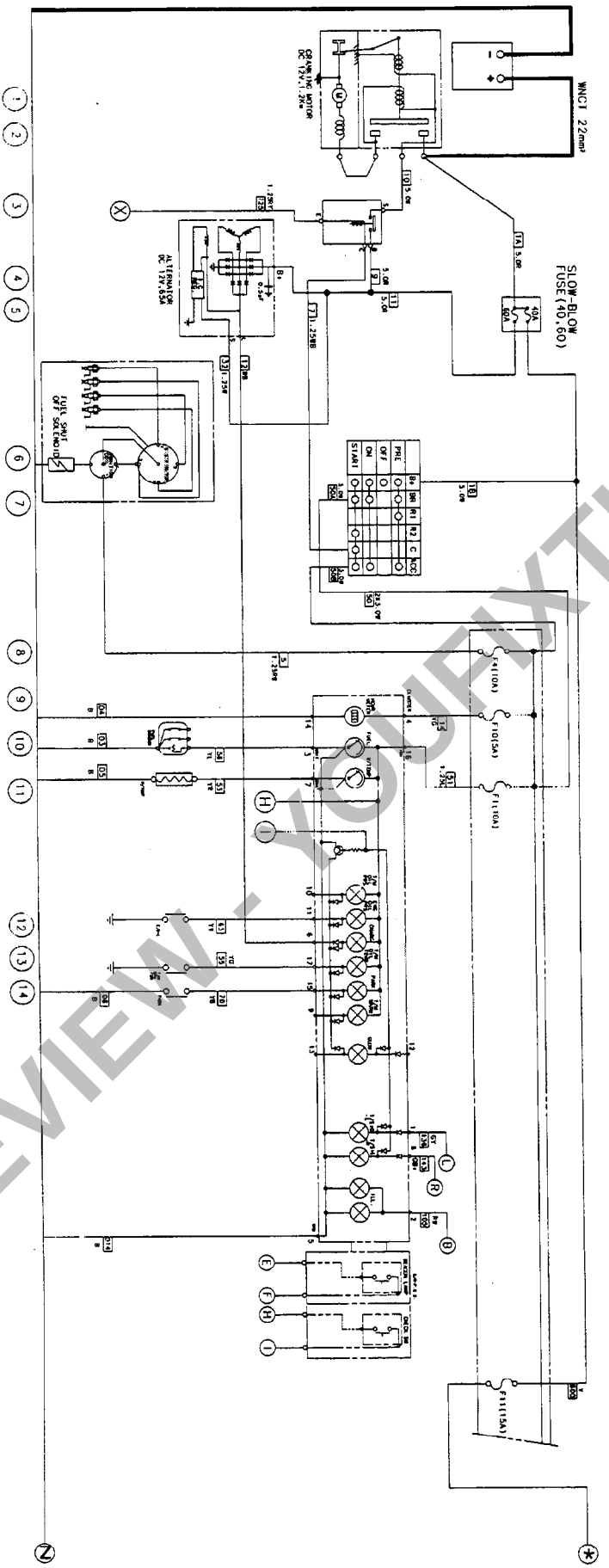
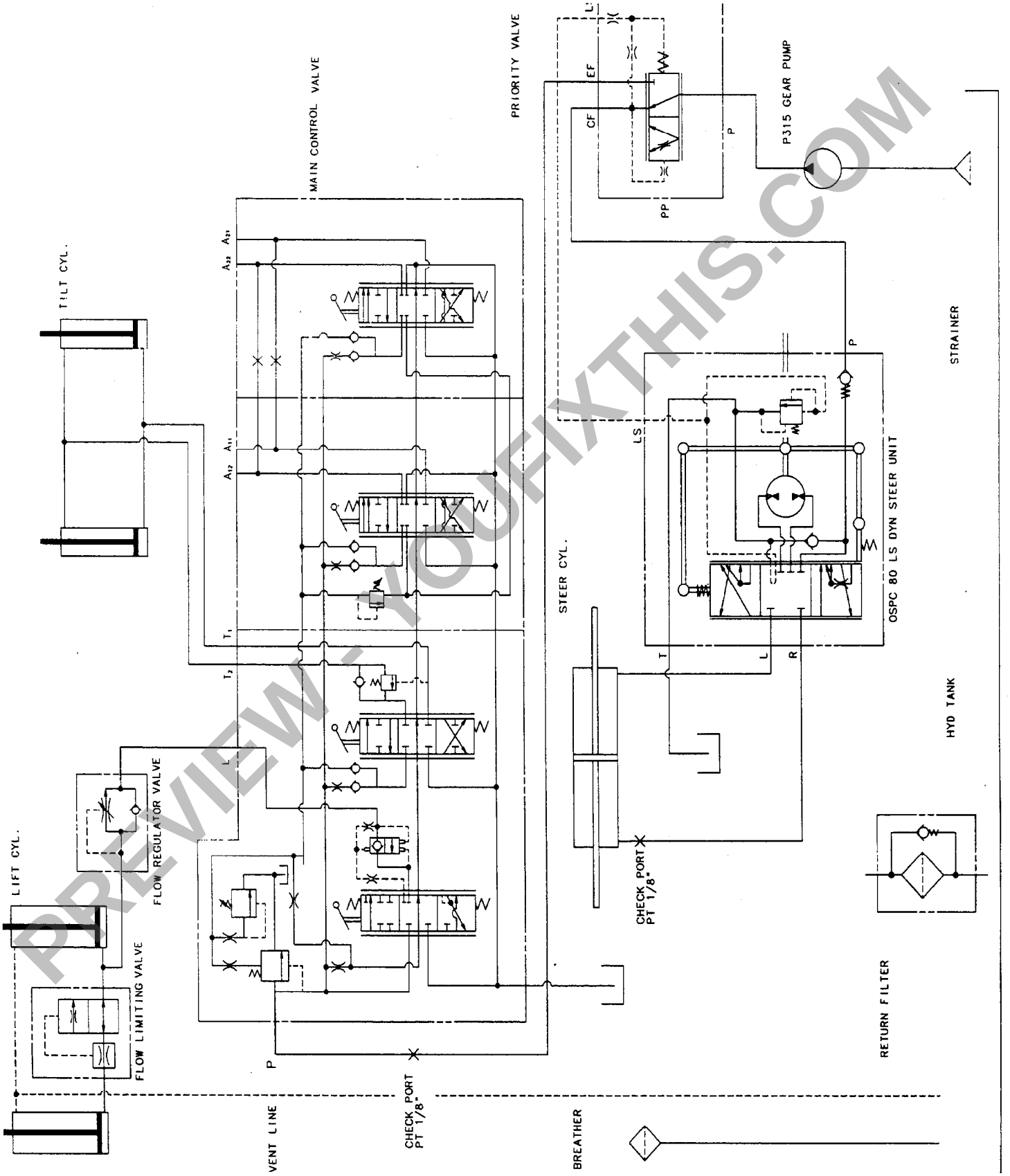


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Hydraulic Schematic



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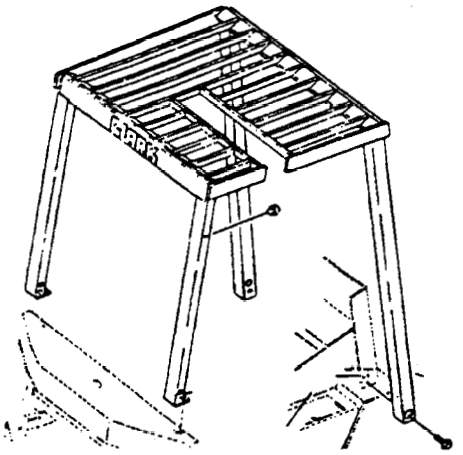
Critical Torque Specifications
CMP 15/18

Item		Unit	Specification
Bolt, mounting bracket, engine		kgf · m (lbf · ft)	13.1~16.1 (95~116)
Bolt, transaxle		kgf · m (lbf · ft)	12.1~14.7 (88~106)
Bolt, steering axle and silent block		kgf · m (lbf · ft)	25~30 (181~217)
Bolt, silent block		kgf · m (lbf · ft)	10.7~12.9 (77~93)
Bolt, parking brake lever		kgf · m (lbf · ft)	5.8~7.2 (42~52)
Nut, driving wheel		kgf · m (lbf · ft)	29.7~31 (215~225)
Nut, steering wheel		kgf · m (lbf · ft)	16~19.7 (116~142)
Bolt, clamping, rod end, tilt cylinder		kgf · m (lbf · ft)	18.4±1 (133±7)
Bolt, pin, tilt cylinder		kgf · m (lbf · ft)	4.9±0.5 (35±4)
Bolt, steering unit		kgf · m (lbf · ft)	4.2±0.4 (30±3)
Bolt, steering column		kgf · m (lbf · ft)	6.5±0.7 (47±5)
Nut, steering hand wheel		kgf · m (lbf · ft)	8.5±0.8 (61±6)
Bolt, counterweight		kgf · m (lbf · ft)	45~50 (325~362)
Bolt, lift cylinder mast		kgf · m (lbf · ft)	26.7±2.7 (193±20)
Bolt, mast stopper	Rubber	kgf · m (lbf · ft)	3.6 (26)
	Steel	kgf · m (lbf · ft)	26.7±2.7 (193±20)

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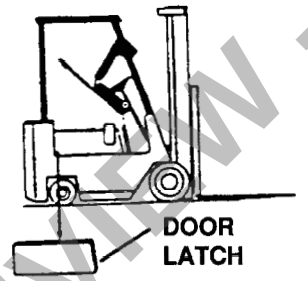
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1. Remove the overhead guard (OHG). Fasten a chain hoist of proper capacity to the top portion of the OHG and lift slightly to remove all chain slack.



Remove the two fasteners connecting the rear legs of the OHG to the counterweight. Then, remove the four fasteners (two per leg) connecting the front legs to the cowl. Lift the OHG off the truck and store in a safe place.

2 Open and remove the engine compartment side doors by lifting upward and off the pivot pins.

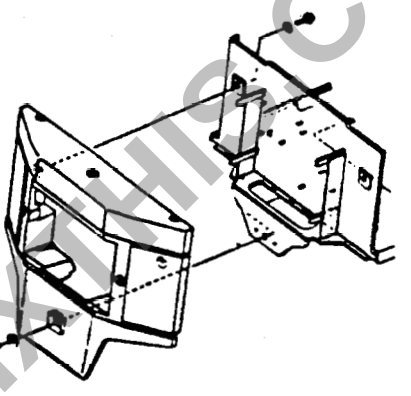


SIDE DOOR MAY BE REMOVED BY LIFTING DOOR AFTER OPEN

3. Remove the counterweight. First insert eyebolts into the holes provided in the top surface of the counterweight.

Connect a short length of chain of correct capacity between the eyes using bolts to connect the chain to the eyes. Connect the hook of a chain hoist to the lifting chain connecting the eyes and raise the hoisting chain slightly to remove all slack.

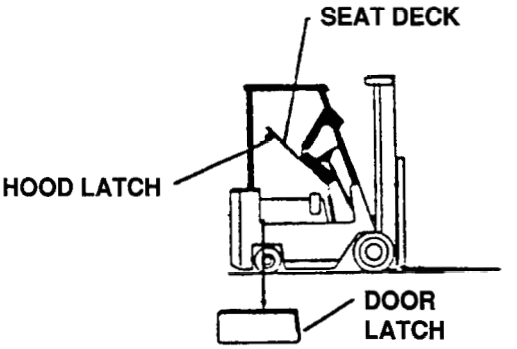
Remove the two fasteners at the lower end of thecounterweight (near the tow-pin). Remove the two fasteners attaching the counterweight to the frame stanchions in the engine compartment. NOTE - The counterweight rests on hooks on the frame which will normally hold the counterweight in position when these bolts are removed. Carefully lift and move the counterweight from the truck and store in a safe position.



4. Remove the seat deck and seat as an assembly. The seat deck is retained by two pivot pins and a gas assist(support) cylinder.

First lift the seat to the fully-raised position. Use a chain hoist or similar holding means to support the seat deck in this position. Remove the clips retaining the pivot pins. Remove the nut holding the gas cylinder to the seat deck and disconnect the gas cylinder.

Lift the seat deck off the truck and store in a safe position.



SIDE DOOR MAY BE REMOVED BY LIFTING DOOR AFTER OPEN

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Section 2.
Engine Troubleshooting

Also use the rpm, vacuum, and stall tests in Section 5 to analyze engine performance.

The following troubleshooting guide lists typical complaints or troubles encountered in routine operation of the 4G64 engine, and suggests possible remedies.

Engine hard to start or won't start

- Fuel system fault; see fuel system troubleshooting in Group 02.
- Ignition system fault; see ignition system troubleshooting in Group 12.
- Starter motor faulty; see electrical system troubleshooting in Group 14.
- Battery, ground, or wiring is faulty; see electrical system troubleshooting in Group 14.
- Engine oil is too viscous (heavy weight oil); change to lighter oil viscosity.
- Engine timing too advanced; adjust timing.
- Valves or valve seats worn and leaking; relap or replace valves.
- Intake manifold gasket leaking: replace gasket if necessary and retighten manifold nuts to correct torque.
- Cylinder head gasket leaking; replace head gasket and retighten cylinder head nuts to correct torque.
- Internal engine seizure; refer to engine overhaul procedures.
- Out of fuel.
- LPG tank shut off or improperly coupled.

Irregular idling

- Fuel system fault; see fuel system troubleshooting in Group 02.
- Spark plug gap is too wide; adjust.
- Cylinder head gasket leaking; replace head gasket.
- Valves not seating tight; relap valves.
- Excessive clearance between valve and guide; replace valves and valve guides.

Engine runs unevenly at high speed

- Fuel system fault; see fuel system troubleshooting in Group 02.
- Ignition system fault; see ignition system troubleshooting in Group 12.

Engine fires erratically

- Fuel system fault; see fuel system troubleshooting in Group 02.
- Ignition system fault; see ignition system troubleshooting in Group 12.
- Uneven compression or cylinder head problem:
  - Carbon deposits in combustion chamber; clean.
  - Cylinder head water passages clogged; clean.
  - Cylinder head gasket leaking; replace.
  - Cylinder head bolts not torqued properly; tighten per specification.
- Leaking intake gasket.
- Valves sticking; repair or replace valves.
- Valve springs weak or broken; replace valve springs

- Fuel system fault; see fuel system troubleshooting in Group 02.
- Ignition system fault; see ignition system troubleshoot.ing in Group 12.
- Sticking valves; repair.
- Broken or fatigued valve springs; repair or replace.

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Section 1.

Engine Specifications

General Information

The 4G6 series engine is a 4-cylinder overhead camshaft type power plant having a cast iron cylinder block, aluminum cylinder head and silent shafts. The forged steel crankshaft is supported by five bearings. The cylinder block is of siamese type which assures a superior cooling efficiency and uniform cooling of the cylinder.

Two silent shafts (countershafts) are built in the cylinder block for reducing the engine noise and vibration. This silent shaft system functions to cancel the vibromotive force in the vertical directions and such secondary vibromotive force as the vibromotive moment in the rolling directions. The silent shafts are provided on the upper left side and on the lower right side. The left-hand silent shaft rotates in the same direction as the crankshaft, while the right-hand silent shaft rotates opposite to the other, each at twice the crankshaft speed. Each silent shaft is supported by two bearings.

The piston is an aluminum alloy casting with two compression rings and one three-piece type oil ring in its grooves. The piston pin is floating with respect to the piston, and press-fitted into the forged steel connecting rod. The piston pin is offset toward the thrust side from the center of the piston.

The intake and exhaust valves are mode of heat-resistant steel and arranged in a "V" with the camshaft on center.

The cast iron camshaft is supported by five bearings. It is driven by crankshaft sprocket and camshaft sprocket via the timing belt.

The distributor driving gear and fuel pump driving eccentric cam are provided on the front section (sprocket side) of the camshaft and between the 3rd and 4th journals, respectively.

The camshaft is driven by a cogged type belt (timing belt), which is properly tensioned by a tensioner provided on its slack side to assure quite operation at all times.

The rocker arm is an aluminum alloy casting with wear-resistant hard metal slipper. The same design is used for both the intake valve and exhaust valve rocker arms. Use of an auto lash adjuster (some engine models are not provided with adjuster) eliminates the need for adjusting clearances of the intake and exhaust valves of the rocker arm.

General Specifications

Engine Type:
CMP 15/18 Trucks: Mitsubishi 4G63
CMP 20/30 Trucks: Mitsubishi 4G64
Both engines have in-line, overhead valve and single overhead camshaft.

Number Of Cylinders: 4

Combustion Chamber: Semi-spherical

Total Displacement::
4G63 Engine: 1997 cu cm (121.8 cu in)
4G64 Engine: 2350 cu cm (143.4 cu in)

Cylinder Bore:
4G63 Engine: 85.0 mm (3.35 in)
4G64 Engine: 86.5 mm (3.4 in)

Piston Stroke:
4G63 Engine: 88.0 mm (3.46 in)
4G64 Engine: 100 mm (3.9 in)

Compression Ratio: 8.5 for 4G63; 8.6 for 4G64

Cylinder Compression: 1880 kPa (163.5 psi) at 300 rpm

Valve timing:

Camshaft Identification	(D)		
Intake valve	Open	12°	BTDC
	Close	40°	ABDC
Exhaust valve	Open	54°	BBDC
	Close	6°	ATDC

Fuel: LPG for CMP 15/18/20/25/30. Gas and LPG for CMP 20/25/30

Lubrication System: Pressure feed, full-flow filtration

Oil Pump Type: Involute gear type

Engine Oil: 10W30, API, CC, CD/SG, SF engine oil

Sump Capacity: 4.0 L (4.2 qt) for 4G63; 5.0 L (5.3 qt) for 4G64

Cooling System: Water-cooled circulation

Water Pump Type: Centrifugal impeller type

Tune-Up Specifications

Tune-up specifications are listed in the engine tune-up Section of this Group.

Overhaul Specifications

Overhaul specifications are listed in the engine overhaul Section of this Group.

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Recommended Periodic Service Schedule

This chart lists maintenance tasks that should be done periodically and the suggested time intervals. Refer to Operator's Manual for **Daily Checks**.

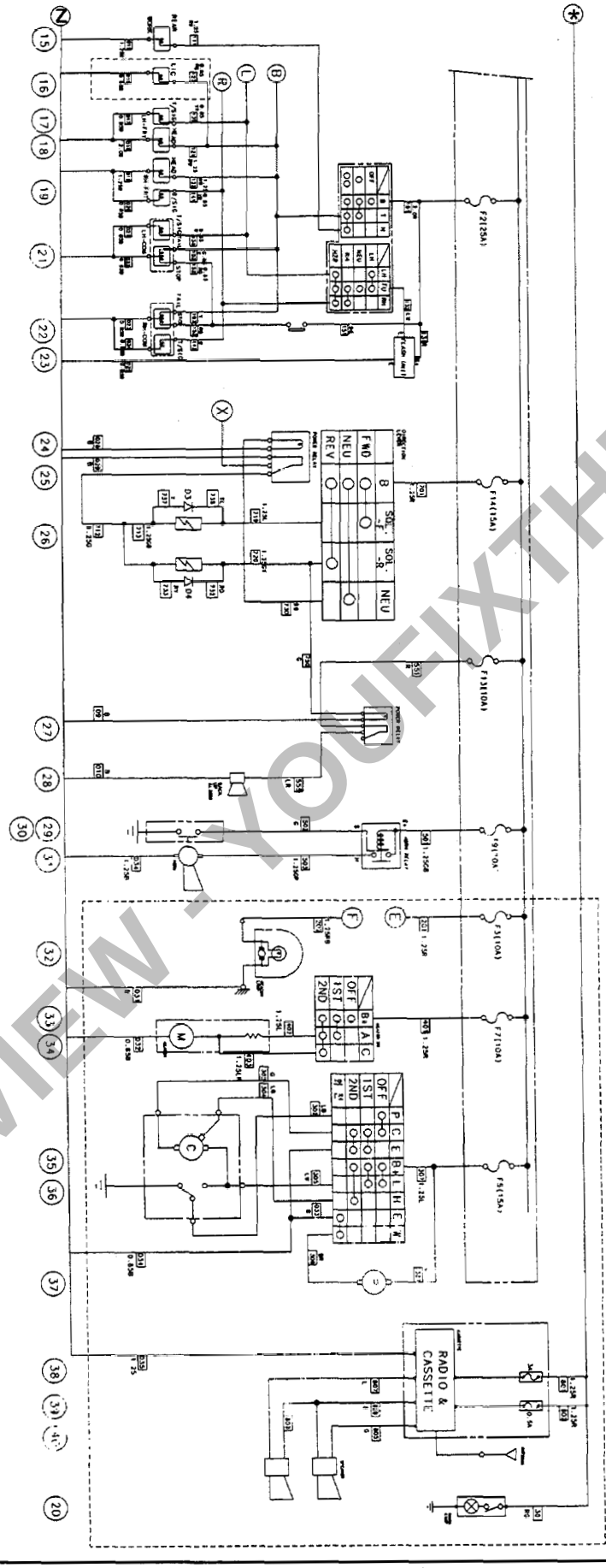
No.	Items \ Period	First month First 200 hours	Every 1 month Every 200 hours	Every 3 months Every 500 hours	Every 6 months Every 1000 hours	Every 12 months Every 2000 hours
Engine system						
1. Inspection and adjustment (or replacement)						
1)	Intake/Exhaust valve clearance	○		○		
2)	Belt tension	○	○			
3)	Cylinder head bolts and manifold nuts	○		○		
★4)	Fuel strainer (Filter)	○		○		
5)	Idling speed	○	○			
6)	Electrolyte specific gravity (Battery)				○	
7)	Starting motor and alternator				○	
8)						
9)						
10)						
11)						
12)						
2. Cleaning						
★1)	Radiator exterior (Fins)			○		
★2)	Fuel strainer (Filter) element	○		○		
★3)	Air cleaner element	○	○			
4)	Fuel tank interior					○
5)	Cooling system interior (Radiator)				○	
3. Replacement						
★1)	Engine oil	○	○			
★2)	Engine oil filter	○	○			
★3)	Coolant				○	
★4)	Air cleaner element			○		

*** If you operate the fork lift in a dusty environment, "★" marked items must be checked more frequently.**

NOTE: Oil change interval may be determined by laboratory analysis

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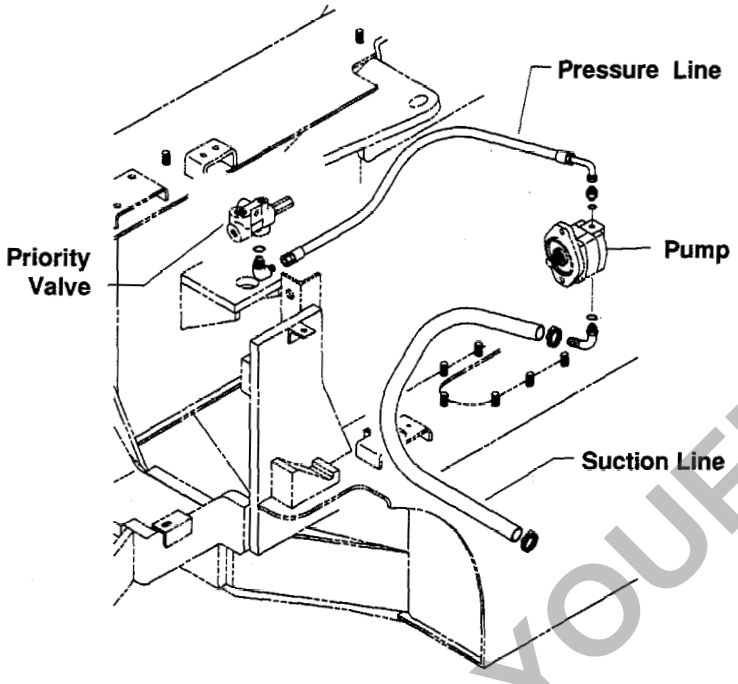
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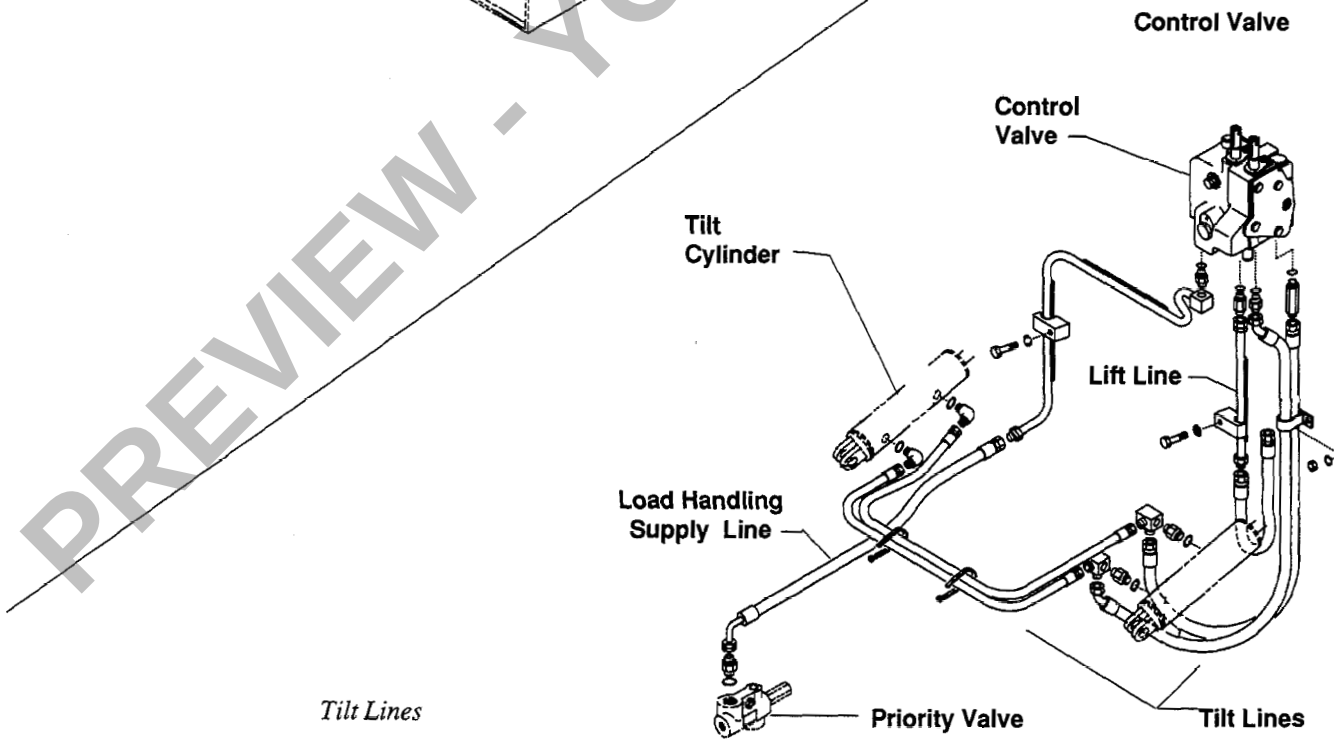
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Hydraulic Lines



Pump Lines



Tilt Lines

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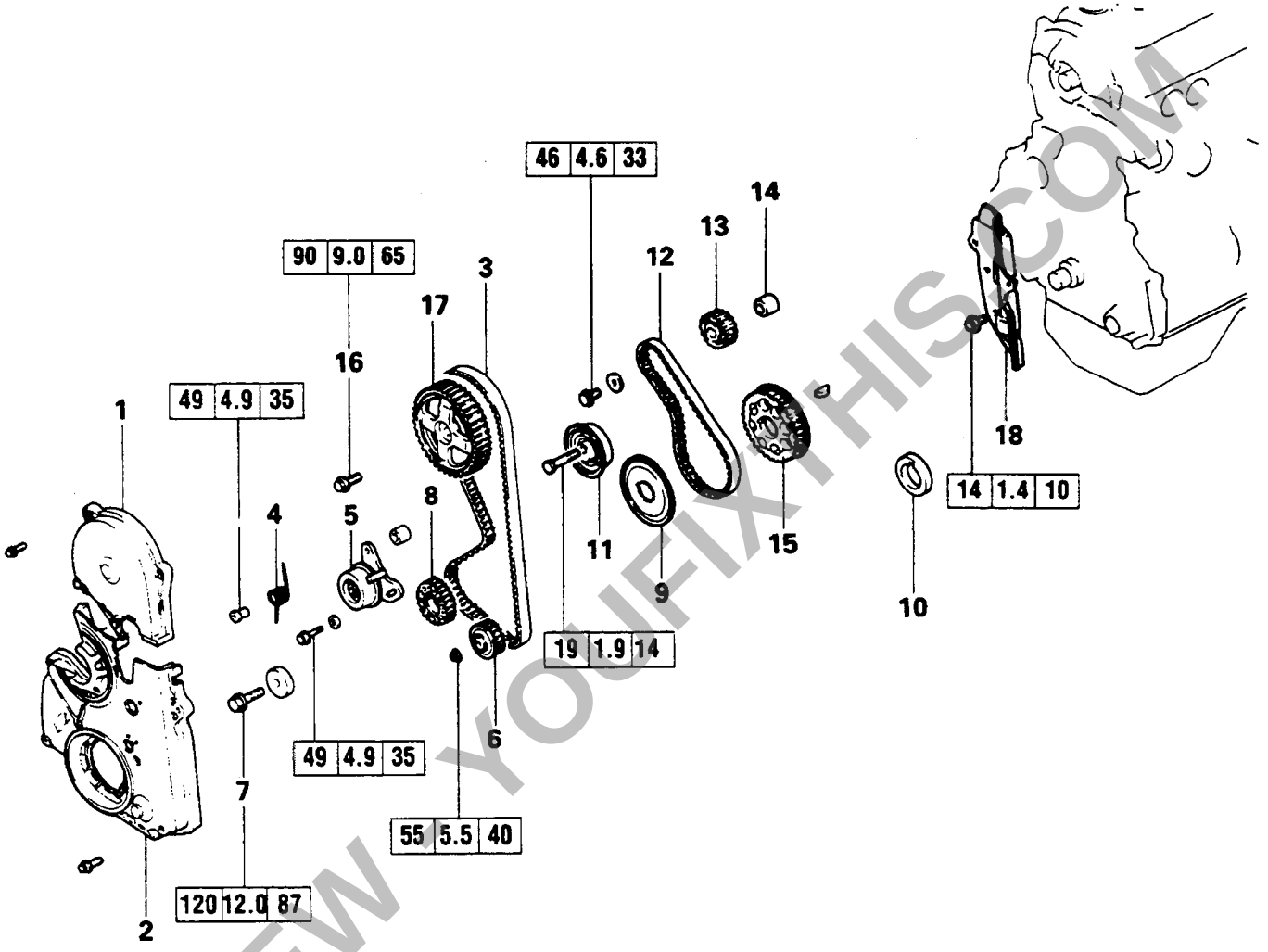
CMP 20/30

Item		Unit	Specification
Bolt, mounting bracket, engine		kgf · m (lbf · ft)	14~15 (101-108)
Bolt, transaxle		kgf · m (lbf · ft)	45~50 (325~362)
Bolt, steering axle and silent block		kgf · m (lbf · ft)	25~30 (181~217)
Bolt, silent block		kgf · m (lbf · ft)	10.7~12.9 (77~93)
Bolt, parking brake lever		kgf · m (lbf · ft)	5.8~7.2 (42~52)
Nut, driving wheel		kgf · m (lbf · ft)	65-73 (470~528)
Nut, steering wheel		kgf · m (lbf · ft)	16.0~19.7 (116~142)
Bolt, clamping, rod end, tilt cylinder		kgf · m (lbf · ft)	18.4±1 (133±7)
Bolt, pin, tilt cylinder		kgf · m (lbf · ft)	4.9±0.5 (35±4)
Bolt, steering unit		kgf · m (lbf · ft)	4.2±0.4 (30±3)
Bolt, steering column		kgf · m (lbf · ft)	6.5±0.7 (47±5)
Nut, steering hand wheel		kgf · m (lbf · ft)	8.5±0.8 (61±6)
Bolt, counterweight		kgf · m (lbf · ft)	45~50 (325~362)
Bolt, overhead guard		kgf · m (lbf · ft)	9.4~11.4 (68-82)
Bolt, side roller, carriage		kgf · m (lbf · ft)	6.5±0.7 (47±5)
Bolt, lift cylinder, mast		kgf · m (lbf · ft)	26.7±2.7(193±20)
Bolt, stopper, mast	Rubber	kgf · m (lbf · ft)	36 (26)
	Steel	kgf · m (lbf · ft)	26.7±2.7 (193±20)

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Timing Belt



Removal and installation steps

		1.	Timing belt front upper cover
		2.	Timing belt front lower cover
◇A◇	◆N◆	3.	Timing belt
	◆K◆	4.	Tensioner spring
	◆K◆	5.	Tensioner pulley
◇D◇	◆J◆	6.	Oil pump sprocket
◇E◇	◆I◆	7.	Crankshaft bolt
◇F◇		8.	Crankshaft sprocket
		9.	Flange
		10.	Spacer
		11.	Tensioner " B"
◇G◇	◆H◆	12.	Timing belt "B"
◇H◇	◆G◆	13.	Silent shaft sprocket
	◆F◆	14.	Spacer
◇I◇		15.	Crankshaft sprocket "B"
◇J◇	◆A◆	16.	Camshaft sprocket bolt
		17.	Camshaft sprocket
		18.	Timing belt rear cover

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3) Check the service brake and inching pedal for correct adjustment and travel. Be sure the pedal moves freely and returns fully.

4) Be sure that all components of the cooling system™ are in good condition and operating correctly. The radiator must be clean to maintain the proper cooling and operating temperatures for the engine and transmission. Air clean the radiator and transmission cooler, if necessary.

5) The engine must be operating correctly. Be sure that it is correctly tuned and adjusted to the correct idle and maximum no-load governed speed specifications.

4. Hydraulic Check - Also, before checking the transmission clutches, torque converter, charging pump and hydraulic circuit for pressure and rate of oil flow, it is important to make the following transmission fluid check:

1) Check oil level in the transmission (transaxle). The transmission fluid must be at the correct (full) level. All clutches and the converter and its fluid circuit lines must be fully charged (filled) at all times. See NOTE below.

NOTE

The transmission fluid must be at operating temperature of [82-93 °C] 180-200 °F to obtain correct fluid level and pressure readings. DO NOT ATTEMPT TO MAKE THESE CHECKS WITH COLD OIL.

To raise the oil temperature to this specification it is necessary to either operate (work) the truck, or run the engine with the converter at "stall".

Be careful that the truck does not move unexpectedly when operating the engine and converter at stall rpm.

Converter Stall Procedure

1. Put the truck against a solid barrier, such as a wall, and/or apply the parking brake and block the wheels.
2. Put the directional control lever in FORWARD (or REVERSE, as applicable).
3. Put the speed control lever in "2" (HIGH), if 2-speed transmission.
4. With the engine running, slowly increase engine speed to approximately one-half throttle (1200-1500 rpm) and hold until transmission (converter outlet) oil temperature reaches the operating range.

IMPORTANT

DO NOT OPERATE THE CONVERTER AT STALL CONDITION LONGER THAN NECESSARY TO REACH THE DESIRED TEMPERATURE. EXCESSIVE TEMPERATURE ([120 °C] 250°F MAX.) WILL OVERHEAT THE CONVERTER AND CAUSE DAMAGE TO TRANSMISSION CLUTCHES AND FLUID.

Diagnostic Guide

Refer to the following troubleshooting guide for the diagnosis of typical transmission troubles.

Low Clutch Pressure

1. Low fluid level.
2. Clutch pressure regulating valve spool stuck open.
3. Defective or worn charging pump.
4. Broken or worn clutch shaft or piston sealing rings.
5. Clutch piston bleed valve stuck open. (Range clutches only.)
6. Accumulator piston rings worn or broken.

Low Converter Out Pressure - Low Charging Pump Output

1. Low fluid level.
2. Suction screen has restriction.
3. Defective or worn charging pump.

Overheating - Unit Getting Too Hot

1. Low fluid level.
2. Worn charging pump.
3. Worn oil sealing rings.
4. Dirty oil cooler.
5. Restriction in cooler line.

Noise In Converter

1. Defective converter.

Loss of Power

1. Low engine RPM at converter stall. Tune engine.
2. Overheating - See above items.

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