CAT® Lift Trucks

Service Manual

K21, K25 Gasoline Engine

For use with GC15N-GC33N
Chassis Service Manual.

99789-65120

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Specifications

INSPECTION AND ADJUSTMENT

- Oil capacity H line (L)
  3.5
- Oil capacity L line (L)
  2.5
- (Oil filter capacity) (L)
  0.3
- Fan belt deflection (When pressed by a force of approximately 10 kgf) (mm)
  Standard 11 - 13
- Compression [MPa (kgf/cm^2)/rpm]
  Standard 1.45 (14.8)/250 (K21: Gasoline/Combined)
  1.51 (15.4)/250 (K25: Gasoline/Combined)
  1.57 (16.0)/250 (K21/K25: LPG)
- Difference between each cylinder (kgf/cm^2/rpm)
  Repair limit 1.0/300
- Spark plug gap (mm)
  Standard 0.8 - 0.9
- Distributor (Full transistor type) air gap (mm)
  Standard 0.35 - 0.45
- Valve clearance (Hot) (mm)
  Standard Intake: 0.38
  Exhaust: 0.38
- Thermostat valve opening temperature (STD) (˚C)
  Standard 76.5
- Idle speed and ignition timing (BTDC˚/rpm)
  Standard 0/700±50 (K21)
  0/700±50 (K25)

CYLINDER HEAD

- Cylinder head (mm)
  Material Aluminum alloy
  Distortion limit 0.1

CYLINDER BLOCK

- Block upper surface (mm)
  Distortion limit 0.1
- Bore diameter dimension (mm)
  Standard 89.00 - 89.05
- Bore diameter wear (mm)
  Repair limit 0.2
- Bore diameter out-of-round (mm)
  Standard 0.02 or less
- Bore diameter taper (mm)
  Standard 0.02 or less
- Bore diameter out-of-round and taper (mm)
  Repair limit 0.1

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Diagnosis Chart by Symptom

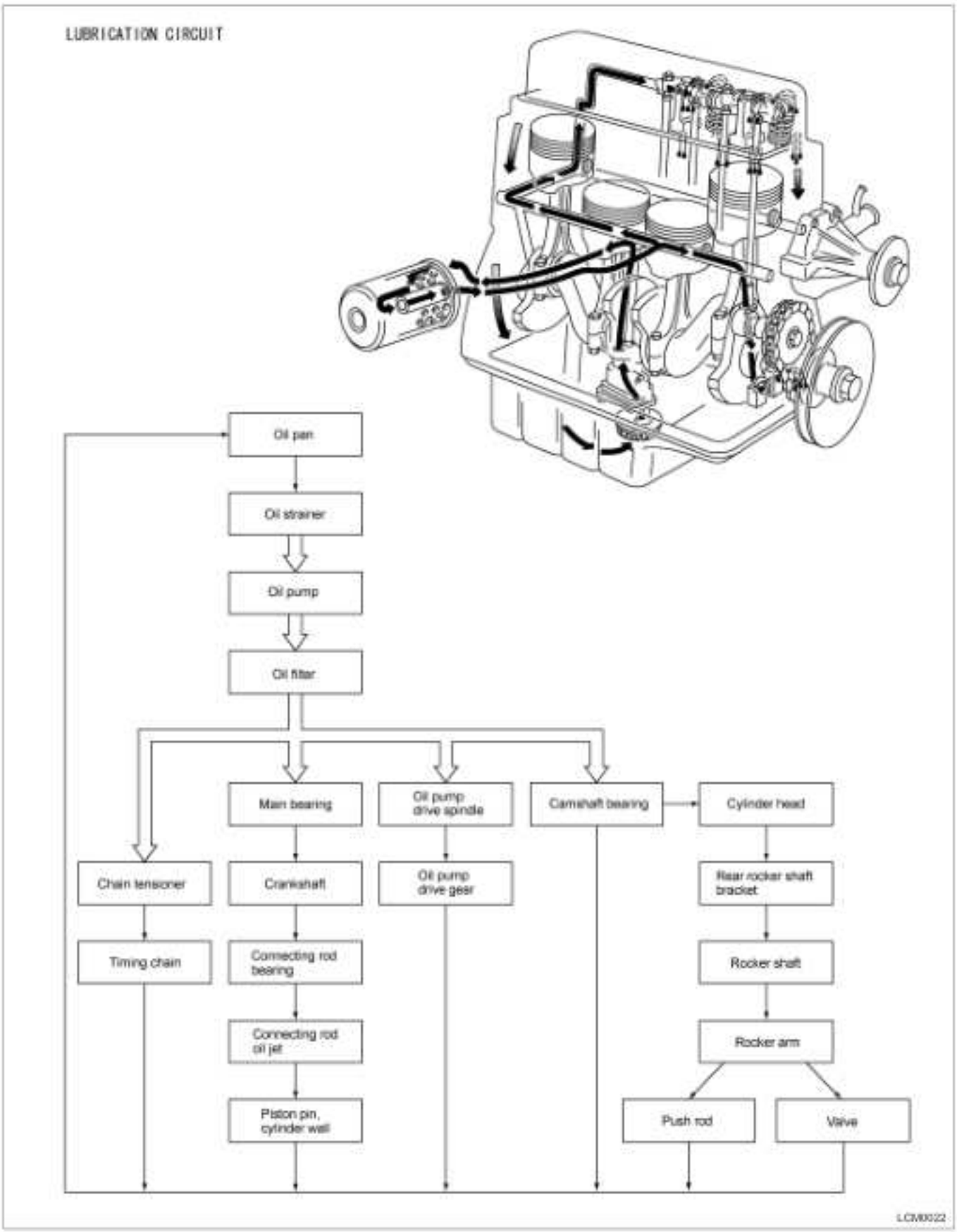
RELATIONSHIP BETWEEN MALFUNCTIONING SYMPTOMS AND THE SENSOR CIRCUIT

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

Symptoms			Impossible to start		Poor starting		Poor idle					Poor driving control								Engine stall				Other				Description/notable characteristics of the symptom
Sensor malfunction ⊕: Highly possible ♦: Possible			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 driving	Knocking	Backfire	After-burn	At idle	Driving	During deceleration	During a heavy load	Engine over temperature (Overheat)	Poor fuel consumption efficiency	Check that symptoms are detected with self-diagnosis.	Check that symptoms are in fail-safe condition.	
Crankshaft position sensor (POS, PHASE)		OPEN	⊕																	⊕	⊕	⊕	⊕			♦		• An open circuit in either REF or POS 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 in fail-safe condition, and vehicle runs at an engine speed from 800 rpm to 1,600 rpm.
		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 in fail-safe condition, and vehicle runs at an engine speed from 800 rpm to 1,600 rpm.
Intake air temperature sensor		OPEN/ SHORT																							♦			
Engine coolant temperature sensor		OPEN/ SHORT		♦	♦	♦		♦		♦	♦	♦	♦	♦	♦	♦	♦								♦	♦		• It will be in fail-safe condition, and then Engine Warning lamp 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.

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Lubrication Schematic Diagram



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