CAT® Lift Trucks

Service Manual

K15, K21, K25 Gasoline Engine

K15	000001-up
K21	000001-up
K25	004868X-up

For use with GP15N-GP35N, GPE15N-GPE35N Chassis Service Manual.

99789-85100

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Specifications

INSPECTION AND ADJUSTMENT

- Oil capacity H line (L)
  3.7
- Oil capacity L line (L)
  2.7
- (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 1.27 (13.0)/250 (K15)
  1.23 (12.5)/250 (K21)
  1.27 (13.0)/250 (K25)
- 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 (K15)
  0/700±50 (K21)
  0/700±50 (K25)
  2/700±50 (K21, carburetor specification)
  0/700±50 (other than above)

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 75.50 - 75.55 (K15)
89.00 - 89.05 (K21, K25)

- 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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RELATIONSHIPS BETWEEN MALFUNCTIONING SYMPTOMS AND ACTUATOR CIRCUITS

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

Symptoms			Impossible to start		Poor starting		Poor idle						Poor driving								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 driving	Knocking	Backfire	After-burn	At Idle	Driving	During deceleration	During a heavy load	Engine over temperature (Overheat)	Poor fuel consumption efficiency			
Actuator malfunction ⊕: Highly possible ♦: Possible																													
Gasoline injector	Power supply circuit	OPEN	♦	♦	♦	♦				⊕	⊕	♦	♦	♦	♦					♦	♦	♦	♦						• No fuel injection to cylinder with open circuit, resulting in LEAN output of heated oxygen sensors. • Starting engine is impossible when the circuits for all the cylinders are open.
		Momentarily open														♦				♦		♦	♦						
	Coil	OPEN	♦	♦	♦	♦				⊕	⊕	♦	♦	♦	♦					♦	♦	♦	♦						
		Momentarily open														♦				♦		♦	♦						
	Drive circuit (ECM side)	OPEN	♦	♦	♦	♦			♦	⊕	⊕	♦	♦	♦	♦		♦	♦		♦	♦	♦	♦						
		Momentarily open									⊕					♦													
		SHORT	♦	♦	♦	♦				⊕	⊕	♦	♦	♦	♦				♦	♦	♦	♦	♦					• Continuous fuel injection to cylinder with short circuit, resulting in OVER-RICH and misfiring. • Starting engine is impossible when the circuits for all the cylinders are open.
	Nozzle hole	Foreign material intrusion	♦	♦	♦	♦					⊕	♦	♦	♦		♦			♦	♦	♦	♦	♦					• The cylinder with foreign material will keep injecting.
		Clogging	♦	♦	♦	♦		♦		⊕	⊕	♦	♦	♦		♦	♦	♦		♦	♦	♦	♦					• The symptom depends on clogging status. The correction factor of air-fuel ratio becomes larger.
	Ground circuit (ECM)	OPEN	♦																	♦	♦	♦	♦					• Shocks may be sensed and engine stall may be occur depending on the duration of the operation conditions.
		Momentarily open								♦	♦	♦	♦		♦	♦				♦		♦	♦					
Ignition signal circuit		OPEN	♦	♦	♦	♦			♦	♦	♦	♦	♦	♦	♦				♦	♦	♦	♦	♦		♦			• Slight shocks and surges may be sensed depending on the duration of momentarily open circuit and the operating conditions.
		Momentarily open														♦			♦	♦								
Ignition coil	Power supply circuit	OPEN	♦	♦		♦				♦	♦	♦	♦	♦	♦				♦	♦	♦	♦	♦					•
		Momentarily open														♦			♦	♦								• Engine stall may occur if duration of momentarily open circuit is too long.
	Coil	OPEN	♦	♦		♦				♦	♦	♦	♦	♦	♦				♦	♦	♦	♦	♦					• Shocks may be sensed and engine stall may be occur depending on the duration of the operation conditions.
	Ground circuit	OPEN	♦	♦		♦				♦	♦	♦	♦	♦	♦				♦	♦	♦	♦	♦					• Injects fuel toward spark plug on the cylinder with open circuit.
		Momentarily open														♦			♦	♦								
ECM relay circuit		OPEN	⊕																♦	⊕	⊕	⊕	⊕					

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SST Data Monitor Display

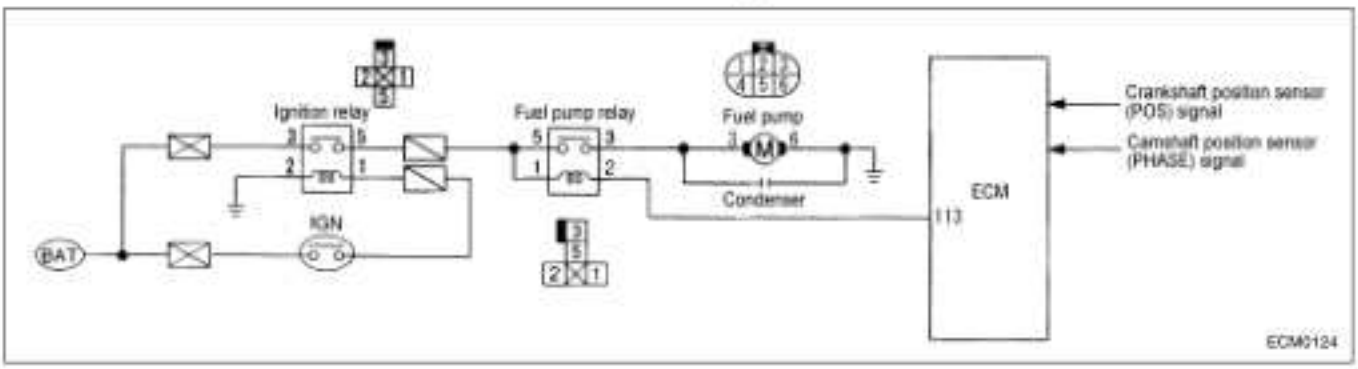
Monitor item	Fuel pump is not activated	Fuel pump is operated
Fuel pump relay	OFF	ON

ECM Input/Output Signal Specifications

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

Terminal	Signal name	For approx. 1 second after ignition switch is turned ON	At cranking, engine running
113	Fuel pump relay	Approx. 1V (After approx. 1 second: Battery voltage)	Approx. 1V

Circuit Diagram



Component Parts Inspection

Fuel pump

Check resistance between terminals 3 and 6.

Resistance: Approx. 1 Ω (at room temperature)

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