6-3.7.3. Oil Pump Operational Check

1. Perform a Maintenance Preflight Inspection according to Section 6-3.7.2.
2. Perform a normal “Engine Start” according to instructions in Section 7-3.2 and “Ground Run-up” according to Section 7-3.3 to allow the engine to warm to normal operating temperatures.
3. Oil Pressure..... Check
   RESULT: Verify oil pressure is between 30 and 60 psi at cruise power RPM. If necessary, adjust according to the “Oil Pressure Adjustment” instructions in Section 6-3.10.1. If no oil pressure is noted, shut down the engine immediately and investigate the cause.
4. If no further checks are required, proceed to “Engine Shutdown” on page 21.

6-3.7.4. Fuel System Operational Check

A fuel system operational check is required after replacement of fuel injection system components, such as the fuel pump, fuel manifold valve, or fuel injectors. The fuel system setup is a critical component of proper engine operation.

Setup instructions differ for the fuel system, depending on the test equipment being used. If a Porta-Test Unit will be used for the operational check, follow the test equipment setup instructions in Section 6-3.7.4.1. If using calibrated gauges for the operational check, begin with Section 6-3.7.4.2.When the test equipment is set up properly, proceed with the Operational Check Procedure in Section 6-3.7.4.3.

NOTE: Fuel system adjustments are interactive. Once begun, perform the entire procedure for proper fuel injection system operation.

Required Test Equipment

- Portable Tachometer
- Model 20 ATM-C Porta Test Unit

OR

- Calibrated pressure gauges

  NOTE: Pressure gauges must be accurate within +/- 1%. The calibration period should not exceed one year.

  - A calibrated 0-60 psi gauge graduated in 1 psi increments (unmetered pressure).
  - A calibrated differential pressure gauge, 0-30 psid maximum graduated in 0.2 psi increments (metered pressure and fuel flow gauge verification).
  - Two P/N MS51523-B4 swivel tees used to insert gauges in line with fuel lines for metered and unmetered pressure references.
  - Hoses of sufficient length to allow personnel and equipment to perform the test at a safe distance from the propeller arc and blast area.

    NOTE: Engine driven fuel pump pressures vary with engine RPM. Rated FULL POWER RPM may not be achieved during ground run-up. Use the

Fuel Flow Compensation Table to adjust the metered pressures if FULL POWER RPM cannot be achieved.

Table 6-4. Static Ground Setup Compensation Table

Static Engine RPM	Correction Factor	Corrected Metered Pressure
Metered pressure vs. RPM @ 70° F fuel temperature		
Rated RPM	1	
-20	.991	
-40	.982	
-60	.973	
-80	.964	
-100	.955	
-120	.946	

Procedure

To determine the appropriate correction factor:

Subtract the maximum static RPM from the maximum rated RPM.

Locate the number closest to the difference between rated RPM and maximum static RPM.

Multiply the correction factor adjacent to the maximum static RPM by the rated metered pressure to determine the corrected metered pressure.

Example: TSIO-550-C rated RPM 2600
Maximum static RPM 2560
Difference 40

Maximum Static RPM	Metered Pressure Range	Correction Factor	Corrected Metered Pressure
2560 (-40)	12.7 -13.9 x	.982=	12.47 - 13.65

6-3.7.4.1. Fuel System Operational Checkout with the Port-Test Unit

Procedure

1. Loosen the unmetered fuel supply hose from either the fuel pump outlet fitting or the fuel control inlet fitting, depending on access to connections.
2. Connect one MS51523-B4 swivel tee to the fuel connection loosened in step 1.

   NOTE: Some installations may require a number of fittings to adapt the metered and unmetered test equipment to the fuel injection system.Connect the unmetered fuel supply hose to the straight end of the tee connector.

3. Connect the unmetered fuel supply hose to the straight end of the tee connector.
4. Connect the Porta-Test Unmetered Pressure hose to the tee connector.
5. Remove the cap from the metered fuel port fitting on the fuel manifold valve.
6. Disconnect and upper deck pressure fitting at the throttle body or intake manifold. Install an MS51523-B4 swivel tee in line with the upper deck pressure fitting.
7. Connect the Porta Test Unit metered pressure test hose to the metered pressure fuel port on the fuel manifold valve fitting.
8. Connect the Porta Test Manifold Pressure and Upper Deck Pressure hose to the engine according the Porta Test instructions.
9. Torque all connections to Appendix B specifications.
10. Position the throttle control to the FULL OPEN position and the mixture control to FULL RICH. Operate the aircraft boost pump in accordance with the aircraft manufacturer's instructions. Bleed the air from the test unit and hoses according to the Porta-Test unit instructions.

WARNING

Drain all fuel from the induction system prior to attempting engine start. Failure to comply may result in hydraulic lock ad subsequent engine failure.

11. Install the engine cowling or cooling shroud during ground operation.
12. Proceed to Section 6-3.7.4.3.

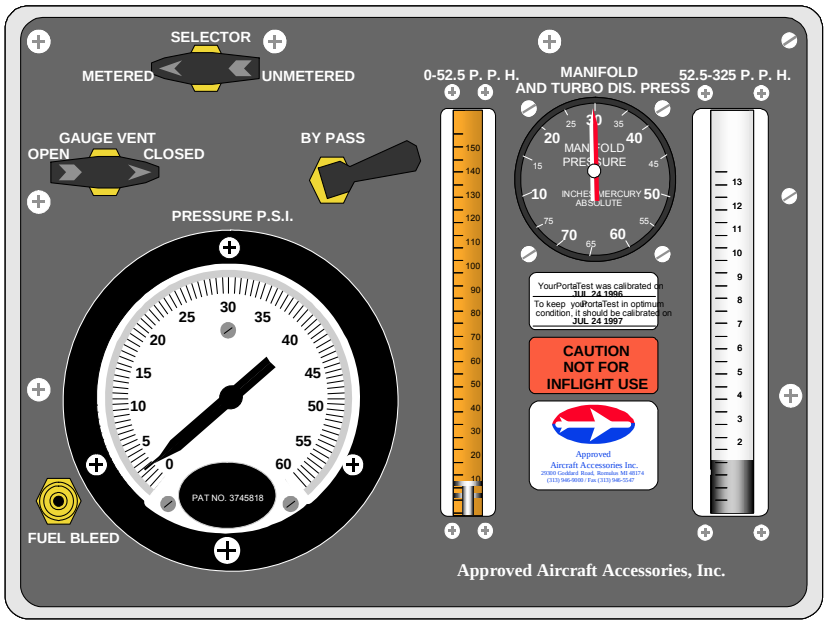

Figure 6-1. Model 20 ATM-C Porta-Test

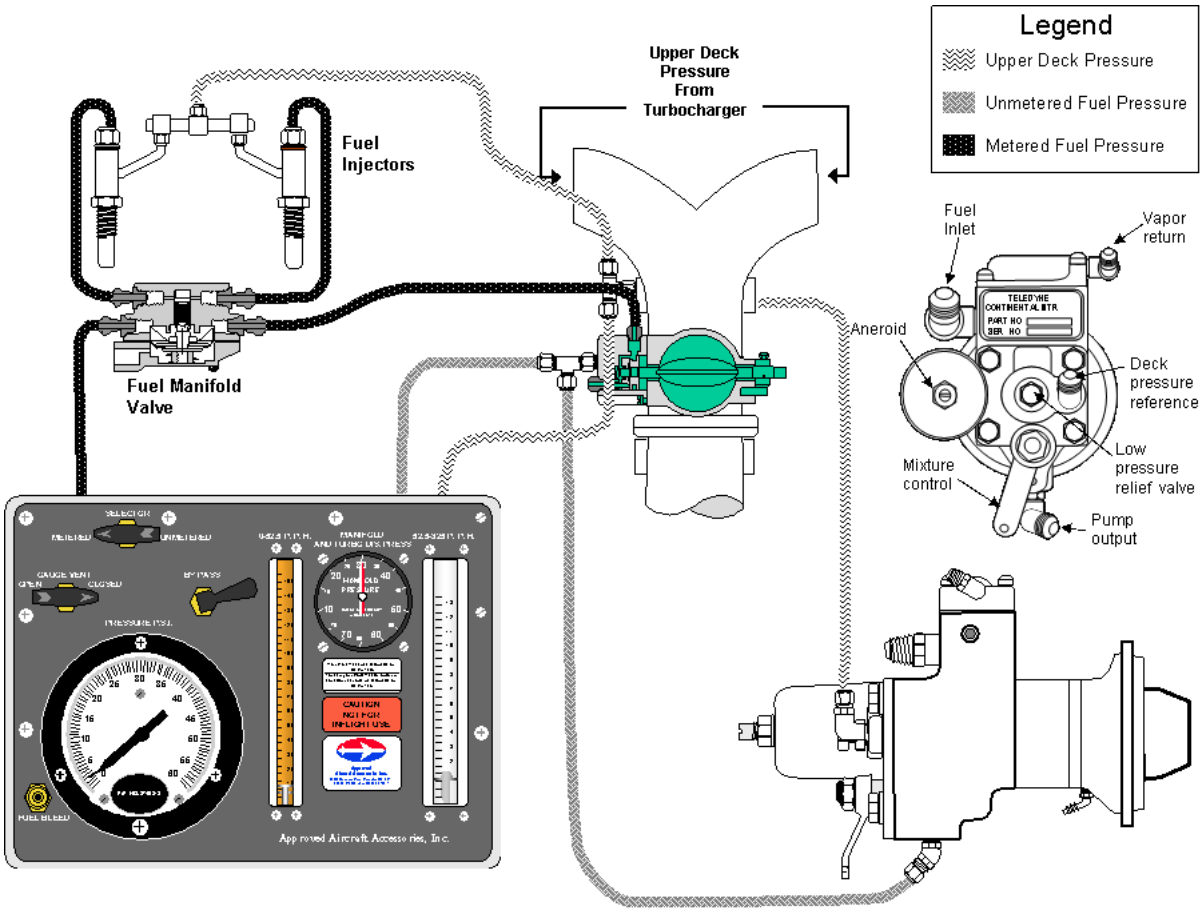

Figure 6-2. Porta-Test Connections

6-3.7.4.2. Fuel System Operational Checkout with Calibrated Gauges

Procedure

1. Loosen the unmetered fuel supply hose from either the fuel pump outlet fitting or the fuel control inlet fitting, depending on access to connections.
2. Connect the MS51523-B4 swivel tee to the fuel connection loosened in 1.

   NOTE: Some installations may require a number of fittings to adapt the metered and unmetered test equipment to the fuel injection system.
3. Connect the unmetered fuel supply hose to the straight end of the tee connector.
4. Connect the 0-60 psi unmetered gauge to the tee connector with a hose.
5. Remove the cap from the metered fuel port fitting on the fuel manifold valve.
6. Disconnect an upper deck pressure fitting forward of the throttle body. Install and MS51523-B4 swivel tee online with the upper deck pressure fitting.
7. Connect two equal lengths of hose to the 0-30 psid differential pressure gauge.
   a. Connect the pressure hose from the differential pressure gauge to the metered pressure fuel port on the fuel manifold valve fitting.
   b. Connect the “suction” side hose to the tee installed in the upper deck pressure line installed in step 6.
8. Torque all connections to Appendix B specifications.
9. Position the throttle control to the FULL OPEN position and the mixture control to FULL RICH. Operate the aircraft boost pump in accordance with the aircraft manufacturer's instructions.

   NOTE: Gauges must remain at the same height or above the fuel injection system components under test for the duration of the operational check. Indicated fuel pressure at the gauge will increase if the gauges are below the fuel injection system, causing erroneous indications.
10. Loosen the test connections at each gauge to bleed the lines of air. Hold the gauge at, or slightly above, the height of fuel system components to allow the fuel to force the air out of the lines. Operate the boost pump only long enough to purge the air from the fuel system. Torque all loosened fittings to Appendix B specifications.

    WARNING

    Drain all fuel from the induction system prior to attempting engine start. Failure to comply may result in hydraulic lock ad subsequent engine failure.
11. Install the engine cowling or cooling shroud during ground operation.
12. Proceed to Section 6-3.7.4.3.

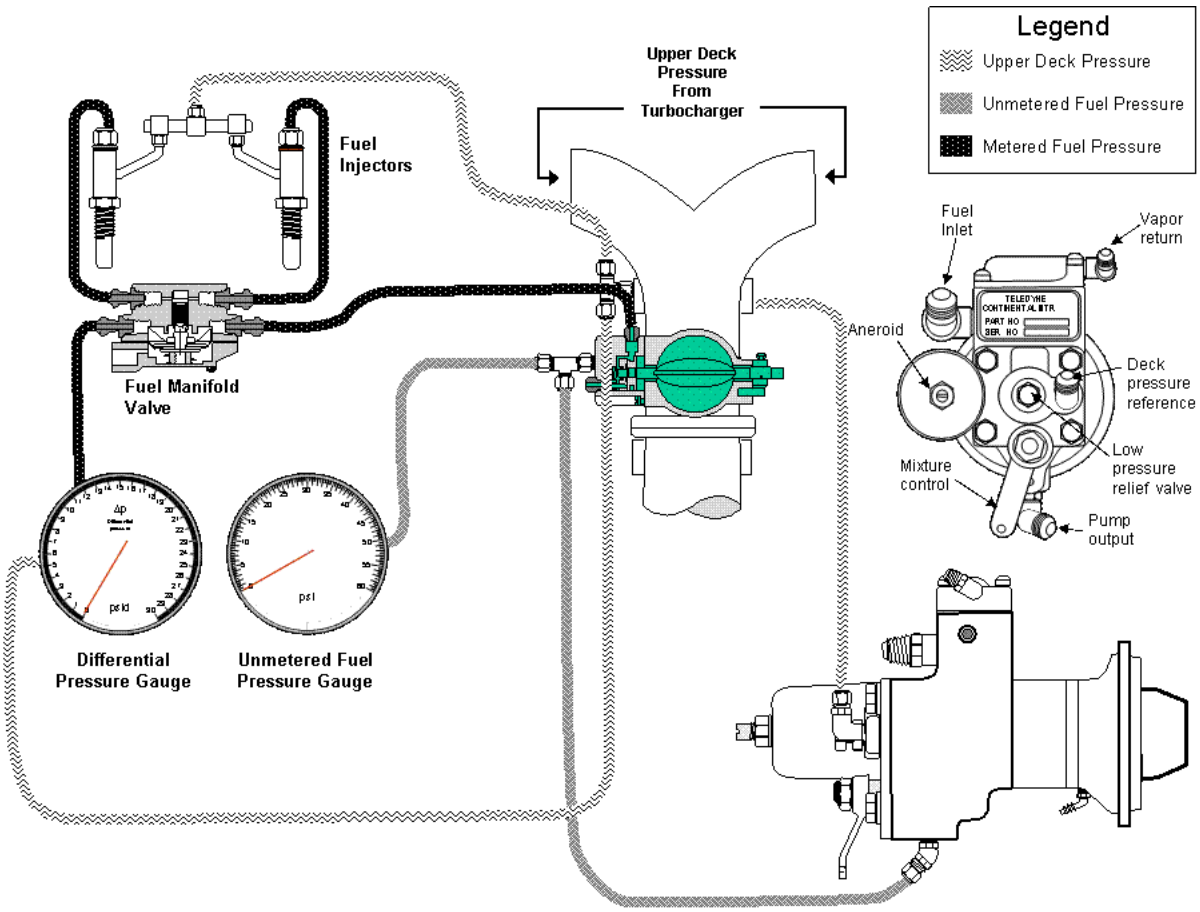

Figure 6-3. Fuel Injection System Gauge Hookup

6-3.7.4.3. Fuel System Operational Checkout Procedure

Procedure

1. Verify the accuracy of the tachometer and fuel flow gauges prior to making any adjustments; replace faulty gauges.
2. Locate the IDLE speed stop screw (Figure 6-4) on the throttle body and turn it counter-clockwise two complete turns. During the operational check, IDLE RPM will be controlled manually using the cockpit throttle control.

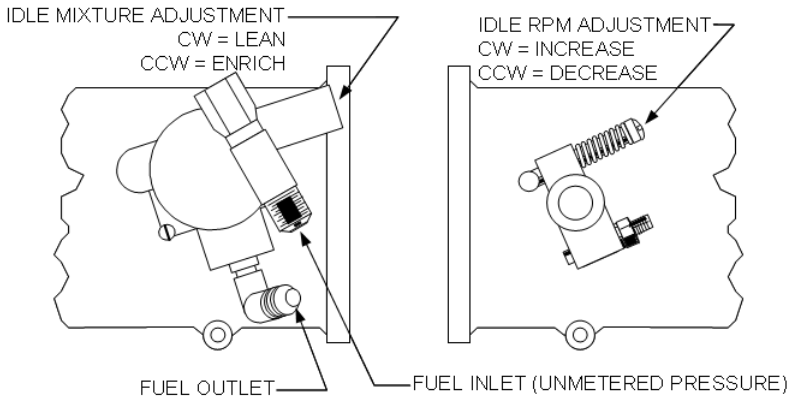

Figure 6-4. Throttle Body Adjustments

WARNING

Ensure the propeller area is clear before starting the engine.

3. Fuel Selector Valve ..... ON
4. Mixture Control ..... FULL RICH
5. Boost Pump..... ON
6. Perform a normal “Engine Start” according to instructions in Section 7-3.2 and “Ground Run-up” according to Section 7-3.3 to allow the engine to warm to normal operating temperatures.

   NOTE: A puff of white smoke from a new or rebuilt engine, or an engine returned from storage is normal. The source of the smoke is the remaining preservation oil in the burning off in the combustion chamber. The smoke should dissipate quickly; if smoke persists, shut down the engine and investigate the cause.

   CAUTION: Operating the engine without oil pressure will result in engine malfunction or failure.

7. Throttle..... 600-1000 RPM (One minute)
   RESULT: Operate the engine for one minute, gradually increasing the speed to 1000 RPM in 3 minutes.
8. Oil Temperature ..... Check

   NOTE: Allow the engine oil to reach normal operating temperature (100°F (38°C)) before proceeding to the next step.

9. Boost Pump ..... OFF
10. Mixture Control ..... FULL RICH
11. Throttle ..... 600±25 RPM
12. Unmetered Fuel Pressure Gauge ..... Check
    RESULT: Unmetered fuel pressure is within the range specified in Table 6-3. Maintain engine speed until CHT is 250°F to 350°F and engine oil temperature is 160°-180°F. Record the unmetered fuel pressure, regardless of setting. If the unmetered fuel pressure is not within the limits specified in Table 6-3, adjust the fuel pressure according to the instructions in Section 6-3.10.2.

WARNING

Do not operate the engine at speeds above 1700 RPM until the oil temperature is at least 100°F (38°C) and oil pressure is within the normal operating range. Operating at speeds above 1700 RPM before reaching the minimum oil temperature may result in engine malfunction or engine failure.

NOTE: to eliminate rough idling after the mixture rise check, increase engine RPM to 1700 RPM for 15 seconds before returning to IDLE RPM.

13. Mixture Control ..... Retard slowly toward IDLE
    RESULT: The engine speed should increase 25 to 50 rpm before beginning to drop toward zero. If the engine speed increase is less that 25 rpm, the mixture is too lean. If the engine speed increases more that 50 rpm, the mixture is too rich. Adjust the idle fuel pressure mixture rise according to Section 6-3.10.2.
14. Mixture Control ..... FULL RICH
15. Propeller Governor ..... WIDE OPEN
16. Throttle ..... WIDE OPEN
    RESULT: Check the engine RPM with a portable tachometer. Record the engine speed on the checklist. If the engine does not reach the rated, full power RPM, calculate the corrected metered fuel pressure (Table 6-4).
17. Manifold Pressure ..... Check
    RESULT: Manifold pressure should equal the value specified for the engine model in Table 6-3. If manifold pressure not within the specified limits, adjust the Wastegate Controller according to instructions in Section 6-3.10.3.
18. Metered Fuel Pressure Gauge ..... Check
    RESULT: The full power, metered fuel pressure should equal the value in Table 6-3, with Table 6-4 correction factor, if applicable. Record the metered fuel pressure, regardless of setting. If the full power, metered fuel pressure is not within the specified limits, adjust the metered fuel pressure according to Section 6-3.10.2.
19. Throttle ..... IDLE
20. If no further checks are required, proceed to “Engine Shutdown” instructions in Section 6-3.7.6.