

MT-AUTOPILOT Manual

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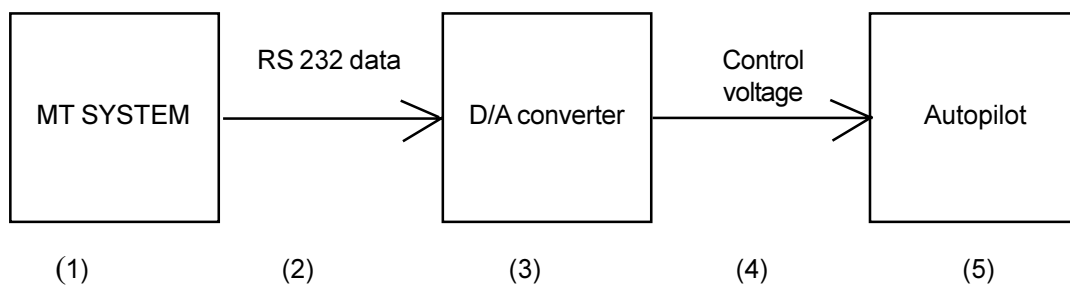
I Installation

Moving Terrain's Autopilot software is integrated into the main program. The module can be enabled separately by authentication code.

It is then ready for operation and must be calibrated (see Section III).

Components

(Fig. 1) MT connection to Autopilot



II MT Digital Analog Converter

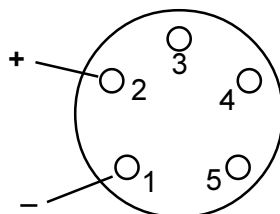
Type MTDA/21-xxx-02-02

II.1 Autopilot control voltage



View of port as in diagram below (connection side).

Autopilot output port
(connection side, view same as above)



Connection side

Assignment:

Pin 1: GND

Pin 2: Analog out

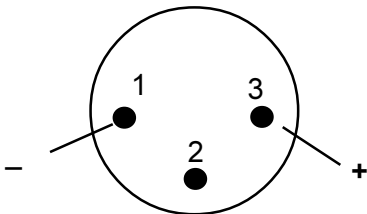
II.2 Connecting to the MT system and power supply



Power supply
12V - 28V DC

RS232 Input port from MT system

Power supply
connection side
View same as above
12V - 28V DC



Pin assignment:

a) Power supply

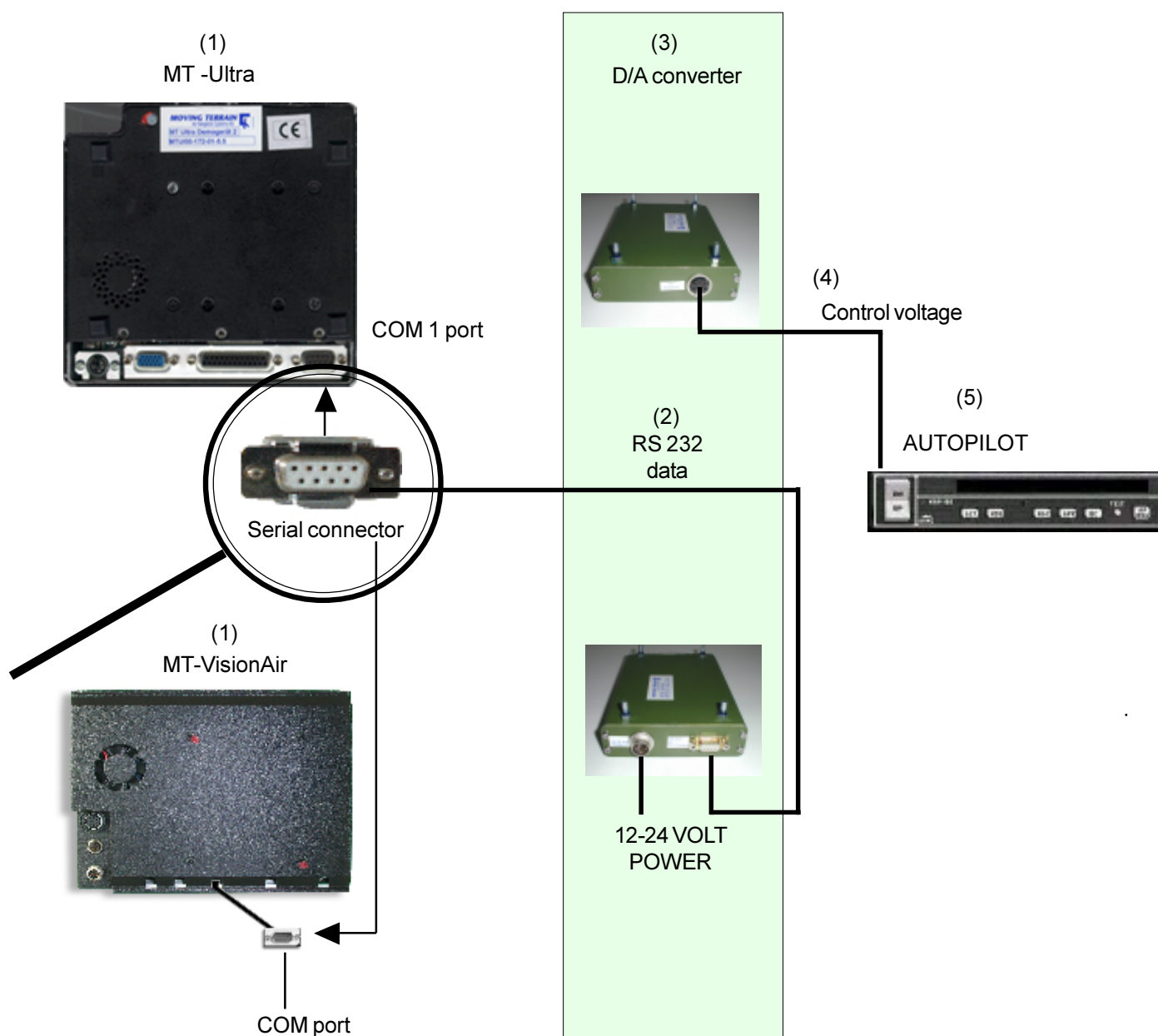
Pin 1: Ground
Pin 3: 10 V - 28 V

b) RS232 connection:

Pin 2: TxD (connection side)
Pin 3: RxD (connection side)
Pin 5: GND (connection side)

Please note: The cable for connecting the MT system and D/A converter is a serial RS232 extension cable (pins are 1:1 feed-through).

II.3 Connection diagram



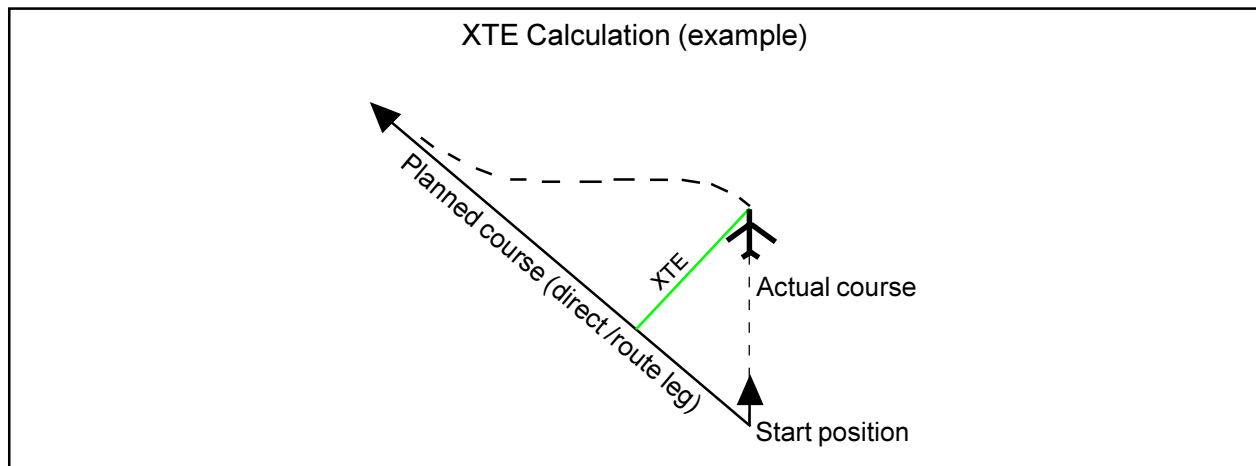
III Set-up

III.1. Mode of operation

MT Autopilot only functions when an **APDCT** (Direct) or **APRTE** (Route) is active in the MT system.

If neither of the two is active, no signal will be transmitted to the D/A converter and as a result no control voltage will be supplied to the Autopilot.

If a route or direct is active, a so-called “cross track error” (XTE) will be calculated between the current position (GPS / MT) and the planned course (direct/route leg). Depending on how large this XTE is, the Autopilot will cause a heading change to be made.

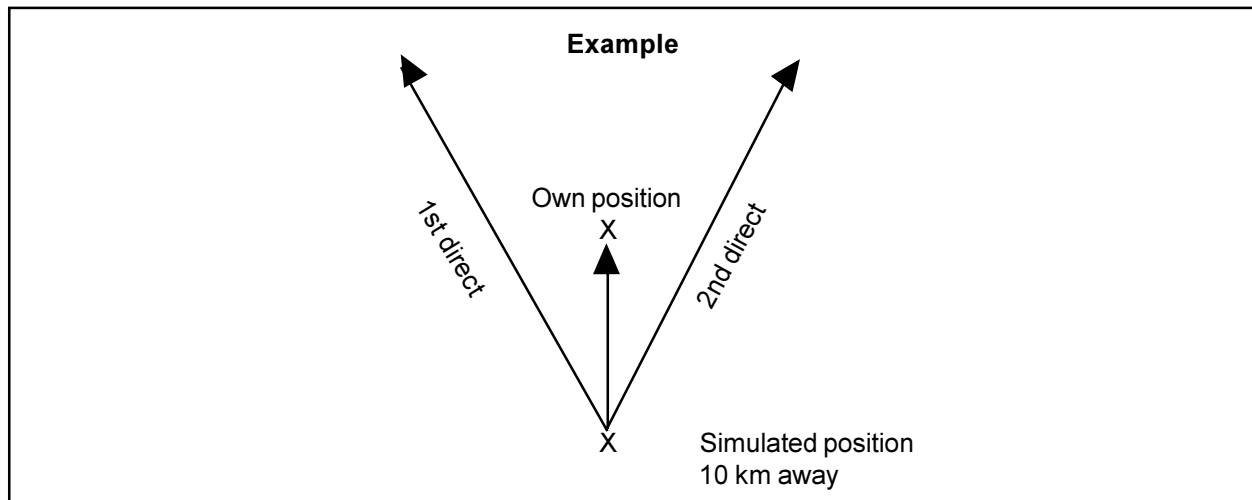


III.2. Start-up und calibration

III.2.1 Polarity test

- a) Power supply to D/A converter, MT system and Autopilot.
- b) Start MT system, wait for GPS SatFix and switch to FLT mode -> Chart will position itself.
- c) Switch to MAP mode (MAP key) and set position approx. 10 km south.
- d) Now set a direct to a point to the left of your own position (see drawing). Return to FLT mode, enable Autopilot (AP) and select APDCT. Then observe rudder deflection (full deflection? direction?)

Now repeat the above procedure, only this time with a direct to the right of your own position. Should the rudder be deflected in the wrong direction, one solution could be to reverse the polarity in the file MTPRO.INI.



- e) Test for correct polarity as described in d) or whether the rudder moves in the wrong direction.

In MTPRO.INI:

[Smart coupler]

Polarity = L (+ means rudder to port)

III.2.2 Static calibration

Setting for the sensitivity of the Autopilot. This procedure must be carried out for each aircraft separately, since each of them reacts differently. This can also be set in MTPRO.INI. At a sensitivity of 100 and an **XTE** of 1.25 nm (nautical miles) the Autopilot has the maximum turn rate.

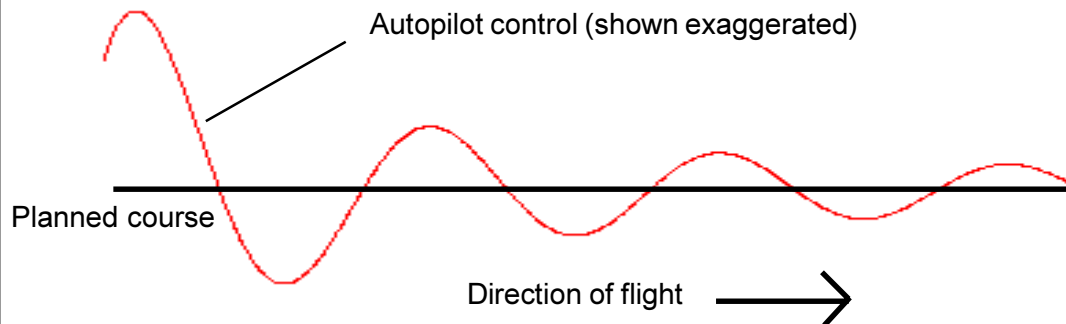
[SmartCoupler]

Sensitivity = 250 means that sensitivity has been set at 250 % and at an **XTE** of 0.5 nm and over the maximum turn rate has been achieved (assumed 2 min. turn).

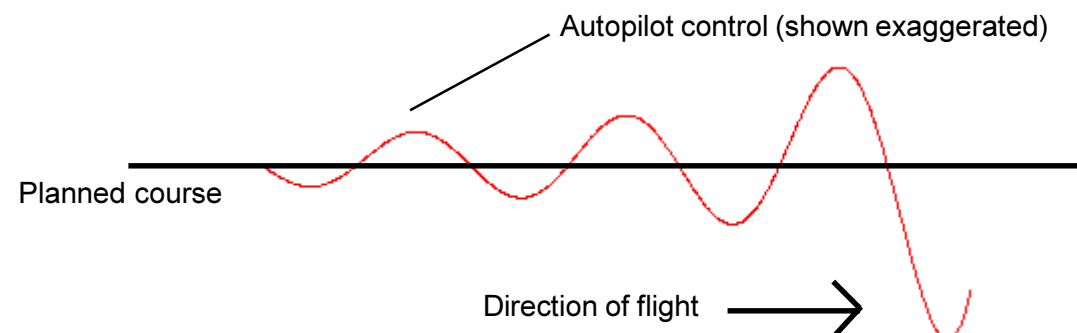
However, the sensitivity should only be changed if the aircraft vibration increases (reduce sensitivity) or if it reacts lethargically to a change of course (increase sensitivity). Dynamic calibration can thus only be performed in-flight.

Aircraft behavior at various levels of sensitivity:

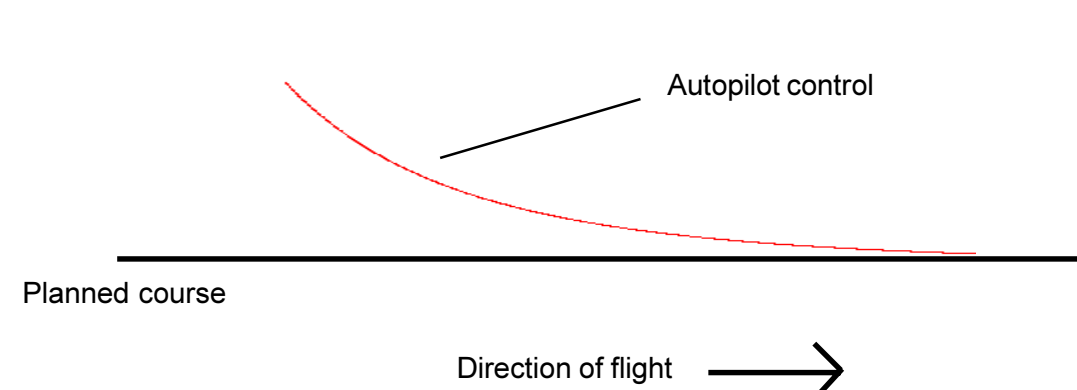
1st case: Oscillatory convergence => Aircraft turns too slowly.
Possible cause: Sensitivity set too low,



2nd case: Oscillatory divergence => Aircraft vibration increases.
Possible cause: Sensitivity set too high



3rd case: Asymptotic behavior => Aircraft intercepts course => Sensitivity is correct



Please note: In the event of a malfunction occurring in the MT system or GPS, after approx. 3 seconds the control voltage will be reset to neutral (no further heading changes via the MT Autopilot module).

III.2.3 Dynamic calibration

Dynamic calibration is different for each aircraft and model. It can only be performed in-flight. As shown in the diagrams on the previous page, the behavior of the Autopilot must be observed and the following value subsequently reset in the MTPRO.INI file:

[SMART COUPLER]

Sensitivity = 250

250 is a value suggested by Moving Terrain that is derived from tests and experience. However, it may vary from one aircraft type to another.

IV. Flying a route with the MT system and Autopilot

Autopilot can also work with the MT flight planning system. In this case the route you previously put together is flown. Changes of course are made as described above.

You can switch in-flight from route- to direct flying with the aid of two change-over functions. The latter are to be found in the FLT submenu (flight mode) and AP.



A submenu with the functions APDCT and APRTE will now open.



With the APDCT key, the Autopilot receives a command from the MT system to follow the direct (Fig. above left). The APRTE key transmits MT system data for route flying to the Autopilot (Fig. above right). If the first point on the route has already been overflowed before the switchover to APRTE, the Autopilot automatically intercepts the next point along the route.

If the Autopilot is enabled and receiving data from the MT system, depending on the mode APDCT or APRTE will be displayed in the info box instead of FLT MODE.

It is also possible to fly an IFR route with this model (APRTE).