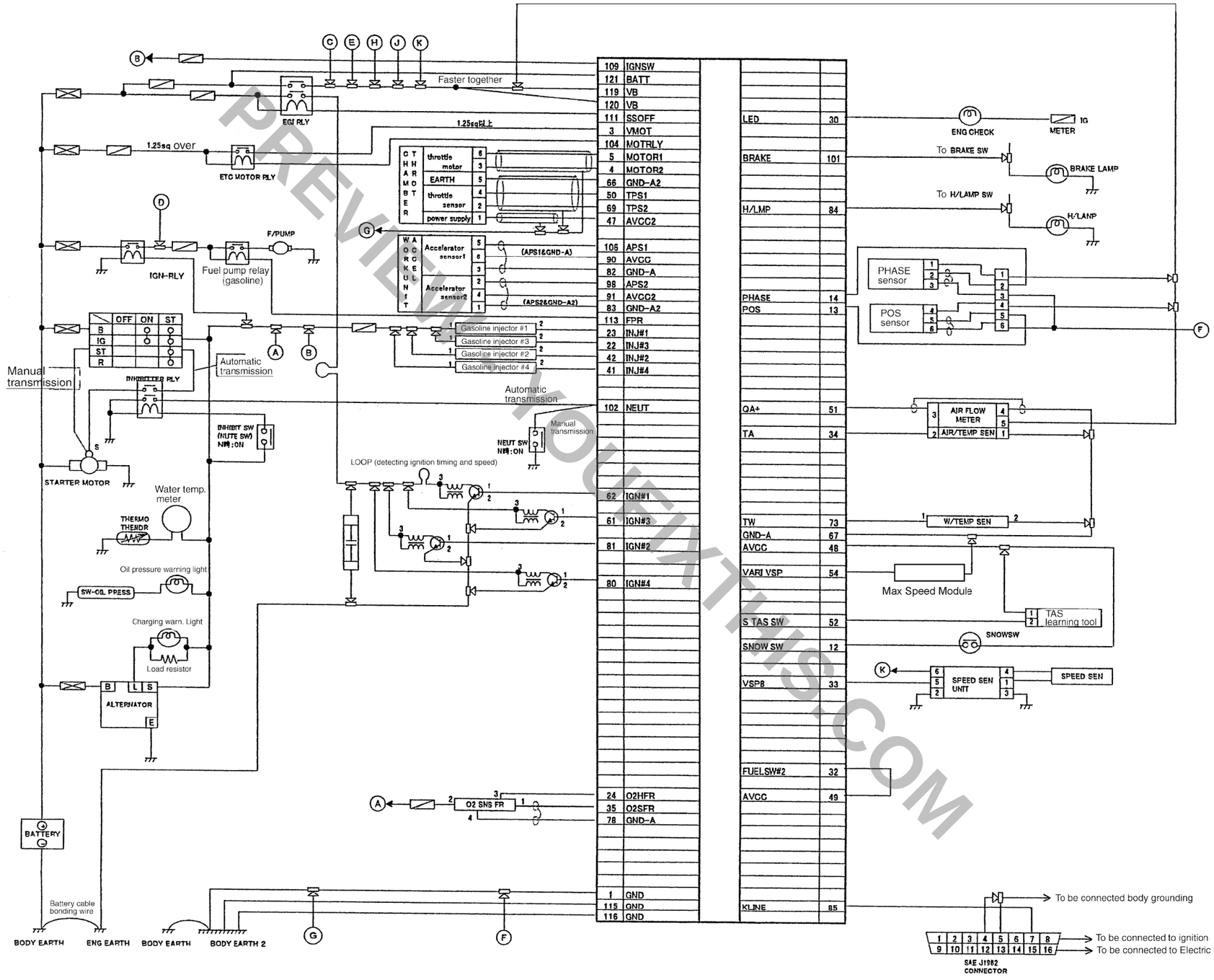
Gasoline



PREVIEW ONLY
YOUFIXTHIS.COM

Download full manual at youfixthis.com

TIGHTENING TORQUE

Standard Bolt Tightening Torque

Upper column:Lubricated (Antirust oil is applied to abrasive faces of threads and seating faces)
Lower column:No lubrication (Threads and seating faces are completely degreased)

	Thread size		Unit	4T (Bolt)	7T (Bolt)	9T (Bolt)
	Diameter	Pitch				
Hexagon head bolt and nut	M6	1	N·m	3.82 - 4.41	6.37 - 7.45	9.22 - 10.8
			(kgf-m)	(0.39 - 0.45)	(0.65 - 0.76)	(0.94 - 1.1)
			N·m	5.00 - 6.47	8.43 - 10.8	11.8 - 15.7
			(kgf-m)	(0.51 - 0.66)	(0.86 - 1.1)	(1.2 - 1.6)
	M8	1.25	N·m	9.32 - 10.8	15.7 - 17.7	22.6 - 25.5
			(kgf-m)	(0.95 - 1.1)	(1.6 - 1.8)	(2.3 - 2.6)
			N·m	12.7 - 15.7	20.6 - 26.5	29.4 - 37.3
			(kgf-m)	(1.3 - 1.6)	(2.1 - 2.7)	(3.0 - 3.8)
	M10	1.25	N·m	19.6 - 22.6	32.4 - 38.2	47.1 - 53.9
			(kgf-m)	(2.0 - 2.3)	(3.3 - 3.9)	(4.8 - 5.5)
			N·m	25.5 - 33.3	43.1 - 54.9	61.8 - 78.5
			(kgf-m)	(2.6 - 3.4)	(4.4 - 5.6)	(6.3 - 8.0)
		1.5	N·m	18.6 - 21.6	30.4 - 36.3	44.1 - 52
			(kgf-m)	(1.9 - 2.2)	(3.1 - 3.7)	(4.5 - 5.3)
			N·m	24.5 - 31.4	41.2 - 52	58.8 - 74.5
			(kgf-m)	(2.5 - 3.2)	(4.2 - 5.3)	(6.0 - 7.6)
Flanged bolt	M6	1	N·m	4.9 - 5.69	8.14 - 9.51	11.8 - 13.7
			(kgf-m)	(0.5 - 0.58)	(0.83 - 0.97)	(1.2 - 1.4)
			N·m	5.98 - 7.65	9.81 - 12.7	14.7 - 18.6
			(kgf-m)	(0.61 - 0.78)	(1.0 - 1.3)	(1.5 - 1.9)
	M8	1.25	N·m	11.8 - 13.7	19.6 - 23.5	28.4 - 33.3
			(kgf-m)	(1.2 - 1.4)	(2.0 - 2.4)	(2.9 - 3.4)
			N·m	14.7 - 18.6	24.5 - 31.4	35.3 - 45.1
			(kgf-m)	(1.5 - 1.9)	(2.5 - 3.2)	(3.6 - 4.6)
	M10	1.25	N·m	24.5 - 29.4	41.2 - 48.1	59.8 - 69.6
			(kgf-m)	(2.5 - 3.0)	(4.2 - 4.9)	(6.1 - 7.1)
			N·m	30.4 - 39.2	51.0 - 64.7	73.6 - 93.2
			(kgf-m)	(3.1 - 4.0)	(5.2 - 6.6)	(7.5 - 9.5)
		1.5	N·m	23.5 - 27.5	39.2 - 46.1	56.9 - 65.7
			(kgf-m)	(2.4 - 2.8)	(4.0 - 4.7)	(5.8 - 6.7)
			N·m	29.4 - 37.3	49.0 - 61.8	69.6 - 89.2
			(kgf-m)	(3.0 - 3.8)	(5.0 - 6.3)	(7.1 - 9.1)

CAUTION:
- **Except special nuts and bolts.**
- **The bolts applicable to this table have one of the following marks embossed on their heads.**
  4T.....4
  7T.....7
  9T.....9

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

APPENDIX 3. Error Code List

No.	Code No.	Marking Figure	Contents
1	0031	02 HEATER B1	02 HEATER LOW INPUT (BROKEN WIRE)
2	0032	02 HEATER B1	02 HEATER HIGH INPUT (SHORT)
3	0102	MAF_SEN/CIRCUIT	AIRFLOW METER LOW INPUT (BROKEN WIRE)
4	0103	MAF_SEN/CIRCUIT	AIRFLOW METER HIGH INPUT (SHORT)
5	0117	WATER TEMPERATURE SENSOR	WATER TEMP SENSOR LOW INPUT (BROKEN WIRE)
6	0118	WATER TEMPERATURE SENSOR	WATER TEMP SENSOR HIGH INPUT (SHORT)
7	0122	THRTL POS SEN/ CIRC	TPS2 LOW INPUT FAILURE
8	0123	THRTL POS SEN/ CIRC	TPS2 HIGH INPUT FAILURE
9	0132	H02S1_(B1)	FR 02/S ABNORMAL VOLTAGE (BANK 1)
10	0134	H02S1_(B1)	FR 02/S BROKEN WIRE (BANK 1)
11	0222	THRTL POS SEN/ CIRC 1	TPS1 LOW INPUT FAILURE
12	0223	THRTL POS SEN/ CIRC 1	TPS1 HIGH INPUT FAILURE
13	0335	CKP /SEN/CIRCUIT	CRANKSHAFT ANGLE POS SENSOR BROKEN WIRE WHEN STARTING
14	0335	CKP SEN/CIRCUIT	CRANKSHAFT ANGLE POS SENSOR BROKEN WIRE AFTER STARTING
15	0335	CKP SEN/CIRCUIT	CRANKSHAFT ANGLE POS SENSOR MOMENTARY BROKEN WIRE - NOISE - TOOTH BROKEN
16	0340	CMP SEN/CIRCUIT	CAMSHAFT ANGLE PHASE SENSOR BROKEN WIRE WHEN STARTING
17	0340	CMP SEN/CIRCUIT	CAMSHAFT ANGLE PHASE SENSOR BROKEN WIRE AFTER STARTING
18	0340	CMP SEN/CIRCUIT	CAMSHAFT ANGLE PHASE SENSOR MOMENTARY BROKEN WIRE - NOISY - TOOTH BROKEN

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

REMOVAL AND INSTALLATION OF ENGINE

CAUTION:
- **Always pay attention to safety.**
- **Do not remove engine until exhaust system and engine coolant have completely cooled off.**
- **Support the vehicle at the specified lift points.**
- **For operation procedure for components other than engine, refer to appropriate sections.**

Removal

[OPERATION DESCRIPTION]

- Remove engine by pulling up after removing transmission.

[PREPARATION WORK]

1. Release the fuel pressure. Refer to “Release of Fuel Pressure” in Chapter 6.
2. Remove radiator drain plug and drain engine coolant.
3. Remove the following parts.
   - Undercover of battery
   - Radiator, shroud, and radiator hose
   - Engine drive belt and cooling fan
4. Disconnect accelerator cable from throttle drum and move it out of position.

[LEFT SIDE OF ENGINE ROOM]

5. Remove air duct and air cleaner case.
6. Disconnect oxygen sensor harness connector and ground (between exhaust manifold cover and body).

[RIGHT SIDE OF ENGINE ROOM]

7. Disconnect vacuum hose (for brake booster and for differential lock) on engine side.
8. Remove fuel hose.

CAUTION:
After disconnecting hoses, plug them immediately to prevent fuel from draining.

9. Disconnect all harness connectors on engine side, and then move harnesses to body side.
10. Remove starter motor.
11. Overhead guard and stays may have to be removed in some cases.

[REMOVAL]

12. Engage chain block hook in front/rear engine slingers and support.

CAUTION:
Be careful not to contact hook and chain with body and piping when engaging hook in slingers

13. Remove engine mount insulator LH/RH nuts.
14. Pull up and remove engine by adjusting the position diligently.

CAUTION:
- **Make sure that all wires and piping were disconnected while removing.**

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

TROUBLE SHOOTING

Refer to each section for details.

Condition	Possible causes	Action	Application	
			Common	Electronic controlled specifications
Incident in ignition system	• Malfunction of low-voltage electronic distribution ignition coil	Replace.		√
	• Condenser malfunction	Replace.	√	
	•			
	• Spark plug malfunction	Clean, adjust gap or replace.	√	
	•			
	• Ignition coil malfunction	Replace.	√	
	•			
	• Loose or open primary wire connection	Repair or replace.	√	
Incident in fuel system Refer to EF section for the LPG model.	• Insufficient fuel	Fill.	√	
	• Contaminated fuel filter	Replace.	√	
	• Plugged or contaminated fuel piping	Wash.	√	
	• Plugged or contaminated fuel injector	Clean or replace.		√
	• Fuel pump malfunction	Repair or replace.	√	
	•			
	•			
	•			
Lowered compression pressure	• Poor tightening of spark plug or inappropriate gasket	Tighten to correct torque or replace.	√	
	• Inappropriate engine oil grade or deteriorated viscosity	Replace with appropriate grade of oil.	√	
	• Inappropriate valve clearance	Adjust.	√	
	• Compression pressure leak from valve seat	Remove head and perform fine grinding to valve.	√	
	• Stuck valve stem	Repair or replace cylinder head and valve.	√	
	• Broken or chip valve spring	Replace valve spring.	√	
	• Compression pressure leakage from head gasket	Replace head gasket.	√	
	• Worn or stuck piston ring	Replace piston ring.	√	
	• Worn piston ring or cylinder	Engine overhaul (troubleshooting procedure) a. Put a small amount of engine oil from the ignition plug hole and measure the compression pressure. b. If the pressure builds up, a possible cause is in the cylinder or piston ring. c. If the pressure remains unchanged, the leakage can be attributed to the valve, cylinder head or head gasket.		

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

MAIN SPECIFICATIONS

Engine type		K21		
Engine control system		Electronic controlled specifications		
Fuel specification		Gasoline	LPG	Combined
Total displacement (cc)		2,065		
Shape of combustion chamber		Bathtub		
Valve mechanism		OHV		
Bore x stroke mm (in)		89 x 83 (3.50 x 3.27)		
Compression ratio		8.7	9.3	8.7
Compression pressure [kPa (bar, kg/cm^2, psi)/rpm]		1,226 (12.2, 12.5, 178)/ 250	1,275 (12.8, 13.0, 185)/ 250	1,226 (12.2, 12.5, 178)/ 250
Engine speed control system		Engine Control System, electronically controlled throttle		
Fuel in use (Note 1)		Unleaded regular gasoline	At 20P	See the left column
Maximum output [kW (PS)/rpm]		38.7 (52.7)/2,700	41 (55.7)/2,700	40.7 (55.3)/2,700
Maximum torque [N·m (kg-m)/rpm]		149 (15.2)/2,000	151 (15.4)/2,000	150 (15.3)/2,000
Valve opening/closing timing (degree)	Intake open (ATDC)	4		
	Intake close (ABDC)	40		
	Exhaust open (BBDC)	36		
	Exhaust close (ATDC)	0		
Valve clearance mm (in)	Intake (when engine is hot)	0.38 (0.0150)		
	Exhaust (when engine is hot)	0.38 (0.0150)		
Firing order		1-3-4-2		
Ignition timing (idling)	degree (BTDC)	0		
On board idle speed (rpm)	ATM	700		
	MTM	700		
On board high-idle speed (rpm)	ATM	2,700		
	MTM	2,700		
Allowable maximum engine speed (rpm)	Instantaneous, no load	3,600		
	Continuous load	3,000		
PTO system		Silent chain-driven/side PTO		
Engine oil (originally fitted)	Specification	10W-30 (Class SJ)		
	Amount 2 (US qt, Imp qt)	3.7 (3-7/8, 3-1/4) (including oil filter)		
Engine dimensions (length x width x height) (Note 2) mm (in) width = maximum		716.8 x 568 x 720 (28.220 x 22.362 x 28.346)		
Engine weight (w/o coolant, w/ oil) (Note 2) N (kg, lb)		1,353 (138, 304)		

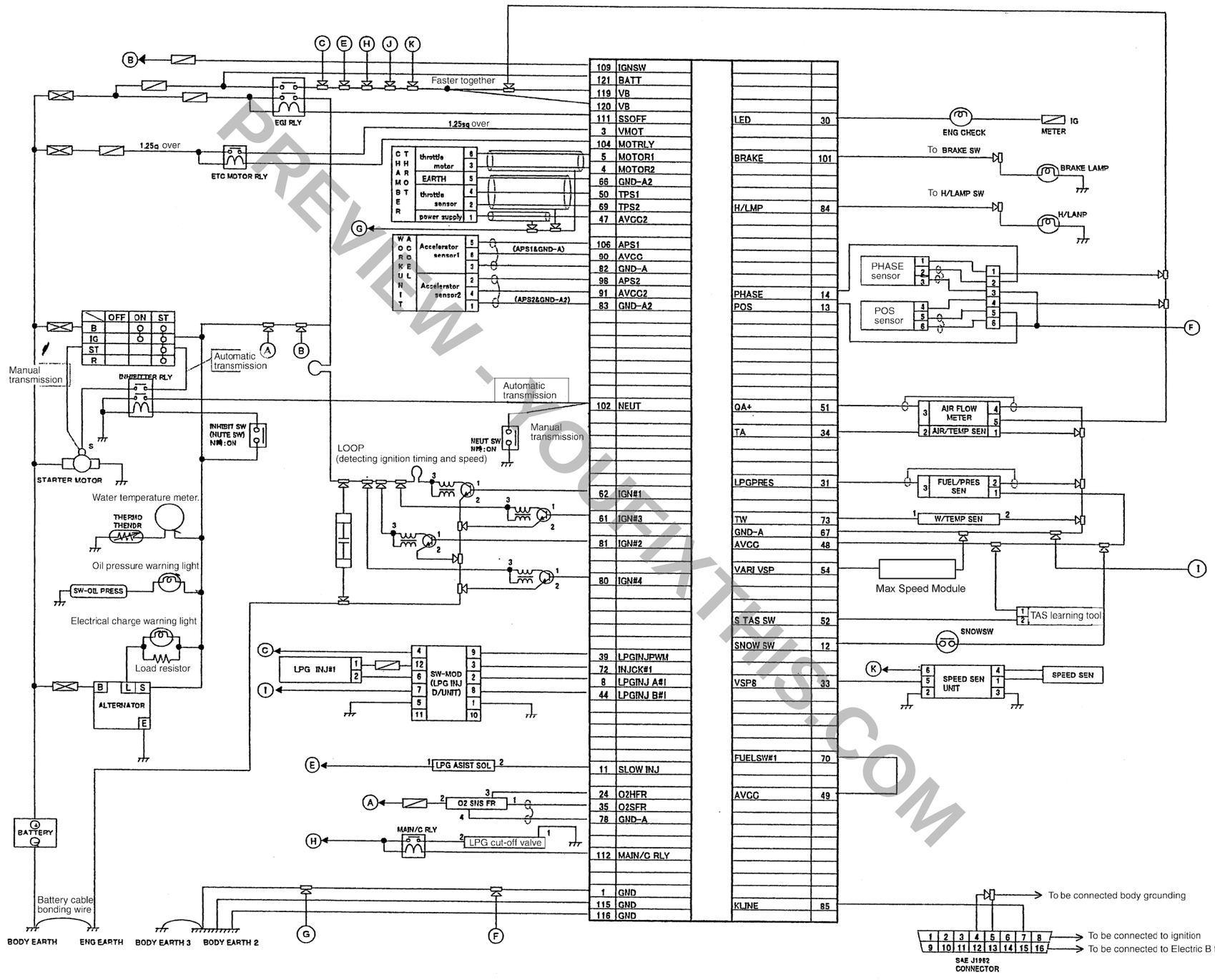
Note 1: Fuel
Gasoline: Use unleaded regular gasoline with an octane rating of 91 or more.
LPG: Use a fuel of 30P or more in cold seasons. In ambient temperature of 23° F (-5°C) or less, use a 100P fuel.

Note 2: The engine dimensions and weight differs with the customer specifications. The above data should be deemed as reference.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

LPG



PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

TAPER SCREW TIGHTENING TORQUE

Allowable materials for tightening / Normal size	Unit	Aluminum		Cast iron	
		Standard	Max. value	Standard	Max. value
R1/8	N·m	7.8	11.8	15.7	21.6
	kg-m	0.796	1.2	1.6	2.2
	ft-lb, in-lb*	69*	9	12	16
R1/4	N·m	19.6	29.4	34.3	44.1
	kg-m	2.0	3.0	3.5	4.5
	ft-lb	14	22	25	33
R3/8	N·m	39.2	54.9	53.9	73.5
	kg-m	4.0	5.6	5.5	7.5
	ft-lb	29	41	40	33

Engine Part Tightening Torque

TIGHTENING TORQUE AT VARIOUS POINTS OF ENGINE

Tightening point	Unit	Standard	Max. value
Cylinder head (lubricated)		Separately given	
Main bearing cap (lubricated)		Separately given	
Crankshaft pulley bolt	N•m	220.5	240.1
	kg-m	22.5	24.5
	ft-lb	163	177
Flywheel bolt (lubricated)	N•m	132	142
	kg-m	13.47	14.49
	ft-lb	97	105
Connecting rod nut (lubricated)	N•m	31.4	37.3
	kg-m	3.2	3.81
	ft-lb	23	28
Rear plate bolt	N•m	44.1	58.8
	kg-m	4.5	6.0
	ft-lb	33	43
Camshaft sprocket bolt	N•m	39.2	49
	kg-m	4.0	5.0
	ft-lb	29	36
Oil filter stud	N•m	29.4	39.2
	kg-m	3.0	4.0
	ft-lb	22	29
Oil filter element	N•m	14.7	20.6
	kg-m	1.5	2.1
	ft-lb	11	15
Spark plug	N•m	19.6	29.4
	kg-m	2.0	3.0
	ft-lb	14	22
Engine slinger bolt	N•m	22.6	25.5
	kg-m	2.31	2.6
	ft-lb	17	22
Rocker cover nut	N•m	14.7	16.7
	kg-m	1.5	1.7
	ft-lb	11	13
Water temperature gauge	N•m	15.7	19.6
	kg-m	1.6	2.0
	ft-lb	12	14
Oil pressure switch	N•m	15.7	21.6
	kg-m	1.6	2.2
	ft-lb	12	16
Exhaust manifold nut	N•m	41.2	48.1
	kg-m	4.2	4.91
	ft-lb	30	36
Straight screw plug (For head top face)	N•m	44.1	58.9
	kg-m	4.5	5.5
	ft-lb	33	40
Oil pan drain plug	N•m	29.4	39.2
	kg-m	3.0	4.0
	ft-lb	22	29
Mass air flow sensor mounting screw	N•m	1.27	1.67
	kg-m	0.13	0.17
	in-lb	11	15
Fuel tube flare nut	N•m	16.0	23.0
	kg-m	1.63	2.35
	ft-lb	12	17
Crankshaft position sensor plug bolt	N•m	6.37	7.45
	kg-m	0.65	0.76
	in-lb	56	66
Thermo-housing relief plug	N•m	6.37	7.45
	kg-m	0.65	0.76
	in-lb	56	66

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

No.	Code No.	Marking Figure	Contents
19	0340	CMP SEN/CIRCUIT	CRANKSHAFT POSITION SENSOR - DIAGNOSIS MAGNETIC CRANKSHAFT PHASE SIGNAL
20	0350	IGN SIGNAL - PRIMARY	DIAGNOSIS IGNITION PRIMARY SIGNAL
21	0500	VEH SPEED SEN/ CIRCUIT	VEHICLE SPEED SENSOR OR SIGNAL NOT INPUT DUE TO A CONDITION FOR A PREDETERMINED TIME DURING DRIVING AFTER WARM-UP
22	0605	ECM	* SYNC MONITORING PART
23	0605	ECM	* ALU FUNCTION DIAGNOSIS
24	0605	ECM	* MAKE QUESTIONS OF COMPUTING EXERCISE
25	0605	ECM	* FUNCTION FOR ACCOUNTS WITH COMPUTED RESULTS
26	0605	ECM	* AD DIAGNOSIS
27	0605	ECM	* CPU FUNCTION DIAGNOSIS
28	0605	ECM	* TPS FOUR TIMES INPUT DIAGNOSIS
29	0605	ECM	* VAPO M-S MISMATCHING DIAGNOSIS
30	0605	ECM	* APO M-S MISMATCHING DIAGNOSIS
31	0605	ECM	* THROTTLE OPEN TARGET VALUE MISMATCHING DIAGNOSIS
32	0605	ECM	* WATER TEMP SENSOR M-S MATCHING DIAGNOSIS
33	0605	ECM	* TQHOAP DEFICIENCY DIAGNOSIS
34	0605	ECM	* TTEPTD MISMATCHING DIAGNOSIS
35	0605	ECM	* TATE MISMATCHING DIAGNOSIS
36	0605	ECM	* TTEP MISMATCHING DIAGNOSIS
37	0605	ECM	* S/SOFF SYSTEM DIAGNOSIS
38	0605	ECM	* TASK EXECUTION CYCLE DIAGNOSIS (MAIN)
39	0605	ECM	* ROM FUNCTION DIAGNOSIS (MAIN)
40	0605	ECM	* RAM FUNCTION DIAGNOSIS (MAIN)
41	0605	ECM	* WTD FUNCTION DIAGNOSIS (MAIN)

PREVIEW - YOUFIXTHIS.COM

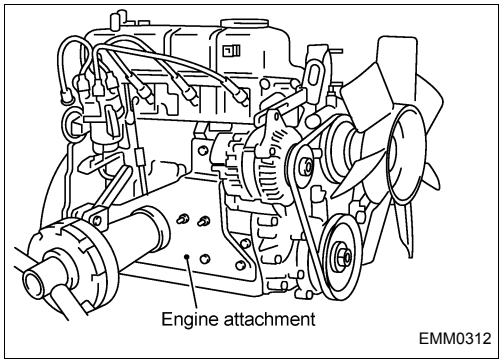
Download full manual at youfixthis.com

ENGINE SERVICE

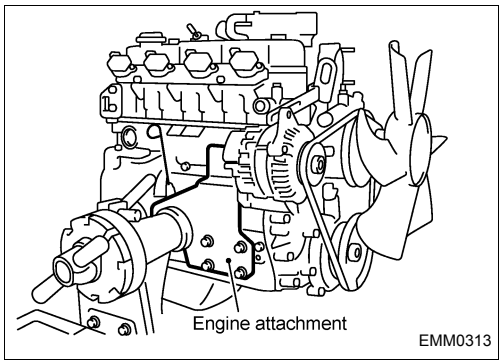
Engine Disassembly

Always use appropriate tools and ensure that no parts are damaged. The following tasks can be performed more easily by using the relevant engine attachment (Special tool) and engine stand (Special tool).

1. Preparation for engine disassembly
   - Drain coolant and engine oil.



2. Installation of engine attachment
   Remove the following parts from the cylinder block and install the engine attachment (Special tool).
   - Oil filter
   - Engine mount bracket (RH)
   - Fuel tube
   - Oil pressure switch
   - Release the alternator adjusting lever and remove the alternator.
   - Using some of the existing holes on the engine attachment (Special tool), retain the attachment with the mounting bracket bolts at four points at least.



3. Removal of exterior and electrical parts
   Set the engine to the engine stand (Special tool) and remove the following parts.
   - Ignition system wiring
   - Ignition coil unit
   - Spark plug
   - Oil level gauge
   - Cooling fan and pulley
   - Starter motor
   - Clutch and flywheel
   - Rear plate
   - Rocker cover
   - Crankshaft pulley
   - Remove the injector unit (for LPG, gasoline)
   - Remove the electric throttle control unit
   - Remove the oil pump and drive shaft

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine Adjustment

Condition	Cause	Action
1. Engine noise		
Slapping noise of bearing and crankshaft	Bearing looseness	Replace.
	Bearing seizure	Replace.
	Crankshaft bend	Repair or replace.
	Uneven wear of journal	Correct.
	Excessive end play	Replace center bearing.
Slapping noise of piston, connecting rod	Bearing looseness	Replace.
	Bearing seizure	Replace.
	Piston looseness	Replace piston pin(s) or bushing(s).
	Piston looseness relative to cylinder	Reselect.
	Piston ring damage	Replace.
	Poor rod alignment	Realign.
Slapping noise of camshaft	Bearing looseness	Replace.
	Excessive axial looseness	Replace bearing thrust plate(s).
	Rough gear tooth face(s)	Correct.
	Gear damage	Replace.
Timing chain noise	Inappropriate tension	Adjust.
	Damaged or sagged chain	Replace.
	Worn sprocket	Replace.
	Damaged or loose tensioner	Replace.
	Excessive camshaft-to-bearing clearance	Replace.
Slapping noise of valve gear	Inappropriate valve clearance	Adjust.
	Loose Adjust. screw(s)	Replace.
	Worn rocker face(s)	Replace.
	Worn valve guide(s)	Replace guide(s).
	Loose valve spring(s)	Replace.
	Valve seizure	Repair or replace.
Slapping noise of water pump	Inappropriate end play	Replace.
	Damaged impeller	Replace.
2. Other mechanical damage		
Stuck valve	Inappropriate clearance	Adjust.
	Valve stem - insufficient guide-to-guide clearance	Clean stem(s), ream guide(s).
	Loose or damaged spring	Replace.
	Seized or damaged valve stem(s)	Replace or clean.
	Poor fuel quality	Use good fuel.
Burnt valve seat(s)	Inappropriate valve clearance	Adjust.
	Deteriorated valve spring(s)	Replace.
	Edged valve end(s)	Replace bulb.
	Too narrow valve seat width	Correct valve seat(s).
	Engine overheat	Repair or replace.
	Overrun	Operate in optimum speed range.
	Stuck valve guide(s)	Correct.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine type		K25		
Engine control system		Electronic controlled specifications		
Fuel specification		Gasoline	LPG	Combined
Total displacement (cc)		2,488		
Shape of combustion chamber		Bathtub		
Valve mechanism		OHV		
Bore x stroke mm (in)		89 x 100 (3.50 x 3.94)		
Compression ratio		8.7	9.2	8.7
Compression pressure [kPa (bar, kg/cm^2, psi)/rpm]		1,226 (12.2, 12.5, 178)/ 250	1,275 (12.8, 13.0, 185)/ 250	1,226 (12.2, 12.5, 178)/ 250
Engine speed control system		Engine Control System, electronically controlled throttle		
Fuel in use (Note 1)		Unleaded regular gasoline	At 20P	See the left column
Maximum output [kW (PS)/rpm]		45 (61.1)/2,700	45.8 (62.3)/2,700	45.5 (61.9)/2,700
Maximum torque [N·m (kg-m)/rpm]		170 (17.3)/1,600	186 (19)/1,600	184 (18.8)/1,600
Valve opening/closing timing (degree)	Intake open (ATDC)	4		
	Intake close (ABDC)	40		
	Exhaust open (BBDC)	36		
	Exhaust close (ATDC)	0		
Valve clearance mm (in)	Intake (when engine is hot)	0.38 (0.0150)		
	Exhaust (when engine is hot)	0.38 (0.0150)		
Firing order		1-3-4-2		
Ignition timing (idling)	degree (BTDC)	0		
On board idle speed (rpm)	ATM	700		
	MTM	700		
On board high-idle speed (rpm)	ATM	2,700		
	MTM	2,700		
Allowable maximum engine speed (rpm)	Instantaneous, no load	3,600		
	Continuous load	3,000		
PTO system		Silent chain-driven/side PTO		
Engine oil (originally fitted)	Specification	10W-30 (Class SJ)		
	Amount 2 (US qt, Imp qt)	3.7 (3-7/8, 3-1/4) (including oil filter)		
Engine dimensions (length x width x height) (Note 2) mm (in) width = maximum		716.8 x 568 x 720 (28.220 x 22.362 x 28.346)		
Engine weight (w/o coolant, w/ oil) (Note 2) N (kg, lb)		1,353 (138, 304)		

Note 1: Fuel
Gasoline: Use unleaded regular gasoline with an octane rating of 91 or more.
LPG: Use a fuel of 30P or more in cold seasons. In ambient temperature of 23° F (-5°C) or less, use a 100P fuel.

Note 2: The engine dimensions and weight differs with the customer specifications. The above data should be deemed as reference.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 12 of 223 pages

The full manual includes:

- All 223 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Komatsu K21, K25 Service Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual