** - Senstronic sensor	The sensor is disconnected
4.X.9D	**X492** - Senstronic sensor	No boost calibration value
4.X.9E	**X492** - Senstronic sensor	Frequency interval too great
4.X.A2		CAN messages failure
4.X.B8	**X483** - Intermediate speed sensor	No speed during calibration
4.X.FE		Program without parameters or calibration, or EEPROM failure
4.X.FF		Internal fault

2.14.8 Front axle error codes for AutoPower IV/AutoPower VI

No.	Components concerned	Causes
5.X.80	**X104** - TECU controller	Absence of calibration
5.X.81	**X166** - Suspended front axle position sensor	The signal is too high
5.X.82	**X166** - Suspended front axle position sensor	The signal is too low
5.X.83	**X166** - Suspended front axle position sensor	Incorrect values during calibration
5.X.84	**X166** - Suspended front axle position sensor	Values too high during calibration

2.14.9 Power take-off error codes AutoPower IV/AutoPower VI

No.	Components concerned	Causes
6.X.04	**X7** - Rear PTO solenoid valve	Short circuit to +12 V
6.X.06	**X7** - Rear PTO solenoid valve	Shortcut to Ground
6.X.07	**X7** - Rear PTO solenoid valve	Open circuit
6.X.08		Excessive drop in engine speed when engaging the power take-off
6.X.09		PTO switch is activated but the PTO is not activated
6.X.49	**X592** - Position switch for the rear PTO 540/1000 speed	Inconsistency between the power take-off speed selected and the speed engaged
6.X.4A		The PTO speed engaged does not match the selected speed
6.X.E2		Engine speed too high (> 1780 rpm) in economy power take-off mode
6.X.E7		Checksum error for the operating temperatures and the clutch times of the rear power take-off
6.X.E9		GSPTO error

2.14.10 Error codes for the high-pressure braking

No.	Components concerned	Causes
14.X.01	**X135** - Braking pressure sensor	Pressure below 70 bar (1015 psi) during initialisation.
14.X.02	**X135** - Braking pressure sensor	Pressure below 70 bar (1015 psi) for more than 2 seconds
14.X.03	**X135** - Braking pressure sensor	Pressure too high
14.X.04	**X135** - Braking pressure sensor	Overfeeding of sensor
14.X.05	**X135** - Braking pressure sensor	Pressure outside of range during initialisation
14.X.06	**X135** - Braking pressure sensor	The high-pressure braking accumulator is filled too often
14.X.07	**X135** - Braking pressure sensor	Open circuit
14.X.08	**X135** - Braking pressure sensor	Pressure too low

No.	Components concerned	Causes
14.X. 09	**X135** - Braking pressure sensor	Operating pressure not reached within the specified time
14.X. 0A	**X135** - Braking pressure sensor	Short circuit to 12 V
14.X. 0B	**X135** - Braking pressure sensor	The pressure does not drop despite 100 presses on the brake pedals

2.14.11 Rear linkage error codes

No.	Components concerned	Causes
8.X. 10	**X27** - Rear linkage lifting solenoid valve	Open circuit
8.X. 11	**X28** - Rear linkage lowering solenoid valve	Short circuit to +12 V
8.X. 12	**X27** - Rear linkage lifting solenoid valve	Short circuit to +12 V
8.X. 16	**X177** - Linkage controller	Battery voltage <11 V or >16 V
8.X. 18	**X119** - Rear linkage lifting/lowering switch	Incorrect signal
8.X. 1A	**X177** - Linkage controller	Engine speed too low
8.X. 1B	**X87** - Linkage lifting switch on right-hand fender /**X97** - Linkage lifting switch on left-hand fender /**X664** - Linkage lowering switch on right-hand fender /**X665** - Linkage lowering switch on left-hand fender	Incorrect signal
8.X. 1C	**X119** - Rear linkage lifting/lowering switch	Incorrect signal
8.X. 22	**X30** - Rear linkage position sensor	Incorrect signal
8.X. 23	**X121** - Rear linkage height/depth adjustment thumb wheel	Incorrect signal
8.X. 27	Setting potentiometer for high position of **X717** - Linkage and PTO keypad on pillar	Incorrect signal
8.X. 28	Intermix potentiometer of **X717** - Linkage and PTO keypad on pillar	Incorrect signal
8.X. 29	Lowering speed potentiometer of **X717** - Linkage and PTO keypad on pillar	Incorrect signal
8.X. 2B	Active transport control switch of **X717** - Linkage and PTO keypad on pillar	Incorrect signal
8.X. 31	**X31** - Rear linkage right-hand draft sensor	Incorrect signal
8.X. 32	**X32** - Rear linkage left-hand draft sensor	Incorrect signal

No.	Components concerned	Causes
8.X.50	**X31** - Rear linkage right-hand draft sensor	Saturation
8.X.51	**X32** - Rear linkage left-hand draft sensor	Saturation
8.X.60	**X28** - Rear linkage lowering solenoid valve	Open circuit
8.X.61	**X28** - Rear linkage lowering solenoid valve	Shortcut to Ground
8.X.62	**X27** - Rear linkage lifting solenoid valve	Shortcut to Ground
8.X.A0	**X177** - Linkage controller	Parameter loss
8.X.A1	**X177** - Linkage controller	Checksum error
8.X.B4	**X177** - Linkage controller	No calibration
8.X.B5	Dual Control sensor	Signal incorrect or incorrect calibration

2.14.12 Front power lift error codes

No.	Components concerned	Causes
9.X.02	**X277** - Front linkage lifting switch/**X658** - Front linkage lowering switch	Incorrect signal

2.14.13 Armrest error codes

No.	Components concerned	Causes
3.X.1A	FingerTIPs	CAN message lost
3.X.19	Joystick	CAN message lost
3.X.80	**X104** - TECU controller	10 V output fault
3.X.81	**X104** - TECU controller	VIN Error - Vehicle electronic identification incorrect
3.X.83	**X104** - TECU controller **X717** - Linkage and PTO keypad on pillar	CAN message lost
3.X.84	**X104** - TECU controller **X214** - Multifunction armrest	CAN message lost
3.X.85	**X104** - TECU controller **X717** - Linkage and PTO keypad on pillar	CAN message lost on Classic models

No.	Components concerned	Causes
3.X.86	**X587** - FingerTIP 3	Shortcut to Ground
3.X.87	**X587** - FingerTIP 3	Short circuit to 12 V
3.X.89	**X587** - FingerTIP 3	Calibration not performed
3.X.8A	**X588** - FingerTIP 4	Shortcut to Ground
3.X.8B	**X588** - FingerTIP 4	Short circuit to 12 V
3.X.8C	**X588** - FingerTIP 4	Calibration not performed
3.X.94	**X110** - FingerTIP 6	Shortcut to Ground
3.X.95	**X110** - FingerTIP 6	Short circuit to 12 V
3.X.96	**X110** - FingerTIP 6	Calibration not performed
3.X.97	**X882** - FingerTIP 7	Shortcut to Ground
3.X.98	**X882** - FingerTIP 7	Short circuit to 12 V
3.X.99	**X882** - FingerTIP 7	Calibration not performed
3.X.9A	**X883** - FingerTIP 8	Shortcut to Ground
3.X.9B	**X883** - FingerTIP 8	Short circuit to 12 V
3.X.9C	**X883** - FingerTIP 8	Calibration not performed
3.X.9D	Hand throttle on armrest	Shortcut to Ground
3.X.9E	Hand throttle on armrest	Short circuit to 12 V
3.X.9F	Rear linkage height/depth adjustment thumb wheel	Shortcut to Ground
3.X.A0	Rear linkage height/depth adjustment thumb wheel	Short circuit to 12 V

No.	Components concerned	Causes
3.X.A 1	T-lever on armrest	Shortcut to Ground
3.X.A 2	T-lever on armrest	Short circuit to 12 V
3.X.A 3	**X104** - TECU controller	VIN Error - Vehicle electronic identification incorrect

2.14.14 Hydraulic valve error codes

Reading the error code number on the instrument panel.

The code is represented by 3 sections of characters separated by dots.

EX: A.Y1.4B:

- **A**: hydraulic valve
- **YX**
  - **Y**: corresponds to the number of the affected valve.
  - **X**: error code severity
- **4B**: error code number

Number	Components concerned	Causes
A.YX. 11		RAM or EEPROM error
A.YX. 12		Insufficient power
A.YX. 13		Excessive power
A.YX. 15		Excessive power
A.YX. 18		The valve does not return to neutral position
A.YX. 19		The valve is not in the neutral position at start-up
A.YX. 1A		The valve position is greater than the reference
A.YX. 1B		The valve does not reach floating position
A.YX. 1E		Valve internal error
A.YX. 1F		Communication error
A.YX. 20		The position of the valve is the opposite of the specified value
A.YX. 21		Checking error

Number	Components concerned	Causes
A.YX.22		Validation error
A.YX.23		Validation error
A.YX.24		The valve flow rate is higher than 100%
A.YX.25		The position received from the valve is unknown
A.YX.26		Validation error
A.YX.27		Validation error
A.YX.28		Validation error
A.YX.29		Validation error
A.YX.2A		The valve is not emitting a CAN message
A.X.36	**X96** - Hydraulic spool valve switch on left-hand fender	Incorrect signal

2.14.15 Air conditioning error codes

No.	Component(s) concerned	Cause(s)
10.X.01	**X441** - Ventilation temperature sensor (TT1)	Sensor in open circuit
10.X.02	**X441** - Ventilation temperature sensor (TT1)	Sensor short-circuited
10.X.03	**X442** - Ventilation temperature sensor (TT2)	Sensor in open circuit
10.X.04	**X442** - Ventilation temperature sensor (TT2)	Sensor short-circuited
10.X.05	**X69** - Cab interior temperature sensor	Sensor in open circuit
10.X.06	**X69** - Cab interior temperature sensor	Sensor short-circuited
10.X.07	**X358** - Outside temperature sensor	Sensor in open circuit
10.X.08	**X358** - Outside temperature sensor	Sensor short-circuited
10.X.09	**X443** - Evaporator temperature sensor	Sensor in open circuit
10.X.10	**X443** - Evaporator temperature sensor	Sensor short-circuited

No.	Component(s) concerned	Cause(s)
10.X. 11	**X70** - Solar radiation sensor	The signal from the solar sensor is outside its limits or is giving an impossible value
10.X. 14	**X449** - Motor for left-hand heating shutter	The signal from the potentiometer of the left-hand recirculation actuator is outside its operating range
10.X. 15	**X449** - Motor for left-hand heating shutter **X450** - Motor for right-hand heating shutter	The potentiometer reference is short-circuited to earth
10.X. 16	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Error in temperature selected, the signal is out of range
10.X. 17	**X439** - Air conditioning control module (blue connector)	Error from the fan potentiometer
10.X. 18	**X69** - Cab interior temperature sensor	Ambient temperature sensor fan fault
10.X. 19	**X451** - Motor for heating mixer shutter	Stepper motor output error (water valve)
10.X. 20	**X449** - Motor for left-hand heating shutter **X450** - Motor for right-hand heating shutter	Left-hand and right-hand recirculation actuator motor output error
10.X. 21	**X318** - Air conditioning compressor	Air conditioning compressor relay output error
10.X. 22	**X453** - Extreme cold weather pump motor	Water pump relay output error
10.X. 23	**X436** - Left-hand side fan switch/**X437** - Relay for left-hand side fan	Fault with fan output
10.X. 24	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Engine speed error
10.X. 25	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Vehicle speed error
10.X. 26	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Engine water temperature error
10.X. 27	**X445** - Left-hand fan adapter module	Fan speed controller output error
10.X. 28	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Overvoltage

No.	Component(s) concerned	Cause(s)
10.X. 29	**X439** - Air conditioning control module (blue connector) **X440** - Air conditioning control module (yellow connector)	Undervoltage
10.X. 30	**X444** - Right-hand fan adapter module (signal)	The signal is outside its operating range
10.X. 31	**X445** - Left-hand fan adapter module	The return signal is outside its operating range
10.X. 32	**X444** - Right-hand fan adapter module (signal)	The return signal is outside its operating range
10.X. 33	**X450** - Motor for right-hand heating shutter	The input signal from the right-hand recirculation actuator is outside its operating range

2.14.16 Error codes of the keypad in the pillar

No.	Components concerned	Causes
1B.X. 01	**X717** - Linkage and PTO keypad on pillar	Configuration error
1B.X. 02	**X717** - Linkage and PTO keypad on pillar	Error while writing parameters in the memory
1B.X. 03	**X717** - Linkage and PTO keypad on pillar	Configuration error
1B.X. 04	**X717** - Linkage and PTO keypad on pillar **X718** - Additional keypad	Loss of the LIN communication
1B.X. 05	**X717** - Linkage and PTO keypad on pillar	CheckSum error
1B.X. 06	**X717** - Linkage and PTO keypad on pillar	CAN message lost
1B.X. 07	**X717** - Linkage and PTO keypad on pillar	Rear power lift intermix potentiometer error
1B.X. 08	**X717** - Linkage and PTO keypad on pillar	Error of the rear power lift high stop
1B.X. 09	**X717** - Linkage and PTO keypad on pillar	Error of the rear power lift lowering speed potentiometer

2.14.17 Suspended cab error codes

No.	Components concerned	Causes
517000	**X466** - Suspended-cab controller	Supply voltage too high
517001	**X466** - Suspended-cab controller	Supply voltage too low
517002	**X959** - Suspended-cab rear right sensor/**X979** - Suspended-cab rear left sensor	Supply voltage too low
517003	**X959** - Suspended-cab rear right sensor/**X979** - Suspended-cab rear left sensor	Supply voltage too high

No.	Components concerned	Causes
517004	**X959** - Suspended-cab rear right sensor/**X979** - Suspended-cab rear left sensor	Incorrect signal
517005	**X979** - Suspended-cab rear left sensor	Signal voltage too low
517006	**X979** - Suspended-cab rear left sensor	Signal voltage too high
517007	**X979** - Suspended-cab rear left sensor	Signal in open circuit
517008	**X979** - Suspended-cab rear left sensor	Signal voltage is constant for 10 seconds with a forward speed greater than 10 kph
517009	**X959** - Suspended-cab rear right sensor	Signal voltage too low
517010	**X959** - Suspended-cab rear right sensor	Signal voltage too high
517011	**X959** - Suspended-cab rear right sensor	Signal in open circuit
517012	**X959** - Suspended-cab rear right sensor	Signal voltage is constant for 10 seconds with a forward speed greater than 10 kph
517013	**X466** - Suspended-cab controller	RAM failure
517014	**X466** - Suspended-cab controller	Program memory failure
517015	**X466** - Suspended-cab controller	Data programming failure
517016	**X466** - Suspended-cab controller	Monitoring failure
517017	**X466** - Suspended-cab controller	Absence of current calibration
517018	**X466** - Suspended-cab controller	Incorrect parameters
517019	**X466** - Suspended-cab controller	CAN interruption.
517020	**X466** - Suspended-cab controller	CAN interruption.
517021	**X466** - Suspended-cab controller	CAN interruption.
517022	**X466** - Suspended-cab controller	CAN signal invalid
517023	**X466** - Suspended-cab controller	CAN signal invalid
517024		CAN Bus Off
517025	**X690** - Suspended-cab rear left solenoid valve	Supply line in open circuit
517026	**X690** - Suspended-cab rear left solenoid valve	Supply line overvoltage
517027	**X689** - Suspended-cab rear right solenoid valve	Supply line in open circuit
517028	**X689** - Suspended-cab rear right solenoid valve	Supply line overvoltage
517099	Suspended cab	

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3.1 General specifications

3.1.1 Model MT515E/MT525E AutoPower IV

Engine	
Brand	AGCO Power
Type	66 AWF-T4F
Number of cylinders	6

Transmission	
Gearbox type	AutoPower IV GBA25
Rear axle type	GPA23 or GPA23+
Final drive type	Super Heavy Duty

Power take-off	
Rear PTO type	Interchangeable shaft/flanged shaft
PTO speeds	540/1000 540/540Eco 1000/1000Eco rpm

Front axle	
Front axle type	DANA 740-555 (fixed) DANA 740-616 (suspended)
Synchronization ratio (value id displayed on the name plate)	1.326

Hydraulics	
Hydraulic type	Open Center 57 l/min (15.1 gal/min (US)) Optional 100 l/min (26.4 gal/min (US)) Open Center system Optional 110 l/min (29.1 gal/min (US)) Closed Center system
Number of spool valves	4 max.

Electronics	
Transmission control	Autotronic 5
Linkage control	Autotronic 5

Cab	
Air conditioning	Standard
Windscreen	Standard
Roof	Standard

3.1.2 Model MT525E/MT535E AutoPower VI

Engine	
Brand	AGCO Power
Type	66 AWF-T4F
Number of cylinders	6

Transmission	
Gearbox type	AutoPower VI GBA25
Rear axle type	GPA23 or GPA23+
Final drive type	Super Heavy Duty

Power take-off	
Rear PTO type	Interchangeable shaft/flanged shaft
PTO speeds	540/1000 540/540Eco 1000/1000Eco

Front axle	
Front axle type	DANA 740-555 (fixed) DANA 740-616 (suspended)
Synchronization ratio (value id displayed on the name plate)	1.326

Hydraulics	
Hydraulic type	Classic version: Open Center 57 l/min (15.1 gal/min (US)) Optional 100 l/min (26.4 gal/min (US)) Open Center system Optional 110 l/min (29.1 gal/min (US)) Closed Center system Deluxe/Premium version: 110 l/min (29.1 gal/min (US)) Closed Center
Number of spool valves	4 max.

Electronics	
Transmission control	Autotronic 5
Linkage control	Autotronic 5

Cab	
Air conditioning	Classic version: Standard Deluxe/Premium version: Standard or automatic
Windscreen	Standard
Roof	Standard

3.1.3 Model MT545E AutoPower VI

Engine	
Brand	AGCO Power
Type	66 AWF-T4F
Number of cylinders	6

Transmission	
Gearbox type	AutoPower VI GBA25
Rear axle type	GPA23 or GPA23+
Final drive type	Super Heavy Duty

Power take-off	
PTO type	Interchangeable shaft/flanged shaft
PTO speeds	540/1000

Power take-off	
	540/540 Eco 1000/1000 Eco rpm

Front axle	
Front axle type	DANA 750-759 (fixed) DANA 750-638 (suspended)
Synchronization ratio (value id displayed on the name plate)	1.318

Hydraulics	
Hydraulic type	Classic version: Open Center 57 l/min (15.1 gal/min (US)) Optional 100 l/min (26.4 gal/min (US)) Open Center system Optional 110 l/min (29.1 gal/min (US)) Closed Center system Deluxe/Premium version: 110 l/min (29.1 gal/min (US)) Closed Center
Number of spool valves	4 max.

Electronics	
Transmission control	Autotronic 5
Linkage control	Autotronic 5

Cab	
Air conditioning	Standard or automatic
Windscreen	Standard
Roof	Standard

3.2 Operator environment

3.2.1 Noise levels (dB(A)) at operator's ears

Noise levels (dB(A)) at operator's ears, in accordance with Directive 2009/76/EC Appendix II			Pass-by noise (dB(A)), in accordance with Appendix VI of Directive 2009/63/EC	
Model	**Windows closed**	**Windows open**	**40 kph**	**50 kph**
AutoPower IV	69	77	NA	NA
AutoPower VI	69	77	75.	81

3.2.2 Level of vibration felt through the seat

Seat model	Homologation no.	Class II (m/s²)				Class III (m/s²)			
		Light operator		Heavy operator		Light operator		Heavy operator	
		kg	(m/s²)	kg	(m/s²)	kg	(m/s²)	kg	(m/s²)
MSG85/731	e1-0009	59±1	1.18	98±5	0.80	59±1	1.01	98±5	1.24
MSG95G/731	e1-0519	59±1	-	98±5	-	59±1	1.24	98±5	1.10
MSG95AL/731	e1-0013	59±1	-	98±5	-	59±1	0.85	98±5	0.70
MSG95AL/741	e1-0013	59±1	0.75	98±5	0.65	59±1	0.73	98±5	0.62

Vibration measurement in accordance with Directive 78/764/EEC

3.3 Engine

3.3.1 Engine specifications

	MT515E AutoPower IV	MT525E AutoPower IV	MT525E AutoPower VI	MT535E AutoPower VI	MT545E AutoPower VI
Type	AGCO Power 66 AWF-T4F	AGCO Power 66 AWF-T4F	AGCO Power 66 AWF-T4F	AGCO Power 66 AWF-T4F	AGCO Power 66 AWF-T4F
Nominal power hp ISO (kW) at an engine speed of 2100 rpm	130 (96)	140 (103)	140 (103)	150 (110)	165 (121)
Maximum torque with EPM	675 Nm (498 lbf ft)	732 Nm (540 lbf ft)	732 Nm (540 lbf ft)	776 Nm (572 lbf ft)	825 Nm (608 lbf ft)
Number of cylinders	6	6	6	6	6
Turbocharging	yes	yes	yes	yes	yes
Intercooler	air/air	air/air	air/air	air/air	air/air
Stroke	120 mm (4.7 in)	120 mm (4.7 in)	120 mm (4.7 in)	120 mm (4.7 in)	120 mm (4.7 in)
Bore	108 mm (4.3 in)	108 mm (4.3 in)	108 mm (4.3 in)	108 mm (4.3 in)	108 mm (4.3 in)
Cubic capacity	6600 cm^3 (402.73 in^3)	6600 cm^3 (402.73 in^3)	6600 cm^3 (402.73 in^3)	6600 cm^3 (402.73 in^3)	6600 cm^3 (402.73 in^3)
Idle speed, hand brake engaged	740	740	740	740	740
Idle speed, hand brake disengaged	840	840	840	840	840
Nominal speed	2100	2100	2100	2100	2100
Maximum speed at no load	2160	2160	2160	2160	2160
Lubrication	Gear pump at the bottom of the timing				
Valves	Controlled by camshaft, valve lifters and rocker arms				
Valve clearance - Cold or warm - Inlet	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)
Valve clearance - Cold or warm - Exhaust	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)	0,35 mm (1.4 in)

3.3.2 Fuel system and air filter

Water separator	1 water separator filter (fitted as an option)
Fuel filter	1 filter
Fuel prefilter	1 prefilter
Injection pump	Bosch

Fuel injection type	Common rail CP4.3
Injector type	CRIN 3.20 / 8 holes
Cold weather starting	Grid heater with relay controlled by the ECU
Air filter	Two-stage, dry element with blockage indicator

3.3.3 Cooling

Type	Pressurized system
Regulation	One thermostat, opening at 83°C
Fan	Vistronic clutch fan for AutoPower VI Viscostatic clutch fan for AutoPower IV
Belts	Poly-V ribbed belts
Water pump	Belt-driven centrifugal pump

3.3.4 Tightening torques

Engine drain plug	80 Nm (59 lbf ft)
Coolant filler plug	Manual tightening

3.4 Transmission

3.4.1 Forward speed at maximum speed with AutoPower IV 40 kph transmission and 20.8R38 tires

Forward and reverse travel, AutoPower IV transmission

Range	Ratio	GTA 2523 - MT515E/MT525E at 1800 rpm
1	A	1.71 kph
1	B	2.11 kph
1	C	2.57 kph
1	D	3.16 kph
2	A	4.06 kph
2	B	5 kph
2	C	6.09 kph
2	D	7.49 kph
3	A	8.25 kph
3	B	10.15 kph
3	C	12.37 kph
3	D	15.22 kph
4	A	20.82 kph
4	B	25.61 kph
4	C	31.23 kph
4	D	38.41 kph

Forward and reverse travel, AutoPower IV transmission with super creeper

Range	Ratio	GTA 2523 - MT515E/MT525E at 1800 rpm
1	A	0.12 kph
1	B	0.15 kph
1	C	0.18 kph
1	D	0.22 kph
2	A	0.29 kph
2	B	0.35 kph
2	C	0.43 kph
2	D	0.53 kph
3	A	0.59 kph
3	B	0.72 kph

Range	Ratio	GTA 2523 - MT515E/MT525E at 1800 rpm
3	C	0.88 kph
3	D	1.08 kph
4	A	1.48 kph
4	B	1.82 kph
4	C	2.21 kph
4	D	2.72 kph

3.4.2 Forward speed at maximum speed with AutoPower VI 40 kph transmission and 20.8R38 tires

Forward and reverse travel, AutoPower VI transmission

Range	Ratio	GTA 2523 - MT525E/MT535E/MT545E at 1800 rpm
1	A	1.33 kph
1	B	1.59 kph
1	C	1.87 kph
1	D	2.25 kph
1	E	2.65 kph
1	F	3.19 kph
2	A	3.59 kph
2	B	4.31 kph
2	C	5.06 kph
2	D	6.09 kph
2	E	7.16 kph
2	F	8.62 kph
3	A	7.29 kph
3	B	8.76 kph
3	C	10.28 kph
3	D	12.37 kph
3	E	14.55 kph
3	F	17.51 kph
4	A	16.81 kph
4	B	20.21 kph

Range	Ratio	GTA 2523 - MT525E/MT535E/MT545E at 1800 rpm
4	C	23.72 kph
4	D	28.54 kph
4	E	33.56 kph
4	F	40 kph [1]

[1] The speed limit is governed by the engine's electronic management system.

Forward and reverse travel, AutoPower VI transmission with super creeper

Range	Ratio	GTA 2523 - MT525E/MT535E/MT545E at 1800 rpm
1	A	0.09 kph
1	B	0.11 kph
1	C	0.13 kph
1	D	0.16 kph
1	E	0.19 kph
1	F	0.23 kph
2	A	0.25 kph
2	B	0.31 kph
2	C	0.36 kph
2	D	0.43 kph
2	E	0.51 kph
2	F	0.61 kph
3	A	0.52 kph
3	B	0.62 kph
3	C	0.73 kph
3	D	0.88 kph
3	E	1.03 kph
3	F	1.24 kph
4	A	1.19 kph
4	B	1.43 kph
4	C	1.68 kph
4	D	2.02 kph
4	E	2.38 kph
4	F	2.86 kph

3.4.3 Forward speed at maximum speed with AutoPower VI 50 kph transmission and 20.8R38 tires

Forward and reverse travel, AutoPower VI transmission

Range	Ratio	GTA 2523 - MT525E/MT535E/MT545E at 1800 rpm
1	A	1.33 kph
1	B	1.59 kph
1	C	1.87 kph
1	D	2.25 kph
1	E	2.65 kph
1	F	3.19 kph
2	A	3.59 kph
2	B	4.31 kph
2	C	5.06 kph
2	D	6.09 kph
2	E	7.16 kph
2	F	8.62 kph
3	A	7.29 kph
3	B	8.76 kph
3	C	10.28 kph
3	D	12.37 kph
3	E	14.55 kph
3	F	17.51 kph
4	A	19.31 kph
4	B	23.22 kph
4	C	27.25 kph
4	D	32.79 kph
4	E	38.56 kph
4	F	40 kph [1]

[1] The speed limit is governed by the engine's electronic management system.

Forward and reverse travel, AutoPower VI transmission with super creeper

Range	Ratio	GTA 2523 - MT525E/MT535E/MT545E at 1800 rpm
1	A	0.09 kph
1	B	0.11 kph
1	C	0.13 kph
1	D	0.16 kph
1	E	0.19 kph
1	F	0.23 kph
2	A	0.25 kph
2	B	0.31 kph
2	C	0.36 kph
2	D	0.43 kph
2	E	0.51 kph
2	F	0.61 kph
3	A	0.52 kph
3	B	0.62 kph
3	C	0.73 kph
3	D	0.88 kph
3	E	1.03 kph
3	F	1.24 kph
4	A	1.37 kph
4	B	1.65 kph
4	C	1.93 kph
4	D	2.33 kph
4	E	2.73 kph
4	F	3.29 kph

3.4.4 Gearbox

AutoPower IV transmission	This transmission comprises four ratios (A to D) and four AutoPower IV robotic ranges (1 to 4) • 16 forward transmission ratios • 16 reverse transmission ratios
With creeper unit	• 32 forward transmission ratios • 32 reverse transmission ratios
PowerShuttle filtration	1 60-micron strainer
Filtration	• 1 150-micron suction strainer, located to the left of the center housing • External main high-pressure 15-micron filter, to the right of the center housing

3.4.5 Gearbox

AutoPower VI transmission	This transmission comprises 6 AutoPower VI ratios (A to F) and 4 robotic ranges (1 to 4) • 24 forward transmission ratios • 24 reverse transmission ratios
With creeper unit	• 48 forward transmission ratios • 48 reverse transmission ratios
PowerShuttle filtration	1 60-micron strainer
Filtration	• 1 150-micron suction strainer, located to the left of the center housing • External main high-pressure 15-micron filter, to the right of the center housing

3.4.6 Final drives

Drives	Epicyclic, located in the rear axle housings.
Reduction ratio:	• Super Heavy Duty: 5.571 to 1

3.4.7 Rear differential lock

Type	Dog clutch lock
Control	Hydraulic, with electric control

3.5 Brakes

3.5.1 Brake system technical specifications

Type	Oil-immersed single disk, diameter 354 mm (13.9 in) (1 disk per wheel)
Operation	Hydraulic with automatic adjustment
Parking brake	Mechanical control acting directly on the shaft of the pinion
Trailer brake	Hydraulic braking controlled by hydraulic spool valve or pneumatic braking or hydraulic and pneumatic braking.

3.5.2 Regulatory data on maximum permitted trailed weights

Drawbars and towing equipment

IMPORTANT:
Before attaching a trailed implement, read the following carefully.

Maximum permitted towed weight

The equipment identification number plate provides important information on tractor and towed equipment weight combinations.

The figures represent the maximum weights authorized for the vehicle and towed equipment which should not be exceeded so as not to affect tractor safety.

Fig. 1

Fig. 1

Before transporting towed equipment, read the equipment's Operator's Manual. Check that the equipment is properly installed, find out how to safely transport it, and determine the maximum permitted transport speed. Check that the tractor/towed equipment combination is in compliance with local and national legislation.

Never transport at speeds higher than the equipment's maximum transport speed. By exceeding the maximum transport speed of the equipment, there is a risk of reducing the braking performance and/or losing control of the tractor and its towed equipment.

Unless otherwise specified by the equipment manufacturer or the legislation, observe the following rules when towing.

For towed equipment:

Do not tow equipment:

- Without brakes and weighing over 3000 kg (6614 lb) when fully loaded
- With an independent brake and weighing over 6000 kg (13228 lb) when fully loaded
- With an overrun brake and weighing over 16,000 kg (35274 lb) when fully loaded
- With assisted braking (hydraulic or air brake) and weighing over 32,000 kg (70547 lb) when fully loaded

Total permitted weight of tractor-implement combination

	Weight technically permissible for the tractor/trailer assembly		
	MT515E AutoPower IV/ MT525E AutoPower IV AutoPower VI/ MT535E MT545E AutoPower VI **40 kph Standard braking**	**MT525E MT535E MT545E AutoPower VI** **40 kph High-pressure braking**	**MT525E MT535E MT545E AutoPower VI** **50 kph**
With trailer without brakes	12,250 kg (27006 lb)	14,000 kg (30864 lb)	12,250 kg (27006 lb)
With trailer equipped with independent brake	15,250 kg (33620 lb)	17,000 kg (37478 lb)	15,250 kg (33620 lb)
With trailer equipped with overrun brake	25,250 kg (55666 lb)	27,000 kg (59524 lb)	25,250 kg (55666 lb)
With trailer with hydraulic braking	41,250 kg (90940 lb)	43,000 kg (94798 lb)	41,250 kg (90940 lb)

Load and ballast distribution per axle

Axle load distribution

		4-wheel drive	
		MT515E/MT525E/MT535E/MT545E	
Weights of unladen vehicle based on optional equipment		min.	max.
		5900 kg (13007 lb)	8000 kg (17637 lb)
Total weight distribution	Front axle	2400 kg (5291 lb)	3600 kg (7937 lb)
	Rear axle	3600 kg (7937 lb)	5200 kg (11464 lb)

Ballast distribution per axle

		4-wheel drive		
		MT515E AutoPower IV/MT525E AutoPower IV AutoPower VI/MT535E MT545E AutoPower VI **40 kph Standard braking**	**MT525E MT535E MT545E AutoPower VI** **40 kph High-pressure braking**	**MT525E MT535E MT545E AutoPower VI** **50 kph**
Maximum technically permissible loaded weights of the vehicle		9250 kg (20393 lb)	11,000 kg (24251 lb)	9250 kg (20393 lb)
Maximum distribution of weight per axle	Front axle	5400 kg (11905 lb)	5400 kg (11905 lb)	5400 kg (11905 lb)
	Rear axle	8000 kg (17637 lb)	9000 kg (19841 lb)	8000 kg (17637 lb)
Minimum percentage of maximum permissible distribution of weight between axles	Front axle	58%	49%	58%
	Rear axle	86%	81%	86%

When ballasting the tractor, observe the following conditions:

- The minimum load on the front axle must be more than 20% of the tractor weight at no load.
- The load capacity of the rear tires must be taken into account. Do not overload the rear axle. (Refer to the load capacity table).

3.6 Front axle and steering

3.6.1 Four-wheel drive front axle

Clutch mechanism	Multidisc, with electrohydraulic control, activated by a switch in the cab
Differential lock	Multidisc, with electrohydraulic control, activated by a switch in the cab
Gear reduction ratios	DANA 740-555/616: 17.00 DANA 750-559/638: 17.104

3.6.2 Steering

Fig. 2

Steering type	Hydrostatic, controlled by a steering unit		
Assistance	Hydraulics		
Maximum inner/outer steering angle	55°/39°		
Turning radius	Tire	Adjusting the front wheel track width	Turning radius R
	420/85R28	1800	5382 mm (212.1 in)

3.7 Power take-off

3.7.1 Specifications

Front power take-off specifications	
Number of selections possible for front PTO	1000 rpm
Maximum permissible power, hp (kW)	Counterclockwise: 150 (112)
Maximum permissible input torque	Counterclockwise: 549 Nm (405 lbf ft)
Maximum permissible output torque	Counterclockwise: 1054 Nm (777 lbf ft)
Rotational direction	1 counterclockwise (viewed from the front of the tractor)
Engine speed for 1000 rpm PTO	1920 rpm
Ratio	1.92
Clutch type	Hydraulics
Splined shaft type	Fixed shaft with 6 and 21 splines, diameter 35 mm (1.4 in) (1"3/8)

Rear power take-off (PTO)	
Power take-off	Proportional to engine speed.
Clutch	Electrohydraulic
Type of shaft	AutoPower IV/AutoPower VI: Interchangeable or flanged
Number of splines	• 6 or 21 splines: Shaft diameter 35 mm (1.4 in) • 20 splines: Shaft diameter 45 mm (1.8 in)
Theoretical PTO speed	AutoPower IV • 540 at 1980 engine rpm • 540E at 1533 engine rpm • 1000 at 2030 engine rpm • 1000E at 1572 engine rpm AutoPower VI • 540 at 1980 engine rpm • 540E at 1533 engine rpm • 1000 at 2030 engine rpm • 1000E at 1572 engine rpm
Economy PTO	540E/1000E
Maximum permissible power, hp (kW)	• 540 version with 6 and 21-spline shaft: 100 (74) • 540E version with 6 and 21-spline shaft: 110 (81) • 540/540E version with 20-spline shaft: (40)

Rear power take-off (PTO)	
	• 1000/1000E version with 6 or 21-spline shaft: 127 (93) 1000/1000E version with 20-spline shaft: 55 (40)

3.7.2 Tightening torques

Rear PTO shaft retaining screw	69 Nm (51 lbf ft)

3.8 Linkage

3.8.1 Rear linkage

Type	• 3-point • Category 2 or 3 (depending on model) • 75-mm rams

Models	Rear axle type	Category	Lift rod position	Linkage capacity at the ball joints		Linkage capacity at 610 mm (24 in) (24.0 in) from the ball joints	
				Maximum linkage capacity at end of travel	Capacity over the entire length of travel of the linkage	Maximum linkage capacity at end of travel	Capacity over the entire length of travel of the linkage
MT515E/ MT525E AutoPower IV	GPA 23	Category 3	T2	7100 kg (15653 lb)	5100 kg (11243 lb)	5300 kg (11684 lb)	4450 kg (9810 lb)

Models	Rear axle type	Category	Lift rod position	Linkage capacity at the ball joints		Linkage capacity at 610 mm (24 in) (24.0 in) from the ball joints	
				Maximum linkage capacity at end of travel	Capacity over the entire length of travel of the linkage	Maximum linkage capacity at end of travel	Capacity over the entire length of travel of the linkage
MT525E/ MT535E/ MT545E AutoPower VI	GPA 23	Category 3	T2	7100 kg (15653 lb)	5100 kg (11243 lb)	5300 kg (11684 lb)	4450 kg (9810 lb)
	GPA 23+ (increased capacity of linkage)	Category 3	T2	8100 kg (17857 lb)	5600 kg (12346 lb)	5750 kg (12676 lb)	5100 kg (11243 lb)

3.9 Auxiliary hydraulics

3.9.1 Hydraulic system

Open Center or Closed Center with flow control and pressure control (Load Sensing)	Versions available depending on model: - 57 l/min (15.1 gal/min (US)) or 100 l/min (26.4 gal/min (US)) Open Center: Flow rate 97 l/min (25.6 gal/min (US)) at an engine speed of 2160 rpm, maximum pressure 200 bar (2901 psi) - Closed Center: 110 l/min (29.1 gal/min (US)), maximum pressure 200 bar (2901 psi)
Maximum exportable volume for AutoPower IV and AutoPower VI transmissions	32 l (8.5 gal (US)) (14 l (3.7 gal (US)) on a 10% slope)
Maximum exportable volume for AutoPower IV and AutoPower VI transmissions after adding 10 l (2.6 gal (US)) of oil for heavy implements	42 l (11.1 gal (US)) (24 l (6.3 gal (US)) on a 10% slope)

Available flow rate at 2160 rpm	Nominal
With one spool valve (depending on option installed)	- 57 l/min (15.1 gal/min (US)) - 98 l/min (25.9 gal/min (US)) - 100 l/min (26.4 gal/min (US))
With two spool valves	110 l/min (29.1 gal/min (US))
With the Power Beyond coupler (P)	110 l/min (29.1 gal/min (US))

Hydraulic performance

3.10 Electrical equipment

3.10.1 Electrical equipment technical specifications

Voltage	12 volts. Negative earth
Batteries	2 x 420 A maintenance-free batteries
Alternators	2 x 120 A or 1 x 175 A
Indicators, side lights on hand rail	10 W - 21 W
Stop lights, brake lights on fenders	21 W - 5 W
High beams on lighting bar at front of engine cover	H4 - 60/55 W
Low beam lamps, side lights on lighting bar at front of engine cover	H7 - 55 W + T4 - 4 W
High beams on hand rail	H4 - 60/55 W
High beams on hand rail, low position	H3 - 55 W
Work lights on hand rail	H3 - 55 W
Work lights on roof	H3 - 55 W
Number plate lights on roof	H3 - 5 W
Reversing lights	21 W
Rotary beacon	H1 - 55 W
Interior light	2 x 5 W

3.10.2 Layout of components

North America models

Fig. 3

(1) Rotary beacon: H1 55 W
(2) Front work light: H3 55 W
(3) Front work light: H3 55 W
(4) Warning lights: 21 W
(5) Front work light: H3 55 W
(6) Front work lights: H9 65 W
(9) Rear work light: H3 55 W
(10) Warning lights: 21 W
(11) Indicator: 21 W
(12) Rear brake lights/side lights: 21 W / 5 W
(13) Rear warning lights: 21 W
(14) Rear work light: H3 55 W

3.11 Wheels and tires

3.11.1 Rims

Four-wheel drive front axle	Welded steel rim/disk (2 settings depending on the position of the rim on the hub) Mobile steel rim/disk (8 settings depending on the position of the disk on the rim and on the hub)
Rear wheels	Welded steel rims/disk (setting depending on the position on the straight shaft) Steel rims/cast iron disk (setting of the disk position on the rim and depending on the position on the straight shaft)

3.11.2 Tires

On an unequal 4-wheel drive tractor, the front wheels are smaller than the rear wheels, so they have to turn slightly faster than the rear wheels. The synchronization ratio K specifies the difference between the rotation of the front and rear wheels. For total compatibility between the front and rear tires, apply the synchronization ratio K (the value is displayed on the name plate).

The following formula is used to check that your choice of front/rear tire is correct. The result should be between 1 and 1.05. **Calculation formula:** 1<K x (rolling circumference of the front tire/rolling circumference of the rear tire)<1.05

3.11.3 Tightening torques

	Disk on hub	Rim on disk with lugs	Rim on disk with slots
4-wheel drive	• M18: 400 Nm (295 lbf ft) to 450 Nm (332 lbf ft) • M22: 640 Nm (472 lbf ft) to 680 Nm (502 lbf ft)	220 Nm (162 lbf ft) to 250 Nm (184 lbf ft)	300 Nm (221 lbf ft) to 320 Nm (236 lbf ft)

Front axle

	Disk on hub	Rim on disk with lugs	Rim on disk with slots	Rim on disk, fixed cast iron
Flanged shaft	• M18: 400 Nm (295 lbf ft) to 450 Nm (332 lbf ft) • M22: 640 Nm (472 lbf ft) to 680 Nm (502 lbf ft)	-	-	250 Nm (184 lbf ft) to 350 Nm (258 lbf ft)
Straight shaft	M22: 640 Nm (472 lbf ft) to 680 Nm (502 lbf ft)	-	-	250 Nm (184 lbf ft) to 350 Nm (258 lbf ft)
Cone/hub assembly, M20: 350 Nm (258 lbf ft) to 460 Nm (339 lbf ft)				

Rear axle

3.12 Capacities and dimensions

3.12.1 Capacities

Type	Model	Capacity
Fuel tank	Tier 4F/Stage IV SCR Technology engine	245 l (64.7 gal (US))
Additional tank	Tier 4F/Stage IV SCR Technology engine	60 l (15.9 gal (US))
DEF tank	Tier 4F/Stage IV SCR Technology engine	30 l (7.9 gal (US))
Cooling system	All	23.25 l (6.1 gal (US))
Engine sump	All	18.5 l (4.9 gal (US))
Transmission/rear axle	AutoPower IV	Minimum 57 l (15.1 gal (US)) Maximum 65 l (17.2 gal (US))
Transmission/rear axle	AutoPower VI	Minimum 56 l (14.8 gal (US)) Maximum 70 l (18.5 gal (US))
Front axle beam	740/555; 740/616	7 l (1.8 gal (US))
	750/559; 750/638	9 l (2.4 gal (US))
Fixed front axle final drive (each)	740/555; 740/616	0.7 l (0.2 gal (US))
	750/559; 750/638	2.2 l (0.6 gal (US))
Refrigerant fluid R134A	Standard roof	1200 g (42.32 oz)
	High-visibility roof	1350 g (47.61 oz)

Type	Model	Capacity
Front power take-off	All	3.5 l (0.9 gal (US))
Windscreen washer bottle	All	4 l (1.1 gal (US))
Pneumatic brake system antifreeze reservoir	All	0.5 l (0.1 gal (US))

For AutoPower IV/AutoPower VI models

3.12.2 Dimensions and weights

Fig. 4

Fig. 5

MT500E AutoPower IV/AutoPower VI

Reference	Measured specification	Dimension/weight
(A)	Wheel base	2875 mm (113.3 in)
(B)	External length without front linkage without weights	5013 mm (197.5 in)
	External length without front linkage with weights	5426 mm (213.8 in)
	External length with front linkage	5604 mm (220.8 in)
(C)	Standard height to roof without Auto-Guide	2083 mm (82.1 in)

Reference	Measured specification	Dimension/weight
	High-visibility height to roof without Auto-Guide	2110 mm (83.1 in)
(D)	Height to ground - rear with tires 650/65R38	750 mm (29.6 in) to 875 mm (34.5 in)
(E)	Maximum external width	1600 mm (63 in) to 2550 mm (100.5 in)
(F)	Ground clearance	325 mm (12.8 in) to 450 mm (17.7 in)
	Tractor weight	Refer to regulatory data specified in the chapter: Safety instructions and safety points.

MT500E AutoPower IV/AutoPower VI

Reference	Measured specification	Dimension/weight		
		Rear Axle	Front axle	
			Dana 740	Dana 750
(G)	Distance between flanges: GPA23 Short shaft Ø 82 mm (3.2 in) Long shaft Ø 82 mm (3.2 in)	1835 mm (72.3 in) 1657 mm (65.3 in) to 2028 mm (79.9 in) 1657 mm (65.3 in) to 2672 mm (105.3 in)	1800 mm (70.9 in)	1900 mm (74.9 in)
(H)	Center-to-center distance between studs - flanged shaft - straight shaft	203 mm (8 in) 335 mm (13.2 in)	275 mm (10.8 in)	335 mm (13.2 in)
(I)	Centring diameter - flanged shaft - straight shaft	149,35 mm (588.4 in) 281 mm (11.1 in)	220 mm (8.7 in)	280 mm (11 in)
(J)	Stud length	41 mm (1.6 in) to 66 mm (2.6 in)	35 mm (1.4 in)	50 mm (2 in)
(K)	Stud diameter	M18/M22	M18 x 1.5	M22x1.5
(L)	Number of studs (per side) - flanged shaft - straight shaft	8 (M18) 10 (M22)	8	10

3.12.3 Attachment points: AutoPower IV/AutoPower VI models without front linkage

Fig. 6

NOTE:
Values x, y and z represent reference point 0 of the tractor.

Reference		X	Y	Z
1[1]	M20	-1862 mm (-73.4 in)	-315 mm (-12.4 in)	-45 mm (-1.8 in)
2[1]	M20	-1862 mm (-73.4 in)	-315 mm (-12.4 in)	-125 mm (-4.9 in)
3[1]	M20	-947 mm (-37.3 in)	-280 mm (11 in)	27.5 mm (1.1 in)
4[1]	M20	-947 mm (-37.3 in)	-280 mm (-11 in)	-37.5 mm (-1.5 in)
5	M20	-947 mm (-37.3 in)	-280 mm (-11 in)	-102.5 mm (-4 in)
6[1]	M20	51 mm (2 in)	-270 mm (-10.6 in)	30 mm (1.2 in)
7[1]	M20	51 mm (2 in)	-270 mm (-10.6 in)	35 mm (1.4 in)
8[1]	M20	27 mm (1.1 in)	-270 mm (-10.6 in)	-146.5 mm (-5.8 in)
9	M16	323 mm (12.7 in)	-	-
10	M16	967 mm (38.1 in)	-	-
11	M16	549 mm (21.6 in)	-	-

Reference		X	Y	Z
12	M16	81 mm (3.2 in)	-	-
13	M16	922 mm (36.3 in)	-	-
14	M16	332 mm (13.1 in)	-	-
15	M16	827 mm (32.6 in) (without front weight)		
16	M16	1476 mm (58.2 in)	509 mm (20.1 in)	-229 mm (-9 in)
(17)	M16	1476 mm (58.2 in)	585 mm (23 in)	-229 mm (-9 in)
18	M16	1718 mm (67.7 in)	509 mm (20.1 in)	-229 mm (-9 in)
19	M16	1718 mm (67.7 in)	585 mm (23 in)	-229 mm (-9 in)
20	-	106 mm (4.2 in)	-	-
21	-	280 mm (11 in)	-	-
22	-	252 mm (9.9 in)	-	-

[1] Front-end loader attachment points

3.12.4 Attachment points: AutoPower IV/AutoPower VI models with front linkage

Fig. 7

NOTE:
Values x, y and z represent reference point 0 of the tractor.

Reference		X	Y	Z
1[1]	M20	-1962 mm (-77.3 in)	-343 mm (-13.5 in)	-66 mm (-2.6 in)
2[1]	M20	-1962 mm (-77.3 in)	-343 mm (-13.5 in)	-146 mm (-5.8 in)
3[1]	M20	-947 mm (-37.3 in)	-280 mm (11 in)	27.5 mm (1.1 in)
4[1]	M20	-947 mm (-37.3 in)	-280 mm (-11 in)	-37.5 mm (-1.5 in)
5	M20	-947 mm (-37.3 in)	-280 mm (-11 in)	-102.5 mm (-4 in)
6[1]	M20	51 mm (2 in)	-270 mm (-10.6 in)	30 mm (1.2 in)
7[1]	M20	51 mm (2 in)	-270 mm (-10.6 in)	35 mm (1.4 in)
8[1]	M20	27 mm (1.1 in)	-270 mm (-10.6 in)	-146.5 mm (-5.8 in)
9	M16	323 mm (12.7 in)	-	-
10	M16	967 mm (38.1 in)	-	-
11	M16	549 mm (21.6 in)	-	-
12	M16	81 mm (3.2 in)	-	-
13	M16	922 mm (36.3 in)	-	-
14	M16	332 mm (13.1 in)	-	-
15	M16	1059 mm (41.7 in) (with folded linkage)		
16	M16	1476 mm (58.2 in)	509 mm (20.1 in)	-229 mm (-9 in)
(17)	M16	1476 mm (58.2 in)	585 mm (23 in)	-229 mm (-9 in)
18	M16	1718 mm (67.7 in)	509 mm (20.1 in)	-229 mm (-9 in)
19	M16	1718 mm (67.7 in)	585 mm (23 in)	-229 mm (-9 in)
20	-	106 mm (4.2 in)	-	-
21	-	280 mm (11 in)	-	-
22	-	252 mm (9.9 in)	-	-

[1] Front-end loader attachment points

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4.1 Cab

4.1.1 Cab accessories

- Radio fittings (loudspeakers, aerial and wiring).
- Radio
- Top link for attachments (onboard computer)
- Fender extensions
- Rotary beacon
- Work lights on hand rails

4.2 Engine

4.2.1 Engine accessories

- Engine block preheater (220 V or 110 V according to version)

4.3 Power take-off

4.3.1 Power take-off accessories

- Power take-off: Consult your dealer for the different types available

4.4 Linkage

4.4.1 Linkage accessories

- Rear linkage: Consult your dealer for the different types available
- Single-piece weight: 850 kg (1874 lb)/1500 kg (3307 lb)
- Front weights: 16 weights of 45 kg (99 lb)/22 or 24 weights of 55 kg (121 lb)

4.5 Auxiliary hydraulics

4.5.1 Auxiliary hydraulics accessories

- Additional hydraulic spool valves
- Trailer brake

4.6 Wheels and tires

4.6.1 Wheels and tires accessories

- Rear wheel weights: 1 to 2 external wheel weights

5. Appendix

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5.1.1 Conversion table 219

5.1 Conversion table

5.1.1 Conversion table

Length		
mm	x 0.0394	in
in	x 25.400	mm
m	x 3.2808	ft
ft	x 0.3048	m
km	x 0.6214	mile
mile	x 1.6093	km

Surface area		
mm^2	x 0.0016	in^2
in^2	x 645.16	mm^2
m^2	x 10.7639	ft^2
ft^2	x 0.0929	m^2
ha	x 2.4711	acre
acre	x 0.4047	ha

Volume		
cm^3	x 0.0610	in^3
in^3	x 16.387	cm^3
m^3	x 35.315	ft^3
ft^3	x 0.0283	m^3

Capacity		
ml	x 0.0338	fl oz (US)
fl oz (US)	x 29.5735	ml
l	x 0.2642	gal (US)
gal (US)	x 3.7853	l

Power		
kW	x 1.3410	HP SAE[1]
HP SAE[1]	x 0.7457	kW
kW	x 1.36	hp[2]
HP[2]	x 0.736	kW

[1] US unit

[2] Metric unit

Torque		
Nm	x 0.7375	lbf ft
lbf ft	x 1.3558	Nm
daNm	x 7.3756	lbf ft
lbf ft	x 0.1356	daNm

Pressure		
bar	x 14.504	psi
psi	x 0.0690	bar

Flow rate		
l/min	x 0.2642	gal/min (US)
gal/min (US)	x 3.7853	l/min
l/hr	x 0.2642	gal/hr (US)
gal/hr (US)	x 3.7853	l/hr
l/ha	x 0.1069	gal/acre (US)
gal/acre (US)	x 9.3531	l/ha

Speed		
kph	x 0.6214	mph
mph	x 1.6093	kph

Weight		
g	x 0.03527	oz
oz	x 28.3495	g
kg	x 2.2046	lb
lb	x 0.4536	kg
t	x 1.1023	US ton
US ton	x 0.9072	t

Temperature		
°C	(°C x 1.8) + 32	°F
°F	(°F - 32)/1.8	°C

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