Moving Terrain

Handbook Version 5.5

MTUP/ 16 – 02 REV E
DATE: 6/22/2001

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Even though great care was taken while compiling all the text and illustrations. Errors may still occur. Neither publisher nor author can be held liable in any way for any incorrect information and the consequences that may follow.

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Important instructions for the use and possible risks associated with the use of Moving Terrain:

You have purchased a high capacity system for navigational support, that will simplify flying as never before, but we feel obligated to inform you of any dangers that our test pilots have encountered.

We have tried to develop the Moving Terrain System very carefully and to make it a dependable product. The system was tested under all possible conditions. Regardless, if you or we do not find any mistakes at present, **any liability for the functioning of the system is out of the question.**
Even if our system should be a 100% flawless, there is still **danger because of incorrect operation** and especially, because of the **manipulation of the GPS correctness** of the operator, the US Defense department. For the **future licensing politics of the GPS operators,** we cannot make any predictions or make any guarantees.
The Moving Terrain System is a VFR instrument. It is not safe in any way to fly with this navigation support according to instrument flight rules, if you do not have all required navigational instruments in use and you are moving according to instrument flight rules on instrument routes.

A pilot that is not IFR trained and rated who flies in IMC, is with or without Moving Terrain in life threatening danger!

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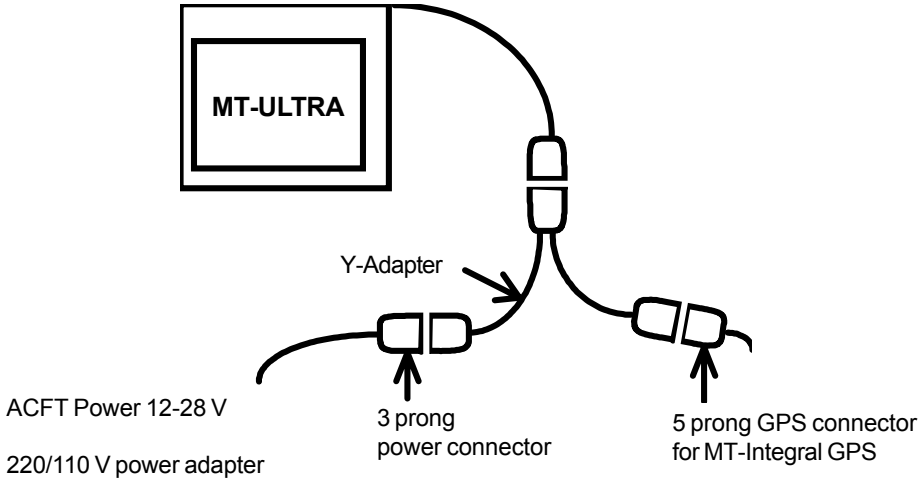
Fax: ++49 8376 9214-14

THE INDEX

I. Short Introduction

I.1 Start-up of Instrument

I.1.1 Connection of Power and GPS



GPS: Connect MT Integral GPS. Position it in an unobstructed environment (visibility of sky) and wait for GPS reception (SATFIX). If you hook up an external GPS (not the MT-Integral) make sure it provides for serial data output, with position data in NMEA 0183 format and a respective output cable for correct pinout. Please refer to installation manual.

I.1.2 Starting the Unit

There are two rows of keys above the display. The top button on the left edge is the on/ off button for the instrument.

- Start and wait until the following appears:


MOVING TERRAIN Software Release 5.5

This software is to facilitate your terrestic 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 coeputer 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:

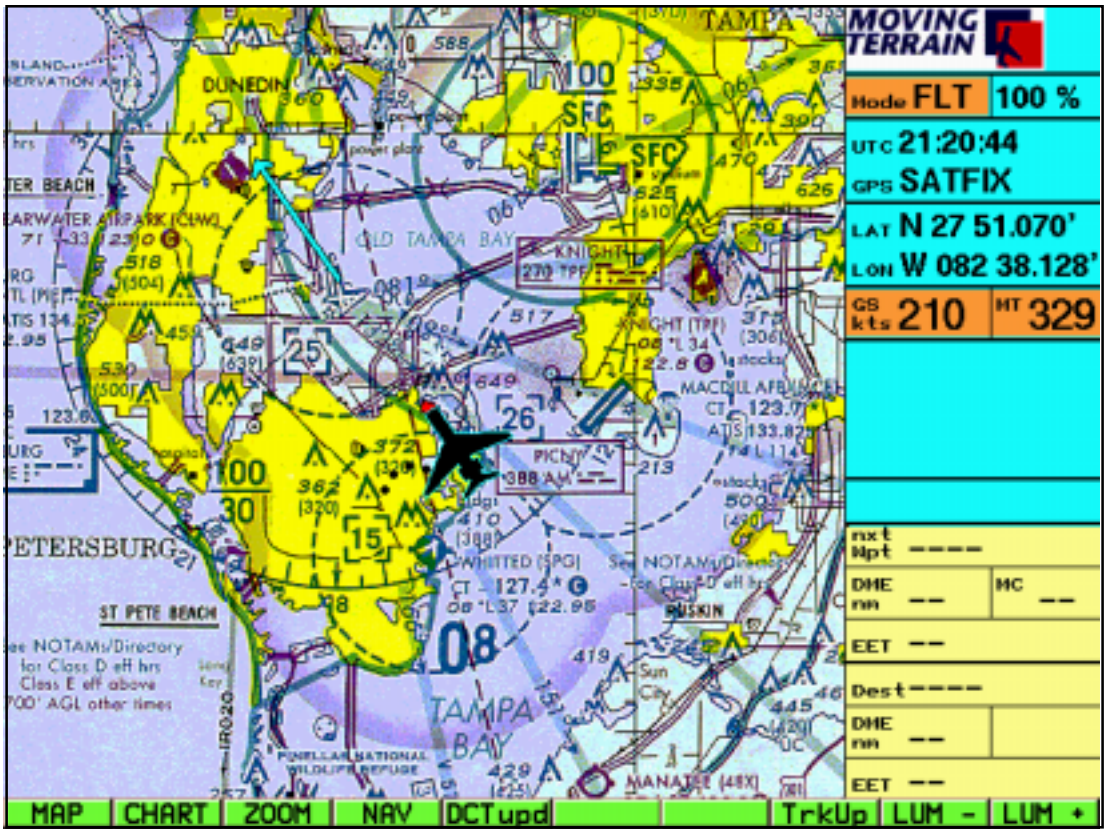
The manufacturer, distributor or sales agent resume no liability as to the correct function of the software, the availability of a reference signal (GPS) or the validity of the charts. Never will the manufacturer, producer, sales representative and neither of their staff be liable to you for any consequential incidential 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.

Important Tip:
In the upper right corner
You will find the info on your
Software Release

- **AGREE** Push Key
- **FLT** Push Key => Now you see Flight Mode: Mode FLT

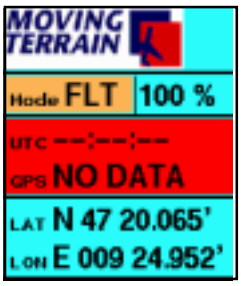
- The chart is positioned by GPS to its location. If your aircraft moves faster than 2 kts., the cross, that marks your location while standing still, changes to the aircraft symbol.



The chart flies with you, anywhere, worldwide.
We wish you a good flight!

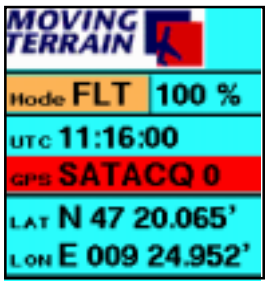
I.2 GPS Messages in the Info Box

If the system does not position the chart immediately, please note the following messages:



NO DATA:
Connection to GPS or GPS defect

DISTORTED:
Distorted data is being recieved the GPS (no picture)



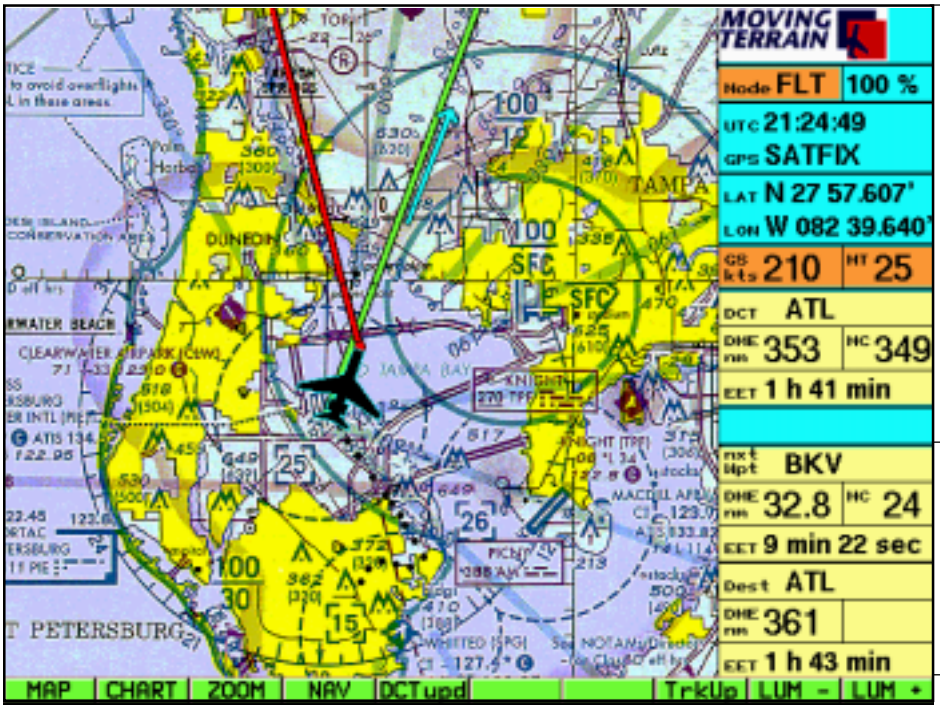
SATACQ:
GPS is connected correctly :"Acquisition" of the satellite data (the number 0 is always shown regardless of how many satellites are found prior to inition fix)

SATFIX:
Positioning successful the blinking number shows the number of GPS satellites, that are presently being tracked by actual

*** End of Short Introduction ***

II. Basics of Moving Terrain

II.1 The Screen



Info Box

FMS: Flight Management System Window
or
Track-Up Window

Function Keys

II.1.1 Chart

MT offers various basic charts, worldwide and in various dimensions.
If the section of the chart is gray, then you are outside of the active basic chart.

II.1.2 Info Box

MT Logo	
MT Mode (Map/Flt)	Zoomfactor of the chart
GPS:	UTC GPS Status, number of satellites blinks
Coordinates:	WGS84
Flight Data:	Speed above ground in knots Magnetic Track: magnetic course over ground
Direct Data:	Identifier of selected waypoint from navdata bank Magnetic course DME: distance to WPT selected by DCT function (in nm) Estimated enroute time
Custom Chart:	Name of the armed (preselected) custom chart

II.1.3 FMS: Flight Management System Window

- Underneath the right side of the info box a window appears. In this window either the active chart in Track Up Mode appears or the Flight Management System.
- The FMS is only useful, if you have loaded a flight plan.
- The FMS window is activated at the start of the system or if you have already activated the Track Up window – by the FMS key in Flight Mode.
- If it is active, it always appears, on all levels, in Map- or Flight Mode. It is active until you switch to the Track Up window.

The FMS window makes data available from the flight plan for both, the next and the destination waypoint:

Next Waypoint	Identifier
DME in nautical miles	Magnetic course over ground
Estimated enroute time:	Remaining time to the next Waypoint
Destination Wpt	Identifier
DME in nm: Remaining distance to destination in nautical miles*	
EET to destination Waypoint (maintaining current GS)*	

* (Please see Chapter IV.2.6.5 to understand the calculations of DME and EET)

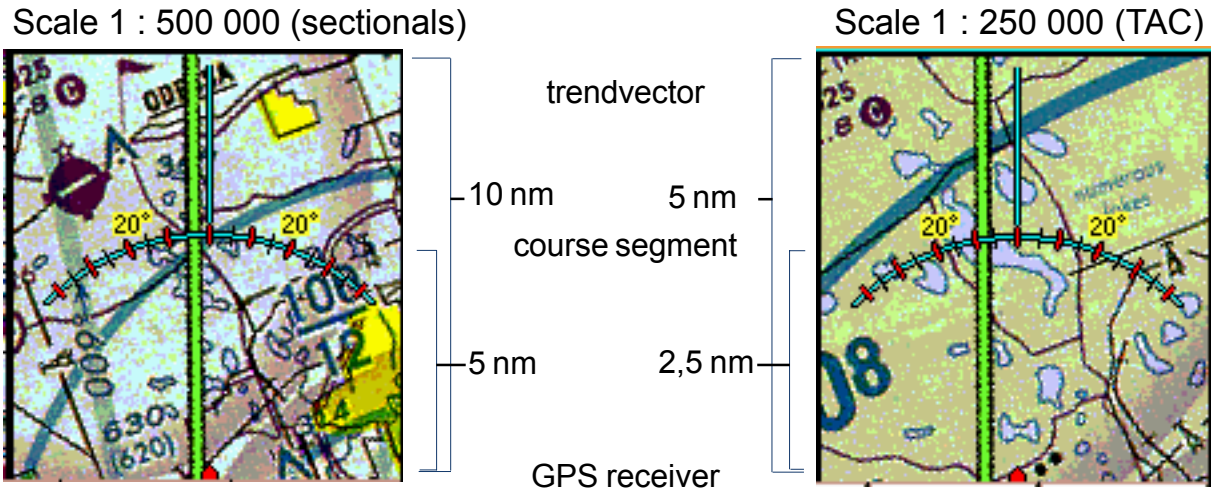
Next waypoint: The next waypoint is the waypoint corresponding to the present position in the flight plan

Destination waypoint: The destination waypoint is the last point in the flight plan.

The FMS information is calculated from present position. When you switch to the Map Mode, to see the surrounding area on the chart, the data is newly calculated to the waypoint.

II.1.4 Track-Up Window (Obtained by the Key TrkUp in Flight Mode)

The Track-Up window at the right edge of the lower screen shows you a part of a chart in the perspective, you see the landscape from the cockpit. The displayed arc segment allows for precise navigation.
As soon as the GS is more than 2 knots, the chart appears Track-Up oriented. The red dot below in the middle depicts your position.
Depending on the scale of the chart, distance “red dot – arc segment – tip of the trendvector” to the following distances:



- In the Track-Up window, DCT appears red and route vector and the User Waypoint symbol appear green.
- In case, that both vectors fall together, the red DCT vector overlays the green flight plan vector (as in the main window).
- The zoom factor has no effect in the Track-Up window: The rotated chart section always appears 100%.
- Custom charts are also shown in the Track-Up window.
- In Map Mode and when the speed is below 2 kts, the Track-Up window remains gray.

Important:
The Track-Up window is activated by the key TrkUp in Flight Mode.
It is active until the FMS window is activated.

II.2 The Main Levels: Map Mode – Flight Mode

Map Mode: The user steers the chart:

- The chart can be moved with the help of directional buttons (EAST / WEST / NORTH / SOUTH).
- Function GOTO available on several levels.
- AUX key makes additional functions available, like the storing of a track.

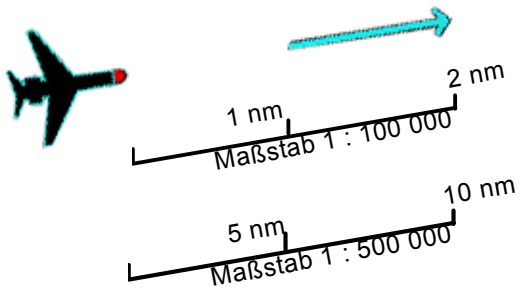
Flight Mode: The GPS steers the chart:

- The chart cannot be moved by the keys.
- The GOTO function is deactivated.

Many important functions are active in both modes (see following example).
The info box shows in which mode you are presently using, the first key on the function row (bottom) commands the mode.

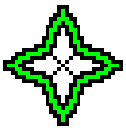
II.3 The Symbols

Location Symbol: (Map and Flight Mode), position in the middle of the coordinator cross



Aircraft Symbol: appears by movement greater than 2 knots. The position is marked by the red dot.

The trendvector (blue) represents an extension of the aircraft, the tip of the arrow marks the point, that you would reach if you continued in the same direction.



I D E N T _

User Waypoint: with the identifier

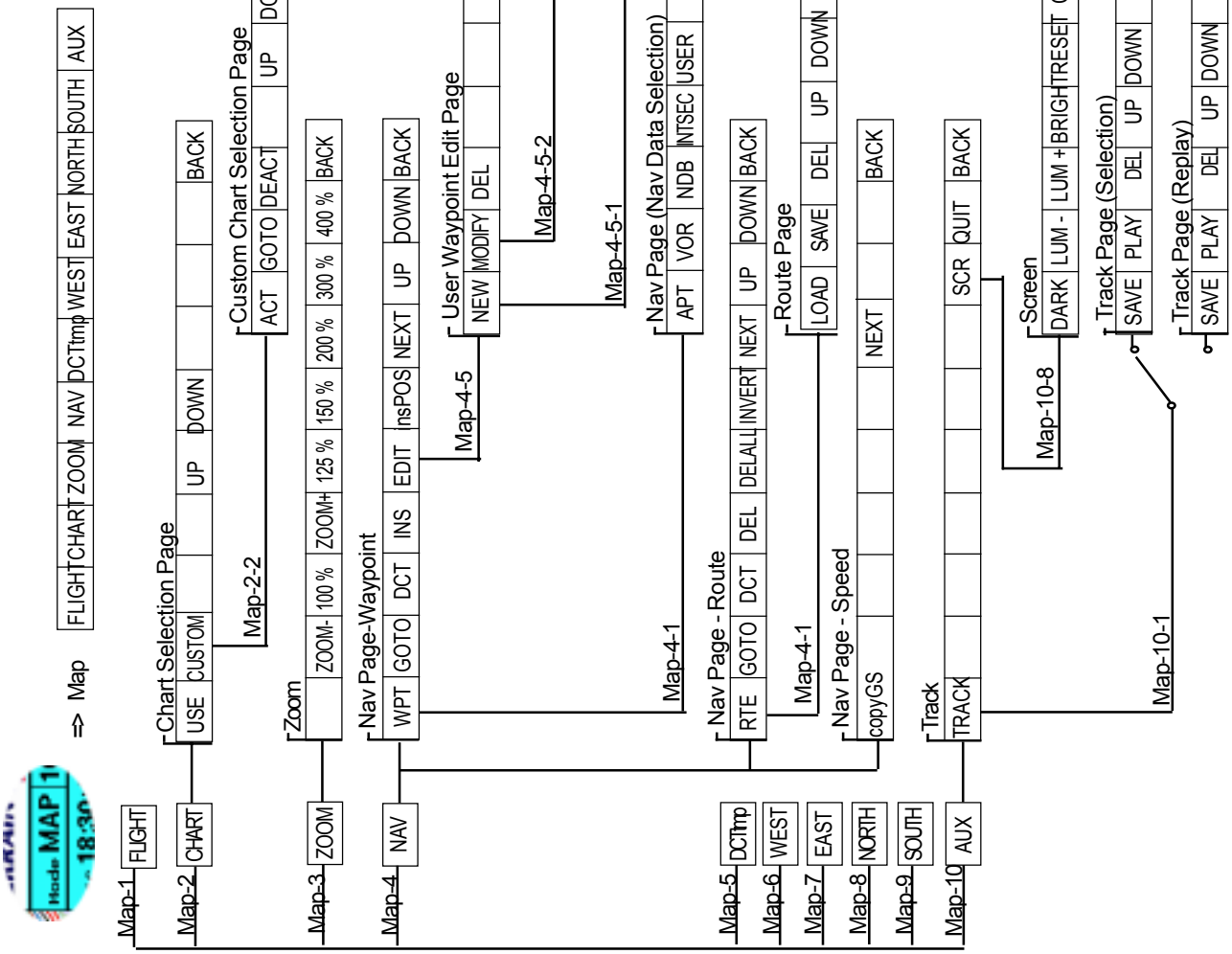
Red Vector: DIRECT (no picture)

Green Vector: Flight Plan (route) (no picture)

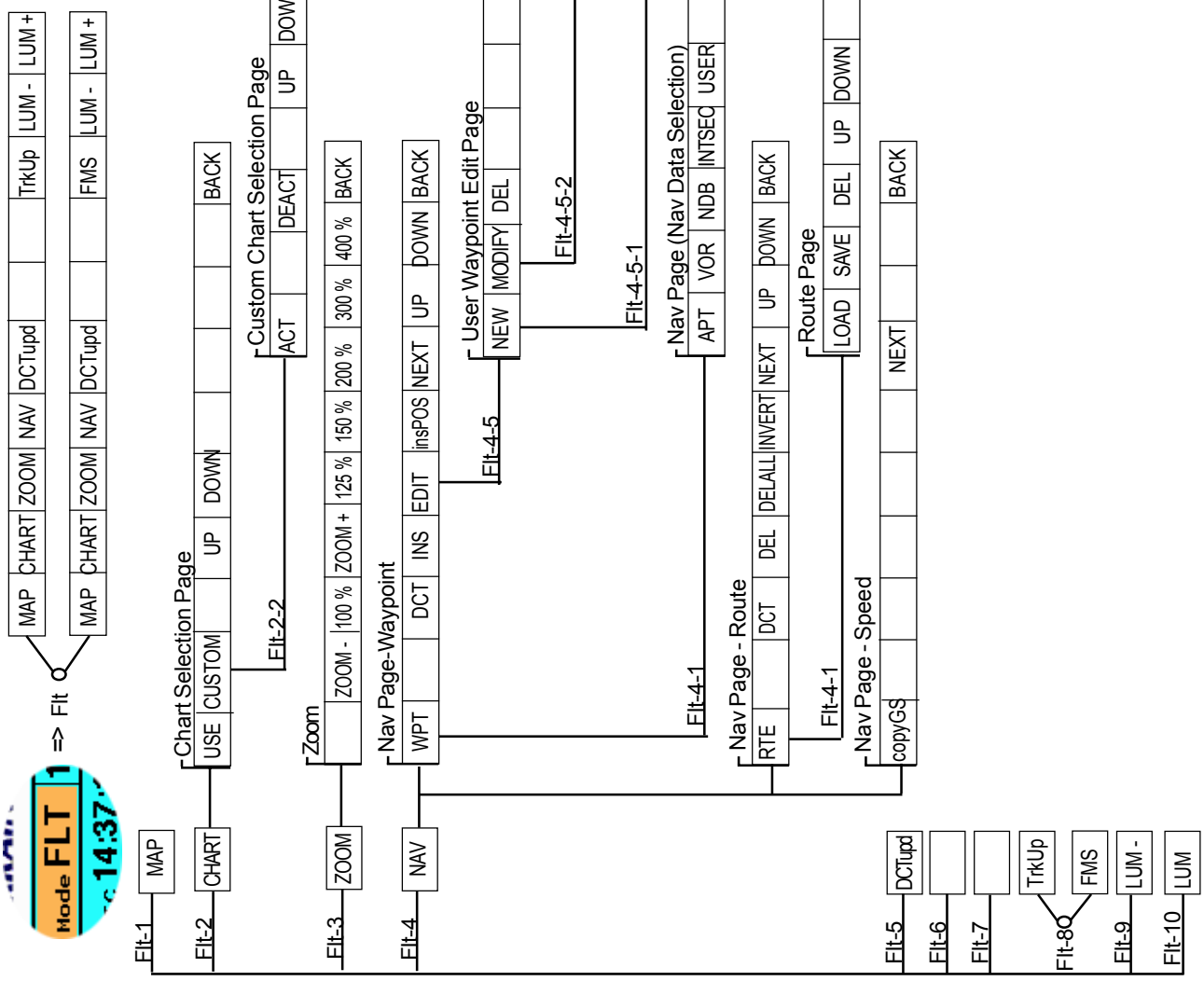
III. Block Diagram of all Functions

III.1 Structure

III.1.1 Map Mode

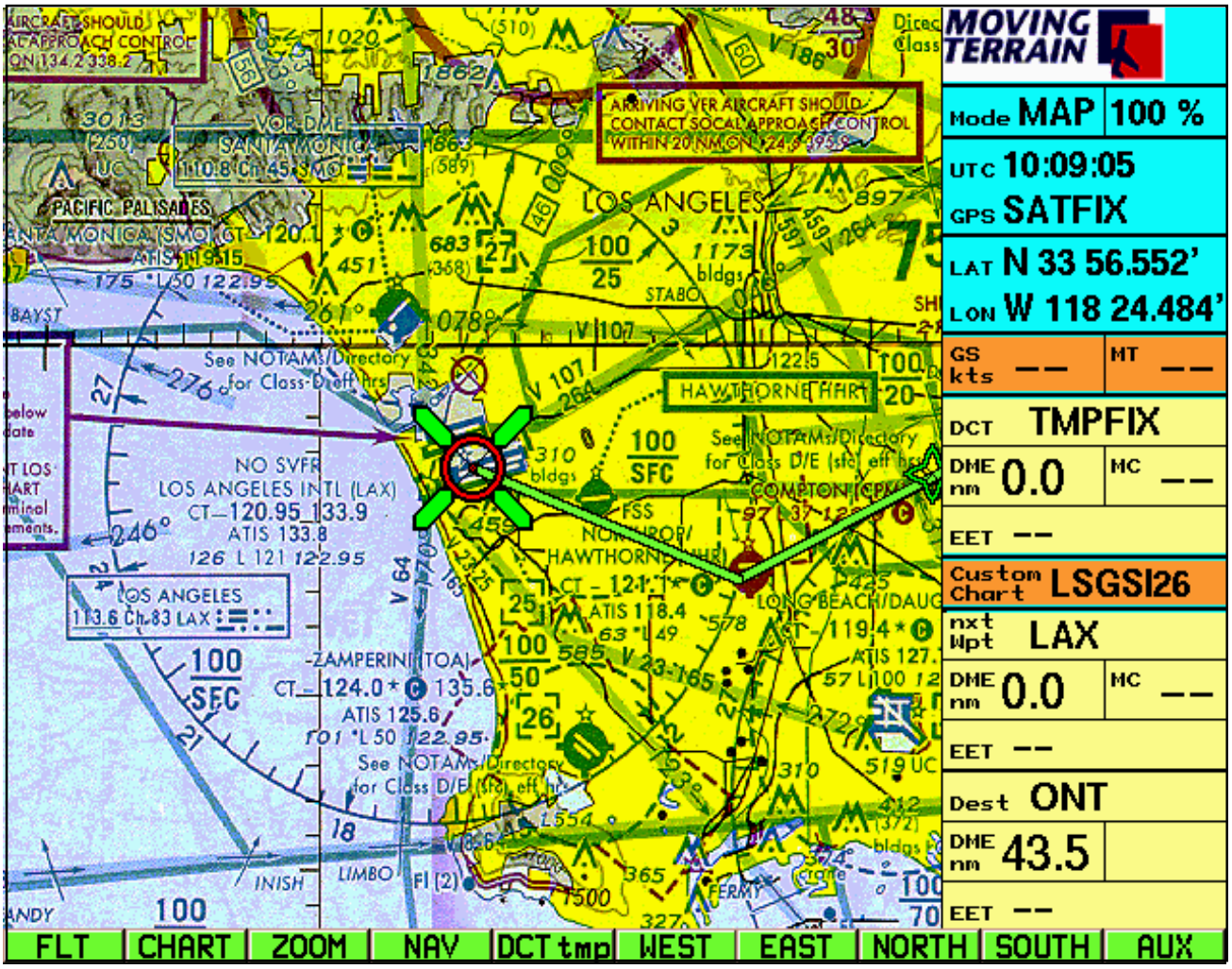


III.1.2 Flight-Mode



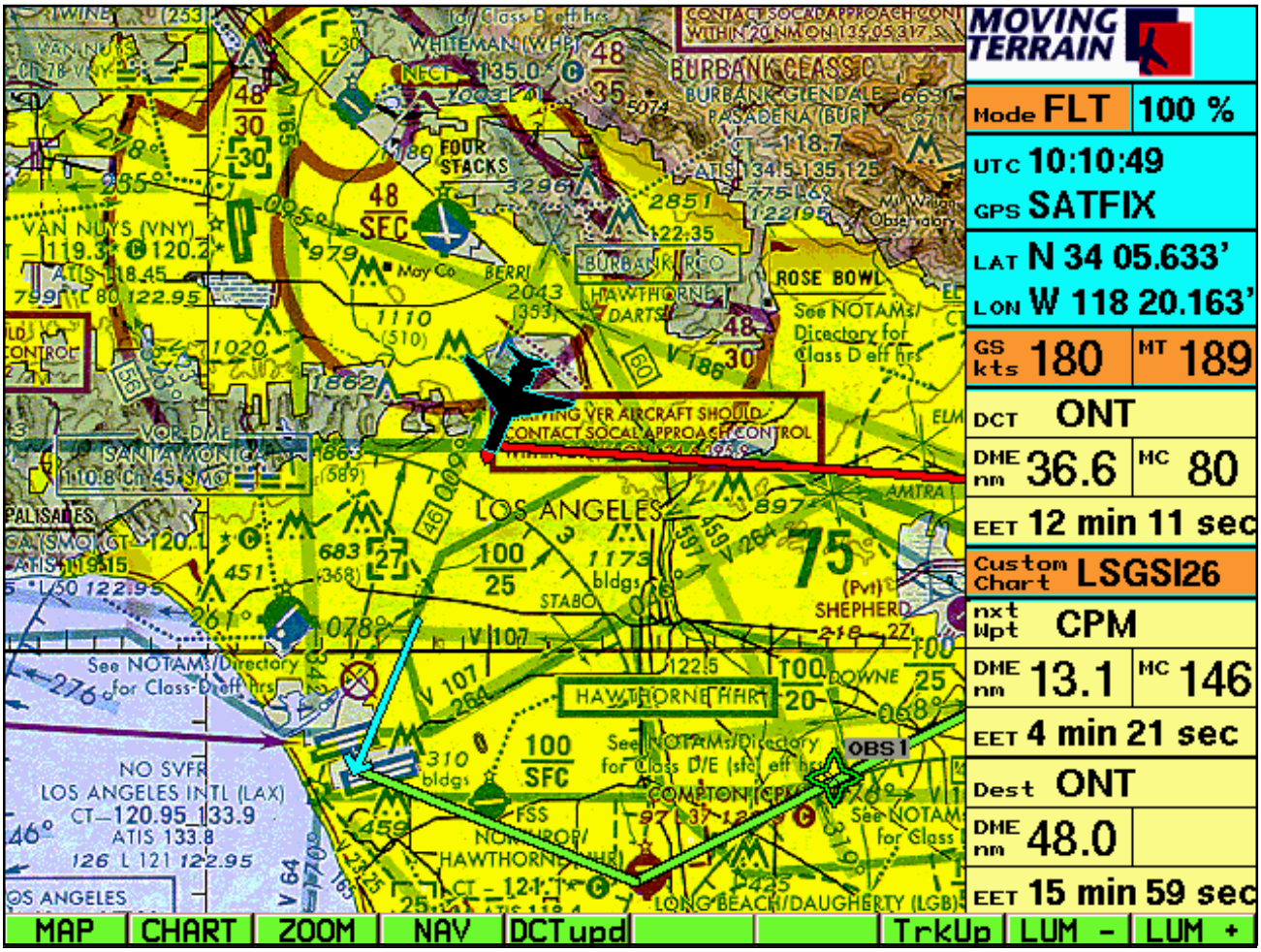
II.2 Overview: The Program Pages with the Corresponding Function Keys

Map **Map Mode**



Map-1	**FLT**	Switching to Flight Mode
Map-2	**CHART**	Changing of Chart Selection Page: Selection of various base charts and custom charts
Map-3	**ZOOM**	Enlargement of chart (one step or step by step)
Map-4	**NAV**	Switching to Nav Page
Map-5	**DCTtmp**	Fast selection of the destination for the Direct Vector on the chart without naming a WPT
Map-6	**WEST**	Moving the location symbol on the chart to the west
Map-7	**EAST**	Moving the location symbol on the chart to the east
Map-8	**NORTH**	Moving the location symbol on the chart to the north
Map-9	**SOUTH**	Moving the location symbol on the chart to the south
Map-10	**AUX**	Switching to additional options

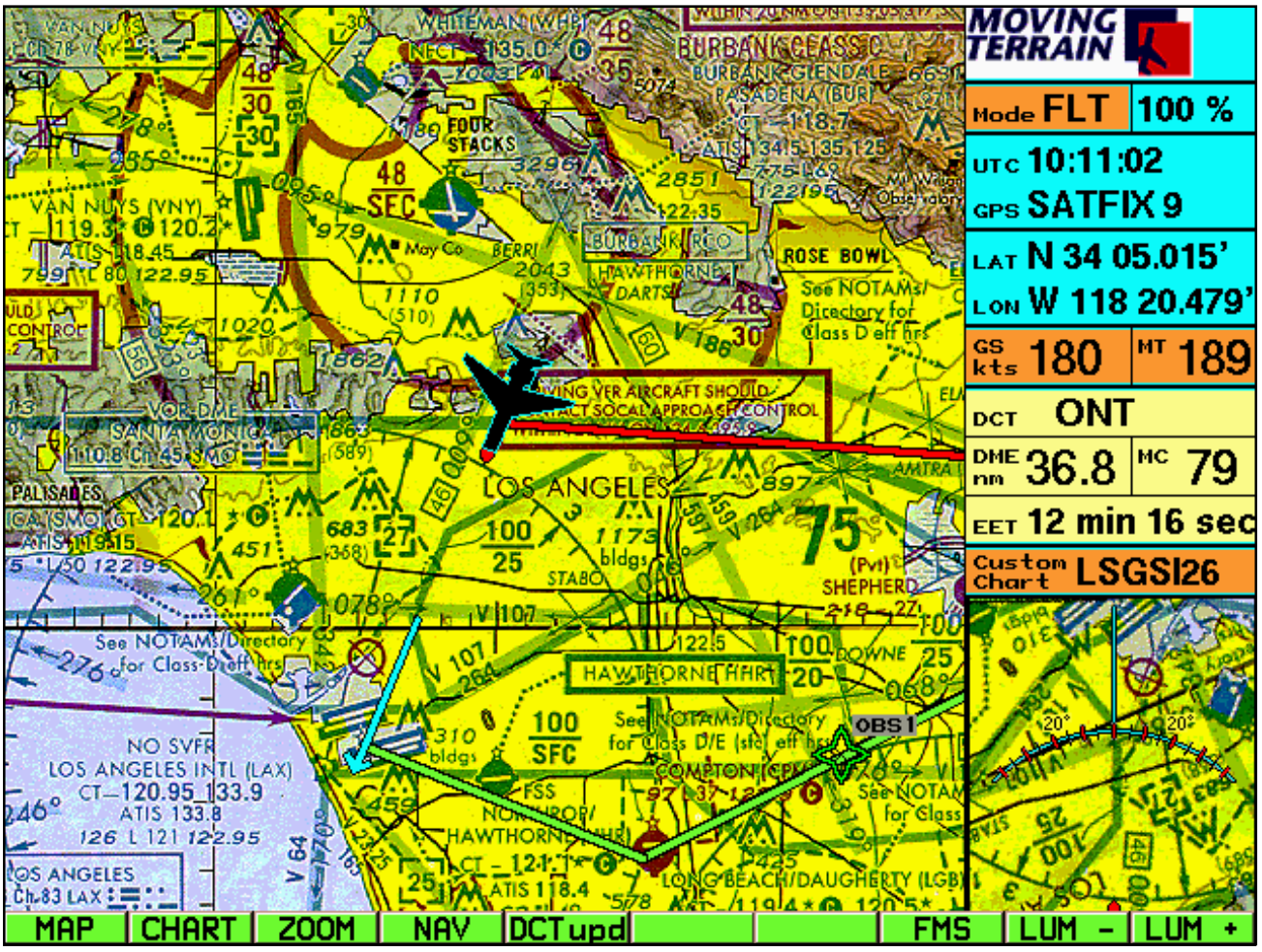
Flt **Flight Mode = Operating Mode with GPS Guidance**
With FMS – Flight Management System - Window



Flt-1	**MAP**	Switching to Map Mode
Flt-2	**CHART**	Changing to Chart Selection Page: Selection from various base charts and custom charts
Flt-3	**ZOOM**	Enlargement of chart (one step or step by step)
Flt-4	**NAV**	Switching to Nav Page
Flt-5	**DCTupd**	Using the direct vector for the actual position at the present time
Flt-6		
Flt-7		
Flt-8	**TrkUp**	Switching to the Track-Up Window
Flt-9	**LUM -**	Dimming the screen
Flt-10	**LUM +**	Illuminating the screen

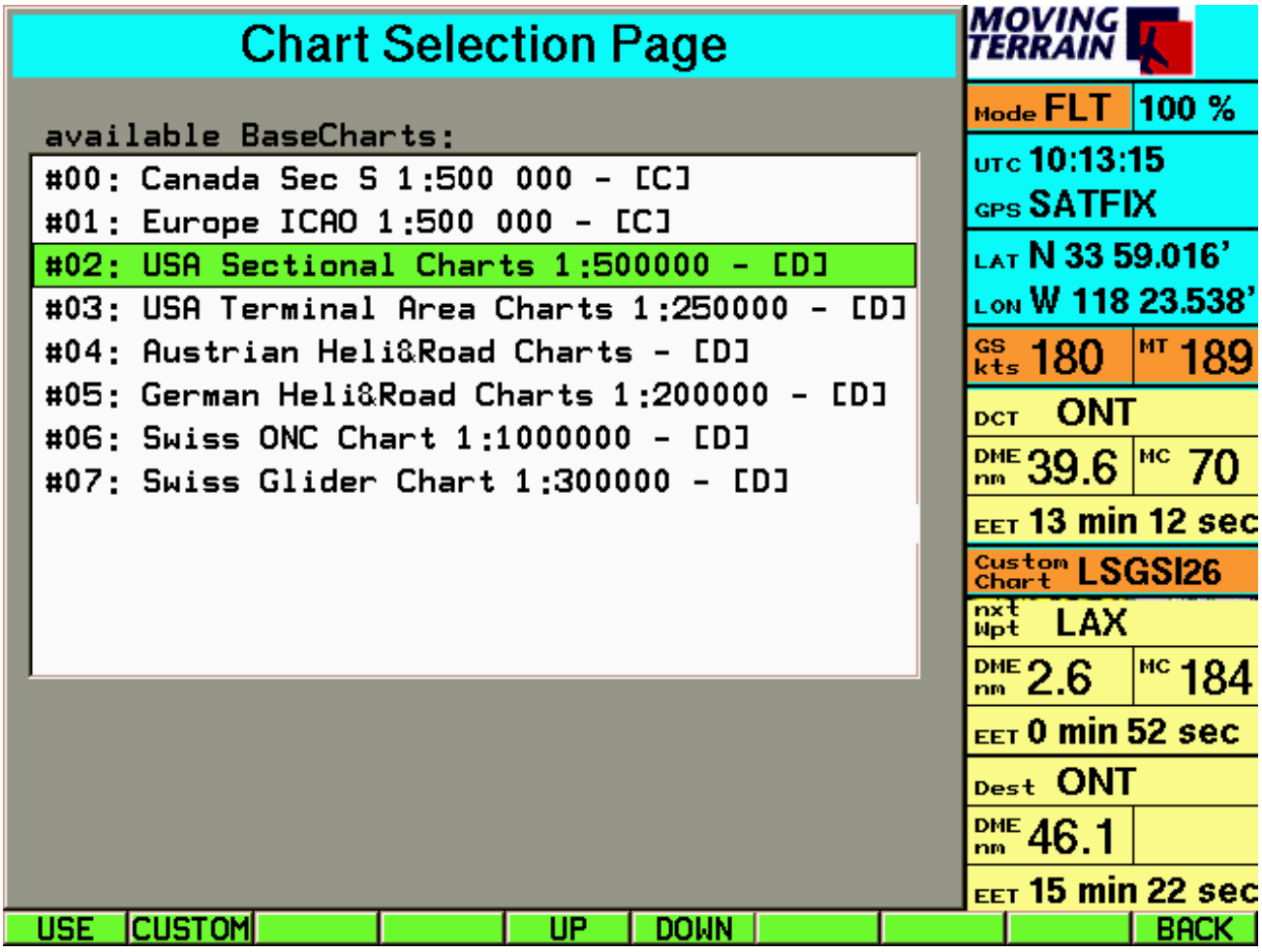
Important:
The selection between the FMS window or the Track-Up window is made in the Flight Mode, the selection then appears in both modes, in Map and in Flight Mode. The chosen window remains until the alternative is selected.

Flt **Flight Mode = Operating Mode with GPS Guidance**
With Track Up = Window



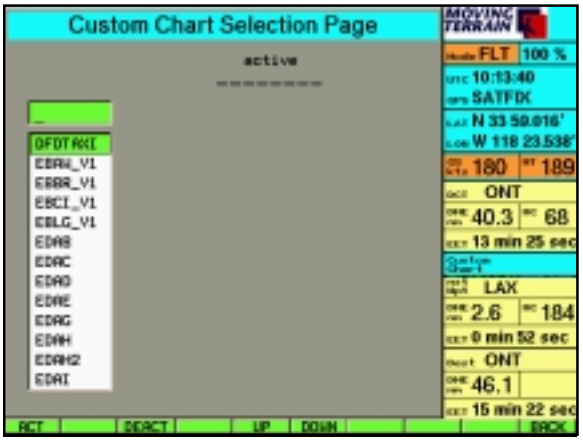
Flt-1	**MAP**	Switching to Map Mode
Flt-2	**CHART**	Changing to Chart Selection Page: Selection from various base charts and custom charts
Flt-3	**ZOOM**	Enlargement of chart (one step or step by step)
Flt-4	**NAV**	Switching to Nav Page
Flt-5	**DCTupd**	Using the direct vector for the actual position at the present time
Flt-6		
Flt-7		
Flt-8	**FMS**	Switching to FMS: Flight Management System window
Flt-9	**LUM -**	Dimming the screen
Flt-10	**LUM +**	Illuminating the screen

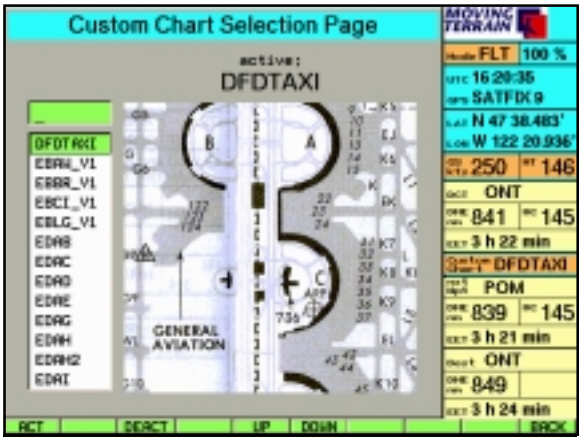
Flt/Map-2 **Selection of Charts: Basic and Custom Charts: Chart Selection Page**



-2-1	**USE**	Activation of the respective base charts
-2-2	**CUSTOM**	Changing to Custom Chart Selection Page
-2-3		
-2-4		
-2-5	**UP**	Moving up in the list box
-2-6	**DOWN**	Moving down in the list box
-2-7		
-2-8		
-2-9		
-2-10	**BACK**	Back to main level

Flt/Map-2-2 **Selection of Custom Charts: Custom Chart Selection Page**





not active → ACT → active: preview

DEACT ←

-2-2-1 **ACT** Activating the selected custom chart:
The centersection of the activated custom chart can then be seen in a preview.
The custom chart automatically appears as you fly in that respective territory.

Map-2-2- **GOTO** Jumps to the middle of the activated custom chart. The custom chart is activated at the same time (only available in Map Mode)

-2-2-3 **DEACT** Deactivation of custom chart

-2-2-4

-2-2-5 **UP** Moving up in the list box

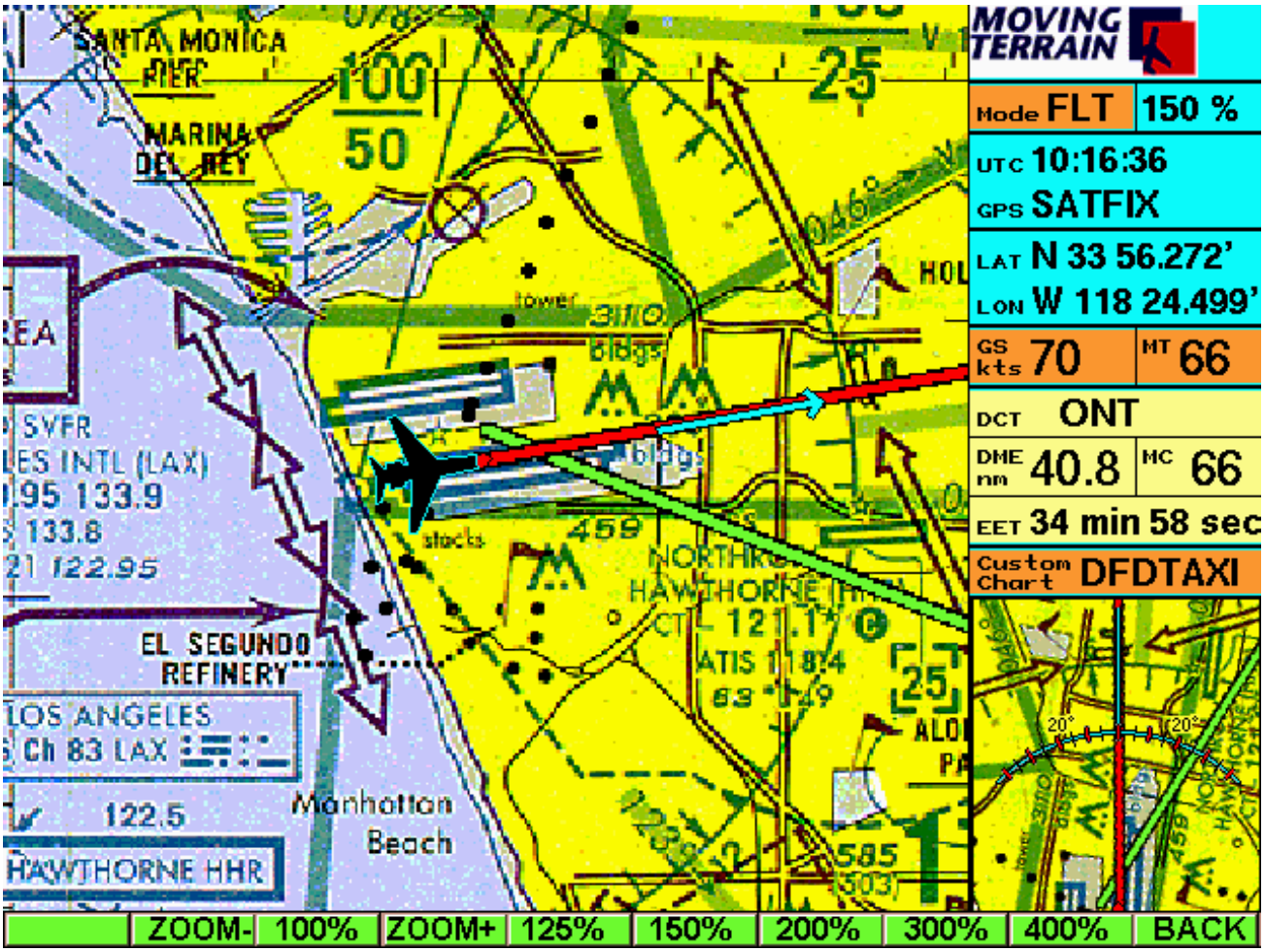
-2-2-6 **DOWN** Moving down in the list box

-2-2-7

-2-2-8

-2-2-9

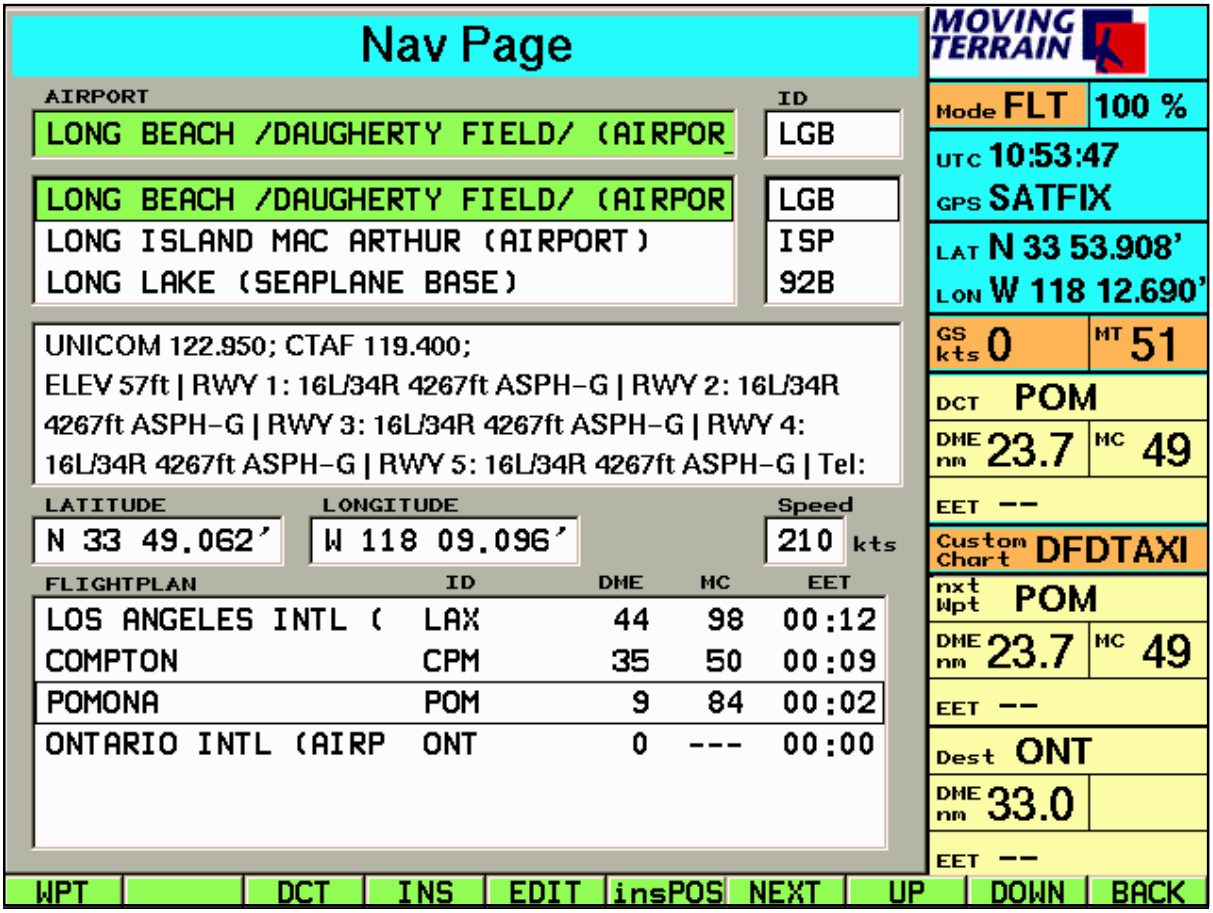
-2-2-10 **BACK** Back to main level



(Zoom factor is noted in the info box)

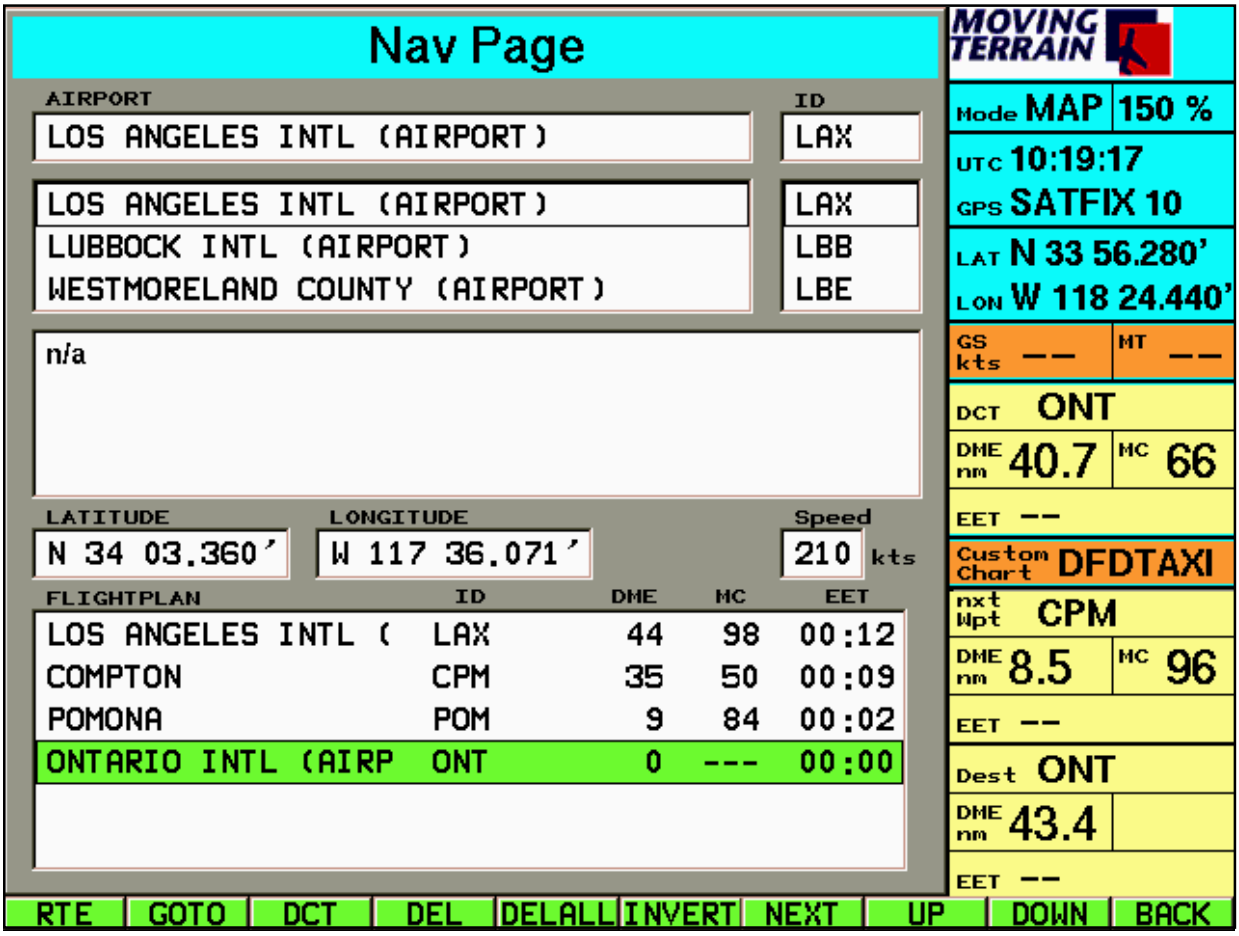
-3-1		
-3-2	**ZOOM -**	Decreasing the chart (to maximum 100%)
-3-3	**100 %**	Back to the original presentation (100%)
-3-4	**ZOOM +**	Increasing the chart
-3-5	**125 %**	Zoom factor 125%
-3-6	**150 %**	Zoom factor 150%
-3-7	**200 %**	Zoom factor 200%
-3-8	**300 %**	Zoom factor 300%
-3-9	**400 %**	Zoom factor 400%
-3-10	**BACK**	Back to main level

The zoom factor is not relevant in the Track-Up window, it always shows the chart 100%.

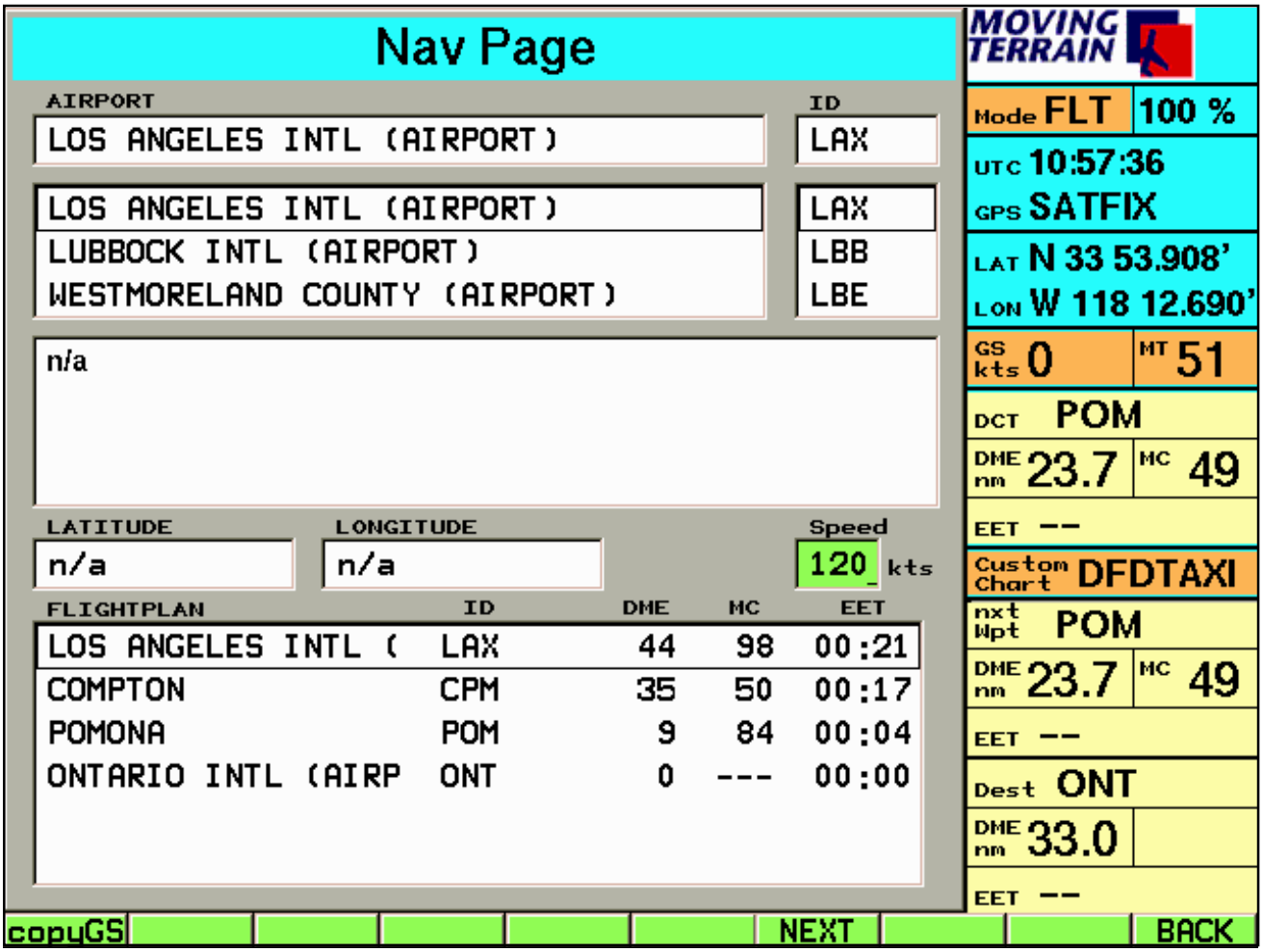


Lat/Lon given in the center relate to the active = highlighted waypoint. Is the highlight in the top window, it corresponds to the activated waypoint of the data bank that is showing (APT/VOR/NDB/INTSEC/USER). Is the highlight in the flight plan window, it corresponds with a WPT in that flight plan.

-4-1	**WPT**	Selection of Waypoint Types (APT/VOR/ NDB/INTSEC/ USER)
Map-4-2	**GOTO**	Positioning the chart on the selected waypoint from the data bank (function in Flight Mode not available)
-4-3	**DCT**	Direct vector from the present position to the selected waypoint from the data bank while MC/DME/EET is showing in the info box
-4-4	**INS**	Insertion of the selected waypoints in the flight plan above the framed WPT
-4-5	**EDIT**	Changing to User Waypoint Edit Page
-4-6	**insPOS**	Insertion of the present location on the chart into the route at the place above the insertion frame
-4-7	**NEXT**	Moving to the next field on the nav page
-4-8	**UP**	Moving up in the active list box
-4-9	**DOWN**	Moving down in the active list box
-4-10	**BACK**	Back to the main level (Map/Flight)

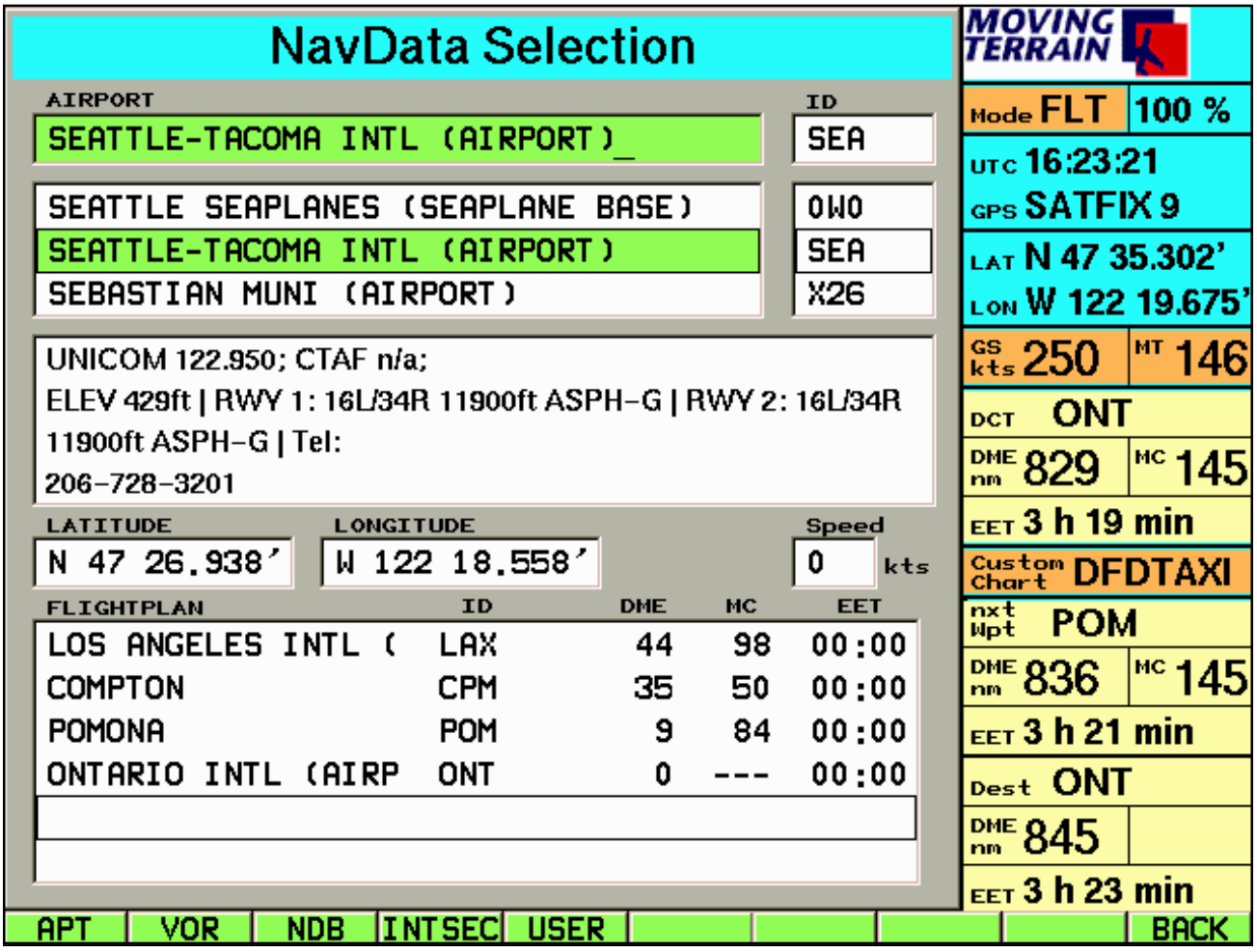


-4-1	**RTE**	Change to route page for storing a flight plan and loading of previously stored flight plans
Map-4-2	**GOTO**	Positioning the chart on the selected waypoint from one of the data banks (not available in Flight Mode)
-4-3	**DCT**	Direct vector from the present position to the selected waypoint out of the data bank visible at the same time of the MC/DME/EET in the Info Box
-4-4	**DEL**	Erasing the colored WPT from the flight plan
-4-5	**DELALL**	Erasing the entire flight plan from the Nav page (does not erase a stored flight plan, a stored flight plan can be reloaded at any time)
-4-6	**INVERT**	Reversing the flight plan (return flight)
-4-7	**NEXT**	Moving to the next field on the Nav Page
-4-8	**UP**	Moving up in the active List box
-4-9	**DOWN**	Moving down in the active List box
-4-10	**BACK**	Back to the main level



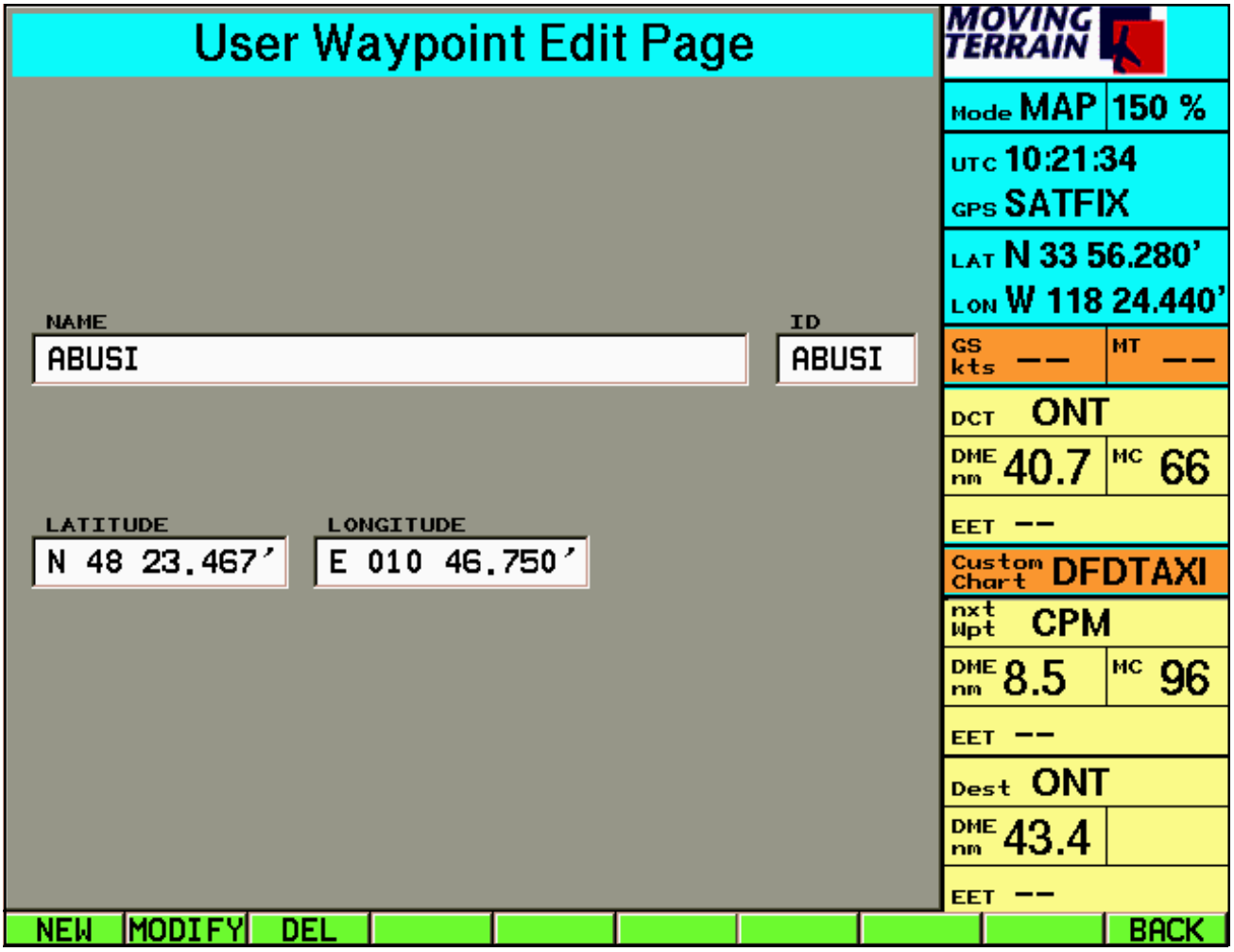
Flt-4-1 **copyGS** Using current GS for updated EET in flight plan
-4-2
-4-3
-4-4
-4-5
-4-6
-4-7 **NEXT** Moving to next field on the nav page
-4-8
-4-9
-4-10 **BACK** Back to the main level

Flt/Map-4-1 Nav Data Selction Page: Selection of Nav Data Bank



-4-1-1 **APT** Data bank of the airports
-4-1-2 **VOR** VOR data bank
-4-1-3 **NDB** NDB data bank
-4-1-4 **INTSEC** Data bank for IFR intersections
-4-1-5 **USER** Data bank for the user defined waypoints
-4-1-6
-5-1-7
-4-1-8
-4-1-9
-4-1-10 **BACK** Back to Nav Page

Editing a User Waypoint: User Waypoint Edit Page



-4-5-1 **NEW** Changing to User Waypoint Edit Page:
Enter a new WPT.
MT suggests a waypoint number with current number (WPT000,WPT001 etc.)

-4-5-2 **MODIFY** This is to modify the current waypoint

-4-5-3 **DEL** Deleting the user waypoint

-4-5-4

-4-5-5

-4-5-6

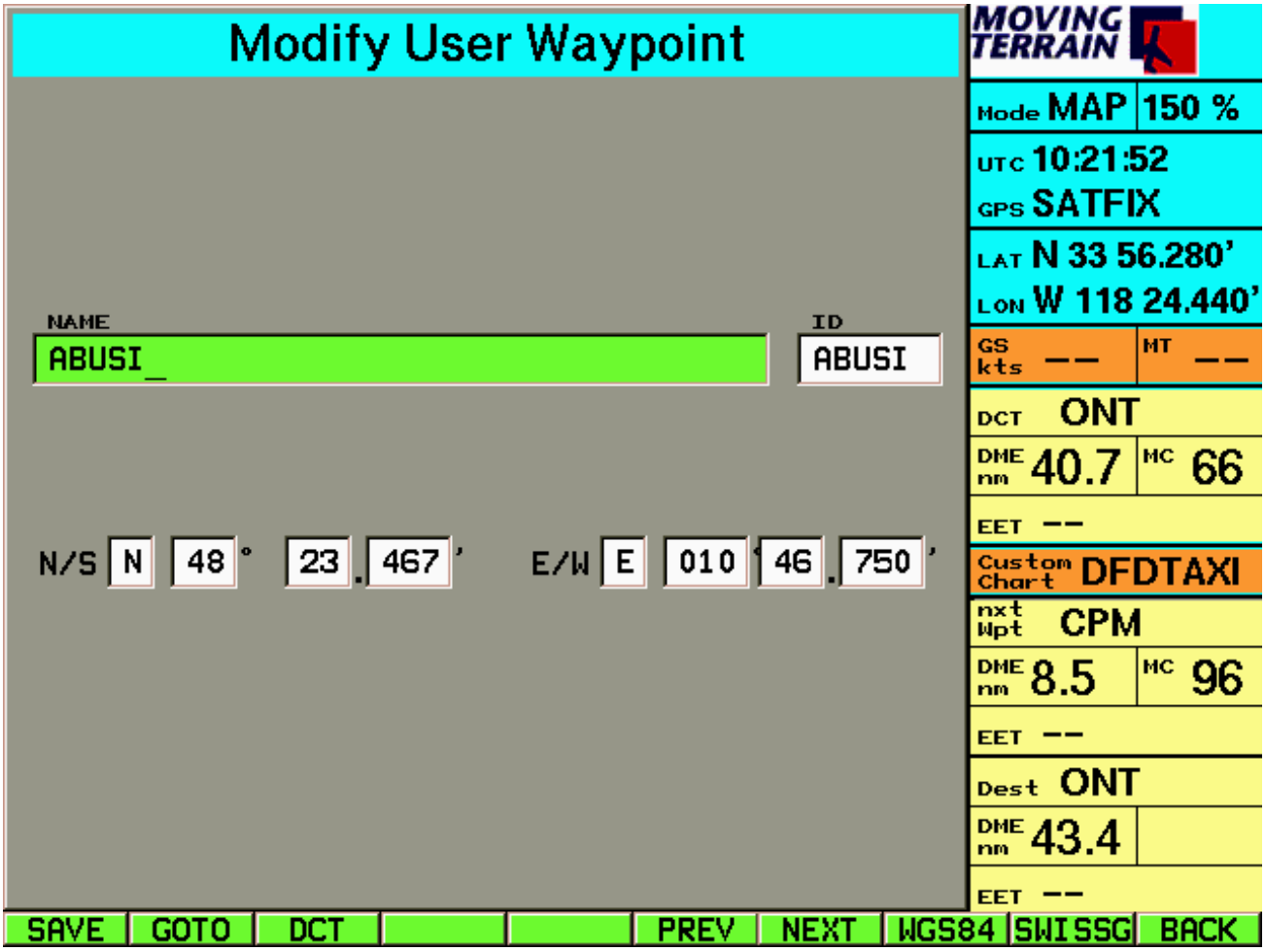
-4-5-7

-4-5-8

-4-5-9

-4-5-10 **BACK** Back to Nav Page

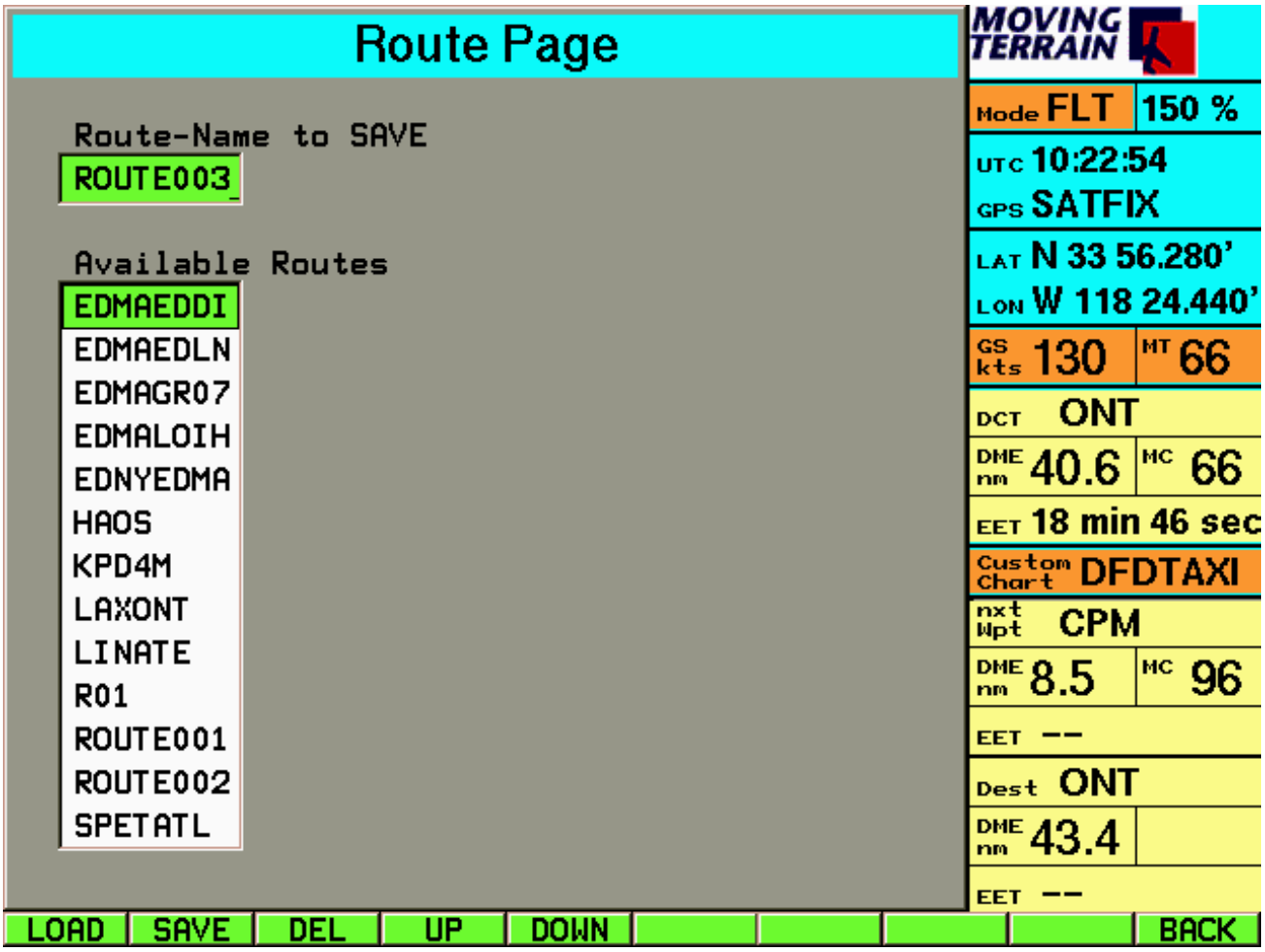
Flt/Map-4-5-1 **Creating or Modifying a User Waypoint: User Waypoint Edit Page (new/modify)**



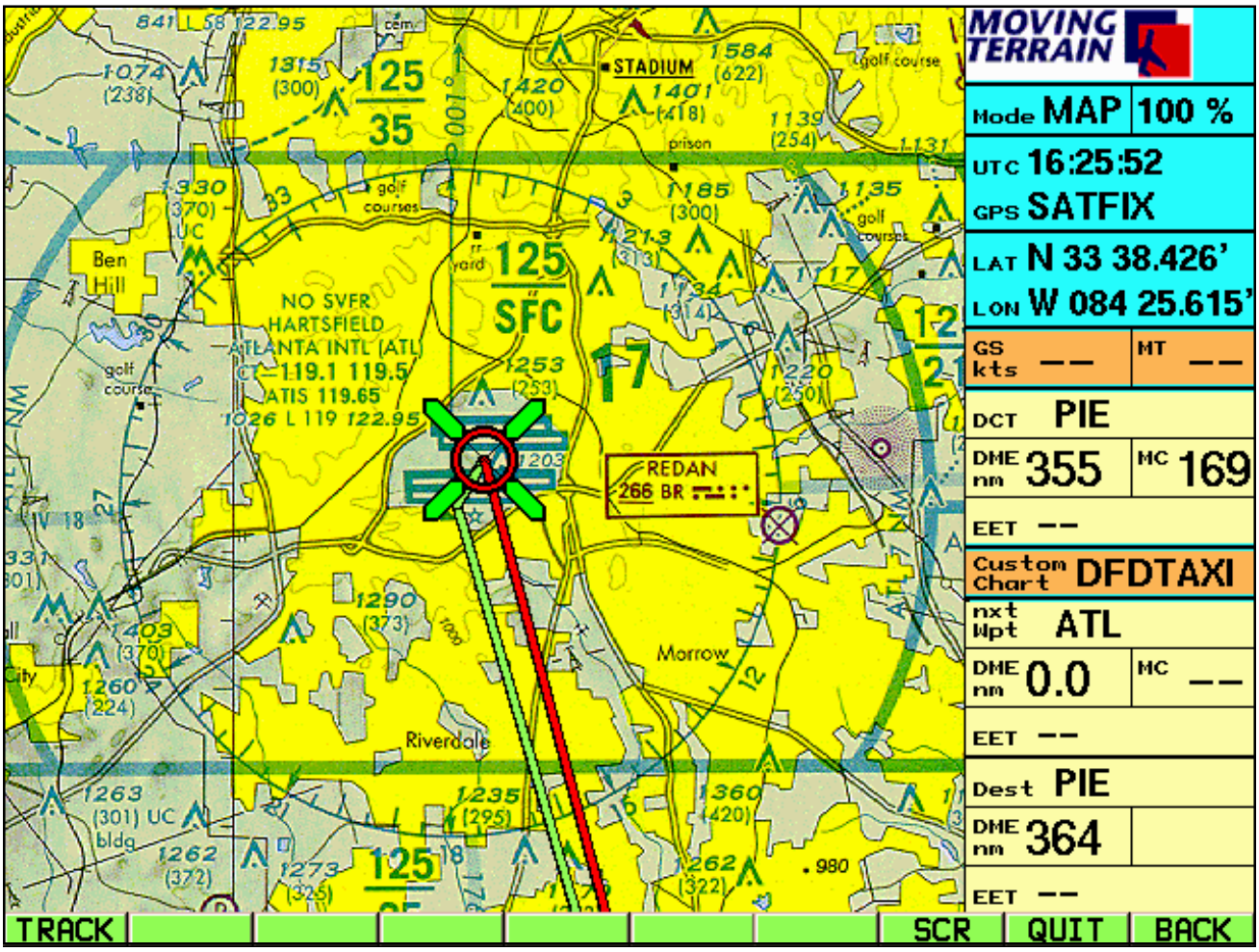
-4-5-1-1	**SAVE**	Saving the waypoint under entered name
Map-4-5-1-2	**GOTO**	Positioning of the chart on the selected waypoint (not available in Flight-Mode!)
-4-5-1-3	**DCT**	Direct vector to the coordinates entered
-4-5-1-4		
-4-5-1-5		
-4-5-1-6	**PREV**	Moving to previous field
-4-5-1-7	**NEXT**	Moving to next field
-4-5-1-8	**WGS84**	Coordinates in WGS84
-4-5-1-9	**SWISSG**	Coordinates in Swiss Grid
-4-5-1-10	**BACK**	Back to previous page

Flt/Map-4-1 (alternative)

Route Page: Storing and Loading of Flight Plans



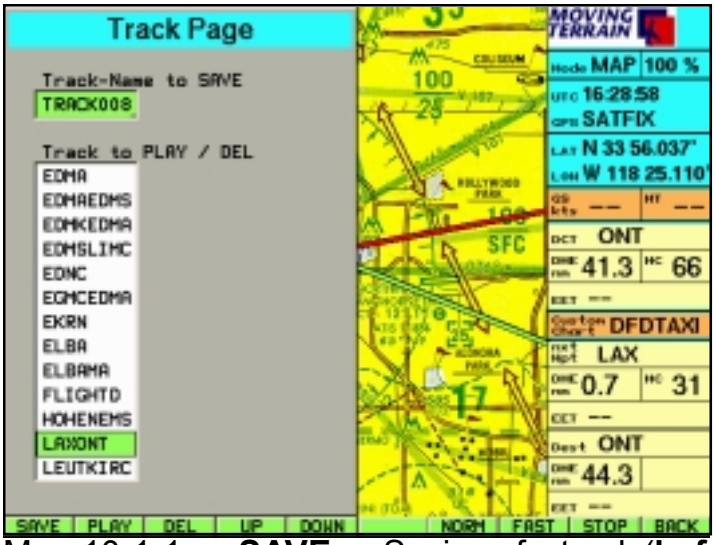
-4-1-1	**LOAD**	Loading the selected route: the flight plan in the upper window is activated
-4-1-2	**SAVE**	Storing the active flight plan, either with an individual name or under ROUTEXXX (preselected naming)
-4-1-3	**DEL**	Deleting a flight plan
-4-1-4	**UP**	Moving up in the list box
-4-1-5	**DOWN**	Moving down in the list box
-4-1-6		
-4-1-7		
-4-1-8		
-4-1-9		
-4-1-10	**BACK**	Back to Nav Page



Map-10-1 **TRACK** Switching to Track Page (selection, replay, saving)
Map-10-2
Map-10-3
Map-10-4
Map-10-5
Map-10-6
Map-10-7
Map-10-8 **SCR** Adjusting of the screen according to the surroundings (brightness, contrast)
Map-10-9 **QUIT** Ending Moving Terrain, last geographical position, the activated base chart and the settings for brightness and contrast are saved. **Important: Continue to push the button for about 3 seconds until you leave the program** (safety mechanism against inadvertent ending of Moving Terrain).
Map-10-10 **BACK** Back to main level

Map-10-1 **Track Page: Storing and Replaying of a Flight**

Replay inactive



Map-10-1-1 **SAVE** Saving of a track (**before** turning off the unit!): name given by the system (TRACK000, TRACK001 etc.) or - better - an individual name

Map-10-1-2 **PLAY** Replaying of a saved track in time lapse

Map-10-1-3 **DEL** Deleting the selected track

Map-10-1-4 **UP** Moving up in the list box

Map-10-1-5 **DOWN** Moving down in the list box

Map-10-1-6

Replay active

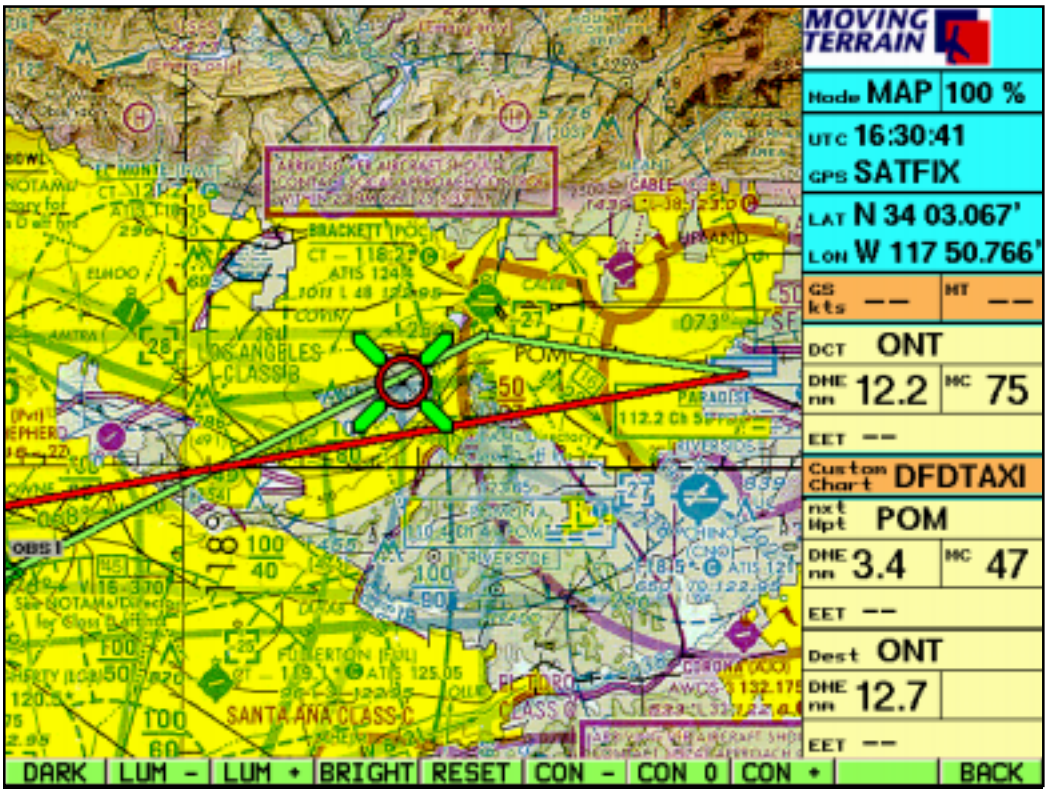
Map-10-1-7 **NORM** Replay in approximately 10 x as real speed

Map-10-1-8 **FAST** Replay in fast speed

Map-10-1-9 **STOP** Ending the replay mode

Map-10-1-10 **BACK** Back to main level

Map-10-8 **Screen Adjustments**



Map-10-8-1	**DARK**	Night screen (very dark)
Map-10-8-2	**LUM -**	Continuous adjustment of the screen brightness (dimming)
Map-10-8-3	**LUM +**	Continuous adjustment of the screen brightness (illuminating)
Map-10-8-4	**BRIGHT**	Lightest setting possible
Map-10-8-5	**RESET**	Back to factory setting
Map-10-8-6	**CON -**	Decrease contrast
Map-10-8-7	**CON 0**	Contrast back to factory setting
Map-10-8-8	**CON +**	Increase contrast
Map-10-8-9		
Map-10-8-10	**BACK**	Back to the main level

Important (Note 1):
The contrast settings are also helpful if you want to improve brightness, once you look at the map from above (if you sit higher).

Important (Note 2):
The screen settings are saved when the program is ended with AUX-QUIT (hold key until program has ended). When restarting Moving Terrain the unit appears with the previous settings. You can change them immediately with RESET.

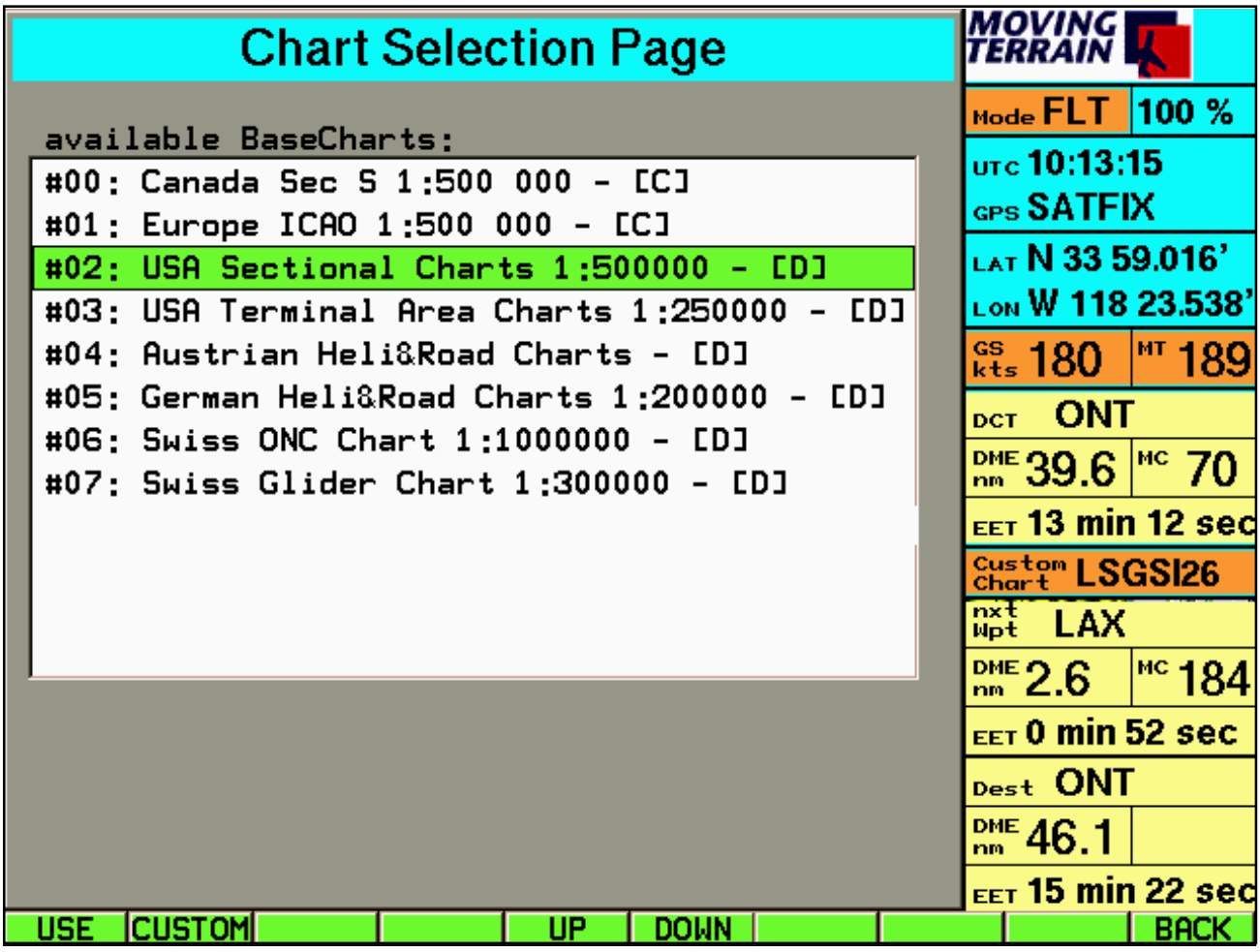
IV. The Functions: Explanations and Examples

IV.1 Base Charts with Various Scales

Moving Terrain offers various basic charts in various scales. You also have the possibility to work with customized charts (custom charts).

IV.1.1 The Base Charts in the Seamless System

MT offers various basic charts in the seamless system, worldwide and in various scales.

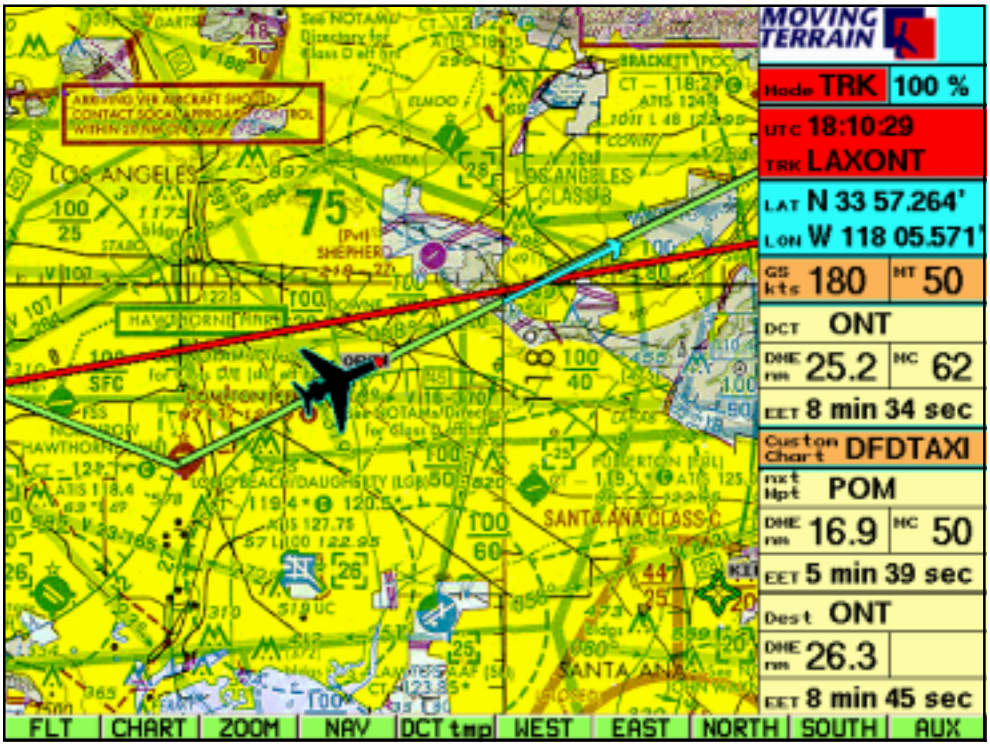


Note

The last used basic chart is saved when Moving Terrain is terminated by QUIT (hold down key until the program has ended).

The QUIT function is not important. You may also just shut the master off.

IV.1.1.1 Sectionals in Scale 1: 500 000



The sectionals cover the entire USA, the TAC charts on the other hand only cover the TAC areas only. If you fly outside the respective TAC areas only gray background shows instead of any chart. Please select the sectionals again at that time.

IV.1.1.2 TAC (Terminal Area Charts) in Scale 1: 250 000

IV.1.2 Individual Charts: Series and Custom Charts

IV.1.2.1 Custom Charts

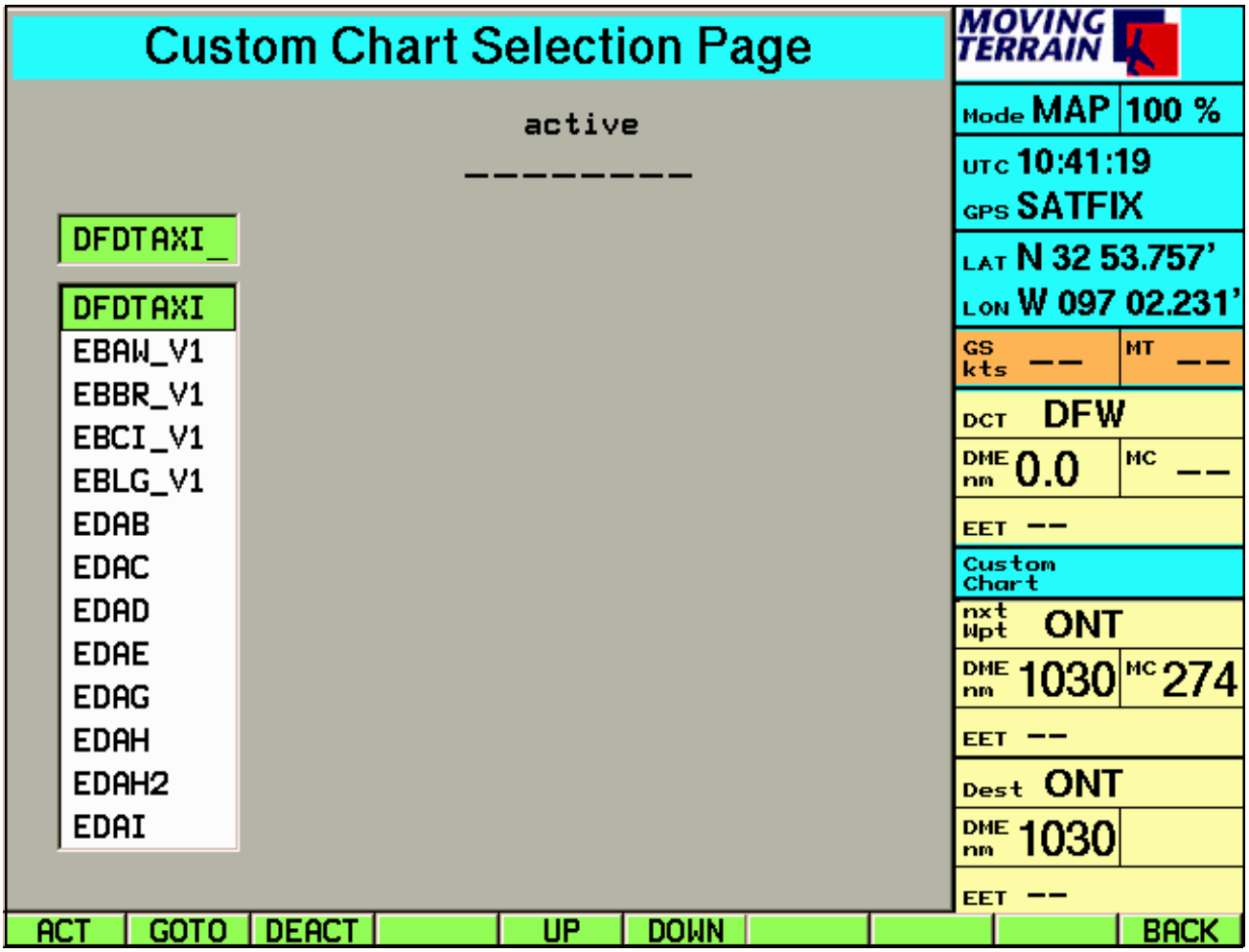
- Custom charts are other than base charts individual charts of a confined area.
- The activated **custom chart** (name in the info box) is shown instead of the base chart, **as soon as you fly into the area of the custom chart.**
- Custom charts can have **any dimension** from the taxi chart to the continental overview chart.
- A custom chart for **USA** you can find in your system under the Name “USA”. There you can, for instance, get an overview on long flights, erg. how your route should be laid out or you can observe great circle effects.
- These custom charts can be made by the user (this is an open system) or by the factory - talk to us.

Important for all Custom Charts:

- Only one custom chart is active at one time.
- The custom chart is also visible in the track-up window.
- The direct vector and the route vector are shown on the custom chart: the red direct vector overlays the green route vector.
- The great circle of the route- and direct-vectors are displayed as such great circle line.

IV.1.2.2 Working with Custom Charts

To get the custom chart page push the CHART key twice.



To select a chart enter initial characters.
Or
move the highlight in the list box with:

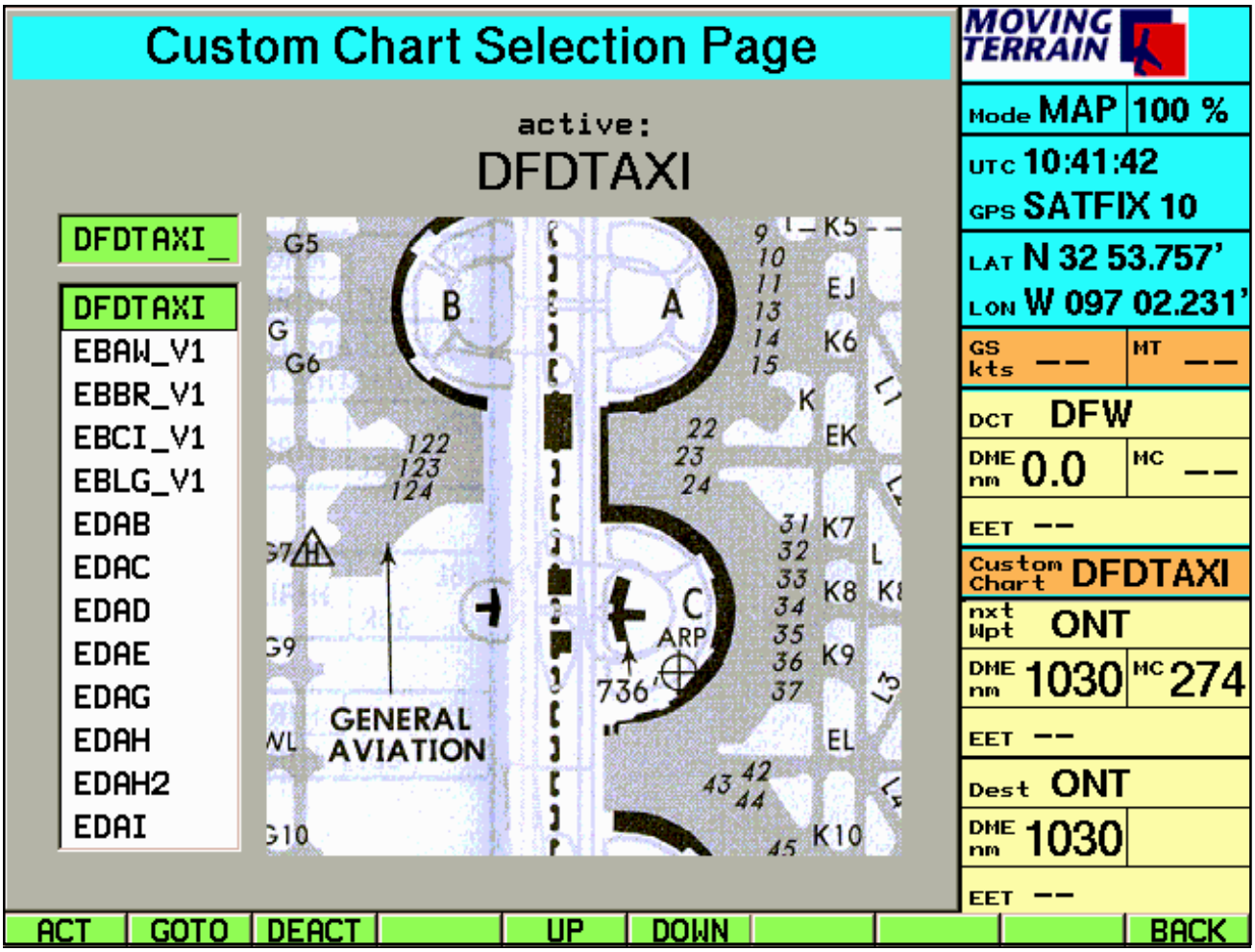
-2-2-5 **UP**
-2-2-6 **DOWN**

-2-2-1 **ACT:** Activation of the custom chart

The activation of the custom chart shows that chart and
- the name of the chart is written above,
- the chart name shows in the Info Box.

Map-2-2-2 GOTO

The function GOTO activates the custom chart marked in the list box and move back to main level, whereby the location symbol is positioned in the middle of the custom chart
(function GOTO only available in Map Mode).



-2-2-3 **DEACT**

A custom chart remains active until another custom chart is activated or the chart is deactivated=>DEACT.

-2-2-5 **UP/DOWN**

-2-2-6 Moving in the list box

-2-2-10 **BACK**

Back to main level: Instead of the base chart the custom chart is now shown, if the position lies in the area which the custom chart covers.

IV.2 Flight Planning

The Nav page is designed to create flight plans. To make a complex subject simple, this page is divided: **upper part: waypoints**
lower part: flight plan.

"**WAYPOINT"**

In this area you are allowed to choose from the available data banks. This is possible with the whole name as well as by identifier. You get to the "ID" field by pushing NEXT.

"FLIGHTPLAN"

- In this area the flight plan is described. By pushing NEXT the colored bar is positioned and the function keys change (explanation follows).

- The **"SPEED"** field
- By pushing the NEXT key the colored beam is positioned in the **"SPEED"** field. Here is the possibility, to enter the planned speed for the route or, in Flight Mode to use the actual speed.

"LATITUDE/LONGITUDE" (COORDINATES)

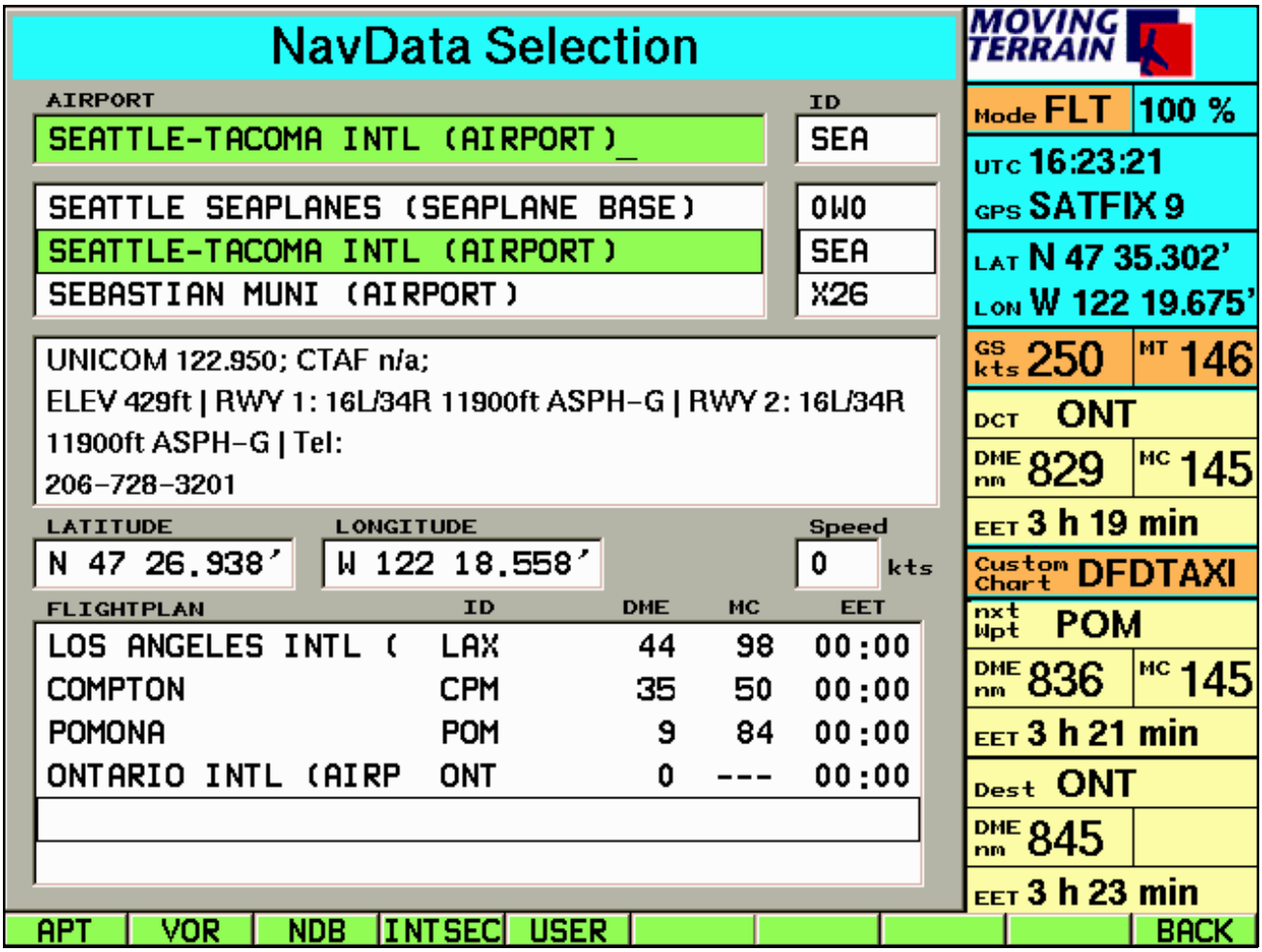
Lat/Lon given in the center relate to the active = highlighted waypoint. Is the highlight in the top window, it corresponds to the activated waypoint of the data bank (APT/VOR/NDB/INTSEC/USER). Is the highlight in the flight plan window, it corresponds with a WPT in flight plan.

IV.2.1 Working with Waypoints from the Data Banks

By key –4-1 WPT (Nav Page: Nav Data Selection) you can work in the Nav Page in the following data bank categories:

-4-1-1	**APT**	Data bank of airports
-4-1-2	**VOR**	VOR data bank
-4-1-3	**NDB**	NDB data bank
-4-1-4	**INTSEC**	Data bank for IFR intersections
-4-1-5	**USER**	Data bank of the user defined waypoints.

The Nav Page is opened by default with the airport data bank.
While in use, the Nav Page is always opened with the data bank, that was last selected => Memory of the last used data bank.



Besides the coordinates and the identifier you receive additional important informations like to radio, direction, length and type of the runway as well as important telephone numbers.

After selection of the data base work is continued on the Nav Page, the keys change back to these functions.

IV.2.1.1 Update of MT Navigation Data

- Moving Terrain offers a regularly update for the nav data.
- Please bear in mind that the frequencies, telephone numbers of airports or the usage of runways may change. Beacons are no longer being used and others are added.
- To take full advantage of your GPS equipment, your navigation data should be up to date.
- **We recommend strongly to keep your navigation datas updated.**

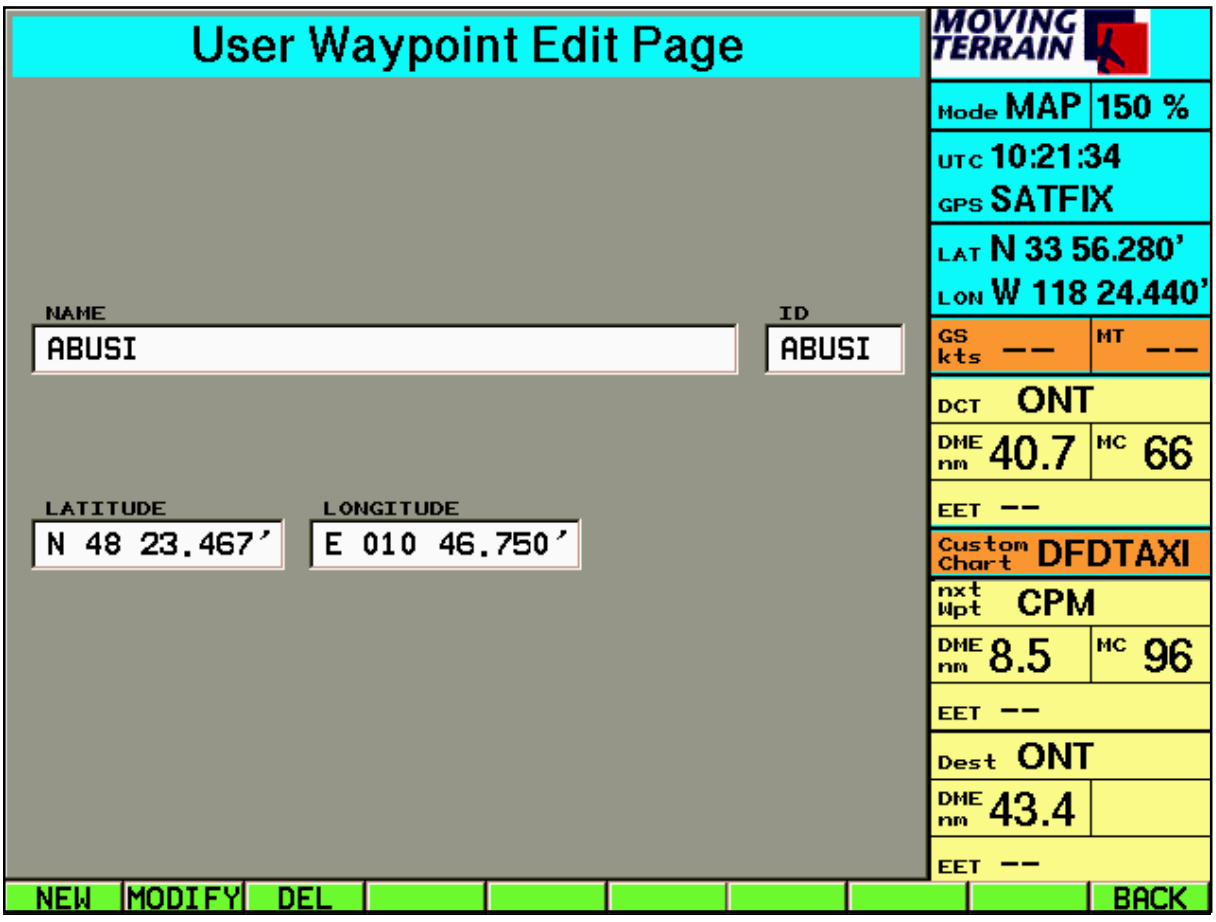
IV.1.2 Enroute with IFR Intersections

- The European IFR intersection data bank offers a safe and precise enroute navigation.
- Not only the direct vector, which simplifies flying from point to point, but especially the flight planning and following the route in the FMS window are valuable supports for the IFR navigation.
- The Moving Terrain System is a VFR instrument. It is not safe to fly with this navigational assistance under instrument flight rules, if you do not have all the required navigational instruments in use and you are moving according to instrument flight rules on instrument routes.

A pilot who is not IFR rated is with or without Moving Terrain in life threatening danger!

IV.2.2 Working with User Waypoints: User Waypoint Edit Page

-4-5 **EDIT**



-4-5-3 **DEL**

With DEL the present user waypoint is deleted from the data bank.

IV.2.2.1 Creating a New Waypoint

-4-5-1 **NEW**

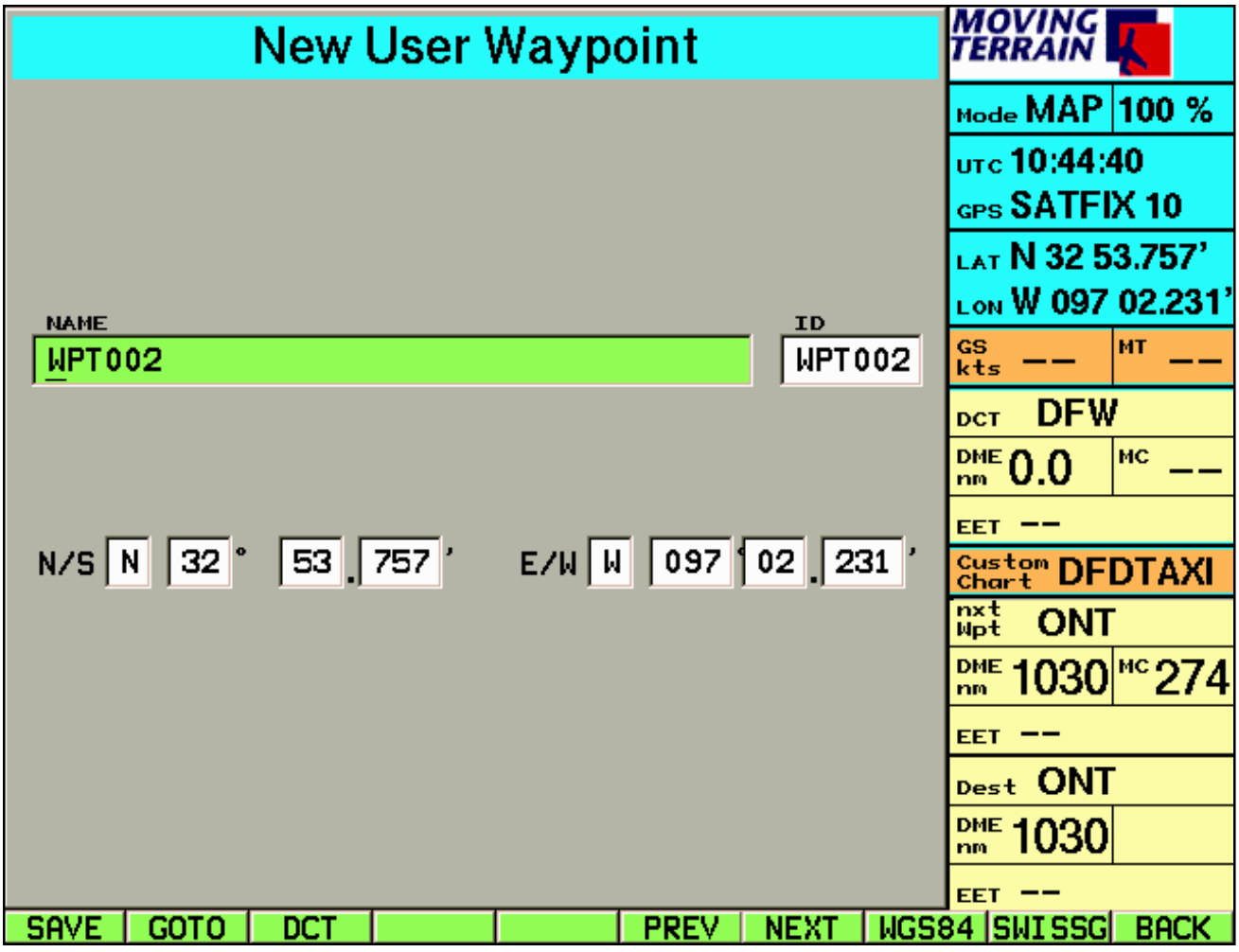
The moment the Nav Page is opened the coordinates are locked in. Even if there is a time lapse between opening and saving of the waypoint, the desired position remains: the coordinates are registered in the fields *N/S* and *E/W* (Lat/Lon).

In the field *Name* as well as the field *ID,* WPTxxx appears, whereby xxx corresponds to the number of the last saved waypoint + 1.

-4-5-1-1 **SAVE** Type in an individual name by using the keys.
If only the *NAME* is changed, the *ID* remains the same (WPTxxx)
Change the field *ID* with key NEXT, then enter a new identifier.

Attention: **A name cannot be used twice, even if it is combined with another identifier!**

-4-5-1-1 **GOTO** Positioning the chart on the visible coordinates (only map mode)
-4-5-1-3 **DCT** Direct vector to the selected coordinates.

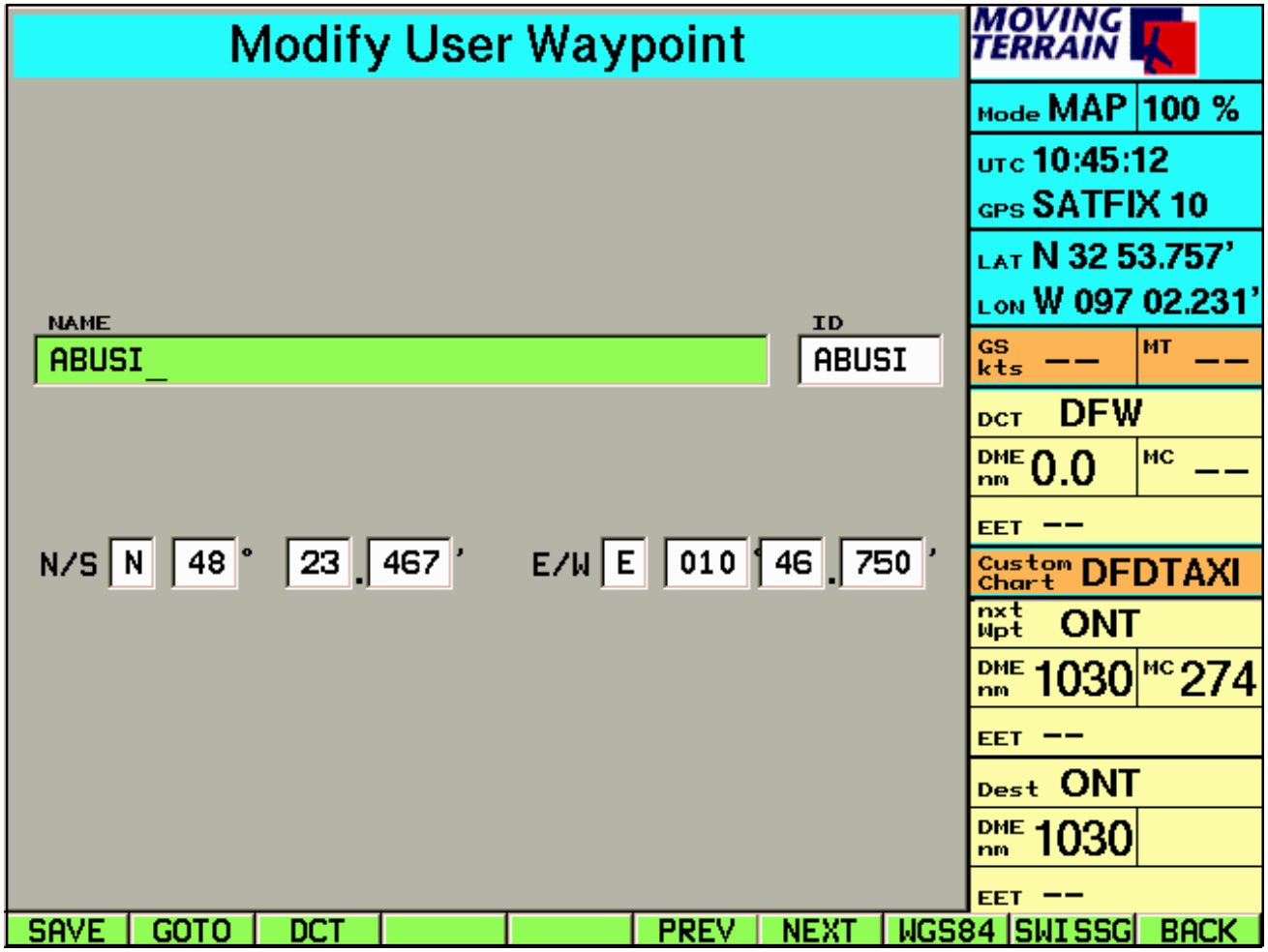


IV.2.2.2 Modifying a User Defined Waypoint

-4-5-2 MODIFY

The previously selected waypoint can be changed.

- **The page cooresponds with the New User Waypoint page:**



- With **PREV** and **NEXT** you change the previous or next field, the changes are made by the alpha numerical keys.
- **WGS84** or **SWISSG** enables the changing between the coordinate systems (only relevant for Switzerland).

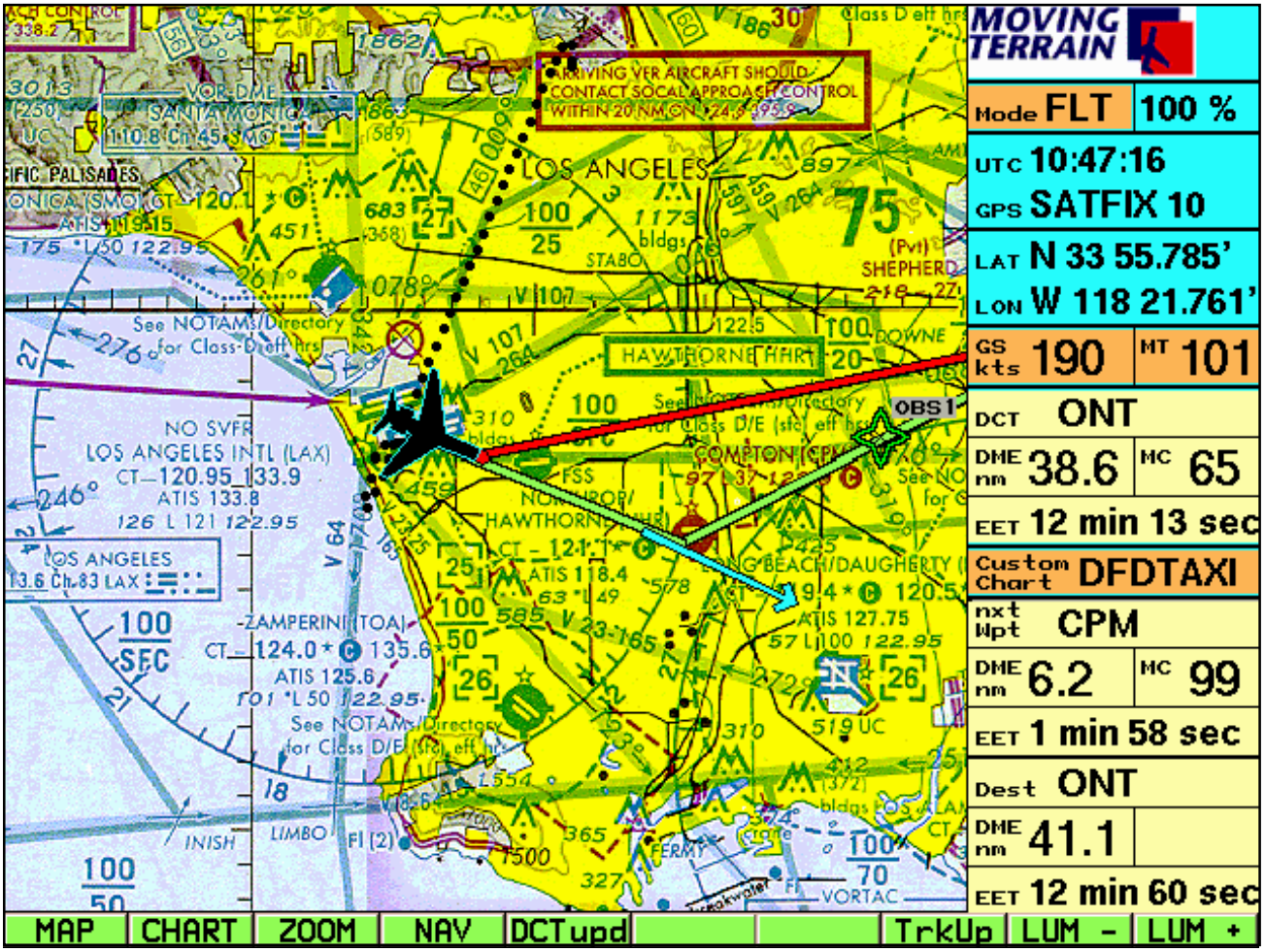
- **BACK** changes back to Nav Page.

IV.2.3 The Direct Vector

-4-3 DCT

Each data bank point can be the destination of the direct vector:

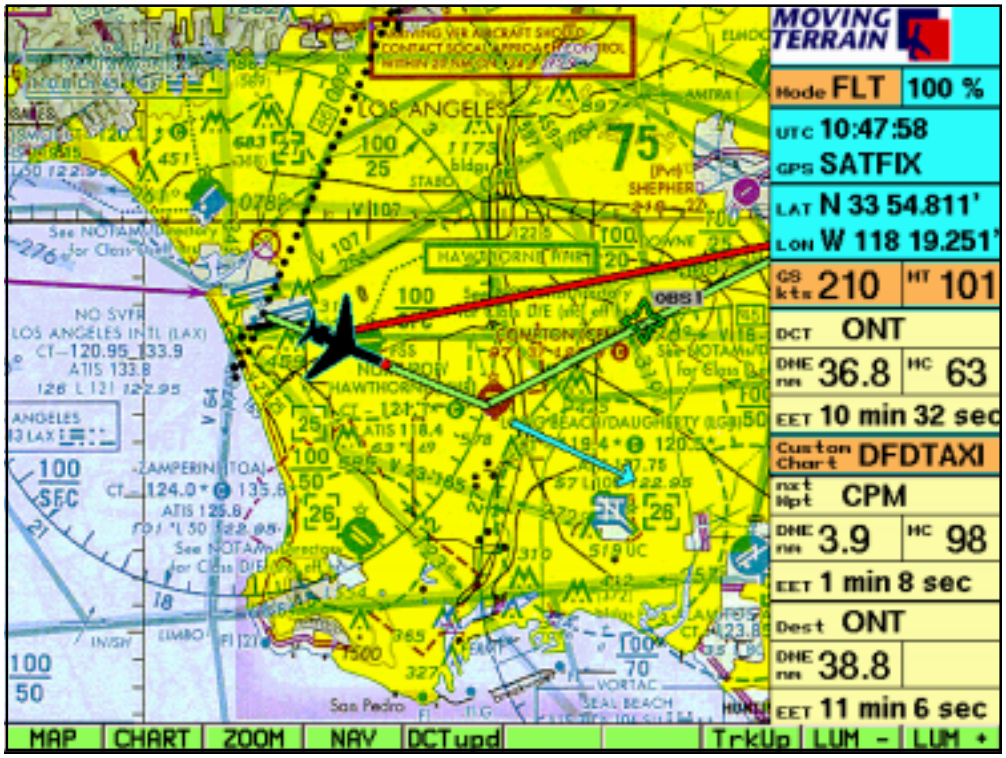
- Select your waypoint and push the key DCT.
- Instantly it changes into the base mode and the chart (base chart or custom chart) appears.
- The red line shows the way (great circle) from present location to the selected destination.
  (Note: is the present position with the destination of the direct identical, the line is reduced to a point).
- Additional information (DME, MC, EET) is given by the info box.



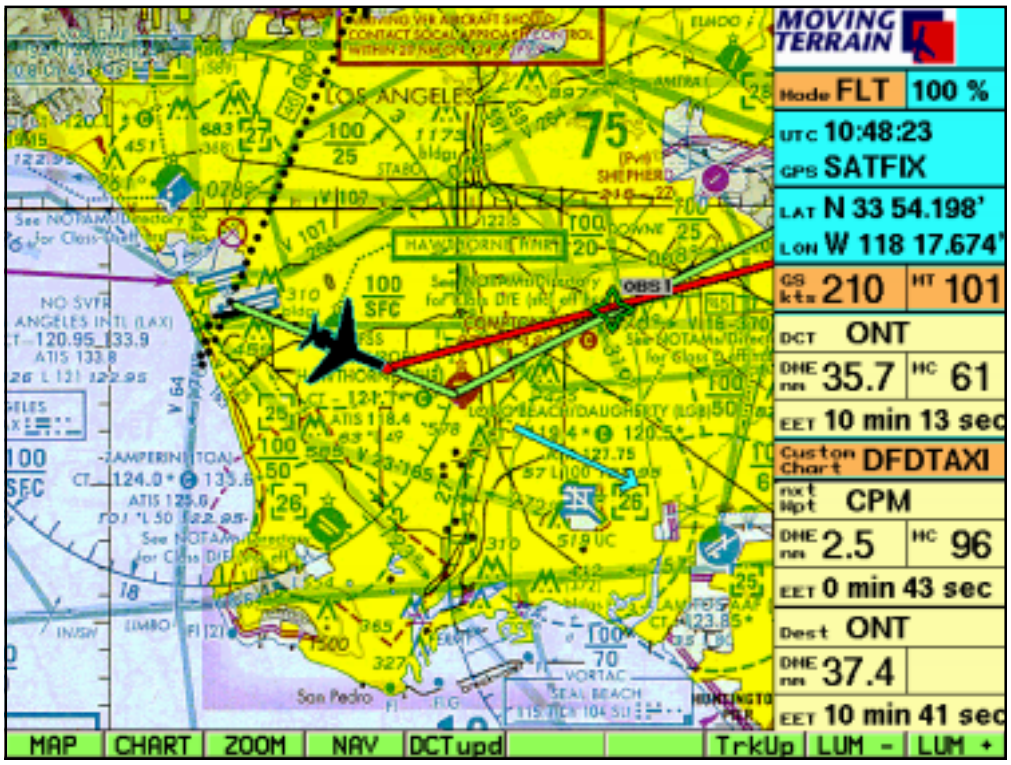
IV.2.4 DCTupd

By pushing the key **DCTupd** you get the vector updated from present position.

Before the Direct Vector:



After pushing the key DCTupd:



IV.2.5 DCTtmp

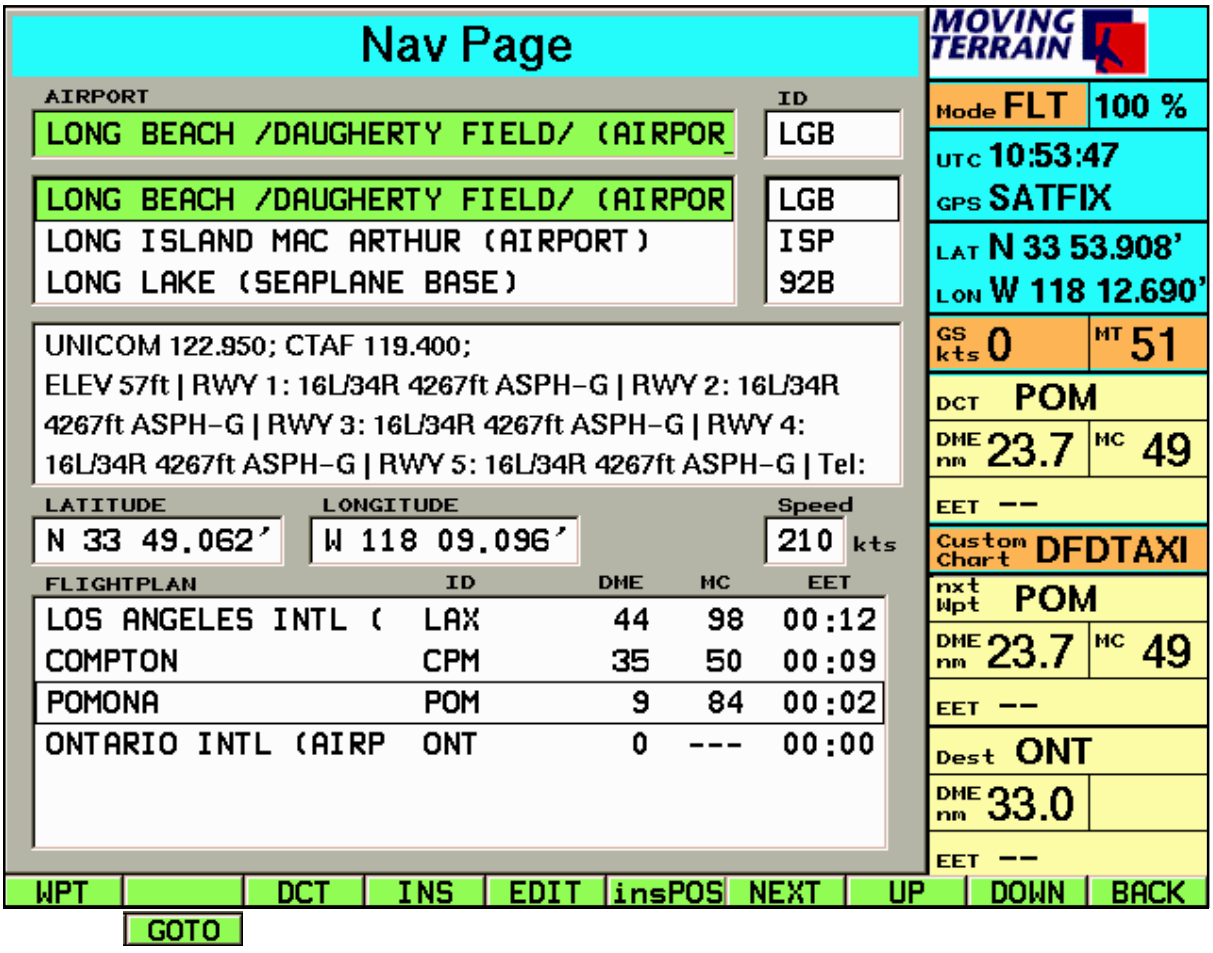
This function yields a quick direct vector, without defining a WPT, to an arbitrary location on the map:
Simply move the chart to the destination, push **DCTtmp.** If you now move away from the point, the vector appears. It always “follows” your location. When you change to Flight Mode, the GPS gives your position, the direct vector appears on the chart as a red line between your position and the selected destination. In the Info Box the destination shows as DCT TMPFIX.

Example in Map Mode:

Example in Flight Mode:

IV.2.6 Flight Plan (Route)

IV.2.6.1 Designing a Flight Plan with Waypoints from Various WPT Types



Your will put your flight plan clearly together on this page:
Depending on the position of the highlight, the functions of the keyboard changes. During closing of the nav page, the last position of the cursor is saved. When reopening the Nav Page, the functions of the keyboard relate to the position of the highlight.

4-1 **WPT**
To select a waypoint data bank (APT/VOR/NDB/INTSEC/USER)

4-2 **GOTO**
Each point from any data bank can be reached by GOTO (only available in Map Mode).

4-3 **DCT**
Each point from any data bank can become the destination of the direct vector. The Direct Vector can be activated at any time from the Flight Mode by **DCTupd** from the present position.

-4-4 **INS**

Inserting the waypoint in the flight plan before the position, where the insertion frame is visible:
Normally a route point is inserted in the last position of the route. If you want to insert a point at a different position in the route, you have to push NEXT (2 x), the cursor is now positioned in the field “flight plan”. Select with UP or DOWN the waypoint, which will be the following of the new route point. The new waypoint will be inserted **before** the highlighted waypoint.
With NEXT (2 x) you get back to the waypoint window.

-4-5 **EDIT**

Change to User Waypoint Edit Page.
EDIT always points to User Waypoint data, only these can be worked on.
The safety of loosing data from all other data banks remains.

-4-6 **insPOS**

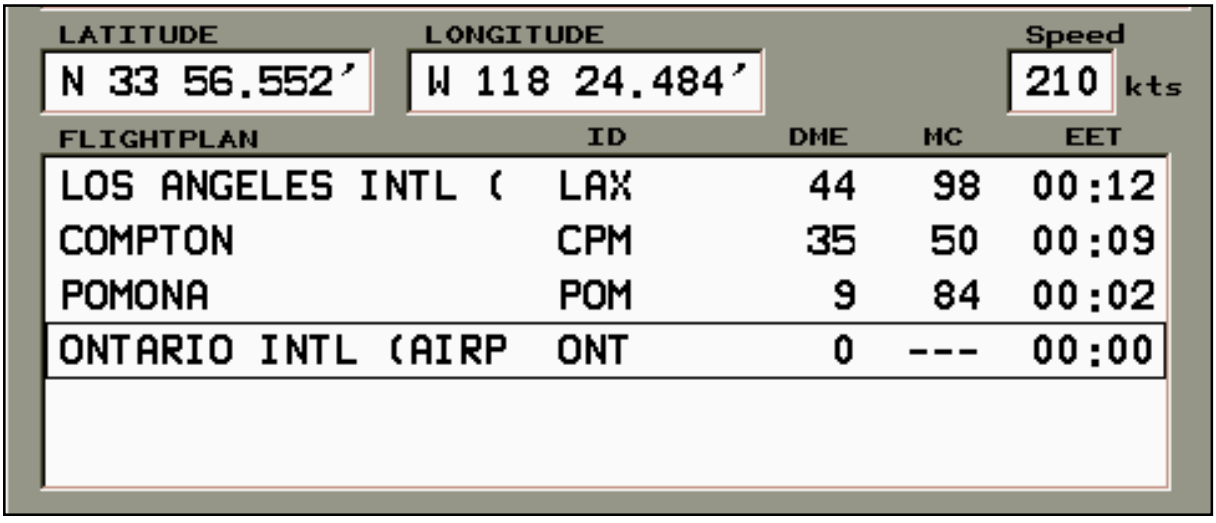
The present location on the chart is inserted into the flight plan.

-4-7 **NEXT/UP/DOWN**
to -4-9

The keys move from field to field (NEXT) and within a field for selection in list boxes (UP/DOWN).

IV.2.6.2 The Flight Plan: Explanation of the Field “Flight Plan”

In the flight plan the name of the route point as well as the identifier are given.



Further features:

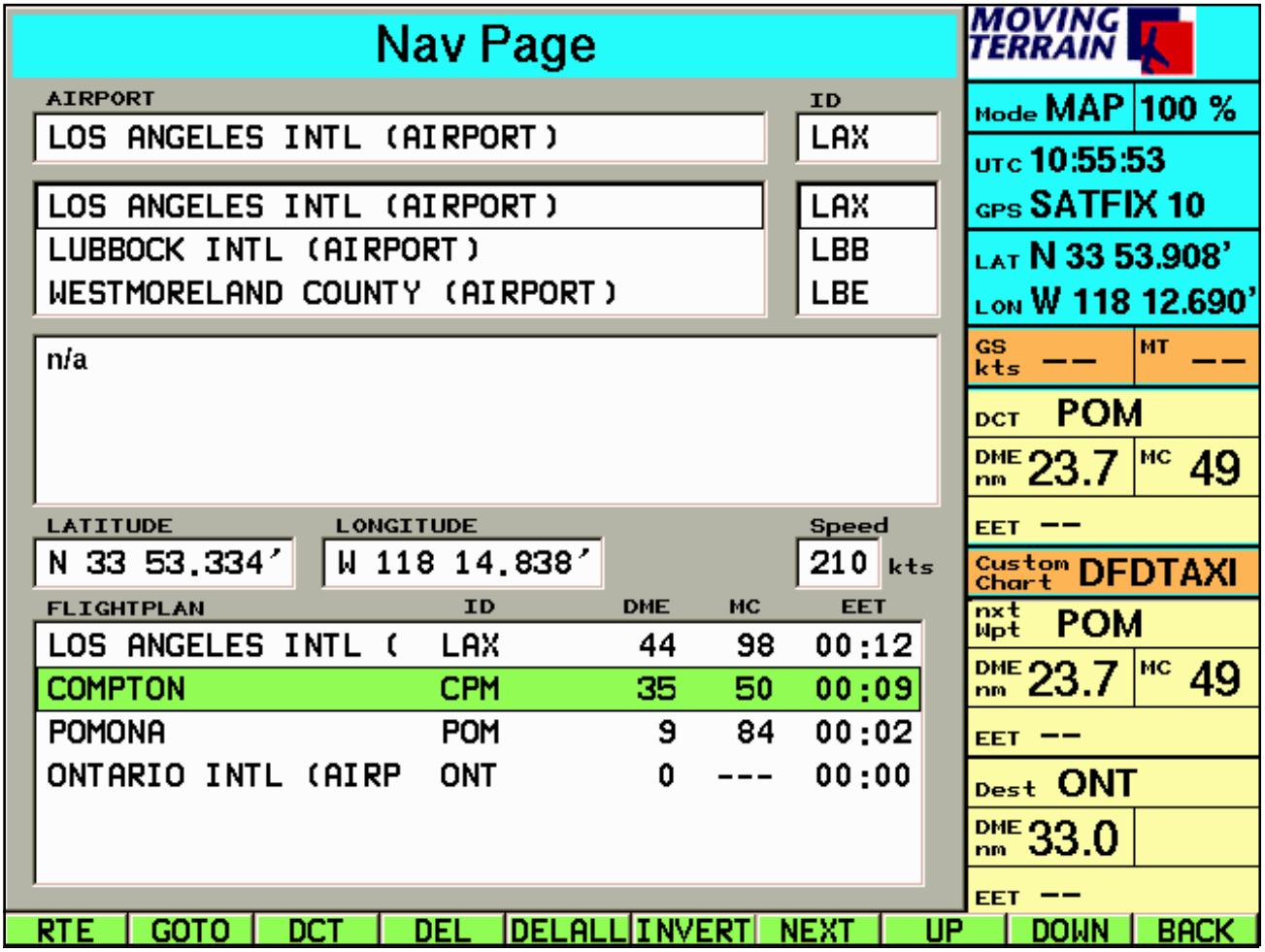
DME Accumulative remaining distance to destination (=last route point in flight plan) along route in nautical miles

MC The magnetic course

EET The estimated enroute time using the speed value
The speed can be typed in or gathered in flight mode from GPS (see chapter “Speed”).

The coordinates given in the fields LATITUDE/LONGITUDE always relate to the highlighted waypoint, either in the upper “waypoint” field or in the “flight plan” field. Coordinate insertions cannot be done on this page (see chapter IV.2.2.1 “Creating a New Waypoint” and IV.2.2.2 “Modifying a User Defined Waypoint”).

If you position the highlight in the field “flight plan” (by pushing NEXT), additional functions are available.



-4-1 **RTE**

Changing to route page and saving of actual flight plans and loading of already saved routes (flight plans).

GOTO/DCT **NEXT/UP/DOWN/BACK**

Same functions.

-4-4 **DEL**

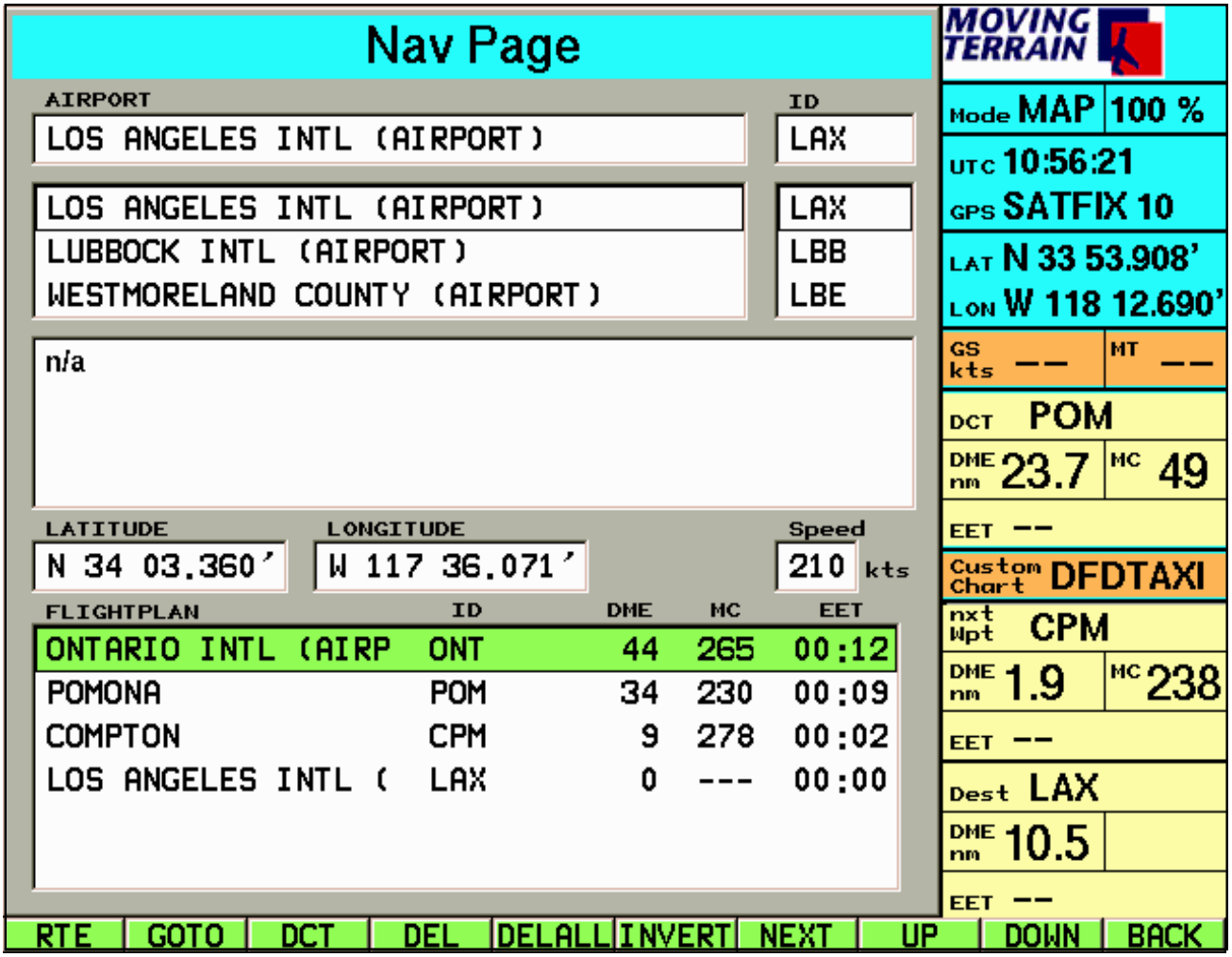
If you want to delete a certain point from your flight plan, position the colored beam on it (UP/DOWN) and push DEL.

-4-5 **DELALL**

With DELALL you are deleting the entire flight plan from this menu (but not already saved flight plans, which you can load again with the help of the route page).

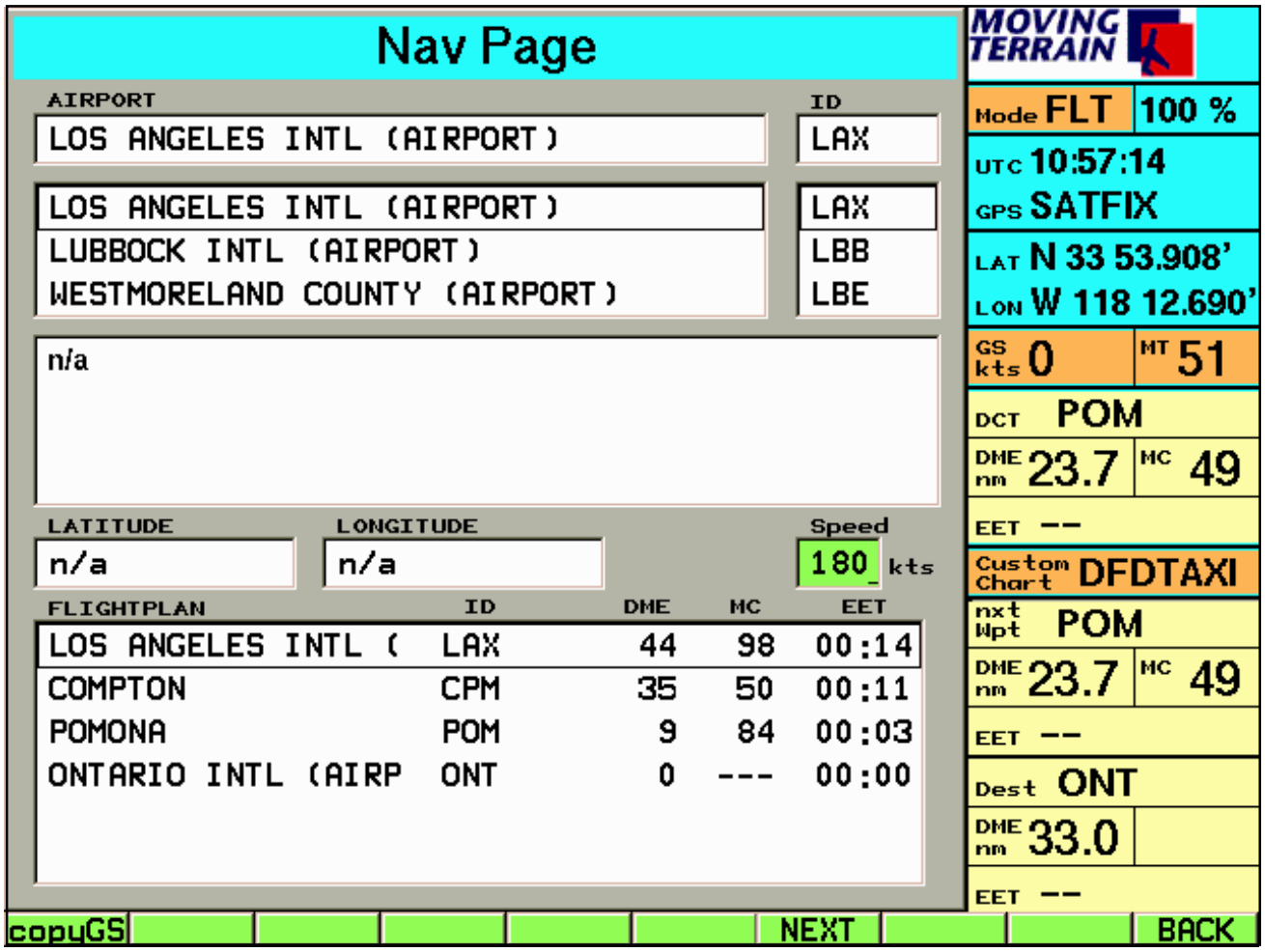
-4-6 **INVERT**

INVERT turns the flight plan around: By pushing a key you have the flight plan for the return flight:



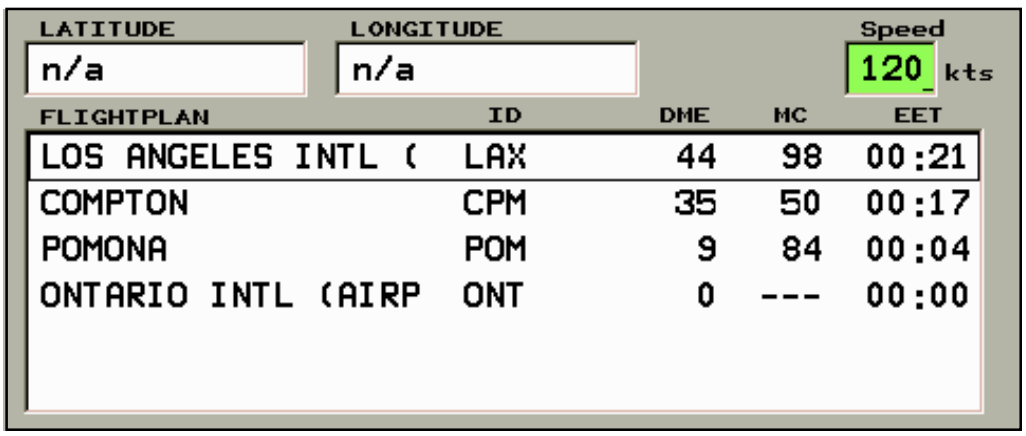
IV.2.6.3 Speed

“Jump” with NEXT to the field “Speed”.

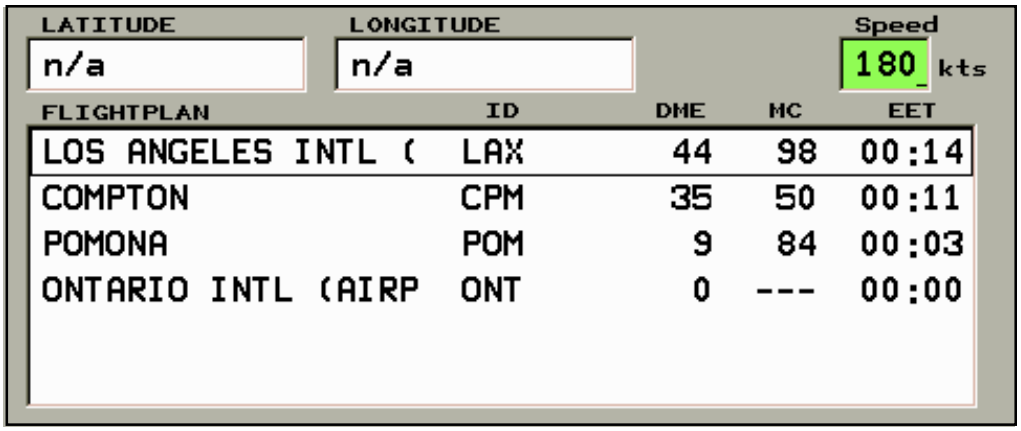


Give your traveling speed in knots by using the keys or by pushing **copyGS:** Now the EET of the selected flight plan is calculated by the current speed. This function is only available in Flight Mode!

GS 120 kts:

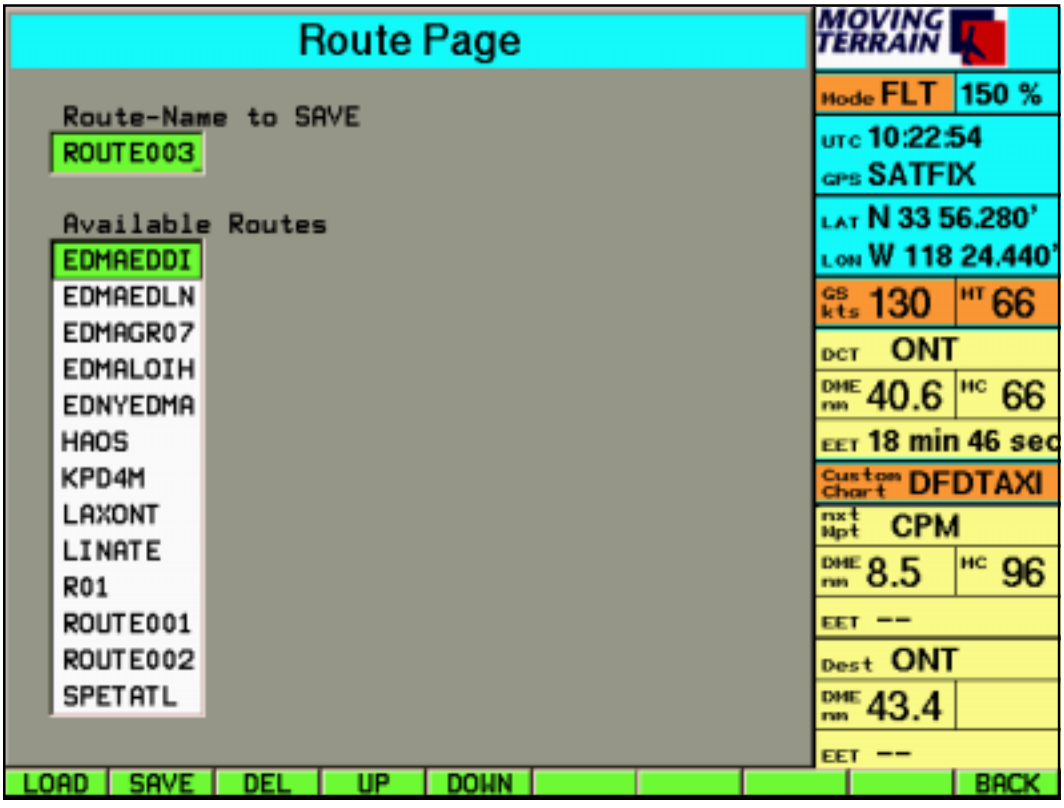


GS 180 kts:



IV.2.6.4 Saving and Loading of Flight Plans and Route Segments (Route Page)

To make a flight plan available for future use, it can be saved. Open the route page by pressing of RTE.



In the field “Route Name to SAVE” appears a previously given name ROUTEXXX. You change the name with the keys in the frame, 8 symbols are available (for example, identifier of the departure airport and the destination airport or another sensible name). The entry of an individual name simplifies finding it again for future use.

Tip: Did you make a typing error? Press UP/DOWN, now you have another change to type the correct name.

4-1-2 **SAVE**
Press SAVE and the flight plan is saved by the given name.

If you want to load a saved route, type the name or move the highlight with UP/DOWN.

4-1-1 **LOAD**
The flight plan typed in the individual window is activated and it goes automatically back to the nav page.

Important:

Flight plans are loaded additively. That means: If you have already loaded a route, the route that is now activated by LOAD is **added** or **inserted before** the position where the cursor in the field “flight plan” is located. This function serves the uncomplicated combination of route segments.
(For example, repeatedly used arrival- or departure routes.)

-4-1-3 **DEL**
Deleting a flight plan: with UP/DOWN you can select the flight plan, which you are no longer using. By pressing DEL you are deleting it.
The deletion of no longer used routes simplifies finding flight plans or route segments that are repeatedly being used.

-4-1-4 **UP**
Moving up in the list box.

-4-1-5 **DOWN**
Moving down in the list box.

-4-1-10 **BACK**
Back to nav page.

IV.2.6.5 Following the Flight Plan in Flight Management System Window

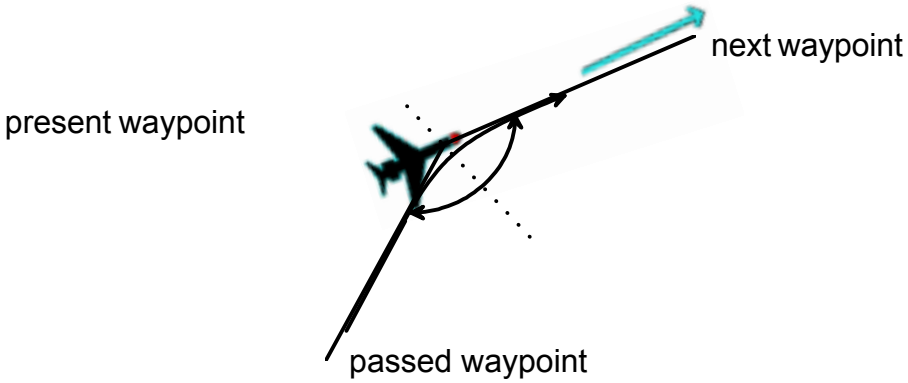
This window appears by starting Moving Terrain 5.5 automatically.
By the key **TrkUp** (Flight Mode), change to view the Track Up window.
By the key **FMS** (Flight Mode) back to Flight Management System window.

The FMS window shows data to both, the next and the destination waypoint from the selected flight plan:

Next Waypoint	Identifier
DME in nautical miles	Magnetic course above ground
Estimated enroute time:	Remaining time to next waypoint (by maintaining same GS)
Destination Wpt	Identifier
DME in nm:	Remaining distance to destination of the planned route in nautical miles*
EET to destination Waypoint (by continuing GS)*	

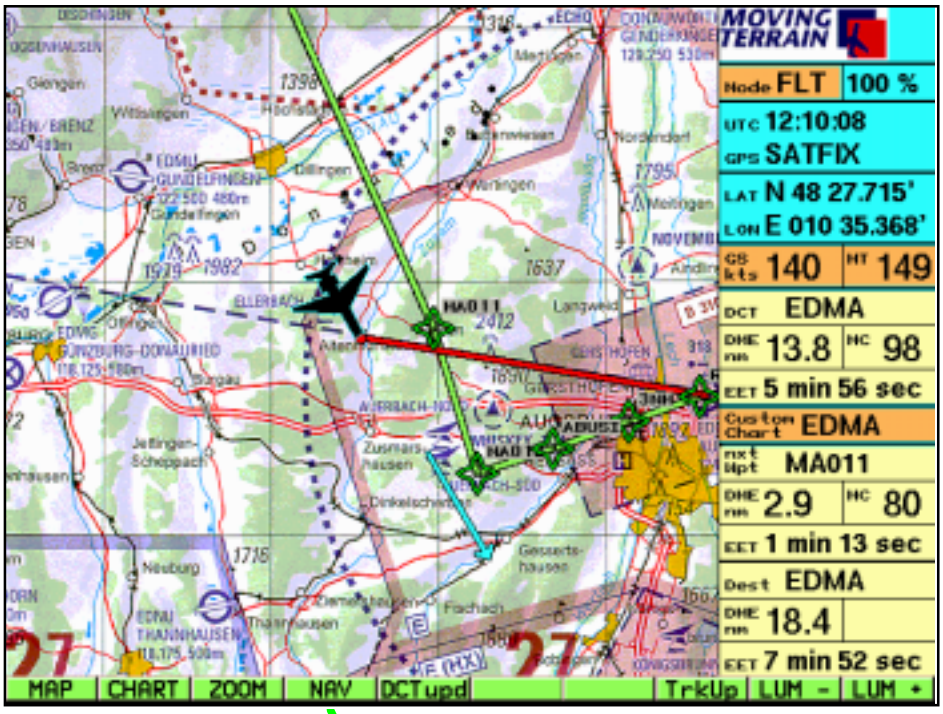
* (Please note the following for the calculation of DME and EET)

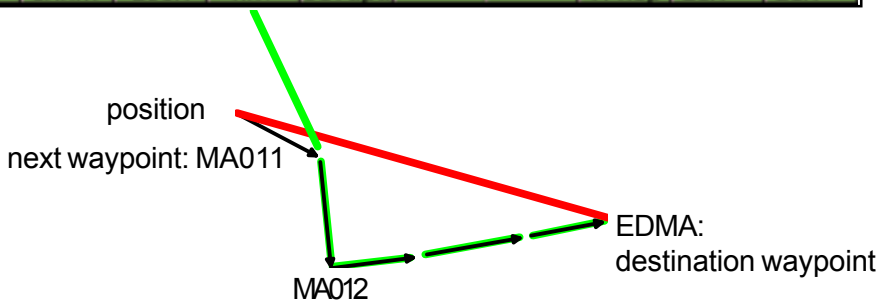
Next Waypoint: The next waypoint is the waypoint relative to the present flight position in the flight plan. The system moves to the next waypoint, as you are just flying over a point on the flight plan or you have flown passed it. Flown passed means, the centerline is in an angle: passed WPT, present WPT and next WPT.



Destination Waypoint: The destination waypoint is the last point in the flight plan (destination of the route).

(Note to the following example: The green symbols refer to user waypoints in this example: the approach waypoints are saved as user waypoints. If you use points from other data banks, only the green route line appears.)





Calculation of Navigation Information in FMS: DME, MC, EET

Direct:	Shortest connection (great circle) between location and destination (red line)
Next Waypoint:	Data is obtained how to get directly to the next waypoint.
Destination Waypoint:	From location to next waypoint: from there values are calculated along the selected flight plan to destination.

The information in the FMS window always depart from the point, which is marked as the actual position on the chart. As you switch to Map Mode and move the chart, the data to the waypoints are continuously updated.

Important:
The FMS window is activated by starting the system or by the key FMS in Flight Mode. If it is active, it is always visible, in all modes, in Map- or Flight Mode. It is active until you switch to the Track Up window.

IV.2.6.6 Mapping out the Fligth Plan on the Chart

The flight plan is represented on the chart using green lines.

In case both vectors happen to be exactly the same, the red DCT vector overlays the green route vector.

IV.2.7 GOTO or DCT to Known Coordinates (Example)

Problem: Only the coordinates of the destination are known, the point is not saved in any of the data banks.

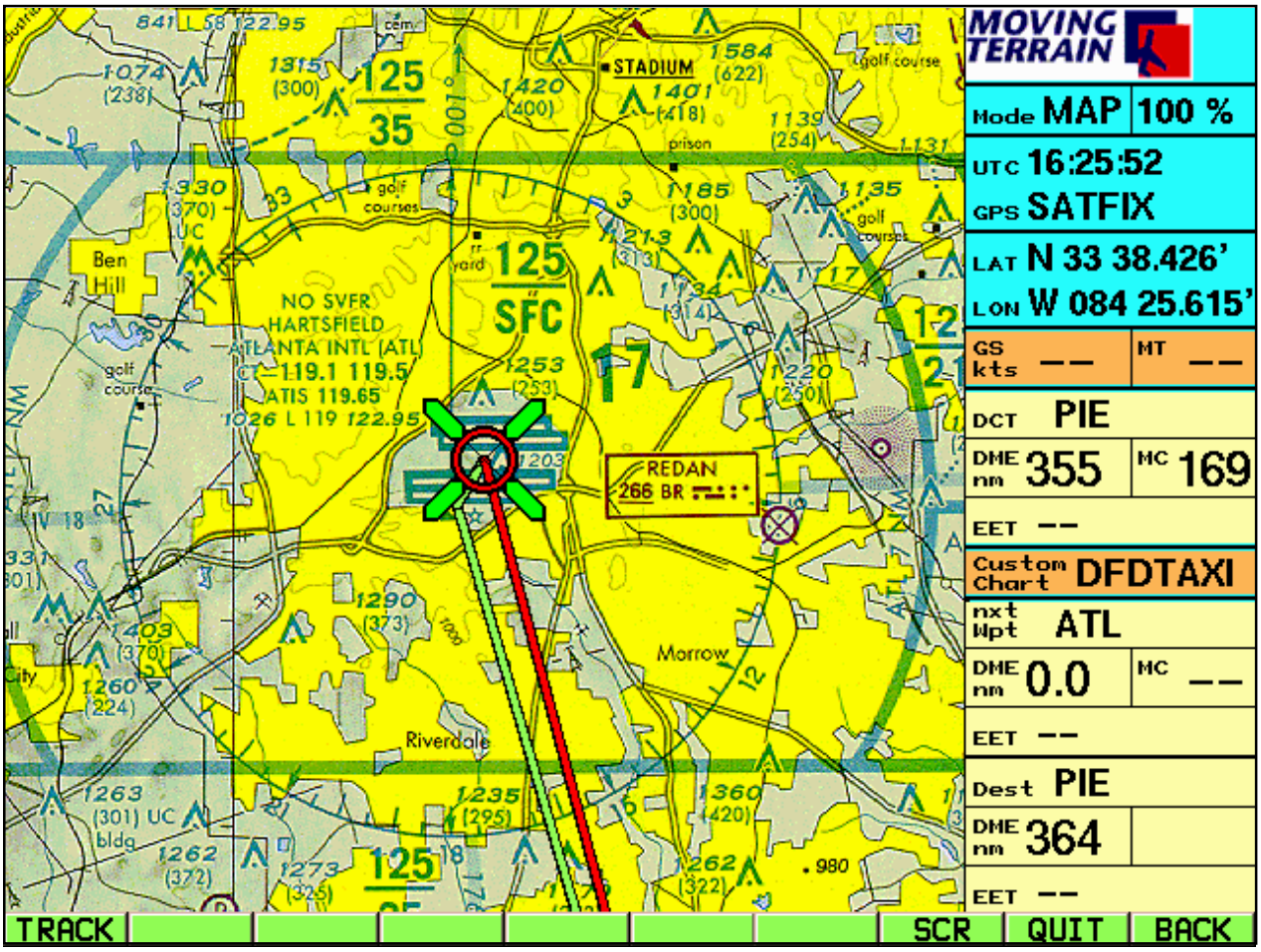
Solution:

Map/Flt		Main level
-4	**NAV**	Nav Page
-4-5	**EDIT**	User Waypoint Edit Page
-4-5-1	**NEW**	Creating a New User Waypoint
-4-5-1-6/	**PREV**	
-4-5-1-7	**NEXT**	With these keys jump to the coordinate fields and enter the desired coordinates
-4-5-1-2	**GOTO**	Direct “jumping” to the point on the chart without saving a WPT or:
-4-5-1-3	**DCT**	Direct Vector to that point. In both cases you will be positioned back to the chart

The saving by a name (either the previous (WPTxxx or by an individual name) is possible =>4-5-1-1 **SAVE**

It is usually simpler to directly position the chart at the desired point (NORTH/SOUTH/ EAST/WEST) and press DCTtmp.

IV. AUX (Switching to Additional Functions)



IV.3.1 Basics of Tracking

- Beginning of tracking starts with valid position (SATFIX) in Flight Mode.
- Every 10 seconds the position is marked (track points).
- When turning off the unit the track is deleted. In other words, it has to be saved beforehand, if you want to replay the track in the future.

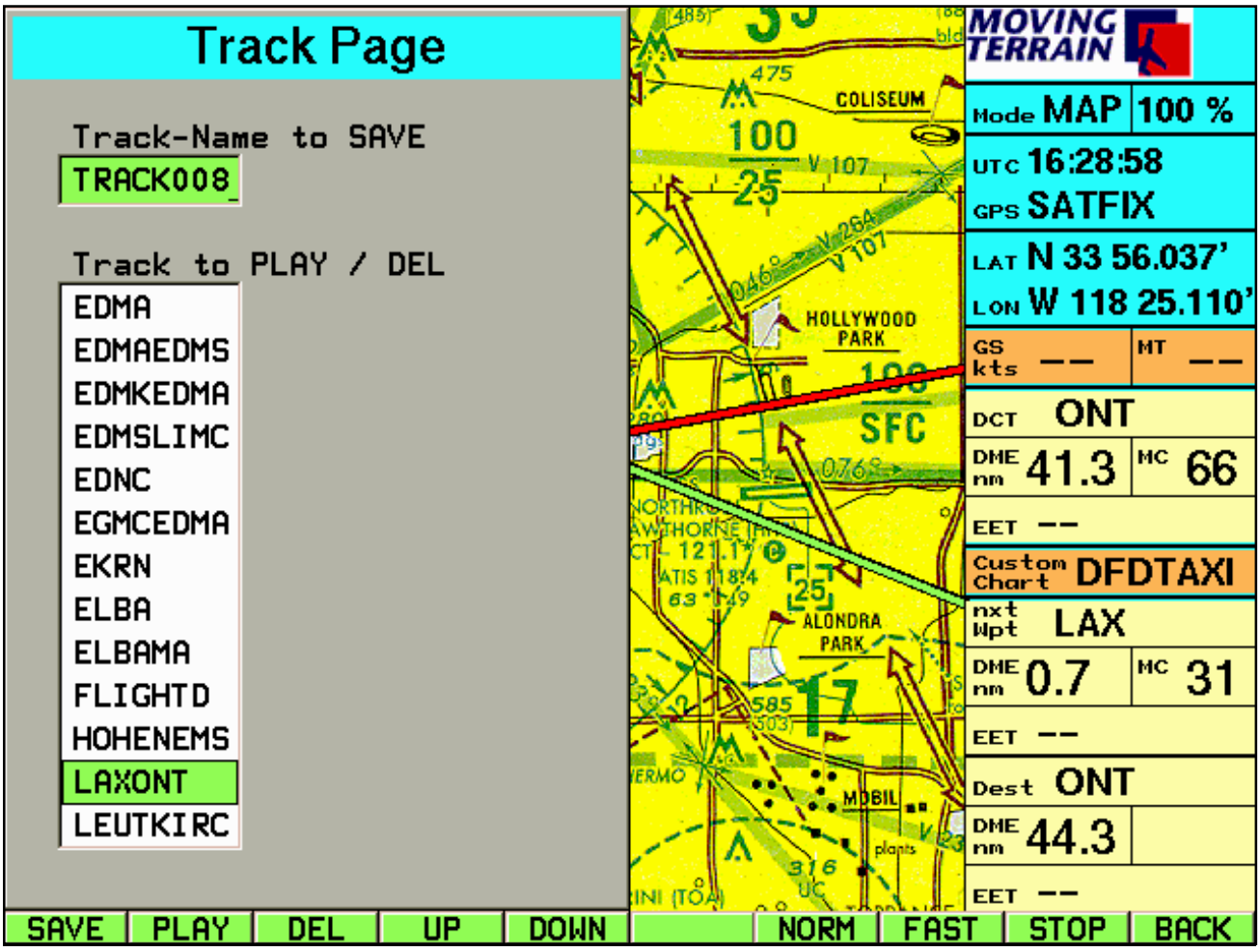
IV.3.2 Working with the Track Page: Saving and Replaying of a Flight Route

-10-1 **Track** Track Page

The Track Page appears in two Modes:

- Function Mode: The keys **SAVE/DEL/UP/DOWN/BACK** relate to this mode..
- Replay Mode: Activated by **PLAY** (keys **NORM/FAST/STOP/BACK).**

Function Mode:

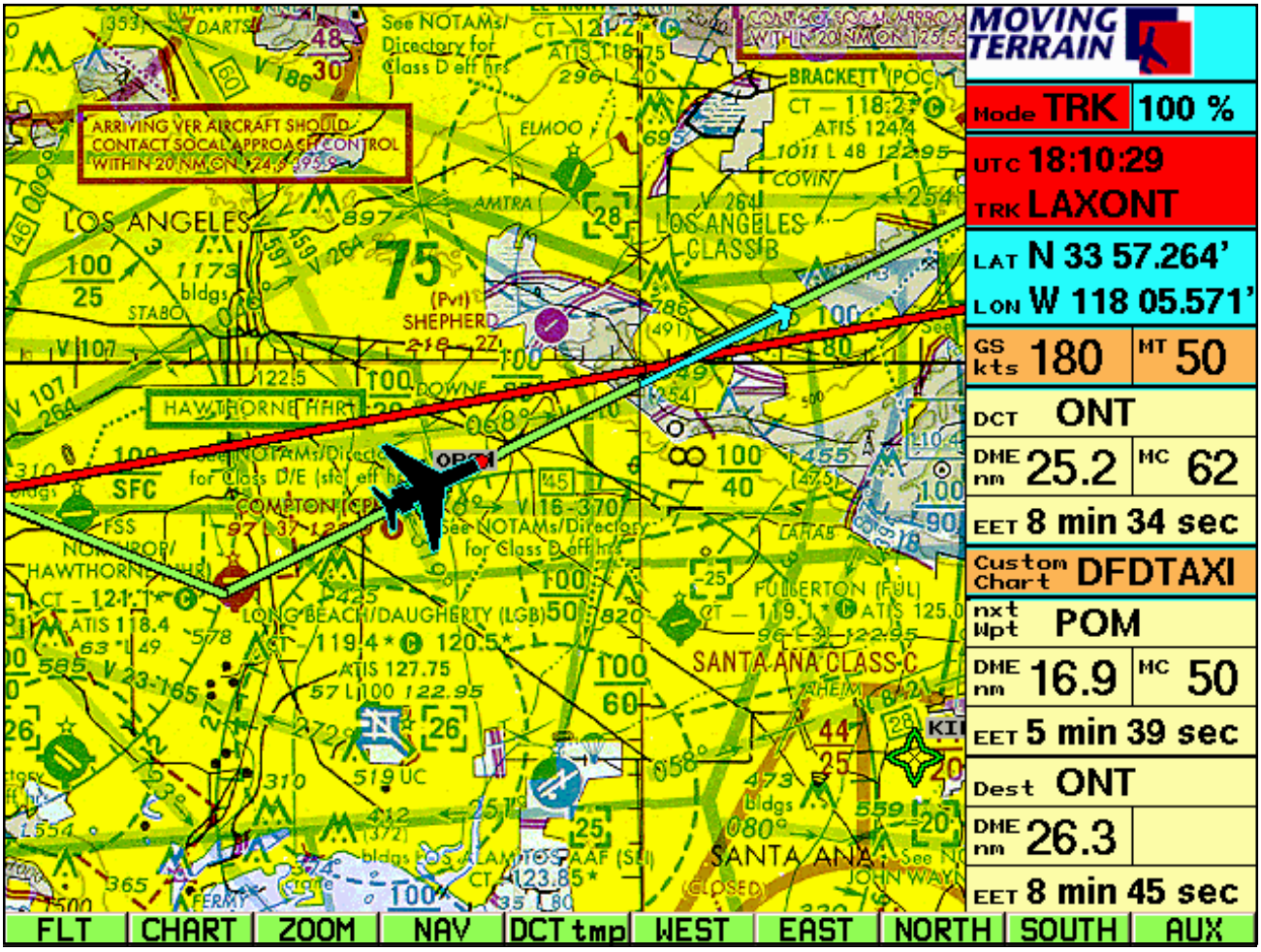


Map-10-1-1	**SAVE**	Saving of the track just flown (before turning the unit off) by a name suggested by the system (TRACK000, TRACK001, etc.) or - better - by an individual name
Map-10-1-2	**PLAY**	Playing a saved track in time lapse (relates to selected track in the bottom window)
Map-10-1-3	**DEL**	Deleting a track from the list
Map-10-1-4	**UP**	Moving up in the list box
Map-10-1-5	**DOWN**	Moving down in the list box
Map-10-1-10	**BACK**	Back to main level

Replay Mode: activated with **PLAY**

In the info box appears:
- TRK mode (various zoom factors available)
- UTC of the track
- TRK: name

In the Track-Up window the chart is shown pivoted track up.



Map-10-1-7	**NORM**	Replay in approx 10 x as real speed
Map-10-1-8	**FAST**	Replay in fasted possible speed
Map-10-1-9	**STOP**	Ending of the replay, back to Map Mode.
Map-10-1-10	**BACK**	Back to Map Mode with additional functions (like ZOOM, DCT, change of chart base)

When switching to Flight Mode the replay ends.

V.1.Introduction

V.1.1 How does the installation program work?

Basic idea:

A standard PC and the MT-Ultra unit will be connected by a cable and software. The PC is used for reading data from a CD-Rom or from a directory of its harddisk and transmitting this over the cable onto the harddisk of the MT-Ultra.

For the connection of both units it is necessary, that the PC is started in DOS-mode. This is achieved by the attached floppy disk.

Please read the instructions carefully and **follow the installation process step by step**. The order of the individual steps is important for the success of the installation.

V.1.2 What is the purpose of the installation program?

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

  Installation of **Base Charts**
  Installation of **NavData** (APTs, VORs, NDBs, Intersections)
  Installation of **Custom Charts** (special charts)
  Installation of Obstacle Data*
  Installation of newer versions = **Update of the MT program**

- Further allows it to copy data from the harddisk of your computer onto the MT unit:

  Custom Charts (referenced with the program MTChart)
  NavData*
  Obstacle Data*

- Finally:

  Copying Navdata from the MT Ultra onto floppy disk*

Important: Options marked by an * are not contained in the serial version of MT.

V.1.3 Preparations

The following items are required for the update:

- PC or Laptop with floppy drive;
- Laplink Cable;
- customary PS/2 keyboard (for version MT 3.6);
- bootable disk = MT Update Utility Disk from MT;
- CD-ROM from MT.

V.2. Connecting the two devices

Important: Both devices are switched off at the beginning.

Step 1: Open the service lid on the rear of your MT-Ultra unit.

Step 2: Use the enclosed laplink-cable to connect the first parallel port (printer port) of your PC (LPT 1) and the parallel port of the MT-Ultra unit.

Step 3: Turn on your MT-Ultra unit and wait until it has booted completely. Then press the AGREE button.

Step 4: Switch the MT-Ultra into Update-mode:

a) if you use **software version Moving Terrain 5.0 or higher**, quit the program via **AUX -> QUIT** (keep button pressed).

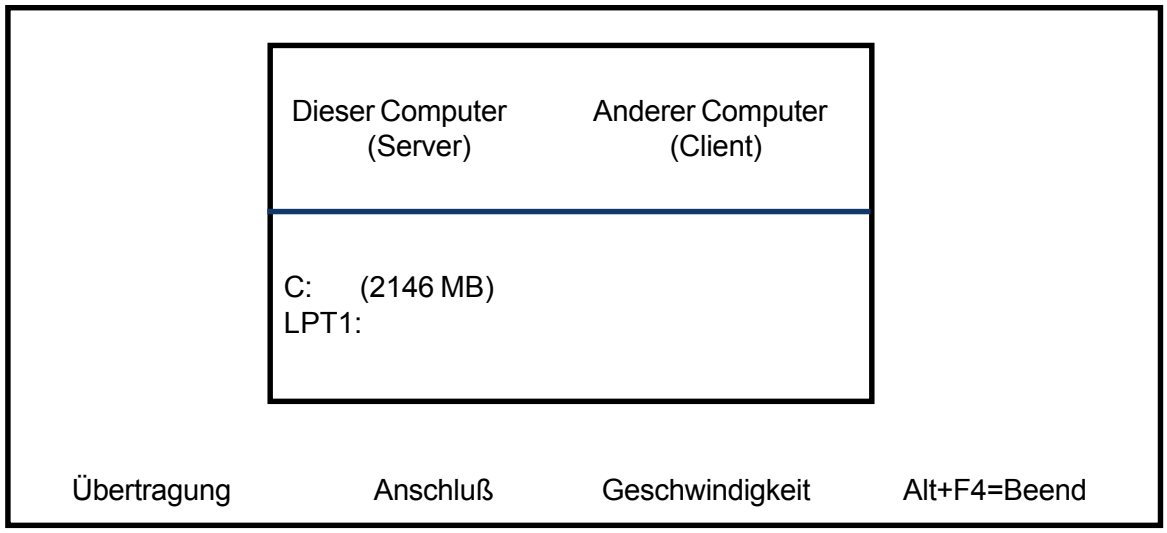
b) if you use **software version 3.6x**, you need a customary PS/2 keyboard (an adapter for other keyboards is also enclosed); quit the MT-program by holding down the F12 key for 5 seconds. Then quit Windows by pressing <ALT-F4> and <ENTER>; in DOS-mode enter the following line:

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

or if you have a German DOS version and an American keyboard

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

Independently from the version of your MT Software the following screen will appear on your display:



Your MT-Ultra unit is now ready for data transmission.

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

Step 6: Turn on your PC.

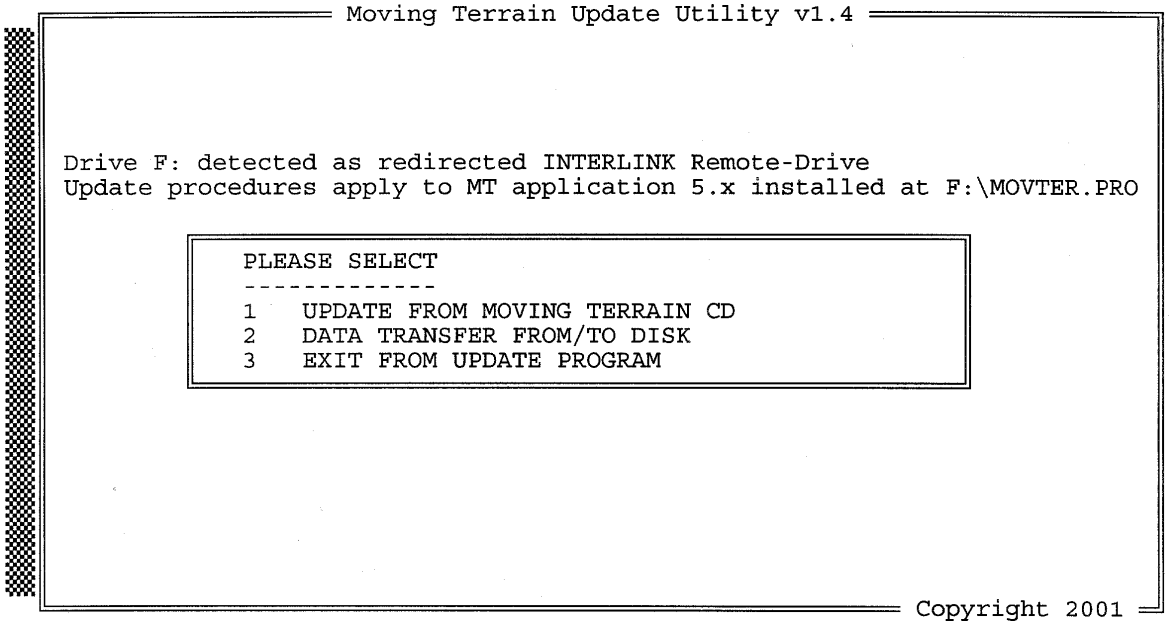
Step 7: Choose the keyboard-option:

´1´ = German keyboard

´2´ = American keyboard

<ENTER>.

Now the program looks for your MT-application and shows after a successful search the following main menu:



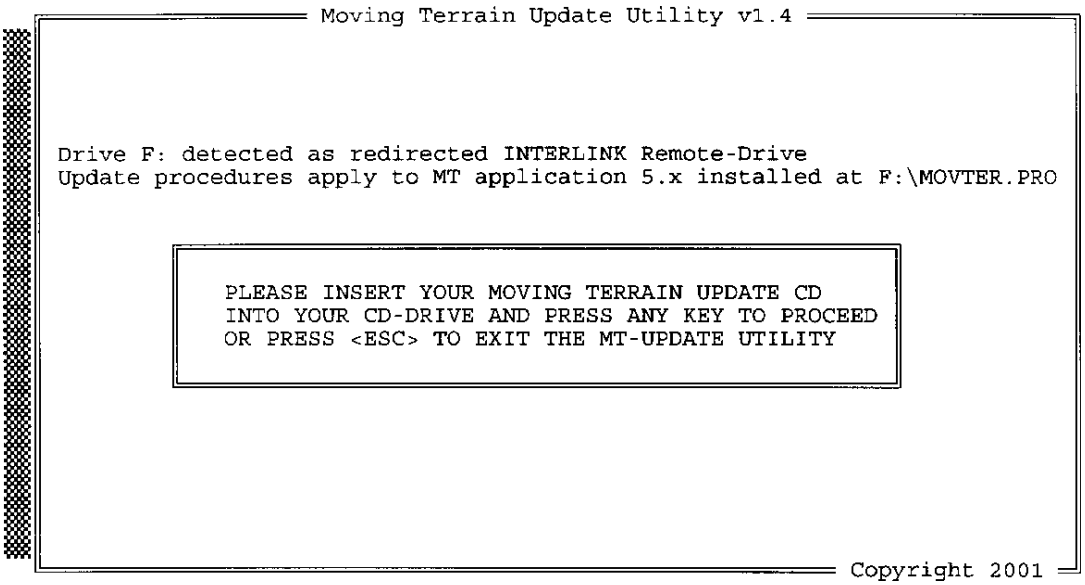
Both units have been successfully connected.

V.3. Options of the installation program

Now select your preferred option by typing the corresponding number.

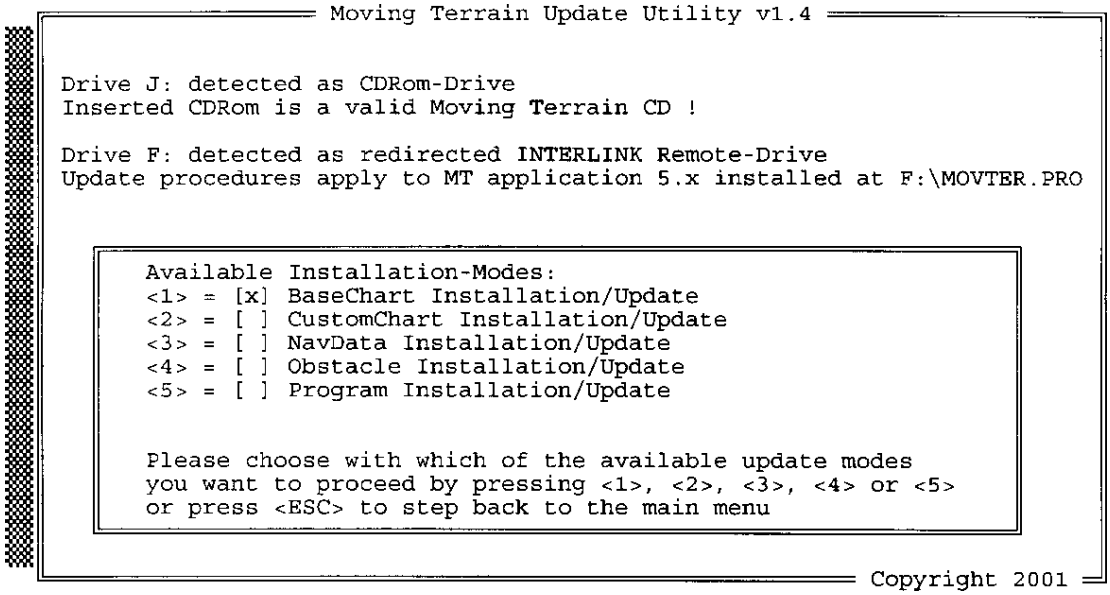
V.3.1 Installation from CD

For installation of data from a Moving Terrain CD choose option 1.
By the following screen you are asked to insert a Moving Terrain CD.



Insert the CD and press any button to continue with the installation.

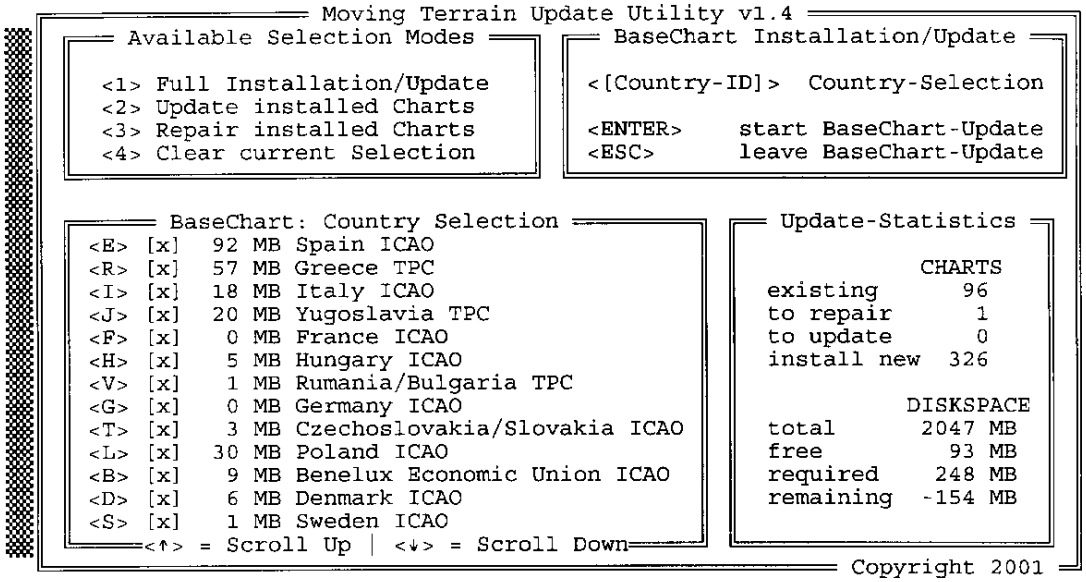
In case the inserted CD is a valid MT-Installation CD, the program shows you the following menu:



Active menu points are marked by an X.

- Choose out of the categories marked with (X) the desired update/installation **by pressing the corresponding number key** (1-5).
- By pressing the <ESC> key you will return in to the main menu.
- (Installation/Update of obstacle data does not apply to the serial version of MT 5.x!)

V.3.1.1 Installation/Update of Base Charts



Choose 1: Base Chart installation/update

Important:
In the lower right window on your display you can see how much hard disk space is available before and after the installation (at least 10 MB must always remain free!)

In this example the installation will not be started, since there is not enough free disk space on the unit.

Select now between:

<1> **Full Installation/Update:** Update of all existing charts and installation of new charts
<2> **Update installed Charts:** Only update of existing charts (recommended if hard disk space is limited)
<3> **Repair installed Charts:** Repairs incomplete or corrupted charts.
<4> **Clear current Selection:** Clears your actual selection.

The desired option is activated by pressing the corresponding number.

In the lower left window you see the list of all countries contained on the CD. Since in the normal case all data should be copied onto the MT unit , all single countries are active by default. This is shown by the (X) in the second column. The first column contains the letter by which the corresponding country may be deactivated/activated. For toggling the state of a country press the corresponding letter.

- Choosing the desired countries to be installed allows the possibility to have exactly that combination of charts on your MT Unit that you require for your journey. On account of the fact that the hard disk space of the MT Unit is limited, a selection of the charts should be made.

- If a selection of the countries it to be made, press <4> to get all countries deactivated. Now you can select the desired countries by pressing the corresponding letter (e. g. <E> for ICAO Spain, <G> for ICAO Germany).

For Europe only:

- Please take into account: Since we assemble the available ICAO charts of the European countries along their borders, charts belonging to two (or more) countries have to be assigned to only one of them. This means that e.g. if only Switzerland is chosen to be installed, you can be quite sure that the whole country will not be available on the MT unit. This is because several files are assigned to France, Italy, Austria or Germany. In a case like this the bordering countries should also be selected for installation. Also, in case you’re flying in the Pyrenees, don’t neglect to include the Spanish base charts!

- One exception: If Germany is selected to be installed then the ICAO charts for the entire of Germany will be installed (i.e. including all bordering charts).

V.3.1.2 Installation/Update of Custom Charts

Choose 2: CustomChart Installation/Update
All custom charts contained on a MT CD will be installed. If there exist already files with the same name older files will be replaced by newer versions. It is not possible to make a selection of custom charts.

V.3.1.3 Installation/Update of NavData (APTs, VORs, NDBs, Intersections)

Choose 3: NavData Installation/Update
NavData will be installed, older versions will be replaced by newer ones.

V.3.1.4 Installation/Update of Obstacle data *

Not relevant for the serial version of MT 5.5

V.3.1.5 Installation/Update of the program

Choose 5 for the installation of the program Moving Terrain v. 5.5 on your MT-Ultra unit or for the update from an older version of Moving Terrain to a newer one.

V.3.1.5.1 Registration of Moving Terrain Version 5.x on the MT Unit

If MT 5.x is being installed for the first time, the following menu will appear on the MT unit´s screen at start-up:

```
This file is not authorized at this site
   AUTHORIZATION NOT PRESENT

[A=Authorize|  [D=Direct Transfer|       [Q=Quit|
[R=Register Site| [O=Transfer Out|  [I=Transfer In|
Please select from the menu above:
```

At this point press ´A´ to receive the ,,site code'' e.g.

```
Site Code = A012 B345 C901 23.
```

Please fill in this ,,site code´´ into the form and fax it to Moving Terrain. The ,,site key´´ will be faxed back to you.

This ,,site key´´ has to be typed in and to be confirmed by pressing <ENTER>. If you have no other keyboard, you can temporarily attach the keyboard of your PC to the MT-Ultra unit (adapter - if necessary- is enclosed) as to have an ENTER-key.
After this select ´Q´ for QUIT. This will finish the registration program and start MT 5.x.

V.3.1.5.2 Remarks concerning the update from MT 3.x to MT 5.x

* All base charts and custom charts that were installed under MT 3.x will be available after the update under the new program version.

* The databases of the two software versions are not compatible:
User waypoints, tracks and routes are only available in that version they have been elaborated for.

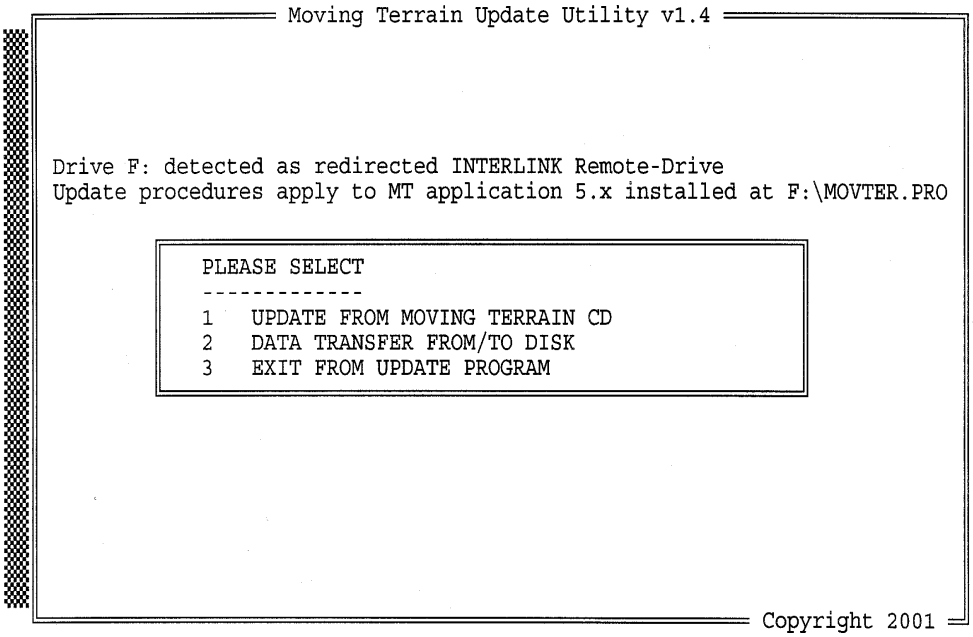
* **MT 5.x only supports GPS with NMEA protocol**

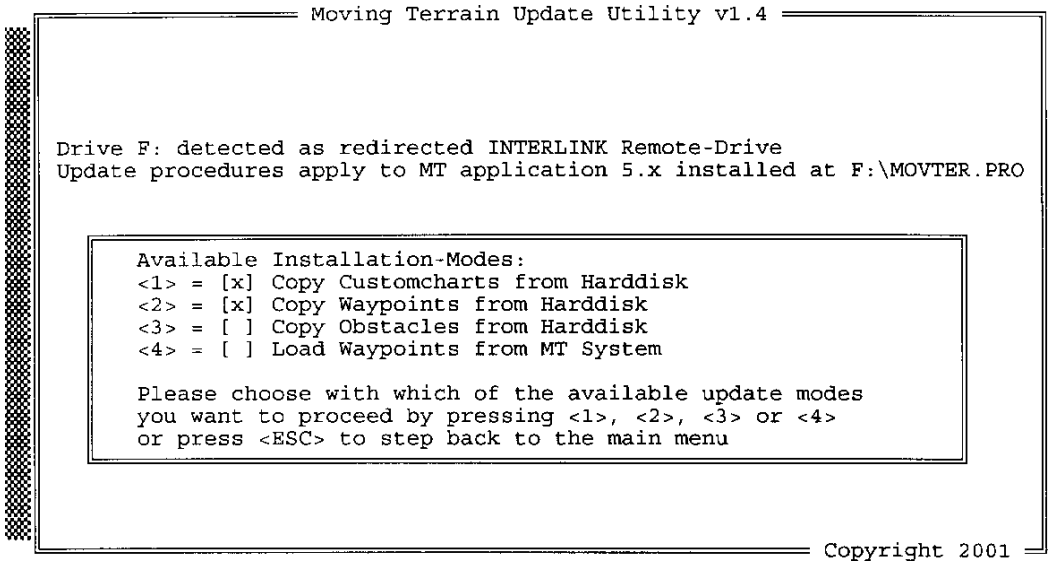
V.3.2 Installation of Custom Charts immediately from the harddisk of your PC

If you have your own custom charts already referenced with the program MTChart.exe that you can immediately (without burning them on CD) copy them to your MT-Ultra unit.

Remark to the MTChart program:
The files necessary for the program are be contained in the directory MTCHART of your installation disk and can also be downloaded from our homepage www.moving-terrain.de. Here you find a guide as well.

In the main menu select the option:
Data transfer from/to disk.





Important:

Store your referenced custom charts (*.mtc) in the directory **C:\MOVTER\CUSTOM.NEW**, since otherwise the installation program will not find them. Please create a directory with this name on the harddisk C on your PC and store your custom charts there.

V.4. Exit from the installation program

By pressing <ESC> you get the choice to quit the program by pressing <ESC> again or to choose another category of installation/update by pressing any other key.

Turn off both the MT-Ultra unit and your PC and remove the interlink cable.
Remove the boot disk from your PC and care about it, you will need it for further updates.
Close the service lid on the rear of your MT-Ultra unit and fix it by the three screws.