CAT® Lift Trucks

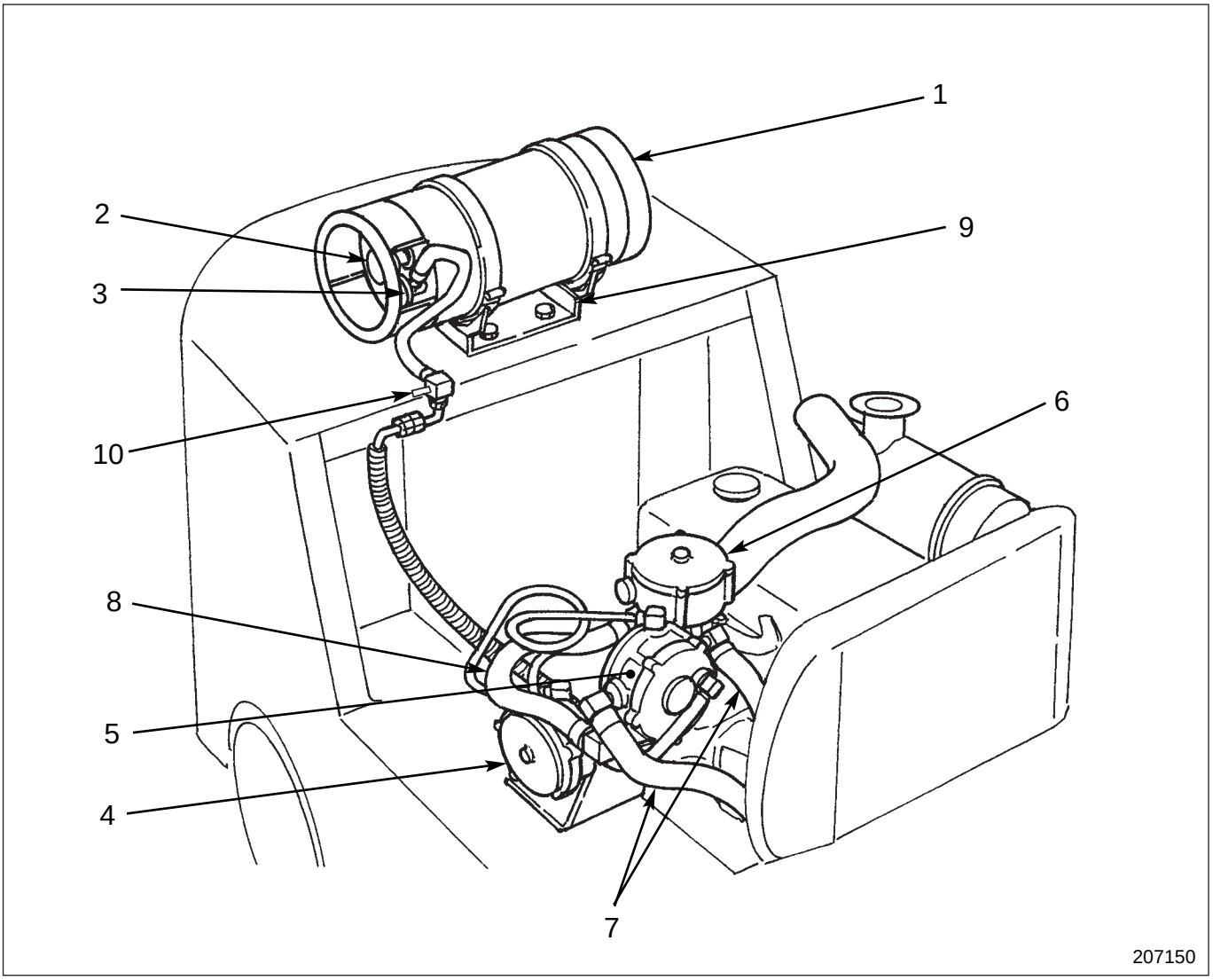
Service Manual

Liquefied Petroleum Gas Supplement

4G63	**AA0001-ZZ9999**
4G64	**AA0001-ZZ9999**
6G72	**0A0001-0Z9999**

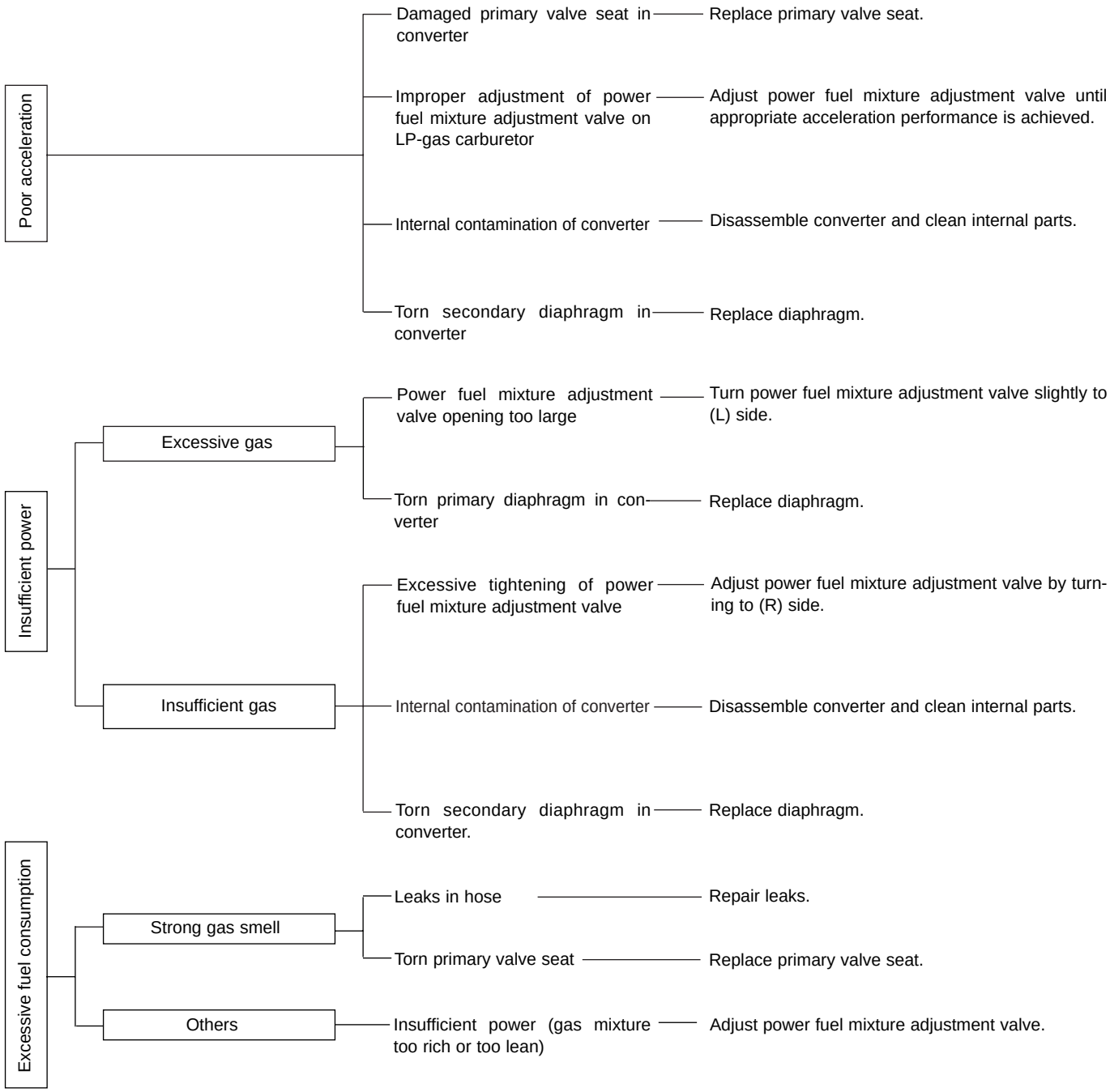
For use with 4G63, 4G64 & 6G72 Engine Service Manuals. **99729-85100**

2. LP-gas device layout



1 LP-gas tank
2 LP-gas charge valve
3 LP-gas outlet valve
4 Vacuum fuel lock filter
5 Converter (vaporizer)
6 LP-gas carburetor
7 Hot-water hose
8 Gas outlet hose
9 Tank bracket
10 Relief valve hydrostatic

PRE CARB TROUBLESHOOTING



5. Disassembly and reassembly of LP-gas filter, fuel lock (VFF30)

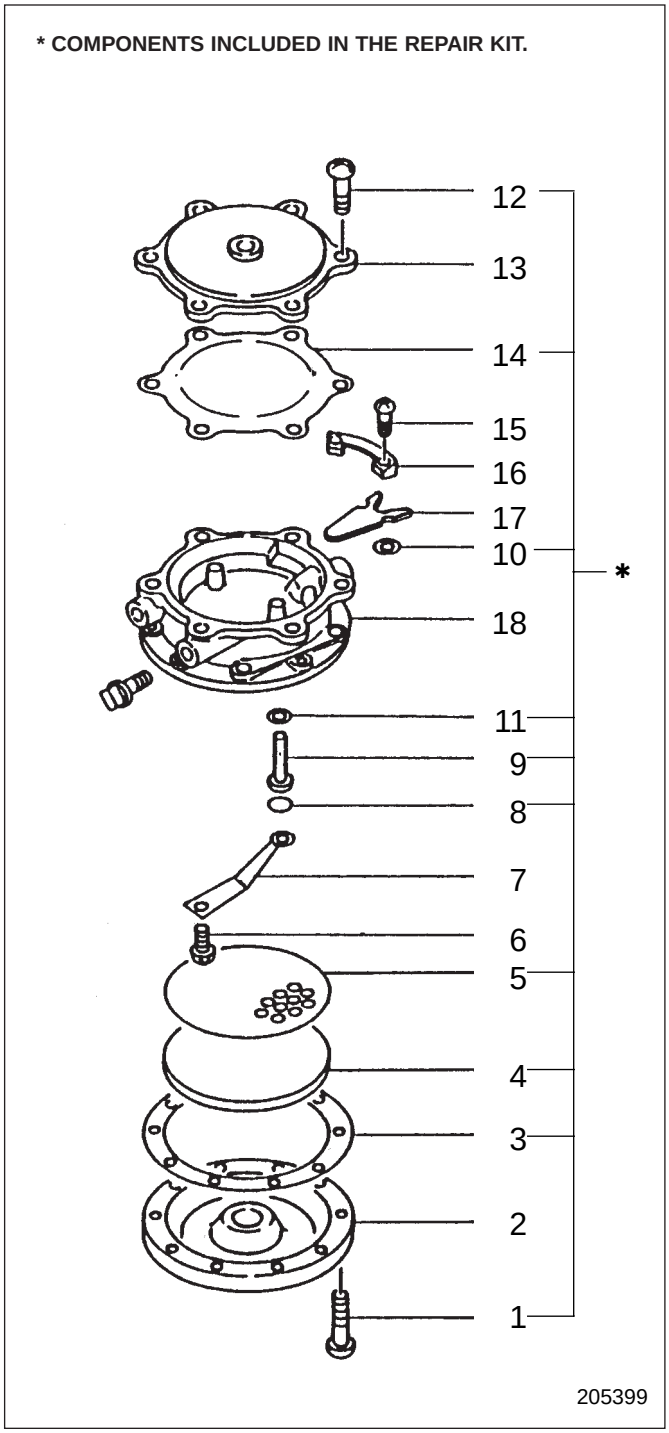
⚠ CAUTION

1. **DO NOT use Teflon thread tape on any of the NPT pipe-thread fittings where fuel travels. Use a suitable fuel resistant joint compound.**
2. **Be sure to leak-check all fittings and covers for fuel tanks, using a soapy solution.**
3. **Be sure to use proper mounting bolts to secure the lockoff. Bolts which are too long may cause severe damage to the lockoff.**

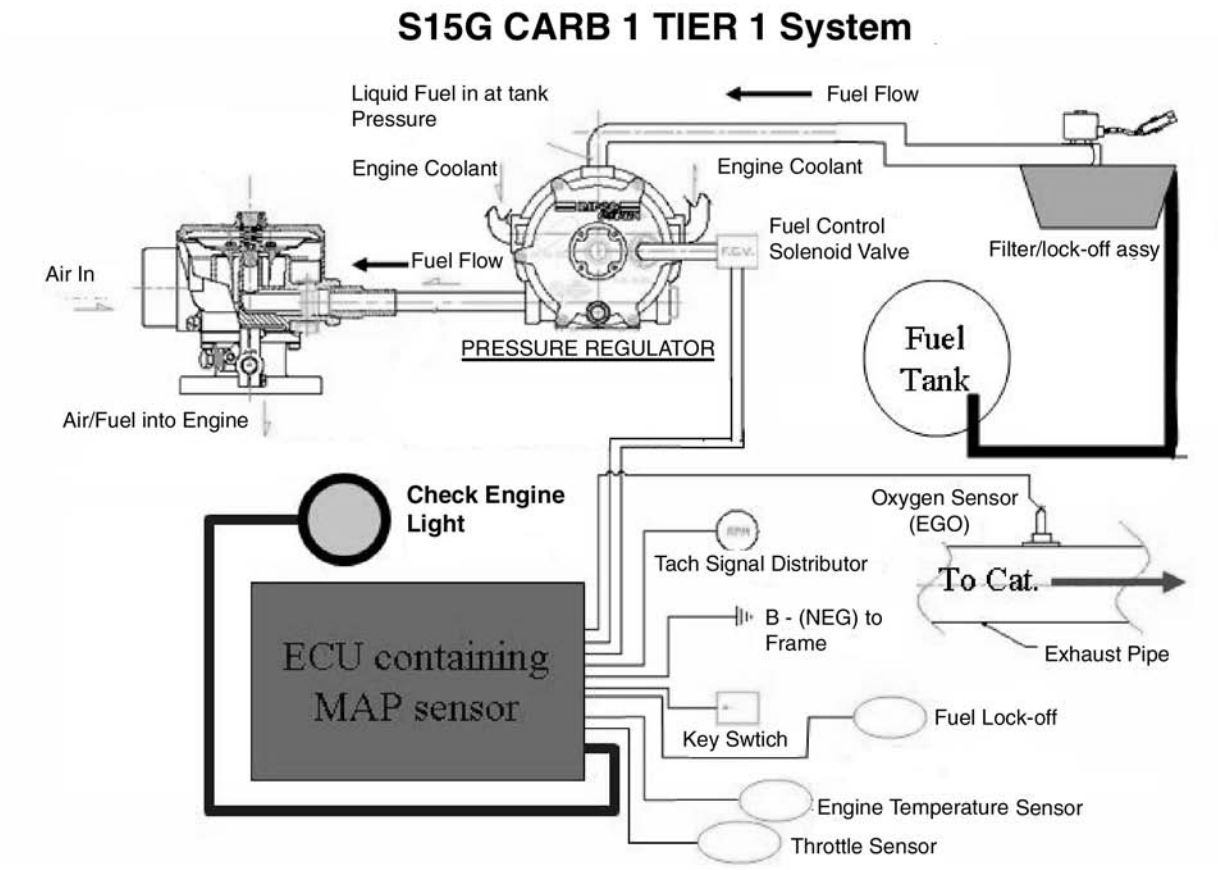
Disassembly

Disassembly sequence

1 Screw (10)
2 Filter cover
3 Gasket
4 Filter
5 Screen
6 Screw (1)
7 Valve spring
8 Valve seat
9 Valve operating pin
10 Retaining washer
11 O-ring lip seal
12 Screw (6)
13 Diaphragm cover
14 Diaphragm
15 Screw (2)
16 Fulcrum
17 Valve operating lever
18 Valve body



1. Outline of CARB Tier 1 LP-gas system



Function of components

2. Fuel Control Operation:
When the operator turns the key to start the engine, the ECU power supply is activated. After the engine starts the distributor provides a signal to the ECU by a connection in the wiring harness that provides the current RPM. Once the ECU detects a RPM, a ground circuit is activated to the electronic LP lock off, to "open" the valve and allows the LP gas to begin flowing. The electronic LP lock off is normally closed when the engine is not running.

Upon start-up the ECU monitors for engine temperature and will adjust the air-fuel control valve rich to compensate for the cold engine. The idle RPM is increased (over the base idle set speed of 700RPM) during the warm-up period. During the warm-up period, the A/F ratio is determined by presets in the ECU and not influenced by the oxygen sensor. This is called “Open Loop mode”. The engine will NOT operate in "closed loop" fuel control until the following conditions have occurred.
1) Engine must be warmed to operating temperature.
2) The operator must have applied accelerator input causing the engine RPMs to exceed 2000 RPMs for a brief period of time.

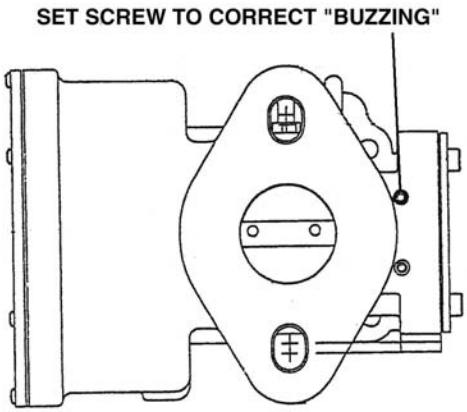
Once the engine is operating in closed loop mode, the ECU will begin to actively adjust the fuel flow to keep the A/F ratio at stoichiometric. Stoichiometric is the A/F ratio that allows maximum combustion efficiency and allows the catalytic converter to minimize the exhaust pollutants. If the A/F ratio is not kept at stoichiometric, the catalyst will not operate correctly. If the ECU detects that the closed loop control system is not operating correctly and the A/F ratio is not in the normal range for longer than 90 continuous seconds, the check engine light will illuminate and a "limp home" feature is activated and the maximum engine RPM is limited to 1800. If the engine is operated at high RPMs and high hydraulic use or intense driving demands while the closed loop fuel control system is not operating properly, damage to the catalyst may result. When the ignition switch is turned off, the error recorded by the ECU is reset. The S-15G ECU does not store error codes. Upon restart, the engine will operate normally unless an error is again detected. Periodic illumination of the check engine light does not necessarily indicate a fuel control system malfunction. Poor fuel quality, improper system operation and running an LP tank dry can also cause a "closed loop" error which will be displayed on the diagnostic monitors as an "OXY" code.

By monitoring changes in MAP and RPM the ECU can determine the engine load, if the engine is accelerating or decelerating the ECU will calculate a suitable increase or decrease in A/F to match the engine condition. The fuel flow is controlled by the Fuel Control Solenoid Valve (FCSV). The FCSV is a 12 volt electrically operated solenoid valve that is inline between the vacuum port on the mixer and the regulator converter assembly. The FCSV is normally in the closed position when no voltage is provided.

The mixer, the FCSV, and the regulator are connected by a network of vacuum lines. The FCSV operates at specific "DWELL" based on fuel requirements. A 50% dwell means the valve is open 50% of the time and closed 50% of the time. A DWELL of 100% indicates that the valve is open 100% of the time and the fuel control system is at full "lean". A DWELL of 0% indicates that the valve is closed 100% of the time and the fuel control system is full "rich". Normally, the FCSV will operate at a DWELL between 20-80 depending on local atmospheric factors, engine temperature, operating conditions, and fuel quality. As the FCSV opens it allows engine vacuum, as supplied by the vacuum port on the mixer, to reach the diaphragm chamber on the regulator converter assembly. As this engine vacuum reaches the diaphragm chamber, it "pulls" on the diaphragm which in turn reduces the fuel pressure supplied to the engine. The reduction in

1.4. Problem: The check engine light comes on intermittently while the engine is allowed to idle for extended periods of time.

Analysis: Some trucks in the field can occasionally have this happen. In the event this problem occurs and also is accompanied by a "buzzing" noise coming from the mixer. This "buzzing" can be corrected by adjusting the "minimum" limit set screw on the throttle body.



1) Remove the throttle body from the intake manifold.
2) Locate the correct setscrew. (see diagram for location of setscrew)
3) Turn the screw counter clockwise 1 turn.
4) Reinstall the throttle body and check for operation.
5) If not corrected repeat the same procedure as above and rotate the setscrew an additional HALF turn counterclockwise.
6) If problem is not corrected contact your local Authorized Caterpillar dealer for further assistance.