CAT® Lift Trucks

Service Manual

6M60-TL Diesel Engine

For use with the P17500-P36000,
DP80N-DP160N Service Manuals.

99709-61100

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6M6

(for industrial use)

Shop Manual

diesel engine

FOREWORD

This Shop Manual is published for the information and guidance of personnel responsible for maintenance of the Mitsubishi 6M60-TL series diesel engine, and includes procedures for adjustment and maintenance services.

We earnestly look forward to seeing that this manual is made full use of in order to perform correct services with no wastage.

For more details, please consult your nearest authorized Cat® lift truck dealer.

Kindly note that the specifications and maintenance service figures are subject to change without prior notice in line with improvement which will be effected from time to time in the future.

SEPTEMBER 2006

Applicable models
6M60-TL

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GROUP 00 GENERAL

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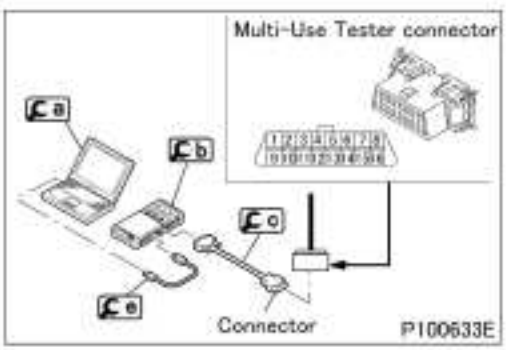
NOTE:
The Multi-Use tester tool will not be used to service the 6M60-TL diesel engine at this time. Please disregard the Multi-Use Tester information. Diagnozer 2.41 or later software must be used to service the 6M60-TL diesel engine.

1. Using Multi-Use Tester

1.1 Connecting Multi-Use Tester

Special tools

Mark	Tool name and shape	Part No.	Application
a	PC  P57295	FMSI-E06-1 (Multi-Use Tester-III version)	Data transmission to/from V.C.I.
b	V.C.I.  P57296	N/A	Data transmission between electronic control unit and PC
c	Multi-Use Tester harness A  P57297	MH062928	Power supply to V.C.I. and communication with electronic control unit
d	Multi-Use Tester test harness D (used for extension)  P57299	MH062931 (1 m) MH062951 (2 m)	Multi-Use Tester test harness A extension
e	USB cable  P57300	MB991827	Communication between V.C.I. and PC



- Move the starter switch to the LOCK position.
- Connect a, b, c and e as illustrated.
- Connect the Multi-Use Tester connector on the vehicle with the connector of c.

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SPECIFICATIONS

Item			Specifications
Supply pump	Manufacturer		DENSO
	Control system		Electronically-controlled pump
	Type		HP-4
	Feed pump type		Trochoid pump
Common rail system	Manufacturer		DENSO
	Common rail capacity	cm^3 {mL}	26 {26}
	Pressure limiter valve opening pressure	MPa {kgf/cm^2}	221 ± 9 {2253 ± 91.8}
	Common rail pressure sensor supply voltage	V	5
Injector	Manufacturer		DENSO
	Control system		Electronically controlled
	Maximum injection pressure	MPa {kgf/cm^2}	155 {1580}

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● Disassembly sequence

1 Lock washer
2 Compressor gear
3 Cylinder head
4 Gasket
5 Valve seat
6 O-ring
7 Cylinder liner
8 O-ring
9 1st compression ring
10 2nd compression ring
11 3rd compression ring
12 Oil ring
13 Snap ring
14 Piston pin
15 Piston
16 Coupling
17 Bearing cover
18 Bearing
19 Connecting rod
20 Crankshaft
21 Crankcase

Ⓟ: Locating pin
Ⓝ: Non-reusable parts

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards (Unit: mm)

Location	Maintenance item		Standard value	Limit	Remedy
7, 15	Clearance between cylinder liner and piston	Top	–	0.30	Replace
		Skirt	–	0.20	
9 to 12	Piston ring end gap (measured with ring placed in cylinder)	Compression ring	–	0.60	Replace
		Oil ring	–	0.65	
9 to 12, 15	Clearance between piston ring and piston groove	Compression ring	–	0.07	Replace
		Oil ring	–	0.075	
14, 15	Clearance between piston pin and piston		–	0.07	Replace
14, 19	Clearance between piston pin and connecting rod small end		–	0.07	Replace
19	End play of connecting rod		–	1.5	Replace
19, 20	Clearance between connecting rod big end and crankshaft		–	0.1	Replace
20	Crankshaft end play		–	0.7	Replace
20, 21	Clearance between crankshaft and crankcase bushing inside diameter		–	0.2	Replace

Tightening torque (Unit: N·m {ft.lbs, kgf·m})

Mark	Parts to be tightened	Tightening torque	Remarks
Ⓣa	Nut (compressor gear mounting)	167 to 186 {17 to 19}	–
Ⓣb	Bolt (cylinder head mounting)	29 to 34 {3.0 to 3.5}	–
Ⓣc	Bolt (cylinder liner mounting)	25 to 29 {2.5 to 3.0}	–
Ⓣd	Bolt (coupling mounting)	53 to 65 {5.4 to 6.6}	–
Ⓣe	Nut (bearing cover mounting)	8.8 to 10.8 {0.9 to 1.1}	–
Ⓣf	Stud bolt	5.9 to 12 {0.6 to 1.2}	–

Special tools

Mark	Tool name and shape	Part No.	Application
Ⓢa	Piston ring tool  01732	MH060014	Removal and installation of compression rings

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