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**.

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

⚠ WARNING ⚠

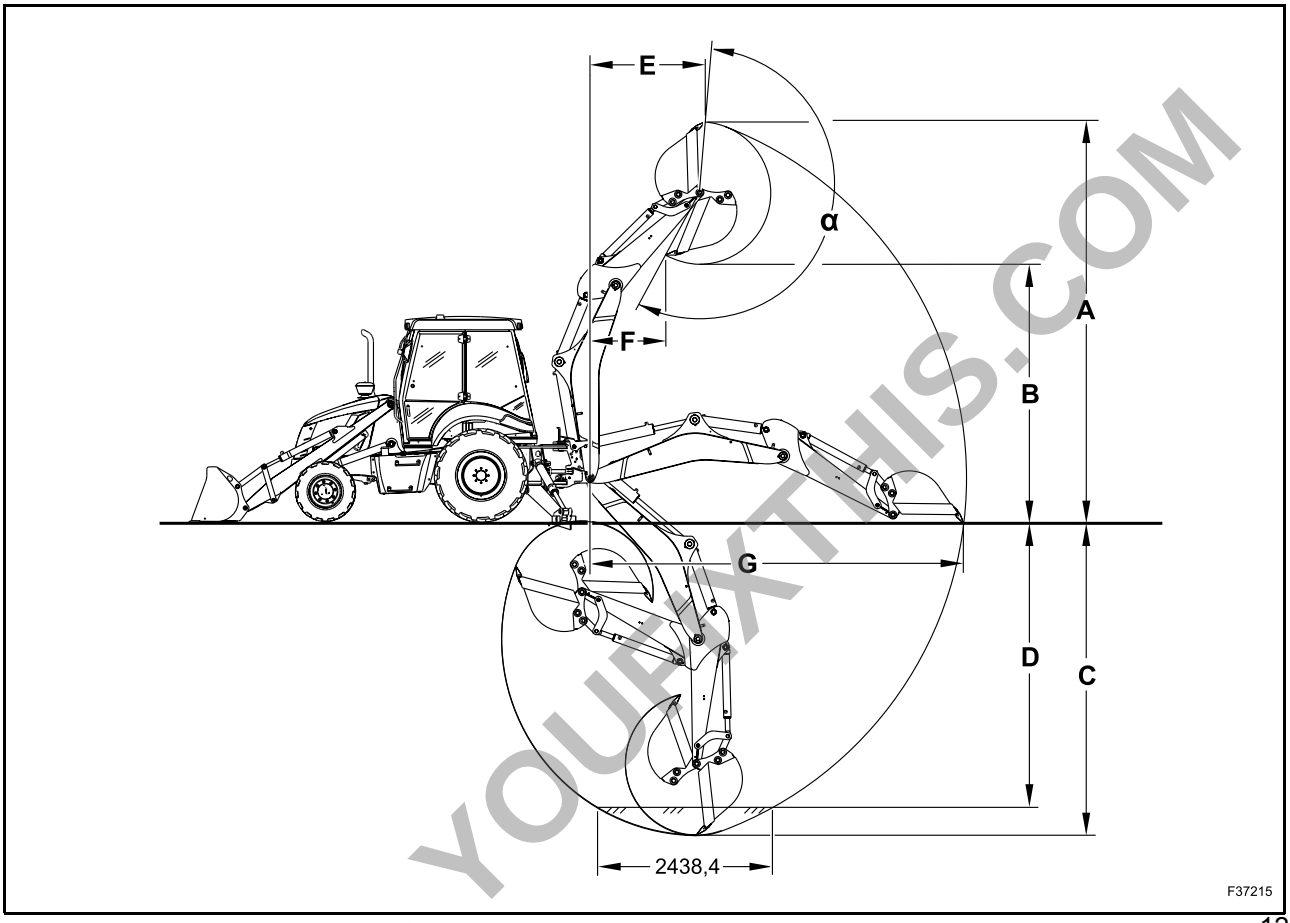
This symbol warns about the possibility of potential damages to the machine that can involve the operator's safety.

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BACKHOE ATTACHMENT PERFORMANCE

B90B AND B95B (WITH SHORT STANDARD DIPPER)



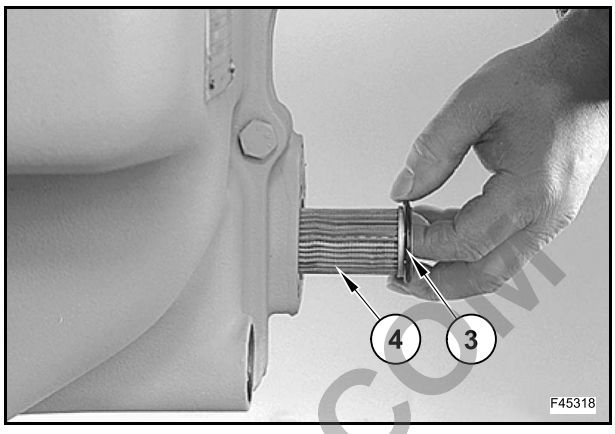
12

A. Maximum digging height
B. Maximum height at full load
C. Maximum digging depth
D. Digging depth [L = 2438.4 mm (95.99 in)]
E. Digging reach at maximum height
F. Maximum reach when loaded
G. Maximum digging reach with lowered bucket
α. Bucket digging angle

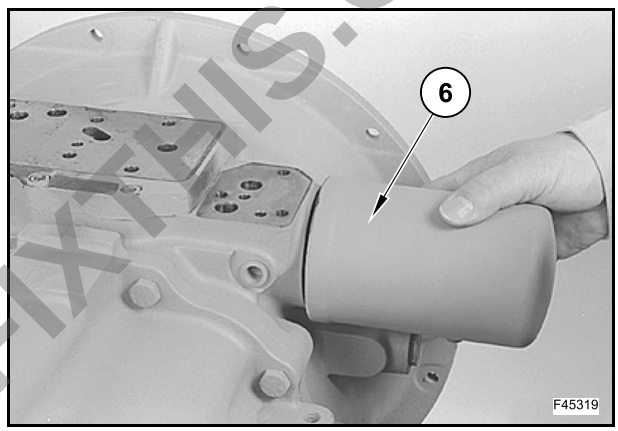
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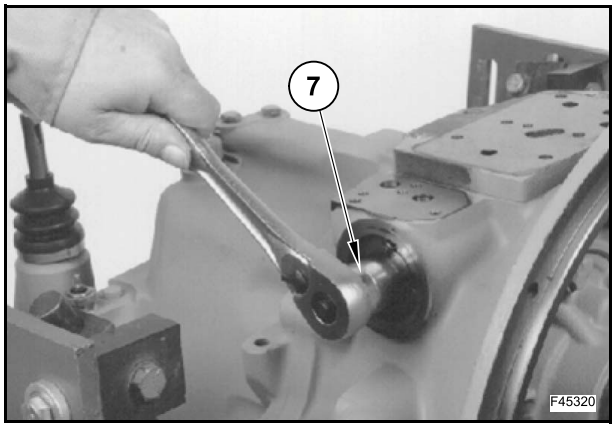
Remove the oil filter (4) and the O-ring (3).



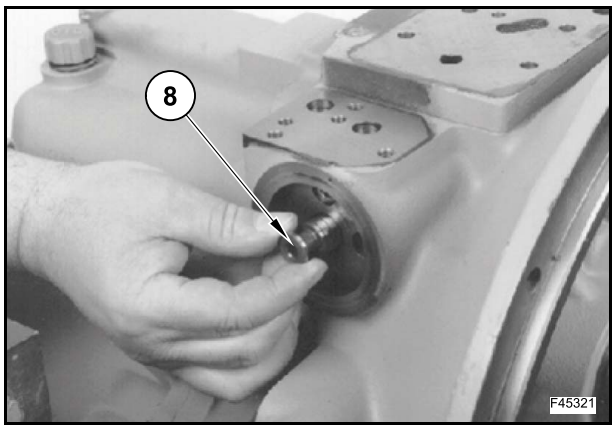
Unscrew and remove the oil filter (6).



Remove fitting (7).



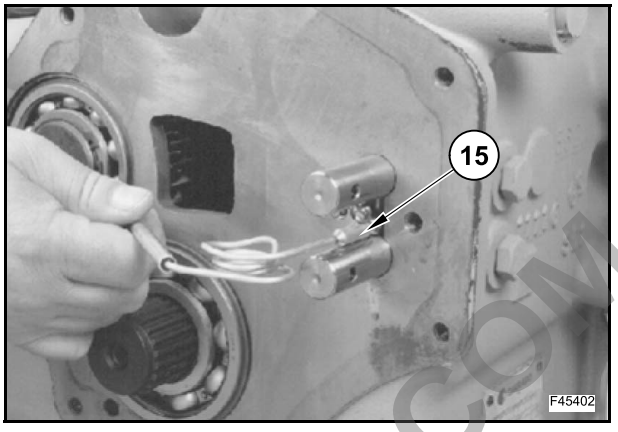
Remove the spool (8).



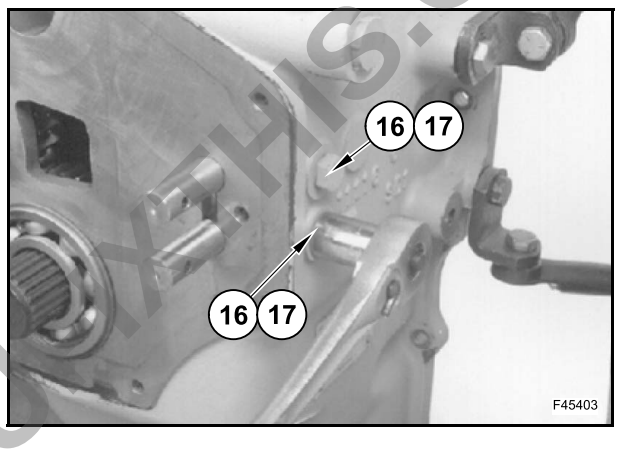
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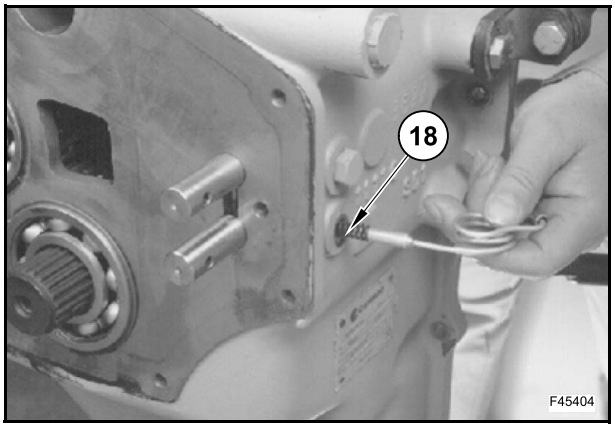
Remove the 2 balls (15).



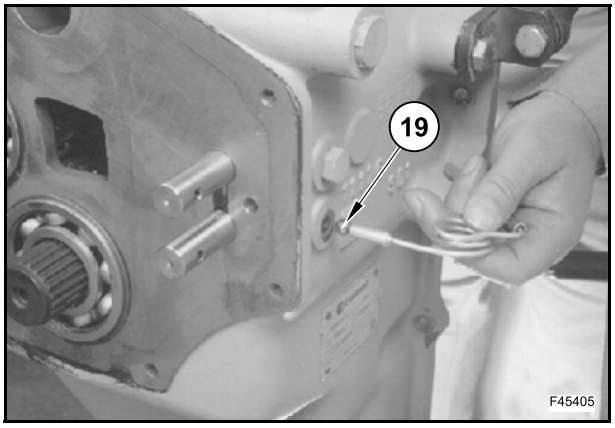
Loosen and remove the screws (16) and the washers (17).



Remove the springs (18).



Remove the balls (19).

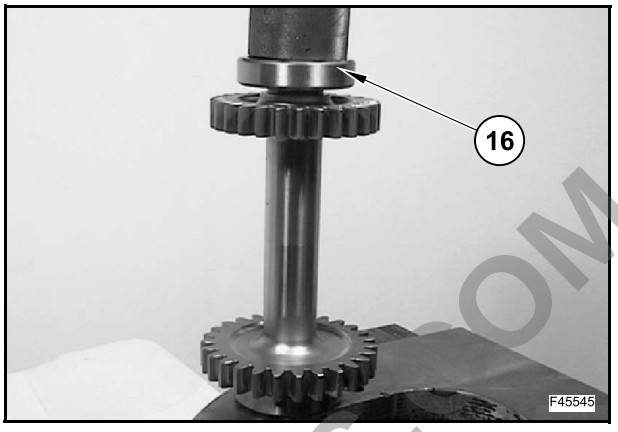


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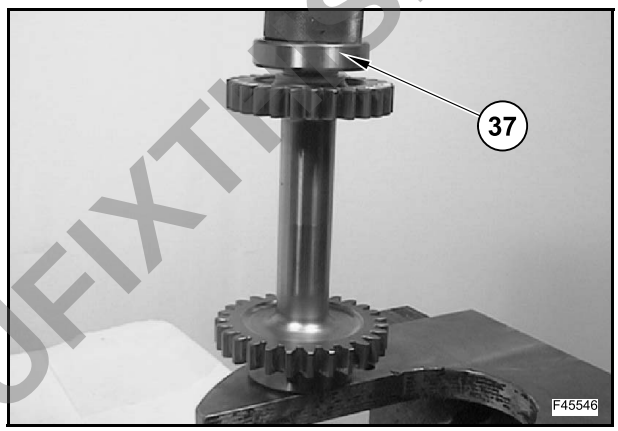
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Shaft (D)

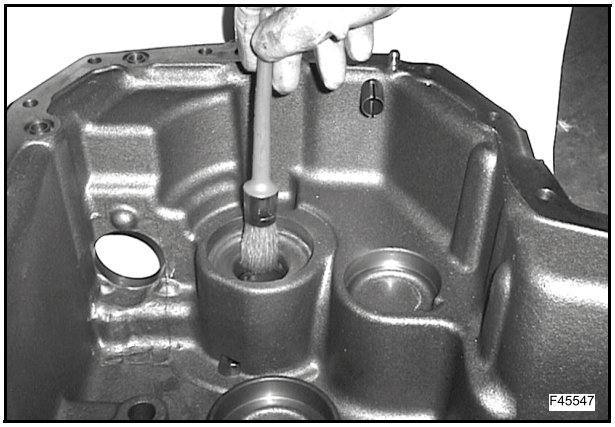
Assemble the bearing (16) on shaft (D) by means of tool 380200230.



Assemble the bearing (37) on shaft (D) by means of tool 380200230.

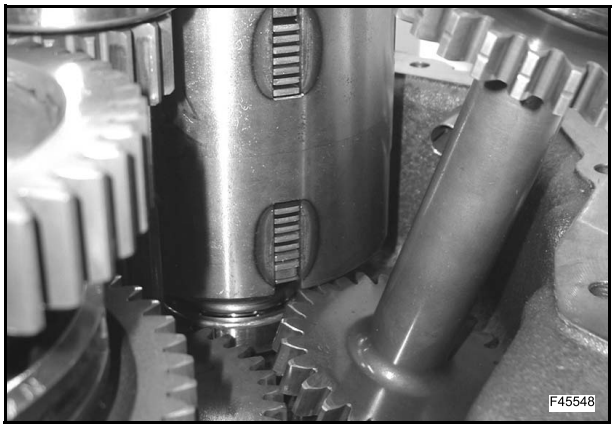


Lubricate with oil the shaft seat (A).



Insert shaft (D) and shaft (A).

The operation is correct only if the 2 shafts are fitted at the same time.



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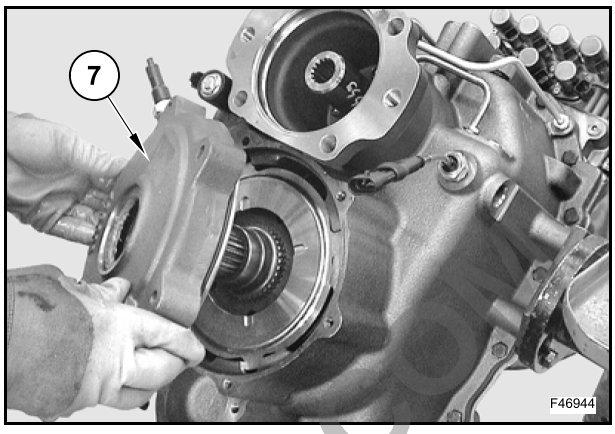
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REF.	DESCRIPTION	NOTES
1	Suction filter	250 Nm (184.39 lbf·ft)
2	Pump	36 cm^3/rev (2.20 in^3/rev)
3	Oil filter relief valve	23 bar (333 psi)
4	Filter	10 Nm (7.4 lbf·ft)
5	Torque converter	
6	Oil cooler	
7	Torque converter relief valve	5.5 bar (80 psi)
8	Pressure regulator for sequential valve	
9	Air breather	
10	Forward gear pressure check port	
11	Reverse gear pressure check port	
12	Forward gear clutch	
13	Reverse gear clutch	
14	4WD SAHR clutch	
15	HDL	
16	Shaft lubrication inlet	
17	Brake oil return port	
18	Transfer oil return port	
19	Main pressure check port	
20	Pressure check port of 1st gear clutch	
21	Pressure check port of 2nd gear clutch	
22	1st gear clutch	
23	2nd gear clutch	
24	3rd gear clutch	
25	4th gear clutch	
26	Main shaft lubrication	
27	Output shaft lubrication	
28	Temperature thermostat	
29	Parking brake SAHR clutch	
30	Parking brake solenoid valve	

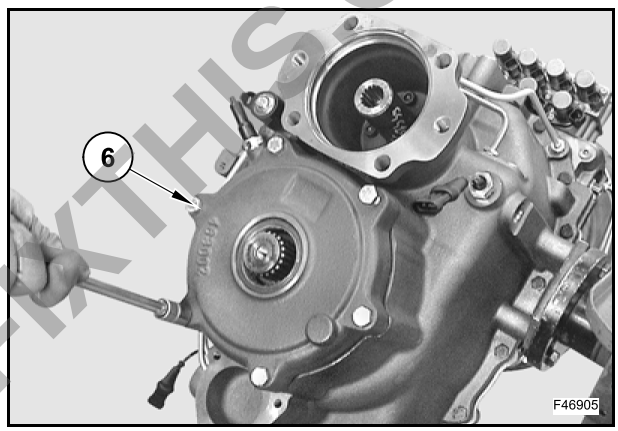
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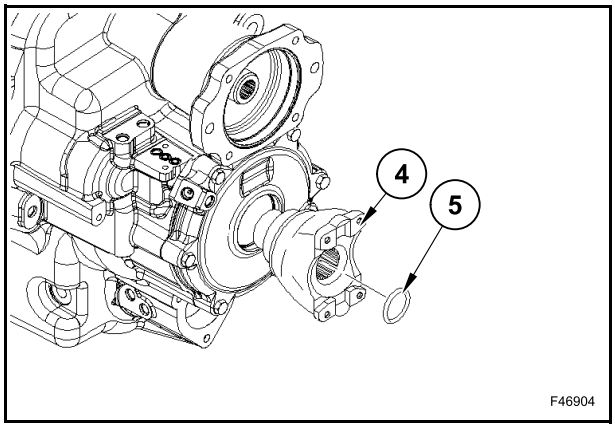
Assemble the brake cover assembly (7).



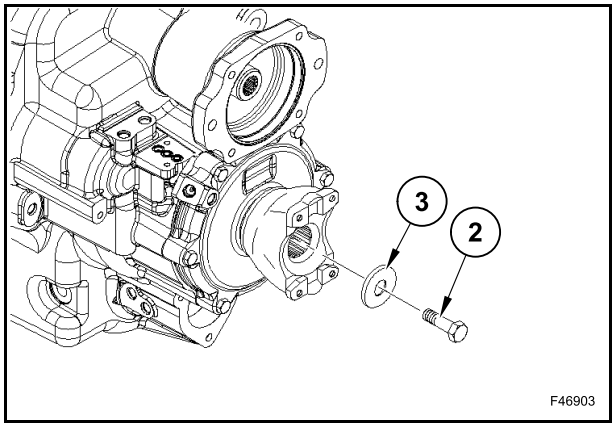
Screw and tighten screws (6) to the tightening torque of 50 Nm (37 lbf·ft).



Assemble the flange (4) and a new O-ring (5).



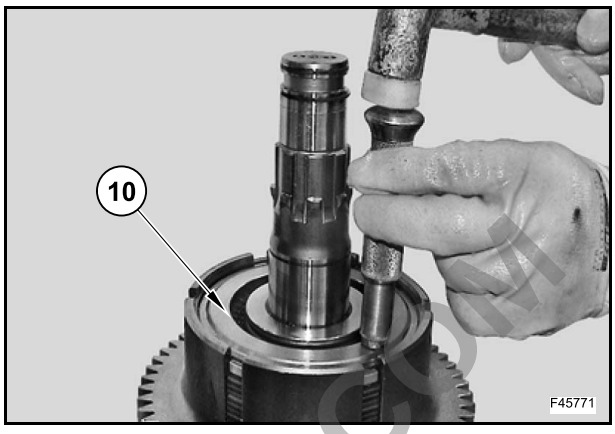
Assemble the washer (3) and the screw (2).



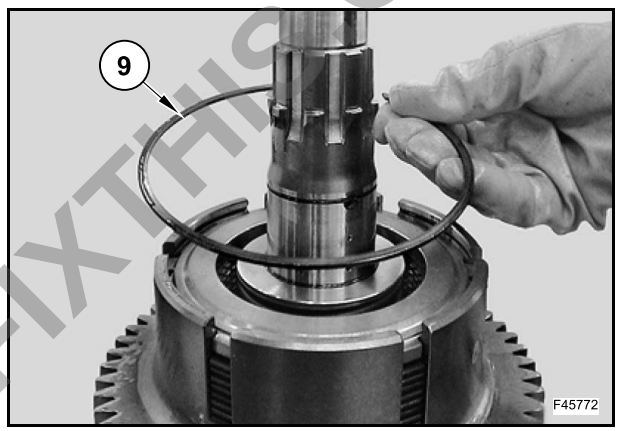
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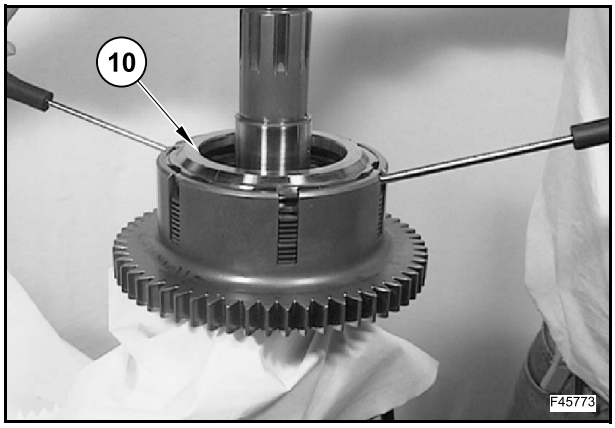
Push the thrust washer (10) slightly.



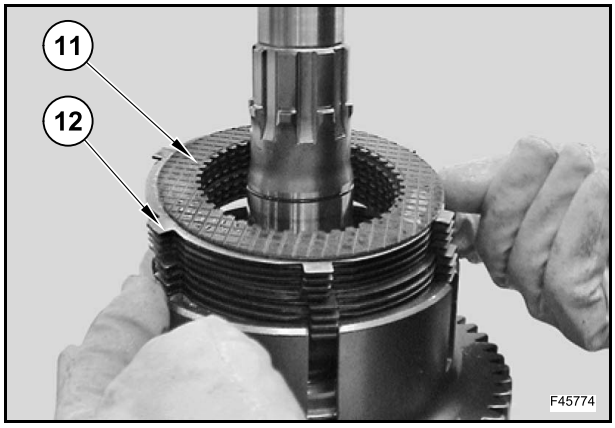
Remove the snap ring (9).



Remove the thrust washer (10) by means of 2 screwdrivers.



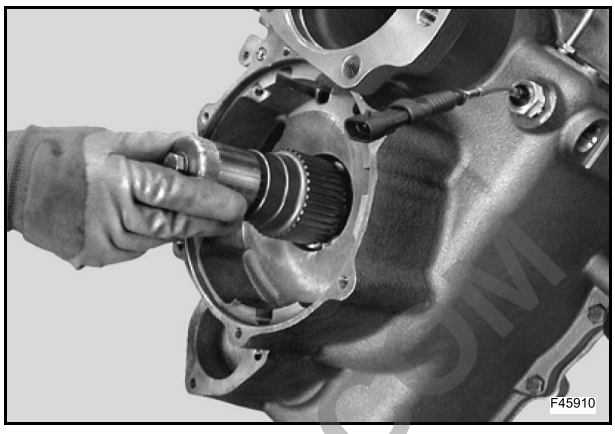
Remove the discs (11) and the counterdiscs (12).



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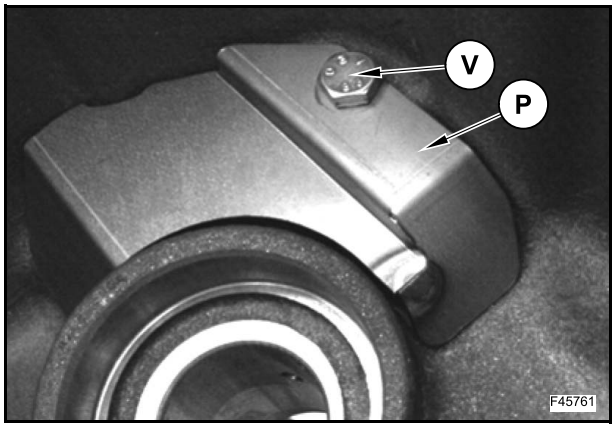
Assemble on the rear end of the shaft (C) the hub and tool 380200256.



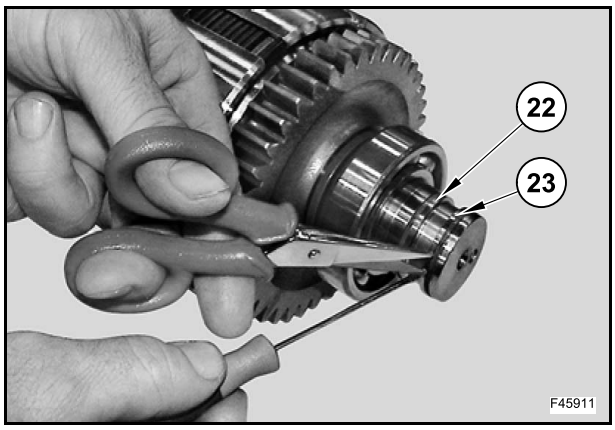
Lift the 3 shafts (B), (C) and (E) simultaneously by means of tool 380200239.



Do not remove the oil bulkhead (P) and the screw (V).



Remove the seal rings (22) and (23).



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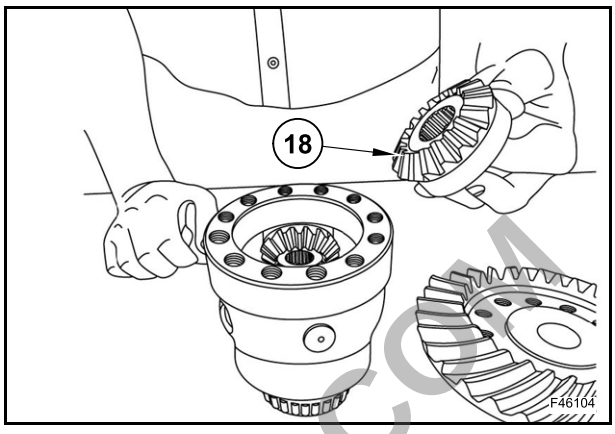
SPECIAL TOOLS

PN CNH	DESCRIPTION	USE	2WS	4WS
380002211	Handle	To be used with the various pushers and buffers	•	•
380200190	Buffer	Assembly / disassembly of several bearings	•	•
380200197	Buffer	Assembly of shaft A bearings	•	•
380200203	Buffer	Assembly of several bearings and of 2nd travel gear	•	•
380200214	Calibrator	Assembly of seal ring on PTO shaft and 4WD shaft	•	•
380200215	Attachment	Disassembly / assembly of clutch	•	•
380200218	Buffer	Assembly of oil pump seal ring	•	•
380200223	Check	Piston check	•	•
380200224	Cover and shims	Several seal ring assembly	•	•
380200225	Plunger	Several seal ring assembly	•	•
380001926	Protection	Clutch piston assembly	•	•
380200226	Buffer	Assembly of SAHR seal ring for parking brake	•	•
380200230	Buffer	Assembly of D shaft bearings	•	•
380200240	Cover and shims	Seal ring assembly	•	•
380001933	Cover and shims	Assembly of seal ring on shaft A	•	•
380001927	Calibrator	Assembly of seal ring on shaft A	•	•
380001928	Plunger	Assembly of seal ring on shaft A	•	•
380200241	Calibrator	Assembly of seal ring on shaft	•	•
380200239	Hook	Lifting of shafts B, C, E and of gear control yokes	•	•
380200257	Protection	Assembly of seal ring on PTO shaft	•	•
380200242	Plunger	Seal ring assembly	•	•
380200248	Protection	Assembly of seal ring on C shaft	•	•
380200250	Calibrator	Assembly of seal ring on C shaft	•	•
380200251	Cover and shims	Assembly of seal ring on C shaft	•	•
380200252	Plunger	Assembly of seal ring on C shaft	•	•
380200253	Calibrator	Assembly of seal ring on C shaft	•	•
380200256	Sleeve	Shaft disassembly	•	•
380200275	Tool	Assembly of snap ring on E shaft	•	•
380200258	Puller	Disassembly of snap ring on E shaft	•	•
380200220	Drift	Assembly of E shaft bearings	/	•
380200229	Drift	Assembly of E shaft bearings	/	•

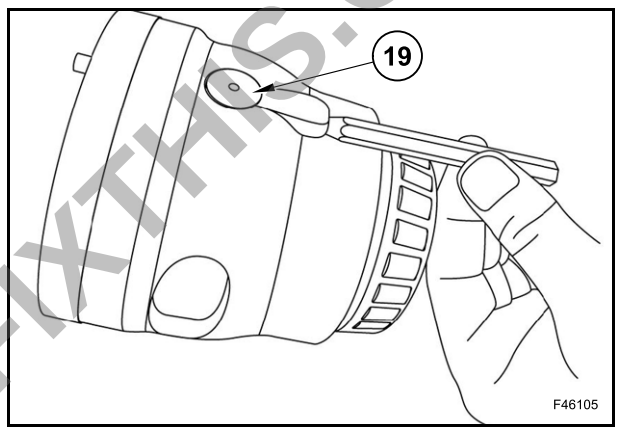
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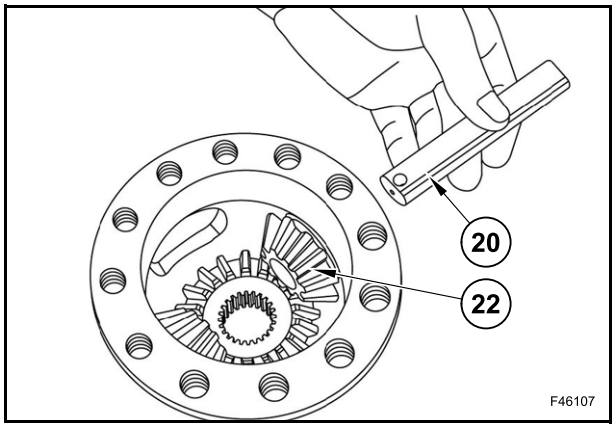
Remove the gear (18).



Remove the retaining pin (19).



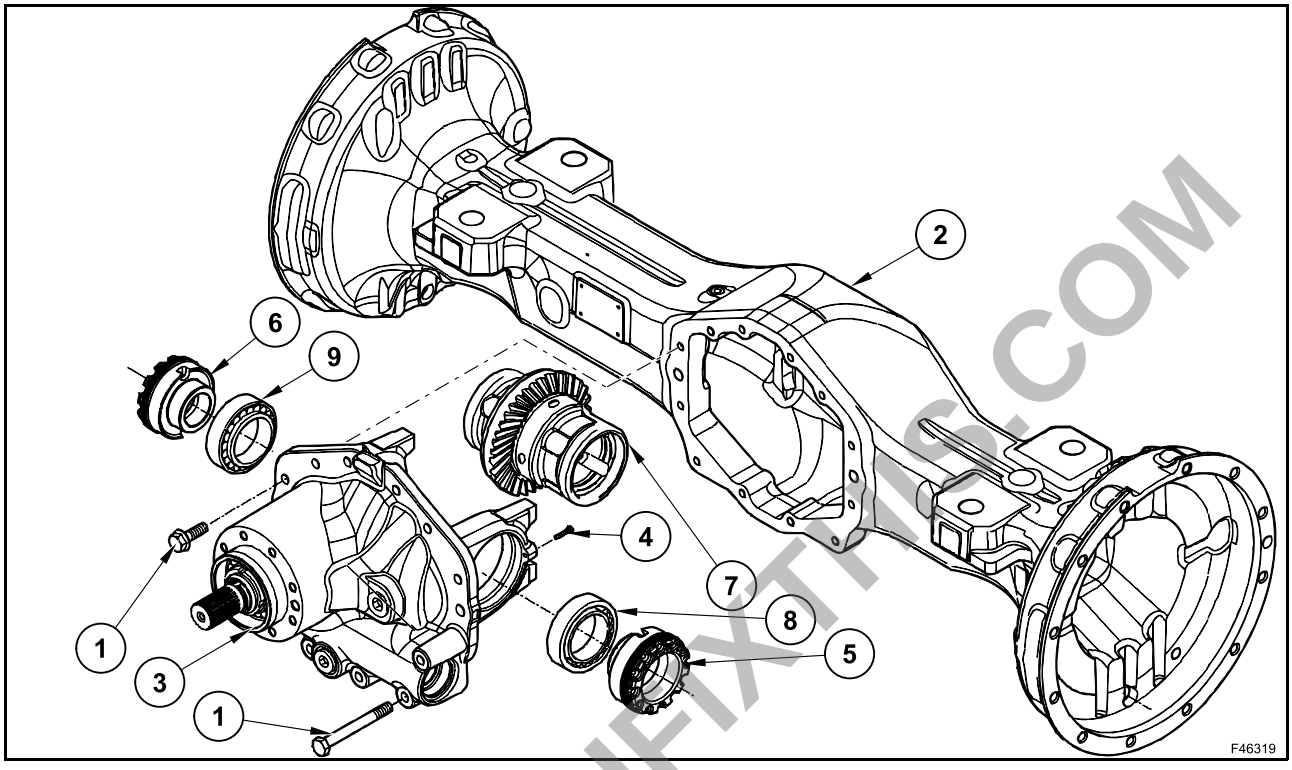
Remove the pin (20) and the gears (22).



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DIFFERENTIAL SUPPORT ASSY

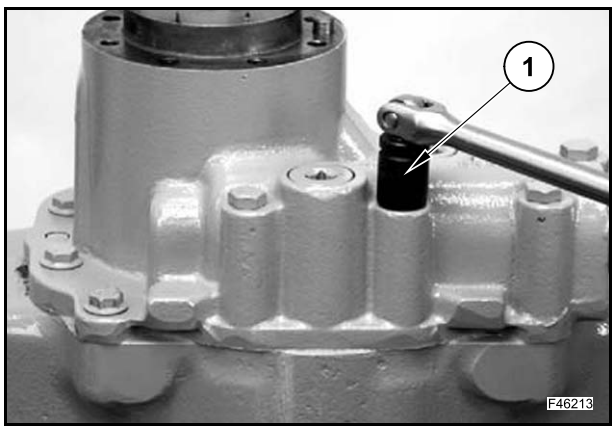


Disassembly

Drain the oil completely from the differential.



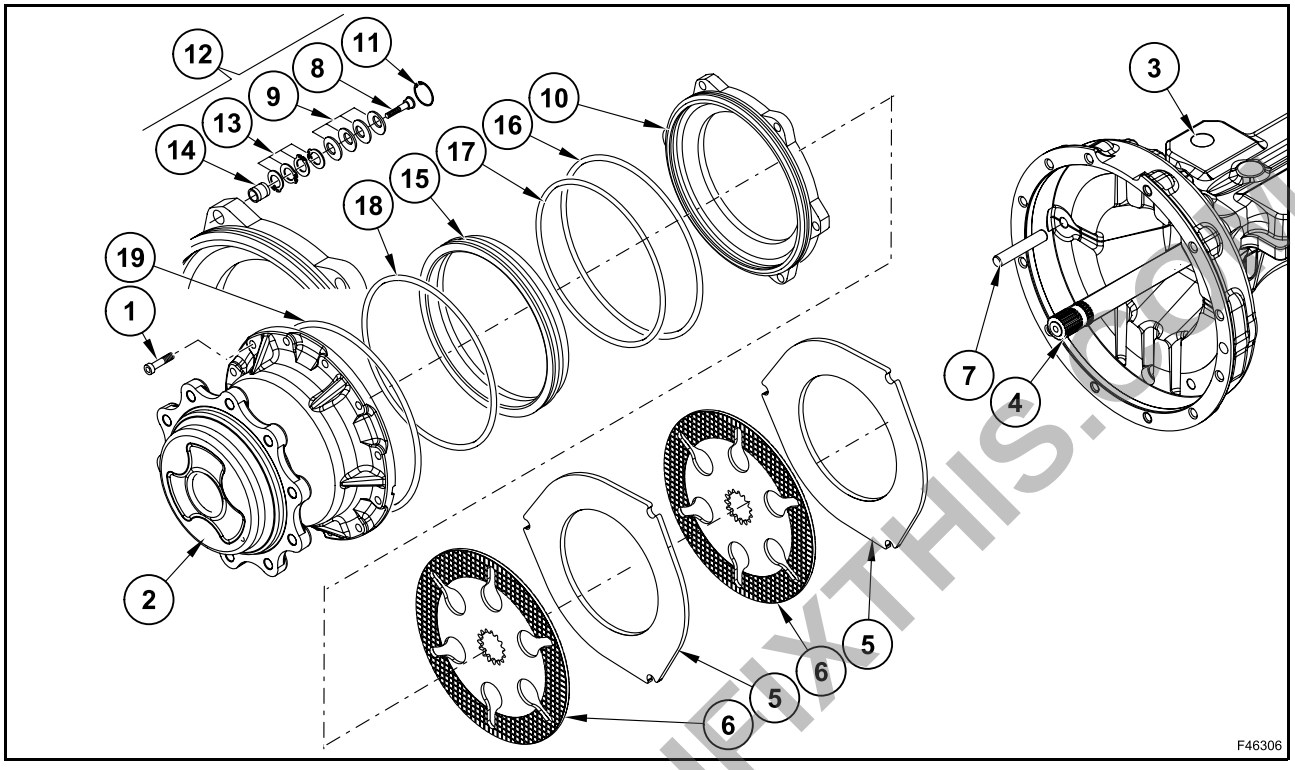
Loosen and remove the screws (1).



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BRAKES

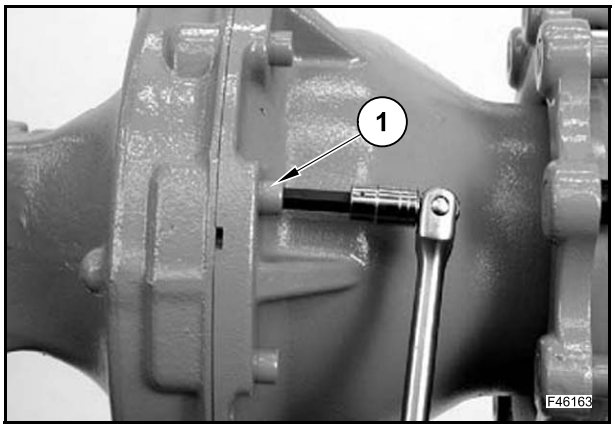


Disassembly

Drain the oil completely from the differential.



Loosen and remove all screws (1) except for 2 as a safety measure.



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TROUBLESHOOTING

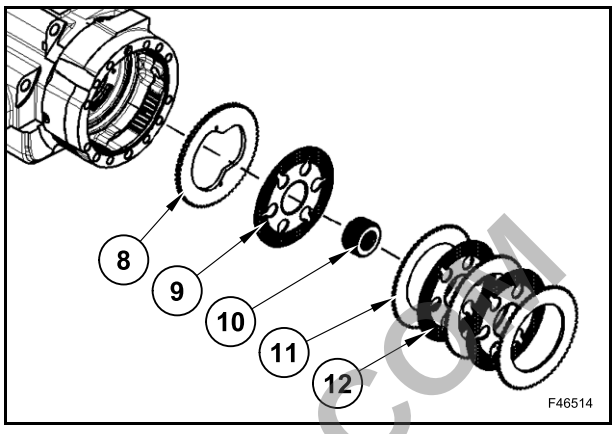
FAULT	POSSIBLE CAUSE	ACTION
Wheel vibrations.	Incorrect installation.	Correct the installation.
	Axle faulty.	Inspect and repair the axle.
	Wrong weight distribution.	Distribute the weight differently.
	Overload.	Remove the excessive load.
	Incorrect tyre rotation radius.	Replace the tyre or adjust pressure on both tyres.
	Axle beam bent.	Replace the axle beam.
Tyre resistance.	Incorrect installation.	Correct the installation.
	Axle faulty.	Inspect and repair.
	Wrong weight distribution.	Distribute the weight differently.
	Overload.	Remove the excessive load.
	Incorrect tyre rotation radius.	Replace the tyre or adjust pressure on both tyres.
	Axle beam bent.	Replace the axle beam.
Broken axle shaft.	Incorrect installation.	Correct the installation.
	Axle faulty.	Inspect and repair.
	Wrong weight distribution.	Distribute the weight differently.
	Overload.	Remove the excessive load.
	Incorrect tyre rotation radius.	Replace the tyre or adjust pressure on both tyres.
	Axle beam bent.	Replace the axle beam.
Difficult steering; the machine travels in a straight line while steering.	Incorrect installation.	Correct the installation.
	Axle faulty.	Inspect and repair.
	Wrong weight distribution.	Distribute the weight differently.
	Overload.	Remove the excessive load.
	Incorrect tyre rotation radius.	Replace the tyre or adjust pressure on both tyres.
	Bent or broken axle shaft.	Replace the axle beam.

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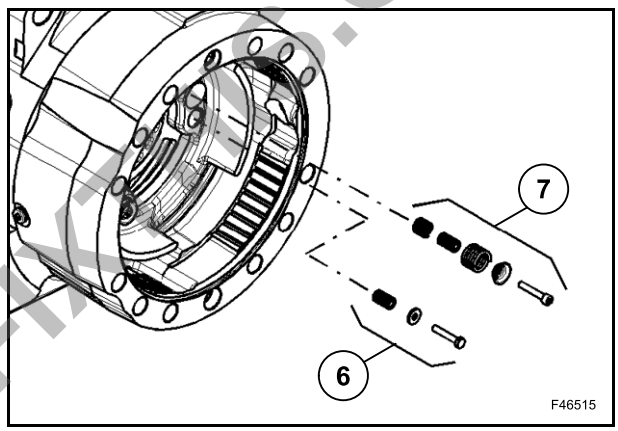
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Remove the brake components: the counterdiscs (11), discs (12), the brake disc carrier hub (10), the brake disc (9) and the brake counterdisc (8).

NOTE: *mark the position of the hub for assembly.*

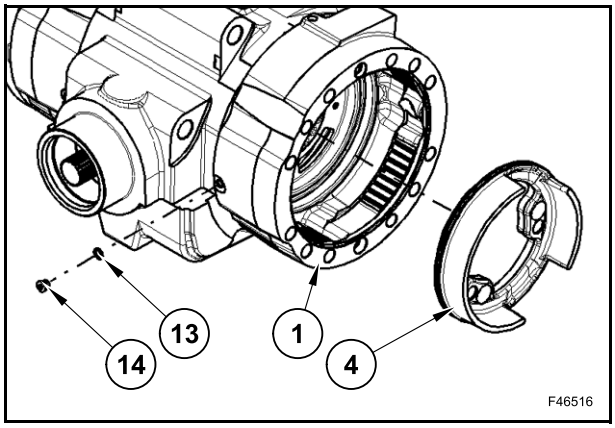


Remove the brake piston return kit (7) and the self-adjust kit (6).

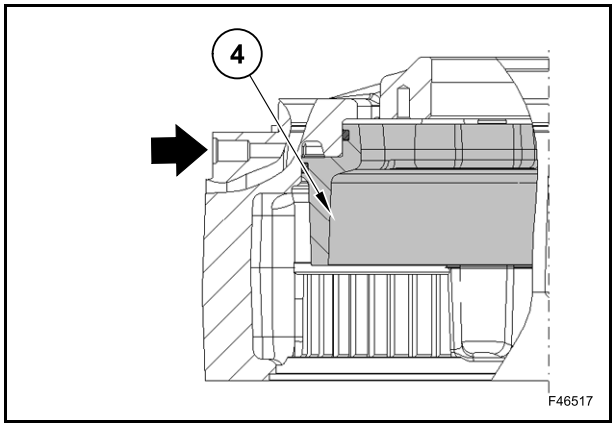


Take out the brake piston (4) from the brake cylinder (1).

If necessary, remove the plug (14) and the relevant O-ring (13).



Blow some air through the oil supply hole for the brake to eject the piston (4), using the minimum pressure required.



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ASSY	OPERATION	TIME (minutes)
Differential	Differential replacement	150
	Overhaul / replacement of bevel gear, planetary gears, pins	240
	Overhauling / replacement of differential box bearings	120
Pinion	Overhauling / replacement of pinion bearings	180
	Overhaul / replacement of bevel gear, planetary gears, pins	240

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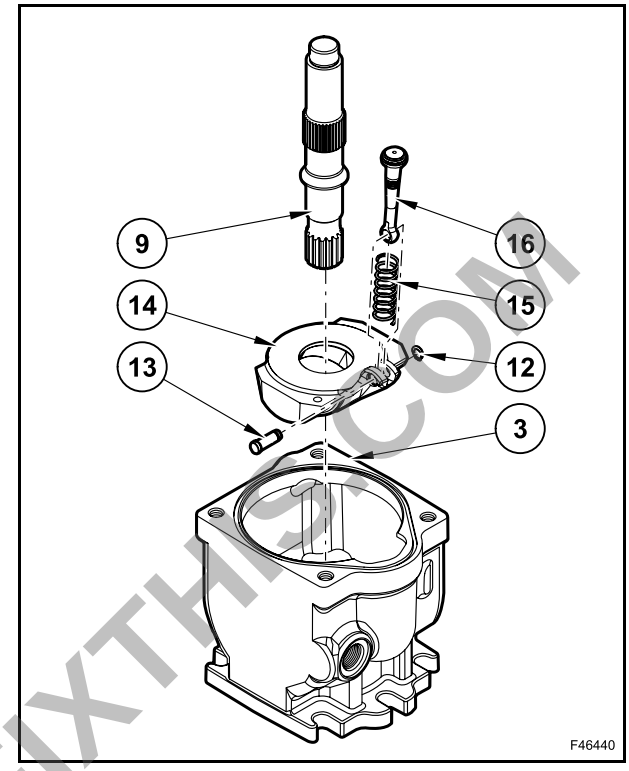
Rotate the pump body (3) to a position so that the shaft is pointing down.

Pull the shaft (9) out of the pump body (3).

Compress the spring (15) and rotate the piston (16) towards the swash plate (14).

Lift the swashplate/piston assy until it is tilted and remove it from the pump body (3).

Remove the piston (16) and the spring (15) from the swashplate (17) by removing the pin (13) and the snap ring (12).



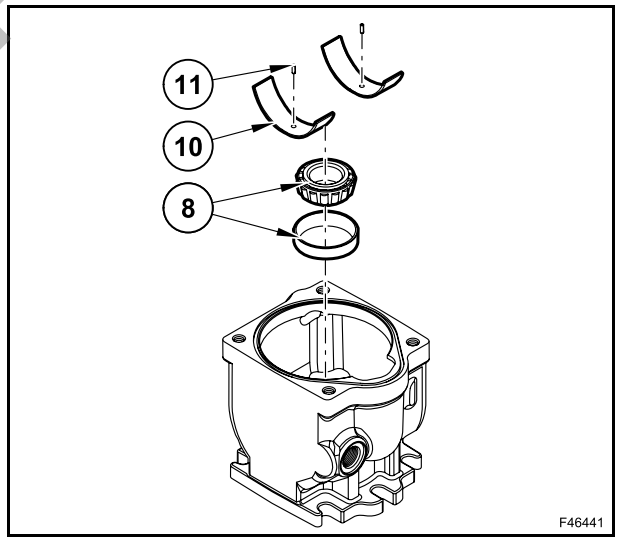
Remove the bearing (8).

Examine the cradle bearings (10) to determine if they need replacement.

Removing the pins (11) will likely damage the cradle bearings, so make sure you have replacement bearings before you remove them.

If cradle bearings (10) need replacing, remove the 2 pins (11).

Note the location and orientation of the bearings for re-installation.



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PRECISION SWING VALVE FAULT FINDING

Measurement of swing drift

On horizontal ground, tilt unit approximately 10° with stabilizers. Extend the boom, dipper, and bucket so they are horizontal. Warm unit up to approximately 49 °C (120 °F) (valve will be warm to the touch).

Center boom, lower to the ground, and make a mark with the bucket (or line up an object with a bucket tooth). Raise bucket to approximately 6'.

Turn unit off and wait 5 minutes. Lower boom (no swing!) to the ground.

Measure the difference between mark (or reference object) and bucket tooth.

This distance should be approximately 5" for a B95.

Delay check leaks

Symptom:

The backhoe linkage would likely swing slowly to one side during roading / loading of the backhoe.

Verification method:

Switch swing port relief valves. If the drifting switches to the opposite side, the problem is with the relief valve.

Perform swing drift test measurement. If the check is leaking, the measured distance will increase significantly.

Performing the swing drift test with a cross-over orifice plugged would eliminate the cross-over spool as a cause of the leakage.

Shuttle valve leaks

Symptom:

The backhoe linkage would likely swing slowly to one or both sides during roading / loading of the backhoe.

Verification method:

See "Delay Check Leaks" above.

Cross-over spool leaks

Symptom:

The backhoe linkage would likely swing slowly to both sides during roading / loading of the backhoe. The swing may drift slowly after almost stopping when the unit is tilted.

Verification method:

Perform the swing drift test and then repeat the test with a cross-over orifice plugged.

This would determine if the cross-over spool is the cause of the leakage.

Bypass orifice contaminated

Symptom:

The backhoe linkage would likely drift slowly to one side after the swinging motion is stopped and the unit is tilted slightly.

Verification method:

Repeat the motion, so that the drift occurs again, and then add tilt to the unit. Repeat the motion several times to verify that drift is not reproducible at higher angles.

Delay orifice or delay screen contaminated

Symptom:

The backhoe boom takes longer than normal to stop from a swinging motion in both directions.

Verification method:

Perform the swing drift test with a cross-over orifice plugged. If the symptom stops, this would indicate that the delay orifice is contaminated.

Thermal bypass fails

Symptom:

The backhoe boom takes longer than normal to stop from a swinging motion in both directions when starting in cold weather or the system may not actuate after oil is warmed up.

Verification:

In cold weather, remove the cross-over spool assembly, and with snap ring pliers, remove all internal components. Reinstall the crossover spool in the valve and verify that the backhoe boom stops quickly and with some oscillations.

If the system is not activating after the oil is warmed up, remove the cross-over spool assembly. Push the back of the thermal actuator and verify that it easily strokes approximately ¼". With snap ring pliers, remove all internal components. Visually inspect the thermal actuator for evidence of damage.

7 or 0.34 bar (100 or 5 psi) main flow check fails

Symptom:

Anti-rebound valve works well in one direction, but doesn't work in the other direction.

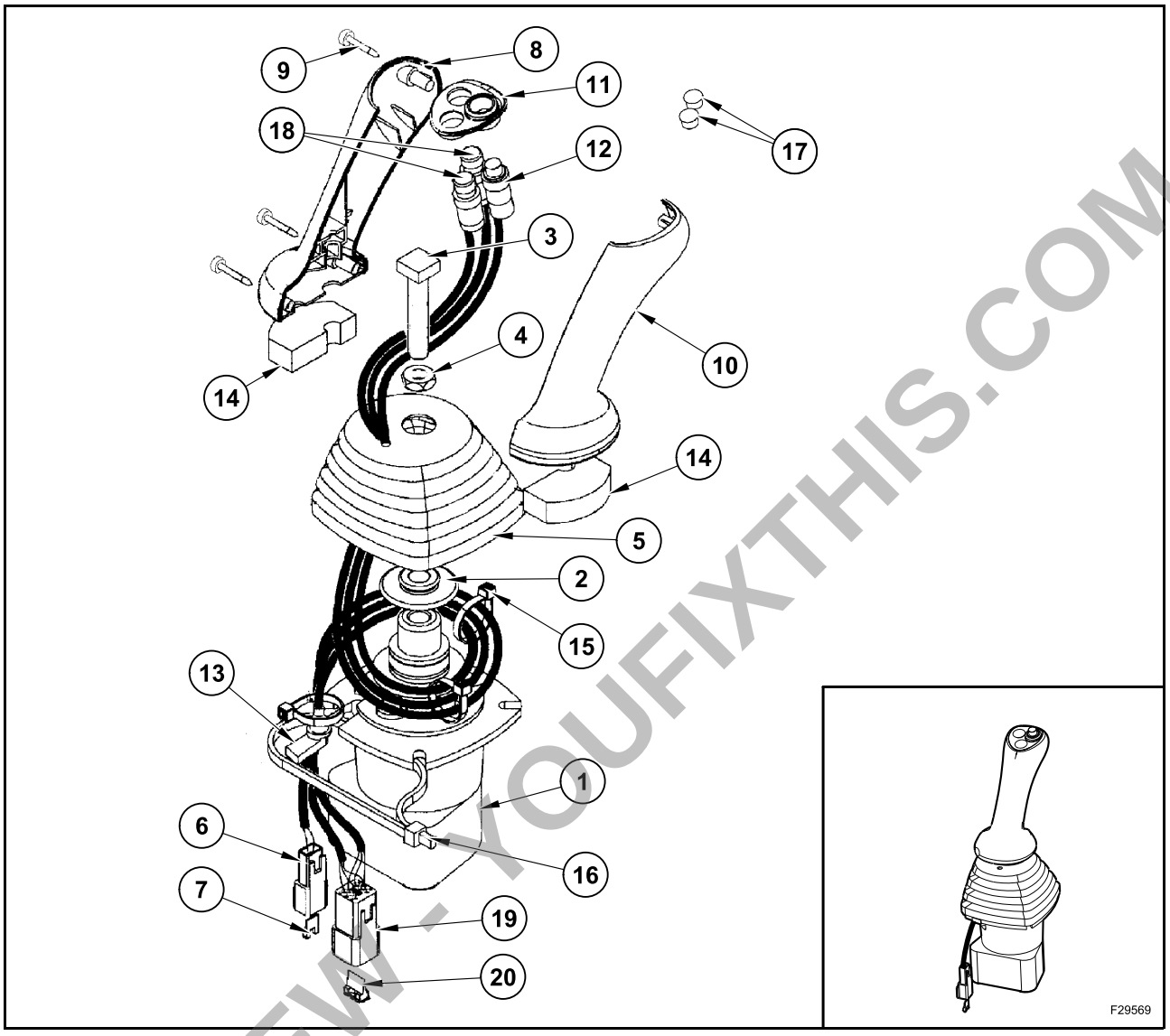
Verification method:

Remove the swing anti-rebound valve. Switch the check valves from one side to the other side. Make sure that the black (100 psi) check valves are inserted closest to the mounting surface, and that the direction of good performance is noted before the swap.

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LEFT HAND CONTROL LEVER



1. Valve
2. Plate
3. Screw
4. Nut
5. Boot
6. Connector
7. Wedge
8. Half handle
9. Screw
10. Half handle
11. Cover
12. Switch push button (horn)
13. Washer
14. Spacer
15. Clip
16. Clip
17. Plugs [if the switches (18) are not fitted]
18. Switch push buttons (auxiliary bidirectional)
19. Connector
20. Wedge

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B90B
B95B - B95BLR - B95BTC
B110B
B115B



SECTION 50 - CAB HEATING AND AIR CONDITIONING

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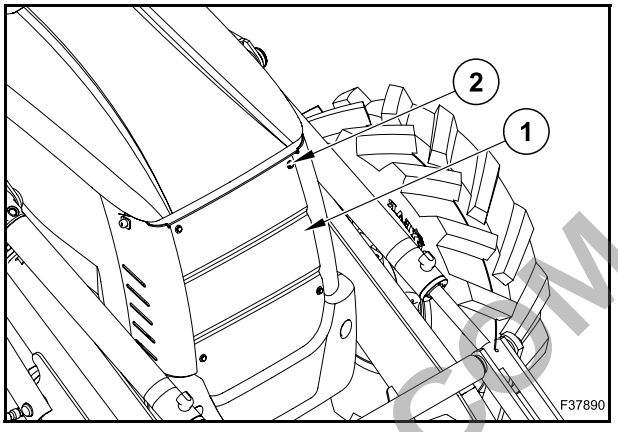
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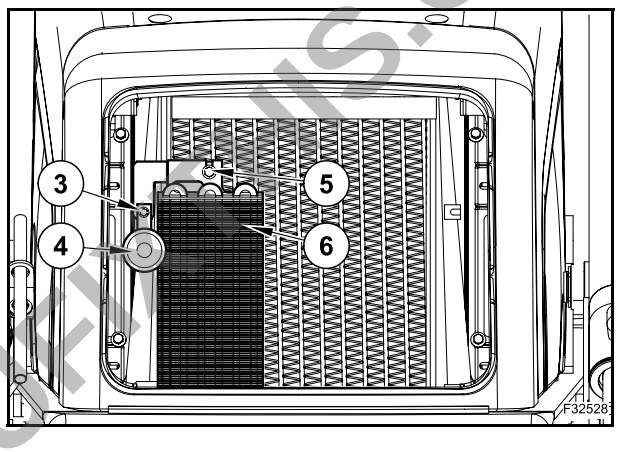
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CONDENSER

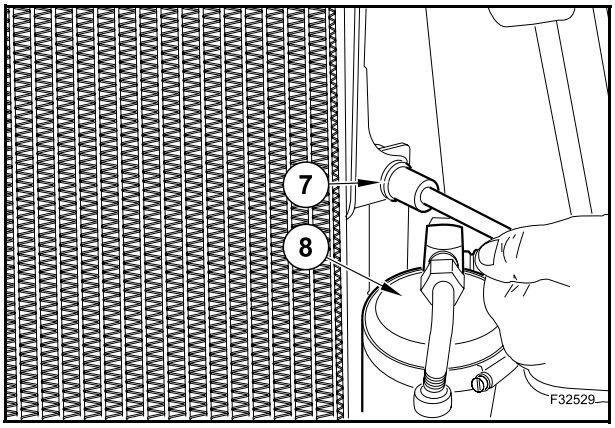
Loosen and remove the fixing screws (2). Remove the front grill (1).



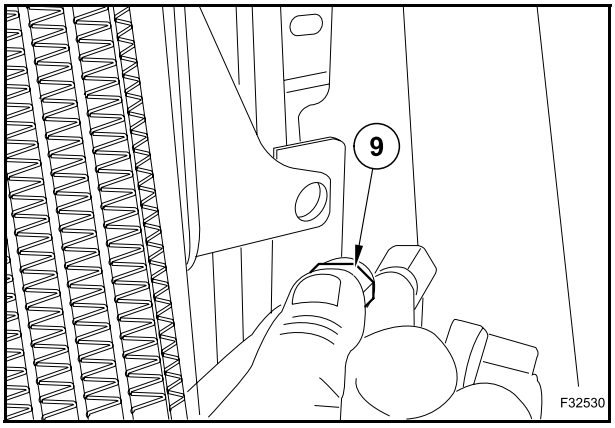
Unscrew and remove the nut (3). Remove the horn (4). Unscrew and remove the nut (5). Remove the fuel cooler (6).



Unscrew and remove the fixing upper nut (7) and loosen the fixing lower nut. Move the dryer filter (8) to the right side.



Unscrew and remove the nuts (9).



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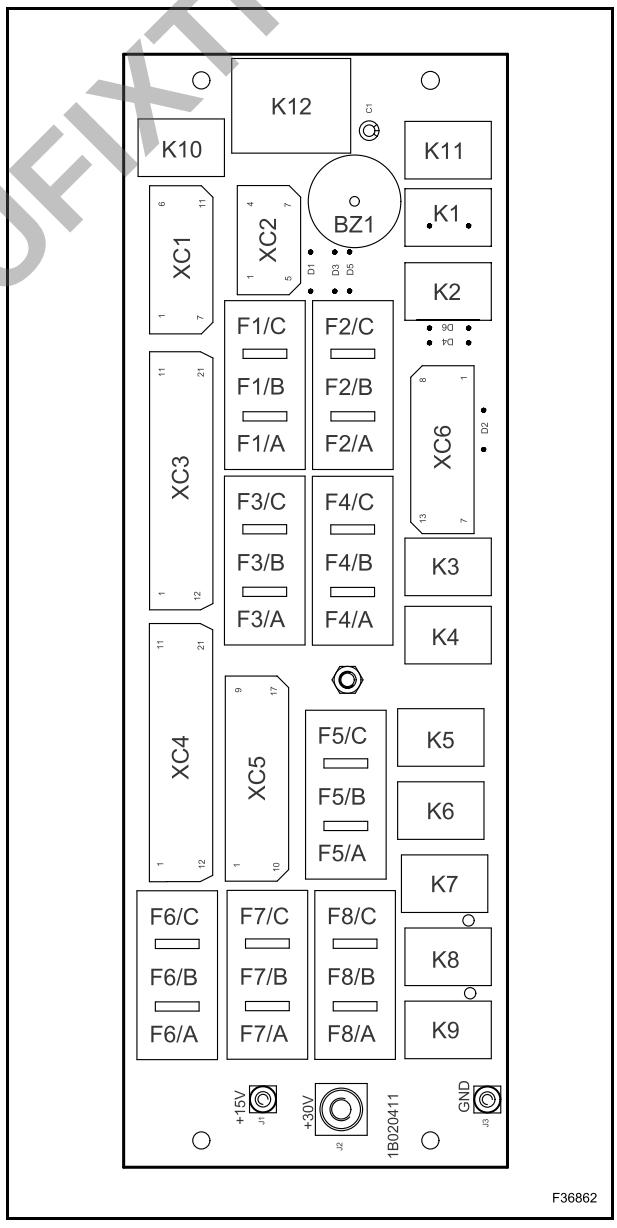
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ELECTRIC DIAGRAMS - POWERSHUTTLE CAB (B90B)

FUSES AND RELAYS

Fuse No.	Rating	Function
F1A	15 A	Rear windshield wiper and washer
F1B	7.5 A	Engine stop, (+15) anti-theft device, “grid heater”
F1C	10 A	Stop light switch
F2A	15 A	Instrument power supply, switch control lamps, pneumo-electric seat, buzzer
F2B	15 A	Air conditioning
F2C	15 A	Pilot control
F3A	3 A	Rear right/front left-side lights, instrument backlighting, air conditioning switch
F3B	3 A	Rear left/front right side lights, number plate light
F3C	10 A	Front work light switch, ride control, 4x1 bucket
F4A	5 A	Forward travel, reverse travel, reverse travel alarm, gearshift control
F4B	10 A	Rear hammer button, sensor + bucket level solenoid valve, clutch disconnecting buttons and differential lock
F4C	10 A	Backhoe attachment lock, backhoe attachment travel lock, rear work light switch
F5A	15 A	Inner front work lights
F5B	10 A	Low beams
F5C	15 A	Main beams
F6A	7.5 A	Rotating beacon
F6B	7.5 A	(+15) hazard warning light power supply
F6C	7.5 A	Hand hammer, 4WD
F7A	10 A	(+30) power supply for hazard warning lights, horn
F7B	10 A	Electric socket, radio, cab lighting
F7C	6 A	Front windshield wiper
F8A	15 A	Outer rear work lights
F8B	15 A	Outer front work lights
F8C	15 A	Inner rear work lights

K1	Forward-reverse travel control relay
K2	Gear engaged + parking brake activated relay
K3	Starting relay
K4	Bucket level solenoid valve relay
K5	Low and main beam relay
K6	Inner front work light relay
K7	Inner rear work light relay
K8	Outer front work light relay
K9	Outer rear work light relay
K10	Reverse travel relay
K11	Forward travel relay
K12	Hazard warning lights

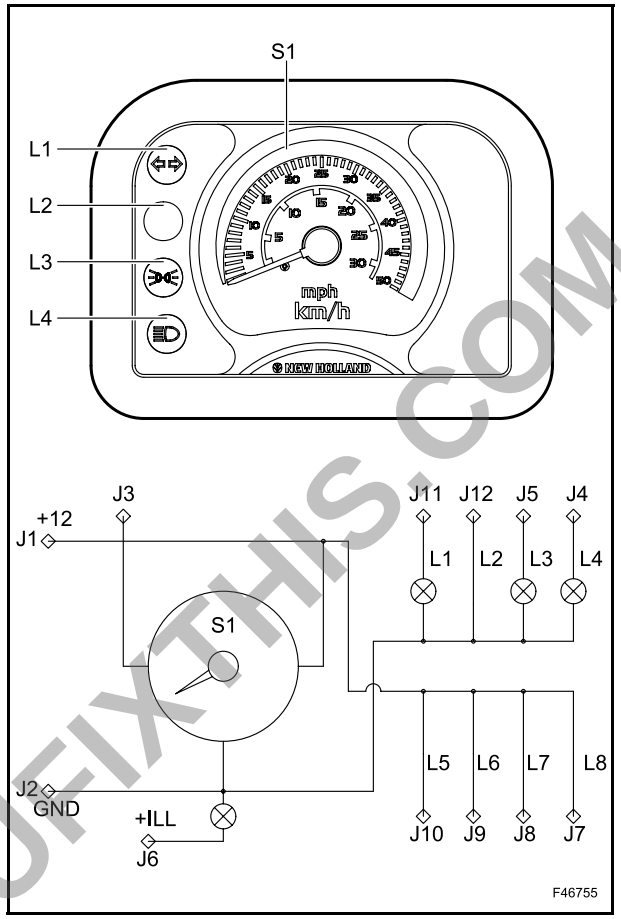


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FRONT INSTRUMENT

REF.	PIN	FUNCTION	SIGNAL
+12	J1	Positive (+12 V)	
GND	J2	Ground - Negative	
S1	J3	Speedometer	Sensor
L4	J4	Main beam lamp (blue)	Positive
L3	J5	Side light lamp (green)	Positive
+ILL	J6	Backlighting (+)	+ Light
L8	J7	Not used	
L7	J8	Not used	
L6	J9	Not used	
L5	J10	Not used	
L1	J11	Direction lamp (green)	Positive
L2	J12	Not used	



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Function	Lamp	Alarm	Lamp	Display lamp	Condition	DTC	SA	Description	Priority	Colour
Accelerator pedal signal out of range		One second alarm every 30 seconds				1013	VCM	Foot accelerator sensor - no signal	2	Amber
Accelerator pedal signal out of range		One second alarm every 30 seconds			Accelerator above 9 V for 5 seconds	1029	VCM	Foot accelerator sensor - shorted high to Vbat	2	Amber
Accelerator pedal signal out of range		One second alarm every 30 seconds			Accelerator under 0.5 V for 5 seconds	1030	VCM	Foot accelerator sensor - shorted low to Vbat	2	Amber
5 V accelerator pedal power supply		One second alarm every 30 seconds			Accelerator above 5.1 V for 5 seconds	1023	VCM	Foot accelerator supply voltage too high	2	Amber
5 V accelerator pedal power supply		One second alarm every 30 seconds			Accelerator under 4.9 V for 5 seconds	1024	VCM	Foot accelerator supply voltage too low	2	Amber
5 V accelerator pedal power supply		One second alarm every 30 seconds			Accelerator above 9 V for 5 seconds	1025	VCM	Foot accelerator supply shorted high to Vbat	2	Amber
5 V accelerator pedal power supply		One second alarm every 30 seconds			Accelerator under 0.5 V for 5 seconds	1026	VCM	Foot accelerator supply voltage shorted low to ground	2	Amber
Accelerator knob signal out of range		One second alarm every 30 seconds			Accelerator above 4.75 V for 5 seconds	1035	VCM	Accelerator knob sensor - signal above range	2	Amber
Accelerator knob signal out of range		One second alarm every 30 seconds			Accelerator under 0.25 V for 5 seconds	1036	VCM	Accelerator knob sensor - signal above range	2	Amber
Accelerator knob signal out of range		One second alarm every 30 seconds				1037	VCM	Accelerator knob sensor - no signal	2	Amber

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LOADER BUCKET (B95BTC - B115B)

REMOVAL

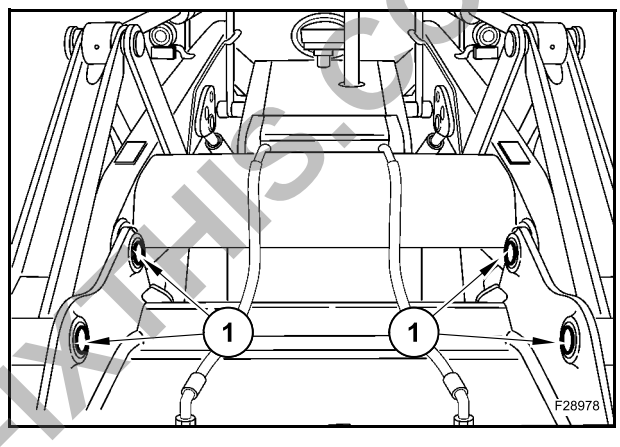
Move the machine to a level and firm ground.

Lower the bucket to the ground in dump position (tilted completely forward).

Stop the engine and remove the starter key.

If the machine is fitted with a 4x1 bucket, release the pressure from the bucket circuit.

Remove the retaining rings and pins, then drive out the pins (1).



⚠ WARNING ⚠

Always wear eye protection when using a tool which might project metal particles. Use a hammer with a soft face, such as copper, for pins assembly/ disassembly.

(4x1 bucket) disconnect and plug the hydraulic supply lines.

Start the engine.

Operate the attachment controls so as to release the bucket.

Reverse the machine from the bucket.

INSTALLATION

Make sure all bushings are completely clean. Remove any dirt or foreign matter, if necessary.

Start the engine.

Use the attachment controls to engage the attachment between the bucket lugs.

Reinstall the arm/bucket pins (1) and then install the relevant retaining pins and rings.

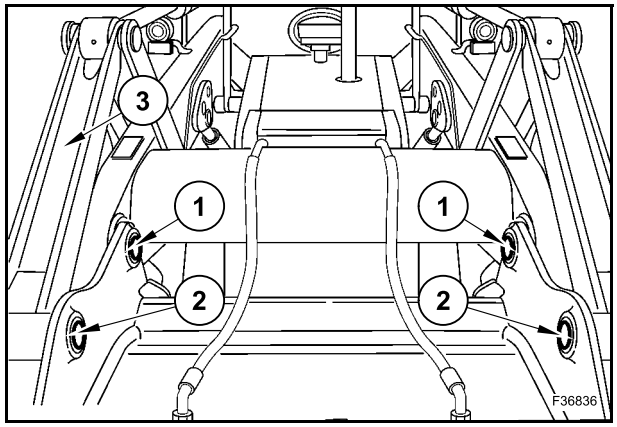
Use the bucket controls to align the connecting rod holes (3) with the bucket lugs.

Stop the engine and remove the starter key.

(4x1 bucket) release the pressure from the bucket circuit.

Install the rod/bucket pins (2) and then install the relevant retaining pins and rings.

(4x1 bucket) remove the plugs and reconnect the hydraulic lines.



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