WIRE CODES		
WIRE	COLOR	GAUGE
A	BLUE	16
B	WHITE	14
C	BLACK	16
D	YELLOW	16
E	BLUE	16
F	YELLOW	16
G	BLACK	16
H	BLACK	10
J	BLACK	12
K	BLACK	16
L	BROWN	16
M	BLUE	16
N	ORANGE	16
P	YELLOW	16
Q	WHITE	16
R	BROWN	16
S	WHITE	16
T	GREEN	16
U	GREEN	16
V	ORANGE	16
W	BLACK	14
X	RED	16
Z	BLACK	14
AA	RED	16
AB	YELLOW	14
AC	RED	12
AF	BLACK	16
AG	BLACK	16
AH	BLACK	16
AJ	GREEN	16
AK	WHITE	16
AL	BROWN	16
AM	BLACK	16
AN	RED	12
AP	BLUE	12
AQ	ORANGE	12
AR	GREEN	16
AS	BLACK	16
AT	BROWN	12
AU	RED	16
AV	WHITE	16
AW	GREEN	16
AX	ORANGE	16
AY	BLUE	16
BA	PINK	18
BB	WHITE	18
BC	PURPLE	18
BD	BROWN	18
BE	BLACK	18
BF	ORANGE	18
BG	DARK BLUE	18
BH	BLACK/WHITE STRIPE	18
BJ	RED	18
BK	BROWN	18
BL	BLACK/WHITE STRIPE	18
BM	BLACK/WHITE STRIPE	18
BN	DARK GREEN	18
BP	BLACK/WHITE STRIPE	18

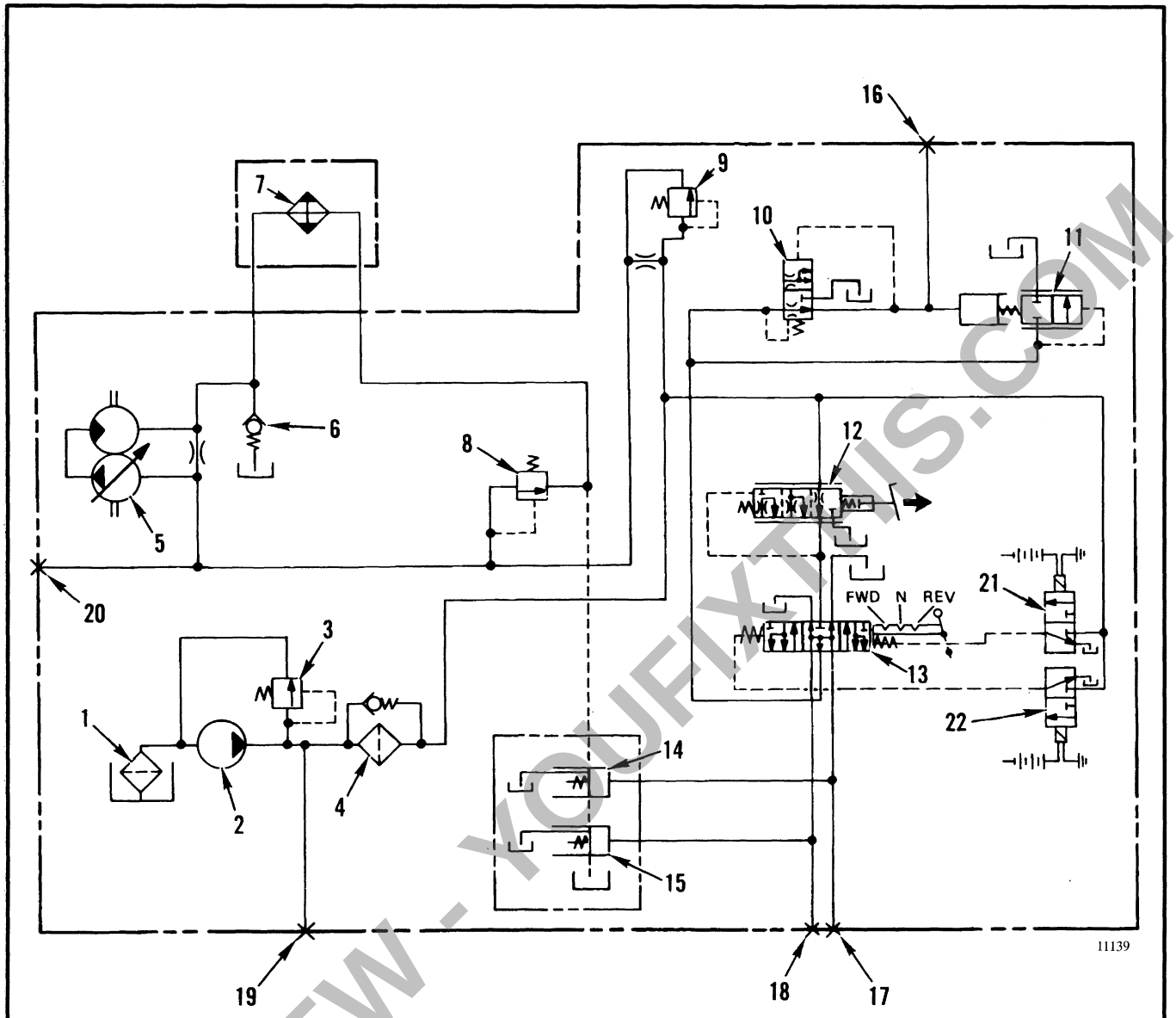
WIRE CODES		
WIRE	COLOR	GAUGE
RR	BLACK	16
TT	WHITE	16
UU	NON–INSULATED	18
VV	YELLOW	16
XX	CLEAR OR WHITE	16
YY	RED	16
ZZ	WHITE	16

1. MSTS CONTROLLER
2. INITIAL TIMING CONNECTOR
3. MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)
4. MSTS DISTRIBUTOR
5. IGNITION COIL
6. COOLANT TEMPERATURE SENSOR (CTS)
7. GROUND CONNECTION, ENGINE HEAD
8. SENDER, ENGINE OIL PRESSURE
9. FUEL LEVEL SENDER, GASOLINE ONLY
10. HORN
11. ALTERNATOR (TYPE LP AND G)
12. ALTERNATOR (TYPE LPS AND GS)
13. DISCONNECT SWITCH (LPS AND GS ONLY)
14. STARTER
15. BATTERY
16. SENDER, COOLANT TEMPERATURE
17. SENDER, TRANSMISSION OIL TEMPERATURE
18. CARBURETOR IDLE SOLENOID (GASOLINE ONLY)
19. GOVERNOR SOLENOID
20. HORN RELAY
21. PARKING BRAKE SWITCH
22. FUSE BLOCK
23. HOUR METER
24. GAUGE, WATER TEMPERATURE
25. HORN BUTTON SWITCH
26. FUEL GAUGE, GASOLINE ONLY
27. INDICATOR, ENGINE OIL PRESSURE
28. INDICATOR, ALTERNATOR DISCHARGE
29. INDICATOR, TRANSMISSION OIL TEMPERATURE
30. INDICATOR, WATER IN FUEL
31. IGNITION SWITCH
32. MONOTROL PEDAL OPTION
33. GOVERNOR CONTROLLER
34. BRAKE SWITCH WHEN EQUIPPED WITH MONOTROL OPTION
35. NEUTRAL START SWITCH WHEN EQUIPPED WITH MONOTROL OPTION
36. NEUTRAL START SWITCH WHEN EQUIPPED WITH FORWARD AND REVERSE LEVER

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FIGURE 3. WIRE SCHEMATIC, GM 4–181 ENGINE, GASOLINE AND LPG (1 of 2)

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1. SCREEN
2. OIL PUMP
3. PUMP RELIEF VALVE
4. FILTER AND BY–PASS
5. TORQUE CONVERTER
6. COOLER RELIEF VALVE
7. OIL COOLER
8. TORQUE CONVERTER REGULATOR
9. CLUTCH REGULATOR
10. MODULATOR CONTROL VALVE
11. MODULATOR REGULATOR
12. INCHING SPOOL
13. DIRECTION SPOOL
14. REVERSE CLUTCH
15. FORWARD CLUTCH
16. CHECK PORT FOR MODULATOR PRESSURE
17. CHECK PORT FOR REVERSE CLUTCH PRESSURE
18. CHECK PORT FOR FORWARD CLUTCH PRESSURE
19. CHECK PORT FOR PUMP PRESSURE
20. CHECK PORT FOR CONVERTER PRESSURE
21. DIRECTION CONTROL LEVER OPTION
22. MONOTROL OPTION

FIGURE 15. OIL FLOW IN THE NEUTRAL POSITION (1 of 2)

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ENGINE SPECIFICATIONS

Available undersize connecting rod bearings
– See **PARTS MANUAL**

Side clearance of connecting rod to crankshaft
– Production limit
0.1524 to 0.4318 mm (0.006 to 0.017 in)
– Service Limit 0.5588 mm (0.022 in)

COOLING SYSTEM

Thermostat 82°C (180°F)

LUBRICATION SYSTEM

Oil pressure @ 2500 rpm
170 to 241 kPa (25 to 35 psi)

Minimum oil pressure @ idle rpm 48 kPa (7 psi)

Oil pressure switch “ON” @
20 to 39 kPa (2.9 to 5.7 psi)

TORQUE SPECIFICATIONS

ITEM	SPECIFICATION
ADAPTER PLATE FOR TORQUE CONVERTER HOUSING	
3.0L	44 N.m (35 lbf ft)
ALTERNATOR PULLEY	61 N.m (45 lbf ft)
CAMSHAFT THRUST PLATE	10 N.m (7 lbf ft)
CHAIN BLOCK FOR HYDRAULIC PUMP DRIVE	19 N.m (14 lbf ft) with adhesive sealant
CONNECTING ROD CAP NUTS	44 N.m (35 lbf ft)
COOLANT PUMP TO BLOCK	10 N.m (7 lbf ft)
COOLING FAN TO HUB	19 N.m (14 lbf ft)
CYLINDER HEAD	130 N.m (95 lbf ft)
ENGINE MOUNT TO BLOCK	44 N.m (35 lbf ft)
EXHAUST MANIFOLD	41 N.m (30 lbf in)
EXHAUST MANIFOLD TO INTAKE MANIFOLD	61 N.m (45 lbf ft)
FAN BELT PULLEY TO VIBRATION DAMPENER	44 N.m (35 lbf ft)
FLYWHEEL CAPSCREWS	
4–153, 4–181	80 N.m (60 lbf ft) with adhesive sealant
3.0L	107 N.m (79 lbf ft) with adhesive sealant
6–250	100 N.m (75 lbf ft) with adhesive sealant
FLYWHEEL HOUSING	44 N.m (35 lbf ft)
INSPECTION COVER (Lifters)	10 N.m (7 lbf ft)
INTAKE MANIFOLD TO CYLINDER HEAD	54 N.m (40 lbf ft)
MAIN BEARING CAP	95 N.m (70 lbf ft)
OIL SUMP	
1/4–20 Capscrews	10 N.m (7 lbf ft)
5/15–18 Capscrews	19 N.m (14 lbf ft)
OIL SUMP TO TIMING COVER	8 N.m (6 lbf ft)
OIL PUMP TO ENGINE BLOCK	30 N.m (22 lbf ft)
OIL PUMP COVER	14 N.m (10 lbf ft)
ROCKER COVER	8 N.m (6 lbf ft)
STARTER	44 N.m (35 lbf ft)
TIMING COVER	11 N.m (97 lbf in)
VIBRATION DAMPENER	80 N.m (60 lbf ft)

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COUNTERWEIGHT

The counterweight is held in position on the frame by two hooks that are part of the frame. One large capscrew holds the counterweight to the lower part of the frame: (M24 x 3 x 150 on the S50–60XL models and M24 x 3 x 80 on the S40XL model).

⚠ WARNING

Do not operate the lift truck if the capscrew for the counterweight is not installed. When the capscrew is removed, the counterweight can fall from the lift truck.

Removal

1. If the lift truck has an LPG fuel system, remove the LPG tank and bracket so that the counterweight can be removed. Additional information on the LPG fuel system can be found in the following section of the **SERVICE MANUAL**:

THE LPG FUEL SYSTEM, 900 SRM 15.

⚠ WARNING

LPG can cause an explosion. Do not cause sparks or permit flammable material near the LPG system. LPG fuel systems can be disconnected indoors only if the lift truck is at least 8 metres (25 feet) from any open flame, motor vehicles, electrical equipment, or ignition source.

Close the fuel valve on the LPG tank before any part of the engine fuel system is disconnected. Run the engine until the fuel in the system is used and the engine stops.

If the engine will not run, close the fuel valve on the LPG tank. Loosen the fitting on the supply hose from the LPG tank where it enters the filter unit. Permit the pressure in the fuel system to decrease slowly. Fuel leaving the fitting removes heat. Use a cloth to protect your hands from the cold fitting.

2. Use the following procedure to remove the LPG tank**:**

a. Removable LPG tanks can be removed and replaced indoors only if the lift truck is at least 8 metres (25 feet) from any open flame or ignition source.

b. Move the lift truck to the area where tanks are changed.

c. Turn the tank fuel valve clockwise until the valve is completely closed.

d. Run the engine until it stops, then turn the key switch to the **OFF** position.

e. Disconnect the quick disconnect fitting.

f. Release the LPG tank latch and remove the tank from the bracket.

⚠ WARNING

The counterweight castings have the following approximate weights:

S2.00XL (S40XL)	**1070 kg (2360 lb)**
S2.50XL (S50XL)	**1430 kg (3150 lb)**
S3.00XL (S60XL)	**1820 kg (4010 lb)**

3. See FIGURE 2. Install a lifting eye in the lifting hole of the counterweight. Connect a crane to the lifting eye and raise the crane until it holds part of the weight of the counterweight. Remove the capscrew that holds the counterweight to the frame. Use the crane to lift the counterweight from the lift truck.

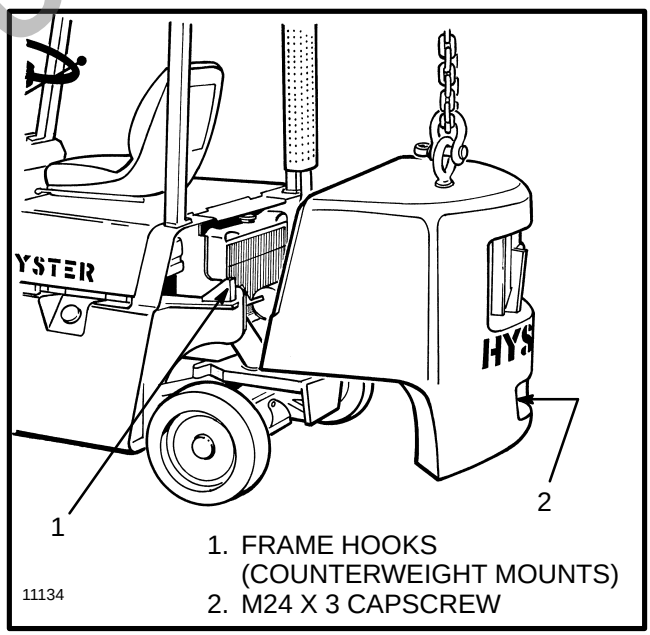


FIGURE 2. REMOVAL OF THE COUNTERWEIGHT

Installation

1. When the counterweight is installed, make sure the hooks on the frame fully engage the counterweight so that it is aligned with the parts of the frame. Tighten the M24 x 3 capscrew to 555 N.m (410 lbf ft).

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TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
When the ignition switch is in the “START” position, the starter does not operate.	The battery has a problem.	Install a new battery.
	The battery is not fully charged.	Charge the battery.
	The connections at the battery are loose or they have corrosion.	Clean and tighten the battery connections.
	The ignition switch has a problem.	Repair or install an ignition switch.
	The starter system has a problem.	Check and repair the starter circuit.
	There are damaged parts in the engine.	Repair the engine.
The engine will not start.	The fuel tank is empty.	Fill the fuel tank.
	The battery is not fully charged.	Charge the battery.
	The valves are worn or damaged.	Repair the valves.
	The piston rings are worn or have damage.	Install new piston rings.
	The ignition system has a problem.	Check and repair the ignition system.
	The fuel system has a problem.	Check and repair the fuel system.
The engine does not run smoothly.	The valve mechanism does not operate correctly.	Repair the valve mechanism.
	The head gasket has a leak.	Install a new head gasket.
	The cylinder head has cracks.	Install a new cylinder head.
	There is a leak in the intake system.	Install new gaskets at the intake manifold.
	The spark plugs have a problem.	Install new spark plugs.
	The ignition system has problems. (See the sections for the electrical components in the **SERVICE MANUAL** for more information.	Repair the ignition system.
The engine does not have enough power.	The air filter is dirty.	Clean or install a new air cleaner.
	The fuel is the wrong type.	Drain and fill fuel tank.
	The ignition timing is not correct.	Check timing.
	The valve mechanism does not operate correctly.	Repair parts of valve mechanism.
	The piston assemblies are worn or damaged.	Install new pistons.
	The spark plugs are the wrong type or they are not installed correctly.	Install new spark plugs.
	The valve timing is not correct.	Check valve mechanism.
	The exhaust system has restrictions.	Clean or repair exhaust system.

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Stop the engine. Rotate the cooling fan and fan drive by hand. The rotation must be smooth with some resistance. A small amount of movement side–to–side will occur at the tips of the fan blades because of bearing clearance. Approximately 5 mm (0.2 in) maximum of side–to–side movement at the tips of the fan blades is permitted. If the cooling fan can not be rotated by hand or has a rough rotation, the fan drive must be replaced. A very small leakage of oil around the bearing is normal. If oil has leaked from the fan drive, the cooling fan will turn too easily. If the cooling fan will turn more than three revolutions when pushed by the hand and released, the viscous fan drive must be replaced.

ENGINE SPECIFICATIONS

ENGINE DATA

GM 4–153

Number of cylinders	4
Firing order	1–3–4–2
Bore and stroke	98.45 x 82.5 mm (3.876 x 3.25 in)
Displacement	2512 cm^3 (153 in^3)
Compression Ratio	8.25:1
Governor speed	See the **PERIODIC MAINTENANCE** section for each model of lift truck

GM 4–181

Number of cylinders	4
Firing order	1–3–4–2
Bore and stroke	101.6 x 91.44 mm (4.00 x 3.60 in)
Displacement	2965 cm^3 (181 in^3)
Compression Ratio	8.25:1
Governor speed	See the **PERIODIC MAINTENANCE** section for each model of lift truck

GM 3.0L

Number of cylinders	4
Firing order	1–3–4–2
Bore and stroke	101.6 x 91.44 mm (4.00 x 3.60 in)
Displacement	2965 cm^3 (181 in^3)
Compression Ratio	8.25:1
Governor speed	See the **PERIODIC MAINTENANCE** section for each model of lift truck

GM 6–260

Number of cylinders	6
Firing order	1–5–3–6–2–4
Bore and stroke	98.45 x 89.66 mm (3.88 x 3.53 in)
Displacement	4095 cm^3 (250 in^3)
Compression Ratio	8.25:1
Governor speed	See the **PERIODIC MAINTENANCE** section for each model of lift truck

CYLINDER HEAD

Valve seat specifications — See FIGURE 6.

Valve seat width, intake valves
0.896 to 1.897 mm (0.035 to 0.074 in)

Valve seat width, exhaust valves
1.468 to 2.468 mm (0.058 to 0.0971 in)

Clearance between intake valve and guide
– Production Limit
0.0254 to 0.0686 mm (0.0010 to 0.0027 in)

– Service Limit — 0.094 mm (0.0037 in)

Clearance between exhaust valve and guide
[**NOTE:** The valve stems for the exhaust valves have a taper of 0.0025 mm (0.001 in)]

– Production Limit (top of taper)
0.0254 to 0.0686 mm (0.0010 to 0.0027 in)

– Service Limit — 0.119 mm (0.0047 in)

– Production Limit (bottom of taper)
0.0508 to 0.0939 mm (0.0020 to 0.0037 in)

– Service Limit — 0.145 mm (0.0057 in)

Diameter of exhaust valve stem
8.6817 to 8.9665 mm (0.3418 to 0.3425 in)

Diameter of intake valve stem
8.6995 to 8.6817 mm (0.3425 to 0.3418 in)

Valve head diameter (all)
8.6817 to 8.6995 mm 0.3418 to 0.3425 in)

Valve installed height (all)
42.926 mm (1.69 in)

Valve spring, free length (See FIGURE 48.)
52.8 mm (2.08 in)

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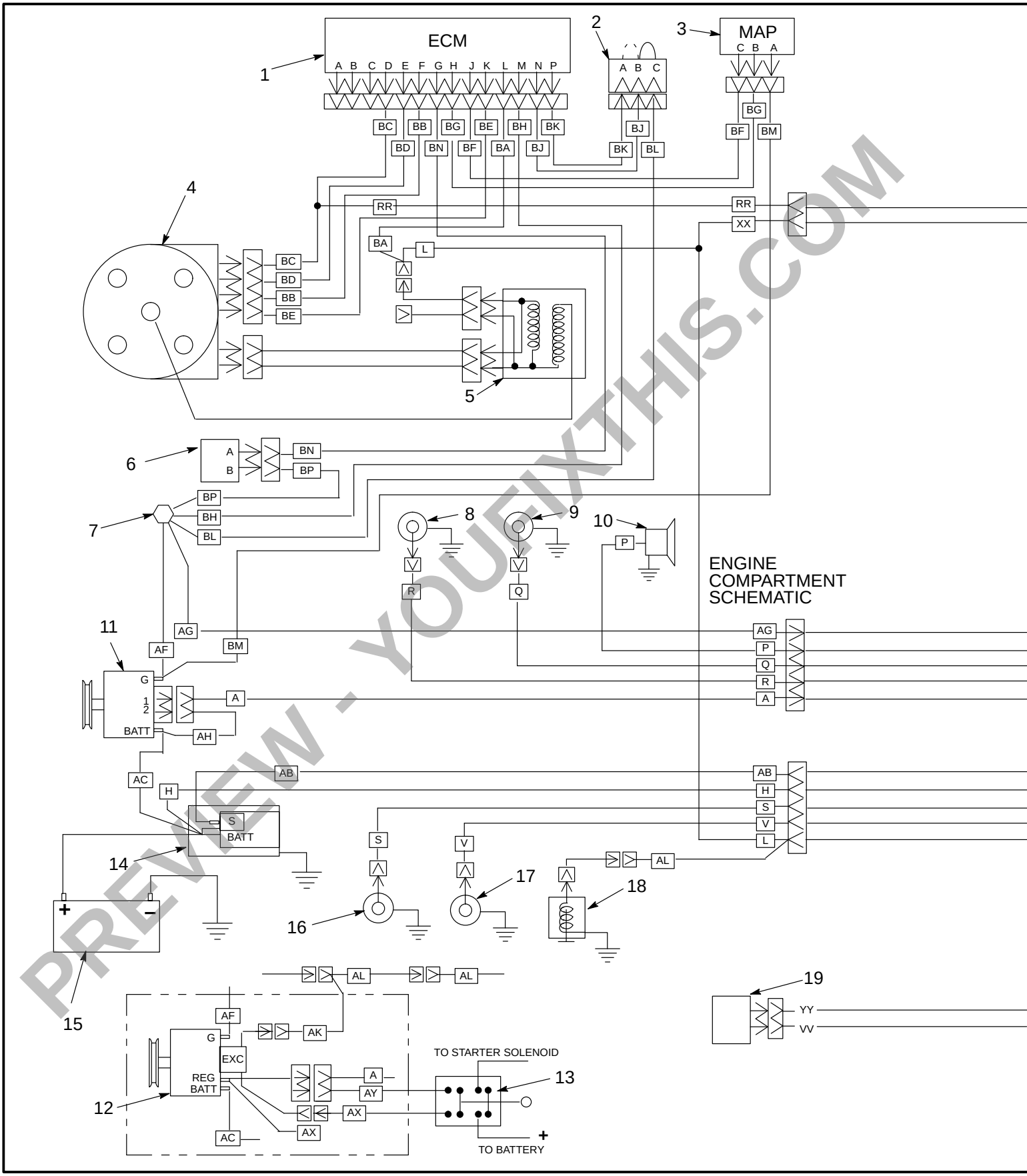
ITEM NO.	ITEM	8 Hr./ Daily	250 Hr./ 6 wk.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
1	ENGINE OIL Mazda 4–121G (Gasoline and LPG)	X	C			5.2 litre (5.5 qt)	API CC/SE/SF/SG, MIL–L–46152 30°C (85°F) and up SAE 30 15–30°C (60–85°F) SAE 30 0–15°C (32–60°F) SAE 20 less than –10°C (15°F) SAE 10W
1	ENGINE OIL GM 4–181 and GM 4–153 (Gasoline and LPG)	X	C			4.3 litre (4.5 qt)	API CC/SE/SF/SG, greater than –18°C (0°F) SAE 10W–30
1	ENGINE OIL Isuzu C240 (Diesel) Isuzu 4JB1 (Diesel)	X	C			5.2 litre (5.5 qt) 6.5 litre (6.9 qt)	API CC/SE/SF/SG, 27°C (80°F) and up SAE 40 0–32°C (32–90°F) SAE 30 less than –7°C (20°F) SAE 10W
2	DRIVE BELTS	X				Check Condition	See Parts Manual
	CHECK FOR LEAKS— FUEL, OIL, WATER	X				Check for Leaks	
3	COOLANT HOSES	X				Check Condition	See Parts Manual
4	COOLING SYSTEM S/H1.25–1.75XL (S/H25–35XL) Mazda 4–121G Isuzu C240 S2.00–3.00XL (S40–60XL) Mazda 4–121G GM 4–181 and GM 4–153 Isuzu C240 H2.00–3.00XL (H40–60XL) Mazda 4–121G GM 4–181 Isuzu C240 Isuzu 4JB1	X			C	 7.8 litre (8.2 qt) 8.1 litre (8.6 qt) 7.6 litre (8.0 qt) 11.4 litre (12.0 qt) 8.5 litre (9.0 qt) 11.1 litre (11.8 qt) 11.0 litre (11.7 qt) 11.4 litre (12.0 qt) 11.0 litre (11.7 qt)	 50% Water with 50% Ethylene Glycol
5	BATTERY ELECTROLYTE	X				Check Level	
6	FUEL FILTER, DIESEL	X		C		Clean or Replace See NOTE 1	See Parts Manual
7	FUEL TANK S/H1.25–1.75XL (S/H25–35XL) S2.00–3.00XL (S40–60XL) H2.00–3.00XL (H40–60XL)	X				 25.0 litre (6.5 gallon) 38.6 litre (10 gallon) 43.5 litre (11.5 gallon)	85 Octane — Gasoline Diesel No. 2 LPG — HD–5
8	AIR FILTER	X				Clean or Replace See NOTE 2	See Parts Manual
9	TRANSMISSION OIL S/H1.25–1.75XL (S/H25–35XL) S2.00–3.00XL (S40–60XL) H2.00–3.00XL (H40–60XL	X			C	 9.0 litre (9.5 qt) 10.4 litre (11 qt) 9.0 litre (9.5 qt)	Hyster Part No. 336831

X= Check C=Change L=Lubricate

NOTE 1: Check indicator light during operation (Lift trucks with serial codes B/C177 and B187 only).
NOTE 2: Very dirty conditions will require daily check and clean.

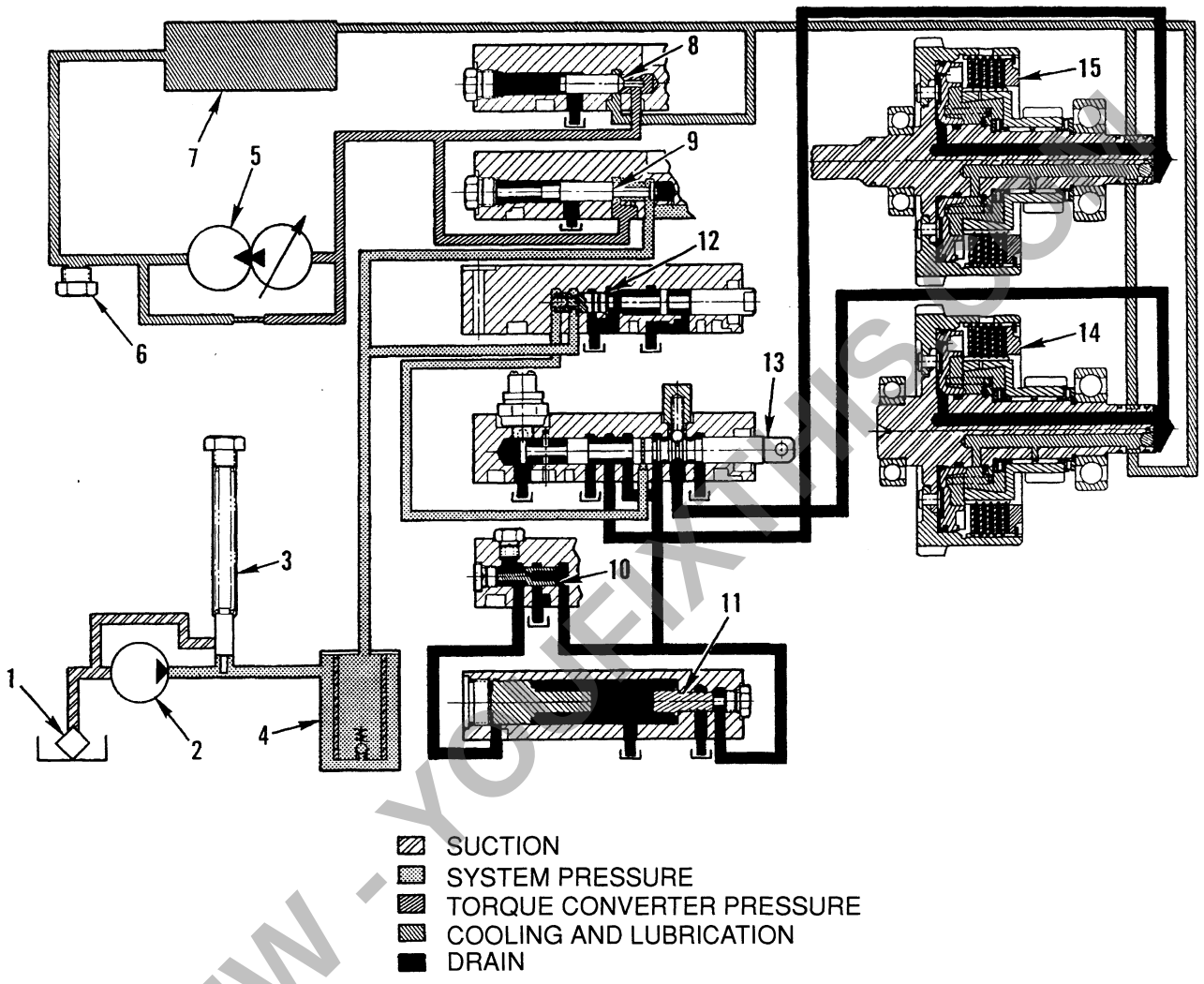
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When the engine is running and the direction spool is in the NEUTRAL position, both clutches are released. The transmission is disengaged. The inching function is not applied and oil flows through the inching spool to the direction spool. With the direction spool in the NEUTRAL position, the oil flow is stopped at the direction spool and all the oil flows to the clutch pressure regulator. At the clutch pressure regulator, the oil has two paths for flow. One path is through the orifice in the valve body to the torque converter and the lubrication circuits. The clutch regulator spool opens a second path to the torque converter. The torque converter regulator then controls the oil pressure and flow to the torque converter. If the oil pressure is too high, the torque converter regulator opens a path directly to the lubrication circuit. The torque converter regulator is a by–pass for the torque converter and the oil cooler. The modulator circuit is not in operation in the NEUTRAL position.

FIGURE 15. OIL FLOW IN THE NEUTRAL POSITION (2 of 2)

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TORQUE SPECIFICATIONS

ITEM	SPECIFICATION
FRAME	
Counterweight Capscrews	555 N.m (410 lbf ft)
Engine Mount to Frame	53 N.m (39 lbf ft)
ENGINE (ISUZU C240)	
Cylinder Head Bolts	78 N.m (58 lbf ft)
Crankshaft Pulley Bolt	167 N.m (123 lbf ft)
Connecting Rod Cap Bolt	81 N.m (60 lbf ft)
Flywheel Bolts	108 N.m (80 lbf ft)
Main Bearing Bolts	160 N.m (120 lbf ft)
Camshaft Gear Bolt	108 N.m (80 lbf ft)
Camshaft Thrust Plate Bolt	19 N.m (14 lbf ft)
Idler Gear Bolt	26 N.m (19 lbf ft)
Engine Mount to Engine	53 N.m (39 lbf ft)
ENGINE (MAZDA M4–121G)	
Cylinder Head Bolts	88 N.m (65 lbf ft)
Main Bearing Cap	81 to 88 N.m (60 to 65 lbf ft)
Rod Bearing Cap	47 to 52 N.m (35 to 38 lbf ft)
Timing Gear Case	16 to 23 N.m (12 to 17 lbf ft)
Flywheel Housing	28 to 41 N.m (20 to 30 lbf ft)
Flywheel	58 to 64 N.m (43 to 47 lbf ft)
Rocker Arm Support	28 to 41 N.m (21 to 30 lbf ft)
Engine Mount to Engine	56 N.m (41 lbf ft)
ENGINE (GM 4–153)	
Cylinder Head Capscrews	130 N.m (95 lbf ft)
Main Bearing Capscrews	90 N.m (65 lbf ft)
Piston Rod Cap Nuts	50 N.m (35 lbf ft)
Flywheel	80 N.m (60 lbf ft)
Engine Mount to Flywheel Housing	75 N.m (55 lbf ft)
Engine Mount to Engine	47 N.m (35 lbf ft)
ENGINE (GM 4–181)	
Cylinder Head Capscrews	130 N.m (95 lbf ft)
Main Bearing Capscrews	90 N.m (65 lbf ft)
Piston Rod Cap Nuts	50 N.m (35 lbf ft)
Crankshaft Pulley Capscrews	80 N.m (60 lbf ft)
Flywheel	80 N.m (60 lbf ft)
Engine Mount to Engine	44 N.m (33 lbf ft)
TRANSMISSION	
Drive Plate to Torque Converter	45 N.m (33 lbf ft)
Torque Converter Housing to Transmission	38 N.m (28 lbf ft)
Torque Converter Housing to Engine	38 N.m (28 lbf ft)
Front Cover to Transmission	38 N.m (28 lbf ft)
Differential Adapter to Transmission	38 N.m (28 lbf ft)
Oil Pump to Front Cover	19 N.m (14 lbf ft)
Differential Case Halves	50 N.m (37 lbf ft)
Ring Gear	111 N.m (82 lbf ft)
Pinion (Prevail Nut Torque)	750 N.m (553 lbf ft)
Differential Bearing Caps	110 N.m (80 lbf ft)
Retrainers for Adjusting Nuts	19 N.m (14 lbf ft)

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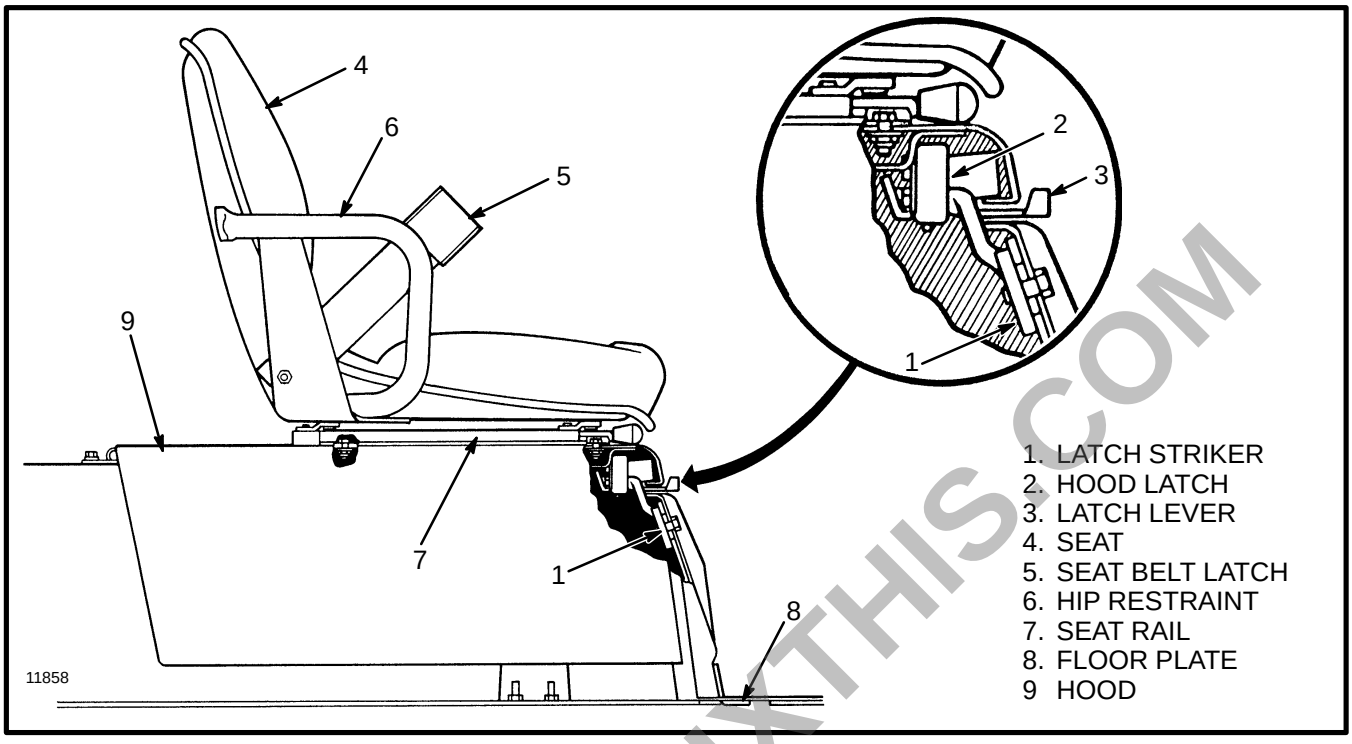


FIGURE 5. CHECK THE HOOD AND SEAT LATCHES

See FIGURE 5. Make sure the seat rails and latch striker are not loose. The seat rails must lock tightly in position, but move freely when unlocked. The seat rails must be correctly fastened to the mount surface. If the mount surface is the hood, the hood must be fastened to the floor plate with the latch. The floor plate must be fastened to the lift truck frame. Try to lift the hood to make sure it is fastened correctly and will not move.

Adjust the hood, hood latch and latch striker when any of the parts of the operator restraint system are installed or replaced. See HOOD for the adjustment procedures.

ENGINE REMOVAL AND INSTALLATION

Removal of the Engine and Transmission

1. Do the following steps as described in the paragraphs at the beginning of this section:

a. Remove the hood and seat.

b. Remove the floor plates and the front panel from the engine compartment.

c. Remove the counterweight. Make sure that you use the correct procedures to disconnect and remove an LPG tank.

d. Remove the overhead guard.

e. Remove the radiator.

⚠ WARNING

Always disconnect the cables at the battery before you make repairs to the engine. Disconnect the cable at the negative terminal first.

2. Disconnect the cables at the battery.

3. Put the lift truck on blocks so that you have access under the lift truck.

4. Disconnect the hydraulic lines.

Lift trucks with serial codes A187:

a. **Mazda and Isuzu engines**. Disconnect the inlet line and the return hose at the main control valve. Disconnect the return hose at the back of the hydraulic filter and remove the hydraulic filter and plate from the frame. Disconnect the steering return line and the line from the steering relief valve at the hydraulic tank. Disconnect the steering supply line at the hydraulic pump and remove the clamp that holds the line. Disconnect the suction line at the hydraulic pump on the Isuzu engine. On the Mazda engine, disconnect the hose at the tube that is fastened to the flywheel housing. Put a plug in the hose. Move the hose out of the support bracket on the flywheel housing.

b. **GM engine**. Disconnect the inlet line and the return hose at the main control valve. Disconnect

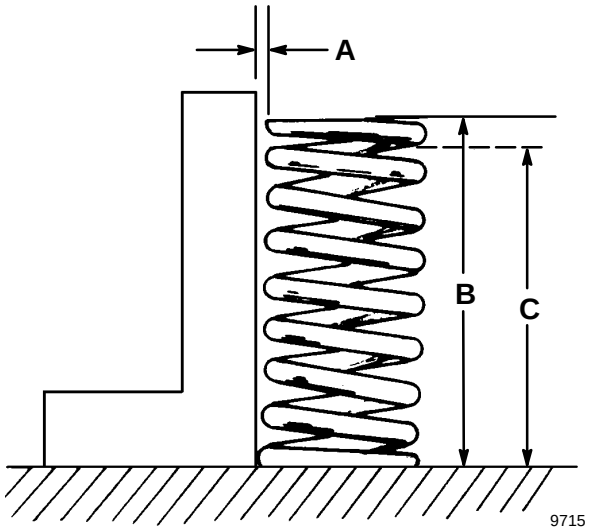
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TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
There is noise inside the engine.	The main bearings are worn or damaged.	Install new bearings.
	The bearings for the connecting rods are worn or damaged.	Install new bearings.
	The pistons are worn or damaged.	Install new pistons.
	The engine is too hot.	Check the cooling system.
	There is not enough oil in the engine.	Fill the engine to the correct level.
	The flywheel is loose.	Tighten the capscrews for the flywheel.
	A connecting rod is bent.	Repair the engine.
	There is a leak in the exhaust system.	Repair the exhaust system.
	A valve lifter has a problem.	Check the valve lifters.
	The valve mechanism does not operate correctly.	Repair the valve mechanism.
There is noise in the engine during acceleration.	The spark plugs are dirty.	Install new spark plugs.
	The spark plugs are the wrong type.	Install the correct spark plugs.
	The ignition timing is not correct.	Check the timing.
	The fuel is the wrong type.	Fill the tank with the correct fuel.
	There is too much carbon in the combustion chamber.	Clean the cylinder head and pistons.
	The engine is too hot.	Check the cooling system.
The engine gets too hot.	There is not enough coolant in the cooling system.	Fill cooling system with coolant.
	The belt for the water pump is worn or not adjusted correctly.	Adjust drive belts.
	The thermostat has damage.	Install a new thermostat.
	The cooling system has restrictions.	Clean the cooling system parts.
	The water pump has damage.	Install a new water pump.
	The radiator is dirty.	Clean the radiator.
	The exhaust system has restrictions.	Clean or replace the parts of the exhaust system.
The bearings in the engine are damaged.	There is not enough oil in the engine.	Fill engine with correct oil.
	The oil in the engine is the wrong type.	Fill engine with correct oil.
	The oil pump has damage.	Install a new oil pump.
	The connecting rods have damage.	Install new connecting rods.
	The camshaft is worn or damaged.	Install a new camshaft.
	The passages for oil have restrictions.	Clean oil passages.
	The bearings are not installed correctly.	Install new bearings.
	The oil in the engine is dirty.	Install a new oil filter and oil.

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A. VARIATION FROM VERTICAL:
– Production less than 1.5 mm (0.06 in)
– Service limit 2.5 mm (0.984 in)

B. FREE LENGTH:
– Standard 49.7 mm (1.96 in)
– Service Limit 48.2 mm (1.90 in)

C. INSTALLATION HEIGHT:
THE VALVE SPRINGS NEED A MINIMUM FORCE OF 347 to 383 N (76 to 86 lbf) TO COMPRESS THEM TO A HEIGHT OF 43 mm (1.69 in)

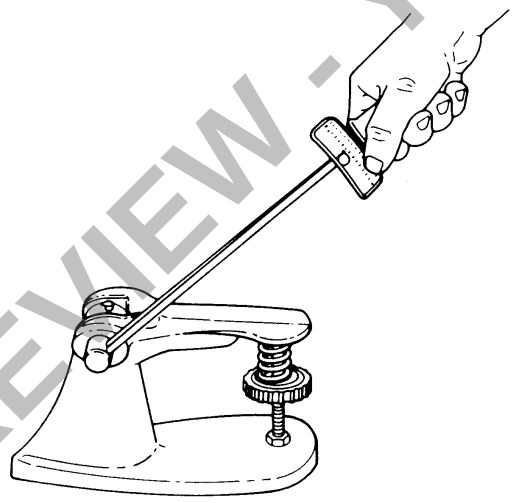


FIGURE 48. VALVE SPRING SPECIFICATIONS

Valve spring force (installed and valve is closed)
347 to 383 N @ 43 mm
(78 to 86 pounds @ 1.69 in)

Valve spring force (installed and valve is open)
756 to 800 N @ 32 mm
(170 to 180 pounds @ 1.26 in)

HYDRAULIC VALVE LIFTER

Leak rate 12 to 90 seconds with 50 lb load

Body diameter
21.3868 to 21.4046 mm (0.8420 to 0.8427 in)

Plunger travel 3.175 mm (0.125 in)

Clearance in bore 0.0635 mm (0.0025 in)

Lifter bore diameter
21.425 to 21.450 mm (0.8435 to 0.8445 in)

CAMSHAFT

Variation from front to rear of a cam lobe
– Taper with larger dimension away from No. 1 piston

Bearing journals, diameter
47.44 to 47.49 mm (1.8677 to 1.8697 in)

Bearing journals, clearance
0.01778 to 0.9685 mm (0.0007 to 0.0027 in)

Variation of a bearing journal in either diameter or axial direction 0.03 mm (0.001 in)

Axial Clearance (see FIGURE 17.)
– Production Limit
0.020 to 0.120 mm (0.001 to 0.005 in)
– Service Limit 0.2 mm (0.008 in)

PISTONS

Piston diameter (see gauge points in FIGURE 27.)

Clearance at top of cylinder
– Production Limit
0.0635 to 0.0838 mm (0.0025 to 0.0033 in)

Clearance at bottom of cylinder
– Production Limit
0.043 to 0.104 mm (0.0017 to 0.0041 in)

Clearance in cylinder (service limit for top and bottom of cylinder) 0.76 mm (0.030 in)

Piston ring to groove clearance for piston rings (see FIGURE 28.)

Compression rings No. 1 and No. 2
– Production Limit
0.0381 to 0.0889 mm (0.0015 to 0.0035 in)

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ITEM NO.	ITEM	8 Hr./ Daily	250 Hr./ 6 wk.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
10	HYDRAULIC SYSTEM (TANK) S/H1.25–1.75XL (S/H25–35XL) S2.00–3.00XL (S40–60XL) H2.00–3.00XL (H40–60XL)	X			C	 18.9 litre (20 qt) 30.3 litre (32.0 qt) 31.8 litre (33.6 qt)	–18°C (0°F) and Above SAE 10W API CC or CC/SE/SF/SG
11	TIRES, TIRE PRESSURE	X				See Nameplate	
12	MAST, CARRIAGE, LIFT CHAINS	X				Check Condition	See Parts Manual
13	FORKS	X	X			Check Condition	
	SAFETY LABELS	X				Replace as Necessary	See Parts Manual
	SEAT BELT AND SEAT RAILS	X				Check Condition	
	HOOD AND SEAT LATCHES	X				Check Condition	
	HORN, GAUGES, LIGHTS, ALARMS	X				Check Operation	
14	SERVICE BRAKES AND PARKING BRAKE	X			X	Check Operation Check Condition	
	STEERING & POSITION LATCH	X				Check Operation	
15	TRANSMISSION	X				Check Operation	
16	BRAKE FLUID		X			0.2 litre (0.4 pt)	SAE J–1703
2	DRIVE BELTS		X			Adjust or Replace	See Parts Manual
	BRAKE, INCHING/BRAKE PEDALS		X			Adjust as Required	
1	ENGINE OIL FILTER		C			See NOTE 3	See Parts Manual
10	HYDRAULIC TANK BREATHER		X			Clean or Replace	See Parts Manual
	GOVERNOR OIL, MAZDA 4–121G		C			200 ml (6.8 oz)	Engine Oil
17	MAST PIVOTS SLIDING SURFACES AND LOAD ROLLER SURFACES		 L L			 2 Fittings As Required	 Multi–Purpose Grease See NOTE 4 Multi–Purpose Grease
12	LIFT CHAIN		X, L			As Required	Engine Oil
18	WHEEL NUTS DRIVE WHEELS S/H1.25–1.75XL (S/H25–35XL) S2.00–3.00XL (S40–60XL) H2.00–3.00XL (H40–60XL) STEER WHEELS H2.00–3.00XL (H40–60XL) SPACERS IF DUAL WHEELS ARE INSTALLED (ALL)		X			Check Torque	 155 N.m (115 lbf ft) 240 to 305 N.m (175 to 225 lbf ft) 610 to 680 N.m (450 to 500 lbf ft) 237 to 305 N.m (175 to 225 lbf ft) 98 N.m (80 lbf ft)

X= Check C=Change L=Lubricate

NOTE 3: Change filters on new lift trucks after first 100 hours.
NOTE 4: Multi–Purpose Grease with 2 to 4% Molybdenum Disulfide.

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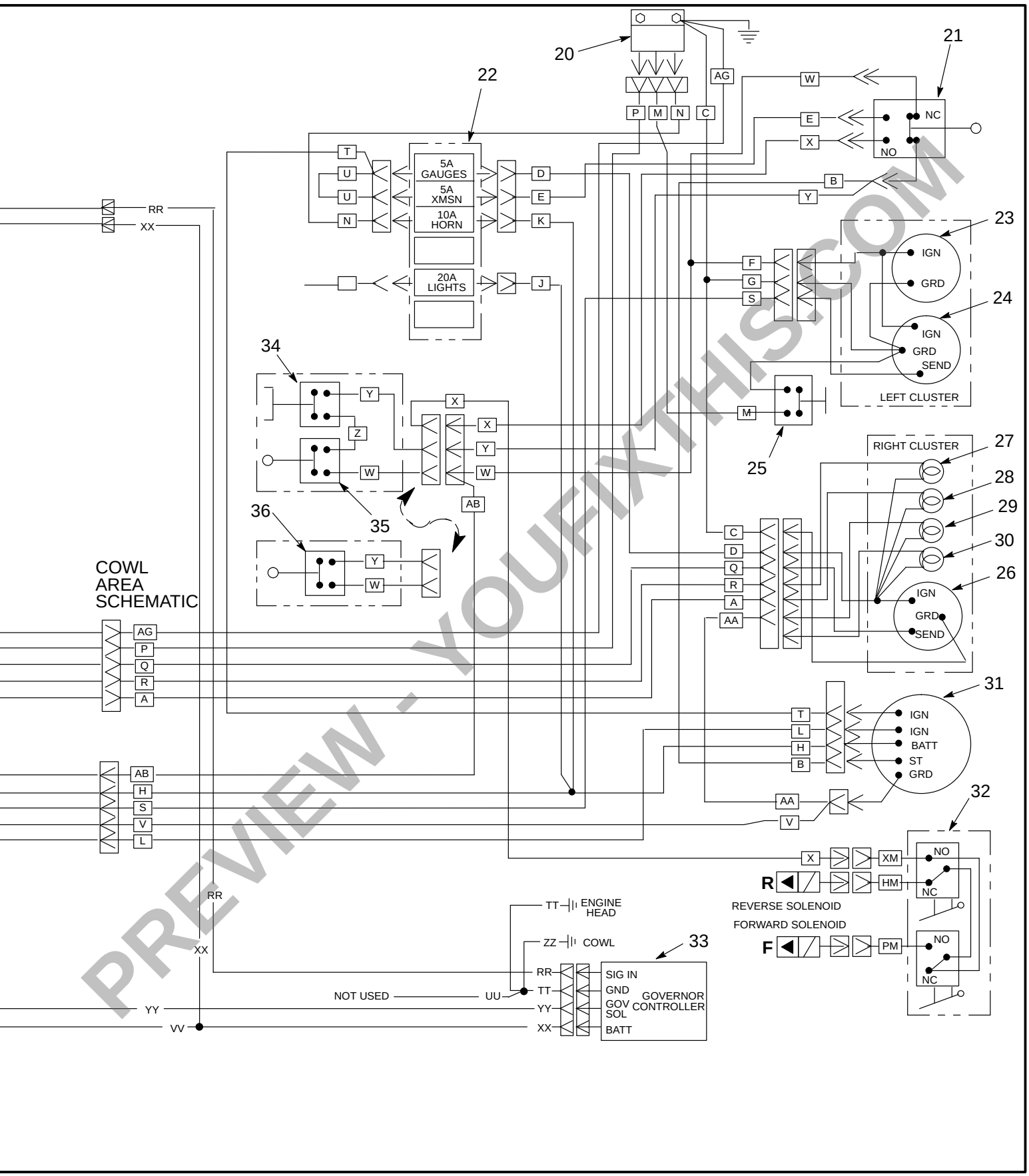
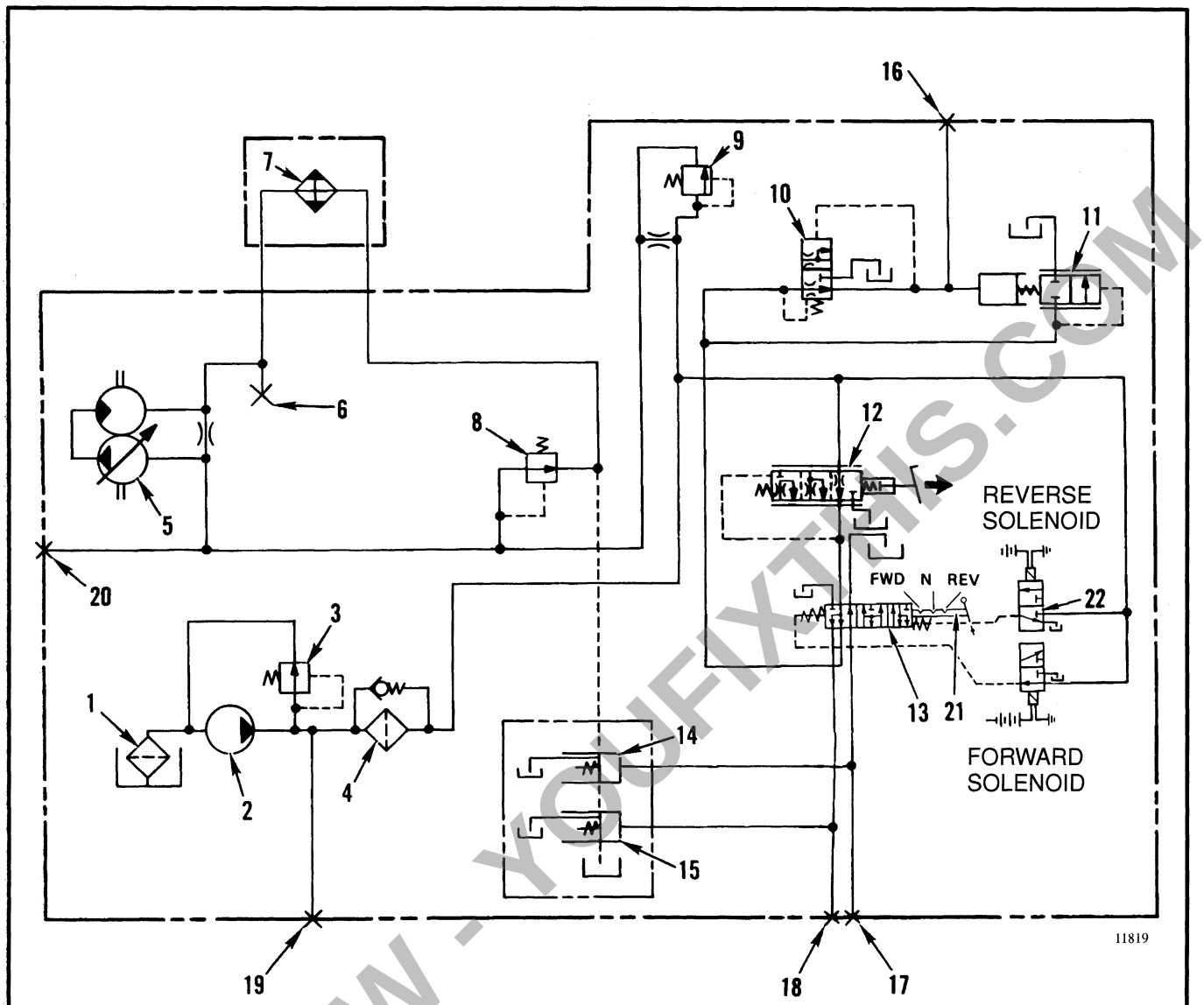


FIGURE 3. WIRE SCHEMATIC, GM 4–181 ENGINE, GASOLINE AND LPG (2 of 2)

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1. SCREEN
2. OIL PUMP
3. PUMP RELIEF VALVE
4. FILTER AND BY–PASS
5. TORQUE CONVERTER
6. COOLER RELIEF VALVE
7. OIL COOLER
8. TORQUE CONVERTER REGULATOR
9. CLUTCH REGULATOR
10. MODULATOR CONTROL VALVE
11. MODULATOR REGULATOR
12. INCHING SPOOL
13. DIRECTION SPOOL
14. REVERSE CLUTCH
15. FORWARD CLUTCH
16. CHECK PORT FOR MODULATOR PRESSURE
17. CHECK PORT FOR REVERSE CLUTCH PRESSURE
18. CHECK PORT FOR FORWARD CLUTCH PRESSURE
19. CHECK PORT FOR PUMP PRESSURE
20. CHECK PORT FOR CONVERTER PRESSURE
21. DIRECTION CONTROL LEVER OPTION
22. MONOTROL OPTION

FIGURE 17. FORWARD DRIVE (1 OF 2)

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TORQUE SPECIFICATIONS

ITEM	SPECIFICATION
DRIVE AXLE	
Back Plate to Axle Mount Capscrews	245 N.m (181 lbf ft)
Axle Mount to Frame Bolts and Nuts	
Tighten with bolt head	540 N.m (398 lbf ft)
Tighten with nut	475 N.m (350 lbf ft)
Axle Housing to Differential Housing Capscrews	38 N.m (28 lbf ft)
Axle to Hub	90 N.m (66 lbf ft)
Wheel Nuts	271 N.m (200 lbf ft)
STEERING AXLE	
Axle to Frame Bracket	88 N.m (65 lbf ft)
Spindle Cap, Lower	44 N.m (32 lbf ft)
Tie Rod to Spindle	163 N.m (120 lbf ft)
Cylinder Mount Capscrews	225 N.m (166 lbf ft)
BRAKES	
Back Plate to Axle Mount Capscrews (3)	245 N.m (181 lbf ft)
Back Plate to Axle Mount nuts (3)	110 N.m (80 lbf ft)
HYDRAULIC PUMP	
Adjustment Screw Acorn Nut	28 to 31 N.m (20 to 23 lbf ft)
Plug for Relief Valve	34 to 39 N.m (25 to 29 lbf ft
Plug for Regulator Valve	59 to 69 N m (43 to 51 lbf ft)
Capscrews for Body	46 to 49 N.m (34 to 36 lbf ft)
HYDRAULIC CONTROL VALVE	
Through Bolts	
5/16 in	19 N.m (14 lbf ft)
3/8 in	45 N.m (33 lbf ft)
TILT CYLINDERS	
Rod End capscrews	77 N.m (57 lbf ft)
MASTS	
Bolts, Hanger caps	165 N.m (122 lbf ft)

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2. Clean the surfaces and apply liquid sealant to the area where the transmission fastens to the differential housing.

3. Carefully install the engine and transmission into the lift truck. Make sure that the lines, hoses, linkage, wires, and cables are not damaged during the installation. Make sure that you have correct alignment at the differential housing and the mounts for the engine.

4. Install the capscrews that fasten the transmission to the differential housing. Tighten the capscrews to 38 N.m (28 lbf ft).

5. Install the clamp and parking brake cable at the bottom of the housing for the torque converter.

6. Clean the surfaces and apply liquid sealant to the areas where the axle shafts fasten to the hubs. Engage the axle shafts in the differential. Install the capscrews that hold the shafts in the hubs. Tighten the capscrews to 90 N.m (65 lbf ft).

7. Install the bolts, washers and nuts to connect the engine mounts at the frame. See FIGURE 7. Install the clamps and hoses on the bolt for the left–hand engine mount.

8. Install the exhaust pipe.

9. Connect the fuel line to the engine. See Removal of the Engine and Transmission, Step 11, as necessary. If the lift truck has an LPG fuel system, install the LPG tank and bracket after the counterweight is installed.

NOTE: Assemble fittings that have pipe threads with sealant for threads (Hyster Part Number 246108) on LPG fuel systems. Test for leaks with a solution of soap and water when pressure in the system is at least 620 kPa (90 psi).

10. Connect the clevis for the throttle cable at the pedal lever. Slide the throttle cable into the bracket in the frame and tighten the jam nut that holds the throttle cable to the bracket. Also connect the cable for the choke or the diesel STOP control as necessary.

11. Connect the electrical circuits between the engine and parts on the frame. See Removal of the Engine and Transmission, Step 9, as necessary.

12. **Lift Trucks with serial codes A187:** Connect the linkage at the transmission control valve.

Lift Trucks with serial codes B187 and C187: See FIGURE 6. Use the following procedure to install the master cylinder assembly:

a. Put the master cylinder assembly in position on the frame. Install the capscrews (7), washers and nuts that hold the bracket (8).

b. Install the brake lines if the lines were removed. Connect the brake lines (5) at the master cylinder (10). Connect the wires for the switch on the left–hand brake line, as necessary.

c. Connect the link for the inching spool at the pin (4) in the spool. Make sure that the spring washer is installed between the flat washer and the link.

d. Connect the rod (2) at the pin (3) on the inching/brake pedal.

e. Install the springs (1) between the bracket and the linkage for the brakes.

f. Check the adjustment of the inching/brake pedal and remove air from the brake system. See the section **THE BRAKE SYSTEM, 1800 SRM 458**.

13. Connect the lines and hoses for the hydraulic system. See Removal of the Engine and Transmission, Step 7, as necessary.

14. Install the radiator. (See RADIATOR AND COOLANT SYSTEM, Installation.) Remove the lift truck from the blocks.

15. Install the overhead guard. If there are electric wires in the legs of the overhead guard, make sure that the wires are not damaged when the overhead guard is installed.

16. Install the counterweight. See COUNTERWEIGHT, Installation.

17. Install the hood and seat. Fasten the hinges to the frame. Connect the gas controlled spring.

18. Check and adjust linkages and controls as necessary. Install the front panel for the engine compartment and the floor plates.

19. See the section **PERIODIC MAINTENANCE, 8000 SRM 259** for information on the engine coolant, engine oil, hydraulic oil and oil for the differential. Connect the battery cables when the repairs are complete. Connect the cable for the positive terminal first.

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TROUBLESHOOTING

PROBLEM	CAUSE
The engine will not start or the engine is difficult to start.	The vent in the fuel cap has a restriction. The air cleaner has a restriction. The fuel lines or the fuel filter has a restriction. The fuel pump is damaged The shut–off valve for the fuel is closed. The choke does not operate correctly. The carburetor is not adjusted correctly. There is no fuel in the fuel tank.
The smoke from the exhaust is black.	The choke does not open completely. The adjustment of the carburetor is not correct. The needle for the float has leaks. Dirt is in the needle of the float. The air cleaner has a restriction
The engine idle is not smooth.	The adjustment of the idle mixture is not correct. The carburetor has air leaks. The idle passages have restrictions. The throttle shaft is loose in the carburetor. The height of the float is not correct. The needle valve is worn. The float in the carburetor is partially filled with fuel.
The carburetor has leaks.	The fuel bowl has a crack. The gaskets have defects. The float in the carburetor is partially filled with fuel. The height of the float is not correct. The needle valve is worn.
The speed of the engine does not increase smoothly.	The operation of the accelerator pump is not correct. The height of the float is not correct. The air cleaner has a restriction The choke is not open completely. The carburetor has air leaks.
The idle speed and mixture adjustments will not remain correct.	The compensator valve is damaged.

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ENGINE SPECIFICATIONS

ENGINE	MAZDA M4–121G (A187 & B187)*	ISUZU C240 (A187 & B187)*
NUMBER OF CYLINDERS	4	4
FIRING ORDER	1–3–4–2	1–3–4–2
BORE AND STROKE	82 mm x 94 mm (3.23 in x 3.70 in)	86 mm x 102 mm (3.39 in x 4.02 in)
DISPLACEMENT	1985 cm^2 (121.1 in^2)	2369 cm^2 (144.5 in^2)
COMPRESSION RATIO	8.0:1 (A187)* 8.6:1 (B187)*	20.0:1
COMPRESSION PRESSURE	1075 kPa (156 psi) @ 200 rpm	3040 kPa (441 psi) @ 200 rpm
OIL PRESSURE	450 kPa (65 psi) Min. @ 3000 rpm	390 kPa (57 psi) Min. @ 1000 rpm
TIMING	13° BTDC @ 625 rpm	14° BTDC Static
IDLE SPEED	600 to 650 rpm	600 to 650 rpm
GOVERNOR SPEED (No Load)	2700–2800 rpm	2500 to 2600 rpm
STALL SPEED **	2000 to 2100 rpm (Gasoline) 1950 to 2050 rpm (LPG)	2100 to 2200 rpm
THERMOSTAT RANGE	75 to 78° C (167 to 172° F)	75 to 78° C (167 to 172° F)
COOLING SYSTEM PRESSURE	103 kPa (15psi)	103 kPa (15psi)
VALVE CLEARANCE Intake and Exhaust	0.3 mm (0.012 in) Hot	0.45 mm (0.018 in) Cold
FUEL INJECTOR PRESUURE	N/A	11.95 MPa (1706 psi)
FUEL INJECTION TIMING	N/A	14° BDTC

* Lift Truck Serial Number Codes

** Engines with 30 hours of operation or more

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ITEM NO.	ITEM	8 Hr./ Daily	250 Hr./ 6 wk.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
19	STEERING AXLE		L				Multi–Purpose Grease See NOTE 4
	S/H1.25–1.75XL (S/H25–35XL)						
	PIVOT PIN					1 Fitting	
	TIE RODS					4 Fittings	
	H2.00–3.00XL (H40–60XL)						
	PIVOT PIN					1 Fitting	
	TIE RODS					4 Fittings	
	KING PIN BEARINGS (UPPER AND LOWER)					2 Fittings	
	S2.00–3.00XL (S40–60XL)						
	KING PIN BEARINGS (LOWER)					2 Fittings	
	ENGINE SPEED		X			Adjust as Required	
	IDLE SPEED						
	Mazda & GM 4–153						600 to 650 rpm
	GM 4–181						550 to 600 rpm
	Isuzu C240						600 to 650 rpm
	Isuzu 4JB1						750 to 800 rpm
	GOVERNED SPEED						
	S/H1.25–1.75XL (all units) (S/H25–35XL)						2600 to 2700 rpm
	S2.00–3.00XL (S40–60XL)						
	Mazda 4–121G						2700 to 2800 rpm
	GM 4–181 and GM 4–153 (B187)						2550 to 2650 rpm
	GM 4–181 (C187)						2700 to 2800 rpm
	Isuzu C240						2500 to 2600 rpm
	H2.00–3.00XL (H40–60XL)						
	Mazda 4–121G						2900 to 3000 rpm
	GM 4–181						2700 to 2800 rpm
	Isuzu C240						2900 to 3000 rpm
	Isuzu 4JB1						2250 to 2350 rpm
	PCV VALVE, GM ENGINES			X	C	Replace as Necessary	See Parts Manual
20	DIFFERENTIAL OIL			X	C		SAE 80W–90, 85W–140
	S2.00–3.00XL (S40–60XL)					3.8 litre (4.0 qt)	
	H2.00–3.00XL (H40–60XL)					7.6 litre (8.0 qt)	
	TIMING			X		Adjust as Required	
	MAXDA 4–121G						Gasoline – 9° BTDC LPG – 18° BTDC at 625 rpm
	GM 4–153 only						8° BTDC at 600 rpm
	GM 4–181						Electronic Control
	ISUZU C240						14° BTDC Static
	ISUZU 4JB1						16° BTDC Static

X= Check C=Change L=Lubricate NOTE 4: Multi–Purpose Grease with 2 to 4% Molybdenum Disulfide.

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This section is for the following models:

Model	Serial Number Code
S1.25–1.75XL (S25–35XL)	B10 – Late Models
H1.25–1.75XL (H25–35XL)	C1 – Late Models
S2.00–3.00XL (S40–60XL)	A187, B187 & C187 – All Models
H2.00–3.00XL (H40–60XL)	A177 – Late Models
H2.00–3.00XL (H40–60XL)	B177 & C177 – All Models

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SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks.
- Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:



WARNING

Indicates a condition that can cause immediate death or injury!



CAUTION

Indicates a condition that can cause property damage!

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fully closed (two clicks). Also check that the hood touches the rubber bumpers. If additional adjustment is necessary, repeat Step d.

OVERHEAD GUARD

⚠ WARNING

Do not operate the lift truck without the overhead guard correctly fastened to the lift truck.

Changes that are made by welding, or by drilling holes that are too big in the wrong location, can reduce the strength of the overhead guard. See the instructions for "Changes to the Overhead Guard" in the PERIODIC MAINTENANCE section included with this lift truck.

Removal and Installation

Connect a crane or lifting device to remove or install the overhead guard. If the lift truck has an overhead exhaust, disconnect and remove the exhaust pipe assembly. Four bolts hold the overhead guard to the frame. The overhead guard is fastened to the cowl and the rear frame plate. Disconnect any electric wires from under the cowl that go through the legs of the overhead guard. When the overhead guard is lifted from the frame, make sure any electric wires are moved through the holes in the frame so that they are not damaged.

RADIATOR AND COOLANT SYSTEM

Removal

1. Drain the coolant from the radiator and the engine.

2. Remove the capscrews that hold the fan shroud to the radiator. Remove the four capscrews that fasten the fan to the hub and remove both the fan and the fan shroud.

3. Disconnect the coolant hoses at the radiator. Disconnect the lines to the oil cooler in the bottom of the radiator. Also disconnect these lines at the transmission housing. Put caps on the open lines and ports. Remove the two capscrews that still hold the radiator. Remove the radiator.

Installation

1. Install the radiator with the two capscrews that do not fasten the fan shroud. Connect the lines for transmission oil to the oil cooler in the radiator. Also connect these lines at the ports in the transmission housing. Connect the lower coolant hose to the radiator.

2. Install the fan and fan shroud in position on the radiator. Install the four capscrews that hold the fan shroud and the radiator to the frame. Install the capscrews that fasten the fan to the hub. Connect the upper coolant hose at the radiator.

OPERATOR RESTRAINT SYSTEM (See FIGURE 4. and FIGURE 5.)

The seat belt, hip restraint brackets, seat and mount, hood, latches and floor plates are all part of the operator restraint system. Each item must be checked to make sure it is fastened correctly, functions correctly and is in good condition.

The end of the seat belt must fasten correctly in the latch. Make sure the seat belt pulls from the retractor assembly and retracts smoothly. The seat belt must be in good condition. A seat belt that is damaged or worn will not give protection when it is needed. If the seat belt can not be pulled from the retractor assembly, remove the screw that keeps the cover on the retractor. Push the bar to release the spool. Straighten the belt so that it will pull and retract smoothly from the retractor assembly. See FIGURE 4.

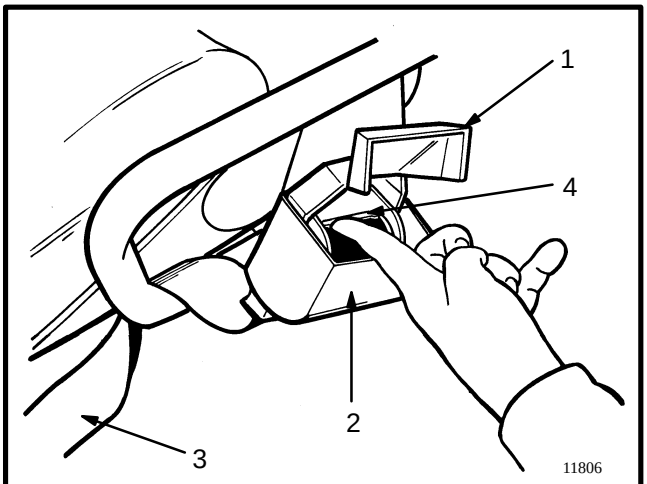


FIGURE 4. RELEASE A JAMMED SEAT BELT

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INTRODUCTION

GENERAL

This section has the description and repair procedures for the chain drive assembly for the hydraulic pump(s).

DESCRIPTION (See FIGURE 1. and FIGURE 2.)

The chain drive assembly transfers the power from the engine to the hydraulic pump for the hydraulic system. On H3.50–5.00XL (H70–110XL) units, the chain drive assembly also operates the hydraulic pump for the oil clutch system. The assembly has a drive sprocket, a leaf chain and a driven sprocket. The drive sprocket fastens directly to the engine crankshaft. The driven sprocket rotates on ball bearings. One bearing for the driven gear is installed in the flywheel housing. The other bearing for the driven gear is installed in the housing for the torque converter or the oil clutch. The leaf chain connects the two sprockets. Splines in the driven sprocket engage with the splines on the shafts of the pumps. Special blocks in the flywheel housing prevent oscillations of the chain.

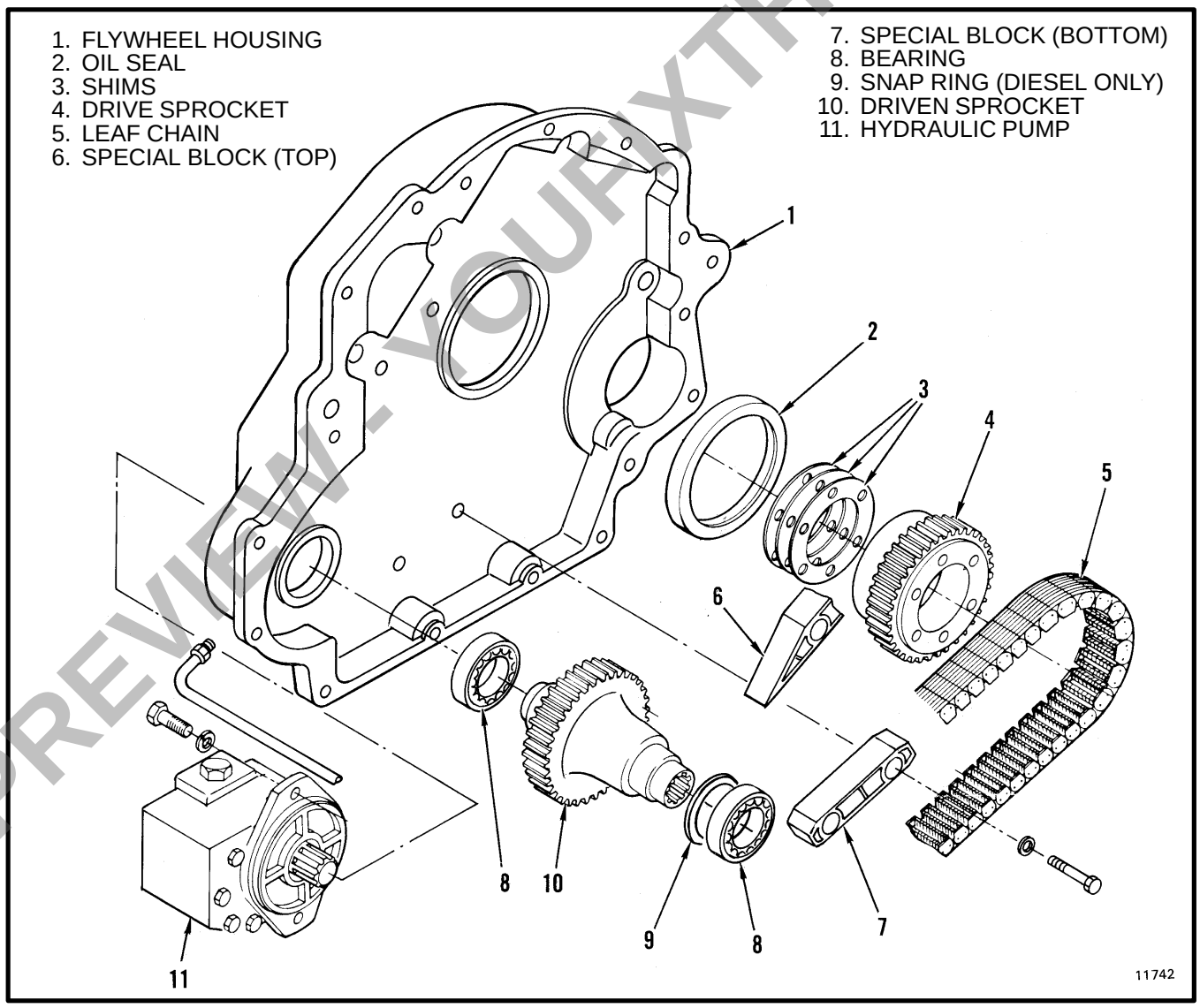


FIGURE 1. CHAIN DRIVE ASSEMBLY

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