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Engine – 6 Cylinder Mechanical — Chapter 4

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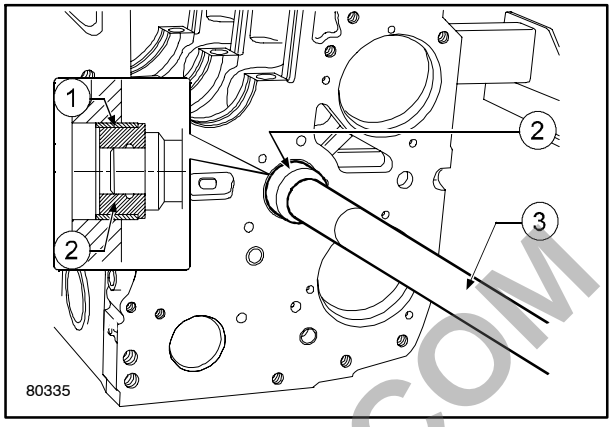
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Changing bushings on the crankcase

83. To change the front bushing (1), use a suitable drift for its disassembly and assembly.

⚠ CAUTION ⚠

Upon assembly, the bushing (1) must be directed so that the lubrication holes coincide with the holes in the seats in the crankcase.

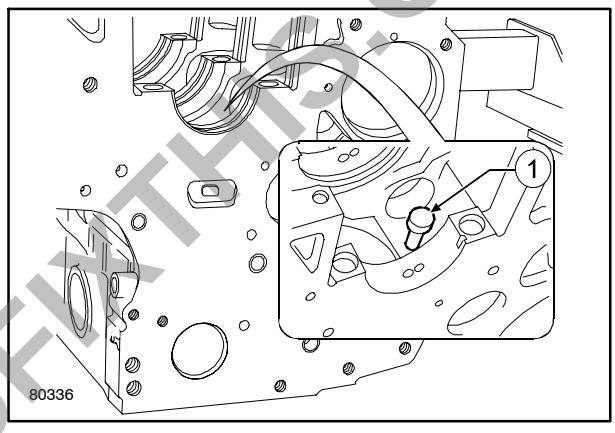


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ASSEMBLY AT THE BENCH

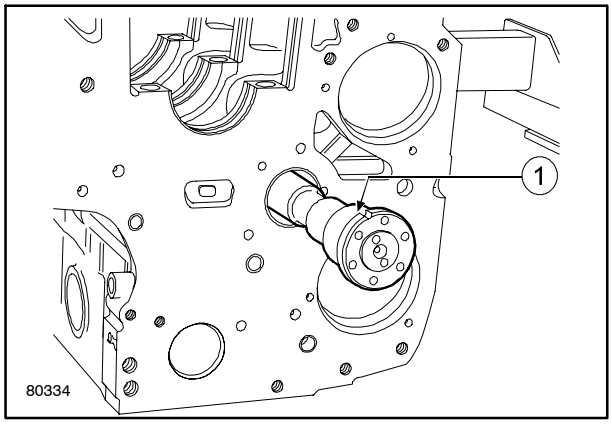
Installing the tappets – Camshaft

84. Lubricate the tappets (1) and fit them in their seats in the crankcase.



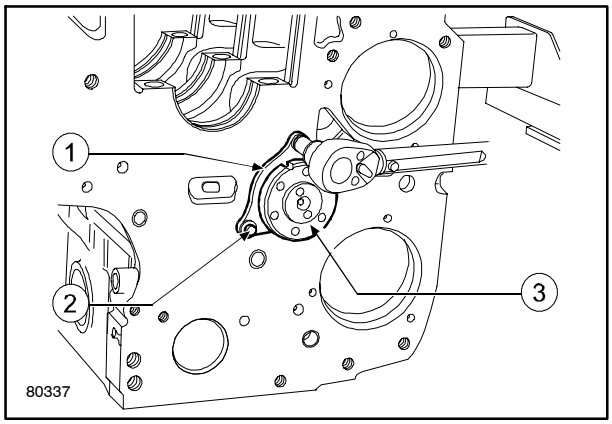
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85. Lubricate the bushing supporting the camshaft and mount the camshaft (1) taking care that, during this process, the bushing or the supporting seats do not get damaged.



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86. Position the plate (1) retaining the camshaft (3) with the slot facing towards the top of the crankcase and the punchmark facing the operator. Tighten the screws (2) to the pre-



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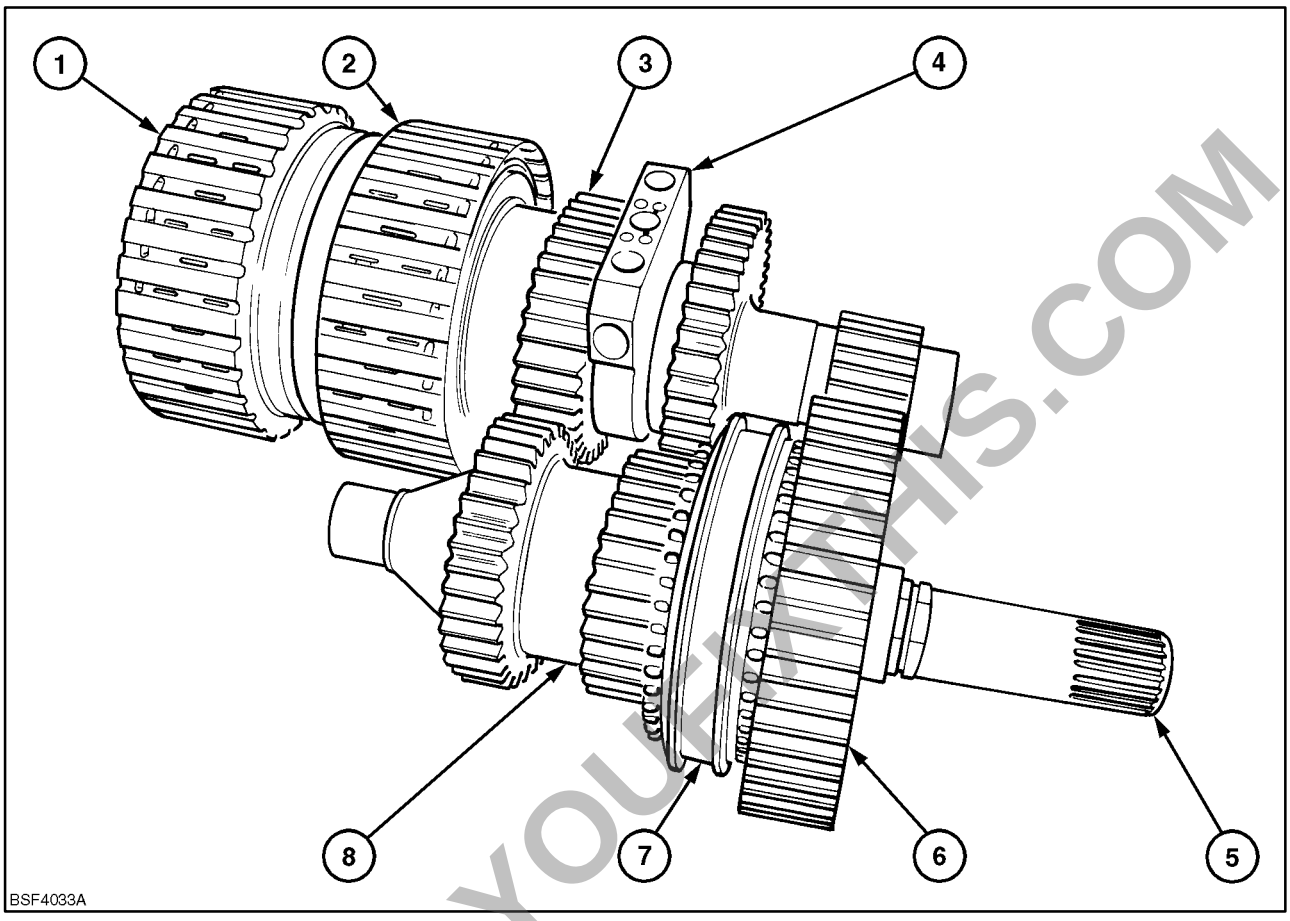
TORQUE WRENCH SETTINGS

PART	TORQUE Nm (lb ft)
Cooling nozzles (M 8x 1.25x 10)	15 ± 3 (11.0634 ± 2.2127)
Main bearings ..... 1st phase ..... 2nd phase ..... 3rd phase	50 ± 3 (36.8781 ± 2.2127) 80 ± 5 (59.0050 ± 3.6878) 90° ± 5°
Timing gear casing ..... (M 8x 1.25x 40) ..... (M 10x 1.5x 30)	 24 ± 4 (17.7015 ± 2.9502) 47 ± 5 (34.6654 ± 3.6878)
Oil pump (M 8x 1.25x 30) ..... 1st phase ..... 2nd phase	8 ± 1 (5.9005 ± 0.7376) 24 ± 4 (17.7015 ± 2.9502)
Big end cap bolts (M 11x 1.25) ..... 1st phase ..... 2nd phase ..... 3rd phase	30 ± 3 (22.1269 ± 2.2127) 60 ± 5 (44.2537 ± 3.6878) 60° ± 5°
Bolts securing oil sump (see Figure 5) ♦ Tightening Bolts Nº 31 & 34 M10 1.5x45 ..... Tightening Bolts Nº 4-14, 17-27, 32-33 M10 1.5x90 ..... Tightening Bolts Nº 1-3, 28-30 M10 1.5x125 ..... Tightening Bolts Nº 15-16 M10 15x190	 50 ± 5 (36.8781 ± 3.6878) 70 ± 5 (51.6293 ± 3.6878) 70 ± 5 (51.6293 ± 3.6878) 70 ± 5 (51.6293 ± 3.6878)
Fuel pump installation ..... M8 Bolts ..... M6 Bolts ..... M6 Nuts	 24 ± 4 (17.7015 ± 2.9502) 10 ± 1 (7.3756 ± 0.7376 10 ± 1 (7.3756 ± 0.7376
Nuts securing fuel pump M 10x 1.5 for tightening ..... final torque	10 – 15 (7.3756 - 11.0634) 50 – 55 (36.8781 - 40.565)
Rocker arm / head fastening (M 8) . .	36 ± 4 (26.5522 ± 2.9502)
Rocker arm adjuster fastening (3/4 24)	24 ± 4 (17.7015 ± 2.9502)
Bolts securing cylinder head ..... Step 1 (M 12x 1.75 10.9x 70) ..... Step 2 ..... Step 1 (M 12x 1.75 10.9x 140) ..... Step 2 . Step 3 . Step 1 (M12x 1.75 10.9x 180) . Step 2 . Step 3 .	 50 (35.71429) +90° 40(28.57143) +90° +90° 70(50) +90° +90°
Rocker arm cover (M 8x 1.25x 25)	24 ± 4 (17.7015 ± 2.9502)
Intake manifold fastening (M 8x 1.25)	24 ± 4 (17.7015 ± 2.9502)
Air intake union assembly (M 8x 1.25)	24 ± 4 (17.7015 ± 2.9502)
Exhaust manifold fastening (M 10x 1.5x 65) (see figure 2) .... 1st phase ..... 2nd phase	43 ± 6 (31.7152 ± 4.4254) 24 ± 4 (17.7015 ± 2.9502) 43 ± 6 (31.7152 ± 4.4254)
Fan pulley fastening (M 6) ..... (M10)	 10 ± 2 (7.3756 ± 1.4751) 43 ± 6 (31.7152 ± 4.4254)
Fan mounting fastening (M10)	33 ± 5 (24.3395 ± 3.6878)
Lifting bracket fastening (M 12x 1.75x 25) ..... (M 10)	 7 ± 12 (5.1629 ± 8.8507) 43 ± 5 (31.7152 ± 3.6878)
Crankshaft pulley (M 12x 1.75x 10.9)	50 ± 5 (36.8781 ± 3.6878) + 90° ± 5°
Flywheel / crankshaft fastening (M 12x 1.25) ..... 1st phase.	85 ± 10 (62.6928 ± 7.3756)
Injector / cylinder head fastening	.....

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REAR SECTION
DISASSEMBLY/ASSEMBLY



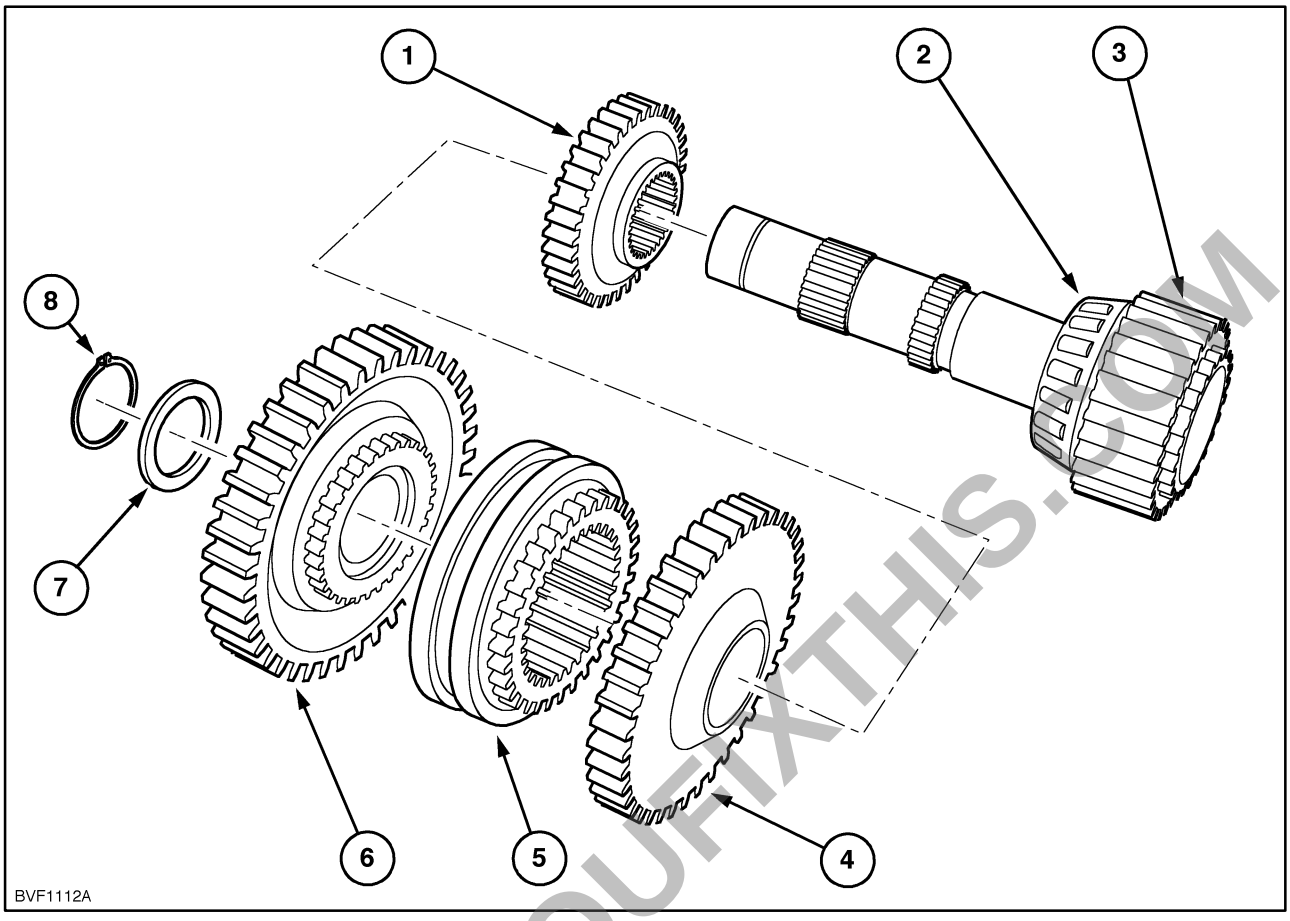
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Drive Line Components - Rear Section

1. Clutch C3
2. Clutch C4
3. Clutch C4 output gear (41 or 37 teeth)
4. Clutch C3/C4 support assembly
5. Output shaft
6. Low range gear (65 teeth)
7. Hi/Lo synchronizer
8. Cluster gear

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4

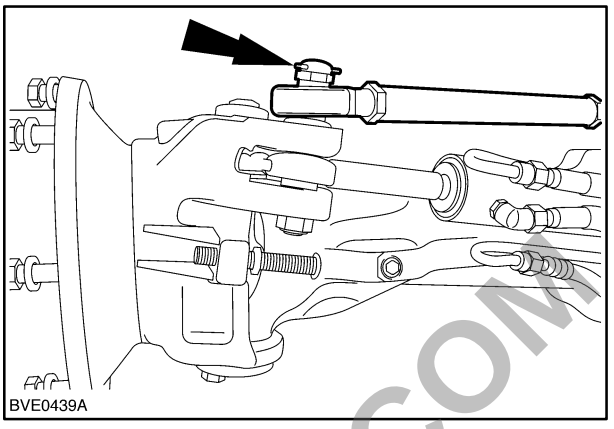
Counter Shaft Exploded View

1. 3rd gear driven (34/39 teeth)
2. Bearing
3. High range gear driven (27/31 teeth)
4. 2nd gear driven (41/45 teeth)
5. 1/2 synchronizer
6. 1st gear driven (49/52 teeth)
7. Steel thrust washer
8. Circlip

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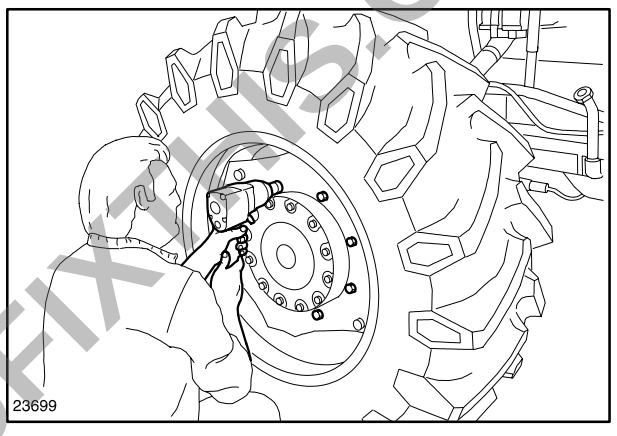
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3. Attach the steering arm to the stub axle housing. Repeat this step for the right hand side.



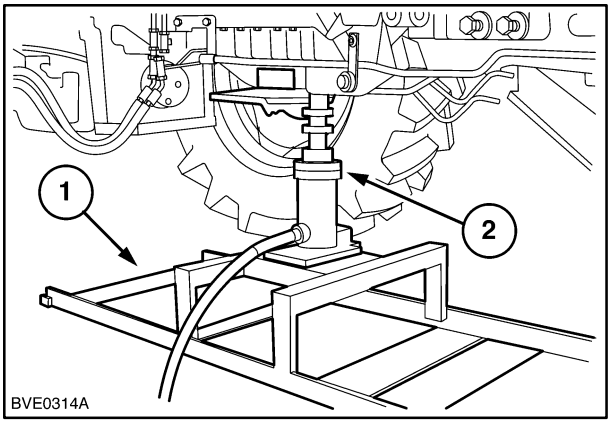
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4. Install the left hand side front wheel and install the retaining bolts. Remove the wooden wedges. Repeat this step for the right hand side front wheel.



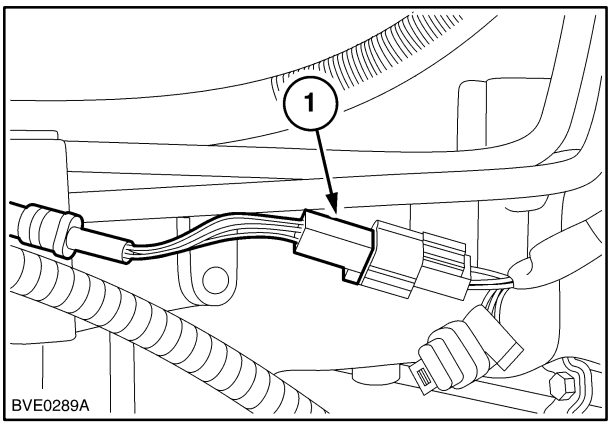
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5. Remove the supports (2) and the splitting kit (1).



5

6. Connect the steering sensor electrical connector (1) (if fitted).



6

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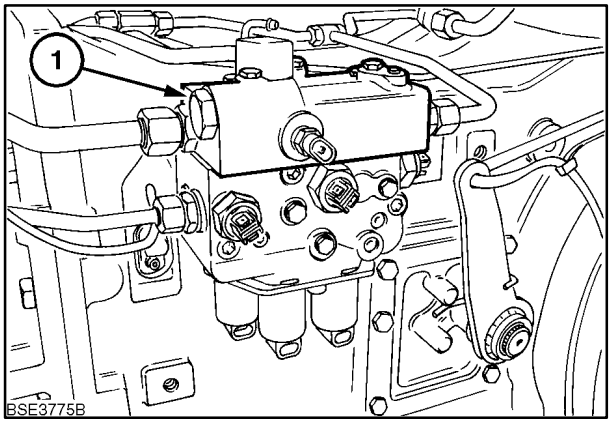
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PROBLEM	POSSIBLE CAUSES	CORRECTION
No/low front brake assistance	Front brake valve faulty.	Repair or replace the front brake valve.
	Logic head faulty.	Repair or replace the logic head.
	Air in the front brake circuit.	Bleed the air form the front brake circuit.
	Faulty low pressure circuit.	Pressure test the low pressure circuit.
Parking brake does not operate correctly	Parking brake cable incorrectly adjusted.	Adjust the parking brake cable.
	Worn brake pads.	Replace brake pads.
Parking brake will not release	Restricted parking brake lever travel.	Repair as necessary.
	Seized brake pads on the brake discs.	Replace damaged parts.

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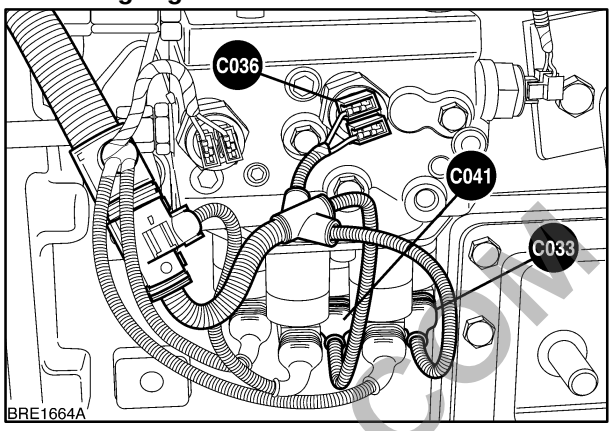
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Transmission Low Pressure Warning Light 'ON'



17

Low Pressure Regulating Valve



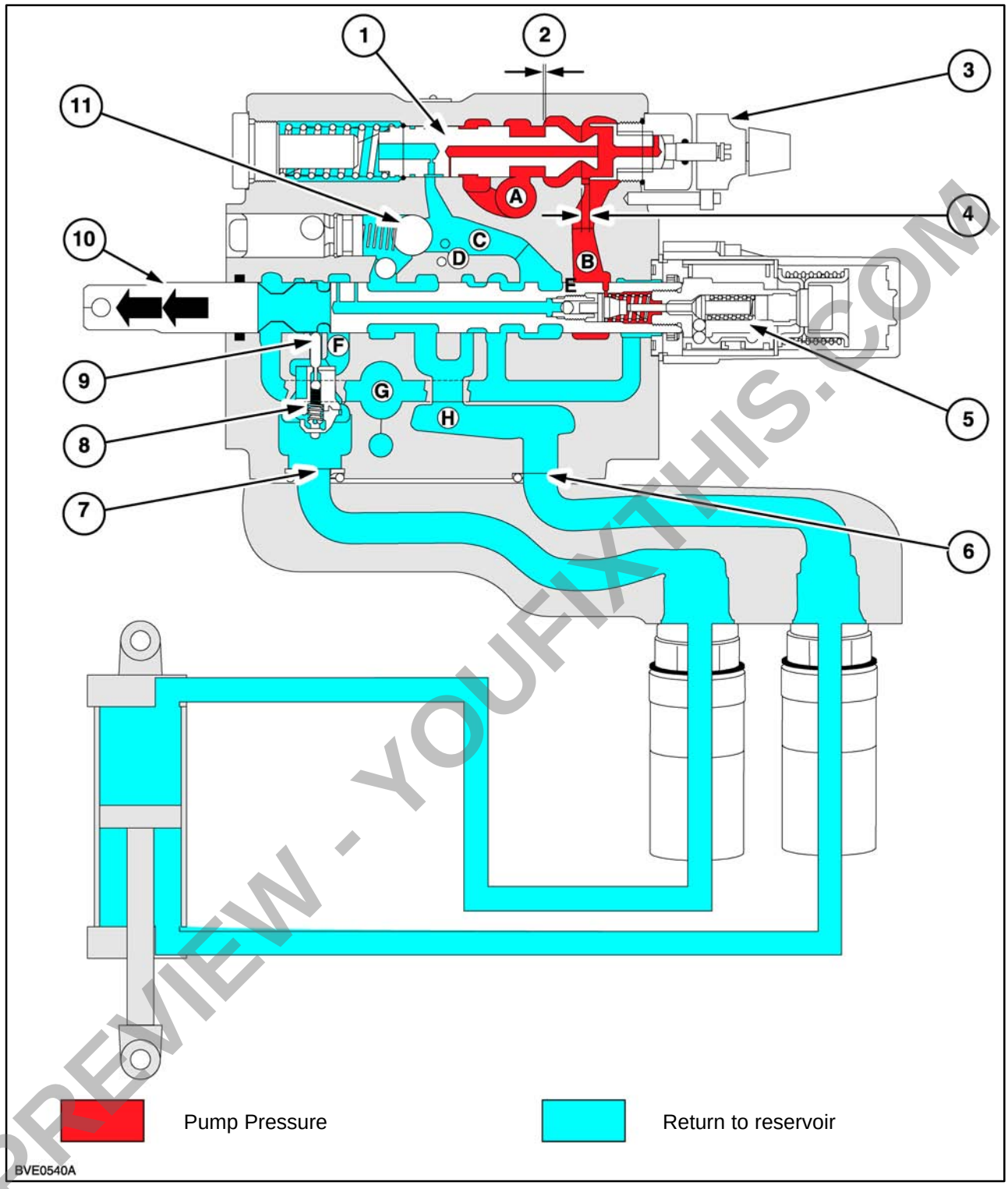
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Transmission Low Oil Pressure Switch

Problem	Possible Cause	Remedy
High pressure system components i.e. hydraulic lift, remote valves, and trailer brakes, and low pressure system components are still operating	Wiring fault	Remove connector C036 from the oil pressure switch. If the warning light remains on repair the wiring fault between C036 and C081 of the instrument cluster
High pressure system components i.e. hydraulic lift, remote valves, and trailer brakes, do not operate	Pressure incorrect	Perform tests for variable displacement pump. Refer to pressure testing described later in this chapter
Low pressure system components i.e. transmission, PTO, FWD and Diff locks do not operate	Sticking, broken components of low pressure regulating valve or stuck open relief valve.	Remove and examine the low pressure regulating valve for sticking, broken components or stuck open relief valve.
	Low pressure circuit pressure is incorrect	Pressure test circuit. Should be 17 bar
		Check for electrical fault which may affect the operation of all low pressure components i.e. disconnected harness to low pressure block
	Oil pressure switch faulty	Inspect the switch. The switch should be normally open, replace if faulty.
	Large leak in one of the low pressure system component circuits	Check for leaks and rectify

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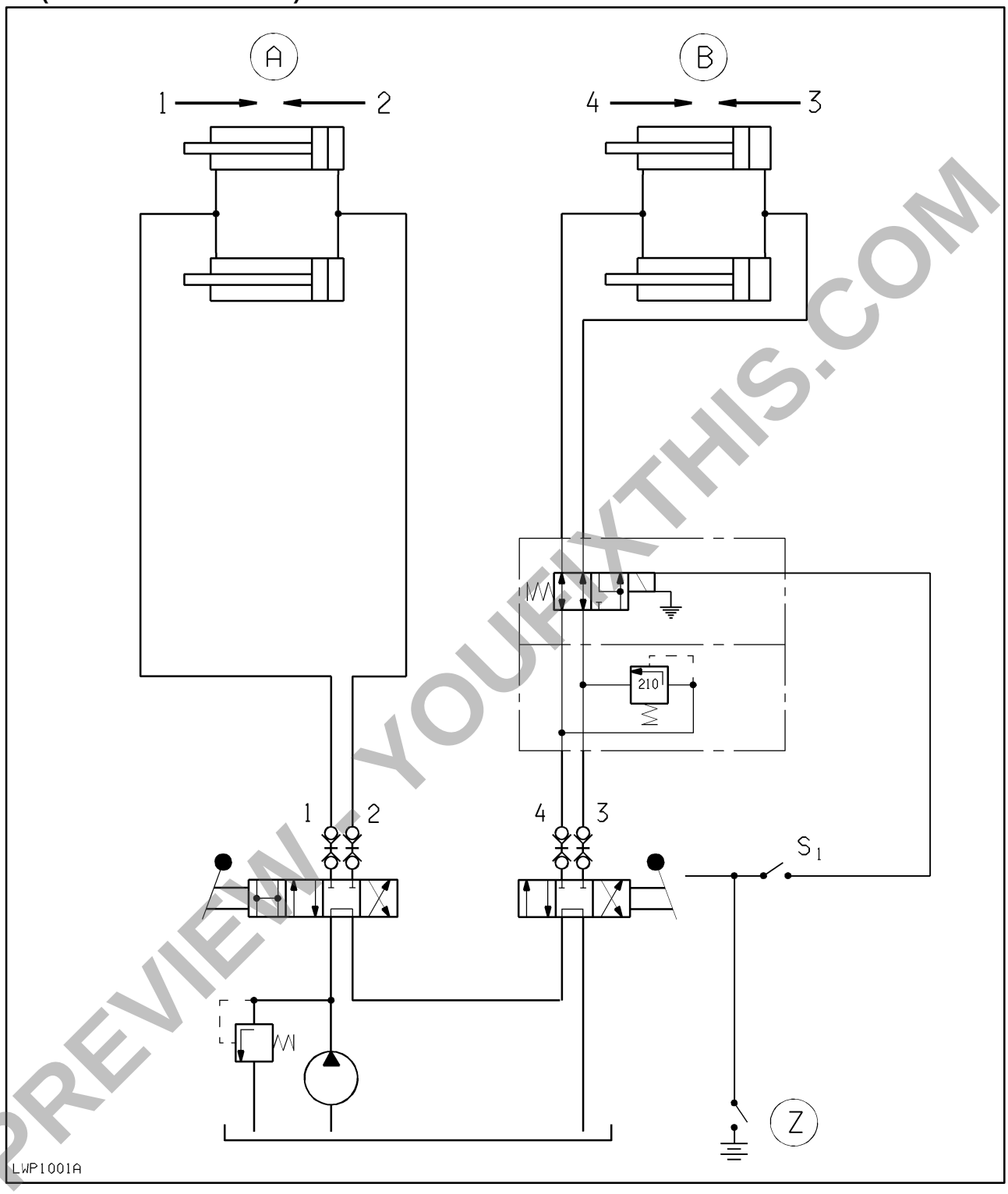
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Single Remote Control Valve Operation - Float

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NS (standard – basic version)



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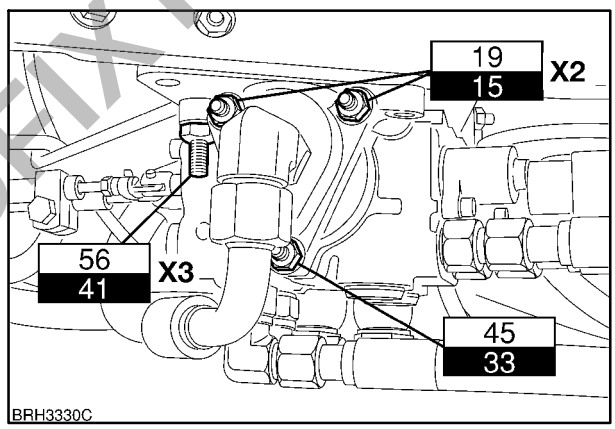
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MID MOUNT VALVE SPECIFICATIONS

Type . .	Parallel–Open Centre Circuit
Maximum Flow through one valve at rated engine speed: - Fixed Displacement Pump ….....	63 Litres/Min (16.64 U.S. Gals/Min)
Maximum Flow through Third Mid mount Valve: ….....	37.7 Litres/Min (10 U.S. Gals/Min)
Valve to Coupler Hoses	1/2” Bore with 13/16” ORFS fittings both ends

TORQUE VALUES

NOTE: *Ensure correct alignment of end sections relative to spool sections. Apply pressure to the end sections and tighten all nuts to 13 Nm (10 lb.ft). Final torque the two 1/2” nuts to 19Nm (15 lb.ft) and the single 9/16” nut to 33 Nm (45 ib.ft).*



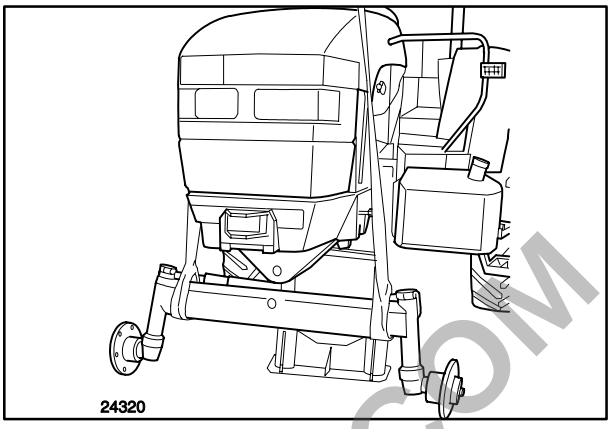
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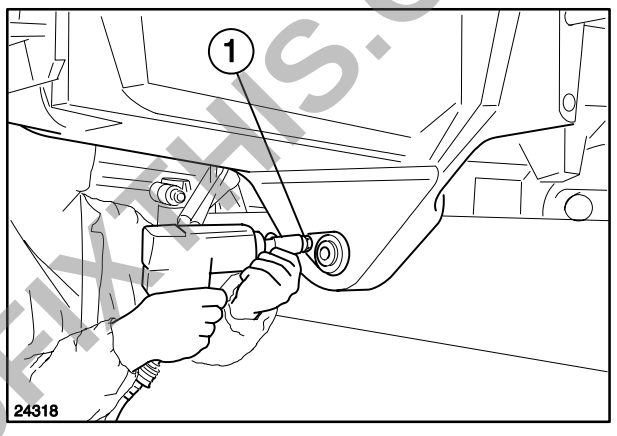
Installation

11. Locate the front axle into the front support using a hoist.



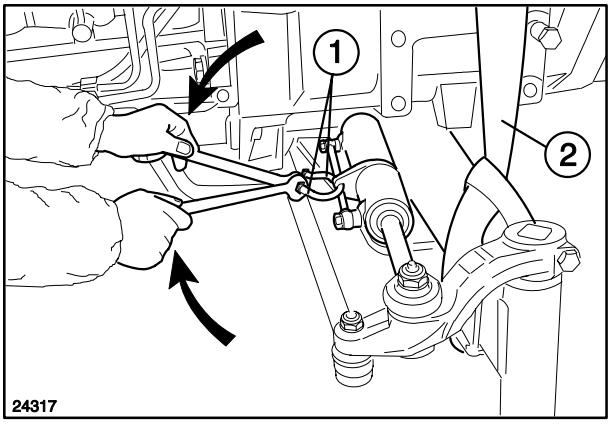
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12. Install the axle pivot pin and tighten securing bolts (1) to a torque of 70-90 Nm (52-65 lbf ft).



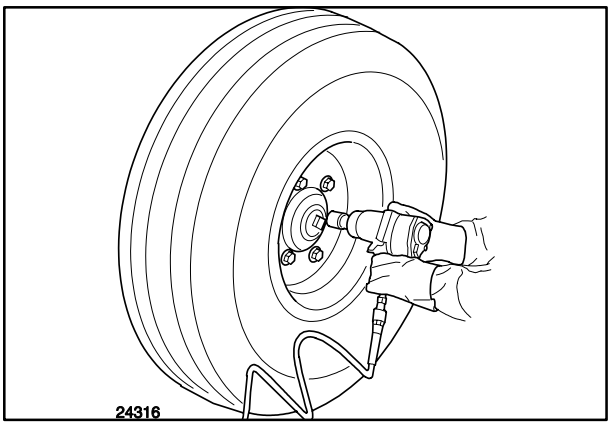
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13. Reconnect the steering cylinder control pipes.



13

14. Place the wheels onto the hubs and tighten to 133 Nm (98 lbf ft).



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Tests

Before commencing battery tests check the battery for clogged vents, corrosion, raised vent plugs or a cracked case.

Test equipment required:

- Hydrometer
- Battery starter tester (High rate discharge tester)
- Thermometer
- Battery Charger

Specific Gravity: This test will determine the state of battery charge.

1. With the float in the vertical position take the reading.
2. Adjust the hydrometer reading for electrolyte temperature variations by subtracting 4 points (0.004 specific gravity) for every 5.5°C (10°F) below the temperature at which the hydrometer is calibrated and by adding 4 points (0.004 specific gravity) for every 5.5°C (10°F) above this temperature.

The following examples are calculated using a hydrometer calibrated at 30°C (86°F).

Example 1:
Temperature below 30°C (86°F)

Electrolyte temperature	19°C (66°F)
Hydrometer reading	1.270
Subtract $\frac{11.0}{5.5}$ x 0.004	0.008
Corrected specific gravity =	1.262

Example 2:
Temperature above 30°C (86°F)

Electrolyte temperature	40°C (104°F)
Hydrometer reading	1.220
Add $\frac{10.0}{5.5}$ x 0.004	0.007
Corrected specific gravity =	1.227

3. Use the following table to determine the state of charge.

State of Charge	Corrected Specific Gravity @15°C	Corrected Specific Gravity @25°C	Average Battery Voltage
100%	1.295	1.287	12.76
75%	1.253	1.246	12.52
50%	1.217	1.210	12.30
25%	1.177	1.170	12.06
Discharged	1.137	1.130	11.84

NOTE: *Specific gravity should not vary more than 0.025 points between cells.*

4. If the specific gravity is 1.280 or more the battery is fully charged and in good operating condition.
5. Should the corrected specific gravity be below 1.280, charge the battery and inspect the charging system to determine the cause of the low battery charge.

NOTE: *If distilled water has recently been added the battery should be recharged for a short period otherwise accurate hydrometer readings will not be obtained.*

If the battery has been charged under static conditions, denser electrolyte will accumulate at the bottom of the cells. The battery should be shaken periodically to mix the electrolyte, this will improve the charge rate and provide a more accurate hydrometer reading when tested.

Performance Test: The performance test is to determine if the battery has adequate capacity to turn the engine. The voltage reading obtained is used to determine the battery condition. Prior to testing, ensure the electrolyte level is correct and the open circuit voltage is 12.5V or more. The battery may be tested on or off the tractor.

1. Set the current control switch of the battery starter tester (high rate discharge tester) to the 'off' position and the voltage selector switch equal to, or slightly higher than, the rated battery voltage. Connect the tester positive leads to the battery positive terminal and the negative leads to the negative battery terminal.
2. Turn the current control knob until the ammeter reading is half the CCA rating of the battery and take the voltage reading.

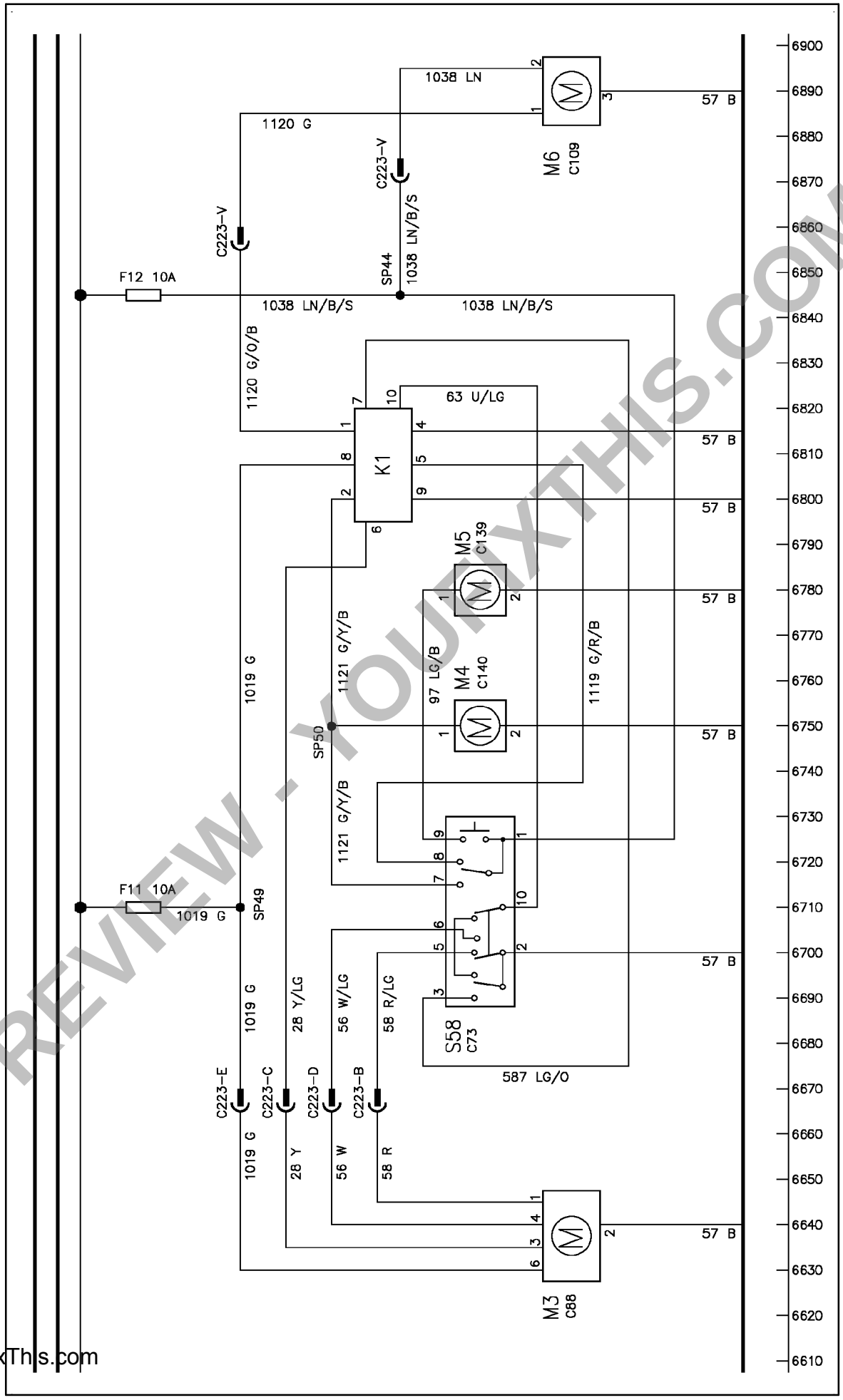
- If the reading is 9.6 volts or more after 15 seconds, the battery has an acceptable output capacity and will readily accept a normal charge.
- If however the reading is below 9.6 volts, the battery is considered unsatisfactory for service and should be test charged as described below.

CAUTION

Do not leave the high discharge load on the battery for periods longer than 15 seconds.

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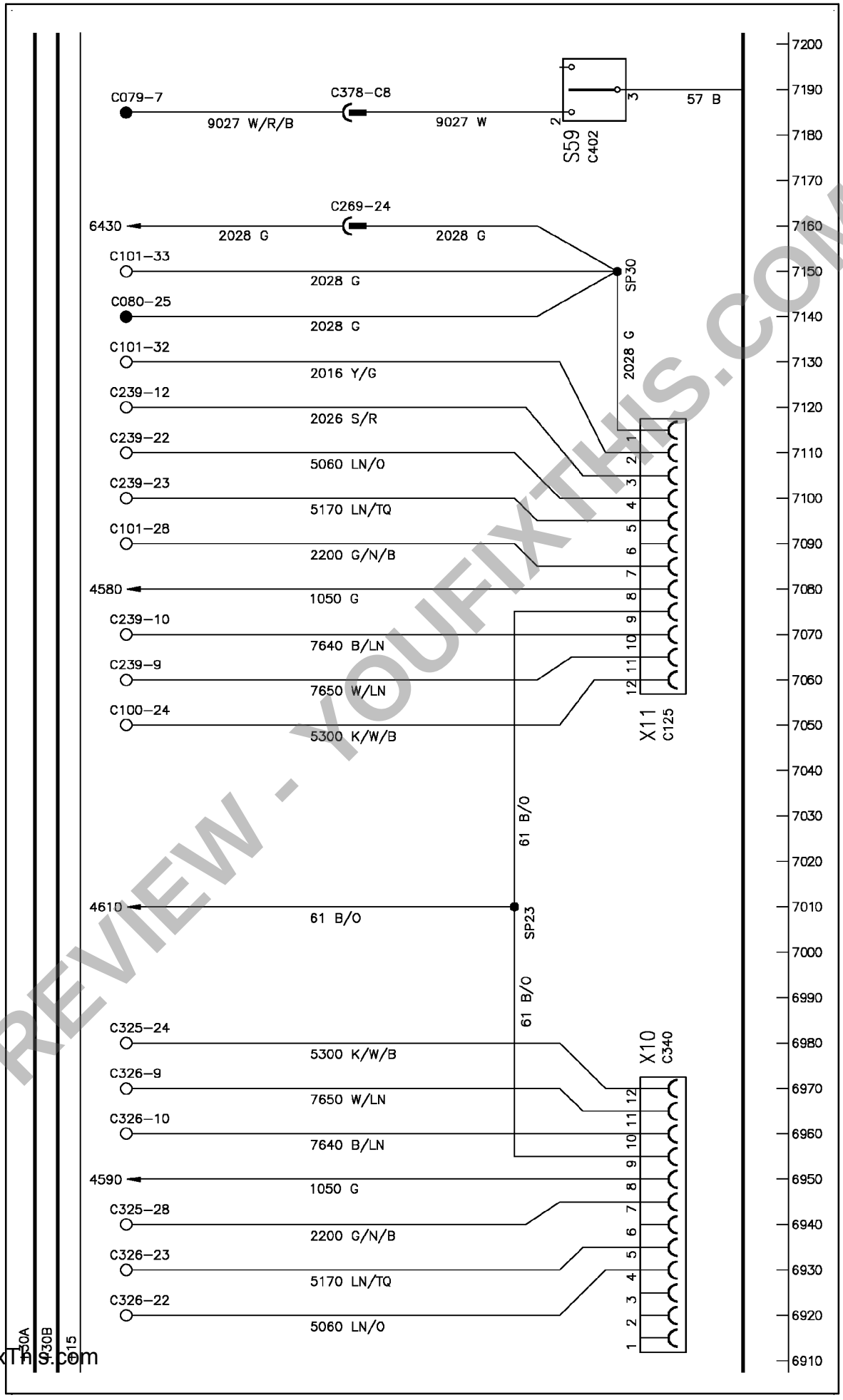
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12x12 Transmission, W/Cab, W/Mechanical Engine

DIAGNOSTIC PLUGS 2
Line 7210-7500

F33 Fuse - 25A

X12 ADIC Diagnostics Connector

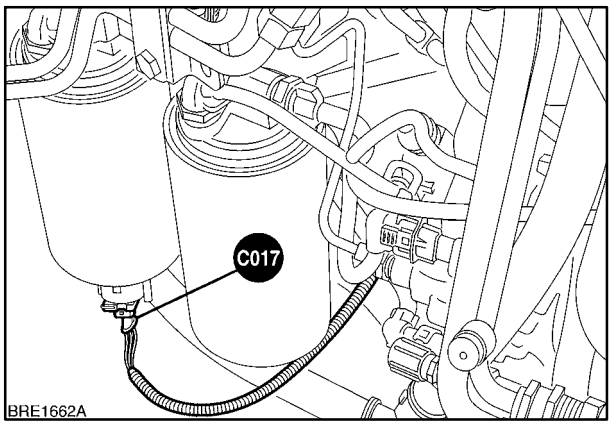
X13 EST Diagnostics Connector

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		

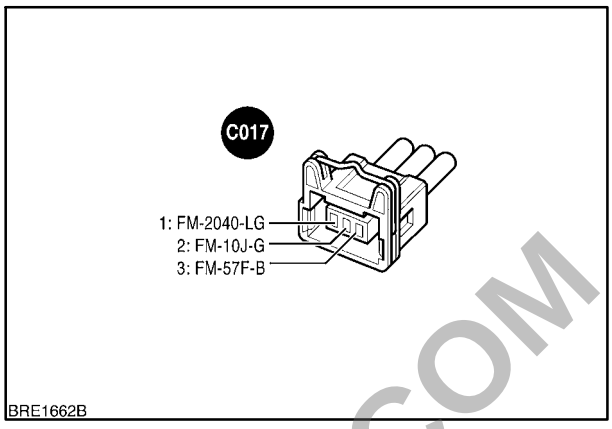
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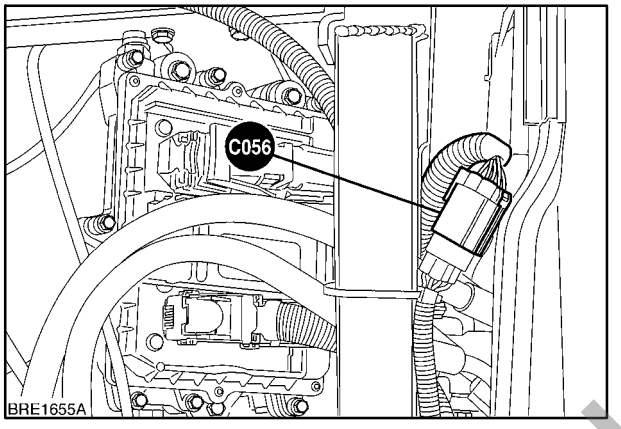
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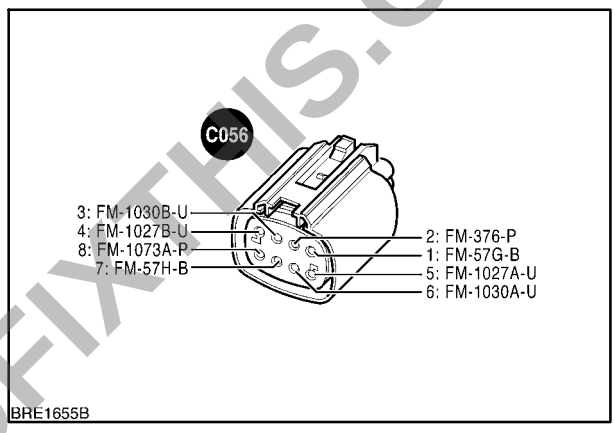
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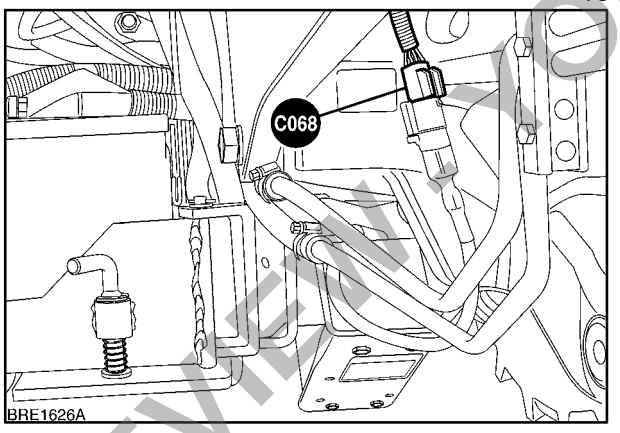
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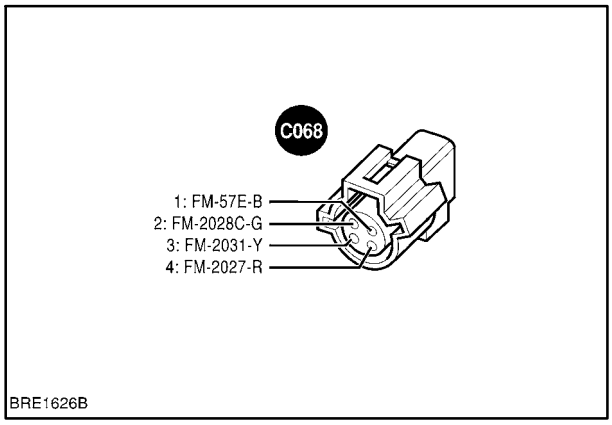
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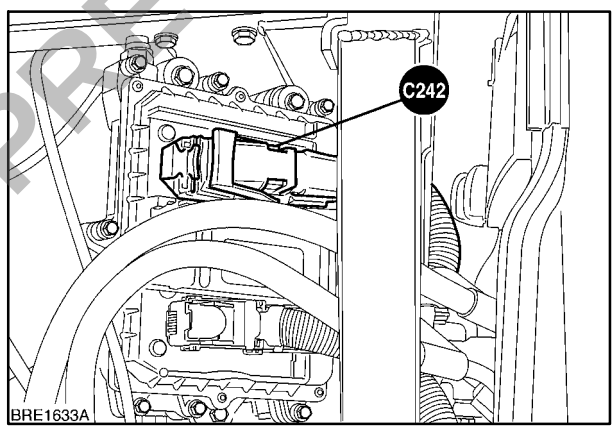
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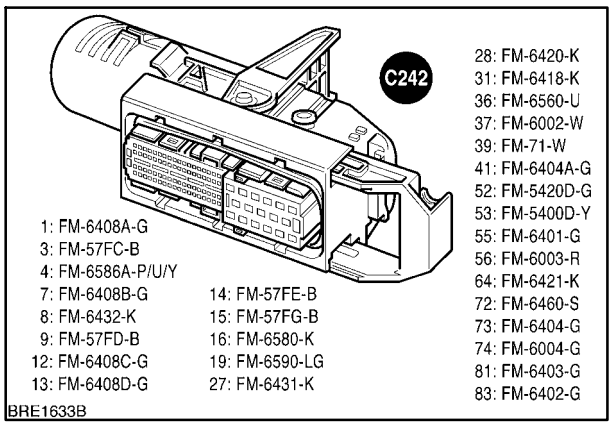
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2055	No signal from wheel speed sensor
2056	Manual/automatic differential lock switches both closed
2059	Shuttle lever switch disagreement
2060	Forward synchroniser no longer engaged
2061	Forward/reverese synchroniser potentiometer signal high
2062	Forward/reverese synchroniser potentiometer signal low
2063	Forward synchroniser did not engage
2064	Reverse synchroniser did not engage
2065	Forward synchroniser solenoid open circuit
2066	Reverse synchroniser solenoid open circuit
2067	Forward solenoid short to ground or high voltage
2068	Reverese solenoid short to ground or high voltage
2069	Reverse synchroniser no longer engaged
2070	Shuttle lever forward switch voltage high
2071	Shuttle lever forward switch voltage low
2072	Shuttle lever reverse switch voltage high
2073	Shuttle lever reverse switch voltage low
2075	No signal from flywheel speed sensor
2076	Flywheel speed sensor open circuit
2077	Flywheel speed sensor short to ground or high voltage
2080	1–4 (9–12) range synchroniser no longer engaged
2081	4/5 range synchroniser potentiometer signal high
2082	4/5 range synchroniser potentiometer signal low
2083	1–4 (9–12) range synchroniser engaged error
2084	5–8 (13–16) range synchroniser engaged error
2085	1–4 (9–12) range synchroniser solenoid open circuit
2086	5–8 (13–16) range synchroniser solenoid open circuit
2087	1–4 (9–12) range synchroniser solenoid short to ground or high voltage
2088	5–8 (13–16) range synchroniser solenoid short to ground or high voltage
2089	5–8 (13– 16) range synchroniser no longer engaged
2090	Output speed to high for creeper engage
2091	Clutch C3 not calibrated
2092	Clutch C4 not calibrated
2093	High clutch not calibrated
2094	Low clutch not calibrated
2095	Clutch C1 not calibrated
2096	Clutch C2 not calibrated

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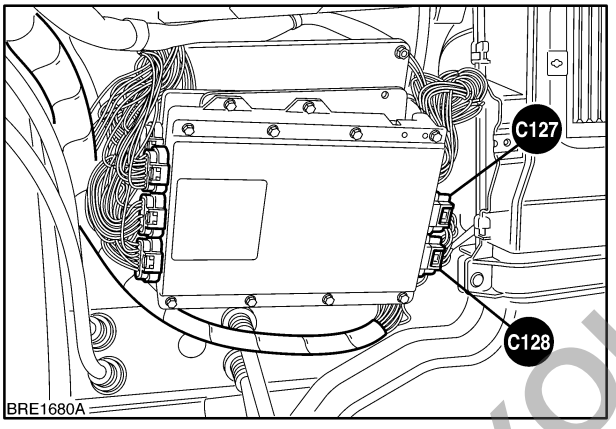
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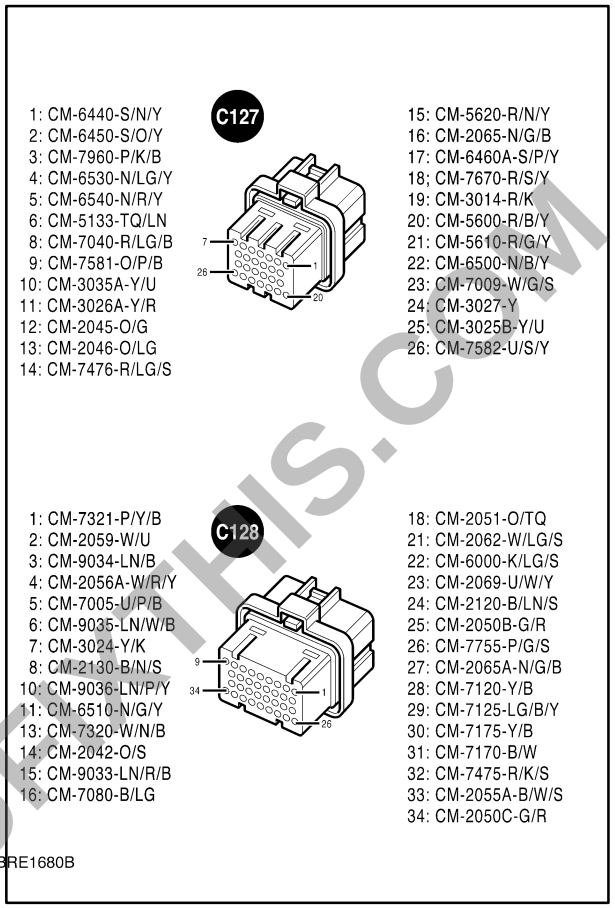
2055	No signal from wheel speed sensor
2056	Manual/automatic differential lock switches both closed
2059	Shuttle lever switch disagreement
2060	Forward synchroniser no longer engaged
2061	Forward/reverese synchroniser potentiometer signal high
2062	Forward/reverese synchroniser potentiometer signal low
2063	Forward synchroniser did not engage
2064	Reverse synchroniser did not engage
2065	Forward synchroniser solenoid open circuit
2066	Reverse synchroniser solenoid open circuit
2067	Forward solenoid short to ground or high voltage
2068	Reverese solenoid short to ground or high voltage
2069	Reverse synchroniser no longer engaged
2070	Shuttle lever forward switch voltage high
2071	Shuttle lever forward switch voltage low
2072	Shuttle lever reverse switch voltage high
2073	Shuttle lever reverse switch voltage low
2075	No signal from flywheel speed sensor
2076	Flywheel speed sensor open circuit
2077	Flywheel speed sensor short to ground or high voltage
2080	1–4 (9–12) range synchroniser no longer engaged
2081	4/5 range synchroniser potentiometer signal high
2082	4/5 range synchroniser potentiometer signal low
2083	1–4 (9–12) range synchroniser engaged error
2084	5–8 (13–16) range synchroniser engaged error
2085	1–4 (9–12) range synchroniser solenoid open circuit
2086	5–8 (13–16) range synchroniser solenoid open circuit
2087	1–4 (9–12) range synchroniser solenoid short to ground or high voltage
2088	5–8 (13–16) range synchroniser solenoid short to ground or high voltage
2089	5–8 (13– 16) range synchroniser no longer engaged
2090	Output speed to high for creeper engage
2091	Clutch C3 not calibrated
2092	Clutch C4 not calibrated
2093	High clutch not calibrated
2094	Low clutch not calibrated
2095	Clutch C1 not calibrated
2096	Clutch C2 not calibrated

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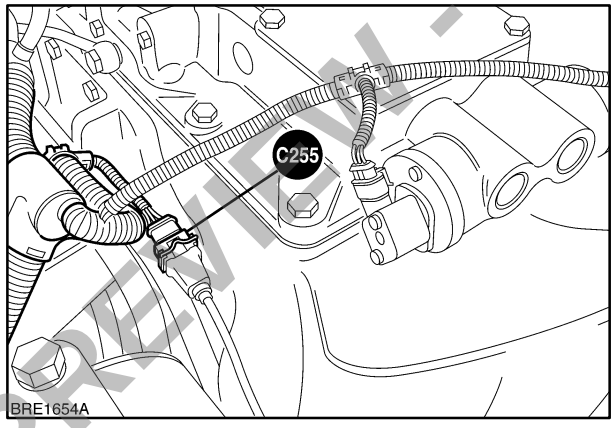
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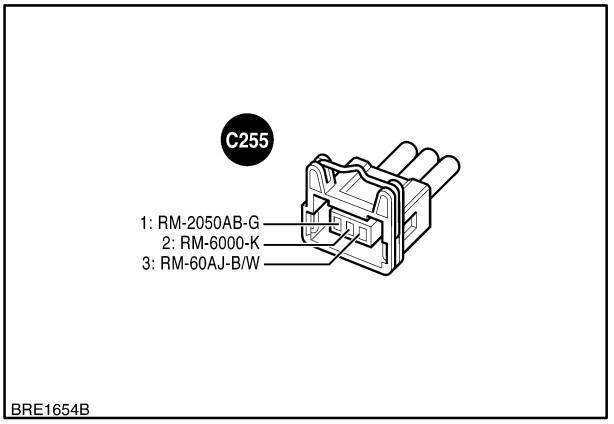
All Transmissions





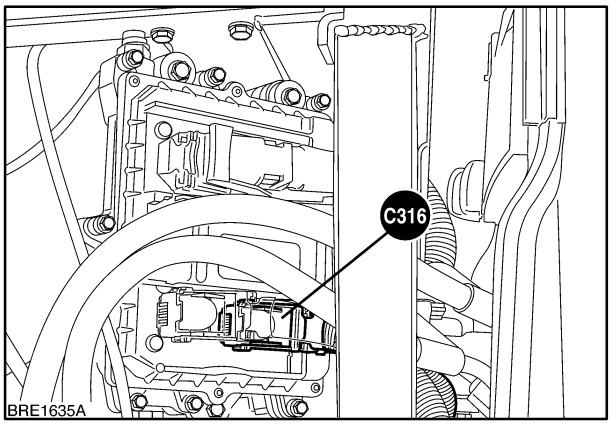
16x16 Transmission

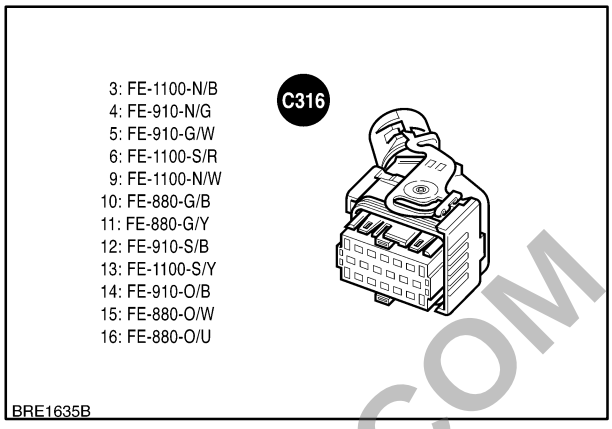


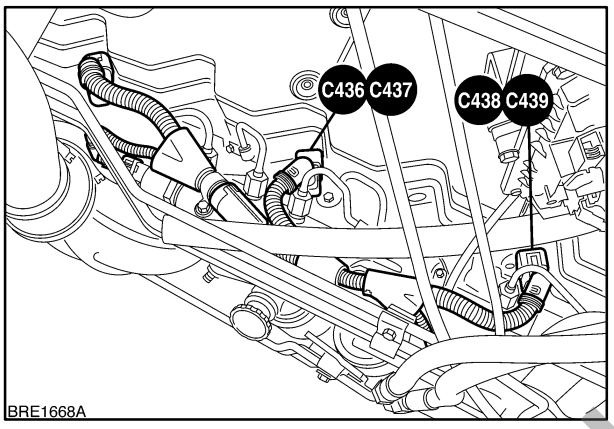


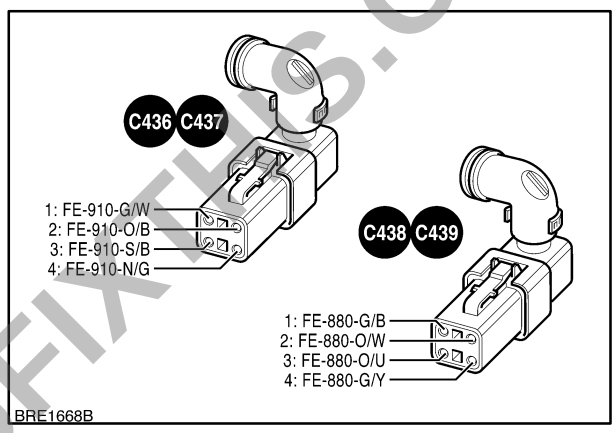
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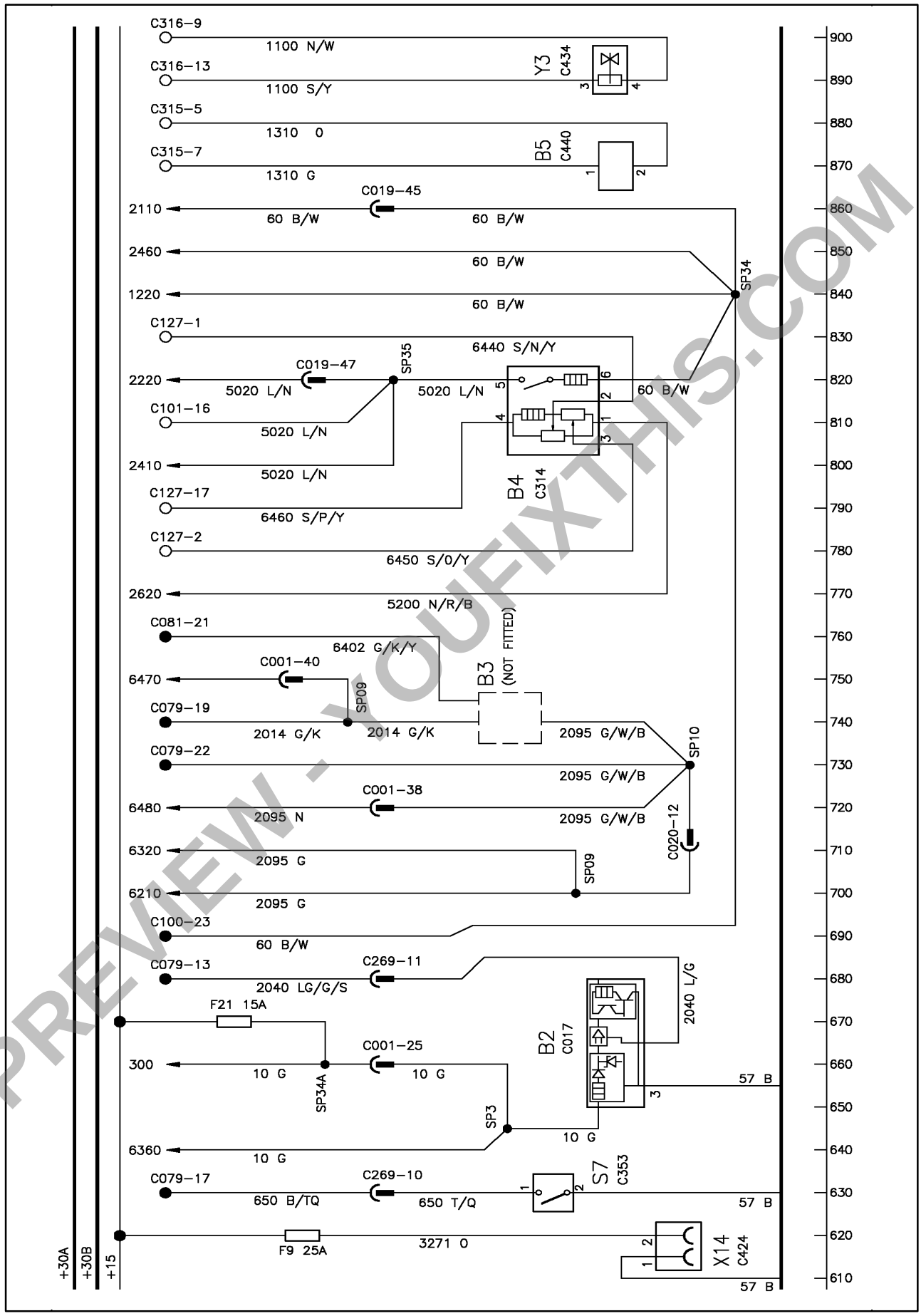






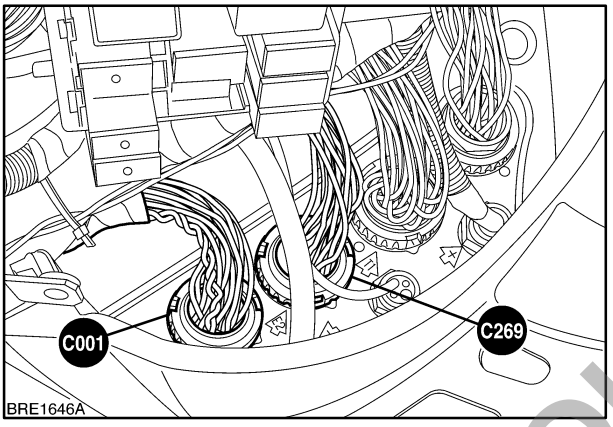
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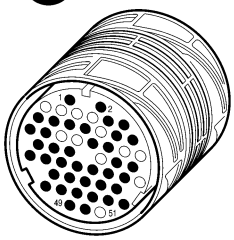


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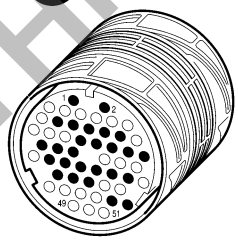


C001



1: CM-5400D-Y
2: CM-5420D-G
7: CM-6401-G/B/Y
8: CM-6402-G/K/Y
9: CM-6403-G/LG/Y
10: CM-6460-S/P/Y
11: CM-6404B-G/LN/Y
12: CM-6590-LG-U-Y
14: CM-6408D-G/O/Y
15: CM-6408A-G/O/Y
16: CM-6408B-G/O/Y
17: CM-6408C-G/O/Y
20: CM-6418-K/B/Y
21: CM-6414-G/TQ/Y
24: CM-3016-S/Y
25: CM-10J-G
26: CM-1030B-U/R
28: CM-39-G/U
29: CM-1073A-P/W
30: CM-376-P/N
31: CM-57AH-B
32: CM-57AJ-B
33: CM-57AK-B
34: CM-39B-G/U/W
35: CM-57AM-B
36: CM-1027B-U/W
38: CM-2095A-G/W/B
39: CM-31-Y/S
40: CM-2014A-G/K
41: CM-1006-N/Y
42: CM-1035-W/N
43: CM-71C-W/K
44: CM-1005-B/S
45: CM-1001S-W/R
46: CM-1001T-W/R
47: CM-1001V-W/R
48: CM-1001W-W/R
49: CM-6580-K/U/Y
50: CM-2019-B/K

C269

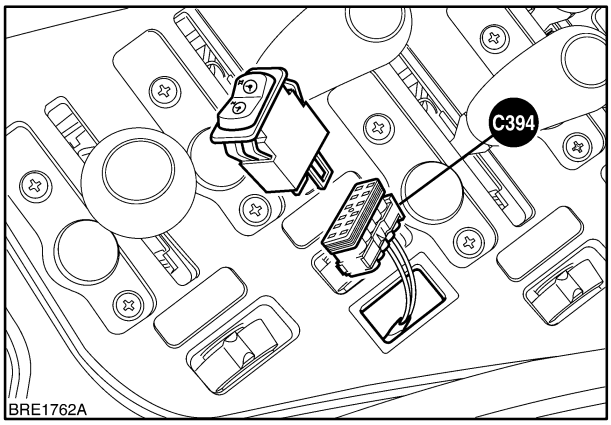


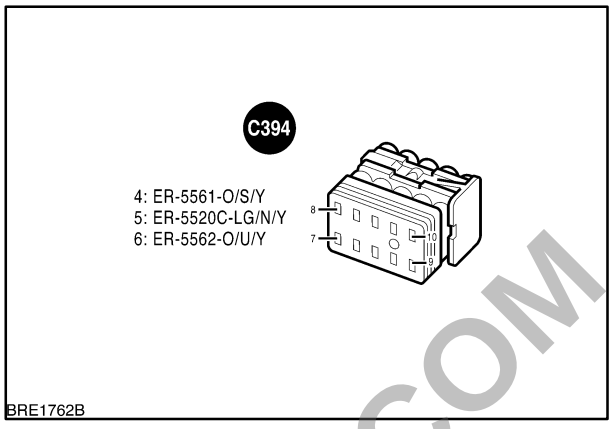
1: CM-3272-O/W
2: CM-3273-O/B
10: CM-650-B/TQ
11: CM-2040-LG/G/S
12: CM-2027-R
13: CM-3120-B/K/S
14: CM-2044-O/B/Y
19: CM-2570Z-R/K/Y
20: CM-60AC-B/W
21: CM-2510-N/G/S
22: CM-2530B-N/LG/S
23: CM-2031-Y/TQ
24: CM-2028B-G
25: CM-3230-U/K/S
26: CM-3220-O/LG/S
31: CM-2043-O/K
32: CM-2260-O/G/Y
33: CM-57HA-B
34: CM-1010C-G
35: CM-3274-R/W
36: CM-3275-R/B
38: CM-1018-LG/W
39: CM-2006B-U/O
40: CM-2006A-U/O
47: CM-3070D-P
48: CM-9032B-Y/G

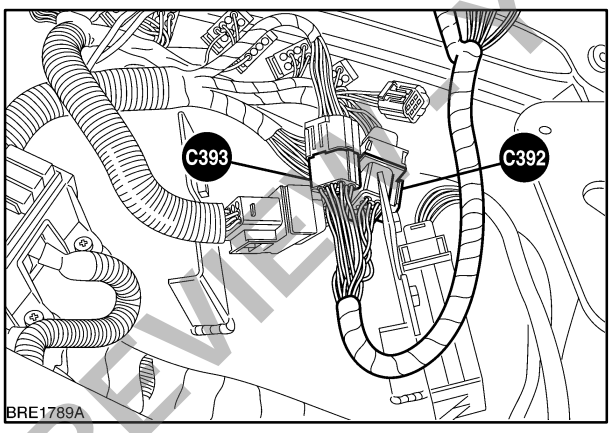
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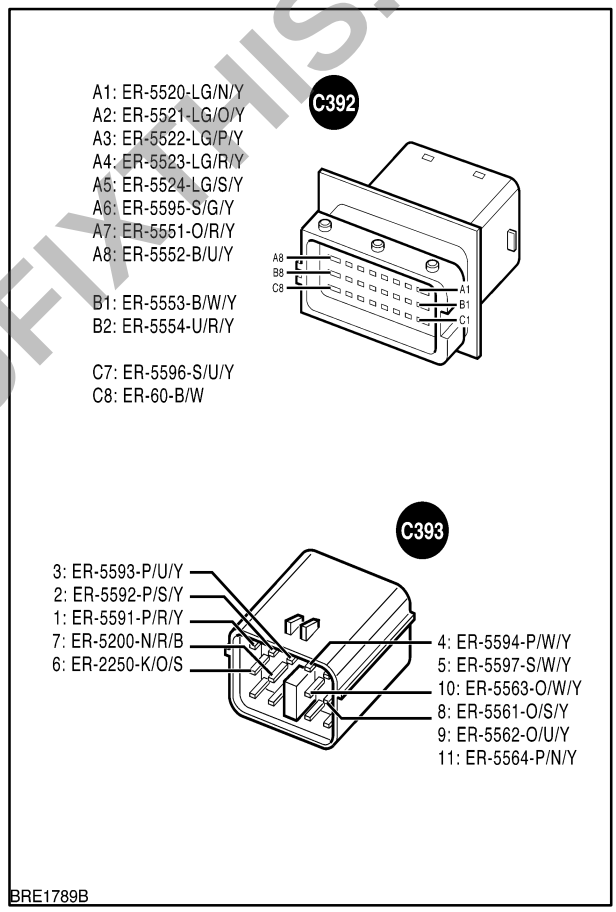
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ERROR CODE 15011 – MAXIMUM ENGAGEMENT TIME ELAPSED (5 MINUTES)

Effects:

1. System Auto disengages, non critical alarm activated

Possible failure modes:

1. Operator error
2. Other component fault – check for other error codes

Solution:

NOTE: *When the cause of the error code has been rectified, clear the error code and test the system for normal operation.*

1. Operator error. Clear error code and test system for normal operation.
   A. If system remains disabled check for other error codes and rectify as required.

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