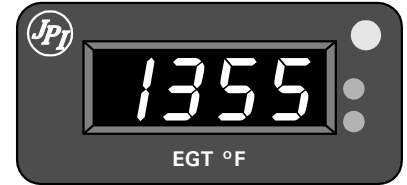


Applicable to  
**Slim Line® Temperature, Pressure, and  
Volt-Amp Instruments.**



### READ THIS FIRST

The following notes apply to a new installation. **Read this section before proceeding.**

- a) The JPI warranty found in the back of this manual clearly states that JPI will replace defective parts under warranty, **but does NOT cover labor to remove or install any parts from or to the aircraft.**
- b) This installation will require some parts unique to your aircraft that are not supplied with the kit, (including but not limited to tie-wraps, hoses and fittings). Acquire all the necessary parts prior to beginning the installation.
- c) This manual is applicable to temperature, pressure and volt-amp instruments. Refer only to those sections that pertain to your particular instrument(s).
- d) Determine the locations of all holes before drilling to ensure that nothing interferes with the probe, clamp, clamp screw or wire.
- e) Provide service loops at the instrument.
- f) Power up and test the instrument before installing it in the instrument panel.
- g) Thermocouple wire *length* is not critical. Trim to required length, allowing for service loops at the engine so that the probe can be swapped to adjacent cylinder positions for troubleshooting purposes.
- h) Dress all wires away from high temperature components such as exhaust stacks.
- i) *Never splice thermocouple wire using copper wire.* Use only K-type thermocouple wire. Soldering thermocouple wire is not recommended, but if you must, solder using zinc chloride flux such as Nokorode brand – rosin flux won't work.
- j) Observe correct polarity on all probe wires. Connect like colors together (red to red [-], yellow to yellow [+]). Two-terminal pressure sensors have no polarity restrictions.
- k) The most common cause of probe problems is poor terminal crimps. Crimp ring terminals with AMP part 48518 crimp tool or equivalent.

## 1) Installation Overview

The overall installation procedure is as follows:

1. Power the instrument on the bench to verify it was received in working order. Set the alarm limits, if necessary.
2. Install the instrument in the instrument panel.
3. Install the probe or sensor in the engine compartment.
4. Connect the connectors to the instrument.
5. Run the wires from the instrument in the instrument panel through the fire wall to the engine compartment. Dress the wires to the probe or sensor.
6. Cut the excess length off the wires and connect to the probe or sensor.
7. Verify instrument operation.

J. P. INSTRUMENTS

PO Box 7033

Huntington Beach, CA 92615

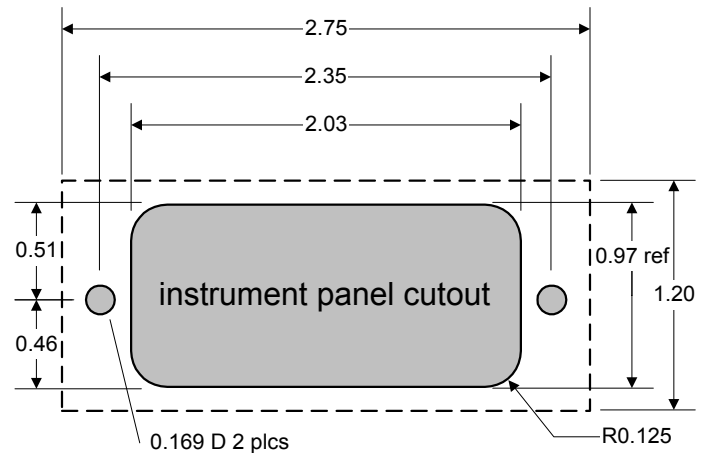
## 2) Initial Bench Check

Connect the red wire to +12V or +24 V and the black wire to power return. Verify that the display lights up. If the alarm limit has to be changed, it will be easier to do it now before the instrument is installed in the aircraft. See the procedures near the end of this manual.

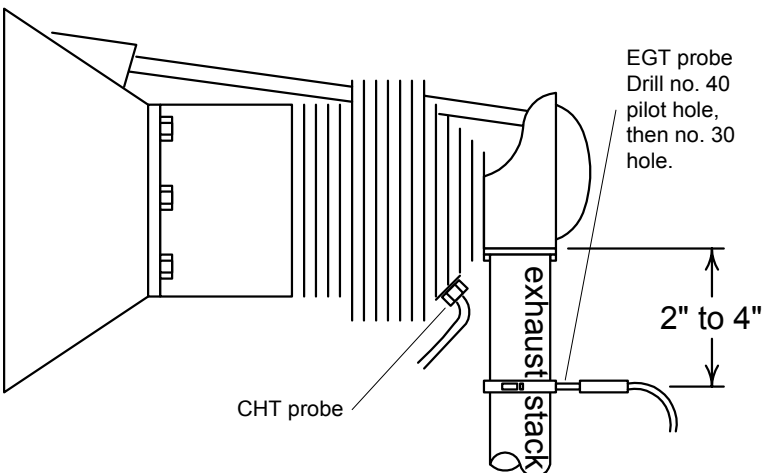
## 3) Installing the Instrument

Installation should be in accordance with Advisory Circular AC43.13-1A. Identify the location for the instrument on the instrument panel that can accommodate 2.75 inches wide by 1.2 inch high instrument, and 3.5 inches clearance behind the instrument panel. Check the rear clearance with the connectors attached to the instrument.

If more than one instrument is to be installed, the horizontal center-to-center spacing must be at least 2.75 inches, and the vertical center-to-center spacing must be at least 1.2 inches. Two instruments can be installed in a 3¼ inch hole. Contact JPI for an optional bezel.



## 4) Exhaust Gas Temperature (EGT) Probe Installation



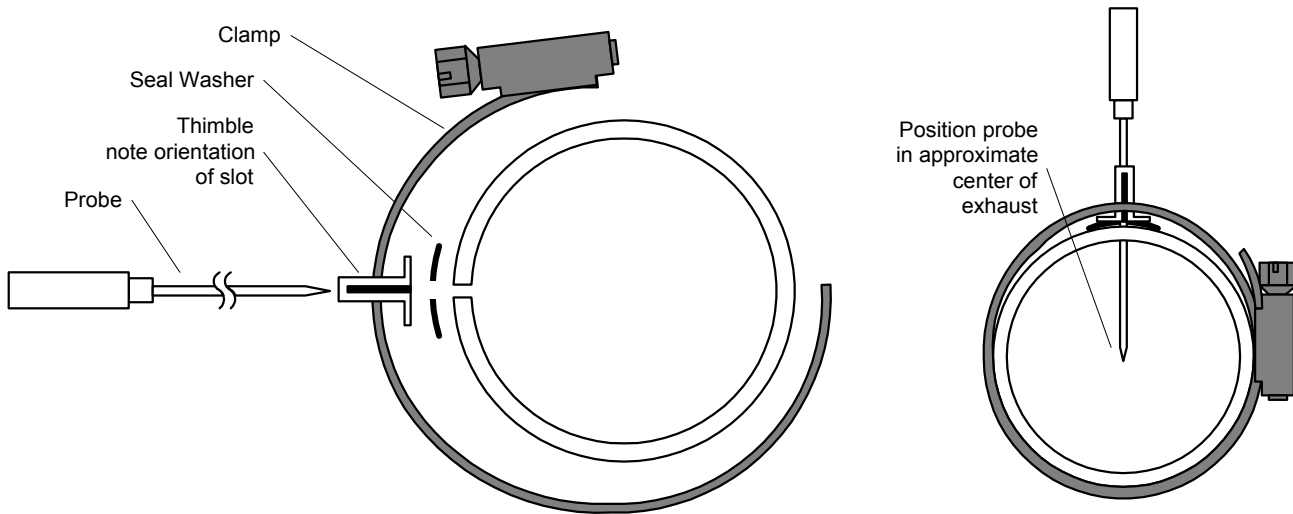
Determine the locations of all holes before drilling to ensure that nothing interferes with the probe, clamp, clamp screw or wire. The model M-111 EGT probe will fit any engine having existing holes in the exhaust stack of between 0.125 in. and 0.250 in. If no hole exists, drill a 0.125 in. hole and ream to fit. For multi-EGT probe installations, it is important that each probe be mounted a uniform distance from the exhaust stack flange. A nominal distance of 2 to 4 inches from the exhaust flange is recommended. If the recommended distance is impractical due to obstructions, slip joints or bends in the exhaust system, then position the probes a uniform

distance from the flange as space permits. Careful matching of probe position will provide the best temperature readings. Do not mount EGT probes in slip joints.

Insert the probe in the exhaust stack hole such that the tip of the probe is in the center of the exhaust stream. Tighten the stainless steel clamp and torque to 45 in/Lbs. Cut off excess strap close to the screw.

## 5) Turbine Inlet Temperature (TIT) Probe Installation

The standard TIT probe PN M111-T with a #48 clamp is placed in the exhaust stack accumulator to a maximum depth of 1/2 inch and approximately 4 inches from the turbine inlet if possible, on the wastegate side of the turbine.



### 6) Cylinder Head Temperature (CHT) Probe, Bayonet Installation

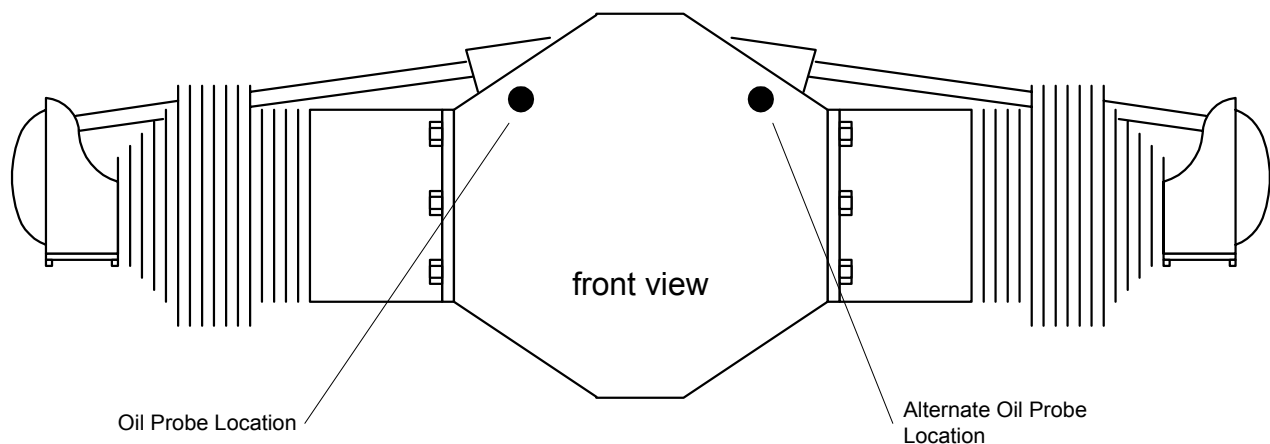
The bayonet probe 5050-T has a captive 3/8-24 boss that is screwed into the base of the cylinder. The probe has a screwdriver slot to facilitate tightening.

### 7) Cylinder Head Temperature (CHT) Probe, Spark Plug Gasket Installation

If there is no socket hole for the EGT probe on any cylinder or the aircraft is equipped with Tanis heaters, use a spark plug gasket probe.

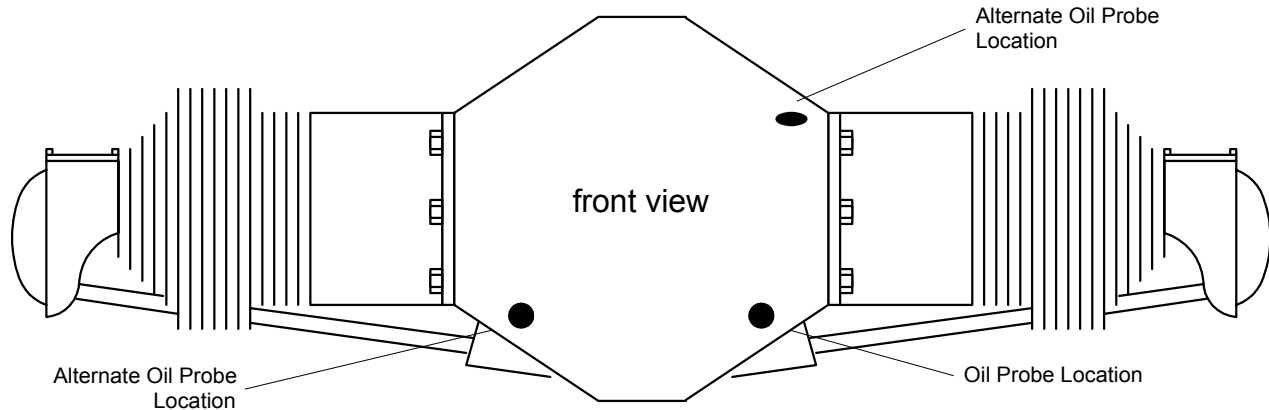
The spark plug gasket probe, PN M-113, replaces the standard copper spark plug gasket on one spark plug. Choose the upper or lower spark plug, the one that provides the best correlation with the other temperature probes. Due to the spark plug location, the gasket probe may read 25°F higher or lower than the factory probe. Place the probe on the plug that receives the most direct cooling air.

### 8) Oil temperature (OIL) Probe Installation



### Lycoming Engines

**Lycoming Engines:** The PN 400505-L probe is for all Lycoming direct drive engines and is installed in the *right* (passenger side) front oil galley by removing the existing 1/8 NPT plug on the passenger side of the engine and inserting the optional JPI oil probe supplied with the kit.



### Continental Engines

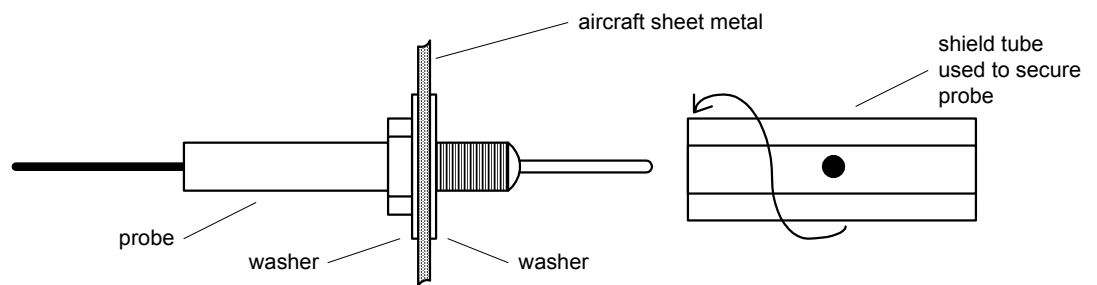
**Continental Engines:** The PN 400505--C probe is for all Continental direct drive engines and is installed in the *left* (pilot side) front oil galley by removing the existing 3/8 or 1/8 inch NPT plug (see figure above) located on the front, pilots side of the engine. Insert the optional JPI oil probe supplied in the kit. For 3/8 inch NPT installations, use the supplied brass adapter. An alternate location is on the top, front of the engine on the pilot's side, where the probe is inserted vertically. There are two 1/8 NPT plugs close together. Install the probe in the position that is above and to the rear of the nearby position. Check for oil leaks before first flight.

### 9) Radial Engines

Radial engine exhausts require a larger EGT clamp (supplied) to fit the 2.5 inch exhaust pipe. The EGT probe is installed using the same technique as on a Lycoming or Continental engine and should be placed between the exhaust pipe flange and the accumulator at a distance of 2 to 3 inches from the engine exhaust flange. Cylinder head temperatures are measured with a spark plug gasket type probe placed under the front sparkplugs. Front spark plugs will read 15 to 20 degrees cooler than the rear plugs. Do not route the wire adjacent to or in the ignition harness. Do not extend thermocouple wires with copper wire.

### 10) Outside Air Temperature (OAT) Probe Installation

Install the OAT probe, PN 400510 in the airframe manufacturer's recommended location. If this information is not available, place the OAT probe in clean airflow such as in a cabin air scoop or below the underside of the wing



away from engine heat or exhaust. In this case it is recommended that the installation be done similar to the antenna installation instructions of AC 43.12-2a *Acceptable Methods, Techniques and Practices*.

The outside aluminum shield tube is used to both hold the probe in place and shield it from radiated heat. When testing the OAT shield the sensor from direct sunlight and engine heat.

### 11) Induction Air (IAT), Compressor Discharge Temperature Probe Installation

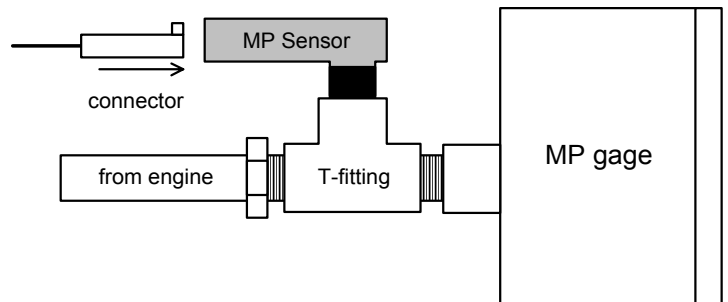
The Induction Air Temperature probe, (IAT), is installed just after the inter-cooler and the Compressor Discharge Temperature (CDT) just before the inter-cooler. The probe is the same as an EGT probe and installed similarly to an EGT probe. A large clamp is supplied to fit around the air port leaving the inter-cooler. Alternately a 1/8 NPT fitting is available.

### 12) Carburetor (CRB) Probe Installation

Locate the access hole in the carburetor near the butterfly valve. Remove the screw plug and screw the CRB probe into the carburetor throat.

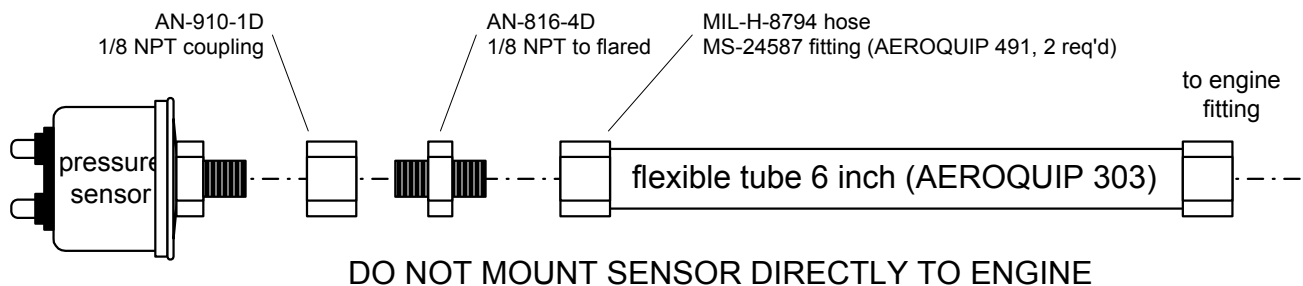
### 13) Manifold Pressure (MP) Sensor Installation

Install a T-fitting (not supplied) in the aircraft's MP gauge line in the cockpit near the MP gauge. Install the MP sensor on the T-fitting. Later, you will connect the MP sensor to the wiring using the 4-pin connector supplied.



### 14) Oil Pressure, Fuel Pressure, Boom Pressure Sensor Installation

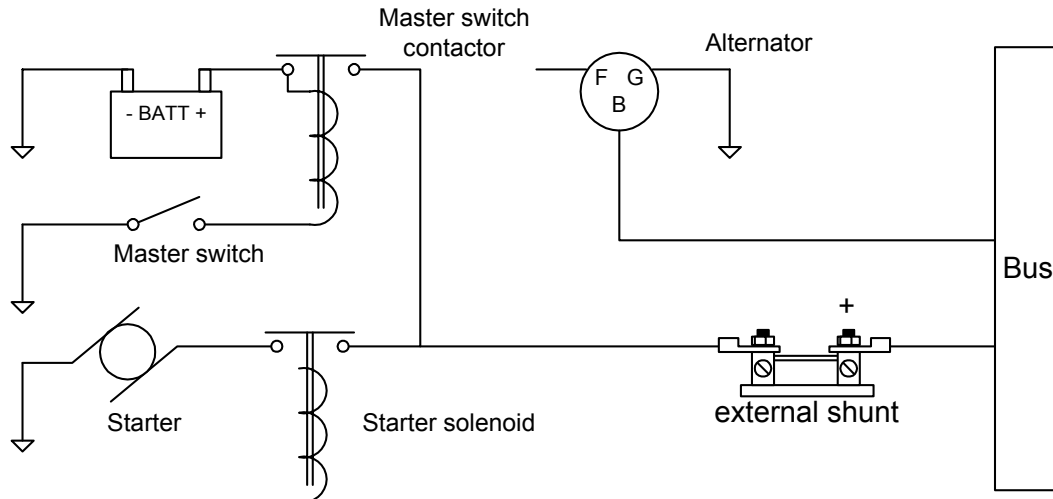
Mount the two ring-spade lugs to the two terminals on the sensor using the hardware supplied. Mount the pressure sensor to the pressure line using a 6 inch flexible hose and fittings (not supplied) as depicted in the drawing below. Use tie-wraps to mount the pressure sensor on engine mount structure. Do not mount the sensor directly to the engine. Connect the other end of the hose to the existing pressure line, with a T-fitting if necessary. Later, you will connect the pressure sensor to the two pressure sensor wires.



### 15) VOLT/AMP Shunt Installation

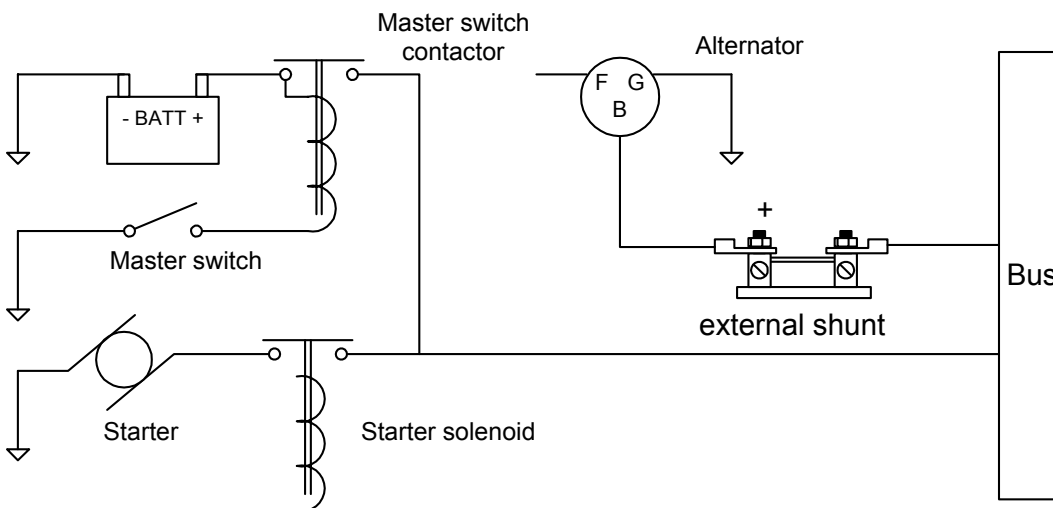
Install the current shunt in the electrical system.

**Charge/Discharge configuration.** The shunt can be installed between the master contactor and the main bus in which case it will be in the ammeter configuration showing battery charge and discharge. Be sure that the *positive* side of the shunt is connected to the main bus in the *ammeter* configuration. The alarm will be triggered by a discharge condition.



### Ammeter Configuration

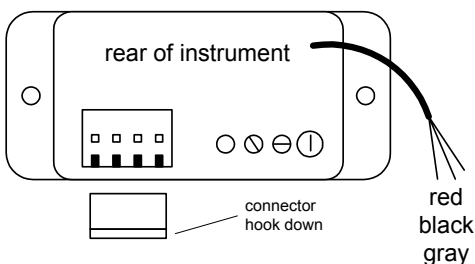
**Load Meter Configuration.** Or the shunt can be installed between the alternator output and the main bus in which case it will be the load meter configuration showing alternator load (positive only). Be sure that the *negative* side of the shunt is connected to the main bus in the *load meter* configuration. There is no alarm.



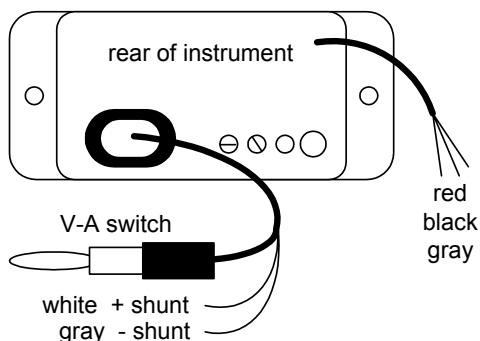
### Load Meter Configuration

## 16) Connecting to the instrument

All temperature and pressure instruments

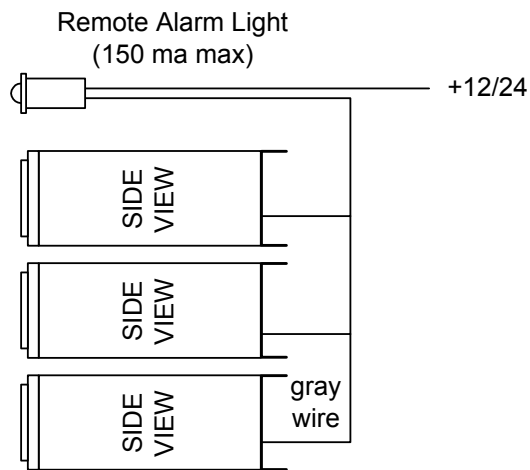


Volt-Amp instrument



Slim Line automatically accommodates both 14 and 28 volt electrical systems. Connect the power lead (red) to a separate 2 amp circuit breaker (or 1 amp in-line fuse) connected to the avionics power bus. The avionics master switch will then be used to turn off the instrument during engine start-up. If the panel lacks an avionics master switch it is recommended that one be installed or a circuit breaker switch be provided to turn off the Slim Line during engine start-up. Connect the ground return (black) to the avionics ground.

No connection to the aircraft dimmer system is required or permitted because the instrument dims automatically with reductions in ambient light.



The gray remote alarm wire is an open collector capable of sinking up to 150 ma. This signal may be connected to a unique alarm light or buzzer, or it may be connected to other Slim Line instruments in a “wired-OR” configuration to a common alarm light or buzzer. If it is not used, leave the line open and tie-wrap the wire so that it does not obstruct the freedom of control travel.

Plug the probe or sensor connector on the rear of the instrument with the hook tab of the connector pointing down. Be sure the connector is aligned with all the pins and not shifted left or right.

The Volt/Amp instrument is configured without a connector. Identify the wire bundle with the toggle switch attached. The toggle switch should be mounted to the instrument panel near the instrument. The white wire should be connected to the positive side of the shunt and the gray wire to the negative side of the shunt. See the section, later, on VOLT/AMP shunt wiring.

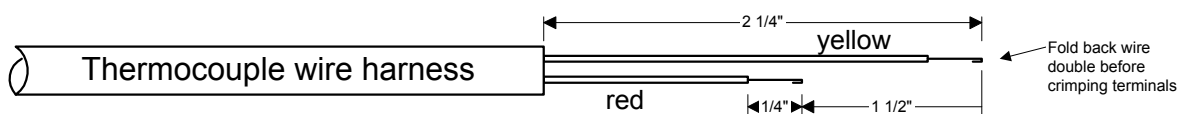
### 17) Routing the Wiring

Leave adequate service loops at the instrument. Bundle all the probe and sensor wires together and route them from the instrument through the firewall using fireproof rubber grommets and flame retarding silicone. Use an existing hole if possible. All wires must be routed away from high temperature areas (exhaust stacks, turbochargers, etc.). Secure probe and sensor leads to a convenient location on the engine approximately 8 to 12 inches from the probe or sensor, being sure there is sufficient slack to absorb engine vibration and torque. It is essential in routing the probe or sensor wire that this wire not be allowed to touch metal parts of the air-frame or engine since abrasion will destroy the wire.

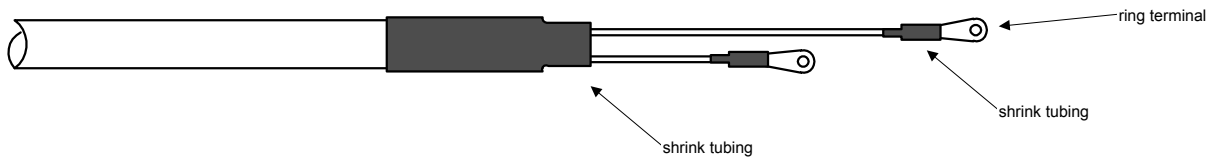
### 18) Temperature Probe Wiring

When cutting the pair of leads to the proper length to connect to the probes, leave enough slack in the wiring so that probe may be interchanged to an adjacent cylinder if necessary for trouble-shooting and servicing. Thermocouple wire length is not critical and should be trimmed to any length as required for a clean installation.

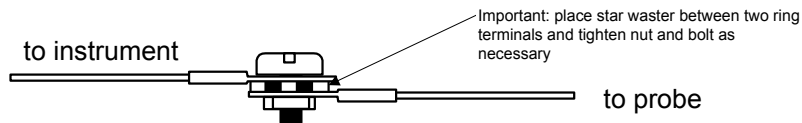
The Temperature probe must be wired with the correct polarity. The temperature probe connects to its temperature indicator with yellow jacket Teflon Chromel Alumel wire supplied. Strip the wires as shown below -observing color codes.



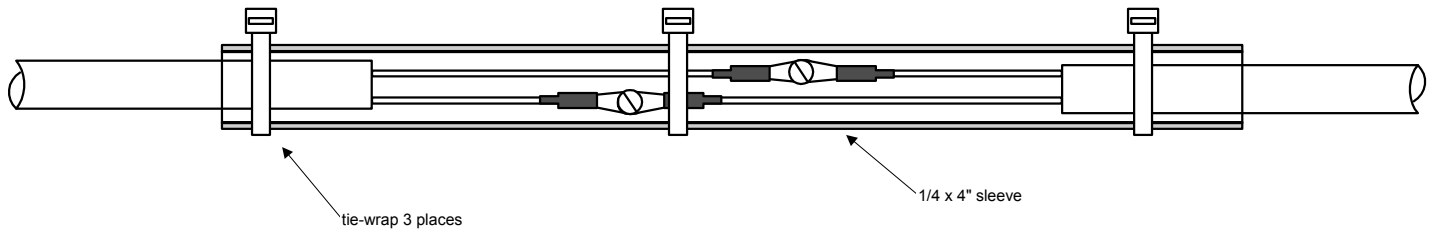
Terminate each wire with a crimp-on ring terminal, provided. The ring terminals may be crimped with a “service-type” tool, however AMP part number 48518 crimp tool is recommended. Verify the quality of each crimp with a sharp tug on the wire. The terminal should be impossible to pull off when crimped correctly.



Place a ¼ x 4 inch sleeve over each pair of wires in the wiring. Connect the wire ring lug to the probe ring lug using the supplied number 4 screws and nuts, placing the star washer *between* the ring lugs, not against the nut.



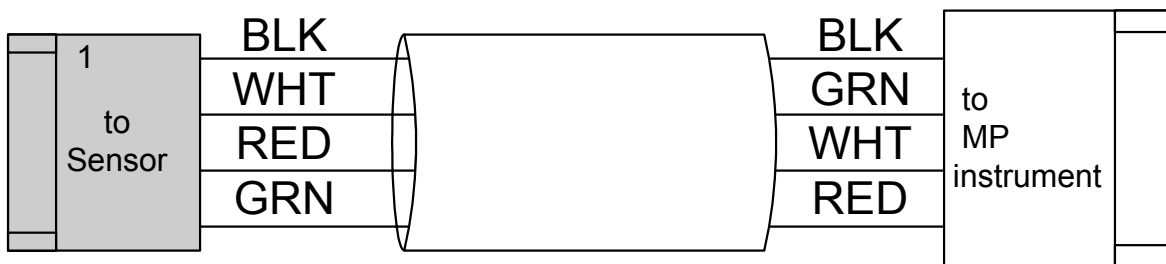
Slide the sleeve over the joint and secure with three tie-wraps.



The most common installation problems are related to poor quality terminations.

### 19) MP Sensor Wiring

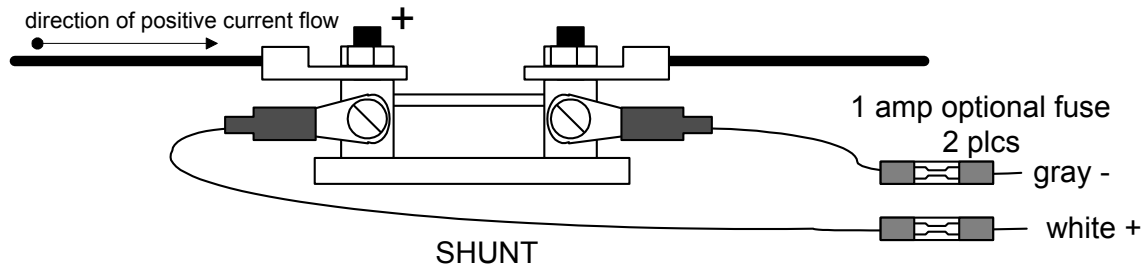
Use the four-conductor cable supplied with the kit. Plug the smaller connector onto the sensor.





## 20) VOLT/AMP Shunt Wiring

Connect the white lead from the Slim Line instrument to the positive shunt terminal and the gray lead to the negative shunt terminal. Optionally, you may install 1 amp fuses in series with the shunt sense wires. Do not allow any other connection to the shunt. Do not power the Slim Line instrument from the shunt.



## 21) Oil Pressure, Fuel Pressure, Boom Pressure Sensor Wiring

If you have not already done so, install a ring-spade lug on each of the two pressure sensor terminals. Cut sensor leads to length at the pressure sensor. Provide adequate service loop. Attach the supplied female spade lugs by stripping and crimping a pin on each wire, and then inserting each pin onto the pressure sensor. There is no polarity restriction on the two wires.

## 22) Specifications and Limitations

### Environmental:

Passed TSO C43c

### Power:

10 to 35 volts DC, 250 ma

### Operating Temperature Range:

-40 to 195 °F

### Display Size:

2.0 x 0.95 inches

### Common Mode Range:

± 4v, rejection > 80db

### Analog-Thermocouples:

Resolution: 1.0 °F

Accuracy: ± 1.0 °F

Calibration: K

### Pressure Sensors:

Oil (0 to 150 psi)

Fuel (0 to 30 psi)

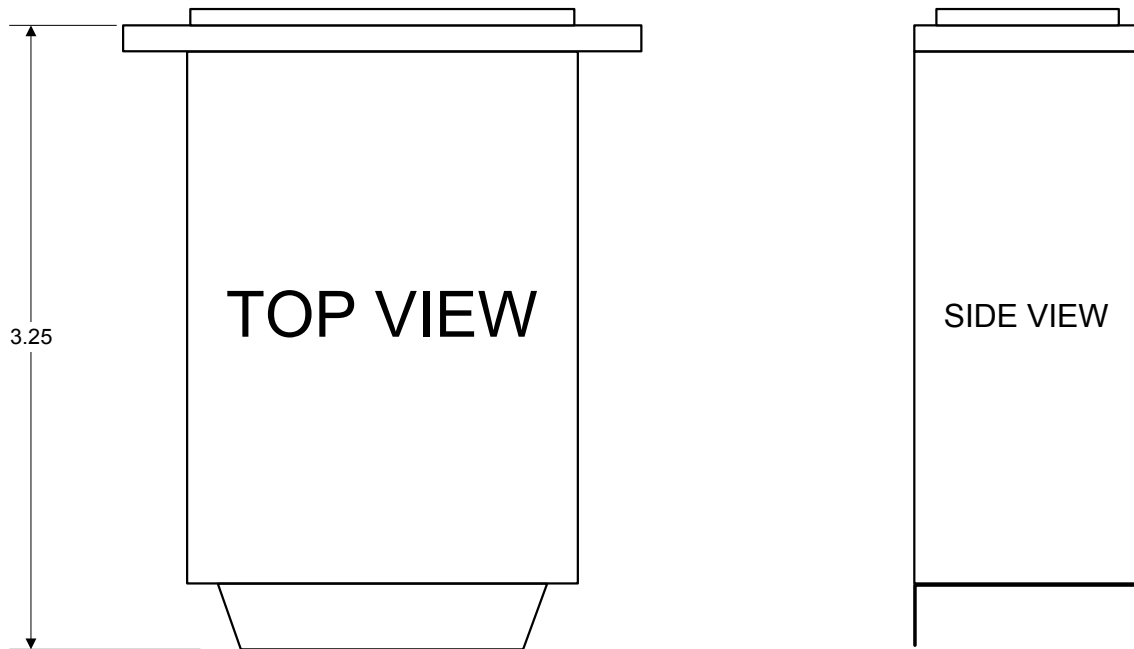
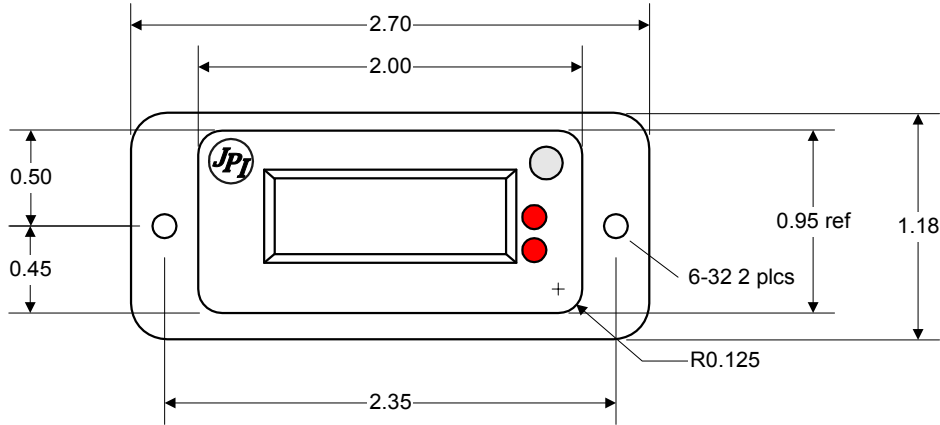
Boom (0 to 150 psi)

MP (0 to 40 psi)

### Volt/amp:

Voltage 10-35 volts

Shunt 50 mv. at 60 amps or 100 amps



The conditions and test required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards.

**23) Weight and Balance Data**

Weights below do not include customer supplied fittings, hoses, and other hardware.

TSO C43b, Slim Line instrument	3.0 oz. / 0.19 lbs.
MP, Oil P option	1.5 oz. / 0.094 lbs.
EGT probe M-111, IAT, CRB, TIT, OAT, OIL	2.0 oz. each / 0.125 lbs. each
CHT probe 5050T	1.5 oz. each / 0.094 lbs.
Oil P, Fuel P, Boom P sensor	4.0 oz. / 0.250 lbs.
Current shunt	3.5 oz. / 0.22 lbs.

**24) Parts List for Slim Line**

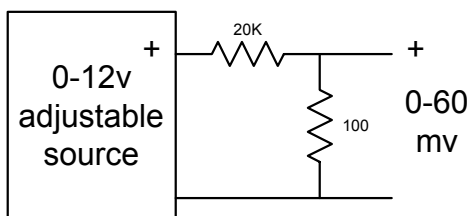
Slim Line Instrument ↗ Included parts ↘	EGT	CHT	TIT/IAT	OIL	OAT	CRB	VOLT/AMP	OIL P	FUEL P	Boom P	MP
Slim Line Display, 2 mount. screws	1	1	1	1	1	1	1	1	1	1	1
Thermocouple Wire	8'	8'	8'	8'	8'	8'					
Molex 0.256" Connector Pins	2	2	2	2	2	2		2	2	2	
Connector housing	1	1	1	1	1	1		1	1	1	
Stainless Steel Clamp Thimble	1		1								
Stainless Steel Exhaust Seal Washer	1		1								
Stainless Steel Screw Clamp #24	1										
Stainless Steel Screw Clamp #48			1								
Ring Terminals	2	2	2	2	2	2					
Screws and nuts 6-32 X 1/4	2	2	2	2	2	2					
Fiberglass tube ½ in. X 4 in.	1	1	1	1	1	1					
Hookup Wire 2 conductor							8'	8'	8'		
Cable, 4 conductor, two connectors											8'
Ring Spade Terminals								2	2	2	
Female Spade Terminals								2	2	2	
M-111 Thermocouple Probe	1		1								
5050 Bayonet Probe, Spring loaded		1*									
M-113 Gasket Probe, Spark Plug		1*									
400505 -C or -L, OIL Probe				1							
400510, OAT Probe					1						
400128 Carburetor Probe						1					
3060-17 Pressure Sender (30 psi)									1		
3060-18 Pressure Sender (150 psi)								1		1	
604010 MP Sensor											1
60 or 100 amp, 50 mv Shunt†							1				

\* CHT includes one bayonet or one gasket thermocouple probe. †not included – available from JPI

**25) Setting the Alarm Limits**

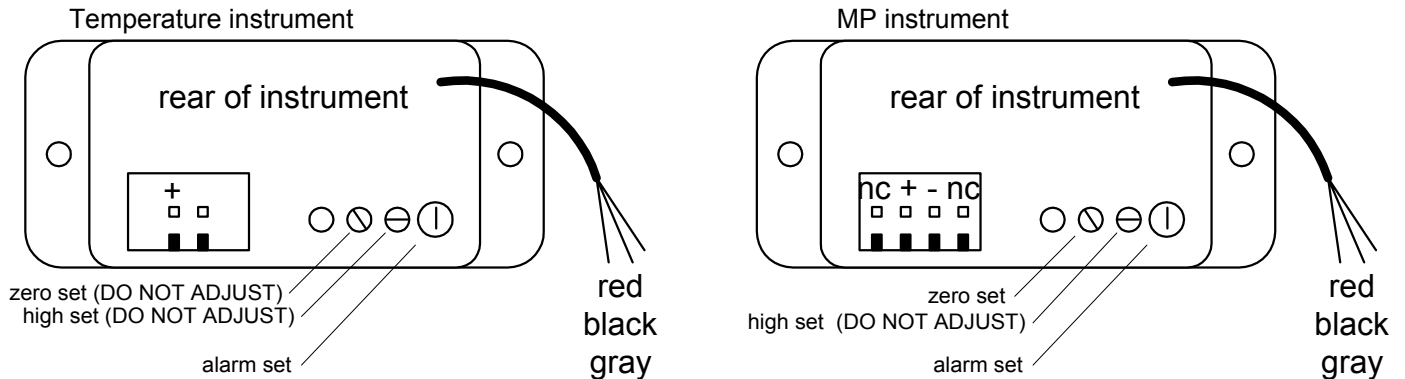
The Slim Line instrument is calibrated at the factory and should require no calibration in the field. However if the instrument alarm limit must be changed for any reason, follow these steps.

**Temperature and MP instruments Alarm Limit Set**



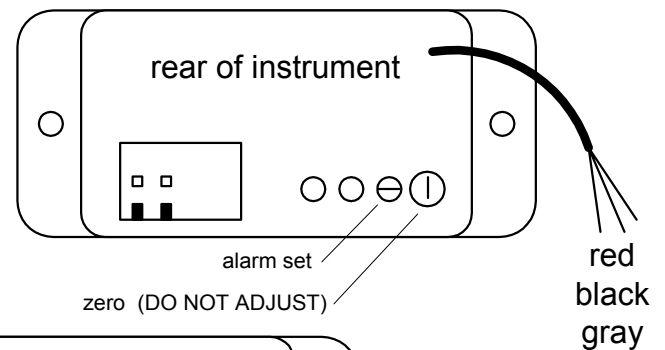
Obtain a stable voltage source capable of generating 0 through 60 millivolts (0.060 volts). A useful source is an adjustable power supply and a pair of dropping resistors as shown to the left. Apply the millivolt source to the two center pins on the rear of the instrument. The positive lead should be on the left as you look at the rear of the instrument. Apply a fixed +12 volts to the instrument's red power wire and ground return to the black wire. Adjust the millivolt source until the reading on

the front is at the desired red-line. Adjust the alarm pot until the two red alarm lights just turn on or off. This is the correct setting for the alarm limit.



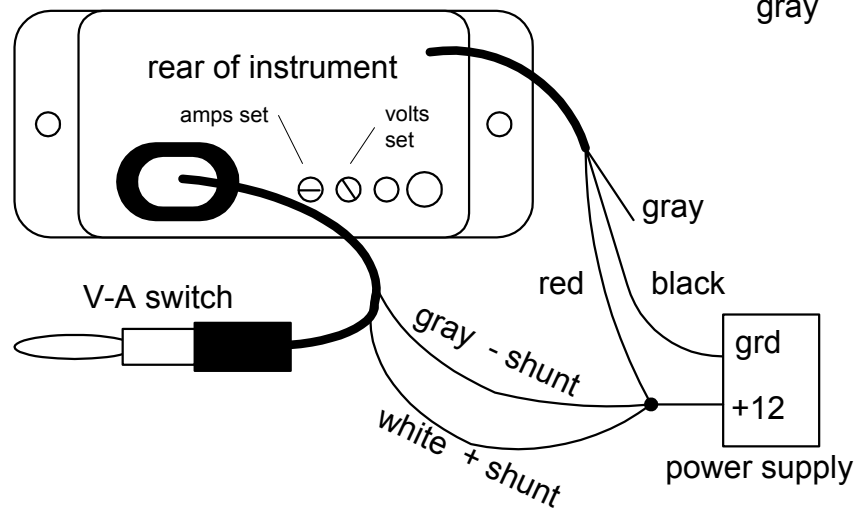
**Oil Pressure, Fuel Pressure and Boom Pressure Instruments Alarm Limit Set**

Connect a 250 ohm linear variable resistor across the two pins on the rear of the instrument. Apply +12 to the instrument's red power wire and ground return to the black wire. Adjust the variable resistor until the reading on the front is at the desired red-line. Adjust the alarm pot until the two red alarm lights just turn on or off. This is the correct setting for the alarm limit.



**Volt/Amp Instrument Adjustment**

To adjust the Volt/Amp instrument, follow this procedure. Connect the red power lead, the gray shunt lead (not the gray alarm indicator lead) and the white shunt lead together and to a +12 or +24 volt source. Connect the black lead to the power return. Connect an external voltmeter between the + voltage source and return. Set the toggle switch to the *voltage* setting and adjust the *volts set* pot until the voltage on the Slim Line instrument matches the voltage on the external voltmeter.



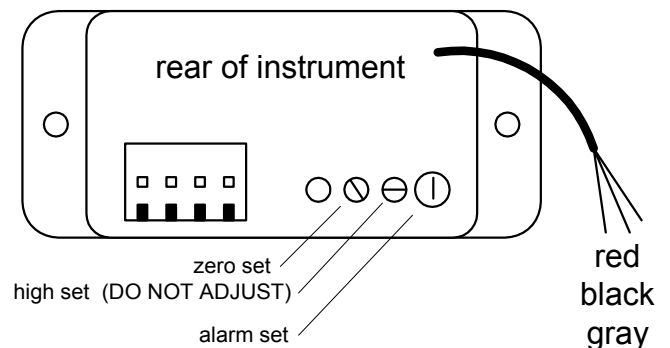
Set the toggle switch to *amps* setting and adjust the *amps set* pot to indicate zero amps.

**26) Manifold Pressure Calibration**

The manifold pressure must be calibrated to the ambient air pressure. You must adjust the instrument to the current ambient barometric pressure. This setting is *not* the same as the altimeter setting that you receive from ATIS or unicom. It will vary with field elevation.

The engine must *not* be running.

If your field elevation is less than 500 feet, you can set your altimeter to zero feet and read the ambient MP on



the Kollsman window. Or use the chart below to calculate the MP FACTOR. Multiply this MP FACTOR by the altimeter setting that you receive from ATIS or unicom. For example if the field elevation is 1700 ft and the current altimeter setting is 30.1, the MP FACTOR is determined to be 0.9400 from the table. Multiply 30.1 x 0.9400 to obtain the ambient MP of 28.29.

Adjust the *zero set* pot as shown on the above diagram so that the MP reading is the same as the ambient MP determined above.

Field Elev	MP FACTOR	Field Elev	MP FACTOR	Field Elev	MP FACTOR	Field Elev	MP FACTOR	Field Elev	MP FACTOR
-500	1.0182	1000	0.9644	2500	0.9129	4000	0.8636	5500	0.8165
-400	1.0145	1100	0.9609	2600	0.9095	4100	0.8604	5600	0.8135
-300	1.0109	1200	0.9574	2700	0.9062	4200	0.8572	5700	0.8104
-200	1.0073	1300	0.9539	2800	0.9028	4300	0.8540	5800	0.8074
-100	1.0036	1400	0.9504	2900	0.8995	4400	0.8508	5900	0.8043
0	1.0000	1500	0.9469	3000	0.8962	4500	0.8477	6000	0.8013
100	0.9964	1600	0.9435	3100	0.8929	4600	0.8445	6100	0.7983
200	0.9928	1700	0.9400	3200	0.8896	4700	0.8414	6200	0.7953
300	0.9892	1800	0.9366	3300	0.8863	4800	0.8382	6300	0.7923
400	0.9856	1900	0.9332	3400	0.8830	4900	0.8351	6400	0.7893
500	0.9821	2000	0.9298	3500	0.8798	5000	0.8320	6500	0.7863
600	0.9785	2100	0.9264	3600	0.8765	5100	0.8289	6600	0.7833
700	0.9750	2200	0.9230	3700	0.8733	5200	0.8258	6700	0.7804
800	0.9714	2300	0.9196	3800	0.8700	5300	0.8227		
900	0.9679	2400	0.9162	3900	0.8668	5400	0.8196		

**27) Warranty**

J. P. Instruments, Inc. (JPI), warrants all parts in your new Slim Line to be free from defects in material and workmanship under normal use. Our obligation under this warranty is limited to repair or exchange of any defective part of this unit if the part is returned, shipping prepaid, within two years for electronics and one year for probes from the date of original purchase. Installation labor is the responsibility of the aircraft owner. Homebuilt aircraft warranty starts when the aircraft is certified for flight. Replacement parts carry a warranty for the balance of the warranty period.

Under this warranty, JPI is not responsible for any service charges, including removal, installation, nor any other consequential damages. JPI incurs no obligation under this warranty unless a Warranty Registration Certificate describing the warranted product has been completed and mailed to JPI with all information requested.

This warranty is void on any product which has been subject to misuse, accident, damage caused by negligence, damage in transit, handling or modification which, in the opinion of JPI, has altered or repaired the product in any way that effects the reliability or detracts from the performance of the product, or any product whereon the serial number has been altered, defaced, effaced or destroyed.

This warranty is in lieu of all other warranties expressed or implied and other obligations of liability on JPI's part, and it neither assumes nor authorizes any other person to assume for JPI any other liability in connection with the sale of JPI products.

To initiate this warranty, the aircraft owner must submit a completed warranty card to JPI. JPI will initiate the warranty from the date of original purchase. Any replacement parts carry a warranty that extends for the balance of the period of the original warranty. For homebuilt aircraft the warranty starts when the aircraft is certificated for flight and noted on the warranty card.

## 28) Troubleshooting

- a) **A negative temperature reading** (- in front of the number) indicates reverse polarity on the red and yellow thermocouple wire to probe.
- b) **Ohmmeter check.** (Temperature instruments only) Remove the connector from the rear of the instrument and measure the resistance of the probe lead pair. The reading should be about 10 ohms. At the connections between the probe and the wiring in the engine compartment, the resistance should be about 2 ohms.
- c) **Ohmmeter check.** (Oil pressure, Fuel pressure and Boom pressure instruments only) Measure the resistance of the pressure sensors at the two terminals. With no pressure applied the resistance should be about 10 ohms. Full pressure should read about 200 ohms, with intermediate pressures in between.
- d) **Temperature reading varying rapidly.** Verify that the Instrument is grounded at the engine block for single engine installations. If an adapter probe is being used insure that it is screwed in tightly. Remove the factory original probe that is in the adapter and note if problem is resolved. If so an resistive ground exists between the engine and the adapter probe. Check for a poor quality crimp between the probe and wiring.
- e) **Ammeter doesn't read zero when no current is flowing.** Check that there are no other connections to the current shunt other than what is described in this manual. The Slim Line instrument should *not* be powered from the shunt.
- f) **An alarm never occurs on the Volt/Amp indicator.** Alarm will only show battery discharge. For a load meter configuration, there will never be an alarm. There is no alarm for the voltage function.

Returns for repair should include a description of the problem symptom and conditions under which the symptom occurred. Be sure to include your return address and phone number. Send instruments for repair to

**J. P. Instruments, 3402-I West Mac Arthur, Santa Ana, CA 92704**

## 29) Operation

The Slim Line instrument requires no operator interaction. Upon power-up, it will begin to display the measured parameter. There are two red alarm indicators to the right of the numerical display. When an alarm condition is detected, *both* indicators will flash simultaneously. These are the factory set alarm limits unless requested otherwise.

EGT (Exhaust Gas Temperature Max. limit 2500°F)	1650°F
CHT (Cylinder Head Temperature Max. limit 600°F)	450°F
TIT (Turbine Inlet Temperature Max. limit 2500°F)	1650°F
OIL (Oil temperature Max. limit 600°F)	230°F
OAT (Outside Air Temperature Limit -40 to 300°F)	No alarm
IAT/CRB (Induction Air Temperature Max. Limit 600°F.)	No alarm
VOLT (Voltage, 0 to 40 volts.)	No alarm
AMP (Amperes -60 to +60 or -100 to +100)	Negative 0.5 amps or higher
OIL P, (Oil Pressure 0 – 150 psi)	15psi
FUEL P (Fuel Pressure 0 – 30 psi)	4 psi
Boom P (Boom Pressure 0 – 150 psi)	No alarm
MP (Manifold Pressure 0 – 40 inHg)	36 inHg

The entire display dims automatically depending on the ambient lighting.