

# REPAIR MANUAL

**NEW HOLLAND**

**TC54**

**TC56**

**AL59**

Product: New Holland TC54, TC56, AL59 Combines Service Repair Manual  
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**WHOLLAND**



**NEW HOLLAND**

# **COMBINES TC54 - TC56 - AL59 REPAIR MANUAL**

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### INTRODUCTION

This manual is subdivided in sections marked by two-digit numbers, with independent page numbering within each section. When one section is formed by more chapters, each new chapter starts from page 1.

The paragraphs and information dealt with can be easily found out in the index, at the page of the relevant section, or in the table of contents at the beginning of the manual.

At the bottom of each page there is the manual print number and the relevant publication/up-dating date.

The pages of further up-dating shall have the same print number, followed by a two digit number (for example: 1<sup>st</sup> Up-dating 604.64.961.01; 2<sup>nd</sup> Up-dating 604.64.961.02; etc.) and the relevant publication date. These pages shall be completed by the new print of the index, duly revised.

The information in this manual is up-dated at the date of the publication. As NEW HOLLAND continuously improves its product range, some information could be not up-dated due to modifications of technical or commercial type, as well as for suiting the law regulations of the different countries.

In case of disagreement, refer to NEW HOLLAND Sales and Service networks.

### IMPORTANT INFORMATION

All repair and maintenance works listed in this manual must be carried out only by staff belonging to the NEW HOLLAND Service network, strictly complying with the instructions given.

Anyone who carries out the above operations without complying with the prescriptions shall be responsible for the subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional or local dealers, reject any responsibility for damage due to anomalous behaviour of parts and / or components not approved by the manufacturer himself, including those used for servicing and/or repair of the product manufactured or marketed by the Manufacturer. In any case, no warranty is given or attributed on the product manufacturers as for the product manufactured or marketed in case of damages due to an anomalous behaviour of parts and / or components not approved by the Manufacturer.

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## GENERAL INSTRUCTIONS

### SHIMMING

Shims must be set during each new adjustment. Measure the shims individually using a micrometer and sum the measured values. The measurement of the complete pack is not reliable.

### ROTATING SHAFT SEALS

For correct rotating shaft seal installation, proceed as follows:

- before assembly, allow the seal to soak in the oil it will be sealing for at least thirty minutes;
- thoroughly clean the shaft and check that the working surface on the shaft is not damaged;
- position the sealing lip front part facing the fluid; with hydrodynamic seals, take into consideration the shaft rotation direction and position the grooves so that they will deviate the fluid towards the inner side of the seal;
- coat the sealing lip with a thin layer of lubricant (use oil rather than grease) and fill the gap between the sealing lip and the dust lip on double lip seals with grease;
- insert the seal in its seat and press down using a flat punch, do not tap the seal with a hammer or mallet;
- whilst inserting the seal, check that it is perpendicular to the seat. Once settled, make sure the seal touches the thrust element;
- to prevent damaging the seal lip on the shaft, position a protective guard around the shaft or the axle during installation operations.

### O-RING SEALS

Lubricate the O-ring seals before inserting them in the seats; this will prevent them from overturning or twisting, which would jeopardise sealing efficiency.

### SEALING COMPOUNDS

Apply one of the following sealing compounds on the mating surfaces marked with an X: RTV SILMATE, RHODORSIL CAF 1 or LOCTITE PLASTIC GASKET.

Before applying the sealing compound, prepare the surfaces as follows:

- remove any incrustations using a metal brush;
- thoroughly de-grease the surfaces using one of the following cleaning agents: trichlorethylene or a water and soda solution.

### COTTER PINS

When fitting split cotter pins, ensure that the pin notch is positioned in the direction of the force acting on the pin.

Spiral cotter pins do not require special assembly positioning.

### PROTECTING THE ELECTRONIC/ELECTRICAL SYSTEM DURING CHARGING OR WELDING

1. Before connecting a battery charger, switch the battery off through the suitable switch. Check that the battery charger is correctly connected.
2. Never let the engine run when the generator and the battery are disconnected.
3. Disconnect the battery using the battery switch if any electric welding work is to be carried out on the combine.  
Secure the negative (-) terminal of the welding apparatus as close as possible to the part to be welded.
  - If welding in close proximity to a computer module, then the module should be removed from the combine.
  - Never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress.
4. The positive (+) lead of the batteries is live at all times. To prevent damage, first of all move apart the battery ground cable (-).
5. Ensure the batteries are connected properly, i.e. negative (-) lead to the negative (-) terminal and positive (+) lead to the positive (+) terminal.

**IMPORTANT:** if welding must be performed on the unit, either the combine or the header (if it is attached), the battery ground cable must be disconnected from the combine battery. The electronic monitoring system and charging system will be damaged if this is not done.



**CAUTION**



Batteries contain sulphuric acid. In case of contact with skin, flush the affected area with water for at least five minutes. Seek medical attention immediately. Avoid contact with the skin, eyes or clothing. Wear eye protection when working near batteries.

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## SPARE PARTS

Only use original NEW HOLLAND spare parts bearing the logo shown below.



# NEW HOLLAND

Only genuine spare parts guarantee the same quality, duration and safety as original parts, as they are the same parts that are assembled during standard production.

Only NEW HOLLAND genuine spare parts can offer this guarantee.

When ordering spare parts, always provide the following information:

- machine model (commercial name) and serial number
- part number of the ordered part, which can be found in the "Microfiches" or the "Spare Parts Catalogue", used for order processing.

## TOOLS

The tools that NEW HOLLAND suggests and illustrated in this manual have been:

- specially researched and designed for use with NEW HOLLAND machines;
- essential for reliable repair operations;

- accurately built and rigorously tested so as to offer efficient and long-lasting operation.

By using these tools, Repair Personnel will benefit from:

- operating in optimal technical conditions;
- obtaining the best result;
- saving time and effort;
- working in safe conditions.

**NOTE:** *Welding limit values indicated for certain parts should be considered to be recommended, but not binding. The terms "front", "rear", "right-hand" and "left-hand" (when referred to different parts) are determined with the operator sitting in his seat, facing in the direction of travel of the machine during operation.*

## Safety regulations

### WARNING AND DANGER SYMBOLS



*This warning symbol points out important personal safety messages. Carefully read the following safety regulations and observe advised precautions in order to avoid potential hazards and safeguard your health and safety. In this manual the symbol is accompanied by the following key-words:*



*WARNING - Warnings concerning unsuitable repair operations that may jeopardise the safety of Repair personnel.*

*DANGER - Specific warnings concerning potential hazards for operators' safety or for other persons directly or indirectly involved.*

### ACCIDENT PREVENTION

Most accidents or injuries that occur in workshops are the result of non-observance of simple and fundamental safety regulations. For this reason, **IN MOST CASES THESE ACCIDENTS CAN BE AVOIDED** by foreseeing possible causes and consequently acting with the necessary caution and care.

Accidents may occur with all types of machine, regardless of how well the machine in question was designed and built.

A careful and judicious service technician is the best guarantee against accidents.

Precise observance of the most basic safety rules is normally sufficient to avoid many serious accidents.



**DANGER**



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

### SAFETY RULES

#### General guidelines

- Carefully follow specified repair and maintenance procedures.
- Do not wear rings, wrist-watches, jewellery, unbuttoned or loose articles of clothing such as: ties, torn clothing, scarves, open jackets or shirts with open zips that may remain entangled in moving parts. It is advised to wear approved safety clothing, e.g.: non-slip footwear, gloves, safety goggles, helmets, etc.

- Do not carry out repair operations with someone sitting in the driver's seat, unless the person is a trained technician who is assisting with the operation in question.
- Do not operate the machine or use any of the implements from different positions, other than the driver's seat.
- Do not carry out operations on the machine with the engine running, unless specifically indicated.
- Stop the engine and check that the hydraulic circuits are pressure-free before removing caps, covers, valves, etc.
- All repair and maintenance operations must be carried out using extreme care and attention.
- Service steps and platforms used in the workshop or elsewhere should be built according to standard accident prevention regulations.
- Any parts to be raised must be locked in position.
- Brakes are inoperative when manually released for repair or maintenance purposes. Use wedges or similar devices to control the machine in these conditions.

- Only use specified towing points for towing the machine. Connect parts carefully. Make sure that all pins and/or locks are secured in position before applying traction. Do not stand next to bars, metal ropes or tensioned tow chains.
- When loading or unloading the machine from the trailer (or other means of transportation), select a flat area capable of sustaining the trailer or truck wheels. Firmly secure the machine to the truck or trailer and lock the wheels in the position used by the carrier.
- Electric heaters, battery-chargers and similar equipment must only be powered by auxiliary power supplies with efficient ground insulation to avoid electrical shock hazards.
- Always use suitable hoisting or lifting devices when raising or moving heavy parts.
- Take extra care if bystanders are present.
- Never use gasoline, diesel oil or other inflammable liquids as cleaning agents. Use non-inflammable, non toxic commercially available solvents.
- Wear safety goggles with side guards when cleaning parts with compressed air.
- Reduce the air pressure according to the local regulations in force.
- Do not run the combine engine in confined spaces without suitable ventilation.
- Never use naked flames for lighting when working on the machine or checking for leaks.
- All movements must be carried out carefully when working under, on or near the machine. Wear protective equipment: helmets, goggles and special footwear.
- When carrying out checks with the engine running, request the assistance of an operator in the driver's seat. The operator must maintain visual contact with the service technician at all times.
- If operating outside the workshop, position the machine on a flat surface and lock in position. If operating on hillsides is required, first of all lock the machine. If working on a slope, lock the machine in position. Move to a flat area as soon as safely possible.
- Damaged or bent chains or metal ropes are unreliable. Do not use them for lifting or towing. Always use suitable protective gloves when handling chains or cables.
- Chains should always be safely secured. Make sure that the hitch-up point is capable of sustaining the load in question. Keep the area near the hitch-up point, chains or cables free of all bystanders.
- Maintenance and repair operations must be carried out in a CLEAN and DRY area. Eliminate any water or oil spillage immediately.
- Do not create piles of oil or grease-soaked rags as they represent a serious fire hazard. Always store rags in a closed metal container. Before engaging the machine, make sure that there are no persons within the machine or implement range of action.
- Empty your pockets of all objects that may fall accidentally unobserved into the machine inner compartments.
- In the presence of protruding metal parts, use protective goggles or goggles with side guards, helmets, special footwear and gloves.
- When welding, use protective safety devices: tinted safety goggles, helmets, special overalls, gloves and footwear. All persons present in the area where welding is taking place must wear tinted goggles. **NEVER LOOK DIRECTLY AT THE WELDING ARC WITHOUT SUITABLE EYE PROTECTION.**

- Metal cables tend to fray with repeated use. Always use suitable protective devices (gloves, goggles, etc.).
- Handle all parts carefully. Do not put your hands or fingers between moving parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

#### **Start-up**

- Never run the combine engine in confined spaces that are not equipped with adequate ventilation for exhaust gas extraction.
- Never place the head, body, limbs, feet, hands or fingers near rotating and moving parts.

#### **Hydraulics**

- A liquid leaking from a tiny hole may be almost invisible but, at the same time, be powerful enough to penetrate the skin. To search for possible leaks, NEVER USE YOUR HANDS, rather a cardboard or a wooden stick. If any liquid penetrates skin tissue, call for medical aid immediately. Failure to treat this condition with correct medical procedure may result in serious infection or dermatosis.
- In order to check the pressure in the system use suitable instruments.

#### **Wheels and Tyres**

- Make sure that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check the rims and tyres for damage.

- Stand away from (at the side of) the tyre when checking inflation pressure.
- Do not use parts of recovered wheels as incorrect welding, brazing or heating may weaken and eventually cause damage to the wheel.
- Never cut or weld a rim mounted with an inflated tyre.
- To remove the wheels, lock all wheels. After having raised the machine, position supports underneath, according to regulations in force.
- Deflate the tyre before removing any objects that may be jammed in the tyre tread.
- Never inflate tyres using inflammable gasses, as this may result in explosions and injury to bystanders.

#### **Removal and Re-fitting**

- Lift and handle all heavy parts using suitable hoisting equipment. Make sure that parts are sustained by appropriate hooks and slings. Use the hoisting eyebolts for lifting operations. Extra care should be taken if persons are present near the load to be lifted.
- Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.
- Avoid twisting chains or metal cables. Always wear safety gloves when handling metal ropes or chains.

## UNITS OF MEASURE - CONVERSION CHART

## Linear

1 mm - 3/76"	=	0.03937 in	1 Inch	=	25.4 mm
1 km	=	0.6214 miles	1 Mile	=	1.6093 km
1 m	=	3.281 ft	1 Foot	=	0.3048 m

## Area

1 ha	=	2.471 acre	1 acre	=	0.4047 ha
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## Volume

1 litre	=	0.0063 barrel	1 barrel	=	158.987 litre
1 litre	=	0.028 US bushel	1 US bushel	=	35.2391 litre
1 litre	=	0.2642 US gal	1 US gal	=	3.7853 litre
1 litre	=	1.057 US quart	1 US quart	=	0.9464 litre
1 mm <sup>3</sup>	=	0.061 in <sup>3</sup>	1 in <sup>3</sup>	=	16387 mm <sup>3</sup>

## Weight

1 kg	=	2.204 pound	1 pound	=	0.4536 kg
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## Tightening torque

1 Nm	=	0.7376 lbf.ft	1 lbf ft	=	1.3558 Nm
------	---	---------------	----------	---	-----------

## Capacity

1 kW	=	1.358 hp	1 hp	=	0.746 kW
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## Pressure

1 bar	=	14.505 lbf/in <sup>2</sup> (psi)	1 lbf/in <sup>2</sup> (psi)	=	0.06894 bar
1 kPa	=	0.145 lbf/in <sup>2</sup> (psi)	1 lbf/in <sup>2</sup> (psi)	=	6.894 kPa
1 pa	=	10 <sup>-5</sup> bar	1 bar	=	100 kPa

## Temperature

1 °C	=	((1.8 x °C) + 32) °F	1 °F	=	(0.56 x (°C - 32)) °C
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## MINIMUM HARDWARE TIGHTENING TORQUES

IN NEWTON-METRES - Nm (FOOT POUNDS - LBF. FT)  
FOR NORMAL ASSEMBLY APPLICATIONS

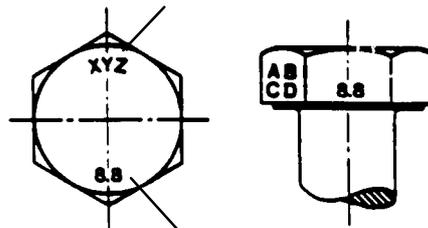
### METRIC HARDWARE AND LOCKNUTS

NOMINAL SIZE	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCKNUT CL.8 W/CL8.8 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	
M4	1.7 (15*)	2.2 (19*)	2.6 (23*)	3.4 (30*)	3.7 (33*)	4.8 (42*)	1.8 (16*)
M6	5.8 (51*)	7.6 (67*)	8.9 (79*)	12 (102*)	13 (115*)	17 (150*)	6.3 (56*)
M8	14 (124*)	18 (159*)	22 (195*)	28 (248*)	31 (274*)	40 (354*)	15 (133*)
M10	28 (21)	36 (27)	43 (32)	56 (41)	61 (45)	79 (58)	30 (22)
M12	49 (36)	63 (46)	75 (55)	97 (72)	107 (79)	138 (102)	53 (39)
M16	121 (89)	158 (117)	186 (137)	240 (177)	266 (196)	344 (254)	131 (97)
M20	237 (175)	307 (226)	375 (277)	485 (358)	519 (383)	671 (495)	265 (195)
M24	411 (303)	531 (392)	648 (478)	839 (619)	897 (662)	1160 (855)	458 (338)

NOTE: torque values shown with \* are inch pounds.

### IDENTIFICATION HEX CAP SCREW AND CARRIAGE BOLTS CLASSES 5.6 AND UP

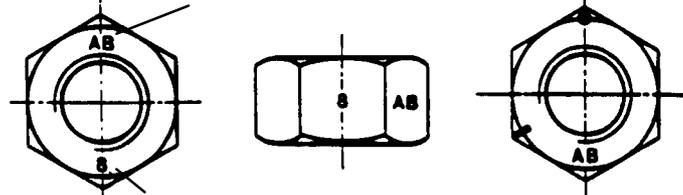
#### MANUFACTURER'S IDENTIFICATION



#### PROPERTY CLASS

### HEX NUTS AND LOCKNUTS CLASSES 05 AND UP

#### MANUFACTURER'S IDENTIFICATION



#### PROPERTY CLASS

#### CLOCK MARKING

IN NEWTON-METERS - Nm (FOOT POUNDS - LBF. FT)  
FOR NORMAL ASSEMBLY APPLICATIONS

INCH HARDWARE AND LOCKNUTS

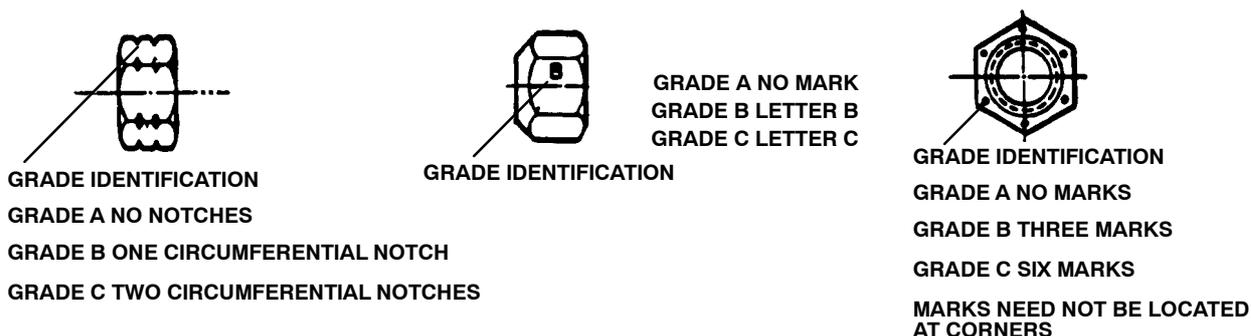
NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUTS		NOMINAL SIZE
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	GR.B w/GR5 BOLT	GR.C w/GR8 BOLT	
1/4	6.2 (55*)	8.1 (72*)	9.7 (86*)	13 (112*)	14 (121*)	18 (157*)	6.9 (61*)	9.8 (86*)	1/4
5/16	13 (115*)	17 (149*)	20 (178*)	26 (229*)	28 (250*)	37 (324*)	14 (125*)	20 (176*)	5/16
3/8	23 (17)	30 (22)	35 (26)	46 (34)	50 (37)	65 (48)	26 (19)	35 (26)	3/8
7/16	37 (27)	47 (35)	57 (42)	73 (54)	80 (59)	104 (77)	41 (30)	57 (42)	7/16
1/2	57 (42)	73 (54)	87 (64)	113 (83)	123 (91)	159 (117)	61 (45)	88 (64)	1/2
9/16	81 (60)	104 (77)	125 (92)	163 (120)	176 (130)	229 (169)	88 (65)	125 (92)	9/16
5/8	112 (83)	145 (107)	174 (128)	224 (165)	244 (180)	316 (233)	122 (90)	172 (127)	5/8
3/4	198 (146)	256 (189)	306 (226)	397 (293)	432 (319)	560 (413)	217 (160)	306 (226)	3/4
7/8	193 (142)	248 (183)	495 (365)	641 (473)	698 (515)	904 (667)	350 (258)	494 (364)	7/8
1	289 ((213)	373 (275)	742 (547)	960 ( 708)	1048 (773)	1356 (1000)	523 (386)	739 (545)	1

NOTE: torque values shown with \* are inch pounds.

IDENTIFICATION  
CAP SCREWS AND CARRIAGE BOLTS



LOCKNUTS



## EXPLANATION OF MACHINE SERIAL NUMBERS

Example : n° 809262001

**80**9262001: The first two digits identify the model within a product line:

TC54 = 79

TC56 = 80

AL59 = 84

80**9**262001: The third digit indicates the product line.

809**262**001: These 3 digits indicate the batch in which the machine was made.

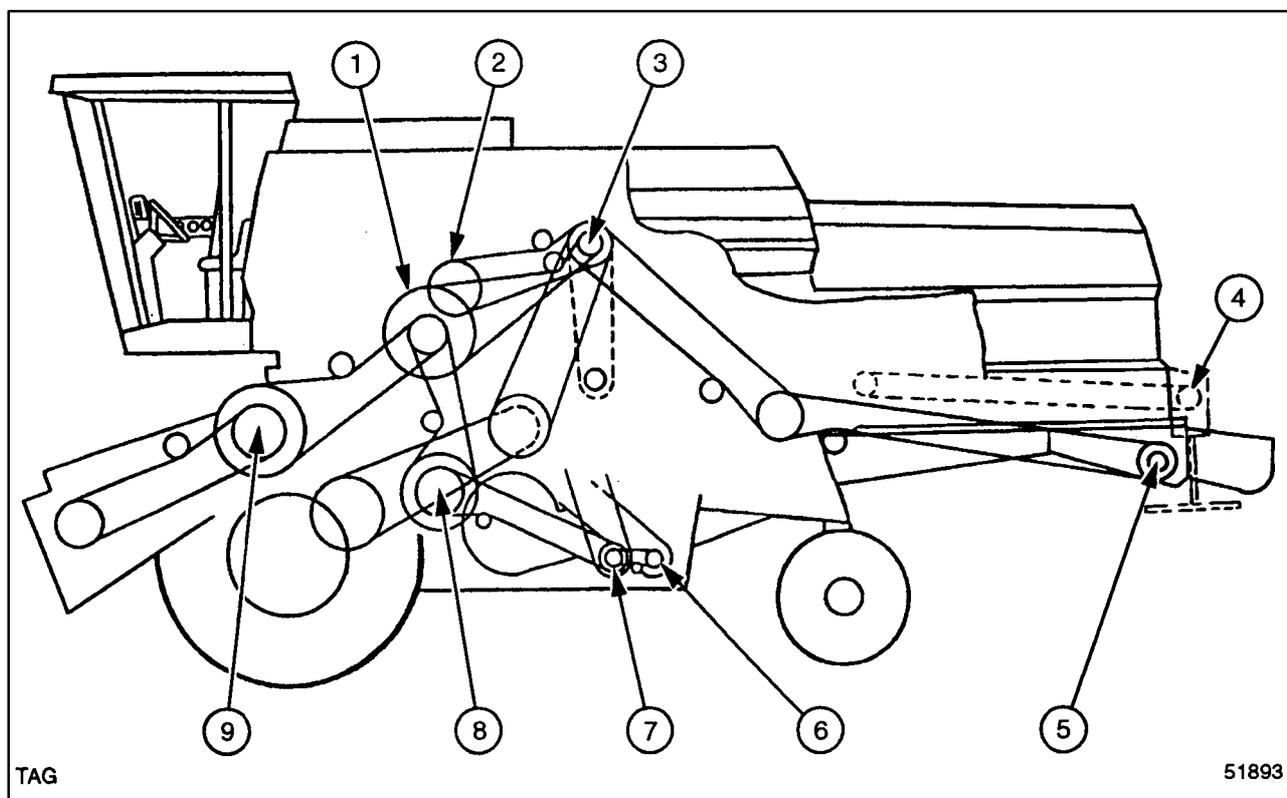
80**9262**001: Product line number (1) and batch together form the series number (9262).

809262**001**: The last 3 digits are a sequential number for each model within a batch.

Summarizing we can say that this machine is the first TC56 of serie 9262.

**SPEED** (*high idle*)

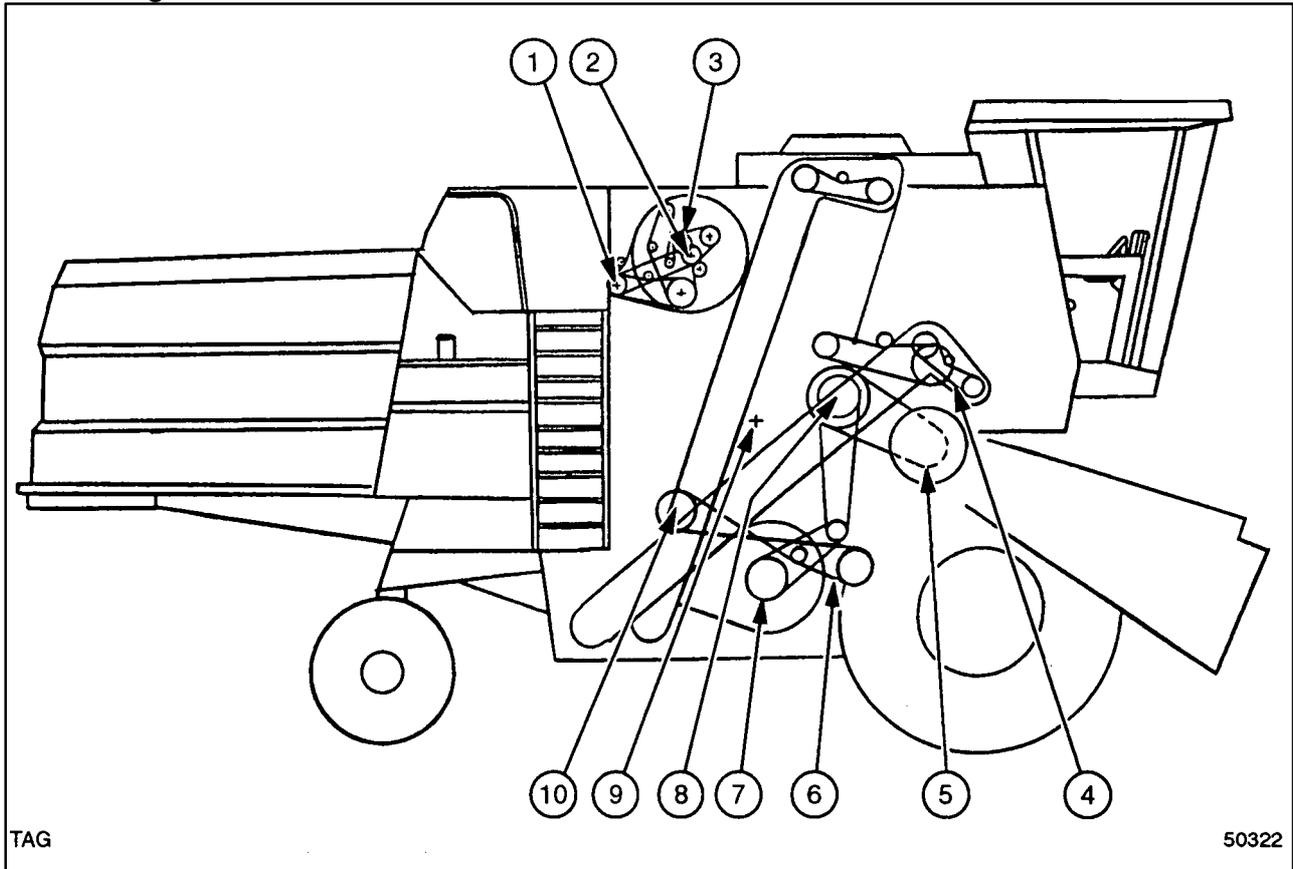
**Combine left side**



1

		<b>Rpm</b>
1	Beater	875
2	Lower auger layshaft	1759
3	Motor + hydraulic pump	2100
4	Straw spreader	275
5	Straw chopper	2465 or 3500
6	Returns elevator	368
7	Grain elevator	368
8	Eccentric shaft	320
9	Straw elevator	376

Combine right side



TAG

50322

		Rpm
1	Engine layshaft	2600 - 2636 <sup>(1)</sup>
2	Engine cooling fan	Refer to your TC Operator's manual
3	Alternator	-
4	Grain tank bottom auger	575
5	Drum variator	430 - 1070
6	Eccentric shaft	320
7	Fan variator	350-1000
8	Beater	875
9	Rotary separator	400-760
10	Walkers	220

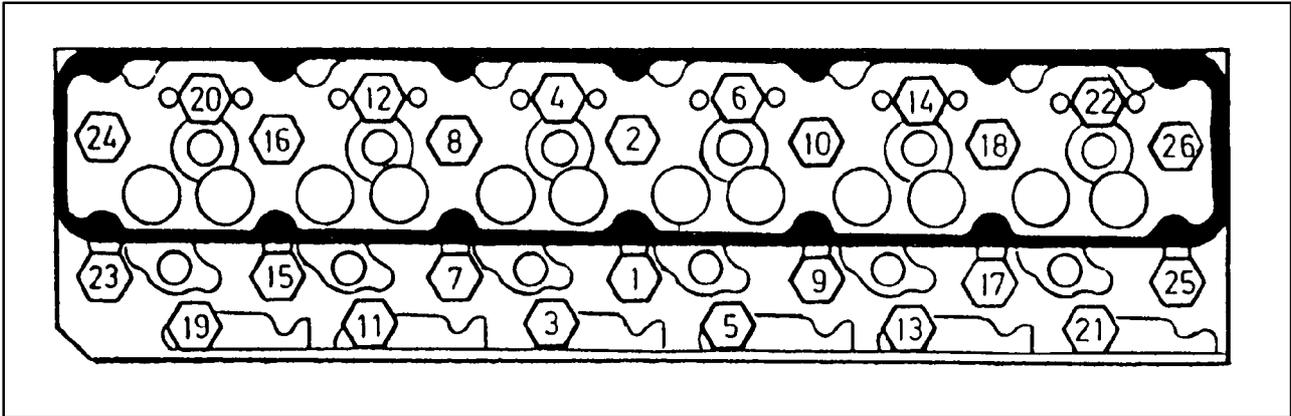
(1) Only machines with 5 straw walkers and hydrostatic transmission

**SECTION 10 - ENGINE****Chapter 1**

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## IMPORTANT INFORMATION

### Cylinder head screws (fig. 1)



1

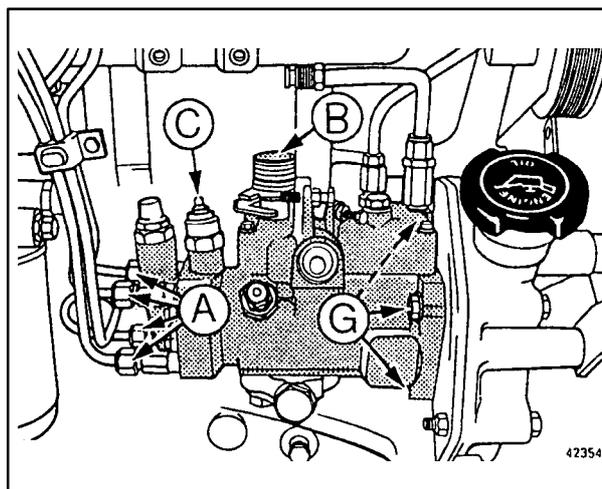
When the cylinder head must be refitted after a repair, the greased screws must be tightening according to the below table (fig. 1) at the intervals of 156-190-210 Nm. During standard service, no further tightening is required.

### Valve clearance

Engine cold:	
intake:	0.36 - 0.46 mm
exhaust:	0.43 - 0.53 mm
Ignition sequence:	
6-cylinder engine:	1-5-3-6-2-4

**Injectors:**

1. Opening pressure:  
300 bar in starting position
2. Sealing: send a pressure by about 158 bar on the injector and measure the time interval for the pressure decrease from 152 to 103 bar. The max. time interval should be 5 seconds.
3. Nozzle opening pressure  
Inflate the injector tester and check the pressure where the needle valve lifts and the fuel is sprayed by the nozzle.
4. Spray type  
Pump the tester quickly and check the spray coming out from the five holes. The distance between two sprays should be the same. The spray must be well spread and generate a 80-mm dia. cup at 10 mm from the injector.
5. Nozzle support loss  
Wipe the nozzle tip dry and apply a pressure 10 bar below the opening pressure. Keep this pressure for 6 seconds, then wipe the nozzle tip with a piece of blotting paper. The combustible oil stain diameter should not exceed 13 mm.
6. Installation  
New cork dust washers and copper seal washers. Fasten each injector with the two fastening screws and tighten at the torque of 20-24 Nm. Tighten the drain pipe at the torque of 7-14 Nm. Tighten the high-pressure fuel lines at the torque of 22-27 Nm.



2

**Thermostat**

Number: 2

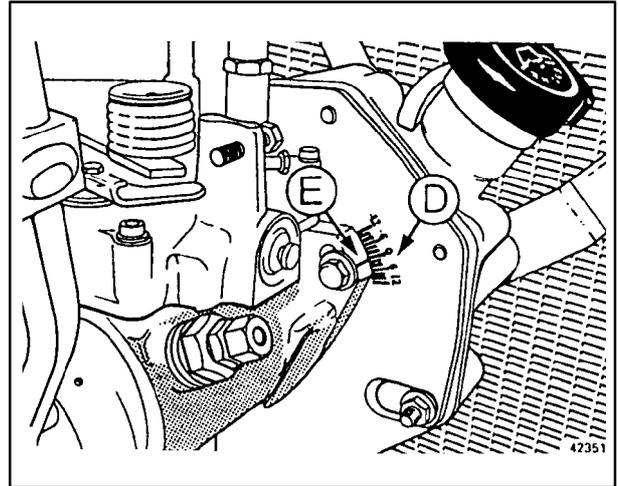
Opening temperature: 79 - 83°C

Fully open: 93 - 96°C

**Injection Pump****Removal**

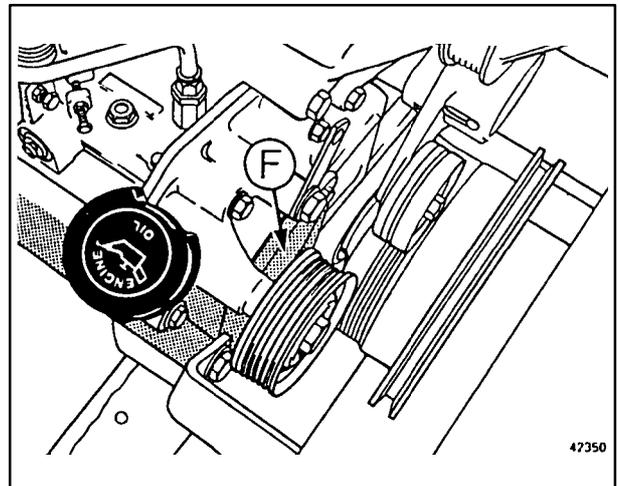
1. Remove dirt from the injection pump and from all the linked parts.
2. Disassemble and take out all the fuel lines (A) from the injection pump (fig. 2) and plug the openings to prevent any dirt inlet.
3. Disassembly the restriction cable in point B and the fuel stop solenoid cable in point C (fig. 2).

4. If the pump needs no inner setting, before disassembly note down the pump setting with respect to the notch corresponding to 0 degrees at the end of the engine front plate (D) (fig. 3). Mark the plate with a centering punch, so that it can be directed with the line (E) etched on the pump flange.



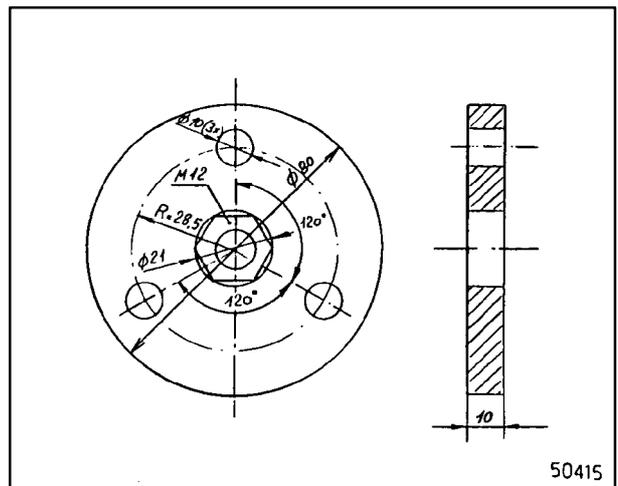
3

5. Remove the engine adjustment guard (F) (fig. 4). Take out the injection pump drive shaft drive gear locking nut.
6. Check that the V-groove of the gear spline is in the upper position.



4

7. Make a puller referring to figure 5. Fasten the puller to the drive train with three screws 5/16" - UNFx2" and an intermediate screw M12x50, then remove the gear from the shaft.
8. Remove the gear from the engine only after removing the engine front guard.



5

9. Take out the fixing screws (G) of the pump (fig. 2). Take out the pump from the engine cover plate. Close all the openings with covers, to prevent any dirt inlet.

### Installation

1. Assembly a new pump on the O-ring of the engine front plate, next to the pump fastening flange.
2. Fit the three screws (G) (fig. 2), fastening the injection pump to the engine front plate.
3. If the pump is adjusted inside, looking at the pump from the back, rotate the pump to the right by half a notch with respect to the notch corresponding to zero degrees, at the engine front plate rear end.
4. If the pump is not adjusted inside, align the cut line on the flange of the pump (E) (fig. 3) with the centering punch previously fitted in the engine front plate rear end. Tighten the fastening screws to 27 Nm.

5. Assemble the pump drive gear aligning it with the Woodruff key on the pump drive shaft.
6. Fit the safety washer and the fastening screw of the pump drive shaft and tighten to 79 Nm.
7. Fit a new control guard seal and fasten the control guard (F) (fig. 4) to the engine front plate; tighten the fastening screws to 25 Nm.
8. Fasten the fuel lines to the injection pump and tighten to the torque of 27 Nm.
9. Assemble the fuel line (B) and the stop cock (C) on the injection pump (fig. 2).

### Venting the system

1. Turn the ignition key to ON and press the reset push button.
2. The electric pump supplies fuel to the filter and the main pump.
3. Open a breather next to the filter.
4. After bleeding air, tighten the breather.