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ADVANCED ELECTRONIC INSTRUMENTATION

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1.0 DPU, SWITCH, DISPLAY CABLE INSTALLATION

1.0.1 DPU MOUNTING

The unit should not be mounted in the engine compartment, but rather in a dry cool cabin location with easy accessibility for wiring, installation and removal. NOTE: If you have a 'Fuel Level System' you may want to calibrate it before mounting the DPU. (See section on FUEL LEVEL SYSTEM OPERATION.)

1.0.2 DPU WIRING

All power, ground and transducer wires (except fuel level transducers connect) to the DPU terminal blocks. See each respective installation section for connections.

- ⇒ **DO NOT**: connect J4-16 to the same aircraft circuit breaker as J4-15.
- ⇒ **DO NOT**: allow wire insulation or foreign objects into the position being connected to.
- ⇒ **DO NOT**: over tighten the set screw onto the wire. Instead, the wire needs to be securely held, but not crushed to the point of separation. Test the wire for security after tightening. The use of a 'Jewelers Screwdriver' will provide enough torque for the job.
- ⇒ **DO NOT**: allow bare wires touch the metal case or adjacent leads.
- ⇒ **DO NOT**: bend the wires where they exit the terminal block position, instead, form a radius away from the terminal block position.
- ⇒ **DO NOT**: allow static electricity to contact any terminal. Always discharge yourself to ground first !

DPU 'J4' TO POWER CONNECTIONS (Use 16 AWG wire)

DPU TERM.	WIRE COLOR	CONNECT TO	DESCRIPTION
J4-14	BLK	GND BUS	ACFT GROUND BUS
J4-15	RED	5 AMP BRKR	ACFT POWER DIST SYSTEM
J4-16	WHT	LITE CNTRL	ACFT PANEL DIMMER SYSTEM
CASE	BLK	GND BUS	ACFT GROUND BUS

All other DPU connections are described in each system installation section.

1.0.3 INDICATOR MOUNTING & WIRING

The indicator is mounted to the panel from the back side. Four mounting screws are provided for this purpose. Do not use longer screws or damage to the instrument will result. The supplied screws will accommodate panel thicknesses from 0.062 to 0.050 inches. If a panel thickness of other than this is required, then determine the difference in thickness and procure new screw length accordingly. Test your new screw lengths by finger tightening them into the panel and indicator. The screws should tighten against the panel only and should not 'bottom out' in the indicator. Be careful not to cross thread the screws or the indicator bezel will be permanently damaged. The indicator cut-out and mounting space requirement's information is provided in 'SECTION 5 ILLUSTRATIONS'.

To wire indicators to DPU simply plug any display cable connector into the back of the indicator observing the keying tab to notch.

1.0.4 DISPLAY CABLE FABRICATION
(P/N 4010005)

STEP 1: Carefully move the connectors into the positions required on the flat ribbon cable for your panel layout. They may face either up or down. Look for the small embossed arrowhead on the cable connectors that points to an edge of the cable. MAKE SURE ALL CONNECTOR ARROWHEADS POINT TO THE SAME EDGE OF THE CABLE AS THE INSTALLED DPU CABLE CONNECTOR !

STEP 2: The connector is secured to the ribbon cable by closing it in clean smooth jaws of a vise until the sides 'snap over' into position. Make sure the cable connector is SQUARE TO THE CABLE before any closing takes place. Once installed, connectors and cable cannot be re-used !

STEP 3: Once all connectors are installed, trim any excess cable away by using a new SHARP pair of scissors. Inspect the cut to insure that adjacent wires are not touching each other.

INSURE that once installed, the trimmed ends of the cable do not touch anything.

1.0.5 MODE SWITCH INST.
(P/N 3010023)

The mode selector switch assembly can be mounted anywhere within reach of the indicator connector.

STEP 1: Once the switch hole has been located and drilled, remove the paper backing and vinyl front covering from the switch plate. The switch plate has an adhesive backing to aid in placement of the plate. Press the plate into position.

STEP 2: Rotate the switch shaft as far counter-clockwise as it will travel (as viewed facing the shaft). The switch comes with the lock washer and nut loosely installed. When removing the nut, DO NOT remove the silver ring underneath. If you have accidentally moved the silver ring, it should be placed back onto the switch with the tab inserted into the hole between switch position numbers '9' and '10'. This tab acts as a stop to only allow 9 possible switch positions.

STEP 3: Insert the switch assembly (switch, silver ring and lock washer) through the back of the panel. Place the nut on the switch and finger tighten. Place the knob over the shaft such that one of the two set screws is perpendicular to the 'flat' on the shaft. Tighten this set screw. Now rotate the entire switch assembly until the slotted line on the knob is aligned with the left lower white line on the switch plate.

STEP 4: If necessary, carefully remove the knob without disturbing the current switch assembly location. Now CAREFULLY tighten the nut (too much force will break the switch) . If necessary, reinstall the knob as before and tighten both set screws. Verify correct alignment with all switch plate positions. Plug the switch assembly connector into the small connector on the appropriate indicator.

1.1 TACHOMETER SYSTEM INSTALLATION

1.1.1 TACH XDUCER INST.

(P/N 3010004 BENDIX, 3010005 SLICK)

The transducer is screwed into the 'magnet vent port' nearest the magneto mounting flange, where the magneto attaches to engine. Do not mistake the 'rotor vent port' nearest the spark plug harness assembly for it.

If possible, install xducer to the non impulse coupled magneto. See engine manual for correct location.

Once properly identified, remove the existing vent plug and screw the sensor in its place, then tighten.

If you are connecting to an Electronic Ignition, only connect the manufacturers 'tach signal output' to J4-12 and install blocking diode (such as 1N914) in series with cathode (bar) going to ignition side.

*** CAUTION*** Always discharge yourself to ground before wiring.

1.1.2 TACHOMETER TRANSDUCER WIRING

DPU TERM.	CABLE COLOR	XDUCER WIRE	XDUCER DESCR.	XDUCER PART NO.
J4-10	BLK	BLK	RPM XDCR	3010004 / 5
J4-11	RED	RED	"	"
J4-12	WHT	WHT	"	"

NOTE: Connect cable bare shield wire to cable BLK wire at DPU and snip off shield wire excess at sensor end.

1.2 MANIFOLD PRESSURE SYSTEM INSTALLATION

1.2.1 MANIFOLD PRES. TRANSDUCER INST.

(P/N 3010015)

The transducer is mounted in the cabin area. The mounting block is tapped with 10-32 UNF-2B threads for mounting. The pressure port snubber (hex brass part) is tapped 1/4 NPT for plumbing. You will typically procure and install a reducer (1/4 NPT male to 1/8 NPT female) into the snubber, then plumb 1/8 hose to the manifold pressure pick off port of the engine. NOTE: The snubber is shipped loose with the manifold sensor assembly and MUST be final installed with an aircraft fuel resistant pipe thread sealant / adhesive.
The transducer pressure port is connected to the engine manifold pressure port via a fabricated hose and fitting assembly. See engine manual for this location.

- ⇒ **DO NOT**: remove or drill snubber inner silver filter
- ⇒ **DO NOT**: mount the transducer near extremely hot areas such as heater ducts, etc.
- ⇒ **DO NOT**: mount the transducer where fluids may contact it during operation or maintenance.
- ⇒ **DO NOT**: mount the transducer in the engine compartment.
- ⇒ **DO NOT**: mount the transducer lower than the engine manifold access port, or accumulated fuel in the hose will not run back into the engine.
- ⇒ **DO NOT**: solder onto terminal lugs of the transducer.

CAUTION Always discharge yourself to ground before wiring.

1.2.2 MANIFOLD PRES. TRANSDUCER WIRING

DPU TERM.	CABLE COLOR	XDUCER WIRE	XDUCER DESCR.	XDUCER PART NO.
J3-9	WHT	WHT	MAN PRES	3010015
J3-10	GRN	GRN	"	"
J3-11	RED	RED	"	"
J3-12	BLK	BLK	"	"

NOTE: Connect cable bare shield wire to cable BLK wire at DPU and snip off shield wire excess at sensor end.

1.3 OIL SYSTEM INSTALLATION

1.3.1 OIL TEMPERATURE TRANSDUCER INST.

(P/N 3010021)

The transducer is mounted on the engine and is designed for mounting according to MS28034-1. Consult your engine manual for the proper installation location. A gasket is supplied for use with the temperature transducer. This gasket is designed to be used only once.

1.3.2 OIL PRESSURE TRANSDUCER INST.

(P/N 3010018)

⇒ **DO NOT**: MOUNT TRANSDUCER DIRECTLY ON ENGINE.

⇒ **DO NOT**: mount the transducer where fluids may contact it during operation or maintenance.

⇒ **DO NOT**: solder onto terminal lugs of the transducer.

Mount the transducer in cabin or engine area using the provided 'Adell' clamp to a STATIONARY location then safety wire it to the clamp. Connect using the appropriate aircraft grade hose and fittings. The transducer has a 1/8 NPT external thread to accommodate many plumbing options. BE CAREFUL not to dent or deform the transducer in any way or improper operation will result. Do not block the tiny vent hole centered on the back of the transducer between the terminals. Use only aircraft grade fittings and hoses. Refer to your engine manual for the proper oil pressure connection port location.

*** CAUTION*** Always discharge yourself to ground before wiring.

1.3.3 OIL SYSTEM WIRING

DPU TERM.	CABLE COLOR	XDUCER PIN / WIRE	XDUCER DESCR.	XDUCER PART NO.
J4-1	RED	RED	OIL TEMP	3010021
J4-2	BLK	BLK	"	"
J3-1	WHT	PIN 1	OIL PRES	3010018
J3-2	GRN	PIN 3	"	"
J3-3	RED	PIN 4	"	"
J3-4	BLK	PIN 2	"	"

NOTE: Connect cable bare shield wire to cable BLK wire at DPU and snip off shield wire excess at sensor end.

1.4 FUEL COMPUTER SYSTEM INSTALLATION

1.4.1 FUEL FLOW TRANSDUCER INST.

(P/N 3010019, 32)

The inlet and outlet of the transducer are tapped with 1/4 inch internal NPT. Use only aircraft grade hoses and fittings when adapting to the 1/4 NPT. Wrap the transducer with a heat barrier material such as 'FIRE SLEEVE'. The transducer should be mounted where only filtered, clean fuel flows through it and **on the engine pressurized side of the fuel system**. The primary considerations for mounting are:

⇒ **DO NOT**: mount the transducer where 'upstream turbulence' exists (such as sharp bends or any disturbances in the fuel line). A minimum straight run of 5 inches of inlet fuel line is recommended after these types of disturbances to settle fuel flow.

⇒ **DO NOT**: ground the flow transducer body to any part of the engine or aircraft if possible, as this forms a 'ground loop' path through the grounded body of the transducer and may affect the transducer signal. If this cannot be complied with then INSURE that the engine is EXTREMELY well grounded to the same point as the DPU. Proper engine grounding is facilitated by the use of a common ground BUS bar and heavy gauge (#4 or lower AWG) wire. See your aircraft manual.

ORIENTATION:

TRANSDUCER P/N 3010019 (CARBURETED) the transducer is mounted with the arrow on the side pointing straight UP and also with the fuel flow in the proper direction (IN to OUT).

TRANSDUCER P/N 3010032 (INJECTED) mount the transducer so that the three WIRE LEADS exit the transducer straight UP and also with the fuel flow in the proper direction (IN to OUT). The transducer is mounted 'in-line' between the fuel flow controller and the flow divider and away from extreme heat.

1.4.1 FUEL PRES. TRANSDUCER INST. (P/N 3010016, 17)

The transducer is mounted in the cabin area or engine compartment, at your option.

⇒ **DO NOT:** MOUNT TRANSDUCER DIRECTLY ON ENGINE.
⇒ **DO NOT**: mount the transducer where fluids may contact it during operation or maintenance.
⇒ **DO NOT**: solder onto terminal lugs of the transducer.

Mount the transducer using the provided 'Adell' clamp to a STATIONARY location then safety wire it to the clamp. Connect using the appropriate aircraft grade hose and fittings. The transducer has a 1/8 NPT external thread to accommodate many plumbing options. BE CAREFUL not to dent or deform the transducer in any way or improper operation will result. Do not block the tiny vent hole centered on the back of the transducer between the terminals.

FOR CARBURETED ENGINES, the fuel pressure should be measured near the carburetor inlet.

FOR INJECTED ENGINES, the fuel pressure is measured at the fuel inlet to the fuel controller assembly (NOT at the fuel flow divider). The transducer has a 1/8 NPT external pipe thread to accommodate many plumbing options. Use only aircraft grade fittings and hoses and proper techniques.

*** CAUTION*** Always discharge yourself to ground before wiring.

1.3.3 FUEL COMPUTER XDUCER WIRING

DPU TERM.	CABLE COLOR	XDUCER PIN / WIRE	XDUCER DESCR.	XDUCER PART NO.
J4-7	BLK	BLK	FUEL FLOW	3010032
J4-8	RED	RED	"	"
J4-9	WHT	WHT	"	"
J3-5	WHT	PIN 1	FUEL PRES	3010017
J3-6	GRN	PIN 3	"	"
J3-7	RED	PIN 4	"	"
J3-8	BLK	PIN 2	"	"

NOTE: Connect cable bare shield wire to cable BLK wire at DPU and snip off shield wire excess at sensor end.

1.5 CYLINDER ANALYZER INSTALLATION

1.5.1 CYLINDER HEAD TEMP PROBE INST.

(P/N 1020061)

Install the probe assemblies in the tapped holes located on the underside of the cylinders. The threads in the holes may require cleaning. Proceed carefully to prevent damaging the threads.

Route wires away from exhaust stacks and other heat sources with enough slack to allow for engine vibration, etc. Do not route the leads creating stress where they exit the probe. A gradual radius away from the spring is best.

1.5.2 EXHAUST GAS TEMP PROBE INST.

(P/N 1020060)

Drill an adequate access hole, for the probe tip, in the exhaust pipe, at a location 3.5 to 4 inches (if possible) down from the exhaust pipe flange, such that the lead wires will exit the probe smoothly without creating sharp bends, while remaining away from exhaust stacks and other heat sources. Angle the probe assembly inward and toward the back of the engine allowing the leads to be secured as they travel back along the side of the engine oil sump.

Install the probe by opening the clamp ring and placing the probe into the exhaust pipe drilled hole. Close and tighten the clamp ring using a screwdriver. Do not over tighten clamp or clamp failure may eventually occur. Make sure the clamp is not crooked on the exhaust pipe or it will loosen up during flight.

Secure the wires along their paths to the DPU, to prevent vibration and abrasion with enough slack to allow for engine vibration, etc. Route wires away from exhaust stacks and other high heat sources. Do not route the leads creating stress where they exit the probe. A gradual radius away from the spring is best.

Use standard aircraft wiring techniques and materials.

1.5.3 CYLINDER HEAD PROBE WIRING

Utilizing the white and red color coded thermocouple extension wire and terminals (contained in kit 3010002 / 3), connect probes at DPU J1 connector as follows:

*** CAUTION*** Always discharge yourself to ground before wiring.

NOTE: Probe shorter lead is RED, and the longer is WHITE.

DPU TERM.	CABLE COLOR	XDUCER WIRE	XDUCER DESCR.	XDUCER PART NO.
J1-1	WHT	WHT	CHT 1 PROBE	1020061
J1-2	RED	RED	"	"
J1-3	WHT	WHT	CHT 2 PROBE	1020061
J1-4	RED	RED	"	"
J1-5	WHT	WHT	CHT 3 PROBE	1020061
J1-6	RED	RED	"	"
J1-7	WHT	WHT	CHT 4 PROBE	1020061
J1-8	RED	RED	"	"
J1-9	WHT	WHT	CHT 5 PROBE	1020061
J1-10	RED	RED	"	"
J1-11	WHT	WHT	CHT 6 PROBE	1020061
J1-12	RED	RED	"	"

NOTE: For 4 cyl engines, jumper J1-9 to J1-10 and J1-11 to J1-12.

1.5.4 EXHAUST GAS PROBE WIRING

Utilizing the yellow and red color coded thermocouple extension wire and terminals (contained in kit 3010002 / 3), connect probes at the DPU J2 connector as follows:

*** CAUTION*** Always discharge yourself to ground before wiring.

NOTE: Probe shorter lead is YELLOW, and longer RED.

DPU TERM.	CABLE COLOR	XDUCER WIRE	XDUCER DESCR.	XDUCER PART NO.
J2-1	YEL	YEL	EGT 1 PROBE	1020060
J2-2	RED	RED	"	"
J2-3	YEL	YEL	EGT 2 PROBE	1020060
J2-4	RED	RED	"	"
J2-5	YEL	YEL	EGT 3 PROBE	1020060
J2-6	RED	RED	"	"
J2-7	YEL	YEL	EGT 4 PROBE	1020060
J2-8	RED	RED	"	"
J2-9	YEL	YEL	EGT 5 PROBE	1020060
J2-10	RED	RED	"	"
J2-11	YEL	YEL	EGT 6 PROBE	1020060
J2-12	RED	RED	"	"

NOTE: For 4 cyl engines, jumper J2-9 to J2-10 and J2-11 to J2-12.

1.6 ELECTRICAL SYSTEM INSTALLATION

1.6.1 ELECTRICAL SYSTEM INST.

Follow the instructions below to install the volt and amp functions.

1.6.2 VOLTAGE SENSE WIRE INST.

The sense wire can be connected directly to the main bus, the avionics bus, or any other point for voltage measurement, as long as the voltage does not exceed +36 VDC.

1.6.3 AMP TRANSDUCER INST.

(P/N 3010022)

The amp system functions as an 'alternator load meter' displaying current flow FROM the alternator TO the aircraft electrical system allowing you to see if a load (such as pitot heat) is really drawing current when turned on. The transducer is mounted in the cabin area. Route the wire connecting the alternator output (usually marked 'BAT') through the transducer so that it EXITS ON THE TRANSDUCERS BLACK PLASTIC SIDE then continues ultimately to the breaker / main bus. If properly installed, the AMPS readout will increase as more electrical loads are turned on and the alternator is active. Shielded alternator wire is OK.

1.6.4 ELECTRICAL SYSTEM WIRING

DPU TERM.	CABLE COLOR	XDUCER WIRE COLOR	XDUCER DESCR.	XDUCER PART NO.
J4-13	RED	N/A	(ACFT +BUS)	N/A
J3-13	GRN	GRN	AMP XDUCER	3010022
J3-14	WHT	WHT	"	"
J3-15	RED	RED	"	"
J3-16	BLK	BLK	"	"

NOTE: Connect cable bare shield wire to cable BLK wire at DPU and snip off shield wire excess at sensor end.

1.7 AIR TEMP SYSTEM INSTALLATION

1.7.1 AIR TEMP INDICATOR INST. (P/N 4010010)

The indicator is simply installed by following instructions in section titled DPU, INDICATOR and MODE SWITCH installation.

1.7.2 O.A.T. TRANSDUCER INST. (P/N 3010020)

Mount the transducer in an area of outside air that is undisturbed and not affected by engine or cabin heat. The transducer thread is 1/4-28 UNF-2A. Do not over tighten the transducer or damage will result.

1.7.3 C.A.T. TRANSDUCER INST. (P/N 3010020)

The transducer is mounted in the forward side of the carburetor via an access hole that is cast into the carb body (see SECTION 5 ILLUSTRATIONS). If this hole is filled with a lead ball plug, it will have to be removed, counter-bored and tapped. The transducer thread size is 1/4-28 UNF-2A. Consult a licensed A&P mechanic for this operation. If it has a threaded plug, remove it. Install an internal lock washer over the transducer (not included) and insert the transducer. Insure that it turns completely into the threads and 'bottoms out' against the flat surface on the carburetor. Remove again and apply a thread sealant with light locking properties on only the last three threads nearest the hex head of the probe and re-install. Do not over tighten the transducer or damage will result. We recommend finger tightening the transducer, then carefully tightening a max of 1/6 to 1/4 additional turn.

CAUTION Always discharge yourself to ground before wiring.

DPU TERM.	CABLE COLOR	XDUCER WIRE	XDUCER FUNCTION	XDUCER PART NO.
J4-3	RED	RED	O.A.T	3010020
J4-4	BLK	BLK	"	"
J4-5	RED	RED	C.A.T.	3010020
J4-6	BLK	BLK	"	"

NOTE: Shield wire not connected

1.8 CHRONOMETER SYSTEM INSTALLATION

1.8.1 CHRONOMETER INDICATOR INST.
(P/N 4010011)

The indicator is simply installed by following instructions in section titled DPU, INDICATOR and MODE SWITCH installation

1.8.2 CHRONOMETER MODE SWITCH INST.
(P/N 3010023)

See SECTION titled 'DPU, Indicator and Mode Switch installation'.

1.9 EC100 INSTALLATION

1.9.1 EC100 INDICATOR NSTALLATION

Refer to the illustrations for dimensional mounting information. You may first want to perform the wiring to the back of the unit as the top cover must be removed.

1.9.2 EC100 TO DPU CONNECTION

Connect to the DPU flat display cable at any connector location. Note that the connectors are keyed to prevent incorrect insertion and also that the black locking arms snap over into position.

1.9.3 EC100 WIRING

USE 18 guage for the ground and power wires. The audio signal connects to the audio system of the aircraft. Adjust the desired volume via the small slotted screw located between the two rear connectors. See your audio panel or radio installation manual for the proper audio input connection locations.

EC100 TERM.	CABLE COLOR	DESCRIPTION	XDUCER PART NO.
J1-1	WHT	LEFT FUEL LEVEL WHT	3010009/10/12/13
J1-2	RED	" RED	"
J1-3	BLK	" BLK	"
J1-4	WHT	RIGHT FUEL LEVEL WHT	3010009/10/12/13
J1-5	RED	" RED	"
J1-6	BLK	" BLK	"
J1-7	WHT	CENTER FUEL LEVEL WHT	3010009/10/12/13
J1-8	RED	" RED	"
J1-9	BLK	" BLK	"
J1-10	(ANY)	ACFT AUDIO INPUT	N/A
J1-11	RED	2 AMP BREAKER	N/A
J1-12	BLK	GROUND BUS	N/A

NOTES: 1. Do not install the IO Board if using the EC100.
2. Install jumpers across WHT & BLK locations on J1 where fuel level transducers are not installed. Also install jumpers between J3-1&3, J3-4&6, J3-7&9, J3-10&12.
3. Use 100% shielded color coded extension cable or splice to connect the probes to the EC100. Connect shield to BLK wire at EC100 end.

1.10 FUEL LEVEL SYSTEM INSTALLATION

1.10.1 FUEL LEVEL SYSTEM INDICATOR INST.

(P/N 4010028)

The indicator is simply installed by following instructions in section titled DPU, INDICATOR and MODE SWITCH installation

1.10.2 FUEL LEVEL MOUNTING KIT INST.

(P/N 3010007)

********** WARNING **********

DO NOT INSTALL PROBE INTO METAL MOUNTING FLANGE WITHOUT FIRST APPLYING THREAD LUBRICANT OR DAMAGE WILL OCCUR. INSURE ALL THREADS ARE FREE FROM BURRS AND DEBRIS. WIRE LEADS OF PROBE ARE FRAGILE AND MUST NOT BE PULLED, TURNED STRAINED IN ANY WAY OR DAMAGE WILL OCCUR AND VOID WARRAN !

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The Fuel Level Probes are designed to be installed in virtually all types of wing tank configurations. The basic objectives are to install the probe so that it can 'sense' the fuel level change from full tank to empty tank (i.e., the probe is wetted the least at empty tank and is wetted the most at full tank) and to position it in such a manner as to allow insertion and removal.

The probe may be cut to a minimum of 16 inches in length overall (metal end to metal end) and mounted in any direction. Internal spacers are located approximately every foot that supports the inner rod. The inner rod should not go unsupported for more than 2 inches. If this is the case after you cut the probe, remove a spacer from the scrap section and install it into the end of the probe over the inner rod and crimp the rod to prevent it from moving.

See the drawing in ILLUSTRATIONS section for an example probe installation. These are intended as examples only. As each tank configuration may be different, it is your responsibility to design and implement a proper installation method for your aircraft:

The example shows a cross section of a typical long flat wing tank. Typically the probe enters the tank from the inboard fuel bulkhead and angles upward so that it is 'wetted' from empty tank to full tank proportionately. INSURE that nothing interferes with the probe such as a 'flop tube', fuel pick ups, vents or drains, etc.

The probe may enter a fuel tank from the bottom up, or vice versa, as long as the probe sees at least a 85% coverage change from full to empty.

FUEL PROBE ILLUSTRATION NOTES:

The following notes should be observed to aid in the proper installation of the probes. See the drawing in ILLUSTRATIONS section and your aircraft construction manual for the proper techniques regarding installation, bonding, sealing and laminating, etc.

NOTE 1: Mounting flange installation (Metal knurled flange)
For composite aircraft, the metal mounting flange is 'potted' into the tank close-out rib at an angle as dictated by probe placement in the tank. INSURE that the flange edges are surrounded by a generous margin of the potting and that 3 layers of laminate are laminated over the potted areas. This is necessary to insure that the flange is 'fuel tight', mechanically rigid and will not be 'cracked' loose during fuel probe installation or vibration in use. Consult your aircraft manual for proper bonding techniques. For metal tanks, the mounting flange is a weldable aluminum alloy allowing many attachment options.

NOTE 2: Bushing installation (white bushing)
The probe (if longer than 48 inches) should be supported in the middle. Install a bushing in the middle rib or baffle using the fuel probe as the alignment guide. Bond the bushing to the rib / baffle using the techniques recommended in your aircraft construction manual.

NOTE 3: End support (white bushing)
The probe end must be supported if more than 4 inches of length remains after the last support point. Position a bushing near the end of the probe so that the edge of the probe is approximately 1/8 inch from the wing skin. Secure the bushing at the surface of the wing using potting mixture. Lay up two layers over the bushing while the potting mixture is still soft to hold the bushing in place. Use the bonding techniques recommended in your aircraft construction manual.

1.10.3 FUEL PROBE INST.

(P/N 3010009, 3010010, 3010012, 3010013)

**********WARNING**********

DO NOT INSTALL PROBE INTO METAL MOUNTING FLANGE WITHOUT FIRST APPLYING A THREAD LUBRICANT OR DAMAGE WILL OCCUR. INSURE THREADS ARE FREE FROM BURRS AND DEBRIS. WIRE LEADS OF PROBE ARE FRAGILE AND MUST NOT BE PULLED, TURNED OR STRAINED IN ANY WAY OR DAMAGE WILL OCCUR AND VOID WARRANTY !

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NOTE: We DO recommend that you 'test install' the probe before the wing is closed to check for proper fit, etc. See warning above.

However, we DO NOT recommend that you leave the probe in the wing during closing as stray resin, etc. , could drip and contaminate the probe and bushings.

For 'final installation', prepare the pipe threads of the probe with an aviation fuel proof thread sealant / lubricant according to sealant manufacturers' directions. Insert the probe into the tank and through the bushings until the threads engage. Hand tighten the probe. Now tighten the probe with a torque wrench to 230 INCH POUNDS.

Allow the sealant time to set, if necessary, according to the sealant manufacturers' instructions before adding fuel to the tanks.

Once the fuel level system has been installed it needs to be calibrated. Read the discussion of 'FUEL LEVEL CALIBRATION' in the section titled 'FUEL LEVEL SYSTEM OPERATION'.

1.10.4 IO BOARD WIRING

NOTE: If using the EC100, then do not install the IO Board and go to EC100 section for wiring directions.

Using 100% shielded color coded extension cable (not provided), you connect the probe and io board together.

Connect IO BOARD J1 to the DPU flat display cable at any connector location. Note that the connectors are keyed to prevent incorrect insertion and also that the black locking arms snap over into position.

*** CAUTION*** Always discharge yourself to ground before wiring.

IO BRD TERM.	CABLE COLOR	DESCRIPTION	XDUCER PART NO.
J3-7	WHT	LEFT FUEL LEVEL WHT	3010009/10/12/13
J3-8	RED	" RED	"
J3-9	BLK	" BLK	"
J3-4	WHT	RIGHT FUEL LEVEL WHT	3010009/10/12/13
J3-5	RED	" RED	"
J3-6	BLK	" BLK	"
J3-10	WHT	CENTER FUEL LEVEL BLK	3010009/10/12/13
J3-11	RED	" RED	"
J3-12	BLK	" BLK	"

NOTES:

1. Do not install the EC100 if using the IO Board.
2. Install jumpers across WHT & BLK locations on J3 where fuel level probes are not installed. Also install jumpers between J2-1&3, J2-4&6, J2-7&9, J2-10&12, J3-1&3.
3. Use 100% shielded color coded extension cable to connect the probes to the EC100. Connect shield to BLK wire at EC100 end.

2.1 INITIAL SYSTEM SET-UP

Some of the VM1000 systems need to be customized for your aircraft before operating. Some procedures are defined here, while others are defined in their respective 'operation sections'. Follow the steps below to properly set up your VM1000 system:

Refer to 'VM1000 QUICK REFERENCE' in Illustrations section.

STEP 1: GRAPHIC DISPLAY MODE SELECTION

You may select between one of the graphic sweep display modes:

1) Sweep Mode - Graphic display is a continuous sweep of pointers.

2) Pointer Mode - Graphic display is a single needle type pointer.

Try either mode by simply holding 'BUTTON 3' in during power-up until the display begins showing actual parameters and is operating. If the mode you see is the one you like the best, you are finished, as the system 'remembers' it.

STEP 2: FUEL COMPUTER SET UP

See Section 2.5.1 INITIAL SET UP OF THE FUEL COMPUTER

STEP 3: FUEL LEVEL CALIBRATION (optional system)

See Section 2.11.1 FUEL LEVEL SYSTEM CALIBRATION

STEP 4: CHRONOMETER SET-UP (Optional system)

See Section 2.9.1 CHRONOMETER SET-UP

STEP 5: EC100 SET-UP (optional system)

See Section 2.10 EC100

2.2 TACHOMETER OPERATION

The tachometer system provides both a full sweep graphic analog display and four place digital display. When you start the engine you will see the analog graph rise in proportion to the engine speed. Full color range marks provide you with a quick reference to monitor normal, caution and red line engine RPM.

RPM: The digital readout provides you with exact RPM information. The resolution (or incremental steps) of the digital display is 10 RPM. For example, the display might read '2400' and after you make a slight increase in power, it would read '2410'. This is a definite advantage over other digital tachs that read in less than 10 RPM steps. They change so frequently that it becomes very distracting and annoying to the pilot.

ENGINE HOURS: Another feature is the 'engine hours counter'. When the engine is off, the digital display reads the total accumulated engine hours to a maximum of '5999.9'. Engine hours are accumulated any time RPM is greater than 1500 .

RPM CHECKS: The graphic arc provides 40 RPM resolution at engine speeds of less than 2000 RPM (where most RPM checks are made) and 100 RPM resolution at engine speeds of 2000 RPM or more. You can of course use the digital display for these checks also. Allow the engine time to stabilize when performing RPM checks. We recommend letting the engine stabilize for a minimum of three seconds on each of these checks before noting the RPM change.

The high accuracy of the tach will allow you to follow long-term performance trends of your engine and prop, such as static maximum rpm, carb heat effectiveness, and typical mag drops. These can be important indicators of engine and accessory condition.

Additionally, a warning alert activates whenever the engines redline is reached. The RPM display will flash until this condition is rectified.

2.3 MANIFOLD PRESSURE OPERATION

The manifold pressure system provides both a full sweep graphic analog display and three place digital display.

The full sweep graphic display resolution is 1" IN. HG. The full color range marks provide you with a quick reference to manifold pressure when making fast power changes.

The digital readout provides you with precise manifold pressure information. The resolution (or incremental steps) of the digital display is 0.1 IN. HG. This allows very precise power settings to be achieved.

You can, for example, in stabilized conditions, watch for small changes in pressure that can indicate throttle creep or induction problems. The effectiveness of carb heat can also be determined by noting the pressure differences 'before and after' heat is applied.

For new induction system designs, or modifications to existing designs, this repeatability is extremely valuable to judge the performance of the design or design changes.

A warning alert activates whenever the engines redline is reached. The display will flash until this condition is rectified.

2.4 OIL SYSTEM OPERATION

Both oil pressure and oil temperature are displayed continuously in two separate full sweep graphic and digital areas.

Oil Pressure:
As oil pressure rises, the graph size increases proportionately. The full color range marks let you see at a glance how close to red line oil pressure you are.

The digital display reads out in 1 PSI increments to a maximum of 99. This is very useful for monitoring typical engine oil pressure system performance. Because of the high accuracy and repeatability of this system, the oil pressure can be closely monitored for unusual trends. For example, if you are cruising in a stabilized condition, and the oil pressure starts to count down, and oil temp is counting up, this could help you to identify impending oil-loss or cooling problems.

A warning alert activates whenever the engines redline is reached. The display will flash until this condition is rectified.

Oil Temperature:

Oil temperature is displayed both graphically and digitally. As oil temperature rises, the graph size increases proportionately. This is consistent with the oil pressure display and makes it very easy to determine relationships between the two parameters.

The full color range marks let you see at a glance how close to red line oil temperature you are.

The digital display reads out in 1 degree Fahrenheit increments to a maximum of 300 degrees. This is very useful for monitoring typical engine oil cooling system performance.

For new engine installations, you can take advantage of the high accuracy and repeatability for analyzing the engine oil cooler system efficiency. If the cooling does not seem to be effective enough, you can make changes and repeat your tests with the confidence that the next test data will reflect the results of your changes.

Your oil temp system also provides you with built-in warning annunciators. If the oil temperature rises above redline, the system captures the event and the display is flashed until the problem is rectified.

This is a real advantage in the busy cockpit.

2.5 FUEL COMPUTER SYSTEM OPERATION

The fuel computer indicator displays BOTH fuel pressure and fuel computer functions, simultaneously.

FUEL PRESSURE is displayed both digitally and graphically. As fuel pressure rises, the graph rises proportionately. Full color operating range marks are provided that indicate the normal operating range of fuel pressure for your engine at a glance. The digital display allows you to see small variations and make notations of typical fuel pressure behavior.

Additionally, the system has a built-in warning system and will flash should fuel pressure fall below the minimum for your particular engine.

FUEL FLOW is displayed both digitally and graphically. As fuel flow increases, the graph increases proportionately. The digital display provides tenth gallon resolution.

Additional features are:
'REM' - Fuel remaining onboard
'BRN' - Fuel burned since last power-up
'HRS' - Hours of fuel remaining
'ADD' - Add fuel to computer memory.

An exclusive feature of our fuel flow computer is its ability to 'damp out' the wide variations in displayed fuel flow normally seen on other fuel flow digital readouts. Our system will smooth these short term flow variations to give you a steady flow indication with NO sacrifice in accuracy.

Additionally, your fuel computer has a built-in 'Low fuel total' warning annunciator. When the computed fuel total is less than 10 gallons, the display will flash.

2.5.1 INITIAL SET UP OF THE FUEL COMPUTER

Your fuel computer features the capability of 'remembering' the SIZE of your fuel tank. This is setup once after you receive your system, or if for some reason the fuel computer memory has been lost. (NOTE: A lithium battery module is located inside the DPU and will require replacing about every three to five years.) Setting up this level is easily done by following these steps:

Refer to 'VM1000 QUICK REFERENCE' in Illustrations section.

STEP 1: With power OFF, press and hold 'BUTTON 4', then turn power ON to the VM1000. Wait for the display test patterns to go off, then for the 'HRS', 'REM', 'BRN', 'ADD' indicators to activate, indicating that fuel tank setup mode has been activated.

STEP 2: You will program the tank size in whole units. Press 'BUTTON 3' for tens ('10.0') and 'BUTTON 5' for ones ('01.0') . If you accidentally went too high, then just repeat pressing 'BUTTON 3' until the display resets back to '00.0' allowing you to start over.

STEP 3: If you like the value displayed, then press 'BUTTON 4' to accept the new maximum tank size, otherwise just leave everything alone and after 20 seconds the setup mode will automatically be canceled, leaving your previous tank size unchanged.

STEP 4: ADD fuel to your computer's memory according to 'Adding Fuel to the Computer'.

2.5.2 ADDING FUEL TO THE FUEL COMPUTER

********** WARNING **********
IMPROPER USE OF THIS FEATURE WILL GIVE YOU INCORRECT FUEL 'REM' AND 'HRS' INFORMATION. INSURE THAT YOU UNDERSTAND THE OPERATION OF THIS SYSTEM BEFORE USING IT IN FLIGHT.
****

Your fuel computer has a unique feature that allows you to 'ADD' fuel according to how much has been pumped into the tank(s). You are not required to calculate the new total fuel level after adding fuel, as on many other fuel computers. This system does it for you. Follow the steps below to 'ADD' fuel to the computer:

Refer to 'VM1000 QUICK REFERENCE' in Illustrations section.

STEP 1: Press 'BUTTON 4' until the **'ADD'** indicator activates

STEP 2: Press 'BUTTON 3 to add tens and 'BUTTON 5' to add ones to match the fuel that was pumped into the tank(s).

NOTE: To 'top off' the tank(s) just press 'BUTTON 3' to run up a high number such as 90. The system will only add what is needed to 'fill' the computers electronic tank as defined when you set-up the 'FUEL TANK CAPACITY SETUP'.

STEP 3: If you made a mistake just leave everything alone for more than 20 seconds and the computer will automatically cancel the **'ADD'** mode. If you are happy with the entered value, then press 'BUTTON 4' and the new fuel will be automatically added to the prior fuel 'REM' total. Double check this new total by pressing 'BUTTON 4' until the 'REM' fuel is shown.

2.5.3 FUEL COMPUTER NORMAL OPERATION MODES

Press 'BUTTON 4' to select the desired fuel computer operating mode. The mode will be indicated in black letters below the words 'FUEL FLW' on the display:

Fuel flow is the mode after powering up and does not activate any additional letters on the display. This mode displays the fuel flow in Gallons Per Hour both digitally and graphically. The digital section provides 0.1 gallon resolution. The graphic section provides you with a quick reference of the fuel flow. This is very useful during power changes.

'REM' - This mode displays the current fuel total remaining in gallons. It is digitally displayed in 0.1 gallon increments. This mode is ONLY usable, if you have kept the computer's memory updated with fuel information corresponding to the actual aircraft usable fuel and have always had the computer operational when fuel is being burned. The graphic display is shut off as it has no relationship to this parameter.

'HRS' - This mode displays the calculated hours of fuel remaining (sometimes referred to as endurance), as a function of the current flow rate and current fuel total in the computer's memory. It is digitally displayed in 0.1 hour increments. This mode is ONLY usable, if you have kept the computer's memory updated with fuel information corresponding to the actual aircraft usable fuel and have always had the computer operational when fuel is being burned. The graphic display is shut off as it has no relationship to this parameter.

'BRN' - This mode displays the gallons of fuel burned in flight since system power up. It is digitally displayed in 0.1 gallon increments. The graphic display is shut off as it has no relationship to this parameter.

'ADD' - This mode allows you to add fuel to the fuel computers 'electronic tank' after fuel has physically been added to the aircraft's tank(s). See section on 'ADDING FUEL TO THE COMPUTER'.

2.6 CYLINDER ANALYZER SYSTEM OPERATION

The 'Diamond Graph' engine analyzer system displays all cylinder information both graphically and digitally. Full color reference marks are provided for cylinder head green, yellow and redline temperatures. Refer to 'VM1000 QUICK REFERENCE'.

'DIAMOND GRAPH' DISPLAY MODES:

'NORMAL MODE' The system powers up in this mode and is ready for flight. The Diamond Graph system displays CHT between the green, yellow and red range marks, left to right, one through six (or four). EGT graphics are displayed above the CHT redline marks where they can be easily observed. A defective CHT or EGT probe will leave the respective graph blank. A flashing CHT graph indicates a cylinder is too hot or is being shock cooled.

'LEANING MODE' Leaning mode is selected by pressing 'BUTTON 1' while in 'Normal Mode'. The entire Diamond Graph display is temporarily used for precise high resolution leaning. The display can be returned to the 'Normal Mode' by pressing 'BUTTON 1' again. Notice that left and right 'brackets' appear on the sides of the graphs when in 'Leaning Mode'. 'Leaning mode' is not allowed if a EGT probe was defective at power up. A flashing EGT graph indicates that the leanest EGT has been detected.

DIGITAL DISPLAY MODES:

The digital display shows the temperatures for each EGT and CHT pair and periodically shows the cylinder number (ex: 'E1' 'C1'). A warning message is shown if a cylinder has reached 'red line' temperature (ex: 'h2' for hot cylinder 2), or is being 'shock cooled' (ex: 'c3' for cold cylinder 3). The default mode at power-up is 'PEAK DISPLAY MODE' (ex: 'P1' means EGT 1 leaned before any other during leaning mode, 'H3' means CHT 3 is the hottest) . Select any combination by pressing 'BUTTON 2' as described below:

Display Mode	Cyl. Numbers	Probes displayed
Cyl. 1 Pair	'E1' 'C1'	EGT1 & CHT1
Cyl. 2 Pair	'E2' 'C2'	EGT2 & CHT2
Cyl. 3 Pair	'E3' 'C2'	EGT3 & CHT3
Cyl. 4 Pair	'E4' 'C2'	EGT4 & CHT4
Cyl. 5 Pair	'E5' 'C2'	EGT5 & CHT5 (If six cyl. eng.)
Cyl. 6 Pair	'E6' 'C2'	EGT6 & CHT6 (If six cyl. eng.)
Peak Mode	'P'? 'H'?	PEAK DISPLAY MODE

2.6.1 LEANING YOUR ENGINE:

Our exclusive automatic 'LEANING MODE' makes leaning the engine a simple operation, without the need to remember values.

STEP 1: **STABILIZE;** the aircraft engine temps, throttle, rpm and insure mixture is on the rich side of peak EGT. This can be verified by enriching mixture to see that all EGT values decrease. Press 'BUTTON 1' (far left) to activate the 'Lean EGT Mode'. Notice that the graphic display changes its appearance. The graph is normalized to the bottom to give you a baseline reference while leaning. Each bar represents ten degrees in this mode.

STEP 2: **LEAN;** the engine mixture smoothly to start the bars climbing (about one bar per 2 seconds). The computer monitors all EGT values and detects the first EGT to lean out. When this happens, the bar graph for that EGT will begin flashing and if optionally equipped an audio/visual alert occurs. This is your signal to stop leaning. NOTE: If it looks as if the graphs will 'fill up' before you achieve leanest EGT, you can simply reinitialize by pressing 'BUTTON 1' twice which 're-arms' the Lean EGT mode and normalizes the graphs to the bottom again. Do not lean further if engine roughness occurs.

STEP 3: **ENRICH;** after the lean EGT graph stops flashing, noting that the lean EGT graph (the graph that now has a single bar marking where the peak was found) goes up. This signifies that the mixture is returning to the peak value again. Set your final mixture via the bar graph or by the digital readout (now showing the leanest EGT) according to your particular engines operating handbook. Some engines require a mixture 50 - 75 degrees rich of peak at high power settings, while others allow running at peak or even leaner ! Consult your engine manual.

TIP: Initially set a rich fuel flow achieving approximately 100 degrees cooler than the last known peak. The 'PEAK DISPLAY MODE' (see 'Digital Display Modes') can be used to perform this, if the system has previously found a lean EGT.

2.7 ELECTRICAL MONITORING SYSTEM OPERATION

VOLTAGE is displayed both graphically and digitally. Full color range marks provide a quick reference for fast analysis of voltage levels. As voltage rises, the graph size increases proportionately.

The digital readout displays voltage at 0.1 volt resolution. This is useful for troubleshooting.

Additionally your system has a built-in warning system that flashes the graph when system voltage is out of nominal range (either too low or too high) .

AMPERAGE is displayed both graphically and digitally. Full color range marks provide a quick reference for fast analysis of amperage levels. As amperage rises, the graph size increases proportionately.

The digital readout displays amperage at 1 amp resolution. This is useful for troubleshooting.

You should see an increase on the amp displays when you turn on a load, such as pitot heat for example. This tells you that the pitot heater is drawing power and is probably OK. By verifying that voltage remains the same, then it can be assumed that the alternator is supporting the additional load. A very handy feature for in-flight testing / verification of electrical loads and the alternator charging system.

Additionally your system has a built-in warning that flashes the graph and triggers the audio/visual annunciator system (if installed) when the alternator does not produce power for the electrical system. This occurs at low amperage levels of approximately less than 2 amps.

2.8 AIR TEMPERATURE SYSTEM OPERATION

Both Outside Air Temp and Carburetor Air Temp are displayed, at the same time, in one compact indicator for complete air temperature information at a glance.

OUTSIDE AIR TEMPERATURE 'OAT' is displayed on the left hand side of the indicator both graphically and digitally in degrees C. Most true airspeed indicators have the temperature correction scale calibrated in Degrees C, making it easy to enter the temperature directly from the OAT display.

CARBURETOR AIR TEMP 'CAT' (or 'cabin air temp' for injected aircraft) is displayed on the right hand side of the indicator both graphically and digitally in degrees C.

As temperatures increase, the graph sizes increase proportionately. The full color range marks let you see at a glance if you are in a temperature area conducive to icing.

The digital displays read out in 1 degree C increments to a maximum of 99 C and a minimum of -50 C . This is very useful for monitoring small changes in temperatures and for calculating temperature related parameters. For new engine installations, you can take advantage of the high accuracy and repeatability for analyzing carb heat effectiveness and other temperature areas.

2.9 CHRONOMETER OPERATION

The chronometer system has BOTH digital and graphic displays of various time-related parameters. The digital readout displays hours 'HRS', minutes 'MIN', and seconds 'SEC', continuously. The exclusive positive-action rotary switch is used to select the various operating modes.

The CHRONOMETER displays time in a 24 hour format. Both local hours 'LOC' and universal 'UTC' time functions are provided. The stop watch timer will both 'count up' and 'count down'.

In the 'Count Down mode' the graphic display initially starts at full scale, and as time counts down, decreases in size proportionately (i.e. when half the initial time remains, half of the graph remains). This is very handy for timing instrument approaches, fuel tank changes and next fix arrival.

An additional feature is the alarm annunciator. When time expires, the entire display flashes alerting you to this fact. This is great for applications such as timing approaches, time to destination or expected checkpoint, or time to change tanks -- to name just a few.

The following page contains easy steps for initial setup and operation of your chronometer.

2.9.1 CHRONOMETER SET UP

You will want to set your chronometer's universal and local time functions. This is easily done by performing the following steps:

SETTING UNIVERSAL TIME COORDINATED (UTC):

STEP 1: With power on, place the selector switch in the 'straight up' position (between the 'RUN' and 'STOP' positions). The display should go blank.

STEP 2: Turn the power off for a few seconds, then back on. The display will now alternately show 'Utc ?' or 'Loc ?'.

STEP 3: First, you should set UTC time. When the display shows 'Utc ?', quickly move the selector switch to the 'HRS' position. When the 'hours' value gets to the correct hour, move the switch to the 'MIN' position. Set the 'minutes' value a few ahead of actual time to allow you to set seconds. Move the selector to 'SEC' and set it to your desired future time. Move the switch to the 'STOP' position.

STEP 4: When the preset time equals the current time, move the selector switch to the 'straight up' position as before. The display will read 'Utcrdy'. Wait for this message to disappear, then move the selector to any desired position. (You can now check 'UTC' for the correct universal time.)

SETTING LOCAL TIME:

STEP 1: With power on, place the selector switch in the 'straight up' position (between the 'RUN' and 'STOP' positions). The display should go blank.

STEP 2: Turn the power off for a few seconds, then back on. The display will now alternately show 'Utc ?' and 'Loc ?'.

STEP 3: When the display shows 'Loc ?', move the selector switch to the 'HRS' position. When the hours value gets to the correct hour, move the switch to the 'straight up' position as before. The display will read 'Locrdy'. Wait for this message to disappear, then move the selector to any desired position. (You can now check 'LOC' for the correct local time). NOTE: Since universal and local minutes and seconds are the same, you can only set local hours.

2.9.2 CHRONOMETER NORMAL OPERATION:

'RUN' TIMER

Move the selector to the 'RUN' position. The display will count up in seconds/minute and hours, if no preset countdown time was loaded, just as a stopwatch would. If a countdown time was loaded, then the display will count down in hours, minutes and seconds. A graphic pattern is also displayed during countdown. See section on 'Stopwatch Operation'.

'UTC' UNIVERSAL TIME COORDINATED

Simply move the selector to the 'UTC' position. The display will show universal time in hours, minutes and seconds. A distinct graphic pattern is also displayed to indicate that the 'time' mode is active.

'LOC' LOCAL TIME

Move the selector to the 'LOC' position. The display will show local time in hours, minutes and seconds. A distinct graphic pattern is also displayed to indicate that one of the two 'time' modes is active.

'FLT' FLIGHT TIMER

Move the selector to the 'FLT' position. The display will show the total time in hours, minutes and seconds since the system was last 'powered-up'. This is useful for your log book entries and in-flight time keeping. Be sure to note the 'FLT' time before shutting off the master as it is cleared at next 'power-up'.

2.9.3 STOP WATCH OPERATION

STEP 1: Move the selector switch to the 'STOP' position. The display will freeze.

STEP 2: When you want to begin timing, simply move the selector to the 'RUN' position and the display will begin counting up. An additional feature is that other functions (such as 'UTC', 'LOC', and 'FLT') are available while the stop watch is counting.

STEP 3: When you want to stop timing, simply select 'STOP' and the time is frozen for you to observe and/or record.

COUNT DOWN GRAPHIC TIMER FUNCTION

STEP 1: First, you will 'pre-set' your timer by moving the selector to the appropriate 'SEC' (seconds), 'MIN' (minutes) and 'HRS' (hours) and allowing each to increment up to the desired value, then quickly moving the selector to the next desired position. When this is completed, move the selector to 'STOP' to hold the current value. If you made a mistake, move to the 'RUN' position for a few seconds, then set again.

STEP 2: When you are ready to begin timing, move the selector to the 'RUN' position. The graph will fill to full scale and the timer will begin counting down. The graph now represents the percentage of 'pre-set' time remaining. This is very handy for an instrument approach or for timing when to switch fuel tanks. It relieves you of the chore of noting clock times and calculating minutes remaining, etc.

STEP 3: When time expires, the entire display flashes alerting you to this fact. Move the selector switch to the 'STOP' position to clear the countdown timer mode. NOTE: You can clear the countdown timer mode any time it is running by moving the switch to the 'stop' position.

2.10 EC100 OPERATION

The EC100 system provides several categories of easily accessed information. Select the desired category by pressing the '>' button to go forward or the '<' button to go backwards. When you see a category you want, press the **'v'** button to select it and again to see further information. The following lists the major categories that may be selected:

1) ENGINE INFORMATION:
   Some of the typical subjects are 'POWER' , 'CYLNDRS', 'F COMP', etc.

2) AIRCRAFT OPERATIONAL CHECKLISTS:
   Some typical subjects are 'CLDSTRT', 'HOTSTRT', 'RUNUP', 'TAKEOFF', etc (NOTE: You may customize your checklist on paper, then send it to the factory and we will 'program' a permanent memory chip. We reccomend sending this in along with your fuel caliration info. See sheets in 'Illustrations section for both fuel cal and checklist recording.)

3) EMERGENCY CHECKLISTS:
   In case of an emergency, press BOTH the '<' and '>' buttons. This will immediatly select the emergency checklist category and disable any warning/alert messages. Use '>' to page through to select the major checklist topic you would like to see (such as 'ENGOUT', etc.). Once you find the area desired, press **'v'** button to select specific info.

4) ALERTS and WARNINGS: These are conditions are of importance and corrective action and/or attention is needed. When an alert/warning condition initially happens, the EC100 will automatically begin to flash the condition and a pulsing audio side tone will be momentarily present. Press the down **'v'** button to read any other possible alert or warning conditions.

To quickly return to the beginning display, press both the **'v'** and '^' buttons until you see the beginning display.

2.11 FUEL LEVEL SYSTEM OPERATION

The fuel level system operates automatically, once the 'FUEL LEVEL SYSTEM CALIBRATION' has been performed. The indicator displays a left, center, and right digital read-out of the gallons of fuel remaining of up to 99 gallons each tank. Additionally the left and right displays are also presented graphically to show percentage of fuel remaining for quick reference.

********** WARNING**********
IF THE AIRCRAFT IS IN A DIFFERENT ATTITUDE THAN THE ATTITUDE DURING CALIBRATION ERRONEOUS FUEL LEVEL READINGS MAY OCCUR.
****

If a probe is not installed or not functioning, that display is blanked. An unsteady display value should be suspected and possibly disregarded as faulty operation. A low fuel level alarm has been incorporated into the system which signals you when a minimum fuel level has been reached in a given tank by displaying 'Lo' in the corresponding display area. This value is picked at our factory but may be changed upon written request at the time fuel calibration information is submitted to us.

2.11.1 FUEL LEVEL SYSTEM CALIBRATION

The fuel level system needs to be calibrated to your fuel tank. The procedure is very easy to perform, but will take a little while to do accurately.

TIPS:

⇒ Flying the aircraft for 10+ hours before performing calibration can result in a better eventual calibration as various contaminents etc. will be flushed from the tanks and probes.

⇒ You can do all tanks simultaneously by adding fuel increments to each of them and following the step by step instructions.

Install all FUEL LEVEL SYSTEM components according to the FUEL LEVEL SYSTEM INSTALLATION section of this manual.

IMPORTANT: During calibration, the aircraft must be positioned rigidly on jacks or the equivalent, in the attitude that you want the fuel calibration to be the most accurate (i.e. , in cruise or parked etc.).

STEP 1: **IF** IO BOARD was installed then connect a selector switch to the fuel level indicator and select desired tank:
- Second position from full CCW for LEFT TANK.
- Third position from full CCW for CENTER TANK.
- Fourth position from full CCW for RIGHT TANK.

ELSE if EC100 was installed you can hold down '<' and '>' buttons during power-up until you see 'TEST MODE'. Now release buttons, then press '**v**'. You should now see all three ('L','C','R',) fuel calibration numbers for recording.

STEP 2: **WAIT** a full 2 minutes, then find the location on the Fuel Calibration Chart equal to the current fuel level. Select and record the complete numerical values that appear in the display. A value may be approx. 3800 for a 8 foot dry probe, or 19800 for a 16 inch dry probe. Values will decrease as fuel is added to the tank(s).

STEP 3: **ADD** a 2 gallon fuel increment to each tank being calibrated and go back to STEP 2. Repeat until all tanks have been filled and recorded.

STEP 4: **MAIL or FAX** copies of the calibration sheets to us for programming. BE SURE to fill in requested information on the chart. If possible, also send in the EC100 (optional system) checklist forms.

2.12 'AUTOTRACK' tm SYSTEM OPERATION

The 'Autotrack' system is a breakthrough in modern engine monitoring technology. Designed to reduce the pilot's workload by assisting in the tedious and often overlooked job of monitoring engine parameters for deviations from one minute to the next, 'Autotrack' adds a new level of safety to engine management.

Subtle changes may occur in engine parameters that can precede major problems. These changes are often missed by even the most attentive of pilots. 'Autotrack' alerts you to these changes allowing you to analyze the situation and take appropriate action.

Refer to 'VM1000 QUICK REFERENCE' in Illustrations section.

WHEN TO USE 'Autotrack':

Climb - Activate during climb to alert you periodically as CHT increases and to a decrease in manifold pressure.

Cruise - Activate during cruise to alert you if any parameter begins to drift from your selected starting point.

Descent - Activate during descent to alert you to increasing manifold pressure and rising EGT due to a leaning mixture.

HOW TO USE 'Autotrack':

STEP 1: STABILIZE the aircraft. Set up your desired power and mixture condition. Allow the engine time to stabilize (i.e., engine temps and pressures, etc.).

STEP 2: Press 'BUTTON 3'. The 'Autotrack' indicator will activate in the display and the system will begin tracking the engine's performance from this point.

The 'Autotrack' system is now armed and watching for engine deviation from the point you picked. To cancel, simply press 'BUTTON 3' again to extinguish the 'Autotrack' indicator. Re-arm again at any time.

NOTE: Any important alert condition, (i.e., low fuel pressure, high CHT, etc.) automatically cancels 'Autotrack' mode.

'Autotrack' ALERT INDICATIONS

If any engine parameter deviates beyond the your initial set point, the system will flash the corresponding graphic display and the 'AUTOTRACK' indicator.

If the deviation is large enough, a graphic pointer (circular sweep displays only) will show where the parameter was before the deviation occurred. This gives you a chance to evaluate the magnitude of the deviation and take the appropriate action.

To shut off the alert condition, return the parameter to its previous value (example: adjusting manifold pressure due to a climb) or simply press 'BUTTON 3' to shut off the 'AUTOTRACK' system.

If optionally equipped, an audible and visual alert will activate in the annunciator system.

2.13 FLIGHT DATA RECORDER SYSTEM OPERATION

The Flight Data Recorder System comes standard with your VM1000 and is designed to allow you to review / record the performance of the engine and systems during each flight. This is extremely valuable during initial flight testing and for subsequent trend analysis.

You may retrieve data using the Flight Data Recorder at any time during the flight or even after the aircraft has been shut down for a prolonged period of time.

Minimum and maximum values are automatically recorded during the flight and can be reviewed at any time before the next flight. Taxi data is automatically omitted as this info is generally not important. Actual time of flight is also recorded.

Refer to 'VM1000 QUICK REFERENCE' in Illustrations section.

HOW TO USE 'Flight Data Recorder':

STEP 1: Press 'BUTTON 5'. The first set of data are flight minimums encountered (i.e., lowest fuel pressure, lowest voltage, amperage, etc.). Also the RPM digital display now shows the actual flight hours and tenths.

STEP 2: Press 'BUTTON 5' again. The next set of data are flight maximums encountered (i.e., max CHT, max Oil Temp, max RPM, etc.).

STEP 3: Press 'BUTTON 5' again. The Flight Data Recorder is shut off. The recorder data will automatically shut off in approximately 20 seconds if no button is pressed.

3.1 INDICATOR CARE AND MAINTENANCE

The indicators require no scheduled care or maintenance. However, you probably will want to clean them occasionally. We recommend the use of diaper flannel. NEVER use paper towels or tissues, as they can have a high abrasive content.

To properly clean your indicator, remove surface dust and abrasives by blowing on the indicator face or brushing with a soft bristle brush. Next, 'fog' the indicator with your breath and gently rub the indicator. NEVER use any solvents or cleaning fluids on the indicators.

Should removal and re-installation of the indicator become necessary, you should always use the same mounting screws, as damage to the indicator will result if too long a screw is used.

Use care when connecting and/or removing the rear mounted connectors as the ejector arms can be broken if improperly handled.

3.2 TRANSDUCER CARE AND MAINTENANCE

Never clamp down on the case of the pressure transducers with pliers or similar tools or damage can occur. Do not expose transducers to washdown fluids.

Use caution when removing and installing the air temperature probes as they can easily be over-torqued.

Always use a new gasket when removing and re-installing the oil temperature transducer.

3.3 DATA PROCESSOR CARE AND MAINTENANCE

The DPU requires no care or maintenance except for a battery memory pack. This pack has a life of 2 to 5 years and tends to average about 3 years, depending on usage and average temperature. If the pack loses charge, then 'Initial System Set-up' is required. See this section for details. The total tach hours can also be re-loaded. Contact the factory for details.

The pack can be field installed by a qualified technician. Contact the factory for details.

4.1 WARRANTY AGREEMENT - ORIGINAL

Vision Microsystems Inc. warrants to the original purchaser that the articles furnished are free from defects in material and workmanship and will perform to the applicable published specifications for one year from date of installation and subsequent operation. The installation and use of this equipment constitutes an agreement between the original purchaser and/or user to the following terms and conditions of this warranty:

1. The liability of Vision Microsystems Incorporated shall be limited to replacing or repairing, at its option, any defective components which are returned F.O.B. to Vision Microsystems Incorporated or an authorized repair center.
2. In no event shall Vision Microsystems Incorporated be held liable for damages to property or personnel due to the use of this product.
3. Equipment or parts which have been subjected to misuse, abuse, accident, alteration, neglect, unauthorized repair or installation are not covered by this warranty. Vision Microsystems Incorporated shall have the right of final determination as to the existence and causes of defect.
4. When items are replaced or repaired, the warranty shall continue in effect for the remainder of the warranty period or for 90 days, whichever is longer.
5. This warranty is in lieu of any other warranty expressed or implied.
6. The purchaser/operator shall lawfully sign and date this agreement stating the date of system installation and return it to Vision Microsystems Incorporated for registration.
7. Internal battery life is not included in warranty.

DATA PROCESSING UNIT SERIAL NUMBER:_____
INSTALLATION DATE: month:___day:___year:_____
PURCHASER'S NAME (printed)_____
I have read this agreement and agree to the terms and conditions.
SIGNATURE :_____

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4.2 SERVICE

You know your aircraft history better than anyone. Gathering the following information before contacting us will help in quickly resolving your problem. Our goal is to insure that your problem is quickly solved and that it does not occur again.

1. What were the conditions leading up to the problem? (Outside air temperature, cabin air temperature, moisture conditions, electrical system conditions, power settings, active accessories, etc.)

2. If intermittent, what are the conditions when the problem occurs? (Temperature, moisture, electrical system loads, power settings, active accessories, etc.)

3. Does the problem always act the same way?

4. What do the indicators show during the problem?

5. Does cycling the power to the system affect the problem?

6. Where and how did you connect the power leads to the system?

7. Where did you mount the DPU and transducers?

8. Have you carefully checked for loose or broken wires?

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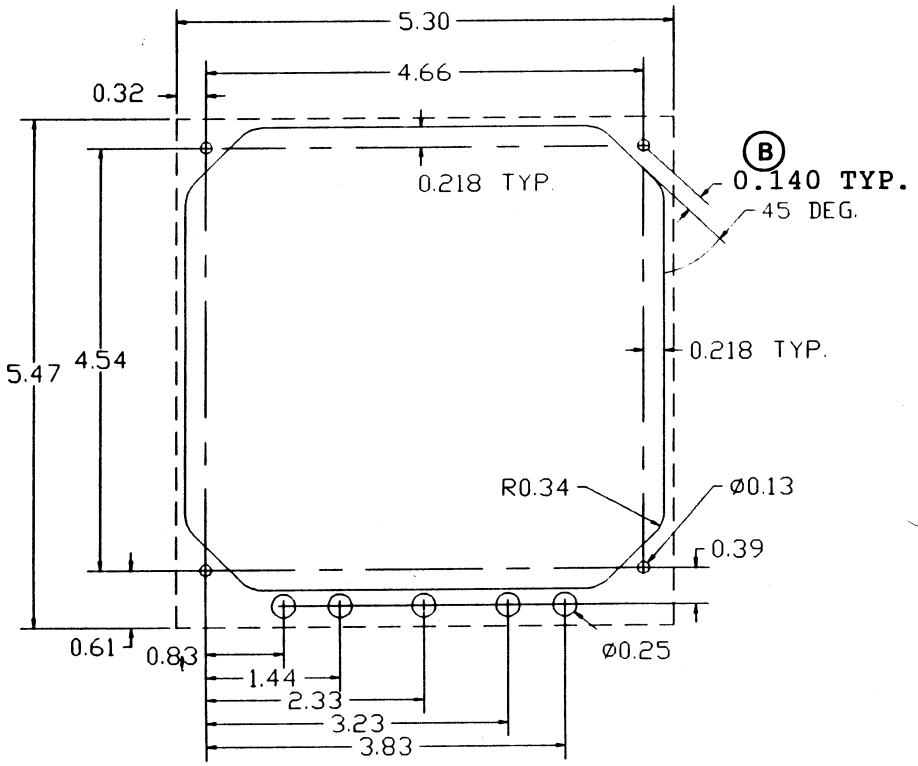
5.0 ILLUSTRATIONS

The following pages contain general illustrations suggesting possible ways to install, mount and attach the various items. The final installation method must be determined by you. The dimensioning can be used as shown for planning and layout purposes. Refer to the various manual sections, that apply, before using these illustrations.

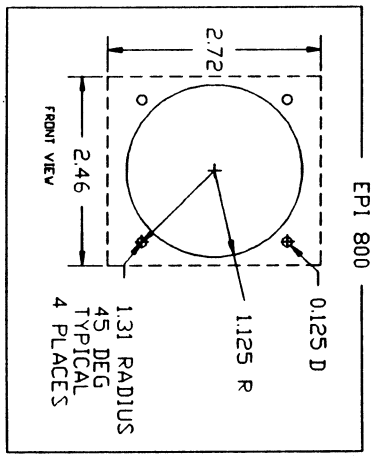
5.0.1 VM1000 IND. CUT OUT DRAWING

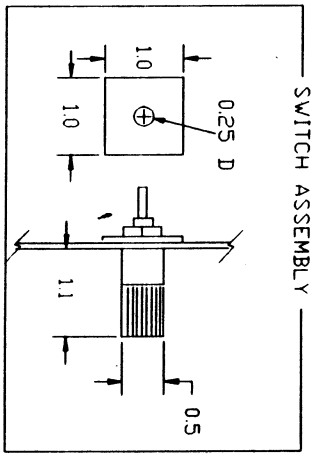
Dimensions include a 0.025 clearance around cut-out.



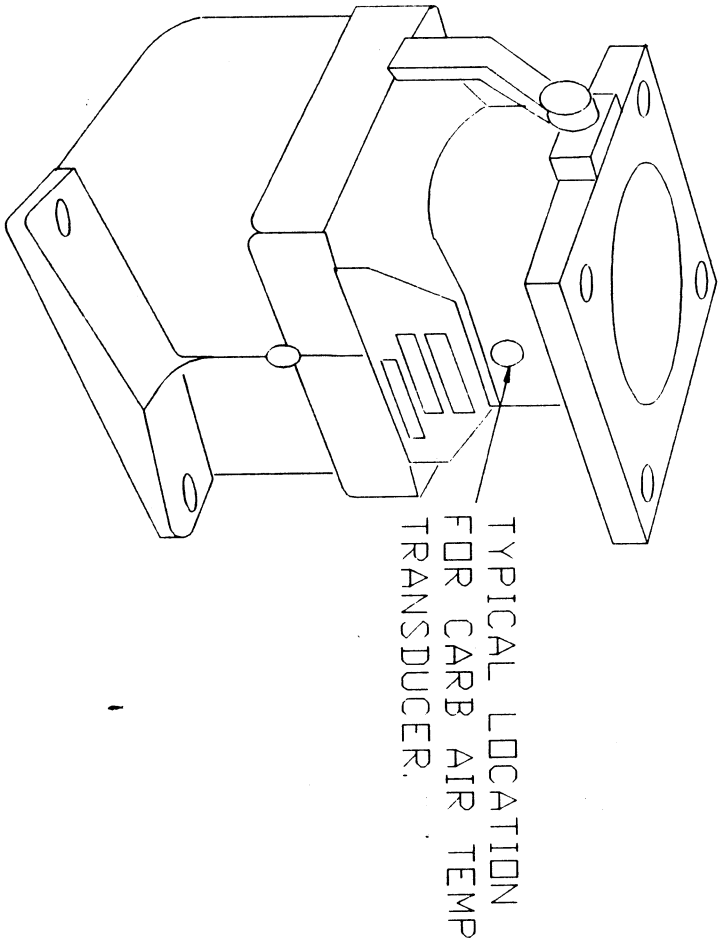
REV B - Changed 0.180 to 0.140

5.0.2 EPI 800 IND., SWITCH MTG. DRAWING

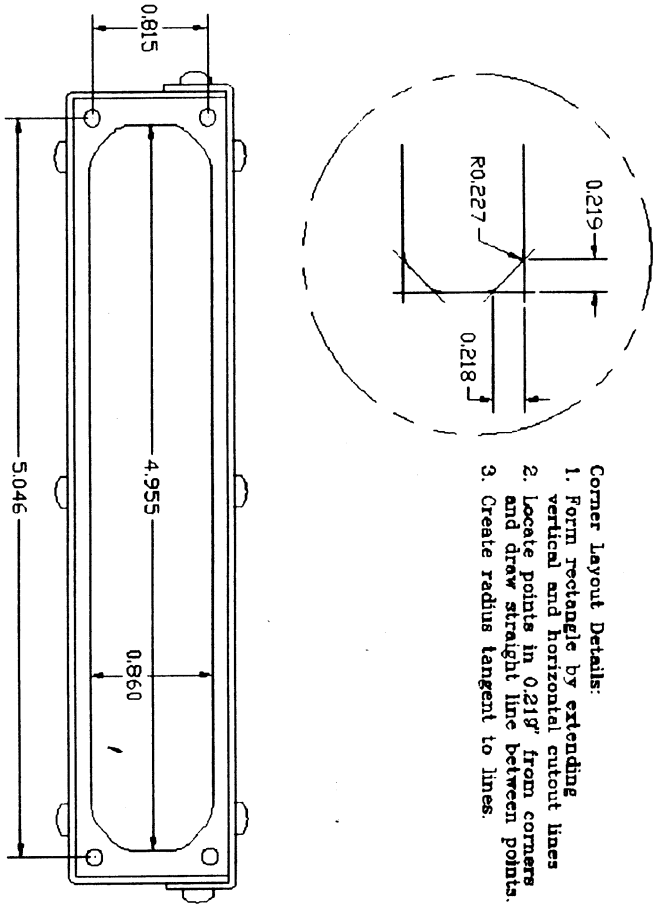




5.0.3 C.A.T. PROBE INST. DRAWING



5.0.4 EC100 Mounting Drawing



5.0.5 EC100 Checklist Entry Forms

Enter line item descriptions for each of the recommended categories below. You can havea max of 10 items per 'Category' (except 'RUN-UP can have 20 max).

Category (8 Char. max.)	Checklist Item (16 Characters max)
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
CLDSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
HOTSTRT:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	
TAXI:	

5.0.5 EC100 Checklist Entry Forms (cont)

Category (8 Char. max.)	Checklist Item (16 Characters max)
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
RUN-UP:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	
TAKEOFF:	

5.0.5 EC100 Checklist Entry Forms (cont)

Category (8 Char. max.)	Checklist Item (16 Characters max)
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CLIMB:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
CRUISE:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	
DESCENT:	

5.0.5 EC100 Checklist Entry Forms (cont)

Category (8 Char. max.)	Checklist Item (16 Characters max)
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
APPRCH:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
LANDING:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	
SHUTDWN:	

5.0.5 EC100 Checklist Entry Forms (cont)

Category (8 Char. max.)	Checklist Item (16 Characters max)
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGOUT:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ENGFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	
ELECFIRE:	

5.0.5 EC100 Checklist Entry Forms (cont)

Category (8 Char. max.)	Checklist Item (16 Characters max)
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	
FORCLND:	

Fill in this information and mail or fax to us for programming. You may also want to send in fuel level calibration at this time also.

DPU MODEL NO._____SERIAL NO._____
PROGRAM NUMBER_____
NAME:_____
ADDR:_____
CITY:_____ST ___ZIP_____
PH:_____FX:_____

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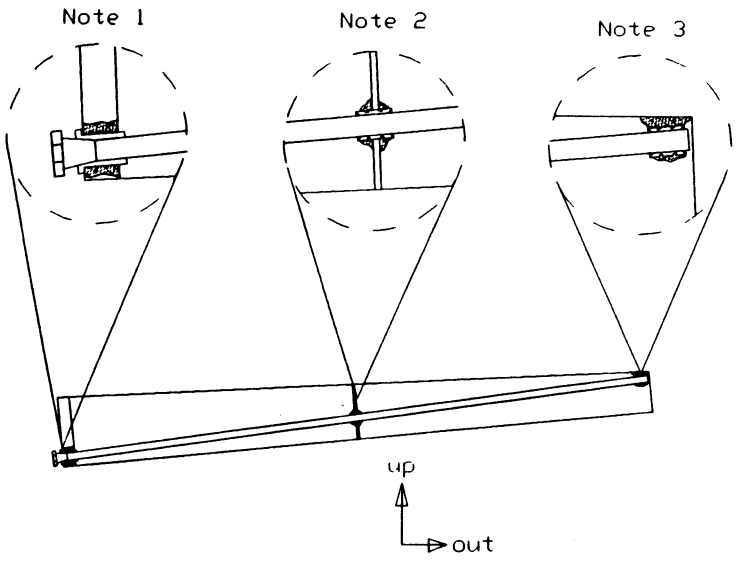
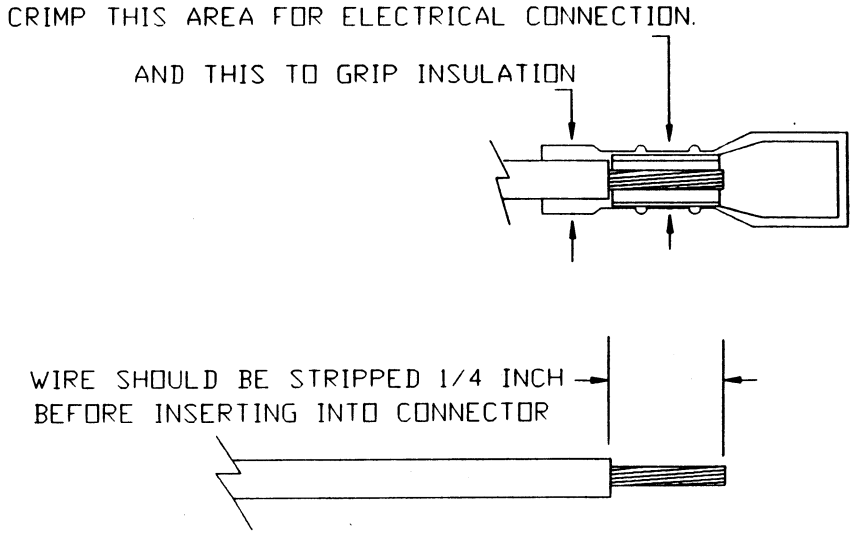
5.0.6 FUEL PROBE INST. DRAWING

Expanded views are shown for the fuel level mounting hardware as installed in a typical composite wing tank. See section on Fuel Level System Component Installation.



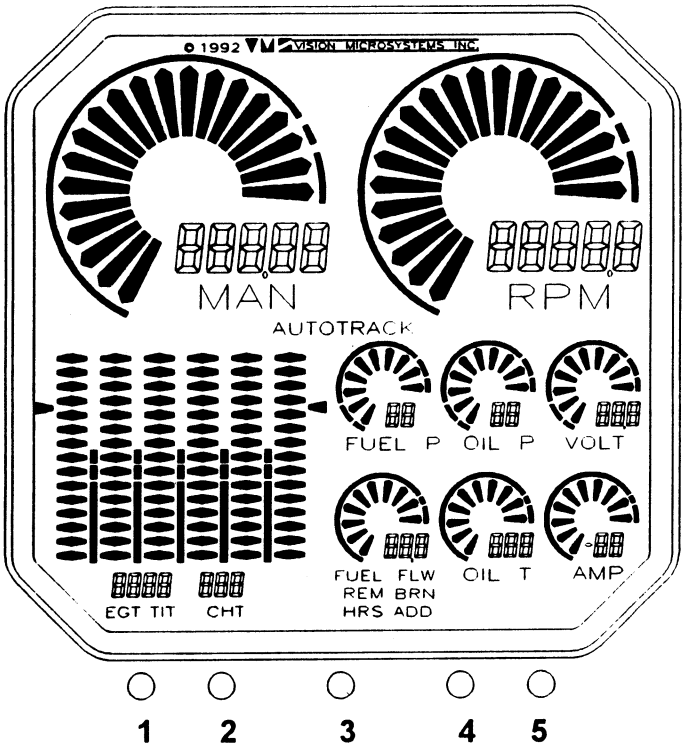
Cross section of wing tank

5.0.7 WIRE CONNECTOR GUIDE DRAWING



NOTES:
1. USE THE PROPER CRIMPING TOOL.
2. USE PROPER CRIMP PRESSURE.
3. TERMINAL GENDER SELECTION IS YUOR CHOICE.
4. INSURE WIRES ARE SECCURE AFTER CRIMPING
5. INSURE TERMINALS ARE FULLY ENGAGED.

5.0.8 VM1000 QUICK REFERENCE



BUTTON 1: 'SELECT EGT/TIT GRAPHIC MODES'

BUTTON 2: 'SELECT EGT/TIT & CHT DIGITAL MODES'

BUTTON 3: 'SELECT AUTOTRACK ON / OFF'

BUTTON 4: 'SELECT FUEL COMPUTER MODES'

BUTTON 5: 'SELECT FLIGHT DATA RECORDER INFO'

5.0.9 FUEL CALIBRATION CHART

Fill in all information:

DPU MODEL NO._____SERIAL NO._____
PROGRAM NUMBER_____
NAME:_____
ADDR:_____
CITY:_____ST ___ZIP_____
PH:_____FX:_____

FUEL QUANTITY	LEFT VALUE	CENTER VALUE	RIGHT VALUE
0			
2			
4			
6			
8			
10			
12			
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			
38			
40			
42			
44			
46			
48			
50			

5.0.9 FUEL CALIBRATION CHART (cont.)

FUEL QUANTITY	LEFT VALUE	CENTER VALUE	RIGHT VALUE
52			
54			
56			
58			
60			
62			
64			
66			
68			
70			
72			
74			
76			
78			
80			
82			
84			
86			
88			
90			
92			
94			
96			
98			

Fax or mail to:

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