



PIPER

*Customer Services*

# SERVICE LETTER

No. 550B

Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.  
July 10, 1974

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(Supersedes and voids Piper Service Letter No. 550A, dated January 17, 1974)

Subject:

Turbocharger Density Control Adjustment -- reference attached Lycoming Service Instruction No. 1187C, dated April 5, 1974.

Reason for Revision:

Reference attached Lycoming Service Instruction No. 1187C, NOTE, Page 5.

Models Affected:

PA-23-250 (Six Place) Aztec  
PA-31 Navajo  
PA-31-350 Navajo Chieftain

Serial Numbers Affected:

27-4053, 27-4226 and up (turbocharged only)  
31-2 and up (turbocharged only)  
31-5001 and up

Compliance Time:

Refer to attached Lycoming Service Instruction No. 1187C, Time of Compliance.

Purpose:

To provide distribution of attached Lycoming Service Instruction No. 1187C, dated April 5, 1974.

Balance of Piper Service Letter format not applicable; refer to attached Lycoming Service Instruction No. 1187C for detailed information.

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# AVCO LYCOMING DIVISION

WILLIAMSPORT, PENNSYLVANIA 17701

## Service Instruction



DATE: April 5, 1974

Service Instruction No. 1187C  
(Supersedes Service Instruction No. 1187B)  
Engineering Aspects are  
FAA (DEER) Approved

SUBJECT: Turbocharger Density Control Adjustment

MODELS AFFECTED: TIO-540-A1A, -A1B, -A2A, -A2B, -AX, -C1A and -J2BD.

TIME OF COMPLIANCE: On newly installed engines; before aircraft is flown. Also recommended at 100 hour inspection or at owner's discretion.

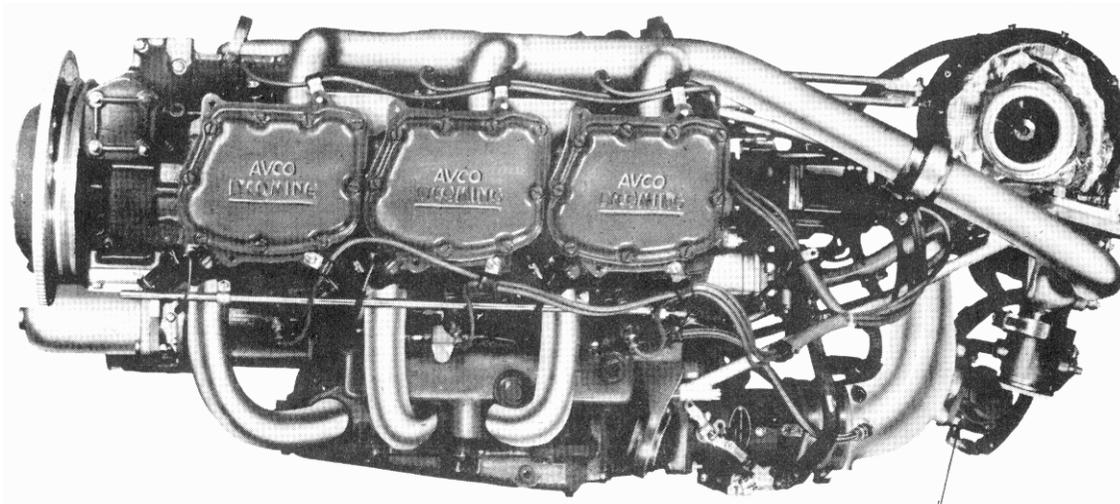
### NOTE

*Although engines are thoroughly tested after manufacture, it is impossible to duplicate the individual installation characteristics that it will encounter in the aircraft, consequently the density controller, which governs the turbocharging, must be adjusted after the engine is installed and before the aircraft is flown.*

To insure engine is developing rated full throttle power it is necessary to periodically check the adjustment of the density controller. This is a comparatively simple procedure which consists of measuring air compressor discharge temperature (deck temperature), under operating conditions, and comparing it with indicated manifold pressure, then, if necessary, adjusting the density controller accordingly. The details for accomplishing the density controller check are as follows:

#### 1. Installation of Deck Temperature Thermocouple Probe.

TIO-540-A1A, -A1B, -A2A and -A2B: On the early models of the engine, to install the deck temperature thermocouple probe, remove the 3/8-16 bolt (P/N STD-1946) which is the lower mounting bolt of the differential pressure controller. See figure 1. Install the deck tempera-



ON EARLY MODELS REMOVE 3/8-16 BOLT FROM THIS LOCATION AND INSTALL THERMOCOUPLE PROBE ST-264-B  
ON LATER MODELS REMOVE BOLT FROM LOCATION AS SHOWN IN FIGURE 3. INSTALL PROBE ST-264-B

Figure 1. Left Side View - TIO-540-A1A, -A1B, -A2A and -A2B Showing Location of Plug to be Removed

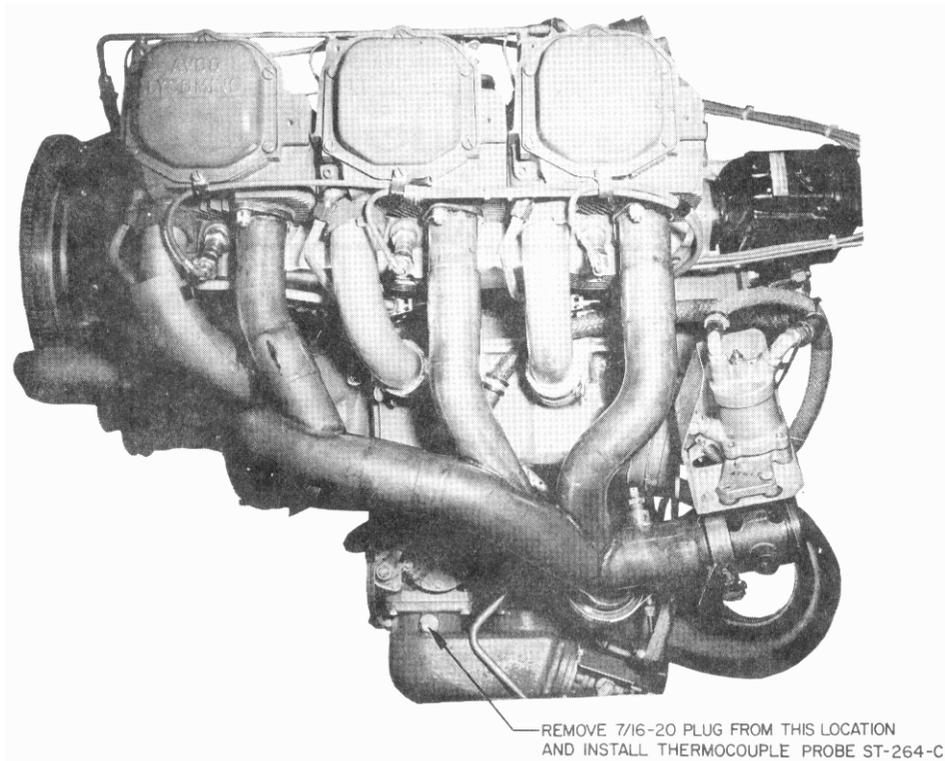


Figure 2. Left Side View - TIO-540-C1A Engine Showing Location of Plug to be Removed

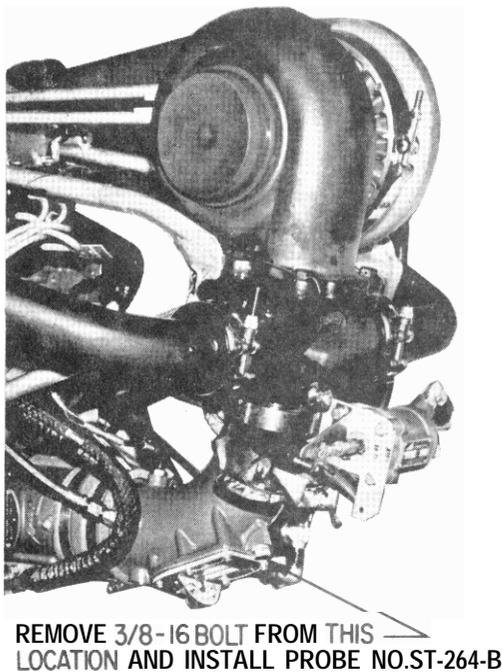


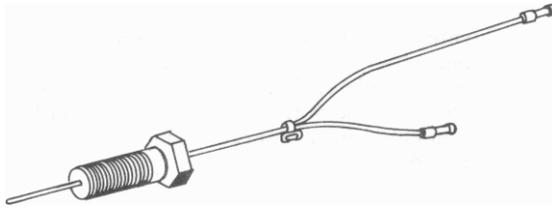
Figure 3. Rear View - TIO-540-J Engine Showing Air Inlet Housing Thermocouple Fitting for Deck Temperature Probe

ture probe, Avco Lycoming tool number ST-264-B (see figure 4) in the hole from which the 3/8-16 bolt was removed. On later models of the above engine, remove the 3/8-16 bolt (P/N STD-1947) located directly in back of the air valve assembly in the air inlet housing. See figure 3. Install the deck temperature thermocouple probe, Avco Lycoming tool number ST-264-B in the hole from which the bolt was removed.

TIO-540-C1A: Remove the 7/16-20 plug (P/N AN814-4) located on the left side of air inlet housing, directly below fuel injector. See figure 2. Install the deck temperature thermocouple probe, Avco Lycoming tool number ST-264-C (see figure 4) in the hole from which the 7/16-20 plug was removed.

TIO-540-A2C, -J2BD: Remove the 3/8-16 bolt (P/N **STD-1947**) located directly in back of air valve plate assembly in the air inlet housing. See figure 3. Install the deck temperature thermocouple probe (Avco Lycoming tool number ST-264-B) (see figure 4) in the hole from which the 3/8-16 bolt was removed.

2. Connect Probe to Thermocouple Extension and Potentiometer: Connect leads of the thermocouple extension, Avco Lycoming tool number ST-265 to the probe and to the potentiometer as indicated in figure 5.



**ST-264-S THREAD SIZE 3/8 X 16**  
**ST-264-C THREAD SIZE 7/16 X 20**

Figure 4. Deck Temperature Thermocouple Probe

**NOTE**

Potentiometer to be used with thermocouple extension ST-265 must be an 8 ohm instrument, in accordance with AN 5536. Lewis Engineering Co.'s model 23B2, or equivalent, with scale range 0" F. to 400" F. minimum (600°F. maximum) is satisfactory for this purpose.

3. Stabilize Aircraft Temperature: Start the engine and ground run the aircraft until normal operating temperature is obtained; do not exceed engine speed and manifold pressure stated in Table 1. On TIO-

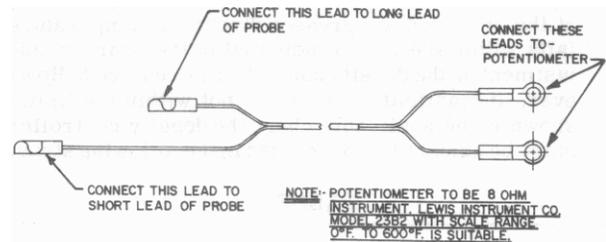


Figure 5. Thermocouple Extension No. ST-265

540-C1A engine it is required to shut the engine down after the initial warm up for 4 or 5 minutes, to allow proper heat soak of engine components. To insure this temperature has stabilized, readings and adjustments must be made with the aircraft cowl installed. Restart engine and run until induction air temperature as indicated on the potentiometer has stabilized.

4. Check Induction Air Temperature with Manifold Pressure: Note both engine manifold pressure and compressor discharge temperature at full throttle and compare with the chart shown in figure 6 for

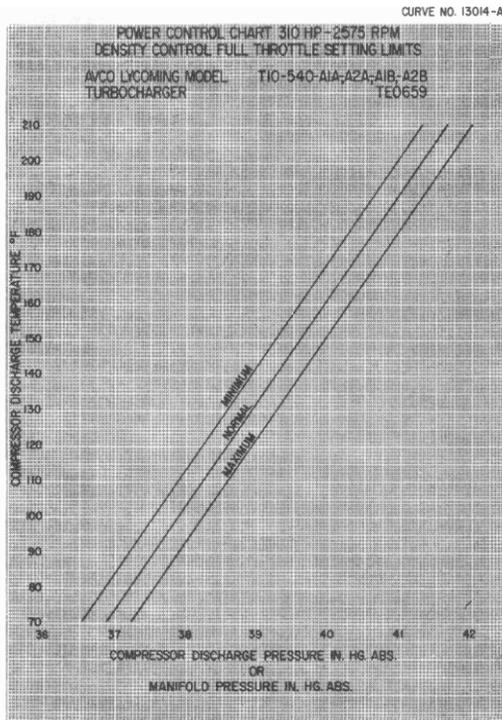


Figure 6. TIO-540-A1A, -A1B, -A2A and -A2B Induction Air Temperature vs Manifold Pressure

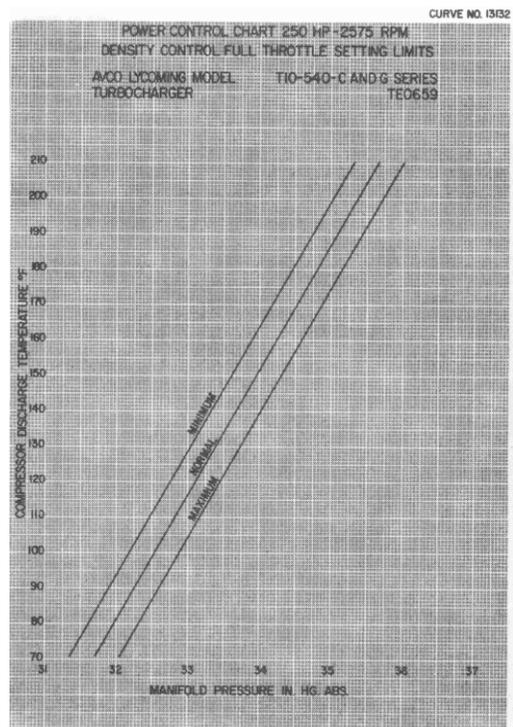


Figure I. TIO-540-C1A Induction Air Temperature vs Manifold Pressure

TIO-540-A1A, -A1B, -A2A, -A2B and figure 7 for TIO-540-C1A. See figure 8 for TIO-540-A2C and figure 9 for TIO-540-J2BD. If manifold pressure, at the observed compressor discharge temperature falls within the limits indicated in the chart no adjustment of the density controller is required. However, if manifold pressure is not within the limits shown in the applicable chart the density controller must be adjusted as described in the following steps.

CAUTION

Turning the adjusting screw 1/16 turn will change the manifold pressure approximately 2 inches; therefore, care must be exercised to turn the screw in very small increments until correct adjustment is obtained.

TABLE 1

MODEL	RPM	MAXIMUM MP
TIO-540-A1A, -A1B, -A2A, -A2B	2575	42 in. Hg.
TIO-540-C1A	2575	36 in. Hg.
TIO-540-A2C	2575	43.6 in. Hg.
TIO-540-J2BD	2515	46.5 in. Hg.

On TIO-540-A1B, -A2B, -A2C, -C1A and -J2BD engines the adjustment is made in the same manner except that a cover plug is not incorporated with the density controller; simply remove the lockwire from the adjusting fitting and by means of a small wrench, turn the square head of the fitting clockwise or counter-clockwise to accomplish the adjustment. Be very careful when reinstalling safety wire to avoid turning the adjusting fitting.

NOTE

On twin engine aircraft, during full power operation, some slight difference in manifold pressure may be noted. This is typical of normal operation of the density controllers as they respond to slight differences in induction air temperature caused by filters, heat soak and other variations in the induction systems.

5. TIO-540-A1A and -A2A - Adjust Density Controller: The density controller is mounted on the right side of the air induction housing. Remove lockwire from the access plug and remove plug from controller. Insert a screwdriver in the hole and engage the adjusting screw. Turning the screw inward, or clockwise will increase manifold pressure; turning it counter-clockwise (outward) will decrease manifold pressure.

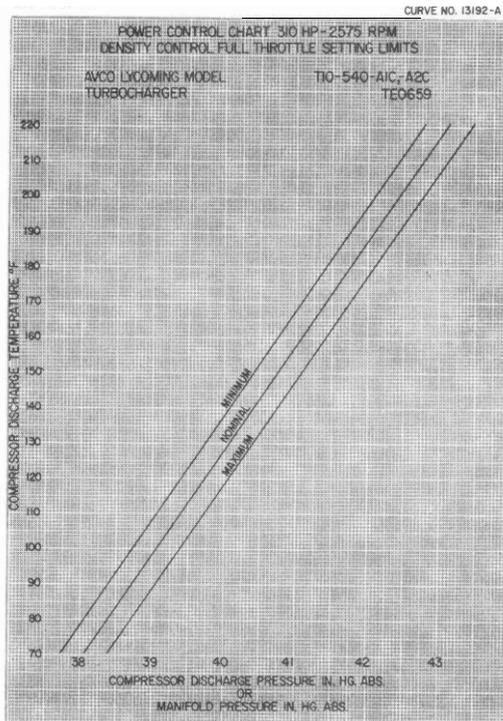


Figure 8. TIO-540-A2C - Induction Air Temperature vs Manifold Pressure

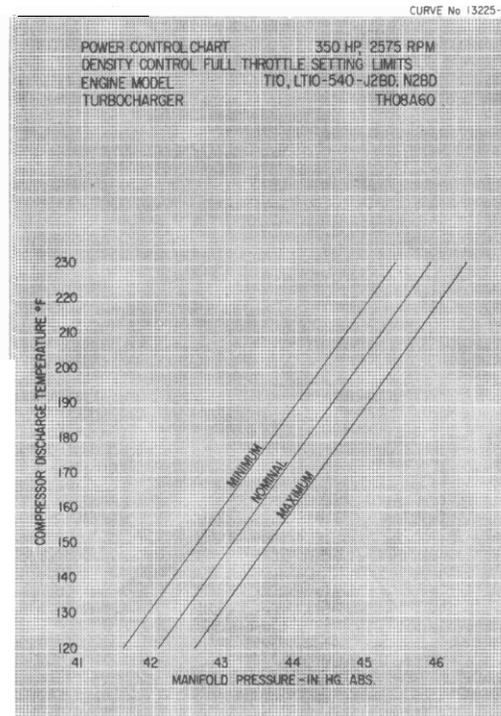


Figure 9. TIO-540-J2BD - Induction Air Temperature vs Manifold Pressure

SPECIAL TOOLS REQUIRED:

- ST-264-B Deck temperature thermocouple probe
- ST-264-C Deck temperature thermocouple probe
- ST-265 Thermocouple extension

Potentiometer (Lewis Engineering Co. model 23B2 or equivalent)  
Lewis Engineering Co. 339 Church Street, Naugatuck, Conn. . . . . Procure Locally

NOTE: Revision "C" revises text.