

**580T
580ST
590ST
695ST
Backhoe Loaders**

Service Manual

Print No. 84581914



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SECTION 00 - SAFETY RULES

SAFETY INSTRUCTIONS

WARNING

This warning symbol points out important messages involving your safety.

Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and to safeguard your safety and personal integrity.

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

WARNING

This symbol warns about the possibility of potential damages to the machine that can involve the operator's safety.

WARNING

With specific warnings about potential dangers for the operator's or other persons integrity directly or indirectly involved.

The non-compliance with the warnings preceded by the above-mentioned keywords (WARNING and DANGER) can cause serious accidents or even the death of the persons involved.

Moreover, in the present Manual, some instructions are given with text in italics, preceded by the words **NOTE** and **CAUTION**.

NOTE: *it emphasizes and underlines to the operator the correct technique or correct procedure to follow.*

WARNING

This symbol warns about the possibility of potential damages to the machine that can involve the operator's safety.

FOREWORD

Backhoe loaders 580T - 580ST - 590ST - 695ST have been designed to perform most earth-moving operations.

If you use this machine for duties involving the use of attachments, accessories, or special tools, consult your Dealer to make sure that the adaptations or modifications carried out are in conformity with the machine's technical specifications and with current regulations on safety.

Any modifications or adaptations which are not approved by the manufacturer may invalidate the machine's original conformity with safety requirements.

The machine must be used according to its intended use, respecting the safety and precautionary rules and strictly following the operating instructions.

Any functional disorders, especially those affecting the safety of the machine, should therefore be rectified immediately.

———— **⚠ DANGER ⚠** ————

A different use of the excavator or of its working equipment:

- for lifting or transporting persons;
- as a working platform;
- for lifting loads without the attachment being approved for this purpose;
- for pulling loads;
- is considered unintended use.

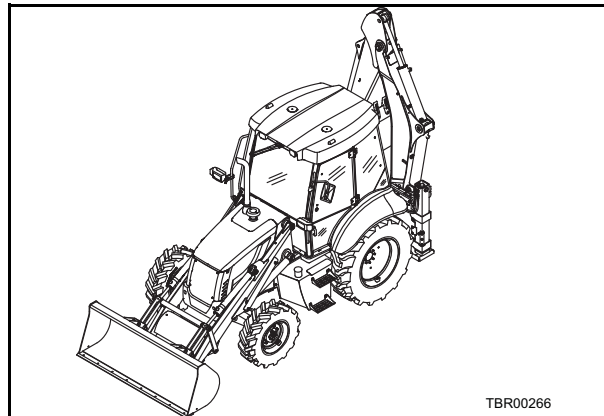
Unintended use may cause injury or life-threatening risks for the operator and for other persons.

The manufacturer/supplier cannot be held responsible for any damage resulting from unintended use. The risk involved in such misuse lies entirely with the user.

———— **⚠ DANGER ⚠** ————

It is absolutely forbidden to tamper with and/or change the setting of any of the hydraulic system valves to avoid damaging machine components, with a consequent risk for personal safety.

The current Operator's Manual is the user's guide for correct run-in, use and maintenance of the machine.



Carefully read this Operator's Manual and store it in the cab for quick location and reference.

Instructions concerning safety, operation and maintenance have been developed to permit safe service and repair of this machine without any risk.

In the event of queries or suggestions relevant to your machine do not hesitate to address to your Dealer.

Dealers have qualified and trained personnel at disposal as well as Original Spares, means and equipment suitable to carry out all necessary maintenance.

Any modifications or adaptations which are not approved by the manufacturer may invalidate the machine's original conformity with safety requirements.

IMPORTANT: *the engine and fuel system on your machine are designed and built to government emissions standards. Tampering by dealers, customers, operators and users is strictly prohibited by law. Failure to comply with this prohibition could result in government fines, rework charges, invalid warranty, legal action and possible confiscation of the machine until rework to original condition is completed. Engine service and/or repairs must be carried out by a certified technician only.*

NOTE: *each machine is supplied complete with a copy of this Manual. Descriptions and illustrations provided herein are not binding. The Manufacturer, provided that the basic characteristics of machine types described and shown in this Manual remain the same, reserves the right to change components, parts and accessories supplied without any commitment to timely update this publication; and this any time it deems it convenient for improvement purposes or due to commercial or manufacturing requirements. For exact information, please consult your Dealer or contact the Manufacturer's Branch Offices, who remain at your disposal for further help.*

SPARE PARTS

The "non-genuine" spare parts have not been checked and authorized by the Manufacturer.

The assembly and/or use of such products may have negative effects on the machine design features and could impair its operation safety.

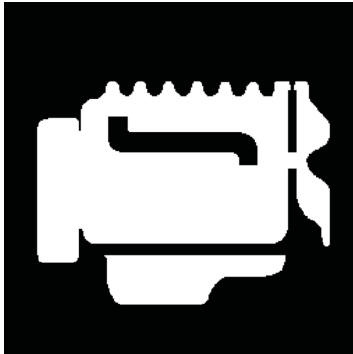
The Manufacturer is not liable for any damage caused by "non-genuine" spare parts or accessories.

WARRANTY

This machine is under warranty according to the regulations in force in Your Country and in compliance with the sales agreement drawn up with the Dealer.

The warranty, however, expires if the operation and maintenance instruction for this machine and contained in this manual, have not been followed.

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SECTION 10 - ENGINE

ENGINE INSTALLATION 3

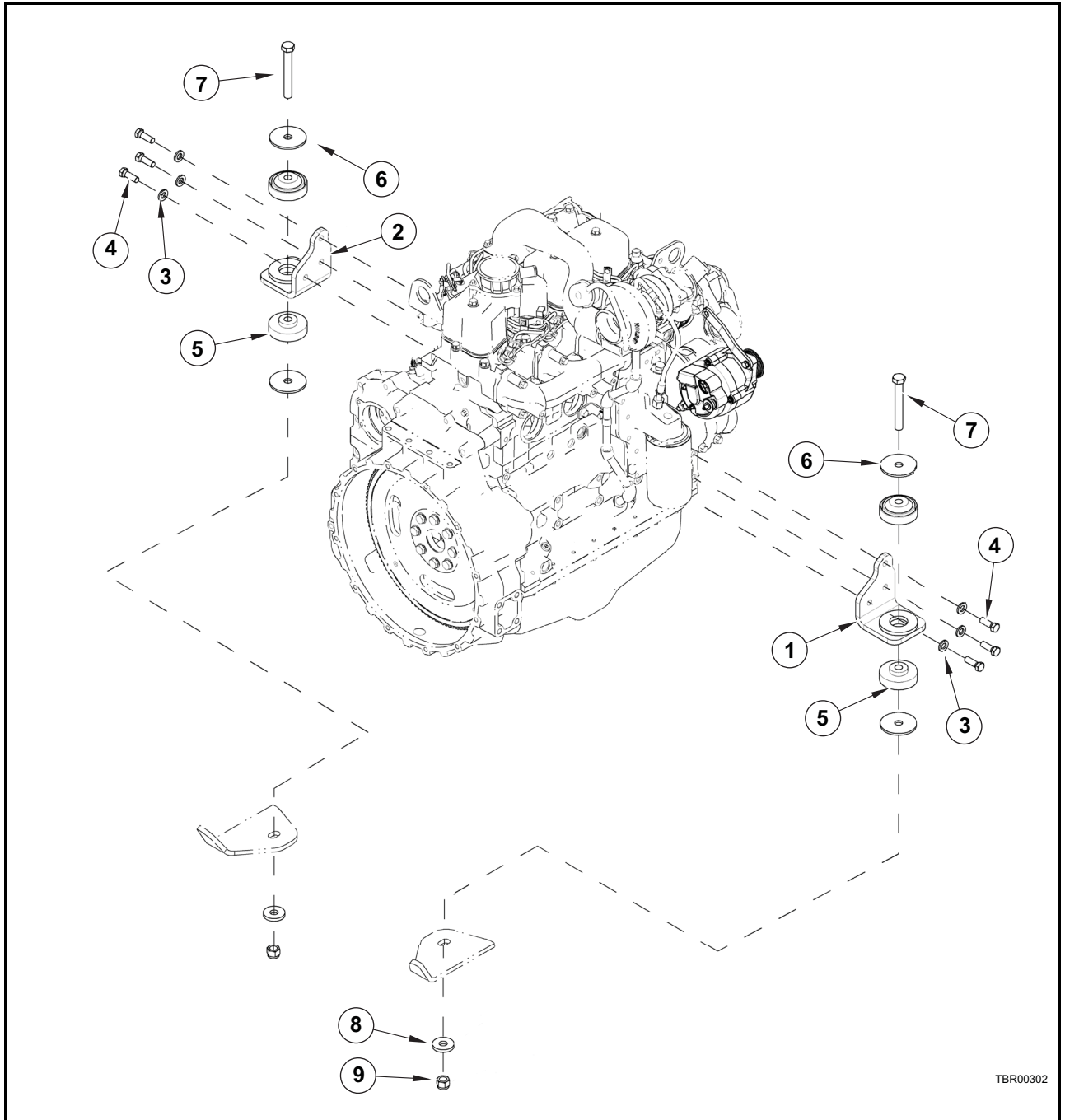
TECHNICAL SPECIFICATIONS..... 4

 72 kW - 97 HP ENGINE (580T) 4

 72 kW - 97 HP ENGINE (580ST) 5

 82 kW - 110 HP ENGINE (590ST - 695ST) 6

ENGINE INSTALLATION



TBR00302

- | | |
|----------------------------------|---|
| 1. Front RH engine mount bracket | 6. Washer |
| 2. Front LH engine mount bracket | 7. M16x120 hex screw |
| 3. Washer | 8. Washer |
| 4. M12x35 hex screw | 9. M16 nut |
| 5. Anti-vibration device | [tightening torque 210 ÷ 240 Nm (156 ÷ 178 lbf-ft)] |

NOTE: Refer to SECTION 21 - TRANSMISSION for the rear RH and LH engine mount brackets.

TECHNICAL SPECIFICATIONS

DIESEL ENGINE

72 kW - 97 HP ENGINE (580T)

Specifications (ISO 14396)	72 kW - 97 HP @ 2200 rpm
Model	F4GE9484C*605
Type	diesel, mechanical
No. of cylinders	4
Valves per cylinder	2
Bore.....	104 mm (4 in)
Stroke.....	132 mm (5.2 in)
Displacement	4485 cm ³ (237.69 in ³)
Compression ratio	17.5:1
Maximum torque (EC)	420 Nm (309 lbf-ft) @ 1250 rpm
Low idle speed at no load	1000 ± 50 rpm
High idle speed at no load (engine not installed)	2430 ± 50 rpm
High idle speed at no load (engine not installed on the vehicle)	2380 ± 60 rpm
Maximum speed at full load	2200 rpm
Air intake	TAA (turbocharged with aftercooler)

Supply

Type	direct injection
Injection pump.....	BOSCH ROTARY VE 4/12 F1100L
Injection sequence	1-3-4-2
Cold-start device	“grid heater” (optional)

Cooling

Pump type	H ₂ O pump
Pump drive	belt drive
Temperature switch (opening start)	81 ± 2 °C (177.8 ± 35.6 °F)

72 kW - 97 HP ENGINE (580ST)

Specifications (ISO 14396)	72 kW - 97 HP @ 2200 rpm
Model	F4HE0484G*J109
Type	diesel, electronic
No. of cylinders	4
Valves per cylinder.....	4
Bore	104 mm (4 in)
Stroke.....	132 mm (5.2 in)
Displacement	4485 cm ³ (237.69 in ³)
Compression ratio	17.5:1
Maximum torque (EC).....	453 Nm (334 lbf-ft) @ 1400 rpm
Low idle speed at no load	1000 ± 50 rpm
High idle speed at no load (engine not installed).....	2430 ± 50 rpm
High idle speed at no load (engine not installed on the vehicle).....	2380 ± 60 rpm
Maximum speed at full load	2200 rpm
Air intake	TAA (turbocharged with aftercooler)

Supply

Type	high-pressure, common rail
Injection pump.....	CP3 high-pressure pump
Control unit.....	EDC7
Injection sequence	1-3-4-2
Cold-start device	“grid heater” (optional)

Cooling

Pump type.....	H ₂ O pump
Pump drive.....	belt drive
Temperature switch (opening start)	81 ± 2 °C (177.8 ± 35.6 °F)

82 kW - 110 HP ENGINE (590ST - 695ST)

Specifications (ISO 14396)	82 kW - 110 HP @ 2200 rpm
Model (590ST)	F4HE9484C*J107
Model (695ST)	F4HE9484C*J108
Type	diesel, electronic
No. of cylinders	4
Valves per cylinder	4
Bore	104 mm (4 in)
Stroke	132 mm (5.2 in)
Displacement	4485 cm ³ (237.69 in ³)
Compression ratio	17.5:1
Maximum torque (EC)	516 Nm (380,58 lbf·ft) @ 1400 rpm
Low idle speed at no load	1000 ± 50 rpm
High idle speed at no load (engine not installed)	2430 ± 50 rpm
High idle speed at no load (engine not installed on the vehicle)	2380 ± 60 rpm
Maximum speed at full load	2200 rpm
Air intake	TAA (turbocharged with aftercooler)

Supply

Type	high-pressure, common rail
Injection pump	CP3 high-pressure pump
Control unit	EDC7
Injection sequence	1-3-4-2
Cold-start device	“grid heater” (optional)

Cooling

Pump type	H ₂ O pump
Pump drive	belt drive
Temperature switch (opening start)	81 ± 2 °C (177.8 ± 35.6 °F)

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SECTION 21 - TRANSMISSION

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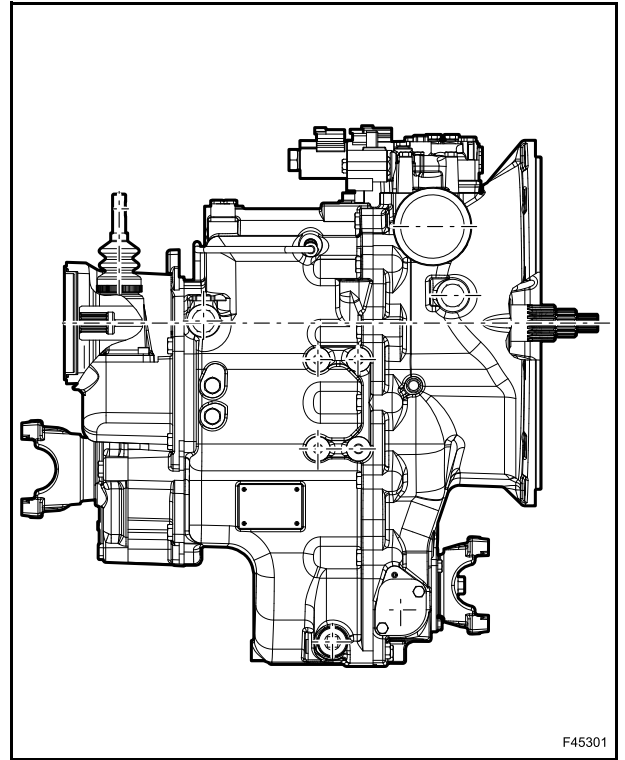
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POWERSHUTTLE TRANSMISSION

This transmission is used on powershuttle backhoe loader models 580T - 580ST - 590ST.



TECHNICAL SPECIFICATIONS

2WD/2WS TRANSMISSION - POWERSHUTTLE (580T)

Model CARRARO TLB1 MPB 2WD

Type (4x4) 4 forward and 4 reverse travel gears

Torque converter ratio 2.38

Transmission ratios:

1st gear forward travel 5.603:1 reverse travel 4.643:1

2nd gear forward travel 3.481:1 reverse travel 2.884:1

3rd gear forward travel 1.585:1 reverse travel 1.313:1

4th gear forward travel 0.793:1 reverse travel 0.657:1

4WD/2WS TRANSMISSION - POWERSHUTTLE (580ST - 590ST)

Model CARRARO TLB1 MPB 4WD

Type (4x4) 4 forward and 4 reverse travel gears

Torque converter ratio 2.38

Transmission ratios:

1st gear forward travel 5.603:1 reverse travel 4.643:1

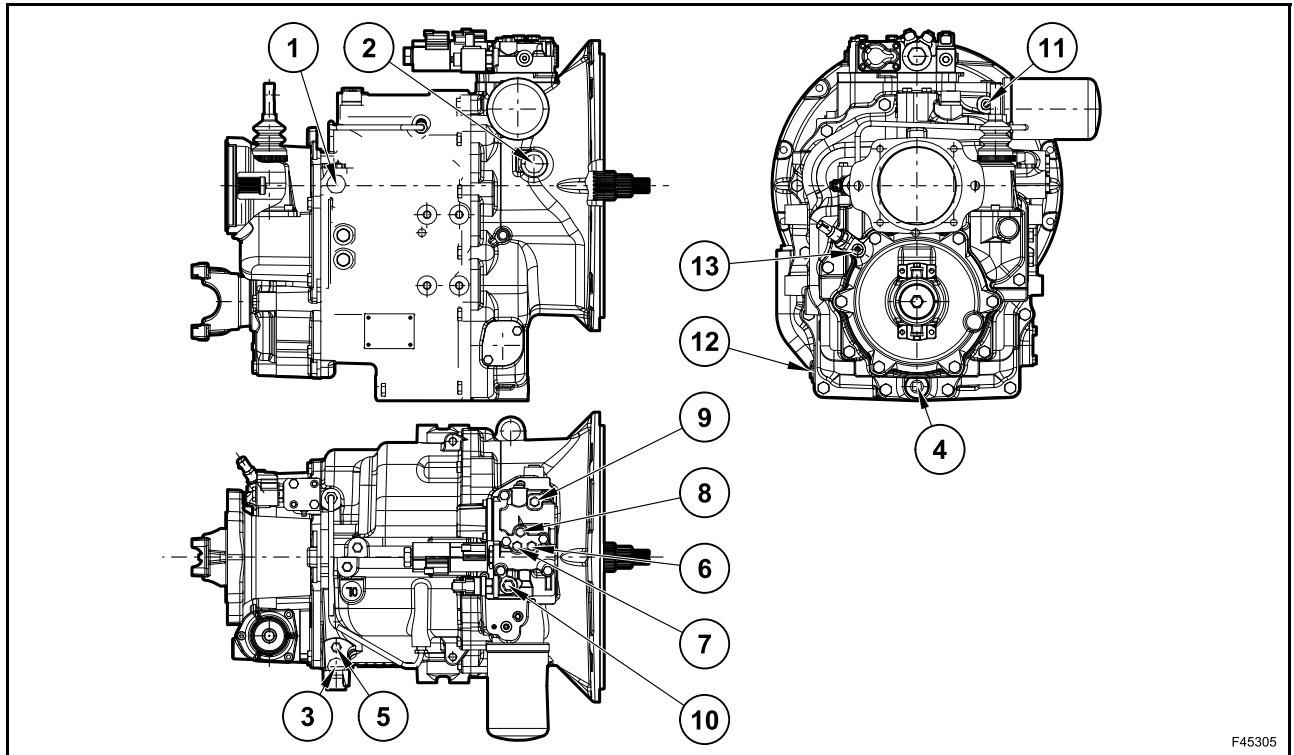
2nd gear forward travel 3.481:1 reverse travel 2.884:1

3rd gear forward travel 1.585:1 reverse travel 1.313:1

4th gear forward travel 0.793:1 reverse travel 0.657:1

PORTS

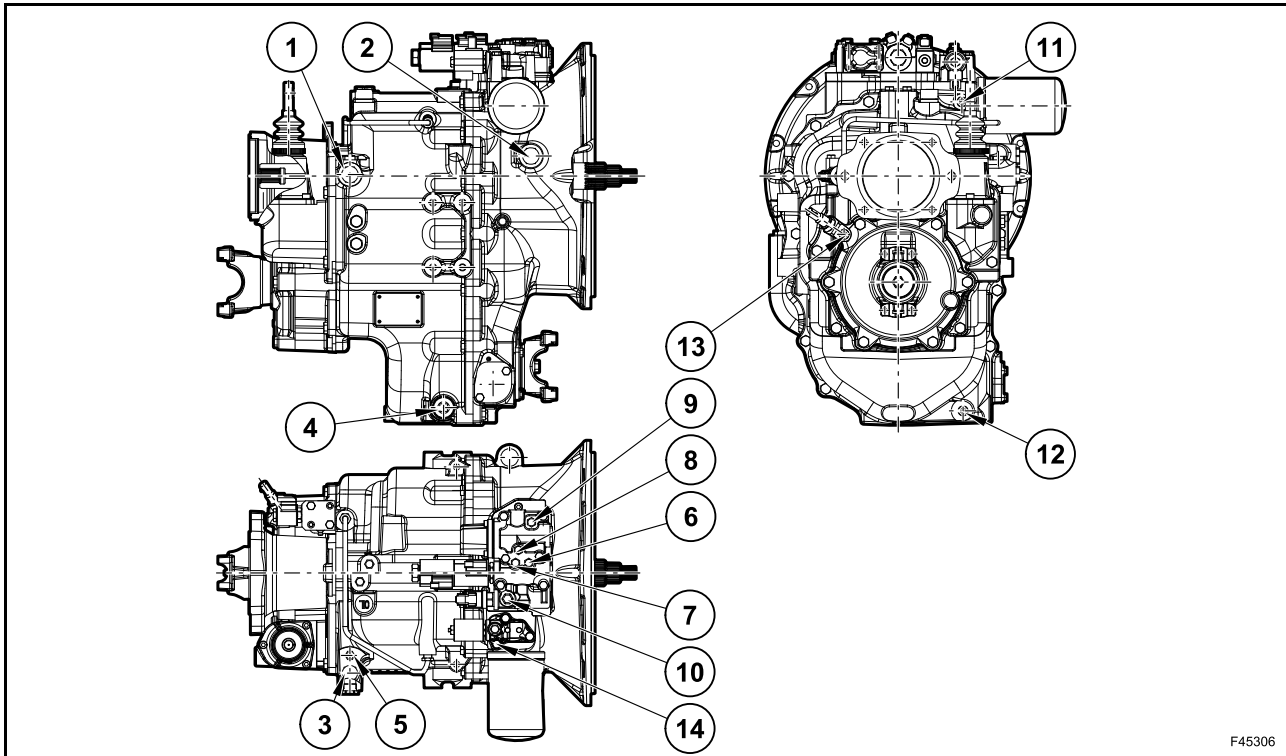
2WD



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Ref.	Dimension	Use	Notes - Miscellaneous
1	7/8" - 14 UNF	Oil inlet from cooler	
2	7/8" - 14 UNF	Oil outlet to cooler	
3	1/2" - 14 UNF	Transmission temperature switch	
4		Oil drain plug	
5	1/8" - 28 BSP ISO 228	Oil cooler return	0.5 ÷ 3.5 bar (7.3 ÷ 50 psi) ON forward / reverse travel position 0.5 ÷ 3.5 bar (7.3 ÷ 50 psi) ON neutral position
6	1/8" - 28 BSP ISO 228	Forward gear pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) = maximum pressure in neutral position
7	1/8" - 28 BSP ISO 228	Reverse gear pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) (4.3 psi) = maximum pressure in neutral position
8	1/8" - 28 BSP ISO 228	Forward / reverse gear clutch pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) = maximum pressure in neutral position
9	1/8" - 28 BSP ISO 228	Converter pressure check port	0.5 ÷ 0.9 bar (7.3 ÷ 13 psi)
10	9/16" - 18 UNF	Oil inlet / outlet for differential lock	
11	9/16" - 18 UNF	Brake oil outlet / inlet	13 bar (188 psi) at 900 rpm 14.5 bar (210 psi) at 2200 rpm
12	9/16" - 18 UNF	Oil inlet from the brake	
13	9/16" - 18 UNF	Oil inlet from service pump to brake release	Brake pressure switch = 10 ± 1 bar (145 ± 14 psi)

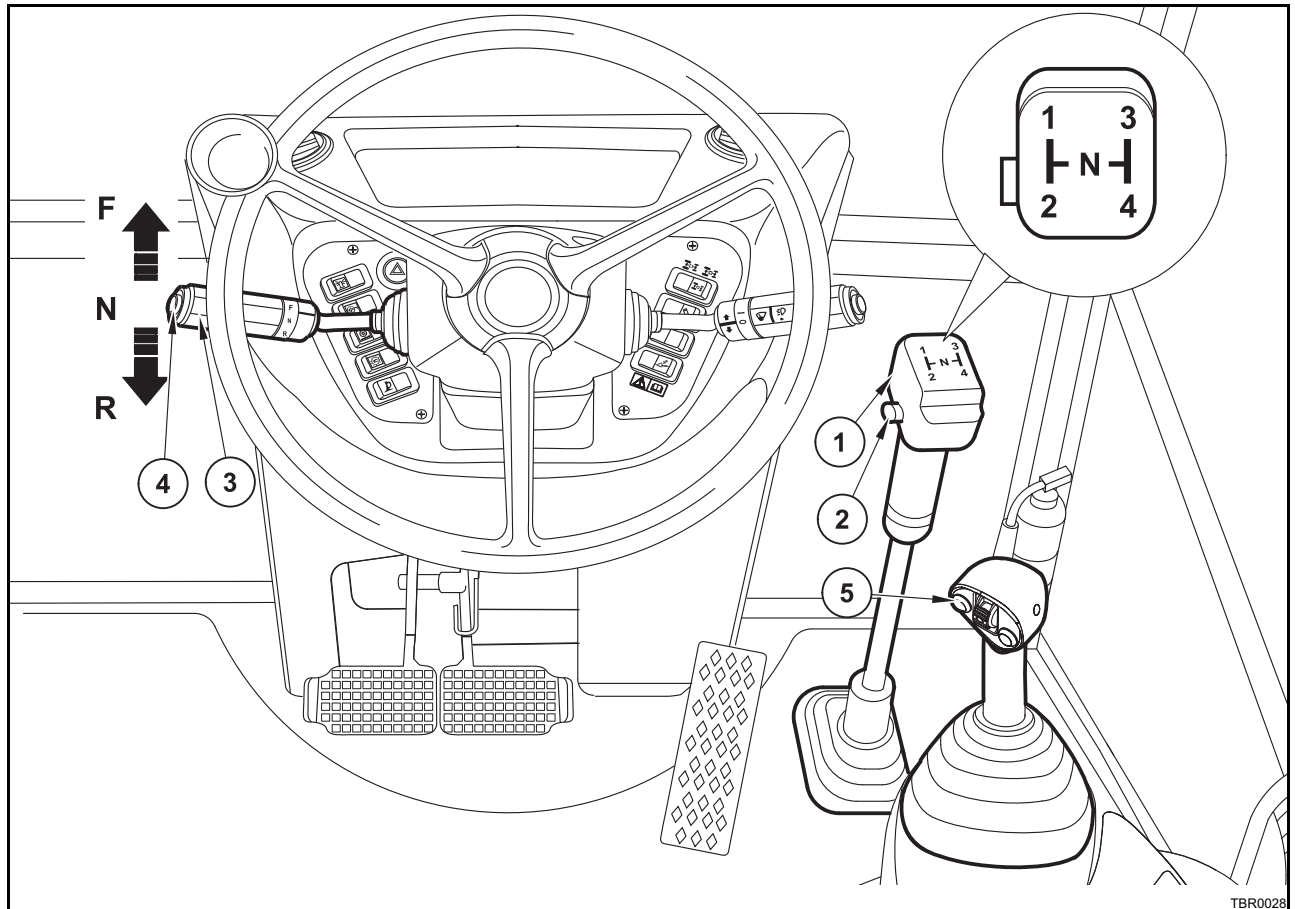
4WD



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Ref.	Dimension	Use	Notes - Miscellaneous
1	7/8" - 14 UNF	Oil inlet from cooler	
2	7/8" - 14 UNF	Oil outlet to cooler	
3	1/2" - 14 UNF	Transmission temperature switch	
4		Oil drain plug	
5	1/8" - 28 BSP ISO 228	Oil cooler return	0.5 ÷ 3.5 bar (7.3 ÷ 50 psi) ON forward / reverse travel position 0.5 ÷ 3.5 bar (7.3 ÷ 50 psi) ON neutral position
6	1/8" - 28 BSP ISO 228	Forward gear pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) = maximum pressure in neutral position
7	1/8" - 28 BSP ISO 228	Reverse gear pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) = maximum pressure in neutral position
8	1/8" - 28 BSP ISO 228	Forward / reverse gear pressure check port	11 ÷ 13 bar (159 ÷ 188 psi) 0.3 bar (4.3 psi) = maximum pressure in neutral position
9	1/8" - 28 BSP ISO 228	Converter pressure check port	0.5 ÷ 0.9 bar (7.3 ÷ 13 psi)
10	9/16" - 18 UNF	Oil inlet / outlet for differential lock	
11	9/16" - 18 UNF	Brake oil outlet / inlet	13 bar (188 psi) at 900 rpm 14.5 bar (210 psi) at 2200 rpm
12	9/16" - 18 UNF	Oil inlet from the brake	
13	9/16" - 18 UNF	Oil inlet from service pump to brake release	Brake pressure switch = 10 ± 1 bar (145 ± 14 psi)
14		4WD pressure check port	13 ÷ 14 bar (188 + 203 psi) at 900 rpm 13 ÷ 15.5 bar (188 + 225 psi) at 2200 rpm

CONTROLS



TBR0028

1. GEARSHIFT LEVER: it is possible to select four forward and four rearward travel gears.
2. TRANSMISSION DISCONNECT BUTTON (on gearshift lever): prior to gearshifting, press and hold this switch; select the desired gear with the gearshift lever and release the switch to re-engage transmission.
3. REVERSE TRAVEL LEVER: the movement of this lever from the neutral position will engage the forward or reverse travel.
4. the warning horn activates in reverse travel.
5. HORN BUTTON
6. TRANSMISSION DISCONNECT BUTTON (on loader attachment control lever).

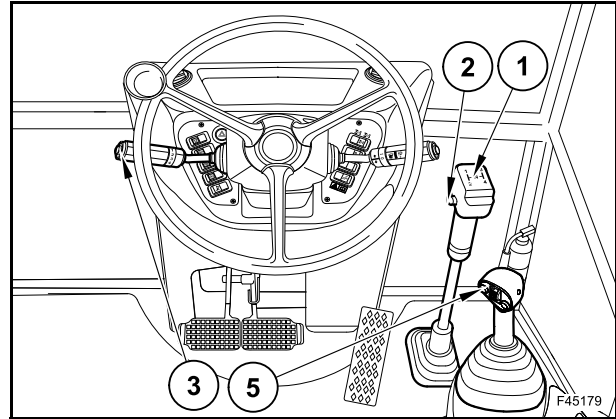
The transmission provides 4 forward and 4 reverse speeds. A torque converter is used to couple the engine with the transmission.

The reverse travel lever (3) allows shifting between forward and reverse travel without disengaging the gear ratios.

A device for "transmission disconnection" is activated by pushing button (2), placed on the gearshift lever (1) or by pushing button (5), placed on the loader attachment (3) control lever.

⚠ WARNING ⚠

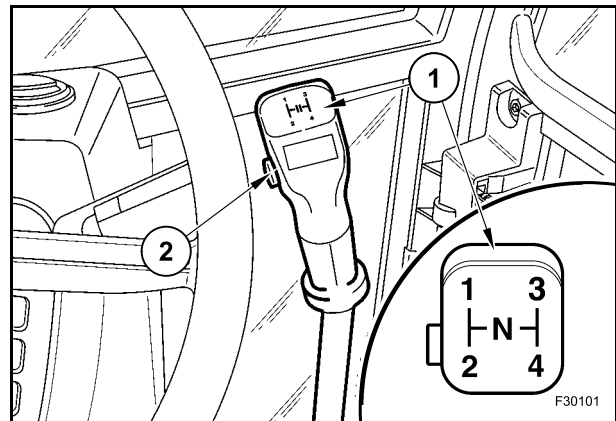
Always apply the parking brake whenever the machine is parked as the machine is free to roll even though the transmission gearshift lever and power reversing lever may be "In Gear" and the engine is turned OFF.



GEARSHIFT LEVER

The gearshift lever (1) is used to select any of the 4 gear ratios.

The transmission disconnect button (2) is depressed and held as the lever is shifted from one gear to another. The button is then released to re-establish the power of transmission drive.



FORWARD/REVERSE POWERSHUTTLE LEVER (TRAVEL DIRECTION CHANGE)

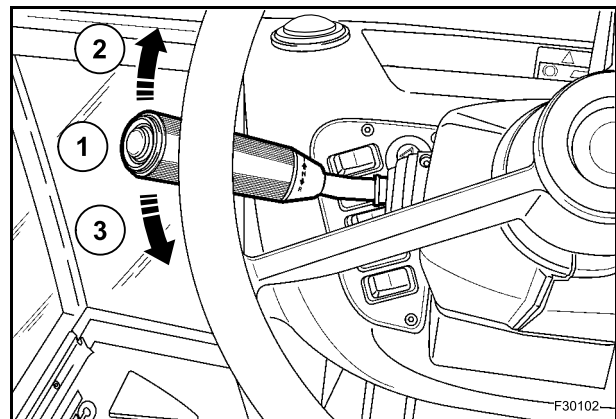
To select the forward travel, engage the required gear ratio with the gearshift lever.

With the engine idling, lift the powershuttle lever from the neutral lock position (1) and move it to the forward position (2).

Use the accelerator pedal to control the engine rpm and the ground speed.

To reverse the direction of travel, reduce engine speed and move the power reversing from neutral lock position (1) and rearwards (3) for reverse travel (audible alarm device sounds).

IMPORTANT: the powershuttle lever is equipped with a neutral lock to prevent an accidental engagement of the transmission. With this design, the powershuttle lever moves through a "T" slot to the forward or reverse positions.



IMPORTANT: when operating at low environmental temperatures with cold transmission oil, allow the oil to warm up before attempting to shift the powershuttle lever. The transmission can be shifted normally after the oil warms up.

IMPORTANT: the horn will sound if the powershuttle lever is operated with the parking brake engaged.

IMPORTANT: The powershuttle lever can be activated with any engine speed.

As a safety and precautionary measure, the engine must run at approximately 1200 rpm.

This action is easily controlled by means of the foot accelerator to control engine and ground speed.

TRANSMISSION DISCONNECTION

The 4x4 transmission provides for easy upward and downward gear ratio changes on the move.

However, as a clutch is not used between the engine and transmission, the power flow from the engine to the transmission must be interrupted to shift from one gear ratio to another. This is accomplished by means of a transmission disconnect (dump) button.

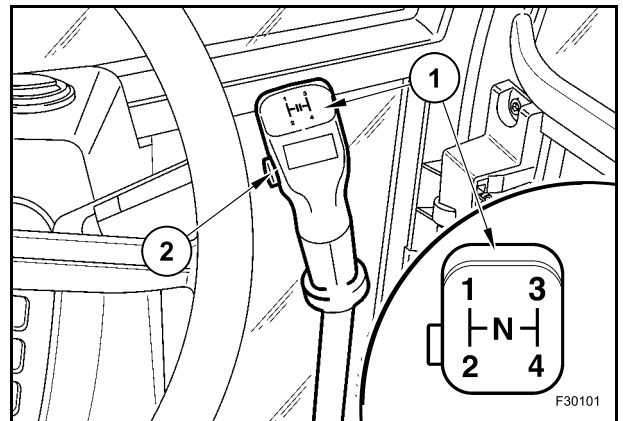
The finger operated button (2) on the main gearshift lever knob (1) is easy to operate.

⚠ WARNING ⚠

Do not use the disconnect switch control down hill, because excessive speed may cause loss of control, personal injury or the failure of transmission.

To make upward gear ratio changes, simply depress and hold button (2) on the gearshift lever (1), while shifting the same from one gear ratio to another.

When the desired gear ratio has been selected release the button and allow the unit to gain engine speed and ground speed. If another higher ratio is required repeat the procedure.



IMPORTANT: to prevent possible damages to the transmission hydraulic clutches, never use the disconnect switch for inching the machine forward, because this will cause the clutches to slip excessively and to overheat.

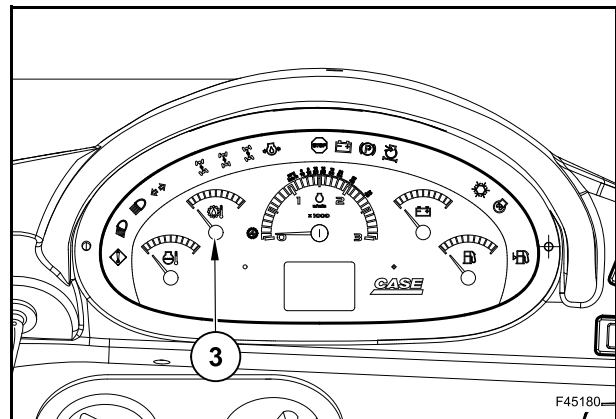
To make downward gear ratio changes or reduce ground speed, simply lower the engine speed, depress and hold the gearshift lever button and downshift the transmission.

When the desired gear ratio has been selected release the button and adjust the engine speed to suit ground speed required.

Operating the machine in a too high gear or under a too heavy load will cause the torque converter to slip excessively and overheat. If the machine is overloaded, the engine speed will not exceed a range of 1800-2200 rpm at maximum accelerator and the torque converter will “stall” bringing the machine to a complete stop.

If “stall” does occur, there is still sufficient engine power to operate the loader attachment; however, to prevent the transmission from overheating, either reduce the load on the machine or select a lower gear ratio.

IMPORTANT: operating at a “stall” for more than 20 seconds can cause the transmission to overheat and can possibly damage the transmission. If the transmission overheats, the needle (3) reaches the red field. Shift both the powershuttle lever and the gearshift lever to neutral. Let the engine run idle (1000 rpm) until transmission oil cools down enough to have the needle (3) return to correct position.





Suggest:

If the above button click is invalid.

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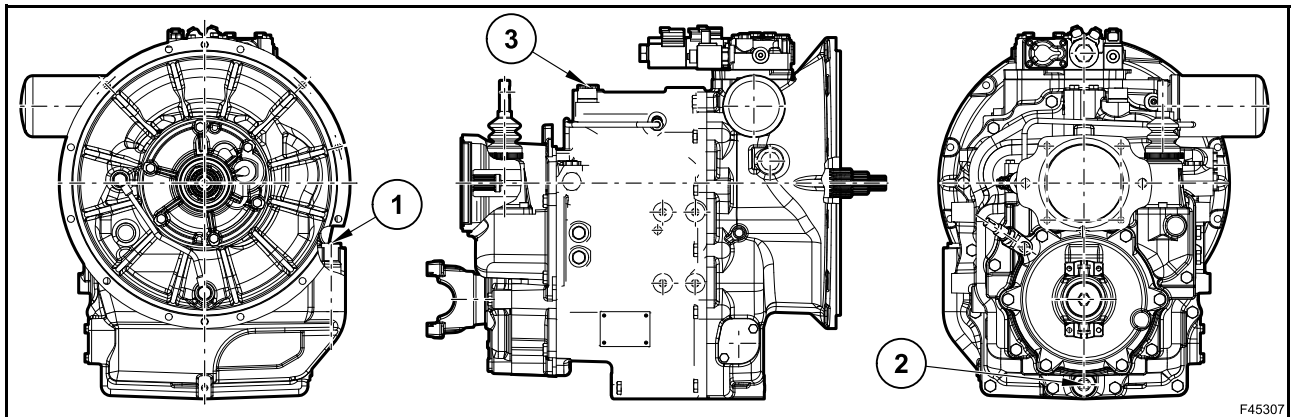
first, and then click the above link

to download the complete manual.

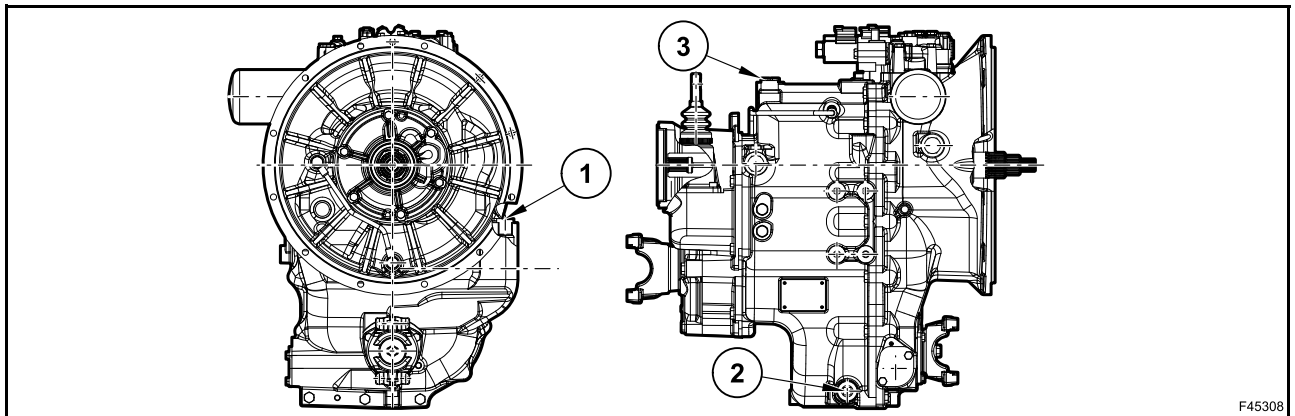
Thank you so much for reading

LUBRICATION

2WD



4WD



1. Oil filler tube interface
2. Oil drain plug
3. Breather

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