CAT® Lift Trucks

Service Manual

TB45 Gasoline Engine

For use with GP40K-GP50K Chassis Service Manual 99789-86100

MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

ENGINE GENERAL

SECTION EG

EC

CONTENTS

PRECAUTIONS FOR SAFETY AND QUALITY EG-2
- Safe Operation EG-2
- Correct Operation EG-3
- Precautions for Radio Equipment Installation EG-3

HOW TO USE THIS MANUAL EG-4
- Description EG-4
- Definition of Terms EG-4
- Definition of Units EG-4
- Description EG-5
- Component Parts Location EG-5

TROUBLE DIAGNOSIS EG-7
- ECM Trouble Diagnosis EG-7
- ECM Abbreviations List EG-10

ECM GENERAL SERVICE INFORMATION EG-11
- Connector Terminal Inspection EG-11
- Inspection for Electrical System EG-12
- Control Unit and Electronic Component EG-13
- ST EG-14

PRECAUTIONS EG-15
- Precautions in Draining Engine Coolant EG-15
- Precautions for Disconnecting Fuel Piping .. EG-15
- Precautions for Removing and Disassembling EG-15
- Precautions for Inspection, Correction, and Replacement EG-15
- Precautions for Assembly and Installation ... EG-15
- Caution for Use of Power Tools EG-16
- Precautions for Liquid Gasket Application ... EG-16
- Parts Requiring Angle Tightening EG-17

PREPARATION EG-18
- Service Tools EG-18
- Service Parts EG-20

SERVICE DATA EG-21
- Periodical Inspection EG-21
- Standard, Repair Limit EG-23
- Tightening Torque EG-24

MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

ENGINE TUNE-UP

SECTION ET

ET

CONTENTS

VALVE CLEARANCE **ET-2**
- Inspection ET-2
- Adjustment ET-3

ENGINE DRIVE BELT **ET-4**
- Inspection ET-4
- Belt Tension Adjustment ET-4

ENGINE OIL **ET-5**
- Engine Oil Inspection ET-5
- Engine Oil Replacement ET-6
- Oil Filter Replacement ET-7

COMPRESSION PRESSURE **ET-9**

SPARK PLUG **ET-10**
- Removal and Installation ET-10
- Inspection After Removal ET-10

MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

ENGINE MECHANICAL

SECTION EM

CONTENTS

INTAKE MANIFOLD EM-2
- Component Parts Location EM-2
- Removal and Installation of Intake Manifold ... EM-3
- Removal and Installation of Air Horn Bolt EM-3
- Inspection EM-3

EXHAUST MANIFOLD EM-4
- Component Parts Location EM-4
- Removal and Installation EM-4

OIL PAN AND OIL STRAINER EM-5
- Component Parts Location EM-5
- Removal and Installation EM-5

ROCKER COVER EM-7
- Component Parts Location EM-7
- Removal and Installation EM-7

ROCKER ARM AND ROCKER SHAFT ASSEMBLY EM-8
- Component Parts Location EM-8
- Removal and Installation EM-8
- Disassembly and Assembly EM-9
- Inspection EM-9

CYLINDER HEAD EM-11
- Component Parts Location EM-11
- Removal and Installation of Cylinder Head Assembly EM-11
- Cylinder Head Assembly EM-14

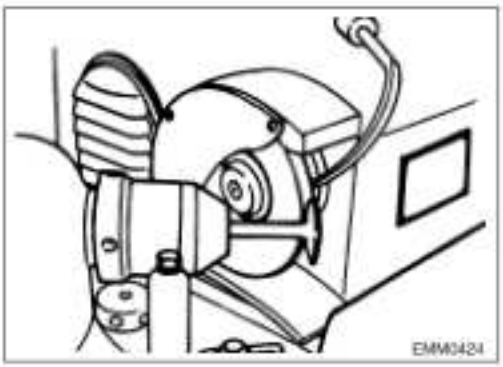
TIMING CHAIN EM-19
- Component Parts Location EM-19
- Removal EM-19
- Installation EM-22

REMOVAL AND INSTALLATION OF ENGINE EM-26
- Removal EM-26
- Installation EM-28
- Inspection EM-28

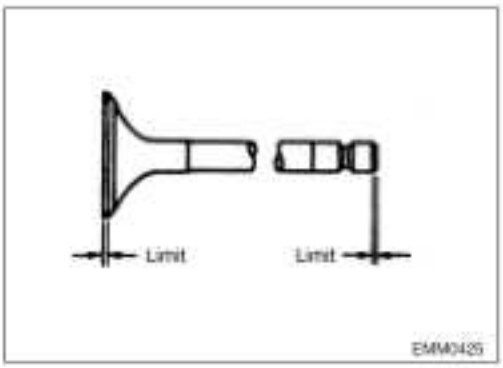
CYLINDER BLOCK EM-29
- Component Parts Location EM-29
- Disassembly EM-29
- Selective-Fit Service Parts EM-33
- Inspection After Disassembly EM-33
- Assembly EM-46

MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

Cylinder Head Assembly (Cont'd)



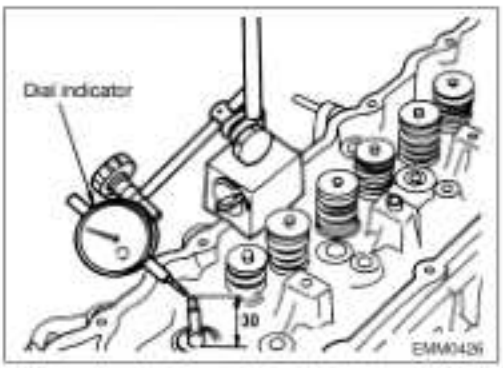
- Stem edge surface is corrected using oilstone.
- Keep corrections to a minimum due to surface reduction. Replace if outside the repair limit.



CORRECTION REPAIR LIMIT

Face correction length:
Intake valve:
0.5 mm (0.020 in) or less
Exhaust valve:
0.5 mm (0.020 in) or less
Stem edge surface correction length:
Intake valve:
0.2 (0.008 in)
Exhaust valve:
0.2 (0.008 in)

3. Valve guide clearance

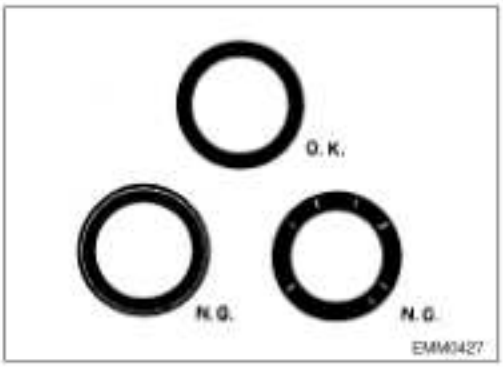


- Check before removing the valve guide.
- Make sure the valve stem diameter is within the standard. Refer to "Valve direction inspection (previous page)".
- Push the valve out toward the combustion chamber. Measure runout while pushing the stem edge surface toward the dial indicator.
- 1/2 of the dial indicator reading is the valve guide clearance.

Standard:
Intake:
0.020 - 0.053 mm (0.0008 - 0.0021 in)
Exhaust:
0.040 - 0.073 mm (0.0016 - 0.0737 mm)
Repair limit:
Intake:
0.1 mm (0.004 in)
Exhaust:
0.1 mm (0.004 in)

- Replace cylinder head if it exceeds the limit.

4. Valve seat contact



- This inspection must be done after ensuring that the dimensions of the valve guide and the valve are within the standard.This inspection must be done after ensuring that the dimensions of the valve guide and the valve are within the standard.
- Check valve contact by applying red lead to valve seat contact surface.
- Make sure that contact surfaces are connected all around.
- Reseat the valve and check again if seating condition is not correct. Replace cylinder head if seating condition cannot be corrected by reseating.

MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

Diagnosis Chart by Symptom

TB45 ENGINE RELATIONSHIP BETWEEN MALFUNCTIONING SYMPTOMS AND THE SENSOR CIRCUIT

- The table below shows the possible symptoms caused by the malfunction of each sensor circuit.

Actuator malfunction ⊕ : Highly possible ♦ : Possible		Symptoms	Impossible to start		Impossible to start		Poor idle					Poor driving control								Engine stall				Other		Check that symptoms are detected with self-diagnosis.	Check that symptoms are in fail-safe condition.	Description/notable characteristics of the symptom
			No initial combustion	Initial combustion	When engine is cold	When engine is warming up	Fast idle is not effective	High idle rpm	Low idle rpm	Inconsistent idle when engine is cold	Inconsistent idle when warming up	Poor power output	Poor acceleration	Engine rpm does not increase smoothly	During surge and acceleration	During surge and constant speed drive	Knocking	Backfire	After-burn	At idle	Driving	During deceleration	During a heavy load	Overheat	Poor fuel			
Crankshaft position sensor (POS, PHASE)		OPEN	⊕																	⊕	⊕	⊕	⊕			♦		• An open circuit in either POS or PHASE signal makes it impossible for the vehicle to start. • Control signals for fuel system and ignition system are not output.
		Momentarily open			♦	♦				♦	♦		♦	♦	♦	♦				⊕	♦	♦	♦			♦			• The symptom depends on the duration of momentarily open circuit and the operating conditions. Slight shocks and surges may be sensed during driving, while engine stall may be caused during idle.
Mass air flow sensor	Signal	OPEN			♦	♦		⊕		♦	♦	♦	♦	♦	♦	♦							♦		♦	♦	♦	• It will be fail-safe condition, and vehicle runs at an engine speed of 2,400 rpm or less.
		High output			♦	♦				♦	♦	♦	♦	♦	♦	♦				♦	♦	♦	♦		♦	♦	♦	• The air-fuel ratio becomes rich. Black smoke may accompany. Poor connection of grounding may be a possible cause.
		Low output			♦	♦				♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦	♦	♦	• The air-fuel ratio becomes lean. Contaminated hot wire or suction of air may be suspected.
	Ground	OPEN	⊕																	⊕	⊕	⊕	⊕		♦			• It will be over-rich.
	Power supply	OPEN			♦	♦		⊕		♦	♦	♦	♦	♦	♦	♦							♦		♦			• It will be fail-safe condition, and vehicle runs at an engine speed of 2,400 rpm or less.
Intake air temperature sensor		OPEN/ SHORT																							♦	♦		
Engine coolant temperature sensor		OPEN/ SHORT		♦	♦	♦		♦		♦	♦	♦	♦	♦	♦	♦	♦								♦	♦	♦	• It will be fail-safe condition, and then MIL turns ON. This malfunction tends to occur when engine is cold or when the engine coolant temperature is high.
		Resistance is large.		♦	♦	♦		♦			♦	♦	♦	♦	♦	♦	♦			♦	♦	♦	♦	♦	♦			• The engine coolant temperature is judged as low. This malfunction tends to occur after warming up.
		Resistance is small.		♦	♦	♦	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦		• The engine coolant temperature is judged as high. This malfunction tends to occur when engine is cold.
Heated oxygen sensor		OPEN/ SHORT								♦	♦	♦				♦				♦		♦	♦		♦	♦		• It will be base air-fuel ratio.
Vehicle speed sensor		OPEN/ SHORT																	♦			♦	♦		♦	♦		• Duration of fuel cut becomes shorter or fuel may not be cut.

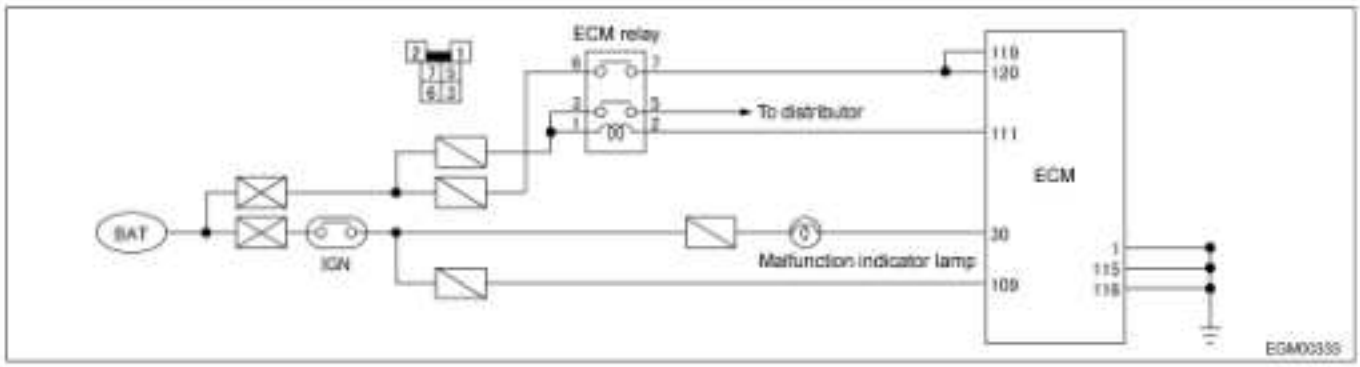
MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >

ECM Input/Output Signal Specifications

Measure voltage between terminals shown below and ground using a circuit tester.

Terminal	Signal name	Warning lamp ON	Warning lamp OFF
30	MIL	Approx. 0.1V	Battery voltage

Circuit Diagram



MidWestTech | Caterpillar TB45 Gasoline Engine Service Manual | Publication 99789-86100 Order the manual at mid-west-tech.com >