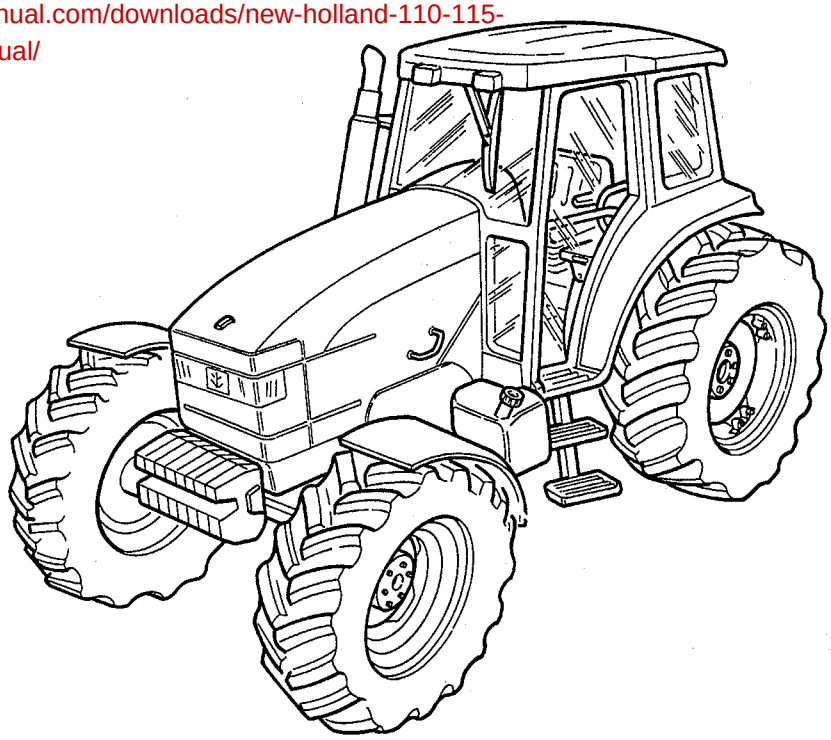
NEW HOLLAND



100 – 115 – 135 – 160 HP TRACTORS

REPAIR MANUAL

VOLUME 1

SECTIONS

A F T E R S A L E S S E R V I C E

FOREWORD

◊ *This Manual is subdivided into Sections, each identified by a 2 digit number and with separately numbering of the pages.*
For ready reference, these Sections maintain the same identification number and group description of the corresponding Flat Time Rate Manual.

◊ *Topics and information can be easily retrieved by consulting the Index on the following pages.*

◊ *Manual Print Number/Part and respective updating date appear on the bottom of each page.*

◊ *Revised sheets will carry the same print number followed by a 2–digit number (e.g. first revision 603.54.321.01; second revision 603.54.321.02 etc.) and their date of issue.*
These pages will be accompanied by a specifically revised and updated index.

◊ *Information contained in this Manual are updated to the date reported on the print. As NEW HOLLAND maintains a constant improvement program for its product range, some information may not result updated because of modifications motivated by reasons of a technical or marketing nature as well as by the legal requirements of different Countries.*
In case of discordance, consult NEW HOLLAND Sales and Service Organizations.

◊ *The imperial weights and measures are given for operators' convenience and though the closest approximation is sought, they are normally rounded off for practical reasons. In case of discrepancies only the metric units should be considered.*

IMPORTANT NOTICES

◊ *All maintenance and repair work reported and described in this Manual is the exclusive reponsibility of the NEW HOLLAND Service Network, which must carry it out by strictly following directions and using, wherever necessary, the specific service tools specified therein.*

◊ *Anybody carrying out service operations dealt with in this manual without abiding strictly to its prescriptions makes himself personally responsible for of any ensuing damage.*

◊ *The Manufacturer and all of the Organizations associated with its distribution network, including but not limited to national, regional or local distributors, decline any and all responsibility for damages that may derive from the abnormal behaviour of parts and/or components not specifically authorized by the Manufacturer, including those utilized in maintenance and/or repair work on its products, manufactured or commercialized by the same.*
In no case, warranties of any kind may be issued or forced on the products fabricated or distributed by the Manufacturer for damages deriving from any abnormal behaviour of parts and/or components unauthorized by the Manufacturer itself.

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TABLE OF CONTENTS

GENERAL INSTRUCTIONS

IMPORTANT NOTICE

All maintenance and repair operations described in this manual should be carried out exclusively by the FIATA-GRI authorised workshops. All instructions detailed should be carefully observed and special equipment indicated should be used if necessary.
Everyone who carries out service operations described without carefully observing these prescriptions will be directly responsible of deriving damages.

SHIMMING

At each adjustment, select adjusting shims, measure them individually using a micrometer and then sum up recorded values. Do not rely on measuring the whole shimming set, which may be incorrect, or on rated value indicated for each shim.

ROTATING SHAFT SEALS

To correctly install rotating shaft seals, observe the following instructions:

- Let the seal soak into the same oil as it will seal for at least half an hour before mounting;
- Thoroughly clean the shaft and ensure that the shaft working surface is not damaged;
- Place the sealing lip towards the fluid. In case of a hydrodynamic lip, consider the shaft rotation direction and orient grooves in order that they deviate the fluid towards the inner side of the seal;
- Coat the sealing lip with a thin layer of lubricant (oil rather than grease) and fill with grease the gap between the sealing lip and the dust lip of double lip seals;
- Insert the seal into its seat and press it down using a flat punch. Do no tap the seal with a hammer or a drift;
- Take care to insert the seal perpendicularly to its seat while you are pressing it. Once the seal is settled, ensure that it contacts the thrust element if required.;
- To prevent damaging the sealing lip against the shaft, place a suitable protection during installation.

O RINGS

Lubricate the O rings before inserting them into their seats. This will prevent the O rings from rolling over and twine during mounting which will jeopardise sealing.

SEALERS

Apply one of the following sealers: RTV SILMATE, RHODORSIL CAF 1, or LOCTITE PLASTIC GASKET over the mating surfaces marked with an X.
Before applying the sealer, prepare the surface as follows:

- remove possible scales using a metal brush;
- thoroughly degrease the surfaces using one of the following cleaning agent: trichlorethylene, petrol or a water and soda solution.

BEARINGS

It is advisable to heat the bearings to 80 to 90°C before mounting them on their shafts and cool them down before inserting them into their seats with external tapping.

SPRING PINS

When mounting split socket spring pins, ensure that the pin notch is oriented in the direction of the effort to stress the pin.
Spiral spring pins should not be oriented during installation.

NOTES FOR SPARE PARTS

Use exclusively **genuine NEW HOLLAND spare parts**, the only ones bearing this logo.

Only genuine parts guarantee same quality, life, safety as original components as they are the same as mounted in production.
Only the **NEW HOLLAND genuine spare parts** can offer this guarantee.
All spare parts orders should be complete with the following data:

- tractor model (commercial name) and frame number;
- engine type and number;
- part number of the ordered part, which can be found on the "Microfiches" or the "Spare Parts Catalogue", which is the base for order processing.

NOTES FOR EQUIPMENT

Equipment which NEW HOLLAND proposes and shows in this manual are as follows:

- studied and designed expressly for use on NEW HOLLAND tractors;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long–lasting working means.

We also remind the Repair Personnel that having these equipment means:

- work in optimal technical conditions;
- obtain best results;
- save time and effort;
- work more safely.

NOTICES

Wear limits indicated for some details should be intended as advised, but not binding values. The words "front", "rear", "right hand", and "left hand" referred to the different parts should be intended as seen from the operator's seat oriented to the normal sense of movement of the tractor.

HOW TO MOVE THE TRACTOR WITH THE BATTERY REMOVED

Cables from the external power supply should be connected exclusively to the respective terminals of the tractor positive and negative cables using pliers in good condition which allow proper and steady contact.
Disconnect all services (lights, wind–shield wipers, etc.) before starting the tractor.
If it is necessary to check the tractor electrical system, check it only with the power supply connected. At check end, disconnect all services and switch the power supply off before disconnecting the cables.

SAFETY RULES

PAY ATTENTION TO THIS SYMBOL

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 safeguard your safety and personal integrity. In this manual you will find this symbol together with the following key–words:

***WARNING** – it gives warning about improper repair operations and deriving 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.*

TO PREVENT ACCIDENTS

Most accidents and personal injuries taking place in workshops are due from non–observance of some simple and essential prudential rule and safety precautions. For this reason, IN MOST CASES THEY CAN BE AVOIDED. It suffices to foresee possible causes and act consequently with necessary caution and care.

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, wristwatches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get hold into moving parts. We advise to use approved safety clothing such as anti–slipping footwear, gloves, safety goggles, helmets, etc.

◊ Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are certified operators to assist 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.

◊ 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 the greatest care and attention.

◊ Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.

◊ 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 and accumulator batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.

◊ Brakes are inoperative when they are manually released for maintenance purposes. In such cases, the machine should be kept constantly under control using blocks or similar devices.

◊ The fuel filling gun should remain always in contact with the filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity buildup.

◊ Use exclusively specified towing points for towing the tractor. Connect parts carefully. Ensure that foreseen pins and/or locks are steadily fixed before applying traction. Do not stop near towing bars, cables or chains working under load.

◊ To transfer a failed tractor, use a trailer or a low loading platform trolley if available.

◊ To load and unload the machine from the transportation mean, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the forwarder.

◊ For electrical heaters, battery–chargers and similar equipment use exclusive auxiliary power supplies with a efficient ground to avoid electrical shock hazard.

◊ Always use lifting equipment and similar of appropriate capacity to lift or move heavy components.

◊ Pay special attention to bystanders.

◊ Never pour gasoline or diesel oil into open, wide and low containers.

◊ Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non–flammable non–toxic proprietary solvents.

◊ Wear protection goggles with side guards when cleaning parts using compressed air.

◊ Do not exceed a pressure of 2.1 bar, in accordance with local regulations.

◊ Do not run the engine in a closed building without proper ventilation.

◊ Do not smoke, use open flames, cause sparks in the nearby area when filling fuel or handling highly flammable liquids.

◊ Do not use flames as light sources when working on a machine or checking for leaks.

◊ Move with caution when working under a tractor, and also on or near a tractor. Wear proper safety accessories: helmets, goggles and special footwear.

◊ During checks which should be carried out with the engine running, ask an assistant to seat at the operator's seat and keep the service technician under visual control at any moment.

◊ In case of operations outside the workshop, drive the tractor to a flat area and block it. If working on an incline cannot be avoided, first block the tractor carefully. Move it to a flat area as soon as possible with a certain extent of safety.

◊ Ruined or plied cables and chains are unreliable. Do not use them for lifting or trailing. Always handle them wearing gloves of proper thickness.

◊ Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stop near the fastening point, trailing chains or cables.

◊ The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.

◊ Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.
Before starting the tractor or its attachments, check, adjust and block the operator's seat. Also ensure that there are no persons within the tractor or attachment operating range.

◊ Do not keep into your pockets any object which might fall unobserved into the tractor's inner compartments.

◊ Whenever there is the possibility of being reached by ejected metal parts or similar, use protection eye mask or goggles with side guards, helmets, special footwear and heavy gloves.

◊ Wear suitable protection such as tinted eye protection, helmets, special clothing, gloves and footwear whenever it is necessary to carry out welding procedures. All persons standing in the vicinity of the welding process should wear tinted eye protection. NEVER LOOK AT THE WELDING ARC IF YOUR EYES ARE NOT SUITABLY PROTECTED.

◊ Metal cables with the use get frayed. Always wear adequate protections (heavy gloves, eye protection, etc.)

◊ Handle all parts with the greatest caution. Keep your hands and fingers far from gaps, moving gears and similar. Always use approved protective equipment, such as eye protection, heavy gloves and protective footwear.

START UP

◊ Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.

◊ Never bring your head, 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 or idle if hot.

◊ Do not fill up fuel tank when the engine is running, mainly if it is hot, to avoid ignition of fires in case of fuel spilling.

◊ Never check or adjust the fan belt tension 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 checking the battery charge by means of "jumpers" made by placing metallic objects across the terminals. Avoid sparks or flames near the battery area. Do no smoke to prevent explosion hazards.

◊ Prior to any service, check for fuel or current leaks. Remove these leaks before going on with the work.

◊ Do not charge batteries in confined spaces. Ensure that ventilation is appropriate to prevent accidental explosion hazard due to build–up of gases releaved during charging.

◊ Always disconnect the batteries before performing any type of service on the electrical system.

HYDRAULIC SYSTEMS

◊ Some fluid slowly coming out from a very small port can be almost invisible and be strong enough to penetrate the skin. For this reason, NEVER USE YOUR HANDS TO CHECK FOR LEAKS, but use a piece of cardboard or a piece of wood to this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention, serious infections or dermatosis may result.

◊ Always take system pressure readings using the appropriate gauges.

WHEELS AND TYRES

◊ Check that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check possible damages to the rims and tyres.

◊ Keep off and stay at the tyre side when correcting the inflation pressure.

◊ Check the pressure only when the tractor is unloaded and tyres are cold to avoid wrong readings due to over–pressure. Do not reuse parts of recovered wheels as improper welding, brazing or heating may weaken the wheel and make it fail.

◊ Never cut, nor weld a rim with the inflated tyre 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 regulations in force.

◊ Deflate the tyre before removing any object caught into the tyre tread.

◊ Never inflate tyres 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.

◊ Handle all parts with great care. Do not place your hands or fingers between two parts. Wear approved protective clothing such as safety goggles, gloves and footwear.

◊ Do not twine chains or metal cables. Always wear protection gloves to handle cables or chains.

CAPACITIES AND PRODUCTS

SYSTEM TO BE FILLED	QUANTITY dm^3 (liters)	NEW HOLLAND RECOMMENDED PRODUCT	NEW HOLLAND SPECIFICATIONS	INTERNATIONAL SPECIFICATIONS
Cooling System: – Cab–less: 100 Cv & 115 Cv ..... 135 Cv & 160 Cv ..... – with Cabin: 100 Cv & 115 Cv ..... 135 Cv & 160 Cv	 25 26 26 27	50/50 water and **AMBRA AGRI-FLU** fluid	NH 900 A	–
Wind–shield wiper Reservoir ..	2	Water and **AREXONS DP1** fluid	–	–
Fuel tank, all models: – main ..... – main + auxiliary	 220 325	Decanted and filtered diesel oil.	–	–
Engine Sump: – w/o filter: all models .. – w/ filter: all models ...	 – 19	**AMBRA SUPER GOLD 15W–40 or 10W–30**	NH 330G (SAE 15W–40) NH 324G (SAE 10W–30)	API CF–4/SG CCMC D4 MIL–L–2104E
Brake Circuit	0,4	**AMBRA BRAKE LHM**	NH 610 A	–
Front Axle: Axle Housing: 100 Cv & 115 Cv ..... 135 Cv & 160 Cv ..... Reduction Units (each): 100 Cv & 115 Cv ..... 135 Cv & 160 Cv ..... Rear Transmission (bevel gear pair, reduction units & brakes), gearbox, hydraulic lift, PTO and hydrostatic steering: • Mechanical Gearbox and Open Centre Lift:100 Cv, 115 Cv & 135 Cv ..... • Power Shuttle Trans. and Open Centre Lift100 Cv, 115 Cv & 135 Cv ..... • Power Shuttle Trans. and Closed Centre Lift100 Cv, 115 Cv & 135 Cv ..... • Power Shift Trans. and Open Centre Lift100 Cv, 115 Cv & 135 Cv ..... • Power Shift Trans. and Closed Centre Lift: – 100 Cv, 115 Cv & 135 Cv – 160 Cv	 9 14 1,7 2,15 65 63 73 80 90 100	**AMBRA MULTI G**	NH 410 B	API GL4 ISO 32/46 SAE 10W–30
Front Wheel Hubs	–	**AMBRA GR 75 MD**	NH 720 A	NLGI 2
Pressure Grease Nipples ..	–			

SECTION 10 – ENGINE

Chapter 1 – Engine

CONTENTS

GROUP 10 – GENERAL FEATURES AND SPECIFICATIONS

Model by horsepower (T=Turbocharged)		100	115	135 (T)	160 (T)
No of Cylinders		6	6	6	6
Bore	ins	4.4	4.4	4.4	4.4
	(mm)	111.8	111.8	111.8	111.8
Stroke	ins	5.0	5.0	5.0	5.0
	(mm)	127.0	127.0	127.0	127.0
Displacement	cu in	456	456	456	456
	(cu cm)	7472	7472	7472	7472
Compression Ratio		17:5–1	17:5–1	17:5–1	17:5–1
Cylinder Bore Compression at cranking speed of 200 R.P.M	lbs in^2	375	375	375	375
	bar	25.5	25.5	25.5	25.5
Firing Order		153624	153624	153624	153624
Idle Speed R.P.M		700 800	700 800	700 800	700 800
Maximum no Load Speed R.P.M		2370–2420	2370–2420	2370–2420	2480 2530
Rated Engine Speed		2200	2200	2200	2300

CYLINDER BLOCK

Taper of Cylinder Bore — 0.025mm (0.001 in) Repair Limit
0.127mm (0.005 in) Wear Limit

Cylinder Bore out of Round — 0.030mm (0.0015 in) Repair Limit
0.127mm (0.0050 in) Wear Limit

Cylinder Bore Diameters — 111.778–111.841mm (4.4007–4.4032 in)

Rear Oil Seal Bore Diameter — 140.77–140.87mm (5.542–5.546 in)

Block to Head Surface Flatness — 0.08mm (0.003 in) in any 152mm (6 in)
0.03mm (0.001 in) in any 25.40mm (1 in)

CYLINDER HEAD

Valve Guide Bore Diameter — 9.469–9.495mm (0.3728–0.3738 in)

Head to Block Surface Flatness — 0.03mm (0.001 in) in any 25.40mm (1 in),
or 0.127mm (0.005 in) overall limit

EXHAUST VALVES

Face Angle	44°15'–44°30' Relative to the Head of Valve
Stem Diameter	Std : 9.401–9.421mm (0.3701–0.3709 in) 0.076mm (0.003 in) Oversize : 9.477–9.497mm (0.3731–0.3739 in) 0.38mm (0.015 in) Oversize : 9.781–9.802mm (0.3851–0.3859 in) 0.76mm (0.030 in) Oversize : 10.163–10.183mm (0.4001–0.4009 in)
Head Diameter	42.88–43.13mm (1.688–1.698 in)
Stem to Guide Clearance	0.048–0.094mm (0.0019–0.0037 in)
Lash Clearance (Cold)	0.43–0.53mm (0.017–0.021 in)

INTAKE VALVES

Face Angle	29°15'–29°30' Relative to Head of Valve
Stem Diameter	Std : 9.426–9.446mm (0.3711–0.3719 in) 0.076mm (0.003 in) Oversize : 9.502–9.522mm (0.3741–0.3749 in) 0.381mm (0.015 in) Oversize : 9.807–9.827mm (0.3861–0.3869 in) 0.762mm (0.030 in) Oversize : 10.188–10.208mm (0.4011–0.4019 in)
Head Diameter	47.37–47.63mm (1.865–1.875 in)
Stem to Guide Clearance	0.023–0.069mm (0.0009–0.0027 in)
Lash Clearance (Cold)	0.36–0.46mm (0.014–0.018 in)

VALVE SPRINGS

Number per Valve	1
Free Length Length, loaded at 27.7–31.3kg (61–69 lb) Length, loaded at 61–69kg (135–153 lb)	60.70mm (2.390 in) 48.26mm (1.900 in) 35.69mm (1.405 in)

VALVE TIMING

Intake Opening	12° Before Top Dead Centre
Intake Closing	38° After Bottom Dead Centre
Exhaust Opening	48° Before Bottom Dead Centre
Exhaust Closing	12° After Top Dead Centre

VALVE INSERTS

Insert Oversize	Exhaust Valve Insert Counterbore Diameter in Cylinder Head	Intake Valve Seat Insert Counterbore Diameter in Cylinder Head
0.254mm (0.010 in)	44.17–44.20mm (1.739–1.740 in)	50.01–50.04mm (1.969–1.970 in)
0.508mm (0.020 in)	44.42–44.45mm (1.749–1.750 in)	50.27–50.29mm (1.979–1.980 in)
0.762mm (0.030 in)	44.68–44.70mm (1.759–1.760 in)	50.52–50.55mm (1.989–1.990 in)

VALVE SEATS

Exhaust Valve Seat Angle	45°00' – 45°30'
Intake Valve Seat Angle	30°00' – 30°30'
Interference Valve Face Angle to Valve Seat Angle	0°30' – 1°15'
Concentricity With Guide Diameter	0.051mm (0.002 in) Total Indicator Reading Max
Seat Width Exhaust Valve Intake Valve	1.8–2.3mm (0.072–0.092 in) 1.9–2.5mm (0.078–0.098 in)

CAMSHAFT IDLER GEAR

Number of teeth	47
End Play	0.076–0.35mm (0.003–0.014 in)
Bushing Inside Diameter	50.813–50.838mm (2.005–2.0015 in)
Adaptor Outside Diameter	50.762–50.775mm (1.9985–1.9990 in)
Backlash with Crankshaft Gear	0.10–0.36mm (0.004–0.014 in)
Backlash with Camshaft Gear	0.20–0.56mm (0.008–0. 022 in)
Backlash with Fuel Injection Pump	0.004–0.006 in (0.10–0.15mm)

CAMSHAFT GEAR

Number of Teeth	52
Timing Gear Backlash	0.001–0.015 in (0.025–0.38mm)

ROCKER ARM SHAFT

Shaft Diameter	1.000–1.001 in (25.40–25.43mm)
Shaft Support Internal Diameter	1.002–1.004 in (25.45–25.20mm)

ROCKER ARM

Inside Diameter	1.003–1.004 in (25.48–25.50mm)

TAPPETS

Clearance to Bore	0.0006–0.0021 in (0.015–0.053mm)

Tappet Diameter	25.118–25.130mm (0.9889–0.9894 in)
Tappet Bore Diameter	25.15–25.17mm (0.9900–0.9910 in)
CAMSHAFT	
Bearing Journal Diameter	60.693–60.719mm (2.3895–2.3905 in)
Bearing Clearance	0.025–0.076mm (0.0010–0.0030 in)
End Play	0.051–0.18mm (0.0020–0.0070 in)
CONNECTING RODS	
Small End Bushing (Internal Diameter) Normally Aspirated Turbocharged	 38.113–38.120mm (1.5005–1.5008 in) 41.288–41.259mm (1.6255–1.6258 in)
Clearance Bushing to Piston Pin	0.013–0.025mm (0.0005–0.0010 in)
Side Float	0.13–0.33mm (0.0050–0.0130 in)
Maximum Twist	0.30mm (0.0120 in)
Maximum Bend	0.10mm (0.0040 in)
PISTON PIN	
Outside Diameter Normally Aspirated Engine Turbocharged Engine	 38.095–38.100mm (1.4998–1.5000 in) 41.270–41.275mm (1.6248–1.6250 in)
PISTONS	
Skirt to Cylinder Clearance Naturally Aspirated	0.140–0.171mm (0.0055–0.0067 in) New or unrun engine 0.140–0.28mm (0.0055–0.011 in.) For run engines
Skirt to Cylinder Clearance Turbocharged	0.166–0.196mm (0.0065–0.0077 in) New or unrun engine 0.166–0.28mm (0.0065–0.011 in.) For run engines
Grading Diameter (at Right Angles to Piston Pin)	111.64–111.74mm (4.3951–4.3991 in) in increments of 0.0127mm (0.0005 in)
Piston Pin Clearance	0.0030–0.0140mm (0.00012–0.00055 in) at 21°C (70°F)
Piston Crown to Block Face, Naturally Aspirated Turbocharged	 0.28–0.58mm (0.011–0.023 in) 0.0–0.3mm (0.0–0.012 in)
PISTON RINGS	
Compression, Number and Location	 2 off,1st and 2nd from the top of the piston
Naturally Aspirated, Top Compression Ring 2nd Compression Ring	 Parallel Sides–Barrelled face Lower side internal chamfer – tapered face
Turbocharged, Top Compression Ring 2nd Compression Ring	 Keystone Tapered sides – Barrelled face Lower side internal chamfer – tapered face
Oil Control, Number and Location Type	 1 off,–Directly above the Piston Pin, Slotted With Expander

Side Face Clearance To Ring Groove,	
Top Compression Ring	0.103–0.153mm (0.0041–0.0060in)
2nd Compression Ring – Turbocharged	0.075–.125mm (0.0030–0.0049in)
– N.A.	0.055–0.105mm (0.0022–0.0042in)
Oil Control Ring	0.040–0.090mm (0.0016–0.0035in)
Gap Width,	
Top Compression Ring – Turbocharged	0.40–0.90mm (0.016–0.036in)
– N.A.	0.38–0.84mm (0.015–0.033in)
2nd Compression Ring	0.40–0.90mm (0.016–0.036in)
Oil Control Ring	0.40–0.90mm (0.016–0.036in)

CRANKSHAFT

Main Journal Diameter–Blue	85.631–85.644mm (3.3713–3.3718 in)
–Red	85.644–85.656mm (3.3718–3.3723 in)
Main Journal Length (except thrust, rear, or intermediate)	36.96–37.21mm (1.455–1.465 in)
Main Journal Wear Limits	0.127mm (0.005 in) Maximum
Main and Crankpin Fillet Radius	3.048–3.556mm (0.12–0.14 in)
Thrust Bearing Journal Length	37.06–37.11mm (1.459–1.461 in)
Intermediate Bearing Journal Length	36.96–37.21mm (1.455–1.465 in)
Rear Bearing Journal Length	37.97–38.48mm (1.495–1.515 in)
Crankpin Journal Length	42.62–42.72mm (1.678–1.682 in)
Crankpin Diameter – Blue	69.840–69.850mm (2.749–2.7500 in)
– Red	69.850–69.860mm (2.750–2.7504 in)
End Play	0.10–0.20mm (0.004–0.008 in)
Crankpin Out of Round	0.005mm (0.0002 in) Total Indicator Reading
Taper Surface Parallel to Centre Line of Main Journal	0.005mm (0.0002 in)
Crankshaft Rear Oil Seal Journal Diameter	122.12–122.28mm (4.808–4.814 in)
Crankshaft Pulley Journal Diameter	44.45–44.48mm (1.750–1.751 in)
Crankshaft Timing Gear Journal Diameter	46.23–46.25mm (1.820–1.821 in)
Crankshaft Flange Runout	0.038mm (0.0015 in) Max

CRANKSHAFT DRIVE GEAR

Number of teeth	26

MAIN BEARING

Liner length (except thrust liner)	27.94–28.19mm (1.10–1.11 in)
Liner Length (Thrust Liner)	39.91–39.96mm (1.453–1.455 in)
Vertical Assembled Bearing Clearance	0.055–0.117mm (0.0021–0.0046 in)

CRANKPIN BEARINGS

Liner Length	35.56–35.81mm (1.40–1.41 in)
Vertical Assembled Bearing Clearance	0.035–0.094mm (0.0014–0.0037 in)

CRANKSHAFT RE–GRINDING

When re–grinding a crankshaft the main and crankpin journal diameters should be reduced the same amount as the undersize bearings used, and the following dimensions apply. The rear end of the crankshaft should be located on the 60° Chamfer of the pilot bearing bore.

UNDERSIZE BEARING AVAILABLE	MAIN JOURNAL DIAMETERS
0.051mm (0.002 in)	85.580–85.593mm (3.3693–3.3698 in)
0.254mm (0.010 in)	85.390–85.402mm (3.3618–3.3623 in)
0.508mm (0.020 in)	85.136–85.148mm (3.3518–3.3523 in)
0.762mm (0.030 in)	84.882–84.894mm (3.3418–3.3423 in)
1.016mm (0.040 in)	84.628–84.640mm (3.3318–3.3323 in)

UNDERSIZE BEARING AVAILABLE	CRANKPIN JOURNAL DIAMETERS
0.051mm (0.002 in)	69.789–69.799mm (2.7476–2.7480 in)
0.254mm (0.010 in)	69.956–69.606mm (2.7400–2.7404 in)
0.508mm (0.020 in)	69.342–69.352mm (2.7300–2.7304 in)
0.762mm (0.030 in)	69.088–69.098mm (2.7200–2.7204 in)
1.016mm (0.040 in)	68.834–68.844mm (2.7100–2.7104 in)

FLYWHEEL

Runout of Clutch Face (Between Outer Edge of Friction Surface and Mounting Bolt Holes),	0.127mm (0.005 in)
Ring Gear Runout	0.63mm (0.025 in)

OIL PUMP

Rotor Clearance	0.025–0.15mm (0.001–0.006 in)
Rotor to Pump Housing Clearance	0.15–0.28mm (0.006–0.011 in)
Rotor End Play	0.025–0.089mm (0.001–0.0035 in)
Pump Gear to Camshaft Gear Backlash	0.40–0.56mm (0.016–0.022 in)

OIL PRESSURE

Minimum At Engine Idle Speed	1.24 bar (18 lbf/in^2) at normal operating temperature
Minimum At Engine Rated Speed	2.76 bar (40 lbf/in^2) at normal operating temperature

OIL FILTER SUPPORT

Relief Valve, Operating Pressure	3.8–4.1 bars (55–60 lbf/in^2)
Flow Rate	68.1–75.7 l/min. (15–16.6 imp gals/min,18–20 US gals/min)

Temperature	Oil Viscosity and Type	API Classification	Engine Oil & Filter Change Period (hours)
Below –12°C (10°F)	SAE 5W or SAE 5W–30 or SAE 10W–30	CD/SF CD/SF CF–4/SG	150 150 150
–12°C to 4° C (10°F to 40°F)	SAE 10W SAE 10W–30	CD/SF CF–4/SG	200 300
0°C to 32°C (32°F to 90°F)	SAE 20W SAE 15W–40	CD/SF CF–4/SG	200 300
Above 24°C (75°F)	SAE 30W or SAE 15W–40	CF–4/SG	200 300

NOTE: *When using diesel fuel with a sulphur content below 1.0%, Series 3 diesel engine oil with an A.P.I. classification of CD may be used instead of CF–4 oil , but the oil and filter interval must be reduced to 150 hours .*

When using diesel fuel with a sulphur content between 1% and 1.3% use only oils listed above but reduce the oil and filter change period to every 50 hours .

ENGINE OIL CAPACITIES (Less Oil Filter)

Model	Imp Pints	U.S Qts	Litres
6 CYL	31.6	19.0	18.0

ENGINE OIL CAPACITIES (With Oil Filter)

Model	Imp. Pints	U.S Qts	Litres
6 CYL	33.4	20.0	19.0

THERMOSTAT

Opening Temperature	79–83°C (174–181°F)
Fully Open	93–96°C (199–205°F)

RADIATOR CAP

Opening Pressure	1.0 bar (14.5 lbs in^2)

WATER PUMP

Type	Centrifugal
Drive	Poly V Belt, 8 rib

FAN BELT

Belt Tension	Maintained by Automatic Tensioner

COOLING SYSTEM CAPACITIES

Model	Imp Pts	U.S. Qts	Litres
100 PS with cab	45.7	27.5	26.0
100 PS less cab	44.0	26.5	25.0
115 PS with cab	45.7	27.5	26.0
115 PS less cab	44.0	26.5	25.0
135 PS with cab	47.5	28.5	27.0
135 PS less cab	45.7	27.5	26.0
160 PS with cab	47.5	28.5	27.0
160 PS less cab	45.7	27.5	26.0

COOLING FLUID

Content Mixture – Water 50%, New Holland Antifreeze 50%.
(New Holland Antifreeze specification: NH900A)

NOTE: *A replaceable coolant filter/conditioner is installed on the tractor and contains a conditioner in the form of a paste. No additional inhibitor is required.*

FUEL SYSTEM MAIN DATA

Turbocharger type:	Garrett T35
Fuel Supply Pump:	Electric pump – 12Volt / 5 lbf/in2
Fuel Injection Pump	Distributor type, integral speed governor and advance device
BOSCH pump	
100 PS model	VE6/12F1100R579–1, Type No: 0 460 426 238
115 PS model	VE6/12F1100R579, Type No: 0 460 426 233
135 PS model	VE6/12F1100R584–1, Type No: 0 460 426 237
160 PS model	VE6/12F1100R584, Type No: 0 460 426 235
Pump rotation	Clockwise
Firing order	1–5–3–6–2–4
Injection pump timing	6° BTDC 100PS, 115PS, 135PS models 6.5° BTDC 160PS model
Pulley timing mark to pointer check (using piston number 2 depth, from block face)	
MODELS	PISTON No.2 DEPTH
100–115PS (6°)	106.81mm
135PS (6°)	107.37mm
160PS (6.5°)	108.56mm
Injectors:	
Type	BOSCH Multi Hole
Quantity, nozzle holes	5
Diameter, nozzle holes	0.254mm 100PS, 135PS, 160PS models 0.260mm 115PS model
Pressure Setting (all)	Initial setting 270–278 bar (3915 lbf/in2) Reset if less than 240 bar (3480 lbf/in2)
Injector service interval	1800 hours

TEST PLAN – 100hp 7.5 litre (456 cu in.)

BOSCH VE DISTRIBUTOR TYPE FUEL INJECTION PUMP WITH ELECTRICAL FUEL SHUT–OFF (12mm diameter plunger , 3.2mm lift)

PUMP NH NUMBER: 87840634 TYPE NUMBER: 0 460 426 238 SHEET 1 of 1

Test No.	Test Description	Pump rpm	Strokes	Overcheck
1	Return fuel	1100	–	50.0 ± 15.0 l/hr
2	Timing piston travel	900 800 600	– – –	1.8 ± 0.7mm 1.2 ± 0.7mm 0.4 ± 0.7mm
3	Start fuel	100	1000	85.0 cc min.
4	Full load fuel a) Rated speed b) Set point c) Peak torque d) Port to port variation	 1100 1050 800 –	 1000 1000 1000 1000	 59.5 ± 3.5 cc 62.0 ±3.0 cc 67.5 ± 3.5 cc 6.0 cc max.
5	Hydraulic torque control	600	1000	61.5 ±3.0 cc
6	Governor breakaway	1180	1000	50.0 ± 8.0 cc
7	Low idle fuel	375	1000	15.0 ± 5.0 cc
8	Fuel shutoff solenoid	375	1000	1.5 ± 1.5 cc
9	Static timing lock plunger lift on port "B"	–	–	1.00 ± 0.06mm
10	Test stand equipment a) Bosch nozzle 1 688 901 110 at 250–253 bar nozzle opening pressure b) High pressure pipes – 840mm long with 2.0mm diameter and 6.00mm O.D. c) Fuel gallery inlet pressure 0.3–0.4 bar d) Calibrating fluid – ISO 4113 at 44° – 46°C outlet temperature			

TEST PLAN – 115hp 7.5 litre (456 cu in.)

BOSCH VE DISTRIBUTOR TYPE FUEL INJECTION PUMP WITH ELECTRICAL FUEL SHUT–OFF (12mm diameter plunger , 3.2mm lift)

PUMP NH NUMBER: 87840635 TYPE NUMBER: 0 460 426 233 SHEET 1 of 1

Test No.	Test Description	Pump rpm	Strokes	Overcheck
1	Return fuel	1100	–	50.0 ± 15.0 l/hr
2	Timing piston travel	750 600 500	– – –	2.3 ± 0.7mm 1.6 ± 0.7mm 1.2 ± 0.7mm
3	Start fuel	100	1000	45.0 cc min.
4	Full load fuel a) Rated speed b) Peak torque c) Port to port variation	 1100 800 –	 1000 1000 1000	 65.0 ± 3.5 cc 69.0 ± 3.5 cc 6.0 cc max.
5	Hydraulic torque control	600	1000	66.5 ±3.0 cc
6	Governor breakaway	1180	1000	55.0 ± 8.0 cc
7	Low idle fuel	375	1000	15.0 ± 5.0 cc
8	Fuel shutoff solenoid	375	1000	1.5 ± 1.5 cc
9	Static timing lock plunger lift on port "B"	–	–	1.00 ± 0.06mm
10	Test stand equipment a) Bosch nozzle 1 688 901 110 at 250–253 bar nozzle opening pressure b) High pressure pipes – 840mm long with 2.0mm diameter and 6.00mm O.D. c) Fuel gallery inlet pressure 0.3–0.4 bar d) Calibrating fluid – ISO 4113 at 44° – 46°C outlet temperature			

TEST PLAN – 135hp 7.5 litre (456 cu in.)

BOSCH VE DISTRIBUTOR TYPE FUEL INJECTION PUMP WITH ELECTRICAL FUEL SHUT–OFF (12mm diameter plunger , 3.2mm lift)

PUMP NH NUMBER: 87840636 TYPE NUMBER: 0 460 426 237 SHEET 1 of 1

Test No.	Test Description	Pump rpm	Strokes	Overcheck
1	Return fuel	1100	–	50.0 ± 15.0 l/hr
2	Timing piston travel	1100 700 600	– – –	2.4 ± 0.7mm 1.4 ± 0.7mm 0.8 ± 0.7mm
3	Start fuel	100	1000	100.0 cc min.
4	Full load fuel a) Rated speed b) Peak torque c) Port to port variation	 1100 800 –	 1000 1000 1000	 76.5 ± 3.5 cc 85.5 ± 3.5 cc 6.0 cc max.
5	Boost control	650	1000	91.5 ± 4.0 cc @ 600 mbar
6	Unboosted fuel	500	1000	81.0 ±4.0 cc @ 0 mbar
7	Governor breakaway	1180	1000	48.5 ± 8.0 cc
8	Low idle fuel	375	1000	12.0 ± 5.0 cc
9	Fuel shutoff solenoid	375	1000	1.5 ± 1.5 cc
10	Static timing lock plunger lift on port "B"	–	–	1.00 ± 0.06mm
11	Test stand equipment a) Bosch nozzle 1 688 901 110 at 250–253 bar nozzle opening pressure b) High pressure pipes – 840mm long with 2.0mm diameter and 6.00mm O.D. c) Fuel gallery inlet pressure 0.3–0.4 bar d) Calibrating fluid – ISO 4113 at 44° – 46°C outlet temperature			

TEST PLAN – 160hp 7.5 litre (456 cu in.)

BOSCH VE DISTRIBUTOR TYPE FUEL INJECTION PUMP WITH ELECTRICAL FUEL SHUT–OFF (12mm diameter plunger , 3.2mm lift)

PUMP NH NUMBER: 87840637 TYPE NUMBER: 0 460 426 235 SHEET 1 of 1

Test No.	Test Description	Pump rpm	Strokes	Overcheck
1	Return fuel	1150	–	50.0 ± 15.0 l/hr
2	Timing piston travel	1150 700 600	– – –	2.4 ± 0.7mm 1.4 ± 0.7mm 0.8 ± 0.7mm
3	Start fuel	100	1000	90.0 cc min.
4	Full load fuel a) Rated speed b) Peak torque c) Port to port variation	 1150 800 –	 1000 1000 1000	 87.5 ± 3.5 cc 100.5 ± 3.0 cc 6.0 cc max.
5	Boost control	650	1000	101.0 ± 4.0 cc @ 600 mbar
6	Unboosted fuel	500	1000	80.5 ±4.0 cc @ 0 mbar
7	Governor breakaway	1250	1000	49.0 ± 8.0 cc
8	Low idle fuel	375	1000	16.0 ± 5.0 cc
9	Fuel shutoff solenoid	375	1000	1.5 ± 1.5 cc
10	Static timing lock plunger lift on port "B"	–	–	1.00 ± 0.06mm
11	Test stand equipment a) Bosch nozzle 1 688 901 110 at 250–253 bar nozzle opening pressure b) High pressure pipes – 840mm long with 2.0mm diameter and 6.00mm O.D. c) Fuel gallery inlet pressure 0.3–0.4 bar d) Calibrating fluid – ISO 4113 at 44° – 46°C outlet temperature			

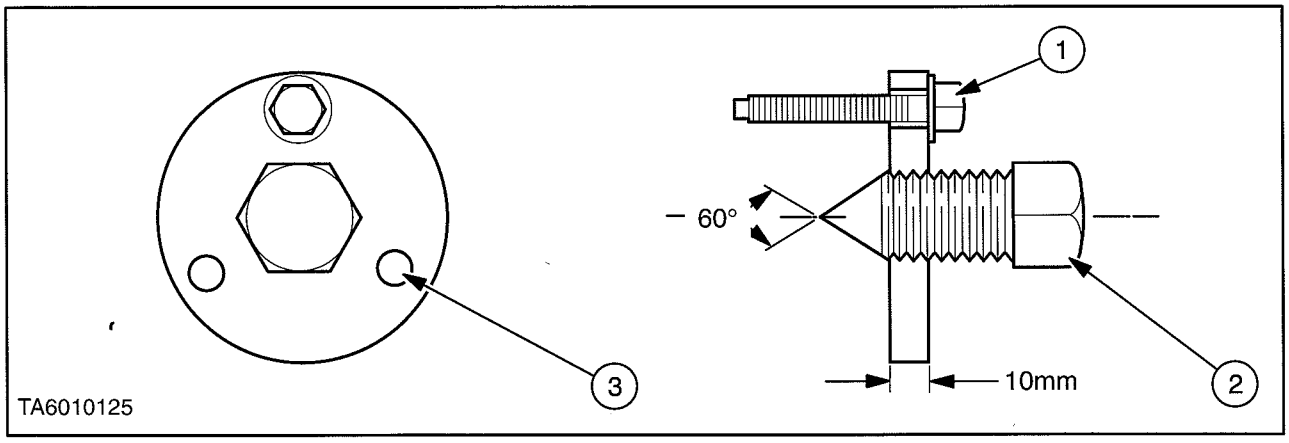
TORQUE VALUES – VARIOUS	lbf ft	Nm
Main Bearing Bolts	145	197
Connecting Rod Bolts	110	149
Cylinder Head Bolts (with Engine Cold)	160	217
Intake Manifold–to–Cylinder Head	26	35
Exhaust Manifold–to–Cylinder Head	28	38
Exhaust Pipe–to–Flange	23	31
Flywheel–to–Crankshaft	145	197
Oil Pan Drain Plug	30	41
Valve Rocker Cover Bolts	18	24
Crankshaft Pulley–to–Crankshaft	210	224
Self–Locking Screw – Valve Rocker Arm	18	24
Injector Attachment Bolts	17	23
Cover Bolts (Blanks Oil Drilling)	23	31
Oil Pump to Block	17	23
Water Pump–to–Cylinder Block	48	35
Water Pump Cover–to–Pump	20	27
Oil Pan–to–Cylinder Block (Cast)	28	38
Injector Line Nuts	18	24
Leak–off Tube Banjo Fitting Bolts	4.4	6
Injection Pump–to–Front Cover	18	24
Camshaft Idler Drive Gear–to–Block	175	237
Front Cover–to–Cylinder Block	18	24
Thermostat Housing Bolts	18	24
Camshaft Gear Bolt	51	69
Camshaft Rear Gear Plate Bolts	35	47
Oil Filter Adaptor Bolts	31	42
Oil Filter Mounting Bolt Insert	25	34
Starting Motor–to–Rear Adaptor Plate	23	31
Injection Pump–to–Gear Nut	68	92
Oil Pressure Switch Assembly	23	31
Turbocharger–to–Exhaust Manifold Nut	33	44
Fan Blade to Viscous Unit	21	27
Viscous Unit to Pulley	40	54
Crankshaft Rear Oil Seal Retainer –		
Initial Tightening	9	12
Final Tightening	17	23
Belt Tensioner Pulley Bolt	40	54
Temperature Senders	15	20
Tensioner to Water Pump Bolt	40	54
Idler Pulley Bolt	40	54
Pump Connector to Block	18	24

TORQUE VALUES

The following general nut and bolt installation torque requirements (lubricated) apply to any operation not previously listed.

INCH SERIES	lbf ft	Nm
1/4 – 20	8	11
1/4 – 28	8	11
5/16 –18	14	19
5/16 –24	17	23
3/4 – 16	23	31
3/4 – 24	33	45
7/16 –14	48	65
7/16 –20	55	75
1/2 – 13	65	88
1/2 – 20	75	102
9/16 –18	90	122
5/6 –18	138	187
CYLINDER BLOCK PLUGS		
1/4 – 27 NPT	8	11
1/4 – 18 NPT	22	29.8
3/4 – 18 NPT	28	38
3/4 – 14 NPT	20	27

SPECIAL TOOLS



Fuel Injection Pump Drive Gear Puller
(Local manufacture or Special Tool No.295042)

1. Bolt 5/16–UNF x 2 in. (51mm) with integral washer (3 bolts required)
2. Bolt 3/4x16–UNC x 2 in.(51mm)
3. Three holes 0.375in (9.5mm) dia. on 2.2in (56.87mm) dia. equally spaced material of 0.394 in. (10mm) Plate HRLC P&O Steel

(Prior Tool Numbers, where applicable, shown in brackets)

Description	New Holland Tool Number	V.L.Churchill Ltd Tool Number	Nuday Tool Number
Engine sling hook, (use with brackets 50075 and 50076)	290740	–	–
Engine revolving stand	290090	–	–
Engine overhaul brackets kit	293860	–	–
Cylinder pressure test kit	291309	–	–
Lube pressure check kit	292870	–	–
Piston ring pliers	296028	–	–
Piston install band	296042	–	–
Crankshaft rear seal installer	295010	FT.6212	–
Crankshaft front seal installer	T87T–6019A	630–16	–
Valve guide set reamers	295006	FT.6202 (SW.502)	2136 (SW.502)
Valve spring compressor	291050	–	–
Water pump impeller seal installer	295007	FT.6209	4672
Injector – hand pump tester	290284	–	–
Injector – cleaning kit	293671	–	–
Injector – splitting block	293760	–	–
Injector – Splitting socket kit	293761	–	–
Injection pump drive gear puller	295042	–	–
Adjustable bridge puller	–	518	9539
Shaft protector	–	625–A	9212
Step plate adaptors	–	630–S	9210
Bushing kit	–	818	9514
Con rod bush – remove/install tool	FNH00035 OTC 134–00002	–	–
Camshaft bearing installer	–	FT.6203	1255 (SW.506)
Handle (for camshaft bearing installer)		N6261–A	1442
Tractor splitting kit	292320	MS.2700 C	–
Engine support brackets (for use with tractor splitting kit)	–	MS.2700 C8	–

GREASE and SEALANTS

Code	Number	Name
A	NLG1 Grade 2	Grease
B	ESF–M1C43–A	Grease–Silicone Light Consistency
C	82995768	Sealer–Anaerobic Low strength
D & J	82995776	Sealer–Silicone
E & F	82995774	Sealer–Polyester Urethane
G	82995773	Sealer–Anaerobic
K	82995772	Thread and Stud Lock
L	82995771	Flexible Gasket Sealant