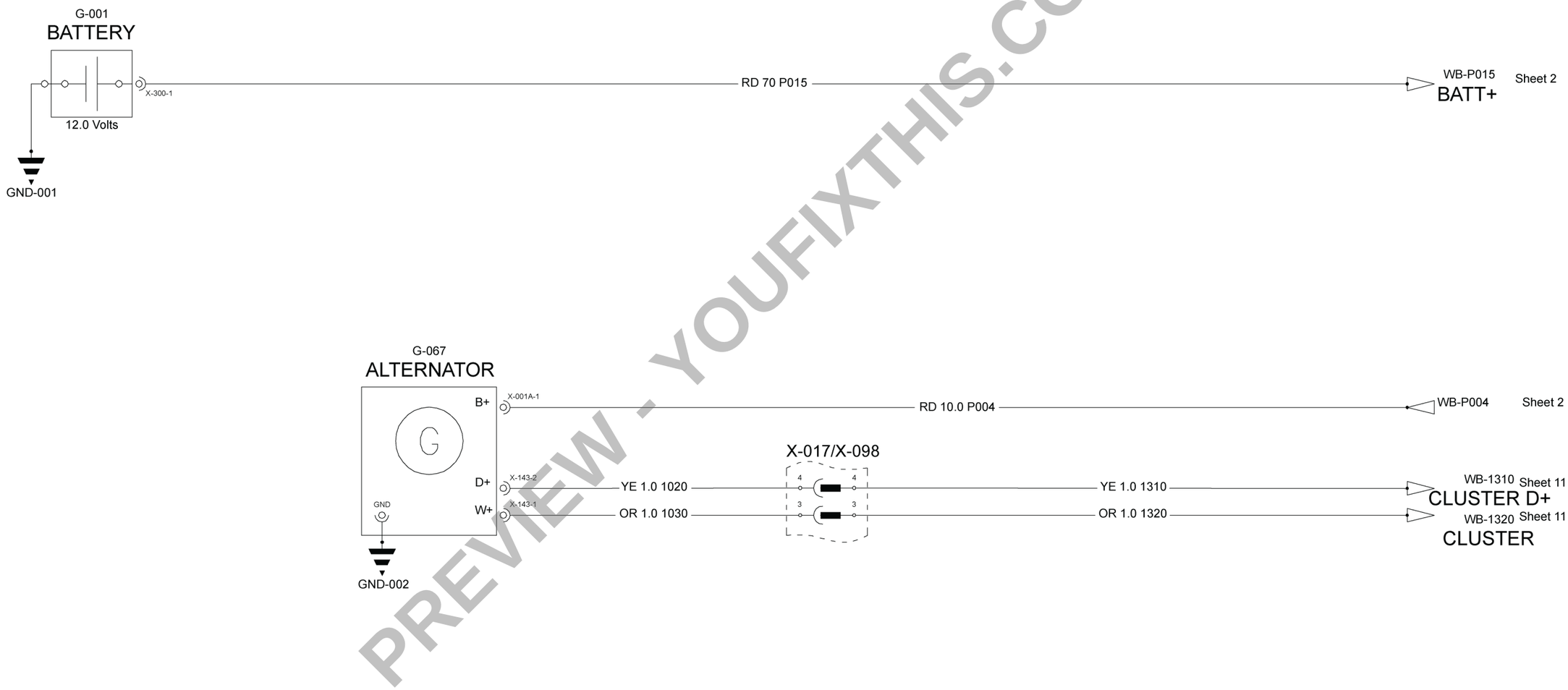
POWER DISTRIBUTION / CHARGING SYSTEM

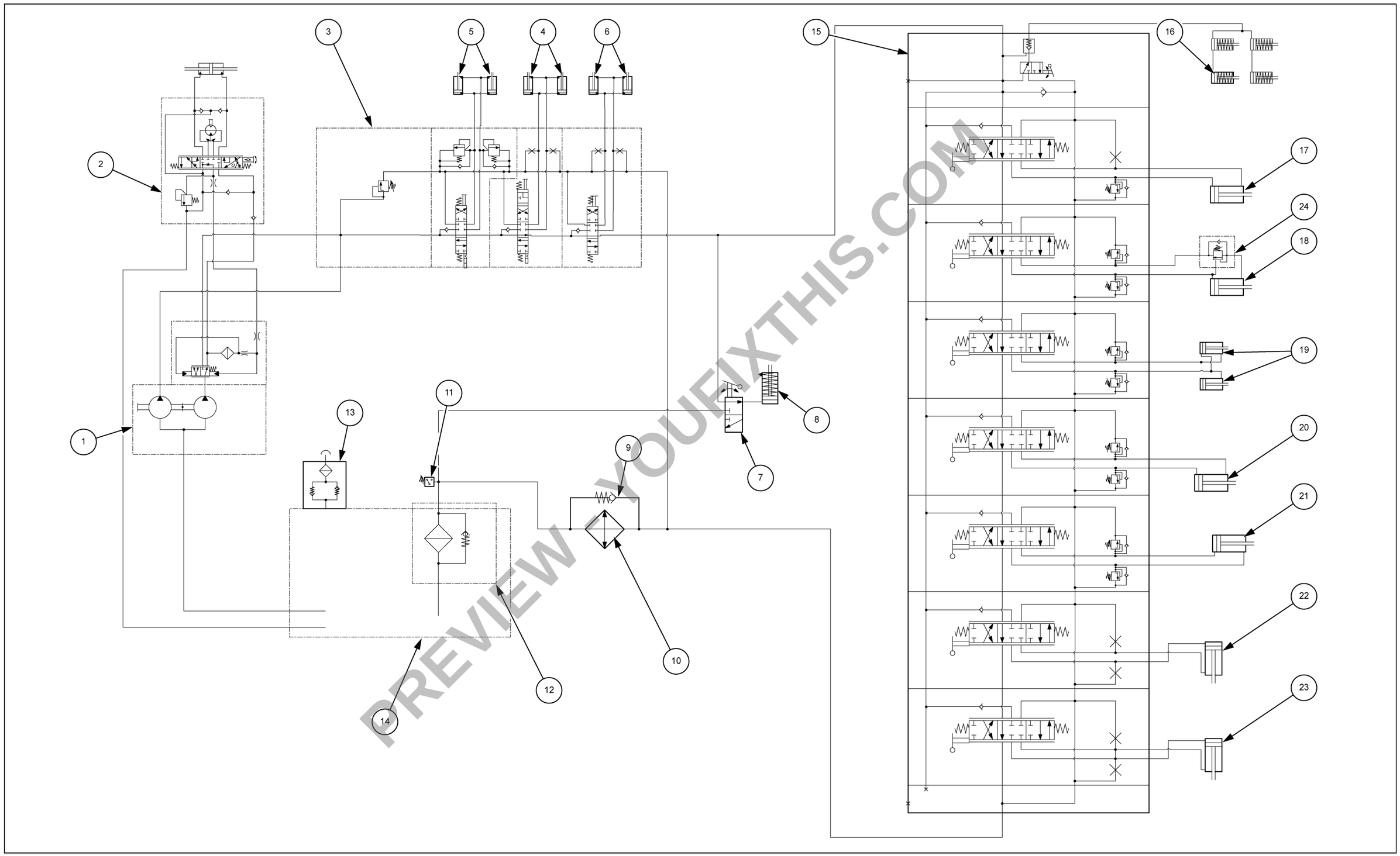


SHEET 1

PTIL13TLB0158JB 1

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Engine - General specification

Engine - Torque

Tightening torques

Description	Thread size	Torque	Angle
Capscrew, cylinder head (C1)	**M12 x 1.25**	**40 N·m (354 lb in)**	130°±5 + 140°± 5
Capscrew, main bearing caps (C2)	**M14 x 1.25**	**80 N·m (708 lb in)**	90°
Capscrew, timing cover and case (C3)	**M12 x 1.25**	**40 N·m (354 lb in)**	-
Capscrew, connecting rod caps (C4)	**M11 x 1.25**	**40 N·m (354 lb in)**	60°
Capscrew, flywheel (C5)	**M12 x 1.25**	**40 N·m (354 lb in)**	60°
Capscrew, rocker shaft bracket (C6)	**M8 x 1.25**	**25 N·m (221 lb in)**	-
Nut, crankshaft pulley hub (C7)	**M30 x 1.5**	**300 N·m (2655 lb in)**	-
Capscrew, fan and alternator drive pulley (C8)	**M12 x 1.25**	**49 N·m (434 lb in)**	-
Nut, injection pump shaft gear (C9)	**M12 x 1.25**	**64 N·m (566 lb in)**	-
Nuts, injection pump to support (C10)	**M12 x 1.25**	**23 N·m (204 lb in)**	-
Retaining screws, additional weights (C11)	**M12 x 1.25**	**110 N·m (974 lb in)**	-
Injector clamp nut	**M8**	**18 N·m (159 lb in)**	-
Sheet metal oil pan	**M10 x 1.25**	**35 N·m (310 lb in)**	-

Engine - Sealing

Sealants

Description	Specification
Adopter for oil filter (S1)	**LOCTITE® 270**
Adopter for tachometer cable (S2)	**LOCTITE® 243™**
Flywheel housing to engine block (S3)	**LOCTITE® 510™**
Timing gear case studs (S4)	**LOCTITE® 270**
Timing gear cover dowel pin (S5)	**LOCTITE® 270**
Starter motor to flywheel housing (S6)	**LOCTITE® 510™**
Allen plug in cylinder head thermostat housing (S7)	**LOCTITE® 243™**
Cylinder head exhaust manifold studs (s8)	**LOCTITE® 270**
Oil sump to engine block (S9)	Loctite - 5699
Silencer mounting studs on exhaust manifold (S10)	Loctite - 77164
Flywheel bolt (S11)	**LOCTITE® 243™**

Engine - Special tools

ATTENTION: *Operations described in this section of the manual must be performed using the following tools to work safely and achieve the best technical results.*

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Capacities

S.N.	Usage	Specification	Brand	Capacity
1	Transmission oil 2WD	SAE 15W30	CASE TRANSPOWER	**16.00 l** (**4.23 US gal**)
2	Transmission oil 4WD	SAE 15W30	CASE TRANSPOWER	**18.50 l** (**4.89 US gal**)
3	Rear axle oil	**SAE 30**	CASE AXLPOWER	**17.10 l** (**4.52 US gal**)
4	4WD front axle oil	**SAE 30**	CASE AXLPOWER	**9.00 l** (**2.38 US gal**)
5	Engine oil - BS III	**API CI4**, **SAE 15W-40**	Servo Pride Supreme	**11.00 l** (**2.91 US gal**)
6	Brake fluid	**ISO 7308**	Servo Transtrac HVI	**0.67 l** (**0.18 US gal**)
7	Hydraulic oil	**ISO VG-68** IS:10522	CASE HYDRAPOWER	Tank: **65 l** (**17.17 US gal**) System: **65 l** (**17.17 US gal**) Total: **130 l** (**34.34 US gal**)
8	Coolant	-	COOL POWER	**20 l** (**5.28 US gal**)
9	Grease	EP GREASE GRADE 2 (IS:7623)	ServoGem EP2	**1.7 kg** (**3.75 lb**)
10	GREASE (front axle), qty. - 1OZ, #2 MOLYDISULFIDE	MAT3550 GR C	Petronas	**0.532 kg** (**1.1 lb**)
11	Refrigerant	HFC-134a	-	-
12	PAG oil (Compressor)	SP-15	-	**270.0 - 300.0 mL** (**9.1 - 10.1 US fl oz**)

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Engine - Troubleshooting

NOTE: *The following table lists problems and their possible causes with recommended remedial action.*

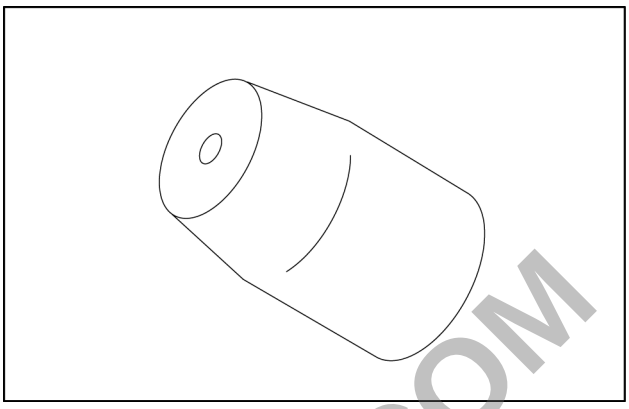
ATTENTION: *When attending a repair the cause of the problem must also be investigated and corrected to avoid repeat failures.*

Problem	Possible Cause	Correction
Engine does not develop full power	Clogged air cleaner	Clean or renew element
	Fuel line obstructed	Clean
	Faulty injectors	Clean and reset
	Incorrect valve clearance adjustment	Clean and reset
	Burnt, worn or sticking valves	Replace valves with new or oversize, and/or machine the valve guide bores
	Blown head gasket	Check head flatness and fit new gasket
	Incorrect fuel delivery	Check injectors and pump
	Low cylinder compression	Renew piston rings or re-bore/re-sleeve as necessary
Oil pressure warning light fails to operate	Bulb burnt out	Renew bulb
	Warning Light pressure switch faulty	Renew pressure switch
	Warning light circuit faulty	Check and renew wiring
Excessive exhaust smoke	Exhaust leak on exhaust manifold	Fit new gasket
	Air cleaner dirty or restricted	Clean
	Excessive fuel delivery	Overall injection pump and injectors
Engine knocks	Diluted or thin oil	Check crankshaft bearings for damage, change as required. Drain and refill with specified oil and renew filter. Ascertain cause of dilution
	Insufficient oil supply	Check oil level and top up as necessary. Overhaul or renew pump as necessary. Check oil filter is not clogged
	Low oil pressure	Overhaul pump or relief valve as necessary
	Excessive crankshaft end play	Replace thrust washer
	Excessive connecting rod or main	Install new bearing inserts and/or bearing clearance re-grind crankshaft
	Bent or twisted connecting rods	Renew connecting rods
	Crankshaft journals out of round	Re-grind crankshaft and fit undersize bearing inserts
	Excessive piston to cylinder	Re-bore/re-sleeve block and fit i bore clearance new pistons
	Excessive piston ring clearance	Fit new pistons and rings
	Broken rings	Fit new rings, check bore and pistons for damage
	Excessive piston pin clearance	Fit new piston or pin
	Piston pin retainer loose or missing	Install new retainer, and check bore/pistons for damage
	Excessive camshaft play	Install new thrust plate
	Imperfections on timing gear teeth	Renew timing gear
	Excessive timing gear backlash	Check and adjust backlash /renew, timing gear
Engine overheats	Coolant hose connection leaking or collapsed	Tighten hose connection, renew hose if damaged
	Radiator cap defective or not sealing	Renew radiator cap
	Radiator leakage	Repair/renew radiator
	Improper fan belt adjustment	Re-adjust fan belt
	Radiator fins restricted	Clean with compressed air
	Faulty thermostat	Renew thermostat
	Internal engine leakage	Check for source of leakage. Renew gasket or defective parts
	Water pump faulty	Overhaul water pump

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380200413 Protection



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Power shuttle transmission - Speeds – Stall test check sheet

Check sheet

Results from stall test procedure (fill in the values accordingly)		
ID	**RPM Test Value**	**Stall test component (specified value)**
1		Loader hydraulic stall speed (**2225 - 2325 RPM**)
2		Backhoe hydraulic stall speed (**1290 - 1360 RPM**)
3		Torque converter stall speed (**2000 - 2150 RPM**)
4		Combined - loader hydraulic and torque converter - stall speed (**1350 - 1550 RPM**)

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[35.723] Front loader bucket hydraulic system 35.7
[35.726] Excavator and backhoe hydraulic controls 35.8
[35.736] Boom hydraulic system 35.9
[35.737] Dipper hydraulic system 35.10
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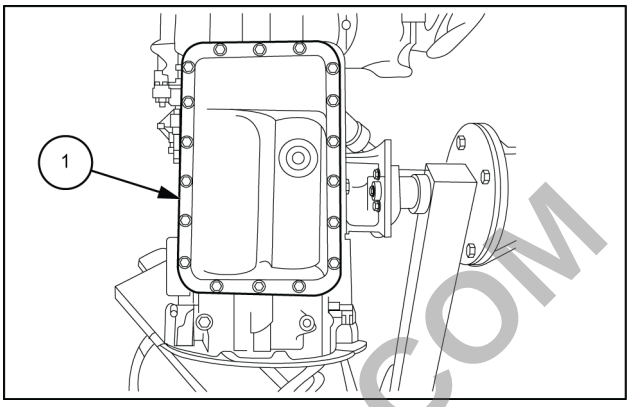
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Engine oil pan - Remove

NOTE: *It is necessary to move the front support forward a few inches to allow removal of the oil sump.*

1. Drain engine oil through oil sump plug and remove dip stick.
2. Remove oil sump bolts **(1)** including those through the timing cover and lower the sump to ground.



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Engine - 10

Lift pump and lines - 210

570T

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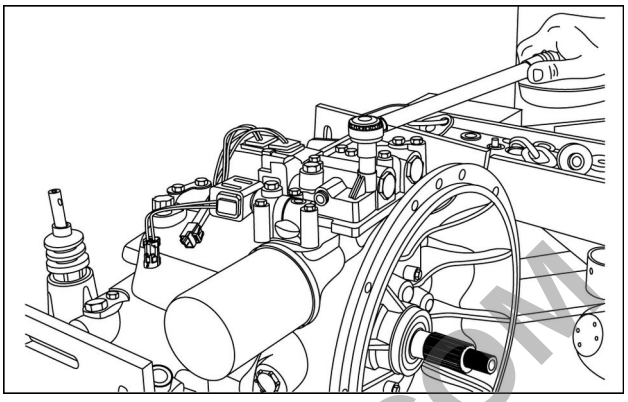
Power shuttle transmission - Pressure test – 2 wheel drive, test two - Engine at 2200 rpm

Test port	Item	Specifications - 2 wheel drive	Actual
1 and 2	Supply pump flow	**62 - 70 l/min** (**16.4 - 18 US gpm**) at **1379 kPa** (**200 psi**) **14 bar** (**203 psi**) at **49 °C** (**120 °F**)	
1 and 2	Cold oil bypass	**3034 - 3310 kPa** (**440 - 480 psi**) **30.9 - 33.7 bar** (**448 - 489 psi**) at **49 °C** (**120 °F**)	
Forward			
9	Pump supply pressure	**1586 - 1655 kPa** (**230 - 240 psi**) **16.2 - 16.9 bar** (**235 - 245 psi**)	
4	Regulated clutch pressure	**1276 - 1317 kPa** (**185 - 191 psi**) **13 - 14.1 bar** (**188 - 204 psi**)	
6	Torque converter IN	**827 - 965 kPa** (**120 - 140 psi**) **8.4 - 9.8 bar** (**122 - 142 psi**)	
7	Torque converter OUT	**434 - 455 kPa** (**63 - 66 psi**) **4.4 - 4.6 bar** (**64 - 67 psi**)	
8	Lubrication pressure	**290 - 303 kPa** (**42 - 44 psi**) **3 - 3.1 bar** (**44 - 45 psi**)	
Neutral			
9	Pump supply pressure	**862 - 965 kPa** (**125 - 140 psi**) **8.8 - 9.8 bar** (**128 - 142 psi**)	
6	Torque converter IN	**724 - 862 kPa** (**105 - 125 psi**) **7.4 - 8.8 bar** (**107 - 128 psi**)	
7	Torque converter OUT	**483 - 503 kPa** (**70 - 73 psi**) **4.9 - 5.3 bar** (**71 - 77 psi**)	
8	Lubrication pressure	**414 - 434 kPa** (**60 - 63 psi**) **4.2 - 4.4 bar** (**61 - 64 psi**)	
Reverse			
9	Pump supply pressure	**1585 - 1627 kPa** (**230 - 236 psi**) **15.9 - 16.6 bar** (**231 - 241 psi**)	
5	Regulated clutch pressure	**1276 - 1379 kPa** (**185 - 200 psi**) **13 - 14.1 bar** (**188 - 204 psi**)	
6	Torque converted IN	**827 - 965 kPa** (**120 - 140 psi**) **8.4 - 9.8 bar** (**122 - 142 psi**)	
7	Torque converter OUT	**339 - 414 kPa** (**49 - 60 psi**) **4 - 4.2 bar** (**58 - 61 psi**)	
8	Lubrication pressure	**241 - 255 kPa** (**35 - 37 psi**) **2.5 - 2.6 bar** (**36 - 38 psi**)	

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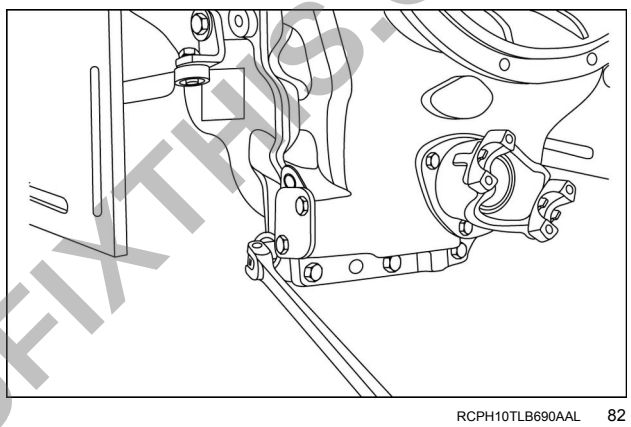
85. Install the bolts that fasten the transmission control valve to the front housing. Tighten the bolts in a pattern alternating from front to back and side to side until all the bolts are at a torque of **23 N·m** (**204 lb in**).



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NOTE: *The following photo shows the drain plug for four wheel drive machines.*

86. Install a new O-ring on the drain plug. Lubricate the O-ring with clean transmission oil. Install the drain plug. Tighten the drain plug to a torque of **80 N·m** (**59 lb ft**).

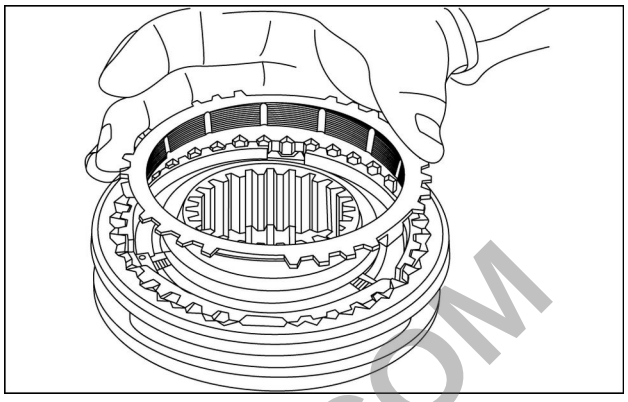


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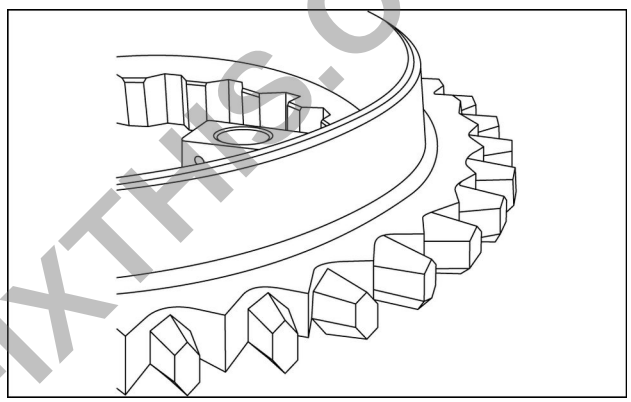
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9. Remove the tapered friction ring from each side of the synchronizer assembly.



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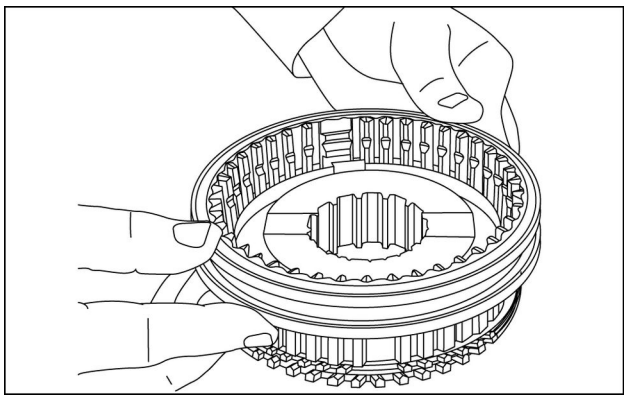
10. Inspect the clutch ring teeth for wear, wear in excess of **0.5 mm** (**0.02 in**) the ring must be replaced.



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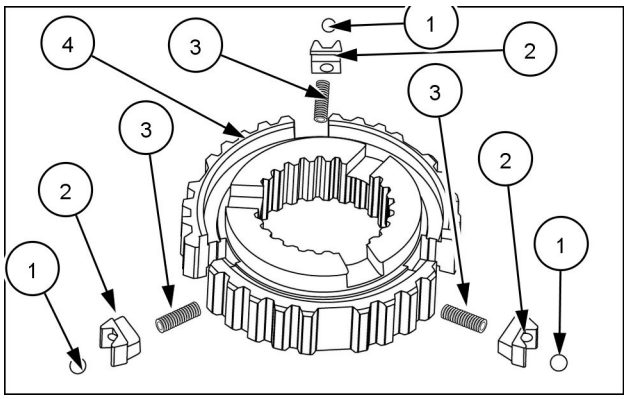
NOTE: *The parts may fly out of the hub when you do the following step. Putting the synchronizer assembly in a cardboard box during this step can prevent loss of parts.*

11. Remove the sleeve from the synchronizer hub. When the sleeve is removed from the synchronizer hub the spring plates, hub pins and hub springs will be released from the synchronizer hub. Be careful not to lose any of these parts.



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12. This photo shows the relationship of the balls **(1)**, the spring plates **(2)**, the springs **(3)**, and the hub **(4)**.



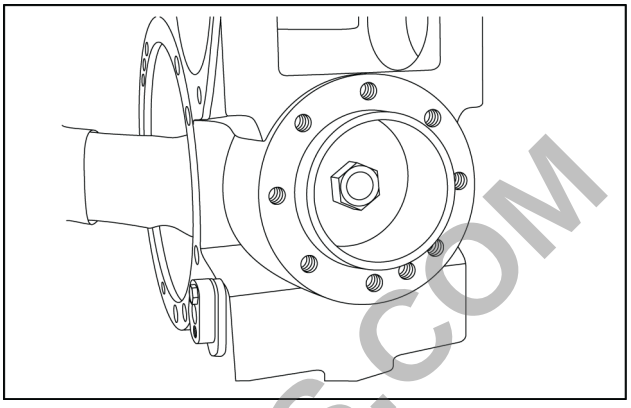
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Axle pinion - Assemble

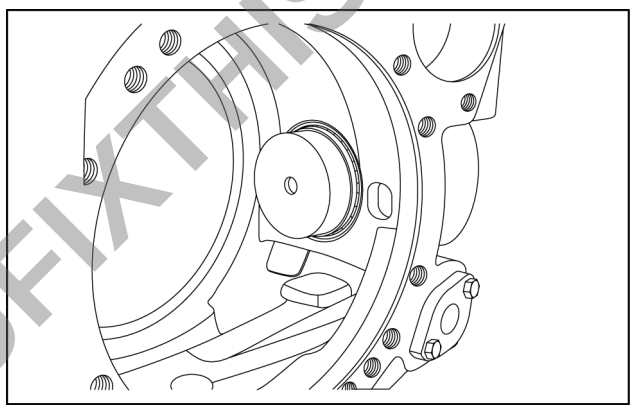
Refer **Axle pinion - Exploded view (25.102)**

1. Position the central body **(6)** on a workbench.
2. Fit the bearing cups **(3)** and **(8)** into their seats using the special tool **380002215**.



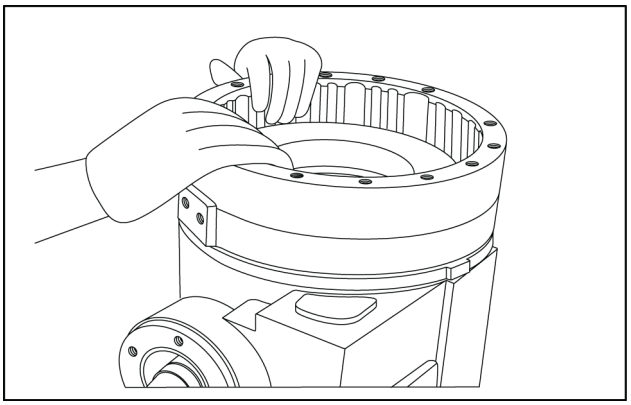
PTIL13TLB0177AA 1

3. Use the special tools false pinion and false differential box (**380002214** and **380200455**) to measure the conic distance.
4. Insert into the seats the bearing cups **(3)** and **(8)** and the false pinion. Tighten the ring nut **(10)** to eliminate the backlash.



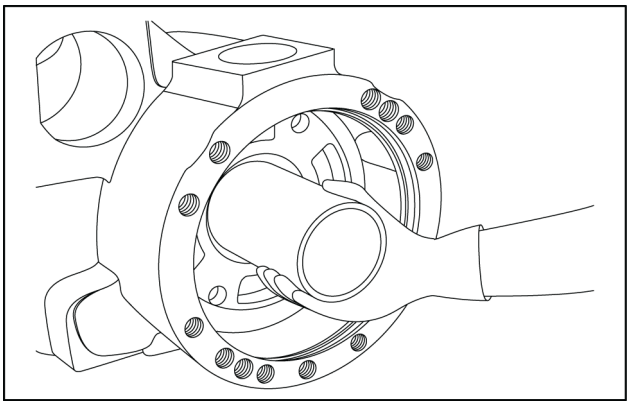
PTIL13TLB0178AA 2

5. Check the correct positioning of the right and left brake cylinder and differential housing supports, using the reference marks on them and on the central body **(6)**.
6. Assemble the two brake cylinders with their fastening bolts.



PTIL13TLB0179AA 3

7. Insert the false differential box into the central body **(6)**.
8. Check that the false differential box is inserted in both differential support housings.



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Rear axle - General specification

Technical features

Description	Values
Dry weight	**420 kg** (**926 lb**)
Bevel gear set backlash	**0.18 - 0.23 mm**
Pinion bearings pre loading (measured on D= **34.87 mm** (**1.37 in**) without seals)	P = **9.2 - 13.7 daN**
Total pinion-ring gear bearing preloading (measured on D= **34.87 mm** (**1.37 in**) without seals)	T = (P+ **3.73 daN**)–(P+ **5.55 daN**)
Oil specification: Use recommended oil enriched in additives	SAE 30
Differential oil capacity	**14.5 l** (**3.83 US gal**)
Epicyclic reduction gear oil capacity each side	**1.30 l** (**0.34 US gal**)
Type of brake	Wet discs brake
Number of brake disks each side	2
Nominal brake disk thickness	**4.80 mm** (**0.19 in**)
Maximum brake disk wearing (each disk)	**0.72 mm** (**0.03 in**)
Maximum operating pressure	**43 bar** (**624 psi**)

Rear axle - Sealing

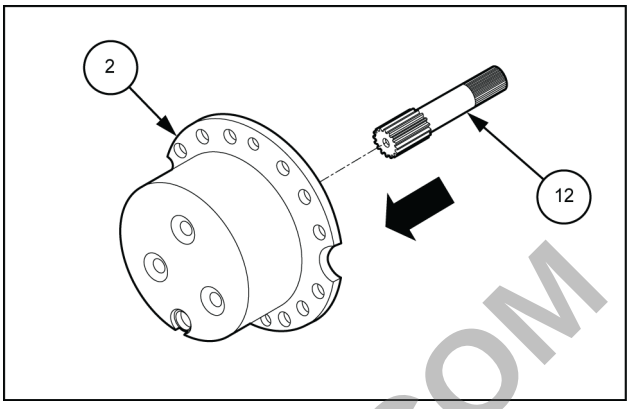
Grease application in assembly

Tecnolube® POLYMER 400	Apply on the indicated surfaces

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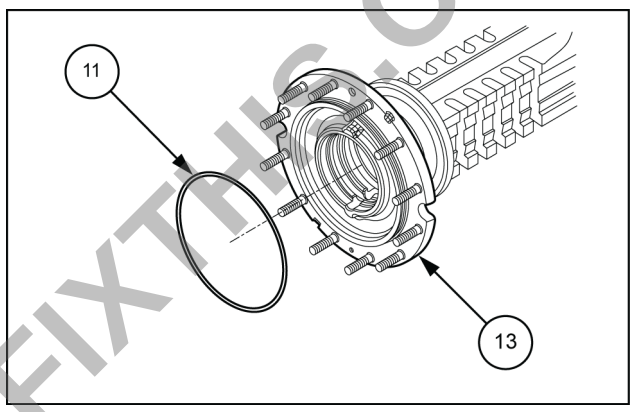
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7. Assemble the shaft **(12)** to the epicyclic reduction gear **(2)**.



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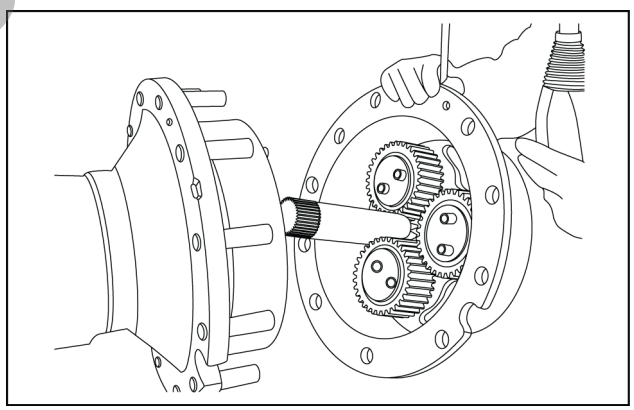
8. Assemble a new lubricated O-ring **(11)** on the wheel hub **(13)**.



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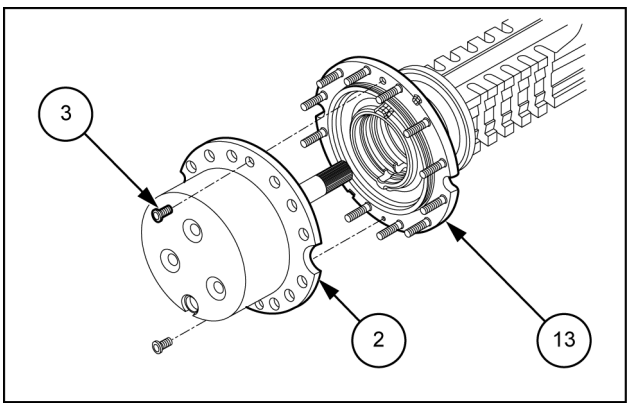
9. Align the epicyclic reduction gear group to the wheel hub **(13)** using an appropriate lifting device.

ATTENTION: *Observe all current safety regulations to guarantee operator's safety.*



PTIL13TLB0028AA 6

10. Fit the epicyclic reduction gear group to the wheel hub **(13)**.
11. Assemble the fastening screws **(3)** and tighten them to the prescribed torque.

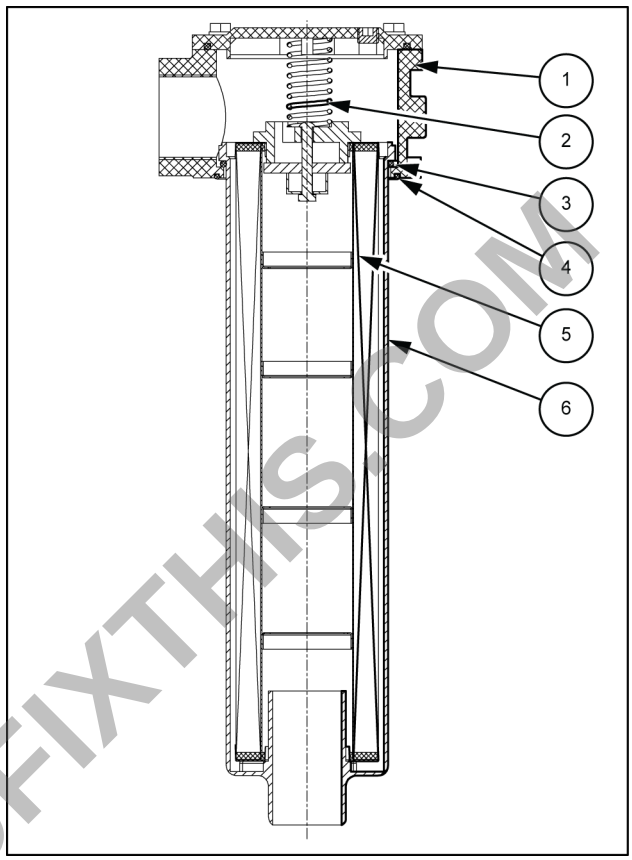


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Oil filters - Sectional view

1. Casting bowl
2. Spring
3. O-ring bowl
4. O-ring
5. Element assembly
6. Bowl

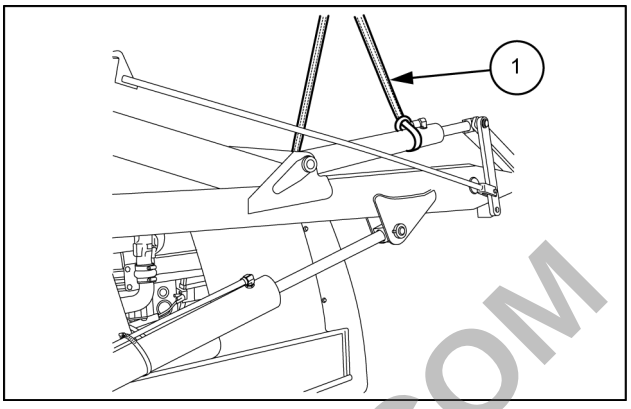


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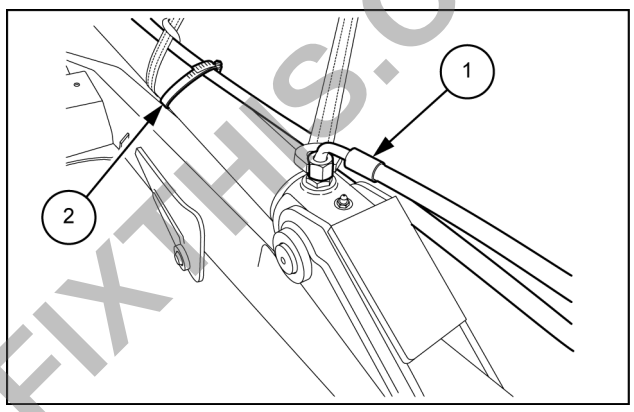
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1. Raise the loader.
2. Attach a suitable lifting device **(1)** to the loader cylinder on both sides.



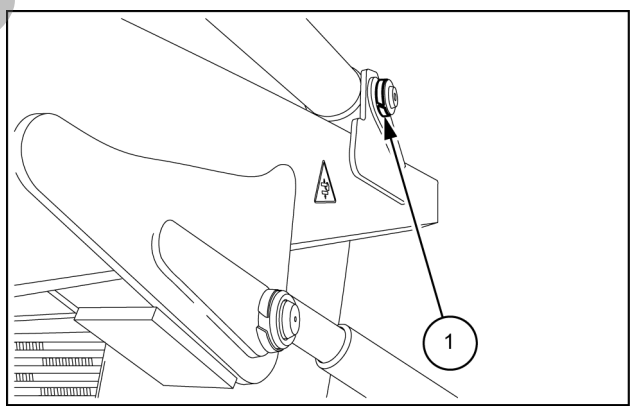
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3. Disconnect the hydraulic lines **(1)** from the cylinders and cap them immediately after removing the clamp **(2)**.



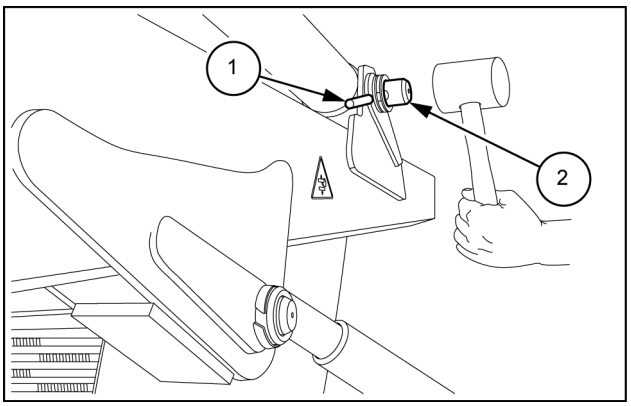
PTIL13TLB0478AB 2

4. Remove the wear ring **(1)** from both sides.



PTIL13TLB0480AB 3

5. Tap and remove the cotter pin **(1)** using a wooden hammer.
6. Now tap and remove the pivot pin **(2)** from the connecting link.



PTIL13TLB0481AB 4

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Hydraulic systems generic sub-group - Inspect – Slew cylinder

Inspection and cleaning

1. Clean all the components by using good clean cloth and hydraulic oil. Any rust on the components should be removed by smooth emery sheet.
2. Ensure that head end cover seal grooves, piston rod end threads and port threads are cleaned properly.
3. Check the piston rod for any dents, scoring lines or any other abnormalities, if found piston rod needs to be replaced.
4. Check for any scoring lines or damages in tube Id. If found tube s/a needs to be replaced.
5. Check head end cover for damages or dents. Small dents/damages can be removed by polishing.
6. However if the damages are heavy, head end cover needs to be replaced.
7. Check and ensure that port threads and piston rod threads are not damaged.
8. Once dismantled seal kit should be replaced with a new one.

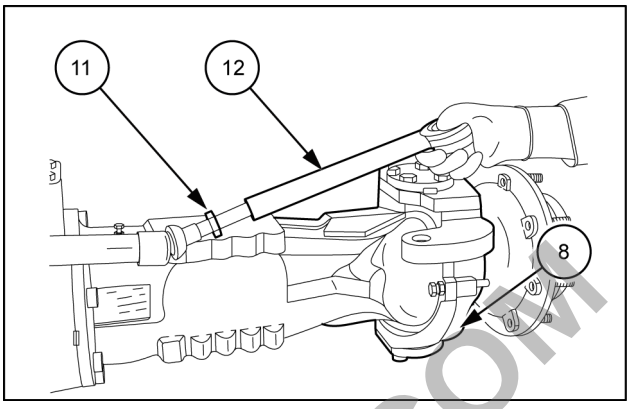
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8. Align the swivel housing **(8)** with the axle.
9. Screw the tie rod **(12)** so that its ball joint can be inserted into the swivel housing **(8)** arm.

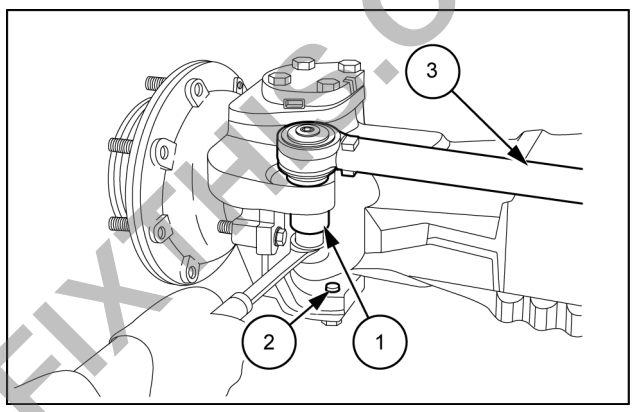
NOTE: *It is important to unscrew the lock nut* ***(11)*** *to carry out this operation.*

10. Repeat the whole sequence of the mentioned operations to the other side.



PTIL13TLB0507AB 5

11. Insert the ball joint of the tie rod **(3)** into its housing on the swivel housing **(2)**.
12. Assemble and tighten the lock nut **(1)** with a dynamo metric wrench to the prescribed torque.
13. Repeat the whole sequence of the mentioned operations to the other side.



PTIL13TLB0508AB 6

Tightening torques

S No.	Description	Tightening torque
1	Tie rod end	**165 N·m** (**122 lb ft**)
2	Ball joint	**300 N·m** (**221 lb ft**)
3	Locking nut	**120 N·m** (**89 lb ft**)
4	Screw	**120 N·m** (**89 lb ft**)

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Cab climate control - 50

Air conditioning - 200

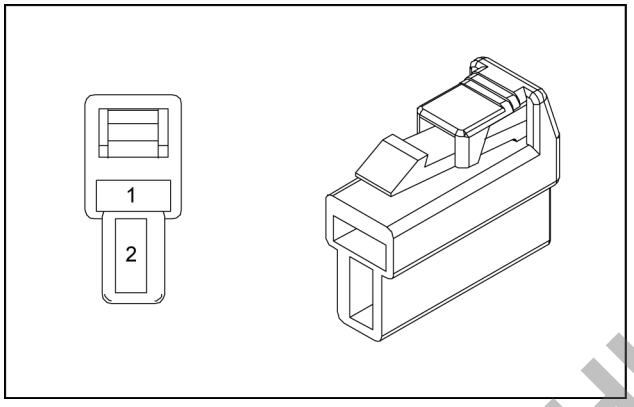
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CONNECTOR X-061 - Radio

CONNECTOR X-061 - Radio		
CAV ID	**WIRE ID**	**COLOR**
1	7040	YE
2	G194	BK



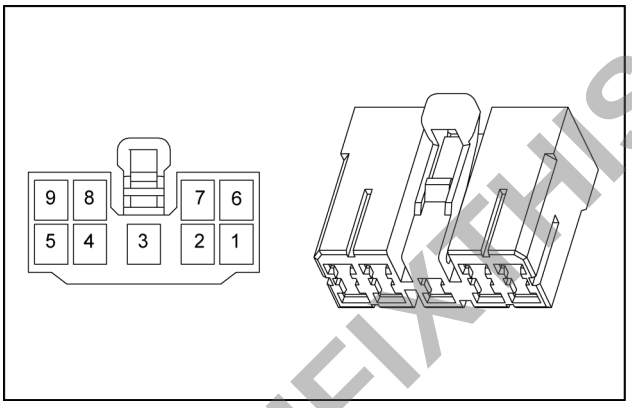
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CONNECTOR X - 113 - AC kit

CONNECTOR X - 113 - AC kit		
CAV ID	**WIRE ID**	**COLOR**
1	4030	YE
2	4040	YE
3	4050	YE
4	6103	OR
5	4070	YE
6	4080	YE
7	4090	YE
8	4100	YE
9	4110	YE

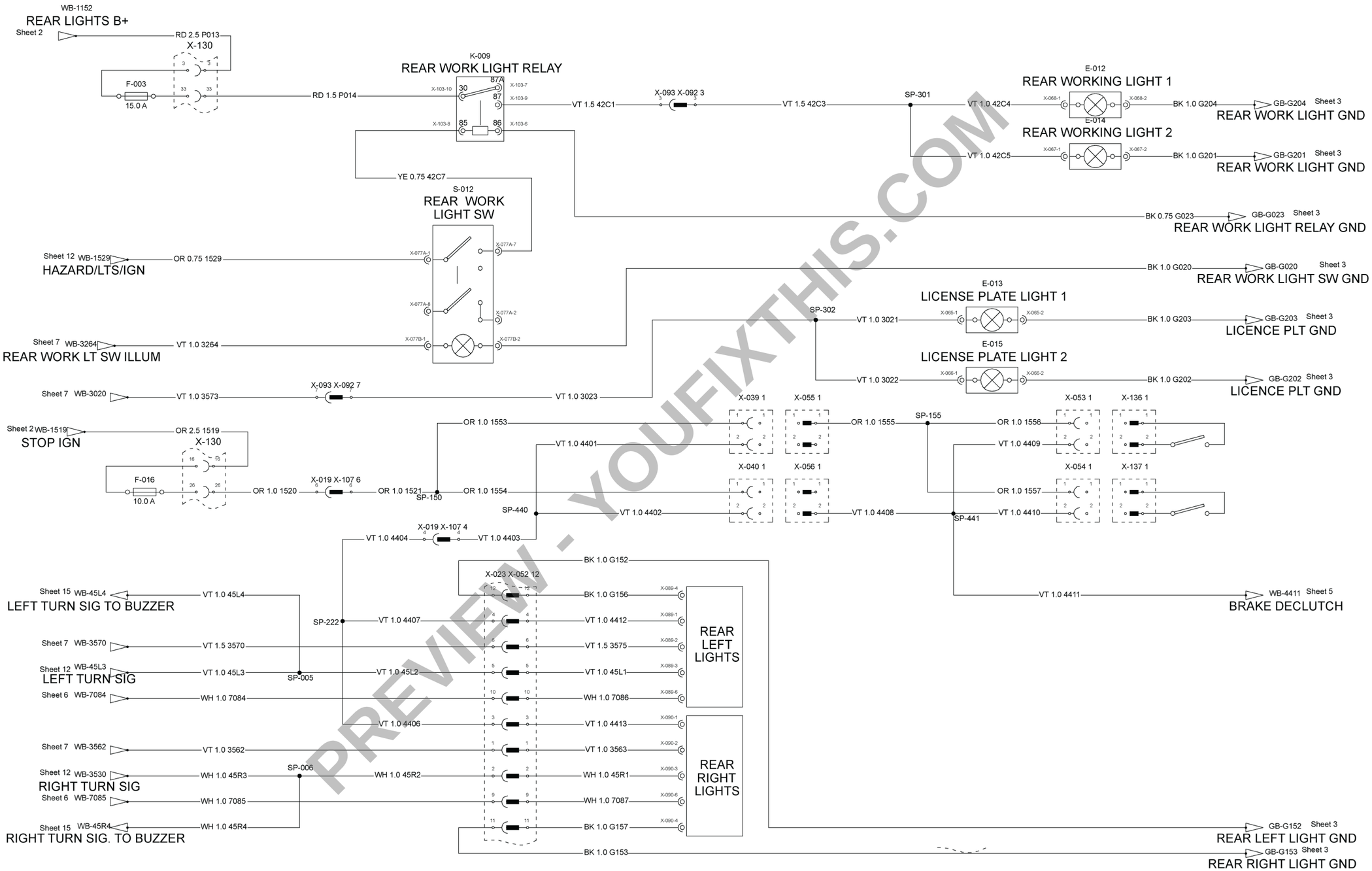


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REAR LIGHTING



SHEET 9

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