

SECTION 1

ENGINE

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GENERAL DESCRIPTION

CAUTIONS FOR HANDLING

The engine includes many parts which were cut and grinded in the tolerance of 1/1000mm and it should be handled with special care in terms of cleanliness upon checking and repairing its inside parts. It is important to keep the engine clean as a habitual manner upon repairing its processed and abraded surface.

- Upon reassembly, apply enough engine oil on the abraded surface for protective lubrication.
- Upon removing valves, pistons, piston rings, connecting rods, connecting rod bearings, crankshaft and journal bearings, arrange it in order not to be confused when it is reassembled.
- Disconnect (—) cable from the battery before the repair of engine to avoid the possible damages on the electrical parts or harness.

The engine cylinders are identified by numbers of No.1, No.2, and No.3 (from the crank pulley side to flywheel side).

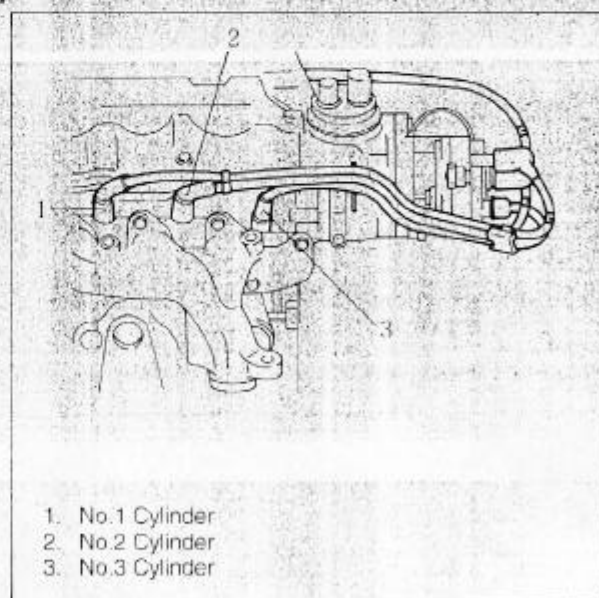


FIG. 1 — 1 NUMBERS OF CYLINDERS

CAUTIONS FOR ENGINE INSPECTION AND MAINTENANCE

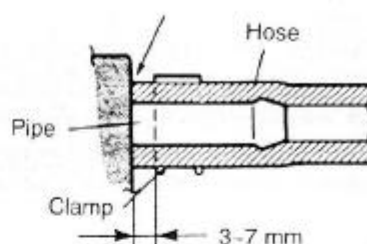
Keep the following cautions to prevent possible damage and obtain the best performance upon checking and maintaining engine.

- Keep the jack away from the bottom part of oil pan while supporting the engine. Due to the narrow gap between oil pan and oil pump strainer, getting the jack touched oil pan can cause damage to the strainer by direct contact.
- Disconnect (—) cable of battery for sure upon engine work.
- When to remove the air cleaner or intake manifold, install a protective cover on the intake to prevent the engine from foreign material input. If foreign material is come into the cylinder through the intake manifold, it may cause a serious damage upon running engine.

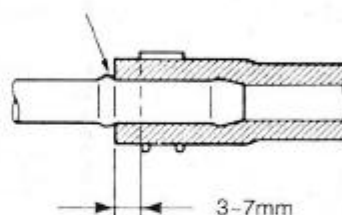
CAUTIONS FOR FUEL SYSTEM INSPECTION AND MAINTENANCE

- Work in a place with excellent ventilation and no fire source. No smoking is allowed.
- When fasten the plug bolt on the union bolt such as fuel filter union bolts, the gasket should be replaced with new one and tighten it with specified torque.
- When tighten the fuel pipe flare nut, tighten it with hand first and then with specified torque.
- The connecting methods of fuel hose depend upon the pipe types. Refer to the methods shown in the figure.
- Check the fuel system first for fuel leakage and then take the following procedures.
- Apply the pressure to the fuel line by operating fuel pump in accordance with "On-car service procedures of fuel pump".
- Check the leaking point of the fuel system in this state.

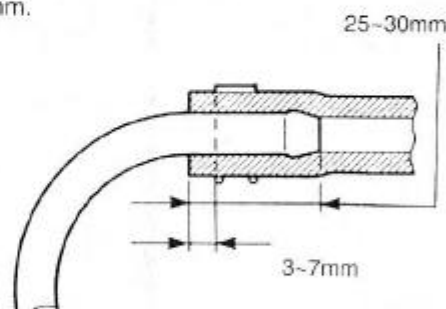
As for the short pipe, insert the hose until it contacts to the pipe joint.



Insert the hose up to the lug of pipe



As for the bent pipe, insert the hose up to the bent part of the pipe. Joining length is about from 25mm to 30mm.



As for the straight pipe, insert the hose with the joining length of 25mm — 30mm.

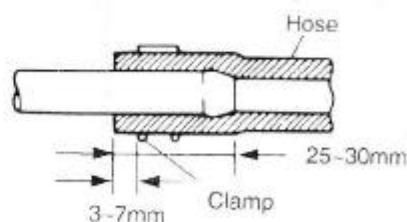


FIG. 1 — 2 HOSE CONNECTION

TROUBLESHOOTING FOR ENGINE

Condition	Probable Cause	Correction
Hard starting (with normal cranking)	Malfunction of ignition system <ul style="list-style-type: none"> • Fuse • Faulty spark plug • Electric leakage at high tension cord • Poor connection of high tension cord or lead wires • Misadjustment of signal rotor air cap • Improper ignition timing • Faulty ignition coil • Damage or loosening of distributor rotor and cap Malfunction of the fuel system <ul style="list-style-type: none"> • Lack of fuel in the fuel tank • Dirty or clogged fuel filter • Clogged fuel pipe • Malfunction of fuel pump Low compression pressure <ul style="list-style-type: none"> • Poor tightening spark plug or poor condition of gasket • Inadequate valve clearance • Leakage of valve seat • Interference of valve stem • Low elasticity or damage of valve spring • Leakage at cylinder head gasket • Abnormal interference or damage of pistons and cylinders • Excessive wear of pistons, rings, and cylinders Others <ul style="list-style-type: none"> • Broken valve timing belt • Malfunction of P.C.V. valve • Loosening, damage or leakage of vacuum hose 	<ul style="list-style-type: none"> • Replace • Clean, adjust the plug gap or replace • Replace • Replace • Adjust • Adjust • Replace • Replace • Feed fuel • Replace • Clean • Replace • Tighten to the specified torque or replace gasket • Adjust • Repair seat • Repair or replace valve or valve guide • Replace • Replace • Replace piston ring • Replace ring and piston and boring or replace cylinder • Replace • Check and replace if necessary • Connect correctly or replace the hose
Lack of engine power	Low compression pressure Malfunction of ignition system <ul style="list-style-type: none"> • Improper ignition timing • Faulty spark plug • Distributor • Electric leakage or poor connection of high tension cord • Malfunction of advance angle system 	<ul style="list-style-type: none"> • See above • Adjust • Adjust or replace • Repair or replace including rotor • Replace or connect correctly • Adjust or replace

Condition	Probable Cause	Correction
Lack of engine power	Malfunction of fuel system <ul style="list-style-type: none"> • Clogged carburetor • Clogged fuel pipe • Dirty or clogged fuel filter • Dirty or clogged air cleaner element • Poor intake manifold gasket Others <ul style="list-style-type: none"> • Dragging brakes • Slipping clutch • Poor quality gasoline 	<ul style="list-style-type: none"> • Disassemble and clean • Clean • Replace • Replace or clean • Replace • Repair or replace • Adjust or replace
Rough engine Idling	Malfunction of fuel system <ul style="list-style-type: none"> • Carburetor is dirty and clogged • Dirt and blocking in air cleaner element • Poor manifold, cylinder head gasket Malfunction of ignition system <ul style="list-style-type: none"> • Malfunction of ignition system • Electric leakage, poor connection of high tension cord • Abrasion of distributor rotor • Poor ignition timing • Loosening or damage of distributor cap Low compression pressure Others <ul style="list-style-type: none"> • Poor connection or damage or leakage of vacuum hose • Malfunction of P.C.V. valve 	<ul style="list-style-type: none"> • Disassemble and clean • Clean or replace • Replace • Adjust or replace • Replace or connect correctly • Replace • Adjust • Replace • See preceding page • Replace or connect correctly • Check and replace if necessary
Engine hesitate (Upon pressing accelerating pedal, the engine makes delayed response. This situation is remarkable when cruising or starting.)	Malfunction of ignition system <ul style="list-style-type: none"> • Poor ignition timing • Poor spark plug, poor adjustment of plug gap • Electric leakage, poor connection of high tension cord Malfunction of fuel system <ul style="list-style-type: none"> • Malfunction of air cleaner system • Leakage at manifold gasket Low compression pressure	<ul style="list-style-type: none"> • Adjust • Replace, adjust the gap • Replace or connect correctly • Clean or replace • Replace • See preceding page
Engine Surging (Engine power makes fluctuation in a fixed speed and speed changes without operating the accelerating pedal.)	Malfunction of fuel system <ul style="list-style-type: none"> • Clogged fuel filter • Clogged or damaged fuel hose or pipe • Vacuum leakage at the intake passage. Malfunction of ignition system <ul style="list-style-type: none"> • Improper ignition timing • Malfunction of distributor advance angle system (governor or vacuum advance angle system) 	<ul style="list-style-type: none"> • Replace • Clean or modify • Replace gasket and tighten bolts or nuts • Adjust • Check, replace if necessary

Condition	Probable Cause	Correction
Engine Surging (Engine power makes fluctuation in a fixed speed and speed changes without operating the accelerating pedal.)	<ul style="list-style-type: none"> • Electric leakage, poor connection of high tension cord • Malfunction of spark plug(excessive carbon deposit, inadequate gap, melted electrode) • Loosening or damage of distributor cap or rotor Low compression pressure Others <ul style="list-style-type: none"> • Leakage of vacuum hose 	<ul style="list-style-type: none"> • Replace or connect correctly • Replace • Replace • See preceding page • Replace or connect correctly
Excessive detonation (According to the opening range of throttle valve, knocking sound of metallic is made with abnormal explosion.)	Overheated engine Malfunction of ignition system <ul style="list-style-type: none"> • Abnormal spark plug • Poor ignition timing • Electric leakage of high tension cord, poor connection Malfunction of fuel system <ul style="list-style-type: none"> • Blocking fuel filter, fuel line • Leakage at intake manifold gasket Others <ul style="list-style-type: none"> • Excessive carbon deposit due to abnormal combustion 	<ul style="list-style-type: none"> • See overheated engine section • Replace • Replace • Adjust • Replace or connect correctly • Replace or clean • Replace gasket • Remove carbon
Overheat	<ul style="list-style-type: none"> • Lack of coolant • Malfunction of thermostat • Poor water pump performane • Misadjustment of ignition timing • Clogged or leaky radiator • Poor engine oil • Blocking oil filter, strainer • Lack of oil • Poor oil pump performance • Leakage of oil • Dragging brakes • Slipping clutch • Damage of cylinder head gasket 	<ul style="list-style-type: none"> • Refill • Replace • Replace • Adjust • Clean, repair, replace • Replace with specified one • Replace or clean • Refill • Replace or repair • Repair • Repair or replace • Adjust or replace • Replace
Poor fuel consumption	Fuel system <ul style="list-style-type: none"> • Leakage of fuel • Clogged air cleaner element Malfunction of ignition system <ul style="list-style-type: none"> • Improper ignition timing • Electric leakage, poor connection of high tension cord 	<ul style="list-style-type: none"> • Repair or replace • Clean or replace • Adjust • Replace or connect correctly

Condition	Probable Cause	Correction
Low fuel consumption	<ul style="list-style-type: none"> • Abnormal spark plug(excessive carbon deposit, inadequate gap, burnt electrode) • Malfunction of distributor advance angle system (governor, vacuum advance angle system) Low compression pressure Others <ul style="list-style-type: none"> • Abnormal valve clearance • Slipping clutch • Poor operation of thermostat • Low pressure of tires 	<ul style="list-style-type: none"> • Replace • Check, replace if necessary • See preceding page • Adjust • Adjust or replace • Replace • Adjust
Excessive consumption of engine oil	Leakage of oil <ul style="list-style-type: none"> • Loosened oil drain plug • Loosened oil pan bolt • Leakage at crankshaft oil seal • Leakage at cylinder head cover gasket • Loosened oil filter • Loosened oil pressure switch • Damage of cylinder head gasket • Leakage of camshaft oil seal Oil mixing in combustion chamber <ul style="list-style-type: none"> • Stuck piston ring • Abrasion piston, cylinder • Abrasion of piston ring, ring groove • Inadequate position of piston ring cutting part • Abrasion or damage of valve system 	<ul style="list-style-type: none"> • Tighten • Tighten • Replace • Replace • Tighten • Tighten • Replace • Replace • Remove carbon and replace piston ring • Boring or replace • Replace piston, piston ring • Adjust the position • Replace
Low oil pressure	<ul style="list-style-type: none"> • Inadequate oil viscosity • Loosening of oil pressure switch • Lack of oil • Blocking oil strainer • Lowered function of oil pump • Abrasion, damage of oil pump relief valve 	<ul style="list-style-type: none"> • Replace with the specified • Tighten • Refill • Clean • Replace • Replace
Engine noise	Valve noise <ul style="list-style-type: none"> • Inadequate valve clearance • Abrasion of valve stem, guide • Malfunction of valve spring Piston ring, cylinder noise <ul style="list-style-type: none"> • Abrasion of piston, ring or cylinder 	<ul style="list-style-type: none"> • Adjust • Replace • Replace • Boring or replace

Condition	Probable Cause	Correction
Engine noise	Connecting rod noise <ul style="list-style-type: none">• Abrasion of connecting bearing• Abrasion of crank pin• Loosened connecting rod nut Crankshaft noise <ul style="list-style-type: none">• Low oil pressure• Abrasion of bearing• Abrasion of crankshaft journal• Loosened bearing cap bolt• Excessive clearance of crankshaft thrust bearing (end play)	<ul style="list-style-type: none">• Replace• Replace• Replace• See preceding page• See preceding page• Grind or replace• Tighten to specified torque• Adjust or replace