

***AISA* Airborne Imaging Spectrometer**

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AISA cabling and interfaces

AISA+ and AISA Eagle

Ver 3.1

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AISA cabling and interfaces

The purpose of this document is to illustrate how to unpack AISA Airborne Imaging Spectrometer shipment and connect required cabling to operate the system.

1. Unpacking the shipment

The AISA system is delivered to a customer in two hard transport cases (figure 1). Total weight of all system components and the cases is approximately 60 kg.



Figure 1. AISA sensor packed in a hard transport case.

Carefully unpack each component from the case. Check that all the equipment and cabling is in perfect condition after transportation to the customer. In case not, please notify the manufacturer immediately.

2. AISA sensor head cabling

AISA sensor head is presented in figure 2. All the required connections to the sensor head are made using back panel. A set of supplied cables is labeled with the same text that is in the panels to help in making proper connections.



Figure 2. AISA sensor head.

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A closer look at the AISA sensor connectors is shown in figure 3. The power to the sensor head is supplied via connector POWER. The other end of the cable is connected to power connector box SENSOR PWR (see chapter 6 for details).

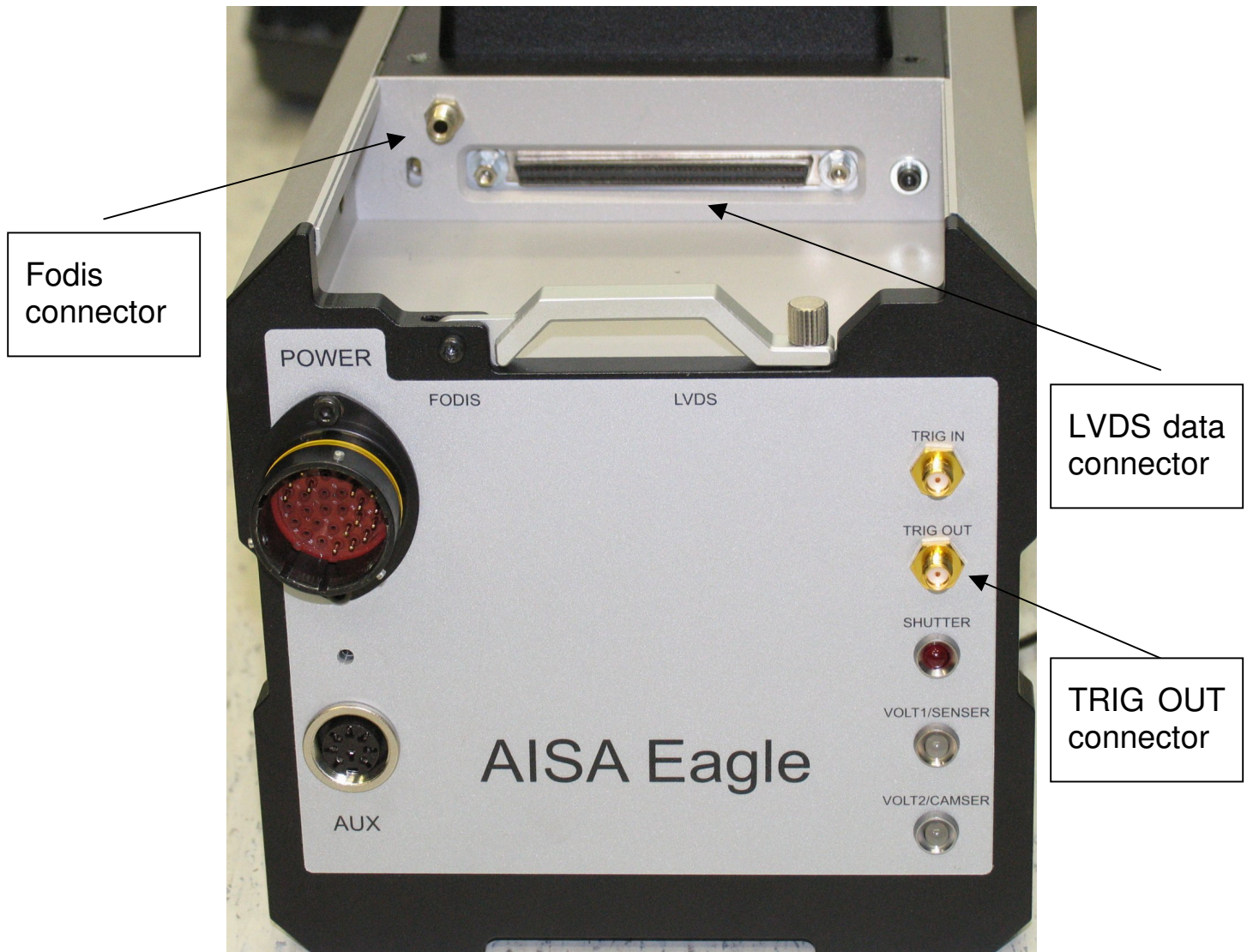


Figure 3. AISA sensor connector details.

On top left side of sensor connectors is a FODIS connector. It's important to keep the protective cap on always, when the fiber is not connected. Also keep fiber connector free of dust and dirt to prevent scratches.

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LVDS connector is a 100-pin SCSI connector for the digital signals. A SCSI extension cable is used to connect AISA sensor to PC data acquisition card marked with label DAQ.

TRIGIN and TRIGOUT connectors for camera trigger signals are also provided, and TRIGOUT is connected to the GPS/INS wiring harness box.

AUX connector is used for connecting to the GPS/INS wiring harness/navsync box or a scanner.

3. Downwelling irradiance sensor FODIS

The outlook of Fiber-Optic Downwelling Irradiance Sensor FODIS is like a GPS antenna. However, this is an optical sensor and the signal is delivered via a fiber optic cable.

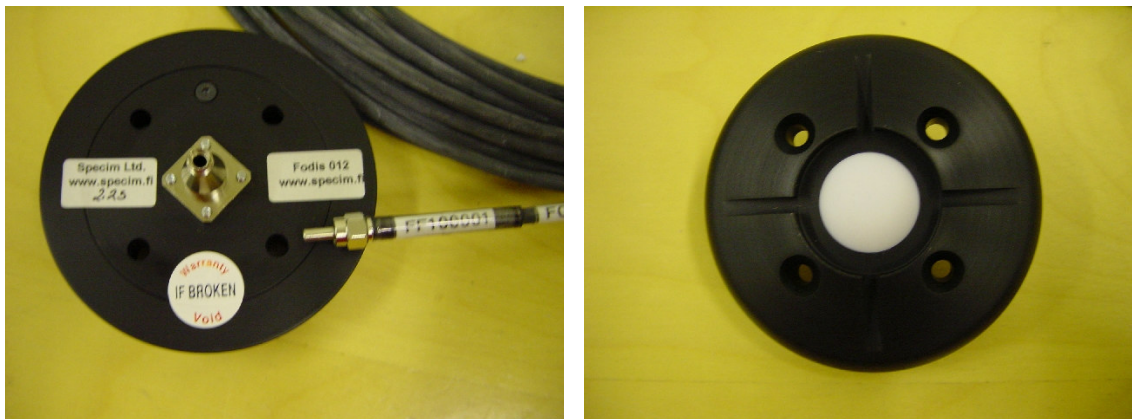


Figure 4. FODIS bottom (left) and top (right) view.

This cable is very sensitive to micro fractions. Do not twist or bend the cable. **Minimum bending radius is approximately 30 cm (1 foot).** This must be respected also during the mounting FODIS head into tight places and when feeding the cable thru holes. Note also that the FODIS sensor is part of AISA calibration. In case a FODIS head or fiber is changed, the system has to be recalibrated.

4. AISA DAQ PC

AISA data acquisition (DAQ) PC is a rugged industrial type computer. Computer has preinstalled Windows 2000 operating system.

In a standard configuration an internal IDE disk is included for system software. An additional hot-swap removable SATA disk is provided for data storage to allow option for quick changing of data disks during field missions.



Figure 5. AISA DAQ computer front and back view.

All the connections to PC are made via the back panel (figure 5, right). Note that also a 24 VDC power to the monitor is supplied from the PC for flight operations.

An illustrative image of PC back plane is shown in figure 6. Power to PC is supplied via PC PWR connector from AISA power connection box (see chapter 7).

There is also supplied a support plate for the LVDS DAQ cable to protect the connector and frame grabber board from external stress.

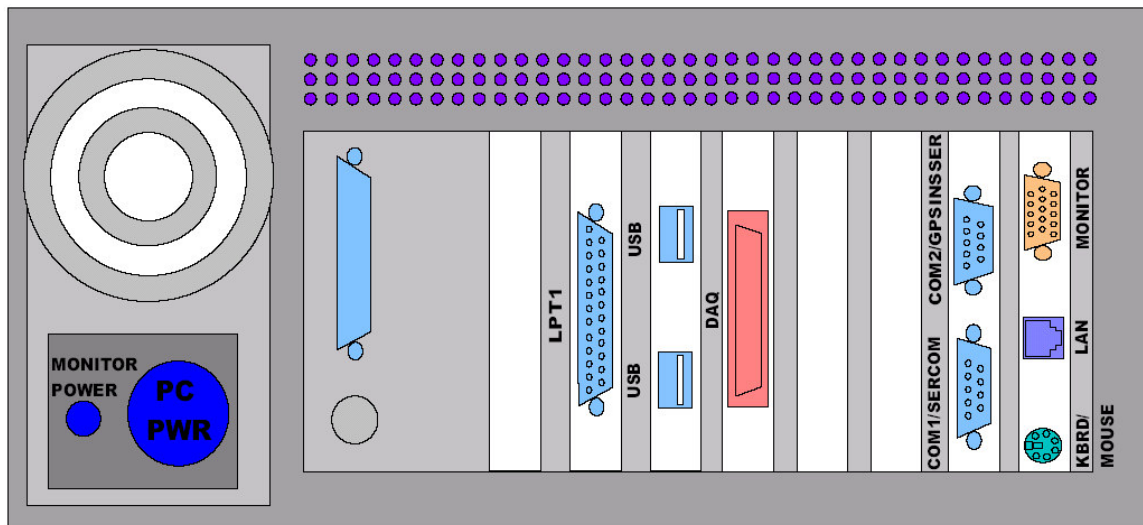


Figure 6. AISA DAQ computer back plane connectors.

Note that PC is DC powered. In no condition should AC power be applied to power connector (PC PWR). A supplied cable also marked as PC PWR is connected to this bayonet connector. Other end of the cable is connected to PC PWR of power connector box.

AISA sensor head data cable should be connected to 100-pin SCSI connector marked with label DAQ in PC and LVDS in AISA sensor head connector panel.

Monitor is connected to SBC board on-board graphics connector marked MONITOR and power supplied to it via preinstalled power cable that fits to MONITOR POWER plug on PC.

LAN interface is available for data download. Keyboard (KBRD) and mouse (MOUSE) share the same PS/2 connector. A cable to connect both simultaneously is supplied with the system (chapter 5).

The cable that is connected to CMBSER connector at powerbox, splits into two cables marked SERCOM and GPSINSSER that are connected to the PC COM1/SERCOM and COM2/GPSINSSER ports.

LPT1 port of the computer is not used in AISA system, but is available for custom connections.

5. Monitor, keyboard and mouse

The monitor supplied with the AISA system is a 500 nits 15" high brightness daylight readable 1024 x 768 XGA monitor. It should be connected to a connector marked MONITOR and the power supplied to it via preinstalled power cable marked MONITOR POWER connected to PC.



Figure 7. Rugged monitor.

The monitor has image adjustment buttons in the front.

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Monitor back view is shown in figure 8. Analog video cable is connected to VGA input. Preinstalled power cable is simply connected to MONITOR POWER connector on PC. Removing preinstalled power cable is not recommended. If removed, it should be connected to GND (blue wire) and +24V (Brown wire) at the back of the monitor.

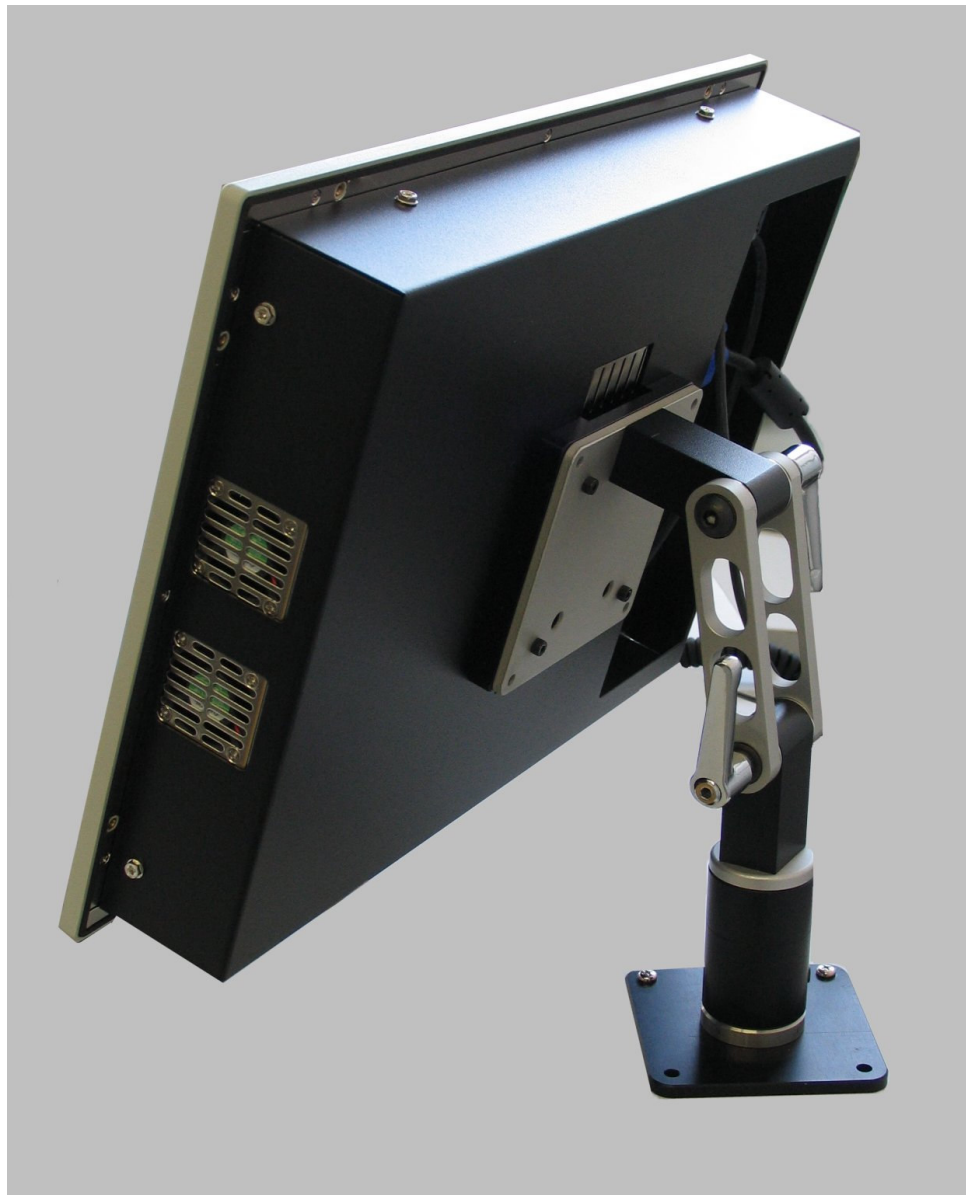


Figure 8. Monitor back view and mounting arm.

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The keyboard supplied with the system is a small lightweight compact keyboard (figure 9). This keyboard can be connected to a single PS/2 connector with a mouse when using a PS/2 cable splitter.

Keyboard and mouse connector is marked KBRD/MOUSE on DAQ PC back plane. It's also possible to use built-in mouse on the keyboard without the splitter cable connected directly to KBRD/MOUSE connector on PC. Keyboard has back light option for use in darkness. This feature can be toggled ON/OFF from bottom left corner using I-O key.



Figure 9. Keyboard and keyboard/mouse connector splitter.

6. GPS/INS wiring harness/navsync

A GPS/INS wiring harness/NavSync box is supplied with the system to connect and synchronize AISA sensor, GPS/INS unit and host PC.

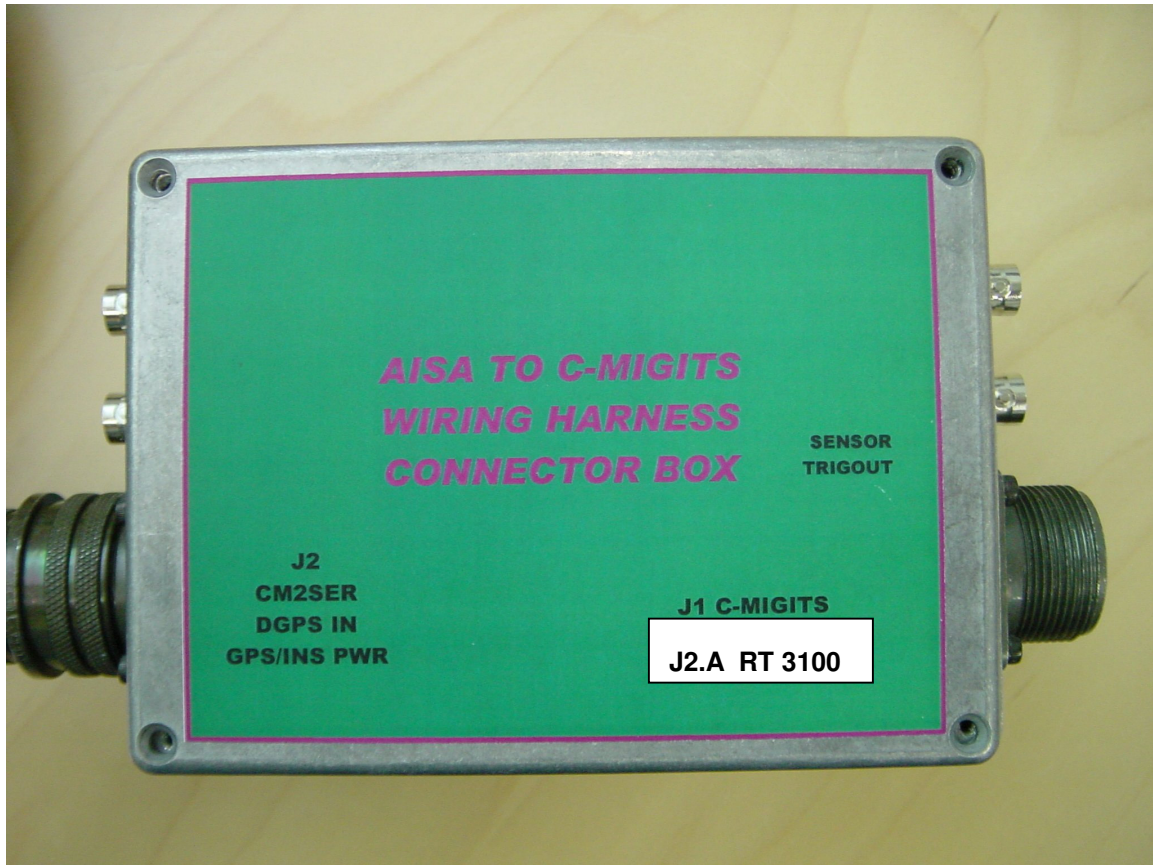


Figure 10. GPS/INS NavSync box.

Connector J2 has a 10-way panel socket. In the other end of wiring harness connected to J2 are two connectors labeled NAVSH and DGPS IN. NAVSH must be connected to AISA Plus/Eagle back panel AUX connector and optional differential GPS may be connected to DGPS system, if available. This feature improves navigation data accuracy in some cases, but is not normally used by default.

J1 is connected to the GPS/INS sensor and SENSOR TRIGOUT is connected to the trigout connector of the AISA sensor.

NOTE: In RT3100 GPS/INS the 10-way socket connector is labeled J2 and the RT3100 connector on navsync box is labeled J2.A.

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Note that the GPS antenna is not connected via this box, but the cable is interfaced directly to GPS/INS using a 50 ohm RF interface SMA connector. The antenna can be passive or active. However, in case an active antenna is used, it's pre-amplifier power requirements must be low (0.1 W max, e.g. 20 mA @ 5VDC) in case GPS/INS is used to power up the preamplifier via the antenna cable RF lead. The other possibility is to use a shared GPS antenna, in which case the other GPS receiver powers up the pre-amplifier and the antenna signal to GPS/INS is connected via an antenna signal splitter or DC block.

Each connection must be carefully studied prior to supplying power to the units. **Especially the right power supply polarity must be checked for the GPS/INSI, because it has no internal reverse polarity protection.**

7. Power connection box

A power supply is supplied with the system to provide correct voltage for each part of the system. All required cabling is supplied. Only a connection to power source is required to be made. All the connectors are polarized, but **there is no internal reverse polarity protection for input.** The person who makes the connection to the aircraft or instrument power is responsible for checking proper voltage polarity when connecting power to power input PWR IN with supplied input wire (labeled 18-36 VDC) and it's leads. Input leads are clearly marked with (+++) and (---) for positive and negative (GND) voltages, respectively.

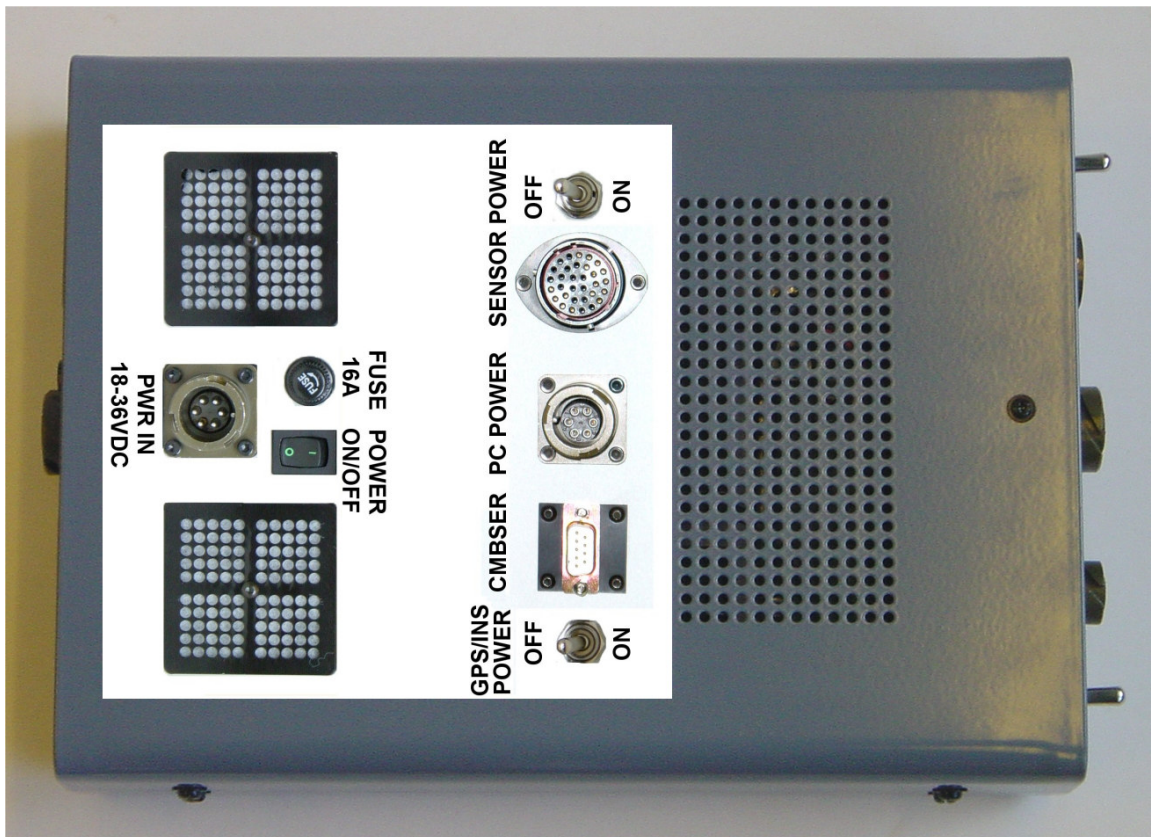


Figure 11. AISA power connector box in (left) and out (right.)

Always make all the cabling connections ready before connecting power to the input of power connection box. A user-supplied connector should be used. It is recommended that power rating and polarity is always double-checked with a multimeter before

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making connection to the instrumentation and switching on the power.

Input side panel of power connection box is shown on figure 12. This includes power connector for system power and a master switch for system power. Operating voltage must be from 20 to 30 Volts DC. Typical power requirement is 150 W with a 15" monitor.



Figure 12. Input side panel of AISA power connector box.

There is a fuse protection for power module. This is a 16A 20 mm x 5 mm fuse. A spare fuse is supplied with the system. In case a fuse is blown, check carefully all the connections before replacing the fuse and retrying. Never use a fuse with higher current rating than specified above or bypass the fuse by any means.

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Output panel side of power connector box is shown on next figure. Two of the outputs have a switch to allow power connection to subunits separately. There is no switch for PC in the power box since the PC has it's own power button. **Start up PC first all the way and then power up GPS/INS and finally sensor head to reduce the current peak during startup.** The power module is well capable to start up all components at the same time, but in that case it momentarily draws as much as 10-11A from the source, which could cause problems. Sequential start-up as described above helps to keep the current below 8A at 24 V voltage at all times. ON/OFF position is clearly marked above the panel. Power lead connectors are labeled CMBSER, PC POWER and SENSOR POWER for GPS/INS unit, PC and sensor power, respectively.

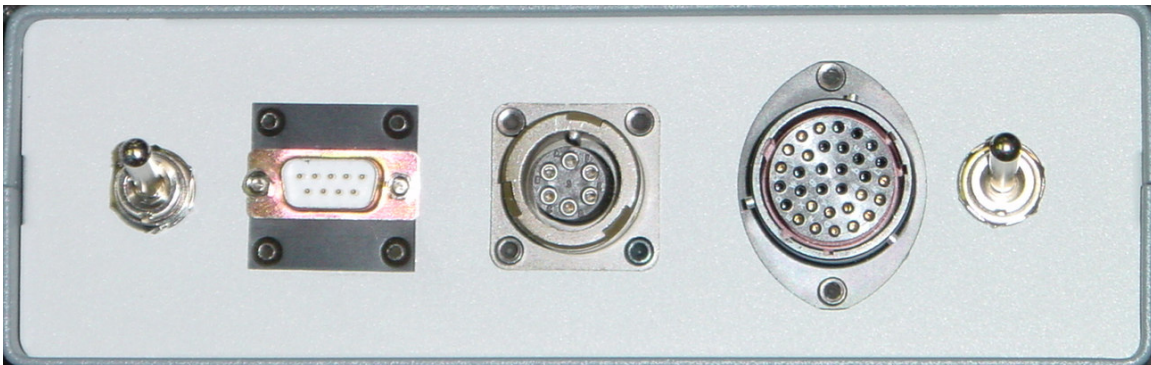


Figure 13. Output side panel of AISA power connector box

8. Cable connections summary

The following is a brief summary on how to make cable connections. More detailed information is available on previous chapters.

A. Sensor head

Connect

- FODIS fiber to FODIS connector (NOTE! Optical fiber handling precautions, chapter 3)
- Other end of FODIS fiber to FODIS head (NOTE! Optical fiber handling precautions, chapter 3)
- Check that power switch for SENSOR POWER is off at the power box
- Sensor head power cable POWER to sensor head POWER
- NAVSH cable to AUX connector
- Trigger cable to sensor TRIGOUT
- DAQ board input cable (100-pin SCSI) to LVDS connector
- Remove lens thread protective cap from sensor head and attach lens

B. PC Back Panel

Connect

- DAQ board input cable (100-pin SCSI) to DAQ connector
- Connector SERCOM from power box CMBSER to COM1/SERCOM
- Connector GPSINSSER from power box CMBSER to COM2/GPSINSSER
- Monitor cable to MONITOR, other end to monitor VGA INPUT

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- Monitor power cable to MONITOR POWER and other end to monitor 24 VDC IN (This cable is preinstalled to monitor and does not need to be removed from the back of the monitor).
- Keyboard / mouse adapter to KBRD/MOUSE and keyboard to it's input connector on other end of adapter
- PC Power cable to PC PWR connector

Optional:

- Connect mouse to the other port of splitter if used. If not used do not use splitter and connect keyboard directly.
- If you are using LAN, connect your network cable to LAN.
- LPT1 port can be used as standard parallel port.

C. GPS / INS

Connect

- GPS/INS connector to GPS/INS unit
- GPS antenna cable to GPS antenna connector at GPS/INS unit
- Other end of GPS cable to GPS antenna

D. GPS / INS Wiring Harness Box

Connect

- AMP 10-pin female connector labeled GPS/INS to box J2.A male
- Wiring harness (NAVSH, DGPS IN) AMP 10-pin male connector to box J2 female
- Sensor trigger cable from AISA sensor TRIGOUT to connector labeled SENSOR TRIGOUT

E. AISA Power connection box

Connect

- Sensor head power cable SENSOR PWR to box SENSOR POWER
- PC power cable PC PWR to box PC POWER
- CMBSER serial cable to CMBSER
- Input adapter cable labeled PWR IN to box PWR IN

F. Interfacing to aircraft or instrument power

Connect

- Connect user-supplied connector to AISA power input 18-36 VDC positive (+++) and negative (---) leads following safety precautions.
- Use preferably a polarized connector to avoid reverse polarity protection accidents

Note! BEFORE SWITCHING ON POWER, CHECK ALL THE CONNECTIONS CAREFULLY