NISSAN
FORKLIFT

SERVICE MANUAL & TECHNICAL BULLETIN

K15, K221, K25 ENGINE

(GAS/LPG)

Model L01/L02 series

SERVICE

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GENERAL INFORMATION

SECTION **GI**

CONTENTS

HOW TO USE THIS MANUAL GI-2
- Description GI-2
- Definition of Terms GI-2
- Definition of Units GI-2
- Description GI-2

PRECAUTIONS FOR SAFETY AND QUALITY .. GI-3
- Safe Operation GI-3
- Correct Operation GI-4
- Precautions for Radio Equipment Installation . GI-4

PRECAUTIONS GI-5
- Precautions in Draining Engine Coolant GI-5
- Precautions for Disconnecting Fuel Piping GI-5
- Precautions for Removing and Disassembling GI-5
- Precautions for Inspection, Correction, and Replacement GI-5
- Precautions for Assembly and Installation GI-5
- Parts Requiring Angle Tightening GI-6
- Caution for Use of Power Tools GI-6
- Precautions for Liquid Ggasket Application GI-6

TIGHTENING TORQUE GI-7
- Standard Bolt Tightening Torque GI-7
- Engine Part Tightening Torque GI-8

SPECIAL SERVICE TOOLS GI-10

ENGINE OUTSIDE DRAWINGS GI-11

MAIN SPECIFICATIONS GI-12

STANDARD AND REPAIR LIMIT GI-16

STAMPED LOCATION OF ENGINE NO. GI-20

TROUBLE DIAGNOSIS GI-21
- Engine Adjust. GI-22
- Engine LPG Fuel System GI-27

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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				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	Check that symptoms are detected with self-diagnosis.	Check that symptoms are in fail-safe condition.	
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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Service tool Data Monitor Display

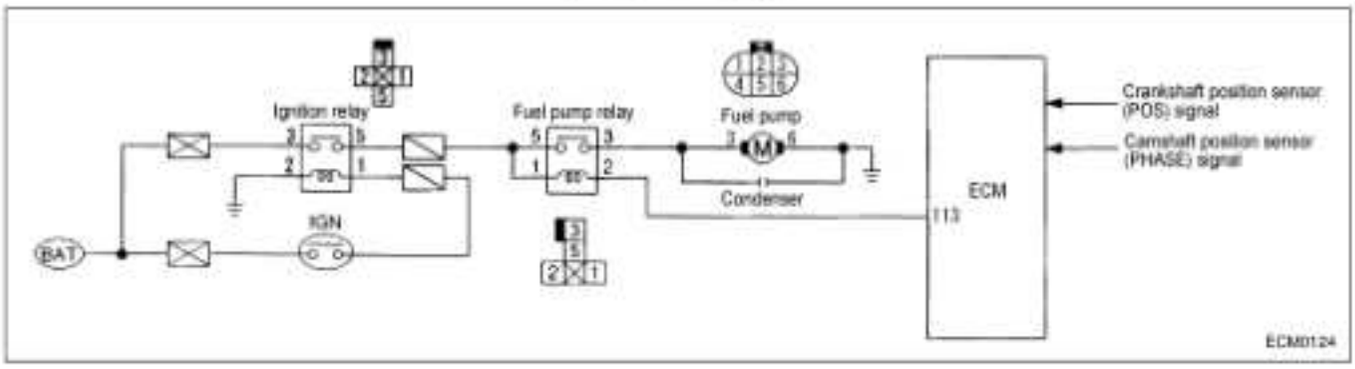
Monitor item	Fuel pump is not activated	Fuel pump is operated
Fuel pump relay	OFF	ON

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	Gasoline F/P 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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5-3 ENGINE COMPONENT PARTS LOCATION FOR INTAKE SYSTEM SPECIFICATION

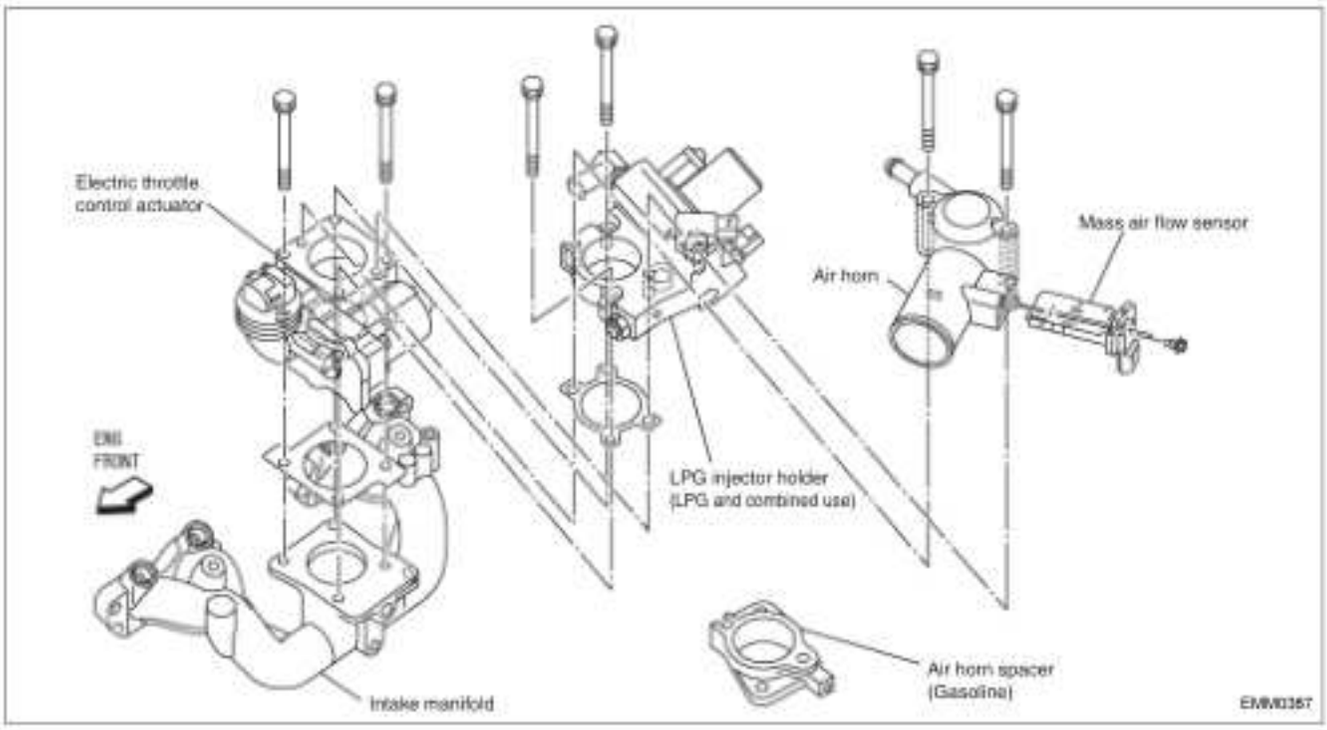
(1) Electronically controlled specifications

1) LPG specification, combined use specification

Electric throttle control actuator is installed on the intake manifold, and then the LPG injector holder and air horn are installed on the electric throttle control actuator. Mass air flow sensor is assembled to the air horn.

2) Gasoline specification

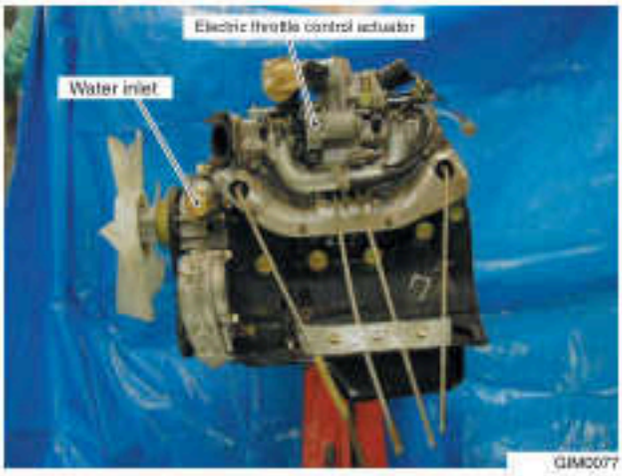
Air horn spacer is installed in the position of the injector holder in the above LPG specification.



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2. Engine Appearance

2-1 K-ENGINE





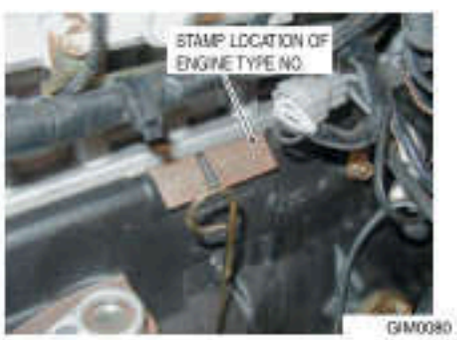
2-2 ENGINE ROOM APPEARANCE



3. Engine Type No. Stamp

3-1 STAMP LOCATION OF ENGINE TYPE NO.

Stamp of engine type No. is located on the ignition plug side center of the cylinder block for K15, K21, and K25 engines in common.



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14. System Components

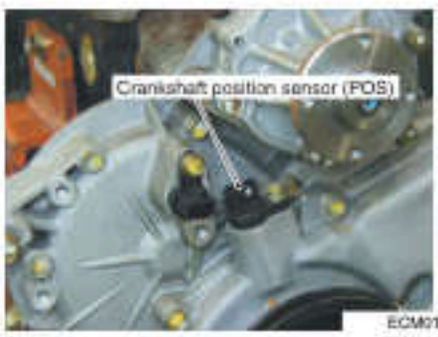
14-1 ECM

Small ECM has been adopted.
Shape of connector is AMP 121-pin, and then it is installed to rear LH of the engine room.
It is necessary to perform idle air volume learning when replacing ECM. Refer to EC section, "Throttle valve closed position learning and idle air volume learning" in the EC section for learning procedure.



14-2 CRANKSHAFT POSITION SENSOR (POS)

Hall IC (element) crankshaft position sensor (POS) has been adopted.
Crankshaft position sensor (POS) detects crankshaft position by crankshaft pulley bushing installed at the tip of a crankshaft and uses it for setup of the ignition timing or injection timing.
Engine speed is detected by 2 signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).
It is installed on the front cover.

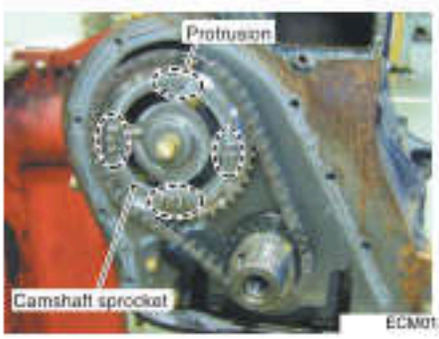


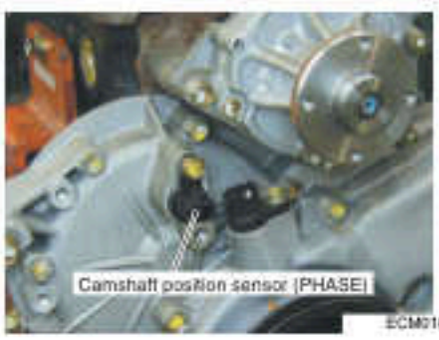
14-3 CAMSHAFT POSITION SENSOR (PHASE)

Hall IC (element) camshaft position sensor (PHASE) has been adopted.
Camshaft position sensor (PHASE) detects PHASE pulse by the protrusion number of the detection part prepared in the camshaft sprocket front, and it detects cylinders.
It is installed on the chain housing front.

Cylinder	No. 1	No. 2	No. 3	No. 4
Pulse	1	2	3	4







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