INTEGRA EMS TL-6724 USER MANUAL

TL ELEKTRONIC inc.

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Record of revision

Revision	Revision Date	Description	ECO#	Insertion date	By
A	1.10.2008	Initial version	0001		Jezek
B	2.2.2009	Language correction			Jezek
C	14.7.2009	New function added			Jezek
D	1.10.2009	New function added			Jezek
E	5.12.2010	New functions added			Hovorka

⚡ **WARNING:** This product is not TSO approved as a flight instrument, therefore, the manufacturer will not be held responsible for any damage caused by its use.

⚡ **WARNING:** The altitude calculated by the INTEGRA is geometric height above mean sea level and could vary significantly from altitude displayed by pressure altimeters in aircraft.

⚠ **CAUTION:** The 3D Terrain Map supplied with INTEGRA relies on GPS data, this system is subject to changes which could affect the accuracy and performance of the INTEGRA 's 3D Terrain map. The electronic chart is an aid to navigation and is designed to facilitate the use of authorized government charts, not replace them. Land and water data is provided only as a general reference to your surroundings. The positional accuracy of the land and water data is not of a precision suitable for use in navigation and it should not be used for navigation. Only official government charts and notices contain all information needed for safe navigation – and, as always, the user is responsible for their prudent use.

⚠ **CAUTION:** The Terrain feature is for supplemental awareness only. The pilot/crew is responsible for all terrain and obstacle avoidance using information not provided by the INTEGRA 3DTerrain feature.

⚠ **CAUTION:** Although the INTEGRA series are precision electronic Navigation AIDs (NAVAID), any NAVAID can be misused or misinterpreted and therefore become unsafe.

⚠ **CAUTION:** Use the INTEGRA at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Owner's Manual and the Flight Manual Supplement, and thoroughly practice basic operation prior to actual use. When in actual use, carefully compare indications from the INTEGRA to all available navigation sources, including the information from other NAVAIDS, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

⚠ **CAUTION:** The INTEGRA -series does not contain any user-serviceable parts. Repairs should only be made by an authorized TL-elektronic service center. Unauthorized repairs or modifications could void your warranty and authority to operate this device under FCC Part 15 regulations.

ⓘ **NOTE:**   It is the pilot's responsibility for initial missed approach guidance in accordance with published procedure. The unit may not provide correct guidance until established on a defined leg.

ⓘ **NOTE:**   This device complies with Part 15 of the FCC limits for Class B digital devices. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Furthermore, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference, the user is encouraged to try to correct the interference by relocating the equipment or connecting the equipment to a different circuit than the affected equipment. Consult an authorized dealer or other qualified avionics technician for additional help if these remedies do not correct the problem. Operation of this device is subject to the following conditions:

(1) This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation..

(2) The INTEGRA display lenses are coated with a special antireflective coating which is very sensitive to skin oils, waxes and abrasive cleaners. It is very important to clean the screen using an eyeglass lens cleaner which is specified as safe for anti-reflective coatings and a clean, lint-free cloth.

To obtain accessories for your INTEGRA, please contact your TL-elektronic dealer. Help us better support you by completing our on-line registration form today! Registration ensures that you will be notified of product updates and new products and provides lost or stolen unit tracking. Please, have the serial number of your unit handy, connect to our web site (www.tl-elektronic.com)
) and look for our Product Registration link on the home page
TL elektronic is fully committed to your satisfaction as a customer. If you have any questions regarding the INTEGRA, please contact our customer service department.

Accessories and Packing List

The INTEGRA represents TL elektronics continued commitment to providing you with the most advanced technology available today — in an accurate, easy-to-use design suitable for all of your flying needs. Unless otherwise specified within this manual, the term "INTEGRA" applies to the TL-6524, TL-6724, TL-6624 and TL-6824. Please note that the difference between these models is indicated in the Specifications section of this manual.

Before installing and getting started with your new system, please ensure that your package includes the following items. If any parts are missing or are damaged, please contact your TL-elektronic dealer.

Standard Package:
• INTEGRA Unit
• Installation Rack
• Accessories
• User and Configuration manual
• CD with software and Installation Manual
• Warranty Card

Optional Accessories:
• Internal back-up Battery
• SD card with 3D Terrain

Your aviation maintenance specialist should perform the installation and configuration of your new INTEGRA unit. The INTEGRA should be secured in the installation rack with the proper wiring connections. Be ready to anwer any questions that your maintenance specialist could have about the installation such as location of antennas or any connections to other equipment in the panel.

Limited warranty

The TL elektronic company warrants this product to be free from defects in materials and manufacture for three years from the date of purchase. TL elektronic will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labour. The customer is, however, responsible for any transportation costs. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL TL ELEKTRONIC BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

To obtain warranty service, call the TL elektronic Customer Service (+420 49 548 23 92) for a returned merchandise tracking number. The unit should be securely packaged with the tracking number clearly marked on the outside of the package and sent freight prepaid and insured to a TL elektronic warranty service station. A copy of the original sales receipt is required as the proof of purchase for warranty repairs. TL elektronic retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

General description

> **Thank you for purchasing the TL-elektronic INTEGRA. This section provides some important cautionary information and general usage instructions for this manual.**

Before You Fly

We strongly recommended that you read this entire guide before attempting to use the INTEGRA in an actual flying situation. Additionally, we encourage you to spend time on the ground familiarizing yourself with the operation of the product. While first learning to use the instrument in the air, we recommend you have a backup pilot with you in the aircraft. Finally, we encourage you to keep this manual in the aircraft with you at all times. This document is designed to give you quick access to information that might be needed in flight.

⚠ **CAUTION:** In a flying situation, it is the pilot's responsibility to use the product and the guide prudently.

OEM Installations

If your INTEGRA is installed by an OEM aircraft producer, you may find that you are unable to access some menus and settings. Some TL-elektronic distributors customize various areas of the INTEGRA firmware to maintain a consistent pilot experience and minimize INTEGRA information issues across a large number of installations. Currently, OEMs can customize access levels to the following settings on TL-elektronic systems: EMS SENSOR setup menu, fuel calibration, trim calibration, flaps calibration, GPS/NAV setup menu, screen configurations, data logging, and checklists/data panels. OEM distributors have the option of customizing some or all of these areas. Please contact your aircraft's manufacturer if you have any questions about how your unit has been customized.

⚡ **WARNING:** TL-elektronic Avionics' products incorporate a variety of precise, calibrated electronics. Except for replacing the optional internal backup battery in INTEGRA -based products per the installation guide, our products do not contain any field/user-serviceable parts. Units that have been found to have been taken apart may not be eligible for repair under warranty. Additionally, once a TL-elektronic unit is opened up, it will require calibration and verification at our factory before it can be considered airworthy.

⚡ **WARNING:**   The INTEGRA is permanently supplied by the aircraft's power supply. Therefore, it is necessary to install a fuse to act as protection against a power surge.   This will protect against the risk of fire and resulting damage to the INTEGRA and/or aircraft.

About this Guide

This guide serves two purposes. The first is to help you configure and get acquainted with the INTEGRA's many functions. The second is to give you quick access to vital information. For detailed technical and installation information, please refer to the INTEGRA Installation Guide.
In the electronic (.PDF) version of this manual, page and section references in the **Table of Contents** and elsewhere act as hyperlinks taking you to the relevant location in the manual. The latest version of this manual may be downloaded from our website at www.tl-elektronic.com.

Integra iFamily® Connection

The TL elektronic iFamily® BUS
If you have multiple TL elektronic products in your aircraft, they can be networked together via the TL elektronic **iFamily®** BUS. Units networked via **iFamily®** have the ability to share information with each other. Any product's data can then be viewed on any other screen in the **iFamily®** network. For example, an EFIS has the ability to display engine monitor information if it is connected to an EMS TL-6724.
The **iFamily®** systems allows you to connect autopilot servos and remote compass.

ⓘ **NOTE:**   That the failure of a unit in an iFamily® network may cause the loss of some or all data shared between units. In the example below, if the connected EMS TL-6724 were to fail, the EFIS/EMS would no longer be able to behave as an engine monitor.

Explanation of 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

Variation A

EFIS TL-6524   EMS TL-6724
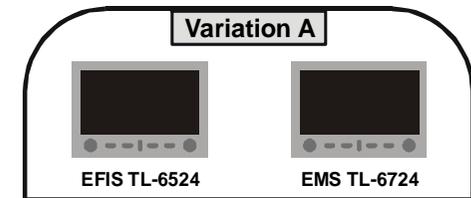
If you connect TL-6524 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6524

Variation B

EFIS TL-6524   REMOTE TL-6824
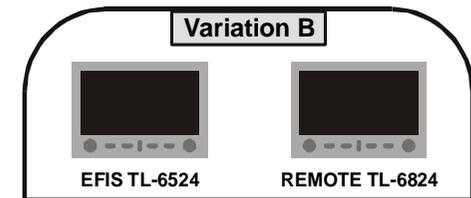
If you connect TL-6724 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6724

Variation C

EMS TL-6724   REMOTE TL-6824
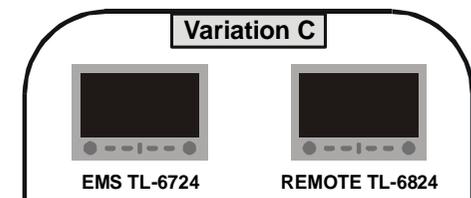
If you connect TL-6624 with TL-6824 you will be able to read the same data on TL-6824 as you have on TL-6624

Variation D

EFIS&EMS TL-6624   REMOTE TL-6824
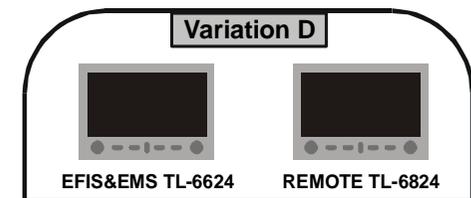
Back up System Recommendation

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
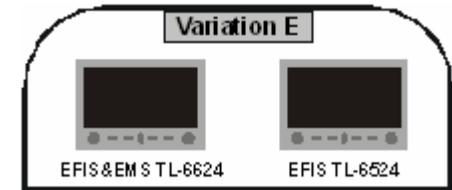
Explanation of Priority setting for Data Sharing

The priority for Data Sharing is set in Setup Mode, separately for EMS data (in EMS Setup Mode) and for EFIS data (in EFIS Setup Mode). Although Setup Mode is subject of Configuration Manual, we explain priority setting of Data Sharing here to make you understand whole Data Sharing function at once.
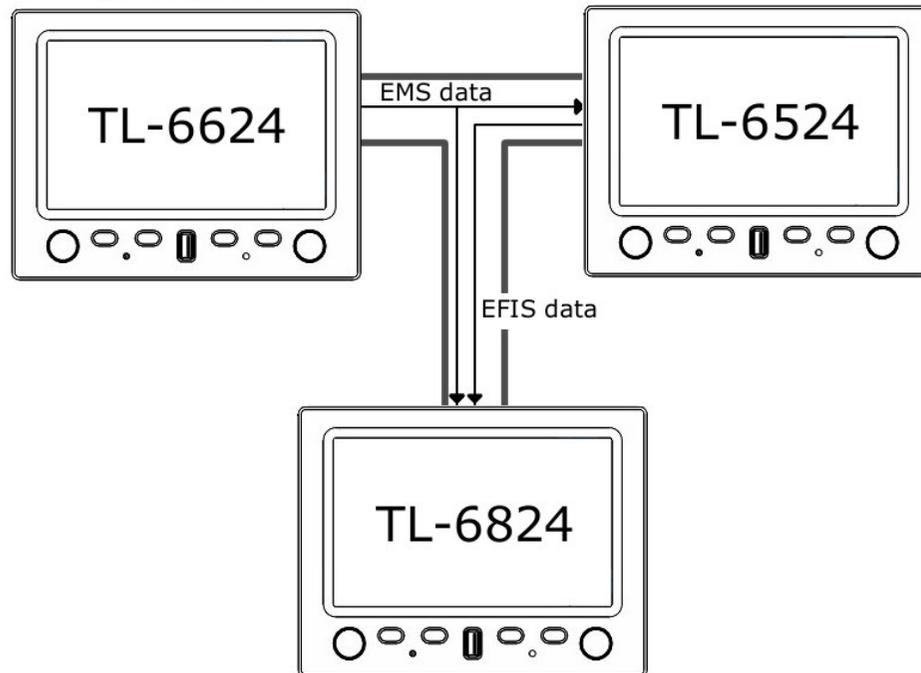
Data Sharing "Priority" means importance of specific data (EFIS or EMS data), which the Integra is sending to bus.
For example:
The picture on right side shows three Integra units connected by bus. Arrows linking the units express actual flow of information. Connection of TL-6624 and TL-6524 creates EFIS data redundancy, because both units have internal sensors for measuring EFIS data. The both units sends EFIS data to the bus, because their EFIS Data Sharing is On (EFIS Data Sharing is not set to Off). EFIS data from TL-6524 takes priority over EFIS data from TL-6624 on the bus, because TL-6524 is set to higher EFIS Data Priority than TL-6624. Therefore TL-6824 receives EFIS data from TL-6524. But TL-6624 and TL-6524 displays their own EFIS data. Own data of the Integra always takes priority over data from the bus.

Because TL-6524 has no inputs for measurement of EMS data, the only way to display EMS data on the unit is to receive EMS data from TL-6624 via the bus. Therefore priority for TL-6624 EMS Data Sharing could be set to Low or High. There is no difference because this unit is only EMS data source.
TL-6824 hasn't got Data Sharing Setting. It only receives data available on the bus according to priority setting of data sources previously described. The only way to disable receiving and displaying data in standard screen is to unplug the bus from TL-6824.

The INTEGRA Glass Cockpit Instrument System

Before operation the INTEGRA, please check to see if there are any parts missing or damaged. If you have not received all the necessary components or if there are damaged components please contact TL-elektronic or your TLe dealer immediately. The INTEGRA requires a Remote Compass and GPS Receiver to provide a full range of functions.

⚡ **WARNING:**   Obstacle clearance is not assured in 3D Terrain or Highway in the Sky (HITS) approach mode

⚠ **CAUTION:**   If any display unit in the chain is inoperable, the display units will not be able to share information. The pilot must account for this   down-graded mode of operation and expect data will not transfer between displays.

ⓘ **NOTE:**   It is highly desirable to provide each display unit with its own connection to each source of data if possible. This increases the redundancy of the system, and reduces the amount of lost function in the event a display unit becomes inoperative.

ⓘ **NOTE:**   Most, but **not all** data contained within this manual is accurate. Some differences may be observed when comparing the information in this manual to other instrument generation models.

Before You Fly
We strongly recommended that you read this entire guide before attempting to use the INTEGRA in an actual in-flight situation. Additionally, we encourage you to spend time on the ground familiarizing yourself with the operation of the product. While first learning to use the instrument in the air, we recommend you have a backup pilot with you in the aircraft. Finally, we encourage you to keep this manual in the aircraft with you at all times. This document is designed to give you quick access to information that might be needed in flight.

ⓘ **NOTE:**   While in-flight, it is the pilot's responsibility to use this product and this guide prudently.

Capabilities

The INTEGRA's robust design enables the use of a wide range of engines and sensors. You may configure the INTEGRA system to meet your monitoring requirements. The INTEGRA visual and audio warning systems give you immediate notification of any potential problem that might otherwise go unnoticed. The accurate and reliable solid-state sensors of the INTEGRA provide essential information with a user-friendly interface.

Power

The INTEGRA requires between 10 and 30 volts DC for operation and should be connected to an external backup power supply with keep-alive voltage. The INTEGRA can be turned on during engine start.

The INTEGRA can be ordered with an optional internal Li-poly backup battery which allows the instrument to continue to operate in the event of an external power failure. This lithium-polymer battery is rechargeable and is charge maintained by the INTEGRA.

If the always-on circuit is connected, the INTEGRA continues to charge its internal battery even if the instrument is turned off. This ensures a full charge for your internal emergency battery.

Under normal conditions, the internal battery should have a voltage between 11.1 and 12.6 volts. A new fully charged internal battery is rated for a minimum 30 minute of normal operation with the INTEGRA. If the INTEGRA has switched to its internal back up battery due to external power loss, it is advisable that you land your aircraft as soon as possible.

   ⓘ   **NOTE:**   Battery life is dependent on for example, the brightness of the display and number of sensors which are battery-powered etc.

Theory of Operation

The primary flight instruments on your EFIS display are generated using a group of calibrated sensors. All of them are solid state – that is, there are no moving parts. These sensors include accelerometers, which measure forces in three directions; rotational rate sensors, which sense rotation of all three axis; pressure transducers for measuring air data; and magnetometers on all three axis for measuring magnetic heading.

ⓘ   **NOTE:**   This product is intended for experimental and Light Sport Aircraft categories and is not approved for installation in Certified Aircraft.

BASIC OPERATION

Operation terminology

Term "select" in the context of Integra operation in this manual means this sequence of operation steps:

1. Highlight described menu option by rotating the knob.
2. Press the knob.

When the manual says e.g. "Press button "Yes", it means press the button with label "Yes" displayed on screen above the button.

Turning the INTEGRA ON

Press the right hand knob to turn the Integra on and wait until the green backlight goes out.

ⓘ **NOTE:** The other knob and buttons are disabled when the INTEGRA is Shut Down.

Turning the INTEGRA OFF

To turn off the INTEGRA and place it in Shut Down Mode

3. Press right knob.
4. Select **Power Off**

ⓘ **NOTE:** All settings and calibrations will be stored when the INTEGRA is Powered Off.

The INTEGRA Control Panel

All INTEGRA instruments function with a common control panel with a user friendly interface of 4 buttons, two knobs and a USB Data port.
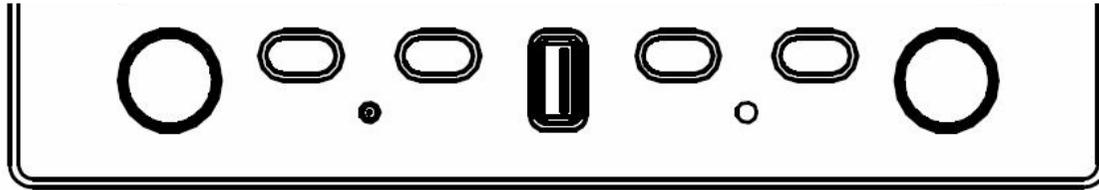
INTEGRA Control Panel

Knobs

Control of all menus is really easy and simple. The two knobs have two interfaces - **press** and **rotate**. These provide particular menu options on different pages, and are used to

- scroll through menus

- adjust instrument parameters and settings

Buttons and Labels

The **Button** and **Knob Labels** will appear as white on black writing in the default mode.
The **Labels** will be highlighted once the control panel is engaged by pressing a button or turning a knob.
The **Prompt Labels** turn red to match any urgent notice appearing on the screen.

Data Port

The INTEGRA allows the pilot to enter checklists, flight plans, general information and update firmware through the USB port. This data must be verified for accuracy by the pilot prior to flight.

If you want to work with data from an external source, plug a flash disk/memory stick into the USB port. Allow 10 seconds for the Integra to read the disk. Press right knob to enter the menu and select Enter Setup. When prompt "Are you sure you want to enter to setup?" appears, press button "Yes". Now the Integra is in Setup Mode. Button label "Data Port" is displayed. Press that button. Menu Data Port will appear containing the following:

- **Menu DATA PORT**
  - *Import Checklist*
  - *Import Configuration*
  - *Export Configuration*
  - *Export Flight Data*
  - *Export Service Log*
  - *Update Firmware*

ⓘ   **NOTE:** If you can't see "Data Port" button label in Setup Mode, check correct flash disk connection.

Import Checklist   You can create your checklist on your computer and you can transfer this data into the Integra.
Import Configuration   You can create your configuration on your computer and you can copy these settings to the Integra.
Export Configuration   You can export your configuration from the Integra to your flash disk.
Export Flight Data   You can export your flight data from the Integra to your flash disk.
Export Service Log   You can export your service log from the Integra to your flash disk.

Update Firmware

1)   Create the TLE directory and then create the UPDATE directory inside the TLE on your flash drive. So the path will be: X:\tle\update

2)   Copy the file "fwu.tls" to the UPDATE (on your flashdrive).

3)   Put the flashdrive in the Integra and wait 10 seconds (flashdrive is loading).

4)   MENU – ENTER SETUP – there will be displayed another label DATA PORT (button just by USB port). Press this button and choose UPDATE FIRMWARE.

5)   Integra will display: "Are you sure you want to update firmware?" Press "yes". There will be another warning message: "During operation do not power off instrument!!!" Press "OK". The display shows you "Firmware update – Please wait while download is finished" while the firmware is loading. Do not touch any button or knob while the firmware is loading. The time for loading the firmware differs with every next firmware. The firmware loading time varies from each software upgrade package.

⚠ **CAUTION:**   Ensure sustaining voltage during updating - if during updating fails the electric power supply, the Integra can be damaged.

⚠ **CAUTION:**   Keep the flash drive connected with the Integra during updating.

⚠ **CAUTION:**   This data port is intended only to be used with a flash disk. Do not try to connect it to another USB device.

Battery Installation

⚡ **WARNING:** Before installing battery turn off INTEGRA.

- Remove INTEGRA from mounting rack.
- Unscrew the battery cover located on the right side of the unit.
- After screw out carefully take off a sheet metal cover.
- The cable is attached to a holder of the battery with the baling wire – this wire must be removed.

Cover

Screw
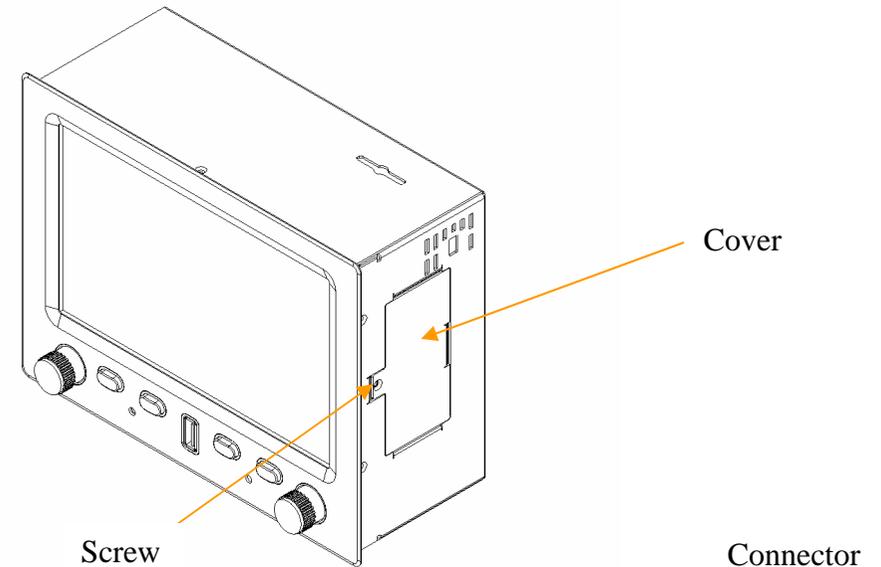
Connector

- The battery is intended to be used only with the INTEGRA. The Battery has a one connector to link it to INTEGRA and two lugs which nicely lock it to the battery holder.

Lugs

- Connect the cables located in the battery holder to the Back-up battery. The connector is notched so you cannot connect this cable incorrectly to the battery.
- Put the battery in to the INTEGRA battery holder so that the lugs fit into the round holes on the INTEGRA battery holder and **the connector must be on the top. You should obey this to prevent damage of the battery cabel caused by sharp edges of the battery holder.**.
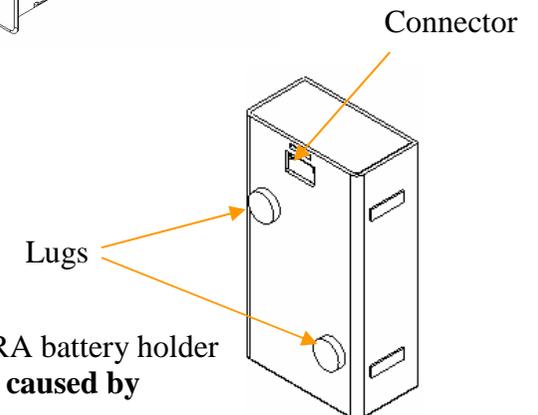
Cable for connecting INTEGRA with battery

Before screwing the cover on make sure that the battery is not protruding and is properly placed in the INTEGRA battery holder. Then screw battery cover back on to INTEGRA.

⚡ **WARNING:** To not apply pressure to the battery while re-installing the cover.

Correct battery installation in Integra   Incorrect battery installation in Integra

Battery

Integra holder
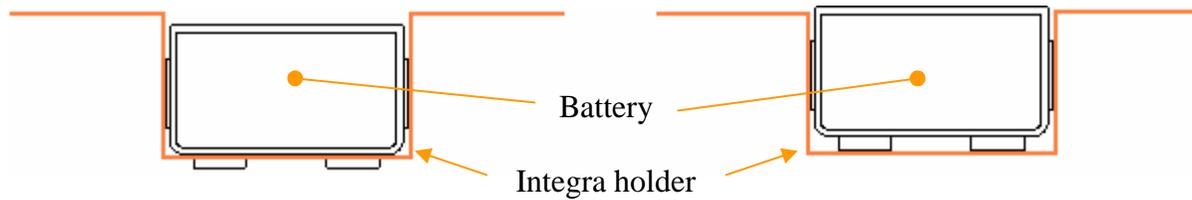
SD card Installation

Slot for SD card

- Turn off INTEGRA.
- Remove INTEGRA from mounting rack.
- The slot for the SD card is situated on the top right side of INTEGRA.
- Now insert SD card into the slot so that the front SD card label is facing you.
- Carefully press the card down until you feel it click.
- The SD is now installed in the INTEGRA.

- If you want to remove the SD card, first carefully press down and the card will eject.   You can then safely remove the card from the INTEGRA.
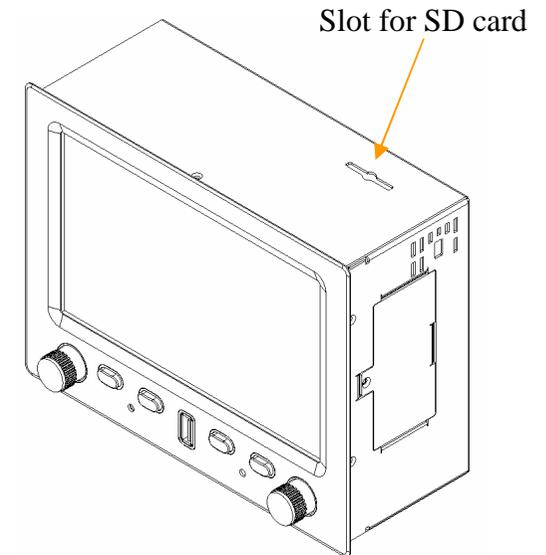
Brightness

This controls the brightness of the LCD.
Press right knob and select Brightness. Rotate the knob to choose the level of brightness.
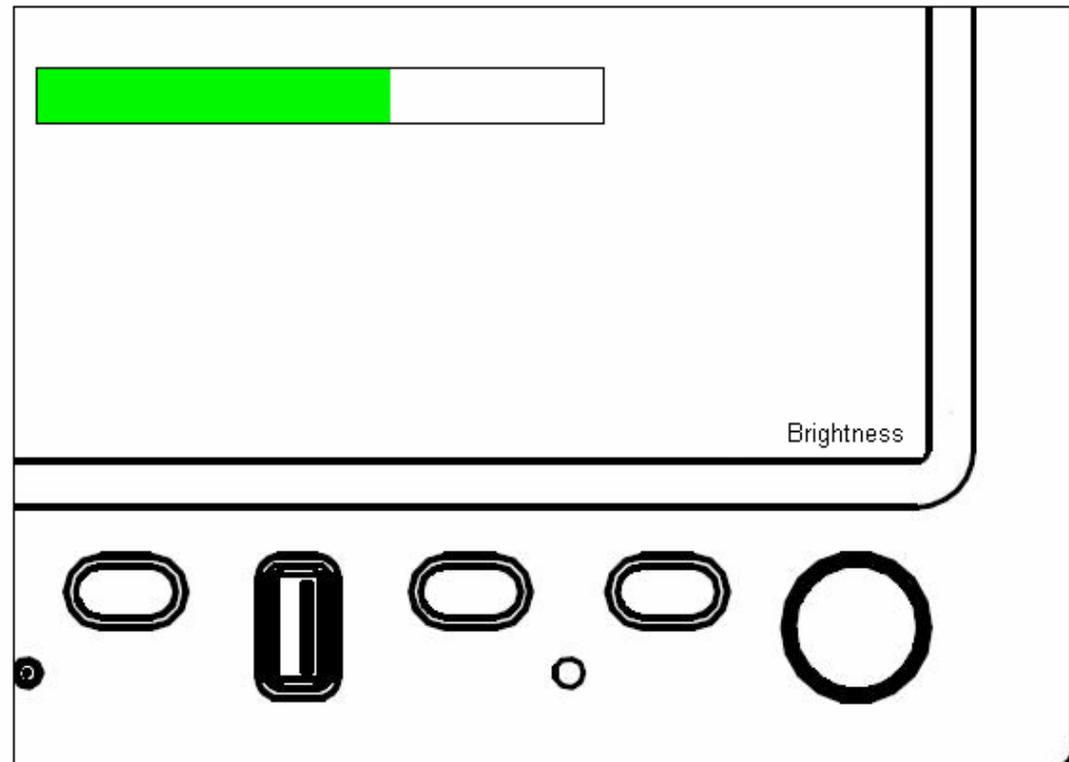
The green strip specifies level of brightness

ⓘ **NOTE:** This function is possible only if you have DIMMER SOURCE CONTROL (Press right knob, select Enter Setup. When prompt "Are you sure you want to enter to setup?" appears, press button "Yes". Now the Integra is in Setup Mode. Press right knob, select Other Setting&Calibration. New menu will appear. There select Backlight Control, then select Dimmer Source Control. Finally select Manual. Now manual setting of display brightness is enabled..

Information about Battery

The INTEGRA utilizes a Lithium Polymer battery with the following characteristics:

Storage Temperature   -20º C to 60º C (-4º F to 140º F)
Recharge Life   300 - 400 cycles

A Lithium Polymer battery operates without a memory effect, meaning it can be recharged before it is completely discharged without affecting the energy capacity.

⚠ **CAUTION:**   Keep the Battery Pack connector away from metallic objects.
                                  Any tampering of the cell within the INTEGRA Battery Pack is strictly forbidden in any circumstances.
                                  Do not immerse in water.
                                  Do not place near a heat source.
                                  Never heat the battery nor throw into a fire.
                                  Do not expose the battery pack to temperatures in access of 60°C (140°F).

⚠ **CAUTION:**   The Integra Battery Pack is intended for use only with Integra Products.

Disposal Procedures:
For Ecological and Environmental reasons it is advisable to consult with local authorities for disposal regulations.

Warning Signals

GEAR UP	Gear is safety engaged
GEAR DOWN	Gear is safety protuberant
GEAR TRANSIT	Gear is pushing up or pushing in or there is any problem with gear
CNPY	Canopy is open
CO₂	A dangerous quantity of CO_2 is in the cockpit
ERR	The information on measured quantity is not available
EXTERNAL POWER	INTEGRA is connected to an external power supply
BATTERY POWER: - - - min	INTEGRA is power supply from battery

ⓘ **NOTE:** Landing gear position is shown by status indicators. Indicator should be used only as a backup. It is provided to give the pilot a single location to view the aircraft configuration. The Gear Lights located on the aircraft instrument panel should be viewed before landing. The INTEGRA can provide a gear up voice warning if the following functions are monitored: Gear Position and Airspeed. If Airspeed drops below a programmed level (set for your aircraft) and the Landing Gear is not down you will get a voice warning.

INTEGRA Operation

* and ** Further description on next page

Water Temperature**

Description of complete EMS

Oil Pressure indicator

Oil Temperature indicator

Manifold air pressure*

Tachometer

Internal air temperature

Voltage and Ampere Information

Outside air temperature

Fuel used and remainin Fuel. Values are compu by use of actual measur Fuel Flow value

Cylinder Head Temperature (measured by thermocouples under spark plugs not in meaning used by ROTAX) and Exhaust GasTemperature Display

Stop watch

Engine time

Date

Time

Fuel consumption, fuel pressure and fuel flow information

Comment on specific EMS indicators

* MAP (manifold air pressure) can be switched to ROTOR RPM for helicopters and other rotor aircraft

The switch between the ROTOR RPM and MAP:
Press the right Menu·Baro knob and select Enter Setup. Press button with label "Yes".
Press the knob and select Configuration & Sensors.
Now you can choose MAP and Rotor RPM and you can choose in each menu of this sensor, if you want to connect or not connect this sensor.

Indicator of ROTOR RPM   **Indicator of MAP**

**Water Temperature can be switched to CHT Temperature

The switch between Water Temperature and CHT Temperature:
Press the right Menu·Baro knob and select Enter Setup. Press button with label "Yes".
Press the knob and select Other Setting & Calibration and then
Water CHT Temperature Label. Then you can choose option "Water"(for Water Temperature) or "CHT".
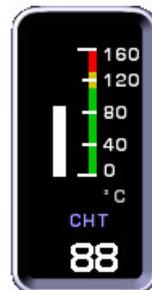
Water Temperature   **Cylinder Head Temperature (in meaning used by ROTAX, technically the sensor is placed on engine block)**

Description of function – EMS

RPM	Engine Revolutions Per Minute
Rotor RPM	If you use INTEGRA in helicopter, you can connect rotor RPM sensor to INTEGRA and this information will be displayed
Oil press	Indicator shows you actual oil pressure
Left and Right	Indicator quantity of fuel in left and right tank
Oil Temp	Indicator oil temperature

Buttons description

There are 3 function buttons – Timer, Checklist and Statistic and 1 knob – Menu/Baro.
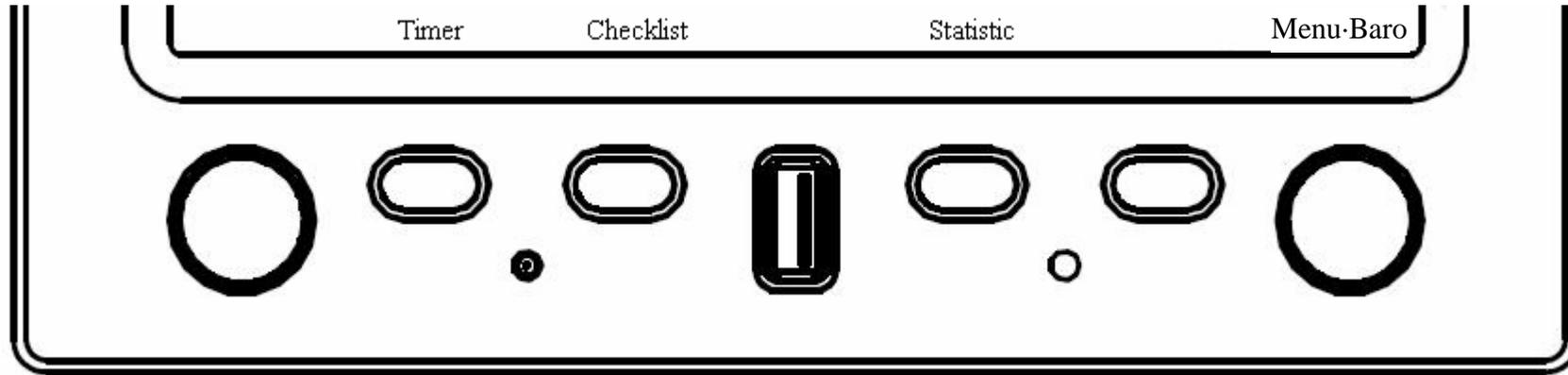
Buttons description

Integra Menu

To enter a menu just press right knob with the Menu Label. Turn the knob to scroll through the menu titles then press the knob when the title is highlighted. Select the **Back Arrow** symbol to return to the previous menu or screen. Each Menu has an **EXIT MENU** title at the bottom. Press to select and exit the menu.

- **MENU·BARO**
  - *Brightness*
  - *Checklist*
  - *Statistic*
  - *Entertainment*
  - *Enter to Setup*
  - *Power Off*
  - *About*
  - *Exit Menu*

Brightness

Instruction is therein before. (Page 23).

Checklist

The Checklist is your most valuable tool to insure a safe flight. It is easy to miss a critical step in any phase of the flight (latch the canopy drop the landing gear, select the mains, etc.). Each checklist is determined by your aircraft make and model and is installed into the INTEGRA to be easily recalled by the pilot at a moment's notice.

You can edit this checklist on your computer and then you can copy via USB port on INTEGRA.

- **Menu CHECKLIST**
  - *Preflight check*
  - *Before start engine*
  - *Starting engine*
  - *Engine runup*
  - *Before take off*
  - *Landing*
  - *After landing*
  - *Shut down*

Preflight check	instructions for a preflight check
Before start engine	instructions on what is needed to check before starting your engine
Starting engine	the procedures to start the engine
Engine run-up	a list of what is required during engine run-up
Before takeoff	a list of what needs to be checked before a takeoff
Landing	instruction about what is necessary before landing
After landing	a list of what must be done after landing
Shut down	instructions on what is needed to be done before shutting down

Cesna 152
Preflight Checklist

Cowling, Intakes, Prop & Spinner	Check
Alternator Belt	Check for tightness
Engine Compartment	Check
Taxi/Landing Light	Check
Induction Air Filter	Check - clear
Left Side Nose Strut & Tire	Check - inflation/wear
Static Port	Check
Left Wing	
Fuel Tank Quantity	Check - secure fuel cap
Pitot Tube	Check
Stall Warning	Check
Fuel Vent	Check
Tie Down	Remove
Leading Edge, Nav Light & Wing Tip	Check
Aileron & Flap	Check (rollers, hinges, weights)
Tire, Brake, & Gear	Check - inflation/wear
Tire Chock	Remove
Walk Around Airplane for Final Check	

For example: Checklist of Preflight check for Cesna 152

Statistics for EMS

Statistics provides a summary of Engine Information

EMS Statistics

RPM MIN	Minimum rotations per minute
RPM MAX	Maximum rotations per minute
OIL PRESS MIN	Minimum oil pressure
OIL PRESS MAX	Maximum oil pressure
OIL TEMP MIN	Minimum oil temperature
OIL TEMP MAX	Maximum oil temperature
ROTOR RPM MIN	Minimum rotor rotations per minute
ROTOR RPM MAX	Maximum rotor rotations per minute
FUEL PRESS MIN	Minimum fuel pressure
FUEL PRESS MAX	Maximum fuel pressure
FUEL FLOW MIN	Minimum fuel flow
FUEL FLOW MAX	Maximum fuel flow
IAT MIN	Minimum inside air temperature
IAT MAX	Maximum inside temperature
OAT MIN	Minimum outside air temperature
OAT MAX	Maximum outside air temperature
EGT1 MAX	Maximum exhaust temperature of cylinder 1
EGT2 MAX	Maximum exhaust temperature of cylinder 2
EGT3 MAX	Maximum exhaust temperature of cylinder 3
EGT4 MAX	Maximum exhaust temperature of cylinder 4
CHT1 MAX	Maximum temperature on cylinder 1(measured by thermocouple under spark plug)
CHT2 MAX	Maximum temperature on cylinder 2(measured by thermocouple under spark plug)
CHT3 MAX	Maximum temperature on cylinder 3(measured by thermocouple under spark plug)
CHT4 MAX	Maximum temperature on cylinder 4(measured by thermocouple under spark plug)

IN = 0 ℃   IAT MAX = 20 ℃
MIN = 0 ℃   OAT MAX = 17 ℃
MAX = 280 ℃   CHT1 MAX = 282 ℃
MAX = 277 ℃   CHT2 MAX = 275 ℃
MAX = 278 ℃   CHT3 MAX = 214 ℃
MAX = 274 ℃   CHT4 MAX = 208 ℃
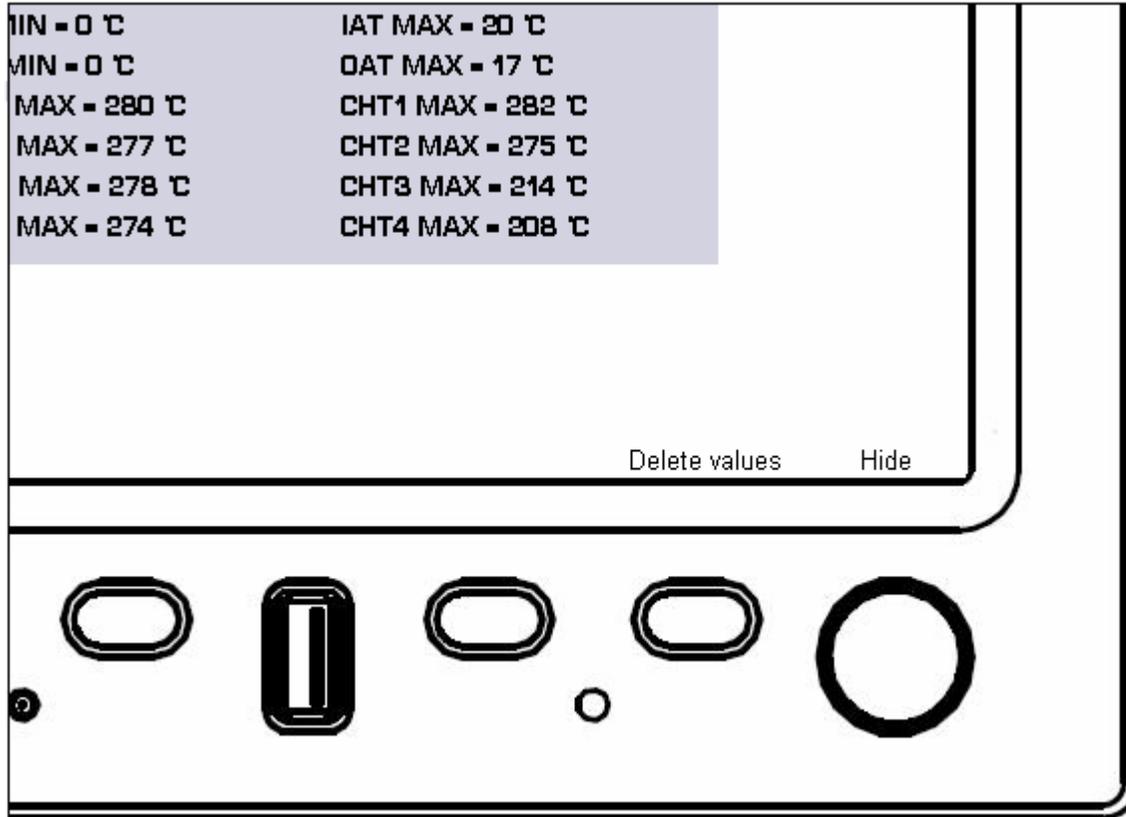
Delete values   Hide

If Statistics are displayed, the basic menu is changed.

HIDE – statistic screen is closed
DELETE VALUES – you can erase statistic values

If you press Delete values, INTEGRA ask you, if "Are you sure you want to delete statistic?" If you press "Yes" the statistic will be delete. If you press "No" the statistic will be conserved.

Configuration of Integra

Enter to setup

In setup you can edit many parameters as you wish such as units, configuration & sensors, limits, other setting & calibration and external devices. Press right knob and select Enter Setup. When prompt "Are you sure you want to enter to setup" appears, press button "Yes".
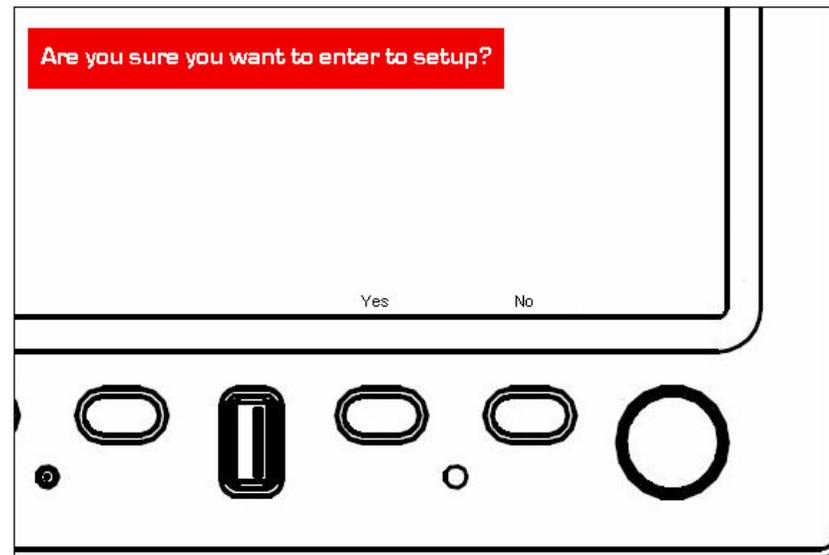
Enter to setup

ⓘ **NOTE:**   More about SETUP menu you can find in CONFIGURATION MANUAL on the CD.

Power Off

You can turn the Integra off by pressing the Power Off button. You have 20 seconds to cancel this operation. Just press any knob or button.

   (i) **NOTE:**   When you power up the Integra and the Integra starts to shut off, press any button and it is necessary to disconnect the Main Switch Signal. (Menu Setup– Other Setting & Calibration – Main Switch Control).

About

There you can find the information about your Integra.

HW version   Information about the hardware version
GUI version   Information about the graphics interface
Release   Information about the firmware version

Menu Entertainment

Menu Entertainment serves for access to multimedia functions of the Integra. You can listen to your favourite music or watch movies. These multimedia possibilities of the Integra enrich passengers' experience from flight.

To enter Entertainment Menu:

Press right knob, select option Entertainment from menu. When prompt "Do you want to enter to Entertainment?" appears, press button Yes.

Now the Integra is displaying Entertainment Screen:

Part for displaying chosen option   **menu**
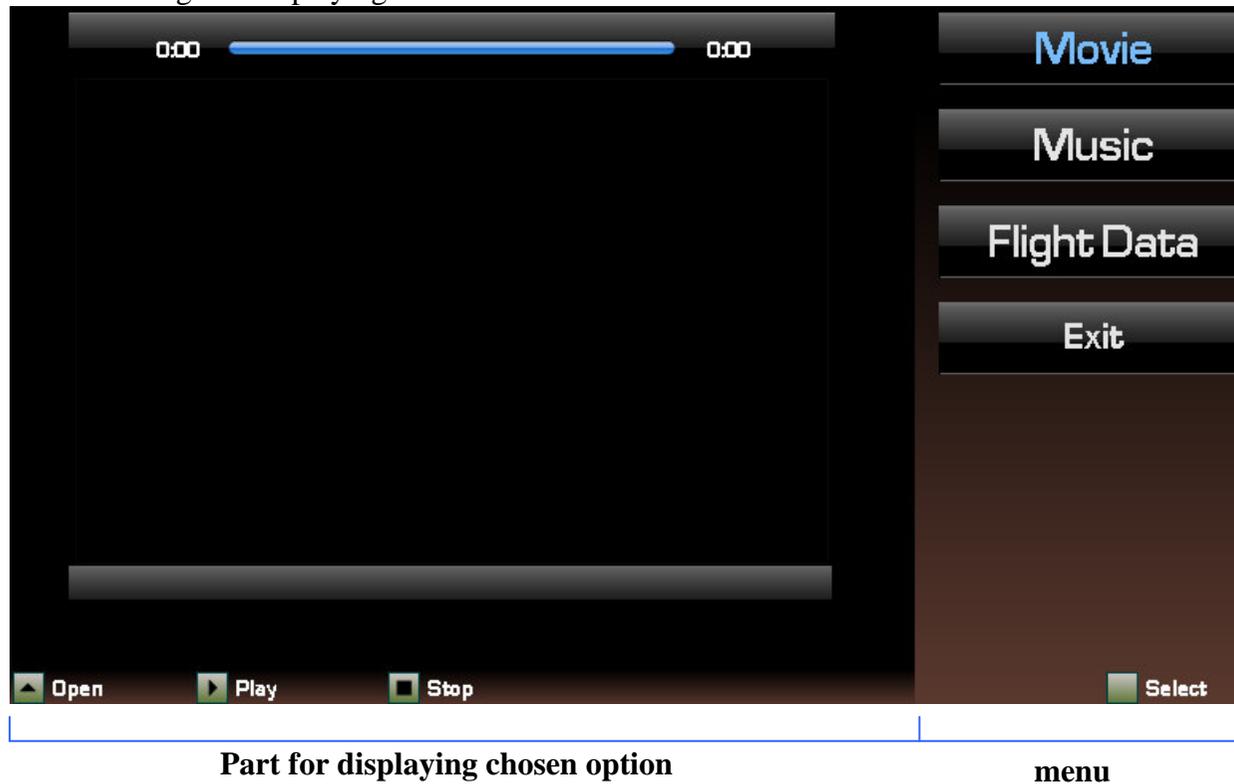
Handling the menu

Rotate right knob for scrolling through menu. Select desired function by pressing right knob.

ⓘ   **NOTE:** If you want to open multimedia file on plugged SD card, you won't be able to have connected USB flash drive. That's because the Integra will check primarily for connected USB flash drive. Then if USB flash drive isn't found, the Integra will check for SD card. And if SD card is not neither plugged, then the Integra will load files from internal memory.

Option Movie

Probably you want to watch some movie on your USB flash drive or SD card. To do this, follow these instructions:

Press left knob "Open". Window will appear for selecting video file. There you can scroll through currently viewed directory by rotating left knob. Names of displayed subdirectories are closed in square brackets[]. Playable files are displayed with postfix ".3gp".

If you want to move down to some subdirectory, choose desired subdirectory and press left knob.

If you want to move up to the parent directory, choose item [..] and press left knob.

For replaying desired video file, just choose appropriate item and press left knob. The Integra should be replaying your video now.

For maximizing video presentation to full screen press button "Maximize". For returning to previous screen, press any button.

ⓘ   **NOTE:** The Integra only supports .3gp video format. Other files-video of different format or any other data aren't displayed in Select video file window.

elapsed time of video   remaining time of video

02:11   -00:02

Movie

Music

Flight Data

Exit

**buttons'
labels**

Open   Play   Stop   Prev   Next   Select

Opens window for   Plays currently   Stops currently   Plays previous   Plays next
selecting desired   stopped video   played video   track   track
video file or folder

Option Music

ⓘ **NOTE:** The Integra only supports MP3 audio files.

elapsed time of track

name of currently played track

remaining time of track

loop playing mode

shuffle playing mode

number of currently played track in list and total number of tracks in list

buttons' labels

Opens window for selecting desired track or folder

Plays currently stopped track

Stops currently played track

Plays previous track

Plays next track
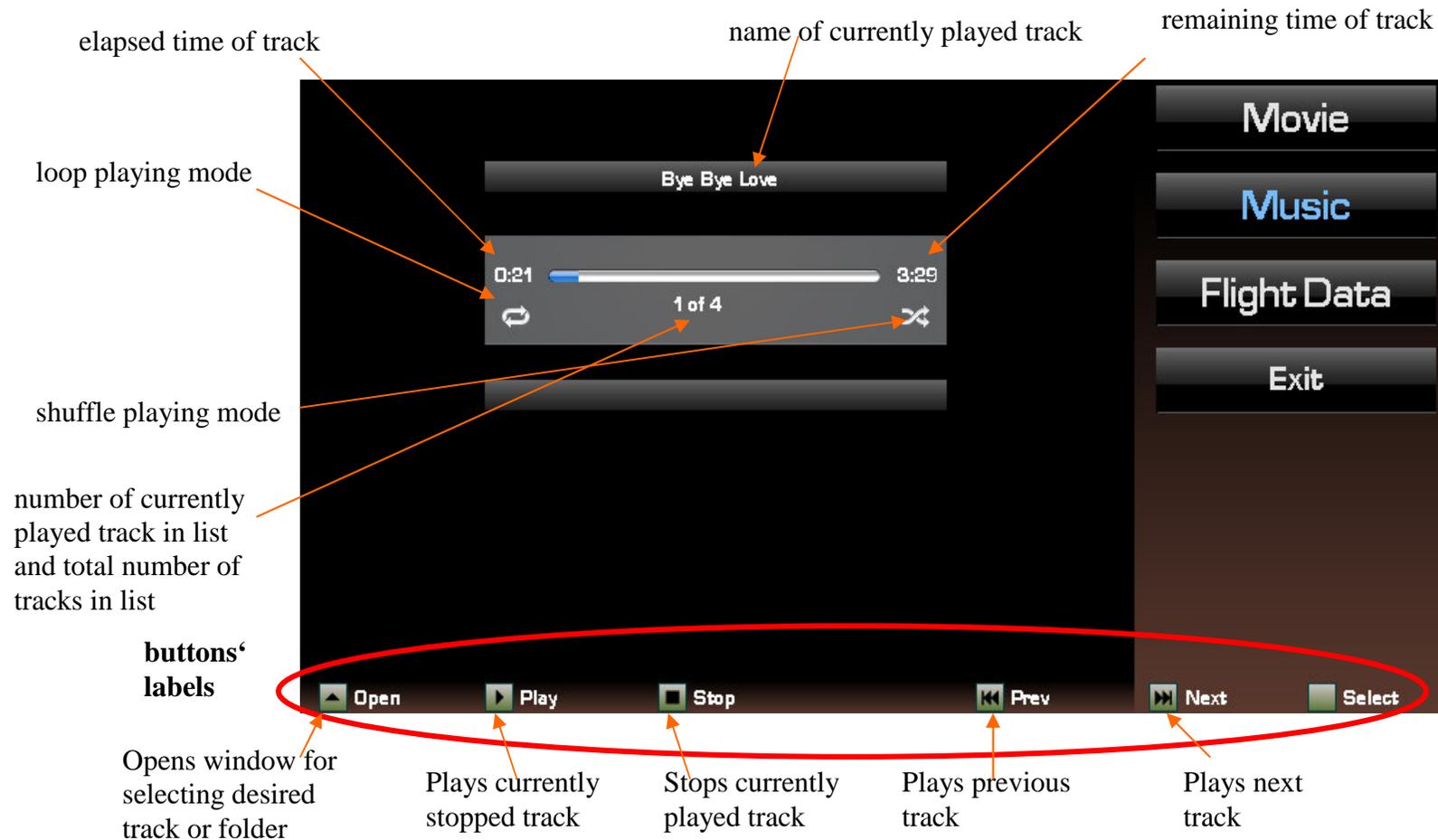
Option Flight Data

This option soothes desire for flight info of impatient and curious passengers. It displays Airspeed, Altitude and Time to arrival.

Option Exit

The option exits Entertainment Screen.

Abbreviations

ACTV— Active
ALT— Altitude
APR— Approach
APT— Airport
ARSPC— Airspace
ARTCC— Air Route Traffic Control Center
ARVL— Arrival
AUX— Auxiliary
AVGAS— Aviation-grade Gasoline
AVTN— Aviation
BARO— Barometric setting
BRG— Bearing To
°C— Degree Celsius
C/V— COM/VLOC
CAS— Calibrated Airspeed
CDI— Course Deviation Indicator
CLR— Clear
COM— Communications Transceiver
CRSR— Cursor
CTA— ICAO Control Area
CTAF— Common Traffic Advisory Frequency
CTR— Center (see ARTCC)
CUM— Cumulative
DB— Database
DEN— Density
DEP— Departure
DEPT— Departure guidance
DIS— Distance

DME— Distance Measuring Equipment
DTK— Desired Track
EFF— Efficiency
ELEV— Elevation
ENDUR—Endurance
ENR— En Route
ENT— Enter
EPU— Estimated Position Uncertainty
ESA— En Route Safe Altitude
ETA— Estimated Time of Arrival
ETE— Estimated Time En Route
°F— Degrees Fahrenheit
FAF— Final Approach Fix
FF— Fuel Flow
FIR— Flight Information Region
FLTA— Forward Looking Terrain Avoidance
FOB— Fuel On Board
FPL— Flight Plan
fpm— Feet Per Minute
FREQ— Frequency
FSS— Flight Service Station
ft— Feet
G/S— Glideslope
gl— gallons
GPS— Global Positioning System
GS— Ground Speed
HAL— Horizontal Alarm Limit
HDG— Heading

HFOM— Horizontal Figure of Merit
hg— Inches of Mercury
HPL— Horizontal Protection Level
HITS— Highway in the Sky
HWY— Highway
IAF— Intermediate Approach Fix
ID— Identifier
ig— Imperial Gallons
ILS— Instrument Landing System
IND— Indicated
INT— Intersection
INTEG— Integrity
ITI— Imminent Terrain Impact
kg— Kilograms
kHz— Kilohertz
km— Kilometers
kph— Kilometers Per Hour
kt— Knots
L/VNAV — Lateral and vertical navigation guidance, LNAV/VNAV service level
LAT/LON—Latitude/Longitude
lb— Pounds
LCL— Local
LFOB— Left-over Fuel On Board
LNAV — Lateral Navigation only
LNAV+V — Lateral Navigation with advisory vertical guidance
LOC— Localizer

LPV — Lateral Precision Performance with Vertical Guidance
LRES— Left-over Fuel Reserve Time
Lrg— Large
lt— Liters
°M— Degrees Magnetic
m— Meters
MAP— Missed Approach Point
MAHP— Missed Approach Hold Point
MAPR— Missed Approach guidance
mb— Millibars of Pressure
Med— Medium
MGRS— Military Grid Reference System
MHz— Megahertz
mi— Statute Miles
MOA— Military Operations Area
mph— Statute Miles Per Hour
mpm— Meters Per Minute
mps— Meters Per Second
MSA— Minimum Safe Altitude
MSG— Message
MSL— Mean Sea Level
mul— Multicom
NATNL— National
NAV— Navigation
NAVAID— Navigational Aid
NDB— Non-Directional Radio Beacon
NM— Nautical Miles
NRST— Nearest
NUM— Number

OBS— Omnibearing Selector
OCN— Oceanic
PDA— Premature Descent Alert
P.POS— Present Position
PROC— Procedure(s)
PROV— Province
PTK— Parallel Track
PWR— Power
RAD— Radial
RAIM— Receiver Autonomous Integrity Monitoring
REF— Reference
REQ— Required / Requirements
RESTRICTD— Restricted
RNG— Range
RTC— Required Terrain Clearance
RX— Receive
SBAS— Space-Based Augmentation System
SID— Standard Instrument Departure
Sml— Small
SPD— Speed
SQ— Squelch
SRFC— Surface
STAR— Standard Terminal Arrival Route
SUA— Special Use Airspace
SUSP— Waypoint sequencing suspended
°T— Degree True
TACAN— Tactical Air Navigation
TAS— True Airspeed
TAT— Total Air Temperature

TEMP— Temperature
TER— Terrain
TERM— Terminal
TKE— Track Angle Error
TMA— ICAO Terminal Control Area
TRANS— Transition
TRFC— Traffic
TRK— Track (also Ground Track) Angle
TRSA— Terminal Radar Service Area
TWR— Tower
TX— Transmit
UTC— Coordinated Universal Time (also GMT or "zulu")
UTM/UPS—Universal Transverse Mercator / Universal Polar Stereographic grids
VAL— Vertical Alarm Limit
VAR— Variation
VER— Version
VFOM— Vertical Figure of Merit
VFR— Visual Flight Rules
VLOC— VOR/Localizer Receiver
VNAV— Vertical Navigation
VOL— Volume
VOR— VHF Omnidirectional Radio Range
VPL — Vertical Protection Level
VS— Vertical Speed
VSR— Vertical Speed Required
WAAS — Wide Area Augmentation System
WPT— Waypoint
WX— Weather
XTK— Crosstrack Error

Technical Parameters

Physical characteristic

Width	192 mm	7,559"
Height	148 mm	5,827"
Depth	76,5 mm	3,012"
Panel rectangle hole	185x143 mm	7,283x5,63"

Weight without battery	1150 g	2,54 lb
Weight with battery	1250 g	2,76 lb

General Specifications

Operating Temperature Range	- 20°C to +60°C
Humidity	95% non-condensing
Altitude Range	4600 meters max
Power Range	10.0 to 32.0 Volts
Max. Signalization	30 Volts, 1 Ampere
Power Consumption	0.95 Ampere @ 14VDC without sensors
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

TL ELEKTRONIC

Communication

RS-232c	up to 115 200 bps
USB 1.1	12 Mb/s
USB 2.0	480 Mb/s
CAN BUS	1 Mb/s

Display parameters

Resolution	800x480
Brightness	800 cd/m2

Memory card	Integra support SD and SDHC memory card

INTEGRA EMS TL-6724 USER MANUAL

TL ELEKTRONIC Inc.

Part Number

TLD-6724X-DU-001_RevE

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