J. P. INSTRUMENTS PO Box 7033 Huntington Beach, CA 92615

FAA APPROVED INSTALLATION MANUAL FOR THE EGT-701 #103

Applicable to EGT-701 and EDM-750.

THE OWNER OF THIS EGT-701 MUST KEEP THIS MANUAL

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 the pilots guide clearly states that JPI will replace defective parts under warranty, **but does NOT cover labor to remove or install any parts**.

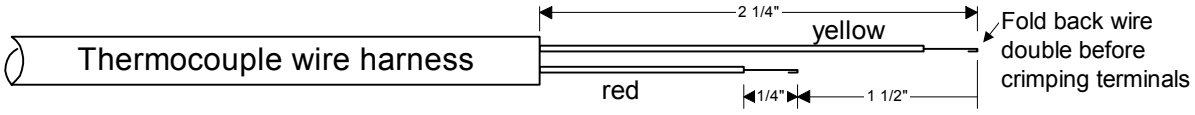
b) To prevent damage to the display **it is essential that the four mounting screws not penetrate the instrument more than 0.12 inches**. Damage caused by screw penetration is not covered under warranty.

c) You must be an FAA certified aircraft mechanic to install this instrument.

d) Check that any necessary FAA approvals (STCs, etc) are available for the aircraft before beginning the installation.

e) Power up and test the instrument before installing in the instrument panel.

f) The most common cause of probe problems is poor terminal crimps. Crimp ring terminals with AMP part 45518 crimp tool or equivalent. **Fold back the wire double before crimping terminals.**



g) 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.

h) Do not use aluminum fittings with the FXT-201 or FXT-231 fuel flow transducer.

i) Write down the K-factor engraved on the side of the fuel flow transducer here _____. Once the transducer is installed and covered with the fire sleeve, you will not be able to access this K factor.

j) Determine the locations of all holes before drilling to ensure that nothing interferes with the probe, clamp, clamp screw or wire.

k) Provide service loops at the instrument.

l) Thermocouple wire length is not critical. Trim to required length, allowing for service loops at the engine so that probes can be swapped with probes on adjacent cylinders for troubleshooting purposes.

m) Dress all wires away from high temperature components such as exhaust stacks.

n) Never splice thermocouple wire using copper wire. Use only K-type thermocouple wire. Solder using zinc chloride flux such as Nokorode brand – rosin flux alone won't work.

o) Observe correct polarity on all probe wires. Connect like colors together (red to red, yellow to yellow).

p) **The instrument must be grounded at the engine**, not at the avionics ground.

q) If a spark plug gasket probe is used, expect the CHT reading on that cylinder to be somewhat higher than on the cylinders with bayonet probes. At additional cost an adapter probe (bayonet or screw-in) is available that permits the factory CHT probe and the JPI probe to be placed in the same bayonet location.

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.
2. Install the instrument in the instrument panel.
3. Install the probes, sensors, and transducers in the engine compartment.
4. Connect the connectors to the instrument.
5. Mount the data port connector and optional fuel flow toggle switch to the instrument panel.
6. Run the harness from the instrument in the instrument panel through the fire wall to the engine compartment. Dress the wires to the probes, sensors, and transducers.
7. Cut the excess length off the harness wires and connect to the probes, sensors, and transducers.
8. Verify system operation.
9. Set the alarm limits and other calibration constants.

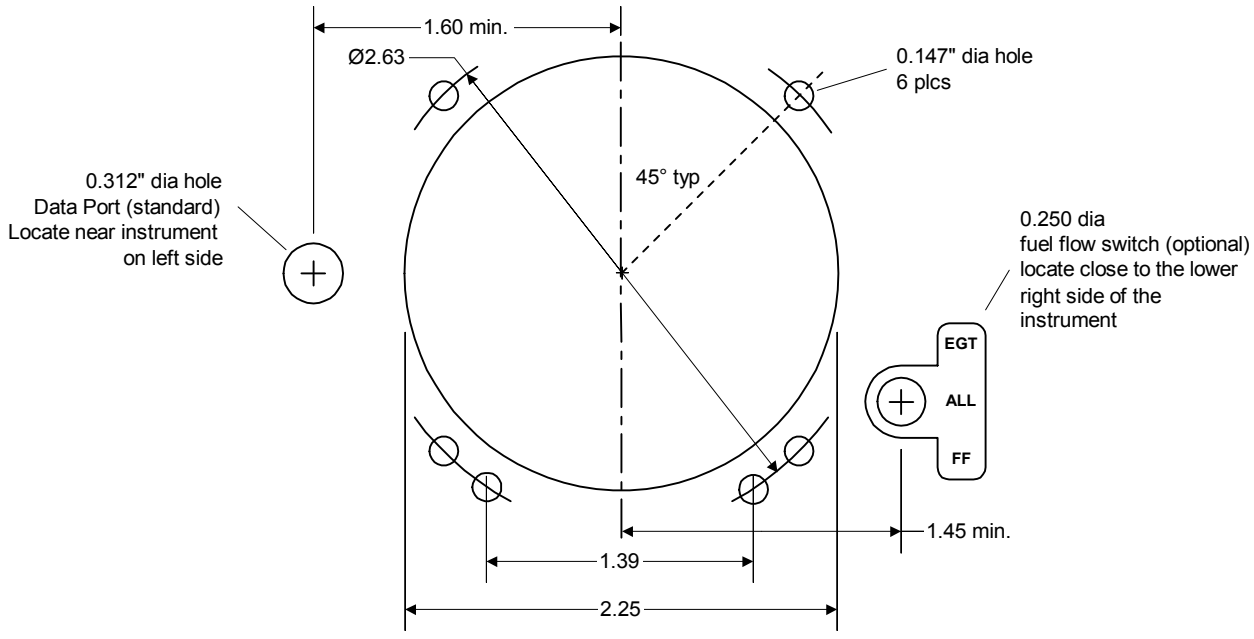
2) Initial Bench Check

Connect the P1 connector to the rear of the EGT-701 and connect the red wire to +12V or +24 V and the black wire to ground. Verify that the display shows `DEMO` followed by `EDM-700`, and that each column is self-tested in sequence.

3) Installing the Instrument

To prevent damage to the display it is essential that the four mounting screws not penetrate the instrument more than 0.12 inches. Damage caused by screw penetration is not covered under warranty.

Installation should be in accordance with Advisor Circular AC43.13-1A. Identify the location for the instrument on the instrument panel that has a 2.25 inch instrument hole and 8.5 inches clearance behind the instrument panel. Check the rear clearance with the connectors attached to the instrument. A GEM upgrade may require extra clearance below the rear of the instrument.

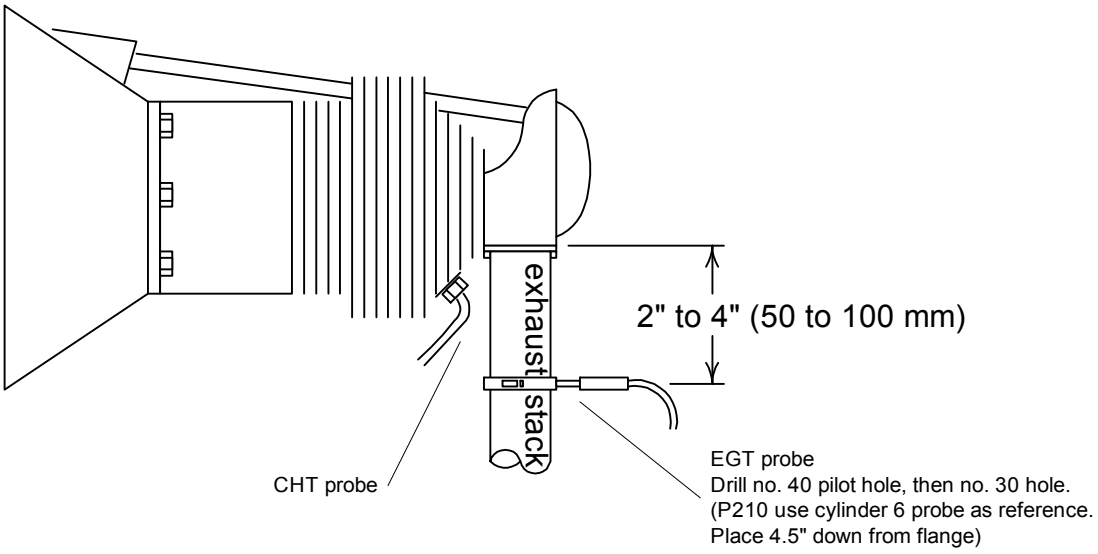


Use the steel template supplied with the installation kit as a guide for drilling the two button holes in the instrument panel. Drill two 0.125 inch pilot holes. Remove the template and verify the instrument alignment. Then drill final 0.147 inch holes. Drill a 0.312" diameter hole for the data port at least 1.60" from the vertical center-line of the instrument face. Drill a 0.250" diameter hole for the optional fuel flow select switch at least 1.45" from the vertical center-line of the instrument face. The instrument mounts in a standard 2.25 inch instrument hole.

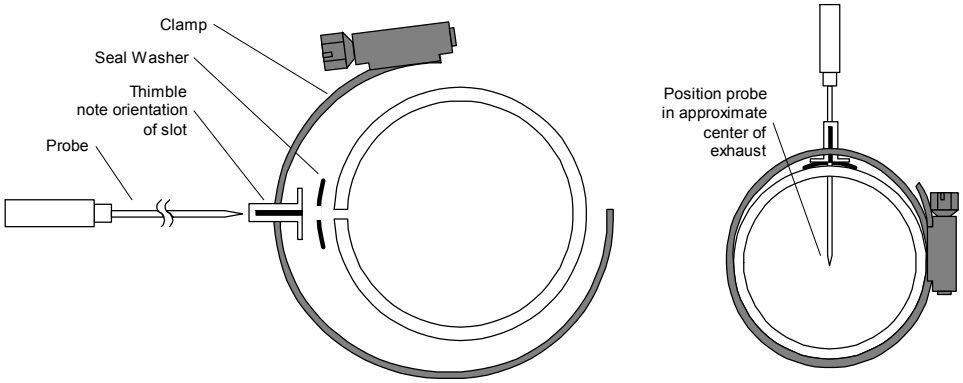
The instrument configures itself automatically for the number of cylinders and the supply voltage (12 or 24 volt). The instrument is 7.5 inches deep, less connectors, and is 2.6 inches square.

4) Exhaust Gas Temperature (EGT) Probe

Determine the locations of all holes before drilling to ensure that nothing interferes with the probe, clamp, clamp screw or wire. Do not mount EGT probes in slip joints. The model M-111 EGT probe will fit any engine having existing holes in the exhaust stack of between 0.125" and 0.250." If no hole exists, drill a 0.125" hole and ream to fit. 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.



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. The probe warranty is void if the probe is mounted in any type of a slip-joint.



5) Turbine Inlet Temperature (TIT) Probe

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. TIT will appear as the rightmost column labeled T and the digital display will show `I650 TIT` (for example) when the indexing dot is under the T. The EGT-701 input is a high impedance and is compatible with the aircraft factory installed TIT probe. The EGT-701 TIT cable may be connected in parallel (piggy back) at the TIT probe (preferred), or at the aircraft TIT gage. Be sure to match the red and yellow wire color codes. If your aircraft is using the factory original TIT probe and gage, you will be required to calibrate the EGT-701 for that probe. Follow the procedure describe later in this manual (in section 30).

6) Cylinder Head Temperature (CHT) Probe, Bayonet

The bayonet probe 5050-T has a captive 3/8-24 boss that is screwed into the base of the cylinder (see figure in section 4). The probe has a screwdriver slot to facilitate tightening.

> NOTE: Required original equipment that has a Red Line may not be replaced by the EGT-701 TIT or CHT installation. This includes but is not limited to all aircraft with adjustable cowl flaps and on aircraft with placards on the instrument panel showing a climb air speed, for cooling, different from the best rate of climb air speed.

If a previously installed TIT, CHT or EGT is listed on the aircraft equipment list as *optional equipment* or not listed at all, it may be replaced by the EGT-701.

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

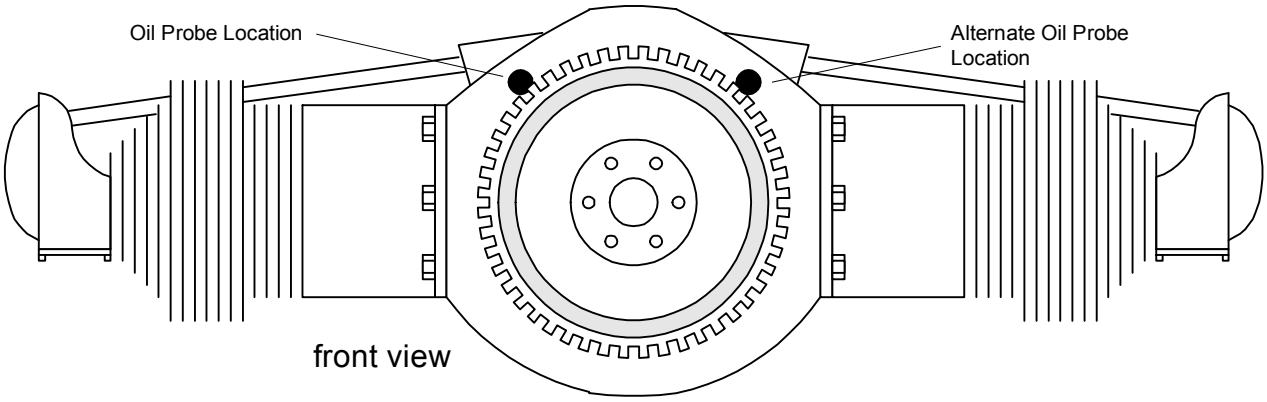
Most factory installed cylinder head temperature gages utilize a bayonet or screw-in resistance-type probe that occupies a socket in one of the cylinders. This probe is not compatible with the thermocouple probes required for the EGT-701.

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. **The probe is usually placed on the plug that receives the most direct cooling air.** Due to the spark plug location, the gasket probe may read 20^{o}F higher or lower than the factory probe. If the discrepancy is greater, be sure the spark plug gasket probe is mounted on the *top* spark plug. An adapter probe is available to occupy the same socket as the factory original probe. Contact J.P. Instruments.

8) Oil temperature (OIL) Probe

The Oil Temperature Probe PN 400505-C or 400505-L is installed as a supplemental oil temperature indicator.

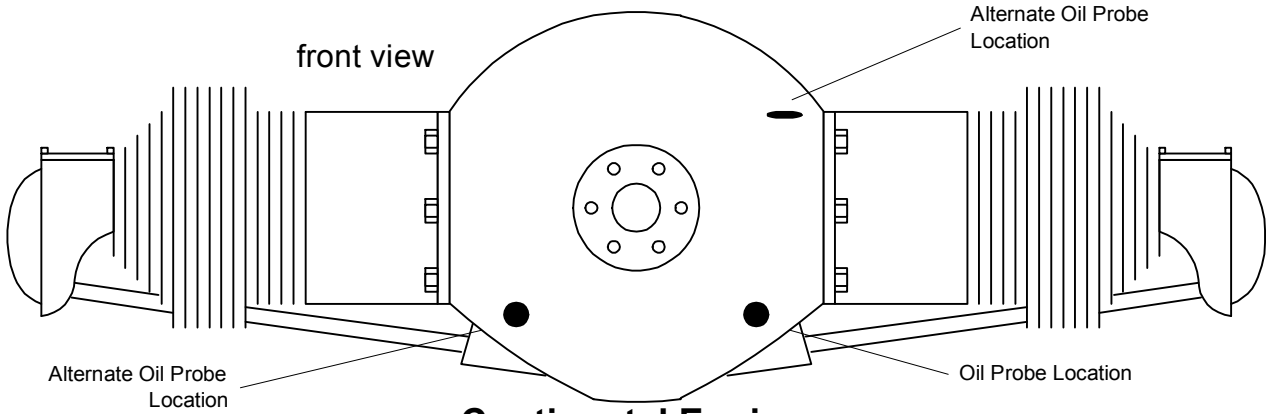
Lycoming Engines: The **-**L part number is for all Lycoming direct drive engines and is installed in the *right* (passenger side) front oil galley by removing the existing 1/8 NPT plug on the passenger side of the engine and inserting the optional JPI oil probe supplied with the kit.



Lycoming Engines

Continental Engines: The **-**C part number 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 below) 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.

Oil temperature will be shown in the digital part of the display as, for example `230 OIL` and will be displayed In the rightmost column if no TIT probe is installed. The original oil temperature gage and sensor must remain installed in the aircraft. Check for oil leaks before first flight.

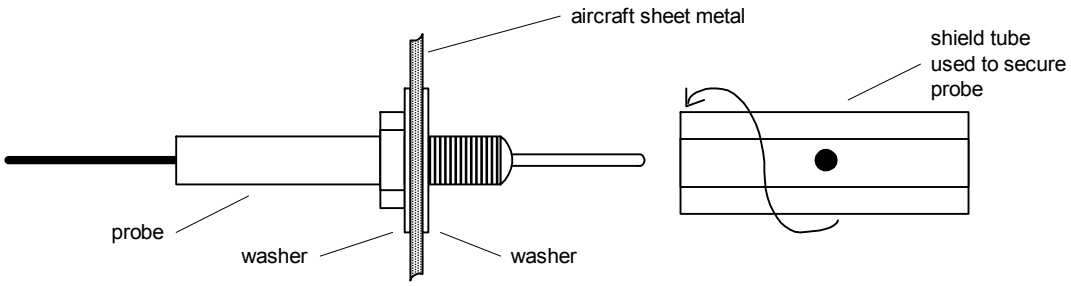


Continental Engines

Another location for the oil probe may be the oil cooler. Check to see if the oil cooler has an unoccupied plug, typically on the top.

9) Outside Air Temperature (OAT) Probe

Install the OAT probe, PN 400510 in the airframe manufacturer's recommended location. If this is not possible, place the OAT probe in clean airflow such as in a cabin air scoop or on the underside of the wing **away from engine heat or exhaust**. Remember, the engine is operating with temperatures in excess of 1500°F. Just a little hot air or conductivity from the engine can cause the indicated OAT to increase by 10 to 20°. 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, protect it from damage, and shield it from radiated heat. OAT will be shown in the digital part of the display as, for example, `75 OAT`. When testing the OAT, shield the sensor from direct sunlight and engine heat, while the engine is operating.

10) Induction Air Temperature (IAT), Compressor Discharge (CDT) and Carburetor (CRB) Probes

The Induction Air Temperature probe, (IAT), is installed just after the inter-cooler—OUT, and the Compressor Discharge Temperature (CDT) just before the inter-cooler—IN. The IAT and CDT probes are the same as EGT probes and are installed similarly to EGT probes. A large clamp is supplied to fit around the air port leaving the inter-cooler. Alternately a 1/8" NPT fitting is available. IAT will be shown in the digital portion of the display as, for example `I25 IAT`. On non turbo engines install the carburetor probe in the threaded hole on the engine side of the butterfly valve. The carburetor temperature is displayed as, for example, `34 CRB`.

11) 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 . Refer to the engine manufacturer's red line and set the EGT-701 red line accordingly. Front spark plugs will read 15 to 20 degrees cooler than the rear plugs. Do not route the EGT/CHT harness adjacent to or in the ignition harness. Do not extend thermocouple wires with copper wire.

12) Fuel Flow Option Mounting Procedure

The K-factor is engraved on the side of the transducer. Write down the K-factor here for future reference _____. You will need it later in this procedure.

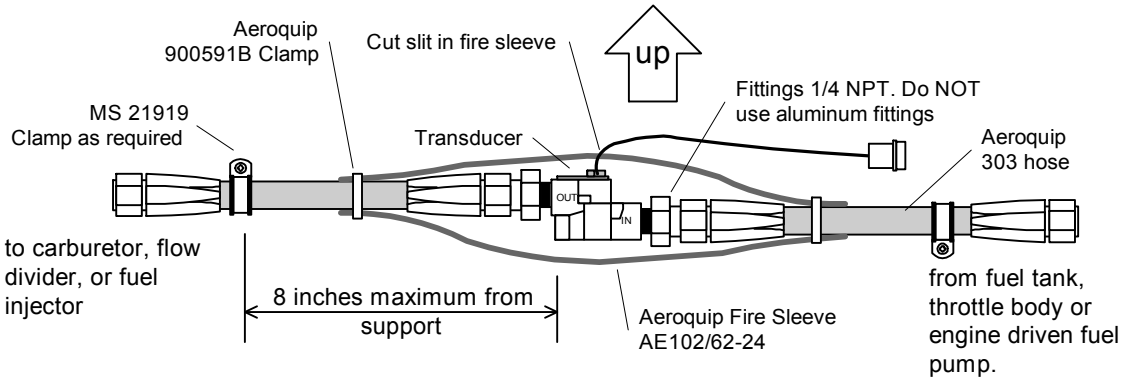
A complete and thorough familiarization and understanding of the system is necessary before commencing the installation. All work must conform to AC 43.13-1A, chap 11, section 2.3.7 requirements.

The EGT-701 can be connected to any previously installed digital flow measuring device such as a FloScan transducer. When wiring the EGT-701 to a preexisting transducer that is also connected to another fuel flow instrument, connect only the signal (white wire) and ground (black wire). **Do not connect the power lead (red wire).** If the previously installed instrument is a Aerosonic, the fuel flow connector on the EDM-701 must be labeled *Aerosonic*. Otherwise, return the EDM-701 to JPI for modification.

Before connecting any hoses to the transducer, thoroughly clean them and insure they are free of any loose material. **Never pass high pressure air through or blow through the transducer; damage may occur.** Remove the transducer cap plugs only when ready to install the hoses. Note the direction of fuel flow marked on the transducer. Fuel must flow in this direction. Mount the transducer with the

three wires pointing up. Torque the fittings no more than 15 ft lb = 180 in lbs., or two full turns past hand tight.

Do not use aluminum fittings when installing the fuel flow transducer.

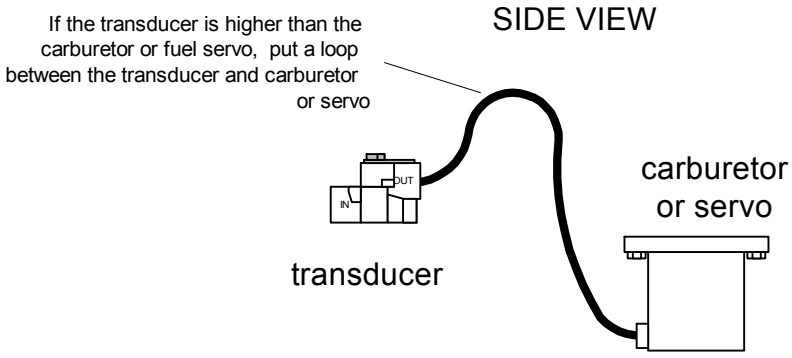


The EGT-701 receives signal from any installed Floscan transducer with any of these part numbers embossed on to the top of the transducer (*Floscan Instruments, Seattle WA 98106)* or equivalent Shadin: Floscan 201A, Floscan 201B (equivalent to Shadin 680501/680600), Floscan 201C, or Flowscan 231 (equivalent to Shadin 680503).

Select the appropriate installation configuration from the three following fuel system categories:

❑ For **gravity feed** systems without a fuel pump	use transducer FXT-231 (yellow plastic top). Connect the transducer between the fuel tank and carburetor.
❑ For **pump feed or fuel injected systems without vapor return** lines	use transducer FXT-201 (black plastic top). Connect the transducer between the engine driven pump and servo/throttle body or carburetor.
❑ For all **fuel injected engines with vapor return** lines to the fuel tank before the servo/throttle.	use transducer FXT-201 (black plastic top). Connect the transducer between the throttle body and the fuel flow divider.

The transducer output port should be mounted lower or level with the carburetor inlet port (or fuel servo on a fuel injected engine). If this is not possible, an anti-siphon loop should be put in the fuel line between the fuel flow transducer and the carburetor or fuel servo.



Find a convenient location within 8 inches of a hose support or fitting to suspend the fuel flow transducer. Mount it away from any hot exhaust pipes. The hose support or fitting may be on the input or output line of the fuel flow transducer. Secure the end of the transducer to any convenient point on the engine with MS21919 clamps or equivalent. **Do not place an angled elbow joint immediately prior to the input port of the fuel flow transducer.** There should be six inches of straight flow immediately before the transducer input port.

For a **carbureted** engine: remove the fuel hose which connects the carburetor to the fuel tank. Purchase two new hoses — one to connect the carburetor to the fuel flow transducer, and the other to connect the fuel flow transducer to the fuel tank. Before connecting the fuel hose to the carburetor, verify that the boost pump delivers at least 125 percent of takeoff fuel flow at minimum fuel pressure as marked on the fuel pressure gage.

For a **pump-fed carbureted or fuel injected engine without vapor return** lines: remove the fuel hose which connects the engine-driven pump and the servo/throttle body or the carburetor. Purchase two new hoses one to connect the engine-driven pump to the fuel flow transducer, and the other to connect the fuel flow transducer to the servo/throttle body or the carburetor.

For a **fuel injected engine with vapor return** lines before the servo/throttle: remove the fuel hose which connects the throttle body and the flow divider. Purchase two new hoses one to connect the throttle body to the fuel flow transducer, and the other to connect the fuel flow transducer to the flow divider. For Continental fuel injected engines adjust the fuel pressure to account for the pressure drop across the transducer per Continental Service Bulletin M89-10.

There must be flexible hose into and out of the fuel flow transducer. The hoses must meet TSO-C53a type C or D FAA specification. The new hoses must be the same size as the current hose in the aircraft. The fuel flow transducer must be wrapped with fire sleeving. Cut a 1 inch slit in the center of the fire sleeve and pass the transducer connector and cable through it. Seal with high temperature silicone RTV sealant.

The placard "**Do not rely on fuel flow instrument to determine fuel levels in tanks**" must be mounted on the aircraft instrument panel near the EGT-701. If the aircraft is equipped with a primary fuel flow instrument, the following placard must be mounted on the aircraft instrument panel near the EGT-701 "**Refer to original fuel flow instrumentation for primary information**."

13) Wiring the Instrument Connectors

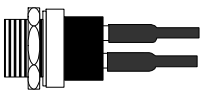
P2 Bottom Connector (has the yellow CHT and EGT wires)

The P2 connector plugs into the bottom jack on the back of the instrument and contains the first six EGT and CHT channels. The plug should be pre-wired with a harness.

P1 Top Connector (contains the red power and black ground wires and the data logging port connector)

The P1 connector plugs into the top jack on the back of the instrument and contains the option probe channels, EGT and CHT channels 7, 8 and 9, alarm signal, data logging port and power and ground. The EGT-701 automatically accommodates both 14 and 28 volt electrical systems. Connect the power lead (red) to a separate 2 amp circuit breaker or 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 EGT-701 during engine start-up.

The EGT-701 must be **grounded to the engine block**, not at a ground point under the instrument panel. No connection to the aircraft dimmer system is required or permitted because the instrument dims automatically with reductions in ambient light.



Install the data port connector in the instrument panel. This is the 2.5 mm ID, 5.5 mm OD on the twisted white and black wires on J1. See *Installing the Instrument* section earlier in this manual.

In you are installing any temperature options such as OIL, TIT, CRB, or OAT, insert the option female pins into the P1 connector according to the table below.

P2 Connector (bottom)

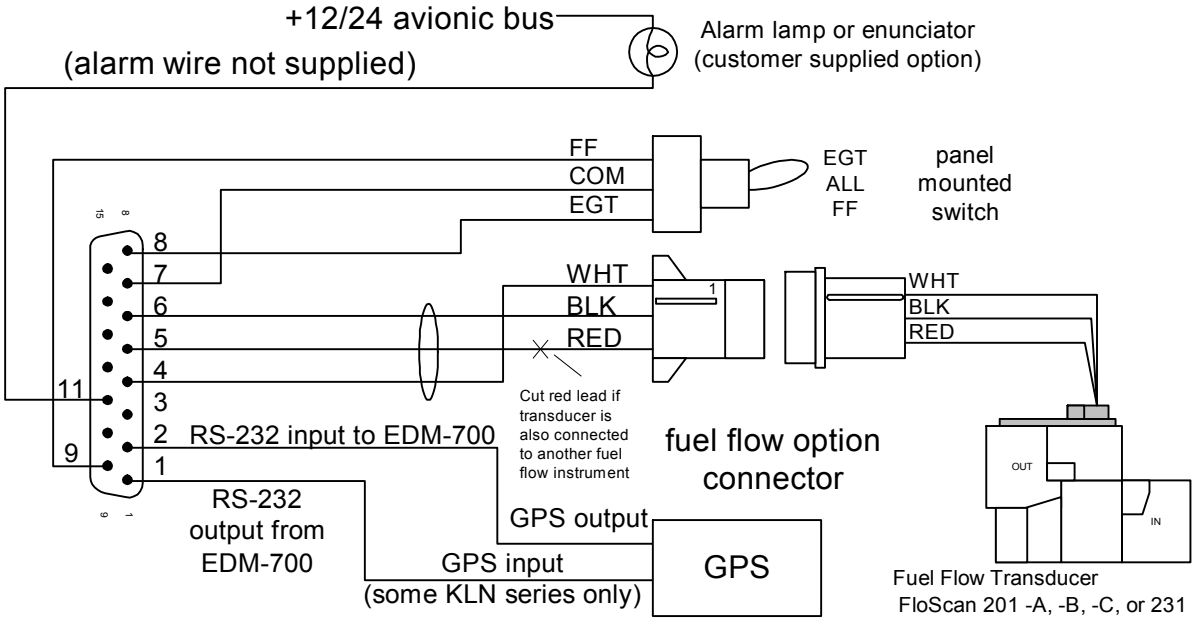
Yel	*Red*	*probe*
1	2	CHT-1
3	4	CHT-2
5	6	CHT-3
7	8	CHT-4
9	10	CHT-5
11	12	CHT-6
14	15	EGT-1
16	17	EGT-2
18	19	EGT-3
20	21	EGT-4
22	23	EGT-5
24	23	EGT-6

P1 Connector (top)

Yel	*Red*	*4 or 6 cylinder*	*7, 8, or 9 cylinder*
1	2	OIL	OIL
3	4	IAT	CRB
5	6	CDT or CRB	CHT-7
7	8		CHT-8
9	10		CHT-9
14	15	OAT	OAT
16	17	TIT-1	TIT
18	19	TIT-2	EGT-7
20	21		EGT-8
22	23		EGT-9
11	(wht)	Mike tip (optional)	
12	(gry)	Remote alarm (optional)	
13	(red)	+ power +14/28 volts fuse 2 a	
25	(blk)	Ground TO ENGINE BLOCK	
24		Data port RS-232 (with conn.)	

Fuel flow Connector (has the fuel flow transducer, RS-232 in and out, and the toggle switch)

If the installation includes the fuel flow option, Install the EGT-ALL-FF display selector switch and legend label in the panel. Connect wires to the fuel flow option connector as shown below. The fuel flow connector is the jack that is on the short wire bundle out of the rear of the instrument. Route the wires along the existing wiring bundle, lacing every foot.



The fuel flow connector is attached to the instrument by a short cable. The plug should be pre-wired with a harness. Fuel flow option connector pin assignments are as follows:

Pin	*Signal*
1	RS-232 out (to GPS)
2	RS-232 in (from GPS)
3	
4	Fuel flow signal (wht)
5	Fuel flow ground (blk)
6	Fuel flow power (red)

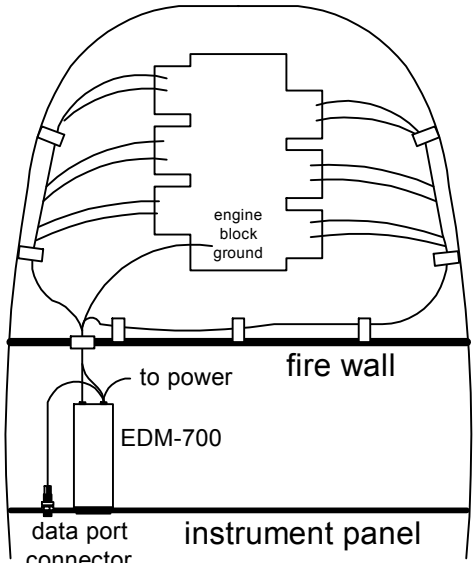
Pin	*signal*
7	EGT/FF switch common
8	EGT/FF switch EGT
9	EGT/FF switch FF
10	
11	Remote alarm (optional)
12	

The EGT-701 with fuel flow option may be connected to a GPS. Most GPS receivers have an output port from which the EGT-701 will accept data. Some GPS receivers can accept data from the EGT-701.

The remote alarm wire on the fuel flow connector, pin 11, 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 the EGT-701 25-pin D connector, P1-12, in a "wired-OR" 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.

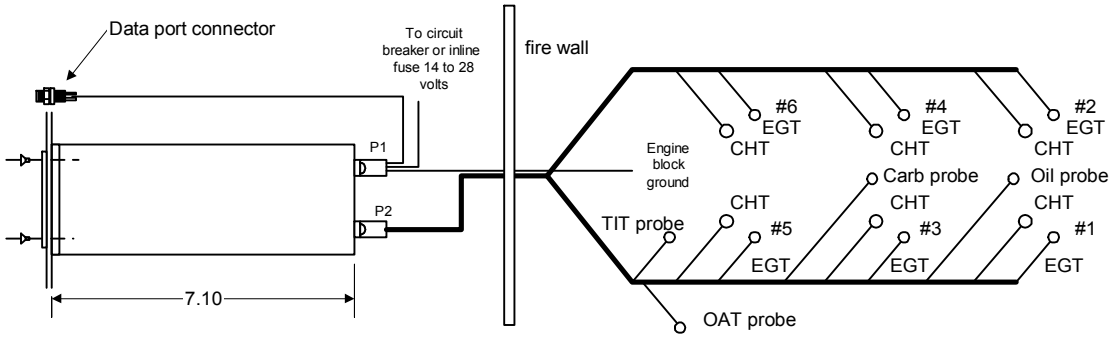
14) Routing the Wiring Harnesses

The EGT-701 is supplied with special Teflon insulated Chromel Alumel factory assembled wiring harnesses configured for the correct number of cylinders and options purchased. The wire harness is marked "E-1" for EGT-1, "C-1" for CHT-1, etc. "T" for TIT, "O" for OIL and "A" for OAT. For upgrades from the EGT-100 Classic Scanner or non-JPI bar graph instruments, where only the indicators are being exchanged, the existing harness wires must have pins crimped on (AMP PN 665049 pins) and fitted into the D-sub connector (AMP PN 205207-1) with hood or connected directly using an adapter connector if the existing installation has connectors.



Leave adequate service loops at the instrument. Bundle all the probe, sensor and transducer wires together with the ground wire and route the harness wires 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, sensor and transducer leads to a convenient location on the engine approximately 8 to 12 inches from the probe, sensor or transducer, being sure there is sufficient slack to absorb engine torque. It is essential in routing the probe, sensor or transducer wire that this wire not be allowed to touch metal parts of the airframe or engine since abrasion will destroy the wire.

The temperature (thermocouple) probe wiring schematic is shown below:

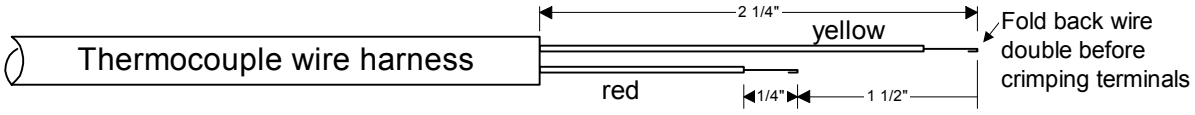


15) EGT, CHT and Other Temperature Probe Wiring

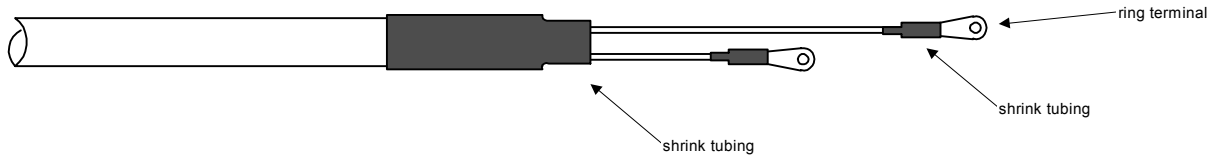
Before you begin, note that the most common cause of probe problems is poor terminal crimps.

When cutting each pair of leads in the wiring harness to the proper length to connect to the probes, leave enough slack in the harness so that probes from adjacent cylinders may be interchanged 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.

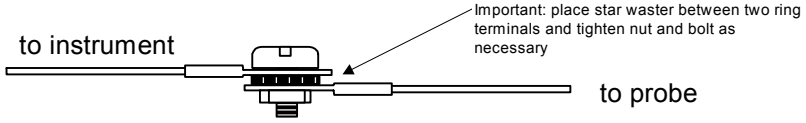
The Temperature probes must be wired with the correct polarity. Each wire is marked with the cylinder number. The EGT and CHT probes connect to the temperature indicator with yellow jacket Teflon Chromel Alumel wire supplied. Strip the wires as shown below, observing color codes. **Important: fold back the wire double before crimping terminals.**



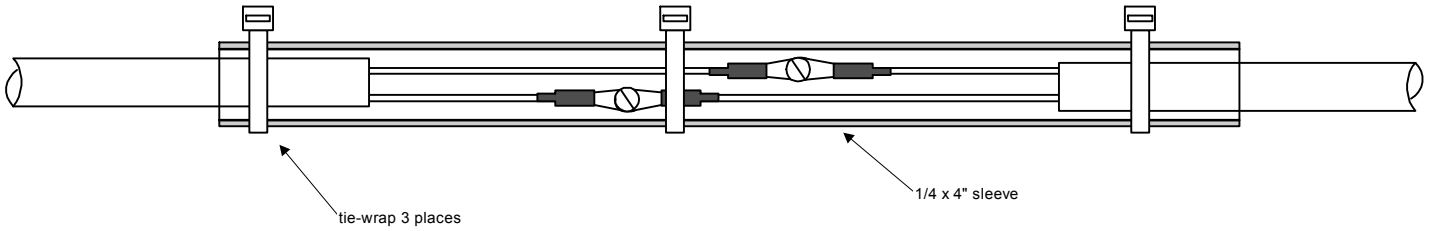
Terminate each wire with a crimp-on ring terminal, provided. The ring terminals may be crimped with a "service-type" tool, however AMP part number 48518 crimp tool is recommended. Verify the quality of each crimp with a sharp tug on the wire. The terminal should be impossible to pull off when crimped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



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



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



The most common installation problems are poor quality terminations.

16) Fuel Flow Transducer Wiring

Cut the fuel flow transducer leads to length at the fuel flow transducer. Provide adequate service loop. Attach the supplied 3-pin connector by stripping and crimping a pin on each wire, and then inserting each pin into the plastic connector housing. Observe pin numbering and wire colors.

17) Initial Checkout

Turn on the aircraft master switch and avionics master, with the engine off. The EGT-701 will perform a self test wherein all segments will light up and each cylinder column will cycle vertically.

With Fuel Flow Option (skip to next subsection if fuel flow option is not installed)

The display should show `FILL? N`. Tap STEP. Set the instrument toggle switch to FF (Fuel flow). Tap STEP until `0 GPH` is displayed. Turn on the boost pump for a few seconds and verify the display shows between `3` and `8 GPH`.

Turn off the boost pump and verify the fuel flow reading returns to `00 GPH`. A display of `--- GPH` indicates no fuel flow transducer signals are detected. Check the connections between the EGT-701 and the fuel flow transducer.

Check the flow reading with the engine running. After running the engine, check the fuel hoses, transducer and fittings for leaks.

Set the instrument toggle switch to EGT and continue the checkout at the following step.

Without Fuel Flow Option.

Tap the STEP button and verify that the options installed are displayed in sequence. With the engine not running, verify that all the temperatures are reading ambient within one or two degrees.

If there are any problems, see the "Troubleshooting" section at the end of this manual.

18) System Description

The EGT-701 temperature indicator displays temperature digitally and in analog format. The TIT as displayed can read up to 100°F higher than any EGT. This is due to mixing and reburning of unburned gases at the turbine. The TIT probe will not necessarily be in agreement with the primary TIT probe but can read higher. Therefore the EGT-701 may not indicate the same as the aircraft primary instruments. The analog display is an electronic bar graph of EGT and TIT temperatures presented as a percentage of 1650°F with default factory limits. Below the vertical columns the specific value for EGT and CHT are displayed digitally. The EGT on the left and CHT on the right. The dot over the column indicates which cylinder's digital temperatures are currently displayed. The missing bar in the graph represents the CHT trend, showing which cylinder is hotter or cooler, which can be verified digitally. The last column will display OIL temperature if that option is installed and the TIT option is not installed.

Holding the LF and STEP buttons simultaneously enters the program mode where the indexing dwell can be adjusted. Tap the LF button until the desired indexing dwell time is displayed. 1 through 9 seconds dwell can be selected. Exit the program mode by taping the STEP button.

If the EGT-701 buttons are not activated for ten minutes the system will begin indexing automatically. Tapping the STEP button will stop the automatic indexing and subsequent taps of the STEP button will step through all available functions. During cruise, if the LF button is held for three seconds all EGT bar graphs will normalize at mid level. Each bar represents 10F° and now acts as an EGT and TIT trend monitor, showing a magnified view of temperature change. Holding LF button for three seconds returns the display to percent view. No other functions are effected.

Options of TIT, OAT, IAT (induction air), OIL, and standard BAT (voltage) and CLD (rate of change of CHT in degrees per minute) are displayed only digitally with legends following the numerical value, such as `230 OIL`. A large value of CLD indicates potential shock cooling which has a detrimental effect on the engine and is usually associated with rapid descents at low power. Those options which are not installed will not be displayed.

The fuel flow option, when connected to a previously installed flow transducer such as the Floscan Inc. transducer, displays fuel flow in gallons, liters, kilograms, or pounds per hour and tracks the quantity of fuel burned. A three-position toggle switch located near the display can be used to select for display fuel flow parameters, temperatures, or both.

19) Installation Record

The indicator is FAA TSO approved, as a temperature indicator under TSO-C43b. Record the installation of the EGT-701 per **STC# SA 2586NM.** Make an appropriate entry in the aircraft log book. FAA form 337 may be required.

20) Operation

Airplane flight manual limitations based on primary instrument indication take precedence over those of the EGT-701. **CAUTION: Comply with manufacturer's airplane/rotorcraft flight manual leaning procedure. Do not exceed applicable engine or aircraft limitations.**

21) Specifications and Limitations

FAA Approved:
Indicator STC SA2586NM
Fuel Flow Option STC SA00432SE

Environmental:
Passed TSO C43c and DO-178a (software level 3)

Power:
10 to 35 volts DC, 2 amps

Operating Temperature Range:
-40 to 195 °F

Display Size:
2 ¼ in panel mount
2.6 in. sq., 7.1 in. deep

Common Mode Range:
± 4v, rejection > 80db

Digital input channels:
1 Fuel flow (GPH)

Analog input channels:
6 Exhaust Gas Temperature (EGT)
6 Cylinder Head Temperature (CHT)
2 Turbine Inlet Temperature (TIT)
1 Oil temperature (OIL)
1 Carburetor Temperature (CRB)
1 Induction Air Temperature (IAT)
1 Compress. Discharge Temp. (CDT)
1 Outside Air Temperature (OAT)
1 System Bus Voltage (BAT) on power lead

Analog-Thermocouples:
Response curve: All Linearized.
Resolution: 1.0 °F
Accuracy: ± 1.0 °F
Calibration: J or K

Resolution and Display Range (Fuel Flow Option)

display	*maximum display value*	*resolution*
K factor range:	5,000 - 99,990	10
Fuel flow:	Accuracy (8 to 60 GPH)	>2 % (TSO C44a)
	140.0 GPH at K factor 85,000	0.1 GPH
	410.0 GPH at K factor 29,000	0.1 GPH
	820 PPH at K factor 85,000	1 PPH
	2400 PPH at K factor 29,000	1 PPH
	560 LPH at K factor 85,000	1 LPH
	1640 LPH at K factor 29,000	1 LPH
	372 KPH at K factor 85,000	1 KPH
	1088 KPH at K factor 29,000	1 KPH
Fuel Remaining:	999.9 Gal	0.1 Gal
	999 Lbs., L, or Kg	1 Lb., L, or Kg
Fuel Used:	999.9 Gal.	0.1 Gal
	9999 Lbs., L, or Kg	1 Lb., L, or Kg
Time to Empty:	50 hours	1 minute

Fuel flow Transducer	*Standard fuel pump (FXT-201)*	*Gravity (FXT-231)*
Range	0.6 to 60GPH	3 to 90 GPH
Linearity	1% (8 to 60 GPH)	1% (8 to 60 GPH)
K-Factor	Approximately 29,000	Approximately 19,500
Pressure drop	1.2 psi at 30 GPH, 4.8 psi at 60 GPH	0.31 psi at 30 GPH, 2.8 psi at 90 GPH
Working pressure	200 psi	200 psi
Minimum burst pressure	2000 psi	2000 psi
Temperature range	-65°C to 125°C	-65°C to 125°C
Fuel ports	¼ Female NPT	¼ Female NPT

Output Display Functions (All Options):	*Factory Default Alarm Limits*
EGT (Exhaust Gas Temp., K ,Max. limit 2500°F)	1650°F
CHT (Cylinder Head Temp., J/K Max. limit 600°F)	450 °F
TIT (Turbine Inlet Temperature, K, Max. limit 2500°F)	1650 °F
OIL (Oil temperature, K, Max. limit 600°F)	(Hi/Lo) 230/90°F
OAT (Outside Air Temp., K, Limit -40 to 300°F)	
IAT (Induction Air Temp., K, Max. Limit 600°F.)	
CLD (Rate of change of CHT)	-60°/minute
DIF (Maximum EGT differential)	500°F
LFM (Lean Find Mode, detects first EGT peak)	
BAT (Voltage, 0 to 40 volts.) Not FAA Approved under TSO-C43b	15.5/11.0 or

All alarm limits are adjustable by a qualified mechanic.

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.

An alarm causes the digital function to flash when the particular limit is exceeded. Factory set default alarm limits for CHT (450°F) and OIL (230°F) are lower than the actual aircraft limits. The values may be adjusted to suit individual preference by pressing the reset button. Other factory set alarm limits are: "BAT" Voltage 15.5/11.0 or 31.0/22.0 Hi/Lo as appropriate; "DIF" (differential Hi/Lo EGT) 500°F; "TIT" 1650°F Hi; "OIL" Lo 90°F; "CLD" (Rate of change of cylinder head temperature in degrees per minute) -60 degrees/minute. Fuel flow warnings: Low Fuel Remaining or Low Time to Empty.

The pilot should be aware of the setting of each alarm for his particular aircraft. An alarm is disarmed for the remainder of the flight by holding the step button in for 5 seconds and observing the word `OFF`**.** Only that particular alarm is disarmed. Disarmed alarms are not armed again until the power has been removed and reapplied to the EGT-701. The entire display dims automatically depending on the ambient lighting.

22) Engine Operation

Operate and lean the engine in accordance with the manufacturers' recommendations for different power settings. Lycoming recommends running peak EGT only at 75% power or less. Continental recommends running peak EGT at 65% power or less.

23) Parts List for EGT Probe PN-128, TIT Probe PN-120, IAT Probe PN-130

1 Thermocouple probe PN M-111
1 Stainless Steel Clamp Thimble
1 Stainless Steel Exhaust Seal Washer
1 Stainless Steel Screw Type Clamp
2 Ring Terminals
2 Screws and nuts 6-32 X 1/4
1 Fiberglass tube 1/2" X 4"

24) Parts List for CHT Probe PN-126

1 Bayonet Probe Spring loaded PN-5050
1 Gasket thermocouple probe PN M-113
2 Ring Terminals
2 Screws and Nuts 6-32 X 1/4"
1 Fiberglass tube 1/2" X 4"

25) Parts List for OIL Probe PN-124

1 PN 400505 -C or -L, OIL probe
2 Ring Terminals
2 Screws and Nuts 6-32 X 1/4"
1 Fiberglass tube 1/2" X 4"

26) Parts List for OAT Probe PN-122

1 PN 400509, OAT probe
2 Ring Terminals
2 Screws and Nuts 6-32 X1/4"
1 Fiberglass tube 1/2" X 4"

27) Parts List for Fuel flow Transducer PN-700900

1 Fuel flow Transducer PN FXT-201 or -231
3 AMP Female Terminals
3 AMP Female Terminals
1 AMP Female Connector housing
1 Fire Sleeve
1 AMP Female Connector housing

28) Parts List for Single Engine EGT and CHT

Part	*-4C*	*-6C*	*-7C*	*-8C*	*-9C*
Temperature Indicator EGT-701	1	1	1	1	1
EGT probe kit PN 128	4	6	7	8	9
CHT probe kit PN 126	3	5	7	7	9
CHT Gasket probe kit PN 126	1	1		1	
Oil probe with option O kit PN 124	1	1	1	1	1
TIT probe with option T kit PN 120	1	1	1	1	
OAT probe with option A kit PN 122	1	1	1	1	1
IAT probe with option I kit PN 130	1	1	1	1	1

29) Weight and Balance Data

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

TSO C43b, Temperature Indicator EGT-701	14.5 oz. / 0.9 lbs.
Fuel flow option	Add 2.0 oz. / 0.125 lbs. to instrument
EGT probe M-111, CRB, IAT, TIT, OAT	2.0 oz. each / 0.125 lbs. each
CHT probe 5050	1.5 oz. each / 0.094 lb. each
Fuel flow option transducer	3.0 oz. / 0.186 lbs.
Wire Harness PN 700700-8, 8 ft.	14.0 oz. each / 0.88 lbs.

30) Calibrating the EGT-701 for the Factory Original TIT probe

If the aircraft is using the factory original TIT probe and gage, you will be required to calibrate the EGT-701 for that probe. The factory original TIT probe must be a type K and the leads must be wired red-to-red and yellow-to yellow. Both the EGT-701 and factory original gage may be used concurrently. Due to the high input impedance of the EGT-701 instrument, it will not affect the accuracy of the factory installed probe or gage.

In normal cruise flight, record the difference between the factory installed TIT gage and the EGT-701 TIT reading. TIT gage _____ EDM _____.

Turn on the EGT-701 and after self-test, press STEP until the instrument is cycling normally. Start the Pilot Programming Procedure, by simultaneously holding the STEP and LF buttons for five seconds.

STEP sequences to the next item	***Tap the LF button to sequence through these values***	***Comments***
PROGRAM		Stays on for two seconds.
RATE 4	RATE 4	hold both STEP and LF for five seconds to begin the next sequence.
ORIG TIT	ORIG T-N ⇔ ORIG T-Y	Y - Yes - selects factory original TIT probe and proceeds to the next step.
CAL TIT	TIT + 0 ⇒ TIT - 5 ⇒ TIT - I0 ⇒ ... TIT - 975 ⇒ TIT + 975 ⇒970⇒...	tap LF to lower the correction; hold :LF to raise the correction. For example, if the EGT-701 reads 100 less than the aircraft's TIT gage, set the display to read TIT + I00.
		STEP exits the procedure.

31) Setting the K-factor (Fuel Flow Option)

You must set the K factor before using the EGT-701 with fuel flow. Note the K-factor that was engraved on the fuel flow transducer.

1. Turn on the EGT-701 and after self-test, press STEP until the instrument is cycling normally.
2. Place the select toggle switch in the FF position.
3. Start the Pilot Programming Procedure by simultaneously holding the STEP and LF buttons for five seconds. You will see the word PROGRAM for two seconds.
4. Tap the STEP button repeatedly until you see KF-SET.
5. Hold STEP and LF for five seconds. First digit blinks: **2**9.00
6. Tap or Hold LF to change flashing digit (for example): **I**9.00
7. Tap STEP for next digit: I**9.**00
8. Tap or Hold LF to change flashing digit: I**8.**00
9. Tap STEP for next digit: I8.**0**0
10. Repeat steps 7 and 8 for the remaining two digits.
11. Verify the K-factor that was engraved on the fuel flow transducer is now displayed.
12. Hold STEP and LF for five seconds to exit.
13. Tap STEP

32) Setting the Data Recording Option Parameters

(Data Recording Option only)

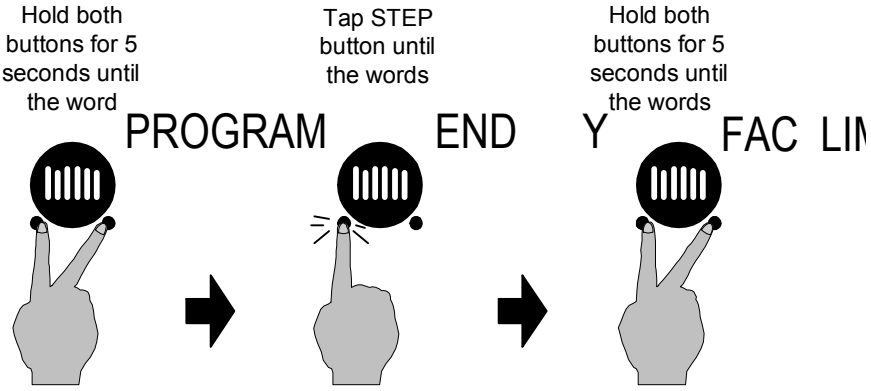
If you haven't already done so, start the pilot programming procedure, simultaneously hold the STEP and LF buttons for five seconds. You will see the word PROGRAM for two seconds. To change the date, time and user id for the Data Recording Option, tap the STEP button until the display shows DUMP? N. Next, simultaneously hold the STEP and LF buttons for five seconds. Then set the date and time as show below

Tap **STEP** *to next item*	**LF** *sequences through these values*	*Comments*
MNTH	I ⇒ I2	Month
DAY	I ⇒ 3I	Day
YEAR	80 ⇒ 79	1980 through 2079
HOUR	OO ⇒ 23	24 hour time. We suggest you set Zulu time.
MIN	OO ⇒ 59	Tapping the step will also zero the seconds (not shown)
USER ID	N I2345	Hold both STEP and LF buttons simultaneously until the first character flashes. Use LF to select the first character. STEP moves to the next character.
		Hold both STEP and LF to exit.

33) Setting the Alarm Limits

Turn on the EGT-701 and after self-test, press STEP until the instrument is cycling normally.

To start the Alarm Limit Procedure, with the EGT-701 powered up, do the following:



Tap the STEP button to advance to the next item in the list. Tap the LF button to select alternate values of that item. Hold the LF button to rapidly back up. *Prompts listed in the first column are displayed for only **two seconds**.*

Changing the Alarm Limits:

STEP to next item	***LF sequences through these values***	***Description***
FAC LIM		Factory Limits.
	FAC? N ⇔ FAC? Y	Restore factory defaults
REV X.XX		Firmware rev. number.
TYPE K	TYPE K⇔ TYPE J Hold STEP and LF for five seconds to toggle	Type K or Type J CHT probes. USE THIS WITH CAUTION.*
EGT-CHT	ENG F ⇔ ENG C	Select F or C degrees for all engine temps.
BATTERY	I0.0 H BAT ⇒ 35.0 H BAT	Battery high voltage limit, set in 0.5 volt increments.
	8.5 L BAT ⇒ 30.0 L BAT	Battery low voltage limit.
EGT DIF	30 DIF ⇒ 990 DIF	EGT difference limit, set in 10° increments.
CHT HI	90 H CHT ⇒ 500 H CHT	CHT high limit, set in 5° increments.
COOL	-5 CLD ⇒ -200 CLD	Cooling limit, set in 5°/min. increments.

CHT		
TIT HI	650 TIT ⇒ 2000 TIT	Both EGT and TIT hi limits are the same.
OIL TEMP	40 H OIL ⇒ 500 H OIL	Oil temperature high limit, set in 5° increments.
	I0 L OIL ⇒ 250 L OIL	Oil temperature low limit set in 5° increments
FUEL FLW	FUEL GAL⇒FUEL KGS⇒FUEL LTR⇒FUEL LBS⇒	Selects the units in **all** parameters where fuel quantity or fuel rate is displayed
MAIN TK	MAIN=50	Main tank capacity, in units selected
AUX TNK	AUX? N⇔AUX? Y	Y - Yes - aircraft has auxiliary tanks
	AUX=0	Auxiliary tank capacity
LO TIME	MIN =45	Alarm limit in minutes for low time in tanks
LO FUEL	REM =I0	Alarm limit for low fuel quantity in tanks, in units selected
	CARB? N ⇔CARB? Y	Y - Yes: carbureted engine
RECRD?	RECRD? Y⇔RECRD? N	Data Recording Option Y-only data recording. N – only real-time data output.
	END Y ⇔ END N	Y - Yes to exit; N - No to review list again

*CHT will read incorrectly if the wrong probe type is selected. Type K probes generally have red and yellow wires; type J probes have black and white wires.

Fuel Flow Units (Fuel Flow Option)

Selects the units in *all* parameters where fuel quantity or fuel rate is displayed. If you change this parameter, it does *not* change the numerical value of the fuel tank capacity. You must do this manually. For example if you change from Gal. to Lbs., the tank capacity will be interpreted as 50 Lbs. rather than 50 gallons; the EGT-701 will not convert 50 Gal to equivalent pounds.

Main Tank Capacity (Fuel Flow Option)

Enter the total capacity of the main tanks in the fuel flow units selected. If you have tank tabs (but no auxiliary tanks) and sometimes fill only to the tabs, set the main tank capacity to the capacity up to the tabs.

Auxiliary Tanks (Fuel Flow Option)

If you do not have auxiliary tanks or tank tabs, answer "No." If you answer yes, you will be asked to input the capacity of the auxiliary tanks in the fuel flow units selected. If you have tank tabs and sometimes fill only to the tabs, set the auxiliary tank capacity to the difference between full tank capacity and tab capacity.

Low Time Alarm Limit (Fuel Flow Option)

Select the value of the time remaining, in minutes, that triggers the alarm. Time remaining is calculated at the current fuel flow rate.

Low Fuel Alarm Limit (Fuel Flow Option)

Select the value of the fuel remaining, in the selected fuel flow units, that triggers the alarm. Fuel remaining is calculated at the current fuel flow rate.

Carburetor? (Fuel Flow Option)

Different response filters are used depending on whether your engine is carbureted or fuel injected. The filter for a carbureted engine has a slower response time to reduce sudden fluctuations in readings.

34) Troubleshooting

a) **A missing column in the display on start up** indicates that the diagnostic routine has found an open wire or probe with a poor connection. The error message will indicate which channel to examine.

b) **A missing column in the display during flight** indicates a widely varying or erroneous temperature value. The probe is deleted from the indexing to prevent false alarms.

c) **Start up OPEN PRB message.** If one of the temperature probe circuits is open, the display indicates `OPEN PRB` followed by one of these messages: `EGT 1, EGT 2, EGT 3, EGT 4, EGT 5, EGT 6, EGT 7, EGT 8, EGT 9, CHT 1, CHT 2 , CHT 3, CHT 4, CHT 5, CHT 6, CHT 7, CHT 8, CHT 9, OIL, IND, OAT, TIT.` Check the connector at the instrument and verify that a female pin is not recessed in the connector. Check the crimps where the probe is connected to the wiring harness.

d) **Displays all six columns in demo mode**. Probes are not connected. Plug probe harness onto the rear of the instrument.

e) **A negative reading** (- in front of the number) indicates reverse polarity on the red and yellow thermocouple wire to probe.

f) **Ohmmeter check.** Remove the connector from the rear of the instrument and measure the resistance of the probe lead pairs. The reading should be about 10 ohms. At the connections between the probe and the wiring harness in the engine compartment, the resistance should read about 2 ohms.

g) **All readings 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 ohmic ground exists between the engine and the adapter probe.

h) **One CHT reads higher or lower than the others**. It is most likely that this is the cylinder that has the spark plug gasket probe installed. 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 higher or lower than the factory probe. Place the probe on the plug that receives the most direct cooling air

i) **One cylinder seems to read erroneously.** Physically swap the suspected probe with a probe from a correctly reading cylinder. If the problem moves to the correctly reading cylinder (stays in the same column on the instrument) check the crimps between the probe and the wiring harness. Check the pins on the connector that plugs into the instrument. If those check okay, then the probe should be replaced. If the problem moves to the other probe's column on the instrument, the temperature readings are correct and there is probably a problem with the original cylinder.

j) **Large EGT span**. Normally aspirated (carburetor) engines at normal cruise display a "DIF" of 125 to 175^{o}F spread between cylinders. Injected engines at normal cruise display a "DIF" 50 to 90^{o}F spread between cylinders. All cylinders are measured by common circuitry. It is unlikely that the calibration is in error on only one channel.

k) **Temperature reading varies** more than 500°F in one second. Check for a poor quality crimp between the probe and harness.

l) **All EGT or CHT readings seem too high or low or unsteady**. Verify that the Instrument is grounded at the engine block for single engine installations. Use a DVM (digital voltmeter) to measure the difference between instrument ground and the engine block ground. If the difference is greater than 0.5 volts with the alternator charging, the ground to the instrument is faulty.

m) **All EGT and CHT readings seem too low.** The instrument may be set to display engine temperatures in Celsius when you are used to seeing Fahrenheit. See Pilot's Guide under Pilot Programming.

n) **OAT readings in error more than 10°,** but oil and CHT readings are okay. Look for *copper wire spliced* in line to the OAT probe. The OAT reading can be adjusted ±10°. See Pilot's Guide under Pilot Programming.

o) **Gem conversion, all CHTs read high** EGT-701 not calibrated for Gem installation "J" calibration. Change to "K" calibration using the procedure to set alarm limits described earlier.