



EMS BU / EDM

Installation & Operation Manual

8300-065 Rev D



TRUTRAK FLIGHT SYSTEMS

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Mechanical Installation Considerations

PROGRAMMER INSTALLATION

Mounting Considerations

The EMS Series unit is designed to mount in the aircraft instrument panel within view and reach of the pilot. The primary unit location should minimize pilot head movement when transitioning between looking outside of the cockpit and viewing/operating the EMS Series unit. Maximum recommended viewing angle should be no more than 20 deg. The maximum mounting angle the EMS can accommodate is 12 degrees longitudinal axis and 0 degrees lateral axis. The location should be such that the EMS Series unit is not blocked by the glare shield on top, or by the throttles, control yoke, etc. on the bottom. Use aircraft installation standards for mounting and support of the EMS programmer.

EDM should be mounted on the firewall so that both sides can be accessed for service. Do not run wire along fuel lines for support. All wiring should be mounted above fuel and hydraulic line for safety. Never mount wiring directly on support structures, use Adel clamps or wire stand-offs.

Wiring Considerations

Use AWG #24 or larger wire for all connections in the interior of the aircraft unless otherwise specified. Engine wiring should not be smaller than AWG #22. The standard crimp pin contacts supplied in the connector kit are compatible with up to AWG #20 wire. In cases where some installations have more than one component sharing a common circuit breaker, sizing and wire gauge is based on length of wiring and current draw on units. In these cases, a larger gauge wire such as AWG #20 may be needed for power connections. Do not attach any wires to the outside of the EMS or route high current wires within six (6) inches of the programmer. Ensure that routing of the wiring is not exposed to sources of heat, RF or EMI interference. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables. Do not route the COM antenna coax near any EMS components.

RFI/EMI considerations

The EMS programmer is shielded and does not generate any appreciable level of electromagnetic interference. The EMS itself has been internally protected from RF interference and has been tested under fairly extreme conditions, such as close proximity to transmitting antennas. However, it is always good practice to insure that such antennas are properly shielded and not routed directly over or under sensitive panel-mounted electronic equipment. Most problems in this area are the result of improper RF shielding on transmitting antennas, microphone cables, and the like.

Pitot and Static Connections

The TruTrak EMS requires connections to the Pitot and static lines. The preferred method of this connection would be tee fittings near the aircraft's airspeed indicator.



PITOT STATIC

Operating controls

As with our autopilot products, extensive attention has been given to providing the simplest operation. No sequential pressing of buttons is required to reach basic control functions. Active descriptions of Knob or Button functions are labeled on display above. If there is a second EFIS connected by way of the TCB-A & B wires, information will be communicated between the two units.

BARO Selection (Backup Gauges only)

In the TruTrak EMS display, barometer **BARO** is set by rotation of the right dedicated knob. The Baro reading is displayed in the Altimeter. The yellow band along with the numerical VS displayed above indicates VSI direction and speed.

GPS Information

The T&B DG requires GPS NMEA information to function correctly. If the primary serial connection and communication protocols have been setup correctly, the EMS T&B gauge will display the DG. Also, the timer is updated with GPS NMEA information.

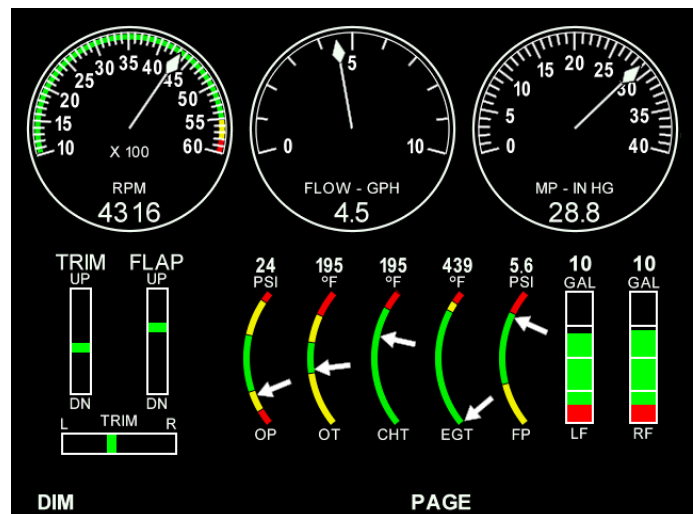


Dimming

Dimming of the display is accomplished by rotating the left knob, **DIM** rotating the knob Counter Clock Wise to reduce the display illumination. External dimmer input will control the button illumination.

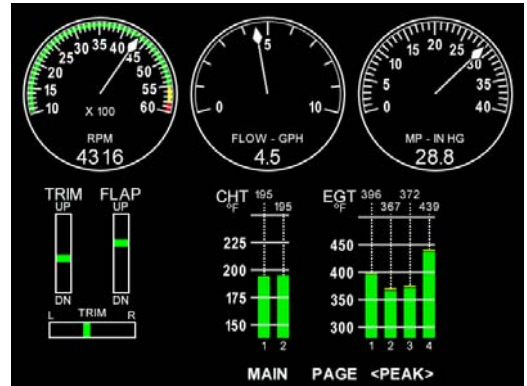
MAIN Page

MAIN page display are shown to the right top of page picture showing Back Up instrument and the picture to the right without Back Up.



CHT /EGT Page

This page displays a detailed readout of all the CHT and EGT sensors. Also, PEAK readings will be marked on this page. The highest reading will be the CHT and EGT that is displayed on the MAIN page.



TIMER Page

This page displays all the timers that are tracked. Detailed fuel information and contact switch position along with voltage and amp indications if installed.

The TIMER Page will be displayed on power up so that fuel information can be updated. Also, the trip and leg timers can be reset if needed.

Any parameter that enters a yellow ARC will change the reading displayed to yellow. See VOLTS. If the parameter progresses to the red position the EMS / EFIS will display a warning box at the bottom of the screen.



WARNINGS

There will be a warning box that will be displayed at the bottom of the screen when a parameter first enters the red arc. See OIL PRESSURE.

Pressing the button below ACK will remove the warning box and the button below VIEW will change the page to the detailed view page if different than the current page. See bottom picture oil pressure indication.



SETUP SCREENS

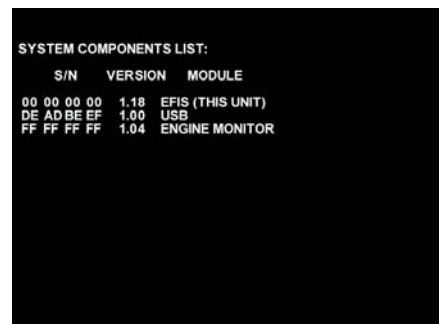
INFO, UNITS, TIME, CONFIG, GAUGES, CALIB

To enter the setup screen the right knob must be pressed and held until the **SETUP** shows then press and release the button below **SETUP** before releasing the right knob. Rotate the right knob to step to the next page. Press and release the right knob [EXIT] to step back a page or to return to the main screens.



INFO

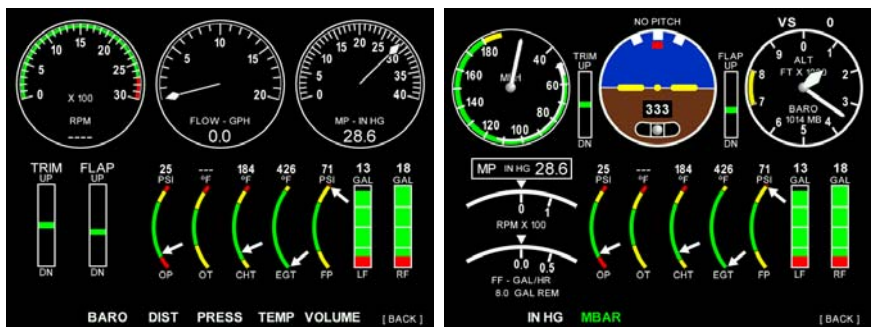
Displays serial numbers and software version and model type of all units connected to the TruTrak communication wires (TCB-A, TCB-B). Exit by press and release of left knob.



UNITS

- BARO, IN HG or MBAR**
- DIST, NM, MI or KM**
- PRESS, PSI, IN HG or KPA**
- MANIFLD, IN HG or MMHG**
- TEMP, F or C**
- VOLUME, GALLON or LITER**

These pages will allow the setting of UNITS of Measure for the different display readouts listed.



Example: Press and release **BARO** to select **IN HG** or **MBAR** as shown.

TIME

- OIL, TZ, ZULU, DATE**

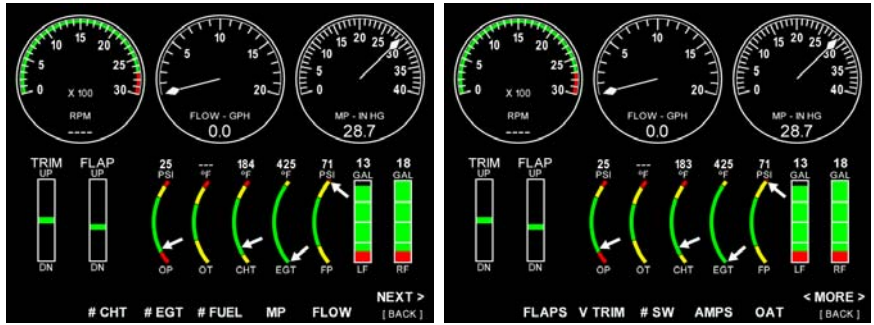
Pressing the **OIL** button will reset the **OIL, TRIP, & LEG** timers. **LEG** timer will reset with zero oil pressure for @ 5 min. **TRIP** is reset with button. The **TZ** (time zone) button sets your time zone by +/- from GMT (Standard Central TZ = -6). Set **ZULU** time with this button.(GMT) Set the **DATE** with this button. The next screen allows the selection of **MONTH, DAY, and YEAR**. Rotate the right knob to change setting.



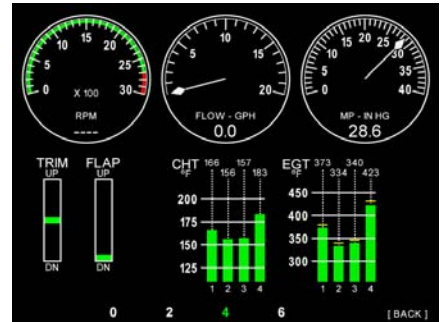
CONFIG

#CHT, #EGT, #FUEL, MP, FLOW, FLAPS, V TRIM, H TRIM, #SW, AMPS, OAT, CARB, BKUP, COMPLX.

These pages will allow the selection of the different type and quantity of indicators displayed. Select the sensors that are installed and the quantity as needed.



Example: Press and release # CHT to select number of CHT probes installed, 4 as shown to the right.

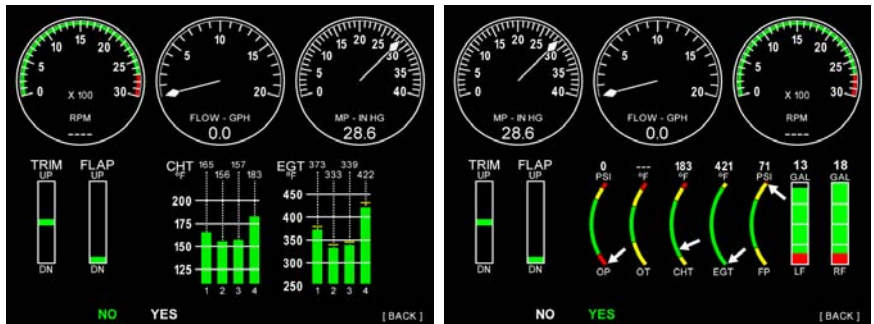


BKUP displays the engine instrument with Airspeed, T&B, Altimeter/VSI in upper part of display. (right)

The far right picture is shown without BKUP selected



As shown on the right pictures, the **COMPLX** engine dial instruments will move the MP to the left side.



COMPLX will also switch the MP to a more detailed display in the **BKUP** mode. RPM (digital) and MP (analog display) swap for more detailed information.



GAUGES (ARC COLOR BAND SETTING)

OIL P, OIL T, CHT, EGT, FUEL P, TANK1, TANK2, RPM, FFLOW, MP, VOLTS, SW #1-3

These pages allow the different colored arcs to be set for the gauge selected. Also, changing Switch labeling and color. Some gauge arcs are preset at factory.

Select the type gauge to adjust (OIL P), (upper right picture) the left knob sets the **START** position or the bottom color setting for that part of the arc, adjust as needed.

Pressing the button below the **COLOR** will step through the available colors for that section of arc.

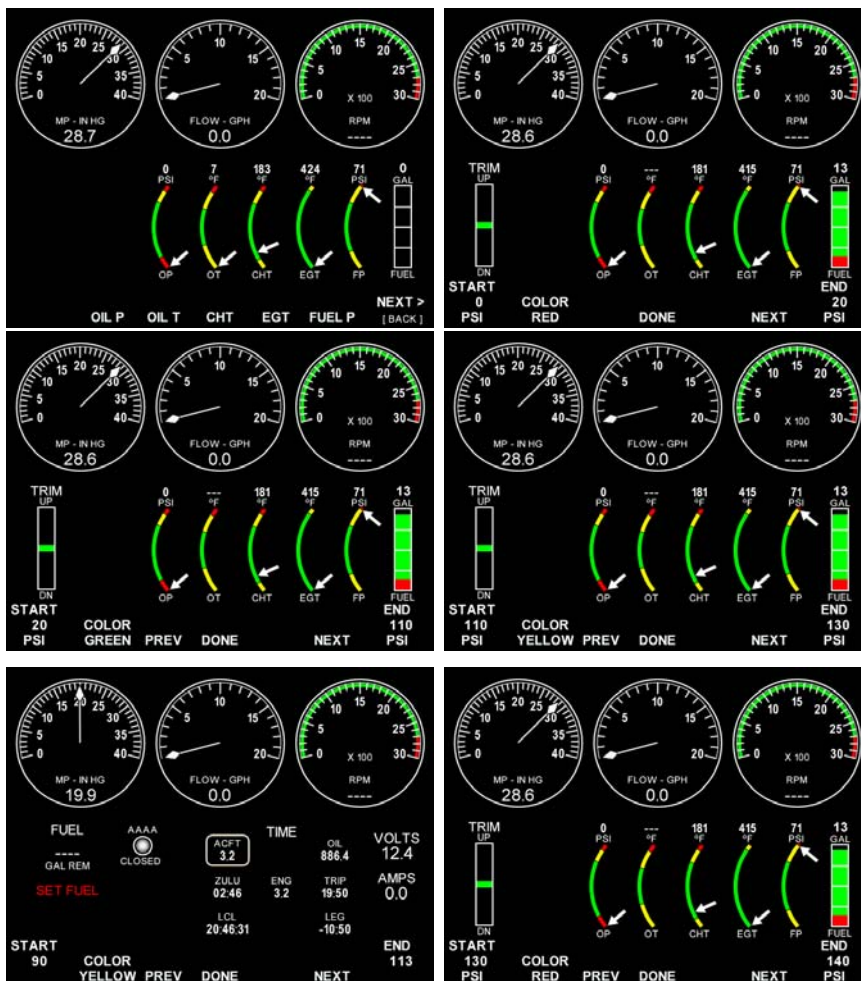
The right side knob will adjust the **END** or top setting for this arc color. Adjust as needed.

Press and release **NEXT**.

Set the next color in the arc (left middle). Step through all the setting for all the arc colors, adjust as needed. Press and release **DONE** when finished. **Oil Pressure is shown from 0 to 140 PSI with four (4) colors in the arc.**

NOTE: VOLTS ARC numbers are 1 volt = 10 digit. Exp. 12V = 120

Pressing **PREV** or **NEXT** will step to the previous or next screen as needed to correct or set.



NINE CYLINDER EDM

To have a nine (9) cylinder EDM system the EDM must be setup using the PC TruTrak software.

With a nine (9) cylinder system pin 29 (Contact #1) of the 37 pin DB connector (J1) MUST be grounded to show cylinder # 7, 8, 9. When the switch is open the EMS display will show CHT/EGT #1-6. When the switch is closed the display will show CHT/EGT 7-9 in place of 1-3. #4,5,6 will NOT be reported. This will also change the state of Contact #1 on the third display page.

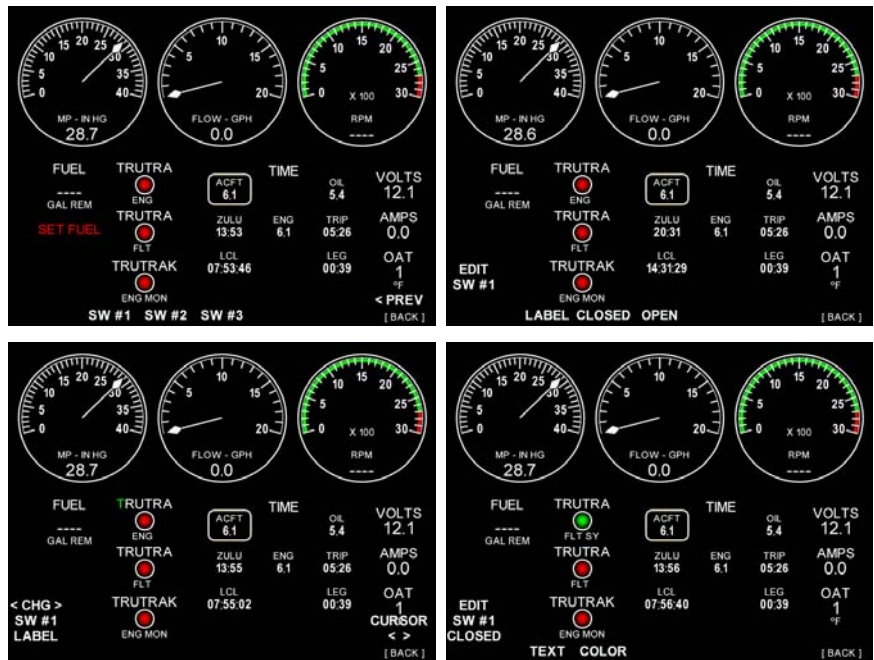
FOR AIR PRESSURE OPERATION

The EDM is designed to use a 0-1000 PSI sensor that has a 4-20 ma output. This sensor output must be connected to pin 32 on the 37 pin DB (J1) connector. Sensor power can be connected to pin 31 if aircraft voltage. Currently, Air pressure will be displayed under the CARB temp Heading. The display will read in degrees F, BUT, in actuality it will be in PSI. If the UNITS are changed to Celsius the air pressure will be wrong, the display MUST be in Fahrenheit.

Unless there is access to the TruTrak setup programming software from the PC, the user MUST NOT change the CARB, TACH, EGT#, CHT# settings. Doing so will result in the unit not functioning properly.

SWITCHES (CONTACTS)

Select the switch (**SW # 1**) to change the label on. Select **LABEL**, now the left knob will select the alphanumerical digits and the right knob will move the cursor position (**green**). Select the name for this switch, there are seven (7) digits available. Press and release the right knob (back) to return to the last page. Select **OPEN** or **CLOSED**, select **TEXT** to change the label displayed when the contact is open or closed. Select **COLOR** to change the color that is displayed in ether switch position. Press and release the right knob (back) repeatedly to return to the beginning.



CALIBRATION

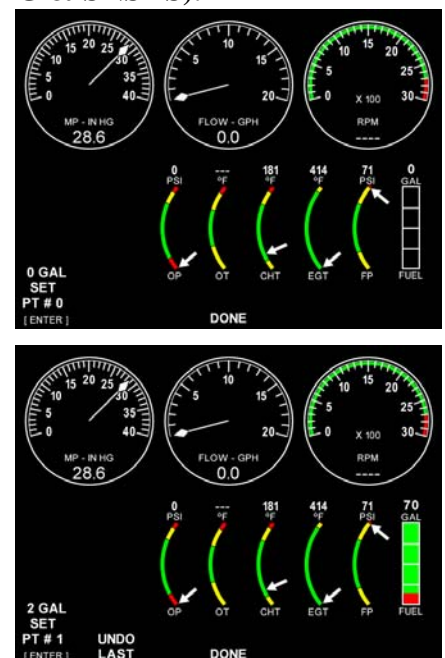
FUEL, TACH, SNSRS, FLAPS, TRIM, SPEEDS, & BALL

These pages allow the selection and calibration of the Fuel level, Tach, Sensors, Flaps and Trim indicators. Also to set the Baud rate and center the ball in the T&B after installation.

FUEL

The type of and # of fuel sensors MUST be selected first (see CONFIG & SNSRS).

Calibration of tank / guages, there are a total of 15 PTs (calibration points) possible, not all are necessary. Select the tank to calibrate, with the tank empty, the first **PT #0** is 0 GAL, press [enter]. Add fuel, in whole gallons until the number of **GAL** over the displayed gauge just starts to move. Wait until the number stabilizes. Enter the gallons added by rotating the left knob and press [enter], **PT #1**. The gauge colors and number of GAL are not correct until the calibration are complete. Continue adding fuel, each **PT#** should have the total amount of fuel in the tank at that time and wait until the number stabilizes. When the number displayed **STOPS** changing when adding fuel, **STOP**. This is the last **PT #** even if the tank is not full, enter the total gallons in the tank by rotating the left knob, wait until the number stabilizes. Press **DONE**. The sender can not measure fuel past this point. This is **NOT** to total fuel used in calcuating remaning fuel. Only the @ amount of fuel in the tanks.



TACH

Select the pulses per revolution,

Lycoming 4 cylinder = 2

Rotax = 1

SNSRS

FUEL, CHT, OIL;

FUEL Select the type of sender, Resistive or Capacitance

CHT Select type of Sensor, J type (J THC), Resistive (VDO), PT100

OIL Select type of Sensor, Honeywell (WSTCH), Resistive (VDO), PT100



FLAPS and TRIM

Select the gauge to calibrate, exp: **FLAP**, move the flap to full up and press and release the button labeled **NONE**. Continue to **HALF** and **FULL** down positions, pressing the button for each.



SPEEDS

Select the Baud rate for your GPS input, 9600 or 4800.

BALL (SLIP)

Center the BALL in the T&B after EFIS installation.

EMS Software Updates

The EMS software can be updated by inserting a Compact Flash card (CF), with software acquired from TruTrak Flight Systems. The CF card must be face down, in the top slot on the back. Then apply power to the EMS, monitor the screen. Follow the instructions on the screen. When power is reapplied to the EMS the new software version will be installed and displayed at the bottom of the screen.

SENSORS AND INPUTS

TruTrak Flight Systems can provide engine kits for all known engine types when an EMS / EDM order is placed. The kit provides for all sensors / harnesses / pins needed.

All sensors ordered from TruTrak Flight Systems have a twisted, color coded, harness attached with correct connections to the sensor. The EDM pin of the harness is not installed to provide easier routing of the harness. Wires routed on the engine should be routed away from the exhaust system and above fuel and hydraulic lines per standard aircraft wiring procedures, AC 43. See the installation manual from the engine manufacture if possible. Engine wiring harnesses route better together where possible and should be supported on the engine every 6 inches, Adel clamps work best for this, and tied together every 3 inches. All wire on the engine side of the firewall should be 22 gauge (bundle only) or larger with high temperature insulation (Teflon) . Any connection from the engine to the firewall should have a service loop to accommodate the movement of the engine.

TACH wires produce a lot of RF and should be shielded to reduce this as much as possible, only ground one end. This is **NOT** the MAG wire, that uses the shield as part of the grounding system.

USE PIN OUT PAGES 18 & 19 FOR WIRING REFERENCES

Color codes:

RED-----	12V	(to EDM)
ORANGE-----	5V	(to EDM)
WHITE-----	SENSOR	(to EDM)
BLACK-----	GROUND	(to EDM)

Cylinder Head Temperature (J TYPE CHT) Probes (8250-036)

Lycoming / Continental engines use the bayonet J type CHT probes.

Rotax 912 engines use two resistive CHT probes that are included with the engine. These probes are preinstalled, but you need to route the wire connections (**8220-019**) from them to the EDM.



Oil Temperature Sensor

Lycoming / Continental engines must install the 399S9 resistive type. OT sensor PN (**8250-038**). One black wire to ground (J2 pin 11, 12, 13) the other black wire to J2 pin 18



Rotax 912 engines use one resistive OT probe that is included with the engine. This probe is preinstalled, but you need to route the wire (**8220-019**) connection to the EDM.

Tachometer

Connect a **shielded** pick-off from the Magneto or **electronic** ignition box, ground the shield at the ignition source. See installation manual for the installed **electronic** ignition box.

The Rotax 912 engines have a 5th trigger coil for the purposes of electrically monitoring rev counts. This trigger coil outputs to a two-wire harness. Connect either of the two wires to ground. Connect the other wire to the TACH input on the EDM.

Manifold Pressure Sensor HOSE (82509-047)

The pressure port on the manifold pressure sensor input requires 1/8" inner diameter tubing for a secure fit. You may need to use adapters to convert up to larger inner diameter tubing for your specific engine. It is recommended that you use clamps at every transition point

Oil Pressure Sensor (8250-032)

Lycoming / Continental engines must install the TruTrak OP sensor supplied.

Note that if you are installing on a Jabiru or Rotax engine, your engine comes with a pre-installed oil pressure sensor. You will need to replace this sensor with TruTrak supplied sensor assembly.

Fuel Pressure Sensor (8250-040)

First, mount the fuel pressure sensor to a fixed location using an Adel clamp or other secure method. The fuel pressure sensor must not be installed directly to the engine due to potential vibration problems. Next, connect the fuel sensor to the engine using appropriate hoses and fittings. Its pressure port has a 1/8-27 NPT pipe thread fitting; you may need adapters to connect to the pressure port on your engine. Locate the correct fuel pressure port for your engine. This port must have a pressure fitting with a restrictor hole in it. This restrictor hole ensures that, in the event of a sensor failure, fuel leakage rate is minimized, allowing time for an emergency landing.

Carbureted engines: Use the supplied sensor and harness.

WARNINGS:

Due to vibration issues, never connect the sensor directly to engine.



Fuel Flow Sensor (8250-041)

The FloScan fuel flow transducer has ¼” female NPT threads at both the inlet and outlet. Only use ¼” NPT fittings to match. When installing, do not screw fittings more than two full turns past hand tightened. The torque should not exceed 180 inch-lbs.



WARNINGS:

Due to vibration issues, never connect the sensor directly to engine. Do NOT use Teflon tape when screwing in any of the fittings.

Make note of the K factor number on the tag attached to the fuel flow sensor. You will need it in the Fuel Flow Configuration section. Do not lose this number, the fuel flow calibration will not be correct without this setting.

Setting K factor:

Press and hold the right knob, wait for “SETUP” to show in center lower display press button below at the same time you are holding the knob. Press and release “CONFIG” press and release “FLOW”, then “YES”, set K factor by rotating right knob. Press and rotate to step in 100 increments.

General Placement Recommendations

When placing the sensor, ensure that the three wire leads are pointed straight up. Ensure that the transducer has 6” of straight fuel line before and after it. Placement of the fuel flow sender relative to other items in the fuel system like fuel pumps is left to the builder. The manufacturer of the fuel flow sender does not make strong recommendations on this point. It is not uncommon, though, to place the sender downstream of any auxiliary electric boost pumps but upstream of the engine driven fuel pump. For best measuring performance, the fuel should travel uphill by one to two inches after leaving the fuel flow sender.

Fuel Level Sensor

The EDM supports both resistive type sensors as well as capacitive sensors, which output a voltage (e.g., Princeton). Once you have installed your fuel level sensors, you will need to calibrate each of them, as described in Fuel Level Calibration.

Resistive Fuel Level Sensor

You may connect up to two resistive fuel level sensors to the EDM. Simply connect the output of the sensor you would like to be Fuel Level 1 (right tank) to pin 26 and the sensor you would like to be Fuel Level 2 (left tank) to pin 8, perform calibration.

Trim and Flaps Position Potentiometers

Most flap and trim sensors are potentiometers (variable resistors) which require power and ground inputs, and supply an output that is a function of position. These potentiometers come in a variety of resistance ranges. A typical trim sensor connection, +5 volts (pin 22) to one side of position potentiometer. The other side is Ground (pin 4), and the center is the output signal (pin 6).

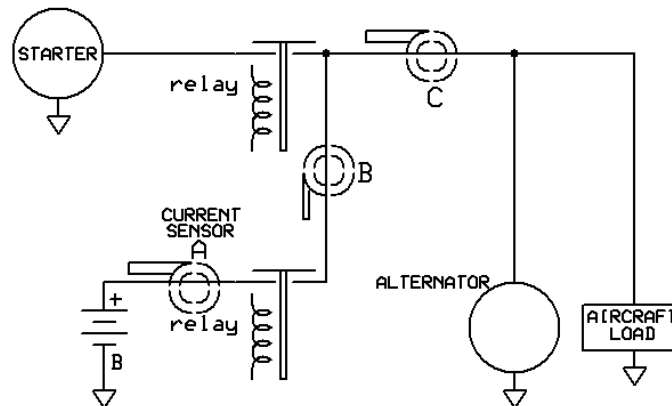
Ray Allen sensor, If the Ray Allen indicator is not used, connect the white/orange wire to the (5V) excitation line (pin 22), the white/blue wire to (GND) (pin 4), and its white/green wire (signal output) to (pin 6) on the J1, 37 pin connector. If the display is used, splice off the green/white wire connect to the EDM (pin 6). Either installation must be calibrated.

Current Sensor (8250-044)

The ammeter transducer can be installed in your electrical system in one of three locations as shown in the (simplified) electrical diagram below.

Position A-C: Ammeter indicates current flow into or out of your battery. In these positions, it will show both positive and negative currents.

The current transducer is not affected by high current levels. Position transducer so that the attaching arm points toward the positive battery post.



Exhaust Gas Temperature (K type EGT) Probes

Correct placement of EGT probes on the exhaust manifold is critical to obtaining accurate readings. Placement differs between engine types, and even specific models. *Consult your specific engine's manual for proper EGT locations.*

ROTAX ENGINES (8250-034)

For Rotax 912 engines, only two of the four cylinders need to be monitored for EGT. Unlike the CHT probes, which are mounted on diagonal cylinders, the EGT probes should be mounted on the two rear cylinders' exhaust manifolds. It is critical that the EGT probes be mounted to parallel cylinders' exhaust manifolds for proper temperature comparison. Recommended distance from exhaust flange is 100 mm.



LYCOMING / CONTINENTAL ENGINE (8250-035)

Consult your specific engine's manual for proper EGT locations.

WARNINGS:

A loose probe could allow exhaust to leak. This can lead to carbon monoxide poisoning in the cabin and/or a potential fire. Have a knowledgeable mechanic inspect the installation.

The probe can come loose during flight, and could potentially come in contact with rotating engine parts or the propeller. We suggest safety wire to keep the probe in place.

Outside Air Temperature Sensor (8250-042)

It is important that the OAT probe be mounted somewhere on the skin of the airplane where it will not be affected by heat sources (sun, engine, airplane interior, etc). The ideal location would receive no heat from the aircraft engine or any other source in the airplane body. While this may be impractical, it is a good idea to mount the probe as far away from heat sources as possible. Generally, avoid these locations:

- Engine exhaust paths
- The engine itself
- Where the sensor will be in direct sunlight
- Where the sensor mounting is exposed to a heated cabin



Transducer Installation

After the mounting location has been determined, drill a 5/16" hole in the skin at the desired location. Install the OAT probe through the skin make sure that the flange nut is on the outside of the skin. Then tighten the two nuts with the lock washer on the inside of the skin in place against the skin. Use some Loctite around the threads of the OAT probe. Twist the nuts onto the threads of the OAT probe and tighten. Once you have physically mounted the OAT probe, route the attached wires to the EDM. Connect one of the white wires to ground, at a supplied connection on the 37-pin harness. The other white wire on the OAT probe to the OAT input on the 37-pin connector pin 25.

Carburetor Air Temperature Sensor

TruTrak can accommodate an additional air temperature sensor for the carburetor or manifold. Westgate makes carburetor air temperature probes for the different carburetors on an engine. The sensor must be a 399S9 resistive type. Use the TruTrak OAT Sensor (8250-042) if there is room in the manifold plenum for a Manifold sensor. This sensor **MUST** be installed in pin 7 of J2 and the CARB must be ON to function. The selection of the CARB will not allow a second resistive type CHT sensor.

EMS Rear Connections to J1 (Continued)

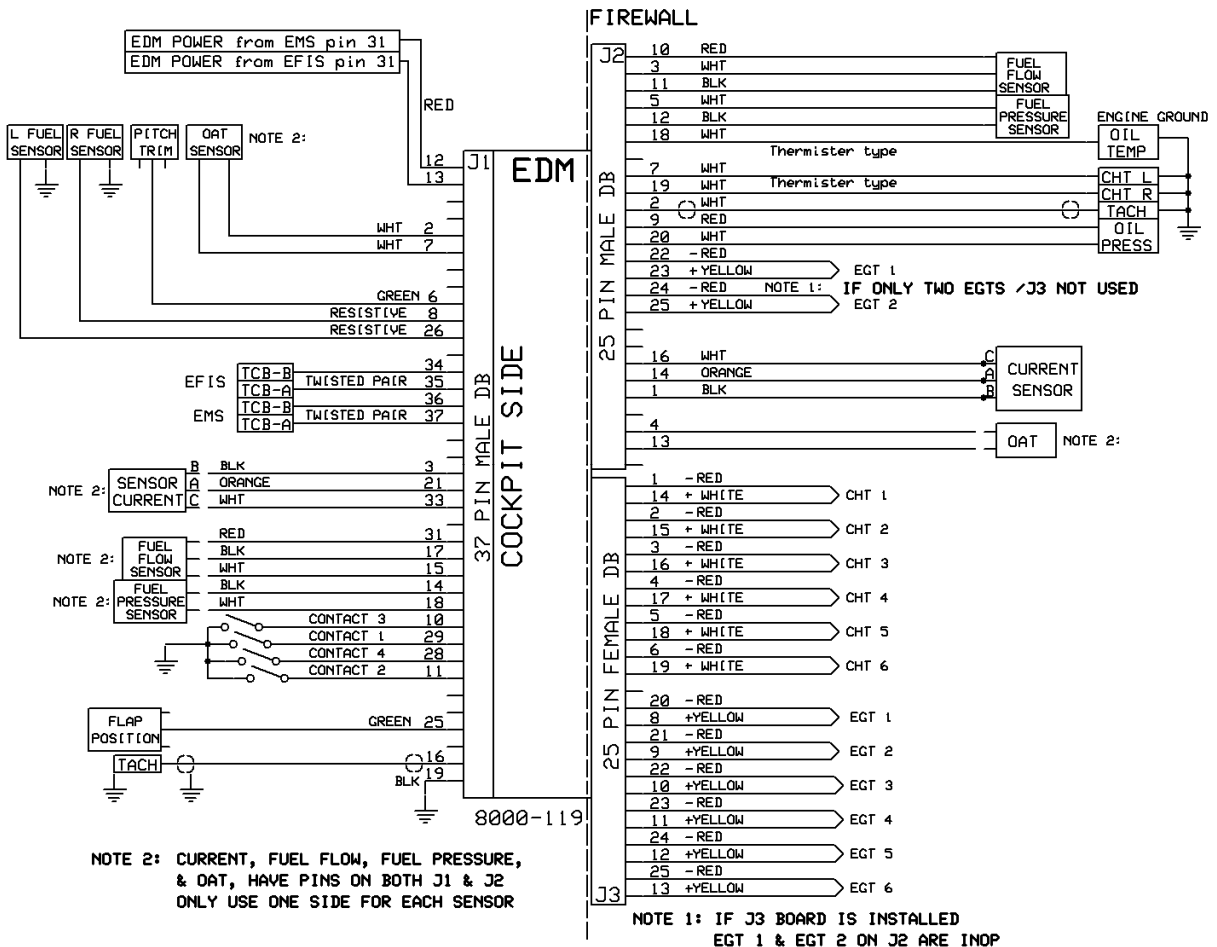
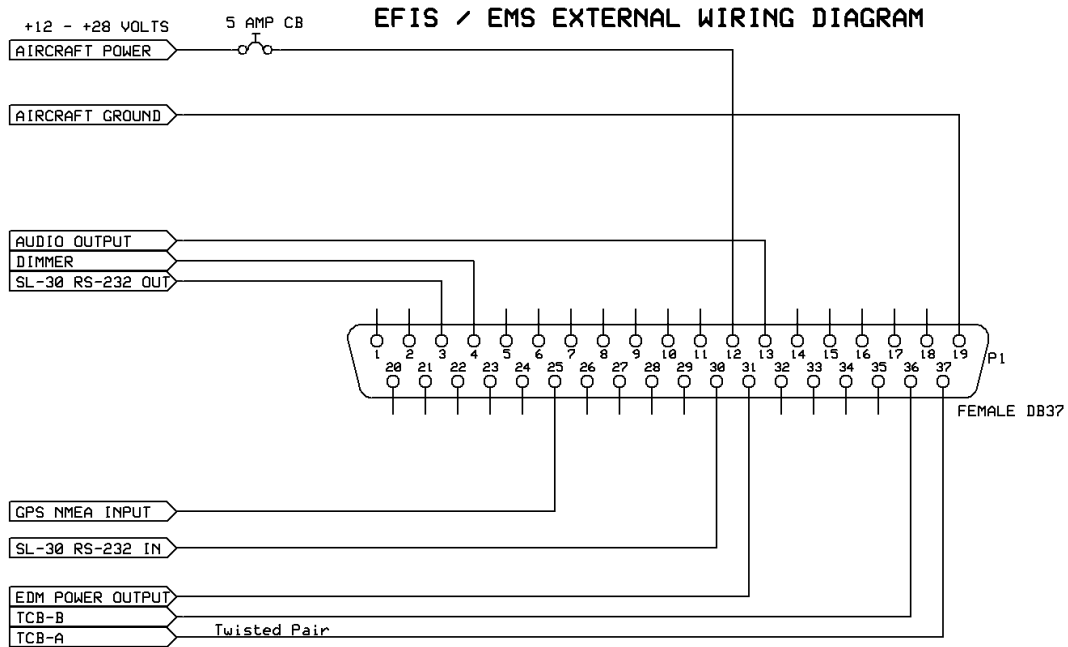
J1 Pin	Function	Notes																
20	Control Wheel Switch / AP Level Button. Connect as shown in wiring diagram to a SPST momentary switch located remotely to the autopilot for convenient engage/disengage function. AP Level Button option should be located in easy reach of Copilot and Pilot.	EMS autopilot only																
21	EMS Switch																	
22	NO CONNECTION	Not used at this time																
23	SPARE SWT	Not used at this time																
24	No Connection																	
25	PRIMARY SERIAL INPUT. Baud rate selectable 1200, 2400, 4800 or 9600 baud. Automatically decodes NMEA-0183, Garmin Aviation Format, or Apollo/UPSAT Moving-Map or GPSS format. Provides slaved directional reference to the autopilot.																	
26	ARINC-A Digital differential signals from Garmin, Sierra, or other panel-mount receiver which provide directional steering commands (GPSS) to autopilot	EMS autopilot only																
27			ARINC-B															
28	Roll Servo Torque Control. A signal from the autopilot to the roll (aileron) servo which sets the amount of torque to be delivered by the servo.	EMS autopilot only																
29	No Connection	Not used at this time																
30	SL 30 input.	SL-30 NAV pin 5 TX																
31	EDM power	Power to EDM																
32	Roll (aileron) Servo control lines. These lines cause the stepping motor in the roll servo to run in the appropriate direction at the desired velocity. They are small-signal lines and do not have any substantial current-carrying capability or require any special shielding. Connect to roll servo as shown on wiring diagram.	EMS autopilot only Reverse servo direction if necessary by swapping wires on pin 32 and 33. See note 3 on wiring diagram.																
33																		
34																		
35			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3">Wiring to roll servo J201</td> <td rowspan="2" style="text-align: center;">Direction of servo arm / capstan rotation (as viewed from face of the servo body) for RIGHT aileron</td> </tr> <tr> <td style="text-align: center;">J101</td> <td style="text-align: center;">Pin 32</td> <td style="text-align: center;">Pin 33</td> </tr> <tr> <td style="text-align: center;">Standard</td> <td style="text-align: center;">J201-4</td> <td style="text-align: center;">J201-5</td> <td>Servo CCW (counter-clockwise) → RIGHT</td> </tr> <tr> <td style="text-align: center;">Reversed</td> <td style="text-align: center;">J201-5</td> <td style="text-align: center;">J201-4</td> <td>Servo CW (clockwise) → RIGHT</td> </tr> </table>	Wiring to roll servo J201			Direction of servo arm / capstan rotation (as viewed from face of the servo body) for RIGHT aileron	J101	Pin 32	Pin 33	Standard	J201-4	J201-5	Servo CCW (counter-clockwise) → RIGHT	Reversed	J201-5	J201-4	Servo CW (clockwise) → RIGHT
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Reversed	J201-5	J201-4	Servo CW (clockwise) → RIGHT															
36	TCB-B																	
37	TCB-A																	

EMS J1 pins	King KMD 150	Garmin III	Garmin 92	Garmin 195	Garmin 196	Garmin 295	Garmin 296	Garmin 396	Garmin 496	AvMap EKP IV
RS 232	25	11	Data out	Data out	Blue wire	Blue wire	Blue wire	Blue wire	Blue wire	Data out
ARINC A	26	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
ARINC B	27	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C

EMS J1 pins	Garmin 155XL	Garmin 200XL	Garmin 300XL	Garmin GX 50-65	Garmin GNS 480	Garmin 430 P4001	Garmin 530 P5001
RS 232	25	19	19	5 / 22	P1- 22	56	56
ARINC A	26	16	16	N/C	P5 - 4	46	46
ARINC B	27	15	15	N/C	P5 - 24	47	47

EMS or EMS AP SERIES	CURRENT DRAW LOW BRIGHT	CURRENT DRAW HIGH BRIGHT	WEIGHT	DIMENSIONS Behind panel
ALL	1.07 Amps @ 12v 0.65 Amps @ 24v	2.02 Amps @ 12 v 1.15 Amps @ 24v	2.33 lbs High bright 1.95 lbs Low bright	6.375W x 5.75H x 3.625D

EMS / EDM Basic Wiring Diagram



EDM ELECTRICAL PIN-OUT

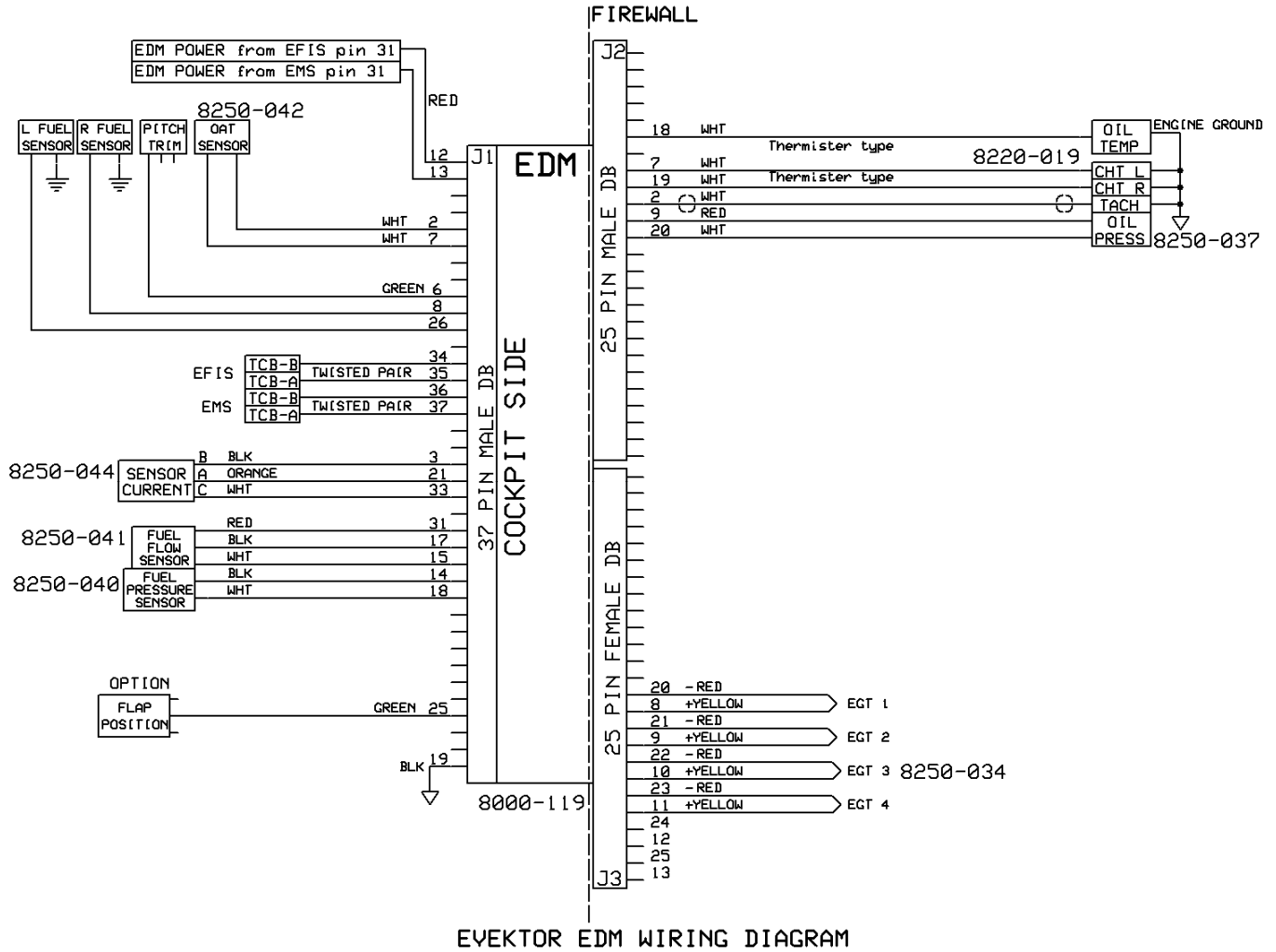
J1 Pin	EDM Function / interior	Notes
1	Ground	Sensor use only
2	Ground	Sensor use only
3	Ground	Sensor use only
4	Ground	Sensor use only
5	Future Alert Lamp	Not used at this time
6	Vertical Trim Position (PITCH) input	Pitch Trim Input
7	OAT Thermister	OAT Input
8	Fuel level Resistive in 2	Left tank Input
9	Fuel level Capacitance in 2	Left tank Input
10	Switch Contact 3	Input
11	Switch Contact 2	Input
12	MAIN EDM POWER	From EMS
13	MAIN EDM POWER from second EFIS (optional)	From EFIS
14	Fuel Pressure Transducer	Fuel Pressure Input
15	Fuel Flow Transducer	Fuel Flow Input
16	TACH	RPM Input
17	Ground	Sensor use only
18	Ground	Sensor use only
19	MAIN EDM AIRCRAFT GROUND	
20	Sensor 5 volt supply	Sensor use only
21	Sensor 5 volt supply	Sensor use only
22	Sensor 5 volt supply	Sensor use only
23	Sensor 5 volt supply	Sensor use only
24	Lateral Trim Position	Roll Trim Input
25	Flap Position	Flap Position Input
26	Fuel level Resistive in 1	Right tank Input
27	Fuel level Capacitance in 1	Right tank Input
28	Switch Contact 4	Input
29	Switch Contact 1 / NINE CYLINDER SELECT SWITCH	Input
30		Not used at this time
31	Sensor 12 volt supply	Sensor use only
32	Air Pressure sensor	Nine Cylinder EDM
33	Current Transducer	Battery Current Input
34	TCB-B (2)	TruTrak Comm. Buss
35	TCB-A (2)	TruTrak Comm. Buss
36	TCB-B	TruTrak Comm. Buss
37	TCB-A	TruTrak Comm. Buss

EDM	CURRENT DRAW		WEIGHT	DIMENSIONS
Engine Data Monitor	0.65 Amps @ 12v 0.65 Amps @ 24v		.5 lb	5.25L x 3.4W x 1.5D

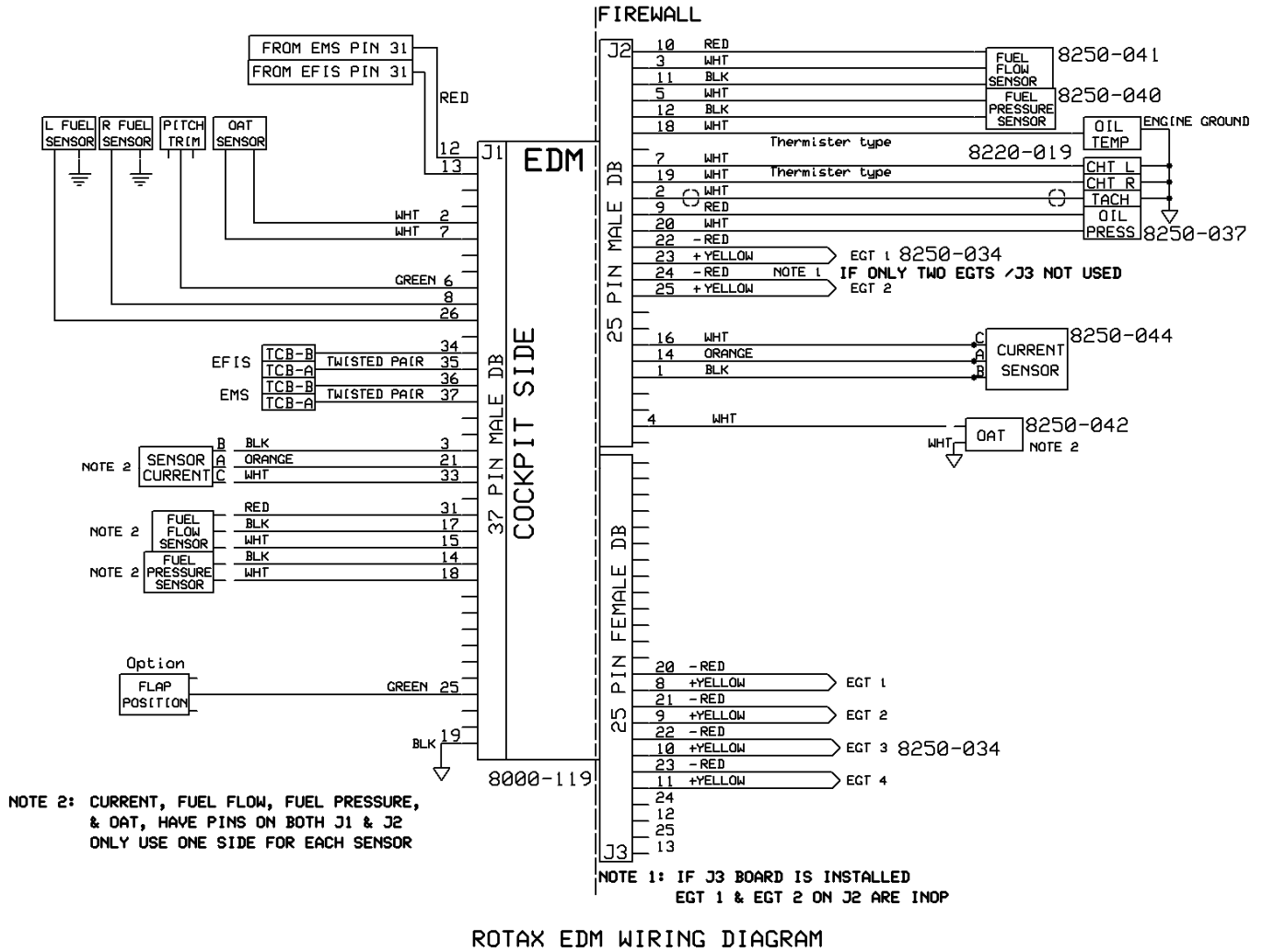
J2 Pin	EDM Function / Fire wall	Notes
1	Sensor Ground	Sensor use only
2	TACH	
3	Fuel Flow	
4	OAT Thermister	
5	Fuel Pressure	
6	OIL pressure Sensor (Resistive type)	Factory setup only
7	CHT 2 Thermister or Second OAT sensor (CARB TEMP)	
8	Sensor 12 volt supply	Sensor use only
9	Sensor 12 volt supply	Sensor use only
10	Sensor 12 volt supply	Sensor use only
11	Sensor Ground	Sensor use only
12	Sensor Ground	Sensor use only
13	Sensor Ground	Sensor use only
14	Sensor 5 volt supply	Sensor use only
15	Sensor 5 volt supply	Sensor use only
16	Current Transducer	
17	Not used at this time	
18	Oil Temperature Thermister	
19	CHT 1 Thermister	
20	Oil Pressure	
21	Not used at this time	
22	- EGT 1 RED K type / # Nine EGT	
23	+ EGT 1 YELLOW K type / # Nine EGT	
24	- EGT 2 RED K type / # Nine CHT	
25	+ EGT 2 YELLOW K type / # Nine CHT	

J3 Pin	EDM Function / Fire Wall	NOT NINE CYL NN OPTION
1	- CHT 1 J Type	RED
2	- CHT 2 J Type	RED
3	- CHT 3 J Type	RED
4	- CHT 4 J Type	RED
5	- CHT 5 J Type	RED
6	- CHT 6 J Type	RED
7	NO CONNECTION	
8	+ EGT 1 K type	YELLOW
9	+ EGT 2 K type	YELLOW
10	+ EGT 3 K type	YELLOW
11	+ EGT 4 K type	YELLOW
12	+ EGT 5 K type	YELLOW
13	+ EGT 6 K type	YELLOW
14	+ CHT 1 J Type	WHITE
15	+ CHT 2 J Type	WHITE
16	+ CHT 3 J Type	WHITE
17	+ CHT 4 J Type	WHITE
18	+ CHT 5 J Type	WHITE
19	+ CHT 6 J Type	WHITE
20	- EGT 1 K type	RED
21	- EGT 2 K type	RED
22	- EGT 3 K type	RED
23	- EGT 4 K type	RED
24	- EGT 5 K type	RED
25	- EGT 6 K type	RED

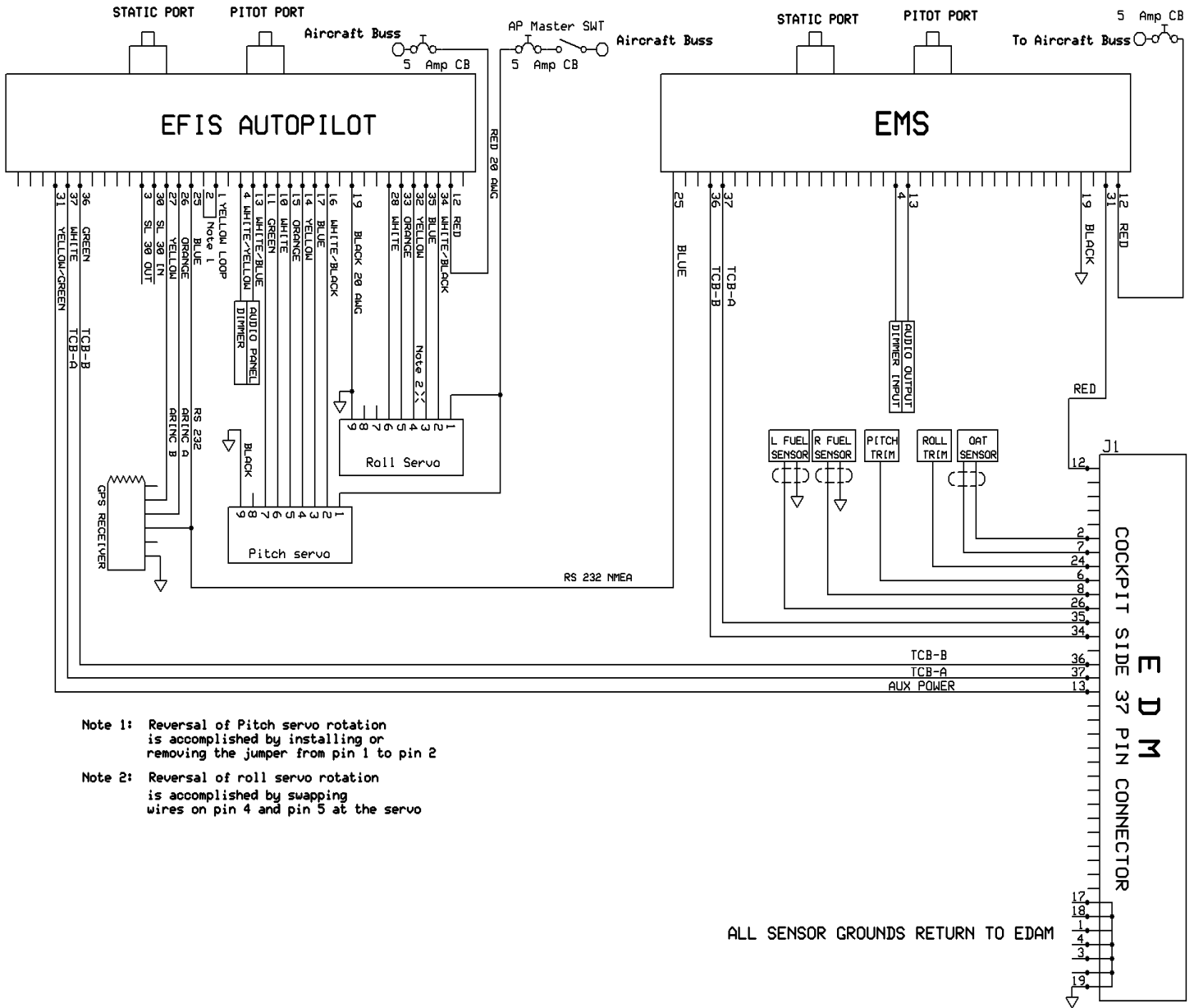
EVEKTOR WIRING DIAGRAM



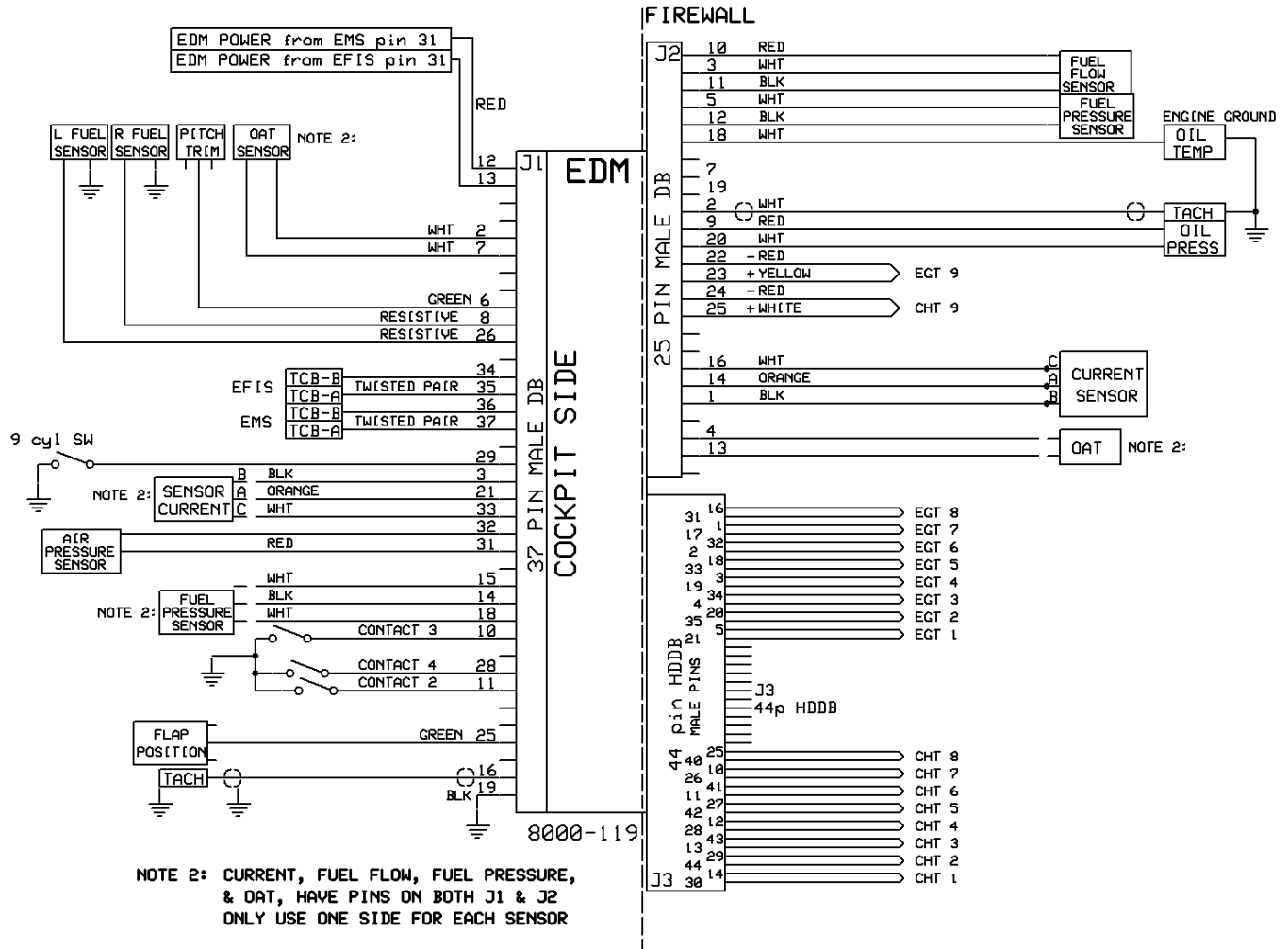
ROTAX WIRING DIAGRAM



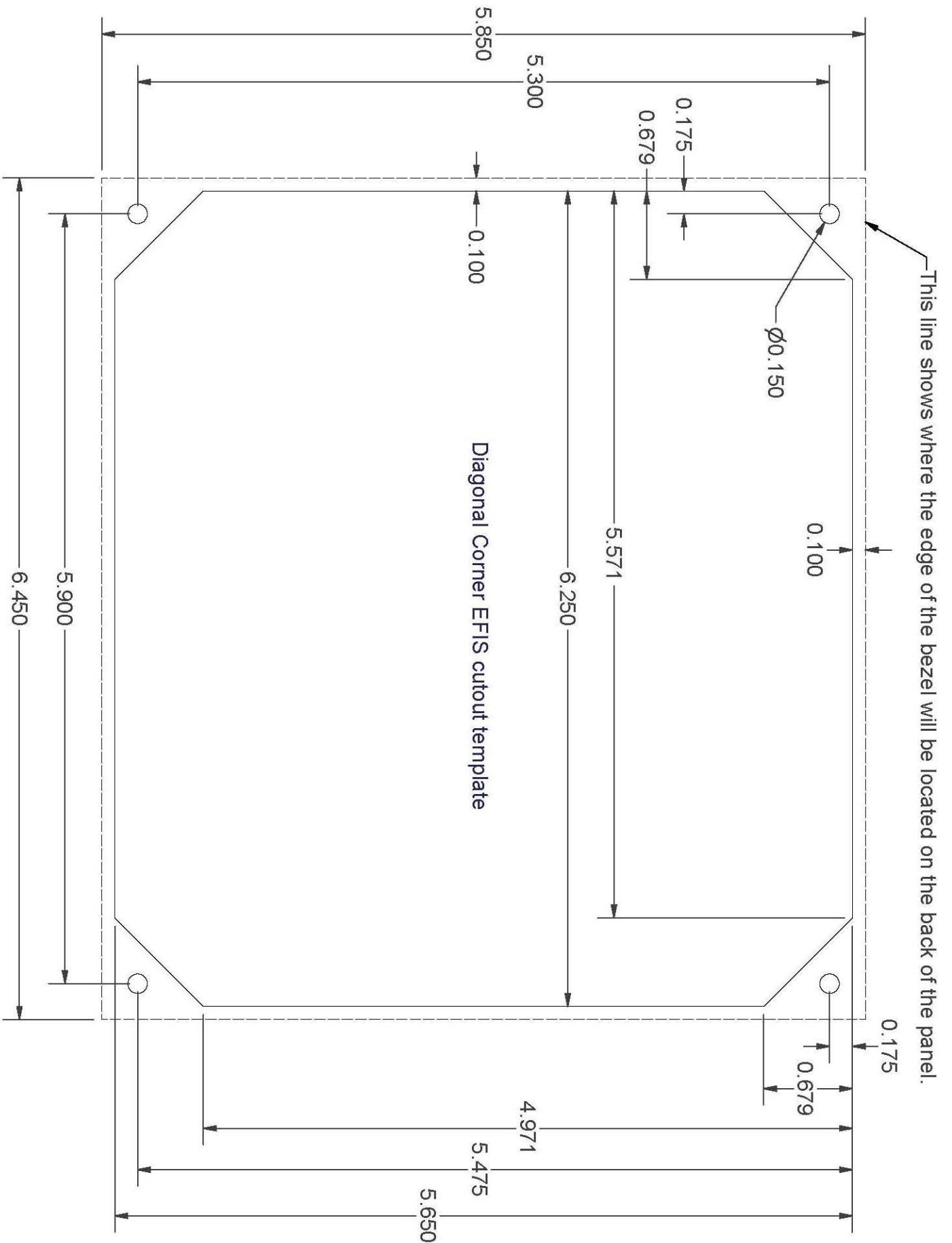
EFIS AP / EMS / EDM BLOCK DIAGRAM

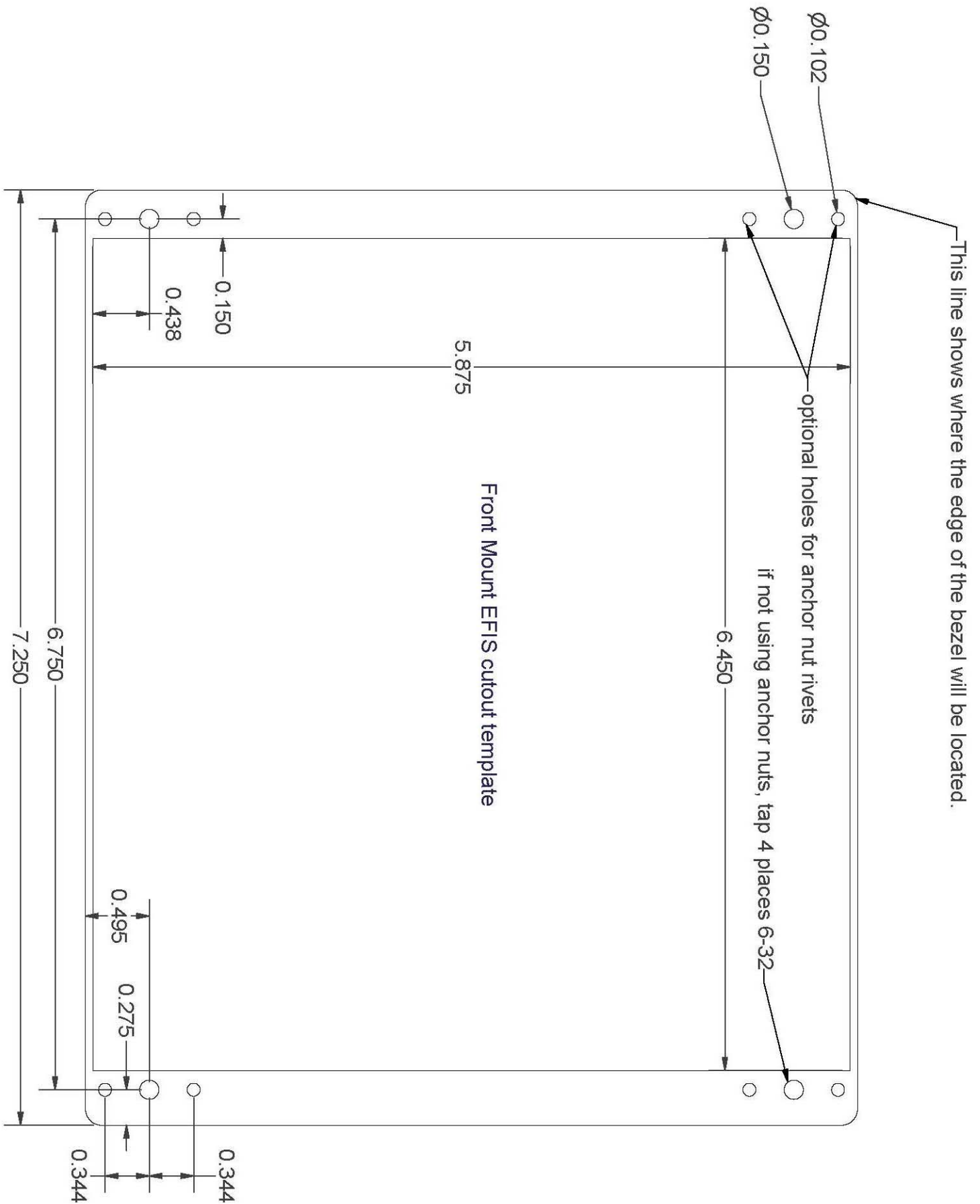


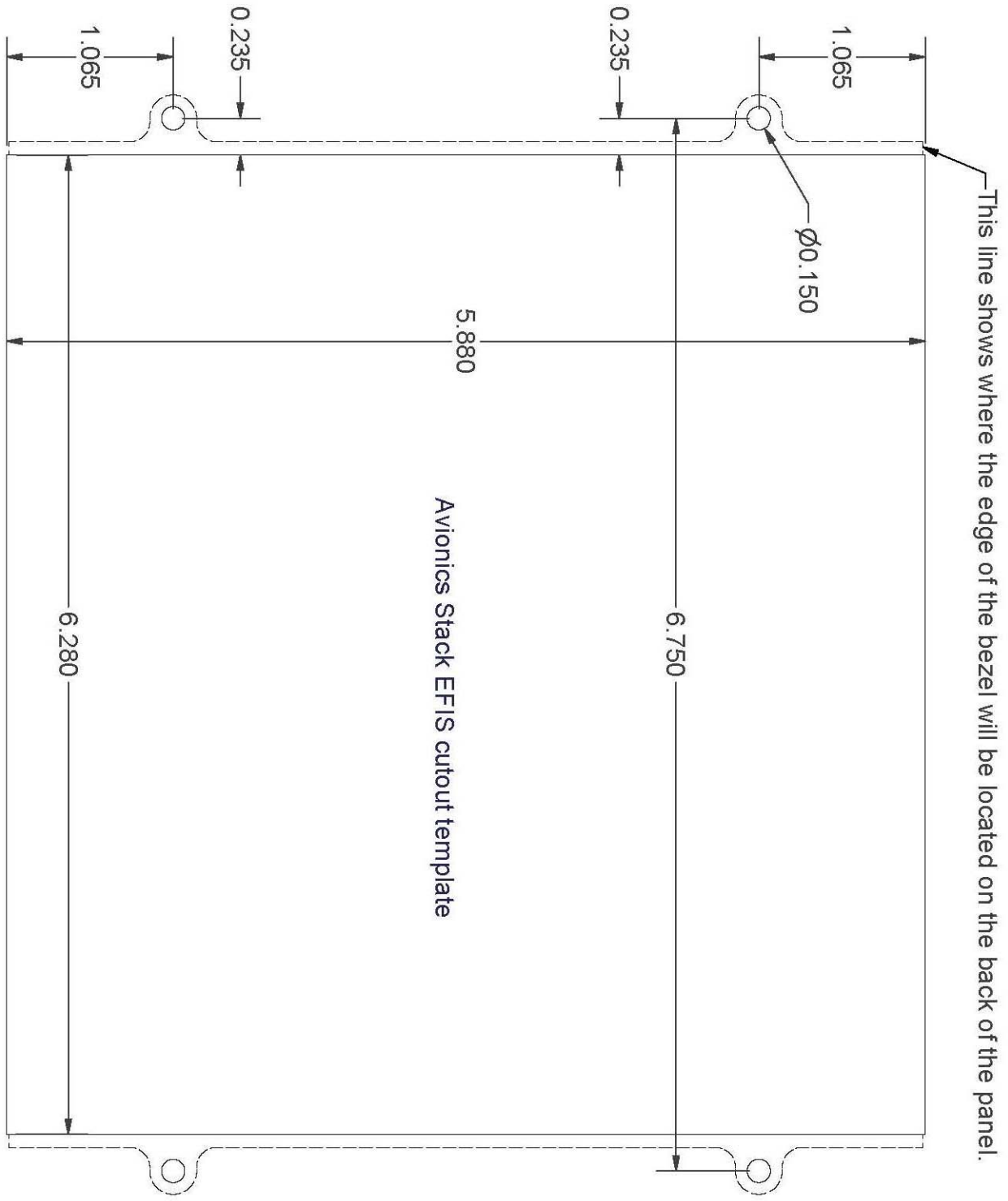
NINE CYLINDER EDM BLOCK DIAGRAM



J3 Pin	EDM Function / Fire Wall	NINE CYLINDER OPTION	
1	+ EGT 7 K Type		YELLOW
2	- EGT 6 K Type		RED
3	+ EGT 4 K Type		YELLOW
4	- EGT 3 K Type		RED
5	+ EGT 1 K Type		YELLOW
6			
7			
8			
9			
10	+ CHT 7 J type		WHITE
11	- CHT 6 J type		RED
12	+ CHT 4 J type		WHITE
13	- CHT 3 J type		RED
14	+ CHT 1 J Type		WHITE
15			
16	+ EGT 8 K Type		YELLOW
17	- EGT 7 K Type		RED
18	+ EGT 5 K Type		YELLOW
19	- EGT 4 K Type		RED
20	+ EGT 2 K type		YELLOW
21	- EGT 1 K type		RED
22			
23			
24			
25	+ CHT 8 J type		WHITE
26	- CHT 7 J type		RED
27	+ CHT 5 J type		WHITE
28	- CHT 4 J type		RED
29	+ CHT 2 J type		WHITE
30	- CHT 1 J type		RED
31	- EGT 8 K type		RED
32	+ EGT 6 K type		YELLOW
33	- EGT 5 K type		RED
34	+ EGT 3 K type		YELLOW
35	- EGT 2 K type		RED
36			
37			
38			
39			
40	- CHT 8 J type		RED
41	+ CHT 6 J type		WHITE
42	- CHT 5 J type		RED
43	+ CHT 3 J type		WHITE
44	- CHT 2 J type		RED







TruTrak Flight Systems No Penalty Upgrade Policy

As the product line continues to grow, it becomes increasingly difficult to maintain a simple upgrade policy. We do want to reward our repeat customers by allowing a lower cost upgrade from one system to another; however we are not able to offer this across the board on all products. If you are considering an upgrade, please call and we will give you a quote on what this would cost. Many products that we sell today are upgradeable for only the difference in system price. Because we continually strive to have the most up to date products possible, we occasionally have to discontinue products. We will continue to offer discounted upgrades even for our discontinued products.



RETURN MERCHANDISE POLICY AND PROCEDURE

Under no circumstances should products be returned to TruTrak without first obtaining a Return of Merchandise Authorization number (RMA #) from TruTrak. An RMA# may be obtained by contacting us at 866-878-8725.

Products that do not have an RMA # will not be processed.

Please include documentation stating the reason for the return and describing any symptoms, failure modes, suspected causes of damage, diagnostics performed, data collected, etc.

Product(s) should be packaged in their original shipping containers. In lieu of this, they should be very carefully packaged in containers suitable to protect them during transit. For your protection, items should be insured for the full value. Note that damage caused during shipping will not be repaired under warranty.

The outside of the box must be clearly marked with the RMA # issued by TruTrak and the RMA # must also be noted on the return documents.

Products will be returned to the customer at no charge via FedEx Ground or UPS Ground. If customer requests expedited shipping (2nd Day or Overnight) they will be charged the shipping cost and must supply a credit card number.

INTERNATIONAL SHIPMENTS:

TruTrak sends all International shipments with an insurance value on all products. TruTrak pays for shipping only. The customer is responsible for any and all additional fees, duties, taxes associated with the shipment.

When sending products to TruTrak for repair or otherwise please be advised that the customer is responsible for all charges and fees associated with shipment. For your protection, items should be insured for the full value.

TruTrak states on all product returns "WARRANTY REPAIR AT NO CHARGE TO CUSTOMER. A COMMERCIAL INVOICE VALUE OF \$___ GIVEN FOR INSURANCE PURPOSES ONLY"

Please keep in mind that your government or another entity in your country may impose a charge for custom and/or brokerage fees, duties and taxes on items received from the US. These charges do not originate from our company nor do we benefit from them in any way. You are responsible for payment of all custom and brokerage fees, duties and taxes that may be imposed when these goods are imported into your country.

Send ALL return shipments to:

TruTrak Flight Systems, Inc., 1500 South Old Missouri Road, Springdale, AR 72764 USA
Attention: Returns Dept. RMA#

Warranty On TruTrak Flight Systems Products

We here at TruTrak Flight Systems know how important it is to feel as though the customer is purchasing a product that the manufacturer is going to stand behind. For this reason we want offer more than the basic one year warranty that is standard to this industry. The warranty on all TruTrak products will be three years from the date of purchase. Abuse and misuse of a product are not covered under this warranty. Modification to a product may void the warranty, as well as carry a penalty when upgrading to another product. This three year warranty will be for all products except the Pictorial Turn & Bank, which will continue to have a warranty of one year from the date of purchase.

TruTrak Flight Systems, Inc.
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Springdale AR 72764

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