

CHECK WIRING HARNESS BEFORE INSTALLATION

It's easier/cheaper to check and recheck all harness's and connections than repairing them later!

INSTALLATION MANUAL

FOR INSIGHT GEM 610C-001
G4-001 AND G4-002

DOCUMENT No. 070906

READ THESE INSTRUCTIONS COMPLETELY
BEFORE PROCEEDING WITH INSTALLATION

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If You Read Nothing Else Read This page!

Follow these recommendations to minimize installation related problems.

USE CAUTION when crimping the terminals onto the end of the GEM harness. Test each crimp by tugging on it sharply. It is almost impossible to pull off a properly crimped terminal.

KEEP the GEM harness at least 1 inch away from the ignition harness, P-leads, and alternator wiring.

Some aircraft produce electrical noise, which will cause erratic indications.

These displays are designed for rugged use. However, since they are constructed of computer-type components, standard precautions for electronic equipment are required;

- Do not expose to rain or water.
- Handle with care - DO NOT DROP.
- Ensure that all electrical connections are correct and properly made.
- Observe electro-static discharge precautions.

The GEM can only do its job of performing accurate engine monitoring if the engine and airframe have a good, solid, low-resistance electrical connection between them. Check for this with a careful visual inspection of the aircraft's ground connections. A measurement with an Ohmmeter will reveal a gross fault but a better test is to measure between the engine case and the airframe with a voltmeter with the engine running and the electrical system under normal load. The voltage difference should be very small (millivolts). Overlooking this important step can lead to a lot of unnecessary troubleshooting later.

Insight Instrument Corp. supports GEM installations with Insight thermocouple probes and harness. GEM installations with probes and harnesses from other manufacturers are not supported.

GEM Installation Location Cautionary Notice

The G-series GEM graphic engine monitors have EGT, CHT and TIT primary STC. The GEM display must be mounted so as to be clearly visible to the pilot. The GEM display should be mounted within the pilot's subpanel or the center panel and not on the copilots subpanel unless the GEM can be canted towards the pilot.

GEM Fuel Totalizer Cautionary Notice

Please note that not all GEM models provide fuel data. The Fuel Remaining display on the GEM is very useful but is not without limitations. Understand first that the factory fuel quantity gauges are the only instruments in the panel that physically measure fuel level. They are still the primary indication of fuel level in the airplane.

The GEM doesn't measure level, but instead measures only fuel flow rate. The GEM totalizes the rate information to account for fuel used. If you know how much fuel you started with and how much you have used you can figure fuel remaining by simple subtraction. The pilot must supply an accurate starting fuel level for this subtraction to produce the correct fuel remaining result. Should the pilot overstate the fuel quantity on board, the GEM will dangerously overstate the fuel remaining and the endurance time as well. The pilot must be careful and diligent when setting the fuel on board. (Cont'd)

GEM Fuel Totalizer Cautionary Notice (Cont'd)

When the aircraft is filled prior to takeoff, the number is the total available on board. If partially filled to a known configuration (ex. tips empty) then the total is easy to calculate.

However if tanks are partially filled on top of a poorly known original value - errors will abound. Unaccounted fuel loss from leakage, fuel vent overflow or theft will of course produce erroneous results.

Be careful and the GEM will deliver safe, reliable, and convenient fuel information. But be sure to cross reference the information on the primary fuel quantity gauges. Never trust a single source of fuel information when you have two on board. Fuel exhaustion still ranks highly among accident causes.

Don't let your engine stop until you're parked.

Warranty policy

The Insight Instrument Corp.'s Graphic Engine Monitor temperature display unit is warranted against defects in materials and workmanship for two years from date of purchase. Insight Instrument Corp.'s temperature probes are warranted for one year from date of purchase or 100 hours whichever comes first.

Insight will, at its option, repair or replace, without charge, those products that it finds defective. Material returned for repair or replacement will be returned prepaid by second day freight. Insight will not be responsible for repairs that result from improper installation, unauthorized maintenance or abuse. Insight is not liable for consequential damages or any labor costs, either directly or indirectly. No other warranty is expressed or implied.

Table of Contents

IF YOU READ NOTHING ELSE READ THIS PAGE!	2
GEM INSTALL LOCATION CAUTIONARY NOTICE	2
GEM FUEL TOTALIZER CAUTIONARY NOTICE	2
WARRANTY POLICY	3
TABLE OF CONTENTS.....	4, 5
TABLE OF DRAWINGS	21
INTRODUCTION	6
INSTALLATION PLANNING.....	7
UPGRADING	7, 8
TOOLS AND MATERIALS REQUIRED	9
UNPACKING THE ENGINE MONITOR DISPLAY.....	9
INSTALLING THE GRAPHIC ENGINE MONITOR DISPLAY.....	9
INSTALLING THE EXHAUST GAS TEMPERATURE PROBES	10
INSTALLING THE CYLINDER HEAD TEMPERATURE PROBES	10
CHT PROBE CHARACTERISTICS.....	11
INSTALLING THE CARBURETOR TEMPERATURE PROBE.....	11
INSTALLING THE TURBINE INLET TEMPERATURE PROBES.....	12
INSTALLING THE MANIFOLD TEE	12
INSTALLING THE OIL TEMPERATURE PROBE.....	12
INSTALLING THE OIL PRESSURE SENSOR.....	12
INSTALLING THE TACHOMETER CABLE FOR RPM.....	12
INSTALLING THE VIBRATION SENSOR.....	13
INSTALLING THE OUTSIDE AIR TEMPERATURE PROBE.....	13
INSTALLING THE FUEL FLOW SENSOR.....	13
WIRING CONSIDERATIONS	14
DISPLAY WIRING POWER AND GROUND CONNECTIONS.....	14
EGT PROBE WIRING	15

Table of Contents

CHT PROBE WIRING 15

ROUTING THE WIRING HARNESS..... 15

CONNECTING AND ROUTING THE OAT HARNESSES 16

CHECKING THE INSTALLATION 16

UPDATE GEM SOFTWARE 16

FLIGHT TESTING THE GEM 17

WEIGHT AND BALANCE DATA.....17

TROUBLE-SHOOTING..... 18-20

DRAWINGS 22-37

TECHNICAL SUPPORT 38

SERVICE PROCEDURES..... 38

Drawings

Table of DRAWINGS..... 21

INTRODUCTION

This Installation Manual will acquaint you with the installation requirements, operational functions and some of the powerful features of the Insight G-series Graphic Engine Monitors. Please read it carefully and completely before starting.

Insight Instrument Corp.'s Graphic Engine Monitors provides simultaneous analog and digital display of engine temperatures for nearly all makes and models of piston-powered aircraft.

The Insight G-series graphic engine monitors are manufactured with models ranging from basic EGT/CHT monitor to full-featured with data-logging and advanced vibration measurement.

G-series GEMs and Available Features Table:

GEM Model Name	G4	G4	G3	G2	G1
	Single	Twin			
Bezel Size	3.125	3.125	2.25	2.25	2.25
EGT	X	X	X	X	X
CHT	X	X	X	X	X
TIT	X	X	X	X	X
FUELFLOW	X	X	X	X	
OAT	X	X	X	X	
BUSS VOLTAGE	X	X	X	X	
TACHOMETER	X	X	X		
MANIFOLD PRESSURE	X	X	X		
OIL TEMPERATURE	X	X	X		
OIL PRESSURE	X	X	X		
ACCELEROMETER	X	X	X		
CARBURETOR TEMPERATURE	X	X	X	X	X
INSTRUMENT VACUUM	X	X	X		
AUXILLIARY TEMPERATURE(S)	X	X	X		
RS-232 INTERFACE(S)	X	X	X		
VIBRATION	X	X	X		

For a comprehensive description of functions and features, consult the Operation Instructions and Pilot's Guide.

Installation Planning

Plan the location of the GEM display such that it is not positioned near any source of high electrical current and is easily visible by the pilot.

The GEM's wiring harnesses should be positioned away from sources of high energy, such as ignition harnesses, P-leads, alternator wiring and high frequency radio wiring and antennas.

Some thought about the steps needed may save hours of installation time and trouble-shooting.

Steps to a successful installation

1. Select which new G-series GEM model is to be installed. Check the GEM's STC Approved Model List for aircraft model eligibility.
2. Review the features and requirements of the selected GEM to ensure compatibility with existing and planned aircraft equipment. Read this manual completely.
3. Identify whether or not the installation is an upgrade from a legacy GEM system or a first-time GEM installation. In the case of an upgrade, see the "Upgrade Installation" section.
4. GEM kits contain much of what is required for installation except for the materials listed in the "Tools and Materials Required" section.

Upgrade Installations

GEM upgrade kits are designed to utilize existing Insight Instrument Corp. EGT/CHT/TIT/OAT wiring and probes that are already installed in the aircraft. Prior to ordering an upgrade kit, inspect the aircraft's existing GEM wiring and probes for condition, suitability, and length for use with the new GEM. If an existing harness is not suitable for upgrade use, new replacement harnesses are available from Insight.

Legacy GEMs were typically installed as supplemental (non-primary) EGT/CHT/TIT instruments. New G-series GEMs may be used as primary EGT/CHT/TIT instruments. Check the GEM STC for eligibility.

Check the GEM instrument hole location for compliance with the new GEMs location requirements.

Upgrading from GEM 602 or 603

Many aircraft have been equipped with GEM 602 or GEM 603 systems. Model 602 systems supported four or six cylinder engines, and 603 systems supported four or six cylinder engines with turbo-chargers. Any 602 or 603 equipped aircraft can be easily upgraded to a G-series GEM system.

New G-series GEMs are plug-compatible with legacy wiring and EGT/CHT/TIT probes from a GEM 602 or 603 system with one difference, the instrument ground wire (black) may have been attached to the engine case and should be moved to an airframe or avionics ground. See wiring drawing 1200-018. The new GEM housings are shorter than old GEM housings; check that the harness length is sufficient to reach the new GEM housing.

The G1, G2 and G3 models have a top control knob or push-button that requires a clearance hole in the instrument panel, check GEM display drawing 610C-001 and outline drawing #930309 for hole sizes and locations.

The G1 GEM is a functional direct replacement for a 602 or 603. Note that the G1 must be configured at the Insight factory. Specify four or six cylinder, turbo-charged or non-turbo, and carburetor or fuel-injected at time of ordering. The configuration determines how many cylinders, and whether or not TIT (Turbo Inlet Temperature) and Carburetor Temperature are measured and shown on the G1 display. The G1 GEM is not field-configurable and must be returned to Insight if a configuration change is needed.

The G2, G3 and G4 models have an additional interface connector (P2) to provide connections to supplemental features such as fuel flow sensors, tachometer, etc. Upgrade kits contain much of the wiring and sensors to accomplish installation, contact Insight for details. See the following sections of this manual for installation details of the new sensors and wiring.

The G4 models are available in single engine and twin configurations. The G4 displays fit into a standard 3.125 inch panel hole. See drawing #930309.

Upgrading from GEM 610 or GEMINI 1200

Upgrading from models 610 or 1200 is similar to upgrading from 602 or 603 with a few differences.

Previous 610 installations will already have all holes drilled for panel mounting a G1, G2 or G3. G4 models require a 3.125 inch hole.

Previous installations of 610 and 1200 models may already have an Insight OAT probe and wiring that can be retained and connected to a G-series GEM. See wiring drawing 610C-315.

Upgrading to G4 Single

The single engine G4 display (3.125 inch) is plug compatible with the G3 display (2.25 inch). Refer to 610C-315 and 1200-018 wiring diagrams.

Upgrading to G4 Twin

The twin engine G4 display is plug compatible with the EGT/CHT/TIT wiring harnesses of legacy GEMINI 1200 installations. The G4 twin display has an additional interface connector (P2) to provide connections to additional sensors such as fuel flow and tachometer, etc. Refer to G4-315 and 1200-018 wiring diagrams.

Upgrading GEM installations in twin-engine aircraft

Twin engine aircraft may be equipped with two single-engine GEM displays or a twin engine GEM display. Check the ground wire configuration if upgrading from older GEMs. Wire the thermocouple harnesses according to wiring diagram #1200-018. Install the supplementary feature wiring according to wiring diagram 610C-315 for 25-pin D-sub connectors, and diagram G4-315 for 37-pin D-sub connectors.

Tools and Materials Required (NOT included in GEM kit - Installer supplied)

- Proper wire stripping tools.
- Proper crimping tools, Insight recommends;
M22520/2-01 Crimping tool and M22520/2-08 Positioner or equivalent.
- Insertion/extraction tool for Amp pin #205089-1.
- Trip-free, re-settable Circuit-breaker (1 AMP).
- Hardware and plumbing for mounting and connection of the Oil Pressure Sensor, and the Manifold Pressure connection.

Unpacking the Graphic Engine Monitor Display

- Carefully inspect the contents of this package for damage. If damage is found; save all packaging so that a claim can be made against the carrier.
- Inspect the contents of the shipment to ensure that all component parts and materials have been supplied.
- Visually inspect all components for proper identification or damage.
- Immediately report any discrepancies to the Insight Customer Service Department.

INSTALLING THE GRAPHIC ENGINE MONITOR DISPLAY

Models G1, G2 and G3 displays mount in a 2.25 inch diameter panel cutout. A new GEM installation will require four mounting holes and two holes for the control knobs in addition to the 2.25 inch hole. See Drawing #610C-001 for a display outline. Insight can supply an adapter plate to allow mounting a 2.25 inch GEM in a 3.125 inch hole.

The G1, G2 and G3 will fit directly into the holes from a previously installed GEM Model 610. Upgrading from GEM 602 or 603 will require a single new hole for the upper control knob.

G4 models fit into a 3.125 inch diameter hole.

See Insight drawing 930309 for 2.25 and 3.125 inch panel mounting holes.

Connections to the GEM G-series displays shall be made in accordance with Drawing No's. 610C-315 and 1200-018. Care should be given to provide sufficient depth allowance for harness and cable routing at the rear of the display. Plan for service loops in all the wiring to ease service or adjustments after the installation.

NOTE: Check for the possible existence of a "double" ground, particularly if the GEM is a replacement for a previously installed GEM display. The GEM must have only one ground connection.

Installing the Exhaust Gas Temperature Probes

The Exhaust Gas Temperature (EGT) probe is designed fit into a hole in each exhaust stack and be secured with an integral stainless steel clamp.

It is important that each probe is mounted a uniform distance from the exhaust stack flange. For normally aspirated engines, a nominal distance of 2 to 3 inches from the flange is recommended.

For turbo-charged engines, a nominal distance of 4 to 5 inches is recommended. See Drawing No. 8254.

If the recommended distance is impractical because of obstructions, slip joints, or bends in the exhaust system, position all the probes a uniform distance from the flange as space permits.

It is more important that all probes be positioned at a uniform distance from the flange rather than meeting the preferred dimension. Probe locations closer to the flange may result in slightly higher (inconsequential) temperature indications. (Careful matching of probe position will provide best temperature readings.)

If the probe must be positioned in a slip joint the inner tube must have a clearance hole of at least 1/4" diameter to prevent it from shearing the probe. Be certain to locate all holes to allow straight-in insertion of the probe without bending or stressing the probe tip.

Before drilling, ensure that nothing interferes with the probe, clamp, clamp screw or wire. Center punch and pilot drill each hole in the exhaust stack with a No. 28 or 9/64" drill bit. Use caution while drilling perpendicular to the stack to prevent an elongated hole. NOTE: Tighten the clamp screw with hand-torque nut driver only.

A right angle drill extension may be necessary in some locations. The probe will slip into a carefully drilled hole and make a tight seal.

Installing the Cylinder Head Temperature Probes

There are three types of Cylinder Head Temperature (CHT) probes:

- Spring Probe (Part Number 2852)
- Spark Plug Gasket Probe (Part Number 2853)
- Adapter Probes (Part Numbers 2855 Bayonet Adapter, and 2856 Threaded Adapter)

The Spring Probe (Part Number 2852) is equivalent to the "old style" Bayonet Probe and screws into threaded thermo-wells in the cylinder head next to the lower spark plug (on top in some engines).

The Spark Plug Gasket Probe (Part Number 2853) replaces the copper 18 mm diameter spark plug gasket.

The Bayonet Adapter Probe (Part Number 2855) screws directly into the temperature well and replaces the standard bayonet adapter to allow simultaneous utilization of the factory-installed Bayonet Probe.

The Threaded Adapter Probe (Part Number 2856) is similar to the 2855 except it is threaded on the inside to allow simultaneous utilization of the factory-installed Threaded CHT Probe.

CHT Probe Characteristics

The Spring Probe (2852) has a probe bushing with a screwdriver slot to facilitate tightening into place. A drop of anti-seizing lubricant on the threads before installation will ease installation, and subsequent removal. When installing Spring Probes be sure you have correctly identified the standard thermo-well. Some aircraft have fuel primer ports with the same thread size.

Many factory-installed CHT displays utilize a single threaded or bayonet-style resistive type probe that occupies one of the thermo-wells. This probe is not electrically compatible with the thermocouple probes required for the Graphic Engine Monitor.

A Spark Plug Gasket Probe (2853) may be used on this cylinder for the GEM series Display, so as to allow the factory-installed display to remain functional.

The Spark Plug Gasket Probe replaces the standard copper spark plug gasket on one spark plug in the selected cylinder. The spark plug chosen should be the one that provides the best correlation with the other temperature probes. On common downdraft-cooled engines the selected cylinder will be the upper plug. Allow enough wire length to move the probe to the other plug if necessary.

The Spark Plug Gasket must be removed and replaced by the Gasket Probe. Annealing of the Gasket Probe is not required or recommended, and the Gasket Probe Does Not require replacement when the spark plugs are changed.

Alternatively, an Adapter Probe may be used instead of a Gasket Probe. An adapter probe will allow both displays to derive their CHT readings from the same thermo-well. For this reason, use of the Adapter Probe is recommended instead of a Gasket Probe.

If the factory-installed CHT display has a bayonet-style probe, the Insight Bayonet Adapter Probe (2855) may be used instead of the Gasket Probe.

The Bayonet Adapter Probe replaces the original bayonet adapter. It has a screwdriver slot to facilitate tightening in place, and placing a drop of non-seizing lubricant on the threads before installation will ease installation and subsequent removal. Once the Bayonet Adapter Probe has been installed, the original bayonet probe may be locked in place with a push and a twist.

If the factory-installed CHT display has a threaded probe located in the thermo-well, the Insight Threaded Adapter Probe (2856) may be used. The Threaded Adapter Probe is installed in the thermo-well between the cylinder head and the original CHT probe.

Installing the Carburetor Temperature Probe

The GEM is supplementary for carburetor temperature. Install the Insight Carburetor Temperature probe (Insight P/N 610C-021) into an existing tapped hole in the carburetor. Consult with the engine or carburetor manufacturer to determine the probe-hole location and thread size. Ensure the probe does not interfere with any internal carburetor components.

For G2, G3 and G4 GEMs refer to Drawing 610C-315 or G4-315 for electrical connections.

The G1 GEM uses pin numbers "A" and "1" on the P1 Edge-Connector. In the case of upgrading from an older GEM system to a G1 GEM check for the possibility of existing wiring to the "A" or "1" pins on the P1 connector. Remove any existing connections to these pins and only connect the Insight Carburetor Probe. See Wiring Diagram Drawing 1200-018 Rev. E or later.

Installing the Turbine Inlet Temperature Probes

There are three types of Turbine Inlet Temperature (TIT) probes which can be used with the GEM G- series system.

- Clamp-Type TIT Probe (Part number 2871) - is identical to the EGT probe except that the clamp diameter is larger
- Threaded-Type, (7/16-20) TIT Probe, including a weld-on boss (Part Number 2872)
- Threaded-Type, (1/4 NPT) TIT probe (Part Number 2873)

For aircraft with a threaded fitting boss already welded to the turbine inlet, the two threaded type probes are used - part number 2872 (7/16"-20 Thread) and part number 2873 (1/4 NPT Thread), as applicable. The 2872 Threaded fitting can be installed on any aircraft when a more permanent installation is desired, or when space for the clamp-type probe is limited.

The Probe Type 2872 Boss fits in a 1/2" inch hole and should be welded by an approved exhaust repair facility. Locate and drill the probe hole as described in Section "INSTALLING THE EXHAUST GAS TEMPERATURE PROBES", and refer to Drawing No. 8254 for the recommended location.

NOTE: If you have questions as to the correct type or location of TIT probes, call Insight Product Support for technical assistance.

Installing the Manifold Pressure Tee

The GEM is supplementary for manifold pressure. The GEM's manifold pressure sensor is located internally inside the GEM display. Refer to Drawing 610C-001 or G4-001 for the location of the GEM's Manifold Pressure port (5/16"-24 #2 Flare fitting). The installer must supply the tubing and a "Tee" fitting to connect the GEM to the existing manifold pressure indicator.

Installing the Oil Temperature Probe

The GEM is supplementary for oil temperature. Install the Insight Oil Temperature probe into an existing tapped hole in an oil gallery in the engine. Insight can supply Oil Temperature probes in a variety of thread sizes to suite most engine types. Consult with the engine manufacturer to determine the probe-hole location and thread size. Ensure the probe does not interfere with any internal engine components. Refer to Drawing 610C-315 or G4-315 for electrical connections.

Installing the Oil Pressure Sensor

The GEM is supplementary for oil pressure. Install the Insight Oil Pressure Sensor (1/8 NPT) on a length of flex-hose "Tee-ed" into the existing oil pressure sensor. The Installer must supply the "Tee" fitting, flexible hose and mounting hardware. Refer to Drawing 610C-315 or G4-315 for electrical connections.

Installing the Tachometer Cable for RPM

The GEM is supplementary for Tachometer. Insight provides a shielded cable with included protection-resistor (Insight P/N 610C-026) for connection to a magneto. Refer to Drawing 610C-315 or G4-315 for electrical connections.

For aircraft equipped with electronic ignition systems with a tachometer signal output, use Insight Tachometer Signal Adapter P/N 610C-027 instead of P/N 610C-026. Wire according to Insight wiring diagram #101123.

Installing the Vibration Sensor

The GEM is supplementary for Vibration Measurement. Insight provides a shielded cable pre-terminated with a mating 7-pin circular plastic connector (CPC) for connection to an Insight Vibration Sensor (Insight P/N 1000-004V). Refer to Drawing 610C-315 or G4-315 for electrical connections. Wire as shown for option "A".

Aircraft with 24 Volt (28 Volt) electrical systems require a 750 Ohm resistor installed in series with the vibration sensors power supply wire.

The sensor should be mounted to an engine case bolt on the top of the engine as close to the propeller as practical. The sensor should be oriented with the nameplate up and the aircraft symbol pointing forward. The sensor may be oriented otherwise if the preferred mounting is impractical, please consult Insight technical support.

Installing the Outside Air Temperature Probe

The Outside Air Temperature (OAT) probe must be mounted in a location which is in free ambient air. Avoid locating the probe adjacent to exhaust pipes, in a confined area, or on the top of the fuselage. Refer to Drawing No. 1200-016 for the mounting dimensions and appropriate hole size to drill.

Any location where the probe is exposed to direct sunlight or radiant heat from the runway pavement will cause increased temperature readings above ambient temperature.

Insight recommends mounting the probe near the engine induction air filter will often read well as soon as the engine is started.

Mount the OAT probe in the prepared hole and secure the nylon nut being careful not to over-tighten. If the OAT probe is installed on a pressurized aircraft where bulkhead penetration is necessary and/or potting of the OAT probe is required, be certain to apply "Proseal" or equivalent potting substance prior to tightening. NOTE: Be careful not to get potting substance on the connector.

Installing the Fuel Flow Sensor

Aircraft without existing FF sensors should have one Insight supplied sensor installed per engine except for engines equipped with pressure-carburetors, which require two sensors.

Insight manufactures a variety of fuel flow sensors for injected and carbureted engines. See drawing 1000-303 (3 pages) for sensor details and part numbers.

Existing FF sensors may be connected directly to the GEM but compatibility with other manufactures' fuel flow sensors cannot be assured. To connect a GEM to an existing fuel flow sensor/fuel computer system use Insight Fuel Flow Signal Adapter P/N 610C-025. Use Insight wiring diagram #101116. Compatibility cannot be assured.

Wire new Insight FF sensors in accordance with Insight Drawing 610C-315 or G4-315, Option "C".

Wire new Insight combination FF/Vibration sensors in accordance with Insight Drawing 610C-315 or G4-315, Option "B".

For all fuel flow sensor installations refer to AC 43.13-1B, Chapter 8 Section 2, 8-30, 8-31, 8-37, 8-38.

The Insight fuel flow sensor case must be connected to airframe ground.

Wiring Considerations

The GEM is supplied with a factory-assembled EGT/CHT (TIT) wiring harness configured for the specified number of cylinders and required length (for each engine). The harness edge connector contains a polarization pin which mates with a slot in the display's printed circuit board. This prevents improper engagement of the connector.

Before installing, confirm that the factory fabricated harness connector matches wiring diagram, drawing # 1200-018. All the red thermocouple wires should be on one side of the connector.

The GEM circuit boards are supported during shipment by small anti-static shipping restraints. Leave these restraints in place during the installation of the display and remove only prior to inserting the harness edge connectors.

The EGT and CHT wire length is not critical and may be trimmed to any length as required to fit each probe.

CAUTION: Splicing of the thermocouple wire is not recommended.

Note: Plan your Installation to include a service loop in the GEM wiring harness to allow for future adjustments.

Wires for the supplemental features are supplied pre-terminated at the sensor end, but must be terminated at the instrument end during installation. The D-sub connectors (25 and 37 pin) utilize crimp pins; see the materials section for recommended tooling.

Some of the D-sub ground pins are shared by multiple wires use a "pig-tail" style connection inside the connector shell to accommodate multiple wires in a single pin.

Display Wiring Power and Ground Connections

The GEM displays automatically accommodates both 14 and 28 Volt electrical systems. Connect the "red" power lead to a separate trip-free, re-settable circuit breaker (1 Amp) that receives power from the avionics bus or aircraft bus.

If the aircraft does not include an Avionics Master switch circuit or bus, we recommend that one be installed or a separate switch (user provided) to remove power from the Display unit during engine starts.

Connect the ground wire (black) to a common avionics ground bus (airframe ground).

CAUTION: For upgrade installations (from GEM 602 or 603) where the harness is grounded to the engine case, disconnect the ground from the engine case and connect the ground wire to the ground bus (airframe ground). Do not connect to two ground points.

NOTE: Double check the Display ground connection before applying power. Many aircraft have terminal strips under the instrument panel that will appear to be connected to airframe ground and will even measure to ground with an ohmmeter. The terminal strips may instead be connected to ground terminated loads such as landing lights or gear motors. When these loads are activated the voltage on this supposed ground will rise to full bus voltage (14 or 28V). [Extensive damage may result from improper grounding and is not covered under warranty.] Refer to Drawing No. 1200-018.

EGT Probe Wiring

The temperature probes must be wired with the correct polarity. The EGT probes connect to the harness wires with the yellow jacket. The probe leads and harness wires are color coded (red and yellow) to facilitate correct polarity. Each wire is marked with the cylinder number.

Slide the wire marker down the wire so it remains with the installation for trouble-shooting. Strip the wires according to Drawing No. 8254 and terminate with the crimp-on terminals (provided).

Verify the quality of each crimp with a “sharp” pull on the wire. The terminal should be almost impossible to pull off when crimped correctly. Harness and probe wire colors should match as in Drawing No. 8254.

NOTE: The ring terminals may be crimped with a “service type” tool, however, AMP part number #47386 is recommended. Be sure to test each crimp by pulling on the wire to ensure it won't come out. The most common installation problems are the result of poor quality termination.

CHT Probe Wiring

The CHT temperature probes must be wired with the correct polarity. The CHT probes connect to the harness wires with the black jacket. The probe leads and harness wires are color coded (red and white) to facilitate correct polarity. Each wire is marked with the cylinder number.

Slide the wire marker down the wire so it remains with the installation for trouble-shooting. Strip the wires according to Drawing No. 8254.

Terminate with the crimp-on ring terminals provided. Verify the quality of each crimp with a “sharp” pull on the wire. The terminal should be almost impossible to pull off when crimped correctly.

Harness and probe wire colors should match according to Drawing No. 8254. Insulate and bundle as discussed below.

Routing the Wiring Harness

It is essential to match the cylinder numbers on all the probes to display the proper information to the pilot.

The probe/harness connections should be insulated with the high temperature fiberglass sleeves provided and routed away from high temperature areas, e.g. exhaust stacks, turbochargers, etc.

The probe wires must not be tied in with ignition, alternator or cabin heater ignition wires because of potential errors in temperature readings.

All wires should be bundled and tied with nylon wire ties or lacing cord and attached to the airframe to prevent damage from vibration and wind buffeting.

The probe wiring harnesses are made of special alloy wire that must not be substituted or extended with copper wire.

The power and ground wires are copper and may be extended if necessary.

When the installation is complete all wires should be secured using wire ties and carefully checked for interference, rubbing or chafing with flight control cables, or other moving parts.

Connecting and Routing the OAT Harnesses

Refer to Drawings 1200-016 and 610C-315 for wiring information. Route the OAT harnesses (factory-terminated with probe connectors) to the probes, and secure.

Attach the harness connectors to the probes making certain that the connectors engage properly and that the male pins on the probes are undamaged

Checking the Installation

Verify the power and ground connections before applying aircraft power. Pin 15 (connector P1) is aircraft ground and pin S is approximately +14V DC or +28V DC (See Drawing No. 1200-018).

When power is initially applied, the GEM series Display will illuminate to full brightness.

Immediately upon power application the version number of the GEM software and other status messages will appear in the display for approximately two seconds. Push and hold one of the control knobs at this time to remain on this screen. If an engine vibration sensor is installed its software version will be displayed otherwise a vibration status message will be shown.

After the status screen display, the GEM reverts to Monitor Mode operation. Monitor Mode is the default power-on operating mode. EGT and CHT (and TIT) color-coded bar graph columns indicate their respective cylinder temperatures, and supplementary values appear in cyan.

The GEM Display brightness level automatically adjusts to match the ambient light level. The automatic dimming may be tested in bright ambient light by covering the entire face of the display with the palm of your hand for several seconds. The display will dim and then brighten when your hand is removed. In low ambient light, the auto-dimming feature may be tested by shining a flashlight on the display for several seconds. It changes brightness slowly, in discrete steps, to prevent annoying flicker in response to rapid ambient light level changes.

After the tests described above have been performed, check for possible interference with existing avionics by listening for audio interference on Com, Nav, DME, ADF, etc. Interference is uncommon; however, these characteristics should be tested.

If interference is detected, remove power from the Display unit to check if it is the emitter of the interference. If the GEM series Display is the interference source, re-route the wiring harnesses away from affected equipment.

Contact Insight Product Support if needed further assistance.

GEM Software Updates

Check the Insight website (www.insightavionics.com) or contact Insight Instrument Corp. for information regarding software updates.

FLIGHT TESTING THE GEM

It is essential that the G-series GEM installation be flight tested.

The GEM must be observed in all phases of flight for consistency in performance. If a problem is noted during the flight test, discontinue the flight test and trouble-shoot the system.

Should you have any questions or problems during installation or trouble-shooting of the GEM don't hesitate to contact Insight Product Support. Please be ready to supply aircraft and engine type, GEM model and serial number and software version.

WEIGHT and BALANCE DATA

1 G-series GEM Instrument	0.5 lb
6 Clamp EGT Probes	9 oz.
6 Spring CHT Probes	6 oz.
6 Gasket CHT Probes	4 oz.
1 Adapter CHT Probe	1 oz.
1 TIT Probe	1 oz.
1 Oil Temperature Probe	1 oz.
1 Oil Pressure Sensor	2 oz.
1 Vibration Sensor	1 oz.
1 Fuel Flow Sensor	6 oz.
1 FF Signal Adapter	1 oz.
1 Carburetor Temperature Probe	1 oz.
1 8 ft Wiring Harness	14 oz.
1 24ft Wiring Harness	34 oz.

Troubleshooting

The following is a compilation of the common symptoms and causes of problems which may be experienced with the GEM Systems. Close examination of these symptoms should assist in identifying the cause of the problem.

Symptom: The G-series Display does not illuminate.

Cause: No ground return at Pin 15, of the edge connector from airframe ground

Cause: Voltage is missing at Pin S, of the edge connector from the circuit breaker or bus.

Symptom: One or more columns will not illuminate.

Cause: G1 GEMs are factory-configured to match the engine type (4/6 cylinder, turbo, carburetor). If the configuration is incorrect the G1 GEM must be returned to Insight for re-configuration. All other G-series GEMs can be configured in the field. Consult the installation manual for configuration instructions.

Symptom: One or more columns will not illuminate or missing data.

Cause: Check the probe connections; the display will blank columns with poor EGT and CHT connections. Columns 5 and 6 shouldn't illuminate on a 4 cylinder engine. Turn top knob on GEM to the probe analysis page to check probe Integrity.

For 8 foot harness on probe analysis page resistance should be 8 - 3 EGT / 1 - 6 CHT

For 24 foot harness on probe analysis page resistance should be 26 - 10 EGT / 4 - 18 CHT

Symptom: No EGT in one or more columns.

Cause: Errors in harness wiring. Visually check probe connections and polarity. Check for probe continuity at the display connector. The resistance of the lead wire is approximately 1 ohm per foot. Take extreme care to not damage the connector terminals with the meter probes. Turn top knob on GEM to the probe analysis page to check probe Integrity.

Symptom: No CHT in one or more columns.

Cause: Errors in harness wiring. Visually check probe connections and polarity. Check for probe continuity at the display connector. The resistance of the lead wire is approximately 1 ohm per foot. Take extreme care to not damage the connector terminals with the meter probes. Turn top knob on GEM to the probe analysis page to check probe Integrity.

Symptom: No CHT in one or more columns.

Cause: Faulty probe. Turn top knob on GEM to the probe analysis page to check probe Integrity. For 8 foot harness on probe analysis page resistance should be 8 - 3 EGT / 1 - 6 CHT. For 24 foot harness on probe analysis page resistance should be 26 - 10 EGT / 4 - 18 CHT.

Symptom: No CHT in one or more columns.

Cause: Faulty probe. Turn top knob on GEM to the probe analysis page to check probe Integrity. For 8 foot harness on probe analysis page resistance should be 8 - 3 EGT / 1 - 6 CHT. For 24 foot harness on probe analysis page resistance should be 26 - 10 EGT / 4 - 18 CHT.

Symptom: Display goes out during engine start.

Cause: Voltage transient or over voltage condition. The display should not be turned on during engine start. An Avionics Master or separate power switch should be installed to apply power to the display.

Symptom: Display is unstable.

Cause: Noisy or defective magneto or ignition harness. Check operation on left and right magnetos. The temperature should rise slowly and may stabilize slightly or completely on one or the other magneto. Single magneto operation will pinpoint the problem to one ignition harness, unless both are faulty. Verify that the probe wires and GEM series system harness are isolated from the ignition harness. If necessary, repair or replace the faulty ignition harness to eliminate ignition related interference.

Symptom: Display is unstable.

Cause: Magneto ungrounded or defective P-lead. Check ignition harness for proper shielding, grounding, and loose spark plug caps. Check magnetos for proper grounding or evidence of arcing. Disconnect magneto P-leads one at a time. If this eliminates or reduces the problem, replace the P-lead. A faulty ignition harness will typically cause all EGT readings to "dance" up and down. The GEM series Display will detect this type of fault long before standard test methods, thus eliminating the potential of more serious problems.

Symptom: Display is unstable.

Cause: Noisy or defective alternator, defective generator or faulty ground connection. Try operation with alternator or generator off. Alternator related interference may indicate faulty commutator.

Symptom: Display is affected by radio transmissions.

Cause: Proximity of probe and/or display unit to the radio power wiring and away from radios and antenna coax. Check radio rack connector for missing 50 ohm matching device. The 50 ohm matching device is a thick washer-like component part that is installed underneath the connector end cap. The end cap will have to be unsoldered to check for the matching device. This seemingly unimportant component is supplied with all connectors and is required for proper operation of the connector. Utilize shielded-twisted pair for power leads.

Symptom: EGT indication is not uniform.

Cause: The EGT indication for a fuel-injected engine will typically vary a bar or two from perfectly uniform when leaned for cruise. Clean the fuel injection nozzles. Non-uniformity is normal in carbureted engines. All cylinders are measured by the same circuitry. It is almost impossible to not have identical response on all channels of the GEM series.

Symptom: A sudden or gradual reduction in the EGT indication can be symptomatic of several engine faults.

Cause: Exhaust leaks above the probe and poor compression due to bad rings, valves or valve guides. If a probe substitution does not reveal a faulty probe, check for mechanical faults in the engine. Consult the GEM series Pilot's Guide for more detailed engine diagnostic information.

Symptom: All EGT readings too high.

Cause: Readjust the EGT "BAR HEIGHT" on the Display.

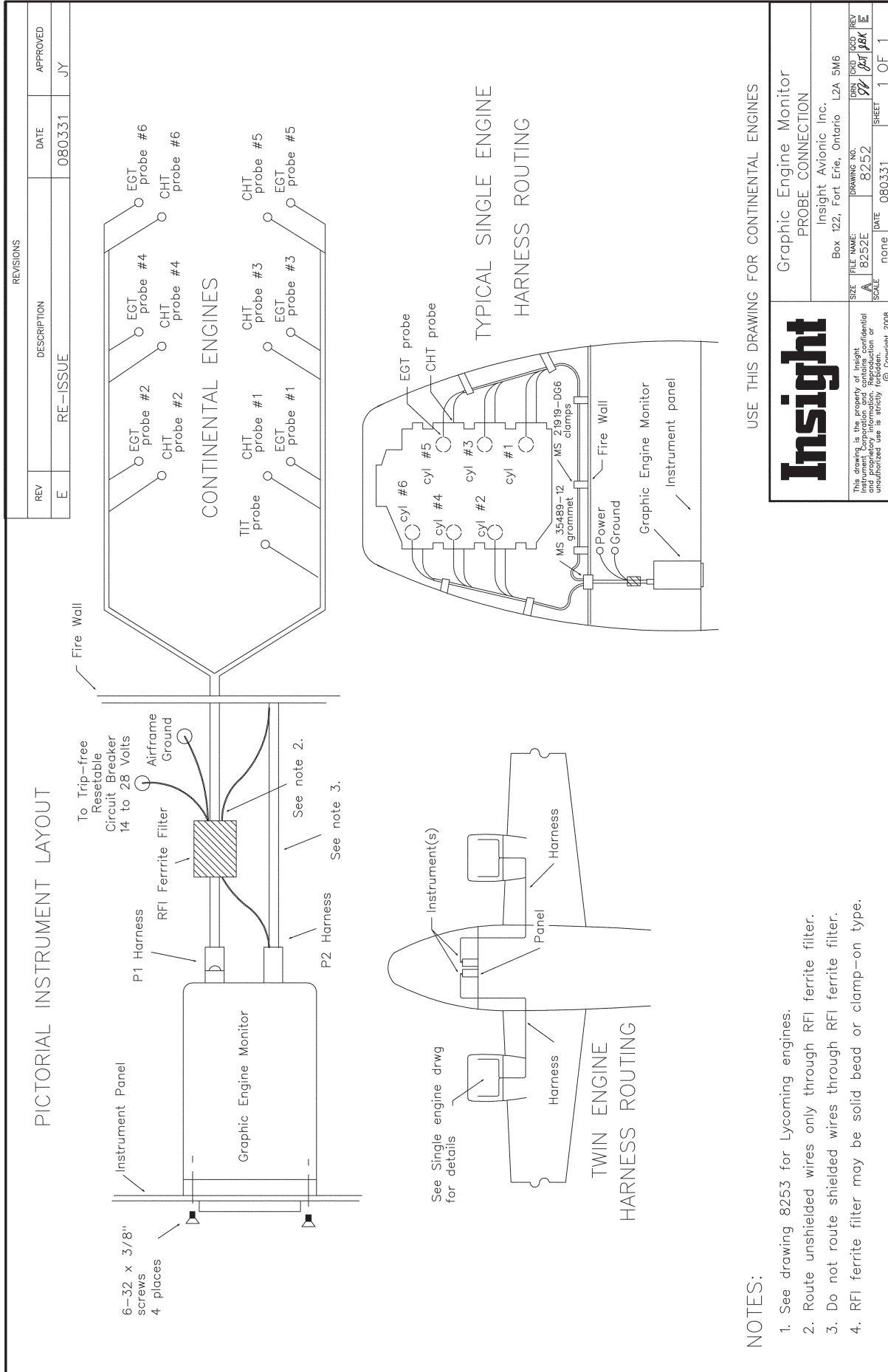
Cause: Possible aircraft ground fault. Test for this by temporarily removing the black GEM ground wire from the airframe and provide an extension directly to the engine block. If this test fixes the bar height an engine ground fault should be suspected. Use a DVM (digital voltmeter) to measure the difference between the instrument ground and engine block ground with the engine running and the battery charging. If the difference is greater than 2 V DC with the alternator charging, a ground fault exists between the engine and air-frame which should be remedied.

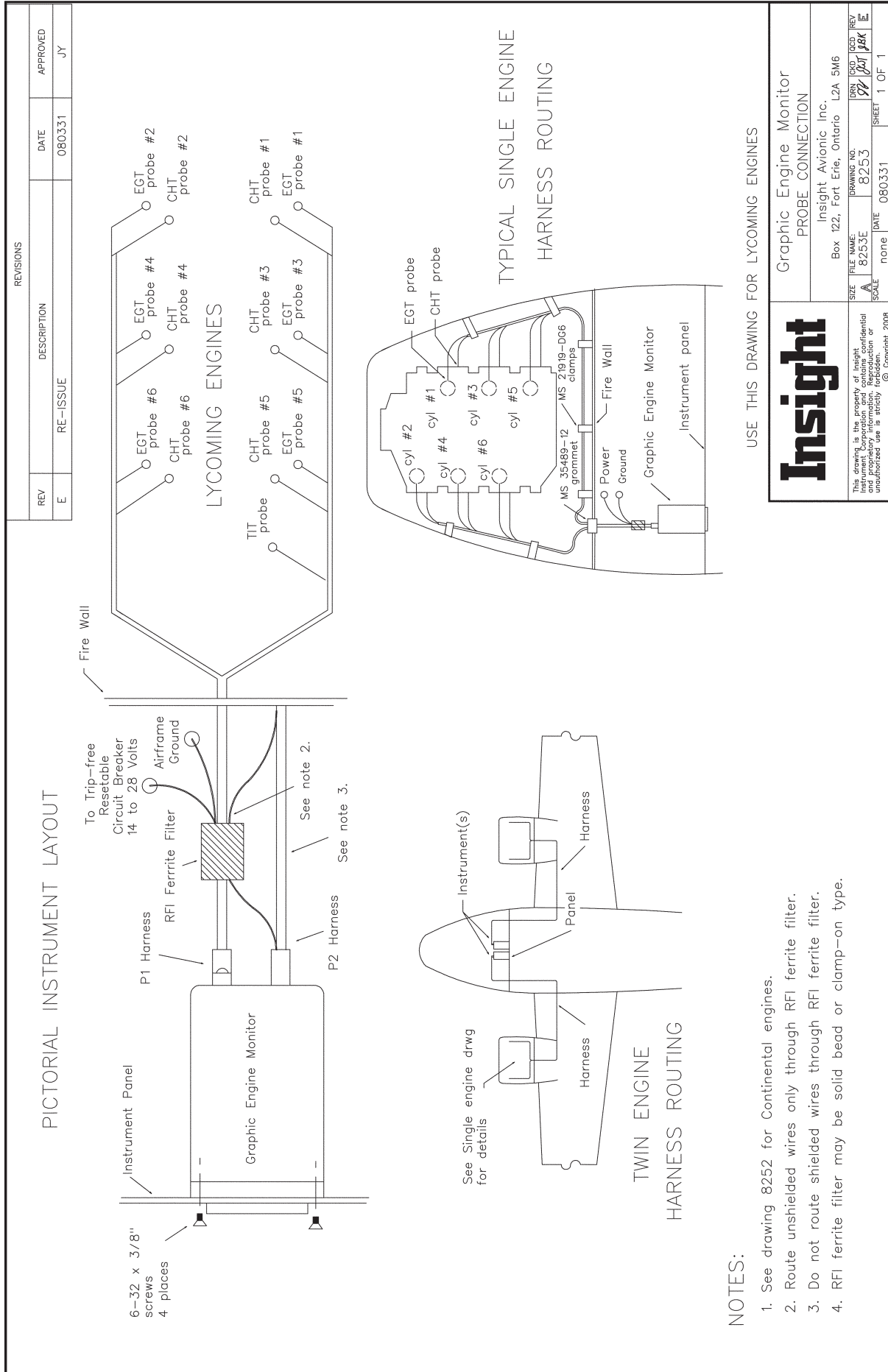
Symptom: Display indicates full scale or blanks out.

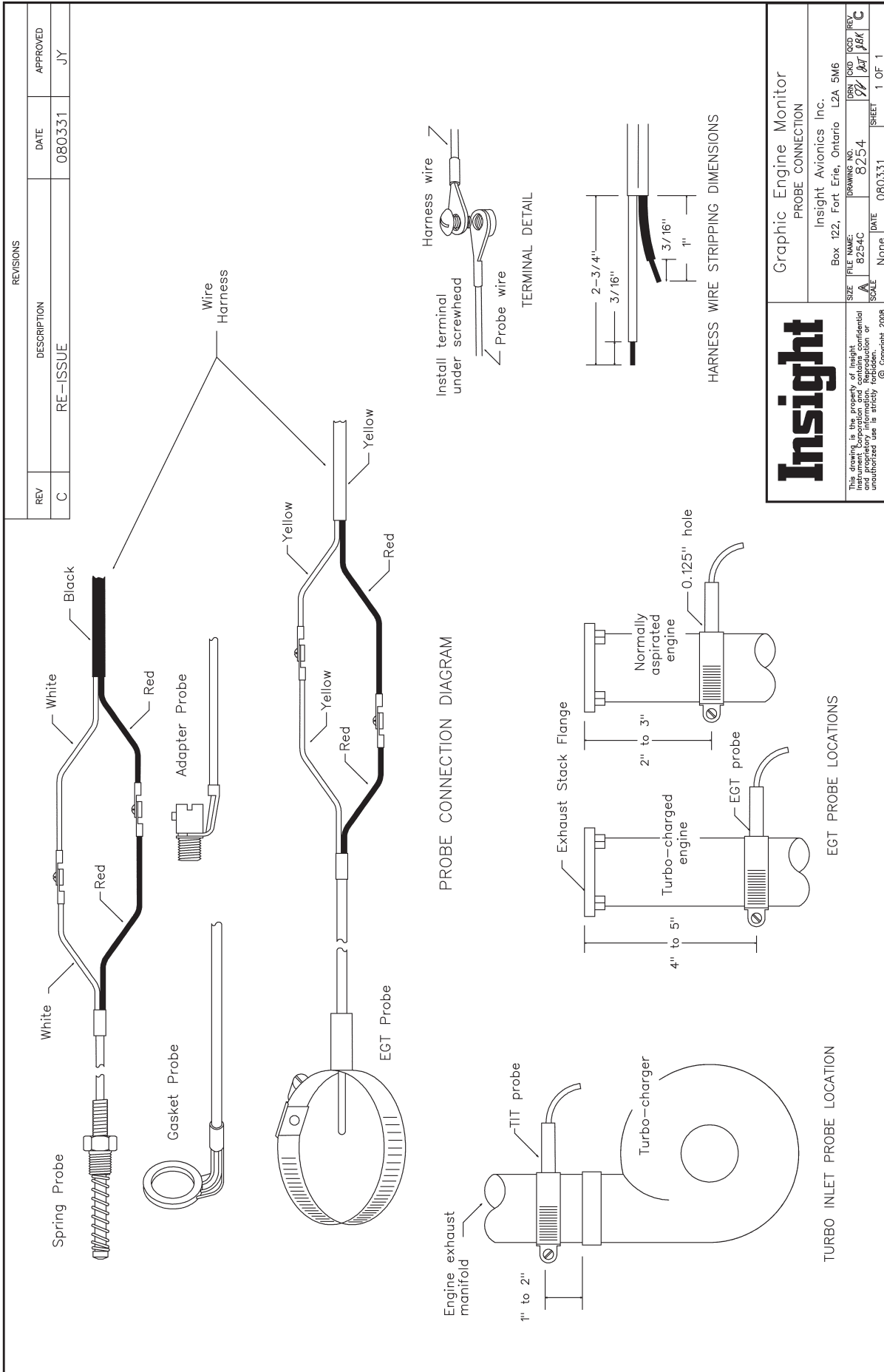
Cause: This can be symptomatic of an intermittent ground fault between engine and air-frame. See "All EGT readings too high".

Drawings

Drawing No.	Revision #	Title	Date
#8252	E	GEM CONNECTIONS FOR CONTINENTAL ENGINES	MAR 31/08
#8253	E	GEM CONNECTIONS FOR LYCOMING ENGINES	MAR 31/08
#8254	C	GEM PROBE CONNECTIONS	MAR 31/08
#1200-016	C	OAT/IAT PROBE MOUNTING DETAIL	MAR 31/08
#610C-315	D	DSUB 25-PIN INTERCONNECT DIAGRAM P1	Sept 1/11
#610C-315	D	DSUB 25-PIN INTERCONNECT DIAGRAM P2	Sept 1/11
#G4-315	A	DSUB 37-PIN INTERCONNECT DIAGRAM P1	Dec 10/10
#G4-315	A	DSUB 37-PIN INTERCONNECT DIAGRAM P2	Dec 10/10
#930309	C	GEM/GEMINI DISPLAY OUTLINES	MAR 31/08
#1200-018	E	GEM WIRING DIAGRAM	NOV 1/11
#610C-001	D	GRAPHIC ENGINE MONITOR	Sept 1/11
#G4-001	A	G4 GRAPHIC ENGINE MONITOR	JUNE 21/10
#1000-303	D	FLOW SENSOR MOUNTING DIAGRAM 1 - 3	Dec 10/10
#101116	A	FUEL FLOW ADAPTER WIRING DIAGRAM	Dec 15/10







Graphic Engine Monitor
PROBE CONNECTION

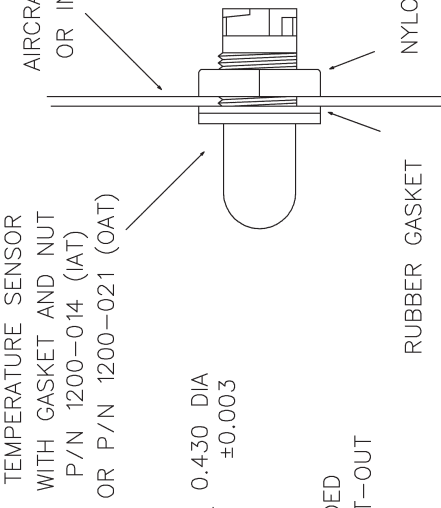
Insight Avionics Inc.
Box 122, Fort Erie, Ontario L2A 5M6

DRAWING NO.	8254C	DATE	080331	SHEET	1 OF 1
FILE NAME	8254C	SCALE	None	REV	C

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REVISIONS			
ZONE	REV	DESCRIPTION	DATE
	A	ADDED P/N 1200-021	930601
	B	ADDED NOTES	960101
	C	RE-ISSUE	080331
			APPROVED JWT

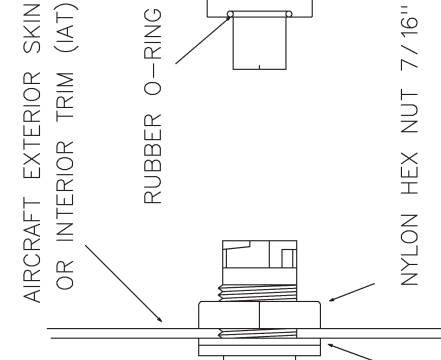
TEMPERATURE SENSOR WITH GASKET AND NUT
P/N 1200-014 (IAT)
OR P/N 1200-021 (OAT)



0.430 DIA
±0.003

RECOMMENDED MOUNTING CUT-OUT

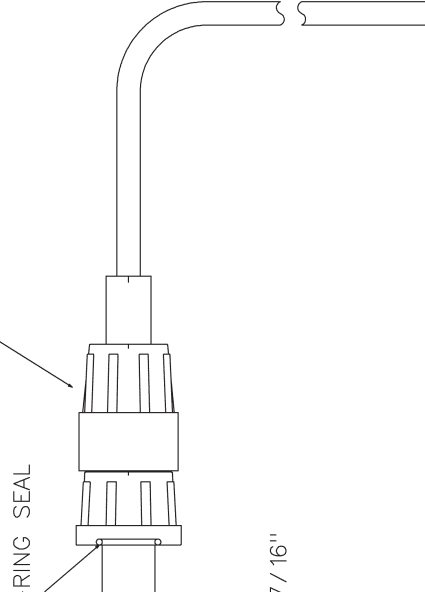
AIRCRAFT EXTERIOR SKIN (OAT)
OR INTERIOR TRIM (IAT)



RUBBER GASKET

NYLON HEX NUT 7/16"

RUBBER O-RING SEAL

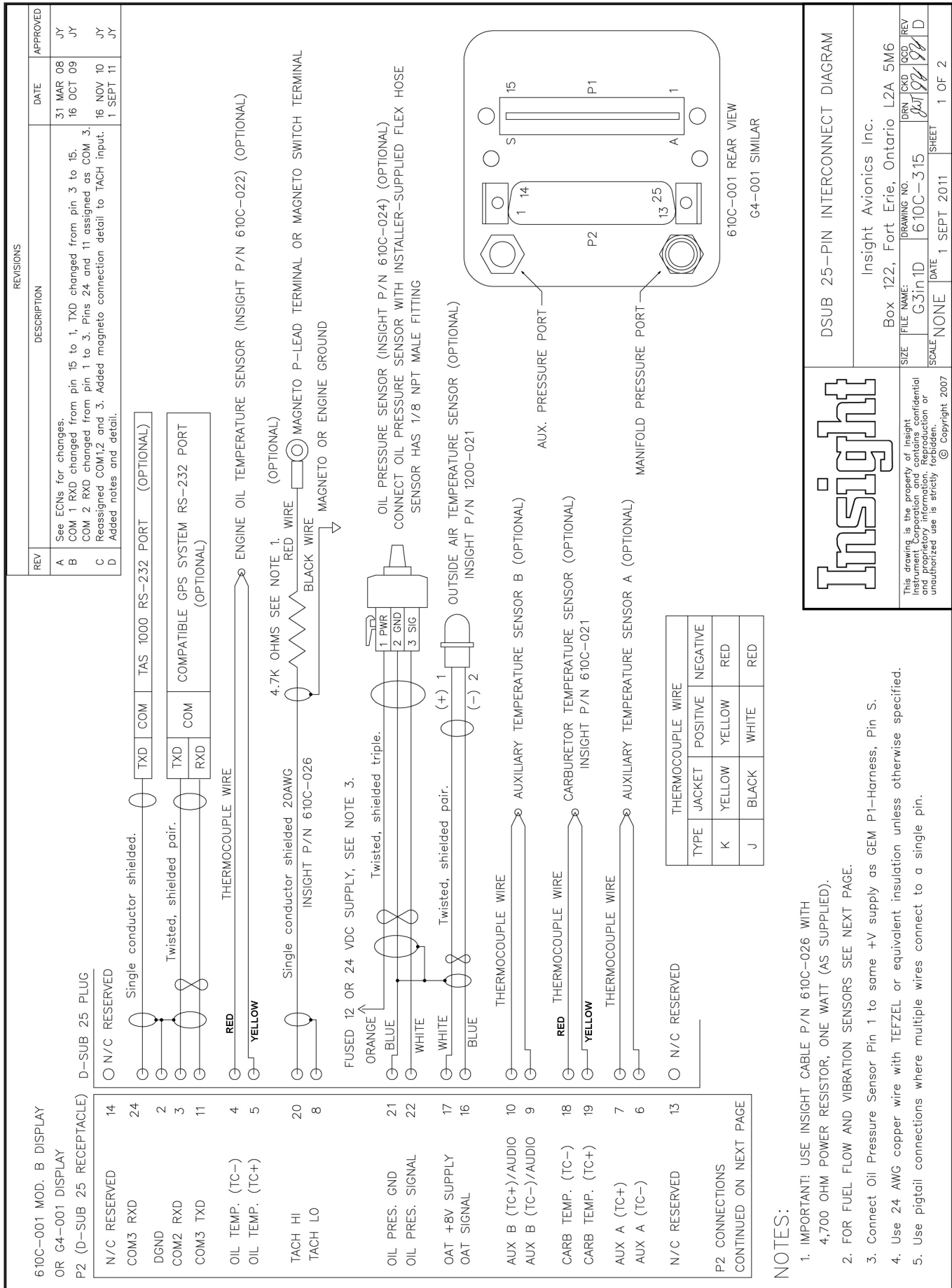


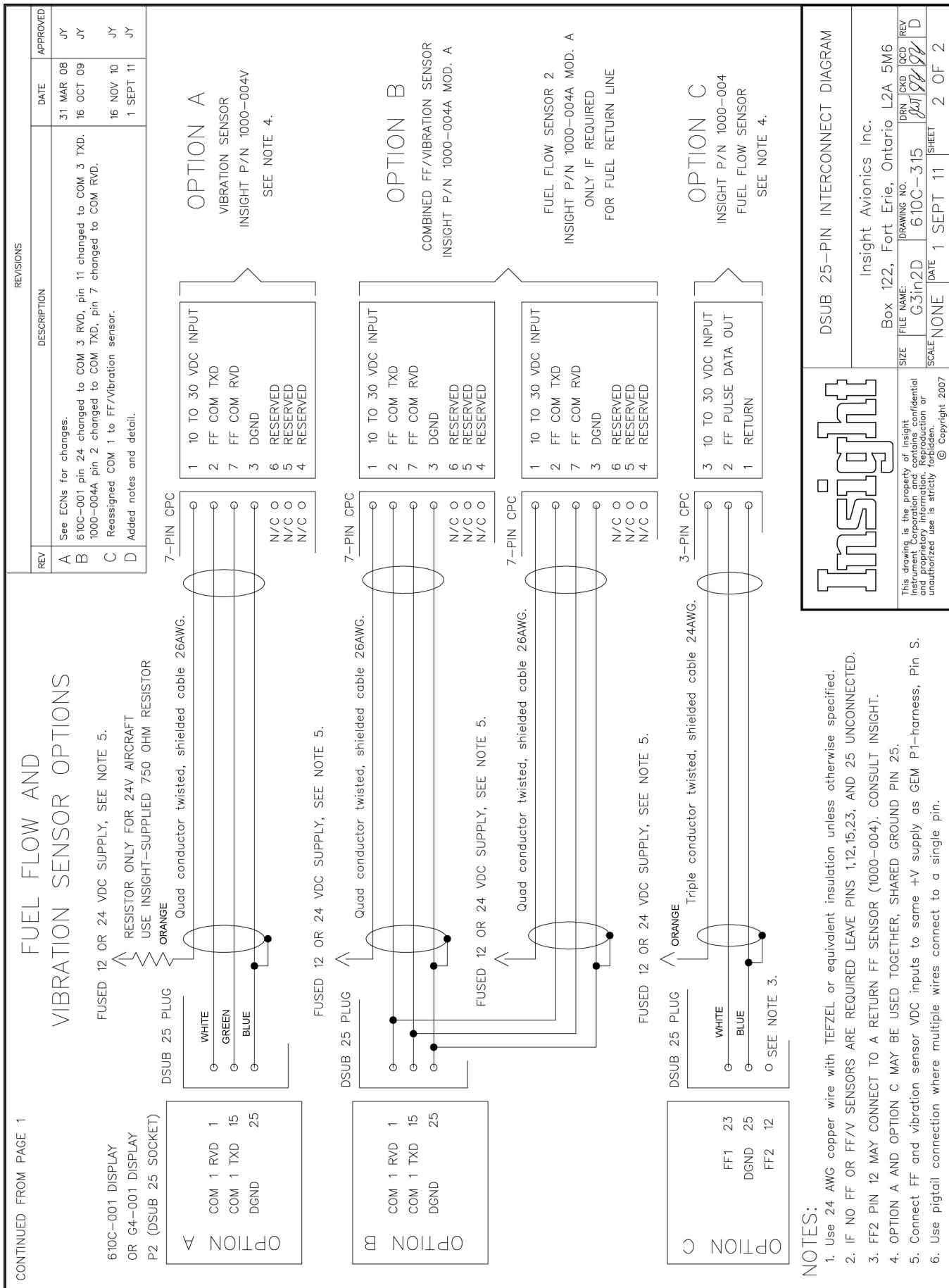
SENSOR CABLE ASSEMBLY
P/N 1200-015

NOTES:

1. LOCATION OF OAT AND IAT PROBE IS CRITICAL TO CORRECT OPERATION REFER TO INSTRUCTIONS BEFORE LOCATING EITHER PROBE.
2. SENSOR CABLE ASSEMBLY IS PRE-TERMINATED BUT LENGTH MAY BE MODIFIED BY INSTALLER.
3. Torque nylon hex nut to 6 in.lb. MAX.
4. DO NOT apply any torque to bullet portion of sensor.

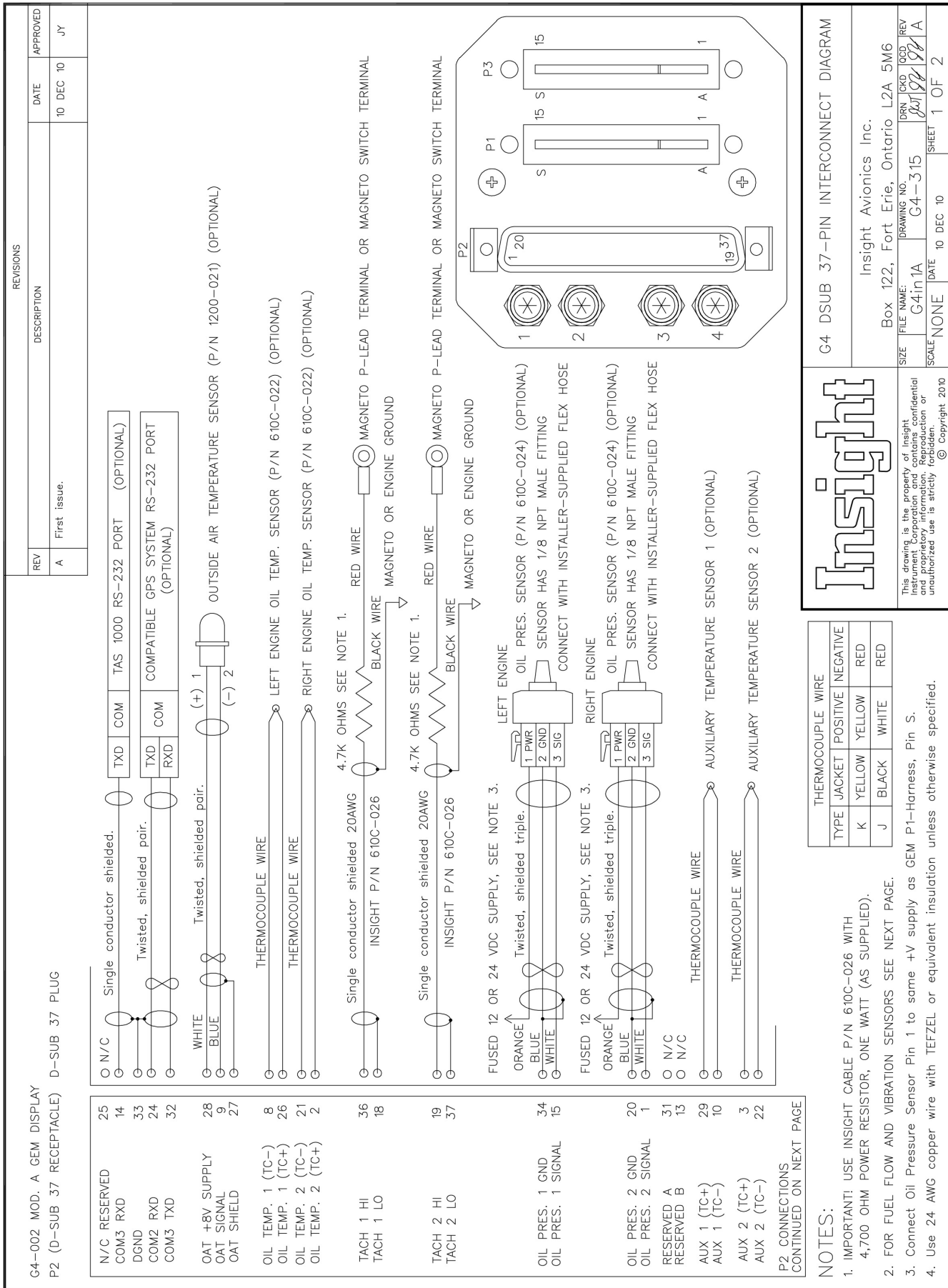
<h1 style="margin: 0;">Insight</h1> <p style="font-size: 8px; margin: 0;">This drawing is the property of Insight Instrument Corp. and is confidential and proprietary information. Reproduction or unauthorized use is strictly forbidden. © Copyright 2008</p>	<p style="text-align: center;">OUTSIDE AIR TEMPERATURE / INSIDE AIR TEMPERATURE PROBE MOUNTING DETAIL</p> <p style="text-align: center;">Insight Avionics Inc. Box 122, Fort Erie, Ontario L2A 5M6</p> <table style="width: 100%; font-size: 8px;"> <tr> <td>FILE NAME:</td> <td>OATINSTC</td> <td>DRAWING NO:</td> <td>1200-016</td> <td>DRN / CKD / OGD / REV</td> </tr> <tr> <td>SCALE:</td> <td>none</td> <td>DATE:</td> <td>080331</td> <td>98 / JBL / JY / C</td> </tr> <tr> <td colspan="3">SHEET</td> <td colspan="2">1 OF 1</td> </tr> </table>	FILE NAME:	OATINSTC	DRAWING NO:	1200-016	DRN / CKD / OGD / REV	SCALE:	none	DATE:	080331	98 / JBL / JY / C	SHEET			1 OF 1	
FILE NAME:	OATINSTC	DRAWING NO:	1200-016	DRN / CKD / OGD / REV												
SCALE:	none	DATE:	080331	98 / JBL / JY / C												
SHEET			1 OF 1													





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DSUB 25-PIN INTERCONNECT DIAGRAM			
Insight Avionics Inc.			
Box 122, Fort Erie, Ontario L2A 5M6			
SIZE	DRAWING NO.	DRY	ICCD
3in	610C-315	08/08/08	D
SCALE	DATE	SHEET	2 OF 2
NONE	1 SEPT 11	11	



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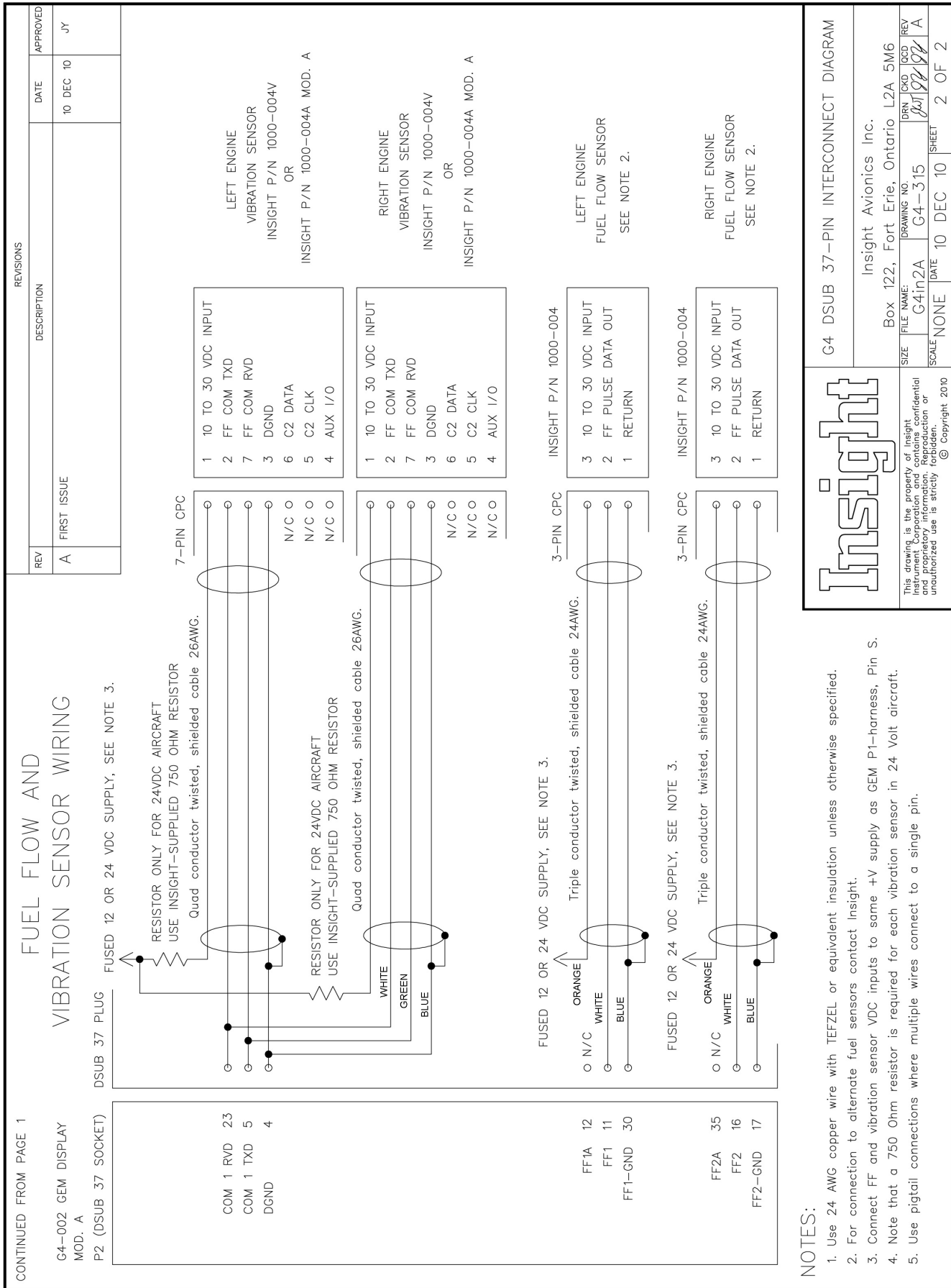
THERMOCOUPLE WIRE			
TYPE	JACKET	POSITIVE	NEGATIVE
K	YELLOW	YELLOW	RED
J	BLACK	WHITE	RED

G4 DSUB 37-PIN INTERCONNECT DIAGRAM

Insight Avionics Inc.

Box 122, Fort Erie, Ontario L2A 5M6

FILE NAME:	DRAWING NO.	DRN	TCD	QCD	REV
G4in1A	G4-315	80198	1	98	A
SCALE	NONE	DATE	10 DEC 10	SHEET	1 OF 2

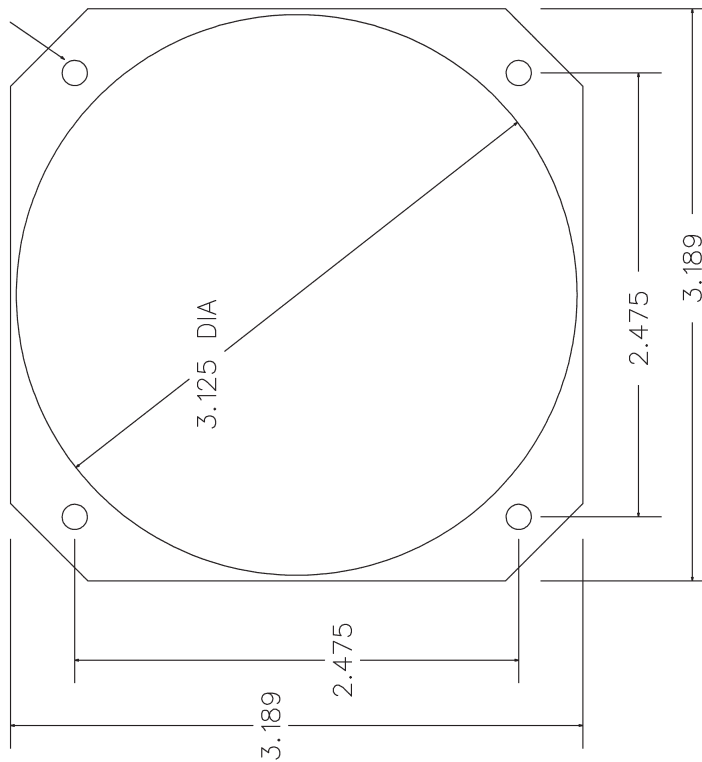


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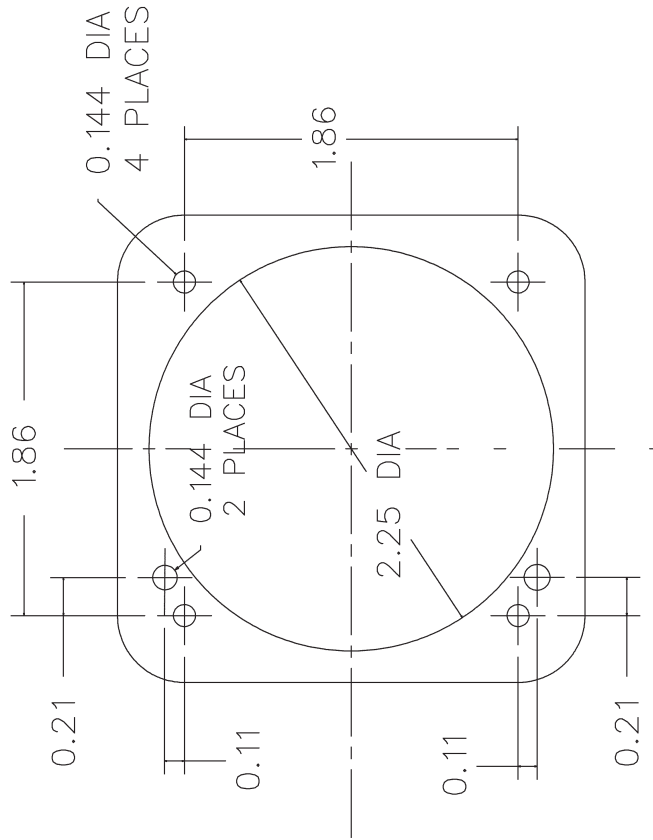
G4 DSUB 37-PIN INTERCONNECT DIAGRAM			
Insight Avionics Inc.			
Box 122, Fort Erie, Ontario L2A 5M6			
SIZE	DRAWING NO.	DRN / CKD	REV
G4in2A	G4-315	001	A
SCALE	NONE	DATE	10 DEC 10
		SHEET	2 OF 2

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	Addition of detail	930601	JWT
B	CORRECTED HOLE DIMENSION	031114	R.R.
C	REVISED FOR CLARITY	080331	JY

Mounting holes
6-32 4 places.



INSTRUMENT PANEL HOLE LAYOUT



G3 PANEL HOLE LAYOUT
(FOR P/N 610C-001)

Insight

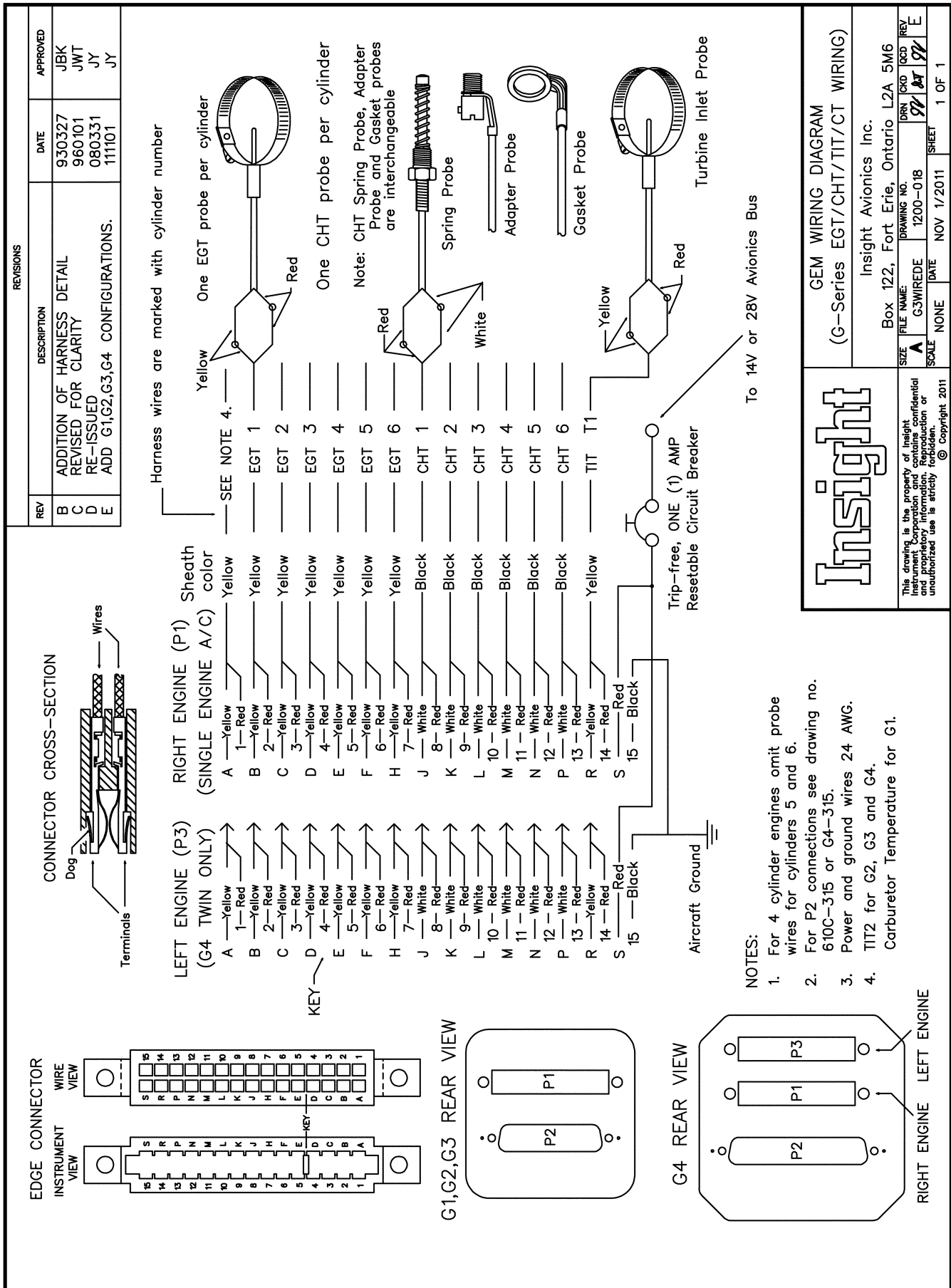
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GEM/GEMINI DISPLAY OUTLINES

Insight Avionics Inc.

Box 122, Fort Erie, Ontario L2A 5M6

SIZE	FILE NAME	DRAWING NO.	DRN	CKD	LOGD	REV
	gemdoutc	930309	92	JK	JWT	C
SCALE	DATE	SHEET	1 OF 1			
	NONE	080331				



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GEM WIRING DIAGRAM
(G-Series EGT/CHT/TIT/CT WIRING)

Insight Avionics Inc.
Box 122, Fort Erie, Ontario L2A 5M6

SIZE	FILE NAME:	DRAWING NO.	DRN	CKD	QC'D	REV
A	G3WIREDE	1200-01B				
SCALE	NONE	DATE	NOV 1/2011	SHEET	1	OF 1

REVISIONS		
REV	DESCRIPTION	DATE
NONE	Prototype.	JUL 4/07
A	Specification A for environmental testing.	MAR 31/08
B	Specification B.	OCT 16/09
C	Specification C.	JUN 21/10
D	Added G1 and G2 configurations.	SEPT 1/11

<p>OPTIONAL PRESSURE PORT AN924-2D (5/16-NF) SEE DWG 610C-315</p> <p>REAR VIEW</p> <p>MANIFOLD PORT (MP) AN924-2D (5/16-NF)</p> <p>LATCH-BLOCK(x2)</p> <p>HARNES MOUNTING HOLES (4-40 x2)</p>	<p>P2 25-PIN D-SUB RECEPTACLE SEE DWG 610C-315</p> <p>P1 30-PIN EDGE CONNECTOR SEE DWG 1200-018</p>
---	---

FRONT VIEW

INSTRUMENT MOUNTING HOLES (6-32 x4)

TOP CONTROL KNOB OR PUSHBUTTON

AMBIENT LIGHT SENSOR

PG

SD MEMORY CARD

SEL

2.613

2.613

SIDE VIEW

NAMEPLATE 610C-105

0.750

3.650

DATA RANGE

EXHAUST GAS TEMPERATURE: 200 TO 1800 F

TURBINE INLET TEMPERATURE: 200 TO 1800 F

CYLINDER HEAD TEMPERATURE: 200 TO 550 F

TACHOMETER: 600 TO 4000 RPM

OIL TEMPERATURE: -40 TO 250 F

OIL PRESSURE: 20 TO 100 PSI

CARBURETOR TEMPERATURE: -40 TO +120 F

ALTERNATOR TEMPERATURE: -40 TO +250 F

OUTSIDE AIR TEMPERATURE: -40 TO +120 F

BUSS VOLTAGE: 8.0 TO 30.0 VDC

G-LOAD (3-AXIS): +/- 5.0 G

POWERPLANT VIBRATION (3-AXIS): +/- 5.0 G

MANIFOLD PRESSURE: 6.0 TO 70.0 in.Hg

OPTIONAL PRESSURE: 3.0 TO 36.0 PSI Absolute

FUEL FLOW:

Fuel Flow Rate: 2.0 to 99 GPH.

Maximum Fuel Quantity: 2000 U.S.G. or 9999 lb.

Serial interface (3): RS-232 9600 Baud Bi-directional

SPECIFICATIONS AND LIMITATIONS

Part Number: 610C-001

Power: 10 TO 30 VDC, 2 W Maximum, 1 W Continuous.

Weight: 0.5 lb.

Altitude: -1000 to 35000 ft.

Operating Temperature: -20 °C to +55 °C.

Environmental: DO-160E

Software: DO-178B LEVEL C

BEZEL MARKING	CONNECTIONS		CONTROLS	
	P1	P2	MP	
G1	YES	NO	NO	PUSHBUTTONS
G2	YES	YES	NO	KNOBS
G3	YES	YES	YES	KNOBS

ALL DIMENSIONS IN INCHES. TOLERANCE +/- 0.050.

INSTALLATION MANUAL: INSIGHT DOC. #070906.

OPERATION INSTRUCTIONS: INSIGHT DOC. #070907.

G3 CONFIGURATION SHOWN, G1 AND G2 SIMILAR



GRAPHIC ENGINE MONITOR

Insight Avionics Inc.
Box 122, Fort Erie, Ontario L2A 5M6

FILE NAME: 610C-001
DRAWING NO. 93specD
DATE: SEPT 1/11
SCALE: none

SHEET 1 of 1

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REVISIONS		
REV	DESCRIPTION	DATE
NONE	Prototype.	MAR 31/08 JY
A	Added 3rd serial port to P2.	JUN 21/10 JY

FRONT VIEW
 INSTRUMENT MOUNTING HOLES (6-32 x4)
 AMBIENT LIGHT SENSOR
 G4 Insight GRAPHIC ENGINE MONITOR
 LCD DISPLAY
 G4-101
 PG SD DATA CARD
 SEL
 PAGE CONTROL KNOB
 SELECT CONTROL KNOB
 3.120 DIA
 3.190

SIDE VIEW
 NAMEPLATE
 G4-105
 3.650

REAR VIEW
 P2 D-SUB RECEPTACLE
 P1 30 PIN EDGE CONNECTOR
 P3 30 PIN EDGE CONNECTOR
 PRESSURE PORTS #2 37 DEGREE FLARE (5/16-24)
 PRESSURE PORTS #2 37 DEGREE FLARE (5/16-24)
 LATCH-BLOCK(x2)
 HARNES MOUNTING HOLES (4-40 x2)

CONNECTOR CONFIGURATIONS			
P1	P2	P3	
G4-001	30-PIN	25-PIN	N/A
G4-002	30-PIN	37-PIN	30-PIN

DATA RANGES
EXHAUST GAS TEMPERATURE: 200 TO 1800 F
TURBINE INLET TEMPERATURE: 200 TO 1800 F
CYLINDER HEAD TEMPERATURE: 200 TO 550 F
TACHOMETER: 700 TO 3400 RPM
OIL TEMPERATURE: -40 TO 250 F
OIL PRESSURE: 20 TO 100 PSI
CARBURETOR TEMPERATURE: -40 TO +120 F
ALTERNATOR TEMPERATURE: -40 TO +250 F
OUTSIDE AIR TEMPERATURE: -40 TO +120 F
BUSS VOLTAGE: 8.0 TO 30.0 VDC
G-LOAD (3-AXIS): +/- 5.0 G
POWERPLANT VIBRATION (3-AXIS): +/- 5.0 G
MANIFOLD PRESSURE (2): 6.0 TO 70.0 in.Hg
OPTIONAL PRESSURE (2): 3.0 TO 36.0 PSI Absolute
FUEL FLOW: Fuel Flow Rate: 2.0 to 99 GPH. Maximum Fuel Quantity: 2000 U.S.G. or 9999 lb. Serial Interface (3): RS-232 9600 Baud Bi-directional

SPECIFICATIONS AND LIMITATIONS

Part Numbers: G4-001, G4-002
 Power: 10 TO 30 VDC, 2 W Maximum, 1 W Continuous.
 Weight: 0.5 lb.
 Altitude: -1000 to 35000 ft.
 Operating Temperature: -20 °C to +55 °C.
 Environmental: DO-160E
 Software: DO-178B LEVEL C

G4 GRAPHIC ENGINE MONITOR

Insight Instrument Corp.
 Box 122, Fort Erie, Ontario L2A 5M6

SIZE	FILE NAME	DRAWING NO.	DATE	REV
A	G4SpecA	G4-001	JUN 21/10	JY
SCALE	none			

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	Added housing and bracket.	June 22/00	JWT
B	CHANGED TITLE	June 15/01	R.R.
C	ADDED 2 ADDITIONAL MOUNTING OPTIONS	MAY 26/03	R.R.
D	ADDED VIBRATION AND K-FACTOR OPTIONS	DEC 10/10	JY

TYPICAL INSTALLATION

TOP VIEW

SIDE VIEW

FRONT VIEW

INSIGHT Instrument Corporation
 XXXXXXXXXXXXXXXXXXXX
 P/N 1000-00X-1
 TSO C44b DO-1600
 Serial Number XXXX
 XXXXXXXXXXXXXXXXXXXX
 MADE IN CANADA

MOUNT WITH 2 CRANKCASE BOLTS
 RE-TORQUE ACCORDING TO ENGINE MANUFACTURER SPECIFICATIONS

MOUNT ONLY WITH BRACKET DOWN
 MUST BE GROUNDED

NOTE 5:
 FUEL INLET
 typically AN 4 TO 1/4" NPT

NOTE 2,3:
 FUEL INLET
 typically AN 4 TO 1/4" NPT

NOTE:
 FUEL OUTLET
 HIGHER THAN INLET

NOTE:
 FUEL OUTLET
 typically AN 4 TO 1/4" NPT
 NOTE 2,3.

NOTE:
 FUEL OUTLET
 typically AN 4 TO 1/4" NPT
 NOTE 2,3.

NOTE:
 FUEL OUTLET
 typically AN 4 TO 1/4" NPT
 NOTE 2,3.

PART NUMBERS		
INJECTOR	CARBURETOR	
FLOW SENSOR	1000-004-1(-Knnnnn)(-EPR)	1000-004-4(-Knnnnn)(-EPR)
TRUE FLOW SENSOR	1000-006-1X	SEE NOTE 12.
FLOW/VIBRATION SENSOR	1000-004A-1	1000-004A-4
VIBRATION SENSOR	1000-004V(-Xn)	SEE NOTE 15.

NOTES:

1. Install INSIGHT FLOW SENSOR, one per engine.
2. Use ONLY approved 1/4 NPT fittings for transducer inlet and outlet, installer supplied.
3. Use ONLY approved fuel line assemblies.
4. Use approved thread sealant. Torque pipe threads to a max of 15 ft. lbs. (180 in. lbs.)
5. INSIGHT supplied electrical harness; 1/3 TURN, 3-pin OR clip-on 7-pin for FLOW/VIBRATION SENSOR.
6. A straight length of fuel line upstream from the sensor inlet will improve accuracy by reducing turbulence in the rotor.
7. CONFIRM TRANSDUCER CASE IS GROUNDED TO AIRFRAME GROUND BEFORE POWERING UP.
8. Mount transducer with nomenclature facing up.
9. Confirm all wiring PRIOR to powering up.
10. SEE INSTALLATION SCHEMATIC 1000-301 FOR FLOW SENSOR WIRING DETAILS.
11. SEE INSTALLATION SCHEMATIC 1000-816 FOR TRUE FLOW SENSOR WIRING DETAILS.
12. SPECIFY GPS MANUFACTURE AND MODEL WHEN ORDERING TRUE FLOW SENSOR, BENDIX KING B-FORMAT, APOLLO AND GARMIN Z-FORMAT.
13. FLOW SENSOR 30,000 PULSES PER GALLON UNLESS INDICATED BY -Knnnn.
14. FLOW SENSOR DATA SIGNAL 5V UNLESS -EPR, EXTERNAL PULL-UP RESISTOR REQUIRED, SEE WIRING DIAGRAM.
15. Install vibration sensor, one per engine, consult Insight for alternate application.

PIN	FUNCTION
1	AVIONICS GROUND
2	DATA OUT (TRANSMIT)
3	10 TO 30 VDC INPUT

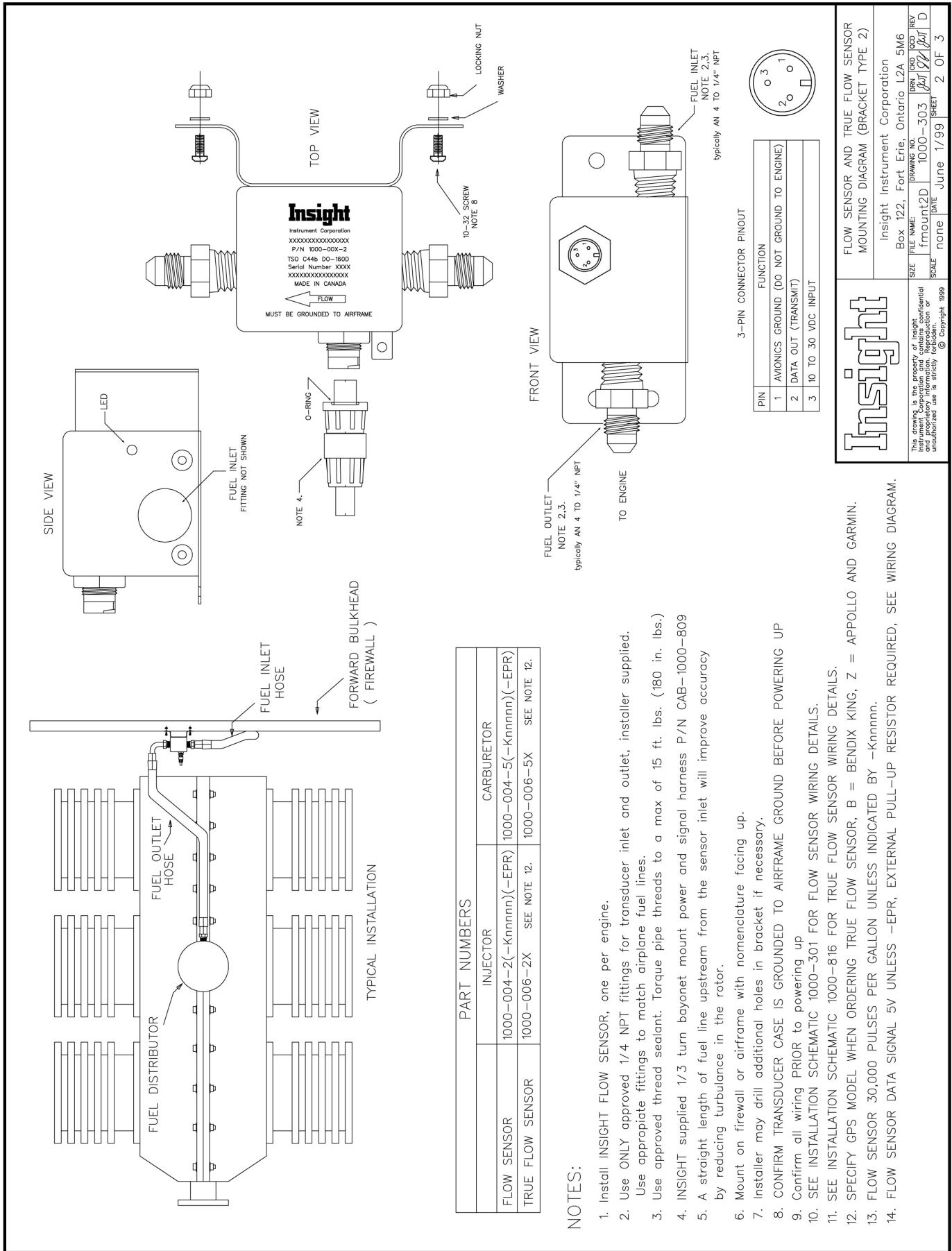
PIN	FUNCTION
1	10 TO 30 VDC INPUT
2	DATA OUT (TRANSMIT)
3	AVIONICS GROUND
4	RESERVED
5	C2 CLOCK
6	C2 DATA
7	DATA IN (RECEIVE)

INSIGHT

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FLOW SENSOR AND TRUE FLOW SENSOR MOUNTING DIAGRAM (BRACKET TYPE 1)	
Insight Instrument Corporation Box 122, Fort Erie, Ontario L2A 5M6	
SIZE	DRAWING NO.
FILE NAME:	1000-303
amountID	1000-303
DATE	June 1/99
SCALE	1 OF 3



PART NUMBERS	
FLOW SENSOR	CARBURETOR
1000-004-2(-Knnnnn)(-EPR)	1000-004-5(-Knnnnn)(-EPR)
1000-006-2X SEE NOTE 12.	1000-006-5X SEE NOTE 12.

NOTES:

1. Install INSIGHT FLOW SENSOR, one per engine.
2. Use ONLY approved 1/4 NPT fittings for transducer inlet and outlet, installer supplied. Use appropriate fittings to match airplane fuel lines.
3. Use approved thread sealant. Torque pipe threads to a max of 15 ft. lbs. (180 in. lbs.)
4. INSIGHT supplied 1/3 turn bayonet mount power and signal harness P/N CAB-1000-809
5. A straight length of fuel line upstream from the sensor inlet will improve accuracy by reducing turbulence in the rotor.
6. Mount on firewall or airframe with nomenclature facing up.
7. Installer may drill additional holes in bracket if necessary.
8. CONFIRM TRANSDUCER CASE IS GROUNDED TO AIRFRAME GROUND BEFORE POWERING UP
9. Confirm all wiring PRIOR to powering up
10. SEE INSTALLATION SCHEMATIC 1000-301 FOR FLOW SENSOR WIRING DETAILS.
11. SEE INSTALLATION SCHEMATIC 1000-816 FOR TRUE FLOW SENSOR WIRING DETAILS.
12. SPECIFY GPS MODEL WHEN ORDERING TRUE FLOW SENSOR, B = BENDIX KING, Z = APOLLO AND GARMIN.
13. FLOW SENSOR 30,000 PULSES PER GALLON UNLESS INDICATED BY -Knnnnn.
14. FLOW SENSOR DATA SIGNAL 5V UNLESS -EPR, EXTERNAL PULL-UP RESISTOR REQUIRED, SEE WIRING DIAGRAM.



PIN	FUNCTION
1	AVONICS GROUND (DO NOT GROUND TO ENGINE)
2	DATA OUT (TRANSMIT)
3	10 TO 30 VDC INPUT

Insight

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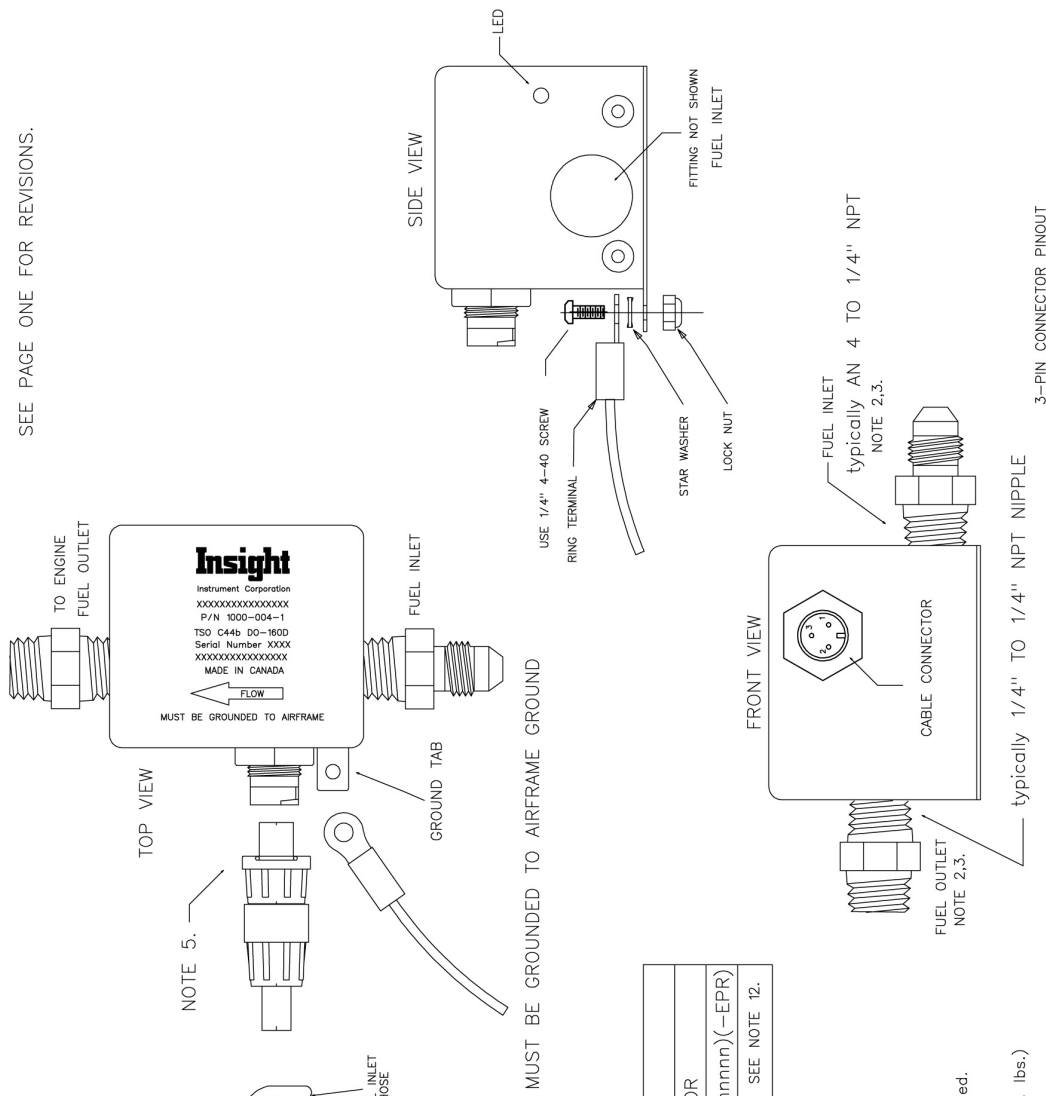
FLOW SENSOR AND TRUE FLOW SENSOR MOUNTING DIAGRAM (BRACKET TYPE 2)

Insight Instrument Corporation
Box 122, Fort Erie, Ontario L2A 5M6

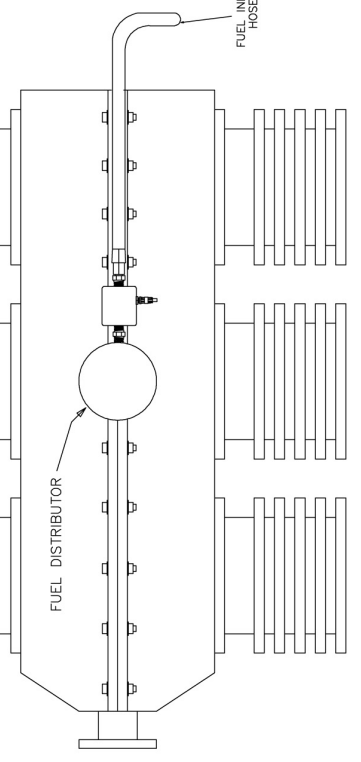
SIZE: FILE NAME: DRAWING NO. IPRN ICKO 100D REV
fmount2D 1000-303 Part 2/2 Part D

SCALE: none DATE: June 1/99 SHEET: 2 OF 3

SEE PAGE ONE FOR REVISIONS.



PIN	FUNCTION
1	AVIONICS GROUND
2	DATA OUT (TRANSMIT)
3	10 TO 30 VDC INPUT



TYPICAL INSTALLATION

MUST BE GROUNDED TO AIRFRAME GROUND

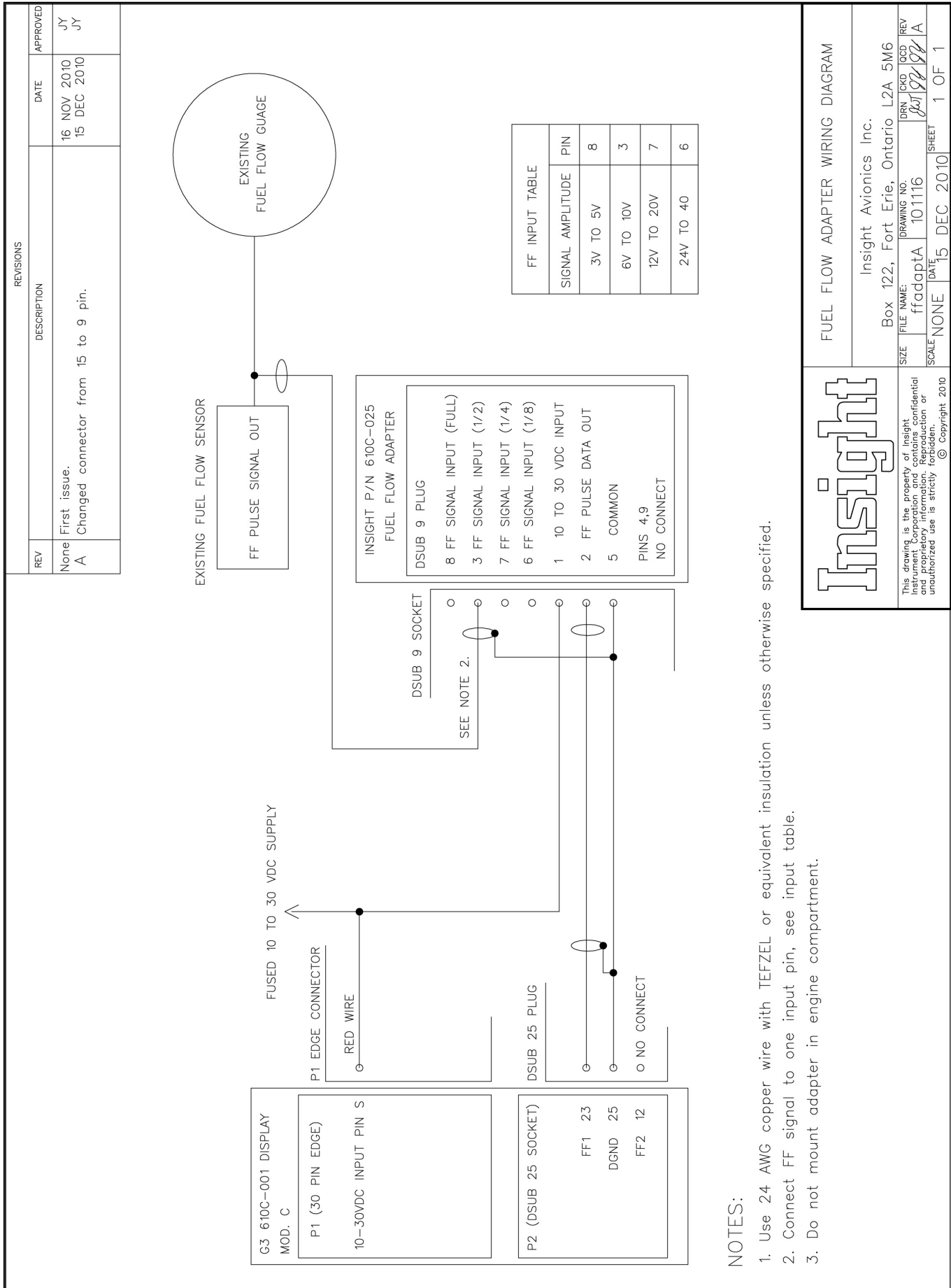
PART NUMBERS	
INJECTOR	CARBURETOR
FLOW SENSOR 1000-004-3(-Knnnn)(-EPR) SEE NOTE 12.	1000-004-6(-Knnnn)(-EPR)
TRUE FLOW SENSOR 1000-006-3X SEE NOTE 12.	1000-006-6X SEE NOTE 12.

NOTES:

1. Install INSIGHT FLOW SENSOR, one per engine.
2. Use ONLY approved 1/4 NPT fittings for transducer inlet and outlet, installer supplied.
3. Use ONLY approved fuel line assemblies.
4. Use approved thread sealant. Torque pipe threads to a max of 15 ft. lbs. (180 in. lbs.)
5. INSIGHT supplied 1/3 turn bayonet electrical harness P/N CAB-1000-809.
6. A straight length of fuel line upstream from the sensor inlet will improve accuracy by reducing turbulence in the rotor.
7. CONFIRM TRANSDUCER CASE IS GROUNDED TO AIRFRAME GROUND BEFORE POWERING UP.
8. Mount transducer with nomenclature facing up.
9. Confirm all wiring PRIOR to powering up.
10. SEE INSTALLATION SCHEMATIC 1000-301 FOR FLOW SENSOR WIRING DETAILS.
11. SEE INSTALLATION SCHEMATIC 1000-816 FOR TRUE FLOW SENSOR WIRING DETAILS.
12. SPECIFY GPS MANUFACTURE AND MODEL WHEN ORDERING TRUE FLOW SENSOR, BENDIX KING B-FORMAT, APOLLO AND GARMIN Z-FORMAT.
13. FLOW SENSOR 30,000 PULSES PER GALLON UNLESS INDICATED BY -Knnnn.
14. FLOW SENSOR DATA SIGNAL 5V UNLESS -EPR. EXTERNAL PULL-UP RESISTOR REQUIRED, SEE WIRING DIAGRAM.
15. Transducer self supporting on fuel fittings.

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FLOW SENSOR AND TRUE FLOW SENSOR MOUNTING DIAGRAM (BRACKET TYPE 3)	
Insight Instrument Corporation Box 122, Fort Erie, Ontario L2A 5M6	
FILE NAME: fmount3D	DRW: 020 020 REV: D
SCALE: none	DATE: June 1/99
SHEET: 3	OF: 3



FUEL FLOW ADAPTER WIRING DIAGRAM

Insight Avionics Inc.
Box 122, Fort Erie, Ontario L2A 5M6

SIZE	FILE NAME:	DRAWING NO.	DRN	CKD	LOGD	REV
	ffadapta	101116				
SCALE	NONE	DATE	15 DEC 2010	SHEET	1 OF 1	

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If you have difficulty installing or using a G3 or G4 system, please read the G series documentation. Every G series system is shipped with complete instructions for installation and use on a CD. You may also find the same information on our website www.insightavionics.com under G3 Documentation.

The answers to many technical questions can be found in these documents. Insight provides customer support free of charge for as long as you own the instrument. If you have any questions concerning G series operation do not hesitate to call.

The Customer Service department accepts calls Monday through Friday between 9 am and 5 pm EST. Be sure to have your instrument model number and serial number(s) ready when you call.

GEM Model No. _____

GEM Serial No. _____

Aircraft Type _____

Educational Video on CD

To assist our customers in installing and using GEMs, Insight has produced an educational CD entitled Modern Engine Management. Our video is available free of charge. Call or write to obtain your personal copy of this classic production.

Service Procedures

Like many modern electronic devices, the Graphic Engine Monitor is extremely reliable. Other than initial configuration during installation, the G series requires no adjustment or routine maintenance. The G series routinely performs a self-test on power-up to test its vital functions. Should the G series fail this test, it will halt on a red screen with a description of the error. Errors of this nature must be returned to the factory for service.

If the instrument performs the self-test successfully but you feel that the instrument is not functioning as expected discuss the problem with your dealer, or consult the troubleshooting section of the G series Installation Instructions. Keep in mind that in the vast majority of cases, erratic or unusual G series operation can be traced to an installation problem, a problem with probes, wiring harness or the aircraft's electrical system.

Due to its reliability and the extensive testing that it undergoes, the instrument itself is the least likely source of trouble. For this reason we strongly encourage you to contact Insight Customer Service at one of the numbers listed below before returning an instrument to the factory, or any time you have any questions concerning the operation of the Graphic Engine Monitor. By contacting us first we may be able to assist you in correcting your problem without the hassle and downtime of sending in an instrument that is not the source of the difficulty.

Technical Support Contact Phone Numbers:

(905) 871-0733

Web: www.insightavionics.com

E-mail: G3TechSupport@InsightAvionics.com