- **Setting the EMP – Advanced EIS**

  – This model of the EIS employs a sophisticated method of measuring engine RPM to provide 10 RPM resolution with practically any engine type. To provide this flexibility, the EMP value is set to a code, corresponding to the number of pulses the instrument detects per revolution of the engine.

  To set the EMP correctly for your engine, first determine how many pulses per engine revolution will be generated, according to the following paragraphs, and set the EMP as indicated by the EMP Table.

  * **Tach Connections to Lighting Coils** – When the tachometer connection is made to the lighting coil, typically 1/2 as many pulses will be generated as there are magnets on the flywheel. For CDI-equipped Rotax Engines, 12 magnets are used, generating 6 pulses per revolution of the engine, and requiring an EMP value of 6. For non-CDI type Rotax engines, an EMP value of 2 is required.
  * **Use of Magnetic Tachometer Sensor** – This sensor will generate one pulse for each magnet that rotates past it. When this sensor is mounted to sense the magnets within the magneto, typically 1/2 as many pulses will be generated per engine revolution as there are cylinders in the engine. Thus, for a 4-cylinder engine, an EMP value of 2 is typically required.
  * **Tach Connections to Ignition Coils or Tach Outputs** – When the tachometer connection is made in either of these manners, typically one pulse will be generated for every spark plug fired per revolution of the engine. Thus, a 4-stroke, 4-cylinder engine will require an EMP setting of 2.

Table 2. EMP Table

EPM Setting	Pulses per Engine Revolution
0	1/2*
1	1
2	2
3	3
4	4
5	5
6	6
7	8
8	10
9	12
(* 1 pulse every other revolution)	

- **Aux Function Scale Factor and Offset** – The "Aux SF" and "Aux Off" entries on the "Set Limit" pages are provided to allow the user a means of adjusting the digital Aux display value for a given voltage on the Auxiliary input. These adjustments allow the user the means of adjusting (calibrating) the display so that it provides meaningful information. For example, in the case of this input being used to display fuel level, the "Aux SF" (Scale Factor) and "Aux Off" (Offset) can be set such that 0-10 will be displayed even when the input signal is 0.5 Volts when empty, and 4.5 Volts when full. (The auxiliary input signal must fall within the range of 0-5 Volts, however, and fall as close as practical so as not to exceed the limits of adjustment available through the Aux Scale Factor and Offset.)

CAUTION: This input must not exceed 5.5 Volts. Although no damage will occur unless this input exceeds 30 Volts, the accuracy of the instrument will be severely reduced while this input exceeds 6.0 Volts.

NOTE: The Aux Display is capable of displaying a range of 0-~~255~~ 512 for the Standard EIS, and 0-51.2 for the Advanced EIS.

Definition of the Aux Scale Factor and Offset

The Aux Scale Factor (Aux SF) can be thought of as a multiplying factor or gain, and the Offset (Aux Off) can be thought of as an additive factor, or bias. More precisely, the displayed value will be as follows:

Standard EIS

$$AuxOutput = \frac{(AuxInputVoltage) \cdot (AuxScaleFactor)}{2.5} + AuxOffset$$

Advanced EIS

$$AuxOutput = \frac{(AuxInputVoltage) \cdot (AuxScaleFactor)}{25} + (AuxOffset) \cdot (0.1)$$

The Aux Offset may be positive or negative. Since only positive numbers can be entered on the display, the following scheme is used to enter positive and negative numbers:

- To enter a positive number, enter double the desired value. (The entered number will always be even for a positive Aux Offset.)
- To enter a negative number, enter double the desired value minus 1. (The entered number will always be odd for a negative Aux Offset.)

  For example, if you want to enter an offset of +12, set Aux Offset to 24. If you want to enter an offset of -5, enter 2 x 5 - 1 = 9. Nothing to it!

Calibrating the Aux Function for Your Use

1. The first step to calibrate your Aux function is to make any adjustments you can to provide a signal into the EIS that ranges from 0 to 5 Volts. Do not exceed 5 Volts, as this may cause the instrument to operate erratically.
2. Decide on the range desired for the Aux Display. For example, you may wish to choose 0-10 to represent 0-10 gallons of fuel.
3. Select the "Set Limits" pages and set "Aux SF" to 100 and "Aux Off" to 0, as your initial settings. (See the "Set Limits" section for a description of how the limits are set.)
4. Vary the Aux input signal through its range (by moving the float of the fuel level sensor, for example). Subtract the minimum reading from the maximum. Increase or decrease "Aux SF" until this DIFFERENCE is equal to the difference in the range you desire. In our example, this desired difference is 10-0 = 10. You can use a calculator to set "AUX SF" directly using the following equation:

   NOTE: If the AUX function reads backwards, the Reverse Aux Sensing option may be selected to correct this condition. See the "Configuration Set Pages" section above.

$$AuxSF = \frac{DesiredDifference \cdot CurrentAuxSF}{ObservedDifference}$$

NOTE: When computing the difference, if the Aux display reaches its maximum, 255, then perform the next step, and repeat this step again.

5. Set "Aux Off" to 0 (if it is not already 0). Then set the Aux input signal to its minimum value. Note the reading. Set "Aux Off" to the negative of this number. For example, suppose the minimum Aux reading is 25. You would compute 2 x 25 - 1 = 49. The Aux display will then show 0 when the Aux input is at its minimum.
6. A check of the calibration must now be performed. In the case of a fuel level sensor, variations in the shape of the tank and the linearity of the sensor can contribute to errors. **NOTE: These errors could mean that a reading of 7 on the Aux gauge (7 gallons), may be displayed when the tank actually contains 5 gallons.** The calibration can be verified by adding small amounts of known quantities of fuel, and then observing the Aux display on the EIS. A table can be created to correlate actual fuel in the tank to the reading on the instrument. A similar calibration can be performed for other uses of the Aux input.

- **OilZero – Advanced EIS Only** This entry provides an adjustment to correct for small differences in installations that could result in a non-zero oil pressure display when the engine is not running. To use this adjustment, start by setting it to zero, and noting the oil pressure displayed on the EIS.

  If the oil pressure is not zero, progressively set OilZero to larger odd numbers (1,3,5,7,9,...) until the oil pressure display first goes to zero. The correct OilZero value is the first setting which results in a zero oil pressure display.

  If the EIS displays an oil pressure of 0 when the OilZero is set to 0, progressively set OilZero to larger even numbers (2,4,6,8,...) until the oil pressure display first reads a non-zero value. Then subtract 2 from OilZero, making the adjustment complete.

- **NumEGTs – Advanced EIS Only** This setting is used to specify how many of the EGT/CHT inputs are used for EGT inputs. A value of 0 through 4 may be entered.

  EGT inputs are assigned starting with EGT/CHT1. Thus, if NumEGTs is set to 3, EGT/CHT1, 2, and 3 will be EGT inputs, and EGT/CHT 4 will be a CHT input. NumEGTs must be set to correspond to the EGT and CHT inputs wired to the EIS so that these signals are processed correctly, and the correct limits are applied.

- **Hours** – This function allows you to set the hour meter so that it matches the actual time on your engine. The hour meter may be set to any value between 0 and 6553.5 hours. The hour meter will advance only when the tachometer reads above 255 RPM. It will reset to zero after 6553.5 hours.

5 INSTALLATION

5.1 Mounting the Instrument.

The first step in mounting the instrument is selection of a suitable location in the aircraft. The location must be selected such that it is not exposed to water or fuel, and preferably away from