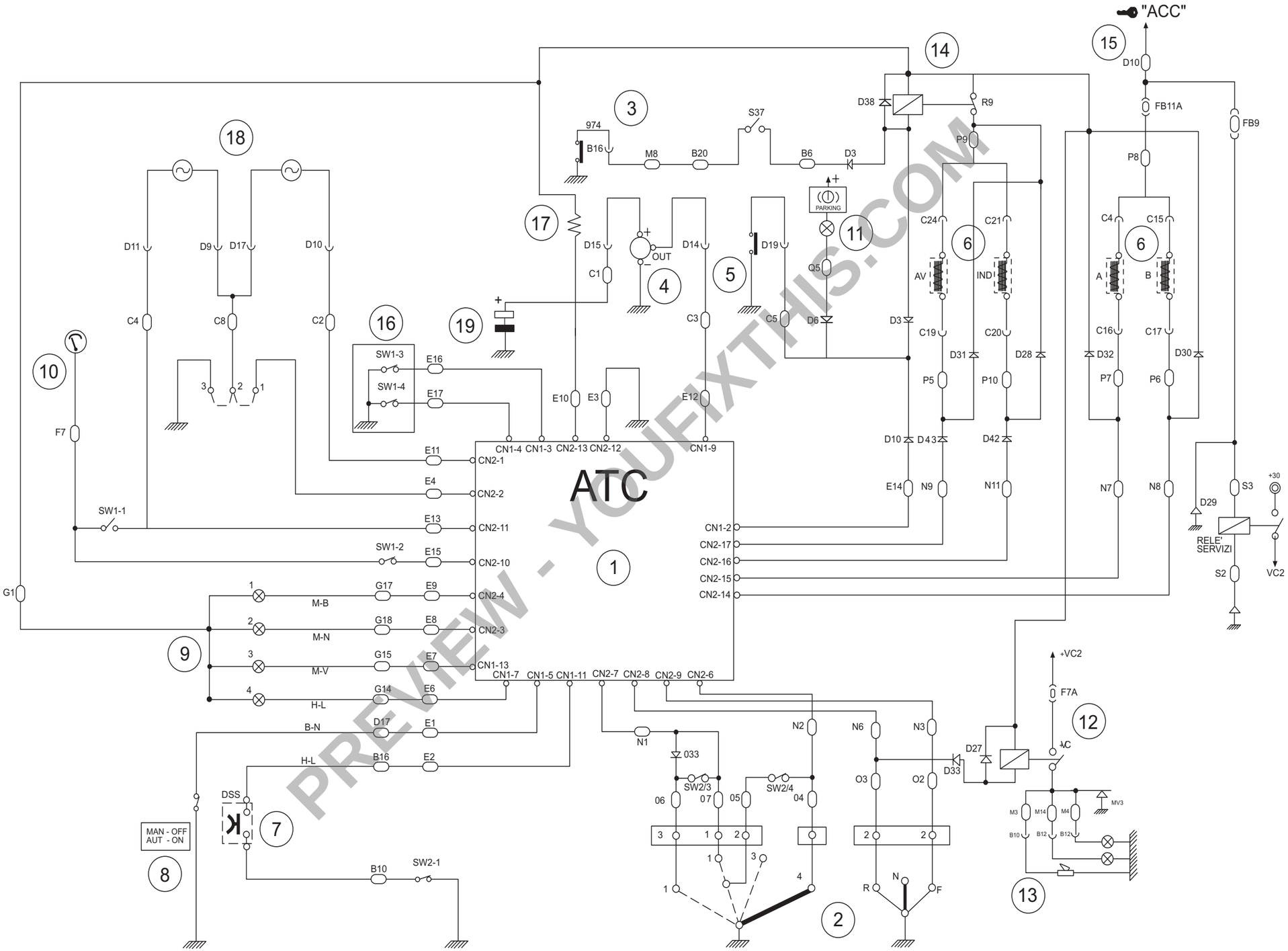
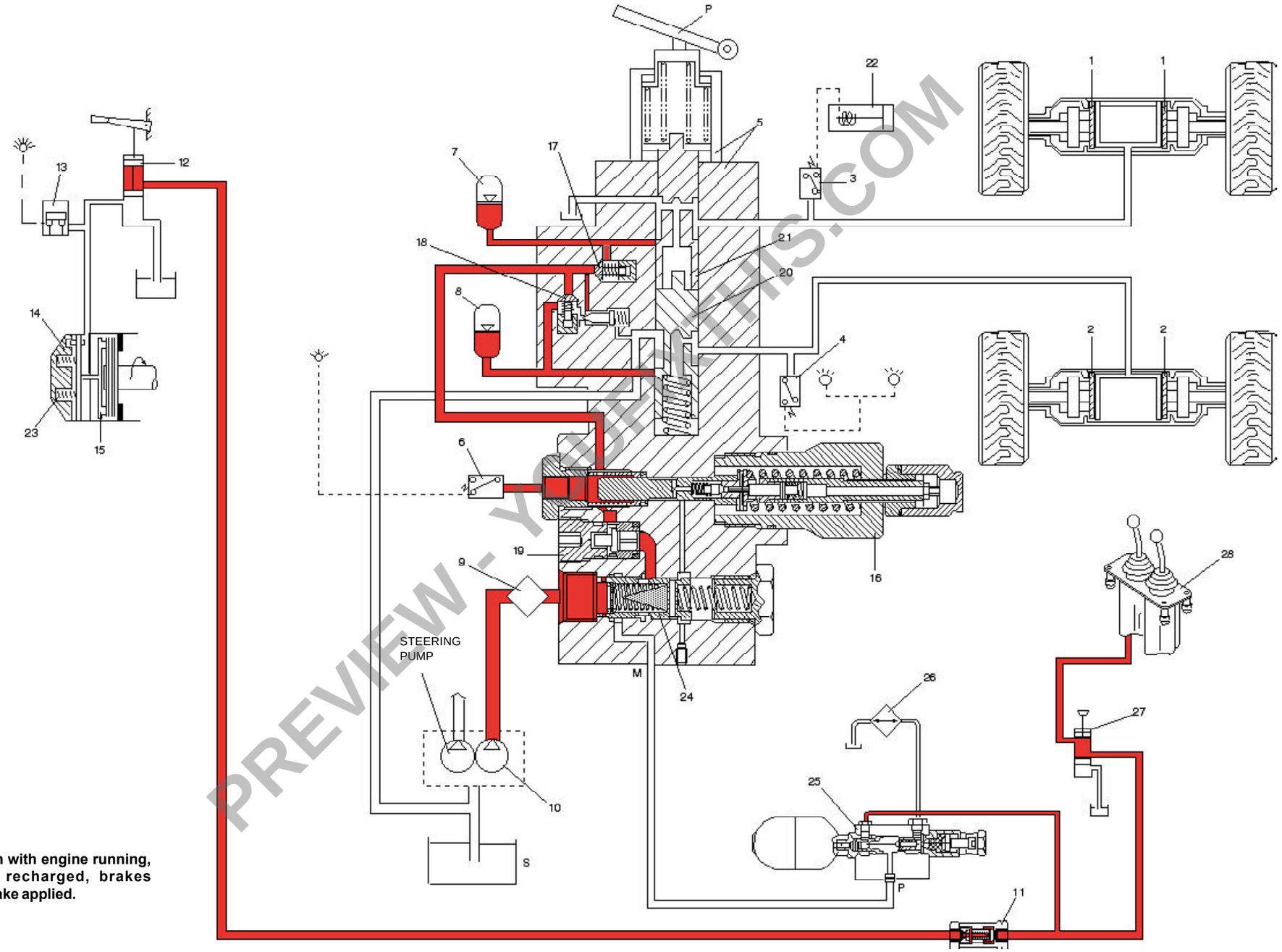


Fig. 2-31Transmission electric diagram

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Fig. 3-2 HYDRAULIC BRAKING CIRCUIT SCHEMATIC



Hydraulic circuit shown with engine running, accumulators being recharged, brakes disengaged, parking brake applied.

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NUTS (ZNT)					SCREWS (ZNT/DEIDR)		
Strength grade: 10 (R80)					Strength grade: 10.9 (R100)		
Diameter and pitch mm	normal daNm	low type daNm	with polyamide ring		Diameter and pitch mm	normal ZNT daNm	self-locking ZNT daNm
			normal daNm	low type daNm			
M6 x 1	1.3	1.2	-	-	M6 x 1	1.3	-
M8 x 1.25	3.2	2.6	3.9	3.2	M8 x 1.25	1.3	3.5
M10 x 1.25	7.2	5.2	8.2	6.2	M10 x 1.25	7.1	7.9
M10 x 1.5	6.5	5	7.7	6	M10 x 1.5	6.5	7
M12 x 1.25	13	8.7	14.5	10.2	M12 x 1.25	12.7	13.9
M12 x 1.75	11	8.1	12.9	9.6	M12 x 1.75	11	12
M14 x 1.5	19.5	13	21.6	15	M14 x 1.5	20	22
M14 x 2	18	12.5	20	14.6	M14 x 2	18	19
M16 x 1.5	30	17	34	20	M16 x 1.5	30	33
M16 x 2	-	-	-	-	M16 x 2	-	-
M18 x 1.5	45	25	50	29	M18 x 1.5	45	48
M18 x 2.5	-	-	-	-	M18 x 2.5	-	-
M20 x 1.5	60	30.5	64.5	35	M20 x 1.5	60	65
M20 x 2.5	-	-	-	-	M20 x 2.5	-	-
M22 x 1.5	80	41	-	-	M22 x 1.5	80	90
M22 x 2.5	-	-	-	-	M22 x 2.5	-	-
M24 x 2	100	47	108	52.5	M24 x 2	100	110
M24 x 3	-	-	-	-	M24 x 3	-	-
M27 x 2	95	40.1	-	-	M27 x 2	100	-
M30 x 2	130	49.4	-	-	M30 x 2	140	-
M33 x 2	170	-	-	-	M33 x 2	190	-
M36 x 3	220	-	-	-	M36 x 3	240	-

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2.9 DISASSEMBLY TRANSMISSION

Note:
- Use a working bench, hoist, bearing puller and hangers for easy and safe disassembly.
- Put the disassembled parts to insure speedy parts in order, and efficient reassembly of them.
- Unit weight: 804 kg (1770 lbs).

a) Torque converter disassembly
Draining oil and removing charging pump

1. Lift the drive unit in an upright position or put on the working bench to drain the oil from the drain outlet.

Quantity oil: 40 l (10.6 U.S. gal)

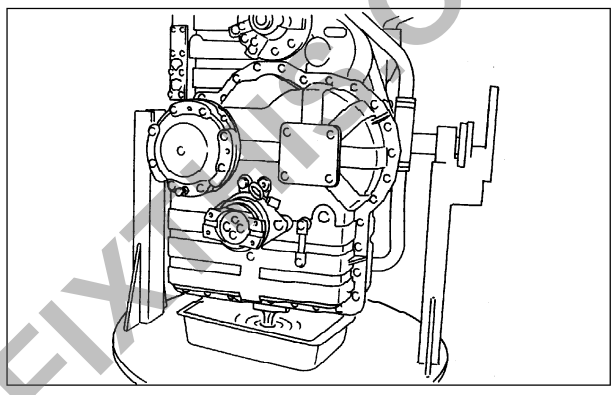


Fig. 2-43

2. Remove the tube from the charging pump.

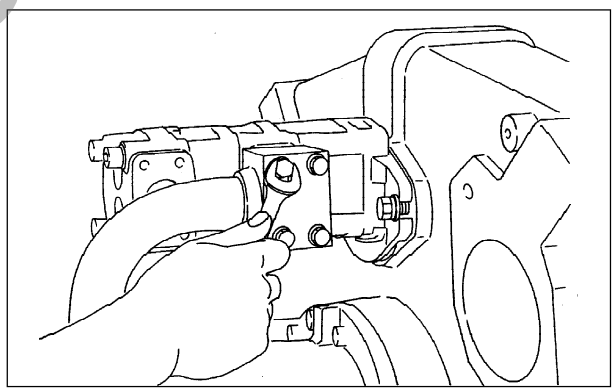


Fig. 2-44

3. Remove the 2 bolts securing the charging pump. Tapping with a copper hammer or using a bar remove the charging pump along with the drive sleeve for the shaft.

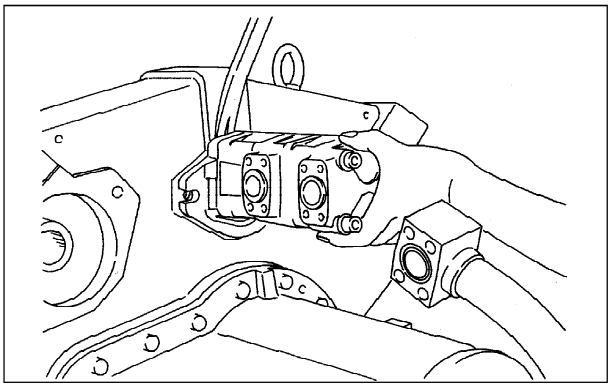


Fig. 2-45

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SPECIFICATIONS - WHEEL LOADER LW270

IDENTIFICATION - 2678.260.00.1

MARKING: LW270

ENGINE

Make and model ..... CUMMINS M11C
Net power at the flywheel ..... 199 kW
Maximum power speed ..... 2100 rpm
Maximum torque ..... 128.5 daNm
Maximum torque speed ..... 1300 rpm
Diesel type, 4 stroke, direct injection, turbocharged
Number of cylinders 6
Bore x stroke ..... 125 x 147 mm
Total displacement ..... 10800 cm^3
Valve/rocker operation lash:
- intake ..... 0.35 mm
- exhaust ..... 0.70 mm
Firing order 1-5-3-6-2-4
Minimum starting temperature: ..... - 20°C
Engine coolant high temperature sender setting .....
..... 101 + 2 °C
Engine oil low pressure switch setting .....
..... 0,5 ± 0,1 bar (at idle speed)

ENGINE SPEEDS

Minimum idle speed (no load) ..... 720 rpm
Maximum idle speed (no load) ..... 2310 rpm
Converter stall speed ..... 2200 ± 50 rpm
Steering stall at idle speed > ..... 600 rpm
Attachment stall ..... 2250 ± 50 rpm
Full stall ..... 1990 ± 100 rpm

TORQUE CONVERTER

Type: Niigata 13.5" (MS370) single-stage, single-phase
Main converter pressure ..... bar
Converter safety valve pressure ..... 7.2 bar

TRANSMISSION

Maximum ground speeds (forward/reverse) in kph (with 26.5 R25 XHA tires):

Forward speed	kph	Reverse speed	kph
First	7.58	First	8.16
Second	13.81	Second	14.85
Third	22.12	Third	23.66
Fourth	37.14	Fourth	38.62

Oil pump flow rate (at 2100 rpm) .....
..... Front 84.2 lt/min.
..... Rear 92.7 lt/min.
Main pressure on the control valve ..... 21 ˜ 24 bar
Transmission disengagement sensor ..... 15 ± 1 bar
Transmission induction sensors to gear teeth adjust
Clearance ..... 0.5 ÷ 0.8 mm
Transmission oil high temperature sensor setting ..
..... 122 ± 3°C

AXLES

Axles complete with disc brakes in oil bath.
Self-locking differentials.
Planetary final drives.
Stiff front axle, support structure type
- reduction ratio ..... 1 : 25.381
Oscillating rear axle, support structure type
- reduction ratio ..... 1 : 25.381

TIRES

Type ..... 26.5 R25 XHA tubeless
Inflating pressure
- Work: front = 4.25 bar
  rear = 2.75 bar
- Transfer: front = 2.00 bar
  rear = 2.00 bar

Wheel tightening torque ..... 78.8 daNm

BRAKES

Delivery brakes pump at nominal speed .. 29.7 lt/min.
Accumulator recharge start pressure ..... 80 ± 5 bar
Accumulator recharge end pressure ..... 110 ± 5 bar
Accumulator pre-charge pressure (1.4 lt) ..... 45 bar
Transmission disengagement pressure switch Setting ..... 15 bar
Brake oil low pressure sensor setting ..... 60 bar
Brake lights pressure switch setting ..... 1.8 bar
Parking brake applied pressure switch setting .....
ON 10 bar - OFF 15 bar

STEERING SYSTEM

Cylinders ..... 2 double-acting
- bore x stroke ..... 80 x 542 mm
Stand-by/main priority valve setting ..... 206 bar

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2.11 TROUBLESHOOTING GUIDE
2.11.1 Torque converter

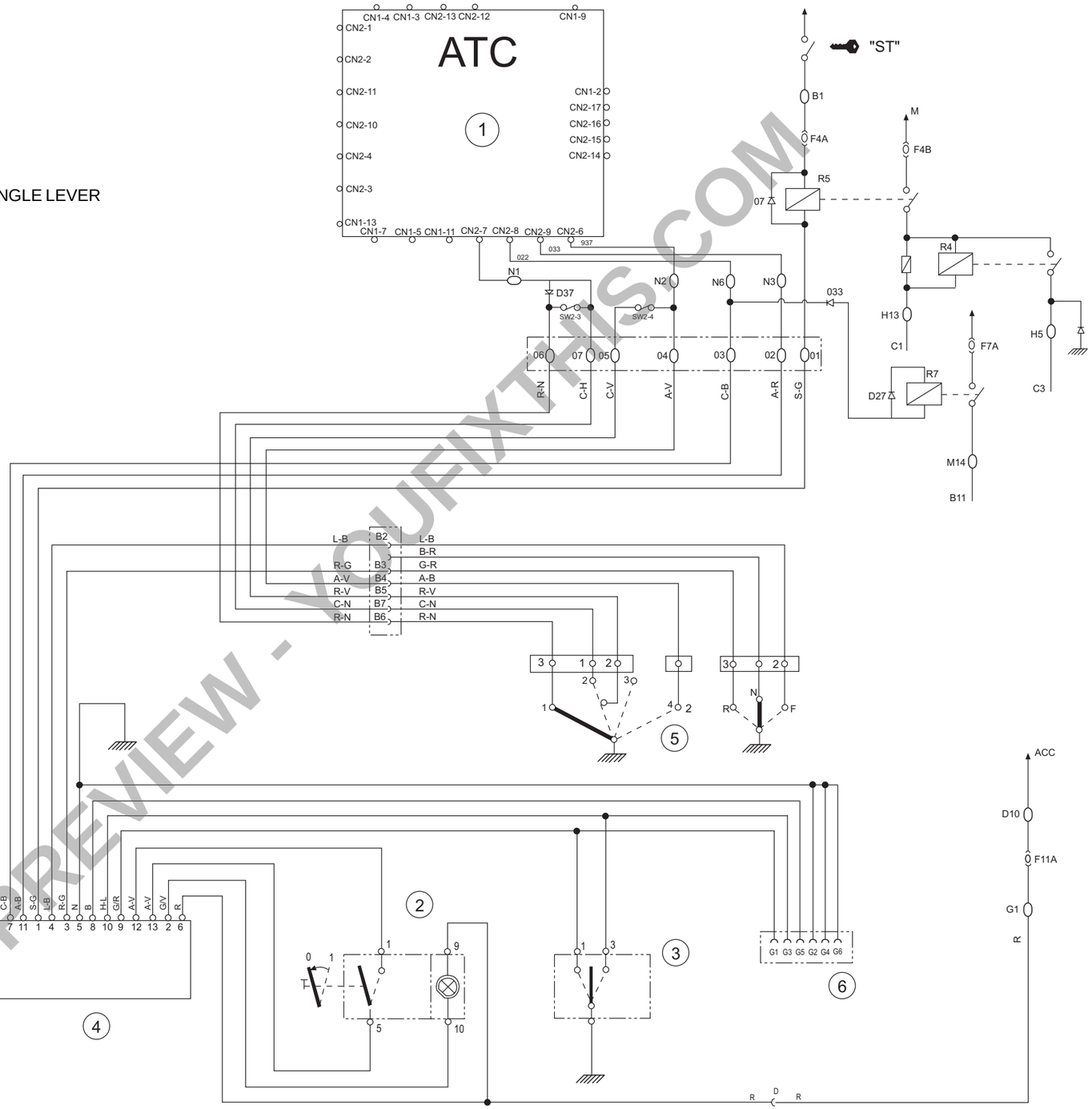
Problem	Cause	Inspection	Corrective Action
Overheat or lower horsepower	Low oil level	Check oil level with oil level gauge	Add oil to the specified level
	Improper oil used	Check oil type	Change for the specified oil
	Malfunction of cooler line	Check cooling water for dirt	Clean
	Defective oil seal ring	Measure oil pressure at inlet port of torque converter	Disassemble and replace parts
		Check breather for oil flash	Disassemble and replace parts
	Malfunction of safety valve	Measure oil pressure at inlet port of torque converter	Disassemble and replace parts
	Broken bearing	Observe foreign material in transmission drain	Disassemble and replace parts
		Check line filter and oil	Disassemble and replace parts
	Low discharge from charging pump	Check transmission strainer for clogging	Clean
		Measure oil pressure at inlet port of torque converter	Replace pump
		Measure oil pressure of transmission clutch	Replace pump
	Excessive use	Check operating conditions and operation	Use properly
	Transmission failure	Refer to "2.10.2 TRANSMISSION"	
Oil leak (from flywheel)	Defective oil baffle oil seal	Check for oil leak to flywheel	Replace parts
	Defective O-ring of oil baffle	Check for oil leak to flywheel	Replace parts
Unusual noises	Broken bearing	Observe foreign material in transmission drain	Disassemble and replace
		Check line filter and oil	Disassemble and replace parts
	Broken gear or improper backlash	Check with sound checker	Disassemble and replace parts
	Broken pump or drive unit	Check with sound checker	Replace pump
	Air in oil	Check oil for air mixed	Retighten piping or replace parts
	Improper oil used	Check oil type	Change for the specified oil

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Fig. 2-32 Auxiliary reverser electric diagram

1. ATC UNIT
2. SAFETY SWITCH OR FORW./REV. AUXILIARY DIVERTER
3. FORW./REV. AUXILIARY DIVERTER
4. FORW./REV. MICRO CONTROLLER
5. TRANSMISSION PILOT CONTROL
6. FORW./REV. AUXILIARY DIVERTER ARRANGEMENT ON "SINGLE LEVER EQUIPMENT CONTROL"



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3.10 DIAGNOSTICS AND TESTING

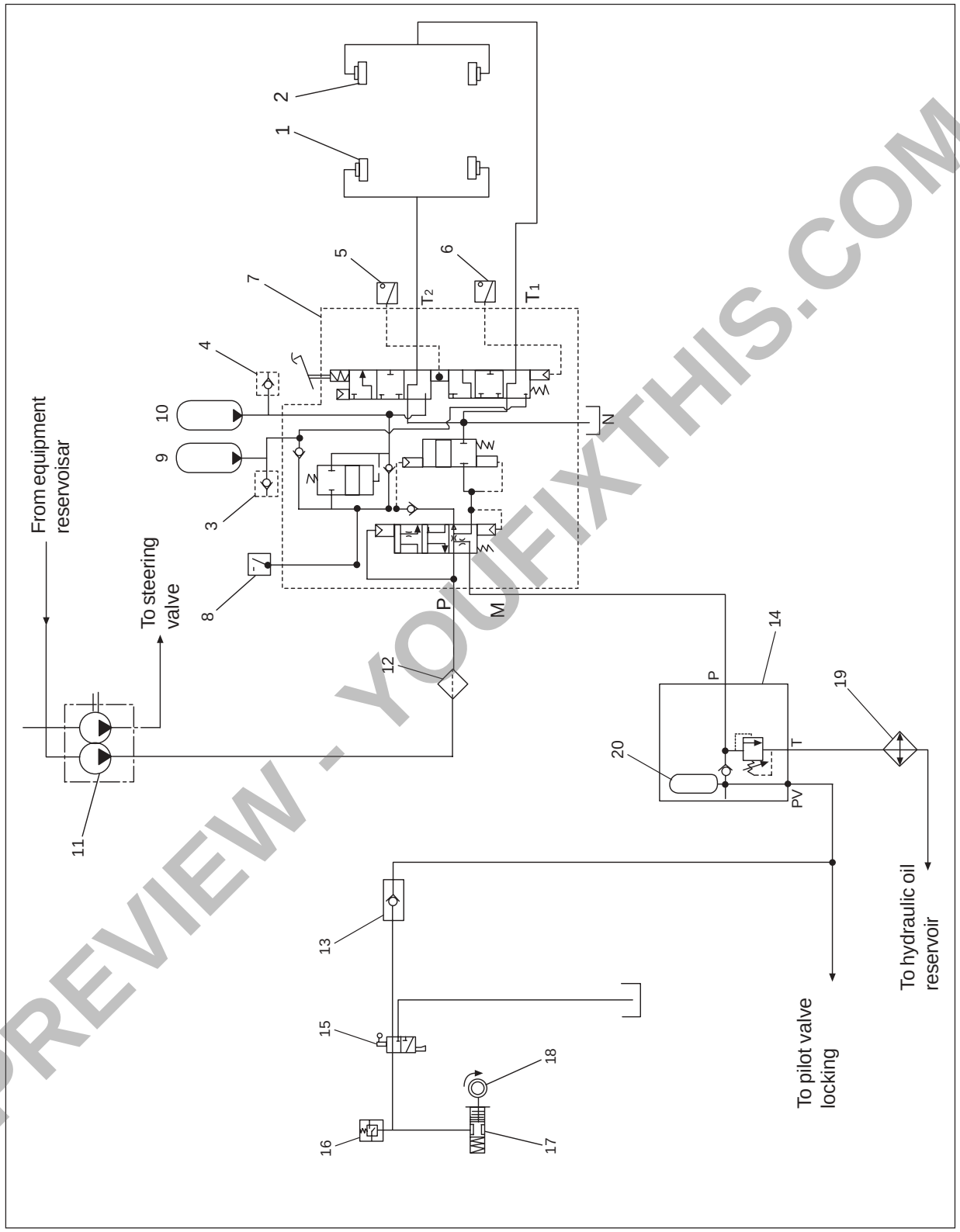


Fig. 3-16 Braking system schematic

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2.13 Tightening torques of main fixture

2.13.1 Torque converter

Item	Tightening torque kg-m (ft-lbs)	Remarks
Pump drive gear fiting bolt	20.9 (151)	Apply LOCTITE#262
Stator holder fitting bolt	10.6 (76.7)	
Bolt securing impeller wheel to cover wheel	4.01 - 4.58 (29.0 - 33.1)	
Bolt securing pump drive gear to impeller hub	5.21 - 5.95 (37.7 - 43.0)	
Input guide fitting bolt	4.01 - 4.58 (29.0 - 33.1)	
Charging pump fitting bolt	3.49 (25.2)	

2.13.2 Transmission

Item	Tightening torque kg-m (ft-lbs)	Remarks
Distributor cap fitting bolt	3.49 (25.2)	
Output shaft bearing cap fitting bolt	23.7 (171)	
Output shaft companion flange retainer plate fitting bolt	9.0 (65)	Apply LOCTITE#262
Brake housing fitting socket bolt	5.31 (38.4)	
Parking brake assembly hex. Bolt	9.30 (67.3)	
Parking brake fiting socket bolt	9.30 (67.3)	
Converter housing fitting bolt	3.49 (25.2)	
Control valve fitting bolt	5.31 (38.4)	

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2.10 REASSEMBLY TRANSMISSION

Cautions to be taken when reassembling

Clean all the disassembled parts in cleaning solvent, then dry with compressed air. In particular, remove LOCTITE and gaskets thoroughly from the mating surfaces of the case and others using a scraper.

Make sure the cleaned parts are free from dirt or foreign matter. Handle them carefully so as not to cause dent, score or scratches.

Replace all the seals with new ones.

a) Reinstalling safety valve

1. Insert the plunger and spring into the safety valve fitting hole.

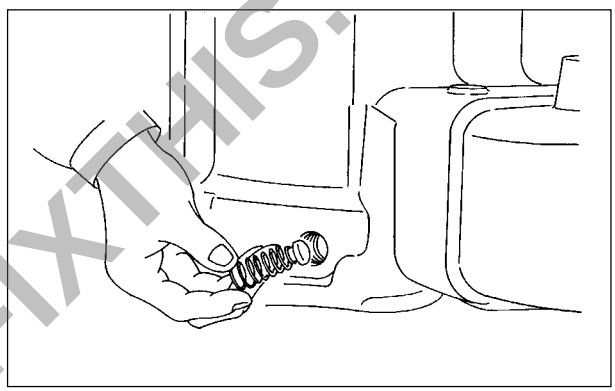


Fig.2- 140

2. Attach a new "O"-ring to the plug and screw plug into the case.

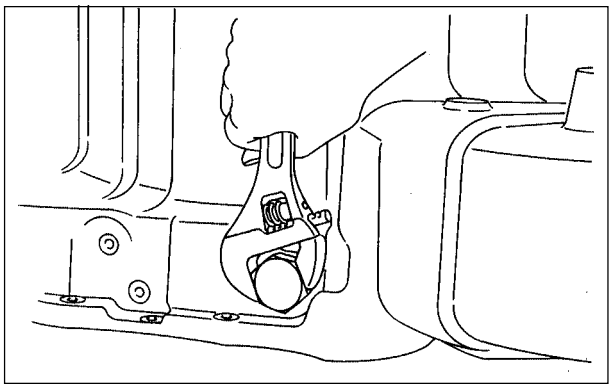


Fig. 2-141

b) Reinstalling pump drive gear

1. Fit the bearing support into the bearing.

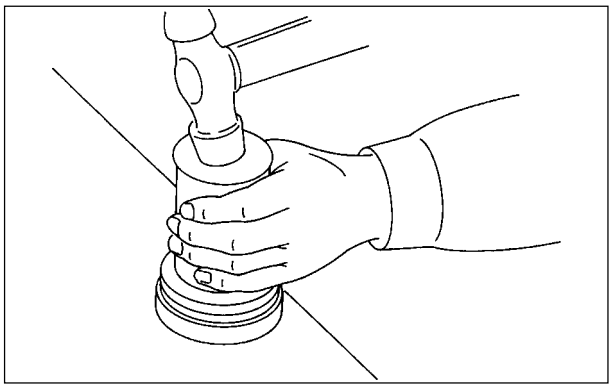


Fig. 2-142

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1.2 GENERAL SPECIFICATIONS OF "M11" SERIES ENGINE

Engine General Data

Power (please refer to the engine identification plate)
Engine speed at maximum power :
- Rated setting ... . 2100 rpm
- Bore and stroke .... 125 x 147 mm [4.921 x 5.787 in]

Displacement . ..... 10.8 lt [661 C.I.D.]
Firing order 1-5-3-6-2-4
Engine weight (with standard accessories)
- Weight dry: ..... 929 kg [2045 lbs]
- Weight supplied (with engine fluids) . ..... 981 kg [2160 lbs]

Engine rotation (seen from front side of engine): ..... Clock wise

Fuel system

For the performances and the fuel delivery values, please refer to the engine data sheet or the fuel pump code for the specific models involved.

Maximum restriction of fuel feeding pump inlet
- Clean fuel filter ..... 102 mm Hg [4 in Hg]
- Dirty fuel filter .. .. 204 mm Hg [8 in Hg]

Maximum restriction of fuel discharge piping
- Without check valves ..... 63 mm Hg [2.5 in Hg]
- With check valves . ..... 165 mm Hg [6.5 in Hg]

Maximum fuel inlet temperature .. .. 71°C [160°F]
Minimum engine starting speed ..... 150 rpm

Lubrication system

Oil pressure:
- At idle speed (minimum allowed) ..... 0.69 bar (70 kPa) [10 psi]
- At 1200 rpm or Torque Peak (minimum allowed) ..... 2 bar (207 kPa) [30 psi]

Oil capacity of standard engine
- Filter combination . ..... 2.6 lt [0.7 U.S. gal]
- Oil sump (high - low) ..... 34 - 26.5 lt [9 -7 U.S. gal]

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2.11.2 TRANSMISSION

Problem	Cause	Inspection	Corrective Action
Overheat or lower horsepower	Torque converter overheat	Refer "TORQUE CONVERTER"	
	Low oil level	Check oil level with oil level gauge	Add oil to the specified level
	Improper oil used	Check oil type	Change for the specified oil
	Slipping or seizing of clutch	Measure oil pressure of transmission clutch	Disassemble and replace parts
	Low clutch lubrificant	Measure oil pressure at outlet port of torque converter	Clean oil cooler
	Broken bearing	Observe foreign material in transmission drain	Disassemble and replace parts
		Check line filter and oil	
	Low engine output and speed	Check stolen speed	Adjust engine
Unusual noises	Broken bearing or improper assembling	Check with sound checker	Disassemble and replace parts
		Observe foreign material in transmission drain	
		Check line filter and oil	
	Broken gear or excessive backlash	Check with sound checker	Disassemble and replace parts
		Observe foreign material in transmission drain	
		Check line filter and oil	
	Seizing clutch	Measure oil pressure of transmission clutch	Disassemble and replace parts
Machine won't travel forward/ reverse	Low oil level	Check oil level with oil level gauge	Add oil to the specified level
	Malfunction of changing pump	Measure oil pressure of transmission clutch (lowered in all ranges)	Replace charging pump
	Regulator valve stayed open	Measure oil pressure of transmission clutch (lowered in all ranges)	Disassemble and replace parts
Machine won't travel forward/ reverse	Broken bolts securing torque converter input plate	Check the operation of load handling system	Replace parts
	Parking brake won't release (stuck or dragged)	Refer to "2.11.3 PARKING BRAKE"	

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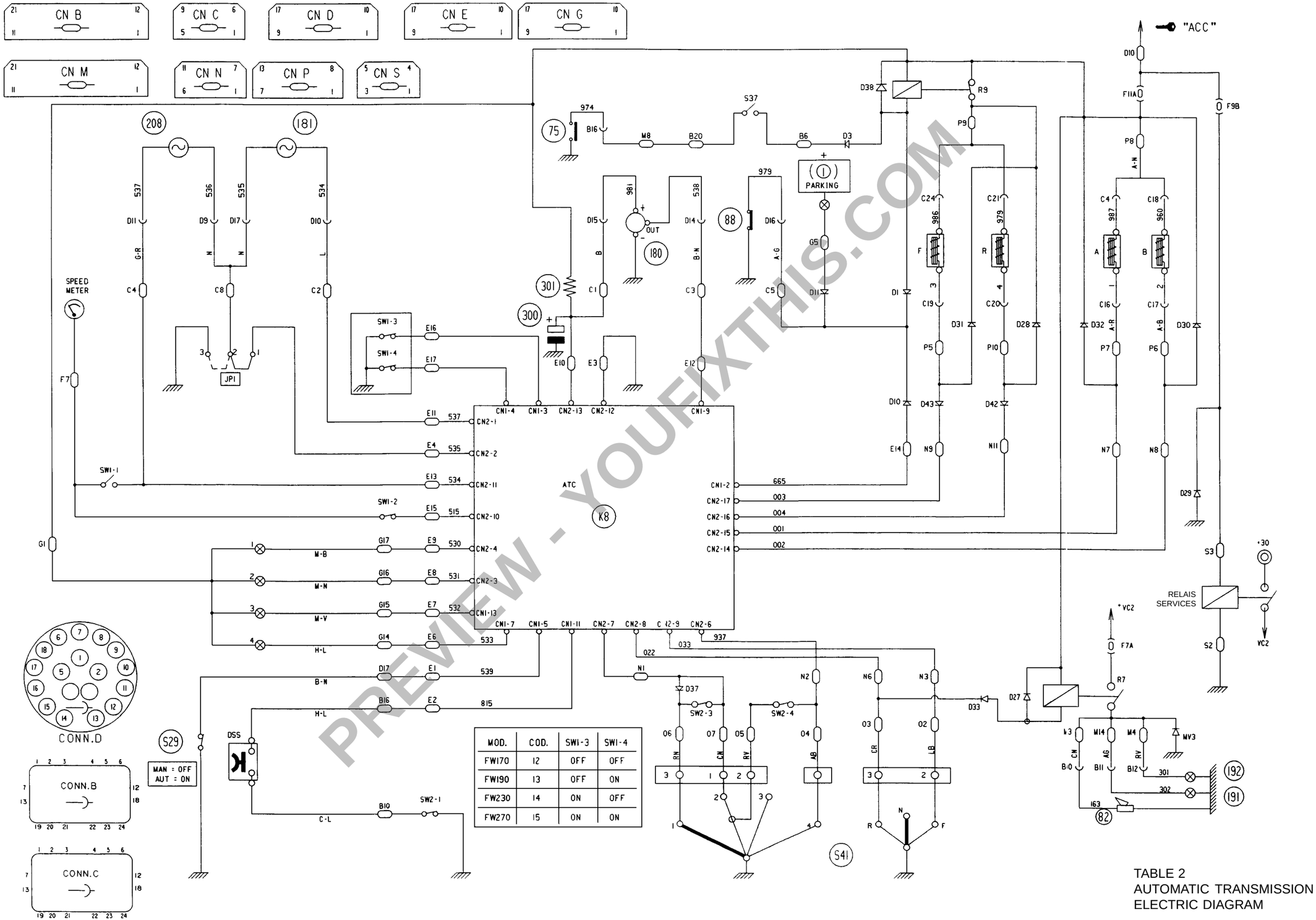
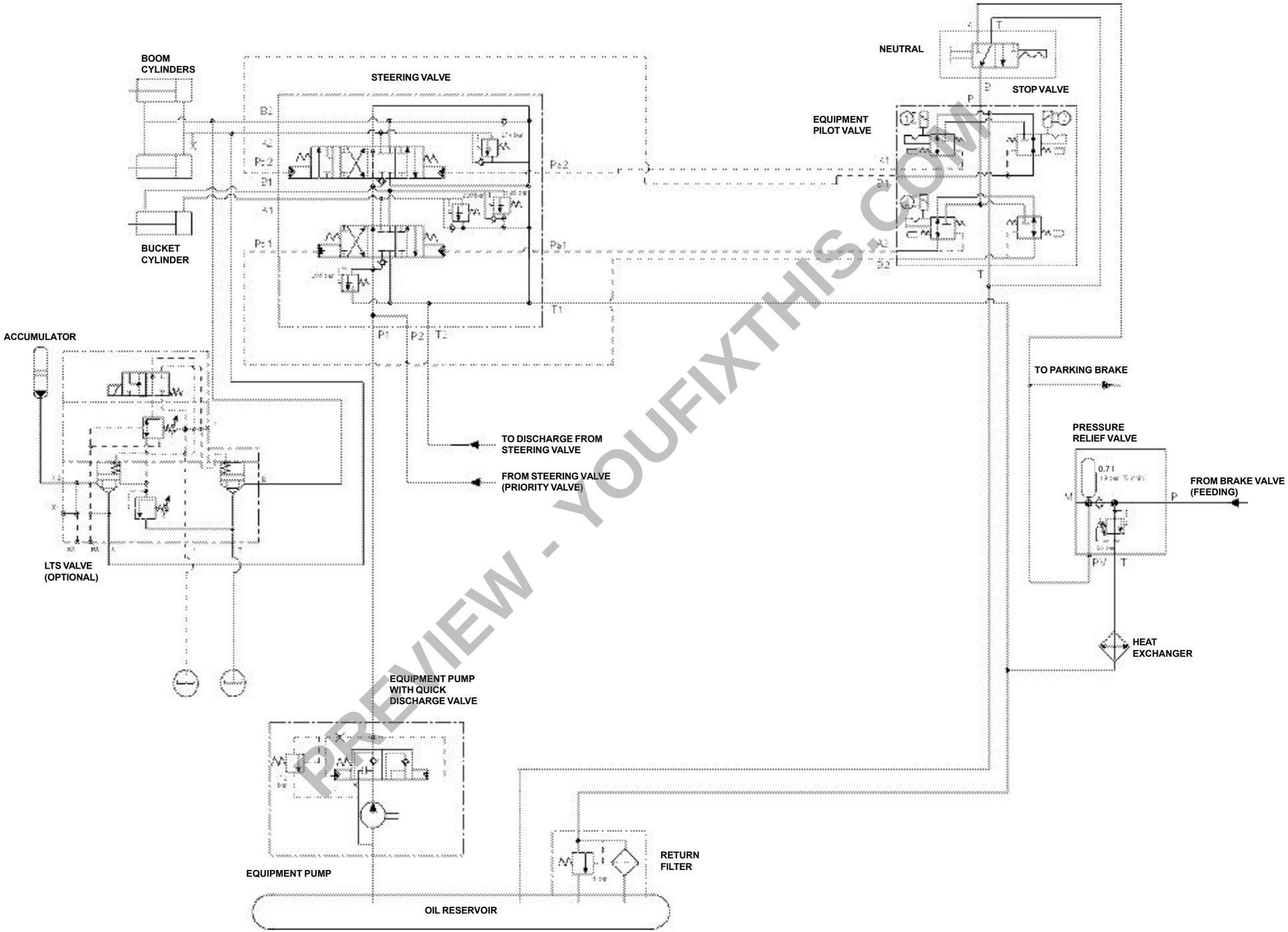


TABLE 2
AUTOMATIC TRANSMISSION
ELECTRIC DIAGRAM

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Fig. 6-2 Equipment hydraulic system



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Item		Standard Size	Useful limit	Remarks
Brake disk thickness		5.9 to 6.5 (0.232 to 0.256)	5.58 (0.220)	
Brake ring thickness		4.9 to 5.1 9.9 to 10.1 (0.193 to 0.201)	4.5 9.5 (0.177)	
	Free height	33 (1.30)	31.7 (1.25)	
	Settings load kg (lbs)	20.8 (45.9)	18.8 (41.4)	
	Setting height	20.0 (0.787)		

2.20 TIGHTENING TORQUE VALUES FOR MAIN BOLTS

Item		Tightening torque	Remarks
Ring gear mounting bolt		23 (166)	Apply LOCTITE 262.
Differential case mounting bolt	LW170 LW190	9 (65) 15 (108)	Apply LOCTITE 262.
Differential bearing retainer mounting bolt		9 (65)	Apply LOCTITE 262.
Bearing cage mounting bolt	LW170 LW190	9 (65) 23 (166)	Apply LOCTITE 262.
Flange nut	LW170 LW190	55 (398) 67 (485)	Apply LOCTITE 262.
Brake piston return spring mounting bolt		5 (36)	Apply LOCTITE 262.
Planet carrier holding bolt (Retainer plate mounting bolt)		111 (803)	Apply LOCTITE 262.
Axle tube mounting bolt		23 (166)	Apply LOCTITE 262.
Differential cover mounting bolt		5 (36)	

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2.16 AXLE DISASSEMBLY

Cautions to be used when disassembling

The illustrations for disassembly and reassembly in this manual show the front axle of the model W190. The construction of the inner components of the motor axle is the same for models from W190 through W270.

When disassembling and reassembling the drive axle, it is good practice to place it on a unit table and use disassembly and reassembly jigs.

Unit weight: Front: 1216 kg (2680 lbs) Rear: 1184 kg (2610 lbs)

1) Removing axle tube

1. Remove the drain plug and drain gear oil.
Front 38l (8.4 U.S. gal)
Rear 38l (8.4 U.S. gal)

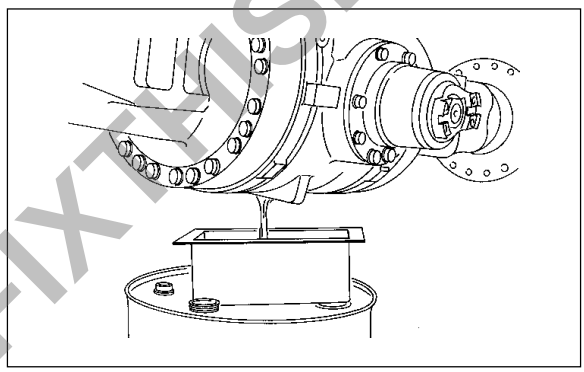


Fig. 2-253

2. Remove the axle tube mounting bolts.
Number of bolts: 20

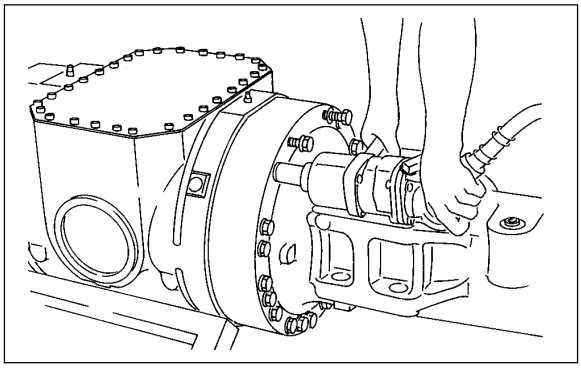


Fig. 2-254

3. Lift the axle tube with a crane temporarily, holding the axle tube at the opposite side to prevent it from lowering.

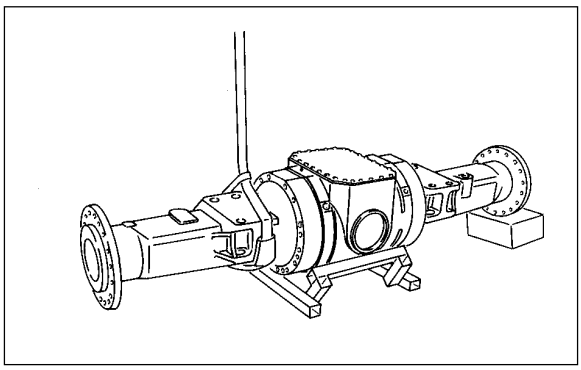


Fig. 2-255

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2.12 STANDARD VALUES FOR MAINTENANCE

2.12.1 Torque converter

Unit: mm (in)

Item		Standard value	Useful limit	Remarks
Pump drive gear backlash		0.13 - 0.23 (0.0051 - 0.0091)	-	
Turbine shaft seal ring	Width (axial)	3.0 - 3.1 (0.118 - 0.122)	2.6 (0.102)	
	Thickness (radial)	2.9 (0.114)	2.76 (0.109)	
Width o seal ing groove in turbine shaft		3.2 - 3.3 (0.126 - 0.130)	3.5 (0.138)	
I.D. of stator holder in turbine shaft seal ring sliding area		50 (1.969)	50.05 (1.970)	
Stator holder seal ring	Width (axial)	2.99 - 3.09 (0.118 - 0.122)	2.6 (0.102)	
	Thickness (radial)	3.3 (0.130)	3.14 (0.124)	
Width of seal ring roove in stator holder		3.2 - 3.3 (0.126 - 0.130)	3.5 (0.138)	
I.D. of Pump drive gear in stator holder seal ring sliding area		84 (3.307)	84.05 (3.309)	

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Problem	Cause	Inspection	Corrective Action
Machine won't travel forward (can travel reverse)	Manual spool (emergency travel spool) is pressed in the position for reverse travel	Check manual spool position at the control valve	Raise the spool to locate it in the normal condition
	Slipping forward clutch (F solenoid valve is not operated	Measure oil pressure of forward clutch	Disassemble and replace parts
	Seizing reverse clutch	Check if machine travels reverse with clutch in neutral	Disassemble and replace parts
Machine won't travel reverse (can travel forward)	Manual spool (emergency travel spool) is pulled in the position for forward travel)	Check manual spool position at the control valve	Lower the spool to locate it in the normal condition
	Slipping reverse clutch (R solenoid valve is not operated)	Measure manual spool position at the control valve	Disassemble and replace parts
	Seizing forward clutch	Check if machine travels forward with clutch in neutral	Disassemble and replace parts
Machine won't travel in Second gear	Slipping second clutch (A and B solenoid valves are not operated)	Measure oil pressure of second clutch	Disassemble and replace part
Machine won't travel in First gear	Slipping first clutch (A solenoid valve is not operated)	Measure oil pressure of first clucth	Disassemble and replace parts
Machine won't travel in Fourth gear	Slipping fourth clutch (B solenoid valve is not operated)	Measure oil pressure of fourth clutch	Disassemble and replace parts

2.11.3 Parking brake

Problem	Cause	Inspection	Corrective Action
Parking brake won't release (stuck or dragged)	Oil leak from parking brake piston (defective D-ring)	Measure braking oil pressure (Check for oil leakage)	Disassemble and replace parts
	Malfunction of disk brake (Piston has foreign matter caught or stuck, or brake disk is seized)	Overhaul	Wash and replace parts
Parking brake won't activate	Slackened or broken brake spring of disk brake	Overhaul	Wash and replace parts
	Malfunction of disk brake (Piston has foreign matter caught or stuck, or brake disk is worn)	Overhaul	Wash and replace parts

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