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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.

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Clutch - Technical Data - Mechanical version

Pedal type	Suspended pedals
Type	Double, dry plate, NEC, (11” X 11”), torsion spring
Control	Mechanical pedal for transmission hand lever for Power Take-Off (PTO)
Release mechanism	Finger type
Pedal type	Suspended pedals
Plate material	Power Take-Off (PTO) disc - organic compound Main disc - cerametallic
Plate thickness	
Transmission	**10.10 - 10.90 mm** (**0.40 - 0.43 in**)
Power Take-Off (PTO)	**7.30 - 7.90 mm** (**0.29 - 0.31 in**)
Wear limit travel	Main disc - 18 max Power Take-Off (PTO) disc - 7 max
Plate with pressure springs	Tangential springs
Transmission clutch control sleeve working clearance. with bearing cover	**0.160 - 0.280 mm** (**0.006 - 0.011 in**)
Power Take-Off (PTO) clutch control sleeve working clearance	**0.060 - 0.180 mm** (**0.002 - 0.007 in**)
Power Take-Off (PTO) clutch lever free play adjustment	**2.500 - 5.000 mm** (**0.098 - 0.197 in**)
Transmission clutch pedal free play adjustment	**40 - 50 mm** (**1.575 - 1.969 in**)
Transmission pedal requirements	
Pedal shaft diameter	**27.959 - 27.980 mm** (**1.101 - 1.102 in**)
Supporting bush internal diameter (fitted, non-dressed)	**22.052 - 22.137 mm** (**0.868 - 0.872 in**)
Pin/bush play	**0.025 - 0.101 mm** (**0.001 - 0.004 in**)
Diameter of bushing housing in steering column casing	**32.045 - 32.085 mm** (**1.101 - 1.102 in**)
Bush outer diameter	**32.045 - 32.085 mm** (**1.101 - 1.102 in**)
Pedal /bush interference fit	**0.085 mm** (**0.003 in**) max

Clutch - Technical Data - Power shuttle version

Type	Wet
No. of Clutches	02 Forward, Reverse)
Number of plates	Steel disc 6, Friction disc 6
Material	Paper
Method of operation	Hydraulic

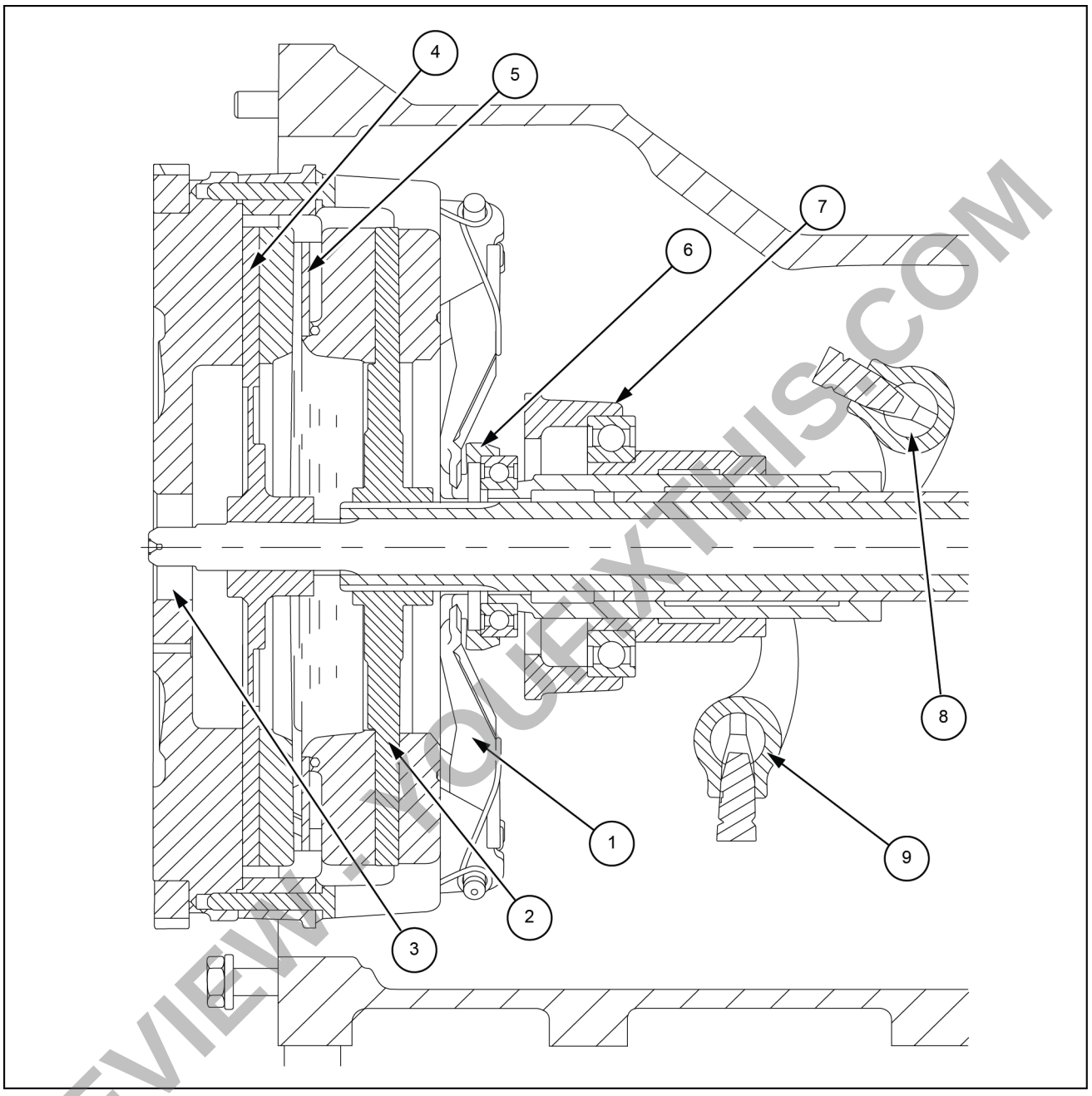
Clutch - Torque

Description	Thread size	Torque
Master clutch housing to fly-wheel housing buckle up bolts **(C1)**	M12 x 1.25	**100 N·m** (**74 lb ft**)
Clutch assembly mounting bolts **(C2)**	M8 x 1.25	**26 N·m** (**19 lb ft**)
Release fork bolts **(C3)**	M16 x 1.5	**160 N·m** (**118 lb ft**)

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Clutch - Sectional view



GNIL15TR00203GB 1

1. Power Take-Off (PTO) clutch release finger
2. Transmission clutch plate
3. Fly-wheel bearing
4. Power Take-Off (PTO) clutch plate
5. Disc spring
6. Release control sleeves with thrust bearings
7. Release control sleeves with thrust bearings
8. Power Take-Off (PTO) clutch release fork
9. Transmission clutch release fork

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Clutch and components - Remove - Mechanical version

⚠ WARNING

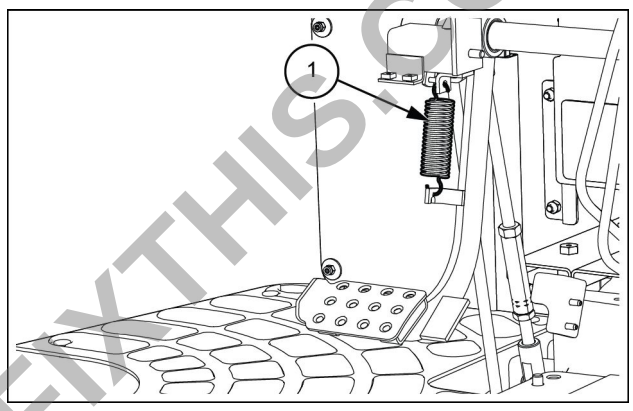
Avoid injury!
Handle all parts carefully. Do not place your hands or fingers between parts. Use Personal Protective Equipment (PPE) as indicated in this manual, including protective goggles, gloves, and safety footwear.
Failure to comply could result in death or serious injury.

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Clutch pedal removal

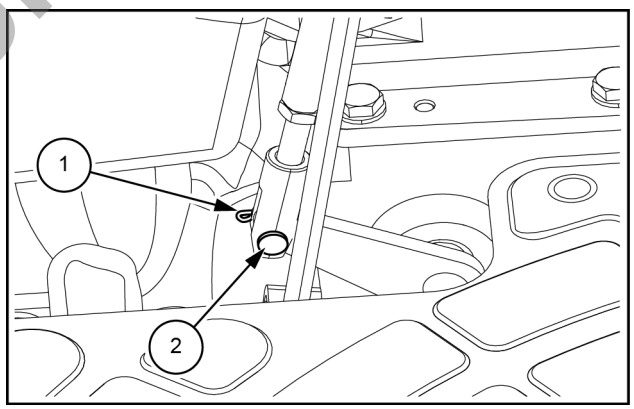
NOTE: *Remove the brake pedal. See the* ***Brake control pedals and shafts - Remove - Mechanical version (33.120)***

1. Remove the clutch pedal spring **(1)**.



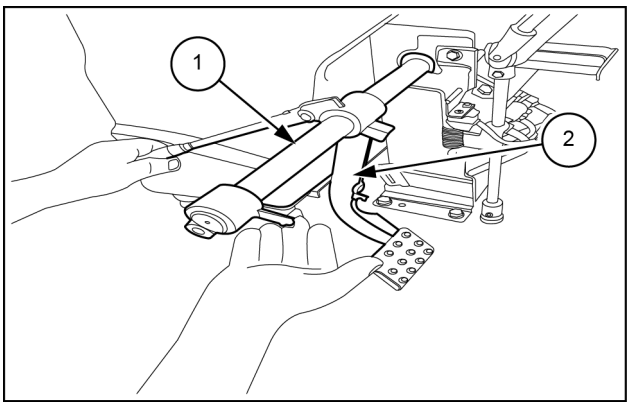
GNIL15TR00210AB 1

2. Remove the split pin **(1)** and remove the pivot pin **(2)** to disconnect the clutch pedal at the bottom.



GNIL15TR00211AB 2

3. Pull out shaft assembly (brake pedal and clutch pedal) **(1)** and separate clutch pedal **(2)** by sliding it out from the shaft.



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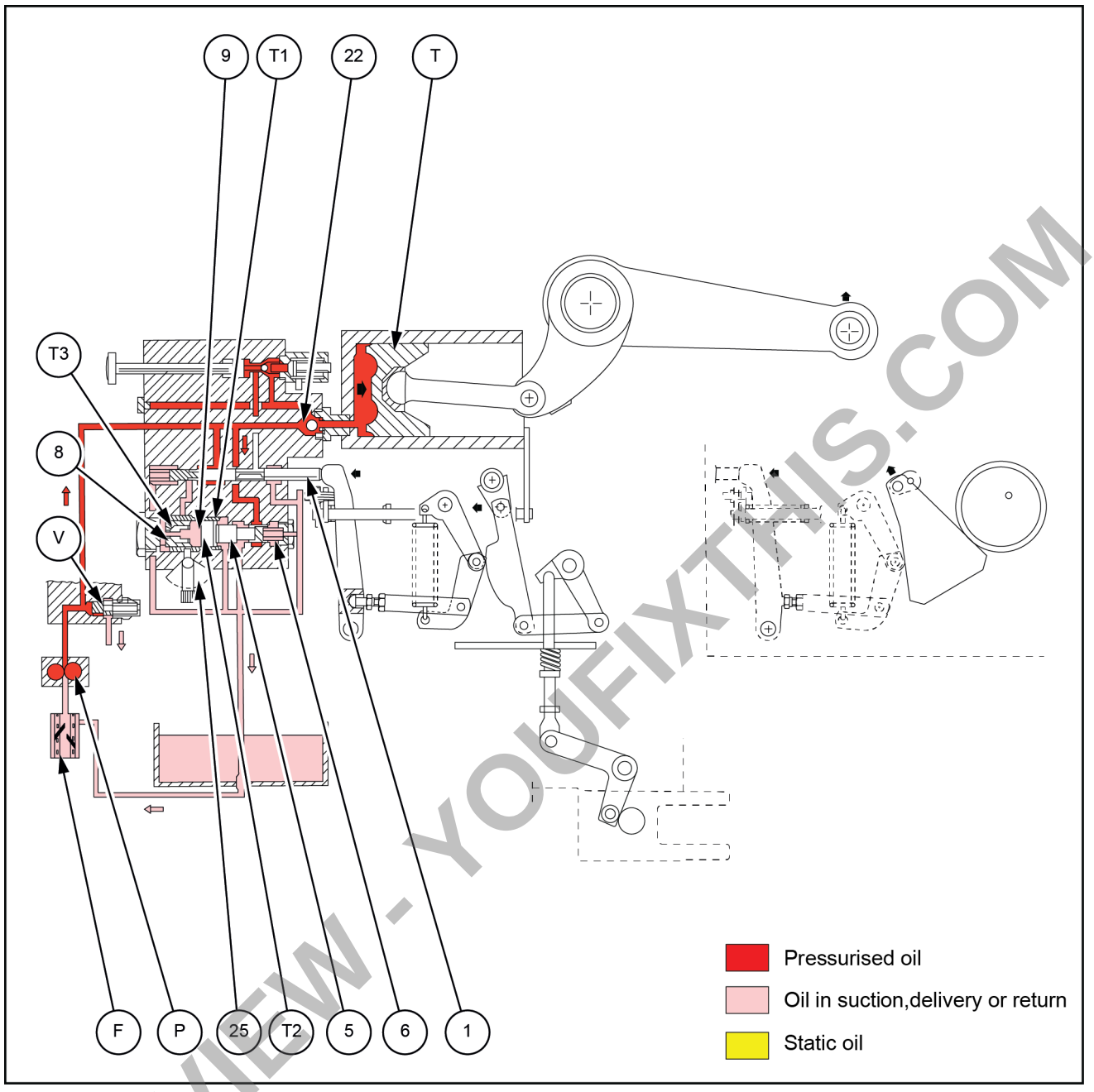
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Clutch - Troubleshooting

Problem	Possible Cause	Correction
Clutch slips	Clutch disc, pressure plate and/or flywheel wear	Replace clutch disc; replace clutch if necessary and grind the flywheel
	Damaged or bent or broken fingers	Replace finger assembly
	Oil or grease on friction material	Replace clutch disc; repair leak of lubricant in to clutch housing; thoroughly clean friction surfaces
Clutch grabs	Stiff external control linkage	Check and lubricate linkage pivot points
	Warped clutch disc	Replace clutch disc
	Clutch disc with damaged damper springs or loose hub	Replace clutch disc
	Oil or grease on friction material	Replace clutch disc; repair leak of lubricant in to clutch housing; thoroughly clean friction surfaces
	Finger springs broken	Replace finger springs
Clutch noise at engagement and /or disengagement	Warped clutch disc	Replace clutch disc
	Damaged clutch disc damper springs	Replace clutch disc
	Excess backlash on clutch disc to hub meshing splines	Replace clutch disc and shaft, as necessary
	Worn clutch release bearing	Replace bearing
Clutch control pedal hardness	Hard pedal	Check and lubricate linkage.
	Broken or disconnected clutch return spring.	Replace or hook up clutch return spring.
Clutch fails to disconnect and drags	Warped clutch disc	Replace clutch disc
	Damaged clutch release bearing	Replace clutch release bearing
	Damaged finger spring	Replace finger springs

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Hydraulic circuit diagram

F. Filter
P. Hydraulic pump
T. Lift arm piston
22. Check valve
8 Piston seat
V. Relief valve
1. Spool valve
5. Plunger
6. Plunger spring
9 Piston

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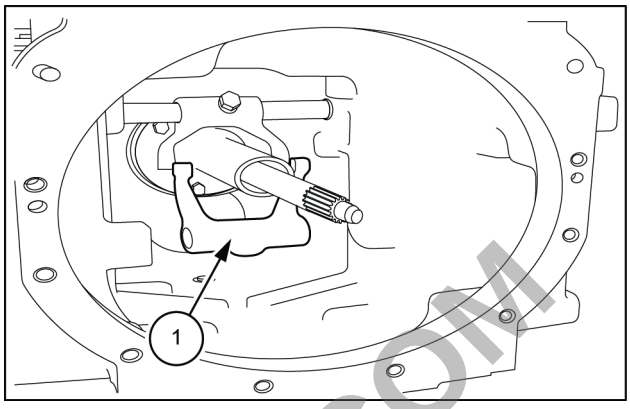
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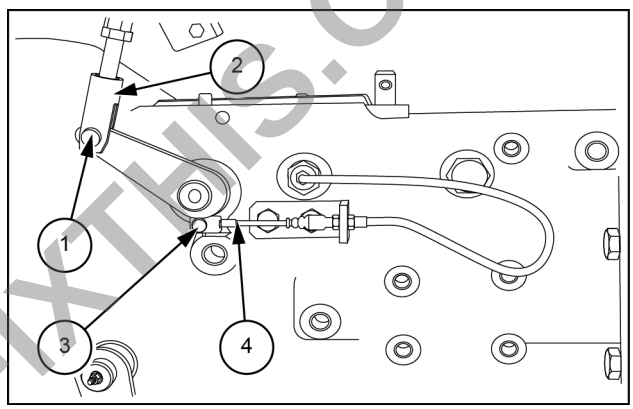
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9. Remove the fork from housing **(1)**.



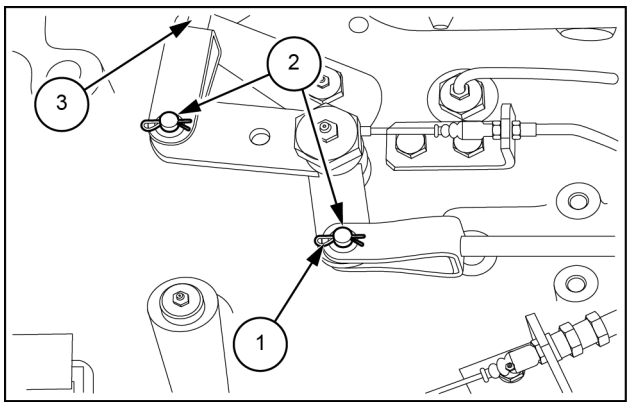
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10. Remove the pin **(1)** and disconnect the main clutch lever shaft **(2)** from the clutch pedal linkage.
11. Remove the pin **(3)** and disconnect the shuttle lever cable **(4)** from the main clutch lever shaft.



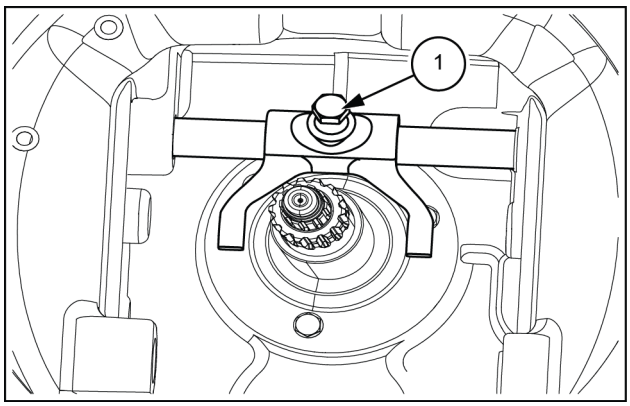
GNIL15TR00222AB 5

12. Remove the split pins **(1)** from the pivot pins **(2)** and disconnect the left-hand brake linkage **(3)** from brake pedal.



GNIL15TR00223AB 6

13. Loosen the main clutch fork screw **(1)**.



GNIL15TR00224AB 7

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Mechanical transmission - Service instruction

NOTICE: *Please read this carefully before starting assembly or disassembly operations.*

Precaution at flange and tool ends

While hammering at flange and tool ends during removal or installation, attention must be paid to the various phases. Functioning and integrity of tool as well as various components must not be endangered.

Reassembling methods

Adequate holding equipment should be used for reassembling group.

Lifting system will be necessary for reconnecting, disassembling and reassembling the ring gear or for holding the gear box.

Use cross section drawings to ease assembly and disassembly operations.

Recommendations regarding lubrication

It is very important to use proper lubricants and to maintain a constant level of correct lubrication.
Right operational temperature is to be maintained.

Shaft seals

Respect the following recommendations during seal and gasket assembly:

- Clean shaft very carefully and ensure that the part in contact with the rings is not damaged, cut or out of roundness.
- Assemble the seals so that the lips is fitted towards the oil side.
- Lubricate seal lips (use oil) and fill 3/4 of seal cavity with grease.
- Use appropriate driver. Do not use a hammer directly on the seals.
- Do not damage the seals while assembling the shaft.

O-ring

Lubricate adequately before inserting them at the right place so as to avoid rolling while assembling shaft.

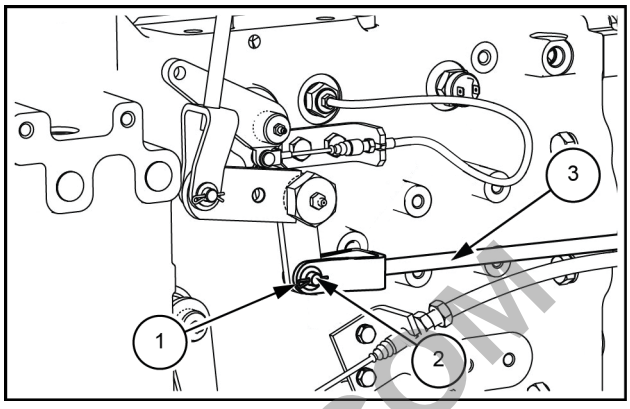
Adjusting shims

Use appropriate adjusting shims and measure each one separately.
Complete group measurement or stamping on the shim is not always reliable check.

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16. Install the linkage **(3)** with the front pivot linkages **(2)** and linkage pin **(1)**.
17. Similarly install the left-hand side brake linkage.

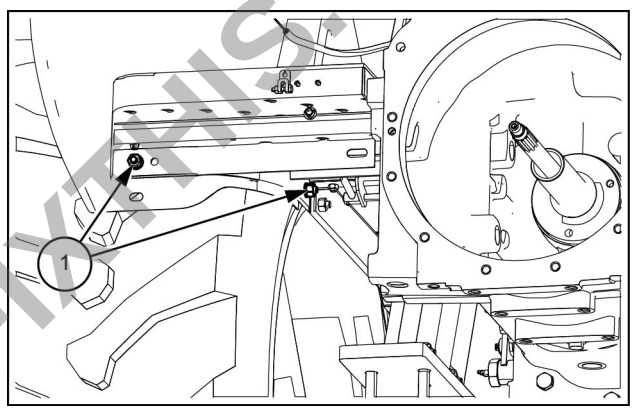


GNIL15TR01701AB 15

18. Install footboard right-hand side by installing:

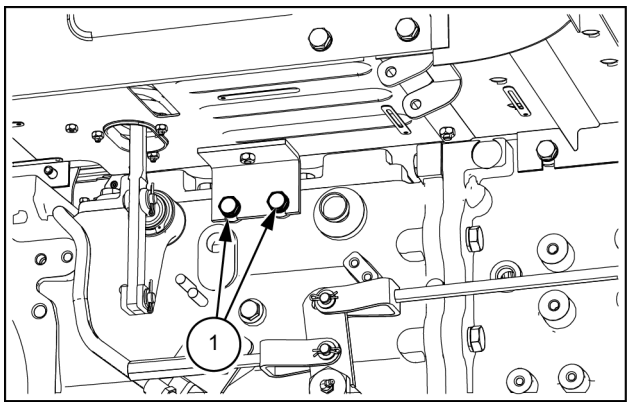
Two bolts **(1)** clamping footboard with fenders.

NOTE: *Use the bubble sheet or some cloth with magnets to avoid any scratch on fenders.*



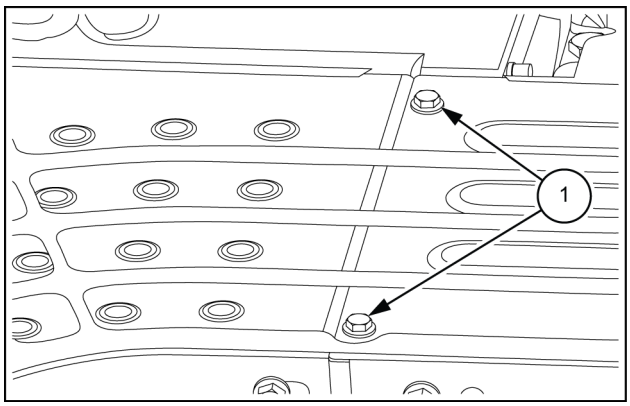
GNIL15TR00668AB 16

Three bolts **(1)** below footboard (two slotted and one normal).



GNIL15TR00667AB 17

Two bolts **(1)** from top joining front platform with rear one.



GNIL15TR00666AB 18

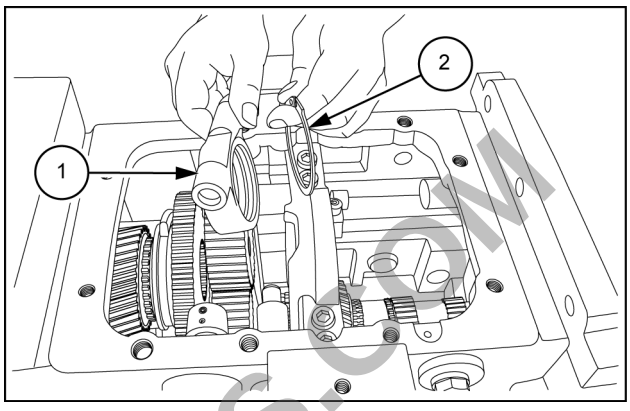
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Gearbox - Disassemble

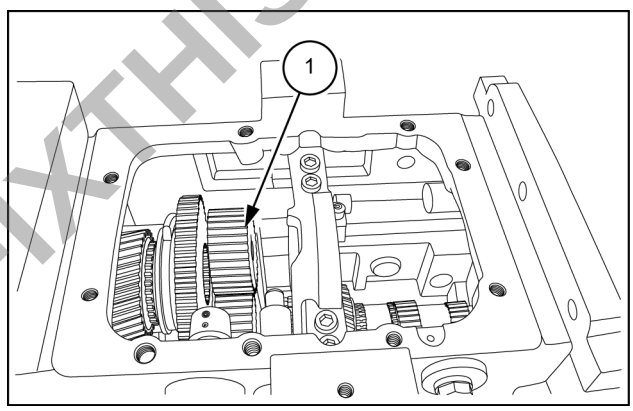
Range gear removal

1. Remove the force lubrication inlet valve **(1)** and the circlip **(2)** from the gearbox.



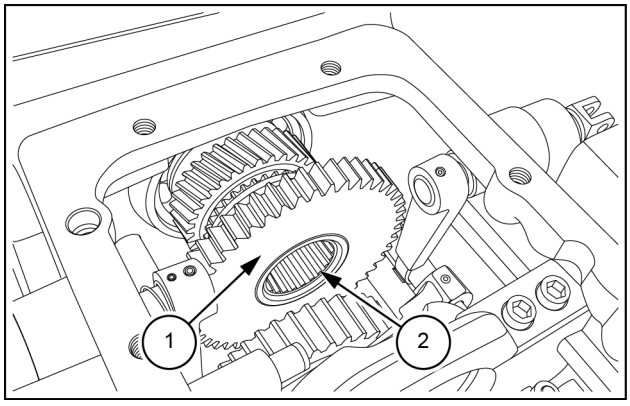
GNIL15TR00909AB 1

2. Remove the low range drive gear **(1)**, washer from the gearbox.



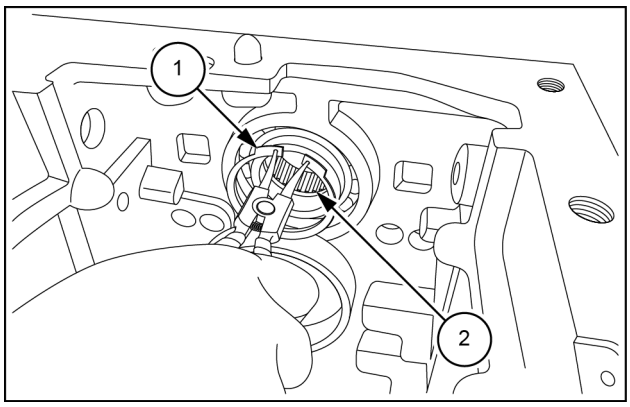
GNIL15TR00910AB 2

3. Remove the high range drive gear **(1)** with needle bearing **(2)** from the gearbox.



GNIL15TR00911AB 3

4. Remove the circlip **(1)** from the drive low gear **(2)**.

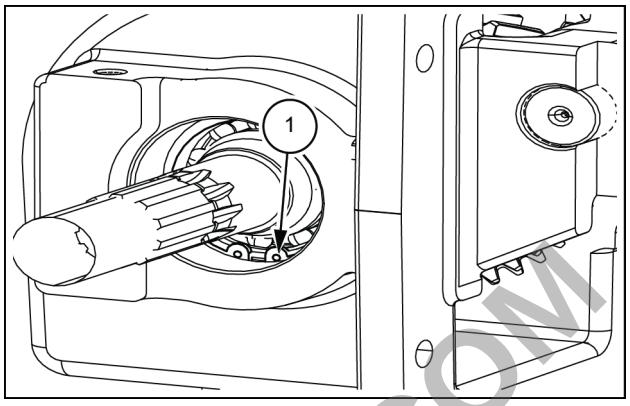


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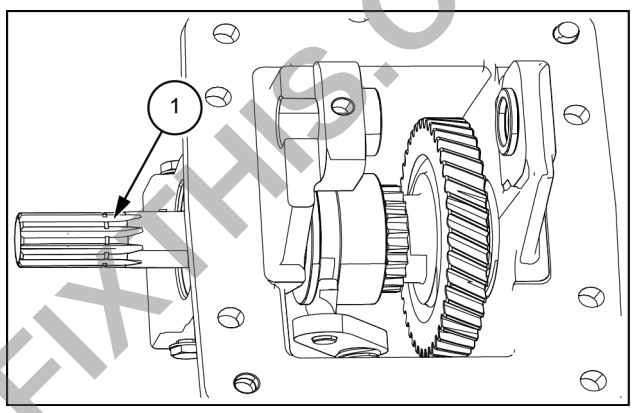
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9. Remove the circlip **(1)** from output shaft **(2)**.



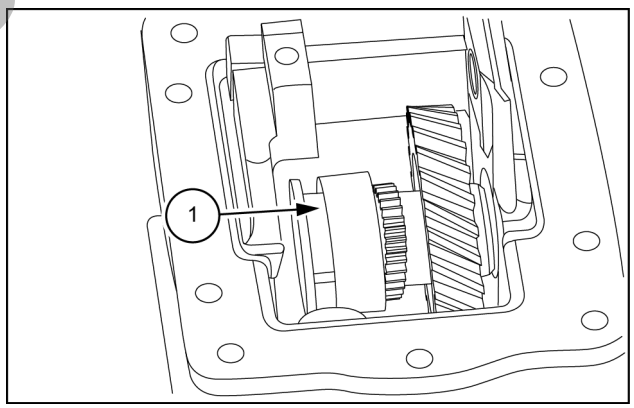
GNIL15TR00736AB 9

10. Remove output shaft **(1)**.



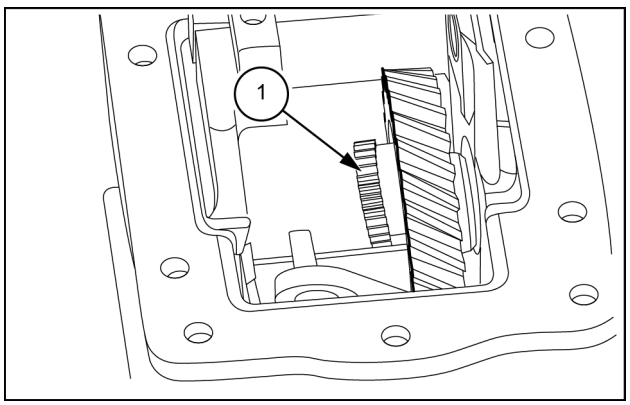
GNIL15TR00737AB 10

11. Remove out the gear coupler **(1)**.



GNIL15TR00738AB 11

12. Remove the output shaft gear **(1)** with spacer.



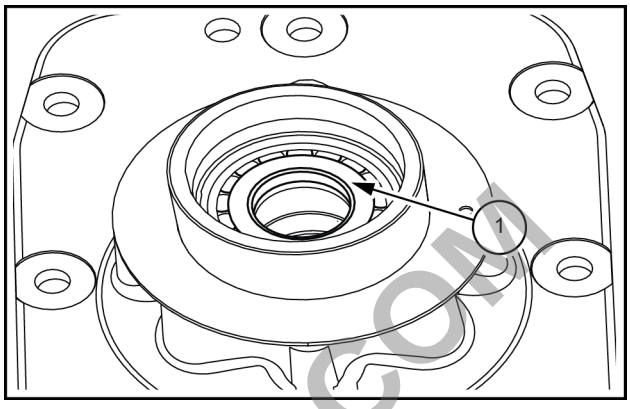
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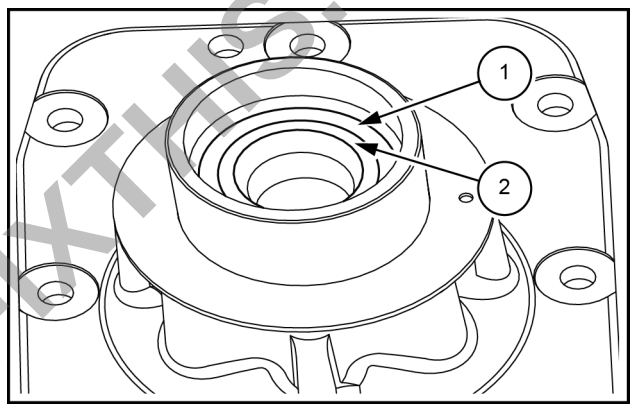
Axle pinion - Install

1. Install the inner bearing **(1)**.



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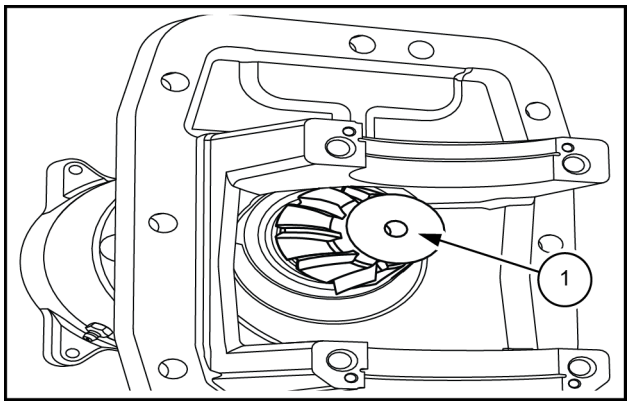
2. Install the dust cover **(1)**, and seal **(2)** from the inner bearing.



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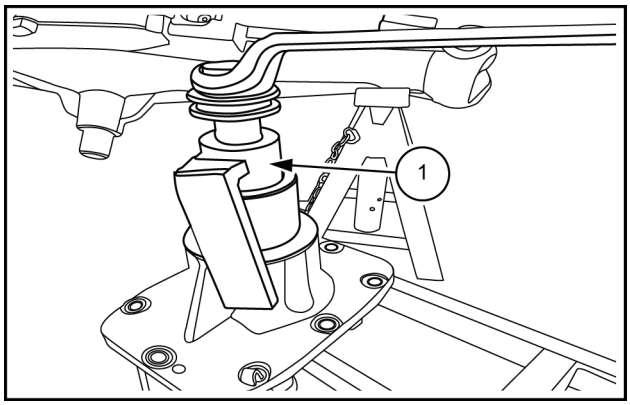
3. Install the pinion **(1)** using hammer.

NOTE: *Make sure to install the ball in the assembly, used to lock bush with the pinion shaft.*



GNIL15TR00585AB 3

4. Install the check nut by using special tool **(1)**.



GNIL15TR00584AB 4

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Rear bevel gear set and differential - Inspect

⚠ CAUTION

Pinch hazard!
Always use suitable tools to align mating parts. DO NOT use your hand or fingers.
Failure to comply could result in minor or moderate injury.

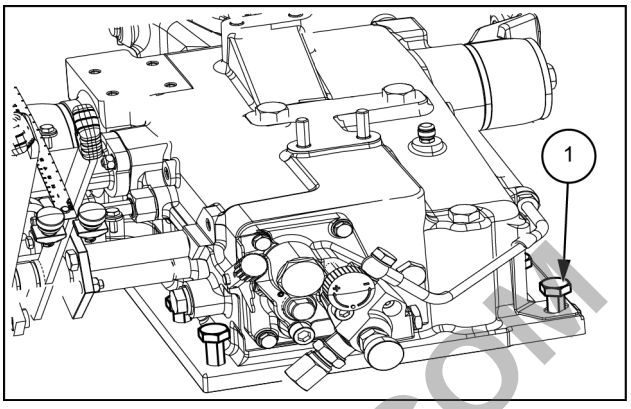
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NOTE: *Check if all parts are in good condition. Replace if any parts are found defective.*

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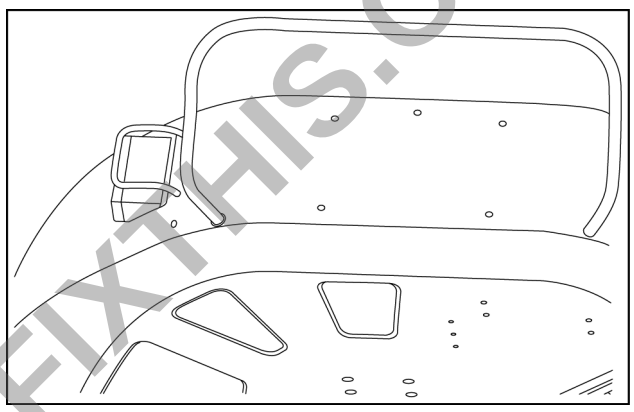
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7. Install the housing with bolts **(1)**.



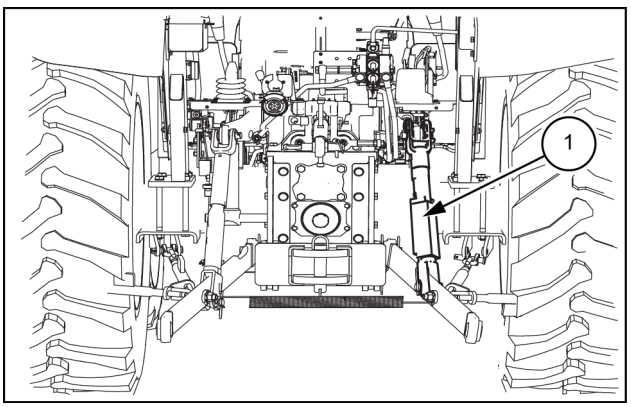
GNIL15TR00391AB 5

8. Install the following sections:
   A. Hand brake lever and cable. See the **Hand brake lever - Install (33.110)**.
   B. PTO clutch lever and cable. See the **Two-speed rear Power Take-Off (PTO) - Install (31.114)**.
   C. HLB cover. See the **Main lift system - Install (35.100)**.
   D. Rear platform. See the **Roll Over Protective Structure (ROPS) frame - Install (90.114)**.
   E. ROPS. See **Roll Over Protective Structure (ROPS) frame - Install (90.114)**.
   F. Hydraulic lines. See the **Main lift system - Install (35.100)**.
   G. Left-hand side and right-hand side fenders.



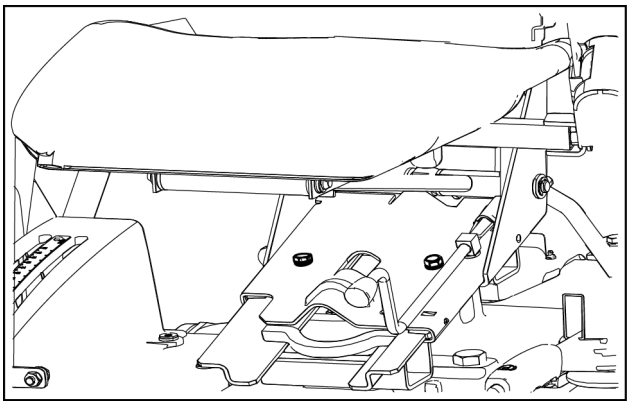
GNIL15TR00390AA 6

9. Install three point linkages **(1)** to the tractor.



GNIL15TR00389AB 7

10. Install the operator seat with the bolts **(1)**.

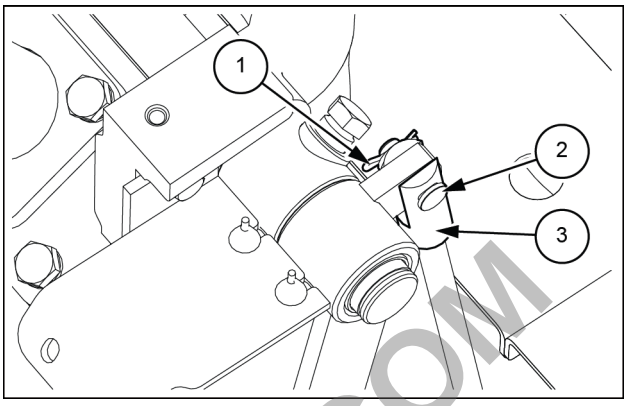


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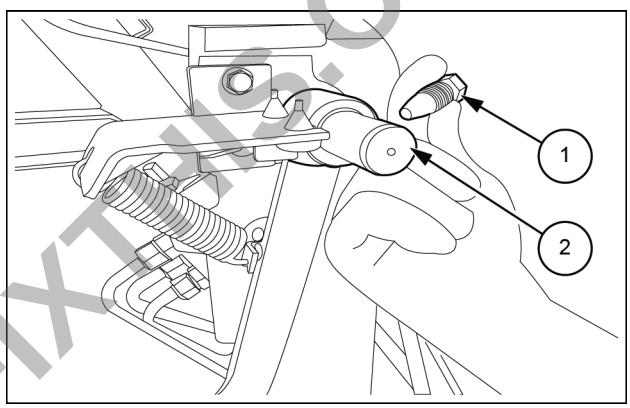
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4. Remove the split pin **(1)**.
5. Remove the pin **(2)** and disconnect the right-hand side brake link **(3)**.
6. Remove the right-hand side brake pedal.



GNIL15TR00453AB 4

7. Loosen and remove the lock bolt **(1)** and remove the left-hand side brake pedal **(2)**.



GNIL15TR00454AB 5

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SERVICE MANUAL

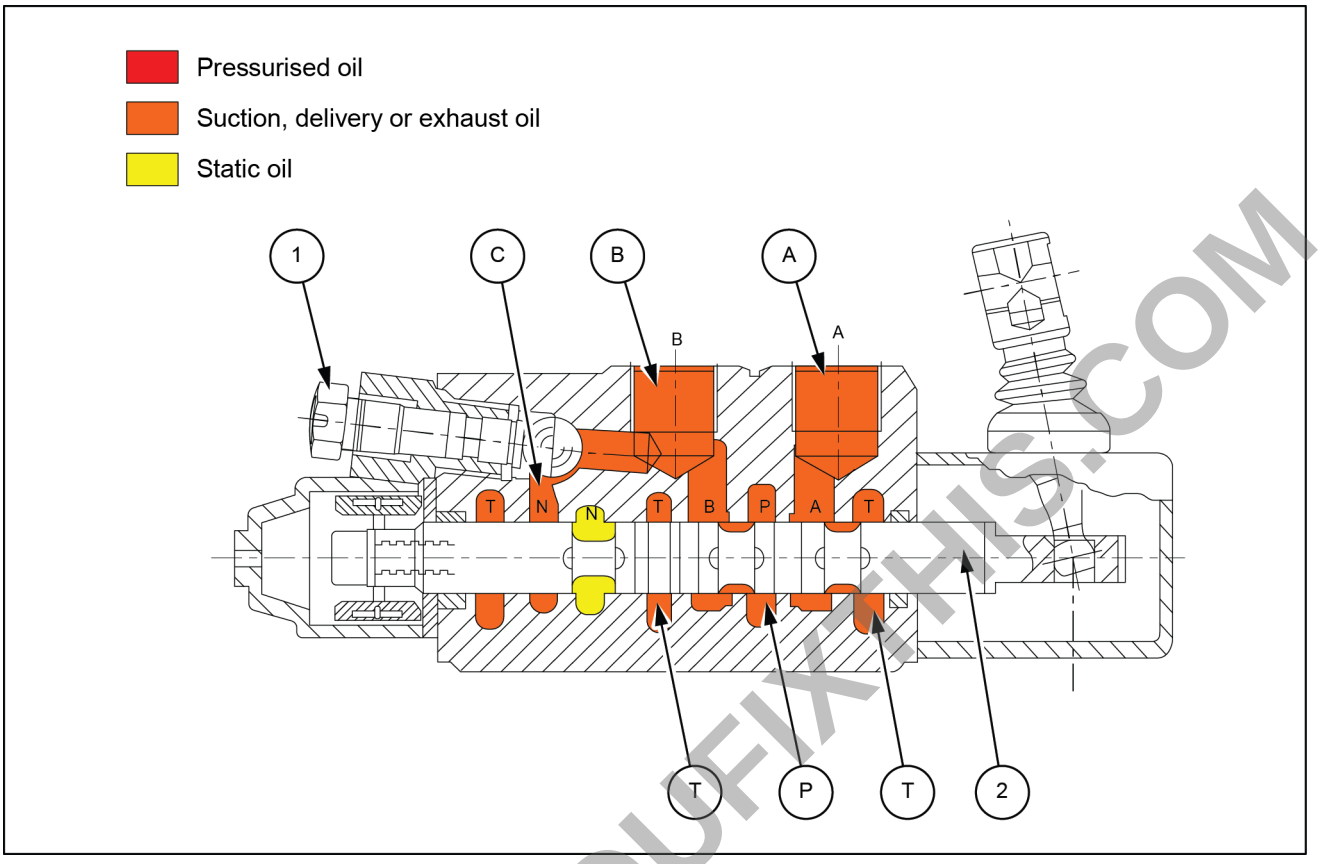
Hydraulic systems

Farmall® 80JXM
Farmall® 90JXM

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Lowering



GNIL15TR00250FB 7

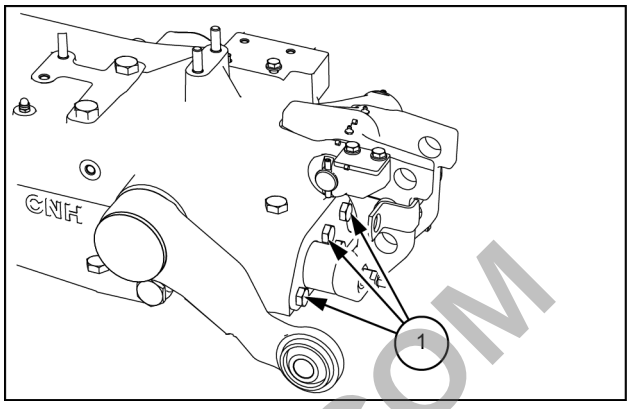
On pushing the control lever forward, the spool **(2)** will move to the position indicated in Fig. 7. The oil contained in the cylinder, pressurised by the weight of the lifted implement, will flow to the exhaust **(T)** by way of line **(A)**, while the entire flow from the pump is also conveyed to the exhaust **(T)** through the line **(B)**.

NOTE: *To operate a double-acting cylinder, tighten screw* ***(1)*** *fully home. To operate a single-acting cylinder, fully undo screw* ***(1)****.*

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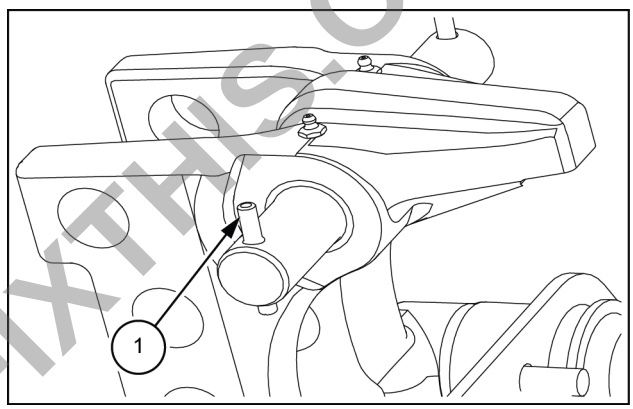
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17. Loosen and remove the bolts **(1)**.



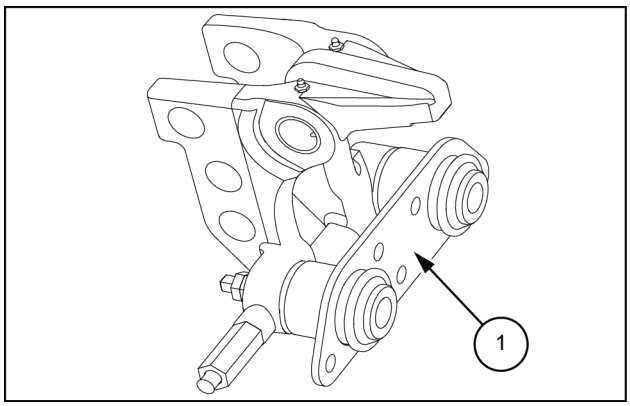
GNIL15TR00297AB 17

18. Remove the roll pin **(1)** and then the pin assembly.



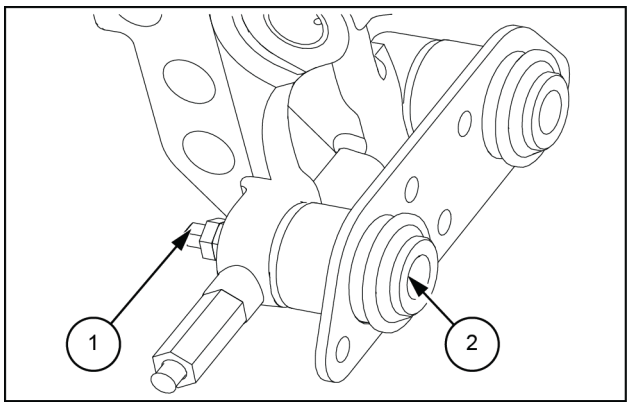
GNIL15TR00298AB 18

19. Remove the rocker bracket along with the sensing arrangement **(1)**.



GNIL15TR00299AB 19

20. Loosen and remove locknut **(1)** by holding the Allen screws **(2)** from the bottom side.



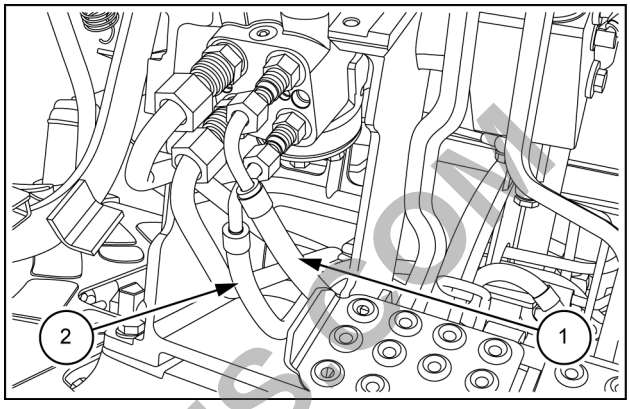
GNIL15TR00300AB 20

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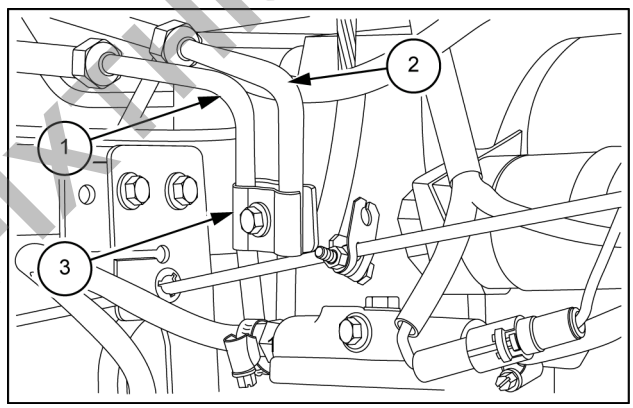
Steering control - Disconnect

1. Remove the battery. See the **Battery - Remove (55.302)**.
2. Disconnect the pipe **(1)** connecting steering motor to left-hand side front steering cylinder.
3. Disconnect the pipe **(2)** connecting steering motor to right-hand side front steering cylinder.



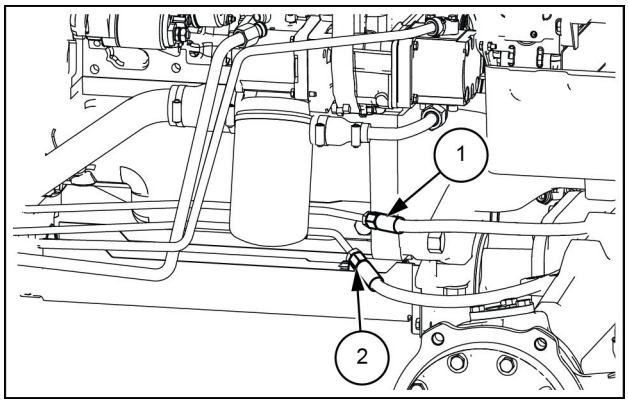
GNIL15TR01514AB 1

4. Remove the bracket **(3)** securing the power steering pipes **(1)** and **(2)**.



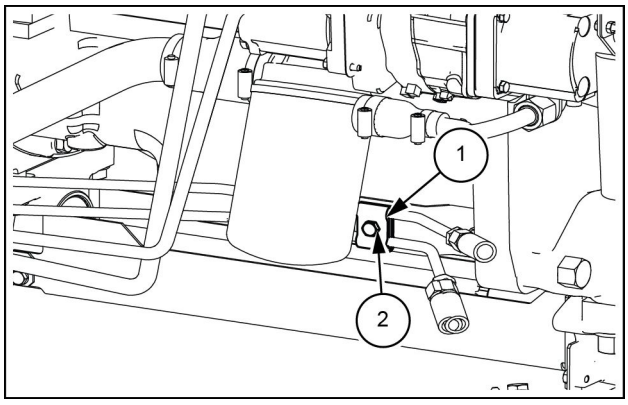
GNIL15TR01505AB 2

5. Remove the bolt **(2)** and pipe clamp **(1)** holding the power steering pipes.



GNIL15TR00762AB 3

6. Remove the bolt **(2)** and pipe clamp **(1)** holding the power steering pipes.



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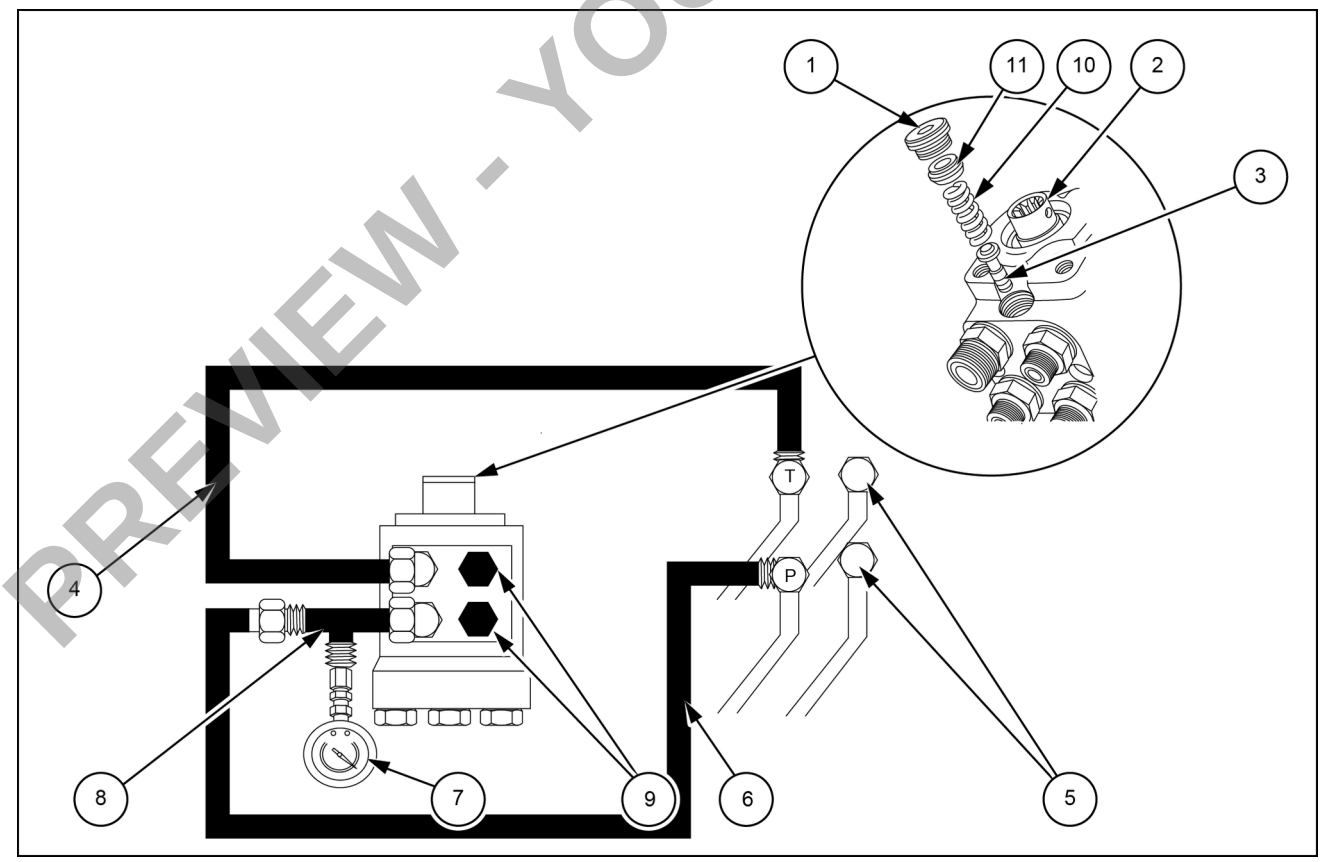
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Steering circuit relief valve - Adjust

Relief valve adjustment

NOTE: *To adjust the steering system relief valve it is necessary to remove the steering motor from the steering bracket, to gain access to the hexagon headed adjusting screw.*

1. Disconnect the steering motor from the steering bracket and remove from the tractor.
2. Fabricate suitable test hose to connect pump pipeline to steering motor. Connect locally procured 'T' joint between test hose and steering motor and install pressure gauge as shown in the figure **1**.
3. Block the plug connections to steering cylinder with suitable blanking cap.
4. Connect the return hose normally. If required connect with extra hose and suitable adopter.
5. Start the engine and idle between **1450 - 1500 RPM**. Run the tractor until the transmission oil reaches normal working temperature.
6. With the engine running, turn the steering motor shaft to obtain full lock. The pressure gauge reading should read **120 bar** (**1740 psi**).
7. If the pressure readings are not correct, reset the adjuster **(11)**, using an **8.000 mm** (**0.315 in**) hexagon key.



GNIL14TR04486FB 1

1. Plug
2. Steering shaft
7. Pressure gauge 0-5000 lbf.in2
8. Swivel running Tee

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Fuse and relay box - General specification

Six fuses housed in the fuse box.		
Sl.No.	**Protected circuit**	**Ampere**
1.	Brake switch	**25 A**
2.	Lamp	**20 A**
3.	Horn	**20 A**
4.	Accessories	**20 A**
5.	Turn signal	**15 A**
6.	Plough lamp	**20 A**

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Battery - Troubleshooting

Problem	Possible Cause	Correction
Battery low or discharged	Loose or worn out alternator drive belt	Check and adjust tension or renew
	Defective battery, do not accept or hold charge	Check the condition of the battery or renew
	Excessive resistance due to loose charging system connections	Check, clean and tighten connections
	Defective voltage regulator / alternator	Check and renew

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3. Install the fuel tank. See the **Fuel tank - Install (10.216)**.

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