

# Moving Terrain

User Manual Versions 6.0, 6.1



## Warnings

The greatest of care has been taken in the compilation of text and illustrations for this manual. Nevertheless, the possibility of errors cannot be completely excluded. No form of liability or legal responsibility can be assumed by either the publisher or authors for incorrect information or its consequences. The publisher is grateful for comments, suggestions and corrections.

\*\*\*

### **Important advice on the use and possible risks involved with Moving Terrain:**

You have acquired a high-performance system for navigational support that will make flying easier than ever before. However, we feel obligated to make you aware of all the associated risks that have been identified by our test pilots.

We have made every effort to ensure that the Moving Terrain system is safe and reliable. The system has been tested under all conceivable flying conditions. Yet although neither you nor we may detect any further defects, **no liability is accepted for correct functioning of the system.**

Even if our system proves to be one hundred percent error-free there may still be **dangers due to operating errors** and in particular **manipulation of GPS accuracy** by the operator, the US Ministry of Defense. We are unable to make any kind of prediction or warranty with regard to the **future licensing policy of the GPS operator.**

The Moving Terrain system is a VFR device. It is in no way safe to fly with this navigational aid under instrument flight conditions unless you have all the mandatory navigational equipment in operation and are flying according to instrument flight rules on instrument routes.

**Any non-IFR trained and licensed pilot who flies in IMC is risking his life – with or without Moving Terrain!**

Under aviation regulations you are obliged to keep the appropriate **up-to-date charts in paper form on board**. Although we place great trust in the system, our pilots always have the latest ICAO charts at hand.

### **WARRANTY AND LIABILITY ADVICE**

The purpose of this software is to facilitate terrestrial navigation only. It is not a certified component of aviation equipment and does not substitute for any aircraft instrument. You are explicitly cautioned to verify that the hardware employed functions correctly and does not cause hazardous interference with the aircraft or other vessels. Data and computer errors are possible. This also applies to the IFR data and procedures implied in the respective modules. Human error can make the moving map incorrect. The pilot in command is and remains the final authority with regard to the accuracy and adequacy of the hard- and software.

#### **Warranty and Liability Disclaimer:**

The manufacturer, distributor or sales agent assume no liability for the correct functioning of the software, availability of a reference signal (GPS) or validity of the charts. The manufacturer, producer, sales representative or their staff cannot be made liable for any consequential, incidental or indirect damages (including loss of business profits, business interruption, loss of business information and similar) arising from the use of or inability to use the software, even if any of the staff mentioned above has been advised.

No warranty is given on the software – neither express or implied – including without limitation, implied warranties of merchantability and fitness for a particular purpose. The entire risk with regard to the results and performance of the hard- and software is assumed by you.

#### **Please note:**

A continuous improvement program is being implemented for our IFR package. If applicable, please contact our Help Desk:

Tel: ++49 - 8376 - 9214-0

\*\*\*

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## Modular structure of the manual

This manual reflects the new modular structure of the Moving Terrain program and is set out as follows:

### **I     Moving Terrain program**

- 1     **MT Basic Version**   Detailed description of the basic MT program

#### **Software modules**

- 2     **MT FMS**                    MT flight management system  
3     **MT IFR**                    Based on FMS databases and instrument flight procedures  
4     **MT Tracking**  
5     **MT Charting module**

Appendix **MT Update Utility**

### **II    Moving Terrain MFD modules**

The manuals for MFD modules can be purchased from us directly.

For a better understanding of your system please read the chapters applicable to your modular structure.

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# MT-VisionAir equipment

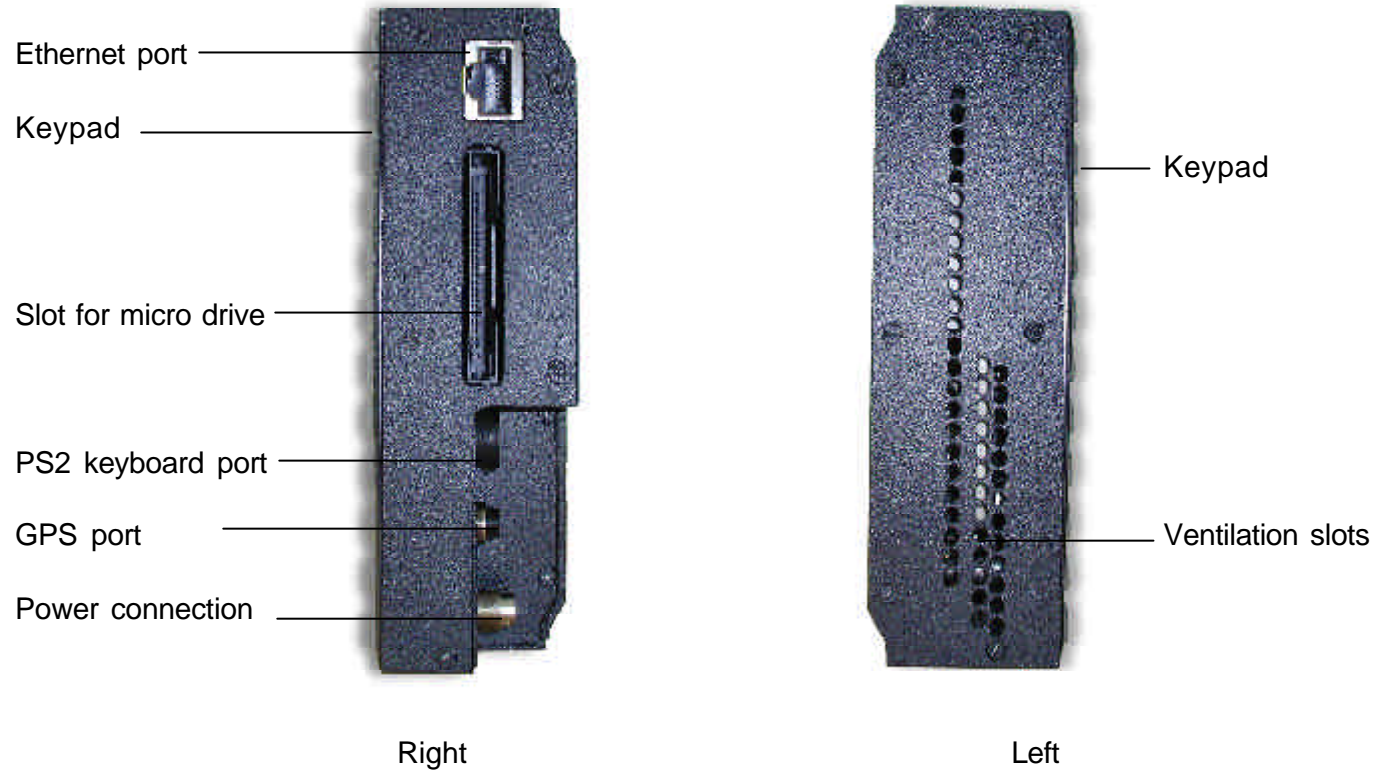
Front view



Rear view



## Side views



## MT-Integral GPS for MT-VisionAir and MT-Ultra





# MT-Ultra equipment

Front view

ON / OFF switch

Alphanumeric keyboard

Chart

10 function keys

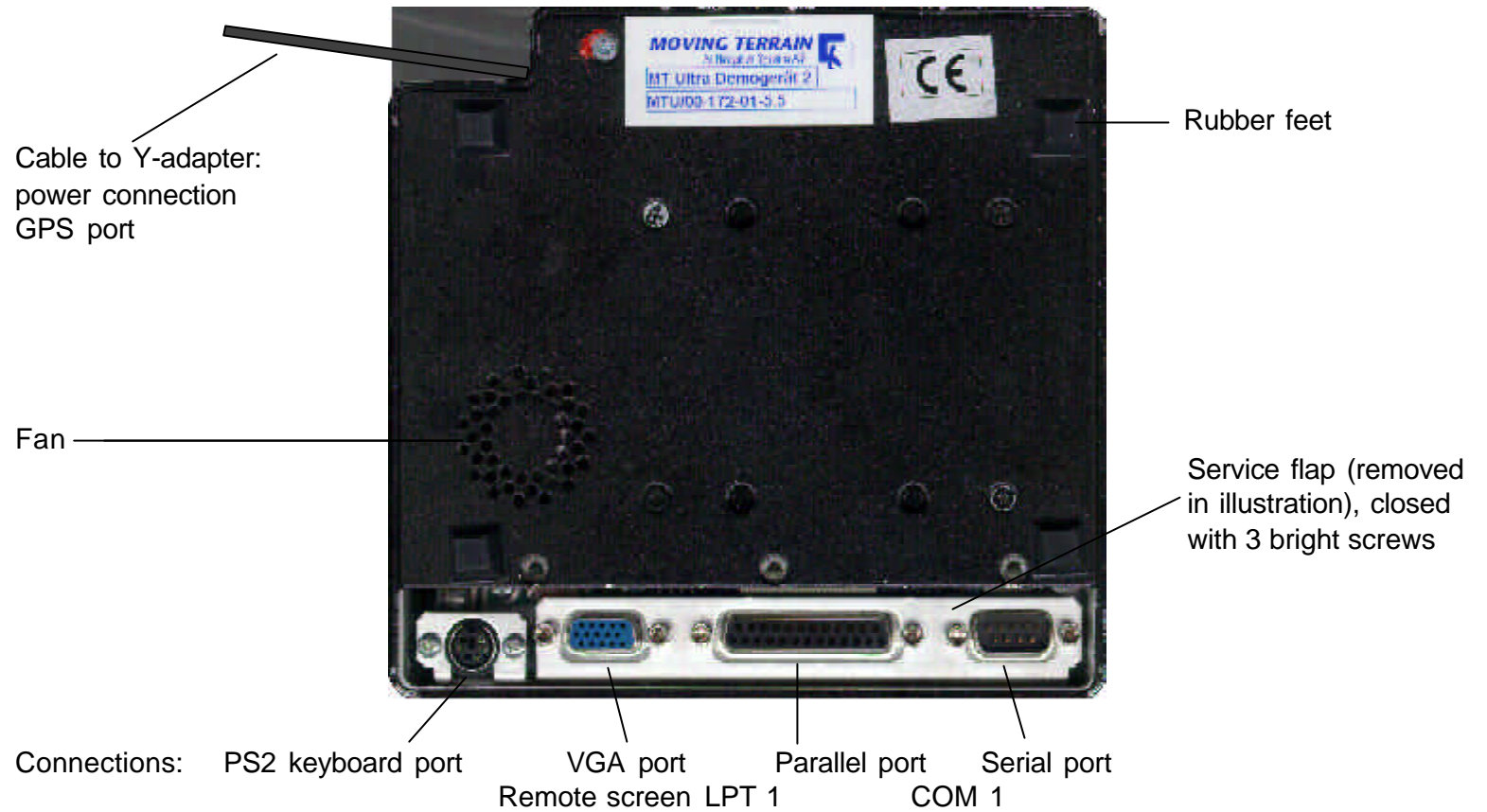


Info box

FMS window  
(or track up  
display)



Rear view



## Operating MT-VisionAir

### Connections

### Switching on

#### Connecting:

GPS



4-pin plug

Power

2-pin receptacle  
(12-28 V aircraft wiring  
system or 230V power pack)

#### Connecting a different GPS type:

- GPS must have a data output + cable (for transfer of data to your MT system).
- If this is not the case, please contact your GPS dealer to purchase a data cable.
- A special connector for MT systems must be soldered to the GPS.

**Switching on:**  
(also switching off!)

**Key**



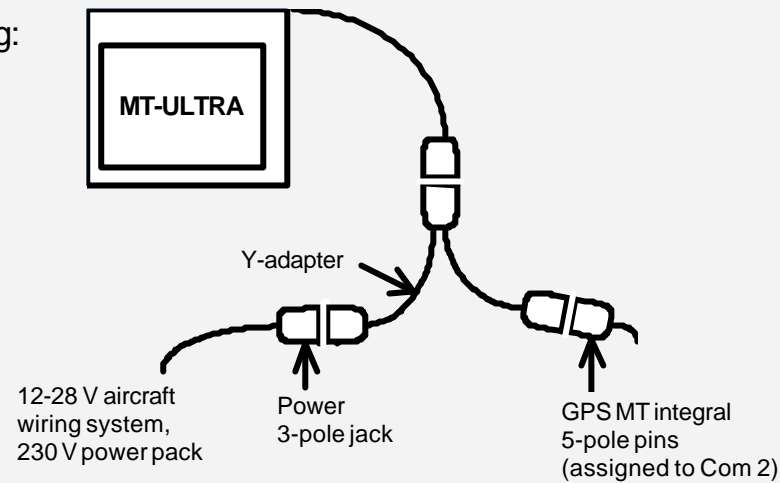
(bottom right)  
**keep pressed for  
approx. 3 seconds**

Device starts up and the following will shortly appear on the screen:  
**(continue on page 16)**

# Operating MT-Ultra

## Connections

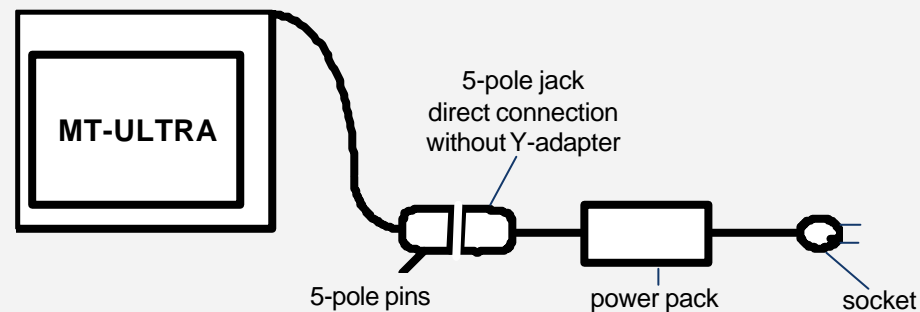
Connecting:



### Connecting a different GPS type:

- GPS must have a data output + cable (for transfer of data to your MT system).
- If this is not the case, please contact your GPS dealer to purchase a data cable.
- A special connector for MT systems must be soldered to the GPS.

Direct connection of MT-Ultra via power pack to socket



## Switching on

**Switching on:**  
(also switching off)

**Key**



(top left)

Device starts up and the following screen will shortly appear:

## Positioning



Software Release 6.1

This software is to facilitate your terrestrial navigation only. It is not a certified aviation equipment and does not replace any aircraft instrument. You are explicitly cautioned to verify that the hardware employed is functioning correctly and does not interfere with the aircraft or other vessel in a hazardous manner. Data errors and computer errors are possible. Human error can make the moving map incorrect. The pilot in command remains the final authority on the accuracy and sufficiency of the hard- and software.

### Warranty and Liability Disclaimer:

The manufacturer, distributor or sales agent resune no liability as to the correct function of the software, the availability of a reference signal (GPS) or the validity of the charts. Never will the manufacturer, producer, sales representative and neither of their staff be liable to you for any consequential incidental or indirect damages (including damages for loss of business profits, business interruption, loss of business information and the like) arising from the use of or inability to use the software even if any of the staff mentioned above has been advised.

There is no warranty, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose, regarding the software. The entire risk as to the results and performance of the hard- and software is assumed by you.

Your software release will be displayed top right

**AGREE**  
**FLT**

Press key  
Press key

**Flight Mode**



The chart will now be positioned via GPS.

Once your aircraft is moving faster than 2 knots, the cross that marks your position when stationary will become an aircraft symbol.

**Normally no further input is necessary.** We wish you a pleasant flight!

Flight mode  
Map mode

We distinguish between two basic modes:



- Map mode: The user controls the chart:
- chart can be moved with direction keys (EAST/WEST/NORTH/SOUTH).
  - GOTO function available at various levels.



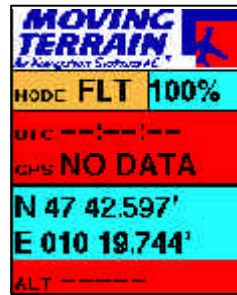
- Flight mode: The GPS controls the chart:
- The chart cannot be moved by means of keys.
  - The GOTO function is deactivated at all levels.

The active mode is shown in the info box, switch-over using key panel.

GPS messages

### In the info box

Should your system fail to position the chart immediately, please observe the following messages:

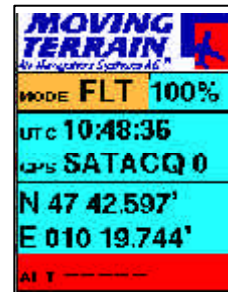


#### NO DATA:

Connection to GPS or GPS itself defective.

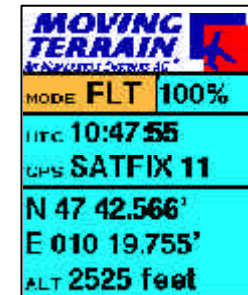
#### DISTORTED:

Errored data is being received from GPS (without picture)



#### SATAcq:

GPS is connected correctly: "Acquisition" of satellite data (the number 0 is always independent of the number of satellites actually found).



#### SATFIX 8:

Positioning successful, the flashing number states the number of GPS satellites momentarily being tracked.

## Display

### Chart

- Base charts in the running system, worldwide and at various scales.
- Single charts (e.g. DFS VFR approach charts)
- If the chart section is only displayed in gray, you are outside the active base chart.

The buttons arranged at the lower edge of the display determine the function of the key immediately below them.

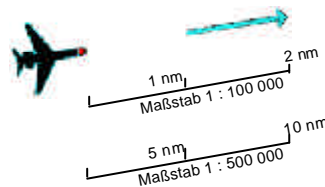
### Function keys

### Symbols



#### Position symbol

Position at the center of the coordinate frame



#### Aircraft symbol

Appears when speed is above 2 knots. Your position is marked by the red dot.

#### Trend vector

Light blue arrow: projection of the aircraft. The tip of the arrow marks the point which will be reached if the present course is maintained.



#### User waypoint

Green diamond: Identifier provided in box

#### Red vector

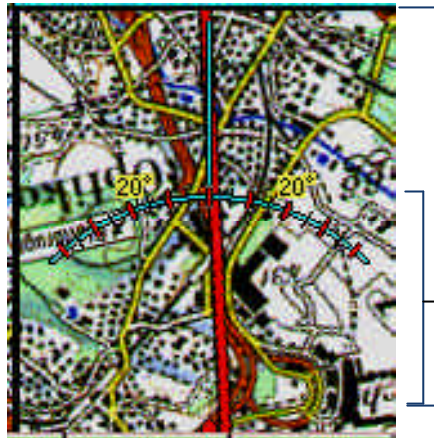
Direct (not illustrated)

### Track up window

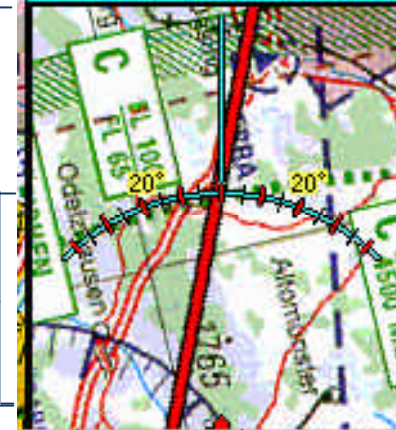
- Shows a chart section in perspective, as you will see the terrain from the cockpit.
- As soon as GS is greater than 2 knots the chart will be displayed – rotated according to the track – in the TrackUp window.
- The red dot bottom center represents the point of your aircraft, i.e. the position of the GPS receiver.
- Depending on the chart scale, the space between red dot – compass rose, or compass rose – peak of the trend vector represents, e.g. the following distances:



Scale 1 : 100 000




Scale 1 : 500 000



**Switch-over** from FMS and TrackUp window to flight mode (FMS module, IFR module)

- DCT vector and user waypoint symbol are displayed in the TrackUp window.
- Zoom factor has no effect in the TrackUp window: rotated chart section is always displayed at 100%.
- Auch single charts werden in the tack-up window displayed.
- Im map mode and at speeds over 2 kt the TrackUp window remains gray.

## Info box

	MT logo	Upon reloading of charts: red panel with LOAD MAPS warning	
MODE <b>FLT</b> 100%	MT mode (map or fli)		Chart zoom factor
UTC <b>11:02:29</b> GPS <b>SATFIX 11</b>	GPS data:	UTC GPS status, number of satellites flashing	
N <b>47 48.575'</b> E <b>010 25.100'</b> ALT <b>2525 feet</b>	Coordinates:	WGS84	
GS [kts] <b>70</b> MT <b>29</b>	Altitude	True altitude in feet above MSL	
DCT <b>EDMA</b>	Flight data:	Speed over ground in knots	Magnetic track: magnetic track over ground
DME [nm] <b>41.9</b> MC <b>28</b>	Direct data:	Name (from database or TMPFIX)	
EET <b>35 min 56 sec</b>		DME: distance measuring equipment in nm: distance to destination (DCT)	
SINGLE CHART <b>EDMA1</b>	Single chart:	Magnetic track to DCT	
		EET Estimated enroute time (remaining time to destination)	
		Name of activated chart, displayed or prepared for display	

Display

Altitude

Hide info box

**ALT 2525 feet**

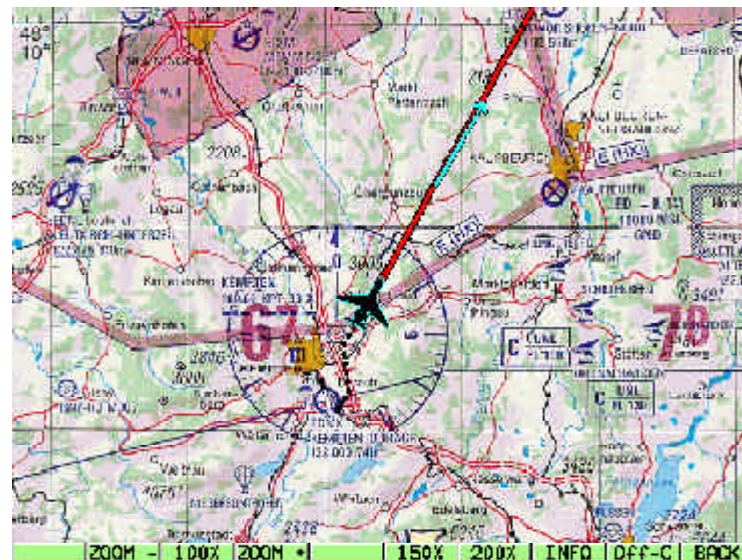
Altitude: in feet above MSL, implemented in Version MT 6.1 and later

Hide info box and TrackUp window = advantage: more of chart is visible

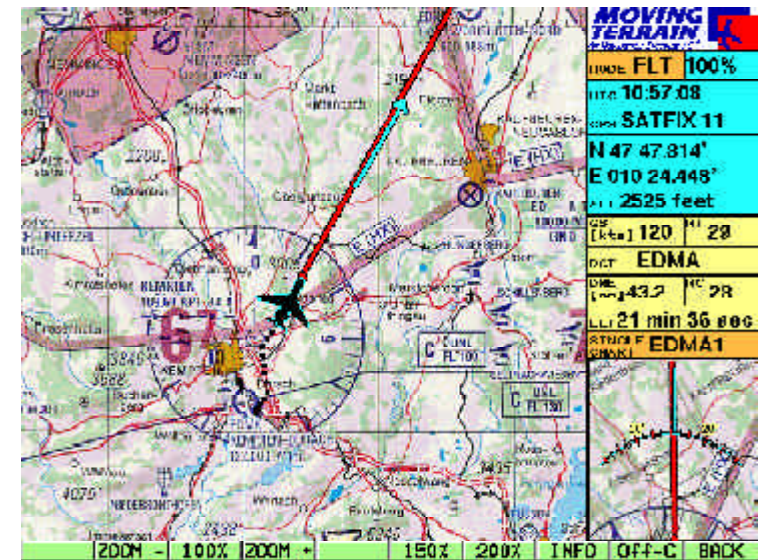
✓ ZOOM

✓ INFO (reappears with same key combination), with BACK return to main menu

without info box / track up window



with info box / track up window





Center  
OFF Center

Shift key Centr / OFF-C on the ZOOM bar

- ✓ **ZOOM**
- ✓ **Centr / OFF-C**  
= Key marking always destination
- ✓ **BACK** Return to main menu

**Center mode: position in center of the chart**

Advantages:

- ✓ Always at the same position
- ✓ Easily recognizable
- ✓ Good all-round view
- ✓ Steady chart movement

Disadvantage:

- ✓ Poor outward view

**OFF Center mode:**

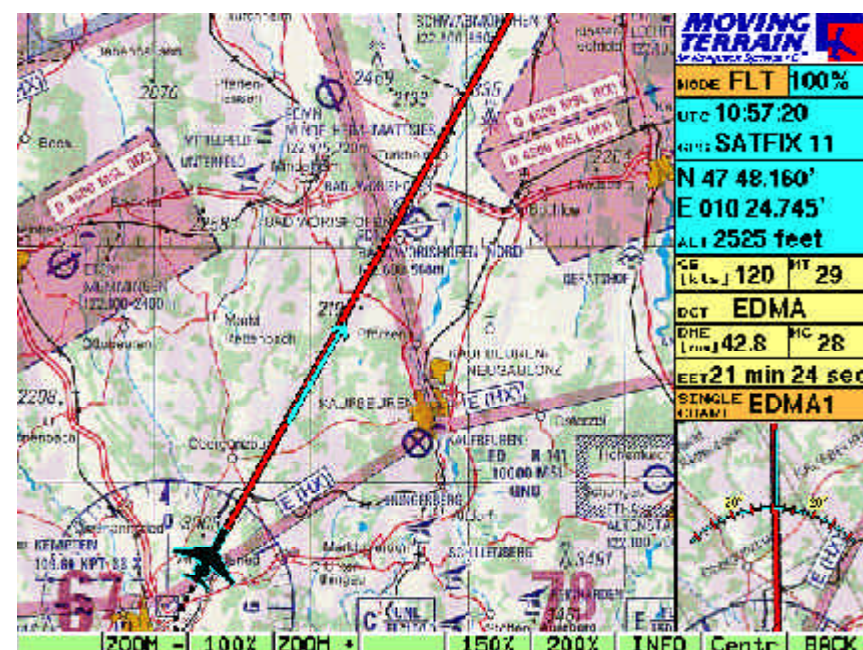
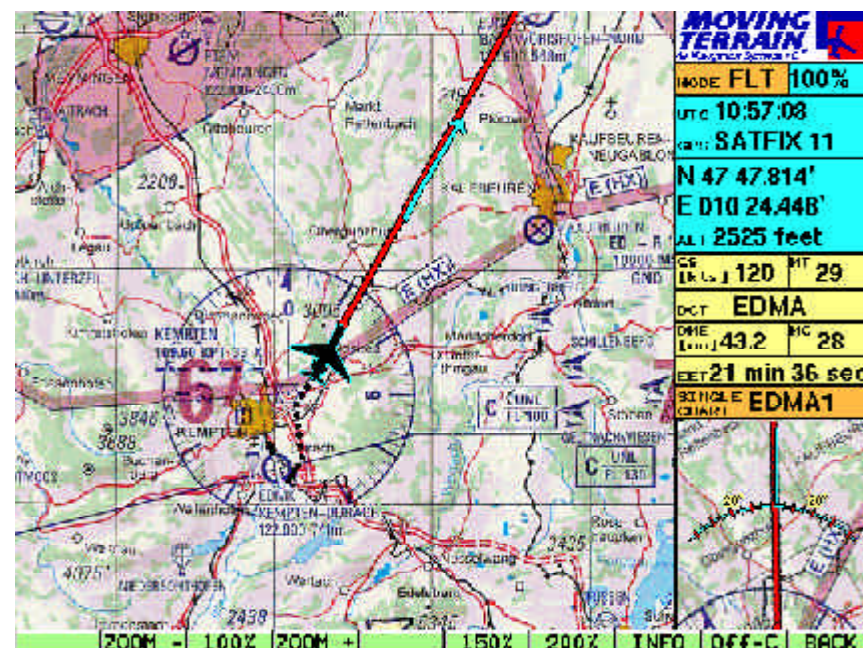
**Tip of the trend vector in center of the chart,  
position projected to edge of the chart**

Advantages:

- ✓ Substantially better outward view on chart
- ✓ Better coverage of airspace structure
- ✓ Advantageous for fast flying

Disadvantages:

- ✓ Unstable chart during change of course



## Nav data

### Structure

### VFR data

✓ NAV

Nav page is displayed

Basically all waypoint and process databases are available on the Nav page:  
VFR Navdata, IFR Navdata, hospital landing places, user waypoints u.a.

For the MT basic version it is important:

**VFR WAYPOINTS** (all VFR Nav data in one list)

Arranged alphabetically *by name* (Europe):

**APT's**      **Airfields**      (Type always in brackets)

Altitude of field

Radio frequency(ies)

Direction and surface of runway(s)

ILS

Telephone numbers

NAV PAGE	
VFR WAYPOINTS	
A CORUNA	LECO
A CORUNA (APT)	LECO
AACHEN (MERZBRUCK) (APT)	EDKA
AALBORG (APT)	EKYT
AALBORG (VOR)	AAL
ELEV 329ft; THR 118,30;	
GND 121,70;	
RWY 04-22 1940m ASPH;	
ILS22 109,90;	
Tel. (981) 187200	
N 43 18.100'	
W 008 22.600'	
SPEED --- [kts]	

**Coordinates** always relate to the **point highlighted** in the database

**VOR's**

with frequency

FRANKFURT (VOR)	FFM
FRANKFURT (NDB)	FW
FRANKFURT (NDB)	FR
FRANKFURT (RHEIN-MAIN INTL) (APT)	EDDF
114,20 MHz; (DME)	
N 50 03.200'	

**NDB's**

with frequency

FRANKFURT (NDB)	FW
FRANKFURT (NDB)	FR
382,0 kHz;	
N 50 00.300'	

Data selection

Names or identification are entered on the integrated keyboard or by pressing

✓ **UP**                      ✓ **DOWN**                      in the list.

ID box

✓ **NEXT**                      Change to ID box:

Alphabetically sorted *according to identification*  
(4-letter code)

Identification or search are entered with

✓ **UP**  
✓ **DOWN**

Return to name box with

✓ **NEXT**

User waypoint  
database

✓ **WPT**  
✓ **USER**                      User waypoints

This database is created by you. Initially it is empty  
(see “Creating/changing waypoint”)

IFR Nav data

The **WPT** key also enables you to switch over to  
IFR databases (IFR module).

✓ **BACK**    Return to main menu

Reopening with  
last-used database

During operation the Nav page is always opened  
with the last-used Nav database.  
Switch-over with                      ✓ **WPT**

VFR WAYPOINTS	ID
FRANKFURT (RHEIN-MAIN INTL)	E00F
FRANKFURT (RHEIN-MAIN INTL) (APT)	E00F
MUNSTER OSNABRUCK (NPT)	E00G
HAMBURG (FUHLSDUETTEL) (APT)	E00H
BERLIN (TEMPELHOF) (APT)	E00I

ELEV 364ft; THR 124,85; RWY 07L-25R 4000m CONC; ILS07L 110,10; ILS25R 109,50; APPR 150

NAV PAGE

WPT GOTO DCT EDIT NEXT UP DOWN BACK

VFR WAYPOINTS	ID
SALZBURG	LOH6
SALZBURG (APT)	LOH6
SALZBURG (VDR)	SBG
SALZBURG (NDB)	SBG
SALZBURG (NDB)	BU

ELEV 1411ft; THR 121,75; RWY 16-34 2750m CONC; ILS16 109,90; APPR 150

NAVDATA SELECTION

WPT GOTO DCT EDIT NEXT UP DOWN BACK



## Tutorial

Pinpointing your  
home airfield

Correcting an entry

Calling in at  
homebase

Zoom

### First steps with Moving Terrain (with examples), first of all without GPS

You want to look at your home airfield on the chart?

- ✓ Switch on
- ✓ Acknowledge warning signals with **AGREE**
- ✓ Press **NAV** in order to select a waypoint
- ✓ Now enter the name of your airfield on the integrated keyboard.  
As soon as the first letters have been entered, the highlighting bar (coloured bar) will move to the appropriate waypoint => It is not necessary to enter the whole name.
- ✓ Made an error?  
No problem: Press **UP** / **DOWN** and re-enter.
- ✓ You wish to select the airfield using the 4-letter code?  
Press **NEXT** and enter the 4 letters in the ID box (data now sorted by ID)
- ✓ For information on airfield see the center of the screen:  
Frequencies, box height, length, direction and surface of runway, phone numbers, etc.
- ✓ Press **GOTO**:  
Now the chart is positioned on your home airfield.

Use the keys **NORTH / SOUTH / EAST / WEST** to move the chart.

- ✓ Place the chart on your homebase, office or similar:
- ✓ Keep key pressed = chart moves very quickly
- ✓ Press key briefly = exact positioning possible

Enlargement of chart in various percentage steps (150%, 200%, with ZOOM+ / ZOOM- infinitely variable)  
Return with **BACK**

## Creating a waypoint

To save your homebase as a user-defined waypoint in your system and save it for later use:

- ✓ **NAV** Nav page, for creating a waypoint
- ✓ **EDIT** User waypoint edit page
- ✓ **NEW** New user waypoint page

- ✓ Enter a name (e.g. "Homebase") in the "NAME" box.

- ✓ **NEXT**

- ✓ Now enter an identification code in the "ID" box (e.g. "home"), max. 6 characters

This identification code will be displayed on the chart together with the waypoint symbol.  
Beneath it you will see the coordinates of your homebase.

- ✓ Made an error?  
No problem: press **PREV** / **NEXT**, then re-enter.

- ✓ **SAVE** save the point

- ✓ with **GOTO** (jump to this point) or 2 x **BACK** you can return to the chart and will see the green user waypoint symbol with the identification code in an orange-coloured box.



## Tutorial

### Changing a waypoint

The **VFR databases** are predefined, **user waypoint data** can be modified:

- ✓ **NAV**
- ✓ **EDIT** user waypoint Edit page
- ✓ **MODIFY** Modify user waypoint page

Now you can change the name, ID and/or coordinates.

Use

- ✓ **PREV** or
- ✓ **NEXT** to jump from one box to another

**Modify User Waypoint**

NAME: HOMEBASE TO: HOME

N/S N 00° 00' 000" E/W E 000° 00' 000"

ALT 2525 feet

DCT EDMA DMC [min] 41.0 HC 28

MODE FLT 100% UTC 11:13:14 GPS SATFIX 11

N 47 49.718' E 010 26.081'

SINGLE CHART EDMA1

SAVE DCT PREV NEXT BACK

Made an error?

No problem: Press **PREV / NEXT** and re-enter.

- ✓ **SAVE** saves the point
- ✓ **GOTO** takes you straight to the specified point (only possible in Map mode) or

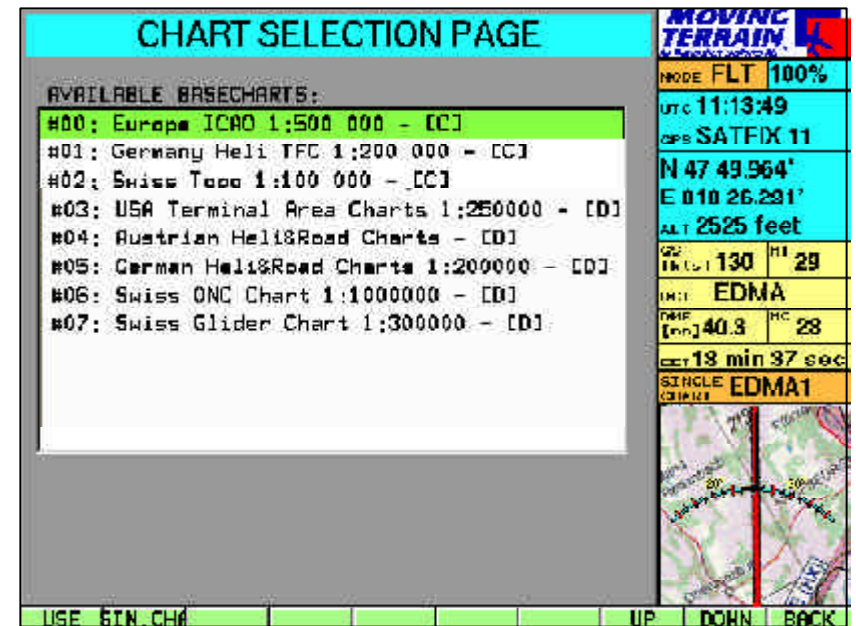
2 x **BACK** returns you to the chart where you will see the green user waypoint symbol with the identification code in an orange-colored box.

## Changing base chart

Various base charts – full coverage – at different scales.

- ✓ **CHART** Lists available base charts (depends on configuration of your device)
- ✓ **UP/DOWN** Select desired chart (green bar)
- ✓ **USE** Confirm choice with USE, return to selected chart

The base chart can be changed without interrupting flight mode.



## Helicopter charts for Germany

Example of a base chart

- ✓ **CHART**
- ✓ Select "German Heli & Road Charts 1:200 000" with **UP/DOWN**
- ✓ **USE**

The current base chart is also displayed in the TrackUp window.





# Tutorial

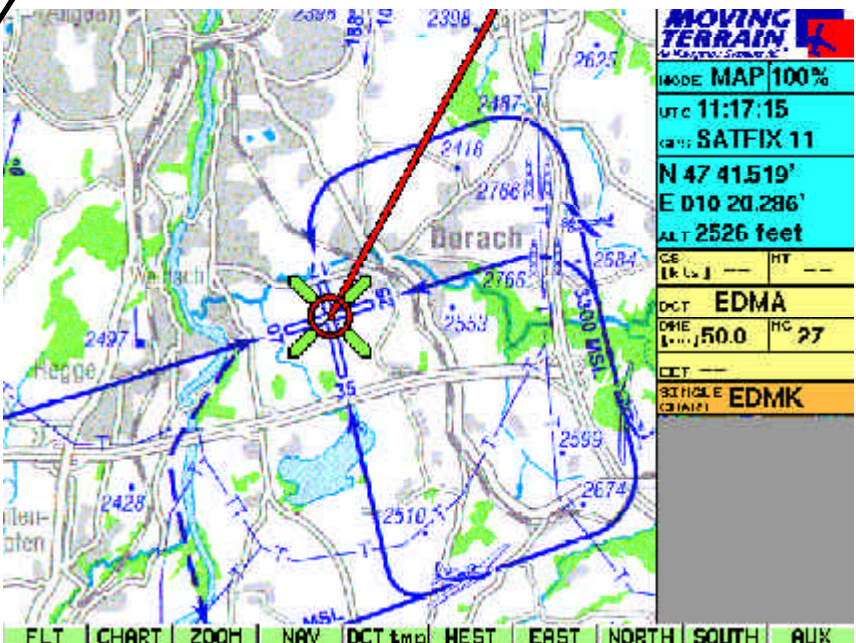
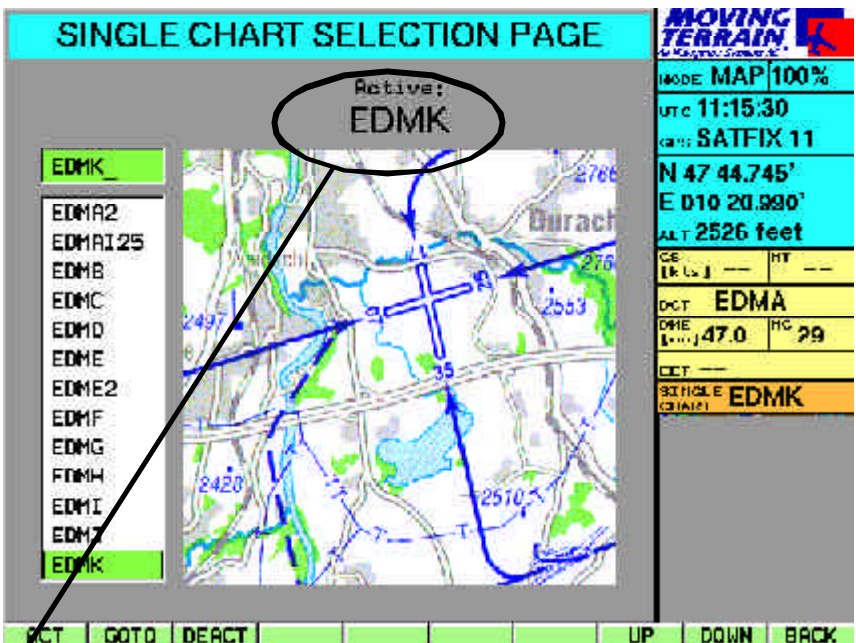
Approach charts =  
circling

## Selecting a chart

## Deactivating a chart

## DFS VFR approach charts for all German airfields

- ✓ Named after identification code of airfield
  - ✓ Several charts at different scales for an airfield are numbered consecutively (e.g. EDDM, EDDM2, EDDM3 etc.)
  - ✓ **CHART**
  - ✓ **SIN.CHA** (press same key again)
  - ✓ Enter airfield identification code on the keyboard (e.g. "EDMK")
  - ✓ **ACT** Displays a preview of the approach chart on the screen. Name of the chart is shown under "Active"
  - ✓ **BACK** returns to chart / current position (e.g. during the flight)
- The chart is ready for use and displayed when you fly into the area covered by the chart,
- or*
- ✓ **GOTO** takes you directly to the chart (e.g. during flight preparations)
  - ✓ **CHART**
  - ✓ **SIN.CHA**
  - ✓ **DEACT** deactivates a single chart
  - ✓ **BACK** displays the active base chart



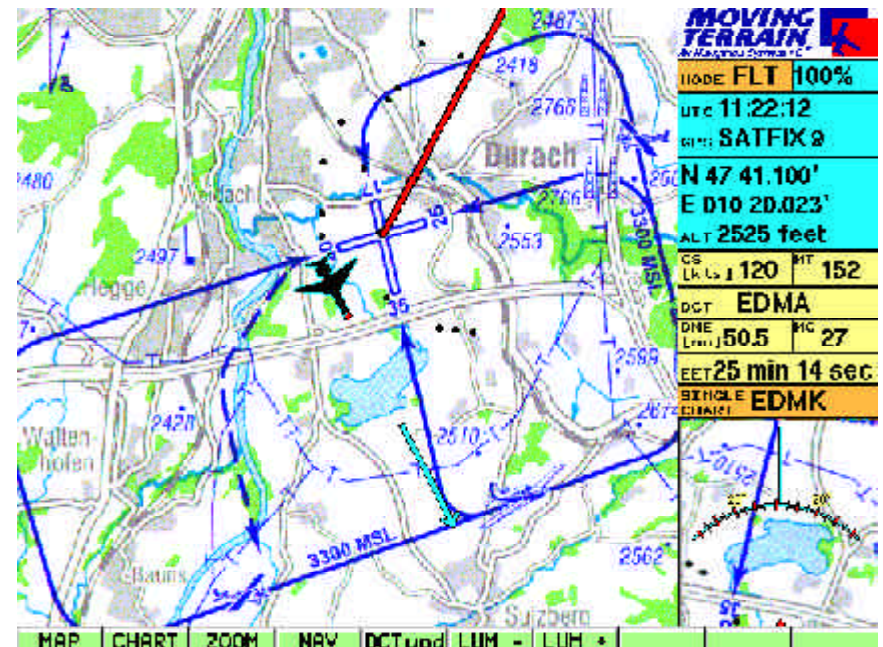


## Basics of single charts

- Single charts are charts that are integrated into the system as **individual “pages”**, i.e. do not precisely abut on each other. Each chart is a self-contained page. It goes without saying that your **exact** position will be displayed on the single chart by **GPS**. According to the same system as for base charts, the single chart moves as your own position changes.
- The activated **single chart** (entry in info box) **will be displayed** instead of the base chart **as soon as your aircraft enters the area of the single chart**.
- Single charts may be displayed at (almost) **any scale**, from the taxi chart to the continental overview.
- You will find a single chart for **Europe at a scale of 1 : 14 million** on your system under ‘EURO’. This will give you an overview, e.g. of your route on long-distance flights, or how great-circle routes can be drawn up over long distances.
- We will also be pleased to integrate **your own charts** into your system as single charts. Ask us about it!

### Important for all single charts:

- No more than one single chart may be active at the same time
- The single chart is also displayed in the TrackUp window
- Direct vectors will be displayed
- User waypoint symbols will be displayed
- The great-circle calculation of the direct vector will also be shown graphically as such (only relevant on charts covering large areas, e.g. EURO).



# Tutorial

## DIRECT

Any point contained in a database can be the destination of the direct vector

- ✓ Select database (VFR or USER waypoints)
- ✓ Select the desired waypoint with **UP** or **DOWN**
- ✓ **DCT**

This will immediately take you back to the base chart.

The chart will display:

DCT = red vector (great-circle calculation)

### Information in the info box

DCT: ID of database or TMPFIX

DME: Distance to destination in nm

MC: Magnetic track to DCT

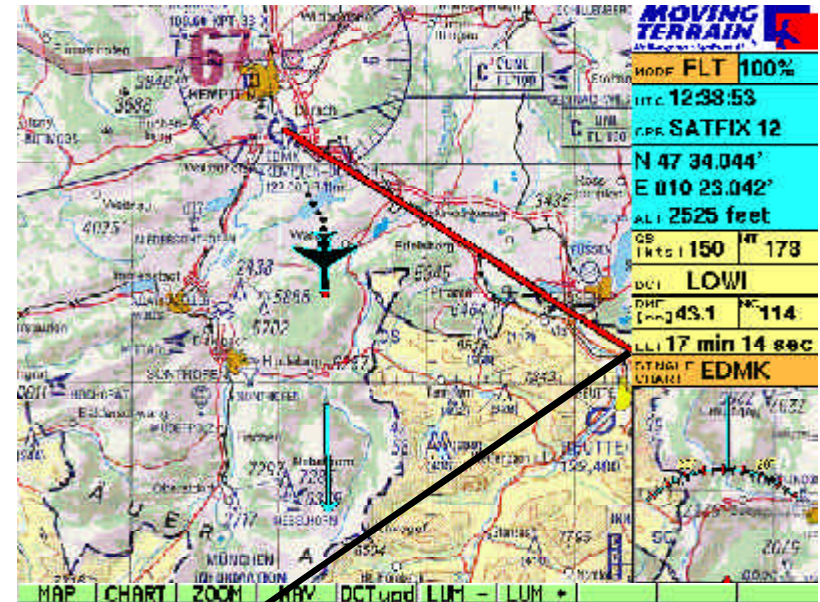
EET: Remaining time to destination at current GS

DCT	LOWI
DME nm	43.1
MC	114
EET	17 min 14 sec

This data is continually updated.

The DCT Vector is updated by

- ✓ **DCTupd** during flight mode



before **DCTupd** (flight mode)



after **DCTupd** (flight mode)

Direct update



## Direct Temp

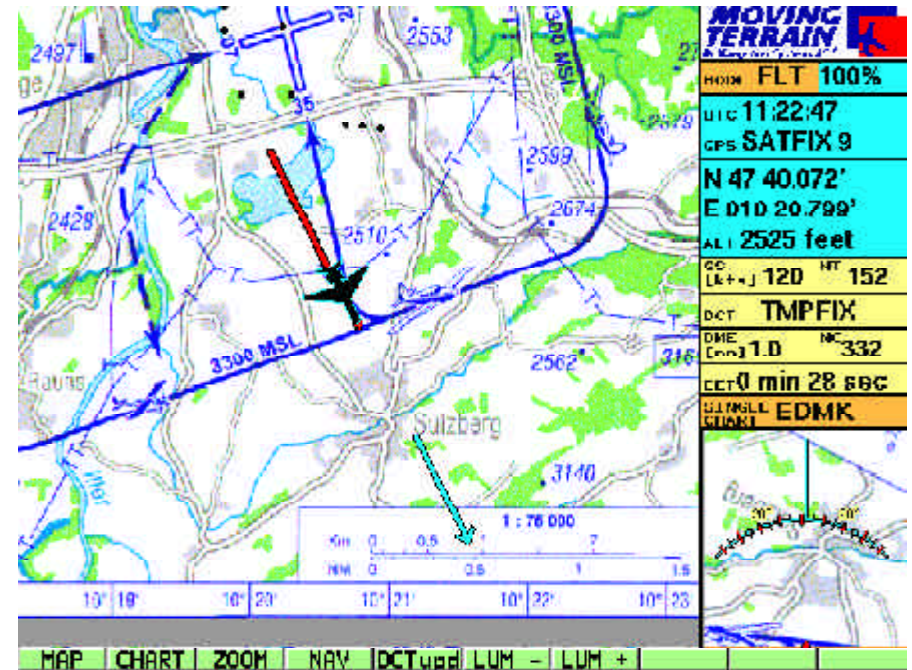
### Quick selection of any desired destination for the direct vector

Move the chart to the desired destination (map mode):

- ✓ **WEST / EAST / NORTH / SOUTH**
- ✓ Press **DCTmp**

When you move away from the point the red vector is displayed:

- It will be continuously “dragged along”
- When you change to flight mode the point will become the destination (in the example it lies behind the aircraft)
- Referred to as **TMPFIX** in the info box



## Linking DIRECT with VFR approach charts

### Creating a DIRECT to a airfield selects the appropriate DFS VFR approach chart:

- ✓ **NAV** Nav page: select terminal airfield, must be market with (APT)
- ✓ **DCT** Red line shows the path
- ✓ **CHART**
- ✓ **SIN.CHA** Approach chart **preselected** by internal combination of databases via 4-letter code. If several sheets are available for an airfield, the first sheet will be selected, Change to other sheets with UP / DOWN.
- ✓ **ACT** Activates the approach chart
- ✓ **BACK** Returns you to the base chart. A single chart will automatically be loaded when you enter the area of the destination airfield.

## Test flight with MT

### Preparation

### Test flight with Moving Terrain: an example

- ✓ A cable with cigarette lighter connection is supplied with the standard equipment as a mobile device.

#### Preparation for a test flight

- ✓ The GPS must correctly plugged in and placed on the instrument panel (free “visibility” to the sky).
- ✓ The power supply must be on: plug the cable with cigarette lighter connection into the device and the cigarette lighter (for installation see Installation Manual)
- ✓ Switch on the device
- ✓ Acknowledge warning signals with **AGREE**
- ✓ The info box will display the GPS status: SATFIX (SATFIX may take a few minutes)
- ✓ Press **FLT**: your current position will be displayed

This is all the preparation normally required!

### Direct

#### Advanced preparation

Direct to the destination airfield:

- ✓ Press **NAV**
- ✓ Select the airfield on the keyboard (name of the airfield must be highlighted)
- ✓ Press **DCT**
- ✓ Automatic return to chart
- ✓ In the info box you will find details of DCT
- ✓ Red vector on the chart shows the path

## Circling (optional)

## Workload reduction

Pre-selection of VFR approach chart (circuit): DFS approach charts can be supplied by us

- ✓ Press **CHART**
- ✓ Press the same key once again; it is now marked **SIN.CHA**
- ✓ By creating the DCT on the airfield the right approach chart is **already pre-selected**: the bar highlights the identification code (4-letter code)
- ✓ **ACT** Activates the chart (name is shown above)
- ✓ **BACK** Return to chart: If you are not already in the immediate vicinity of the airfield, the approach chart will not yet be displayed
- ✓ With the procedure up until now it is ready for display and will be **automatically** displayed if the GPS supplies a position which is located within the area of this approach chart, e.g. in the approach.

### An approach is stressful enough – Moving Terrain will ease the strain:

- ✓ You select the chart in a quiet phase during the flight
- ✓ It is automatically displayed in the difficult approach phase
- ✓ Position reports are simpler than ever
- ✓ You read the coordinates off the screen
- ✓ At the same time the chart shows you your exact current position. You always have a reliable reference to the ground.
- ✓ The trend vector facilitates forward viewing of your flight path

### In the approach phase you don't need to make any further input!

- ✓ The info box will show the identification code of the highlighted single chart.

## Test flight with MT

Start

If your speed is greater than/equal to 2 knots:

- ✓ The position symbol turns into an aircraft (or helicopter) symbol (red dot = your position)
- ✓ The trend vector points to the future: While maintaining your course and speed in 10 nm (with a chart scale of 1 : 500 000) you will have reached exactly the position currently marked by the tip of the arrow.
- ✓ The chart follows continuously, your position is in the center of chart (center mode) or off-center.
- ✓ The rotated chart is displayed in the TrackUp window; your position is at the lower edge of the chart section.

Recording  
of tracks

### Track recording begins when you press **FLT** (with a valid **SATFIX** positioning)

- ✓ When flying over ground, trackpoints mark the distance covered, i.e. the track
- ✓ A dot is “dropped” every 10 seconds
- ✓ At higher speeds the dots are further apart, at lower speeds (in a car) they may overlap.

**Note:** Tracks can be saved and played back in quick motion (facilitates post-flight work and logbook entry) (see Manual Part 4 MT Track, page 72).

Direct Update

The direct vector is updated in flight mode with reference to the current position by means of key **DCTupd**.



## Adjusting the display

Display brightness can be quickly adjusted to prevailing light conditions:

- ✓ **LUM -** Decrease brightness
- ✓ **LUM +** Increase brightness

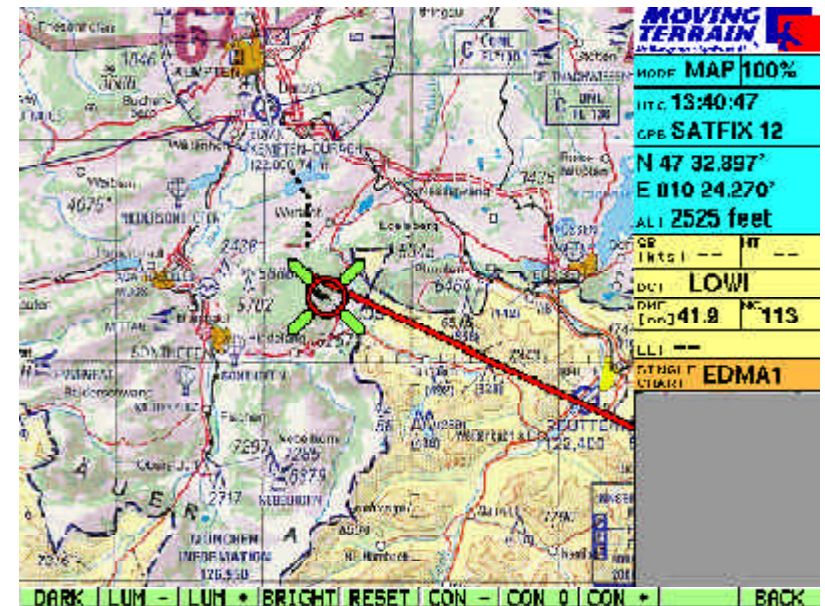
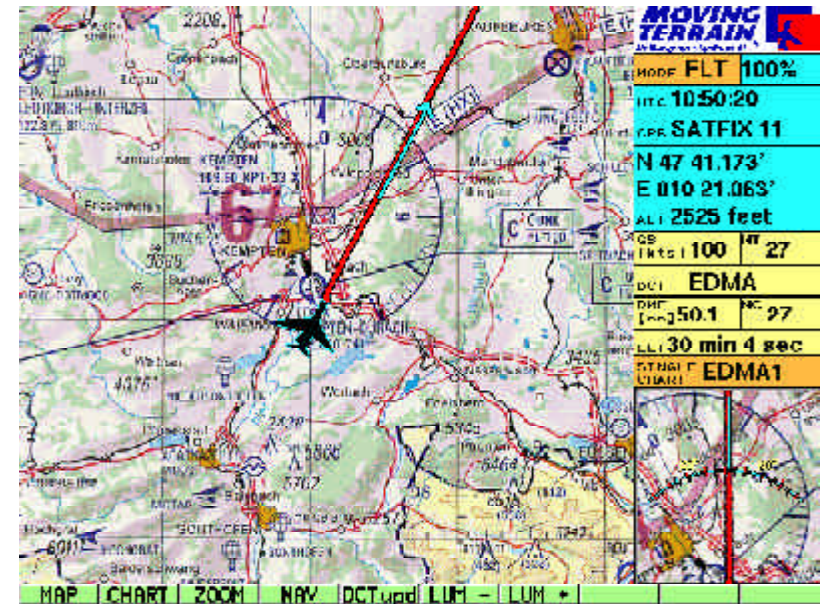
The standard setting is the brightest display.

The following additional settings can be made:

- ✓ **MAP**
- ✓ **AUX**
- ✓ **SCR**

## Night flying

- DARK** Nighttime display (low luminosity)
- LUM -**
- LUM +**
- BRIGHT** Brightest display setting
- RESET** Restore display to factory settings
- CON -** Decrease contrast
- CON 0** Restore contrast to factory settings
- CON +** Increase contrast
- BACK** Return to base level (map)



## Test flight with MT

Working with MT  
during the flight

In principle, Moving Terrain is easy to operate:

**Switch on, select flight mode and the chart is already positioned!**

You **don't need to** input data and are always correctly oriented.

Without leaving flight mode = without interrupting GPS positioning you **can**:

- ✓ Change the base chart
- ✓ Select a single chart (e.g. approach chart) which will be displayed when you enter the area
- ✓ Use the Nav page to lay a DIRECT to an alternative airfield or reporting point
- ✓ Use the Nav page to plan or change routes (FMS / IFR module)
- ✓ Use the Nav page to create or edit a waypoint.
- ✓ Zoom in on the chart
- ✓ Adjust the display to lighting conditions in the cockpit.

Easing the strain in  
the cockpit

**It depends on you and your workload how much data you input during the flight: Moving Terrain offers many options.**

**The prime objective in the cockpit is, however, to ease the strain on you!**

Only 2 examples:

**Position reports** Just read off the screen.

**EET** Read off the screen with the aid of the DCT function.



## Saving your settings

Position

Base chart

Screen settings

**As a general rule you can simply switch off your Moving Terrain device.**

**To facilitate the resumption of work, e.g. following a tankstop, you should save your information.**

The following information is saved:

- Position
- Activated base chart
- Settings for brightness and contrast

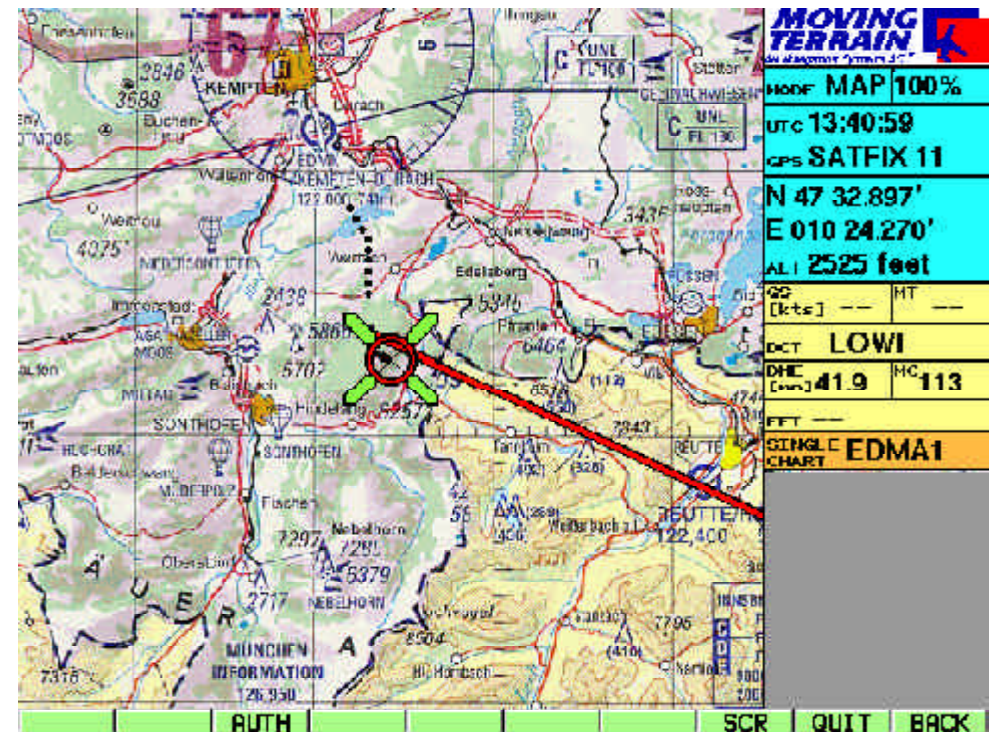
In the course of flight preparations set the brightness to surrounding conditions, select the desired chart and determine your position by GPS (activate FLT mode!).

Quit the program with the following sequence of keys:

- ✓ **AUX**
- ✓ **QUIT** keep key pressed for approx. 3 seconds!
- ✓ Now you may switch off the device

When you next launch Moving Terrain you will find that the previous settings have been imported.

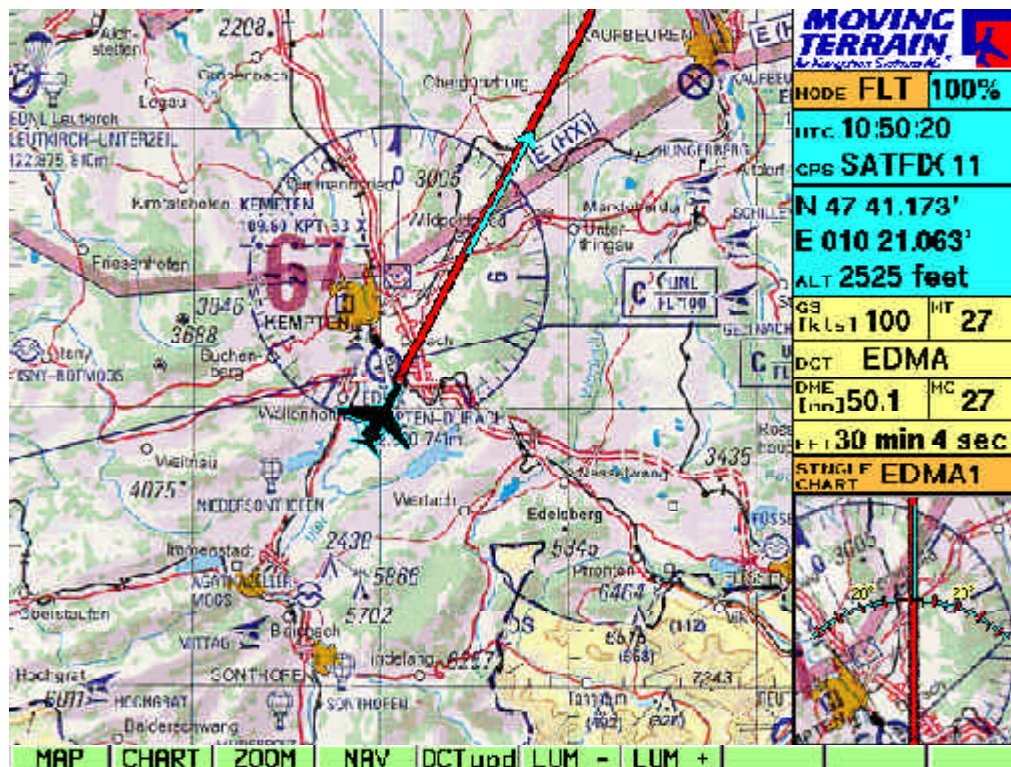
The display (brightness/contrast) can be restored to factory settings with **RESET**.



## Quick reference

Flight mode

Flight mode = operating mode with GPS chart guidance



**MAP**

Change to map mode

**CHART**

Change to chart selection page: Selection of base and single charts ..... p. 23-25

**ZOOM**

Increase scale of chart ..... p. 20

**NAV**

Nav page ..... p. 18-19

**DCTupd**

Update direct vectors relative to current position ..... p. 26, 30

**LUM o**

Reduce display brightness (infinitely variable) ..... p. 31, 33

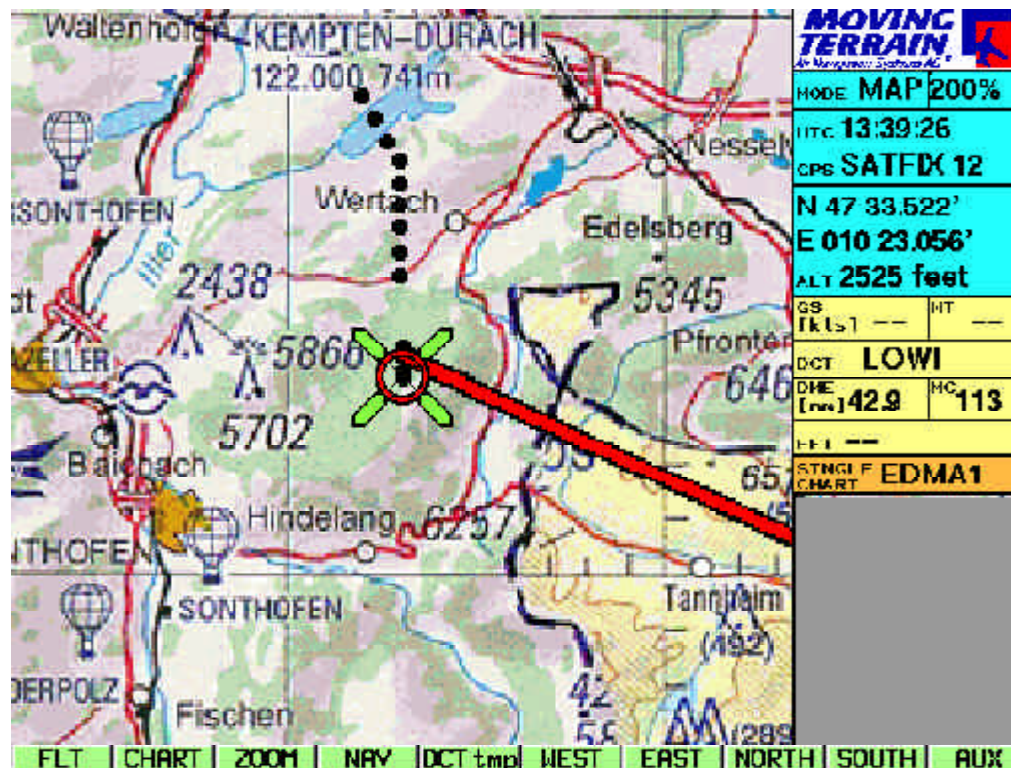
**LUM +**

Increase display brightness (infinitely variable)



Map mode

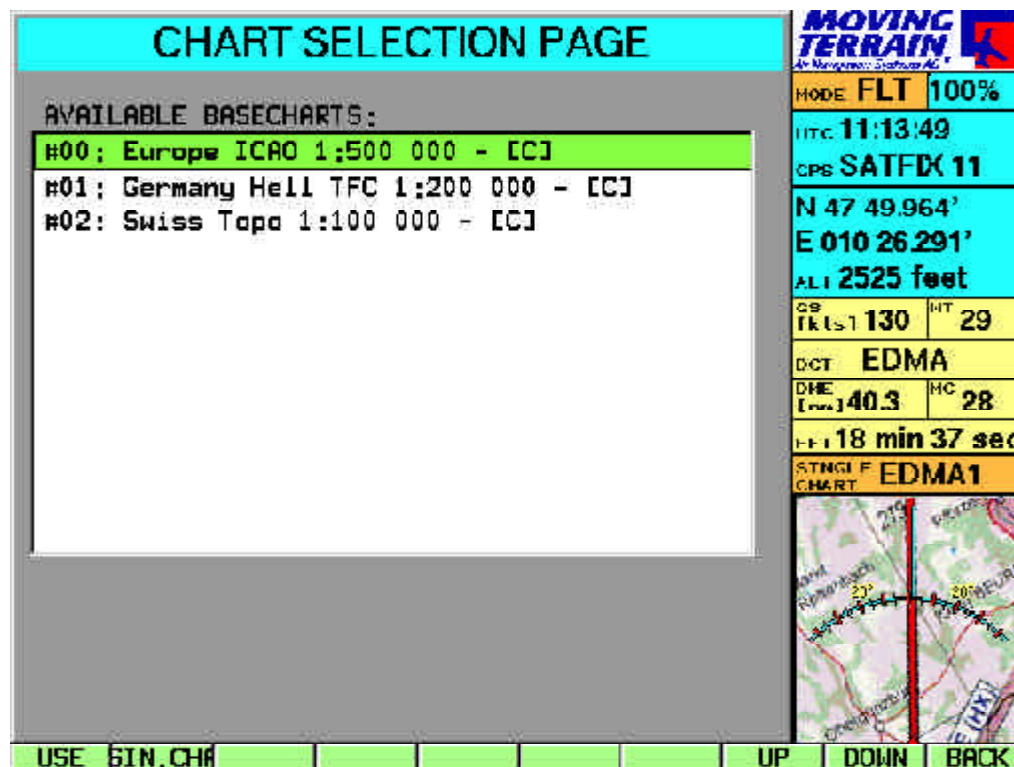
Map mode = The user controls the chart, for flight preparations



<b>FLT</b>	Change to flight mode
<b>CHART</b>	Turn to chart selection page: Selection of base and single charts
<b>ZOOM</b>	Enlarge chart section
<b>NAV</b>	Nav page
<b>DCTtmp</b>	Fast selection of a destination for the direct vector directly on the chart (without naming WPT)
<b>WEST</b>	Moves location symbol on the chart towards the west
<b>EAST</b>	Moves location symbol on the chart towards the east
<b>NORTH</b>	Moves location symbol on the chart towards the north
<b>SOUTH</b>	Moves location symbol on the chart towards the south
<b>AUX</b>	Switches over to further options

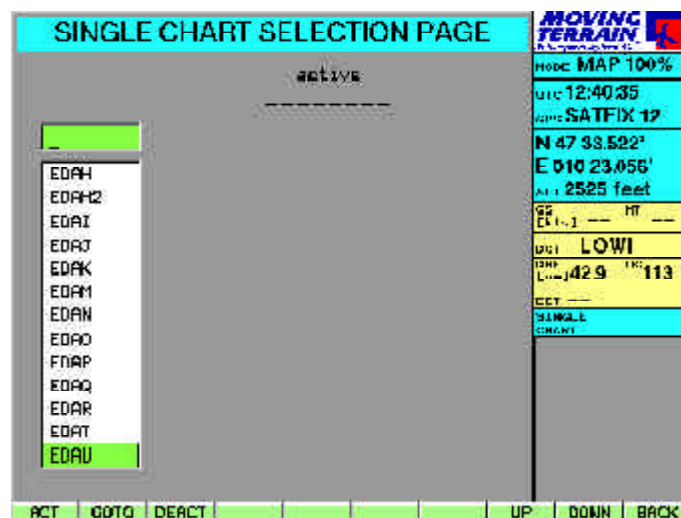
## Quick reference

### Chart selection page



<b>USE</b>	Selection of base chart as highlighted .....	p. 23
<b>SIN.CHA</b>	Change to single chart selection page .....	p. 24
<b>UP</b>	Move upwards in menu	
<b>DOWN</b>	Move downwards in menu	
<b>BACK</b>	Return to previous level (Flight/Map)	

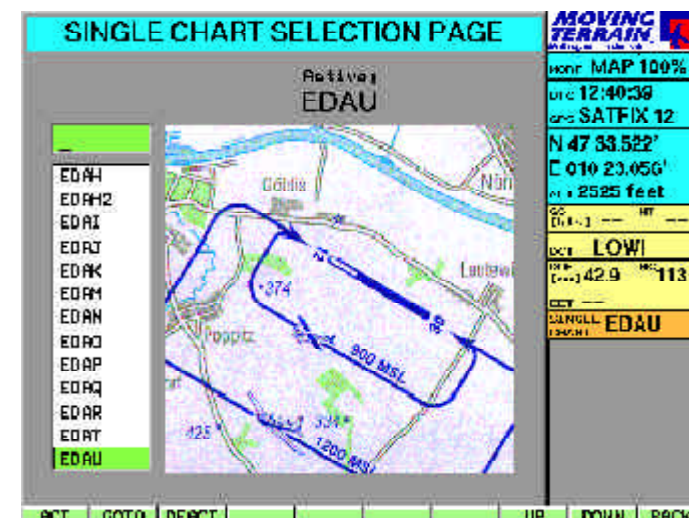
## Single chart selection page



not active

ACT →

← DEACT



active:  
Preview



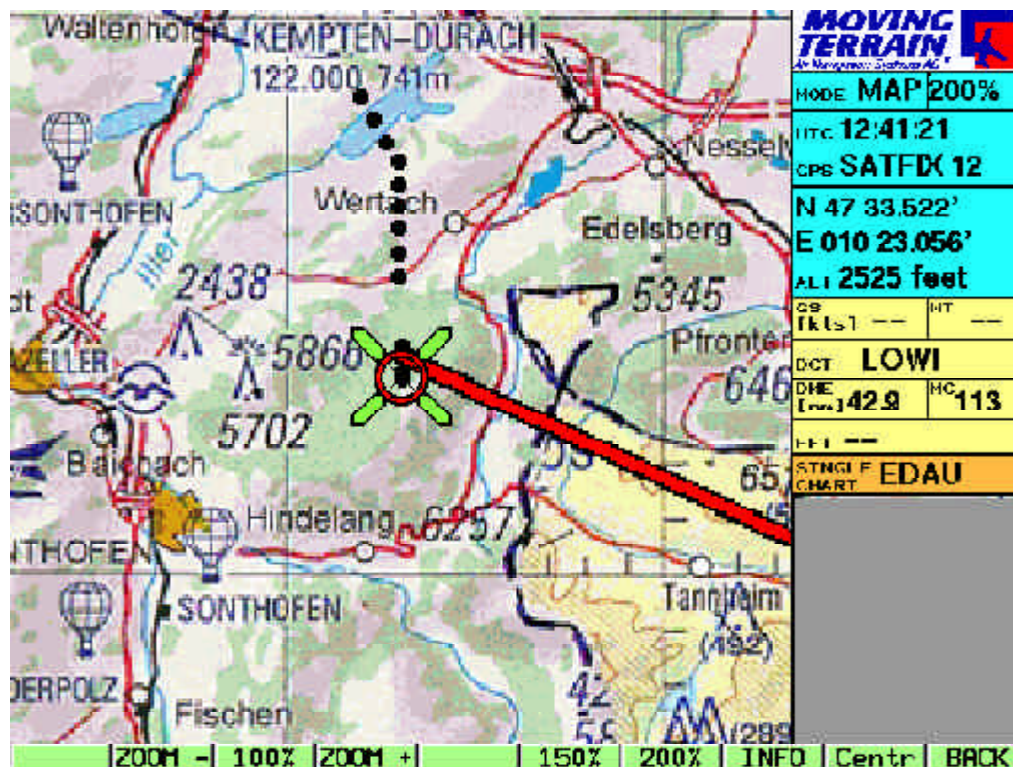
- ACT** Activate selected single chart. The activated single chart is displayed in a preview (section of single chart). The single chart is automatically displayed on the base level (map/flight mode) as soon as you fly into the area.
- GOTO** Jump to center of the selected single chart: The single chart is simultaneously activated (only available in map mode).
- DEACT** Deactivate the single chart
- UP** Move upwards in the selection
- DOWN** Move downwards in the selection
- BACK** Return to base level (map/flight)

Page 24 ff., 29



## Quick reference

### ZOOM



Zoom factor shown in info box

**ZOOM -**  
**100 %**  
**ZOOM +**

Reduce size of chart (infinitely variable, max. 100%)  
Return to original display size (100%)  
Increase size of chart (infinitely variable)

**150 %**  
**200 %**  
**INFO**  
**CENTR / OFF-C**  
**BACK**

Zoom factor 150%  
Zoom factor 200%  
Show/hide info box  
Position symbol displayed in center or off-center  
Return to base level (map/flight)

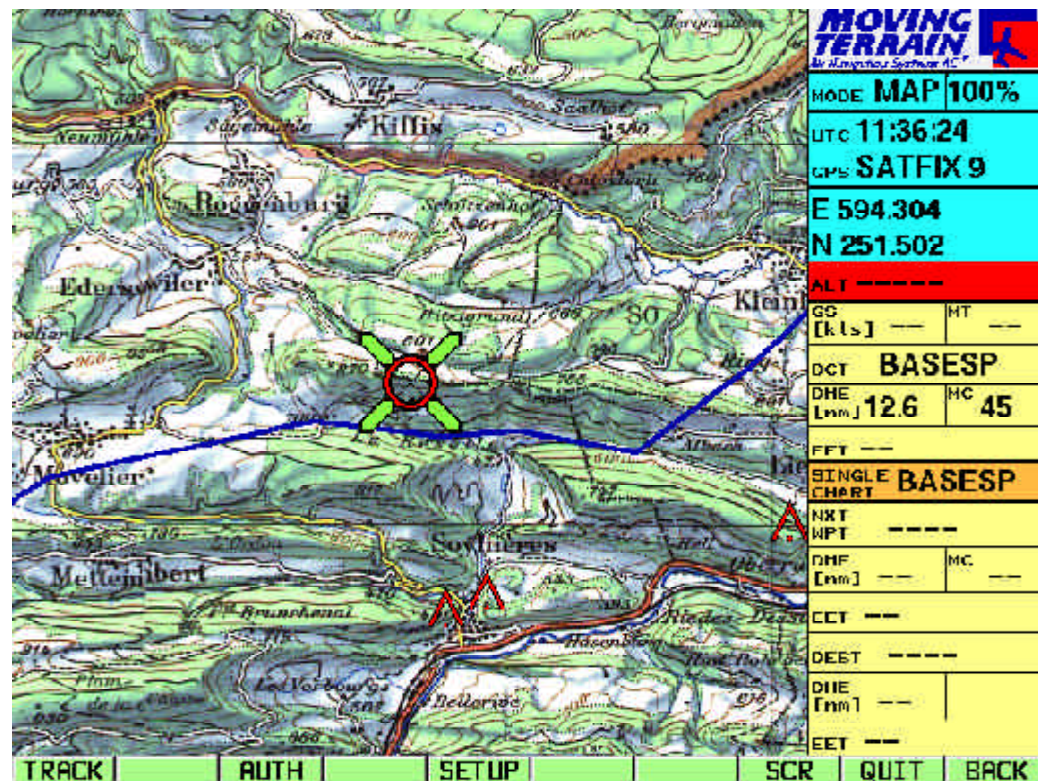
The zoom factor has no relevance for the TrackUp window, where the chart is always displayed at 100%.

## SETUP

## AUX SETUP

SETUP enables you to switch the WPT symbols for user waypoints on or off:

This function is important if too many user waypoints make the chart difficult to read.



Appears only when the track module is disconnected

Hide waypoints  
**WPT -**



Show waypoints  
**WPT +**



## Quick reference

### NAV page

**NAV PAGE**

**VFR WAYPOINTS**

Waypoint	ID
INNSBRUCK	
INNSBRUCK (APT)	LOWI
INNSBRUCK (NDB)	INN
INNOVOCALAN (APT)	EPIN
INSCH (APT)	----

ELEV 1900ft; TWR 120,10; N 47 15.600'  
 ATIS 126,02; E 011 20.600'  
 RNY 08-26 2000m ASPH;  
 ILS08 109,70; LL226 111,10;  
 Tel. (0512) 22525300

SPEED 150 [kts]

NAV PAGE INFO:

MODE MAP 200%  
 UTC 13:36:41  
 CRS SATFDX 12  
 N 47 33.522'  
 E 010 23.056'  
 ALI 2525 feet  
 DCT LOWI  
 DME [km] 42.9 MC 113  
 STAGE F  
 CHART EDMA1

NAV PAGE CONTROLS:

WPT GOTO DCT EDIT NEXT UP DOWN BACK

Page 18 ff

<b>WPT</b>	Change to selection of waypoint type
<b>GOTO</b>	Position the chart on the selected waypoint (function not available in flight mode)
<b>DCT</b>	Direct vector from the current position to the selected waypoint, with simultaneous display of MC/DME/EET in info box
<b>EDIT</b>	Change to user waypoint edit page
<b>NEXT</b>	Move to next box on the Nav page
<b>UP</b>	Move upwards within the active listbox
<b>DOWN</b>	Move downwards in the active listbox
<b>BACK</b>	Return to base level (map/flight)



## NAV DATA selection

**MOVING TERRAIN**  
Air Navigation Software AG

### NAVDATA SELECTION

**VFR WAYPOINTS**

Waypoint	ID
A CORUNA (APT)	LECO
AACHEN (MERZBRUCK) (APT)	EDKA
AALBORG (APT)	EKYT
AALBORG (VOR)	AAL

ELEV 329ft; TWR 118,30;  
GND 121,70;  
RNY 04-22 1940m ASPH;  
ILS22 109,90;  
Tel. (981) 187200

N 43 18.100°  
W 008 22.600°

SPEED 150 [kts]

WAYPOINT ID	ROUTE	ALT	HC	DME	ECT

**MODE** MAP 200%  
**UTC** 13:37:00  
**CPS** SATFDX 12  
**N** 47 33.522°  
**E** 010 23.056°  
**ALT** 2525 feet  
**GS** [kts] --- **HT** ---  
**DCT** LOWI  
**DME** [nm] 42.9 **MC** 113  
**FEI** ---  
**STNG F** EDMA1  
**CHART**

**VFR** **USER** **BACK**

- VFR** VFR database APTs, VORs, NDBs  
Waypoints are marked in each case by the abbreviation shown in brackets
- USER** Change to USER waypoint page
- BACK** Return to Nav page



## Quick reference

User waypoint  
edit page

**User Waypoint Edit Page**

NAME:  ID:

N 00 00.000' E 000 00.000'

**MOVING TERRAIN**  
MODE: FLT 100%  
UTC: 11:02:29  
GPS: SATFIX 11  
N 47 48.575'  
E 010 25.100'  
ALT: 2525 feet  
GS: 170 FT: 29  
DCT: EDMA  
DME: 41.9 HC: 28  
ETE: 35 min 56 sec  
STAGE: EDMA1  
CHART: EDMA1

NEW MODIFY DEL BACK

Page 21 ff

- NEW** Change to User Waypoint Edit Page (new):  
Enables creation of a new waypoint, MT suggests a waypoint name with consecutive number (WPT000, WPT001 etc.); assignment of an individual name and identification code possible.
- MODIFY** Change to user waypoint edit page (modify):  
Enables modification of the displayed waypoint.
- DEL** Delete user waypoint
- BACK** Return to base level (map/flight)

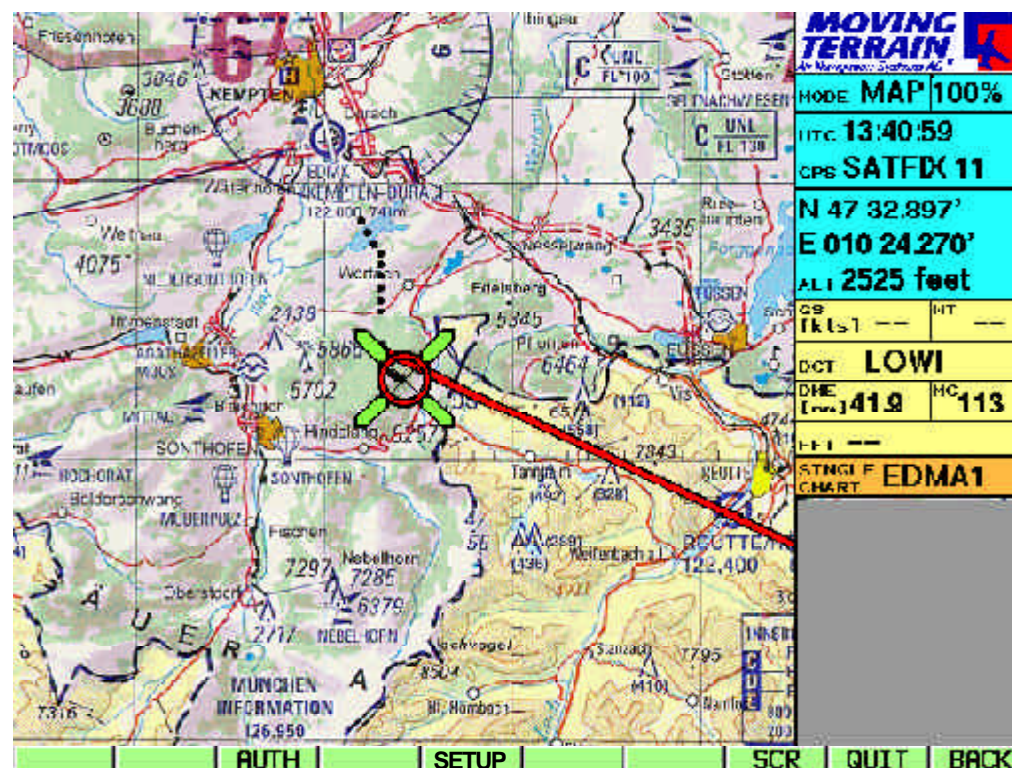
## New user waypoint

- SAVE** Save waypoint under the name as entered
- GOTO** Position the chart on the selected waypoint (understandably not available in flight mode!)
- DCT** Direct vector to the coordinates entered
- PREV** Move back to previous box
- NEXT** Move on to next box
- BACK** Return to Nav page

## Modifying a user waypoint

## Quick reference

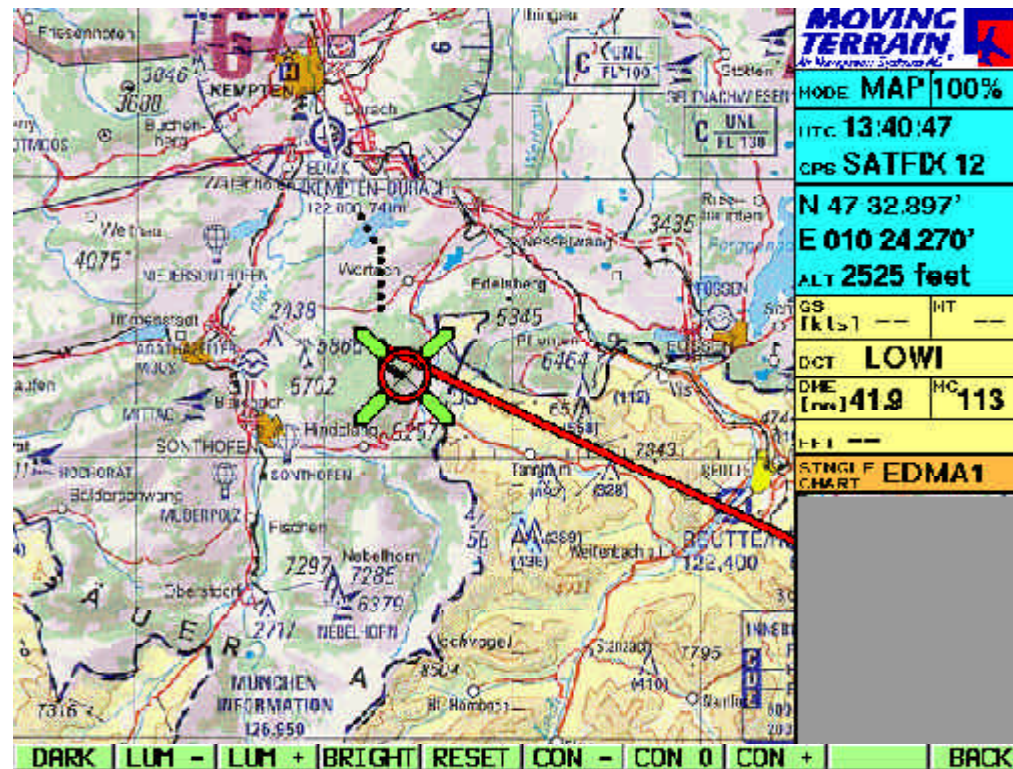
AUX



<b>AUTH</b>	Change to authorization page .....	p. 87
<b>SETUP</b>	Show or hide waypoint symbols .....	p. 43
<b>SCR</b>	Adjust screen settings to ambient conditions (brightness/contrast) .....	p. 31
<b>QUIT</b>	Quit Moving Terrain: Last geographical position, activated base chart and settings for brightness and contrast will be saved .....	p. 33
	<b>Important:</b> Keep key pressed until program quits (protective mechanism against unintentional shutdown of Moving Terrain)	
<b>BACK</b>	Return to base level (map)	



## Display settings



Page 31 ff.

<b>DARK</b>	Nighttime display (lowest luminosity)
<b>LUM -</b>	Infinitely variable reduction of display brightness
<b>LUM +</b>	Infinitely adjustable increase of display brightness
<b>BRIGHT</b>	Brightest setting of the display
<b>RESET</b>	Restore screen to factory setting
<b>CON -</b>	Reduce contrast
<b>CON 0</b>	Restore contrast to factory setting
<b>CON +</b>	Increase contrast
<b>BACK</b>	Return to base level (map)

Contrast settings improve legibility when viewed at an angle from above.



## Part 2: *MT Flight Management system (optional extra module)*

### MT FMS consists of 3 components

- ✓ **Flight planning** via the Nav page
- ✓ **Display of the flight plan** = route on the chart
- ✓ **Flight guidance** via the FMS window

### Flight planning

The flight plan is made up of :

- ✓ individual waypoints from the various databases (VFR, IFR, USER etc.)

and / or

- ✓ routes or route segments already saved.

Composition, storage and loading takes place on the Nav page.

### Back on the chart, the FMS provides:

**Flight guidance** in the FMS window (bottom right) - Alternatively this window becomes the TrackUp display. Switch-over knob **TrkUp / FMS** in flight mode.

**Flight plan display** on the chart as a chain of green vectors.

If the two vectors coincide, the DIRECT vector (rot) will superimpose the route vector (green).

## Flight planning

### Preparing a flight plan

#### Selecting waypoints from the databases

Any point can be selected from any Nav data (VFR, IFR, USER).

✓ **NAV**

Nav page

Waypoint listing

Information

Speed

Flight plan

✓ **Names** entered on the integrated keyboard

✓ In the event of an error, press UP /DOWN and re-enter

To **input identification code** (4-letter code):

✓ **NEXT**

✓ Enter identification code in ID box

FMS window

The **coordinates** always relate to the highlighted waypoint, either in the upper waypoint box or in the flight plan box.  
Coordinates cannot be entered on this page.

#### Adopting waypoints in the flight plan

✓ **INS** Waypoint is imported into the flight plan box (added)

# Flight planning

An example

Flight plan Augsburg EDMA to Nuremberg EDDN  
via  
Walda VOR  
Allersberg VOR  
Röthenbach NDB

✓ **NAV** Nav page

Enter "AUGS..." => Augsburg (APT)  
is highlighted

✓ **INS** add to the flight plan

Enter "WAL..." => Walda (VOR)  
is highlighted

✓ **INS** add to the flight plan

Enter "ALLERS..." => Allersberg (VOR)  
is highlighted

✓ **INS** add to the flight plan

Enter "ROTHE..." => Rothenbach (NDB)  
is highlighted

✓ **INS** add to the flight plan

✓ **NEXT** Jump to ID box database is now sorted  
by ID

Enter "EDDN" => Nurnberg (APT)  
is highlighted

✓ **INS** add to the flight plan

**NAV PAGE**

**VFR WAYPOINTS**

WAYPOINT ID	ROUTE	ALT	INC	DME	FFT
AUGS					
AUGSBURG (APT)					
AUGSBURG (NDB)					
AURILLAC (APT)					
AURILLAC (NDB)					

ELEV 1515ft; TWR 124.97; N 48 25.510°  
 ATIS 124.57; E 010 55.910°  
 RNY 07-25 1280m ASPH;  
 ILS25 108.50;  
 Tel. (0821) 2708134

SPEED 150 (kts)

EDMA --- 0 00:00

WAYPOINT ID ROUTE ALT INC DME FFT

EDMA --- 0 00:00

WPT GOTO DCT INS EDIT INSPOS NEXT UP DOWN BACK

WAYPOINT ID	ROUTE	ALT	INC	DME	FFT
EDMA			39	12	00:04
WLD			---	0	00:00

WAYPOINT ID	ROUTE	ALT	INC	DME	FFT
EDMA			39	50	00:20
WLD			4	38	00:15
ALB			---	0	00:00

WAYPOINT ID	ROUTE	ALT	INC	DME	FFT
EDMA			39	67	00:26
WLD			4	54	00:21
ALB			3	16	00:06
RTB			---	0	00:00

WAYPOINT ID	ROUTE	ALT	INC	DME	FFT
EDMA			39	74	00:29
WLD			4	61	00:24
ALB			3	23	00:09
RTB			277	7	00:02
EDDN			---	0	00:00

Flight plan  
on the Nav page

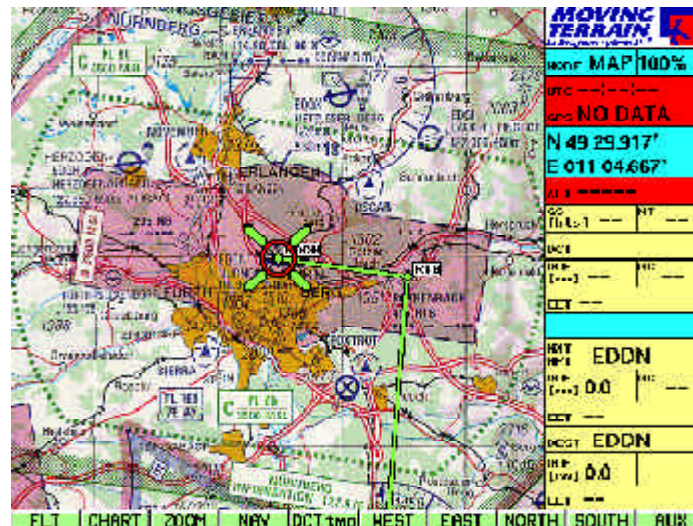
=> The 1st point on the route “EDMA” is no longer visible in the flight plan, but it will be included in calculations.

WAYPOINT ID	ROUTE	ALT	MC	DME	EET
EDMA			39	74	00:29
WLD			4	61	00:24
ALB			3	23	00:09
RTB			277	7	00:02
EDDN			---	0	00:00

**WAYPOINT ID** Identifier entry  
**ROUTE** Name of route / segments, particularly important for IFR planning  
**ALT** Minimum flight altitude => IFR  
**MC** Magnetic course  
**DME** Accumulative calculation of (remaining) distance to destination (= last route point in the flight plan) in nautical miles  
**EET** Estimated enroute time, calculated using speed in knots shown in the “speed” box. Speed is entered on the keyboard or imported into the flight mode from the GPS (see chapter “Speed”).

Flight plan  
on the chart

✓ **BACK** Return to chart



Flight plan = route = green lines from one waypoint to the next

Waypoints marked with green diamonds,  
marked with ID:  
=> makes flight plan easily comprehensible

For explanation of FMS window see page



## Editing a flight plan

### Deleting a waypoint

### Inserting a waypoint

Insert position =  
InsPOS

✓ **2 x NEXT** The highlighting bar is positioned in the flight plan box

✓ **GOTO** “Jump” to the flight plan waypoint (in map mode)

✓ **DCT** Waypoint of the flight plan can become destination of the direct vector

✓ **DEL** Delete highlighted waypoints

✓ **DELSEG** Delete route/route segment from screen

✓ **INVERT** Invert the flight plan

✓ **NEXT** Go to next box, “Speed”, return to waypoint list

✓ **UP / DOWN** Select waypoints, position highlighting bar

✓ Position highlighting bar on the waypoint of the flight plan before which the waypoint is to be inserted.

✓ **2 x NEXT** Return to waypoint database, select point  
✓ **INS** Insert into route.

The screenshot displays the NAV PAGE interface. At the top, it says 'NAV PAGE' in a blue header. Below this, there's a section for 'VFR WAYPOINTS' with a list of waypoints: A CORUNA, A CORUNA (APT), MADRID (CUATRO VIENTOS) (APT), LEIPZIG (VOR), and GRANADA (ARMILLA (MIL)) (APT). To the right of this list are labels: LECO, LECO, LECU, LEG, and LEGA. Below the waypoints list is a large empty box with 'n/a' in the top left corner. To the right of this box are coordinates: N 49 29.917' and E 011 04.667'. Below these coordinates is a 'SPEED' field set to 150. At the bottom of the screen, there's a table with columns for 'WAYPOINT', 'DIST', 'TIME', 'ALT', and 'SPEED'. The table contains data for EDDN, RTB, ALB, WLD, and EDMA. To the right of the table is a vertical column of status indicators: 'MODE MAP 100%', 'NO DATA', 'N 48 29.407', 'E 010 52.327', 'DCT', 'DNE', 'LLI', 'NXT', 'EDMA', 'DNE', 'EET', 'DNE', 'EET'. At the very bottom, there's a row of buttons: RTE, GOTO, DCT, DEL, DELSEG, INVERT, NEXT, UP, DOWN, BACK.

### Example

Upon takeoff at Augsburg the point NOVEMBER is to be overflown.

The point is not in the database.

Position highlighting bar on EDMA using **UP / DOWN** in the flight plan

✓ **GOTO** Return to chart (green vectors mark the flight plan)

✓ Use **WEST/EAST/NORTH/SOUTH** buttons to move to the point NOVEMBER on the chart

✓ **NAV**

✓ Position highlighting bar in the flight plan (you may need to press **NEXT**)

- ✓ **UP/DOWN** Position highlighting bar on WLD (position before which the waypoint is to be inserted)
- ✓ **2 x NEXT** = replaces highlighting bar in waypoint box
- ✓ **insPOS** Inserts current position into plan

⇒ **Effect on calculations**

**NAV PAGE**

VFR WAYPOINTS		TD
NURNBERG		EDDN
NURNBERG (APT)		EDDN
NURNBERG (NDB)		NB
NUTHAMPSTEAD (ROYSTON) (APT)		----
NY ALESUND (NDB)		NYA

ELEV 1046ft; THR 118.30; N 49 29.917'  
 GND 118.10; ATIS 123.07; E 011 04.667'  
 RWY 10-28 2700m ASPH;  
 ILS10 111.30; ILS28 109.10;  
 Tel. (0911) 3508576

SPEED 150 (K.L.)

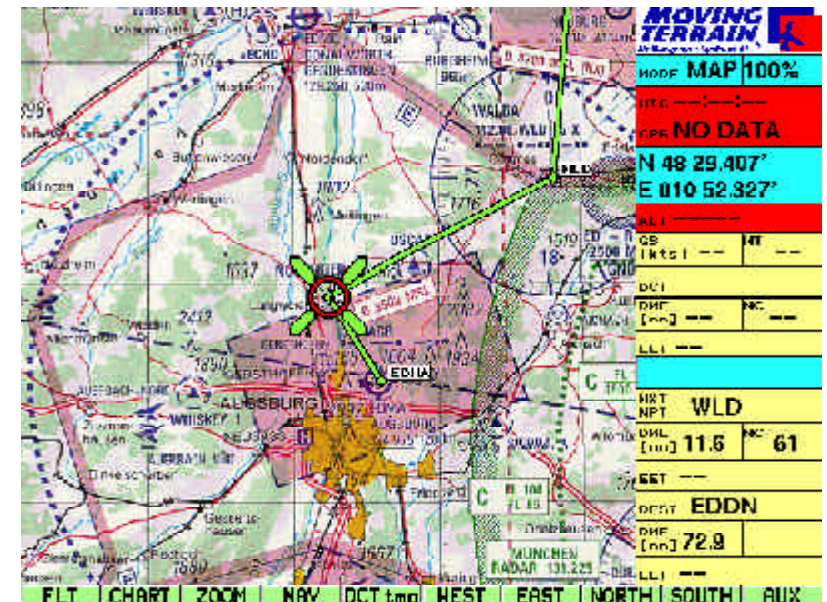
WAYPOINT	ID	ROUTE	ALT	INC	DBL	LLI
EDMA			329	77	00:30	
N 48 29.407'		E 010 52.327'	73	00:29		
WLD			4	61	00:24	
ALB			9	29	00:09	
RTB			277	7	00:02	

WPT GOTO DCT INS EDIT insPOS NEXT UP DOWN BACK

On the chart:

Note

The position determined by GPS in flight mode can also be incorporated into the flight plan with **insPOS**.



## Editing a flight plan

Deleting a route / route segment from the screen

Inverting route = return flight

### ✓ DELSEG

**Deletion** of a flight plan from the memory or deletion of loaded routes/route segments **from the screen** (not from the memory!)=> particularly important in IFR planning.

**Routes (segments) are loaded additively.**

Not all dots can be made visible on the screen.

=> If the calculations in the flight plan box are not correct, please make sure that only the desired route (only 1 x) is loaded (scroll through list with **UP / DOWN!**)

### ✓ INVERT

Reversal of the flight plan

WAYPOINT ID	ROUTE	ALT	HC	DME	EET
EDMA			39	74	00:29
WLD			4	61	00:24
ALB			3	23	00:09
RTB			277	7	00:02
EDDN			---	0	00:00

before **INVERT**

WAYPOINT ID	ROUTE	ALT	HC	DME	EET
EDDN			96	74	00:29
RTB			183	67	00:26
ALB			184	50	00:20
WLD			219	12	00:04
EDMA			---	0	00:00

after **INVERT**

Calculations are updated.

IFR procedures (SIDs, STARs, APPRoaches) cannot be reversed with **INVERT**.

## SPEED box

- ✓ **NEXT** (repeat if necessary) until SPEED is highlighted

Enter average GS in this box

- ✓ using the keyboard.

Calculation of EET (hh:mm) at stipulated speed:

GS 150 kts

WAYPOINT ID	ROUTE	ALT	NO	DME	EET
EDMA			39	74	00:29
WLD			4	61	00:24
ALB			3	23	00:09
RTB			277	7	00:02
EDDN			---	0	00:00

SPEED <b>150</b> [kts]	
NXT WPT	WLD
DME [nm]	11.6 MC 61
EET	--
DEST	EDDN
DME [nm]	72.9
EET	--

copyGS [ ] [ ] [ ] [ ] [ ] [ ] NEXT [ ] [ ] BACK [ ]

WAYPOINT ID	ROUTE	ALT	NO	DME	EET
EDMA			39	74	00:21
WLD			4	61	00:17
ALB			3	23	00:06
RTB			277	7	00:01
EDDN			---	0	00:00

SPEED <b>210</b> [kts]	
NXT WPT	WLD
DME [nm]	11.6 MC 61
EET	--
DEST	EDDN
DME [nm]	72.9
EET	--

copyGS [ ] [ ] [ ] [ ] [ ] [ ] NEXT [ ] [ ] BACK [ ]

GS 210 kts

## Adjusting EET to actual cruising speed

- ✓ **copyGS** Import of GS from GPS => EET updated during the flight.  
CopyGS only available in flight mode (signals from GPS).



## Saving and loading flight plans

### Saving routes / route segments

Preparations: draw up flight plan

- ✓ Highlighting bar must be positioned in the flight plan box

#### ✓ RTE USER ROUTES page

- ✓ Enter a name for the route
  - max. 8 characters
  - Assignment of a unique name makes it easier to find
  - Route001, Route002 => auxiliary name (predefined by system)

Made a mistake?

- ✓ **UP / DOWN**, then re-enter

- ✓ **SAVE** Saved route will be added to the list

**MOVING TERRAIN**

**USER ROUTES**

Route to LOAD  
ROUTE001

Available Routes

MODE **FLT** 100%

UTC ---:---:---

GPB **NO DATA**

N 48 29.407'

E 010 52.327'

ALT -----

CS [kts] -- MI --

DCI

DME [nm] -- MC --

ECT --

MXI NPT **WLD**

DME [nm] 11.6 MC 61

EEI --

DEST **EDDN**

DME [nm] 72.9

FFI --

LOAD SAVE DEL [ ] [ ] [ ] [ ] UP DOWN BACK

## Loading routes / route segments

Preparation: At least one flight plan must have been previously saved

- ✓ Highlighting bar must in be positioned in the flight plan box

- ✓ **RTE** USER ROUTES page

- ✓ **UP / DOWN** route selection  
by positioning  
highlighting bar

- ✓ **LOAD**

### Routes are loaded additively

If a route has already been loaded, the next route will be **added** or **inserted before** the highlighted flight plan.

=> Uncomplicated  
**combination of route  
segments** (arrivals,  
departures, etc.)  
(esp. IFR planning)

**USER ROUTES**

Route to LOAD  
**ROUTE001**

Available Routes  
**EDMAEDDN**

MODE: **FLT** 100%  
UTC: --:--:--  
GPS: **NO DATA**  
**N 48 29.407'**  
**E 010 52.327'**  
ALT: -----  
CG [kts]: -- HT: --  
DCT: --  
DME [nm]: -- HC: --  
FFT: --  
HRT: **WLD**  
HPT: --  
DME [nm]: **11.6** HC: **61**  
EET: --  
DESI: **EDDN**  
DMC [nm]: **72.9**  
EET: --

**LOAD SAVE DEL UP DOWN BACK**

## Deleting routes

- ✓ **DEL** Delete highlighted flight plan from memory

## Flight guidance with MT FMS

FMS window

### Flight management system (flight guidance)

next wpt	KPT
DME nm	19.3
MC	100
EET	8 min 54 sec
Dest	EDMA
DME nm	80.0
EET	36 min 55 sec

Next waypoint

Identification code

DME in nautical miles

Magnetic track over ground

Estimated enroute time: remaining time to next waypoint (at maintained GS)

Destination waypoint

Identification code

DME in nm: Remaining distance to destination on planned route in nautical miles\*

EET to destination waypoint (at maintained GS)\*

The information in the FMS window always relates to the current position shown on the chart, i.e.:

1. the position determined by the GPS receiver *or*
2. the targeted position on the chart in map mode.

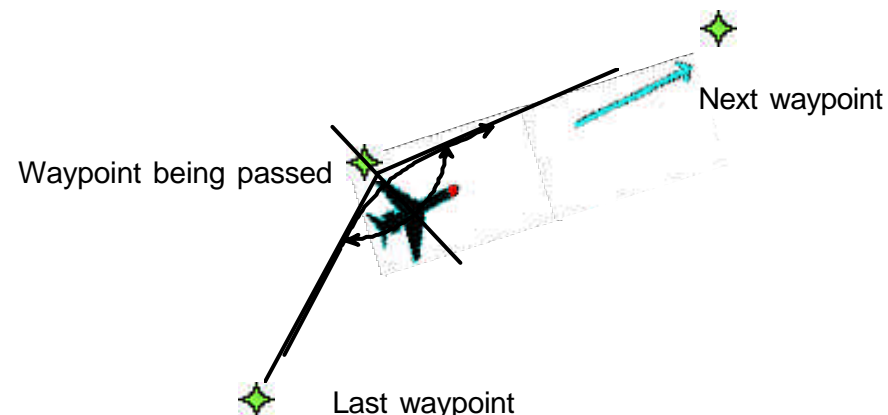
When you switch to map mode in order to “explore” the surrounding area on the chart, waypoint data will be continuously recalculated.

Next waypoint

### The waypoint ahead of your present position in the entered flight plan.

The system determines the next waypoint when it is flying over or past a point in the flight plan.

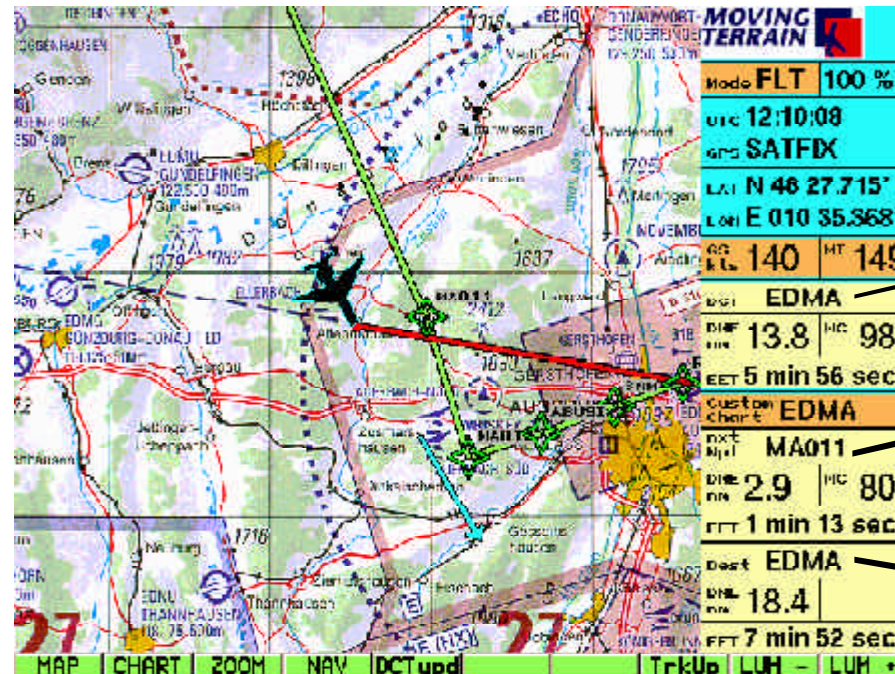
Specifically, flying past means flying over the bisector of the angle formed by the waypoints which are behind, level and ahead of you = next waypoint.



Destination waypoint

Calculation of  
navigational data  
DME, MC, EET

The last point in flight planning (route destination).



Difference in route calculation  
DCT / flight plan

Direct: Shortest distance (great circle)  
between current position and  
destination (red line)

Next waypoint: Data determined as direct to  
next waypoint.

Destination waypoint:  
Direct from position to next waypoint.  
From here the route and time to  
destination are calculated point for  
point according to entered flight plan  
(specification of an MC is not  
necessary).

Switching to  
TrackUp window

- ✓ Switch to TrackUp window in flight mode
  - ✓ If a window is active, it will always be displayed at all levels in map or flight mode.
  - ✓ It will be active until you change to another mode.
- ✓ **TrkUp** return with ✓ **FMS**.



## MT IFR

### Basics

## Part 3: MT IFR (optional extra module)

### MT IFR based on the MT FMS module

Please read the information in the previous chapter about:

- ✓ **Flight planning** via the Nav page
- ✓ **Flight guidance** via the FMS window
- ✓ **Display of flight plan** = route on the chart

In this part of the manual the emphasis is placed on IFR navigation.

Stored Nav data can be retrieved in the Nav page:

- ✓ **NAV**
- ✓ **WPT**

- ✓ **IFR** IFR database consists of:
  - Enroute waypoints** (ENR)
  - Airports** (APT) \*
  - VORs** (VOR)
  - NDBs** (NDB)
  - DME** (DME)
  - ILS** (ILS)
  - TACAN** (TAC)

\* APTs with IFR procedure and  
RWY longer than 4000 ft

IFR enroute +  
Nav data

The screenshot displays the 'NAVDATA SELECTION' screen. The main section is titled 'IFR WAYPOINTS' and lists several waypoints: '6605N / PTSQ' (highlighted in green), '6605N / PTSQ (ENR)' (highlighted in green), '75KMG (ENR)', 'A CORUNA (APT)', and 'A1 (ENR)'. To the right of these waypoints is a column labeled 'ID' containing '6605N', '6605N', '75KMG', 'LECO', and 'A1'. Below the waypoints list, there are fields for 'N 66 00.000°' and 'W 005 00.000°', and a 'SPEED' field set to '0 kts'. At the bottom, there is a row of buttons: 'WAYPOINT TO ROUTE', 'ALT', 'HD', 'DMF', 'FFT', and 'BACK'. On the right side of the screen, there is a vertical strip of information including 'MOVING TERRAIN', 'MODE MAP 100%', 'GPS NO DATA', 'N 47 40.283°', 'E 009 30.683°', and various status indicators like 'GS [kts]', 'DME [nm]', and 'FFT'.

## IFR Terminal waypoints

- ✓ **TRML** Terminal waypoints werden über den APT\* ausgewählt  
\*APTs with IFR-procedure and RWY with mehr as a 4000 ft Länge

Auswahl of the Airport über:  
**IFR APT SELECTION page**

Auswahl of the Flugplatzes über die integrated keyboard or with **UP / DOWN**

or

- ✓ **NEXT** ID Feld  
Eingabe of the ID, data jetzt nach identification = 4-letter-code sortiert  
=> farbiger Balken must den desired airfield markieren

- ✓ **CONT**  
Listing der Terminal waypoints zu dem gewählten APT (nach Namen or ID)  
Auswahl eines waypoints

Terminal waypoint Database beinhaltet  
**Terminal waypoints** (TRM)

## IFR procedure

Active airport

Simplified operation  
with the  
Continue key

IFR procedure

**Locators** (LOC)  
**Runway waypoints** (RWY)

“Active APT” is based on the:

**Terminal waypoint database** TRML

**Terminal procedure**

SIDs  
STARs  
Approaches

Once selected, the APT remains the “**active APT**” until you select a different one or quit the MT program.

“**Active APT**” simplifies your work: all selected the waypoints and procedures apply to this airport.

=> Your selection does not need to be repeated!

A further aid to **simplified handling** is that the **CONT** function is always on the same key with which the procedure was previously selected

=> If you do not change the “**Active APT**”, the same key can be pressed 2 x in succession.

In principle IFR procedures are treated as routes / route segments  
(see FMS manual)

- ✓ NAV
- ✓ NEXT
- ✓ NEXT highlighting bar must be in the flight plan window
- ✓ RTE

The screenshot displays the NAV PAGE for Active APT: EDDF. It features a table of IFR terminal waypoints and a flight plan window.

IFR TERMINAL WAYPOINTS		TO
IFWL		IFWL
IFWL (LOC)		IFWL
OM07L (TRM)		OM07L
OM07R (TRM)		OM07R
OM25L (TRM)		OM25L
n/a		n/a
		n/a

Below the waypoints, there is a section for SPEED (0 kts) and a table for flight plan data:

NAVPOINT ID	ROUTE	ALT	MC	DME	EET

At the bottom, there is a row of buttons: SID, STAR, APPR, USER, and BACK.

On the right side, there is a vertical panel with the following information:

- MOVING TERRAIN** logo
- MAP 100%
- UTC ---:--:--
- GPS NO DATA
- N 48 29.407'
- E 010 52.326'
- ALT ---
- GS [kts] ---
- DCT
- DME [nm] ---
- FTT ---
- HXT
- HPT
- DME [nm] ---
- EET ---
- DEST ---
- DME [nm] ---
- EET ---

SIDs  
STARs  
Approaches

Loading  
procedures

#### The choice now extends to:

- ✓ **SID** Standard instrument departures
- ✓ **STAR** Standard arrival routes
- ✓ **APPR** Approaches
- ✓ **USER** Own routes / route segments

#### Example **SID**

The “active APT” (in our example Friedrichshafen EDNY) has been preselected.

Press the same key (now **CONT**)  
and all procedures of the same  
type (here **SID**) will be listed

Selection of desired procedure  
by name or scrolling **UP/DOWN**

✓ **LOAD** example **ALAG2B**

### SIDs (Active APT: EDNY)

Route to LOAD

ROUTE001

Available Routes

ALAG2B	(RH24)
ALAG2D	(RH06)
ALAG2E	(RH06)
ALAG2W	(RH24)
HEUS1B	(RH24)
HEUS1D	(RH06)
HEUS1E	(RH06)
HEUS1W	(RH24)
KPT5M	(RH06)
KPT6B	(RH24)
KPT6D	(RH06)
LAG02B	(RH24)
LAG02D	(RH06)

**MOVING TERRAIN**  
AN ALPINECHART SYSTEMS / E.

MODE MAP 100%

UTC 21:04:58

GPS SATFIX 9

N 48 12.419'

E 011 15.933'

ALT 2303 feet

CS [kts] -- RT --

DCT

DNE [nm] -- MC --

FFT --

---

NXT WPT ALAGO

DNE [nm] 75.9 MC 251

EET --

DEST ALAGO

DNE [nm] 75.9

EET --

LOAD
UP
DOWN
BACK



## IFR procedure

Once the procedure has been activated, you will see it in the route box as shown here.

The procedure consists of as many waypoints as can be displayed in succession on the screen.

Go to the start (title) of the route with **UP**

### NAV PAGE (Active APT: EDNY)

#### IFR TERMINAL WAYPOINTS

	ID
FHA-083/FHD 009.8	FHD98
FHA-083/FHD 009.8 (TRM)	FHD98
IFHE (LOC)	IFHE
IFHW (LOC)	IFHW
NY002 (TRM)	NY002
n/a	n/a
n/a	n/a

WAYPOINT ID	ROUTE	ALT	HC	DME	EET
ALAG2B	SID (EDNY)				
RN24	ALAG2B	1366	240	17	00:04
(1800'+)	ALAG2B	1800	239	16	00:04
NY040	ALAG2B		59	13	00:03
FHA	ALAG2B		340	8	00:02

**MOVING TERRAIN**  
by MovingMap Software AG

MODE **MAP** 100%  
 UTC **21:05:28**  
 CRS **SATFIX 9**  
 N **48 12.419'**  
 E **011 15.933'**  
 ALT **2303 feet**  
 GS [kts] -- MT --  
 DCT  
 DME [nm] -- MC --  
 EET --  
 NXT WPT **ALAGO**  
 DME [nm] **75.9** MC **251**  
 DEST **ALAGO**  
 DME [nm] **75.9**  
 EET --

RTE GOTO DCT DEL DELSEG INVERT NEXT UP DOWN BACK

Go to the end of the route with **DOWN**

#### IFR TERMINAL WAYPOINTS

	ID
n/a	n/a
n/a	n/a

WAYPOINT ID	ROUTE	ALT	HC	DME	EET
(1800'+)	ALAG2B	1800	239	16	00:04
NY040	ALAG2B		59	13	00:03
FHA	ALAG2B		340	8	00:02
ALAGO	ALAG2B		---	0	00:00

**MOVING TERRAIN**  
by MovingMap Software AG

MODE **MAP** 100%  
 UTC **21:05:28**  
 CRS **SATFIX 9**  
 N **48 12.419'**  
 E **011 15.933'**  
 ALT **2303 feet**  
 GS [kts] -- MT --  
 DCT  
 DME [nm] -- MC --  
 EET --  
 NXT WPT **ALAGO**  
 DME [nm] **0.0** MC **---**  
 DEST **ALAGO**  
 DME [nm] **0.0**  
 EET --

RTE GOTO DCT DEL DELSEG INVERT NEXT UP DOWN BACK

Display of  
procedure on the  
Nav page

## Description of the flight plan box

### Title of every route (procedure) saved in the fixed database

Name of route (6 characters)  
Type of procedure  
followed by (APT) in brackets

Example  
**ALAG2B**  
**SID**  
**(EDNY)**

### Below this the waypoint listing

#### Waypoint ID

Name of **route**

**ALT** Recommended/minimum altitude

**MC** Magnetic track

**DME** in nm

**EET** calculated from the GS entered in  
the "Speed" box

						SPEED	210	[kts]
WAYPOINT ID	ROUTE	ALT	MC	DME	EET			
ALAG2B	SID (EDNY)							
RW24	ALAG2B	1366	240	17	00:04			
(1800' + )	ALAG2B	1800	239	16	00:04			
NY040	ALAG2B		59	13	00:03			
FHA	ALAG2B		340	8	00:02			
RTE	GOTO	DCT	DEL	DELSEG	INVERT	NEXT	UI	

Recommended/  
minimum altitudes

The altitude (minimum altitude) is provided as a recommendation only.

Calculation of EET  
in the flight plan

The average speed in the "**Speed**" box is  
the basis for calculating **EET** (hh:mm)

✓ **NEXT** (repeat as necessary until  
"**Speed**" is highlighted)

or in flight mode

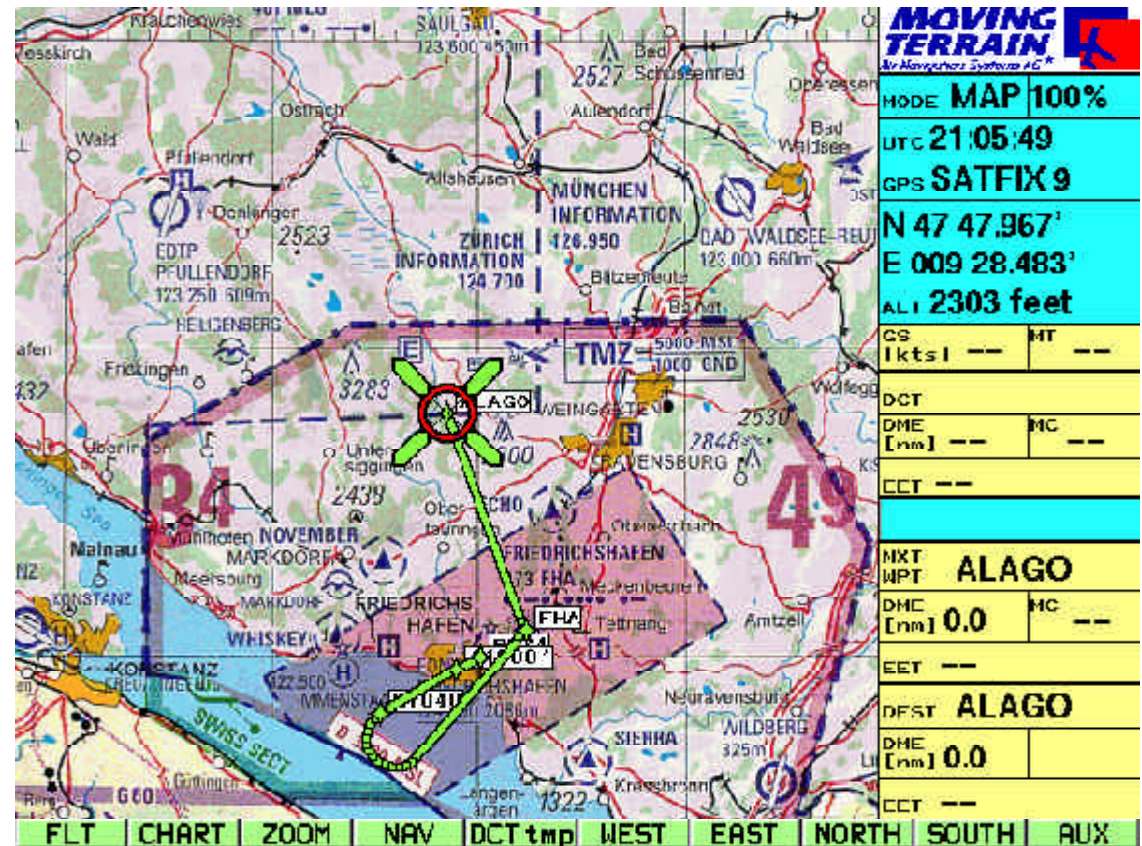
✓ **copyGS** GS determined by GPS  
=> Updating of GS in flight

						SPEED	110	[kts]
WAYPOINT ID	ROUTE	ALT	MC	DME	EET			
ALAG2B	SID (EDNY)							
RW24	ALAG2B	1366	240	17	00:09			
(1800' + )	ALAG2B	1800	239	16	00:08			
NY040	ALAG2B		59	13	00:07			
FHA	ALAG2B		340	8	00:04			
RTE	GOTO	DCT	DEL	DELSEG	INVERT	NEXT	UI	

## IFR procedure

Display of procedure  
on chart

Example SID ALAG2B  
Friedrichshafen



The route display is not a point-to-point guide, but rather the conversion of instructions into vectors that accurately project flight guidance onto the chart:

The display functions on charts of various scales, likewise on DFS approach charts.

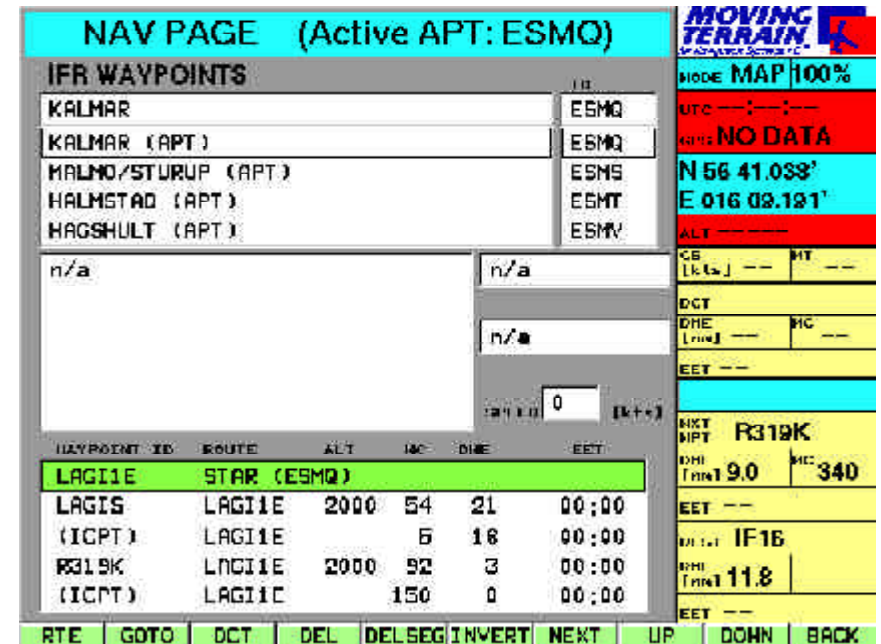
Besides the green routing, the IDs of the terminal waypoints are also shown. This ensures perfect orientation. The DCT to a waypoint further ahead can easily be traced on the chart and created on the NAV page at the touch of a button.



## Example of a STAR

Example **STAR LAG1E**  
Kalmar (ESMQ)

on the Nav page



Example **STAR LAG1E ARC DME**  
Kalmar (ESMQ)

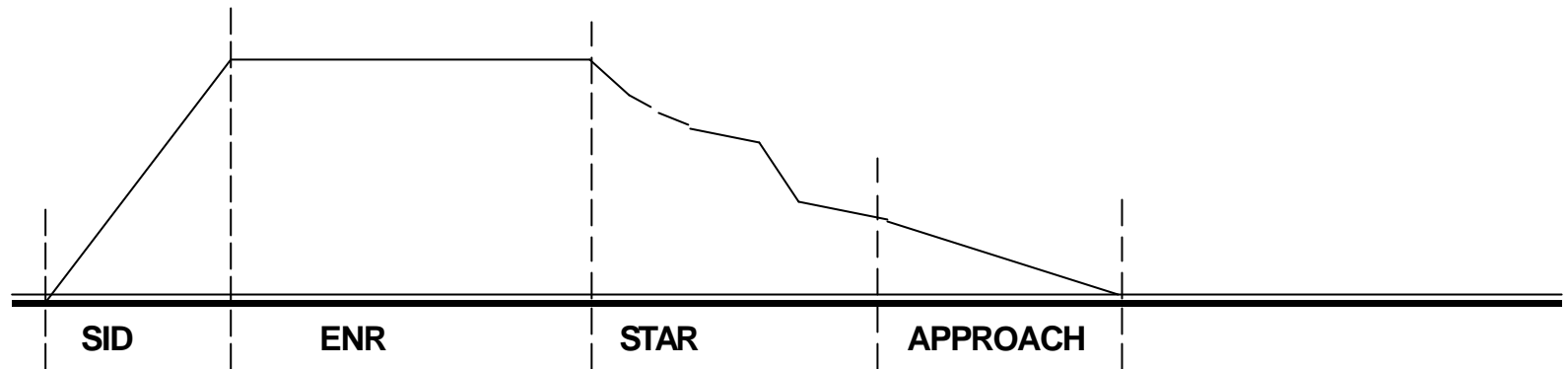
ARC DME on the chart





## The IFR flight plan

Combination of procedures to a complete flight plan



### Route segments

**SID, STAR, APPR** are predefined procedures:

- for finding in the database under the name
- for combining by additive loading.

Procedures are always tacked together **additively**.

Complete procedures cannot be inserted into a procedure which has already been loaded. In this case the newly selected procedure replaces the one originally selected (**DELSEG** is then superfluous).

### Enroute

**ENROUTE** waypoints are added individually to the route as required:

✓ **NAV**

highlighting bar must be in the route box **on the point** (waypoint or name of a procedure), **before** which the **ENROUTE** waypoints are to be inserted.

✓ **NEXT (2 x)**

✓ **WPT**

✓ **IFR**

Selection of WPT database IFR

Selection of (**ENR**) waypoints

✓ **INS**

**Subsequent enroute waypoints** are treated as a **route segment**:  
=> can be deleted altogether with **DELSEG**.

## Inserting waypoints

### **Single waypoints may be inserted into existing procedures (not complete procedures)**

1. Highlight the waypoint of the RTE **before** which the new waypoint is to be inserted.
2. 2 x NEXT highlighting bar must be in the waypoint window
3. Select waypoints (name, ID or **UP** and **DOWN**)

If waypoints are inserted into fixed procedures, no procedure turns can be calculated and plotted for these points on the chart.

=> Plotting of **point-to-point guidance** known from VFR FMS flight guidance.

## Deleting waypoints

Single waypoints can be deleted with

- ✓ **DEL** after the waypoints have been highlighted.

**Since procedural instructions may be distorted by inserted or deleted waypoints, if a misleading display appears the finished procedure should be reloaded.**

**Predefined procedures and routes which contain fixed procedures cannot be inverted.**

## Deleting complete procedures

Procedures no longer required can be deleted with

- ✓ **DELSEG** from the flight plan (remain in the memory).

## Putting together and saving your own flight plans

All IFR waypoints can be used to put together USER routes.  
See page 49ff for the steps to be taken.

USER routes / route segments are displayed in the point-to-point routing.

## The IFR flight plan

Inserting a position –  
an example

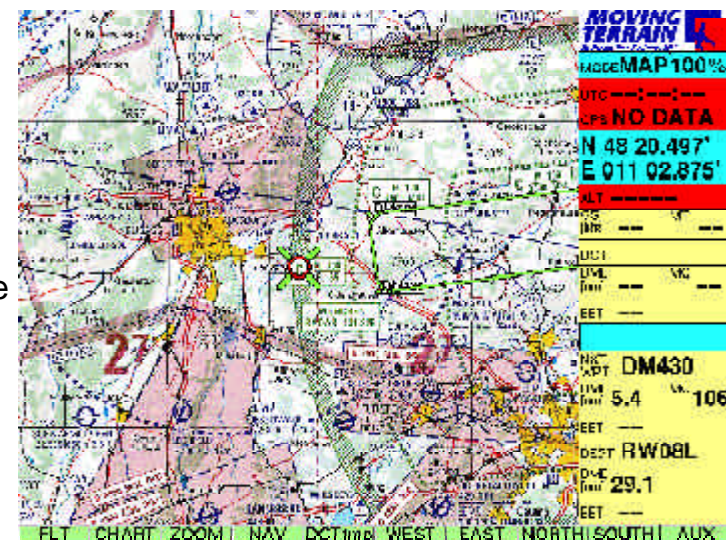
Waypoints may be inserted into an existing procedure

### Example with InsPOS

No procedural turns are plotted on the chart, but the point-to-point routing already familiar from VFR FMS flight guidance.

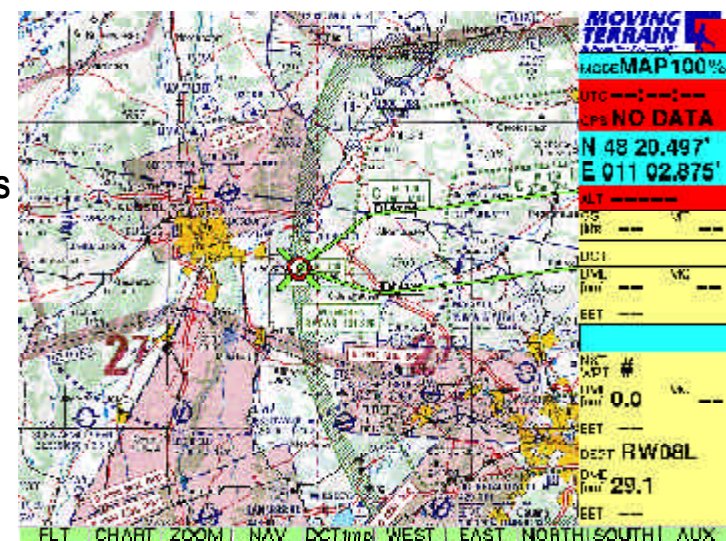
NAV PAGE (Active APT: EDDM)									
IFR WAYPOINTS					MOVING TERRAIN				
6605N / PTSQ					MODE MAP 100%				
6605N / PTSQ (ENR)					GPS NO DATA				
N66 00 E010 00 (ENR)					N 48 20.497'				
N66 00 W010 00 (ENR)					E 011 02.875'				
N66 00 W020 00 (ENR)					ALT				
N66 00 W030 00 (ENR)					DM430				
N/A					5.4				
N 48 18.910'					DEST RW08L				
E 011 10.685'					29.1				
150					EET				
WAYPOINT					DM430				
DM427					5.4				
DM428					DEST RW08L				
DM429					29.1				
DM430					EET				
MAGAT					DM430				
OM08L					5.4				
RW08L					DEST RW08L				
RTE					29.1				
GOTO					EET				
DCT					DM430				
DEL					5.4				
DELSEQ					DEST RW08L				
INVERT					29.1				
NEXT					EET				
UP					DM430				
DOWN					5.4				
BACK					DEST RW08L				

before



NAV PAGE (Active APT: EDDM)									
IFR WAYPOINTS					MOVING TERRAIN				
6605N / PTSQ					MODE MAP 100%				
6605N / PTSQ (ENR)					GPS NO DATA				
75KMG (ENR)					N 48 20.497'				
A CORUNA (APT)					E 011 02.875'				
A1 (ENR)					ALT				
A2 (ENR)					DM430				
N/A					5.4				
N 48 20.497'					DEST RW08L				
E 011 02.875'					29.1				
150					EET				
WAYPOINT					DM430				
DM427					5.4				
DM428					DEST RW08L				
DM429					29.1				
DM430					EET				
MAGAT					DM430				
OM08L					5.4				
RW08L					DEST RW08L				
RTE					29.1				
GOTO					EET				
DCT					DM430				
DEL					5.4				
DELSEQ					DEST RW08L				
INVERT					29.1				
NEXT					EET				
UP					DM430				
DOWN					5.4				
BACK					DEST RW08L				

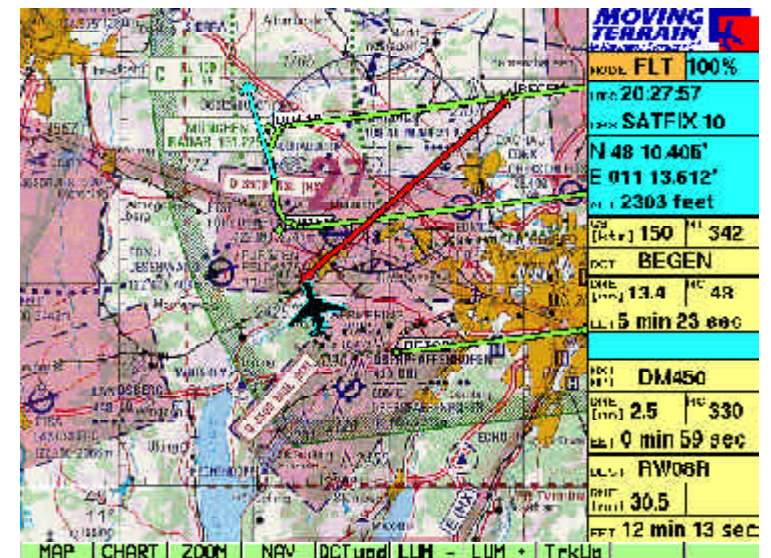
after  
insPOS





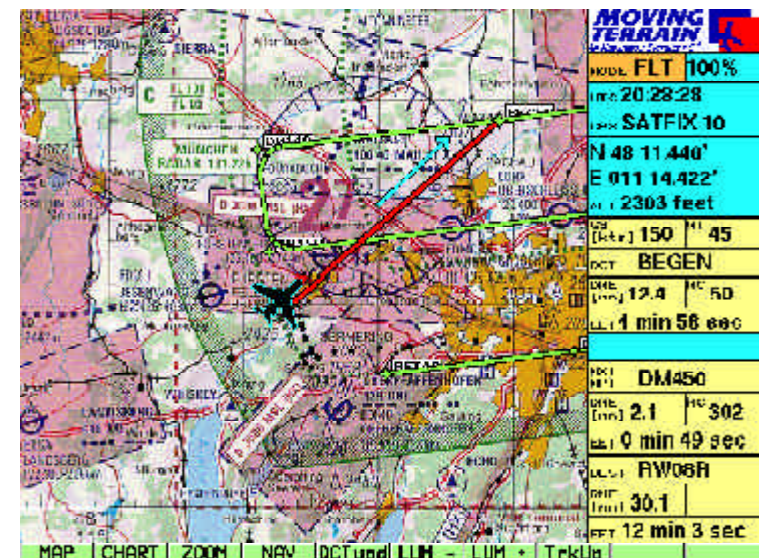
Direct from the flight plan – an example

NAV PAGE (Active APT: EDDM)						<b>MOVING TERRAIN</b> <small>© 2000 Garmin, Inc.</small>	
IFR TERMINAL WAYPOINTS						MODE FLT 100%	
DM049				DM049			
DM019 (TRM)				DM019			
DM050 (TRM)				DM050			
DM051 (TRM)				DM051			
DM052 (TRM)				DM052			
n/a				N 48 19.172°			
				E 011 28.890°			
				150 [kts]			
WAYPOINT TO				ROUTE	ALT	HC	EST
DM453				08R (GPS)	282	47	00:18
DM450				08R (GPS)	352	28	00:11
DM110				08R (GPB)	62	23	00:09
BEGEN				08R (GPS)	82	11	00:04
DM560				08R (GPS)	3130	62	5 00:01
				DM450			
				DME [nm]	3.0	HC	332
				ELI 1 min 11 sec			
				RW06R			
				DME [nm]	31.0		
				FTT 12 min 25 sec			
RTE		DCT		DEL		DEL SEG INVERT NEXT	
UP		DOWN		BACK			



### Abbreviating GPS approach to waypoint BEGEN

- ✓ **NAV** Nav page highlight **Begen** in flight plan box
- ✓ **DCT** The chart will be immediately switched back
  - ✓ The red vector shows the path
  - ✓ Flight guidance in the info box
- ✓ The course can be immediately corrected to the DCT.





## Flight guidance in the FMS window

### The FMS window

Please see pages 57ff for information on flight guidance in the FMS window of the info box.

**Fight guidance in FMS to the NEXT waypoints in IFR navigation is only really practical during the ENROUTE part.**

During landing and takeoff procedures the dots are sometimes so close together that point-to-point guidance is not possible.

During turns the NEXT waypoint cannot be determined by FMS flight guidance.



# MT Track

## Basics

## Basics

**Part 4: MT Track Recording and replaying a flight path** (optional extra module)

MT Track = flight path actually covered

**MT Track = flight path actually covered**

- ✓ Start of recording with valid position (SATFIX) in flight mode
- ✓ Position (track points) recorded every 10 seconds
- ✓ Track is deleted when device is turned off. It must thus be saved beforehand if you wish to replay the track at some time in the future.

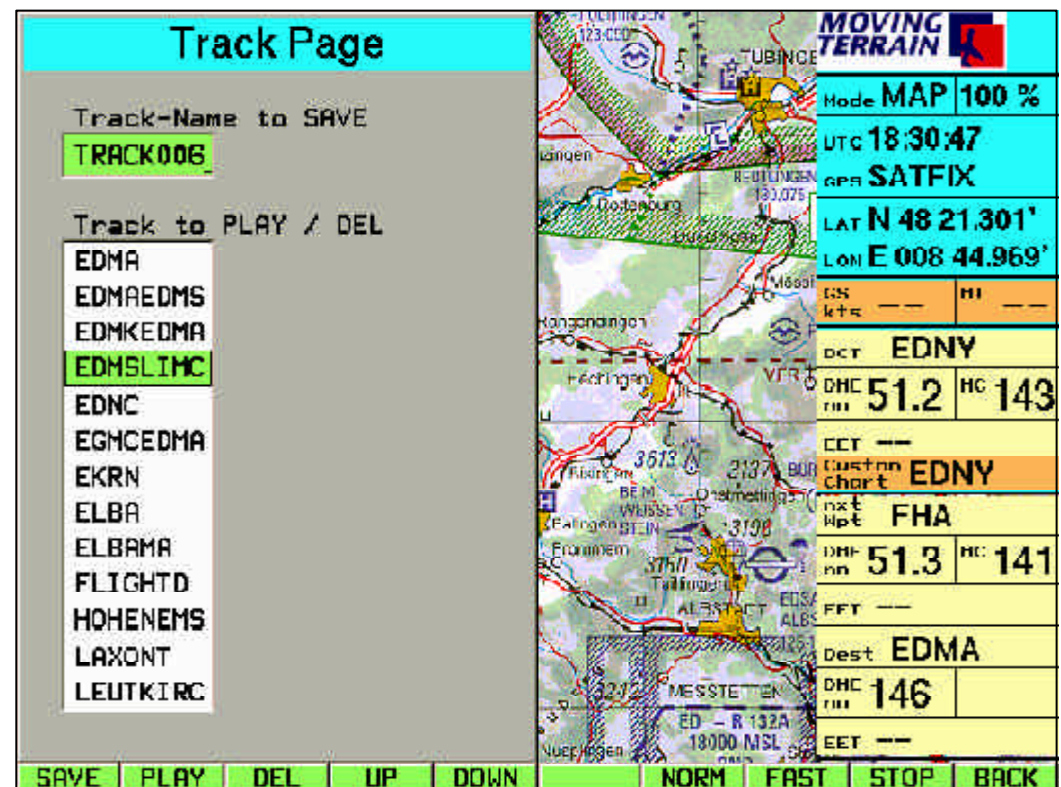
### Retrieving the track page

- ✓ **AUX**
- ✓ **TRACK**

## Function of buttons:

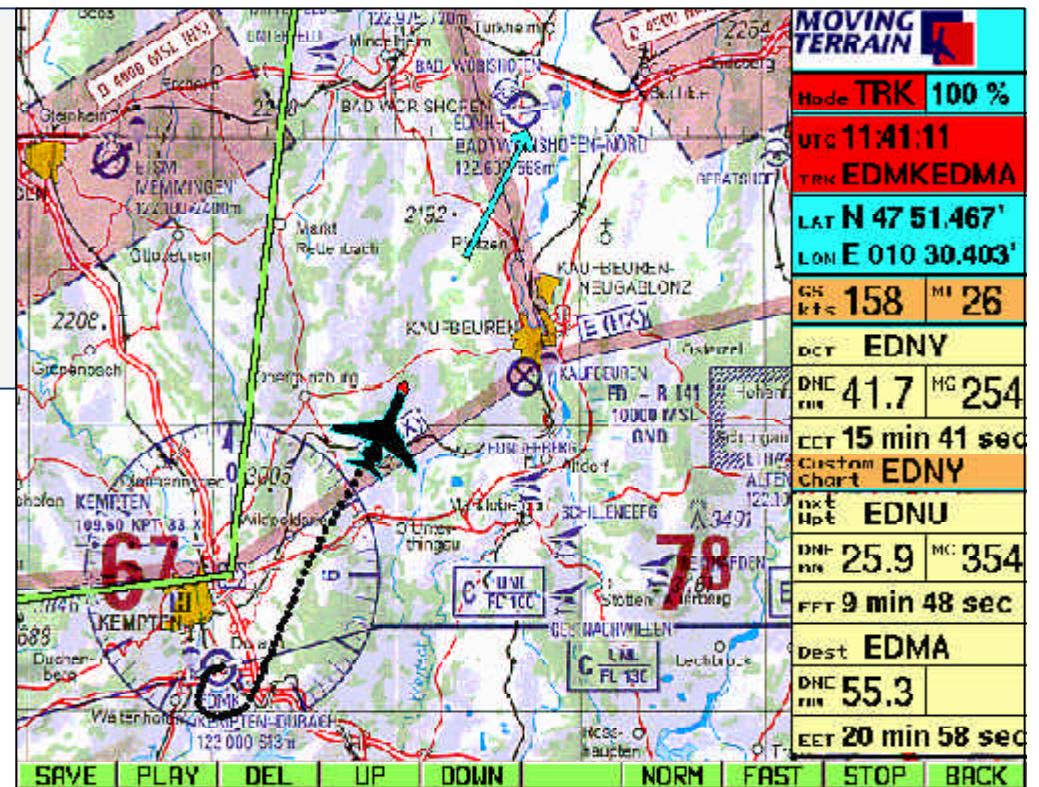
- ✓ **SAVE** Save tracks you have just recorded (flow) – before switching off device! – under a unique name (or one provided by system)
- ✓ **PLAY** Replay a track
- ✓ **DEL** Delete a track
- ✓ **UP**
- ✓ **DOWN**
- ✓ **BACK** Return to map mode

- ## Function of buttons:
- ✓ **SAVE** Save tracks you have just recorded (flow) – before switching off device! – under a unique name (or one provided by system)
  - ✓ **PLAY** Replay a track
  - ✓ **DEL** Delete a track
  - ✓ **UP**
  - ✓ **DOWN**
  - ✓ **BACK** Return to map mode



### Replay mode with buttons

- ✓ **NORM**     Replay in quick motion to real speed
- ✓ **FAST**     Replay at fastest possible speed
- ✓ **STOP**       End replay
- ✓ **BACK**      Return to map mode



### Without interrupting replay mode you can

- ✓ **ZOOM**             Zoom into the chart
- ✓ **CHART**            Change base chart
- ✓ **CHART/SIN.CHA**   Select a single chart
- ✓ **DCT**                Select direct
- ✓ **NAV**                Work with the Nav page.

Replay is ended when you change to flight mode.



### ***Part 5: MT Charting module (optional extra module)***

#### **MT Chart program**

With MT Chart you can reference your own charts (scans). Using the assigned coordinates these can be controlled from the MT main program. MT Chart is a Windows program.

#### **Scanning**

Before launching MT Chart the chart you need must be scanned. For interfacing with Moving Terrain the chart must be prepared as a bitmap file in the so-called Windows BMP format (files with ending \*.BMP). In addition, color resolution must be 24 bit, i.e. 16 million colours = true colors.

Otherwise it does not matter whether you scan the chart with a hand-held scanner at home, at a service center close by or send it to us for conversion into this type of file. You may use any standard scanner, as long as your file is saved as a 24 bit BMP file.

For good, color-accurate and undistorted results it is best to use a color flatbed scanner.

Your original charts must satisfy the following prerequisites:

- It must be **to scale** (not distorted)
- **Latitude / longitude** must be readable on the **grid** or other points must be capable of exact referencing.
- For large areas it is important to make sure that the chart is based on a **cylindrical projection** (e.g. Mercator). Conic (section) projections are not suitable.

The program also tolerates rotated scans. For the sake of clarity they should be north-up, although the software compensates for errors caused by rotation.

### Referencing

Upon launching MT Chart you will see a special referencing symbol (diagonal crosshairs) in the center of the screen, an as yet empty Navdata box and three menu items. In the map (Alt + A) choose the “**Open**” function or press F2. The “**Load Custom Chart**” file dialog will be displayed. Now select the drive, directory and file (in BMP format!) you wish to reference. You can move within the rectangular area with the direction arrows, to the next box by pressing the tabulator and back to the previous box by simultaneously pressing Shift and Tab.

Once you have selected the chart you wish to reference (its name must be visible in the single-line box under file name), confirm by pressing Enter. The file will then be automatically converted to the Moving Terrain MTC format. You now have the choice of deleting or saving the BMP file. From now on you will only need the MTC file. We recommend deleting the BMP file from your hard disk. If you lack the means to scan charts yourself and had the file created externally, it is advisable to make a backup copy on another storage medium before you start work.

Now comes the most important part in the preparation of your chart for using with Moving Terrain: referencing. The more carefully you perform this step, the better will be the results you achieve subsequently together with the GPS. For referencing you must exactly reference three points on the chart (longitude and latitude). Move the chart with the direction arrows or the right mouse button to place the referencing symbol at a point whose coordinates are known to you or which can be read off the chart. For visual approach charts we recommend, e.g. the grid at the edge of the chart. If no coordinates are provided on the chart (e.g. street map), you can also drive/fly/walk to several points on the chart and measure the coordinates with the GPS.

You must reference **3 points**. Please note: your reference points should be distributed as far as possible over the chart. They should not be too close together and not lie in a straight line.

The MT program will also run if you have referenced only 2 points, but you will be forfeiting an important safety backup and verification of accuracy.

To create a reference point move the desired chart point beneath the referencing symbol and select the referencing menu (Alt + R) or press F8. In the dialog that appears you can give this reference point a name and enter its coordinates (up to 1/1000 angular minute). Again you can move from one box to another by pressing the tabulator and to the previous box by simultaneously pressing Shift and Tab. The point can be saved by pressing

## MT Charting

### Quality

Enter (Save). Save three points in this manner. The program will now evaluate the accuracy of your input and the deviation of the chart from the rectangular reference due to the projection. The following evaluations will be provided:

<b>Evaluation</b>	very good	good	medium	poor but useful	unuseable
<b>del psi *</b>	0-1	1-2	2-6	6-10	>10

(\* Del psi is the internal evaluation criterium calculated from the relative angles of rotation of the chart between the earth coordinate system and the pixel system ensuing in each case from the straight connecting lines from the input points. The program simultaneously evaluates projection and reference errors).

Confirm this message by pressing Enter. The referencing quality can also be seen at MAP/ INFO.

Now save the correctly referenced chart with the Save function in the map menu (Alt + A) or by pressing function key F3. This will save the chart in the Moving Terrain format together with your referencing and it is ready for use in the Moving Terrain program.

## **Further functions in MT Chart**

### **Map menu**

In addition to the functions as outlined in Chapter 3.1 – Open, for opening BMP or MTC files, Save for saving MTC files with referencing, and Info for showing the quality of your referencing – the map menu (Alt + A) also contains the following functions:

### **Goto...**

This function is used to check the chart into which you have entered coordinates. The referencing symbol is displayed precisely over the point stipulated by you. However, if the coordinates are off the edge of your chart, an error message will be displayed.

### **Zoom...**

As in the main Moving Terrain program you can also view your own charts, except in the standard display, at a magnification factor of 200%, or a reduction factor of 50%.

## **The charts on your Moving Terrain system**

The charts prepared with the MT Charting module are available as single charts on your system. First of all they must be copied into the directory \MOVTER.PRO\CUSTOM on your system.



## MT Update Utility

How does the installation program work?

What do I need the installation program for?

### MTUpdate Utility Version 6.0: Instructions for the installation program

Basic concept:

A standard PC and the MT-Ultra device are connected via cable and software.

Data is read by a PC from a CD-ROM or a directory on the fixed disk and transferred to MT-Ultra by cable.

To enable the two devices to be connected, the PC must be booted up in DOS mode. This is in turn enabled by the enclosed disk.

Please follow the instructions carefully and **perform the installation step by step**. It is important to adhere to the sequence of individual steps to ensure successful installation.

- The program enables the following installations from Moving Terrain CDs:

Installation of **base charts**

Installation of **Navdata** (VFR and IFR Nav data, hospital data)

Installation of **single charts** (special charts, e.g. hospital landing places)

Installation of **obstacle data**

Installation of later versions = **MT program updates**

- You can transfer self-generated data **from your computer's hard disk** :  
**single charts** (created with the MTChart program)
- You can transfer **from disk** :  
Navdata = **Hospital landing places (SPITAL)**  
= **USER**

## Preparation

For the update you will need:

- PC or laptop with disk drive;
- Laplink cable;
- Keypad with PS/2 connector (with MT version 3.6);
- Boot disk = MT Update Utility Disk from MT;
- CD-ROM from MT.

## Connecting the two devices

**Important: Both devices are first of all switched off.**

Step 1: Open the service cover at the rear of your MT-ULTRA device.

Step 2: Connect the 1st parallel port (printer port) of your PC (LPT 1) and the parallel port of the MT-Ultra device with the supplied Laplink cable.

Step 3: Switch on your MT-Ultra device. Wait until it has completely run up. Then press the AGREE key.

Step 4: Switch MT Ultra to the update mode:

- a) If you have **Moving Terrain software version 5.0** or later, quit the program with **AUX -> QUIT** (keep pressed).
- b) If you have **3.6x software** connect a standard PS/2 keyboard (adapter for other keyboards enclosed) to the respective keyboard outlet. Quit the MT program by keeping <F12> pressed for 5 seconds. Then press <ALT-F4> <ENTER> to exit Windows. At the DOS prompt enter the following line:

**C:\>intersvr /lpt1 /v /x=a: /x=b: <ENTER>**

or if you have a German DOS version and a US keyboard

**C:\>intersvr &lpt1 &v &x)a> &x)b> <ENTER>**

Independently of your MT software version, the following screen must appear:

## MT Update Utility

This computer (Server)	Other computer (Client)		
C: (2146 MB) LPT1:			
Transfer	Connect	Speed	Alt+F4= Quit

**Your device is now ready to receive data.**

Step 5: Insert the MT Update Utility disk into the disk drive of your PC.

Step 6: Switch on your PC.

Step 7: Set the keyboard options:

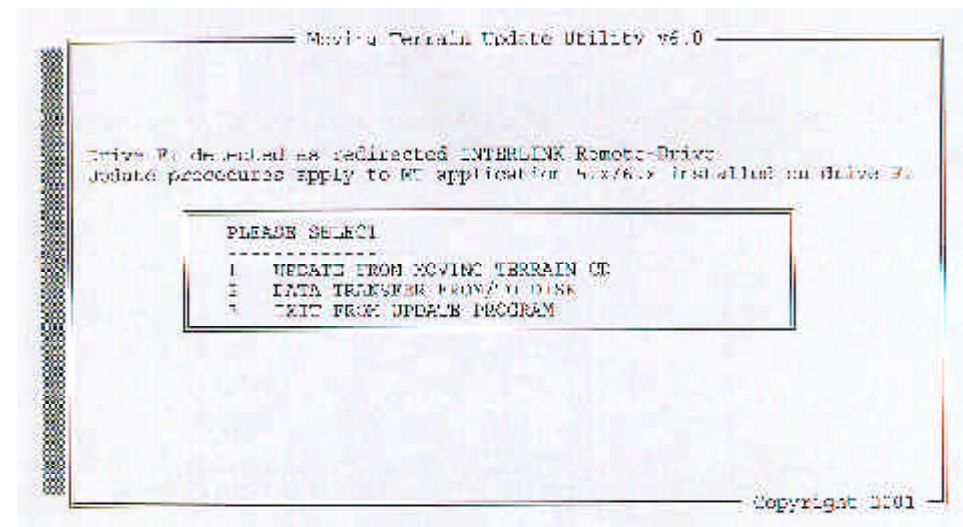
'1' = German keyboard

'2' = US keyboard

<ENTER>.

The program will now look for your MT application. Once successful it will display the main menu:

**The two devices have been successfully connected.**



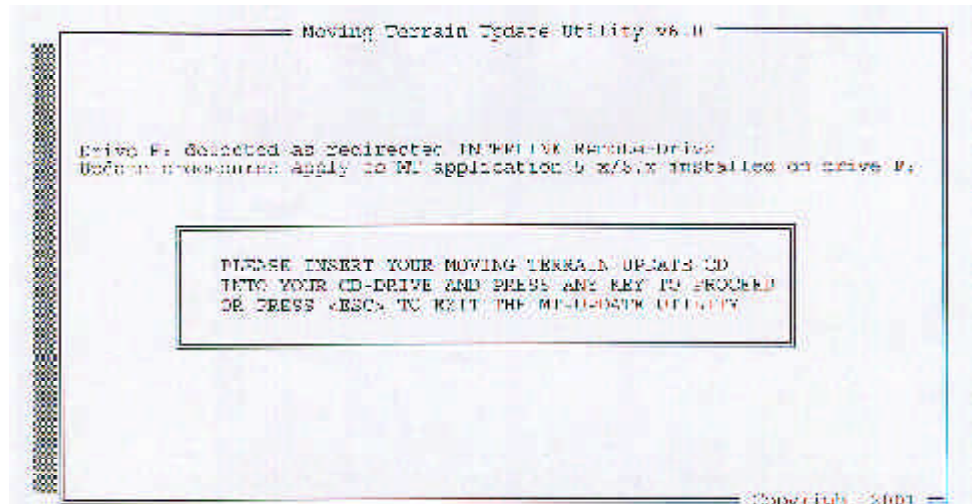
## Installation options

Now select the desired option by pressing the number preceding it.

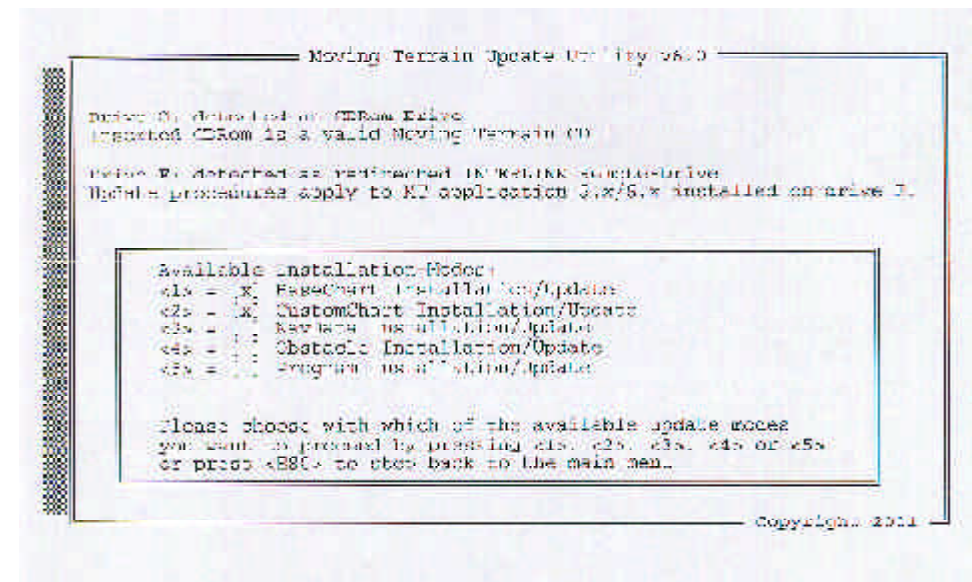
To install data from a Moving Terrain CD select Option 1.  
With the following screen you will be prompted to insert a Moving Terrain CD.

## Installation from CD

Insert the CD and press any key to continue the installation program.



Provided the CD is a valid MT installation CD, the program will display e.g. the following menu:



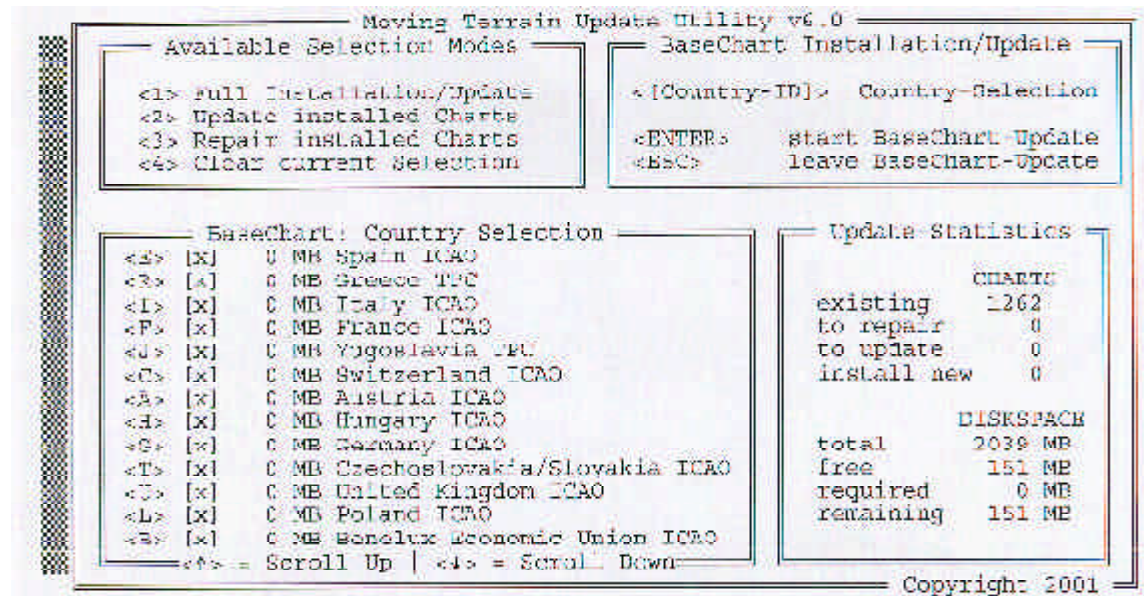


## MT Update Utility

### Installation/update of base charts

Active menu items are marked with an X.

- Now select your desired update or installation from the categories marked with (X) by **pressing number keys 1–5**.
- To return to the main menu press <ESC>.
- Obstacle installation/update is for the Rega version



Select 1: BaseChart installation/update

Make your choice on the number keys between:

- <1> **Full installation/update:** Update all existing charts and installation of new charts
- <2> **Update installed charts:** Only update existing charts (recommended if only limited memory space available)
- <3> **Repair installed charts:** Repair incomplete/defective charts.
- <4> **Clear current selection:** Delete your current chart selection.

With this choice a new window will open in the lower left half of the screen.

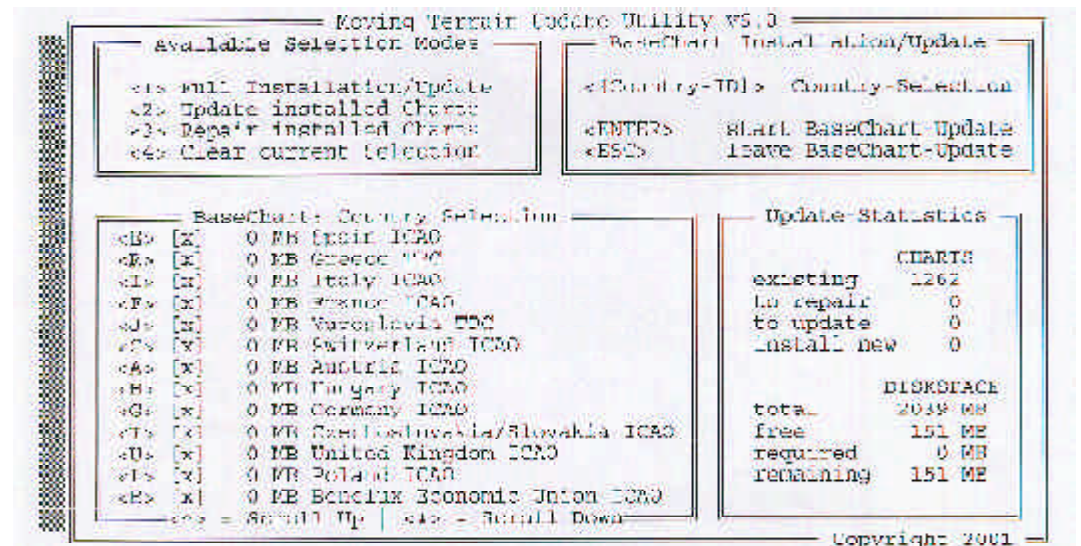
Activate the desired operation by **pressing ENTER**.

- The choice of countries enables you to put together precisely the combination you need for flight planning on your MT Ultra. Since your hard disk does not have unlimited space for the charts, you may need to limit your selection. All available countries will be shown in this list. Normally the complete data will be downloaded and the basic setting now active is for all countries.
- If you wish to define an individual choice, press <4> to deactivate the choice of all countries. Now you can select the countries applicable to you by pressing the respective letters (e.g. <E> for ICAO Spain, <G> for ICAO Germany).
- Please note: Since we fit together the available ICAO charts of European countries at their borders, the border zones can only be assigned to one country. For example, if you select Switzerland, you can be sure that the selected charts will not cover the complete territory, because the system has assigned some single files to France, Italy, Austria or Germany. In this case, please select the adjacent countries as well. If you want to fly into the Pyrennees, you should not forget to load the Spanish chart into your system.
- Exception: If you select Germany, the complete ICAO Germany will be loaded onto your system.

### Important:

At the bottom right of your monitor you will see how much memory space is available on your device before and after installation (at least 10 MB must always be free!)

In this example installation cannot be started because insufficient space is available.



## MT Update Utility

Installing/updating  
single charts from CD

Installing/updating  
Navdata from CD

Installing/updating  
obstacles from CD

Installing/updating  
program from CD

Select 2: CustomChart installation/update

All custom charts will be installed from a MT CD. Even when files have the same name, the older files will be replaced by new versions. A selection of individual custom charts is not possible.

Select 3: NavData Installation/Update

Navdata is installed from an MT CD; older versions can be replaced by newer ones.

**(applies only to Moving Terrain Standard VFR and IFR data)**

Installation or update of obstacle layers (Option 4) (see Updating from disk)

To perform a software update of your MT-Ultra from Version 5.x to 6.x, or from version 6.x to a later version, choose Option 5.

**Important:** The user waypoint databases of the two basic versions 5.x and 6.x are incompatible, you must therefore delete your old database.

If you have already created a large number of user waypoints and do not want to lose them, you can save your database to disk (see also main menu item “Data transfer from/to disk” option “Load user waypoints from MT system”).

As a precaution, upon selecting the option “Program Installation/Update” if a user waypoint database exists in 5.x format the following window will be displayed:

```
THE USERWPT DB CAN NOT BE READ BY THE NEW PROGRAM
AND MUST BE DELETED!!!
PLEASE SPECIFY IF IT SHOULD BE SAVED ON DISK [Y/N]
OR PRESS <ESC> TO STEP BACK TO THE MAIN MENU
```

Do you want to save your database to disk for converting later?\* Choose “Y”. If you have up until now hardly had occasion to record your own waypoints or your database has already been saved to disk, choose “N”. In case of doubt you can press “ESC” to cancel and return to the main menu. No changes will have been made.

\* If required, ask us about the conversion tool.

Registering the  
Moving Terrain  
version on your  
device

Installing/updating  
Navdata from disk

Upon installation of a new program version the device must be re-authorized (see Appendix: “Authorisation page”)

For installation from disk or backup of user waypoints select “Data transfer from/to disk” in the main menu 2:

```
Available Installation Modes:
<1> = [ ] Copy Instruments from Disk
<2> = [x] Copy Waypoints from Disk
<3> = [x] Copy Costables from Disk
<4> = [x] Load User Waypoints from MT System

Please choose with which of the available update modes
you want to proceed by pressing <1>, <2>, <3> or <4>
or press <ESC> to step back to the main menu
```

Now select the desired installation.

```
PLEASE INSERT YOUR WAYPOINT DISK
INTO DRIVE A: AND PRESS ANY KEY TO PROCEED
OR PRESS <ESC> TO RETURN TO MAIN MENU
```

The program will prompt you to insert the appropriate disk.

If you have inserted the wrong disk, the following error message will be displayed:

```
Inserted disk does not contain
a valid waypoint database!!!
Please insert Waypoint disk
and press any key to proceed!
Press <ESC> to return to main menu!
```

Now you may press ESC to return to the main menu or continue installation after inserting the valid disk by pressing any key.

Once installation has been completed, the program will prompt you to re-insert the update disk.



## MT Update Utility

Installing/updating  
obstacles from disk

Backup of user  
waypoint database

Select sub-item 3 "Copy Obstacle from Disk"

Important: Please quit the Update program only via the main menu EXIT in order to guarantee correct installation of the obstacle layer.

Please keep an empty disk at hand.

Select sub-item 4 "Load user waypoints from MT system".

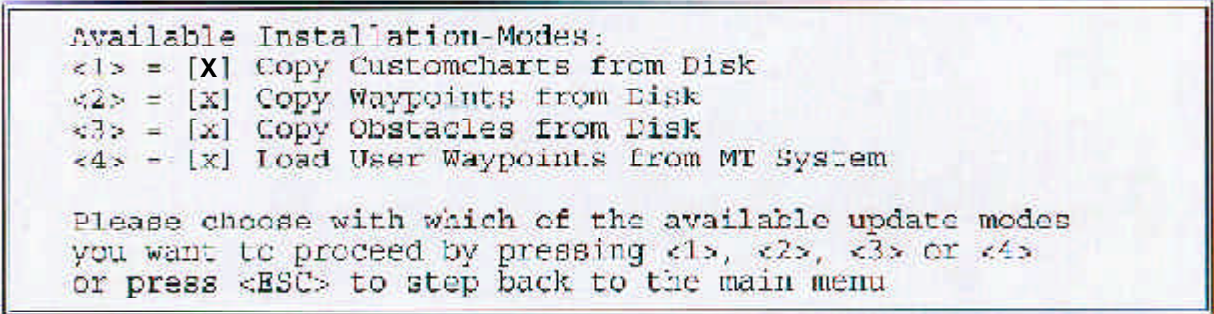
```
PLEASE INSERT AN EMPTY FLOPPY DISK  
INTO DRIVE A: AND PRESS ANY KEY TO PROCEED  
OR PRESS <ESC> TO RETURN TO MAIN MENU
```

Now insert the empty disk and continue.

```
User waypoint database succesfully backed up  
PRESS ANY KEY TO PROCEED !
```

Installing single charts directly from the PC's fixed disk

**Important:** Your referenced custom charts (\*.mtc) must be stored in the directory **C:\MOVTER\CUSTOM.NEW**, otherwise the installation program will not find them. Please create a directory with this name on your PC's hard disk C: and save your custom charts to it.



```
Available Installation-Modes:
<1> = [X] Copy Customcharts from Disk
<2> = [x] Copy Waypoints from Disk
<3> = [x] Copy Obstacles from Disk
<4> = [x] Load User Waypoints from MT System

Please choose with which of the available update modes
you want to proceed by pressing <1>, <2>, <3> or <4>
or press <ESC> to step back to the main menu
```

Choose the option <Copy Customcharts from Disk>. The other functions given in this menu are not relevant for the serial version.

Completing the installation process

To finish the installation program choose option 3 in the main menu:  
"Exit from Update Program"

Switch off the two devices and remove the interlink cable.

Remove the boot disk from your PC and keep it in a safe place. You will need it for further updates.

Close the service cover at the rear of your MT-Ultra with the three screws provided.

Under

- ✓ **AUX**     you will find:
- ✓ **AUTH**     Switch to authorization page

This function allows you to **enable further soft and/or hardware modules** on your system.  
To enable these modules you will need a **code**, only obtainable from us.

- ✓ **AUTH**     (**Keep pressed for approx. 3 seconds** = precaution against unintended activation!)  
                This will take you to the Moving Terrain Licence Manager.

```
Starting Moving Terrain License Manager
-----

MOVING TERRAIN: <MTPRO.EXE> License Maintenance

=====
The base version of the MT Programm is now authorized at this site
The following OPTIONS are enabled:

FMS
Track
TFR
Obstacles
TCAS
Swiss Grid
=====

[A=Authorize] [Q=Quit]
Please Select from the menu above: a
Site Code: DD38 EE33 ECE6 2A80 07
Enter Site Key or '.' to quit:
```

Confirm with “Y”. Moving Terrain Licence Manager will now display information on modules currently enabled.

***Caution:***

***Do not*** press “A” for “AUTHORIZE”, otherwise you ***must*** obtain a code from us. Please avoid this unless you actually wish to acquire a new module for your current system.

**Close the MT Licence Manager with “Q”.**

Registration

Please enter the ‘site code’ in the enclosed form and fax it to Moving Terrain AG (08376 - 9214-14). Moving Terrain will send you your ‘site key’ by return fax.

This ‘site key’ must be entered and confirmed with <ENTER>. If you do not have a second keyboard, you may connect your PC keyboard temporarily to your MT-Ultra and use its ENTER key.

**Please note:** For version 6.1 d and later you will need a 2nd keyboard. Confirm the site key by simply pressing a function key (buttons below the screen).

Finally, press ‘Q’ for QUIT to terminate the registration program and launch MT 6.x.