SERVICE MANUAL

TT35 / TT40 / TT45

Tractor

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SERVICE MANUAL

TT35 2WD tractor , TT35 4WD tractor , TT40 2WD tractor , TT40 4WD tractor , TT45 2WD tractor , TT45 4WD tractor

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Foreword

Important notice

All maintenance and repair operations described in this manual should be carried out exclusively by NEW HOLLAND authorised workshops. All instructions should be carefully observed and special equipment where indicated should be used.

Anyone who carries out service operations described without carefully observing these prescriptions will be directly responsible for any damage caused.

Notes for equipment

Equipment which NEW HOLLAND proposes and shows in this manual is:

- Studied and designed expressly for use on NEW HOLLAND tractors.
- Necessary to make reliable repair.
- Accurately built and strictly tested to offer efficient and long-lasting working life.

Notice

The words “front”, “rear”, “right-hand side” and “left-hand side” refer to the different parts as seen from the operator’s seat oriented to the normal direction of movement of the tractor.

Safety rules

 This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguarded your safety.

In this manual you will find this symbol together with the following keywords.

WARNING: It gives warning about improper repair operations and potential consequences affecting the service technician's personal safety.

DANGER: It gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved in the operation.

To prevent accidents

Most accidents and personal injuries taking place in workshops are due from non-observance of some essential rules and safety precautions.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.
Careful observance of this only basic precaution would be enough to avoid many severe accidents.

 DANGER
Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

Safety rules

Generalities

Carefully follow specified repair and maintenance procedures.

- Do not wear rings, wrist watches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught in moving parts. Use approved safety clothing such as anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Wear safety glasses with side guards when cleaning parts using compressed air.
- Damaged or frayed wires and chains are unreliable. Do not use them for lifting or towing.
- Wear suitable protection such as approved eye protection, helmets, special clothing, gloves and footwear whenever welding. All persons standing in vicinity of the welding process should wear approved eye protection. Never look at the welding arc if your eyes are not suitably protected.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except they are qualified operators assisting in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat or at the side of the machine when operating the fender switches.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated. Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations should be carried out with greatest care and attention.
- Disconnect the batteries and label all controls to warn that the tractor is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks or batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- The fuel filling gun should always remain in contact with filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity build-up.
- To transfer a failed tractor, use a trailer of a low loading platform trolley if available.
- To load and unload the machine from the transportation means, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or the trailer platform and block wheels as required by the transporter.
- Always use lifting equipment of appropriate capacity to lift or move heavy components.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stand near the fastening point.
- The working area should be always kept clean and dry. Immediately clean any spillage of water or oil.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.

Start up

- Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.
- Never bring your body, arms, legs, feet, hands, fingers near fans or rotating belts.

Engine

- Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped.
- Do not fill up fuel tank when the engine is running.
- Never adjust the fuel injection pump when the tractor is moving. Never lubricate the tractor when the engine is running.

Electrical systems

- If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows. (+) to (+) and (-) to (-). Avoid short-circuiting the terminals. Gas released from batteries is highly flammable. During charging, leave the battery compartment uncovered to improve ventilation. Avoid sparks or flames near the battery area. Do not smoke.
- Do not charge batteries in confined spaces.
- Always disconnect the batteries before performing any type of service on the electrical system.

Hydraulic systems

- Some fluid coming out from a very small port can be almost invisible and be strong enough to penetrate skin. For this reason, Never use your hands to check for leaks, but use a piece of cardboard or a piece of wood for this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention may result in serious infections or dermatitis.
- Always take system pressure readings using the appropriate gauges.

Wheels and tires

- Check that the tires are correctly inflated at the pressure specified by the manufacturer. Periodically check for possible damage to the rims and tires.
- Stay a the tire side when inflating.
- Check the pressure only when the tractor is unloaded and tires are cold to avoid wrong reading due to over- pressure.
- Never cut, nor weld a rim with the inflated tire assembled.
- To remove the wheels, block both front and rear tractor wheels. Raise the tractor and install safe and stable supports under the tractor in accordance with the regulations in force.
- Deflate the tire before removing any object caught into the tire tread.
- Never inflate tires using flammable gases as they may originate explosions and cause injuries to bystanders.

Removal and installation

- Lift and handle all heavy components using lifting equipment of adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.

Safety rules

Health and safety precautions

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. The precautions necessary to avoid these hazards are identified.

The list is not exhaustive and all operations and procedures and the handling of materials, should be carried out with health and safety in mind.

Acid and alkalis

See battery acids, e.g. caustic soda, sulfuric acid.
Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.
Ensure access to water and soap is readily available for splashing accidents.

Adhesives and sealers

See fire highly flammable, flammable, combustible.

Generally should be stored in “No smoking” areas, cleanliness and tidiness in use should be observed. E.g. disposable paper covering benches should be dispensed from applicators where possible containers including secondary containers, should be labelled.

Solvent based adhesive / sealers

See solvents. Follow manufacturer’s instructions.

Water base adhesive / sealers

Those based on polymer emulsions and rubber lattices may contain small amounts of volatile toxic and harmful chemicals. Skin and eye contact should be avoided and adequate ventilation provided during use.
Follow manufacturers’ instructions.

Resin based adhesives / sealers

E.g. Epoxide and formaldehyde resin based.
Mixing should only be carried out in well ventilated areas as harmful or toxic volatile chemicals may be released.
Skin contact with uncured resins and hardeners can result in irritation, dermatitis and absorption of toxic of harmful chemicals through the skin. Splashes can damage the eyes.
Provide adequate ventilation and avoid skin and eye contact. Follow manufacturers’ instructions.

Anaerobic, cyanoacrylate and other acrylic adhesives

Many are irritant, sensitizing or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturers’ instructions followed.

Cyanaocrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded cover with a clean moist pad and get medical attention. Do not attempt to pull tissue apart. Use in well ventilated areas as vapors can cause irritation of the nose and eyes.

For two-pack systems see resin based adhesives / sealers.

Isocyanate (polyurethane) adhesives / sealers

See resin based adhesives.

Individuals suffering from asthma or respiratory allergies should not work with or near these materials as sensitivity reactions can occur.

Any spraying should preferably be carried out in exhaust ventilated booths removing vapors and spray droplets form the breathing zone. Individuals working with spray applications should wear supplied air respirators.

Antifreeze

See fire, solvents e.g. isopropanol, ethylene glycol, menthol.

Highly flammable, flammable, combustible.

Used in vehicle cooling systems, brake air pressure systems, screen wash solutions.

vapors given off from coolant antifreeze (glycol) arise only when heated.

Antifreeze may be absorbed through skin in toxic or harmful quantities. Antifreeze if swallowed is fatal and medical attention must be found immediately.

Arc welding

See welding.

Battery acids

See acids and alkalis.
Gases released during charging are explosive. Never use naked flames or allow sparks near charging or recently charged batteries.

Brake and clutch fluids (polyalkylene glycols)

See fire combustible.
Splashes to the skin and eyes are slightly irritating. Avoid skin and eye contact as far as possible. Inhalation of vapor hazards do not arise at ambient temperatures because of the very low vapor pressure.

Brazing

See welding.

Chemical materials - general

See legal aspects.

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, oils and grease should always be used with caution and stored and handled with care. They may be toxic, harmful, corrosive irritant or highly inflammable and give rise to hazardous fumes and dusts.

The effects of excessive exposure to chemicals may be immediate or delayed, briefly experienced or permanent, cumulative, superficial, life threatening or may reduce life expectancy.

Do’s

Do remove chemical materials from the skin and clothing as soon as practicable after soiling. Change heavily soiled clothing and have it cleaned.

Do carefully read and observe hazard and precaution warning given on material containers (labels) and in any accompanying leaflets, poster or other instructions. Material health and safety data sheets can be obtained from manufacturers’.

Do organise work practices and protective clothing to avoid soling of the skin and eyes, breathing vapors / aerosols / dusts / fumes, inadequate container labelling; fire and explosion hazards.

Do wash before job breaks, before eating, smoking, drinking or using toilet facilities when handling chemical materials.

Do keep work areas clean, uncluttered and free of spills.

Do store according to national and local regulations.

Do keep chemical materials out of reach of children.

Do not's

Do not mix chemical materials except under the manufacturers' instructions. Some chemicals can form other toxic or harmful chemicals give off toxic or harmful fumes be explosive when mixed together.

Do not spray chemical materials, particular those based on solvents, in confined spaces. E.g. When people are inside a vehicle.

Do not apply heat or flame to chemical materials except under the manufacturers' instructions. Some are highly inflammable and some may release toxic or harmful fumes.

Do not leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits etc.

Do not transfer chemical materials to unlabeled containers.

Do not clean hands or clothing with chemical materials. Chemicals, particularly solvents and fuels will dry the skin and may cause irritation with dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Do not use emptied containers for other materials, except when they have been cleaned under supervised conditions.

Do not sniff or smell chemical materials. Brief exposure to high concentrations of fumes can be toxic or harmful.

Clutch fluids

See brake and clutch fluids.

Clutch linings and pads

See brake and clutch linings and pads.

Corrosion protection materials

See solvents, fire.

Highly flammable, flammable.

These materials are varied and the manufactures' instructions should be followed. They may contain solvents, resins, petroleum products etc. skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

Cutting

See welding.

De-waxing

See solvents and fuels (kerosene).

Dusts

Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations. Wear respiratory protection if ventilation is inadequate.

Electric shocks

Electric shocks can result from the use of the faulty electrical equipment or from the misuse of equipment even in good condition.

Ensure that electrical equipment is maintained in good condition and frequently tested.

Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.

Ensure that electric equipment is protected by the correct rated fuse.

Never misuse electrical equipment and never use equipment which is in anyway faulty. The results could be fatal.

Use reduced voltage equipment where possible in preference to electrical equipment.

In cases of electrocution:

- Switch off electricity before approaching victim.
- If this is not possible, push or drag victim from source of electricity using dry non-conductive material.
- Commence resuscitation if trained to do so.
- Summon medical assistance

Exhaust fumes

These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, lead and aromatic hydrocarbons. Engines should only be run under conditions of adequate extraction or general ventilator and not in confined spaces.

Gasoline (petrol) engine

There may not be adequate warning properties of odor or irritation before immediate and delayed toxic or harmful effects arise.

Diesel engine

Soot, discomfort and irritation usually give adequate warning of hazardous fume concentrations.

Fiber insulation

See ducts.

Used in noise and sound insulation.

The fibrous nature of surfaces and cut edges can cause skin irritation. This is usually a physical and not a chemical effect.

Precautions should be taken to avoid excessive skin contact through careful organization of work practices and the use of gloves.

Fire

See welding, foams, legal aspects.

Many of the materials found on or associated with the repair of vehicles are highly inflammable. Some give off toxic or harmful fumes if burnt.

Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.

Ensure before using electrical or welding equipment but that there is no fire hazard present.

Have suitable fire extinguisher available when using welding or heating equipment.

First aid

Apart from meeting any legal requirements its i desirable for someone in the workshop to be trained in first aid procedures.

Splashes in the eye should be flushed with clean water for at least **10 min**.

Soiled skin should be washed with soap and water.
Inhalation affected individuals should be removed to fresh air immediately.

If swallowed or if effects persist consult a doctor with information (label) on material used.

Do not induce vomiting (unless indicated by manufacturer).

Foams

See fire.

Used in sound and noise insulation. Cured foams used in seat and trim cushioning.
Follow manufacturers' instructions.

Un reacted components are irritating and may be harmful to the skin and eyes. Wear gloves and goggles.

Individuals with chronic respiratory diseases, asthma, bronchial medical problems or histories of allergic diseases should not work with or near uncured materials.

The components, vapors, spray mists can cause direct irritation, sensitivity reactions and may be toxic or harmful.

vapors and spray mists must not be breathed. These materials must be applied with adequate ventilation and respiratory protection. Do not remove respirator immediately after spraying, wait until vapor / mists have cleared.

Burning of the uncured components and the cured foams can generate toxic and harmful fumes.

Smoking, open flames or the use of electrical equipment during foaming operations and until vapors/mists have cleared should not be allowed. Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation.

Fuels

See fire, legal aspects, chemicals - general, solvents.
Used as fuels and cleaning agents.

Gasoline (petrol)

Highly flammable.

Swallowing can result in mouth and throat irritation and absorption from the stomach can result in drowsiness and unconsciousness. Small amounts can be fatal to children. Aspiration of liquid into the lungs, e.g. through vomiting, is a very serious hazard.

Gasoline dries the skin and can cause irritation and dermatitis on prolonged or repeated contact. Liquid in the eye causes severe smarting.

Motor gasoline may contain appreciable quantities of benzene, which is toxic upon inhalation and the concentrations of gasoline vapors must be kept very low. High concentrations will cause eye, nose and throat irritation, nausea, headache, depression and symptoms of drunkenness. Very high concentrations will result in rapid loss of consciousness.

Ensure there is adequate ventilation when handling and using gasoline. Great care must be taken to avoid the serious consequences of inhalation in the event of vapor build up arising from spillages in confined spaces.

Special precautions apply to cleaning and maintenance operations on gasoline storage tanks. Gasoline should not be used as a cleaning agent. It must not be siphoned by mouth.

Kerosene (paraffin)

Used also as heating fuel, solvent and cleaning agent.

Flammable.

Irritation of the mouth and throat may result from swallowing. The main hazard from swallowing arises if liquid aspiration into the lungs occurs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes in the eye may be slightly irritating.

In normal circumstances the low volatility does not give rise to harmful vapors. Exposure to mists and vapors from kerosene at elevated temperatures should be avoided (mists may arise in de-waxing). Avoid skin and eye contact and ensure there is adequate ventilation.

Gas-oil (diesel fuel)

See fuels (kerosene). Combustible.

Gross or prolonged skin contact with high boiling gas oils may also cause serious skin disorders including skin cancer.

Gas cylinders

See fire.

Gases such as oxygen, acetylene, carbon dioxide, argon and propane are normally stored in cylinders at pressures of up to 2000 lb/sq. in. (13,790 kn/m2) and great care should be taken in handling these cylinders to avoid mechanical damage to them or to the valve gear attached. The contents of each cylinder should be clearly identified by appropriate markings.

Cylinders should be stored in well ventilated enclosures, and protected from ice and snow, or direct sunlight. Fuel gases (e.g. acetylene and propane) should not be stored in close proximity to oxygen cylinders.

Care should be exercised to prevent leaks from gas cylinders and lines, and to avoid sources of ignition.
Only trained personnel should undertake work involving gas cylinders.

Gases

See gas cylinders.

Gas shielded welding

See welding.

Gas welding

See welding.

General workshop tools and equipment

It is essential that all tools and equipment are maintained in good condition and the correct safety equipment used where required.

Never use tools or equipment for any purpose other than that for which they were designed.

Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time that the equipment is used.

Do not use damaged or defective tools or equipment, particularly high speed equipment such as grinding wheels. A damaged grinding wheel can disintegrate without warning and cause serious injury.

Wear suitable eye protection when using grinding, chiselling or sand blasting equipment.

Wear a suitable breathing mask when using sand blasting equipment, working with asbestos based materials or using spraying equipment.

Glues

See adhesives and sealers.

High pressure air, lubrication and oil test equipment

See lubricants and greases.

Always keep high pressure equipment in good condition and regularly maintained, particularly at joints and unions.

Never direct a high pressure nozzle at the skin as the fluid may penetrate to the underlying tissue etc. and cause serious injury.

Legal aspects

Many laws and regulations make requirements relating to health and safety in the use of materials and equipment in workshops.

Workshops should be familiar, in detail, with associated laws and regulations. Consult local factory inspectorate if in any doubt.

Lubricants and greases

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g. routine service change sump oils) are more irritating and more likely to cause serious effects including skin cancer in the event of gross and prolonged skin contact.

Wash skin thoroughly after work involving oil. Proprietary hand cleaners may be of value provided they can be removed from the skin with water. Do not use petrol, paraffin or other solvents to remove oil from the skin.

Lubricants and greases may be slightly irritating to the eyes.

Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals. Discard oil soaked shoes.

Do not employ used engine oils as lubricants or for any application where appreciable skin contact is likely to occur. Used oils may only be disposed of in accordance with local regulations.

There are publications describing the problems and advising on precautionary measures.

Noise insulation materials

See foams, fibre insulation.

Paints

See solvents and chemical materials - general.
Highly flammable, flammable.

One pack

Can contain harmful or toxic pigments, driers and other components as well as solvents. Spraying should only be carried out with adequate ventilation.

Two pack

Can also contain harmful and toxic unreacted resins and resin hardening agents. The manufacturers' instructions should be followed and the on resin based adhesives, isocyanate containing adhesives and foams should be consulted.

Spraying should preferably be carried out in exhausted ventilated booths removing vapor and spray mists from the breathing zone. Individuals working in booths should wear respiratory protection. Those doing small scale repair work in the open shop should wear supplied air respirators.

Paint thinners

See solvents.

Petrol

See fuels (gasoline).

Pressurised equipment

See high pressure air, lubrication and oil test equipment.

Resistance welding

See welding.

Sealers

See adhesives and sealers.

Solder

See welding.

Solders are mixtures of metals such that the melting point of the mixture is below that of the constituent metals (normally lead and tin). Solder application does not normally give rise to toxic lead fumes, provided a gas/air flame is used. Oxy-acetylene flames should not be used, as they are much hotter and will cause lead fumes to be evolved.

Some fumes may be produced by the application of any flame to surfaces coated with grease etc. and inhalation of these should be avoided.

Removal of excess solder should be under taken with care, to ensure that fine lead dust is not produced, which can give toxic effects if inhaled. Respiratory protection may be necessary.

Solder spillage and filing should be collected and removed promptly to prevent general air contamination by lead.

High standards of personal hygiene are necessary in order to avoid indigestion of lead or inhalation of solder dust from clothing.

Solvents

See chemical materials- general fuels (kerosene), fire.

E.g. Acetone, white spirit, toluene, xylene, trichlorethane.

Used in cleaning materials, de-waxing, paints, plastics, resins, thinners etc.

Highly Inflammable, flammable.

Skin contact will decrease the skin and may result in irritation and dermatitis following repeated or prolonged contact. Some can be absorbed through the skin in toxic or harmful quantities.

Splashes in the eye may cause severe irritation and could lead to loss of vision.

Brief exposure to high concentrations of vapors or mists will cause eye and throat irritation, drowsiness, dizziness, headaches and in the worst circumstances, unconsciousness.

Repeated or prolonged exposures to excessive but lower concentrations of vapors or mists, for which there might not be adequate warning indications, can cause more serious toxic or harmful effects.

Aspiration into the lungs (e.g. through vomiting) is the most serious consequence of swallowing.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing if necessary.

Ensure good ventilation when in use, avoid breathing fumes, vapors and spray mists and keep containers tightly sealed. Do not use in confined spaces.

When the spraying material contains solvents, e.g. paints, adhesives, coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturers' instructions.

Sound insulation

See fibre insulation, foams.

Spot welding

See welding.

Suspended loads

There is always a danger when loads are lifted or suspended. Never work under an unsupported suspended or raised load, e.g. jacked up vehicle, suspended engine, etc.

Always ensure that lifting equipment such as jacks, hoists, axle stands, slings, etc. are adequate and suitable for the job, in good condition and regularly maintained.

Never improvise lifting tackle.

Underseal

See corrosion protection.

Welding

See fire, electric shock, gas cylinders.

Welding processes include resistance welding (spot welding), arc welding and gas welding.

Resistance welding

This process may cause particles of molten metal to be emitted at high velocity and the eyes and skin must be protected.

Arc welding

This process emits a high level of ultraviolet radiation which may cause eye and skin burns to the welder and to other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other people.

Metal spatter will also occur and appropriate eye and skin protection is necessary.

The heat of the welding arc will produce fumes and gases from the metals being welded and from any applied coatings or contamination on the surfaces being worked on. These gases and fumes may be toxic and inhalation should always be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary,

particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases where adequate ventilation cannot be provided, supplied air respirators may be necessary.

Gas welding

Oxy-acetylene torches may be used for welding and cutting and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.

The process will produce metal spatter and eye and skin protection is necessary.

The flame is bright and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.

The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts and inhalation of the fumes should be avoided.

In brazing, toxic fumes may be evolved from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event particular care must be taken to avoid inhalation of fumes and expert advice may be required.

Special precautions must be taken before any welding or cutting takes place on vessels which have contained combustible materials, e.g. boiling or steaming out of fuel tanks.

White spirit

See solvents.

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Engine - General specification

TT35 / TT40 models

Make	Simpsons
Type	4 stroke, diesel, naturally aspirated, direct injection, water cooled
Power	
TT40	**42 Hp** (BS Au 141a:1971)
TT35	**35 Hp**(BS Au 141a : 971)
Number of cylinders	3
Bore	
TT40	**91.44 mm** (**3.60 in**)
TT35	**88.90 mm** (**3.50 in**)
Stroke	**127.00 mm** (**5.00 in**)
Cubic capacity	
TT40	**2500 cm³** (**153 in³**)
TT35	**2400 cm³** (**146 in³**)
Compression ratio	
TT40	18.5:1
TT35	17.5:1
Firing order	1-2-3
Idle speed	**650 - 700 RPM**
Maximum no load speed	
TT40	**2200 RPM**
TT35	**2200 RPM**
Rated speed	**2000 RPM**
Height of cylinder block between top and bottom faces	**349.010 - 349.080 mm** (**13.741 - 13.743 in**)
Parent bore diameter for cylinder sleeves	**93.660 - 93.690 mm** (**3.687 - 3.689 in**)
Depth of recess of sleeves flange (cast iron sleeves)	**3.760 - 3.860 mm** (**0.148 - 0.152 in**)
Diameter recess of sleeves flange (cast Iron sleeves)	**97.030 - 97.160 mm** (**3.820 - 3.825 in**)
Main bearing parent bore diameter	**74.080 - 74.100 mm** (**2.917 - 2.917 in**)
Camshaft bore diameter number 1	**47.600 - 47.680 mm** (**1.874 - 1.877 in**)
Camshaft bore diameter number 2	**47.350 - 47.420 mm** (**1.864 - 1.867 in**)
Camshaft bore diameter number 3	**46.840 - 46.910 mm** (**1.844 - 1.847 in**)

Engine - General specification

TT45 model

Make	Simpsons
Type	3 Cylinder, 4 stroke, inline type, coolant cooled
Power	**47 Hp**
Aspiration	Naturally aspirated
Combustion	Direct injection
Bore (nominal diameter)	**95.00 mm** (**3.74 in**)
Stroke	**127.00 mm** (**5.00 in**)
Cubic capacity	**2.70 L** (**0.71 US gal**)
Compression ratio	18.3 : 1
Rotation	Anti-clock wise from the flywheel end
Firing order	1, 2, 3
Valve tip clearance	**0.30 mm** (**0.01 in**) inlet and exhaust
Atomiser setting pressure	**250 - 258 bar** (**3625 - 3741 psi**)
Inlet valve closes	**26.8 °** before top dead centre
Exhaust valve closes	**25.3 °** after top dead centre
Total inlet open period	**250.6 °**

Total exhaust open period	**266.6 °**
Fuel injection pump	MICO VE type fuel injection pump mechanical governor
Injection timing	**0.80 mm** (**0.03 in**) plunger lift when number 1 piston at TDC
Fuel feed pump	Plunger type pump located on cam tunnel driven by engine camshaft
Application	Tractor
Rating	
Maximum gross rating before top dead centre	**49.5 kW** (**67.3 Hp**) @ **2250 RPM**
Maximum gross torque	**180 N·m** (**133 lb ft**) @ **1200 - 1400 RPM**
Rating standard	ISO 14396
De-rating for altitude	
Where engines are called upon to operate in very high atmospheres occasioned by attitude, such engines should be derated.	
Approximate engine weights	
Basic weight (with alternator but without starter motor flywheel and flywheel housing)	**204 kg** (**450 lb**)
Typical installed weight (with starter motor flywheel and flywheel housing)	**290 kg** (**639 lb**)
Engine dimension	
Height	**770.00 mm** (**30.31 in**)
Length	**730.00 mm** (**28.74 in**)
Width	**500.00 mm** (**19.69 in**)

Engine - Torque

TT35 / TT40 models

Description	Thread size	Torque	
		TT40	TT35
Cylinder head nuts and setscrews (non retorque type)	7/16 - 20 UNF	**10.8 kgf** (**23.8 lbf**)	**10.8 kgf** (**23.8 lbf**)
Connecting rod nuts (cadmium plated)	7/16 - 20 UNF	**6.1 kgf** (**13.4 lbf**)	**6.1 kgf** (**13.4 lbf**)
Connecting rod nuts (phosphated)	7/16 - 20 UNF	**8.3 kgf** (**18.3 lbf**)	**8.1 kgf** (**17.9 lbf**)
Main bearing setscrews	M14 x 2	**15.9 kgf** (**35.1 lbf**)	**15.6 kgf** (**34.4 lbf**)
Balance weight setscrews	7/16 - 20 UNF	**7.6 kgf** (**16.8 lbf**)	**7.5 kgf** (**16.5 lbf**)
Idler gear retaining setscrew	M12 x 1.5	**6.9 kgf** (**15.2 lbf**)	**6.8 kgf** (**15.0 lbf**)
Camshaft gear retaining setscrews	M8 x 1.25	**2.9 kgf** (**6.4 lbf**)	**2.9 kgf** (**6.4 lbf**)
Fuel Injection Pump (FIP) gear to adapter setscrew	M8 x 1.25	**2.9 kgf** (**6.4 lbf**)	**2.9 kgf** (**6.4 lbf**)
Flywheel setscrew	M12 x 1.25	**11.1 kgf** (**24.5 lbf**)	**10.8 kgf** (**23.8 lbf**)
Crankshaft pulley retaining setscrew	M22 x 2.5	**15.2 kgf** (**33.5 lbf**)	**14.9 kgf** (**32.8 lbf**)
Injector securing nuts	M8 x 1.00	**1.7 kgf** (**3.7 lbf**)	**1.6 kgf** (**3.5 lbf**)
Engine to front support buckle up bolts	M16 x 2	**22.0 kgf** (**48.5 lbf**)	**22.0 kgf** (**48.5 lbf**)
Engine to clutch housing buckle up bolts	M12 x 1.5	**9.0 kgf** (**19.8 lbf**)	**9.0 kgf** (**19.8 lbf**)
Support radiator to engine setscrew	M10 x 1.25	**4.5 kgf** (**9.9 lbf**)	**4.5 kgf** (**9.9 lbf**)
Fuel tank support bolt	M12 x 1.25	**8.0 kgf** (**17.6 lbf**)	**8.0 kgf** (**17.6 lbf**)
Fuel tank support bolt	M8 x 1	**3.2 kgf** (**7.1 lbf**)	**3.2 kgf** (**7.1 lbf**)
Fan assembly bolt	M8 x 1	**2.6 kgf** (**5.7 lbf**)	**2.6 kgf** (**5.7 lbf**)
Hydraulic pump to coupler setscrew	M8 x 1	**3.0 kgf** (**6.6 lbf**)	**3.0 kgf** (**6.6 lbf**)
Hydraulic pump assembly bolt	Hex. 3/8"	**2.5 kgf** (**5.5 lbf**)	**2.5 kgf** (**5.5 lbf**)
Radiator assembly bolt	M10 x 1.5	**3.0 kgf** (**6.6 lbf**)	**3.0 kgf** (**6.6 lbf**)
Air cleaner to bracket set screw	M10 x 1.5	**5.0 kgf** (**11.0 lbf**)	**5.0 kgf** (**11.0 lbf**)

Description	Thread size	Torque	
		TT40	TT35
Air cleaner bracket to shell nut	M10 x 1.5	**3.2 kgf** (**7.1 lbf**)	**3.2 kgf** (**7.1 lbf**)
Starter motor mounting bolts	M10 x 1.5	**7.4 kgf** (**16.3 lbf**)	**7.4 kgf** (**16.3 lbf**)
Alternator mounting bracket nuts	M10 x 1.25	**4.0 kgf** (**8.8 lbf**)	**4.0 kgf** (**8.8 lbf**)
Alternator hinge bolt	M10 x 1.5	**8.0 kgf** (**17.6 lbf**)	**8.0 kgf** (**17.6 lbf**)
Fan belt tension adjusting bolt	M8 x 1.25	**2.4 kgf** (**5.3 lbf**)	**2.4 kgf** (**5.3 lbf**)

Engine - Torque

TT45

Description	Thread size	Torque
Cylinder head setscrew (camshaft tunnel side)	M10 x 1.0	**65.0 N·m** (**47.9 lb ft**)
Cylinder head setscrew	M12 x 1.5	*
Connecting rod nuts (phosphated)	7/16" - 20 UNF	**80.0 N·m** (**59.0 lb ft**)
Main bearing setscrews	M14 x 2	**155.0 N·m** (**114.3 lb ft**)
Balance weight setscrews	7/16"- 20 UNF	**75.0 N·m** (**55.3 lb ft**)
Idler gear hub nut (lower and upper)	M10 x 1.25	**28.0 N·m** (**20.7 lb ft**)
Camshaft gear retaining setscrews	M12 x 1.75	**75.0 N·m** (**55.3 lb ft**)
Fuel injection pump adaptor to fuel injection pump camshaft nut	M12	**45.0 N·m** (**33.2 lb ft**)
Fuel injection pump gear to adaptor setscrew	M8 x 1.25	**21.0 N·m** (**15.5 lb ft**)
Flywheel setscrews	M12 x 1.25	**110.0 N·m** (**81.1 lb ft**)
Crankshaft pulley retaining setscrew	M22 X 2.5	**150.0 N·m** (**110.6 lb ft**)
Thermostat	7/8” - 14 UNF	**13.6 N·m** (**10.0 lb ft**)
High pressure fuel pipe nuts	–	**20.0 N·m** (**14.8 lb ft**)
Atomiser	M24 x 1.5	**60.0 N·m** (**44.3 lb ft**)

Engine - Special tools

NOTE: *Operations described in this section of the manual must be performed using the following essential tools, to work safely and achieve the best technical results with additional saving of time and effort.*

Tool description	Tool number
Injector tester	290284
Sling hook, engine	290740
Cylinder head valve spring compressor	291050
Tractor splitting trolley	292320
Installer rear main oil seal	9970846
Installer front oil seal	9970845
Dummy injector (compression test kit)	9970847
Swan neck pipe (fuel timing)	9970848
Engine mounting bracket (to be used with engine stand 293860)	9970844
Steering wheel puller	82834312
Bushes for steering wheel puller	9971375
Remover injector	9971238
Cylinder pressure test kit	Local
Lube pressure check kit	Local
Piston ring compressor	Local
Piston ring expander	Local

Engine - Sealing

Operation description	Loctite specification	Equivalent Anabond / other specfication
Injector mounting stud	Loctite - 577	Anabond 340
Front lift hook retaining stud		
Water outlet body retaining stud		
Cylinder block stud fitment (cam side)		
Cylinder block stud fitment (Fuel Injection Pump (FIP) side)		
Fuel Injection Pump (FIP) mounting stud on timing case		
Timing case joint with cylinder block		
Alternator lever retaining stud		
Timing case cover mounting stud fitment on bridge piece		
Water pump mounting stud on timing case cover		
Cylinder block to sump fitment stud		
Rocker shaft retaining stud	Loctite - 262	Evertite TL - 175
Fitment of all water jacket plugs at rear side		
Water jacket plug fitment	Loctite - 603	Anabond 412
Pressure rail hole plug fitment	Loctite - 262	Epoxite resin
Rear main bearing cap O-ring fitment	Loctite - 596	Anabond 666
Rear end oil seal joint with cylinder block		
Suction pipe with joint fitment		
Front and rear neck packing corners		
Timing case cover joint on both sides		
Lubrication oil filler joint on both sides		
Fitment of rear end oil seal with crankshaft flange	OKS - 1110	Morykote - 111
Inlet manifold joint fitment	Loctite - 205	-
Tapper cover fitment		
Water outlet body Allen plug fitment	Loctite - 577	Shellac
Fitment of housing with cylinder block	Loctite 510	-
Seal air deflector - radiator	Hightack - 98 D	Anabond - 870
Between fuel tank clamp and protecting		
Fuel tank support bolt on starter motor side	Loctite - 243	-
Buckle up of engine and clutch housing	Loctite - 574	-

Crankcase - General specification

Cylinder sleeves-cast iron

Sleeve type	Dry-interference fit
Outside diameter for sleeve	**93.71 - 93.74 mm** (**3.69 - 3.69 in**)
Interference fit of sleeve in block	**0.030 - 0.080 mm** (**0.001 - 0.003 in**)
Inside diameter of finished sleeve in block	
TT40	**91.480 - 91.500 mm** (**3.602 - 3.602 in**)
TT35	**88.93 - 88.960 mm** (**3.50 - 3.502 in**)
Outside diameter of sleeve flange	**96.600 - 96.720 mm** (**3.803 - 3.808 in**)
Flange thickness	**3.760 - 3.810 mm** (**0.148 - 0.150 in**)
Depth of sleeve flange relative of top face of cylinder block	**0.050 - -0.100 mm** (**0.002 - -0.004 in**)

NOTE: *Reboring to oversize is not possible*

Pistons

Type	
TT40	Alfin piston with re-entrant bowl in crown
TT35	Alfin piston with re-entrant bowl in crown
Piston height in relation to cylinder block top face	**0.0254 - 0.1000 mm** (**0.0010 - 0.0039 in**)
Bore diameter for piston pin	**31.7462 - 31.7525 mm** (**1.2499 - 1.2501 in**)
Top and 2nd ring groove width	
TT40	**2.4300 - 2.4600 mm** (**0.0957 - 0.0969 in**)
TT35	**2.4300 - 2.4500 mm** (**0.0957 - 0.0965 in**)
3rd ring groove width	
TT40	**4.8100 - 4.8400 mm** (**0.1894 - 0.1906 in**)
TT35	**4.8000 - 4.8200 mm** (**0.1890 - 0.1898 in**)

Piston rings

Top compression	Chrome inlaid steel ring - parallel faced
2nd Compression	
TT40	Cast iron - taper land
TT35	Cast iron - internally stepped
3rd Oil control	Chrome plated - parallel faced conformable oil control ring
Top and 2nd ring width	**2.3600 - 2.3800 mm** (**0.0929 - 0.0937 in**)
3rd Ring width	
TT40	**4.7370 - 4.7630 mm** (**0.1865 - 0.1875 in**)
TT35	**4.7240 - 4.7750 mm** (**0.1860 - 0.1880 in**)
Top, 2nd and 3rd ring clearance in groove	**0.0500 - 0.1000 mm** (**0.0020 - 0.0039 in**)
Ring gap top	**0.3600 - 0.6100 mm** (**0.0142 - 0.0240 in**)
Ring gap - 2nd	
TT40	**0.2800 - 0.5200 mm** (**0.0110 - 0.0205 in**)
TT35	**0.2800 - 0.5100 mm** (**0.0110 - 0.0201 in**)
Ring gap - 3rd	
TT40	**0.3600 - 0.4800 mm** (**0.0142 - 0.0189 in**)
TT35	**0.3600 - 0.4600 mm** (**0.0142 - 0.0181 in**)

The ring gaps quoted above are for a bore diameter of **91.480 mm** (**3.602 in**) TT40 model and **88.930 mm** (**3.501 in**) TT35 model. When checking ring gaps in a worn bore, **0.0800 mm** (**0.0031 in**) should be added to these ring gaps for every **0.0030 mm** (**0.0001 in**) increase in bore diameter.

NOTE: *In a worn cylinder, ring gap should be checked at the bottom of cylinder.*