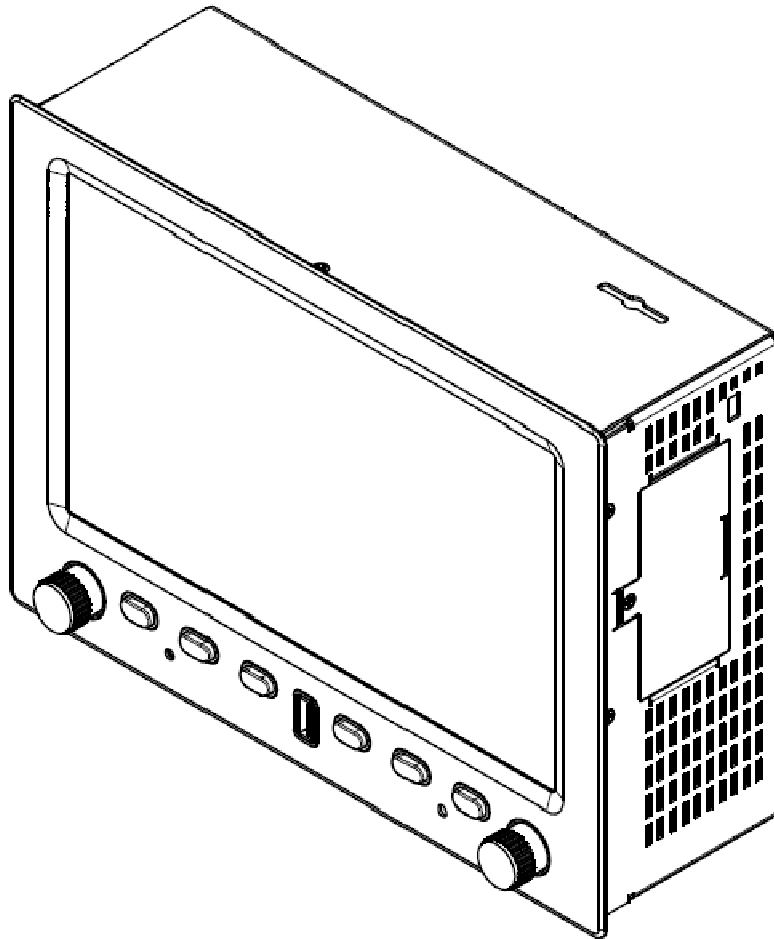


INTEGRA



Installation Manual

TL-6860



P/N: TLX-6860X-DI-001-PrA

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All information in this User's manual is subject to change without prior notice.

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2 General description

2.1 General Information


The INTEGRA stores general information. The pilot and/or owner of the aircraft is responsible for verifying that this information is accurate and complete. The pilot and/or owner is further responsible, on a regular basis, for maintaining this information and insuring that it is up to date and accurate. If the pilot and/or owner of the aircraft is unable or unwilling to do this the, files must be deleted.

When the installation is finished, inspect the system for loose fittings, connections, clamps, probes and inspect for leaks, chafing, obstructions, heat damage and anything that may cause unsafe flight before the 1st run-up, after the 1st run-up and after the first flight. The INTEGRA allows the pilot to enter checklists, and general information through the USB port. This data must be verified for its accuracy (by the pilot) before it is used.

Before allowing the aircraft to be flown, verify the instrument markings displayed on the INTEGRA screens are accurate with the aircraft's POH (Pilot's Operating Handbook) for every function displayed on the INTEGRA. Before allowing anyone to operate the aircraft read the User Manual including Notices therein. Keep the User Manual in the aircraft at all times.

2.2 Limited Warranty

This manual contains important information that may affect the safety of the pilot, passengers, aircraft, the operation of the system or time to install the system. You **MUST** read the manual prior to installing this system. Any deviation from these installation instructions is the sole responsibility of the installer and should be done in accordance with AC 43.13. Read the Warranty/Agreement. There is information in the Warranty/Agreement that may alter your decision to install this product. If you do not accept the terms of the Warranty/Agreement, do not install this product. This product may be returned for a refund. Contact TL elektronik Inc. for details.

 **WARNING:** If the installer does not have the skills, knowledge, tools, equipment or facility, to perform and determine whether the installation of this product is safe, reliable and accurate and to determine whether this product is operating properly after installation, **DO NOT INSTALL THIS PRODUCT**. If the owner/pilot and/ or installer are unwilling to take the responsibility for the installation and operation of this product, **DO NOT INSTALL THIS PRODUCT**. This product may be returned for a refund. Contact TL elektronik Inc. for details.

- ⓘ NOTE:** By installing this product, the aircraft owner/pilot and installer agree to hold TL-elektronic Inc. in no way responsible for monetary compensation, including punitive damages for any incident, harm and/or damage associated with this product. If you do not agree to the above, DO NOT INSTALL THIS PRODUCT. This product may be returned for a refund. Contact TL elektronik Inc. for details.
- ⓘ NOTE:** TL-elektronic Inc. is not liable or responsible for a pilot's action or any situation that results in personal injury, property damage, missed commitments, lack of use of an aircraft or any expenses incurred due to: product failure, inaccuracy in displayed data or text files, display or display format issues, software bugs or problems, upgrade or customization issues, misinterpretation of the display, warning and/or limit settings, calibration problems, installation issues (leaks, incorrect wiring, obstructions, damage to aircraft or components, incorrect installation of any parts, wrong parts, parts that don't fit, etc.) or any other issues related to the installation or operation of this product. All of the above are solely the pilot's and/or installer's responsibility. The pilot must understand the operation of this product before flying the aircraft. The pilot will not allow anyone to operate the aircraft that does not know the operation of this product. The pilot will keep the instrument Operating Instructions in the aircraft at all times.
- ⚡ WARNING:** Do not install a non-certified INTEGRA in a certified aircraft.
- ⚡ WARNING:** Before starting the installation make sure the unit will fit in the location you intend to install it without obstructing the operation of any controls.

3 Technical Specifications

Physical characteristic

Width	240.8 mm	9.480"
Height	178 mm	7.008"
Depth	61.5 mm	2.421"
Panel rectangle hole	233.8x172 mm	9.205"x6.772"
Weight without battery	1000 g	2.20 lb
Weight with battery	1100 g	2.43 lb

General Specifications

Operating Temperature Range	- 20°C to +60°C
Humidity	95% non-condensing
Altitude Range	10000 meters max (32808 feet max)
Power Range	10.0 to 32.0 Volts
Max. Signalization	30 Volts, 1 Ampere
Power Consumption	0.95 Ampere @ 14VDC without ext. sensors 1.73 Ampere when battery is charging
Vibration	5 to 500 Hz
Show Rate (LCD Refresh)	15 fps depends on volume of information displayed

Long-term Memory and communication

Storing Rate	0.1 to 60 seconds user selectable
Memory Capacity	Scheck®method
Data Saved Endurance	30 years
Rolling Memory life-time	100 000 hours @ 1 second storing rate

Communication

USB 1.1	12 Mb/s
USB 2.0	480 Mb/s
CAN BUS	1 Mb/s

Display parameters

Resolution	800x480 pixels
Brightness	800 cd/m2

Memory Card

Type	INTEGRA support SD and SDHC memory card
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Audio Input/Output

Transceiver input line	0.2 to 2 Volts (typ. 0.5 V)@1kHz – input impedance 600 Ω
Voice warning output line	typ. 300 mV@1kHz – output impedance 600 Ω
Audio output line	typ. 300 mV@1kHz – output impedance 600 Ω

Backlight control

Manual control	turn knob
Automatic control	sun sensor
External control	5/12/24 Volts (max. 32 Volts)

4 Install Recommendation

4.1 Introduction

Careful planning and consideration are required to achieve the desired performance and reliability from the INTEGRA.

4.2 Rack Consideration

Plan a location that gives the pilot complete and comfortable access to the entire INTEGRA and so that it is plainly visible from the pilot's perspective. Check that there is adequate depth for the rack in the instrument panel. A place away from heating vents or other sources of heat generation is optimal.

4.3 Installation into Panel

⚡ WARNING: Connect the cables into the connector.

⚡ WARNING: If possible, always use insulated wires connect to connect the Intercom so that you prevent possible interference from other equipment, which could result in interference in the headphones.

The diagram below shows the outside dimensions of the INTEGRA. Note that the instrument and tray extend about 61.5 mm or 2.421" behind the panel. Use the dimensions found on the diagram to plan for the space required by the instrument. Take the following considerations into account when selecting a mounting location for the INTEGRA. Avoid placing the instrument near heater vents or any source of extremely hot or cold air. Air surrounding the INTEGRA during operation may be no warmer than 60°C.

Plan a panel location that allows convenient viewing of the instrument with no obstruction. When flying straight and level, the panel angle from vertical may not be greater than +/- 30 degrees.. To mount the INTEGRA, you must make a rectangular cut out in your panel. Ensure that the dimensions of the cut out are: 9.205" = 233.8 mm wide and 6.772" = 172 mm tall. Place the INTEGRA-series mounting tray behind the cut out. Secure it to your panel by Riveting or Screws. Riveting is recommended, but drilling holes for mounting screws and nuts will work as well.

⚡ WARNING: Avoid applying paint to the mounting rack. The thickness of a coat of paint may distort the rack dimensions.

ⓘ NOTE: When mounting, the INTEGRA frame will not be flush with rack mounting screws. The screws will be exposed after mounting the INTEGRA. Before painting it is necessary to apply putty around the screws.

Upon securing the mounting rack to the back of your panel, slide the INTEGRA into it.

4.4 Recommended Wiring Practices

For all electrical connections, use correct wiring techniques, taking care to properly insulate any exposed wire or cables. A short circuit between any of the wires may cause damage to the INTEGRA and/or your aircraft. Make all connections to your harness before connecting it into any of the components of the system. Do not make connections while INTEGRA is turned on or power is applied at any point in the system. We recommend that all wire you use also meets 22 AWG Mil Standard MIL-W-22759/16; – with the exception of the thermocouple harnesses. When using any pre-manufactured harness, verify that each pin has continuity with the expected wire on the wiring diagram. This test can be easily done with a multimeter. When verifying harnesses. Use the wiring charts and diagrams in this guide. Use appropriate strain relief at all junctions between wires and connectors. We recommend that you secure all wires at regular intervals along wiring runs to accommodate vibration effects.

4.5 Power Requirements

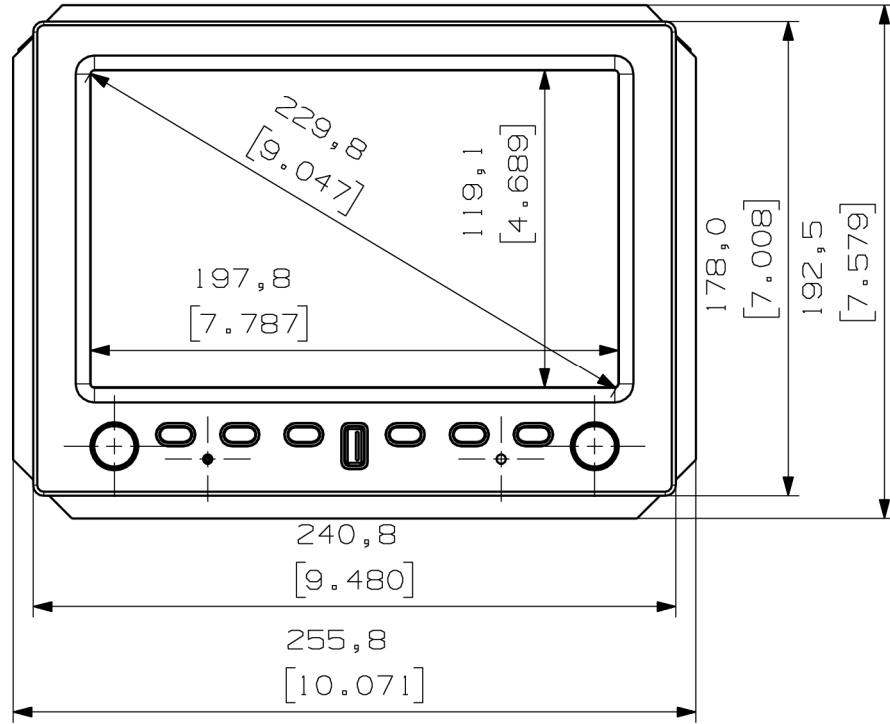
22 AWG wire is normally sufficient for the power supply and grounding, but we recommend that you consult a wire sizing chart and determine the size required for the wire routing in your particular aircraft. Ensure that the power supply include a circuit breaker

4.6 Wiring Overview

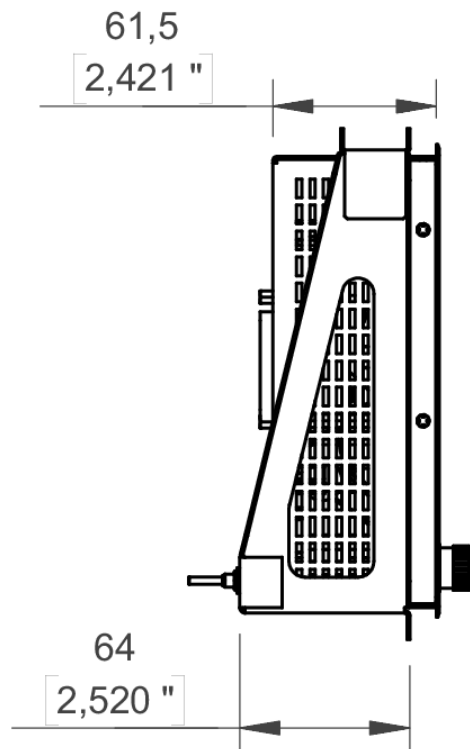
The INTEGRA power requirement is as low as 3 amps in a 12/24 volt system. And therefore you can use a 3-amp circuit breaker. See the technical specification chart for details.

5 Mechanical Drawing

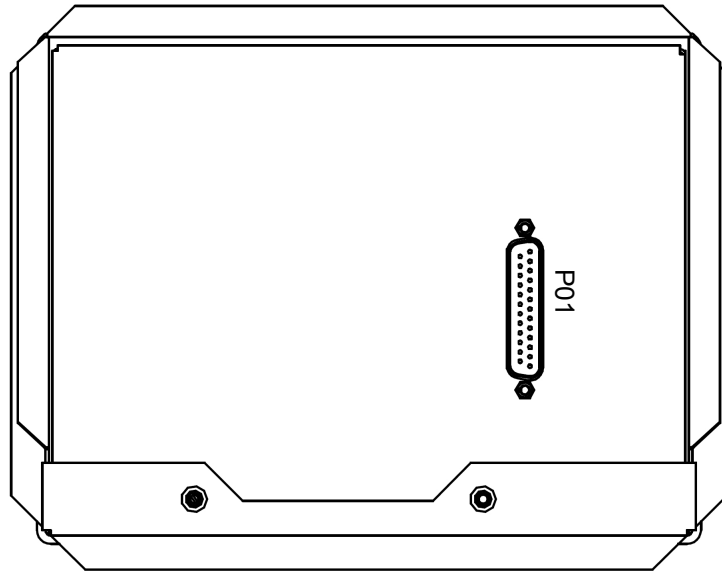
5.1 Front View



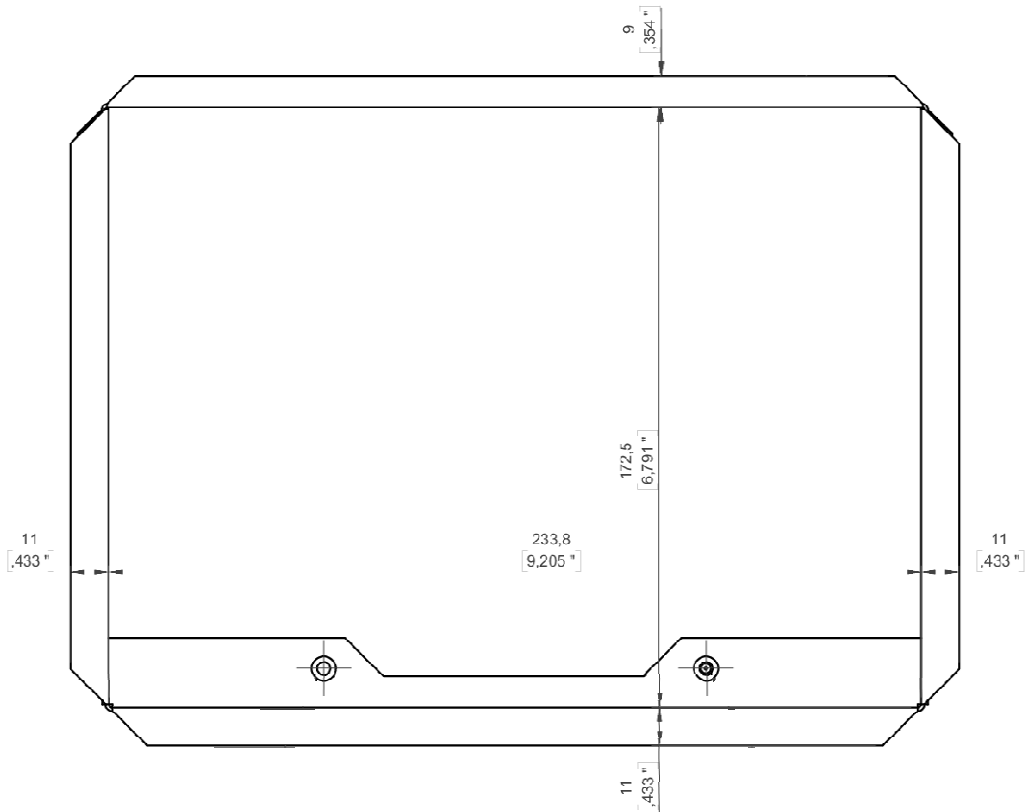
5.2 Side View



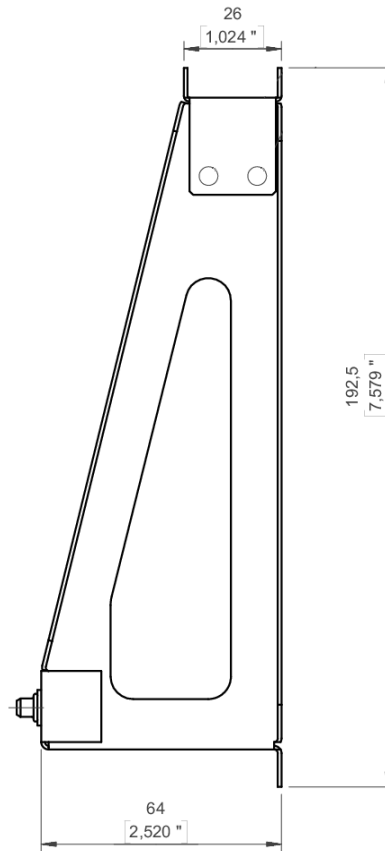
5.3 Rear View



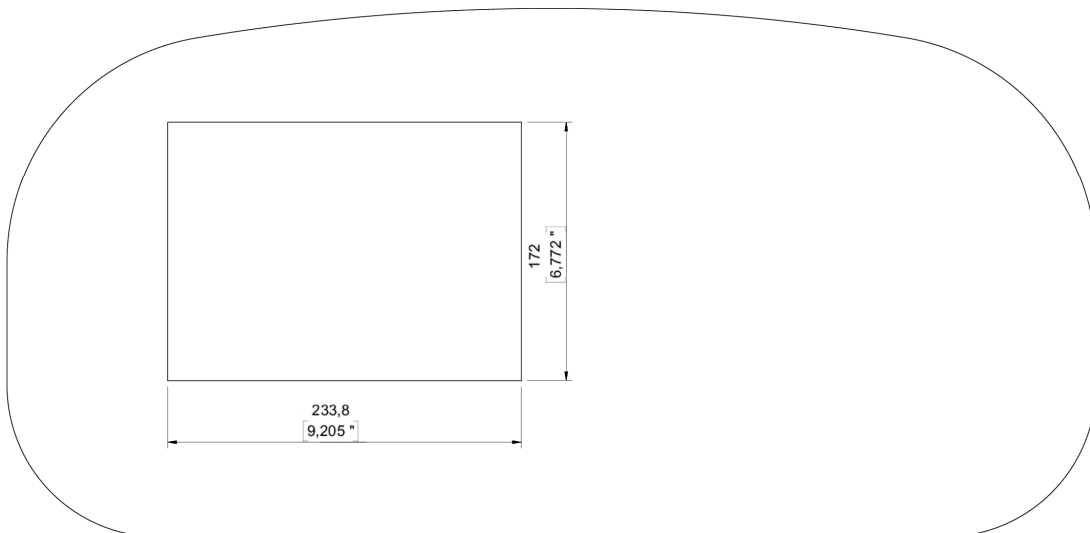
5.4 Front View of Mounting Rack



5.5 Side View of the Mounting Rack

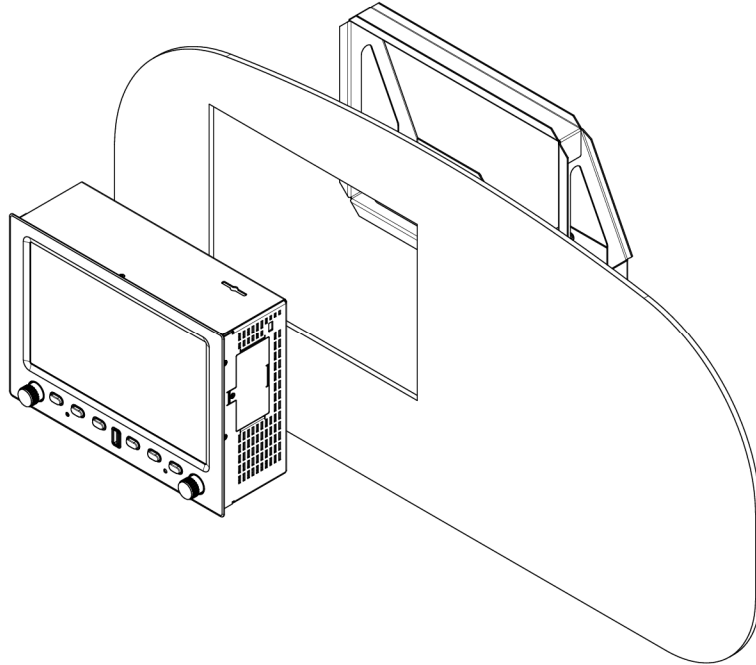


5.6 Panel Cutout



NOTE: For more information about installation into the panel look at chapter 4.3

5.7 INTEGRA Mounting Diagram



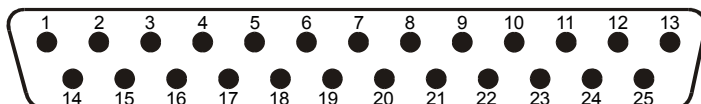
i **NOTE:** For more information about installation into the panel look at chapter 4.3

6 Electrical Drawing

6.1 PIN FUNCTION list

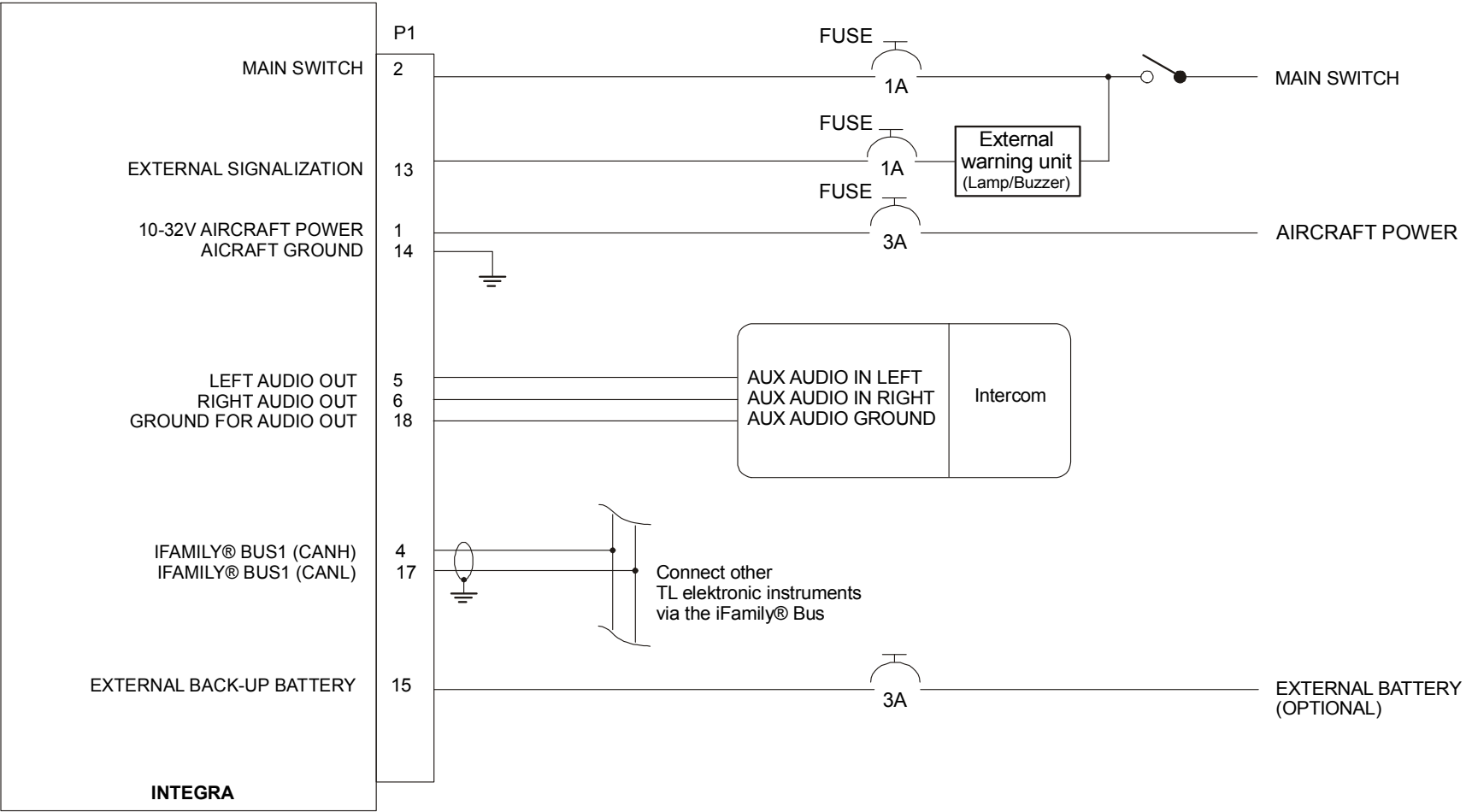
Main Connector P01 – type: D-SUB25 – Male (connector on INTEGRA)

Pin	Pin Name	I/O
1	Aircraft Power (10 to 32V)	In
2	Main switch (10 to 32 V)	In
3	N/A	--
4	iFamily® Bus1 (CANH)	I/O
5	Audio out - Left (HI - pilot headphones or IC)	Out
6	Audio out - Right (HI - pilot headphones or IC)	Out
7	N/A	--
8	N/A	Out
9	N/A	Out
10	N/A	Out
11	N/A	Out
12	N/A	Out
13	External Signalization	In
14	Aircraft Ground	--
15	External Back-Up battery (10 to 32 V)	In
16	N/A	--
17	iFamily® Bus1 (CANL)	I/O
18	Ground for audio out	Out
19	N/A	I/O
20	N/A	Out
21	N/A	Out
22	N/A	Out
23	N/A	Out
24	N/A	In
25	Ground	--



notation of pins D-SUB 25 Male connector

6.1.1 Power Signalization, Transceiver and iFamily® Interconnect

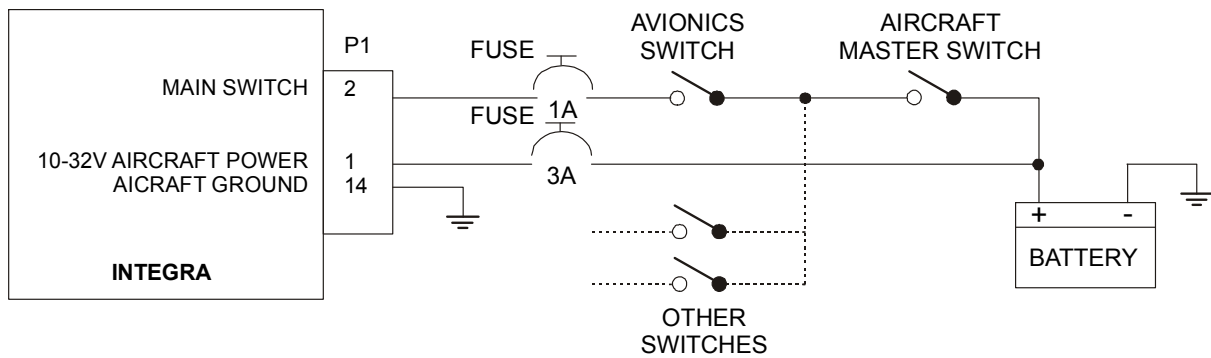


6.2 Recommended connections

6.2.1 Possibilities of Power Supply connection

The following possibilities of power supply connection are applied in case the backup battery of Integra is not connected.

6.2.1.1 Mostly recommended option



NOTE: Protection by fuse of pin no.2 is recommended as it is shown on picture. The reason is protection against accidental short circuit caused by connector manipulation or failure of cable insulation.

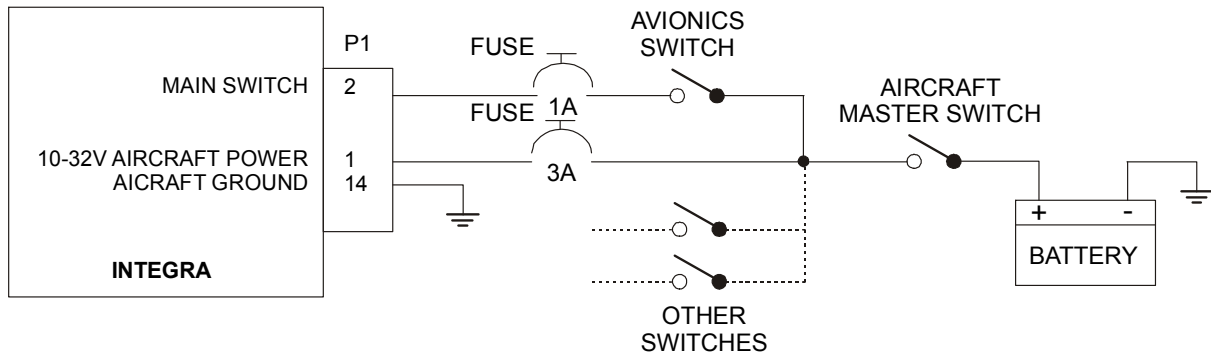
Advantage of this option:

The Integra Quick Start function is available for this option of power supply connection. With this function the Integra can perform quick switch on in 2 seconds after Aircraft Master Switch and Avionics Switch is ON.

Disadvantage of this option:

The Integra is permanently consumes power of 0.5 mA of aircraft battery due its standby state.

6.2.1.2 Recommended option



NOTE: Protection by fuse of pin no.2 is recommended as it is shown on picture. The reason is protection against accidental short circuit caused by connector manipulation or failure of cable insulation.

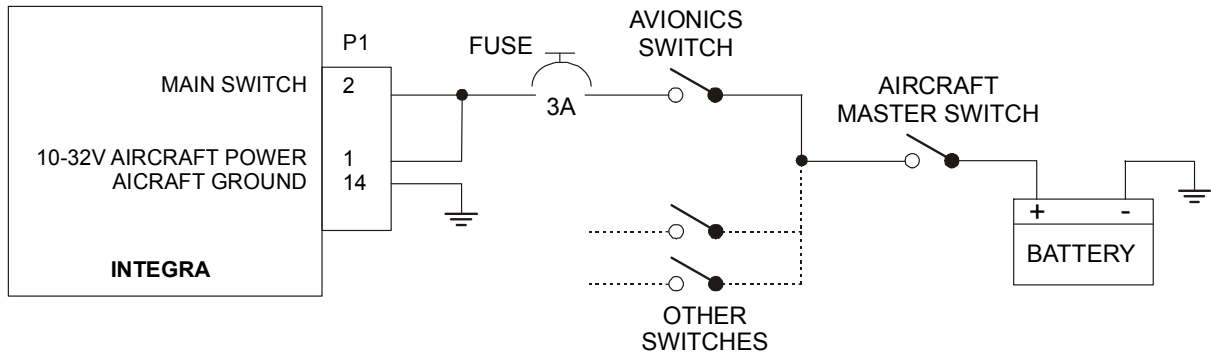
Advantage of this option:

When the Avionics Switch disconnects the pin no.2, the Integra will detect off-state and will be switched off by regular way in 5 seconds. Then the Integra power supply could be disconnected without any harm by Aircraft Master Switch.

Disadvantage of this option:

If the Integra power supply is disconnected by Aircraft Master Switch sooner than in 5 seconds, the latest records in memory could be damaged and therefore they could not be available for inspection. This does not apply to Crash Memory.

6.2.1.3 The least convenient option



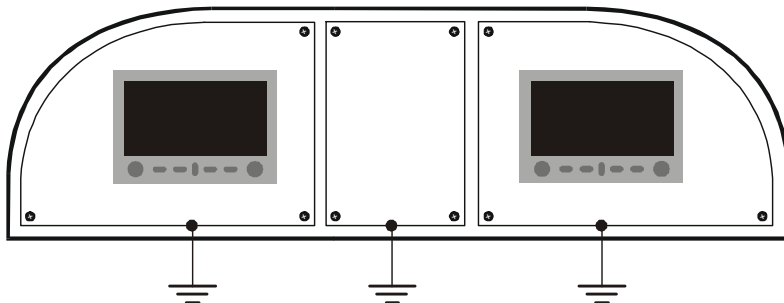
Advantage of this option:
It's simple.

Disadvantages of this option:

The switch (Avionics Switch or Aircraft Master Switch) disconnects the Integra from power supply.

This can result in error of data storage. In case of the error, the sequence of latest records in memory could be damaged and therefore it could not be available for inspection. This does not apply to Crash Memory.

6.2.2 Possible connection to frame



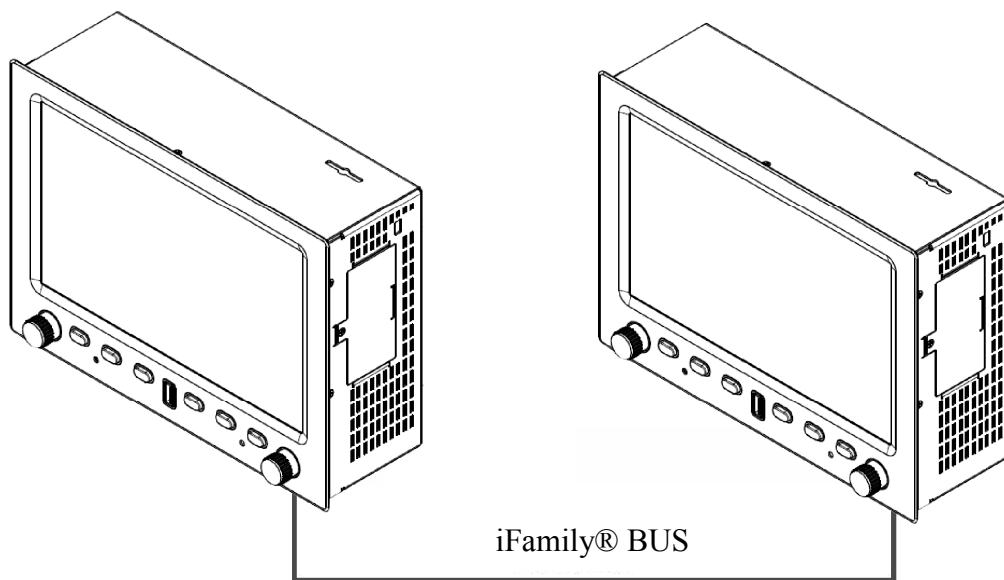
NOTE: The connection to frame of dashboard is recommended, because the metal case of Integra is in contact with metal plate of dashboard. In case dashboard is not connected to frame and onboard systems are simultaneously connected to dashboard, current would flow through the case of Integra and it may result in damage of the Integra.

7 INTEGRA Data Sharing

New Integra Glass Cockpits with 9" displays have same software architecture as Integra Glass Cockpits with 7" displays. This means that functionality is identical for both mentioned product lines. The product lines are fully compatible with each other. Practically this means that for example EFIS TL-6524 can be connected to TL-6760 via **iFamily®** BUS. Also HW solution for connection is identical for both product lines; the connectors are identical; so for example you can easily replace your TL-6624 with TL-6660 without any modification of harness.

Here is table describing part numbers for Integra Glass Cockpits:

Functionality	Part Number for Integra with 7" display	Part Number for Integra with 9" display
EFIS & EMS	TL-6624	TL-6660
EFIS	TL-6524	TL-6560
EMS	TL-6724	TL-6760
Remote Display	TL-6824	TL-6860

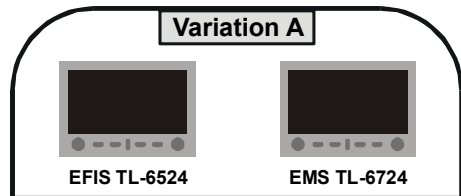


7.1 Explanation of Possible Connections

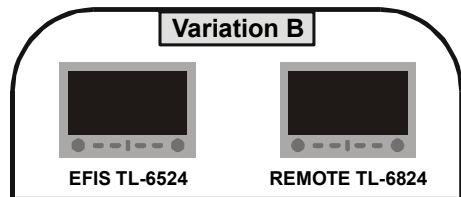
NOTE: This section does not contain all possible connections. Introduction of new Integra Glass Cockpits with 9” displays to market bring many new possible connections.

Here are a few Instrument connection Possibilities

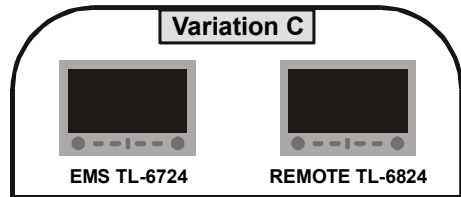
If you connect TL-6524 with TL-6724 you will be able to share the screen data between the two instruments



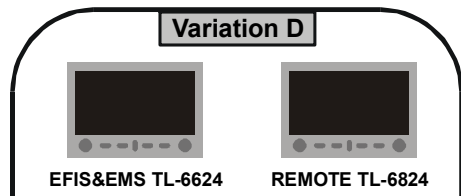
If you connect TL-6524 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6524



If you connect TL-6724 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6724



If you connect TL-6624 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6624

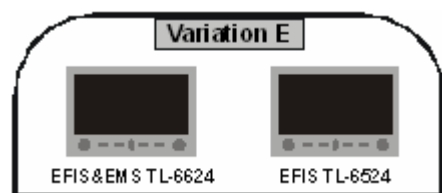


7.2 Back up System Recommendation

NOTE: This section does not contain all possible connections. Introduction of new Integra Glass Cockpits with 9” displays to market bring many new possible connections.

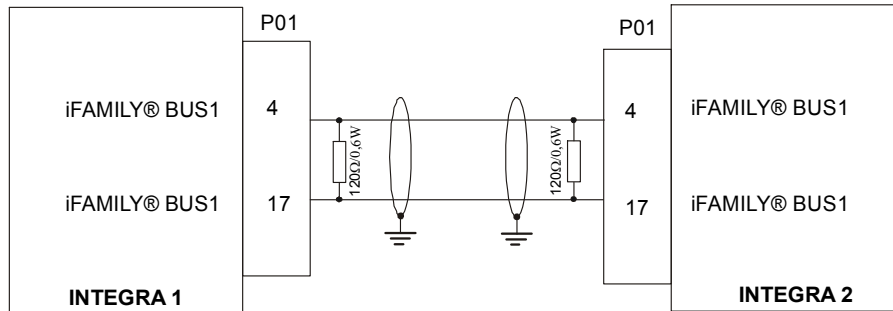
We recommend this configuration for safe panel system redundancy: **TL 6524 and 6624**

In the case of instrument failure flight information will be available on the second instrument



7.3 *INTEGRA* Connector Location

When running iFamily® BUS at its higher speeds it is necessary to terminate the bus at both ends with 120 Ohms. The resistors are there to prevent reflections of communication bus.



⚠ CAUTION: A twisted pair cable must be used to connect instruments or equipment within the iFamily® CAN BUS system.

8 Conclusion

INSTRUCTIONS FOR RETURN

If none of the above sections have helped resolve an ongoing issue with your INTEGRA, please call TL electronic at +420 495 48 23 93 to discuss the issue with Technical Support.

In case the issue cannot be resolved, we will provide you with an RMA number to use when shipping the INTEGRA to us. If your unit is still under warranty, the repairs will be performed and the INTEGRA will be returned promptly. If your warranty has expired, the TL electronic representative will make arrangements with you and make you fully aware of the costs before proceeding with the repair.

While TL electronic makes every effort to save and restore your unit's settings and calibrations, we cannot guarantee that this will happen. Please note that after you receive your unit back from TL electronic with a factory calibration, the heading display on the INTEGRA may be inaccurate once re-installed in your aircraft.