EFIS temperature compensation DIY

Odyssey version 1.0.0.3 introduces active, software driven temperature drift compensation for its three built in pressure transducers, airspeed, altimeter and angle of attack.

The EFIS relies on hardware temperature drift compensation which is adequate in normal circumstances. However, with the introduction of an optional high speed airspeed sensor additional temperature compensation is needed. This is partly due to extending the range of pressures to be measured over a very large span. Additional sensitivity is required at the bottom end of the pressure range (low pressures) to allow indication of very low airspeeds with a high pressure transducer.

Factory built EFIS systems dated July 2008 and later have this calibration performed at the factory. The calibration system will show you if calibration has been performed previously or not.
It is not normally required to re-calibrate but you may do so at any time, perhaps after the system has been serviced or pressure sender(s) have been replaced.

Method:

Please note: All temperature references in this document are in degrees Celcius.
The EFIS has a considerable amount of self heating which raises internal temperature of the EFIS after it is switched on. The EFIS has a built in temperature sensor mounted close to the pressure transducers and can measure the temperature at these devices with a high resolution.

The EFIS is placed in a fridge (not freezer !!!) to bring its temperature to approximately 10 degrees C or lower. The exact temperature is not important but should be in the range of 5-15 degrees for best effect. If a low enough ambient temperature is present, this procedure can be executed with the EFIS installed in the aircraft.

The procedure consists of the following steps:

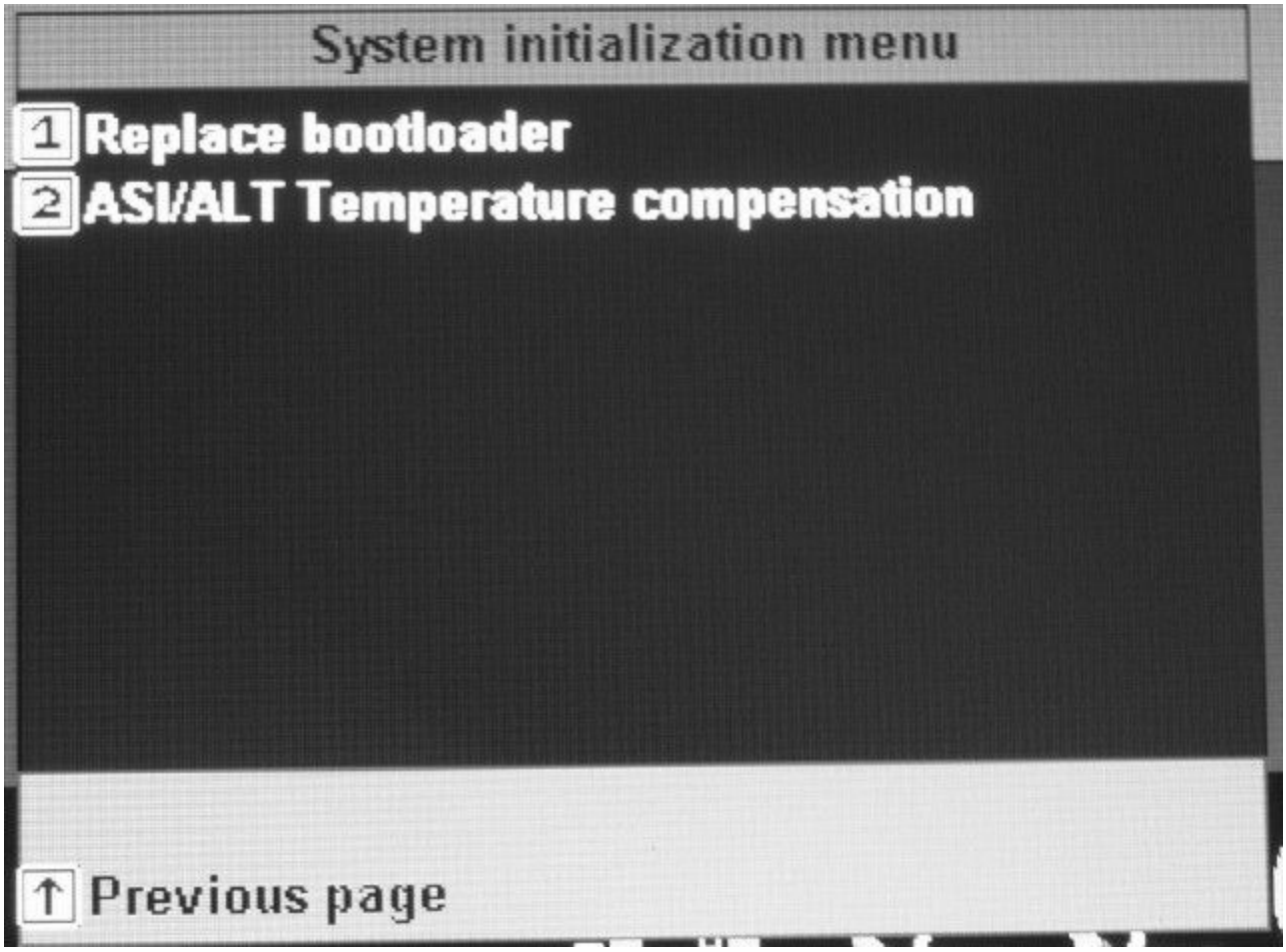
1) Ensure EFIS is at 5 to 15 degrees C internal temperature. This will be the case if ambient temperature is in this range and the EFIS is not switched on.
2) Switch on the EFIS
3) Rapidly activate the temperature compensation function. Do not allow the EFIS much time to start heating up. Press the following buttons to get to the required functions: Menu, Menu, System Setup, Arrow down until you get to the System Initialization menu, Select System Initialization menu, Arrow down to get to ASI/ALT Temperature compensation and select this function.
4) You are now presented with a display of various numeric values. These are explained further on in this document. They are of little consequence, from now on everything is automatic.

Once you have performed step 4, the EFIS will wait until internal temperature has risen by 15 degrees C. During this time the pressure transducers are monitored and their behavior with changing temperature is recorded. When the temperature has risen by 15 degrees C, the

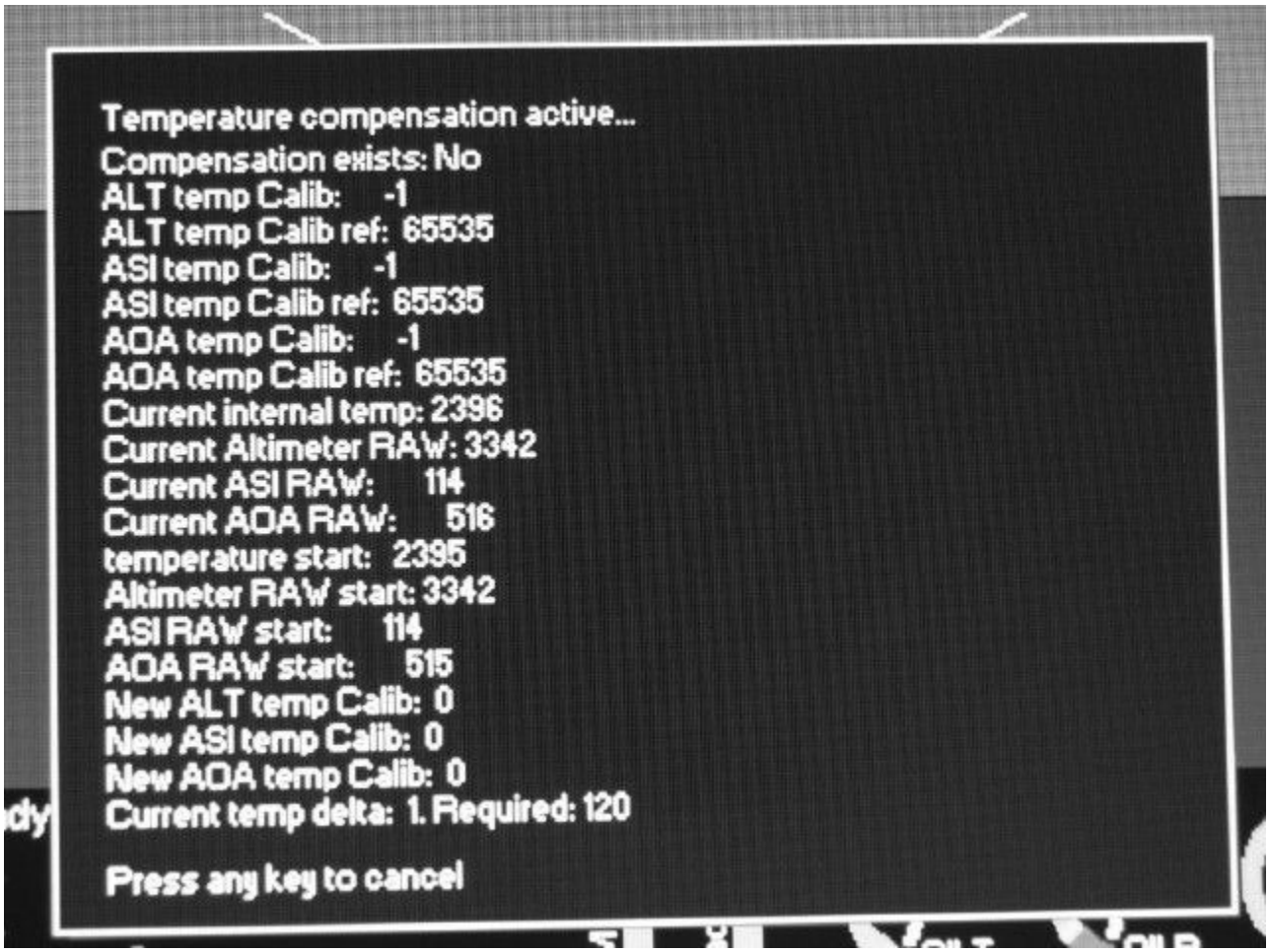
function ends and corrective values (if required) are calculated and stored for future use. It tends to take about 30 minutes for this to complete (time varies depending on ambient temperature).

The final but important step is to perform the “Zero ASI,VSI and AOA sensors” once the temperature compensation has been completed.

The temperature compensation can improve your instruments sensor drift behavior by as much as a factor of ten.



Select “ASI/ALT Temperature compensation” in your System initialization menu to start the compensation procedure.



Typical screen display during the compensation procedure.

The system starts with “Preparing for measurements...” which takes about 15 seconds. During this time initial values for your transducers are obtained and smoothed to remove “electrical noise” and fast fluctuations during often unavoidable pressure changes.

The above screen will be presented once the temperature compensation is activated and no previous compensation data was stored in your instrument. If previous compensation data exists, this will be shown. It does not matter if previous data exists or not, you can repeat this procedure as often as you like.

The various numbers listed have little direct meaning and can be ignored.

The last line “Current temp delta” is interesting. This displays a reference for the internal temperature change since you started the calibration procedure. Note that you needed to start the procedure when the instrument was “cold”. The value 120 approximates a positive change in temperature of about 15 degrees C. You will see the “delta” steadily growing as internal temperature increases until the value 120 is reached. Once this happens, the compensation ends and the calculated compensation data is stored. You can then press any button to exit this screen. You have to perform the “Zero ASI,VSI and AOA sensors” after you have finished.

You can exit the temperature compensation function at any time by pressing a button. If you do this, no changes to your existing calibration are done.

Preconditions for a good and successful calibration:

Ensure that you have a stable power supply. If your power supply fades during the calibration (for example a flat battery), this can introduce measurement errors. If this happens to you, simply repeat the procedure with a better power supply or charged battery. This procedure tends to take about 30 minutes but this time can vary depending on your ambient temperature and the temperature you started the calibration at.

Ensure that you perform the calibration in an area where no pressure changes will occur during the calibration. For example, if you perform this calibration in a small room and somebody slams the door, this will adversely affect the accuracy of your calibration.

Ensure that no drastic barometric pressure changes will occur during the calibration. Rapid changes that will affect your calibration may occur if a frontal system moves through your area. As a good rule of thumb, if there is little wind, there should be little short term change in pressure.

Do not close or pressurize any of the pressure ports on your instrument during calibration. Leave them open and exposed to ambient (atmospheric) pressure.

Be aware that if you calibrate inside a hanger wind may cause pressure changes inside the hanger which could result in your calibration to fail.

Keep in mind that you are operating with a very sensitive instrument, in particular if your instrument is fitted with a high speed ASI sensor. It is your goal to achieve accuracy figures that equal or exceed those found with expensive laboratory references.
You can find out if your instrument is fitted with a high speed sensor by looking up your “status menu”.

If you have any questions about the procedure, please send us an e-mail at MGL Avionics, we will be glad to help: Info@MGLAvionics.co.za