ESM-100

NON-TSO

ELECTRICAL SYSTEM MONITOR USER'S MANUAL

Adaptive Interfaces, Inc.

2013

The ESM-100 is not certified by the FAA and is intended for use only in Homebuilt, Experimental or Ultralight aircraft. Any questions pertaining to the use of this instrument in a particular aircraft should be addressed to your local aviation authorities. It is the responsibility of the aircraft pilot to be thoroughly familiar with the operation of the ESM-100 and know its limitations. Correct installation of this instrument should be verified by a qualified avionics facility.

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT.)

INTRODUCTION

SCOPE

This manual provides specifications, operating instructions and installation instructions for the ESM-100 Electrical System Monitor. This manual is for use by persons who are familiar with aircraft, aircraft avionics, and general electronic principles.

DESCRIPTION

The ESM-100 Electrical System Monitor is a solid state instrument that displays aircraft electrical system voltage and either electrical sytem current or battery charging current on a 3-digit over 3-digit display. The ESM-100 is powered directly from the aircraft electrical system and measures its own supply voltage to provide a display of the system voltage. The ESM-100 also displays current from one of two sources, either the electrical system current (normally measured from the Master Switch) or the battery charging current (measured between the alternator and the battery. For each current measurement, either system or battery, the ESM-100 can use either a standard 50 mV current shunt or a solid state, Hall Effect current sensor. Alarm levels can be set to warn the pilot of high system or charging currents or of a battery discharge (indicating a possible alternator failure).

Control of the ESM-100 is by a set of 4 buttons on the front panel of the instrument. The ESM-100 is a standard 2-1/4 inch instrument and is designed to be mounted in a standard 2-1/4 inch aircraft panel cut-out.

SPECIFICATIONS

Supply Voltage:	10 Vdc - 30 Vdc
Maximum Supply Current:	350 mA
Voltage Display Range:	9 - 30 Vdc
Current Display Range:	0 - 99.9 A (Based on range of sensor)
Current Shunt Types:	50 mV - 10 A, 20 A, 30 A, 40 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A,
Current Sensor Types:	25 A, 50 A, 100 A
Dimensions:	H 2.40" x W 2.50" x D 1.50"
Weight:	4 Oz. (114 g.)
Mounting Screws:	4 ea. 6-32 x L 0.5" (Max.)
Upper Connector:	15-Pin DSUB Female 4-40
Lower Connector:	9-Pin DSUB Female 4-40

BUTTON FUNCTIONS

FUNC

This button is used to select and advance instrument functions for each menu level. Holding this button in for 5 seconds will cause the instrument to advance to the next menu level.

▲

▼

When the instrument is in the MAIN MENU mode, these buttons are used to adjust the brightness of the digital display when the DISPLAY BRIGHTNESS function is set to FP (Front Panel). Otherwise, in MAIN MENU mode, these buttons perform no operations. In functions of MENU LEVEL 1, MENU LEVEL 2 and MENU LEVEL 3, these buttons are used to select options or to increase or decrease values of the selected function.

ALM

When the instrument is in the MAIN MENU mode, this button is used to deactivate the instrument's ALARM for a period of 2 minutes.

In all other cases, the button is used as an "Enter" button to select and retain the value or setting of the displayed function.

INDICATORS

S

The S indicator is lit when the instrument is displaying System Current.

B

The B indicator is lit when the instrument is displaying Battery Charging Current.

+

The + indicator is lit when the displayed Current is positive. This is always the case when the instrument is displaying System Current and it indicates proper battery charging when the instrument is displaying Battery Current.

-

The - indicator is lit when the displayed current is negative. This indicates a battery discharge condition when the instrument is displaying Battery Current. A battery discharge condition may indicate a failure of the alternator while the engine is running.

MENUS OVERVIEW

The ESM-100 is controlled through a series of menus and functions.

MAIN MENU

The MAIN MENU (MENU LEVEL 0) allows the pilot to view the Electrical System Voltage and either the Electrical System Current or Battery Charging Current.

MENU LEVEL 1 - INSTRUMENT SETTINGS

MENU LEVEL 1 (L1) is entered from MENU LEVEL 0 by pressing and holding the FUNC button for 5 seconds.

When the ESM-100 is in MENU LEVEL 1, the user can change the instrument's optional settings. These settings include the digital display's BRIGHTNESS CONTROL mode, the AUTO DIM function, the display UPDATE PERIOD, the SYSTEM (CS1) CURRENT SENSOR type, and the BATTERY (CS2) CURRENT SENSOR type. The RETURN TO MAIN function brings the OSM-100 back to its normal operation mode, MAIN MENU.

MENU LEVEL 2 - CURRENT SENSOR VALUES and ALARMS

MENU LEVEL 2 (L2) is entered from MENU LEVEL 1 by pressing and holding the FUNC button for 5 seconds.

When the ESM-100 is in MENU LEVEL 2, the user can set the values of the SYSTEM CURRENT shunt (SH1), BATTERY CURRENT shunt (SH2), SYSTEM CURRENT sensor (CS1), BATTERY CURRENT sensor (CS2), LOW VOLTAGE alarm level, HIGH SYTEM CURRENT alarm level, and the HIGH BATTERY CURRENT alarm level.

The BACK ONE LEVEL function brings the ESM-100 to MENU LEVEL 1. The RETURN TO MAIN brings the ESM-100 back to its normal operation mode, MAIN MENU.

MENU LEVEL 3 - SENSOR ZERO (0) SET POINTS

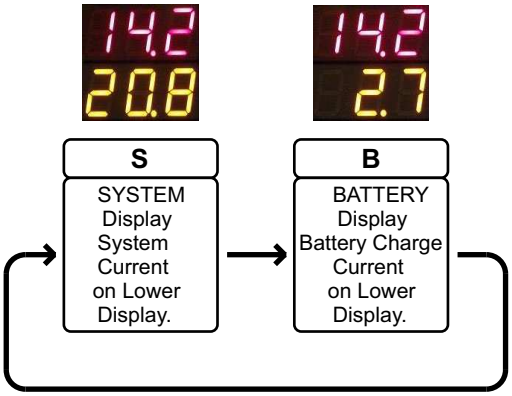
MENU LEVEL 3 (L3) is entered from MENU LEVEL 2 by pressing and holding the FUNC button for 5 seconds.

MENU LEVEL 3 is is used to set the ZERO (0) points of the sensors. While the ESM-100 is calibrated for each type of Solid State Sensor or 50 mV shunt, the zero point of each sensor or shunt may vary slightly or change slightly over time, causing the ESM-100 to show a small positive or negative current when no current is being measured. When the sensors or shunts are set to measure zero current, the ZERO SET function can be used to "Zero Out" the current readings.

The BACK ONE LEVEL function brings the ESM-100 to MENU LEVEL 2. The RETURN TO MAIN brings the ESM-100 back to its normal operation mode, MAIN MENU.

MENU QUICK REFERENCE

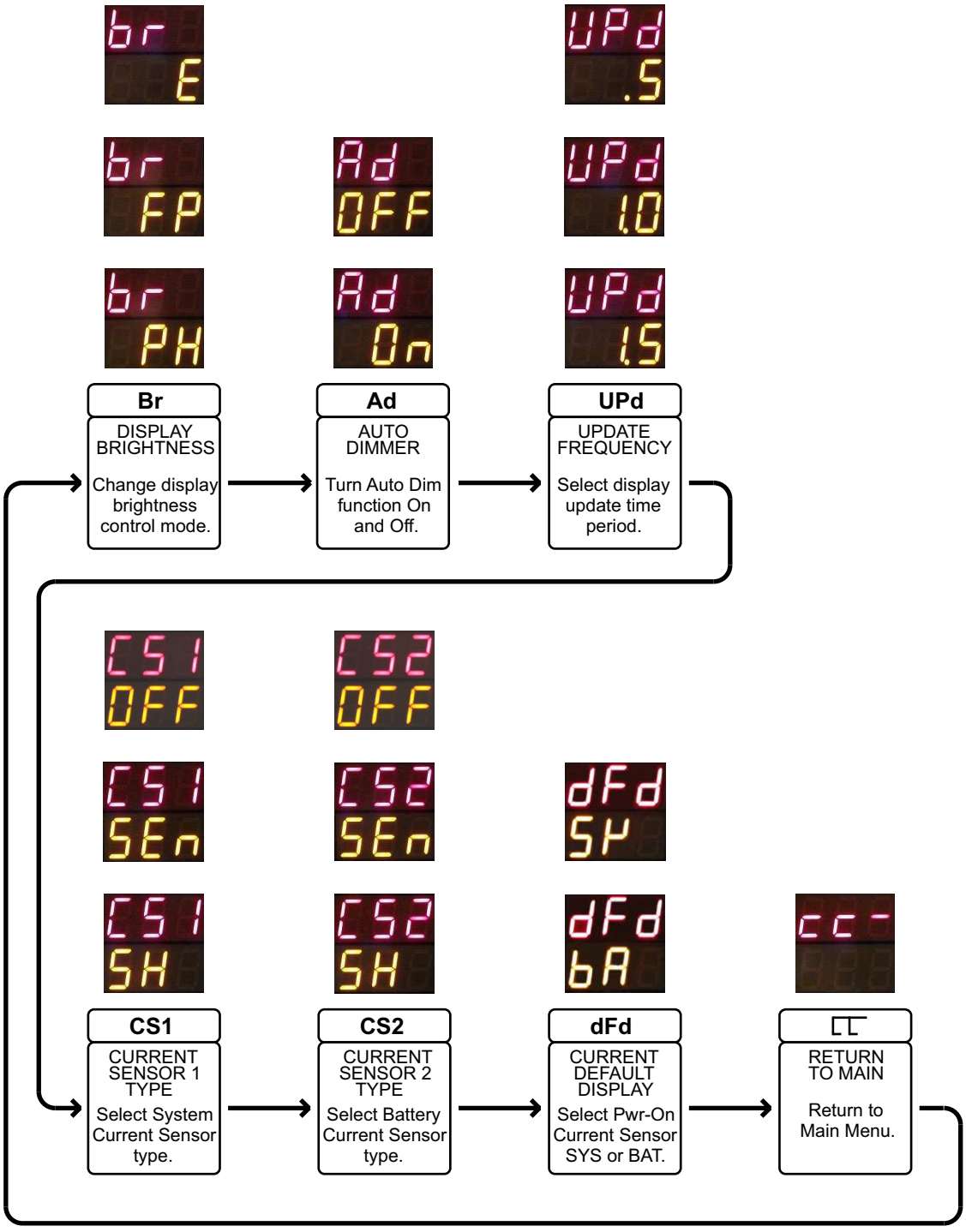
MAIN MENU (MENU LEVEL 0)



MENU QUICK REFERENCE (CONT.)

Press and hold FUNC button 5 seconds to advance to MENU LEVEL 1

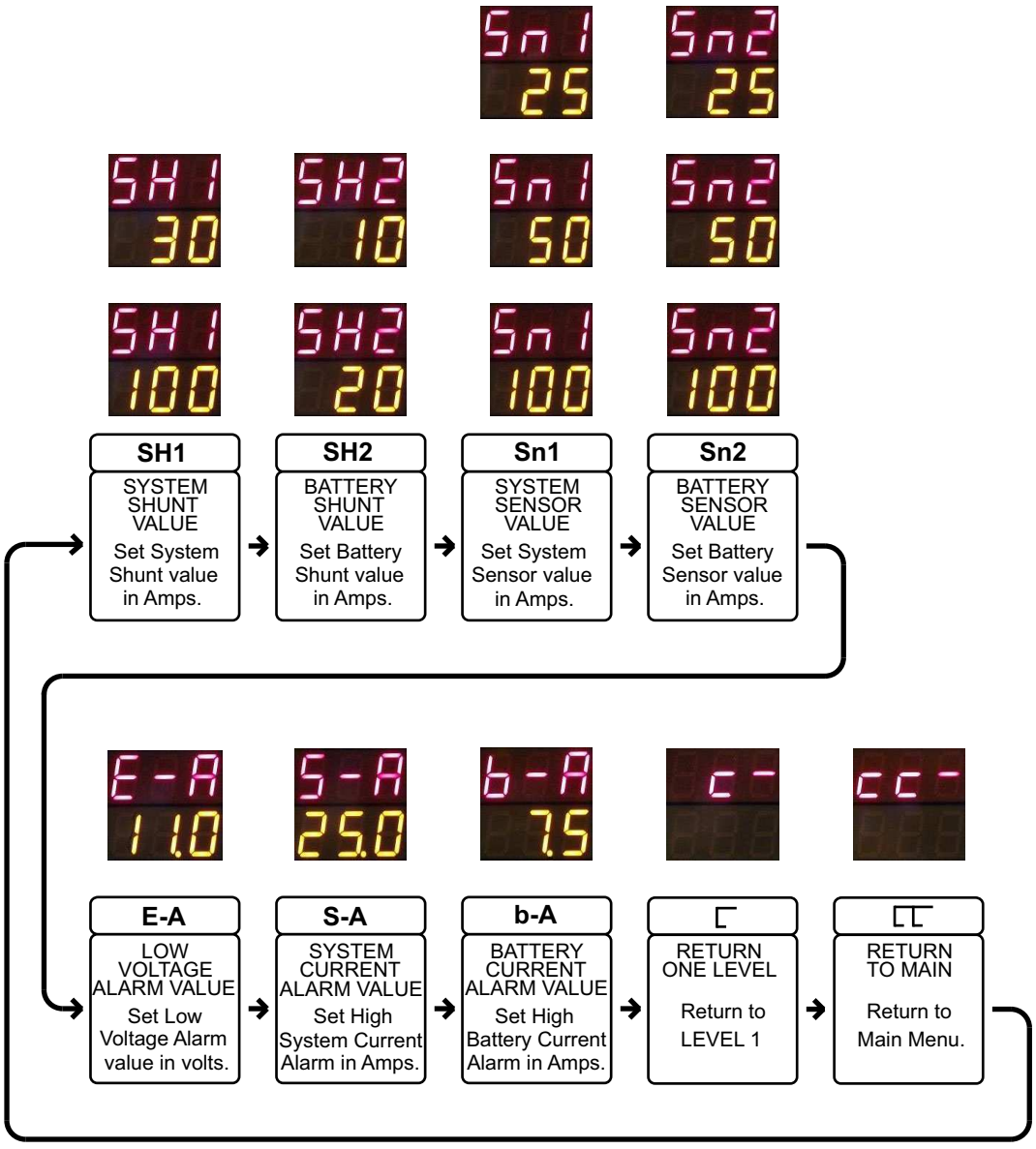
MENU LEVEL 1 - OPTION SETTINGS



MENU QUICK REFERENCE (CONT.)

Press and hold FUNC button 5 seconds to advance to MENU LEVEL 2

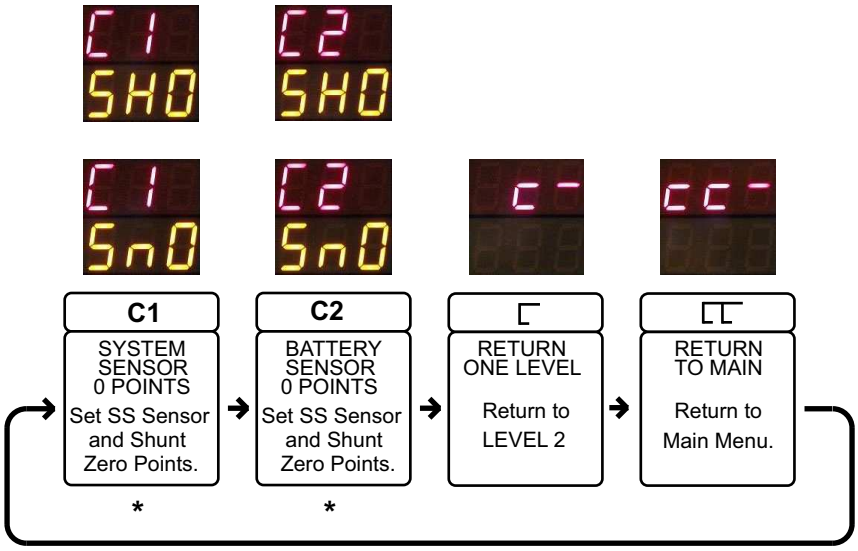
MENU LEVEL 2 - SENSOR VALUE SELECTIONS AND ALARMS



MENU QUICK REFERENCE (CONT.)

Press and hold FUNC button 5 seconds to advance to MENU LEVEL 3

MENU LEVEL 3 - SENSOR ZERO (0) SET POINTS



*** Zero Set Points for System and Battery sensors are as follows:**

1) (SH0) Shunt 0 (Zero) Current Point (0.0 mV)

2) (Sn0) Solid State Sensor 0 (Zero) Current Point

FUNCTIONS

MAIN MENU (MENU LEVEL 0) FUNCTIONS

S (SYSTEM CURRENT)

In this mode, System Voltage is displayed on the top (RED) digital display and System Current is displayed in Amperes on the bottom (ORANGE) digital display.

System Current is usually measured of the Master Switch.

B (BATTERY CURRENT)

In this mode, System Voltage is displayed on the top (RED) digital display and Battery Charging Current is displayed in Amperes on the bottom (ORANGE) digital display.

Battery Charging Current is measured between the Alternator and the Battery.

The photo at left shows negative 2.7 Amperes, indicating a battery discharge and possible failure of the alternator.

FUNC

Press and release
FUNC
to change from
S to B.

MENU LEVEL 1 FUNCTIONS

br (DISPLAY BRIGHTNESS CONTROL)

FUNC	▲ ▼	**ALM**	**FUNC**	**ALM**
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Use Up and Down buttons to select the brightness control mode.	Press ALM button to set and store the mode.	Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

The brightness of the digital display and the indicator LEDs can be set to 16 different levels and be controlled in 3 different modes. These modes are as follows:

E (EXTERNAL CONTROL VOLTAGE)

An external control voltage ranging from 0V to the supply voltage is applied to pin 3 of the Lower Electrical Connector. This voltage is sampled by the ESM-100 and its ratio to the Supply Voltage is calculated into 16 levels. This allows a single potentiometer to be connected between ground and the instrument power input and used as a brightness control, its center tap used as the pin 3 input. See the ELECTRICAL CONNECTIONS section of this manual for details of the control circuit.

FP (FRONT PANEL)

When the ESM-100 is operating in the ALT or MC mode, the UP and DOWN buttons are used to set the display brightness. Also see the AUTO DIMMER function.

PH (PHOTOCELL)

The display brightness is controlled automatically by the amount of ambient light seen by the photocell on the front of the instrument.

MENU LEVEL 1 FUNCTIONS - CONT.

Ad (AUTO DIMMER FUNCTION)

FUNC	**FUNC**	▲ ▼	**ALM**	**FUNC**	**ALM**
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and release FUNC button until the Ad function appears on the display.	Use Up and Down buttons to turn the Ad function ON and OFF.	Press ALM button to set and store the selection.	Press and release FUNC button until the Return To Main ⊏⊏ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

When the display brightness mode of the ESM-100 is set to FP (Front Panel) control, the photocell on the front panel can be used to automatically change the brightness of the digital display when lighting conditions change. When flying from low light (ie. clouds, dawn) to bright sunlight, the AUTO DIMMER function will raise the brightness of the digital display to a set level without the need to press the UP/DOWN buttons. When flying from bright light to low light (ie. dusk), the AUTO DIMMER function will lower the brightness of digital display to a set level. After the display brightness is changed with the AUTO DIMMER function, the display brightness can still be adjusted manually with the UP and DOWN buttons.

The 2 AUTO DIMMER modes are as follows:

Ad OFF — The display brightness will stay at the level selected by the UP/DOWN buttons and will not change as lighting conditions change.

Ad On — The display brightness will raise or lower to set levels when lighting conditions change.

MENU LEVEL 1 FUNCTIONS - CONT.

UPd (Display Update Period)

DEFAULT

FUNC	FUNC	▲ ▼	ALM	FUNC	ALM
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and release FUNC button until the UPd function appears on the display.	Use Up and Down buttons to set the Display Update Period in seconds.	Press ALM button to set and store the selection.	Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

The Electrical System Voltage and Current tend to stabilize when electrical loads are steady but they may still vary slightly. The Battery Charging Current should be at its maximum when the engine is first started and slowly lower as the battery is charged. The ESM-100 samples the System Voltage and the Current Sensors 250 times a second and displays a running average of their values. As the running average of these values change, the new running averages are immediately available to the digital displays. A digital display that updates with different values 250 times a second can be a distraction to a pilot. Therefore, the ESM-100 has a default setting to update its display once every 2.0 seconds. This update period can be modified from 0.5 seconds to 5.0 seconds in 0.5 second steps using the UPd function.

MENU LEVEL 1 FUNCTIONS - CONT.

CS1 Current Sensor 1 (System Current) Select

FUNC	FUNC	▲ ▼	ALM	FUNC	ALM
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and release FUNC button until the CS1 function appears on the display.	Use Up and Down buttons to select the type of current sensor.	Press ALM button to set and store the selection.	Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

1) OFF (OFF) The aircraft is not using a system current sensor.

2) SHUNT (SH)

The Shunt is the most common type of Current Sensor. It is usually a bar of metal with a precise resistance that drops a small voltage that is proportional electrical current. The ESM-100 is designed to use shunts with a standard voltage drop of 50.0 mV at their full rating. The ESM-100 can be used with 10A, 20A, 30A, 40A, 50A, 60A, 70A, 80A, 90A and 100A shunts.

3) SOLID STATE - Hall Effect (SEn)

This series of sensors is provided by Adaptive Intefaces and comes in 3 ranges: 25A, 50A and 100A. These sensors are powered by +5 V and placed around the current carrying wire to be measured. They output +2.50 V at zero (0.0 A) current plus a voltage that is proportional to the sensed current.

See the ELECTRICAL CONNECTIONS section of this manual for details on both these types of sensors.

MENU LEVEL 1 FUNCTIONS - CONT.

CS2 Current Sensor 2 (Battery Charging Current) Select

FUNC	FUNC	▲ ▼	ALM	FUNC	ALM
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and release FUNC button until the CS2 function appears on the display.	Use Up and Down buttons to select the type of current sensor.	Press ALM button to set and store the selection.	Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

1) OFF (OFF) The aircraft does not have a battery charging current sensor.

2) SHUNT (SH)

The Shunt is the most common type of Current Sensor. It is usually a bar of metal with a precise resistance that drops a small voltage that is proportional electrical current. The ESM-100 is designed to use shunts with a standard voltage drop of 50.0 mV at their full rating. The ESM-100 can be used with 10A, 20A, 30A, 40A, 50A, 60A, 70A, 80A, 90A and 100A shunts.

3) SOLID STATE - Hall Effect (SEn)

This series of sensors is provided by Adaptive Intefaces and comes in 3 ranges: 25A, 50A and 100A. These sensors are powered by +5 V and placed around the current carrying wire to be measured. They output +2.50 V at zero (0.0 A) current plus a voltage that is proportional to the sensed current.

See the ELECTRICAL CONNECTIONS section of this manual for details on both these types of sensors.

MENU LEVEL 1 FUNCTIONS - CONT.

dFd (Default Current Display Function)

FUNC	**FUNC**	▲ ▼	**ALM**	**FUNC**	**ALM**
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and release FUNC button until the **dFd** function appears on the display.	Use Up and Down buttons to set the dFd function to Sy or Ba.	Press ALM button to set and store the selection.	Press and release FUNC button until the Return To Main ⌐¯ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.

The user can set the ESM-100 to display either the System Current or the Battery Charging Current when the instrument initially turns on. This allows the user to see information they deem most important without the need for pressing any buttons.

The 2 Default Current Display modes are as follows:

Sy The display will show the system current when the ESM-100 powers on.

Ba The display will show the battery charging current when the ESM-100 powers on.

MENU LEVEL 2 - SENSOR VALUE AND ALARM SETTINGS

SH1 SHUNT 1 (SYSTEM CURRENT SHUNT) VALUE

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** and SH1 appear on the display, then release.

▲ ▼
Use Up and Down buttons to select the Shunt 1 value.

ALM
Press ALM button to set and store the selection.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

The SHUNT 1 VALUE can be set from 10 Amperes to 100 Amperes 5 A steps.

SH2 SHUNT 2 (BATTERY CHARGING CURRENT) VALUE

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and release FUNC button until the **SH2** function appears on the display.

▲ ▼
Use Up and Down buttons to select the Shunt 2 value.

ALM
Press ALM button to set and store the selection.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

The SHUNT 2 VALUE can be set from 10 Amperes to 100 Amperes in 5 A steps.

MENU LEVEL 2 - SENSOR VALUE AND ALARM SETTINGS (CONT.)

Sn1 SENSOR 1 (SOLID STATE SYSTEM CURRENT SENSOR) VALUE

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and release FUNC button until the **Sn1** function appears on the display.

▲ ▼
Use Up and Down buttons to select 1 of 3 Sensor values.

ALM
Press ALM button to set and store the selection.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

Sn2 SENSOR 2 (SS BATTERY CHARGING CURRENT SENSOR) VALUE

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and release FUNC button until the **Sn2** function appears on the display.

▲ ▼
Use Up and Down buttons to select 1 of 3 Sensor values.

ALM
Press ALM button to set and store the value.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

MENU LEVEL 2 - SENSOR VALUE AND ALARM SETTINGS (CONT.)

E-A (System Low Voltage Alarm)

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and release FUNC button until the **E-A** function appears on the display.

▲ ▼
Use Up and Down buttons to select the System Voltage Alarm Value.

ALM
Press ALM button to set and store the selection.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

The System Low Voltage Alarm level can be set from 9.0 V to 28.0 V in 0.5 V increments. If the system voltage drops below the set level for more than 2 minutes, the ESM-100 wil indicate an alarm condition. This function is always active.

S-A (System High Current Alarm)

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and release FUNC button until the **S-A** function appears on the display.

▲ ▼
Use Up and Down buttons to select the System Current Alarm value.

ALM
Press ALM button to set and store the value.

FUNC
Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM
Press the ALM button to return to the MAIN MENU.

The System High Current Alarm level can be set from OFF to 99.5 A in 0.5 A increments. If the measured system current exceeds the set level for more than 2 minutes, the ESM-100 will indicate an alarm condition.

MENU LEVEL 2 - SENSOR VALUE AND ALARM SETTINGS (CONT.)

b-A (Battery High Current Alarm)

FUNC

Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC

Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC

Press and release FUNC button until the **b-A** function appears on the display.

▲ ▼

Use Up and Down buttons to select the Battery Current Alarm value.

ALM

Press ALM button to set and store the value.

FUNC

Press and release FUNC button until the Return To Main ⊏⊐ symbol appears on the display.

ALM

Press the ALM button to return to the MAIN MENU.

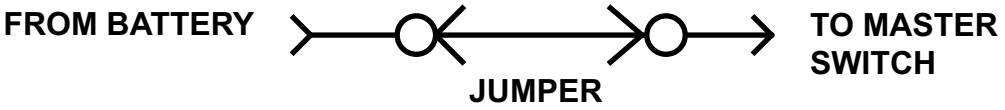
The Battery High Current Alarm level can be set from OFF to 20.0 A in 0.5 A increments. If the battery charging current exceeds the set level for more than 2 minutes, the ESM-100 will indicate an alarm condition. If the battery charging current is measured as any negative value, indicating a battery discharge, an alarm condition will be set.

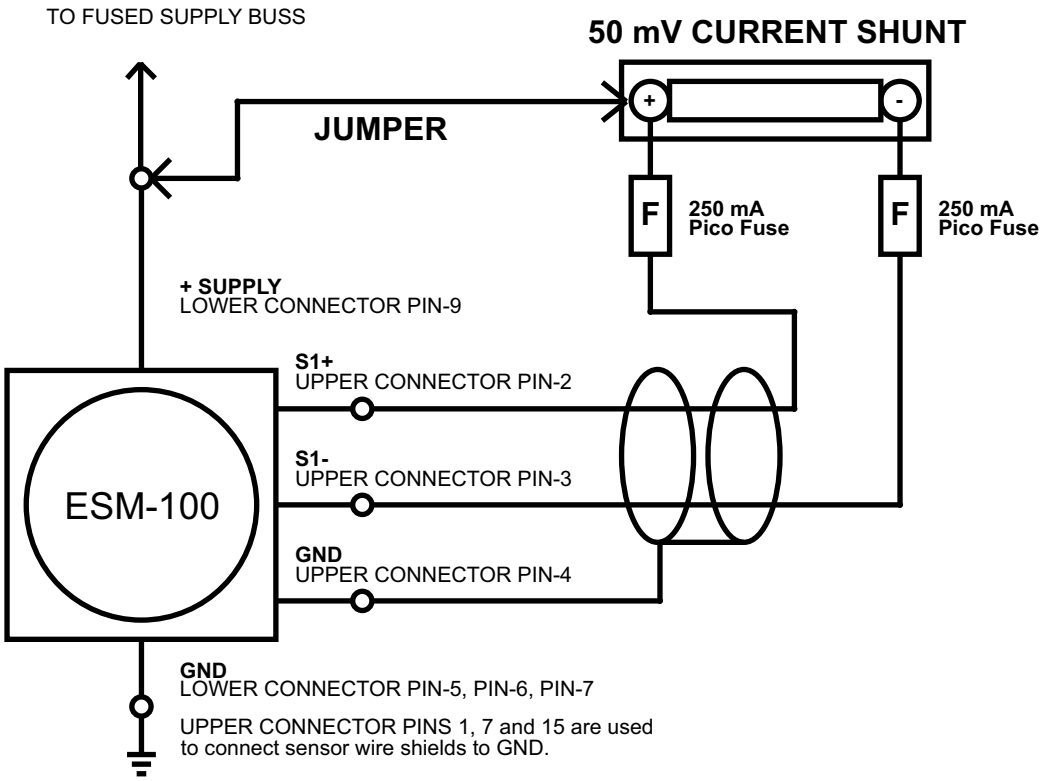
MENU LEVEL 3 - SENSOR ZERO SETTING

(C1 - SH0) SYSTEM CURRENT SHUNT ZERO SETTING

The Zero Points of the current sense circuits of the ESM-100 may drift slightly over time, requiring that a new zero-current reference point be set and stored in the instrument.

Setting the Zero Point on the Current Shunt requires that the shunt be removed from the electrical system. The positive, S1+, side of the shunt must be connected (by a jumper) to the +SUPPLY of the ESM-100 to set the Zero Point.





MENU LEVEL 3 - SENSOR ZERO SETTING

(C1 - SH0) SYSTEM CURRENT SHUNT ZERO SETTING (CONT.)

Once the ESM-100 is configured electrically, the System Current Zero Point is set with the following procedure:

FUNC
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC
Press and Hold FUNC button for 5 seconds until **L3** appears on the display, then release.

FUNC
Press and release FUNC button until the **C1** function appears on the Upper Display.

▲ ▼
Use Up and Down buttons to select **SH0** On the Lower Display.

ALM
Press ALM button to set the Zero Point.

* **FUNC**
Press and release FUNC button until the Return To Main ⊏⊏ symbol appears on the display.

* **ALM**
Press the ALM button to return to the MAIN MENU.

*
The ESM-100 can remain in Menu Level 3 if other zero points need to be set.

MENU LEVEL 3 - SENSOR ZERO SETTING

(C1 - Sn0) SYSTEM HALL EFFECT SENSOR ZERO SETTING

Setting the Zero Point on the System Hall Effect Sensor requires that the sensor be removed from around the power supply wire. Because the Sensor is powered by the ESM-100, no other electrical connections are needed.

FUNC

Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.

FUNC

Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.

FUNC

Press and Hold FUNC button for 5 seconds until **L3** appears on the display, then release.

FUNC

Press and release FUNC button until the **C1** function appears on the Upper Display.

▲
▼

Use Up and Down buttons to select **Sn0** On the Lower Display.

ALM

Press ALM button to set the Zero Point.

*
FUNC

Press and release FUNC button until the Return To Main ⊏⊏ symbol appears on the display.

*
ALM

Press the ALM button to return to the MAIN MENU.

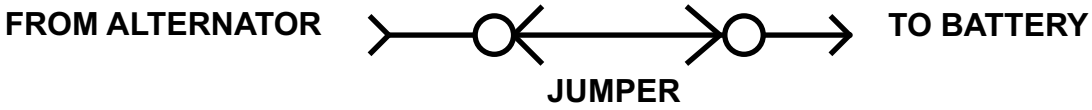
*
The ESM-100 can remain in Menu Level 3 if other zero points need to be set.

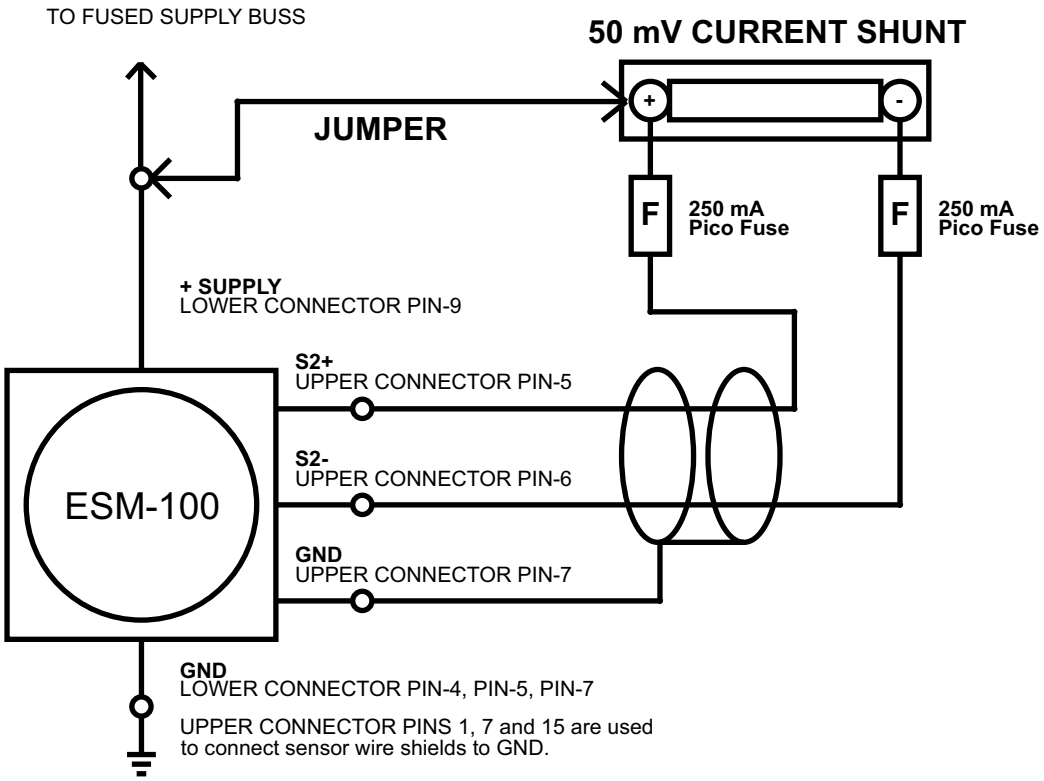
MENU LEVEL 3 - SENSOR ZERO SETTING

(C2 - SH0) BATTERY CHARGING CURRENT SHUNT ZERO SETTING

The Zero Points of the current sense circuits of the ESM-100 may drift slightly over time, requiring that a new zero-current reference point be set and stored in the instrument.

Setting the Zero Point on the Current Shunt requires that the shunt be removed from the electrical system. The positive, S2+, side of the shunt must be connected (by a jumper) to the +SUPPLY of the ESM-100 to set the Zero Point.





MENU LEVEL 3 - SENSOR ZERO SETTING

(C2 - SH0) BATTERY CHARGING CURRENT SHUNT ZERO SETTING (CONT.)

Once the ESM-100 is configured electrically, the Battery Charging Current Zero Point is set with the following procedure:

FUNC	FUNC	FUNC	FUNC	▲ ▼	ALM
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.	Press and Hold FUNC button for 5 seconds until **L3** appears on the display, then release.	Press and release FUNC button until the **C2** function appears on the Upper Display.	Use Up and Down buttons to select **SH0** On the Lower Display.	Press ALM button to set the Zero Point.

* FUNC	* ALM	
Press and release FUNC button until the Return To Main ⊏⊏ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.	

*
The ESM-100 can remain in Menu Level 3 if other zero points need to be set.

MENU LEVEL 3 - SENSOR ZERO SETTING

(C2 - Sn0) BATTERY CHARGE CURRENT SENSOR ZERO SETTING

Setting the Zero Point on the Battery Charge Hall Effect Sensor requires that the sensor be removed from around the Alternator-to-Battery supply wire. Because the Sensor is powered by the ESM-100, no other electrical connections are needed.

FUNC	FUNC	FUNC	FUNC	▲ ▼	ALM
Press and Hold FUNC button for 5 seconds until **L1** appears on the display, then release.	Press and Hold FUNC button for 5 seconds until **L2** appears on the display, then release.	Press and Hold FUNC button for 5 seconds until **L3** appears on the display, then release.	Press and release FUNC button until the **C2** function appears on the Upper Display.	Use Up and Down buttons to select **Sn0** On the Lower Display.	Press ALM button to set the Zero Point.

* FUNC	* ALM	
Press and release FUNC button until the Return To Main ⊏⊏ symbol appears on the display.	Press the ALM button to return to the MAIN MENU.	

*
The ESM-100 can remain in Menu Level 3 if other zero points need to be set.

ELECTRICAL CONNECTIONS

POWER INPUT

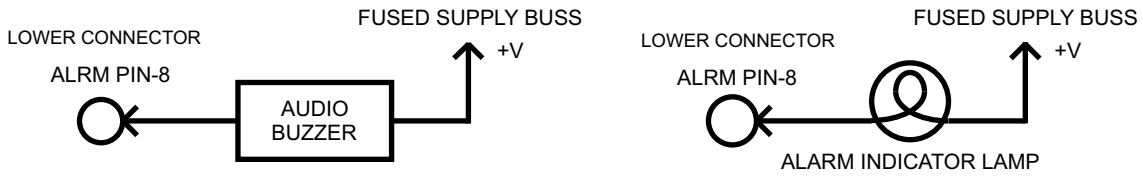
The ESM-100 is designed to operate from a supply voltage of 10V to 30V with a maximum current draw of 350 mA. Power is supplied to the instrument through Pin-9 of the Lower Connector. The ESM-100 uses an internal switching voltage regulator so so no external components are needed when changing from a 12V to a 28V electrical system.

GROUNDS

The case of the ESM-100 is connected to the electrical ground of the instrument. Electrical ground connections are provided to the ESM-100 on pin 4 and pins 8-15 of the Upper Connector and pins 5, 6 and 7 of the Lower Connector. These pins are all connected internally on the ESM-100.

ALARM OUTPUT

The Alarm Output is on Pin-8 of the Lower Connector. This output is used with the Alarm function to drive a warning lamp or audio alarm. The output uses an open collector transistor that can sink up to 300 mA. The pull-up voltage of the load can be 40 Vdc or less. The output is decoupled by a 100 pF capacitor to ground.



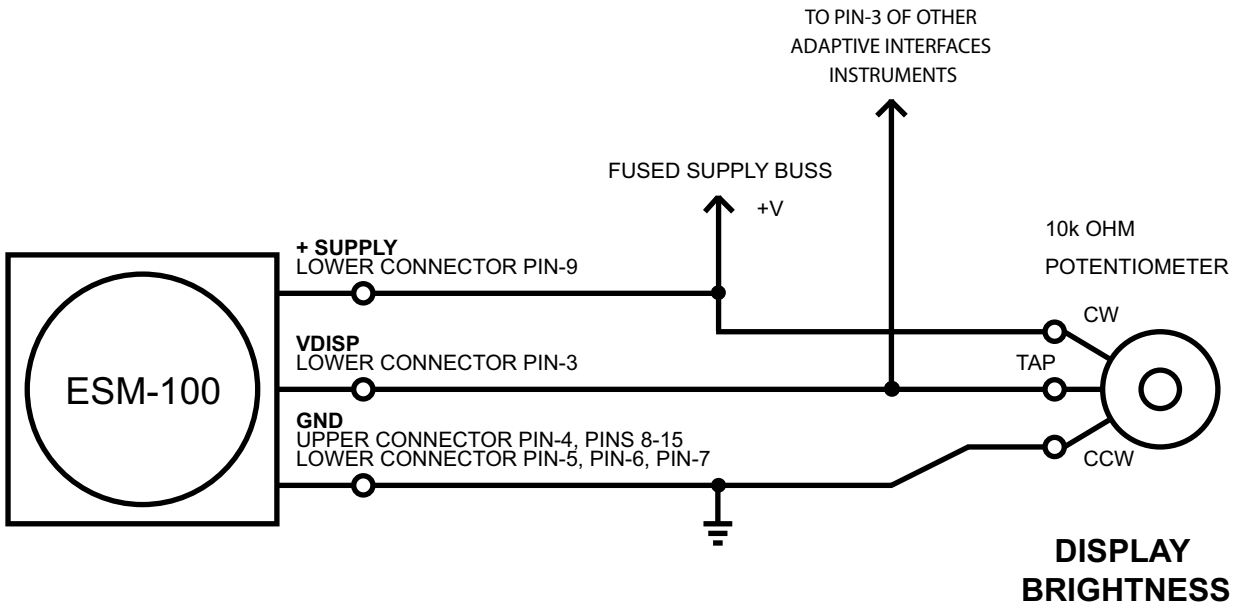
ELECTRICAL CONNECTIONS - CONT.

DISPLAY BRIGHTNESS CONTROL INPUT (VDISP)

The brightness of the digital display and indicator LEDs can be contolled by an external voltage applied to Pin-3 of the Lower Connector when the brightness control mode is set to "E" (See MENU LEVEL 1 FUNCTIONS). In this mode, the display brightness is set by ratio of the voltage at VDISP to the Supply Voltage. This way, a single potentiometer can be placed between ground and the supply voltage with its center tap wired to the VDISP input. Changes or fluctuations of the supply voltage (as can happen when lights and avionics are switched on and off) will not affect the brightness of the display. The display brightness can be set to 16 different levels. The display brightness is limited to 16 levels by the instrument's display driver chip.

To use this function, a linear potentiometer, valued between 10k ohms and 20k ohms, is placed between the instrument supply and ground. The center tap of the potentiometer is wired directly to Pin-3 of the Lower Connector. The input resistance of this input is 200k ohms and the input is protected by Schottky diodes. A single potentiometer can be used to control several Adaptive Interfaces instruments. It is suggested that this input not be connected to existing dimmer controls on the panel as the display brightness is usually the opposite of that desired for nighttime instrument lighting (bright in sunlight - dim at night).

WIRING EXAMPLE



ELECTRICAL CONNECTIONS - CONT.

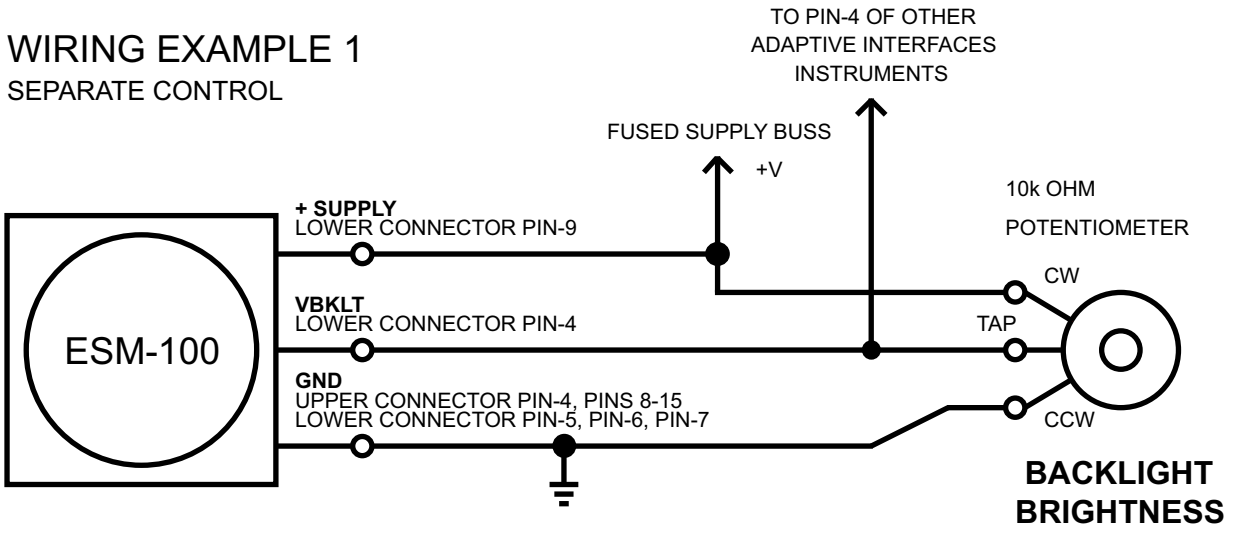
BACKLIGHT BRIGHTNESS CONTROL INPUT (VBKLT)

The ESM-100 has an integrated, white LED, backlight for its front panel graphics. The only way to control the brightness of the backlight is to apply a control voltage to Pin-4 of the Lower Connector (VBKLT). The backlight brightness can be set to 256 levels by the ratio of the voltage at VBKLT to the Supply Voltage. This way, a single potentiometer can be placed between ground and the supply voltage with its center tap wired to the VBKLT input. Changes or fluctuations of the supply voltage (as can happen when lights and avionics are switched on and off) will not affect the brightness of the backlight.

To use this function, a linear potentiometer, valued between 10k ohms and 20k ohms, is placed between the instrument supply and ground. The center tap of the potentiometer is wired directly to Pin-4 of the Lower Connector. The input resistance of this input is 200k ohms and the input is protected by Schottky diodes. A single potentiometer can be used to control several Adaptive Interfaces instruments. The VBKLT input can also be wired into the existing panel lighting circuit.

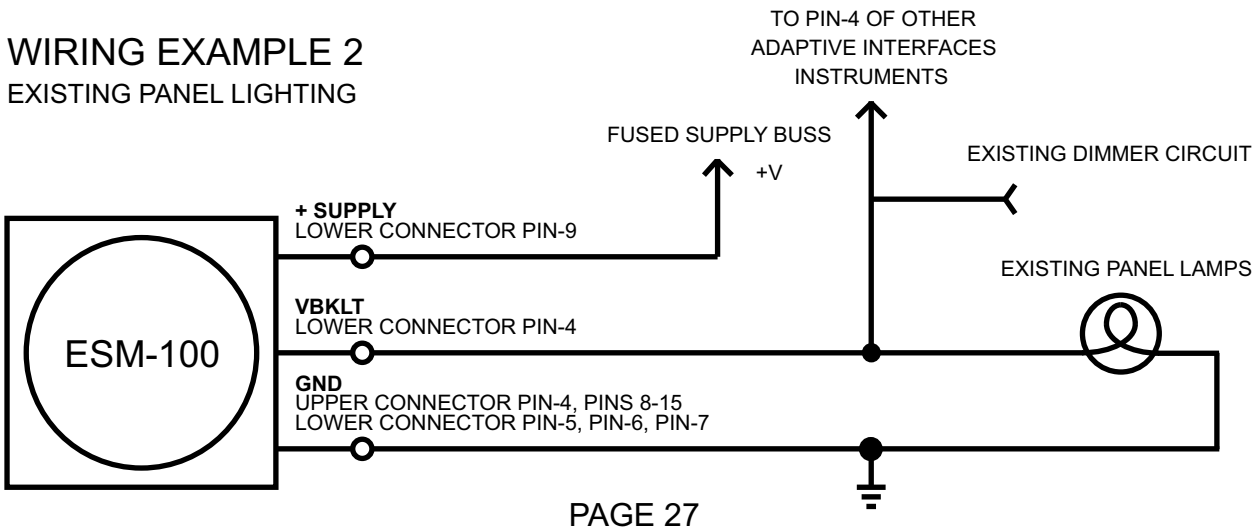
WIRING EXAMPLE 1

SEPARATE CONTROL



WIRING EXAMPLE 2

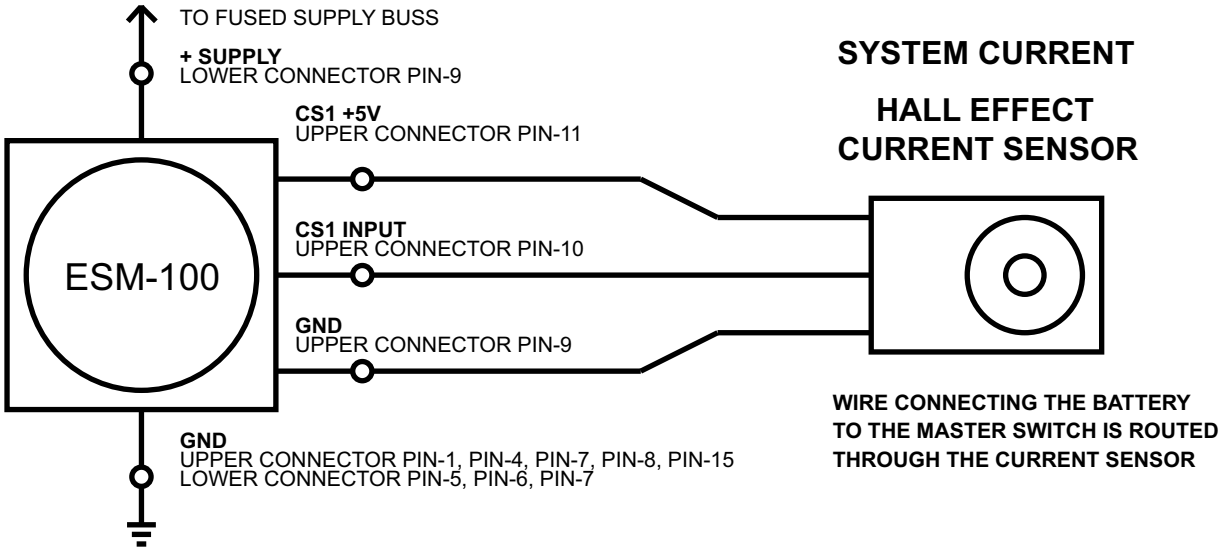
EXISTING PANEL LIGHTING



ELECTRICAL CONNECTIONS - CONT.

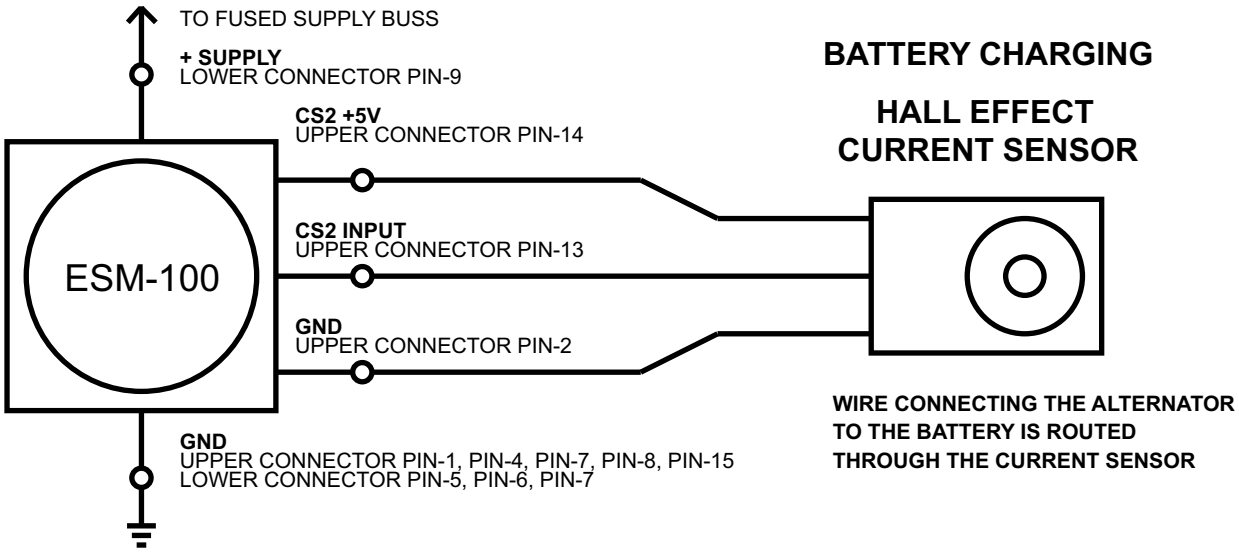
SYSTEM CURRENT - HALL EFFECT SENSOR

The Hall Effect Current Sensor, available from Adaptive Interfaces in 25A, 50A and 100A ranges, is self-contained and powered directly by the ESM-100. To measure total System Current, the sensor is placed around the wire going from the Battery to the Master Switch.



BATTERY CHARGING CURRENT - HALL EFFECT SENSOR

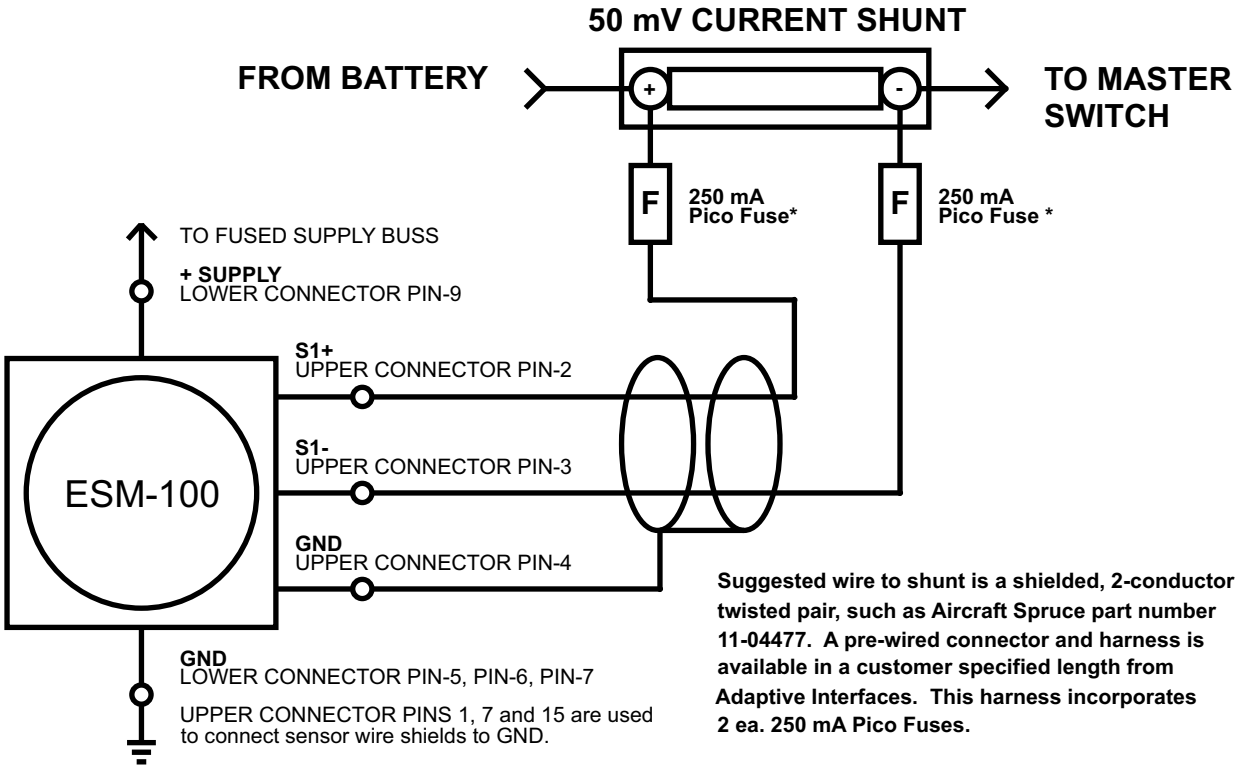
To measure the Battery Charging Current, the sensor is placed around the wire going from the Alternator to the Battery.



ELECTRICAL CONNECTIONS - CONT.

SYSTEM CURRENT - CURRENT SHUNT (50 mV TYPE)

The ESM-100 is designed to use 50 mV type Current Shunts in 10A to 100A (in 10A steps) ranges. To operate properly, the S1+ input must be connected to battery power.

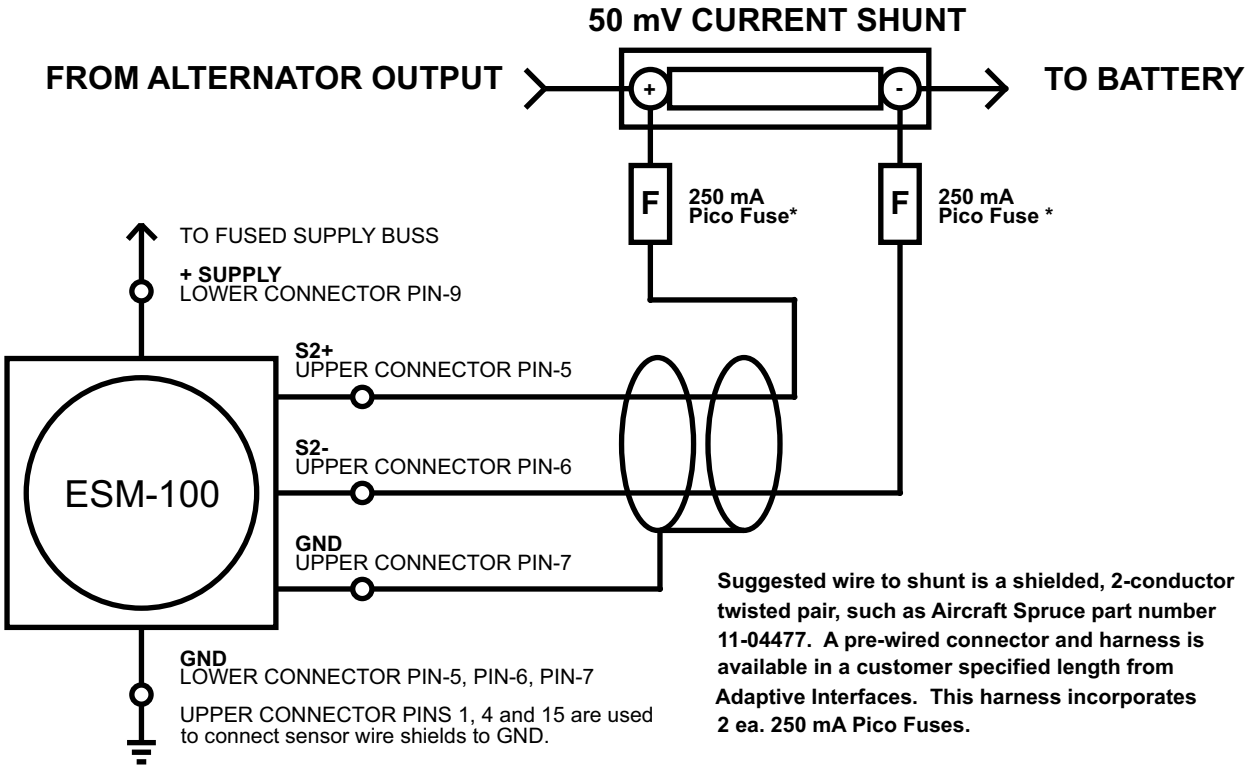


*** The use of these fuses is strongly suggested to protect the inputs of the ESM-100.**

ELECTRICAL CONNECTIONS - CONT.

BATTERY CHARGING CURRENT - CURRENT SHUNT (50 mV TYPE)

The ESM-100 is designed to use 50 mV type Current Shunts in 10A to 100A (in 10A steps) ranges. To operate properly, the S2+ input must be connected to the alternator output.

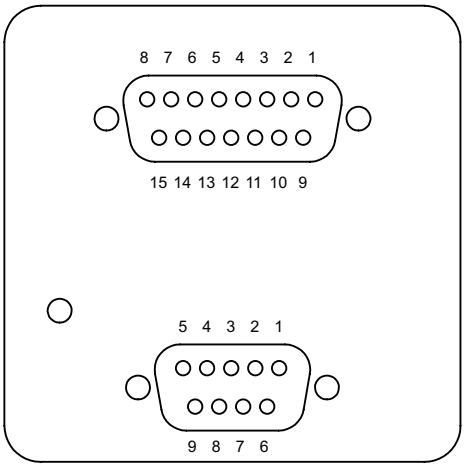


*** The use of these fuses is strongly suggested to protect the inputs of the ESM-100.**

ESM-100 BACK PANEL

UPPER CONNECTOR

1) GND	4) GND	7) GND	10) CS1 INPUT	13) CS2 INPUT
2) S1+ INPUT	5) S2+ INPUT	8) GND	11) CS1 +5V	14) CS2 +5V
3) S1- INPUT	6) S2- INPUT	9) GND	12) GND	15) GND



LOWER CONNECTOR

1) N/C
2) N/C
3) VDISP (DISPLAY BRIGHTNESS CONTROL VOLTAGE INPUT)
4) VBKLT (BACKLIGHT BRIGHTNESS CONTROL VOLTAGE INPUT)
5) GND (GROUND)
6) GND (GROUND)
7) GND (GROUND)
8) ALRM (ALARM OUTPUT - OPEN COLLECTOR)
9) + POWER INPUT