

# MT - TCAS Manual

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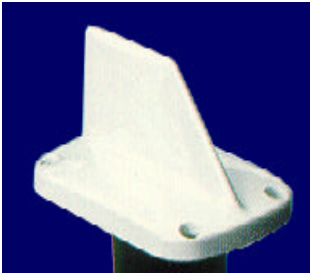
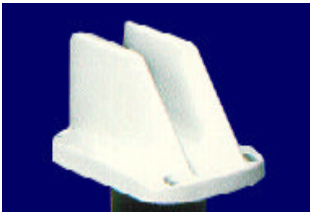
## 1. Installation

### 1.1 Antenna mounting

#### 1.1.1 Standard installation

The Ryan 9900 BXSystem has two double antennas (2 serial antennas in one blade).

Both antennas together are responsible for orientation (bearing).

	Antennentyp		Einbauort	Diagramm
1	<b>Serial</b> , 2 antennas integrated into one blade		top	Pattern of single-blade antenna points alternately to the front and rear.
2	<b>Parallel</b> , 2 antennas side by side		bottom	Pattern of single-blade antenna points alternately to the left and right.

#### Function:

The four different antenna diagrams are connected in sequence. The bearing direction is calculated from the varying signal strengths of the pulses received.

The distance is calculated (as with any secondary radar) from the time difference between the transmit pulse and the reply pulses received.

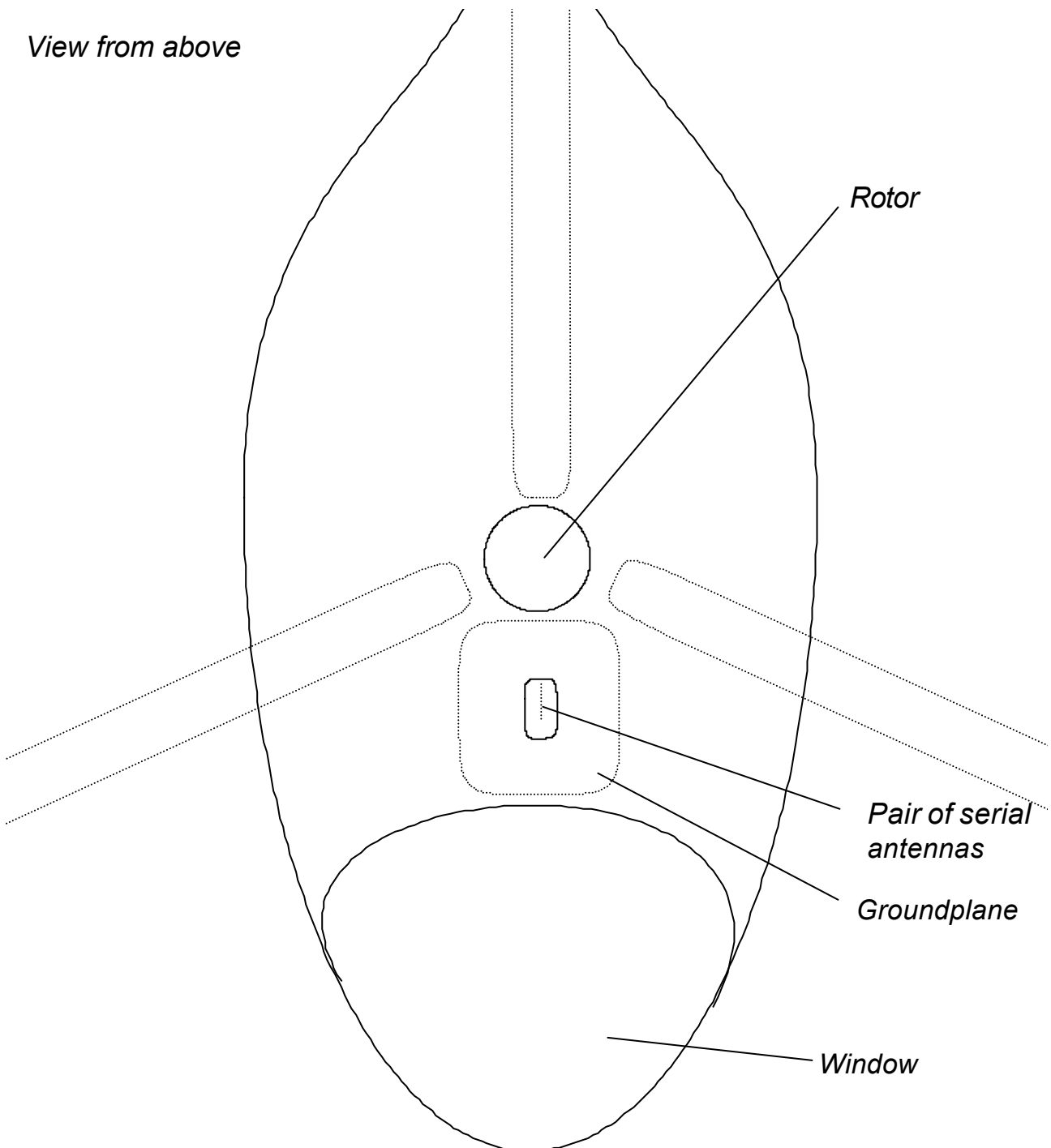
**Ryan recommendations for installing serial antennas (top-mounted antennas)**

Select a mounting point as close as possible to the longitudinal axis of the aircraft.

With plastic sheathing a groundplane (film inside)  
Radius = 30 cm, diameter = 60 cm ( $\epsilon = 27$  cm)

At least 20 cm away from other antennas

*View from above*



**Ryan recommendations for installing serial antennas (under-fuselage antennas)**

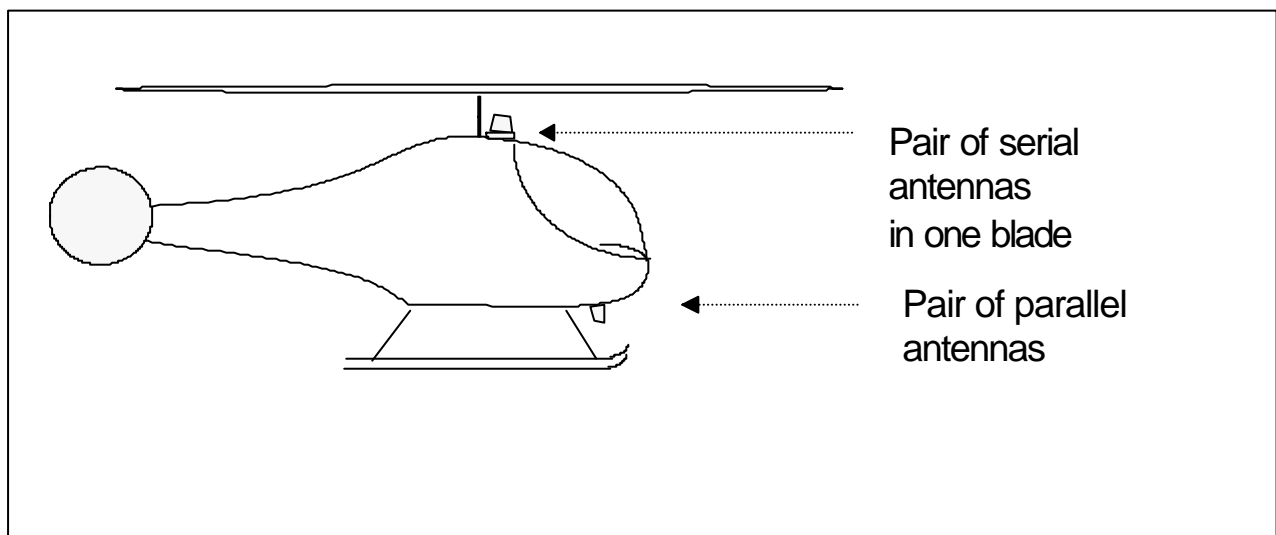
Select a mounting point as close as possible to the longitudinal axis of the aircraft.

At least 1 m away from transponder and DME

At least 30 cm away from other antennas (e.g. Glideslope, ILS)

When mounting both antennas it is important to maintain

**symmetry** and  
**an unobstructed forward view, at least for the serial antenna.**



### **1.1.2 Non-Standard Einbau**

The mounting location of the two antenna types may be exchanged if, e.g. the serial antenna pair does not have unobstructed forward visibility.

Example: Agusta 109 (top mounting position shadowed by pitot tubes).

#### **IMPORTANT:**

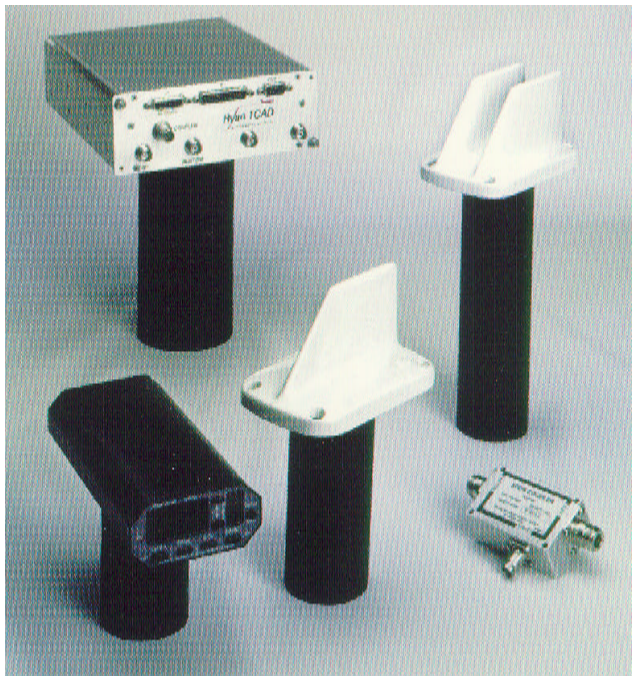
For non-standard installation the same mounting recommendations as for standard mounting of parallel antennas apply to under-fuselage mounted serial antennas:

At least 1 m away from transponder and DME

At least 30 cm away from other antennas (e.g. Glideslope, ILS)



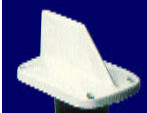


## 1.2 Views, dimensions and weight \*

View of all components:

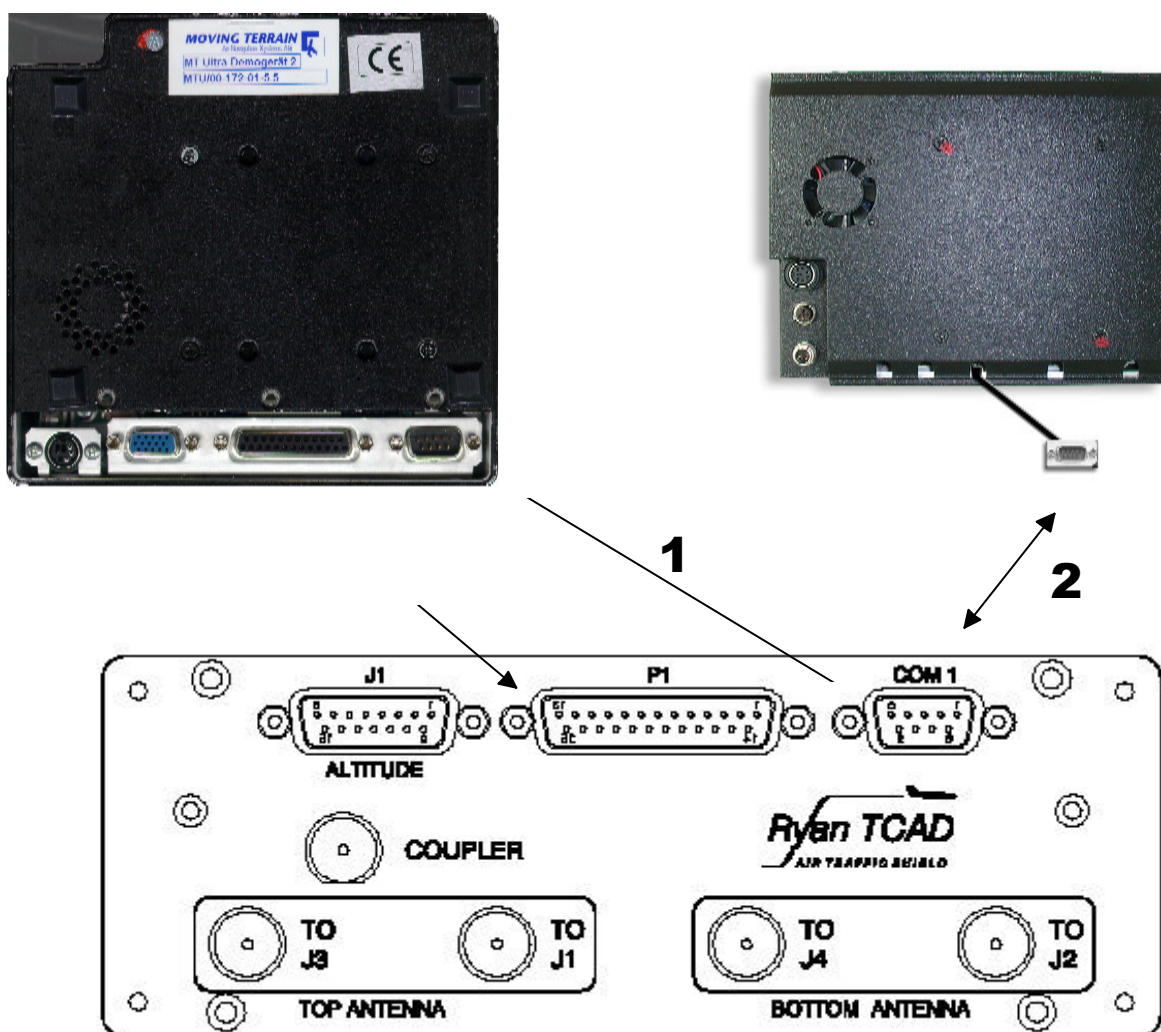


Weight of system: 4.18 kg

Dimensions of components:

		Breite	Höhe	Tiefe	Tiefe mit Anschlüssen
Processor		18.41 cm	7.87 cm	23.68 cm	29.65 cm
Operating Unit		8.28 cm	3.94 cm	17.15 cm	21.59 cm
Directional antennas		8.23 cm		13.06 cm	
seriell					
parallel					
Transponder Coupler		4.57 cm	4.07 cm	6.86 cm	

\* Figures supplied by Ryan. The manufacturer reserves the right to make modifications.



## 1.3 Wiring

There are several options for connecting MT-Ultra or MT-VisionAir to the Ryan TCAS.

### 1.3.1 Connecting to COM 1 on the Ryan TCAD

You will need a null modem cable.

Connecting MT-Ultra to Ryan TCAS (1)

Connecting MT-VisionAir to Ryan TCAS (2)

#### POWER

#### 1.3.1.1 Connecting to MT-Ultra

The null modem cable must be plugged into serial port COM 1 of MT-Ultra and COM 1 of the TCAS (Arrow 1).

#### 1.3.1.2 Connecting to MT-Visionair

The null modem cable must be plugged into serial COM 1 of the device.  
The other end is plugged into COM 1 of the Ryan TCAS (Arrow 2).

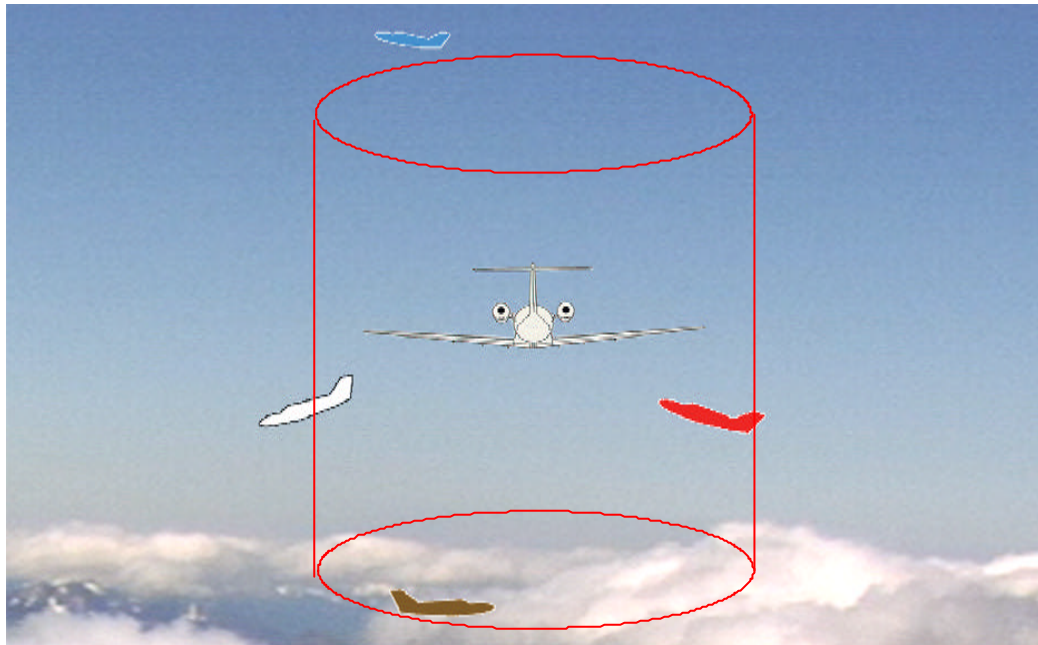


### 1.3.2 Connecting to COM 2, 3 or 4 on the Ryan TCAD

Since COM 1 of the Ryan TCAD is reserved as service port for possible programming of the device, the manufacturer recommends connecting to one of the other COM ports located on the P1 (see installation manual for Ryan TCAD Model 9900BX, Revision 2 – July 26, 2001, page 26 connection diagram page 38, Fig. 2-22: "Wiring diagram for connection of multi-function displays without TCAD display/controller").

### 1.3.3 Pin assignment COM 1 port on MT equipment

The pin assignment of the serial COM 1 port (RS232-Port 1) on the MT-Ultra and MT-VisionAir conforms to standard: PIN 2 = RX



PIN 3 = TX

PIN 5 = Gnd

### 11.3.4 Configuration for operation of Ryan TCAD 9900 BX with Moving Terrain display as MFD without TCAD display/controller

- a The requirements for approved operation of the device are:

**Lamp (annunciator light)**, marked "Traffic" or "Traffic Alert"

**Mute switch**

Connection to aircraft **audio system**

MFD is allowed as an option.

## b Configuration

See installation manual for Ryan TCAD Model 9900BX, Revision 2 – July 26, 2001, page 38, Fig. 2-22: "Wiring diagram for connection of multi-function displays without TCAD display/controller".



**ba** 1 switch **ON/OFF** to GND can be replaced by permanent GND wire and + on device (constant current)

**bb** 1 switch **Mute to GND** (only interrupt warning signal, do not switch off)- Mute switch must be mounted in a position which is easily accessible to the pilot.- Mute switch interrupts the visual and acoustic warning for a specified period.- Mute switch does

not switch off either loudspeaker or TCAD

**bc** 1 switch for **annunciator (light)** to GND

**bd** Connection to aircraft **audio system**

**be** optional: **gear-down switch** or **weight-on-wheel switch** (also functions without gear-down/w-o-w switch when altitude encoder detects change of altitude)

**Important:** Apply current to transmitter only (also to Ryan TCAD) when antennas (or on-state slope resistance) are connected!

## 2 MT-TCAS Software

### 2.1 Dynamic synchronized simulation technology DSS

As soon as other air traffic has been detected in the vicinity, a simulator is activated in parallel. The latter is calibrated to and analyzes the flight characteristics of the respective aircraft. This enables the pilot to determine at a glance the direction and speed (15-second arrow = trend vector) of approaching aircraft.

Each aircraft with transponder recognition is individually interrogated and analyzed by the sensor. This produces a transparent picture of surrounding air traffic.

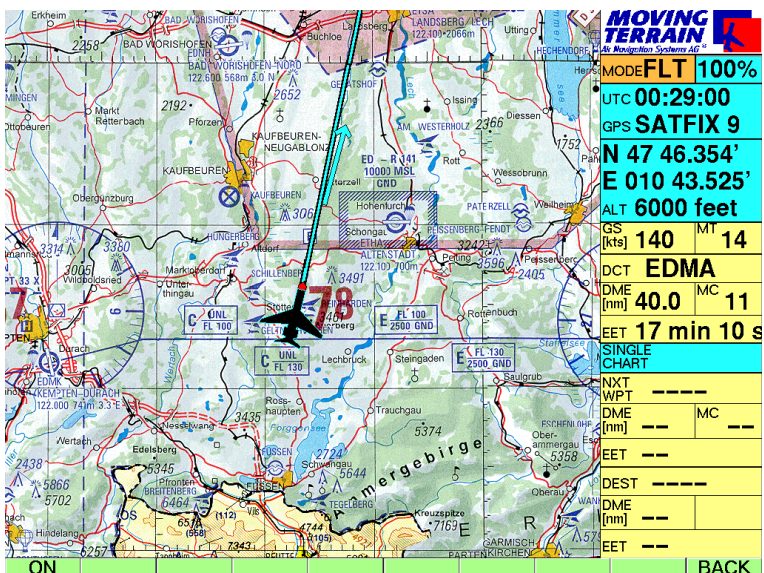
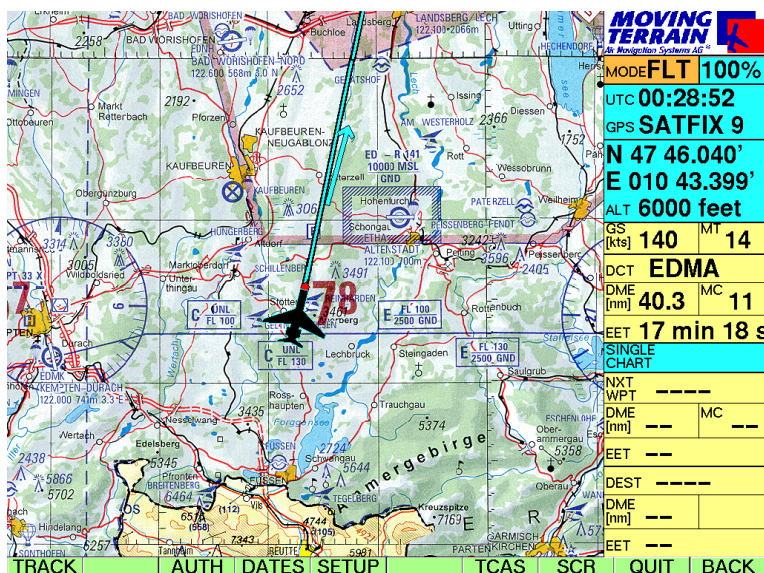
### 2.2 The critical cylinder

Moving Terrain places a "critical cylinder" around your own aircraft. The **radius** of the critical cylinder is 1 nm. Its **height** is **1000 feet**.

The **vertical position** of your own aircraft in the critical cylinder depends on the **current flight path**:

Own flight path	Relative altitude in feet	
	above	below

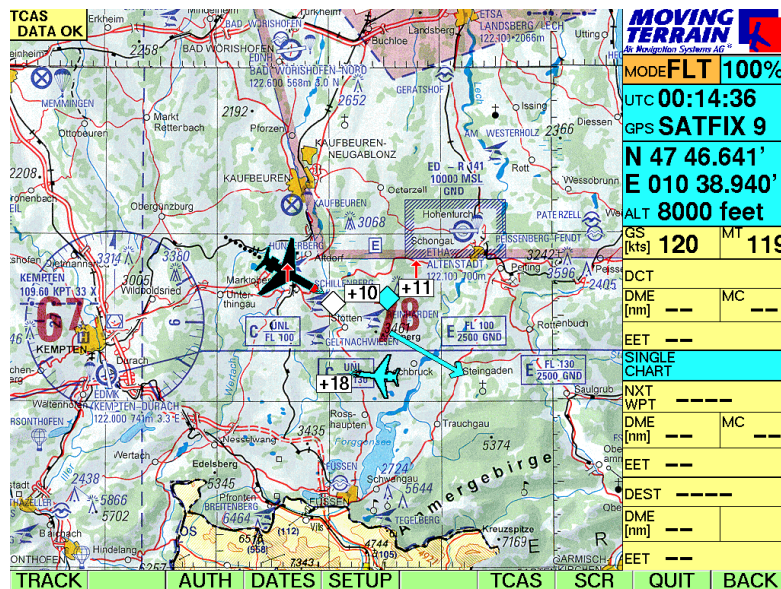
Normal flight	> 500	< -500
Climb	> 1000	
Descent	> 0	< -1000





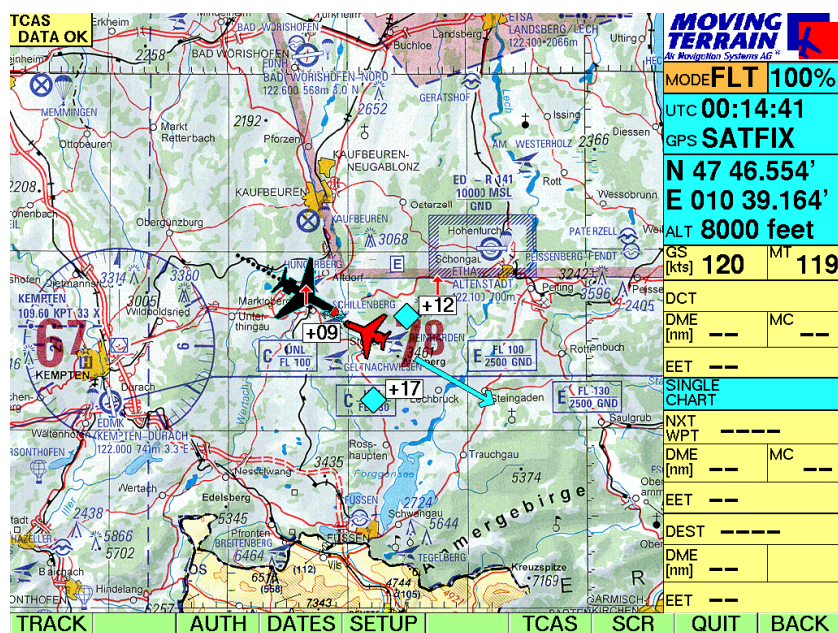
## 2.3 Symbols

Surrounding traffic is shown by flashing lights (more conspicuous, esp. on chart) and color coding:



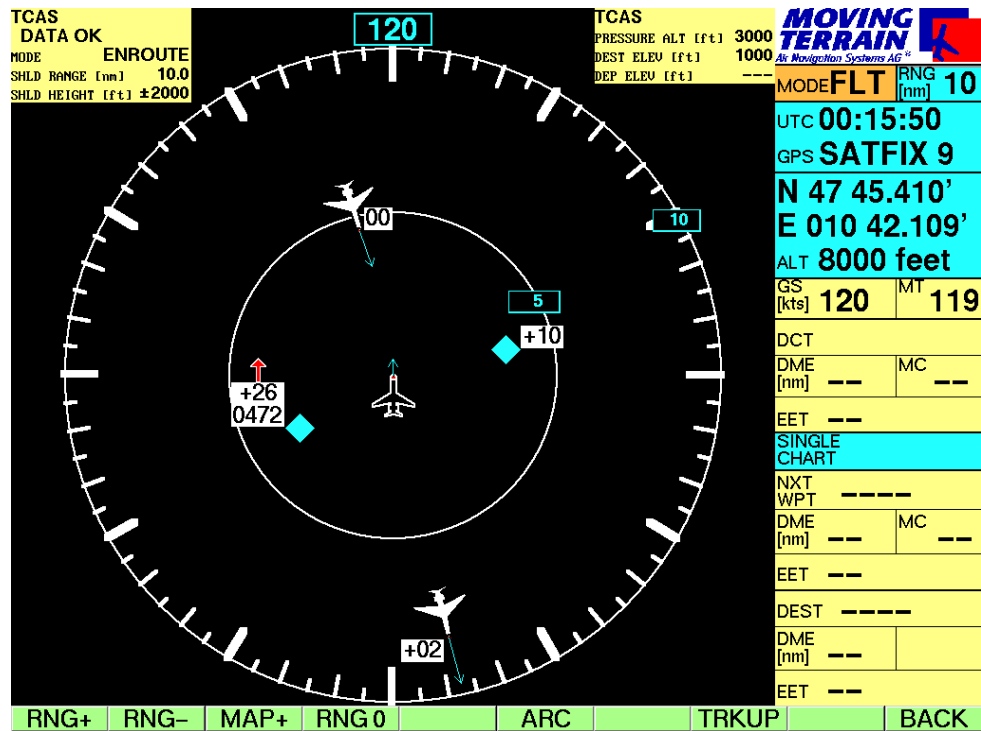
Displayed as an airplane (SQUAWK shown in white box)

- blue - above the critical cylinder
- brown - below the critical cylinder
- red - within the critical cylinder, dangerously close



white - same altitude as the critical cylinder, but outside the danger zone

If the speed of another aircraft is too low to represent its speed, it will appear as a diamond instead



of an airplane.

Stated altitude is relative to your own aircraft (in 100 feet).

Red arrow pointing upwards: Climbing faster than 500 fpm

Red arrow pointing downwards: Descending faster than 500 fpm

Speed vector:

The 15-second arrow on the nose of surrounding aircraft permits conclusions to be drawn on the aircraft category.

## 2.4 Switching MT TCAS monitoring on/off

### AUX TCAS

If the TCAS button is pressed, the following button bar will appear  
(TCAS is not yet active = not yet shown in the info box)

**ON / OFF** TCAS information monitoring to MFD switched on/off

**BACK** Return to further functions of the MT program.

## 2.5 Non Dedicated Mode

### MAP +

The TCAS mode is shown at the top left of the main window. If DATA OK appears, TCAS data is being received. If NO DATA appears, no TCAS data is being transmitted.

Air traffic within the optical range of the TCAD sensor (depends on Ryan TCAD mode) is displayed on the chart in relation to the terrain.

## 2.6 Dedicated Mode

The boxes at top left and right display information from the Ryan TCAD:

Mode:	GND	=	GROUND
	DEP	=	DEPARTURE
	ENR	=	ENROUTE
	APP	=	APPROACH
	UNL	=	UNLIMITED

Press Alt: Pressure altitude

Dep Elev: Elevation of departure airfield

Dest Elev: Elevation of destination airfield

## MT TCAS Manual

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Shield Size: Radius and height (incl. positioning above/below or above+below your own aircraft) of the Ryan TCAD sensor's sighting cylinder (depends on mode).

### Notes on dedicated mode:

- The sighting cylinder of the Ryan TCAD sensor changes according to the set mode (information displayed in top line).
- In exceptional cases, signals can be received from other aircraft located outside the sighting cylinder determined by the set mode, but these must be treated with caution.
- Moving Terrain's "critical cylinder" is fixed at 1 nm.
- Since several modules (TCAS, MT Satellite radar) can be depicted in MFD mode at the same time, the set range is valid for all. For example, the MFD can be set at 800 nm for assessing the current weather situation. However, as no TCAS data is available at long distances, there is little point in setting the MFD mode to such radii when only the TCAS is operating.