

Moving Terrain

Installation Manual MT-Ultra Professional JTSO (TSO)

Trade name: MT-VisionAir EP TSO



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0. Revision Status

Date	Amendment	Revision	Applicable pages
10.10.1999	MT-Ultra Professional JTSO (ETSO) First edition	A	16 of 16
10.01.2000	MT-Ultra Professional JTSO (ETSO) Spelling errors/ part numbers / revision status	B	16 of 16
08.04.2004	MT-Ultra Professional JTSO (ETSO) Complete revision	C	16 of 16
12.11.2007	MT-Ultra Professional JTSO (ETSO) Introducing Mod Level 5: SB MTUP-004 + 005	D	44 of 44

1. General

MT-Ultra Professional JTSO (ETSO) was designed to be installed and operated as a panel mounted device, but can easily be removed for flight planning. MT-Ultra Professional JTSO (ETSO) is equally suited as a hand-held device.

Technically the MT-Ultra Professional JTSO (ETSO) is to be viewed as a hand-held / removable device as it can easily be removed from the panel without the use of tools.

The quick release tray is permanently installed in the panel. MT-Ultra Professional JTSO (ETSO) slides into the tray, but can easily be removed (for flight planning, updates of the navigation data or charts, etc.).

Installation of the the MT-Ultra Professional JTSO (ETSO) has virtually no influence on the weight and balance calculation.

Following installation, an EMI test has to be performed in the aircraft. It is mandatory to turn on the system and check cockpit instruments for deviations from normal performance.

1.1. Power Supply

The manufacturer recommends attaching MT-Ultra Professional JTSO (ETSO) devices to a power supply whose fuse is directly connected to the battery and does not include any other substantial power loads.

Recommended: Ground Clearance Switch
Hot Bus

Not Recommended: general avionics bus

Only under these conditions is the pilot able to perform his preflight work with Moving Terrain without draining the battery. (For power consumption see No. 5 Technical Data)

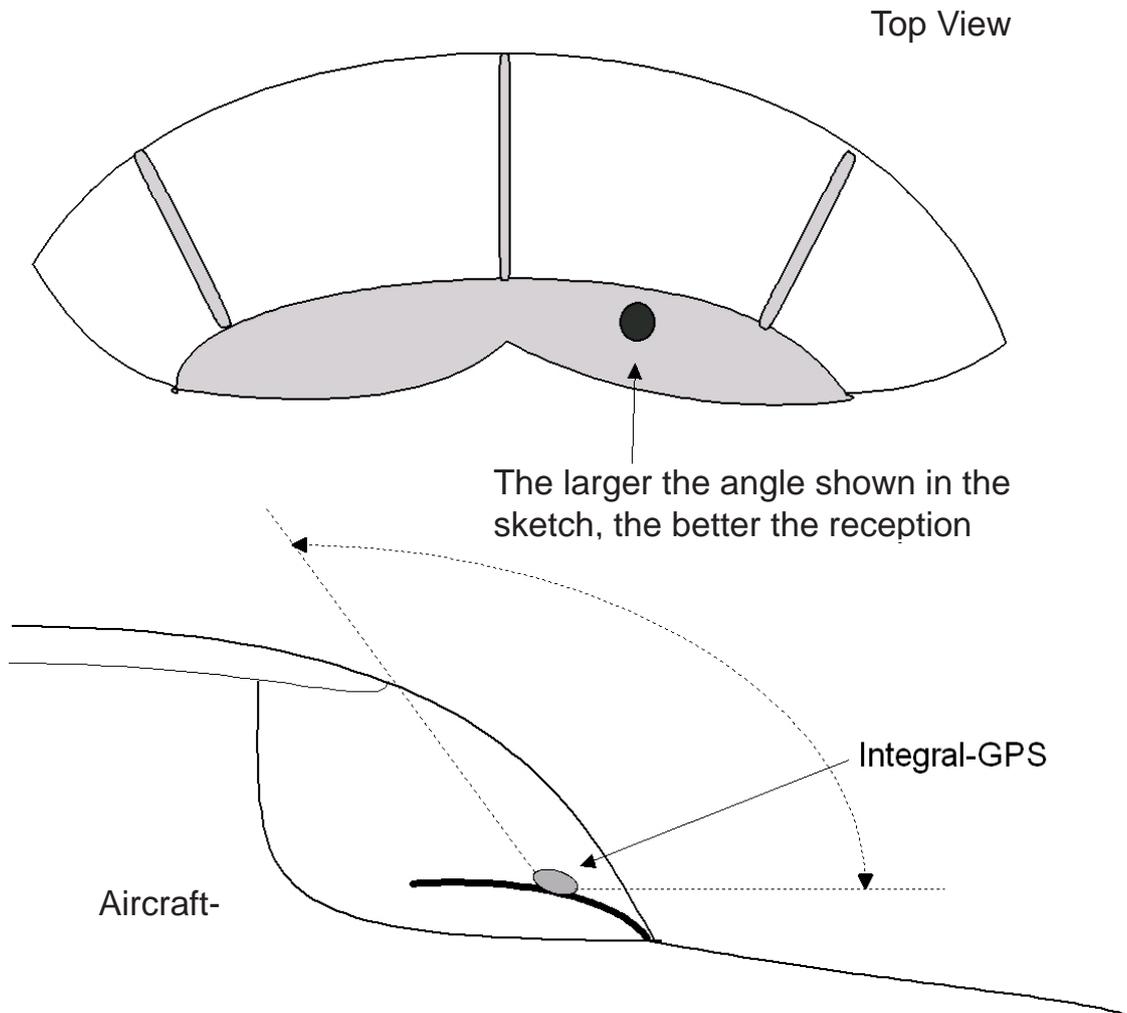
1.2. Recommended Installation Location of the GPS Antenna

The manufacturers strongly recommends installation of the Integral GPS on the glare shield.

A windshield heater usually attenuates the incoming signal to such an extent that placing the antenna under it does not make sense.

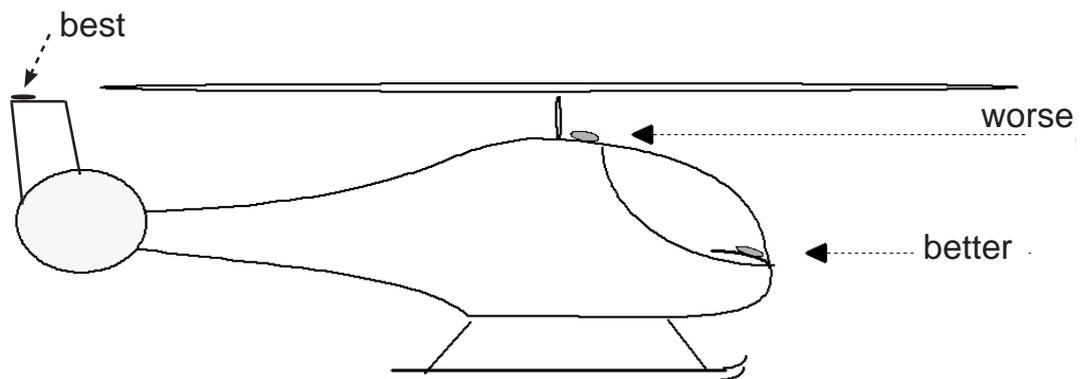
1.2.1. Integral GPS

A segment of the sky as large as possible must be visible for the antenna (integrated in the integral GPS!). The cable length is limited to 20 m. Because of the high peaks of the digital signal a well shielded cable is recommended to prevent interference with other units.



Installation of the GPS antenna in a helicopter:

Please consider the shadowing effect of the rotor and possible interference from the ignition box.



Notice: The integral GPS can also be mounted on the outside of the aircraft. In general a temperature limit of -20°C must be observed.

1.3. Recommended Installation Location of an Iridium Antenna

Antenna position: half of the sky (e.g. antenna is located on the wall of the hangar or the building) is sufficient for the GPS, but not for the satellite telephone: the satellite telephone ideally requires approximately 180° of free visibility. Positioning under the cockpit windshield is not ideal, providing only about 2/3 of the sky.

Solution: installation under the rear window or on top of the roof.

**The manufacturer recommends use
of an external antenna.**

Antenna interference - field observations:

- Spacing (between GPS and Iridium antennae) for best GPS reception > 1,3 m
- Spacing of less than 40cm leads to total GPS failure => SATACQ
- Cables bound together (serial integral GPS and/or coax antenna cable) are not a problem.
Likewise not a problem:
- Integral GPS with angled connector (unshielded cable)
- Integral GPS with straight connector (shielded)

Attention: Interference is often only displayed on the GPS (SATACQ or other error messages), but the satellite telephone is still disrupted in spite of displaying a good signal (good signal is not equivalent to good reception).

Caution: Non MT GPS receivers sometimes do not display an error message in spite of disruption, because they misleadingly continue to transmit data from the cache.

Remarks:

- **An ideal sat radar download hardly takes longer than two minutes.**
- **Iridium reception is generally fluctuating, periodically weak.**
- **The Iridium antenna should be mounted with greatest visibility of the sky (horizon to horizon).**
- **When testing, maintain sufficient distance from the hangar etc..**
- **When installing the Iridium antenna, pay attention to other GPS antennae (non MT).**

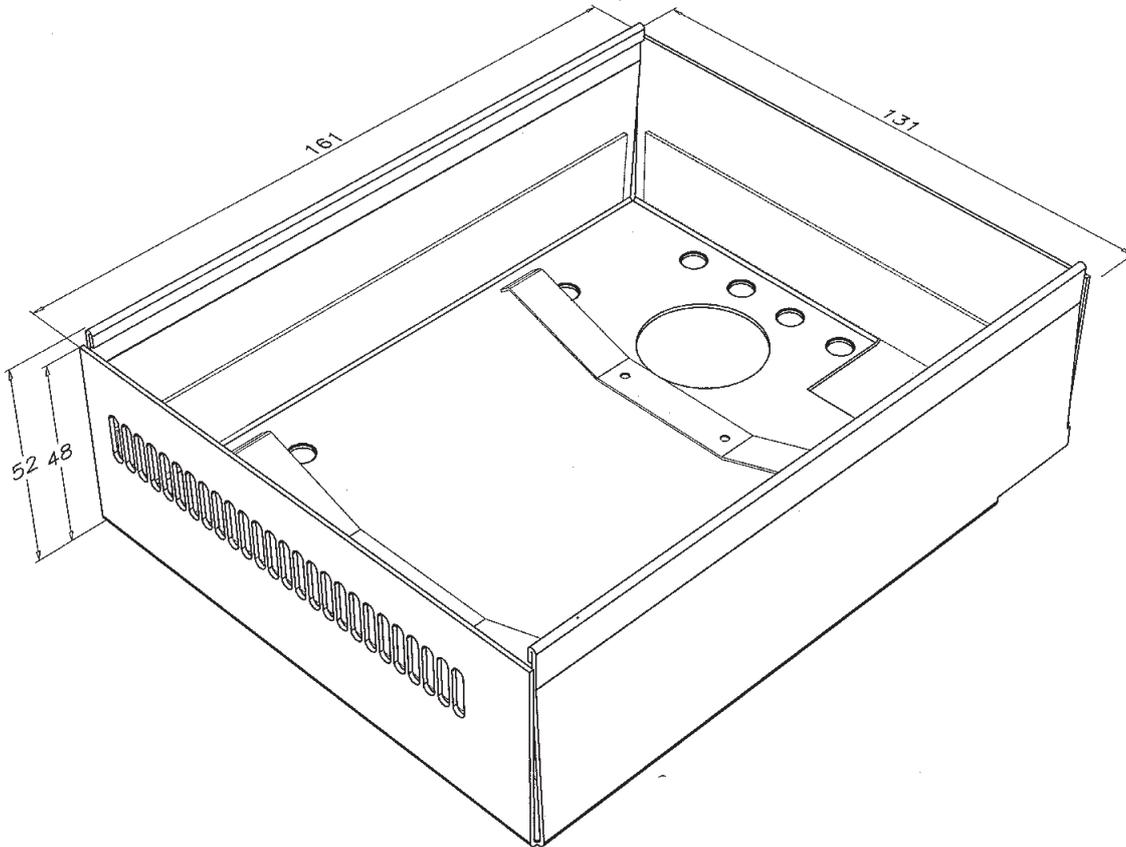
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2. Installation

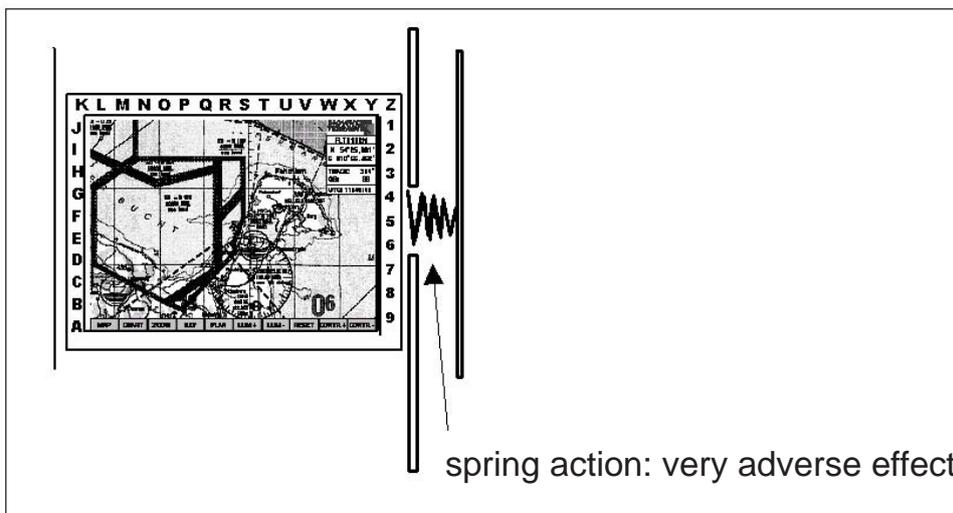
2.1. Quick release tray

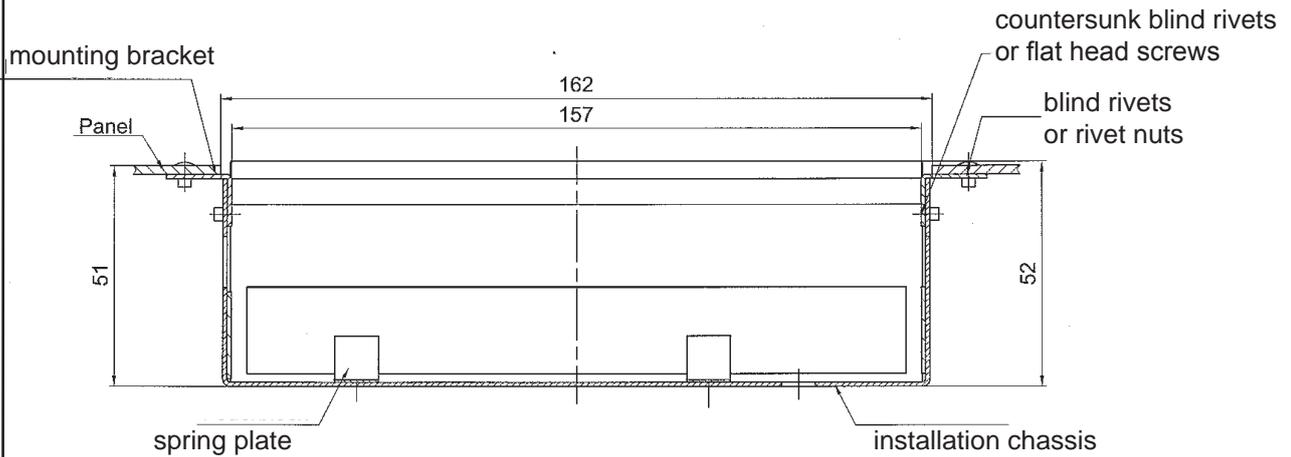
2.1.1. Remarks regarding Installation.

The mounting tray must be firmly attached to the cockpit panel with screws.



It is a disadvantage if the device can vibrate and hit fixed parts of the aircraft - see the symbolic sketch below.

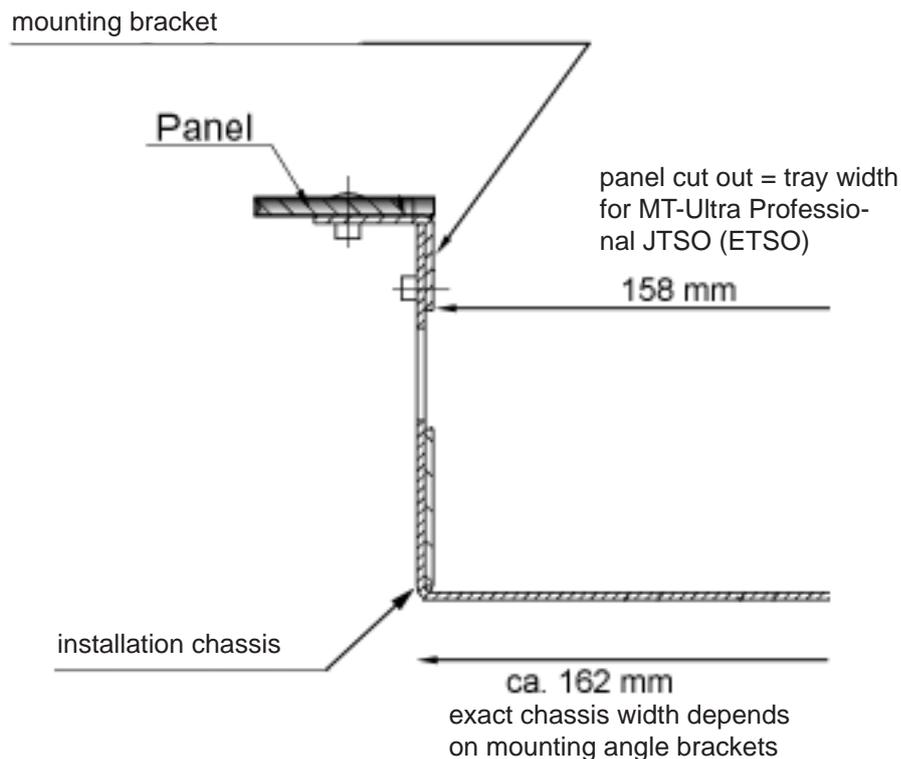




Please use flat head screws for installation in the instrument panel (or onto the angled rail) as space of 158 mm including any protruding screwheads must remain available for the device.

The edges of the chassis are not welded together. If necessary, the side parts can easily be widened in order to push the chassis over the angled rail.

Detailed view showing installation with angles on the back side of the panel:



2.1.2. Panel cutout

The Quick Release chassis is screwed to the rack on the back side of the panel with the help of angle brackets. Screw holes have purposely not been provided on the Quick Release chassis because the dimensions of the racks in the panel vary.

The cutout in the panel is 158 by 130 mm.

The cutout must not detract from the stability of the panel.

If necessary, braces must be mounted around the panel cutout. The required angle brackets can be viewed as such a brace.

The manufacturer points out that the device must be easy to remove from the Quick Release chassis. This requires that the QRchassis be installed in the panel in such a fashion, that the MT-Ultra Professional JTSO (ETSO) is not too tight on the left and right.

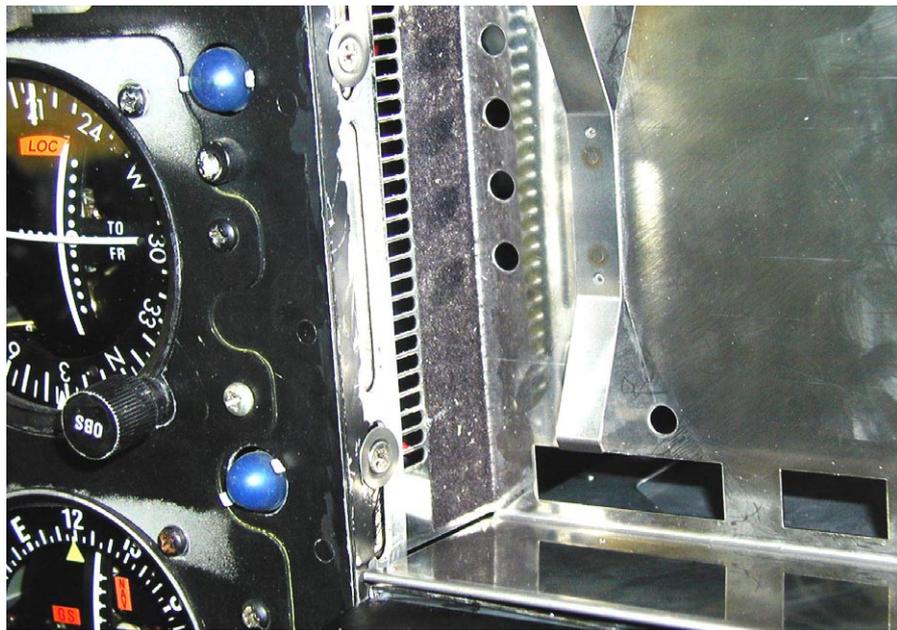
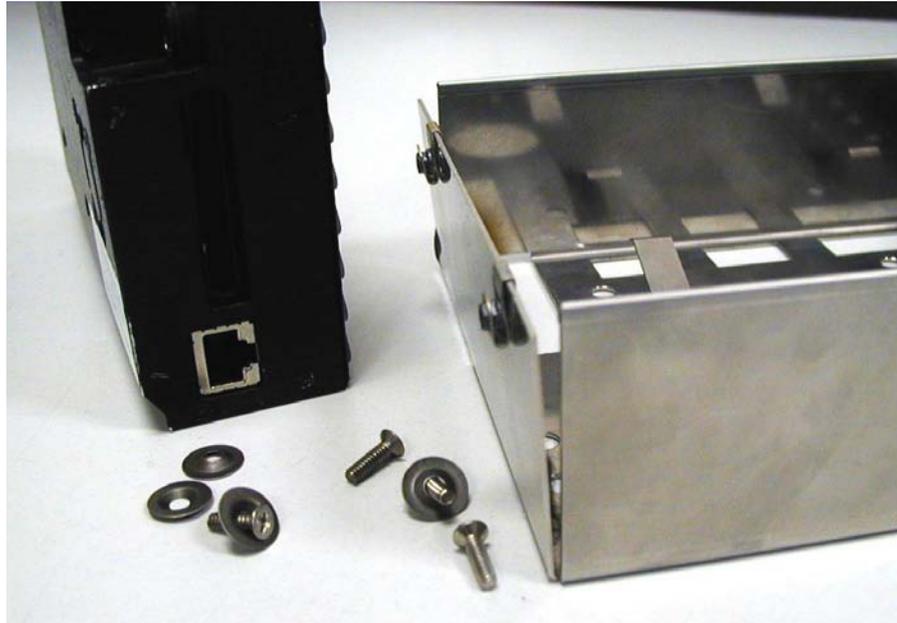
Both on top and bottom space of at least 1 mm must remain so that the QRchassis can easily be bent up.

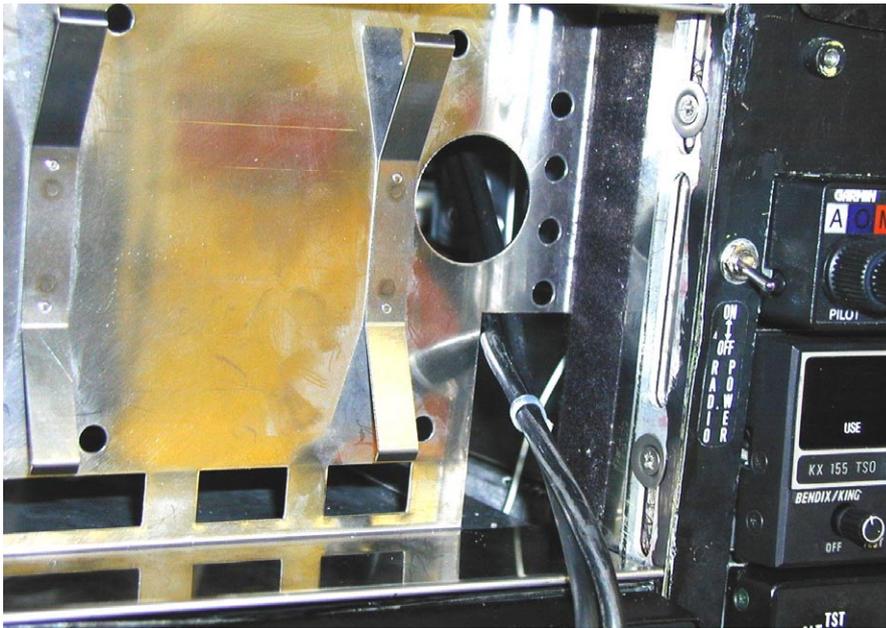
Removal is required for updates via CF and for print options. Furthermore, flight preparation can be performed outside of the cockpit.

We recommend that pilots make themselves familiar with the removal of the device together with the facility providing installation service and to pay attention to the correct installation method of the QR chassis.

!

2.1.3. Detailed view of an installation in a cockpit





2.1.4. Installation depth

The Quick release chassis is delivered such that the MT-Ultra Professional JTSO (ETSO) is flush with the panel surface when pushed in.

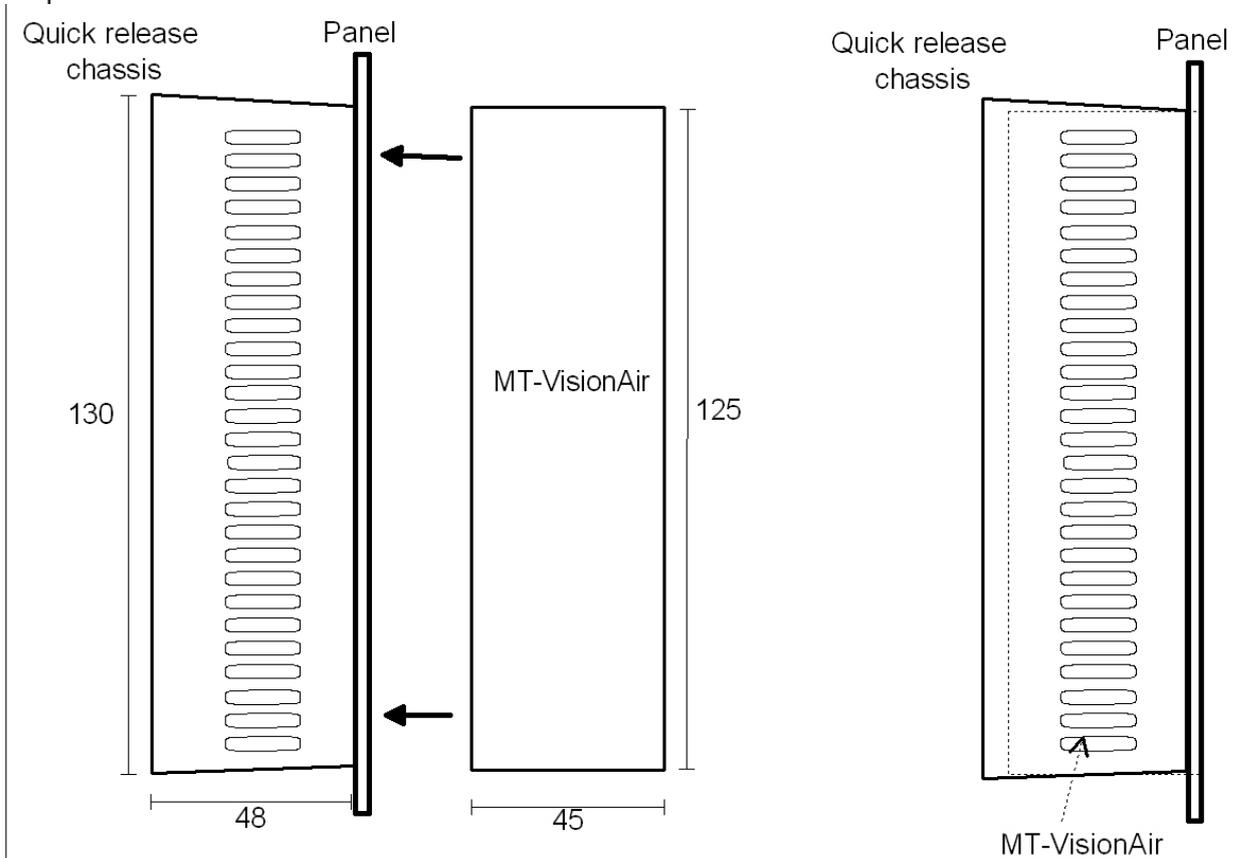


Image: flush installation

If an overhang is required, e.g. to be flush with other overhanging avionics devices, the Quick Release chassis must be shortened as required (max 10 mm). Please shorten on the non crimped side panels of the Quick Release chassis itself. However, please consider that the seam at the top and bottom of the frame may not be modified, as these are required for the fastening of the device.

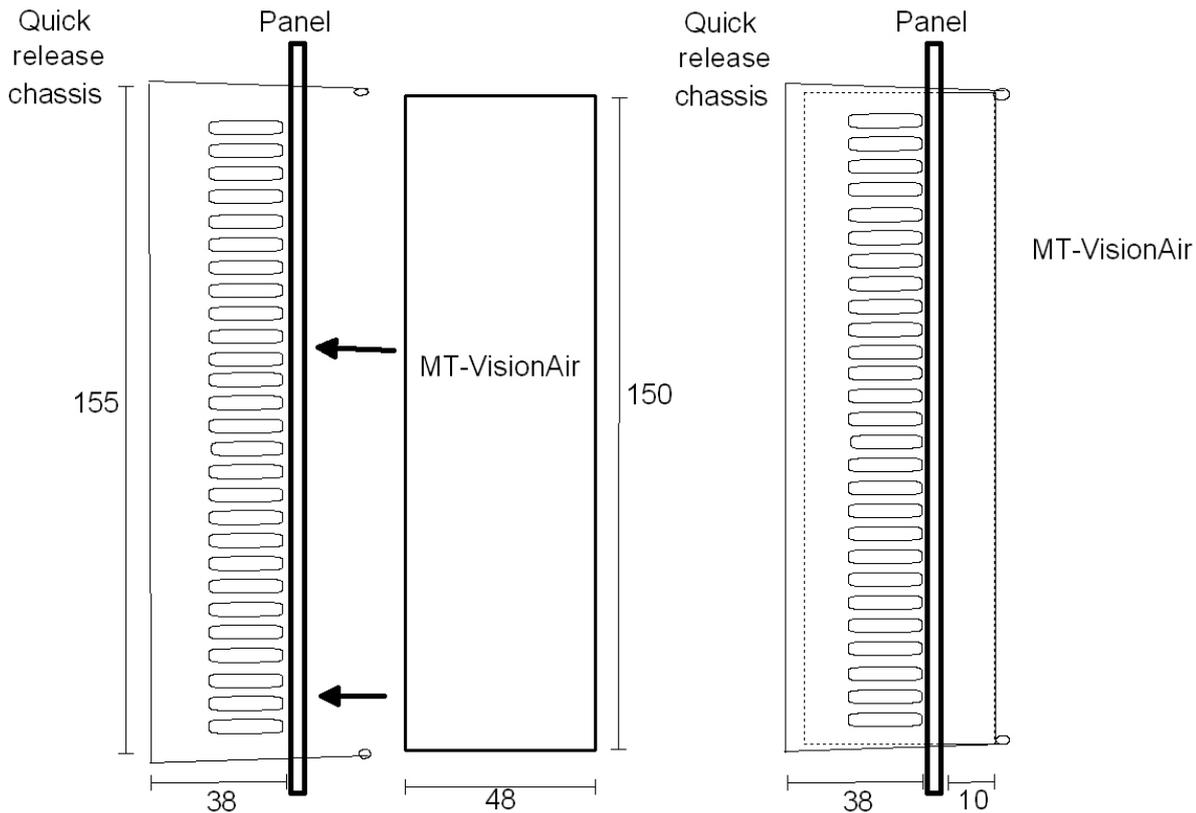


Image: overhanging installation

The round ventilation opening on the back of the device must remain free. The connecting cable for GPS and power is fed through the lower rectangular opening.

For devices with a central connector, this is fed through the central rectangular opening.

In both cases please leave a loop of the cable and bundle the cables so that the device can easily be removed again.

!

2.1.5. Insertion of the MT-Ultra Professional JTSO (ETSO) in the Quick release chassis

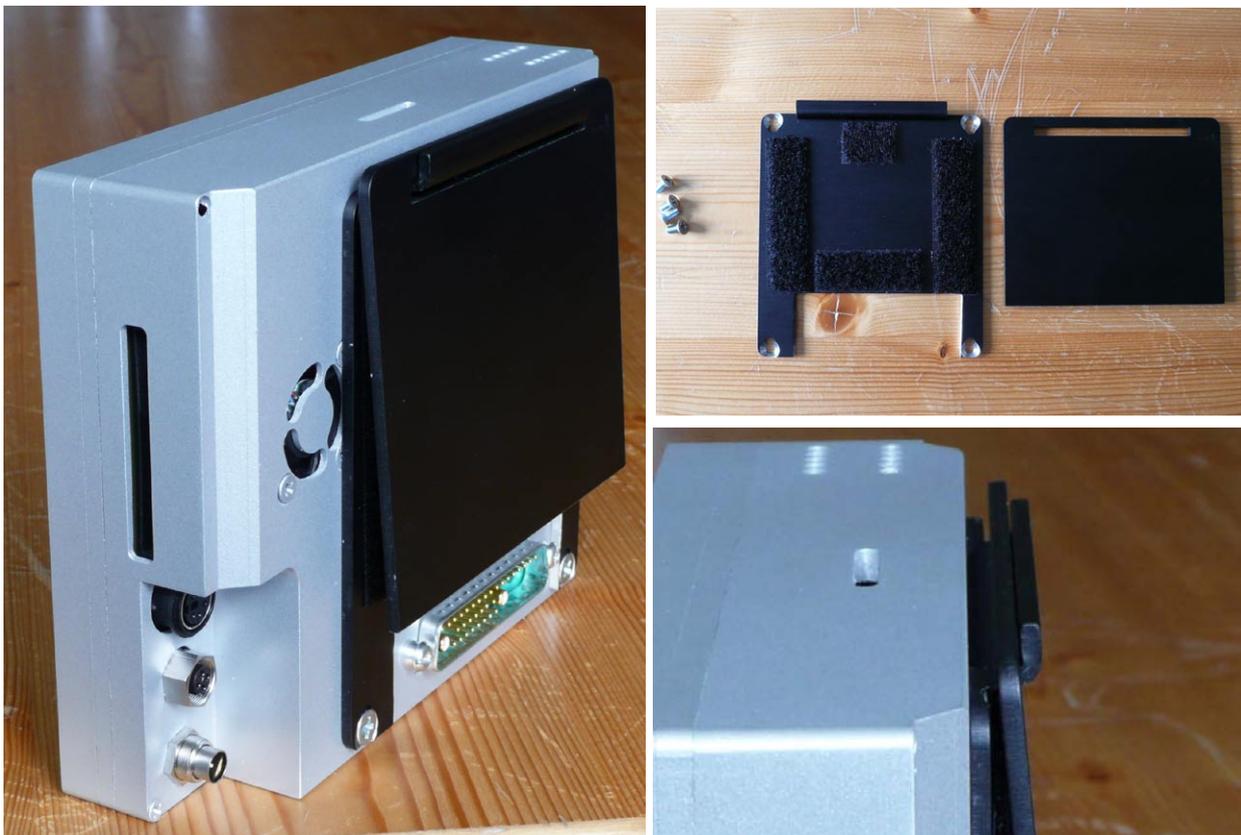
When the Quick Release chassis is securely installed, the MT-Ultra Professional JTSO (ETSO) is inserted in the frame and locked in place under the edge of the upper and lower seams of the frame with a pressure of approximately 4 kgs.

The MT-Ultra Professional JTSO (ETSO) device can be removed from its installed position by lightly pressing the entire unit into the installation chassis and slightly bending the upper and lower QR wall outwards. Since the device is no longer locked in by the seam edges at top and bottom, the spring force pushes the MT-Ultra Professional JTSO (ETSO) up. In order to extract the

device the screwed connectors to the GPS and the power supply or the central connector must be released with 2 clips.

2.2. Two-part Quick Release Mount

The two-part Quick Release mount was developed to enable installation outside of the panel, e.g. on the control wheel (yoke).



2.2.1 Instructions for installation

The unit part can be screwed to the frame with 4 flat head screws M4x5. The fastening of the counterpart is customer specific, e.g. on the control wheel or on the side in the cockpit etc..

Material: 3 mm aluminum anodized black.

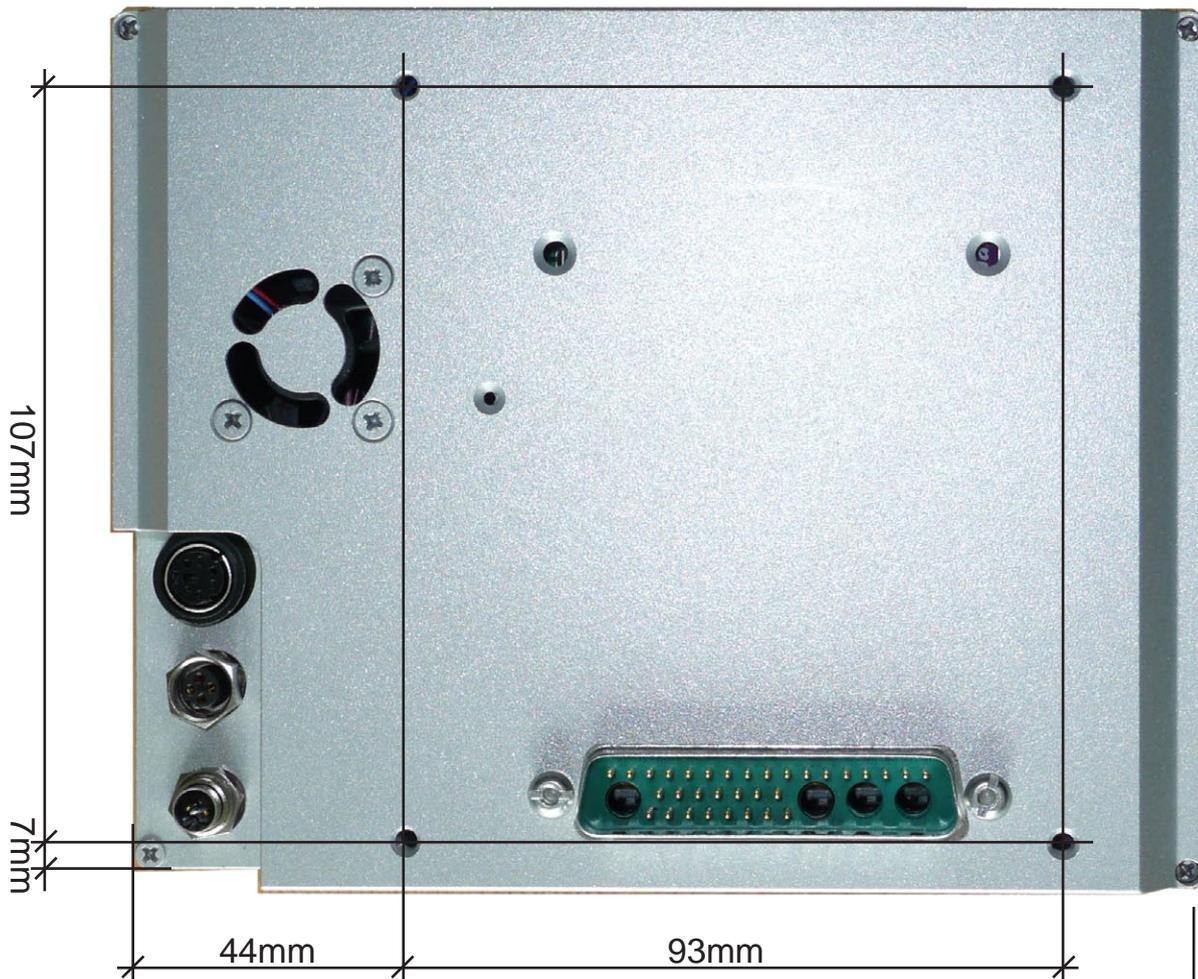
2.3. Third party mounts

Many installation problems can be solved with third-party mounts. Here is a selection:

2.3.1. R.A.M. Mounts

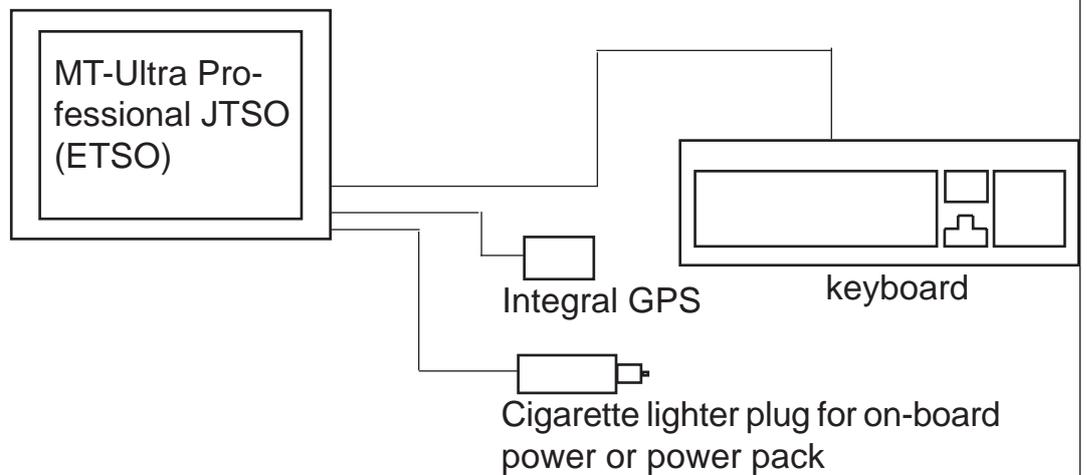
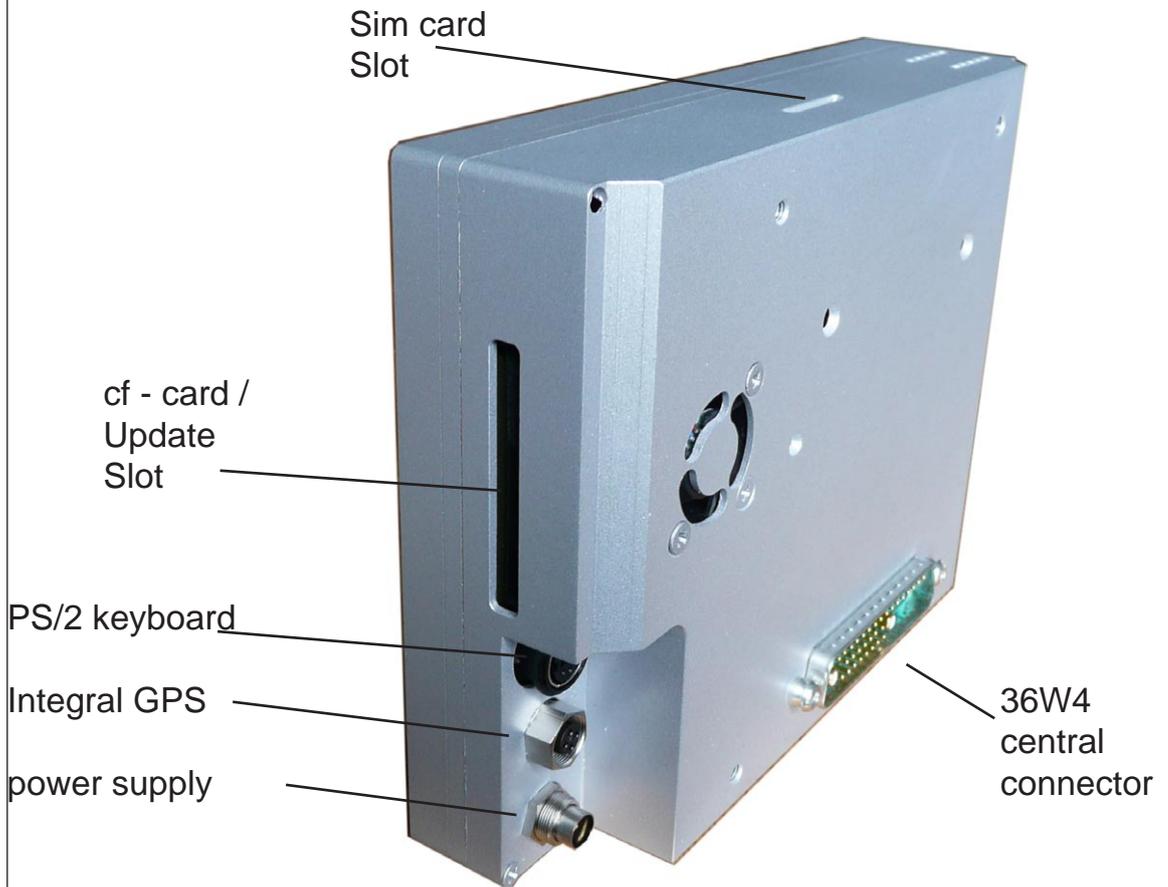


2.4. Image of holes for installation

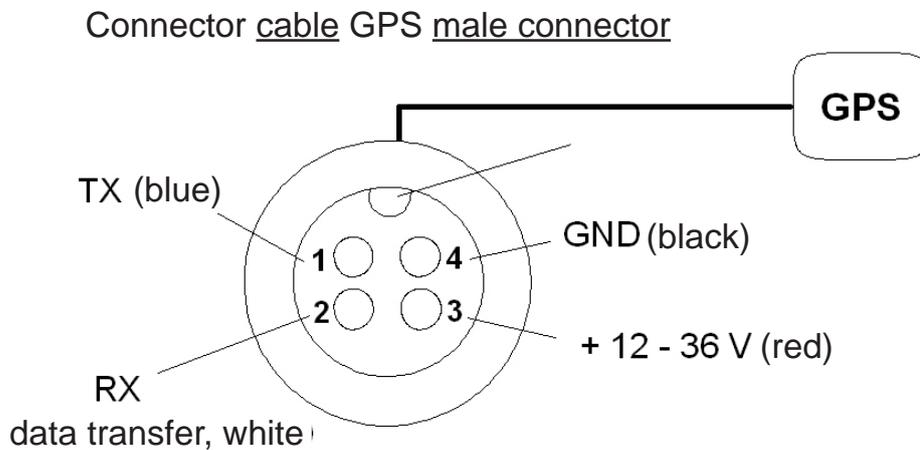
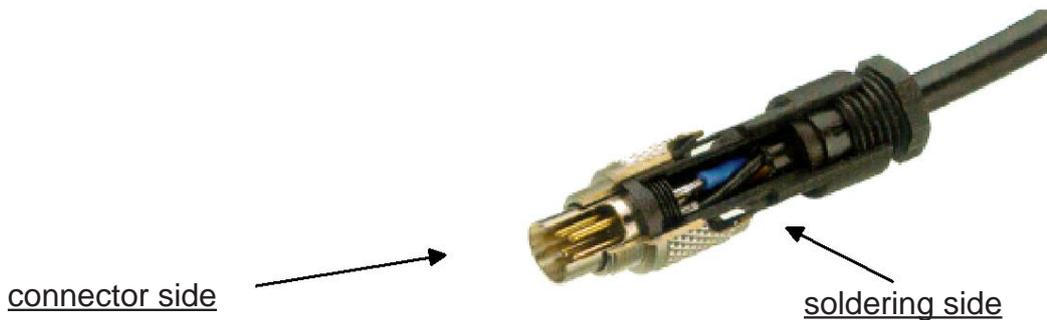
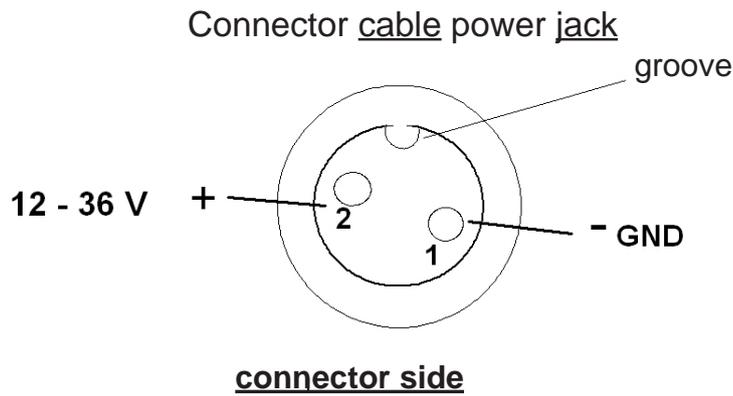


3. Connectors

3.1. General connection of MT - Ultra Professional JTSO (ETSO)



3.2. Pin layout for power supply / GPS round side connector



RX and TX in relation to Ultra Professional JTSO (ETSO), i.e. MT receives on 2 data channels

connector side

3.3. Instructions for power supply

The manufacturer recommends attaching MT-Ultra Professional JTSO (ETSO) devices to a power supply whose fuse is directly connected to the battery and does not include any other substantial power loads.

Recommended: Ground Clearance Switch
 Hot Bus

Not recommended: General avionics bus

Only under these conditions is the pilot able to perform his preflight work with Moving Terrain without draining the battery. (For power consumption see No. 5 Technical Data)

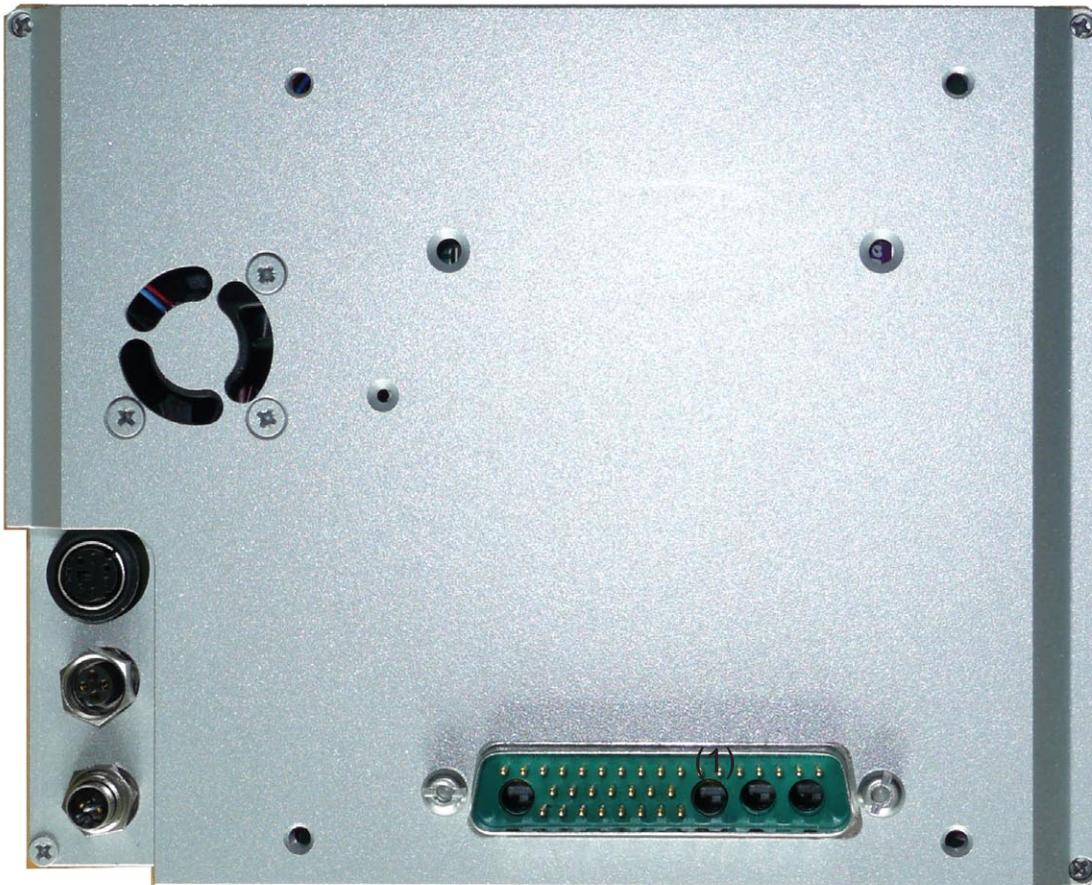
For panel installation the Quick Release chassis includes an installation cable with a straight connector and open ends.

Units with a central connector can use this for the power supply.

3.4. Connections of the 36W4 central connector

In the course of further development the system was equipped with a central connector for serial interfaces, VGA video signals, and power. The objective of the development was to consistently provide the capability of easily connecting and detaching all required signals via a single connector.

On the back of the cabinet there is now only the 36W4 central connector.



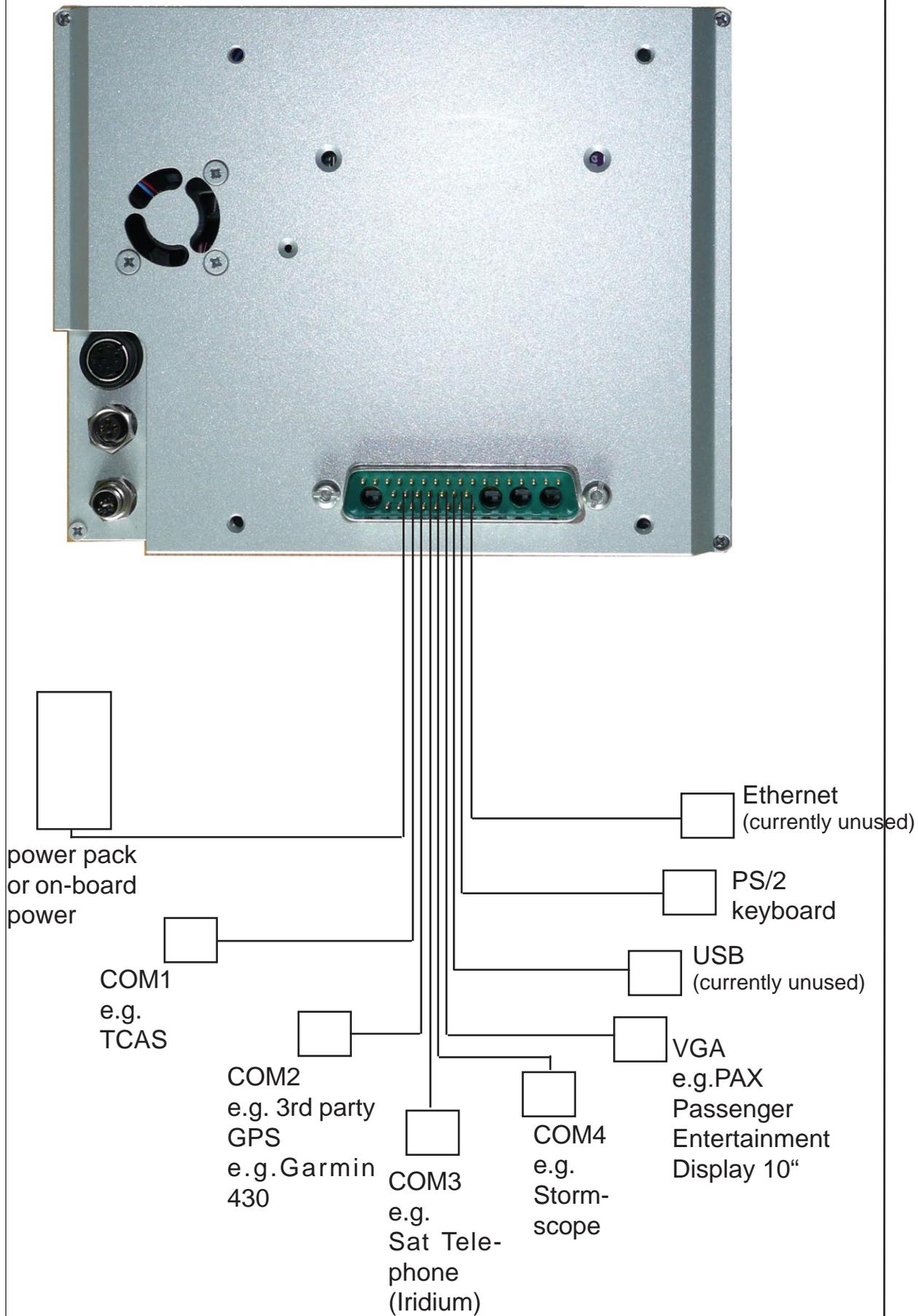
A central connector with a permanently attached Integral GPS antenna and power input are available as an accessory, enabling flight preparation at home or in the hotel room.

In combination with the cigarette lighter cable, mobile utilization is also possible.



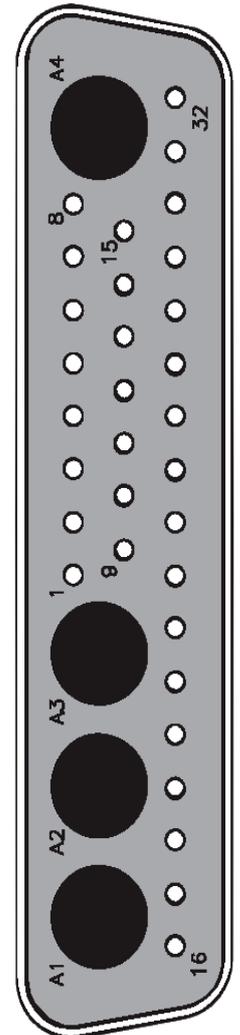
An installation kit is provided by default with the unit, containing all required parts enabling the installation facility to connect the MT-Ultra Professional JTSO (ETSO) with the on-board peripheral units.

3.4.1. General connection options of the 36W4 central connector



Pin assignment 36W4 central connector including coax contacts

Standard Pin assignment		optionale Beschaltung							
Signal	central connector Pin	Pin at common connector	common connector	common wire color	description	Signal optional	Pin at common connector	common connector	common wire color
Power DC 12-36V	01	2	2 Pin Binder	red	use both pins (01+02) together				
Power DC 12-36V	02	2	2 Pin Binder	red					
PWR GND	11	1	round connector	blue / black					
COM 1 RxD	13	2							
COM 1 TxD	12	3							
COM 1 DTR	25	4	9 Pin Sub-D		GND for COM 1 is Pin 24	Ethernet TX+	1	RJ45	green/white
COM 1 CTS	26	8				Ethernet TX-	2	8 pin Western connector	green
COM 1 RTS	27	7				Ethernet RX+	3		orange/white
COM 1 DSR	28	6				Ethernet RX-	6		orange
COM 2 RxD	22	2	9 Pin Sub-D		GND for COM 1 is Pin 24				
COM 2 TxD	23	3							
COM 3 RxD	17	2							
COM 3 TxD	19	3							
COM 3 DTR	21	4	9 Pin Sub-D		GND for COM 1 is Pin 24				
COM 3 CTS	20	8							
COM 3 RTS	18	7							
COM 3 DSR	16	6							
COM 4 RxD	14	2	9 Pin Sub-D		GND for COM 1 is Pin 24				
COM 4 TxD	15	3							
GND COM 1 - 4	24	5	9 Pin Sub-D						
VGA red	08	1							
VGA green	07	2	15 pin high density Sub -D		use 75 Ohm impedance cable for color and sync signals				
VGA blue	06	3							
VGA h-sync	05	13							
VGA v-sync	04	14							
VGA GND	03	6,7,8,10							
USB / PS/2_Keyboard +5V	30	1		red					
USB data -	31	2	USB Buchse	white					
USB data +	32	3		green					
USB / PS/2_Keyboard GND	29	4		black					
PS/2 Keyboard data	09	1	6 pin Mini DIN		use 5V and GND from USB at Mini DIN: 5V pin 4 / GND pin 3				
PS/2 Keyboard clock	10	5							



view: jack; soldering side

3.5. Instructions for connection of peripheral devices

- The port assignment defining which peripheral device (Iridium telephone, TCAS, Stormscope) is to be attached to which COM port can be found on the back page of the installation manual, since these are device dependent.
- When connecting an Iridium telephone, it must be verified that all 7 lines are attached, because they are all required. (Typical error: if lines are missing, the telephone dials but then hangs during the weather download.) In general, connection is made to COM3 and must always be connected 1:1 (no crossed cable).
- COM ports that are marked as "internally cabled" in the list on the back may not be used on the central connector.
- Shielded lines are to be used for cabling and the shield must be connected to aircraft ground to avoid interference of other avionics units.

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4. MT Sat Radar and Blitzplan

NOT for inflight use, only ground information

4.1. System components for data transfer

MT Satellite Radar requires the following components:

4.1.1. Hardware

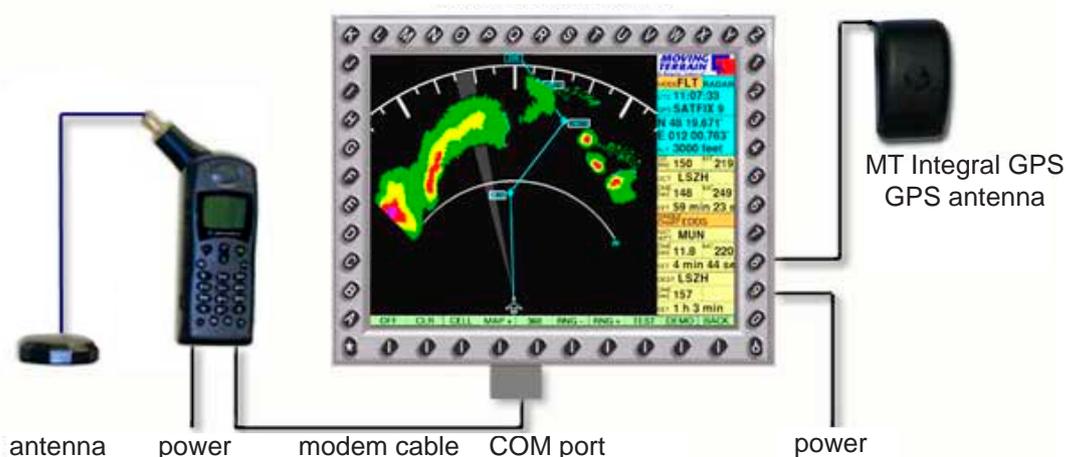
- MT-Ultra Professional JTSO (ETSO) with central connector for data transfer
- GPS receiver
- MT Integral GPS

Important: The GPS has to transmit current time, because weather download is not possible otherwise. Currently known GPS models that are not suitable and do not transmit the time: Garmin GNS430, GNS530.

- Satellite telephone Motorola 9505A with modem kit, data transfer cable and antenna or
- External cell phone (GSM technology)

4.1.2. Software

- MT-Satellite Radar Display software
- Access to DWD weather data (PCMET access)



Important:

For calling and for downloading data the connector between the satellite telephone and antenna must be **cached in 45° angle** (antenna upwards)!

The components of the system must be correctly connected:
Pin assignment of the central connector is described under 3.4.2 or 3.5.2.

When connecting an Iridium telephone, it must be verified that all 7 lines are attached, because they are all required. (Typical error: if lines are missing, the telephone dials but then hangs during the weather download.) In general, connection is made to COM3 and must always be connected 1:1 (no crossed cable).

4.3. Remarks about installation

see 1.3.

Example for an internal installation

Installation of the GPS antenna on the glare shield, the antenna of the satellite telephone in the rear window - if available - facing up (Cessna). Such an installation is well suited as long as the minimum distance to the GPS antenna is 1.3 m.

Remark

Please be aware that interference of GPS reception by use of a satellite telephone cannot be totally ruled out (see also AC-20-138).

4.4. Initial operation of the satellite telephone

Connect the telephone with the MT-Ultra Professional JTSO (ETSO) using the modem cable.

Make sure of reliable power supply for the telephone (on board power).

Suppress PIN code

Standard satellite telephones (e.g. Iridium) allow the deactivation of the security code, so that the telephone need only be turned on. Further input is not required.

4.5. Initial operation and test of the satellite telephone

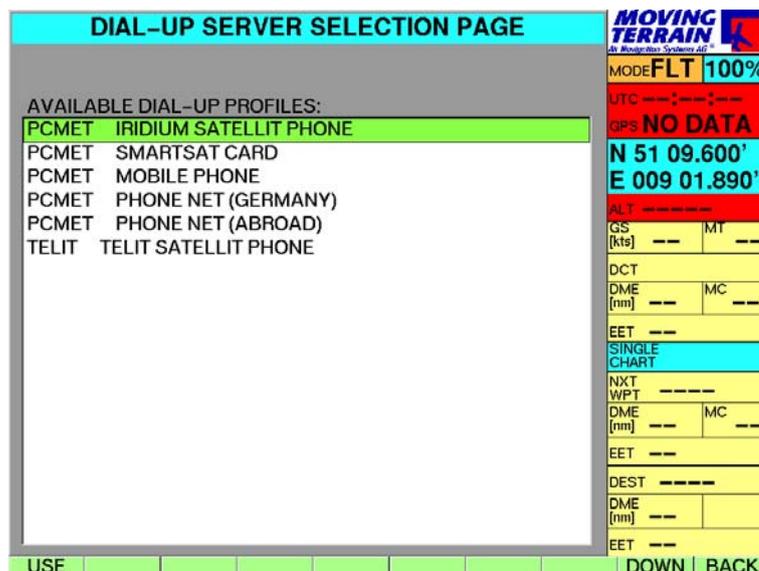
Following installation of the satellite telephone it should be tested:
Practical test of weather download as follows:

4.5.1. Authorization of download of weather data

1. Turn unit on and confirm with AGREE
2. Enter MT satellite weather radar RADAR

Before radar data can be downloaded from Deutscher Wetterdienst prior authorization is required.

AUTH



This leads to the **PCMET FTP authorization page** where access data, i.e. **Username** (beginning with Lf) and **Password** must be entered. These are communicated by DWD on request. **Upper and lower case must be observed.**

To enter an uppercase letter first press CAPS key followed by the appropriate letter key.

CLR deletes the character last entered,

NEXT tabs between the fields USERNAME and PASSWORD.

When leaving this page by pressing BACK both entries will be automatically stored. These need not be re-entered.

PCMET FTP USER IDENTIFICATION		MOVING TERRAIN Air Navigation Systems AG	
MODE	FLT	100%	
UTC	13:04:48		
GPS	SATFIX 9		
N	47 50.611'		
E	009 36.602'		
ALT	6000 feet		
GS [kts]	200	MT	39
DCT			
DME [nm]	---	MC	---
EET	---		
SINGLE CHART			
NXT WPT	-----		
DME [nm]	---	MC	---
EET	---		
DEST	-----		
DME [nm]	---		
EET	---		
CAPS	CLR		BACK
		NEXT	

The key **AUTH** is only re-displayed if the weather service refuses the authorization and access data must be corrected.

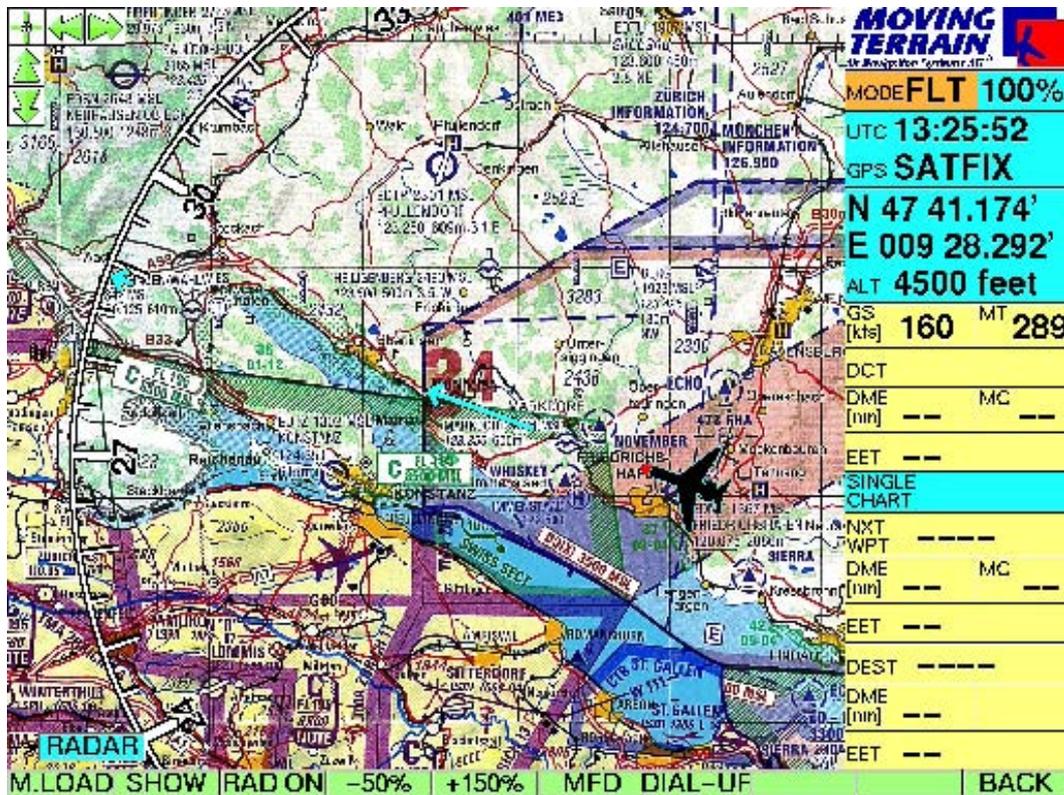
4.5.2. Selection of the ISP

DIAL-UP SERVER SELECTION PAGE		MOVING TERRAIN Air Navigation Systems AG	
MODE	FLT	100%	
UTC	13:26:06		
GPS	SATFIX 9		
N	47 41.380'		
E	009 27.450'		
ALT	4500 feet		
GS [kts]	160	MT	289
DCT			
DME [nm]	---	MC	---
EET	---		
SINGLE CHART			
NXT WPT	-----		
DME [nm]	---	MC	---
EET	---		
DEST	-----		
DME [nm]	---		
EET	---		
->RADAR->DIAL-UP			
USE		HNG-UP	BACK
		UP	

Back in the radar menu the key DIAL-UP allows entry of the appropriate dial up number. The default is the dial up number of the DWD for a satellite telephone or GSM cell phone. When downloading data with the help of a modem and the conventional telephone network the dial up number can be set to PHONE NET (GERMANY) using UP/DOWN and confirmed with USE. When using a SmartSat card in the satellite telephone select the SmartSat entry or Telit Satellite Phone entry in the case of a Telit contract..

4.5.3. Download of Weather Data

Turn unit on and confirm with AGREE



Enter MT satellite weather radar RADAR

M.LOAD –manual download of radar data

SHOW – display of radar data previously downloaded

HIDE – suppress radar layer for better legibility of the chart

RAD ON - turn on automatic download every 15 minutes

By pressing the same key, now labeled RAD OFF, the automatic download is turned off.

Once weather radar data has been loaded onto the MT-Ultra Professional JTSO (ETSO) it can be displayed with SHOW

-50% and +150% allows zooming out and zooming in of the chart.

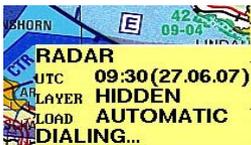
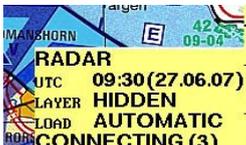
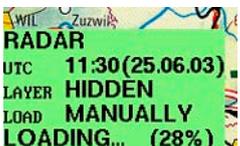
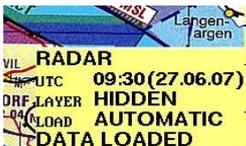
MFD activates the MFD mode

Please be aware:

The keys are labeled with the appropriate function that is to be executed. The **status** is displayed in the small green window on the lower left of the display.

- Manual Mode
- Allows an immediate one time download of weather data, e.g. at the beginning of the weather briefing.
- M.LOAD - no further entries required!

4.5.4. The Download in Detail: StatusWindow

dial up		Time and date of data displayed
connect		Various connection modes displayed in parantheses
FTP logged in connection to server download of data		Loading
Data loaded		Progress report in parantheses
		

All data are completely successfully downloaded and are displayed on the chart.

The connection is automatically terminated!



If precipitation information is not displayed there are two possible causes:

1. Layer is still suppressed (status HIDDEN), solution: press **SHOW**.
2. No precipitation was recorded for the area of the chart displayed (check status display: layer SHOWN)



5. MT TCAS

5.1. Antenna arrangement

5.1.1. Standard installation

The Ryan 9900 BXSystem has 2 double antennae (2 serial antennae in a single casing). Together both antennae are responsible for direction determination (bearing).

type of antenna		installation location	diagram
serial, 2 antennae integrated in one casing		top	The diagram of the single casing antenna alternately points forward and back.
parallel, 2 antennae parallel side by side		bottom	The diagram of the single casing antenna alternately points left and right.

Function:

The four different antenna diagrams are wired sequentially. The bearing is calculated from the various signal strengths of the pulses received.

Distance is calculated from the time differential between the transmitted pulse and the received response pulse (as in any secondary radar).

Ryan installation recommendations for serial antennae (head antennae)

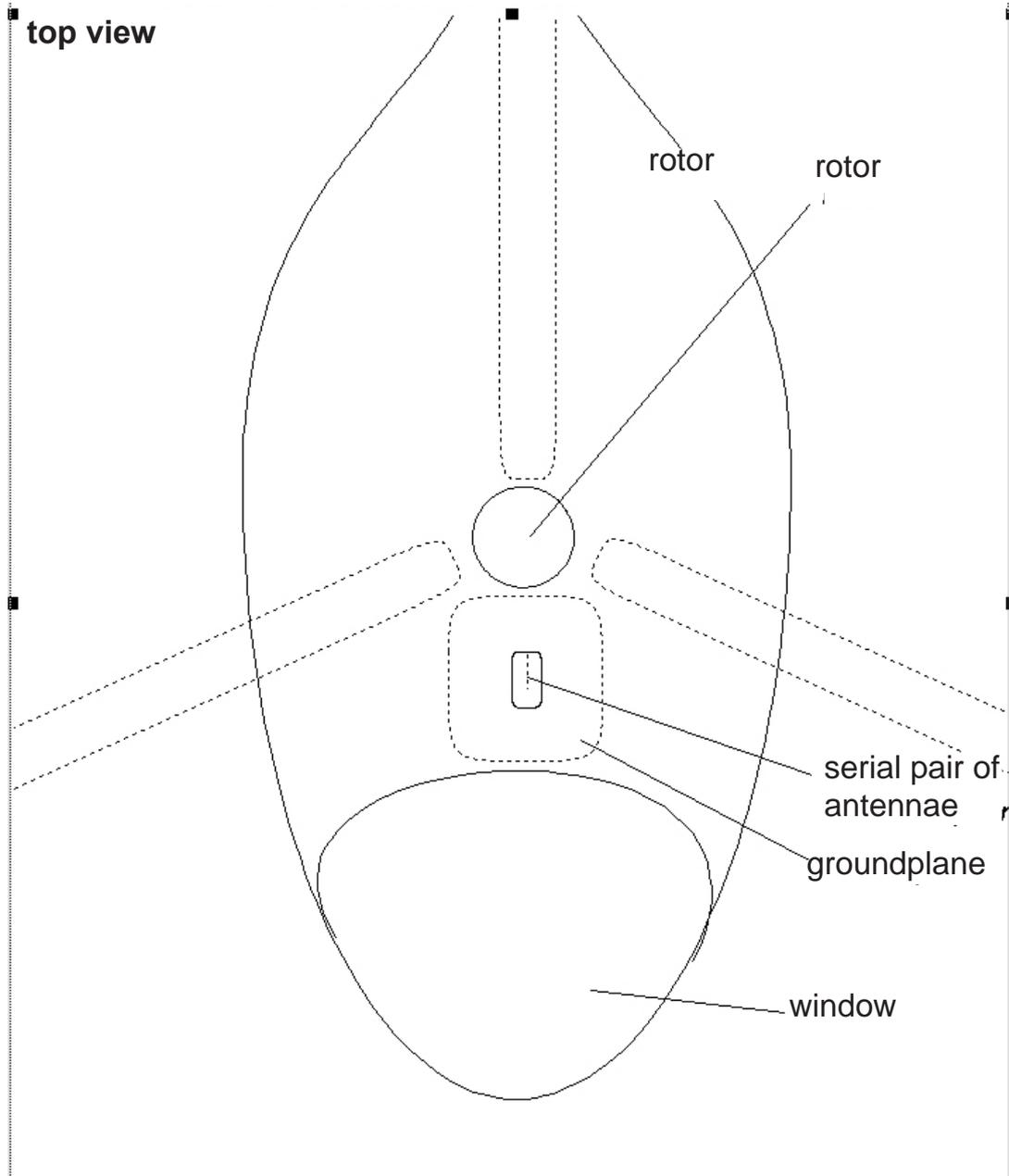
The installation location should be close to the longitudinal axis of the aircraft.

For plastic covers a ground plane (foil inside)

Radius larger or equal 30 cm, diameter larger or equal 60 cm

(l = 27 cm)

At least 20 cm distance from other antennae.



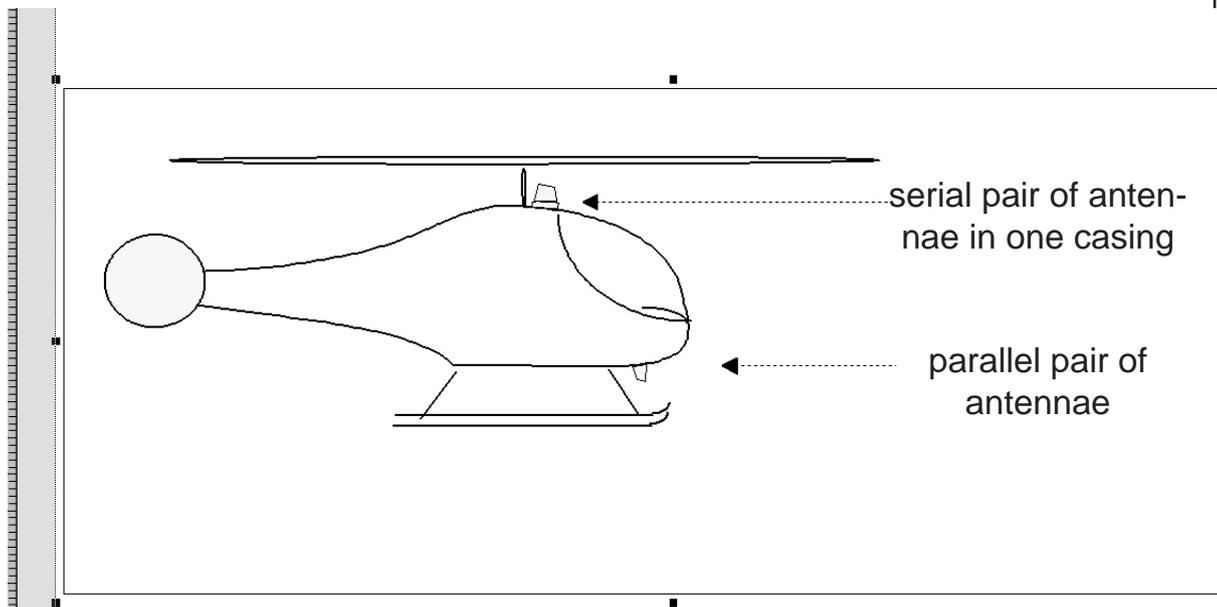
Ryan installation recommendations for parallel antennae (bottom antennae)

The installation location should be close to the longitudinal axis of the aircraft.

At least 1 m distance from transponder and DME.

At least 20 cm distance from other antennae (e.g. glide slope, ILS).

Important for installation of both antennae are symmetry
and at least for the serial antenna
free visibility forwards.



5.1.2. Non-Standard Installation

The installation location of the two antenna types may be swapped, e.g. if free forward visibility is not available for the serial antenna on top.

- Example Agusta 109 (pitot tubes mask the upper installation location).

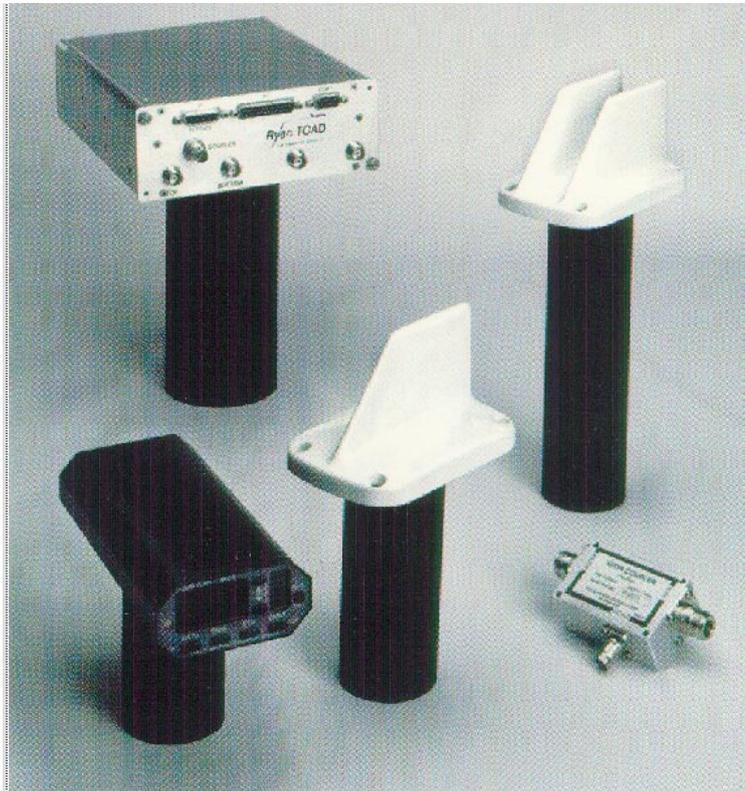
Important:

For a non-standard installation with the serial antennae at the lower location the same recommendations apply as for the standard installation of the parallel antennae:

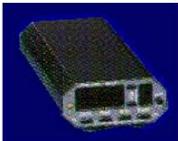
- Minimum 1 m distance from transponder and DME
- Minimum 30 cm distance from other antennae (e.g. glide slope, ILS)

5.2. Views, Dimensions and Weight*

Total view of the components:



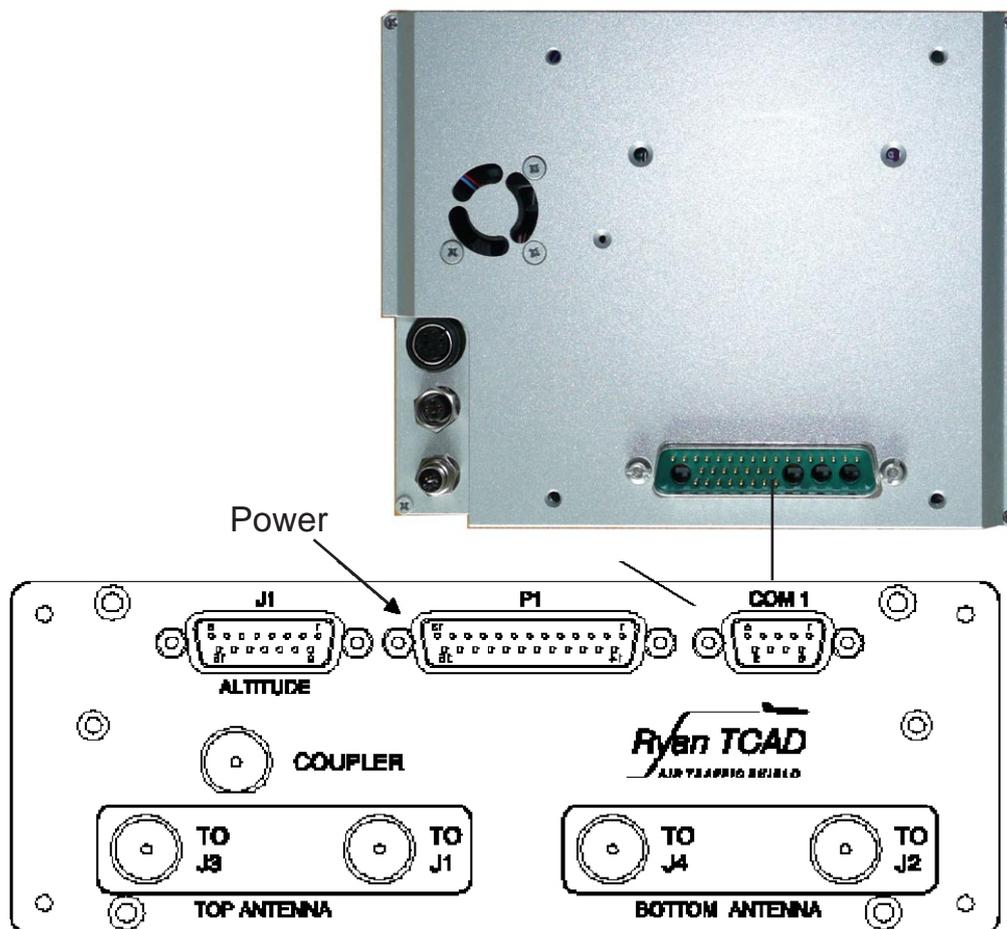
system weight: 4,18 kg

component dimensions		width	height	depth	depth with connectors
processor		18,41 cm	7,87 cm	23,68 cm	29,65 cm
operating panel		8,28 cm	3,94 cm	17,15 cm	21,59 cm
directional antennae serial		8,23 cm		13,06 cm	
parallel					
transponder coupler		4,57 cm	4,07 cm	6,86 cm	

5.3. Connection to COM 1 of TCAD (Ryan TCAD / Avidyne TAS)

For Ultra Professional JTSO (ETSO) (EP) units the TCAS can be connected to COM 1 or COM 4.

Connection of MT-Ultra Professional JTSO (ETSO) to Ryan TCAS:



The connection must be implemented from the central connector to COM 1 of the TCAD. The cabling must be crossed (zero modem), i.e.

TCAD		VA
RxD	-	TxD
TxD	-	RxD
GND	-	GND

5.3.1. Connection to COM 2, 3 or 4 of the Ryan TCAD

As COM 1 of the Ryan TCAD is generally used as a Service Port for potential programming of the Ryan TCAD due to its easy accessibility, the manufacturer recommends a connection to one of the other COM ports that are located on P1 (see "Ryan TCAD Model 9900BX Installation Manual, Revision 2 - July 26, 2001", p. 26, Connection diagram p. 38, Fig. 2-22: "Wiring Diagram for connection to Multi-Function Displays without a TCAD Display/Controller.")

5.3.2. Pin assignment COM 1 port for MT devices

The pin assignment of the serial COM 1 ports (RS232-Port 1) on the MT-Ultra and the MT-Ultra Professional JTSO (ETSO) conforms to the standard:

PIN 2 = RX

PIN 3 = TX

PIN 5 = Gnd

5.3.3. Configuration for the operation of the Ryan TCAD 9900 BX with Moving Terrain

Display as MFD without TCAD Display/Controller

a) preconditions for the certified operation of the device are:

- Annunciator light labeled "Traffic" or "Traffic alert"
- Mute switch
- Feed into the audio system of the aircraft
- MFD is optionally certified.

b) Configuration

see "Ryan TCAD Model 9900BX Installation Manual, Revision 2 - July 26, 2001", p. 26, Connection diagram p. 38, Fig. 2-22: "Wiring Diagram for connection to Multi-Function Displays without a TCAD Display/Controller."

ba) 1 switch ON/OFF to GND,

Can be replaced with a permanent ground wire and + to the unit (permanent power)

bb) 1 switch Mute to GND (warning signal only to be interrupted, not switched off)

- The mute switch must be within easy reach of the pilot.
- The mute switch interrupts the optical and acoustical warning for a certain period.
- The mute switch does not turn off the loudspeaker nor the TCAD.

bc) 1 switch for annunciator light to GND

- bd) connection to the audio system of the aircraft
- be) optional: gear down switch or weight-on-wheel switch
(also works without a gear down/ w.o.w. switch due to
recognition of the altitude change from the altitude encoder)

Important: apply power to the transmitter (including the Ryan TCAD) only
when antennae (or substitute resistors) are connected!

6. MT Stormscope

6.1. System Components

MT-Stormscope requires the following components:

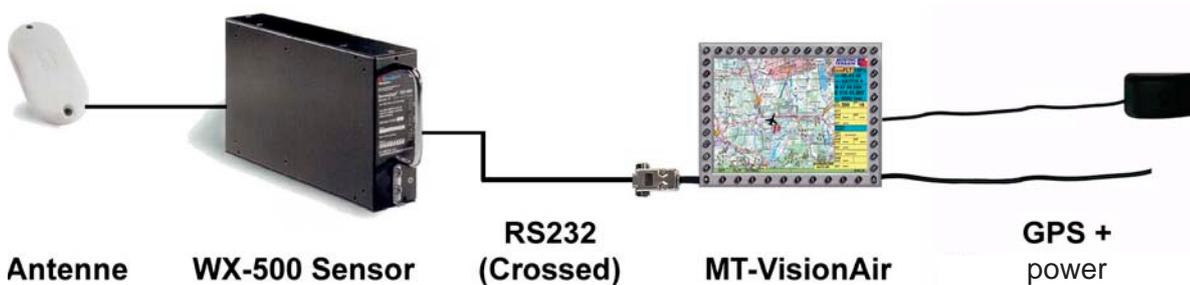
Hardware

- MT Ultra Professional JTSO (ETSO) with COM port for data transfer
- GPS receiver (MT Integral GPS recommended) with antenna
- WX-500 Sensor with data transfer cable and antenna

Software

- MT-Stormscope display software

6.2. Block Diagram



The components of the system must be correctly connected:

Connection for power and GPS to the MT-Ultra Professional JTSO (ETSO) are explained in the basic manual.

Connection of the antenna, WX-500 and power supply for the WX-500 shown in the appropriate operations manual.

For the connection of the WX-500 sensor a crossed RS232 data connection must be used. For the correct COM Port please see unit specific configuration at the end of the manual.

7. Technical Specifications

Type highly integrated navigation unit for cockpit panel mount or as mobile unit

Screen TFT color display 6,5" (diagonal), 1024 x 768 pixels, 256 colors, optimum readability in sunlight, ideal readability up to an angle > 50°

Presentation horizontal

Diagonal position of keys enables vertical use, provided appropriate software changes are made.

Keyboard integrated keyboard (similar to cell phone keys)
alphanumeric keys: 36 keys (alphabet and numbers) + 10 multi function keys + on/off switch + hard wired key to trigger peripheral equipment and MFD sensors

Ports I for operation power and GPS (on COM II)

Ports II for Service PS/2 (external keyboard), compact flash slot for fast update via CF

Optional Ports III

Via Central connector: Power, COM 1, 2, 3, 4, VGA (external screen), USB, PS/2, Ethernet

Casing aluminum, black varnish

Weight 800 g

Dimension 157 x 125 x 40 mm (w x h x d)

Power Supply

12 - 28 V, adapts automatically

Power Consumption

MT-Ultra Professional JTSS (ETSS): 14 W

Environmental Conditions

temperature: -10°C /+50°C operational, -40°C /+80°C storage;
shock and g loading: 10 g in x, y, z direction;
vibration: 10 g at 1-100 Hz

Software MT - basic moving map software with optional software modules

9. Unit specific configuration ex factory

S/N: _____

	internal cabling	COM 1	COM 2	COM 3	COM 4
	<input type="radio"/>				
GPS	<input type="radio"/>				
	<input type="radio"/>				
TCAS		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sat-Telephone Iridium		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stormscope		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>				

- GPS Protocol Configuration:
- NMEA 0183 (Standard setting)
 - Garmin 430 / 530
 - Arinc-TNL