SECTION 10 – ENGINE

BOOK 1 - 87393900

Chapter 2 – Cooling System (Three-Cylinder)

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LUBRICANTS AND FLUIDS

PARTS TO BE FILLED	QUANTITY liter (gal.)	NEW HOLLAND RECOMMENDED PRODUCT	NEW HOLLAND SPECIFICATION	INTERNATIONAL SPECIFICATION
Cooling system:	(1) 10.0 (2.64) (2) 14.0 (3.69)	Water and liquid **AMBRA AGRIFLU 50% + 50%**	Water and liquid Antifreeze Fleetguard ES Coolant EG (Ethylene Glycol) **50% + 50%**	SAE1941 ASTM D4985 (EG)
Fuel tank:	87 (23)	Decanted and filtered fuel oil	-	-
Crankcase sump: without filter:	(1) 6.7 (1.77) (2) 8.9 (2.35)	**AMBRA Super Gold SSL** Engine Oil (10W40)	NH Engine Oil (10W40)	API SE/CC 10W40
with filter:	(1) 7.5 (1.98) (2) 9.5 (2.50)	**AMBRA SUPER GOLD HSP** Engine Oil (15W40)	NH Engine Oil (15W40)	API CH-4/SS CCMC 04 UNI 20153 MIL-L2104C ACEA E3/E5
Brake control circuit	0.7 (0.18)	**AMBRA BRAKE LHM** Mineral Brake Oil	NH Brake Oil	ISO 7308
Front axle: axle case	4.5 (1.19)	**AMBRA MULTI G134** Hydraulic Oil	NH 134D Hydraulic Oil	API GL4 ISO 32/46 SAE 10W-30
final drives (each)	1.0 (0.26)			
Rear transmission (bevel gear pair, final drives and brakes), gearbox, hydraulic lift, power take-off and hydrostatic steering:	42 (11.10)			
Grease fittings	-	**AMBRA GR9** Multipurpose Grease	NH Super Premium MP Lithium Grease	NLGI 2
Windscreen washer reservoir	2.0 (0.52)	Water and Arexons DPI Liquid	Water and Windscreen Washer Fluid	-

(1) Models with 3-cylinder engine
(2) Models with 4-cylinder engine

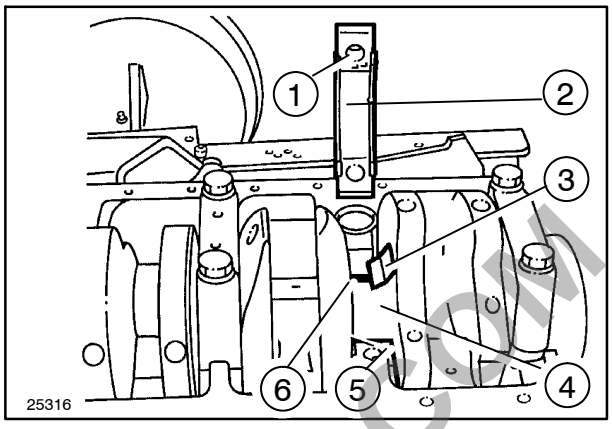
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Main Bearings

Check the clearance between the crankshaft journals and the bearing shells using a calibrated wire gauge as follows:

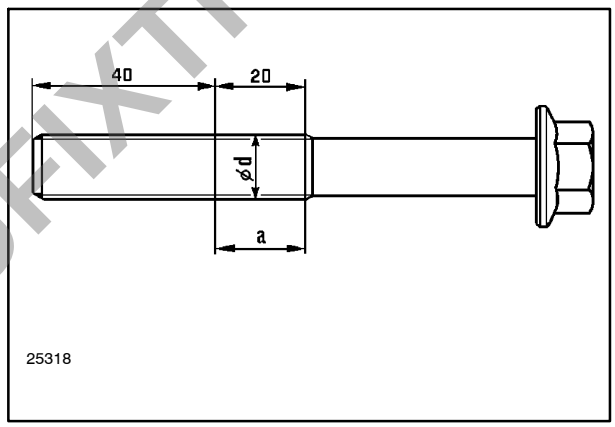
- ensure that all parts are perfectly clean and remove all traces of oil;
- locate the half-shells in respective seats (5);
- install the crankshaft;
- position lengths of calibrated wire (6) on the crankshaft journals (4) in correspondence with the crankshaft centerline (6);
- install the caps (1) complete with half-shells (2) to the respective journals;
- lubricate the bolts fixing the main bearing caps with engine oil and tighten them. Apply the prescribed tightening torques - see the "Contents".



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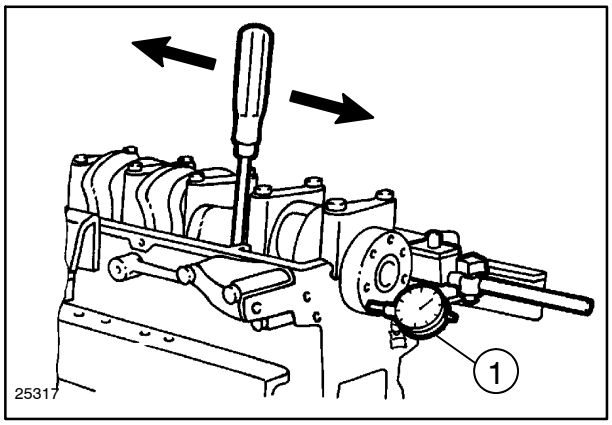
Main Bearing Cap Bolts

If the bolts are to be re-used, check that diameter (d) is greater than 13.5 mm (0.5315 in.); if not, replace the bolts.



80

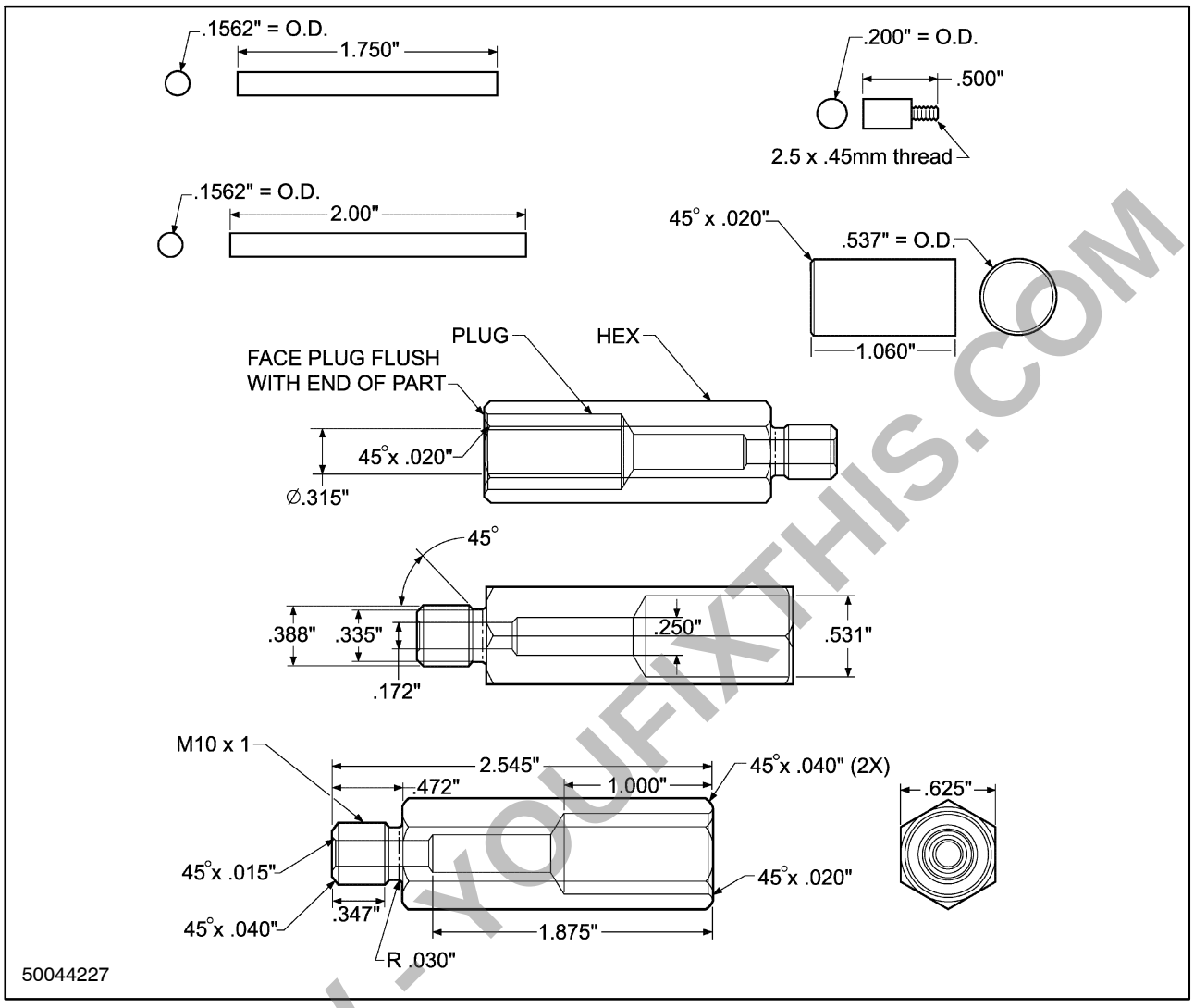
- Remove the caps and determine the bearing clearance by comparing the width of the calibrated wire at the widest point against the scale printed on the packet containing the wire.
- After refitting the crankshaft and the bearing caps and bolts, check crankshaft endfloat, using a dial gauge (1), at the thrust bearing.
- If the endfloat exceeds the specified value. See the "Specifications" - refer to the "Contents". Replace the existing thrust washers with oversize washers.



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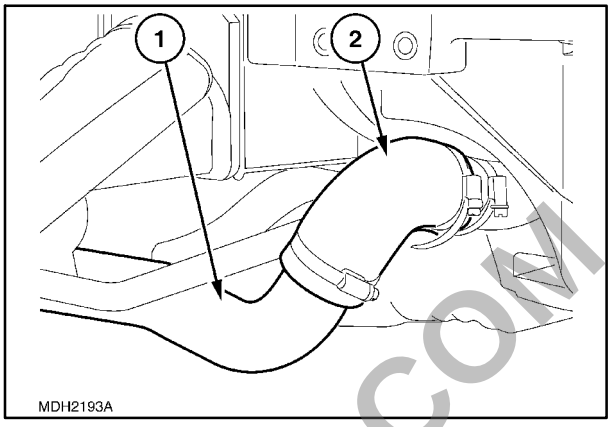


Tool Part Number 380001601 for timing BOSCH Fuel Injection Pump 1

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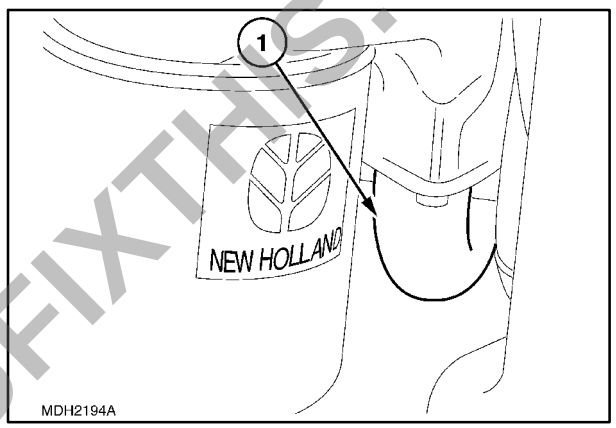
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21. Loosen the related clamps and remove the sleeve (2) from the lift pump oil inlet pipe (1).



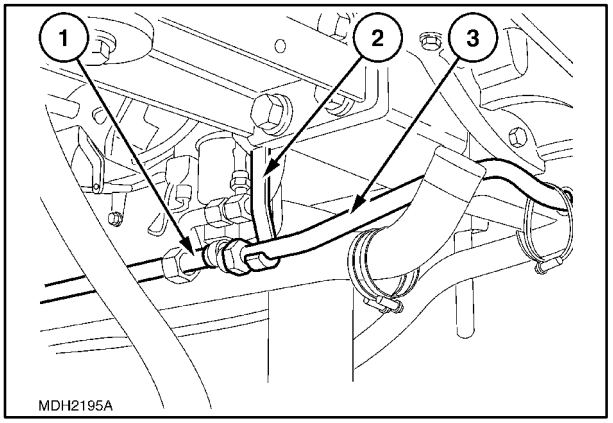
24

22. Unscrew the related retaining bolts and remove the lift pump oil inlet pipe (1).



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23. Disconnect the front pipe (3) delivering oil to the lift from the associated rear pipe (1), unscrew the related bracket retaining bolt (2), unscrew the bolts (3) securing the front pipe to the hydraulic pump and remove the pipe.
24. Place a stand under the clutch casing, attach the rear portion of the engine to a hoist, using chains.



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WARNING

Handle all parts carefully.
Do not put your hands or fingers between parts.
Wear the prescribed safety clothing, including goggles, gloves and safety footwear.

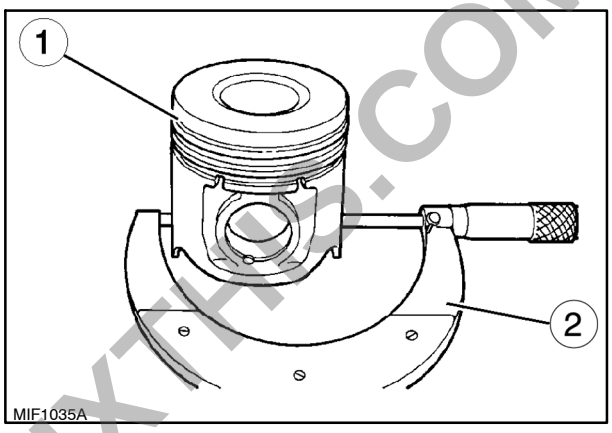
Clean all parts carefully before proceeding with the operations described below.

Measuring the piston diameter

Using a micrometer (2) measure the diameter of the piston (1), and check the cylinder to determine the state of wear of the cylinder and pistons (see "Specifications").

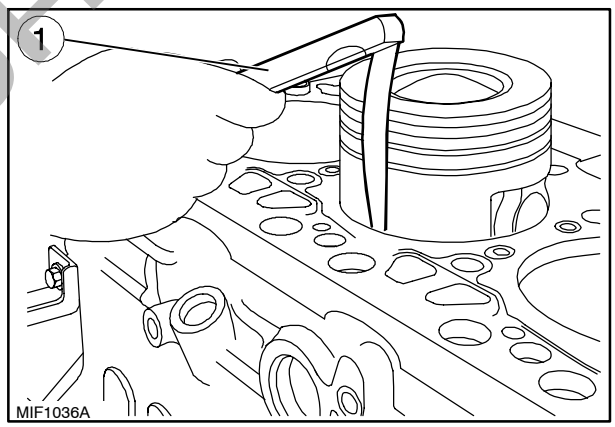
If the clearance is not within the tolerances stated in the specifications, it will be necessary to ream and rebore the cylinders and install oversize pistons and rings (see "Specifications").

NOTE: *Measure the diameter at a distance of 61 mm (2.4015 in.) from the base of the piston skirt.*



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Use a feeler gauge (1) to check the clearance between the piston and the cylinder as shown in the figure 169.

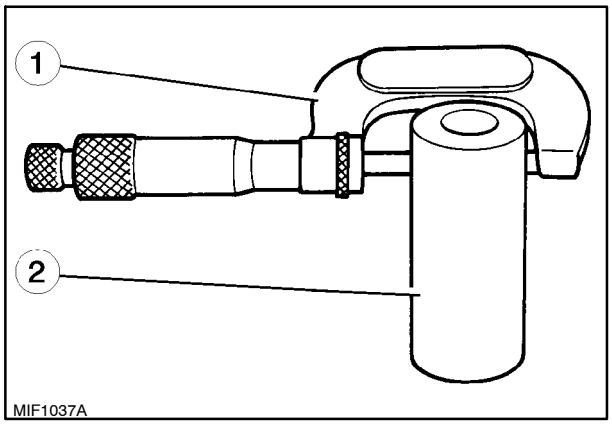


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Piston pins

Measuring the piston pin (2) diameter using a micrometer (1).

When installing pins on pistons, check that the clearance between the gudgeon pin and bore in the piston is within the tolerance. See "Specifications."

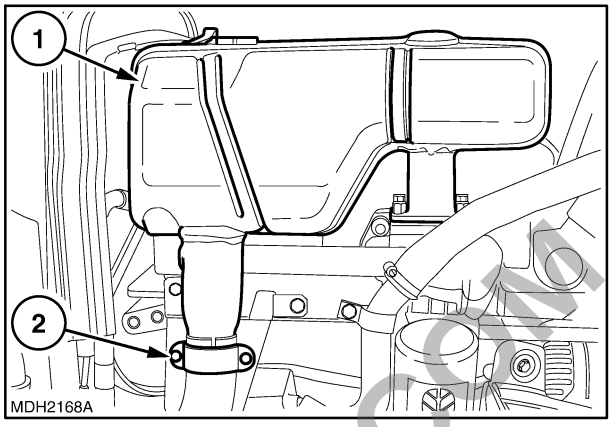


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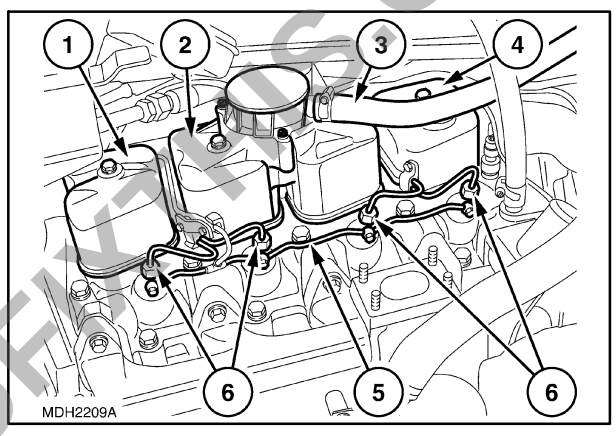
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4. Loosen the clamp (1), unscrew the retaining bolts and remove the exhaust muffler (1); the exhaust pipe remains secured to the cab.



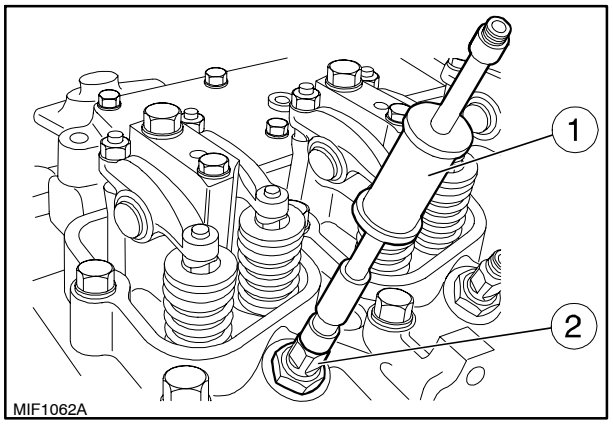
12

5. Loosen the clamp and disconnect the engine oil vapour recovery pipe (3) from the blow-by.
6. Unscrew the relevant bolts and remove the tappet covers (1, 2 and 4).
7. Detach the fuel recirculation pipe from the injectors (5).
8. Disconnect the injector delivery pipes (6).



13

9. Remove the injectors (2) with tool **380000982** (1) and extract them from the cylinder head.



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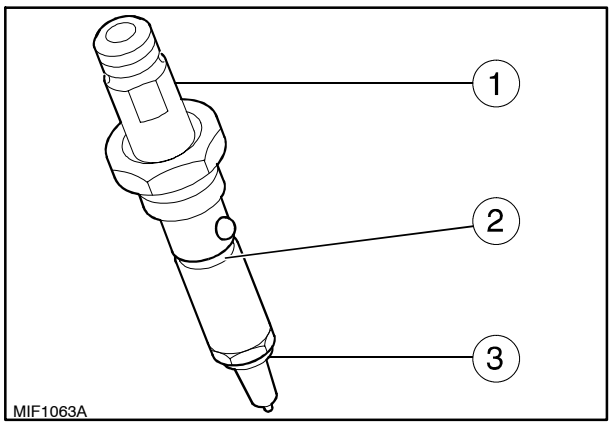
Installation

To reinstall the injector, proceed as follows.

WARNING

Use suitable tools to align the holes. NEVER USE FINGERS OR HANDS.

- On the injector (1), mount a new seal (2) lubricated with Vaseline and a new washer (3).
- Fit the injectors in the seats on the cylinder head and tighten to a torque of 25 N·m (18 lb-ft).



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TROUBLESHOOTING

Problems	Possible Causes	Solutions
Clutch slips	1. Worn disks. Pressure plates and flywheel worn.	Replace any parts which are worn up to or over the limit and adjust levers and clutch control linkage.
	2. Belleville spring disk distorted or damaged.	Replace the Belleville spring disk.
	3. Oil or grease contaminating the friction lining of disks.	Replace the disks, identify and eliminate the source of the lubricant inside the clutch housing and thoroughly clean the friction surfaces.
Clutch jerks	1. Partial seizure of the external control linkage.	Check rod pivots and lubricate.
	2. Clutch disk deformed.	Replace the disk and adjust the clutch control lever.
	3. Clutch disk with damaged hub springs or loose hub rivets.	Replace disc.
	4. Oil or grease contaminating the friction lining of disks.	Replace the disks, identify and eliminate the source of the lubricant inside the clutch housing and thoroughly clean the friction surfaces.
Clutch sticks and drags	1. Clutch disk deformed.	Replace and adjust disks.
	2. Seizure of external control linkage.	Check, replace faulty parts and lubricate.
	3. Controls incorrectly adjusted.	Adjust the controls.
Clutch noisy when engaged and/or disengaged	1. Thrust bearing worn.	Replace Bearing.
	2. Clutch disk with hub springs damaged.	Replace disc.
Clutch pedal stiff	1. Partial seizure of the external control linkage.	Check rod pivots and lubricate.
	2. Partial seizure of pedal pivot.	Check pivot and lubricate.

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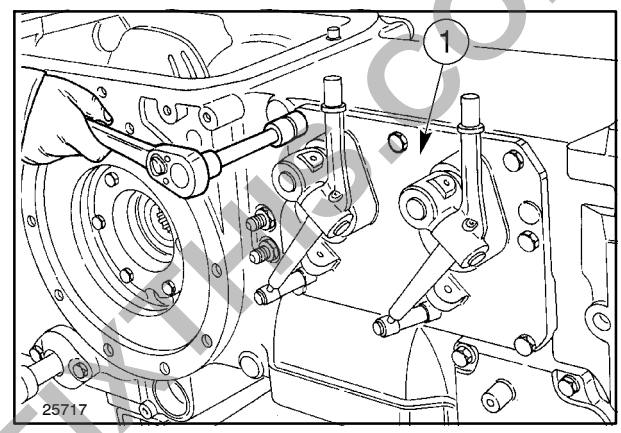
Op. 21 118 85
REAR GEARBOX TRANSMISSION
Disassembly - Assembly

WARNING

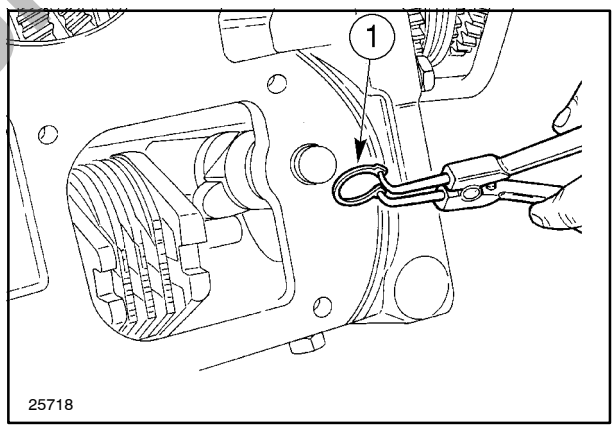
Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

Proceed as follows.

1. Fix the gearbox -transmission casing to the rotating stand **380000301** using brackets **50157 and 50160** (see Figs. 4 and 5).
2. Carry out operation **23 101 40** or **23 202 50** drive gear casing assembly removal (see Section 23, Chapter 1).
3. Unscrew the retaining bolts and remove the cover (1) with the gearbox lever and gear unit.
4. Detach the power take-off control shaft following the instructions in Section 31.
5. Remove the parking brake casing cover and extract the circlip (1) that secures the parking brake control lever.

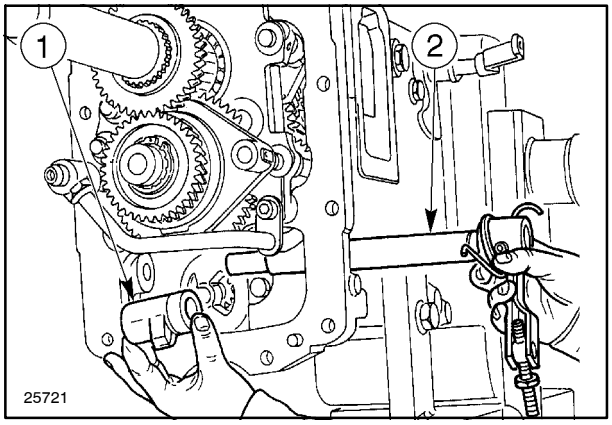


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6. Extract the parking brake control lever(2) and recover the sleeve-cam (1).



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POWER SHUTTLE FAULT CODE PRIORITY

CODES	FAULT	PRIORITY	CORRECTION	EFFECT
11	CPDL_POT_LO_DISABLING_ERR	14	SL	Dis
11	CPDL_POT_LO_ERR	75′	Fixed	Lim
12	CPDL_POT_HI_DISABLING_ERR	15	SL	Dis
12	CPDL_POT_HI_ERR	74′	Fixed	Lim
13	UD_SW_ON_ERR	67	Auto	None
14	C1_SW_HI_DIS_ERR	22	CP/SL	Dis
14	C1_SW_HI_ERR	83′	Fixed	Mod
15	C1_SW_LO_DIS_ERR	23	CP/SL	Dis
15	C1_SW_LO_ERR	84′	Fixed	Mod
16	G1_SW_HI_DIS_ERR	24	CP/SL	Dis
16	G1_SW_HI_ERR	85′	Fixed	Mod
17	G1_SW_LO_DIS_ERR	25	CP/SL	Dis
17	G1_SW_LO_ERR	86′	Fixed	Mod
18	CREEPER_ENG_SW_HI_ERR	47	Fixed	Mod
19	CREEPER_ENG_SW_LO_ERR	48	Fixed	Mod
21	CH_HARN_ERR	1	Fixed	Crit.Dis
22	SOL_A_SHORT_DIS_ERR	39	CP/SL	Dis
22	SOL_A_SHORT_ERR	97′	Fixed	Lim
23	SOL_B_SHORT_DIS_ERR	37	CP/SL	Dis
23	SOL_B_SHORT_ERR	95′	Fixed	Lim
24	CL_UNCAL_ERR	100	Fixed	Mod
26	ERPM_HI_ERR	65	Fixed	Mod
27	ERPM_LO_ERR	66	Fixed	Mod
28	B_CL_UNCAL_ERR	101	Fixed	Mod
29	A_CL_UNCAL_ERR	102	Fixed	Mod
31	SOL_SHTL_SHORT_DIS_ERR	31	CP/SL	Dis
31	SOL_SHTL_SHORT_ERR	90′	Fixed	Lim
32	SOL_HL_SHORT_DIS_ERR	33	CP/SL	Dis
32	SOL_HL_SHORT_ERR	92′	Fixed	Lim
33	SOL_DUMP_SHORT_DIS_ERR	35	CP/SL	Dis
33	SOL_DUMP_SHORT_ERR	98′	Fixed	Lim
35	SOL_DUMP_SHORT_12V_ERR	8	Fixed	Crit.Dis
36	SOL_DUMP_OPEN_OR_GND_DIS_ERR	34	CP/SL	Dis
36	SOL_DUMP_OPEN_OR_GND_ERR	99′	Fixed	Lim
37	CL_SW_OC_ERR	13	CP/SL	Dis

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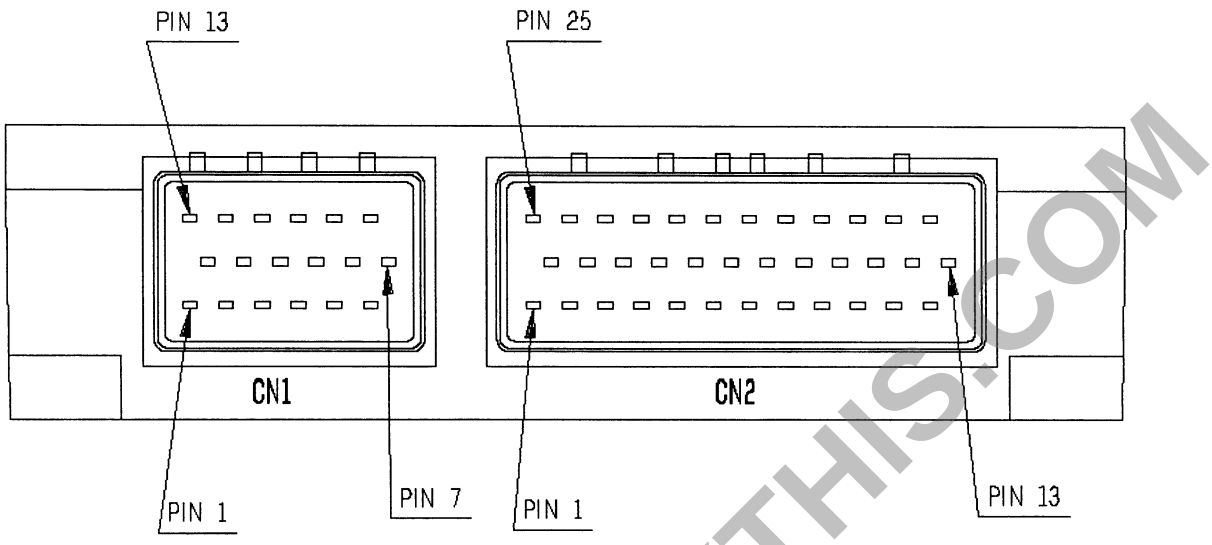
CODES	FAULT	PRIORITY	CORRECTION	EFFECT
38	SOL_B_SHORT_12V_ERR	9	Fixed	Crit.Dis
39	SOL_B_OPEN_OR_GND_DIS_ERR	36	CP/SL	Dis
39	SOL_B_OPEN_OR_GND_ERR	94′	Fixed	Lim
41	SOL_A_OPEN_OR_GND_DIS_ERR	38	CP/SL	Dis
41	SOL_A_OPEN_OR_GND_ERR	96′	Fixed	Lim
42	SOL_A_SHORT_12V_ERR	11	Fixed	Crit.Dis
43	SHTL_SYNCRO_SW_HI_DIS_ERR	18	CP/SL	Dis
43	SHTL_SYNCRO_SW_HI_ERR	81′	Fixed	Lim
44	SHTL_SYNCRO_SW_LO_DIS_ERR	21	CP/SL	Dis
44	SHTL_SYNCRO_SW_LO_ERR	82′	Fixed	Lim
46	FUSE_20_ERR	51	Auto	Lim
47	CL_SW_HI_ERR	55	Fixed	Mod
48	CL_SW_LO_ERR	56	Fixed	None
49	WHLSPD_SNR_HI_ERR	63	Fixed	Mod
51	TEMP_SNDR_OC_ERR	53	Auto	Mod
52	TEMP_SNDR_SC_ERR	54	Auto	Mod
53	V5_VREF_FAILED_HIGH	6	Fixed	Crit.Dis
54	V5_VREF_FAILED_LOW	7	Fixed	Crit.Dis
55	FORWARD_SW_HI_ERR	57	Auto	None
56	FORWARD_SW_LO_ERR	58	Auto	None
57	REVERSE_SW_HI_ERR	61	Auto	None
58	REVERSE_SW_LO_ERR	62	Auto	None
59	FNR_SW_DISAGREE_ERR	43	Auto	Dis
61	HI_LO_SYNCRO_SW_HI_DIS_ERR	16	CP/SL	Dis
61	HI_LO_SYNCRO_SW_HI_ERR	76′	Fixed	Lim
62	HI_LO_SYNCRO_SW_LO_DIS_ERR	17	CP/SL	Dis
62	HI_LO_SYNCRO_SW_LO_ERR	77′	Fixed	Lim
63	SYNCRO_HL_ENG_ERR	40	SL/HI	Dis
64	SYNCRO_SHTL_ENG_ERR	41	SL	Dis
65	SOL_HL_OPEN_OR_GND_DIS_ERR	32	CP/SL	Dis
65	SOL_HL_OPEN_OR_GND_ERR	91′	Fixed	Lim
66	SOL_SHTL_OPEN_OR_GND_DIS_ERR	28	CP/SL	Dis
66	SOL_SHTL_OPEN_OR_GND_ERR	89′	Fixed	Lim
67	SOL_HL_SHORT_12V_DIS_ERR	27	CP/SL	Dis
67	SOL_HL_SHORT_12V_ERR	87′	Fixed	Lim
68	SOL_SHTL_SHORT_12V_DIS_ERR	26	CP/SL	Dis

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FAULT CODE 11

ECM PIN REFERENCE



20007089 **CONNECTOR 1 (137A)** **CONNECTOR 2 (137B)**

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FAULT CODE 26

Turn the starter key to the OFF position.
Is wire (R) on alternator socket (W) correctly connected?

NO → Connect the wire correctly.

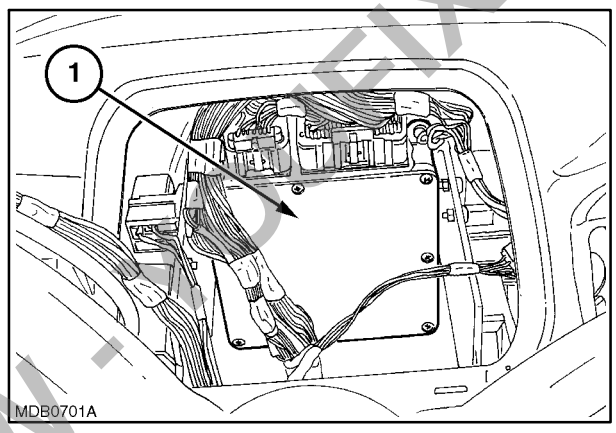
YES

Start the engine and accelerate to 1000 rpm (make sure that the recharging lamp is off).
Using a digital tester measure the frequency at the alternator output between la socket (W) and ground.
Is the frequency ~ 200 Hz?

NO → Replace the alternator if the frequency value is much higher.

YES

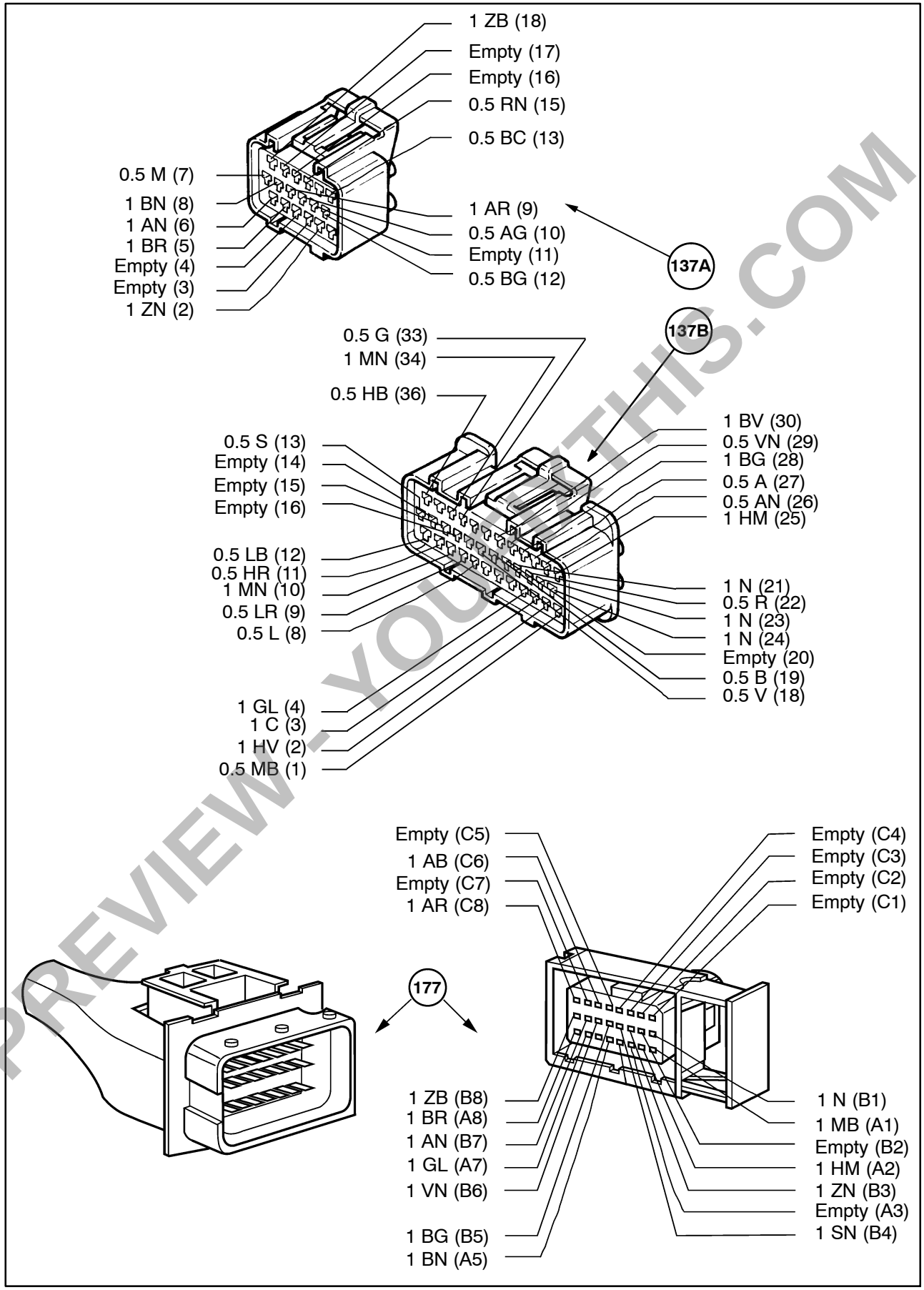
Replace the ECM (1).



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FAULT CODE 42

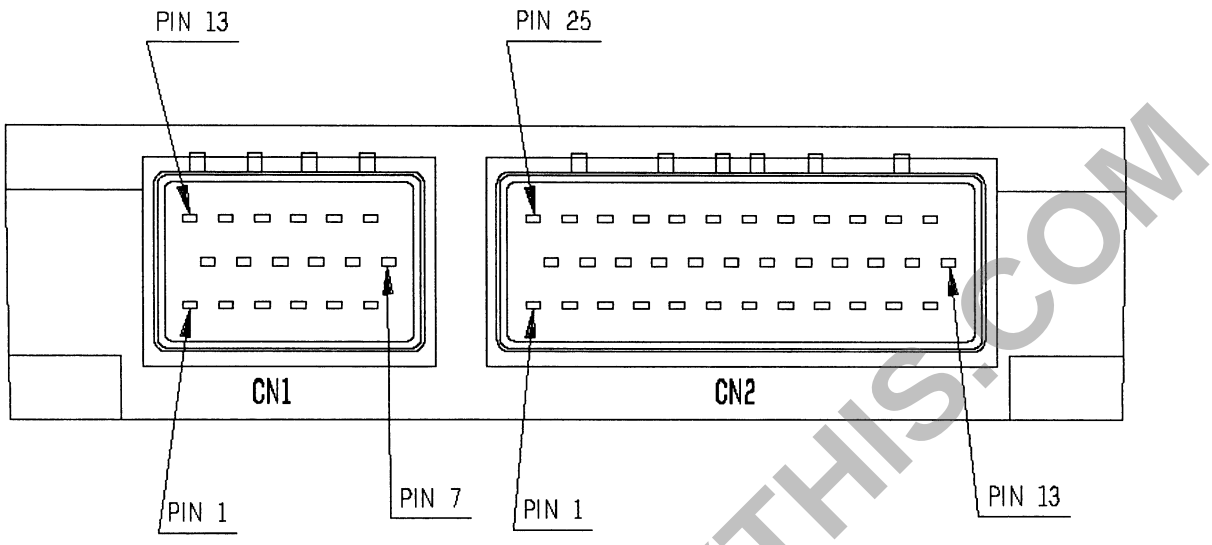


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FAULT CODE 58

ECM PIN REFERENCE



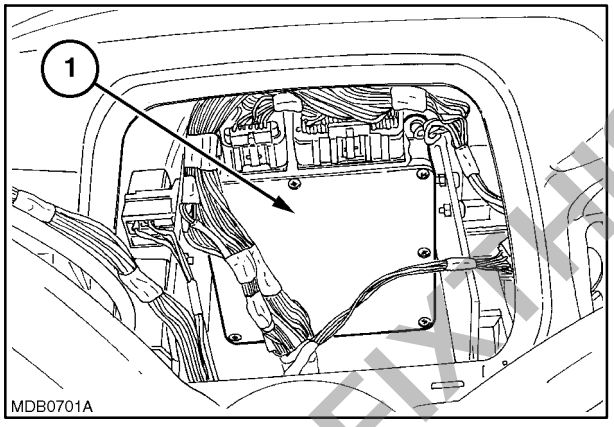
20007089 **CONNECTOR 1 (137A)** **CONNECTOR 2 (137B)**

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FAULT CODE 77

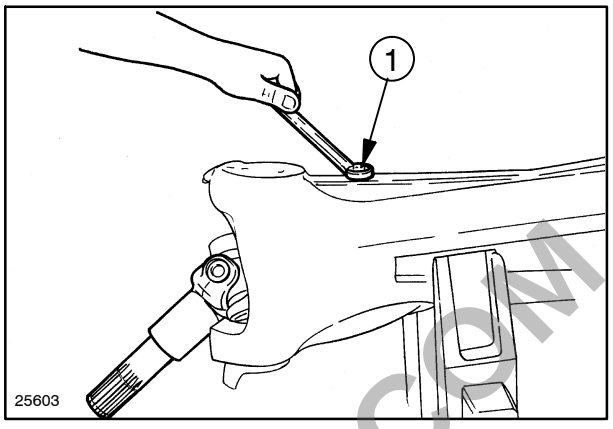


(ECM 1)

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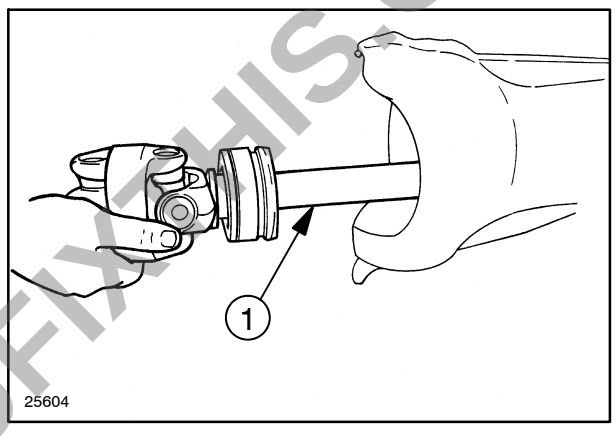
16. Remove the axle shaft retaining bolt (1).



34

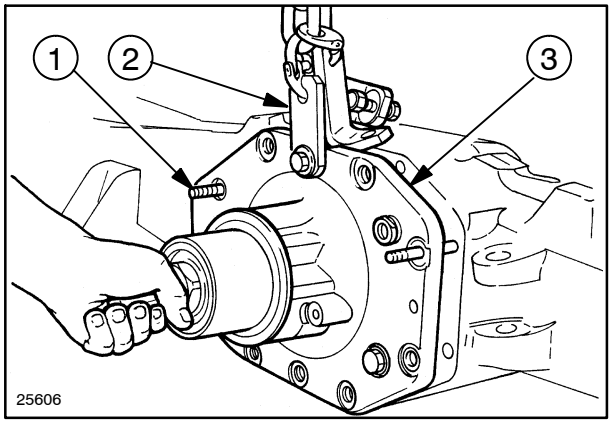
17. Remove the axle shaft (1).

18. To disassemble the right hand side gear unit, observe the order of operations used for the disassembly of the left hand side gear unit.



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19. Unscrew the two bevel drive-differential support retaining bolts from the axle casing, screw on the two pins **50169** (1). Remove the remaining bolts and the bevel drive-differential support, attach a chain (2) and put the hoist under strain. Remove the bevel drive-differential support (3) from the axle casing.

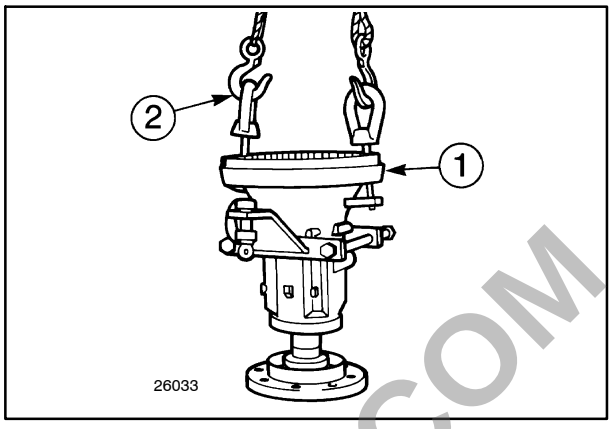


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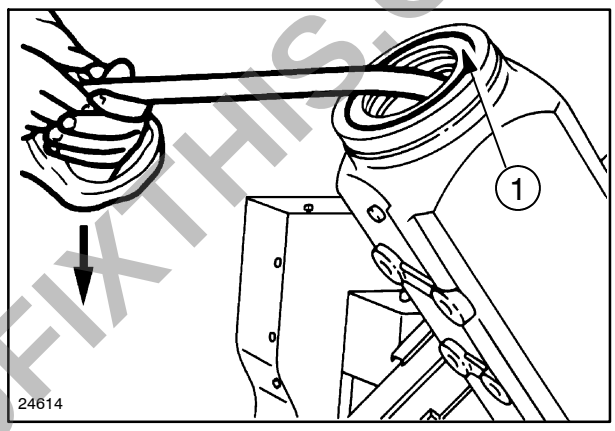
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4. Connect the final drive (1) to a hoist (2) and raise, checking that the wheel axle leaves the housing (tap on the end of the driving gear axle with a rubber mallet to ease it out).



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5. Remove the seal (1).



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6. To install the final drive housing, proceed as follows.

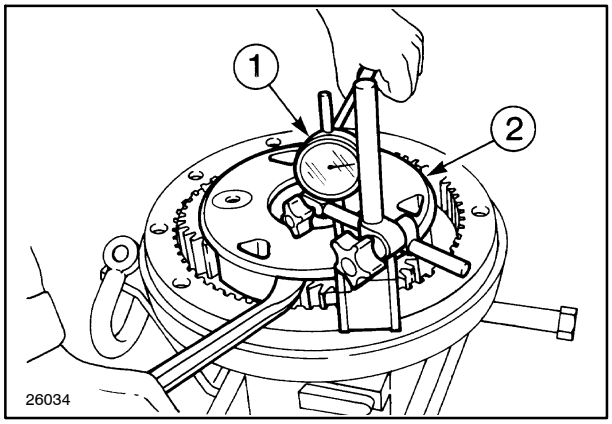
⚠ WARNING ⚠

Always use appropriate tools to align hardware holes. NEVER USE YOUR FINGERS OR HANDS.

- Respect the tightening torques prescribed on page 3.
- Install the seal using a suitable striker.
- Assemble the drive wheel shaft.
- Install the driven gear support and the relative adjuster shim.
- Insert the safety plate and tighten the bolt to the prescribed torque.
- Adjust the axial clearance of the gear support as follows.

7. Using a dial gauge (1), check that the axial clearance of the support (2) is 0.2 to 0.4 mm (0.0079 to 0.0157 in.); if not, change the adjuster shim (10, fig. 8).

NOTE: *The adjustment shims are listed on page 2.*



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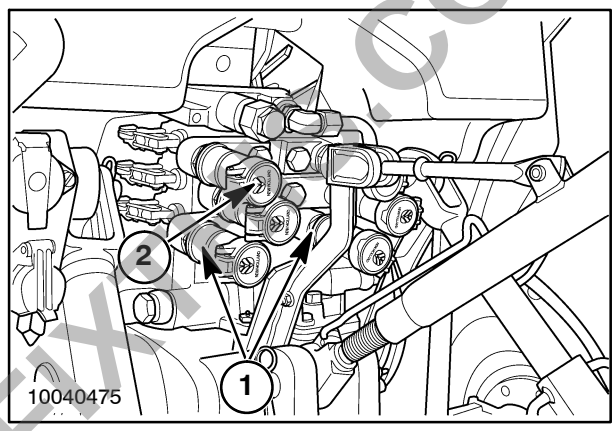
TABLE 4. CONTROL LEVER POSITIONS

Operation Performed	Control Lever Position	Description
Lifting	Full Rearward	Lifts the Implement
Lowering	Forward	Lowers the Implement
Neutral	In-between Rearward and Forward	Stops Lifting or Lowering
Float (where installed)	Full Forward Beyond Lowering	Implement Follows Terrain Under Own Weight

DELUXE QUICK-FIT COUPLERS

NOTE: *Before connecting or disconnecting quick-fit couplers, stop the tractor, and lower any attached implement.*

Each remote control valve contains two 1/2 inch push-pull type couplers (1), which provide for easy installation and removal of external equipment. The couplers contain plastic caps (2) for the prevention of contamination when not in use.

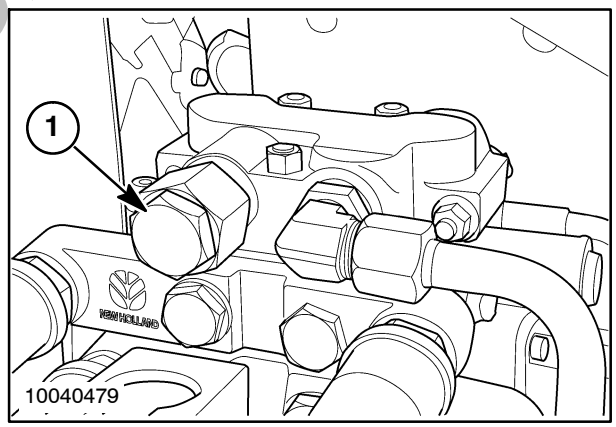


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IMPORTANT: *Clean the area around the coupler before connecting or disconnecting to reduce the ingestion of contaminants such as dirt into the hydraulic system.*

ZERO-PRESSURE RETURN PORT

Implements that operate independent hydraulic motors require attachment of the oil return [discharge] line to the zero-pressure, return port (1) of the tractor. The port requires a union, which is not standard equipment.

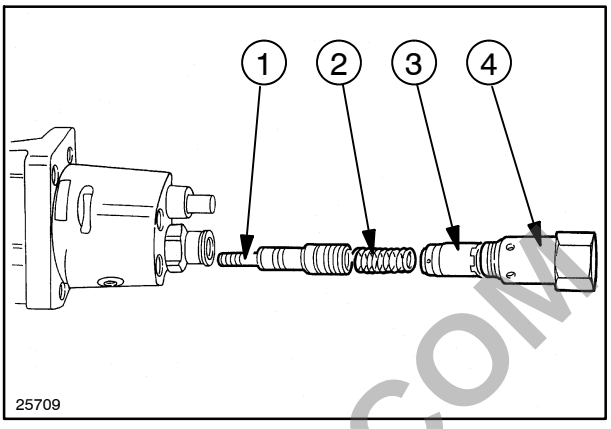


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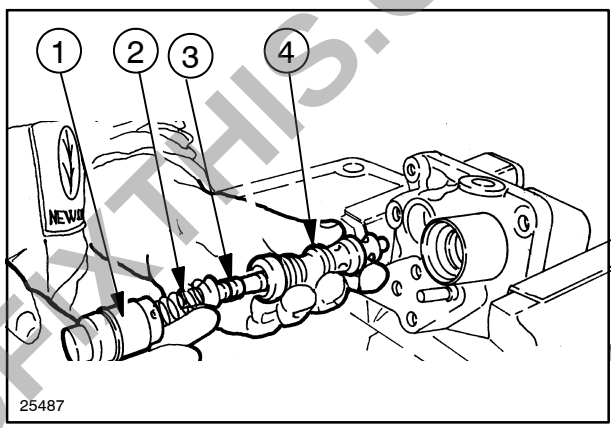
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5. Remove the cylinder safety valve (4) and remove the arm lowering speed adjustment valve (3), the spring (2) and the pin (1).



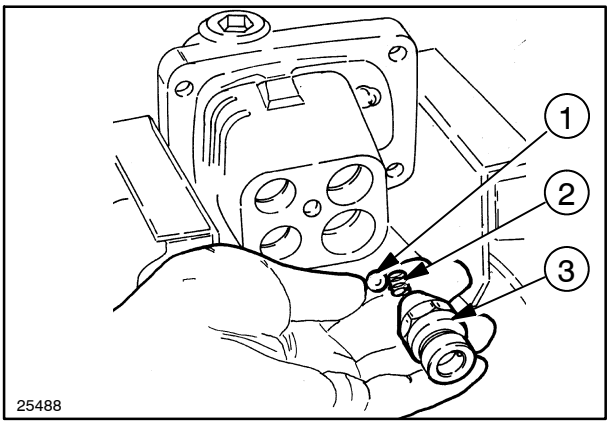
76

6. Unscrew the cap (1) and remove the spring (2), the control valve block pin (3) and seat (4).



77

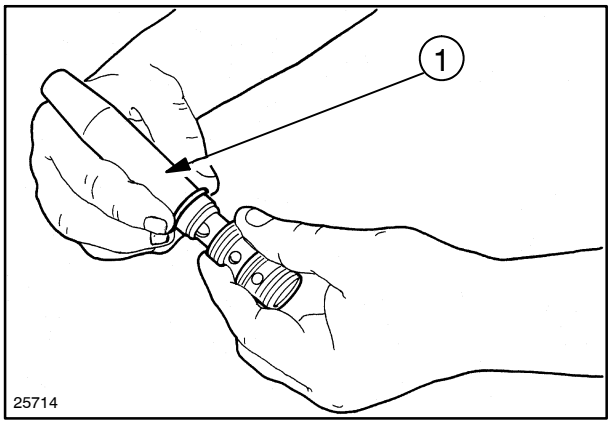
7. Remove the check valve, comprising: ball (1), spring (2) and union (3).



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8. Check the wear of the seals on the control valve block-pin seat. If damaged, replace the seals using protection device **380000275** (1).

   Check the efficiency of the control valve block pin as follows:

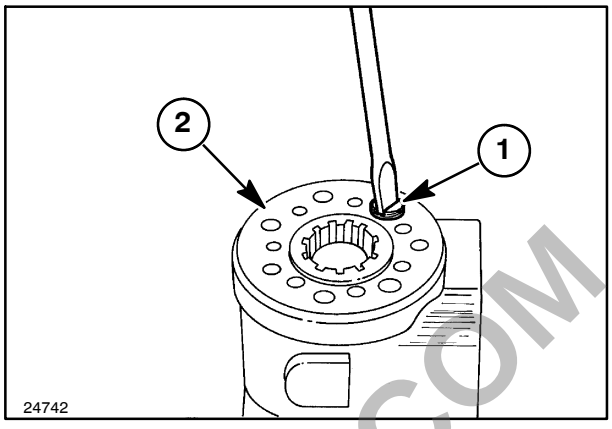


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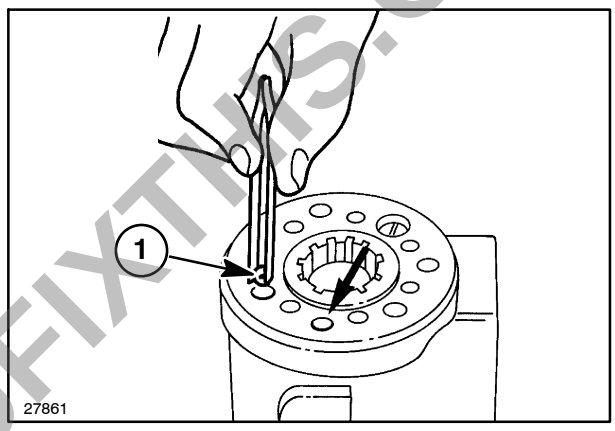
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48. Screw the threaded plug (1) into the non-return valve seat until the upper surface is below the coupling surface of the control valve body (2).



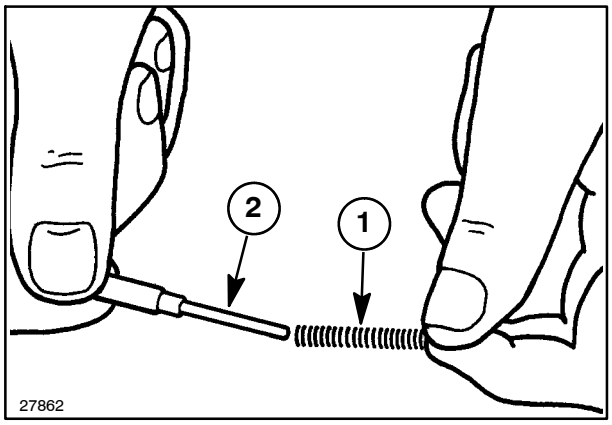
60

49. Insert the non-return valve balls (1) into the two seats indicated by the arrows.



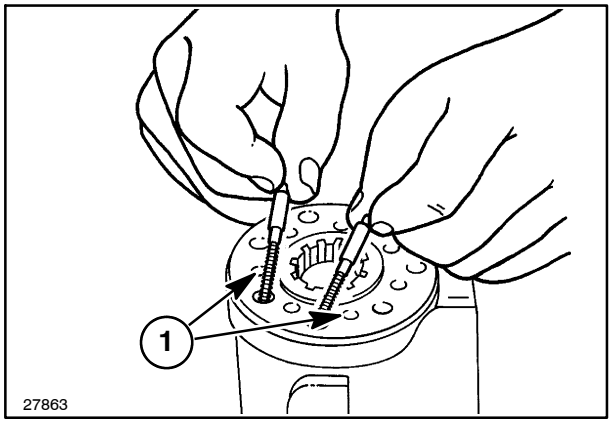
61

50. Insert the springs (1) on the backflow valve pins (2).



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51. Position the pins with springs (1), in the backflow valve seats.

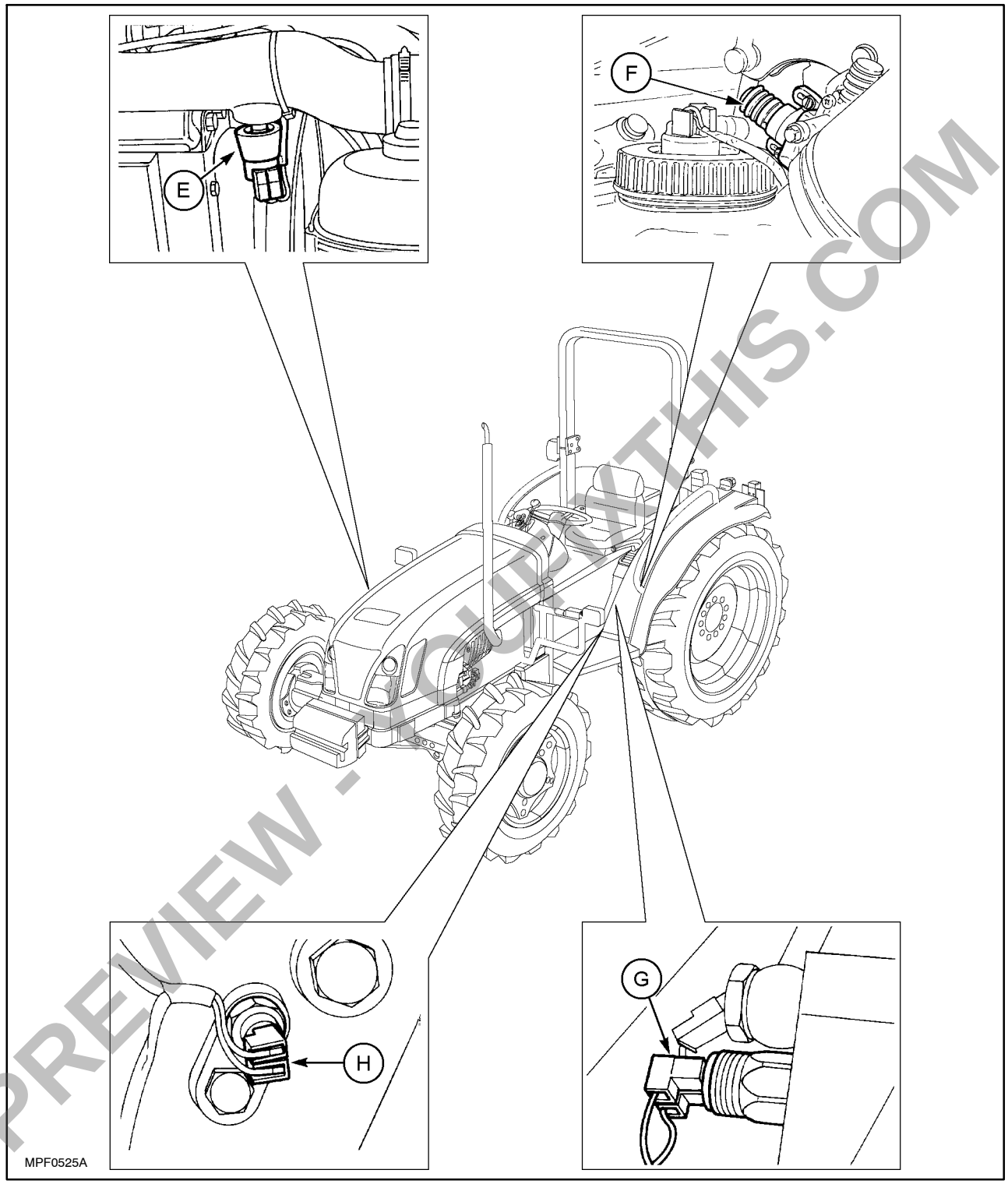


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TRANSMITTERS, SENSORS AND SWITCHES (3 cyl.)



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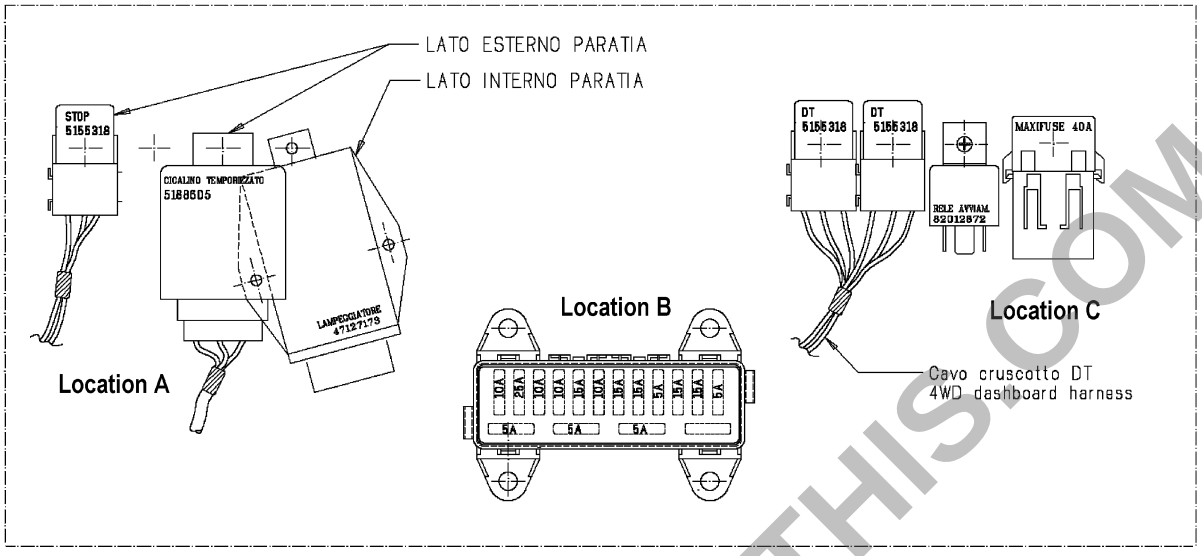
ELECTRICAL CIRCUIT COMPONENTS (Continued)

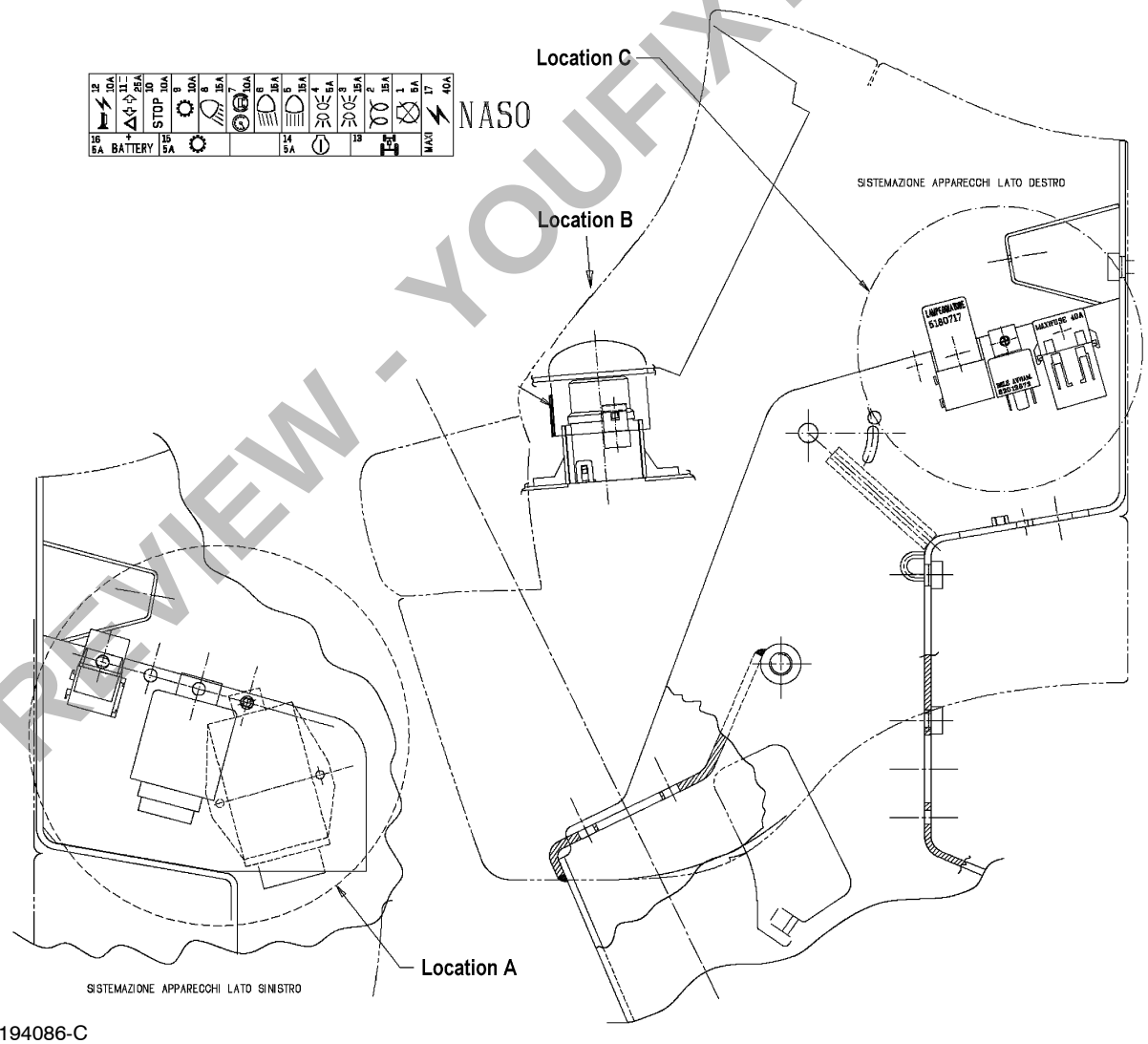
41		Alternator.
42		Overload protection device.
43		Trailer brake indicator pressure switch.
44		Electrohydraulic 4WD indicator pressure switch.
46		4WD solenoid valve.
47		Mechanical 4WD indicator switch.
48		Gear switch connection.
49		Neutral gear switch.
50		Splitter switch.
51		PTO indicator switch.
52		Parking brake switch.
53		Fuel gauge switch.
54		RH tail light.
55		8A power socket.
56		7–pole connection.
57	(C9)	Work light.
58		Number plate light.
59		LH tail light.
60		Rear ground.
61		Trailer brake solenoid valves.
62		Trailer brake safety pressure switch.
63		LH two–faced headlight.
64		RH two–faced headlight.
65		Seat switch.
66		Transmission connection (18 PIN).
67		Brake lights relay.
68	(C6-B)	Transmission connection (10 PIN).
69	(C6-A)	Transmission connection (24 PIN).
70		G1 gear switch.
71		C1 gear switch.
72		Transmission oil temperature sensor.
73		Transmission oil pressure switch.
74		HIGH clutch solenoid valve.
75		LOW clutch solenoid valve.
76		Speed sensor.
77		Dump solenoid valve.
78		Trailer brake connection (4 PIN).
79	(C5)	Front connection (6 PIN).

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Fuse and Relay Locations





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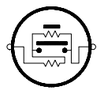
SYMBOLS USED IN ELECTRICAL DIAGRAMS (continued)



Switch



Inductive sensor



Sensor



Solenoid valve



Solenoid valve



Flasher

MPD2704A

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