



Service Manual

GM 4.3L, G6 Gasoline Engine

003103-up

For use with the FGC35K-FGC70K;
FG35-FG50; FG40K-FG50K Chassis Service Manuals.

99789-74120

Sealers, Adhesives and Lubricants

Application	Type of Material	GM Part Number	MCFA Part Number
Balancer Shaft Driven Gear Bolt	Threadlock	12345382	A000006061
Camshaft Retainer Bolt	Threadlock	12345382	A000006061
Crankshaft Balancer Keyway	Adhesive	12346141	A000000165
Cylinder Head Bolt	Sealant	12346004	2I4256
Engine Block to Crankshaft Rear Oil Seal Housing Junction at the Oil Pan Sealing Surfaces	Adhesive	12346141	A000000165
Engine Block to Engine Front Cover Junction at the Oil Pan Sealing Surfaces	Adhesive	12346141	A000000165
Engine Block at the Lower Intake Manifold Sealing Surfaces	Adhesive	12346141	A000000165
Engine Block Coolant Drain Hole Plug	Sealant	12346004	2I4263
Engine Block Oil Gallery Plug	Sealant	12346004	2I4263
Engine Coolant Temperature (ECT) Gauge Sensor	Sealant	12346004	2I4263
Engine Oil	SAE 5W30 Oil	12345610 5QT	
Engine Oil Pressure Sensor	Sealant	12346004	2I4263
Engine Oil Pressure Sensor Fitting	Sealant	12346004	2I4263
Engine Oil Supplement	Lubricant	1052367	
Exhaust Manifold Bolt/ Stud	Threadlock	12345382	A000006061
Expansion Cup Plug (Balance Shaft Rear Bearing Hole)	Sealant	12346004	2I4263
Expansion Cup Plug (Camshaft Rear Bearing Hole)	Sealant	12346004	2I4263
Lower Intake Manifold Bolt	Threadlock	12345382	A000006061
Oil Level Indicator Tube	Sealant	12346004	2I4263
Oil Pump Screen Tube	Sealant	12346004	2I4263
Valve Rocker Arm Stud	Threadlock	12345493	2I4256
Valve Train Component Prelube	Lubricant	12345501	
Water Pump Bolt	Sealant	12346004	2I4263

Form-In-Place Gasket (FIPG)

The engine has several places where the form-in-place gasket (FIPG) is in use. To ensure the gasket is fully sealed, use the following precautions when applying the FIPG:

1. It is absolutely necessary to apply the sealant in the right amount, evenly and without a break.
2. Bead size, continuity, and location are crucial to a good seal. Too thin a bead causes leakage. Too thick a bead can be squeezed out of location and cause blockage or narrowing in the fluid feed line.

NOTE

Since the FIPG used in the engine hardens as it reacts with moisture in the air, it is normally used in the metallic flange area.

Disassembly

The parts assembled with the FIPG can be easily disassembled. Break the seal by striking it with a mallet or by inserting a flat, thin gasket scraper and hammering it through the joint. Use caution to prevent damage to the joined parts.

Surface Preparation

Use a gasket scraper or wire brush to thoroughly remove all surface oil and dirt from all gasket application surfaces. Completely remove any old FIPG still remaining in the bolt holes. All application surfaces must be flat.

Form-In-Place Gasket Application

Apply the FIPG in a smooth, continuous bead without any breaks. Also cover the bolt hole circumference with an even, continuous bead. Wipe away any excess and mount the parts while the FIPG is still wet (15 minutes or less). Check the mounted parts and wipe away any excess sealant.

Electrical Throttle and Governor Control System

System Operation

Description

This controller activates gasoline engine carburetor with a stepping motor to vary air-fuel ratio for controlling engine rpm. Engine rpm is controlled by varying the position of the accelerator pedal. It has a built-in fault detection circuit to provide a fail-safe processing function.

Characteristics

Low idle: 750 ± 50 rpm

High idle: 2650 rpm

Speed regulation (rated load): $\pm 50\%$ (at 2650 rpm)

Instantaneous maximum speed: 2800 rpm

Governor: All-speed type

Fail-safe processing function

This controller detects any of the following faults to perform necessary fail-safe processing and causes the check lamp to indicate error codes in a flickering manner, thereby alerting the operator of a malfunction.

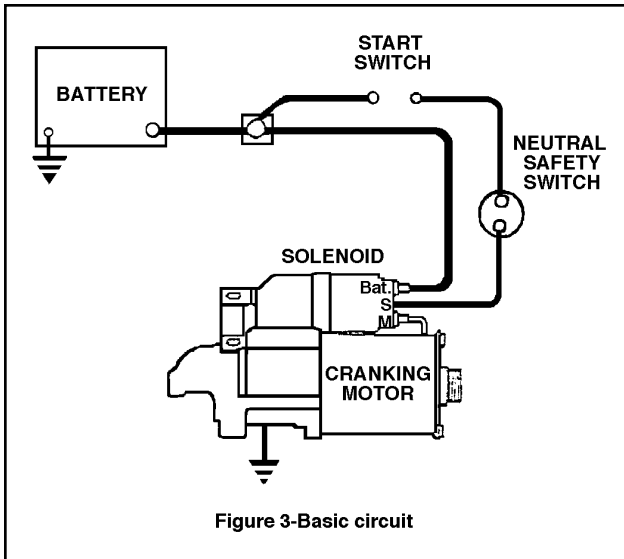
A fault code is stored in the memory even after the power has been turned OFF and, when the diagnostic switch is turned ON, it is displayed.

1. Engine Over Speed
2. Accelerator sensor fault
3. Idle switch fault
4. Throttle CLOSE position detection switch fault
5. Throttle OPEN position detection switch fault
6. Stepping motor fault
7. Rotary pulse fault
8. Alternator fault

The motor output shall perform PWM of approximately 60% to prevent the motor from overheating.

Starter Motor Testing

Electrically the motor consists of the brush assembly and the armature. The solenoid contains pull-in and hold-in windings, and the motor external wiring is the same as field-coil motors. No periodic maintenance or lubrication is required.



In the basic circuit, the solenoid windings are energized when the switch is closed. The resulting plunger and shift lever movement causes the pinion to engage the engine flywheel ring gear and the solenoid main contacts to close, and cranking takes place. When the engine starts, pinion overrun protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage. To prevent excessive overrun, the switch should be opened immediately when the engine starts.

Troubleshooting

Cranking Circuit

Before removing any unit in a cranking circuit for repair, the following checks should be made.

Battery: Ensure that the battery is fully charged, and that it passes the load test. The starting motor cannot operate properly if the battery is discharged or defective.

Wiring: Inspect the wiring for damage. Inspect all connections to the cranking motor, solenoid, ignition switch or any other control switch, and battery, including all ground connections. To eliminate any excessive resistance, disconnect and wire brush all wiring connectors in the cranking circuit. This will ensure optimum performance from the wiring. Cables, when properly attached at the battery side terminals, are sealed and normally required no periodic maintenance attention.

Switches: Inspect all switches to determine their condition. With switches closed, use a voltmeter to check the circuit for continuity. Replace defective switches and wiring as required.

Motor: If the battery, wiring and switches are in satisfactory condition, and the engine is known to be functioning properly, remove the motor and follow the test procedures outlined below.

Regardless of the construction, never operate the cranking motor more than 30 seconds at a time without pausing to allow it to cool for at least two minutes. Overheating caused by excessive cranking will seriously damage the cranking motor.

Cranking Motor Tests

With the cranking motor removed from the engine, the pinion should be checked for freedom of operation by turning it on the screw shaft. The armature should be checked for freedom of rotation by prying the pinion with a screwdriver. Tight bearings or a bent armature shaft will cause the armature not to turn freely. If the armature does not turn freely the motor should be replaced.

Diagnostic Information and Procedures, continued

Checks	Action
Abnormal Internal Engine Noises	1. Start the engine and determine if the noise is timed to the engine camshaft speed or the crankshaft speed. 2. Using a timing light, two knocks per flash is the crankshaft speed and one knock per flash is the engine camshaft speed. 3. If the noise is timed to the engine camshaft speed, inspect the following: • Missing or loose valve train components • Worn or loose valve rocker arms • Worn or bent valve pushrods • Faulty valve springs • Bent or burnt valves • Worn engine camshaft lobes • Worn or damaged camshaft timing chain and/or sprockets Important: A slight COLD knock or piston slapping noise could be considered normal if not present after the engine has reached normal operating temperatures. If the knock is timed to the crankshaft speed, inspect the following: • Worn crankshaft or connecting rod bearings • Piston rod cylinder damage • Worn piston or piston pin • Faulty connecting rod • Excessive carbon build-up on the top of the piston
No Abnormal Internal Engine Noise	1. Inspect for a worn or improperly installed camshaft timing chain and/or sprockets. 2. Remove the valve rocker arm cover on the side of the engine with the cylinder that is misfiring. 3. Inspect for the following: • Loose valve rocker arm studs • Bent valve push rods • Faulty valve springs • Faulty valve lifters (bleeding down) • Worn or improperly seated valves • Worn engine camshaft lobes

Engine Compression Test

1. Engine should be at room temperature.
 - a. Disconnect the Battery terminal and the terminal connector from the distributor.
 - b. Remove the spark plugs.
 - c. Block the throttle body plate wide open.
 - d. Battery should be at or near full charge.
2. For each cylinder, crank engine through four compression strokes (four puffs).
3. The lowest reading cylinder should not be less than 70% of the highest cylinder. No cylinder reading should be less than 689 kPa (100 psi). For example, if the highest pressure in any one cylinder is 1035 kPa (150 psi), the lowest allowable pressure for any other cylinder would be 725 kPa (105 psi). $1035 \times 70\% = 725$ ($150 \times 70\% = 105$).
4. If some cylinders have low compression, inject approximately 15 ml (one tablespoon) of engine oil into the combustion chamber through the spark plug hole.
 - Normal - Compression on each cylinder builds up quickly and evenly to specified compression.
 - Piston Rings Leaking- Compression low on first stroke. Tends to build up on the subsequent strokes but does not reach normal. Improves considerably with addition of oil.
 - Valves Leaking- Compression low on first stroke. Does not tend to build up on the subsequent strokes. Does not improve much with addition of oil. Use approximately three squirts of oil from a plunger type oiler.
 - If two adjacent cylinders have lower than normal compression, and injecting oil into the cylinders does not increase the compression, the cause may be a head gasket leaking between the two cylinders.
5. Install the removed parts.
6. Connect the disconnected components.

Full Version Available

Mitsubishi FG50 Forklift Engine Service Manual (99789-74120)

Mitsubishi FG50 engine service manual, factory LPG engine diagnostics and repair procedures in searchable PDF. Instant PDF download.

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