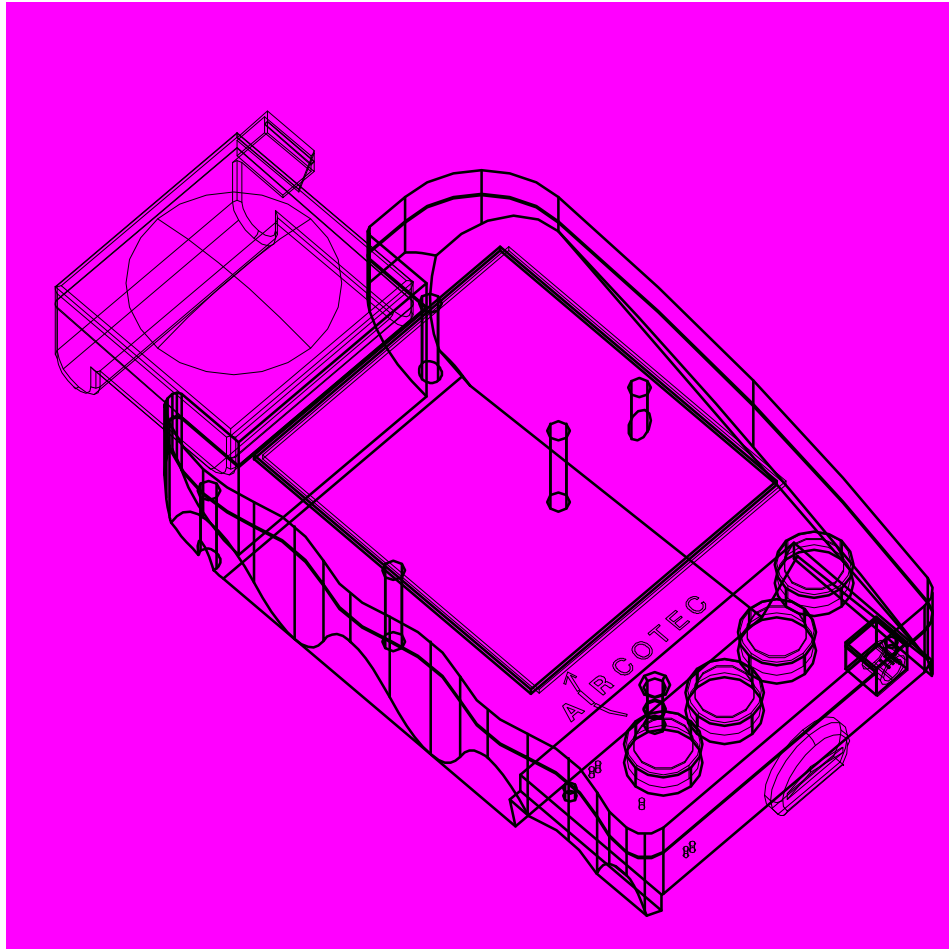


# TOP-NAVIGATOR



## INSTRUCTION MANUAL

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Horw, October 1997

**Software - Version 4.2**

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## Technical Data

Manufacturer :

Neue **AIRCOTEC** GmbH  
Ebenaustraße 10  
PO Box 56  
CH-6048 Horw  
Switzerland  
Tel.: ++41 - (0)41 / 340 - 58 87  
Fax : ++41 - (0)41 / 340 - 70 78

Energy consumption :

GPS on : 230 mA  
GPS off : 80 mA

External interface :

serial RS232 / 9600 baud  
8 bits without parity, 1 start, 1 stop  
XON, XOFF - control

Name of device :

**TOP-NAVIGATOR**

Voltage :

6 Volt  
Duracell nickel metal hydride  
battery DR10 1500 mAh / 6 volt  
Operation approx. 5 flight hours  
Duracell nickel metal hydride  
battery DR11 3600 mAh / 6 volt  
Operation approx. 12 flight hours  
(not included in scope of supply)

Test mark :

complies to CE-NORM, FAI – approval as barograph in preparation

Operative range :

Temperature : -15 ... +50 °C  
Altitude : 0 ... 6.000 m  
Speed :

*TAS* : 0...127 km/h  
*SOG* : 0...191 km/h

Printer report :

- serial RS232 / 9600 baud
- Epson FX80 compatible
- HP PCL3, PCL5 compatible
- ink-jet & laser printer

Dimensions :

l x b x h = 17 cm x 11 cm x 6 cm

Weight : (without accumulator)

500g



## Scope of supply

- **TOP-NAVIGATOR**
- Fixing device for paraglider or hanglider
- Duracell nickel metal hydride battery DR10 (6 Volt / 1500 mAh)
- Accumulator battery charger for Duracell nickel metal hydride battery inclusive 220 V and 12 V autoadapter respectively
- Transmission cable : Top-Navigator -> PC (RS232 serial)
- Transmission cable : Top-Navigator -> Top-Navigator
- 3 ½“ diskettes with PC software
- Fabric carrier bag
- Instruction manual

**The technical data and the accessories represent the current state of the art at the time of printing and are subject to alterations.**

## Safety instructions

The **TOP-NAVIGATOR** is provided with a high quality 8-channel GPS receiver which guarantees for the best possible precision with sufficient satellite recordings.

The US Department of Defence (DOD) may include minor errors in the emission of the satellite signals. This selective availability (SA) may cause position errors of up to approx. 200 m and speed errors of some km/h.

Faulty or insufficient altitude information from maps, wrong altitude settings (air pressure variations) by the pilot or some kind of fault which cannot be excluded, may lead to indication errors. Thus the pilot should always make decisions based on his judgement, his experience and his skill. This applies primarily to tricky flight situations as flights without sufficient sight as well as before and during landing.

Instrument displays should only be read if the present situation so permits – otherwise it should be tried to manage with the acoustic information.

Before every flight the **TOP-NAVIGATOR** must be fixed in such a way that neither the pilot nor a possible passenger in tandem flights may get injured at or by it. Furthermore the manoeuvrability may not be impaired by the **TOP-NAVIGATOR**. It must be secured with the attached cord in such a way that it cannot fall down in any situation during the flight. The pilot has to take particular care that neither the device or parts of the fixing can drop during the flight thus endangering people or damaging things. Thus the fixing, the safety cord and the accumulator compartment of the **TOP-NAVIGATOR** must be checked before every takeoff.

Before every takeoff the pilot should furthermore verify the perfect operation of the **TOP-NAVIGATOR** and the charge of the accumulator utilised.

The **TOP-NAVIGATOR** is splash-proof but not watertight. If water seeps in, the accumulator must be removed as quickly as possible, the casing must be opened and the interior must be dried cautiously with a hairdryer. (Do not place in microwave.) If salt water seeps into the interior, it must be rinsed thoroughly with tap-water prior to drying. A thorough check by **AIRCOTEC** is indispensable.

The **TOP-NAVIGATOR** is used at one's own risk.

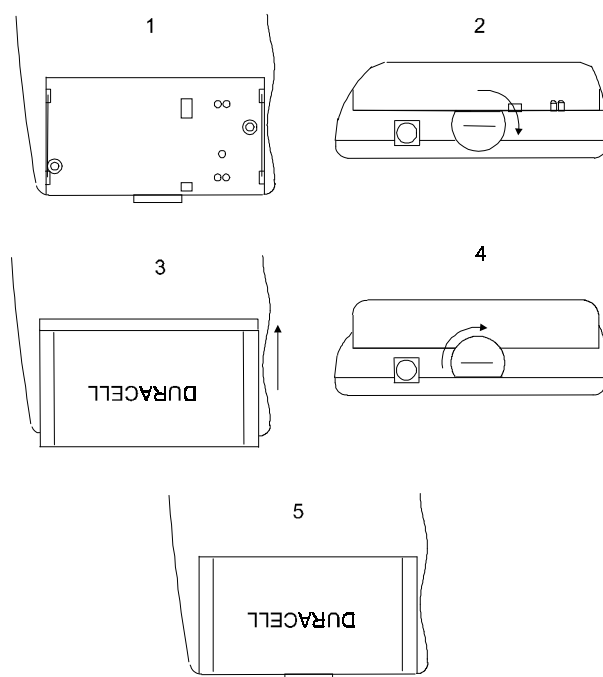
No liability is assumed for damages and loss of data incurred by the use of the PC software supplied therewith.

## Change of accumulator

- Accumulator – open closure (**Fig. 1- picture 2**).
- Insert accumulator cautiously as shown in **picture 3** (the side of the accumulator with the 3 contacts in a row must coincide with the contacts on the **TOP-NAVIGATOR**).
- Turn accumulator closure until snapping (**picture 4**).

### Note :

- If the accumulator is not inserted correctly, the device is not operative. Care must be taken that the accumulator is inserted as shown in **picture 5**.
- Never open the accumulator by force nor throw it into fire.
- Accumulators must be out of children's reach.



**Fig. 1 : Change accumulator**

## Maintenance

The **TOP-NAVIGATOR** is a technically perfected and reliable precision device. Professional handling and correct maintenance guarantee long life.

If the following instructions are not considered, the **TOP-NAVIGATOR** may be damaged considerably:

1. Do not drop the **TOP-NAVIGATOR** and protect it against impact shocks.
2. Never drop it into the water and prevent water from seeping into the interior. The **TOP-NAVIGATOR** is not watertight and in particular salt water may cause severe damages. It must be protected against salt water splashes, spray, rain and moisture. If the **TOP-NAVIGATOR** gets wet, remove the accumulator immediately and dry the device. If moisture seeps into the device, have it checked by **AIRCOTEC**.
3. Protect the **TOP-NAVIGATOR** against extreme temperatures. Extremely hot and cold temperatures impair the power supply from the accumulator. Furthermore extreme temperatures and moisture promote corrosion.
4. Strong vibrations caused eg by car, ship or air travel may result in the loosening of screws or may cause other damages on the **TOP-NAVIGATOR**. In order to prevent this, it is recommended to pad the bottom of the device with foamed material in such situations.
5. Dirt and sand jeopardise the operation, in particular of the movable parts of the **TOP-NAVIGATOR** (keys, contacts etc.).
6. Never disassemble the **TOP-NAVIGATOR**, as there are live components inside.

## Detailed description

# Start TOP-NAVIGATOR

## GENERAL

All **TOP-NAVIGATOR** settings as name of current takeoff location, *active route*, time constants and active polar are stored and reused with the next start except for the descending tone acoustic as well as the *McCready* setting (always **OFF** and **0** respectively).

## SWITCH ON TOP-NAVIGATOR

Press the **ON/OFF**-key for one second to switch on the **TOP-NAVIGATOR**.

The bar (3) in the **On Display** (Fig. 15) displays the charge of the accumulator. After 5 seconds the **TOP-NAVIGATOR** changes to the **Main menu 1** (Fig. 16).

## Fast start

### Procedure :

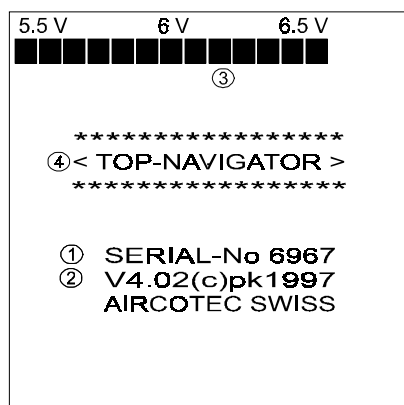
1. If the **TOP-NAVIGATOR** is switched off, press the **ON/OFF**-key for approx. 3 seconds until the message **READY FOR TAKEOFF** appears.
2. The **TOP-NAVIGATOR** starts immediately in the **flight mode**. Until the logging by the satellites is successful the message **GPS BAD 0** appears in the middle of the *Map*. The number indicated shows the number of satellites which can be received at present.

### Important !

Set the altitude of the *takeoff location* and name as well as the *active route points* during the start preparation and leave the **TOP-NAVIGATOR** switched on until the current GPS position at the *takeoff location* is stored (otherwise the distance calculated between the takeoff location and the *landing-strip* is wrong). After this, switch off the **TOP-NAVIGATOR**.

Shortly before takeoff the **TOP-NAVIGATOR** is then started by means of a *fast start* with the current settings in the **flight mode**.

## Display description : ON Display



- (1) Serial number of **TOP-NAVIGATOR**
- (2) Software version
- (3) Check accumulator voltage
- (4) This device is certified for a documentation of record flights according to **FAI** (see [Documentation of Record Flights according to FAI]).

Fig. 15 : ON Display

### Display of *Altitude* and *Temperature*:

Quickly press the ON/OFF-key until the **TOP-NAVIGATOR** switches on.

Instead of the control of the charge of the accumulator, the *Altitude* and the *Temperature* are indicated for 15 seconds. Afterwards the **TOP-NAVIGATOR** switches off automatically.

Manual switching off with key 1.

Prolonging with key 2.

Return to **Main menu 1** with key 3.

## The two main menus : Main menu 1 & 2

### Display description – Main menu 1 & 2

```

97-11-09  11:33:07
(1)----- (2)-----
. 406 m    1012 hPa
(3)-ALTI--- (4)QNH---

more / OFF 4 sec
ALTI/GPS SET
PARA 3  20- 45 kh
NEW FLIGHT
ROUTE
WIND MEASURE
↓      ↑      OK

```

Fig. 16: Main menu 1

```

97-11-09  11:33:42
-----
. 406 m    1012 hPa
---ALTI---QNH---

more / OFF 4 sec
LOG
LIFTS
WAYPOINTS
TAKE OFF LOCATION
SETTINGS
↓      ↑      OK

```

Fig. 17: Main menu 2

- (1) Current Date
- (2) Current Time
- (3) Currently set altitude.
- (4) The air pressure indicated corresponds to the relevant air pressure at sea level (*QNH*) at the particular altitude set.

### Switch off TOP-NAVIGATOR

1. In the **Main menu 1** or the **Main menu 2** select the menu point **more / Off 4 sec**.
2. Confirm with the **OK**-key for 4 seconds. After the release of the **OK**-key the **TOP-NAVIGATOR** switches off.



## Change between main menu 1 and 2

- Select menu point **more / Off 4 sec** and confirm.

## Notes on menu points

- Select the relevant menu point in the **main menu 1** or **main menu 2** and confirm.
- From the text in the menu point 2 of **main menu 1** it can be seen which polar is currently set.
- If it says „**ROUTE ACTIVE**“ in the menu point 4 of **main menu 1** there are marked *waypoints* on the route - see [ activate route].

## Select *takeoff location* / set altitude of takeoff location

### General

Before takeoff the altitude can be adjusted in the **TOP-NAVIGATOR** according to the current air pressure and an 11 character name for the takeoff location can be entered.

The **TOP-NAVIGATOR** offers the possibility of a fast choice for the 10 most important takeoff locations.

### Manual setting of altitude and name of takeoff location

1. By means of the menu point **ALTITUDE / GPS SET (main menu 1)** and then **MANUAL ADJUST (Takeoff location Display)** change to **Set Altitude Display**.
2. By changing the current altitude (**Fig. 18 (2)**), also the relevant *QNH* is changed (**Fig. 18 (3)**).
3. If a new flight is started (menu point : **NEW FLIGHT (main menu 1)**) also the name (11 characters) of the takeoff location can be changed in the **Flight start Display**. The pre-set value results from the *takeoff location* of the last flight.

### Display description – Set altitude Display

(1) 14.7 °C		
-----		
.1420 m	1027 hPa	
(2) ALTI	(3) QNH	
-----		
•		
ADJUST		
CORRECT ALTITUDE		
OR QNH		
-	+	OK

- (1) Temperature in degrees Celsius.
- (2) Altitude at takeoff location in meters.
- (3) Air pressure at sea level.

Fig. 18: Set altitude Display

## Pre-set important takeoff locations

The 10 mostly used takeoff locations can be pre-set in a list. If one of these 10 pre-set values is selected, the **TOP-NAVIGATOR** takes over the altitude and name into the next flight.

SEL &	REPLACE	m
Exit		
1420	SCHOEKEL-SO	
1440	SCHOEKEL-NW	
1770	STODER	
1840	POLSTER-N	
1780	ROESSEL-W	
1900	GERLITZE-S	
1680	HANSBAUER-S	
2100	WOELLAN-VGE	
2135	GOLDECK-SO	
1180	CUARNAN-S	

Fig. 19: Change takeoff location Display

-----		
REPLACE T.OFF ALTI		
-----		
SET ALTI		
(1)	(2)	A
1440	SCHOEKEL-NW	
m		
-	+	OK

Fig. 20: Takeoff location edit Display

### Procedure :

1. Change at the menu point **TAKEOFF LOCATIONS** (main menu 2) to the **Change takeoff location Display**.
2. Select one of the 10 takeoff locations available and by pressing the **←-KEY** change the *takeoff location* selected in the **Takeoff location edit Display**.

## Display description – Takeoff location Edit Display

- (1) Altitude of takeoff location in meters.
- (2) Name of takeoff location (max. 11 characters).

## Select a pre-set *takeoff location*

If a pre-set *takeoff location* is selected, the altitude and the name is taken over in the **Flight start Display** for the next flight.

<b>Exit</b>	
<b>MANUAL ADJUST</b>	
<b>1420</b>	<b>SCHOEKEL-SO</b>
1435	SCHOEK-STBH
1180	CUARNAN-MT
alti	takeoff-loc
alti	takeoff-loc
alti	takeoff-loc
alti	takeoff-loc
alti	takeoff-loc
alti	takeoff-loc
alti	takeoff-loc

### Procedure :

1. At menu point  
**ALTITUDE / GPS SET**  
(main menu 1) change to the  
**Takeoff location Display**.
2. Here a pre-set *takeoff location*  
with its altitude can be selected.

Fig. 21: Takeoff location Display

### Record takeoff position:

Always leave the **Set altitude Display** via the **GPS-Check Display**.

After recording the takeoff position, the device switches off.

Shortly before takeoff the **TOP-NAVIGATOR** can then continue immediately in the flight mode by means of a *fast start*.

## Transfer list of takeoff locations to the PC

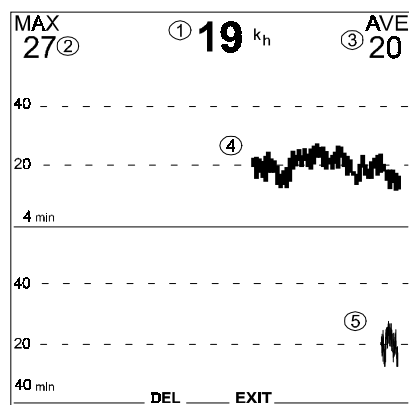
see : [Transmit list of takeoff locations to PC ]

## Anemometry at takeoff location

### Description of function :

1. Select the menu point **WIND MEASURE** in the **main menu 1** and confirm.
2. The **Anemometry Display** appears.
3. Pressing the **DEL**-key for 3 seconds erases the wind diagrams.

### Display description : Anemometry Display



**Fig. 22: Anemometry Display**

- (1) Current wind speed : If the maximum value of 99 km/h is exceeded, the **TOP-NAVIGATOR** indicates „+0“.
- (2) Peak value during the last 30 seconds (MAX - maximum)
- (3) Average value during the last 30 seconds (AVE - average)
- (4) Wind diagram during the last 4 minutes
- (5) Wind diagram during the last 40 minutes

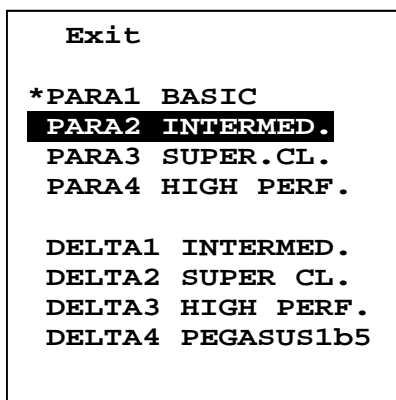
# Polars

## General

- A flight polar is defined by three pairs of values of speed and pertaining descent.
- The polar data selected and entered are the basis for the *speed to fly* and the *glidepath calculation* which indicate the optimum gliding speed in different situations.

## Select standard polars

The **TOP-NAVIGATOR** offers 4 standard polars each for paragliders and hang-gliders. The data of these 8 polars may however be adapted to one's own requirements (eg: different polars for flights with and without weight).



### Procedure :

1. Select the 2<sup>nd</sup> menu point called e.g. **PARA1 18-37 kh** in the **main menu 1** and confirm.
2. Select one of the pre-set 8 *standard polars* in the **Polar Main Display** and confirm.
3. In the **Polar Data Display (Fig. 24)** the data pertaining to the polar selected is now displayed.

Fig. 23 : Polar Main Display

4. Confirm the marked menu point **POLAR / exit** - polar is shown as a graph in the **Polar Graph Display** (no fig.).
5. With the **EXIT**-key change back to the **Polar Main Display** and leave the choice of the polars by confirming the menu point **Exit**.

## Display description : Polar Data Display

POLARE / exit (1)		
(2) Vmin	20.0	km/h
Vmax	59.0	km/h
AIRSPEED SINKING		
	km/h	m/s
V1	24.0	1.10
(3) V2	32.0	1.20
V3	40.0	1.72
SPEED TO FLY IND.		
(4)	0.0	m/s S.WIN.
(5)	2.0	kmh S.WIN.
(6)	3	s TIME CONST

Fig. 24: Polar Data Display

(1) The menu point **POLAR / exit** displays the polars graphically. Furthermore the **Polar Data Display** is left via this menu point.

(2)  $v_{\min}$  : Minimum flyable speed

$v_{\max}$  : Maximum flyable speed

The flyable range of the flying vehicle is limited by  $v_{\min}$  and  $v_{\max}$ .

(3) The polar is clearly defined by the 3 pairs of values of speed and pertaining descent indicated here.

(4) Silence window : is the descent smaller than the value indicated under (4) -

(5) or the deviation in speed from the speed to fly smaller than the value indicated under (5), the *speed to fly acoustic* ([**Varioacoustic**]) is suppressed.

(6) *Speed to fly – time constant* :

The **TOP-NAVIGATOR** averages the values calculated for the *speed to fly* by the value indicated here.

### Long time constant :

Advantage : *Speed to fly* – display indicates stable, little varying values.

Disadvantage : Values are indicated with a corresponding delay.

### Short time constant :










Advantage : Values are indicated correspondingly fast.

Disadvantage : The display may become nervous.










## Fly, extract and feed one's own polar data

- With the **TOP-NAVIGATOR** precise pairs of values (speed, pertaining descent) can be extracted for an exact polar.
- The values calculated by the **TOP-NAVIGATOR** are scaled to a standard atmosphere at an altitude of 1000 m.
- For a most realistic polar the 3 pairs of values required should be in the range of the minimum descent, the best gliding and between the speed of the best gliding as well as the maximum speed. The 3 pairs of values can – if required – be worked out by several flights.
- In order to obtain exact speed values from the propeller speed probe, it is indispensable to calibrate it first (see **[calibrate speed sensor]**).
- The conditions during the flight should be stable and without thermal differences so that the values flown are as precise as possible. The recorded flight should only include speeds of 20..64 km/h and descent values of 0..5 m/s.
- The recorded flight is to be terminated immediately at the *landing-strip* by switching off the **TOP-NAVIGATOR**.

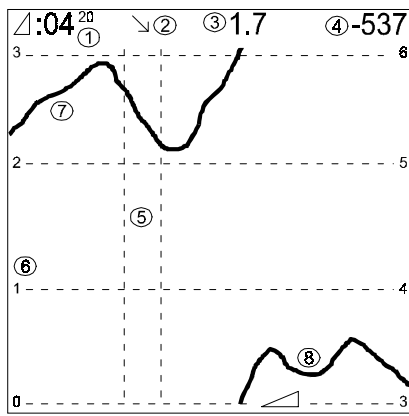
### Procedure :

1. **Main menu 2 - LOGBOOK → Logbook Data Display (Fig. 28):** select flight desired -  - **KEY → Logbook Menu Display – EXTRACT POLAR → Polar Barogram Display (Fig. 25).**
2. Mark roughly a sector of the *barogram* with the  - **KEY** and the  - **KEY**, from which then the precise range of values is located in the **Polar Display (Fig. 26)**. There is a calculation for this sector.
3. When selecting the rough sector one of the display edges is reached, the *barogram* scrolls into the corresponding direction after a short delay and an acknowledgement signal.
4. Change scroll direction : during scrolling, quickly change the key pressed ( - **KEY** or  - **KEY**).
5. After selecting with the double cursor a sector of constant descent, change to the **Polar Display (Fig. 26)** with the  - key.
6. With the  - **KEY** and the  - **KEY** position the vertical cursor line on the left. With the  - **KEY** activate the cursor line on the right for positioning.



7. Position both the cursor lines in such a way that they include a sector with the best possible constant speed (*TAS*). The **TOP-NAVIGATOR** works out the speed in this sector, the pertaining descent and furthermore calculates the pertaining glide number. These values are indicated in the heading lines of the **Polar Display (Fig. 26)**.
8. With the  - **KEY** determine the key function of the  - and  - **KEY** for the correction of the altitude difference.
9. Change altitude difference between *takeoff location* and *landing-strip (8)* (measured by the barometric cell - 30 seconds after the start of the *flight mode*) to the exact altitude difference (survey points). If the exact altitude difference (measured from maps with survey points) is not known, do not change the altitude difference **(8)** measured by the altimeter.
10. With the  - **KEY** determine the key function of the  - and the  - **KEY** for the correction of the propeller speed probe.
11. If the correction factor for the propeller speed probe is not 1, it must be corrected to the value 1.
12. Note down the standard values calculated by the **TOP-NAVIGATOR** (for normal atmosphere at 1000 m) (reduced *TAS (4)*, reduced descent **(5)**) in order to feed them later into the **Polar Data Display**.
13. With the  - **KEY** determine the key function of the  - and the  - **KEY** with **EXIT** and **BRG**.
14. If further pairs of values must be extracted, press the **BRG - KEY** and repeat all the steps as from **point 2** – otherwise continue at **point 15**.
15. Press the **EXIT - KEY** → **Logbook Menu Display** – confirm **LOG / Exit 1 s** → **main menu 2**.
16. Select the 3<sup>rd</sup> menu point called eg **PARA1 18-37 kh** in the **main menu 1** and confirm → **Polar Main Display**.
17. Select one of the pre-set 8 *standard polars* whose values are to be adapted, in the **Polar Main Display (Fig. 23)** and confirm → **Polar Data Display**.
18. The values noted can now be entered into the **Polar Data Display (Fig. 24)**.
19. Confirm menu point **POLAR / Exit** → polar is graphically displayed in the **Polar Graph Display (no fig.)**.
20. Change back to the **Polar Main Display** with the **EXIT - KEY** and leave the polar selection by confirming the menu point **Exit**.

## Display description - Polar Barogram Display



**Fig. 25: Polar Barogram Display**

- (1) Period (minutes : seconds) which is marked by the two vertical cursor lines (5).
- (2)  $\searrow$  means descent;  $\nearrow$  - climb.
- (3) Average descent or climb value respectively of the period selected in (m/s).
- (4) Altitude loss in the period selected in (m)
- (5) Period roughly selected for the calculation of the polar values (4min 20sec).

- (6) Figures on the left and right display edge mean altitude in 1000 meters. The sector of the picture includes only 3000 m for a better altitude resolution. The *barogram* appears thus divided at 3000 m.
- (7) *Barogram* curve (this part of the curve is between 2000 and 3000 m).
- (8) The course of the curve in the range between 3000 and 4000 m.

## Display description - Polar Display

- The entire display locates the rough sector selected at 4min 20sec.

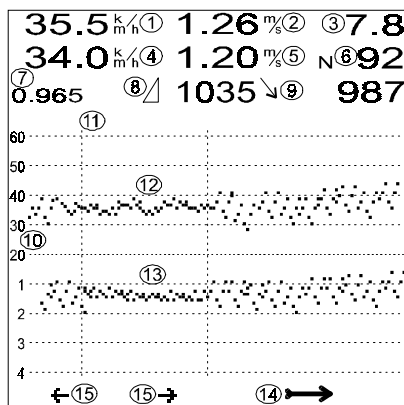


Fig. 26: Polar Display

- (1) Average *TAS* measured at flight altitude.
- (2) Average descent pertaining to (1) at flight altitude.
- (3) Gliding figure calculated.
- (4) Reduced *TAS* to normal atmosphere at 1000 m.
- (5) Reduced descent pertaining to (4).
- (6) Air density (%) at flight altitude referring to normal atmosphere at 1000 m.
- (7) Correction factor for propeller speed probe. Is used for the calibration of the propeller speed probe.
- (8) Altitude difference between *takeoff* location and *landing-strip* (measured by the barometric cell).
- (9) Altitude difference from the total of all vario values between *takeoff* (the first 30 seconds are not considered) and *landing* (for control purposes only).
- (10) Up : scaling of the *TAS* in km/h (between 20 and 64 km/h).  
Down : descent in m/s (between 0 and 5 m/s).
- (11) These two vertical cursor lines locate the period to be calculated.
- (12) *TAS* values recorded during a certain period. The entire display includes 4 min 20 sec.
- (13) Descent values pertaining to (12).
- (14) Change key function of the / - KEYS.
- (15) / - KEYS : Positioning of the left and right cursor line.
- /+ - KEYS : Change the altitude difference (8) and the correction factor for the propeller speed probe (7).
- BRG - KEY : to return to the Polar Barogram Display.
- EXIT - KEY: to leave the Polar Display.

# Logbook


## General

- In the **TOP-NAVIGATOR** the most important data of up to 256 flights are stored in the logbook (*flight summary data*).
- Extreme values of all the flights stored are summarised in the **Logbook Summary Display**.
- All the *flight data* and the *route points* of the active *route* stored every second during the last 16 flying hours are stored. This data is necessary for a subsequent flight analysis on the **TOP-NAVIGATOR** display (*flight data*).
- *Flight summary data* and *flight data* can be transferred with TNCOMM and stored on Intel-compatible PCs.
- For a subsequent analysis flights stored in the PC can be transferred again to the **TOP-NAVIGATOR** or analysed on the PC with TNEVAL (Win95/NT).
- Adjustable values as polar, *speed to fly – time constant* etc. can be changed when replaying a flight. Thus different situations and adjustments can be analysed.

## Logbook summary display

- In the **Logbook Summary Display** extreme values are indicated for all the flights whose *flight summary data* (max. 256) has been stored in the **TOP-NAVIGATOR**.

## Procedure

1. Change to the **Logbook Summary Display (Fig. 27)** by menu point (**main menu 2**).
2. Change to the **Logbook Data Display (Fig. 28)** by pressing the  - KEY.

## Display description - Logbook Summary Display

94-02-17	(1)	(2)	138	FL
96-10-07		(3)	346:14	
max	SUMMARY			Nr.
TIME	(5)	6:48	(4)	91
CLMB	(6)	+8.5	m/s	43
SINK	(7)	-7.5	m/s	112
TAS	(8)	84.5	kmh	38
A-MX	(9)	3387	m	91
A-G	(10)	2854	m	13
A-S	(11)	18923	m	104
DIST	(12)	94.5	km	47
→				

Fig. 27: Logbook Summary Display

- (1) All *flight summary data* stored date from the two dates indicated.
- (2) Number of flights stored (summary data only).
- (3) Total flying time in hours and minutes.
- (4) Flight number from which the relevant extreme value originates.
- (5) Longest flying time in hours and minutes.
- (6) Highest climb value
- (7) Highest descent value
- (8) Maximum TAS

- (9) Highest flight altitude flown.
- (10) Maximum altitude gain.
- (11) Total altitude gain.
- (12) Assessed *distance* of the flight (see [Information on Active Route]).

## Logbook Data Display

In the **Logbook Data Display** the most important data for the last 256 flights are indicated (*flight summary data*). This data also remains stored even if the *flight data* has already been overwritten by other flights. In this case also all other functions of the **Logbook Menu Display** are not available any more.

### Procedure

1. Change to the **Logbook Data Display** by menu point (**main menu 2**).
2. Select a flight with the **FORW**-key and the **BACK**-key.
3. If in the **Logbook Data Display** (Fig. 28 (4)) „NoFD“ (No Flight Data) is indicated, the **EXIT – KEY FUNCTION** appears to leave the **Logbook Data Display** instead of the **← - KEY FUNCTION** (change to the **Logbook Menu Display**.)

## Display description- Logbook Data Display

```

96-06-07(1) FlNr.(2) 1
SCHMITTEN(3) (4)noFD
11:40-18:15=(5)6:35

ALTI m    VARIO-MAX
TO(6) 968 (12)+8.2 m/s
LA(7) 123 (13)-6.4 m/s
MX(8) 998 (14)65.0 kmh
G(9) 564 (15)1027 hPa
S(10) 4423 (16)87.4 km
PARA 4(11) (17)7 RPT
BACK FORW(18) →

```

- (1) Date of flight
- (2) Current number in logbook.
- (3) Name of takeoff location.
- (4) **Empty space** : Flight was not transferred from the PC and the *flight data* is still in the **TOP-NAVIGATOR** storage. Printing of a record flight according to FAI is possible.

### PC-FD: (PC Flight Data)

This flight was transferred from the **PC** to the **TOP-NAVIGATOR**.

Fig. 28: Logbook Data Display

### noFD: (No Flight Data)

The *flight data* stored is not available any more.

**noFAI**: By one of the functions described hereafter, all the flights available in the storage become unusable for a record documentation according to *FAI* and are identified with „**noFAI**“ in as far as the flights have not already been marked with **PC-FD** or **noFD**: change time zone, QNH-calibration, transfer flight from PC to **TOP-NAVIGATOR**.

- (5) Takeoff and landing time as well as flight duration (each in hours : minutes)
- (6) Altitude of takeoff location in (m)
- (7) Altitude of landing-strip in (m)
- (8) Maximum altitude in (m)
- (9) Maximum altitude gain in (m)
- (10) Total of all altitude gains during the entire flight in (m)
- (11) Indicates which polar was activated during the flight.

**PARA4**: The polar **PARA 4** was activated during the flight and is also activated at present.

If **PARA4** appears inverse, the polar **PARA 4** was activated during the flight, however another polar is activated at present. To calculate the *speed to fly* in the *replay mode*, the polar currently set will be used.

- (12) Maximum climb value in (m/s)
- (13) Maximum descent value in (m/s)
- (14) Maximum speed compared to air (TAS - true air speed).
- (15) QNH (air pressure referring to sea level)
- (16) *Assessed distance* flown in (km)
- (17) Number of *route points of flight* activated:  
(The **TOP-NAVIGATOR** stores up to 75 *route points* in the *flight data*. In the *replay mode* only the first 25 *route points* can be considered.)
- (18) In this display the ⬆ - KEY has the standardised function **Leave forward**. If the last flight is selected, the ⬆ - KEY has the function **TNCM** (see [Transmit flight from PC to Top-Navigator ]).

### Calculation basis for assessed distance

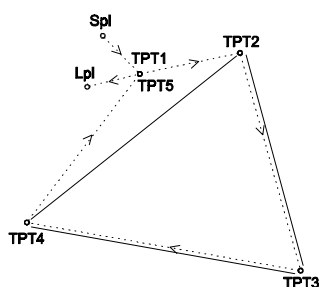


Fig. 29 : Triangle with start at side

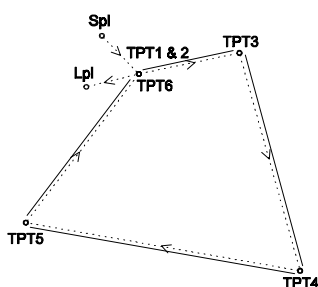


Fig. 30: Task with 5 turning points.

○-----○ actual flight distance      ————— assessed distance

#### No active route :

Distance between *takeoff location* and *landing-strip* (referring to FAI world radius of 6371 km).

#### Precisely 5 turning points (TPT) planned and flown, the first and last are identical :

Distance between 2nd and 3rd, 3rd and 4th as well as between 4th and 2nd *turning point*.  
(Fig. 29)

If the distance in the logbook should correspond to the total of the distances between all the *turning points*, the first *turning point* must be entered in double (Fig. 30).

**Random number of *turning points* planned and flown except for the case mentioned before :**

All sides between the first and last *turning point* are added.

**Task with random number of *turning points* planned is not completed :**



If the task is not completed, the **TOP-NAVIGATOR** adds from *turning point* 1 all the distances between the *turning points* flown plus the distance from the last *turning point* passed to the *landing-strip*.

If none of the *turning points* planned is flown, distance between *takeoff location* and *landing-strip*.

### Replay flight from logbook : *Replay mode*

- Every flight whose *flight data* is still stored in the **TOP-NAVIGATOR** (see **Fig. 28 (4)**) can be replayed in the display in the *replay mode*. The flight either runs with double speed or in real time.
- In the fast speed mode any point of the flight can be scrolled.
- The replay stops at every *flight mark* which was set during the flight.
- The *active route* during the flight is reactivated in the *replay mode*.
- The *glidepath calculation* is made with the currently set polar. This enables repeating the flight with different polars.

#### Procedure :

1. **Main menu 2 - LOG → Logbook Summary Display -  - KEY - → Logbook Data Display** – select flight desired –  - KEY → **Logbook Menu Display - REPLAY → *replay mode***.
2. The *replay mode* corresponds exactly to the *flight mode* except for the key functions (see[**flight mode**]).



## Key functions – *Replay mode* - Map & Centering Display

The functions of the *flight mode* indicated hereafter (see [Key functions in Map and Centering Display]) are not activated in the *replay mode*:

- Switch GPS module on and off
- Set mark
- Set *sped to fly* according to *McCready*
- Varioacoustic

### Exit flight replay :

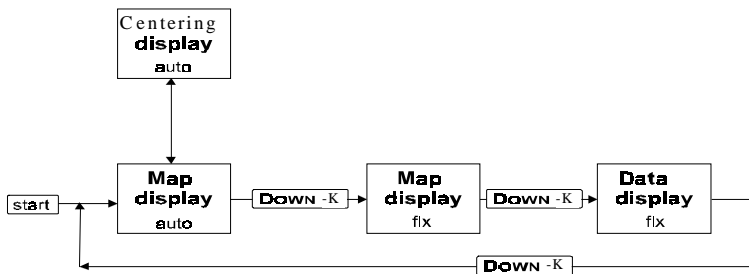
Quickly press  and -KEY simultaneously.

- Flight replay ends and returns to **Logbook Menu Display**.
- Pertaining acoustic signal : { da }


### Change between the three possible displays in the flight mode :

Quickly press -KEY.

- Switch between **Automatic Mode**, **Map Display** and **Data Display**.



- **Auto** : changes between **Centering Display** and **Map Display** depending on the situation.

**Fix** : changes only after pressing the  - KEY

- Pertaining acoustic signal : { da }

## Change size of the geographical area displayed :

Press  - KEY for a longer period of time.

- If we are in the **Map Display**, the size of the geographical area displayed changes too. From the scale symbol (5) in **Fig. 12** the size of the area displayed can be recognised. The distance between two vertical lines each represents 10 square km each (in the **Centering Display** no function has been assigned to this key).
- If the pilot is closer than 1 kilometer from the *turning point* last flown (**fTP**) or the next one (**tTP**), an area of 3 x 3 km is displayed in the **Map Display** (showing the *photo sector*) and the size cannot be changed.
- Possible settings : 10, 20, 40, 80 square km.
- Pertaining acoustic signal : { da – dit }

## Slowly scroll forward :

Quickly press  - KEY :

- Flight scrolls forward by 30 seconds
- Pertaining acoustic signal : { da }

## Fast scroll forward :

Keep  - KEY pressed

- Flight scrolls forward by 4 minutes per step
- Pertaining acoustic signal : { da – da – da - ... }



## Scroll backward :

Press  - KEY and  - KEY simultaneously :

- Flight scrolls backward by 30 seconds per step
- Pertaining acoustic signal : { da – da – da - ... }

## Stop – continue replay :


Quickly press  - KEY

- When stopping the *replay mode* in the **Map** and **Centering Display**, the symbol **GO** appears above the  - KEY.
- After quickly pressing the  - KEY, the **GO** symbol switches off. The analysis is continued.
- Pertaining acoustic signal : { da }
-


**Fix / release *glidepath calculation* to / from next route point :**

**Press  - KEY for 1 second.**



**With active route :**

- In **Fig. 11 (19)** the next route point (**tRP**) is fixed.
- In **Fig. 11 (20)** the distance and in **Fig. 11 (21)** the reserve altitude is displayed (all waypoint symbols).
- The *bearing indicator* (**Fig. 12 (8)**) always points in the direction of the next *route point* which is indicated with the relevant distance at the **lower** end of the display (**Fig. 12 (6)**).
- To release the *glidepath calculation*, press the  - KEY for 1 second.
- Pertaining acoustic signal : { da - dit }
- The *glidepath calc.* is then indicated in a 4 second cycle on all *waypoints* and *lifts* for which the following conditions apply:
  - *Waypoint* is visible in **Map Display** and landing-strip ,o‘, thermal way-point ,T‘ or lift.
  - The point is less than 1000 m above the glidepath.
  - The point is in the [**Map / Sector**] of the current track.


**With inactive route :**

- The *glidepath calc.* is displayed in a 4 second cycle on all *waypoints* and *lifts* for which the following conditions apply:
  - *Point* is visible in the **Map Display** and landing-strip ,o‘, thermal way-point ,T‘ or lift.
  - The point is less than 1000 m above the glidepath.
  - the point is in the [**Map / Sector**] of the current track.
- to fix the *glidepath calculation* to the *point* just marked, press the  - KEY for 1 second.
- Pertaining acoustic signal : { da - dit }

**Display the *excess temperature graph* also in the Map Display instead of the *speed to fly indicator*:**

- Press  - KEY for 2 seconds.
- In the **Map Display** the *excess temperature graph* and the *temperature gradient* are displayed instead of the *speed to fly indicator* as in the **Centering Display**.
- To reactivate the *speed to fly indicator*, press again the  - KEY for 2 seconds.
- Pertaining acoustic signal : { da - dit - dit }

**Change replay speed :**

- Press  - KEY for 3 seconds.**
- The replay speed changes from fast to real time speed and back again.
  - Pertaining acoustic signal : { da - dit – dit – dit }

## Key functions – Replay mode Data Display

### Switch to the next point in the *route* (only if *active route*):

Quickly press **↑** - KEY.

- Pertaining acoustic signal : { da }
- with autom. further switching : { didididit }

### To switch back by one point in the *route* (only if *active route*):

Quickly press **↓** - KEY.

- Pertaining acoustic signal : { da }

### Return to the Automap Display:

Quickly press **MAP** - KEY.

- Pertaining acoustic signal : { da }

### Store current position as *waypoint* :

Press **↓** - KEY for 3 seconds

- The current position can be taken over as a *waypoint* with freely selectable properties in the *waypoint list*.
- Not possible with invalid position (coordinates inverse) { didididit }
- Pertaining acoustic signal : { da – da }

### Stop – release replay :



Press **↑** - KEY for 1 second

- If the replay is stopped, the first line on the display (time) is inverse.
- Pertaining acoustic signal : { da – dit }

## Geographical Map










- The enlargement factor of the area displayed can be set between 600 x 600 kilometers and 2,4 x 2,4 kilometers. Furthermore the display of a shadow enables the distinction between climb and descent distances.
- On the map all lifts are indicated without *drift marker*, all *waypoints* (TPT) with the digit 1 and all other *waypoints* by their symbol.
- The route points stored for the particular flight are not indicated.

### Procedure :

1. **Main menu 2 - LOG → Logbook Summary Display -  - KEY - → Logbook Data Display** – select flight desired -  - KEY → **Logbook Menu Display – MAP → Map Display.**
2. Operate according to key functions.

## Key functions - Map Display

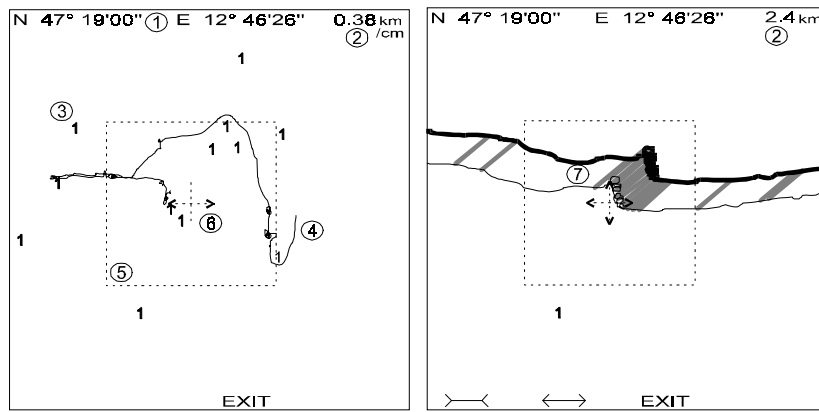
### Change key functions :

- by cyclic short pressing of the **EXIT**-key the arrow symbol in the middle of the **Map Display** is changed which describes the active key functions of the  - KEY and the  - KEY.
-  :  - KEY and  - KEY shift the map area horizontally in the **Map Display**.
-  : Square can be positioned vertically.
-  : with - key enlarge the area indicated (zoom in); with - key reduce it (zoom out).

### Leave the Map Display:

Press **EXIT - KEY** for a longer period of time.

## Display description - Map Display



**Fig. 31 : Map Display**

- (1) Coordinates in degrees, minutes, seconds of the cross-hair in the middle of the broken line square.
- (2) In the shift mode (square can be shifted horizontally and vertically) the real length per centimeter is indicated. In the zoom mode, the side length of the complete display.
- (3) Each *waypoint* entered into the *waypoint list* is marked with the digit 1. All the other *waypoints* are indicated by their symbol.
- (4) Track.
- (5) This broken line square indicates the map area which is enlarged to the complete display if the key  $\longleftrightarrow$  is pressed ( 2:1 ).
- (6) The symbol in the middle of the broken line square describes the active key functions of the  $\uparrow$  - KEY and the  $\downarrow$  - KEY.
- (7) If, when zooming, the smallest sector of 2.4 x 2.4 km is reached, by quick cyclic pressing the  $\longleftrightarrow$  - key
  - the shadow can be indicated
  - the direction of the shadow can be changed (this may possibly result in a better picture).
  - the shadow can be removed again.









The shadow is only indicated up to a area size of 19 x 19 km.

- shadow empty : descent distance
- shadow full : climb distance

## Barogram

In the **Barogram Display (Fig. 32)** the altitude is indicated above the time. For any moment of the flight, the current altitude, the current climb and the current temperature, or between two vertical cursor lines the average climb, the time difference and the altitude gain of this sector, can be indicated.

### Procedure :

1. **Main menu 2 - LOG → Logbook Summary Display -  - KEY - → Logbook Data Display** – select flight desired -  - KEY → **Logbook Menu Display – BAROGRAM,TEMP → Barogram Display.**
2. Position cursor line with  - KEY and  - KEY to indicate the data of a defined period of time.
3. If, when positioning, one of the display edges is reached, the *Barogram* scrolls into the relevant direction after a short delay and an acknowledgement signal.
4. Change scroll direction : quickly change the key pressed during scrolling ( - KEY or  - KEY).
5. Activate the second cursor line with the **TEMP - KEY**, position with the  - and  - KEY to include a sector and to indicate its average data.
6. Leave **Barogram Display** : press **TEMP - KEY** for a longer period of time → **Temperature Gradient Display - EXIT - KEY → Logbook Menu Display**



## Display description - Barogram Display

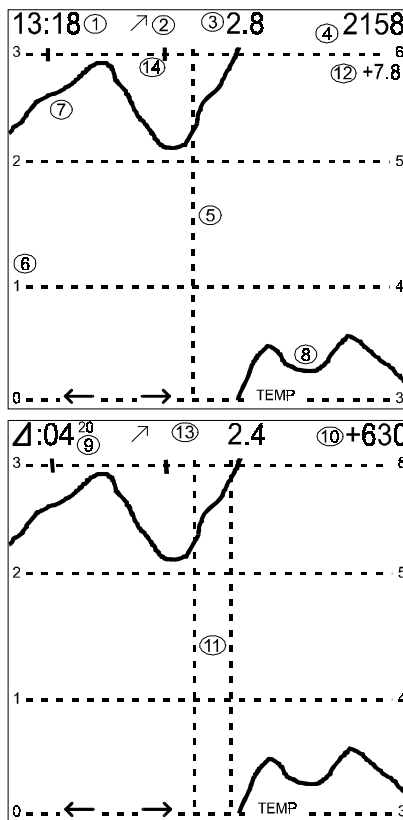


Fig. 32 : Barogram Display

- (1) Time at cursor position (5).
- (2) ↗ : climb  
↘ : descent
- (3) Climb or descent value in (m/s).
- (4) Altitude in (m).
- (5) The values indicated from (1) to (4) belong to the position of the cursor line in the *Barogram*.
- (6) Figures on the left and right-hand display edge indicate the altitude in 1000 meters. For a better altitude resolution the sector of the picture only includes 3000 m. The *Barogram* thus appears divided at 3000 m.
- (7) *Barogram* curve : this sector of the curve is between 2000 and 3000 m.
- (8) Course of the curve in the range of between 3000 and 4000 meters.
- (9) Period of time between the two cursor lines (11) in minutes and seconds.
- (10) Altitude gain or loss in the sector selected in (m)
- (11) The values indicated in the heading line are defined by the two cursor lines.
- (12) Air temperature in (°C) at the cursor position (5).



(13) Average climb over the sector selected.

(14) *Flight marks* which were set during the flight or which are set by the **TOP-NAVIGATOR** when reaching a *turning point*.

## Temperature gradient

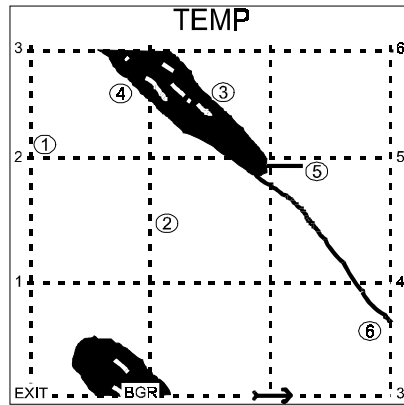
- Among the data stored every second (*flight data*) you can also find data on altitude and temperature.
- In the **Temp Display (Fig. 33)** the excess temperature behaviour in the thermal can be monitored with the altitude and the relevant temperature as well as possible inversions or isotherms can be noted.
- The course of the temperature in the altitude can either be indicated immediately or its build-up can be followed slowly on the diagram with continuing flying time. The display of the course of the temperature is shown on the barogram sector just visible from the beginning until the end of the flight.

### Procedure :

1. **Main menu 2 – LOG → Logbook Summary Display -  - KEY - → Logbook Data Display** – select flight desired -  - KEY → **Logbook Menu Display – BAROGRAM, TEMP → Barogram Display** - press **TEMP - KEY** for a longer period of time → **Temp Display**.
2. The **TOP-NAVIGATOR** starts at the beginning of the visible barogram (**Fig. 32**) until the end of the flight to build up slowly the course of the temperature over the altitude. As long as the **→ - KEY** is pressed, the build-up is faster.
3. In order to change back to the **Barogram Display**, press the **BGR - KEY** again.
4. Leave **Temp Display** : press **EXIT - KEY → Logbook Menu Display**.

## Display description - Temp Display

- (1) The figures at the left and right-hand display edge indicate the altitude in 1000 meters. For a better resolution of the altitude the sector of the picture includes 3000 m only. The temperature curve thus appears divided at 3000 m.
- (2) Each sector between two vertical lines indicates a temperature difference of 10°C.
- (3) The more or less black area indicates all the temperatures which prevail during the flight at the particular altitude.



**Fig. 33 : Temp Display**

- (4) The left-hand display edge (colder) marks the air temperatures measured during the descent flight and its climb marks the TEMP; here approx.  $-45^{\circ}$  ie  $-1^{\circ}\text{C} / 100\text{ m}$ . The right-hand edge indicates the temperature in thermal lifts. Excess temperatures of up to  $+5^{\circ}\text{C}$  are not uncommon : **Fig. 33** section (4) - (3) .
- (5) At the altitude of the takeoff location, higher temperature values appear until the temperature sensor (do not cover the cross-flow opening at the GPS-aerial!) is cooled by the air flow.

### Extract lifts

see : [Extract lift]

### Extract polar

see : [Fly, extract and feed one's own polar data]

### Flight print out (also FAI print)

see : [Flight print out]

### Transfer flight in Baromaster format to PC

see : [Transmit flight in Baromaster format to PC ]



### Transfer flight in TOP-NAVIGATOR format to PC

see : [Transmit flight in the Top-Navigator format to the PC ]

## Delete flight from storage of TOP-NAVIGATOR

- Every flight whose *flight data* is still in the storage of the **TOP-NAVIGATOR**, can be cleared together with the *flight summary data*.
- If the *flight data* has already been overwritten by another flight, the *flight summary data* of the flight cannot be cleared from the logbook any more.
- It is recommended to clear all the flights in the storage before the documentation of a planned record flight according to FAI and not to clear any flights any more between record flight and printing.

### Procedure :

1. **Main menu 2 - LOG → Logbook Summary Display -  - KEY - → Logbook Data Display** – select flight desired -  - **KEY → Logbook Menu Display – DELETE FLIGHT** – press for 3 seconds.

## Delete all flights from storage of TOP-NAVIGATOR

All the *flight summary data* and the relevant *flight data* is cleared from the storage. Furthermore the demo flight is regenerated.

### Procedure :

1. **TOP-NAVIGATOR : Main menu 2 - SETTINGS → Settings Menu Display – DEL. ALL FLIGHTS** – press for 3 seconds.

### Attention !

**All the flights cleared are lost irretrievably!**

# Lifts

## General

- The **TOP-NAVIGATOR** offers space for 768 lifts which can be stored with the geographical coordinates, the entrance altitude, the medium climb as well as the prevailing wind.
- For each one of these lifts, the *distance* and *glidepath calculation* is made during the flight in the **Map Display (Fig. 12)**.









Additional conditions :

- The lift is visible in the **Map Display**.
  - The lift is less than 1000 m above the glidepath.
  - The lift is in the [Map / Sector ] of the current track.
- The current wind conditions and *McCready* are included in the *glidepath calculation*.
- If a climb distance is marked in the *barogram*, the **TOP-NAVIGATOR** itself extracts geographical coordinates, the prevailing wind, the entrance altitude and the average climb as lift data.
- As a preliminary *abbreviated code* the lift extracted receives the running number in the storage: **!!000**‘ to **!!767**‘. This is then to be changed in the lift data display with **Name Lifts**.

## Extract lift

- Lifts are extracted in the **TOP-NAVIGATOR** from the *flight data* of a flight stored or entered in with TNCOMM from the PC (Internet).

### Procedure :

1. **Main menu 2 - LOG → Logbook Data Display** : select flight desired -  - **KEY → Logbook Menu Display – EXTRACT LIFT → Extract Lift Display**.
2. With the  - **KEY** and the  - **KEY** mark the start position/altitude of the lift. From the start position of the lift the geographical coordinates are taken over into the storage.
3. If, when positioning, one of the display edges is reached, the *barogram* scrolls in the relevant direction after a short delay and an acknowledgement tone.
4. Change scroll direction: quickly change the key pressed during scrolling ( - **KEY** or  - **KEY**).
5. The lift sector must be placed in the display. (42 min)
6. Press **LIFT – KEY** to activate the second cursor line.
7. Mark the end position of the lift with the  - **KEY** and the  - **KEY**.
8. If the start and end position of the lift is positioned, change to the **Lift Data Display** by pressing the **LIFT - KEY** for a longer period of time.
9. Press **RETURN - KEY** to store the extracted lift.
10. Press  - **KEY** to switch back to the **Lift Display** without storing the lift.
11. Leave the **Extract Lift Display** : press **LIFT - KEY** for a longer period of time → **Lift Data Display** - press **EXIT - KEY → Logbook Menu Display**.

## Display description – Extract Lift Display

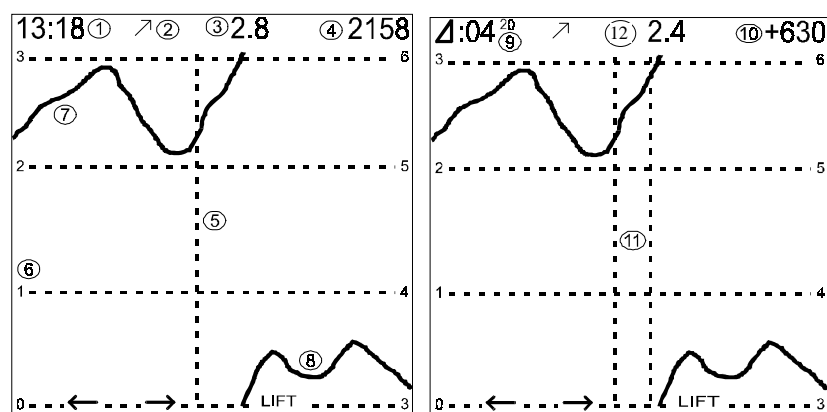


Fig. 34 : Extract Lift Display

- (1) Time in (hh:mm)
- (2) ↗ : climb  
↘ : descent
- (3) Climb or descent value in (m/s) – 20 s average value
- (4) Altitude in (m)
- (5) The values indicated from (1) to (4) belong to the position of the cursor line.
- (6) The figures on the left and right-hand display edge indicate the altitude in 1000 meters. For a better resolution of the altitude the sector of the picture includes 3000 m only. The *barogram* thus appears divided at 3000 m.
- (7) *Barogram* curve : this part of the curve is between 2000 and 3000 meters.
- (8) Course of the curve in the range of between 3000 and 4000 meters.
- (9) The sector between the two cursor lines (11) in minutes und seconds.
- (10) Altitude gain or loss in the sector selected in (m)
- (11) The values (9), (10) indicated in the heading line are defined by the two cursor lines.
- (12) Average climb in the sector selected in (m/s).

## Display description - Lift Data Display

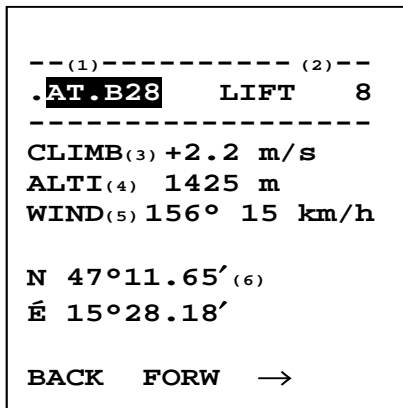


Fig. 35: Lift Data Display

- (1) Abbreviated code (country code. sub-code).
- (2) Running number of lift.
- (3) Average climb in (m/s).
- (4) Entrance altitude in (m) – 25 m steps. (glidepath calculator!)
- (5) Wind direction (degrees) and intensity (km/h) with which the lift was flown.
- (6) Geographical position with entrance altitude.

## Check lifts

### Procedure :

1. **Main menu 2 - LIFTS → Lift Data Display**
2. **With the FORW-key and the BACK-key** check through the *lift list*.
3. Define with the **←**- KEY the key functions of the **↑**- KEY with **Exit**. Press **Exit - KEY** to return to the **main menu 2**.

## Name lifts






Select abbreviated name (1) with the **IDENT**-key and change text.

The use of the Internet country codes is suggested. As a sub-code A-Z and 0-9 are permitted.



## Delete lifts

### Procedure :

1. **Main menu 2 - LIFTS → Lift Data Display**
2. With the **FORW - KEY** and the **BACK - KEY** select the lift to be cleared.
3. Press  - **KEY** to change the key functions of the  - **KEY** and the  - **KEY** to **SEND** and **DEL**.
4. Press the **DEL - KEY** for 3 seconds to clear the lift selected.
5. Define the with the  - **KEY** the key functions of the  - **KEY** with **Exit**. Press the **Exit – KEY** to switch back to the **main menu 2**.

## Delete all lifts

With the **\*\*\*\*- KEY** all the lifts can be cleared.

**Attention: All the lifts are cleared irretrievably.**

## Transmit lifts between two TOP-NAVIGATORS

see : [Transmit lifts between two TOP-NAVIGATORS].

## Transmit lifts to PC

see : [Transmit lifts to PC ].

## Transmit lifts from PC to TOP-NAVIGATOR

see : [Transmit lifts from PC to TOP-NAVIGATOR ].

# Waypoints and Routes

## General

- *Waypoints* define geographical points which sometimes have special properties.
- *Waypoints* can be extracted from maps or be extracted in the ***replay mode*** (see **Store current position as waypoint** :). In which form the geographical position is entered or changed, depends on the **TOP-NAVIGATOR** settings (see [**Units and languages**]).
- From this list of *waypoints* special *routes* for different flight tasks can be compiled with *waypoints* selected by yourself.
- A maximum of 229 *waypoints* can be stored.

## Attention :

*Waypoints* are to be entered in the suitable map date (geodetic date).

It is suggested to use „**EUROPEAN 1979**“ or „**EUROPEAN 1950**“ for Europe (see [**Geodetic date**]). Flights to these *waypoints* must be made in the same map date (positions of the *waypoints* are not converted). *Distance indicators* between *waypoints* of varying map dates are incorrect.

All the position data is stored in steps of 0,01 angular minutes ie a maximum of 18.5 m. *UTM* or *SWISSGRID* coordinates respectively thus cannot be set to the precise meter.

The *waypoint* 0 is used within the device and is not available for the user.

## Display description - Waypoint Display

```

-----
.AT(1)  WAYPOINT(2) 47
-----
NAME(3)  RADEGUND-LP
ALTI(4)   800 m
MAPSIGN(5) ○

N 47°11.17' (6)
E 15°29.06' (7)

BACK  FORW  →

```

Fig. 36 : Waypoint Display

- (1) Country code (2 characters A-Z).
- (2) Running number of waypoint.
- (3) Name of *waypoint* (11 characters).
- (4) Altitude of *waypoint* in (m) (glidepath calculator!)
- (5) Kind of *waypoint* (waypoint symbol).
- (6) Terrestrial latitude
- (7) Terrestrial longitude

The geographical coordinates can be entered and indicated in various formats (see [Units and languages]).






## Check waypoints

Check waypoints with the **Forw-key** and the **BACK-key**.

When pressing the particular key for a longer period of time at the end of the list, it can either be searched in alphabetical order or for running numbers.






## Enter new waypoint

### Procedure :

1. **Main menu 2 - WAYPOINTS → Waypoint Display**
2. With the **FORW**-key and the **BACK**-key select the *waypoint* where the new *waypoint* is inserted thereafter.
3. Define with the  - **KEY** the key functions of the  - **KEY** and the  - **KEY** with **EDIT** and **NEW**.
4. Press the **NEW - KEY** to insert a new *waypoint*.
5. Enter the altitude, name of waypoint and country code.
6. According to the properties desired, select the suitable symbol (see [**Properties of the various symbols**]) and enter the coordinates in the format set (see [**Units and Language**]).
7. If all the data is entered correctly – confirm with the **OK - KEY**.
8. If the data of this *waypoint* should still be changed – edit the *waypoint* again with the **MODIFY - KEY** (see [**Edit waypoint**]).
9. Define with the  - **KEY** the key functions of the  - **KEY** with **EXIT**. Press **EXIT - KEY** to return to the **main menu 2**.






## Edit *waypoint*

### Procedure :

1. Main menu 2 - **WAYPOINTS** → **Waypoint Display**
2. With the **FORW**-key and the **BACK**-key select the *waypoint* whose data should be changed.
3. Define with the  - **KEY** the key functions of the  - **KEY** and the  - **KEY** with **EDIT** and **NEW**.
4. Press **EDIT - KEY** to edit the data of the *waypoint*.
5. Modify altitude, name of waypoint or country code.
6. According to the properties desired, select the suitable symbol (see [Properties of the various symbol]) and enter the coordinates in the format set (see [Units and Language]).
7. If all the data is entered correctly – confirm with the **OK - KEY**.
8. If the data of this *waypoint* should still be changed - edit the *waypoint* again with the **MODIFY – KEY**.
9. Define with the  - **KEY** the key functions of the  - **KEY** with **EXIT**. Press **EXIT - KEY** to return to the **main menu 2**.






## Delete individual *waypoint*

### Procedure :

1. **Main menu 2 - WAYPOINTS → Waypoint Display**
2. With the **FORW - KEY** and the **BACK - KEY** select the *waypoint* to be cleared.
3. Define with the  - **KEY** the key functions of the  - **KEY** and the  - **KEY** with **SEND** and **DEL**.
4. Press the **DEL - KEY** for 3 seconds to clear the *waypoint* selected.
5. Define with the  - **KEY** the key functions of the  - **KEY** with **EXIT**. Press the **EXIT - KEY** to return to the **main menu 2**.

## Delete all *waypoints*

### Procedure :


1. **Main menu 2 - WAYPOINTS → Waypoint Display**
2. Define with the  - **KEY** the key functions of the  - and the  - **KEY** with **INSR** and **\*\*\*\***.
3. Press the **\*\*\*\* - KEY** for 3 seconds to clear **all** the *waypoints*. In the line before last, the message „Delete all Waypts?“ appears.
4. Define with the  - **KEY** the key functions of the  - **KEY** with **EXIT**. Press the **EXIT-key** to return to the **main menu 2**.

### Attention !

**With \*\*\*\* all the *waypoints* are cleared irretrievably.**

## Properties of the various symbols in the *Map*

### Points with pre-set properties in the map :

<i>Symbol</i>	<i>Description</i>
1, 2 ... 99	Waypoints in the active route ( <b>TPT</b> – turning point)
□	Landing-strip
↗	Lift with drift direction (no waypoint)
⊥	Thermal waypoint
⊥	<b>FLIGHT MARK</b> – set during the flight with the  - <b>KEY</b>
-	Inactive waypoint, does not appear in Map.

### Turning points (TPT) :

- **Route active** : all the *turning points* of the active *route* are indicated in the **Map Display** continuously with the numbers 1..99.
- The next *turning point* of the active *route* to be flown to is indicated by the photo sector according to **FAI** instead of its number.
- The last *turning point flown* (*fTP*) remains displayed as a photo sector until the distance becomes longer than 1 kilometer.
- **Route inactive** : all the *turning points* of the *waypoint list* are indicated by a „1“.
- Conditions for the *glidepath indicator* on TPT (**glidepath indicator not fixed**):
  - \* TPT must be the next *route point* to be flown in the *active route*.
  - \* TPT must be visible in the **Map Display**.
  - \* TPT must be in the *Map Sector* of the track.
  - \* If the TPT is missed by more than 1000 meters in altitude according to the *glidepath calculation* ( $\hat{\wedge}$ ), the *glidepath indicator* is skipped.
- Conditions for the *glidepath indicator* on TPT (**glidepath indicator fixed**):
  - \* TPT must be the next *route point* in the *active route*.
  - \* TPT must be within 50 km.
  - \* Track and visibility have no influence in the **MAP**.

**Landing-strip (☐):**

- All the landing-strips of the *waypoint list* are always indicated in the **Map Display**.
- Conditions for the *glidepath indicator* on ☐ (***glidepath indicator not fixed***):
  - \* ☐ must be visible in **Map Display**.
  - \* ☐ must be in the *Map Sector* of the track.
  - \* If the ☐ is missed by more than 1000 meters in altitude according to the *glidepath calculation*, the *glidepath indicator* is skipped.
- Condition for *glidepath indicator* on ☐ (***glidepath indicator fixed***):
  - \* ☐ must be the next *route point* in the *active route*.
  - \* ☐ must be within 50 km.
  - \* Track and visibility have no influence in the Map.

**Lift with drift direction (⚓)(no *waypoint*):**

- Lifts have the same properties as landing-strips and are always indicated in the Map.
- The wind prevailing when flying the lift, is recognisable from the direction of the flag in the lift symbol (flag = drift direction = anti-wind direction).

**Thermal Waypoints (⊥):**

- They have the same properties as landing-strips and lifts and are always indicated in the Map.

**FLIGHT MARK (⊥) - set during the flight with the ➡ - KEY :**

- During a flight up to 15 *flight marks* can be set ([**Key functions in the Map & Centering Display**] - page : Fehler! Textmarke nicht definiert.).
- These are no *waypoints* but time marks. Thus there is no *glidepath indicator* on the *flight marks*. At the time of the *flight mark*, the *flight mark* (⊥) appears again in the Map in the *replay mode*.
- They facilitate the later analysis of the flight and the finding of a certain place.

**Waypoints with blank symbol ( - ) :**

- *Waypoints* with a blank symbol are inactive.
- They do not appear in the **Map Display**.
- They cannot be entered in the *route*.
- They can be reactivated at any time by defining the *waypoint* with another symbol (see [**Edit waypoint**]).



**Points with freely selectable properties :**

<i><b>Symbol</b></i>	<i><b>Description</b></i>
+	general <i>waypoints</i>
×	wind shears, lee
H	<i>waypoint</i> for control zones




- *Route* inactive : These *waypoints* always appear in the **Map Display**.
- *Route* active : only *waypoints* of the active route from the last *route point* to the next *turning point* appear or, if there is no *turning point* available any more, until the end of the active *route* in the **Map Display**.
- Conditions for the *glidepath indicator* :
  - \* *Glidepath indicator* must be fixed.
  - \* Point must be the next *route point* in the *active route*.
  - \* Distance to the point shorter than 50 km.
  - \* Track and visibility have no influence in the Map.

**Distance and *glidepath indicator***

- In the **Map Display** with active *route* (**Fig. 12**) the name (6) and distance (7) to the next *route point* are indicated at the bottom on the right.  
The *bearing indicator* (**Fig. 12(8)**) thus points in the direction of the *route point*.
- The *glidepath indicator* (**Fig. 11**) indicates the name (19), distance (20) and pre-sumable altitude difference (21) to the *waypoints* and the lifts. This only happens if these *waypoints* meet the conditions described in paragraph [**Properties of the various symbols**]).
- If several points meet the necessary properties for the *glidepath indicator*, the **TOP-NAVIGATOR** indicates cyclically every one of these points for 4 seconds in the *glidepath indicator* and frames it with a square in the *Map*.
- Visible points in the *Map* and within the *Map-Sector*, for which however the *glidepath* presumably is missed by more than 1000 meters in altitude, are framed cyclically for one second only. The *glidepath indicator* is thereby suppressed.

## Distance and direction to a second *waypoint*

### Procedure :

1. Main menu 2 - **WAYPOINTS** → **Waypoint Display**
2. Select with the **FORW** - **KEY** and the **BACK** - **KEY** the first *waypoint*.
3. Define with the  - **KEY** the key functions of the  - and the  - **KEY** with **EXIT** and **DIST**.
4. Press the **DIST** - **KEY** to change to the **Distance Display**.
5. Select with the **FORW** - **KEY** and the **BACK** - **KEY** the second *waypoint*.
6. The **TOP-NAVIGATOR** indicates the direction in degrees and the distance in kilometers.
7. Exit the *distance calculation* : **EXIT** - **KEY** → **Waypoint Display** → **EXIT** - **KEY** → main men 2

### Display description - Distance Display

```

-----
.AT(1)  WAYPOINT(2) 76
-----
NAME(3)  RADEGUND-LP
ALTI(4)   800 m

To(5)  44  GOLDECK-LP
      (6) BRG  254°
      (7) DIST 158.9 km

BACK  FORW exit

```




- (1) Country code of 1st *waypoint*.
- (2) Running number of 1st *waypoint*.
- (3) Name of 1st *waypoint*.
- (4) Altitude of 1st *waypoint*.
- (5) Running number and name of 2nd *waypoint*.
- (6) Direction in degrees from 1<sup>st</sup> *waypoint* to 2<sup>nd</sup> *waypoint* (BRG..Bearing).
- (7) Distance between the 2 *waypoints* in kilometers (max. 820 km).

Fig. 37: Distance Display

## Enter *waypoints* in the *route*

- Up to 75 *route points* can be entered into the *route*.
- A new *waypoint* is always added at the end of the *route*.





### Procedure :

1. **Main menu 2 - WAYPOINTS → Waypoint Display**
2. Select with the **FORW - KEY** and the **BACK - KEY** the *waypoint*.
3. Define with the  - **KEY** the key functions of the  - and the  - **KEY** with **INSR** and **\*\*\*\***.
4. Press the **INSR - KEY → Inroute Display →** *waypoint* is added as the last *route point* → with **OK - KEY** return to the **Waypoint Display**.
5. Now either insert new *waypoints* with the **INSR - KEY** in the *route* or exit with the **EXIT - KEY**.


## Delete *waypoints* from the *route*

- From the list of the *route points* the last *route point* can be cleared or all the *route points* at once.
- To clear points from the *route*, first any *waypoint* must be inserted in the *route* via the **INSR**-key so that the key functions **OUTRT** and **DELRT** are available.










### Procedure :

1. **Main menu 2 - WAYPOINTS → Waypoint Display**
2. Define with the  - **KEY** the key functions of the  - and the  - **KEY** with **INSR** and **\*\*\*\***.
3. Press the **INSR**-key → **Inroute Display →** the active *waypoint* is added as the last *route point* → with the **OUTRT - KEY** clear the last, just added *route point* again from the *route*.
4. Now with every pressing of the **OUTRT - KEY** the last *route point* can be cleared or by pressing the **DELRT - KEY** (3 seconds) all the *route points*.
5. **EXIT - KEY → Waypoint Display -  - KEY - EXIT - KEY → main menu 2.**


## Activate route

- From the maximum of 75 *waypoints* in the route, any number of continuous points can be activated by marking. These activated *route points* are then indicated in their corresponding order in the **Map Display – distance indicator - (Fig. 12)(6),(7))**.
- If one or several *route points* are activated, the text „**ROUTE ACTIVE**“ appears in the **main menu 1** (menu point 4) instead of „**ROUTE**“.
- If the pilot approaches the next *route point* to 300 m, the **TOP-NAVIGATOR** (the *distance indicator*) switches automatically on to the next *route point* if this is not a *turning point* (pertaining acoustic signal : short intermittent whistle). If the next route point is a *turning point*, the **TOP-NAVIGATOR** switches on only when reaching the photo sector. In the **Data Display** the point to be flown to can be set manually or switched on manually with the **FORW - KEY** and the **BACK-KEY**. In the **Map Display** you can switch on by one *route point* with the  - **KEY** (press for 1 second) (pertaining acoustic signal : { da – dit }).
- If the *distance indicator* switches on automatically, a *barogram mark* is set furthermore. (not visible in the Map)

### Procedure :

1. **Main menu 1 – ROUTE / ROUTE ACTIVE → Route Display.**
2. The distance is indicated in kilometers between the *route points*.
3. Scroll with the  - **KEY** and the  - **KEY** the first *waypoint* of the route to be activated to the top line in the display.
4. Define with the  - **KEY** the key functions of the  - and the  - **KEY** with **MARK** and **DELM**. Possibly already marked *route points* must first be de-marked with the **DELM-KEY**.
5. By pressing the  - **KEY**, the *route points* are marked one after the other beginning with the first line. Press the  - **KEY** as often as necessary until all the *route points* desired are marked.
6. Define with the  - **KEY** the key functions of the  - **KEY** with **EXIT**.
7. **EXIT- KEY → main menu 1**

### Note :

By repeatedly pressing the  - **KEY** the distance between neighbouring *route points* or part and added distances of the *assessed distance* or the planned distance between the *turning points* can still be indicated as desired.

Only continuous *route points* can be marked. In the *active route* all the points are included which are located between the first and the last *route point* marked.

## Information on Active Route

- ⇒ The basic set-up of a track usually consists of a *takeoff location*, *turning points* and a *landing-strip*. In between any number of *waypoints* with different properties can be inserted (see [Properties of the various symbols]).
- ⇒ The actually *assessed distance* flown is stored in the **Logbook Summary Display (Fig. 27(12))** and the **Logbook Data Display (Fig. 28 (16))** of the **TOP-NAVIGATOR**.
- ⇒ Until the first, possibly activated *turning point* is flown, the *takeoff location* is considered as the *starting point of the assessed distance*.
- ⇒ The *destination of the assessed distance* is located at the *landing-strip* until all the possibly planned *turning points* are flown. In this case the last *turning point* in the *active route* results from the *destination of the assessed distance*.
- ⇒ For the flight task „**Triangle with start at the side**“ exactly 5 *turning points* must be included in the *active route* whereby the first and the last *turning points* are identical. If in this case all the *turning points* are flown, the *assessed distance* results from the sides between the *turning points* 2, 3, 4, 2 (see **Fig. 38**).
- ⇒ With a pre-set flight task, which also consists of 4 *turning points*, whereby the first and the last *turning points* are identical, the following can be done to prevent the **TOP-NAVIGATOR** from evaluating this *assessed distance* as if it were a flight task with start at the side : The first *turning point* must be entered in **double** at the beginning of the route (in immediate succession) (see **Fig. 39**).

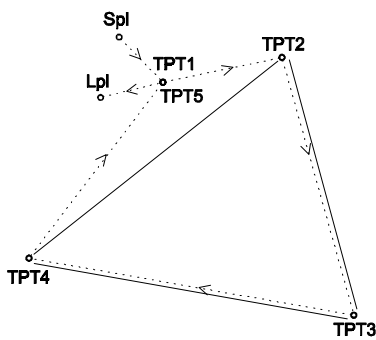


Fig. 38: Triangle with start at side

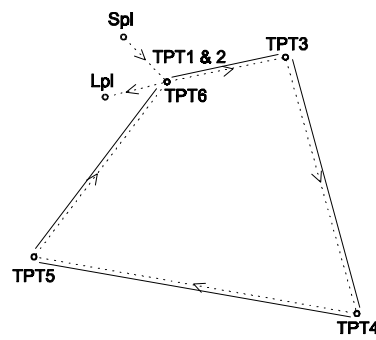
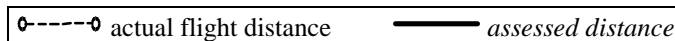


Fig. 39: Task with 5 turning points



### **Transmit *Waypoints* between two TOP-NAVIGATORS**

see [Transmit waypoints between two TOP-NAVIGATORS ] - page : **80**

### **Transmit *Waypoints* to PC**

see [Transmit waypoints to PC ] - page : **81**.

### **Transmit *Waypoints* from PC to TOP-NAVIGATOR**

see [Transmit waypoints from PC to TOP-NAVIGATOR ] - page **82**.

### **Transmit *Active Route* to PC**

see [Transmit active route to PC ] - page : **83**.

### **Transmit *Route* from PC to TOP-NAVIGATOR**

see [Transmit route from PC to TOP-NAVIGATOR ] - page : **83**.





## Display description - Route Display

11	x ①	SCHMITTEN B	
		②	4.6 km
12	TPT	FUERTH BHF	
			23.1 km
13	T	BRENNTLINGA	
			25.3 km
⑤	14	TPT	HOCHSOELL I
			38.0 km
15	TPT	KRIMMLERTAH	
			31.1 km
16	T	BUERGLHUETE	
	↓	④	↑ → ③

Fig. 40: Route Display 1

14	TPT	HOCHSOELL I	
		91.0 km	38.0 km
15	TPT	KRIMMLERTAH	
		122.1 km	31.1 km
16	T	BUERGLHUETE	
		144.5 km	22.4 km
17	TPT	WEISSTEIN A	
		149.2 km	4.7 km
18	TPT	FUERTH BHF	
		149.3 km	⑥ 0.1 km
19	O	FUERTH LPL	
	↓	↑	→

Abb. 41: Route Display 2

- (1) Name of waypoint with pertaining symbol.
- (2) Distance between the two waypoints.
- (3) With the  - KEY the key functions of the  - KEY and the  - KEY are either changed or the *assessed distance* or the planned distance to be flown are indicated.
- (4) With the  - KEY put the 1<sup>st</sup> waypoint for the route to be marked in the first position of the display.
- (5) Running number of the *waypoint* in the *route list*.
- (6) Planned flight distance considering all the *route points* marked until the *route point* thereafter.
- (7) Planned *assessed distance* until the relevant *turning point*.





## Key functions in Route Display

14	<b>T 2</b>	HOCHSOELL I		
		46.4 km	46.4 km	
15	<b>T 3</b>	KRIMMLERTAH		
		84.4 km	38.0 km	
17	<b>T 4</b>	WEISSTEIN A		
	⑦	134.7 km	50.3 km	
14	<b>T 2</b>	HOCHSOELL I		
↓                      ↑                      →				

Fig. 42: Route Display 3

### ⬆️⬇️ - Function :

- Scroll through the list of *route points*.

### Mark *route points* for *active route*

- Quickly press **MARK KEY** to mark *route points* beginning with the top one as „activated“.
- Only continuous *route points* (beginning with the first one) can be marked.

### Clear markings from all currently marked *route points*

Quickly press **LSCHM** - key.

- All *route points* so far marked are deactivated. If no point is marked in the *route list*, „**ROUTE**“ appears in the **main menu 1** (menu point 4) instead of **ROUTE ACTIVE**.

### Inverse *active route*

Press **↔** - key.

- All the *waypoints* of the *active route* are inversed.

### Delete all the *route points* from the *route list*

Press **DELRT** - key for 3 seconds.

- All the *route points* are cleared from the *route*.
- To enter *waypoints* in the *route* again see [Enter waypoints in the route ] - page : 59.

### Leave route display

Quickly press **EXIT** - key.

### Transmit *active route* between PC and TOP-NAVIGATOR:

**SENDRT** - key

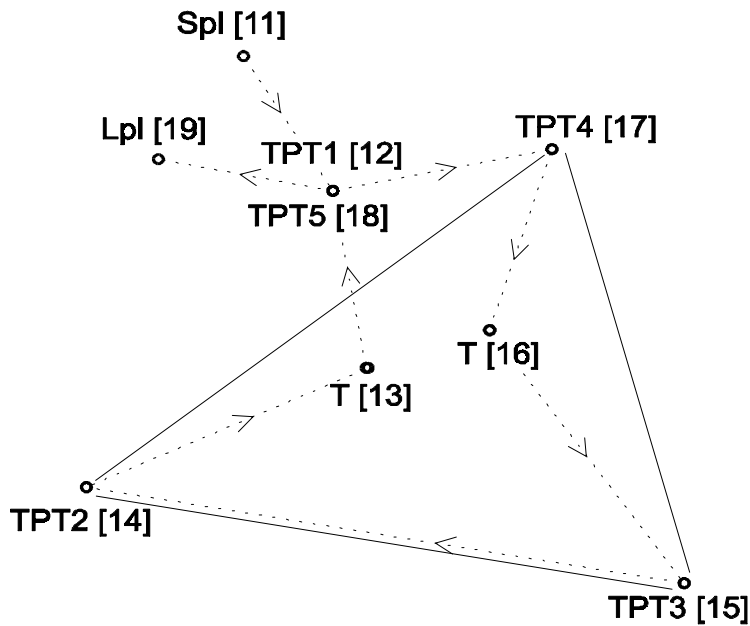
- see [Transmit active route to PC / Transmit route from PC to TOP-NAVIGATOR ] page 83.

## Example for route entry

### Description:

A triangle with start at the side is planned, *Takeoff location* is the Schmittenhöhe [11]. Turning points : Fürth Bahnhof [12], Hochsöll Bergstation [14], Krimmler Tauernhaus [15], Weissteinalm [17], Fürth Bahnhof [18]. In between there are 2 thermal *waypoints* (Brenntlinalm [13], Bürgelhütte [16]). The *landing-strip* is located on Landewiese in Fürth [19] (see **Fig. 40** - **Fig. 4343**).

### Graph :



**Fig. 43 : Example track**

○-----○ : The actual track is indicated in the **Route Display 2** (**Abb. 41**) with the overall distance to be flown.

———— : The planned *assessed distance* is indicated in the **Route Display 3** (**Fig. 42**). Rules for the calculation of the *assessed distance* see : - [Calculation basis for the assessed distance] - page : 30.

# Flight mode

## General

- Additional explanation regarding the **Flight mode** see: [Flight mode].

## Display description : Data Display

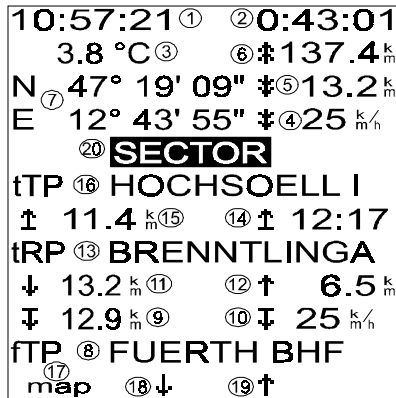
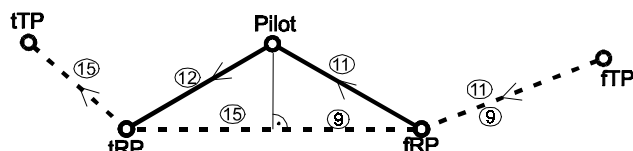


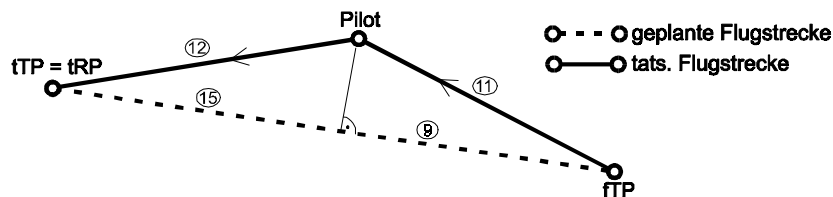
Fig. 44: Data Display

- (1) Current time
- (2) Flying time from beginning of flight mode
- (3) Current temperature
- (4) Average speed from *takeoff location*. After passing the first *turning point* (TP1) the average speed is calculated from the first *turning point* (referring to the track (5)).
- (5) Overall track flown so far measured from the first *turning point* considering all *route points* flown. Before reading the first *turning point* or if it is missing on the active *route*, the track is calculated from the *takeoff location*.
- (6) Absolute distance from the present position to the last *turning point* to be flown (all *route points* still planned are included). If there are no *turning points* in the active *route*, no distance is indicated.
- (7) Geographical coordinates of the present position.
- (8) Last *turning point* passed (fTP ...from *turning point*).
- (9) Distance to *turning point* last passed – reduced to the side between the *route point* last passed and the next following *route point* (see Fig. 45, Fig. 46 - (9)). Results calculated on a reduced basis are marked by a dash at the end of the arrows (↗ ↘).
- (10) Average speed calculated from the last *turning point*. The reduced distance serves as a calculation basis (see Fig. 45, Fig. 46 - (9)) as well as the time since passing the *turning point* last flown.
- (11) Real distance to the *turning point* last passed (see Fig. 45, Fig. 46 - (11)).

- (12) Real distance to the next *route point* (**tRP** ... to *route point*) (see **Fig. 45**, **Fig. 46 - (12)**).



**Fig. 45: Distances with general route point between turning points**



**Fig. 46: Distances without general route point between turning points**

- (13) Next *route point* (**tRP** ... to *route point*).
- (14) Estimated arrival time (**ETA** ... *estimated time arrival*) at next *turning point* (**16**). The distance and time since passing the last *turning point* (**8**) flown serves as a calculation basis. As long as there are no *turning points* passed, from the takeoff location.
- (15) Distance to the next *turning point* (**16**) – reduced to side (see **Fig. 45 - (15)**), **Fig. 46 - (15)** calculated for all the *route points*.
- (16) Next *turning point* planned (**tTP** ... to *turning point*).
- (17) Press **MAP – KEY** to return to the Automap Mode.
- (18) From the present position in the planned *route*, switch back manually by one *route point*.
- (19) From the present position in the planned *route*, switch forward by one *route point*. The *route* is switched back to the active side with that key (**↓, ↑**) whose arrow symbol appears inverse.  
Note : A *turning point* is only considered as flown with automatic switching on (as soon as pilot in photo sector).
- (20) While the pilot flies in the photo sector, the symbol **SECTOR** appears (as also in the **Map** and **Centering Display**).

# GPS Module

## General

8 channels parallel GPS in 2D/3D mode.

## Display description : GPS Check Display

96-06-07 ①		② 11:48:43		(1) Current date
G P S - C H E C K				(2) Current time
SOG 3 km/h ④ 016°T				(3) Geographical coordinates
SATS 6 ⑤		HDOP 2.9 ⑥		(4) Current SOG and pertaining track in degrees (T .. true north).
N 47° 29' 34"				(5) Number of satellites which can be received.
E 9° 41' 29" ③				(6) Measure for the precision (Dilution of precision).
exit	⑦ INIT	⑧ SATS?		

Fig. 47: GPS Check Display

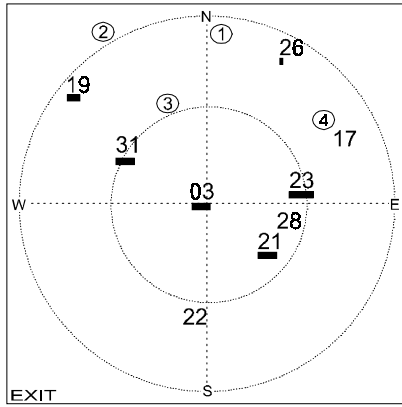
- (7) The **INIT** function is available only if changed from the **SETTINGS (main menu 2)** to the **GPS Check Display**.

By pressing the **INIT - KEY** the present coordinates can be entered approximately (in degrees – a value entered for minutes, seconds is ignored). Then the GPS Module returns to its basic setting.

This procedure is only necessary to resolve possible disturbances or helps with larger changes in location (>300km) whereby the **INIT** function helps to speed up the acquire of the satellites. By the approximate entry of the coordinates, it requires a few minutes only.

- (8) Change with the **SATS - KEY** to the **Sats Display**.

## Display description : Sats Display



- (1) Cardinal points : N, E, S, W
- (2) The outer circle indicates the horizon.
- (3) The middle circle indicates  $45^\circ$  inclination of view (elevation).
- (4) Every number indicates a satellite at the particular position. The signal intensity is indicated by the horizontal bar under the satellite number.

**Fig. 48: Sats Display**

Note: All the functions which require the **switching on of the GPS module built in** as eg printing of the barogram, setting of the local time or changing of the geodetic date, require a **waiting time** of several seconds. (To save energy, the GPS module is only operated when required.)


# Settings

## General

- The following setting possibilities are all activated from the **Settings Menu Display**.
- **Main menu 2 - SETTINGS → Settings Menu Display**

## Varioacoustic

- **CLIMBING TONE** (m/s) : threshold of the climbing tone with climbing tone acoustic switched on.
- **DESCENDING TONE** (m/s) : threshold of the descending tone with descending tone acoustic switched on.
- **SILENCE WINDOW** (m/s) :  
 Pilots who wish to receive continuous tone information while descending, set the **DESCENDING TONE** on 0 m/s and the silence window on the value for which the threshold of the tone is desired (eg: on  $\pm 0,5$  m/s). Thus when descending with 0,5 m/s a continuous tone can be heard whose frequency becomes lower with increasing descent.  
 Pilots who do not wish to have a acoustic signal during the „normal descent“, but an immediate acoustic information when the descent increases or decreases, set the **DESCENDING TONE** on the descending speed in calm air. For the silence window a range is selected for which the silence is desired.  
 Example: **DESCENDING TONE** : 1,1 m/s / **SILENCE WINDOW** :  $\pm 0,2$  m/s  
 → in a range of 0,9 to 1,3 m/s the descending tone acoustic is suppressed.  
 → if the descent is bigger than 1,3 m/s, the **DESCENDING TONE** is heard as described above (continuous tone whose frequency becomes lower with increasing descent).  
 → if the descent is less than 0,9 m/s, there is a longer low-high double tone which becomes shorter and is taken over when changing from descent to climb. Thus lifts can be recognised acoustically before they are indicated by the climbing tone.
- **DESCENT ALARM** (m/s) : Beyond the threshold set here, successive shrill beeps can be heard. The descent alarm is also active with the descending tone acoustic switched off.

- **GLIDEPATH SIGNAL** (RP  : **ON / OFF**) : activates or deactivates the signal which can be heard when reaching the flight altitude required for the next *route point*.
- **TC-ACOUSTIC** (s) : time constant in seconds for the varioacoustic.
- **TC-NUM** (s) : time constant in seconds for the numerical vario indicator. (see : **Fig. 11(10)**).
- **CLIMBING TONE INTERVAL** : Two different speeds for the frequency and two different tone – interval ratios are available (try out).
- **S2F - TONE** : alternately to the descending tone, the following mean :
 

low double beeps :	fly slower
high double beeps :	fly faster

With increasing deviation from the speed to fly, the intervals between the double beeps become shorter.

## Enter polars

- see [**Fly, extract and feed one's own polar data**]

## Summary printout

- see [**Transmit data between Top-Navigator, PC and onto printer**]

## Local time

- **DIFFERENCE BETWEEN UTC (UNIVERSAL TIME COORDINATED) AND LOCAL TIME** : The time in the **TOP-NAVIGATOR** is indicated with quartz precision. If the GPS Module is active, the time is taken over by the satellites.
- The difference between the local time and the UTC- time transmitted by the satellites should be set as a time difference.

### Note !

**By changing the local time, all the flights whose *flight data* is recorded in the TOP-NAVIGATOR, are marked as „noFAI“ and are invalid for a documentation according to FAI.**



## Units and Language

### Units :

- m : meter (SI unit)
- s : second (SI unit)
- km : kilometer (SI unit)
- h : hour
- °C : degree Celsius (SI unit)
- °F : degree Fahrenheit
- ft : foot: 1 ft = 0,3048 m
- fpm : feet per minute : 100 fpm = 0,508 m/s
- nm : nautical mile: 1 nm = 1,852 km
- kts : knot (kt) : 1kn = 1nm/h = 1,852 km/h
- mi : mile : 1 mi = 1,6093 km
- mph : miles per hour

### Geodetic date (GD):

- Depending on the flight area, 170 different settings can be selected.
- *Waypoints* are to be entered in the suitable geodetic (map) date.
- For Europe „**EUROPEAN 1979**“ or „**EUROPEAN 1950**“ is suggested.
- To enter points in the *SWISSGRID* format, „**CH1903 SWISSGRID**“ must be set.
- Flights to these *waypoints* must be made in the same Map date which is used for the relevant map (positions of the *waypoints* are not converted).
- Distance indications between *waypoints* of different Map date are incorrect.
- All position data is recorded in steps of 0,01 angular minutes which is a maximum of 18,5 m. *UTM* or *SWISSGRID* coordinates respectively cannot be set to the precise meter. *SWISSGRID* coordinates can only be entered in the sector between N 45° .. 48,5° and E 5° .. 11,5°.

### Format :

- For the entry and display of the geographical coordinates the following settings can be used :
  - **ddd mm.mm** : degrees, minutes, decimal point minutes
  - **ddd mm ss** : degrees, minutes, seconds
  - **UTM** : Universal Transverse Mercator

**Map / Route :**

Refers to the value indicated in **Fig. 12(9)**.

- **ETA**: estimated time arrival: estimated arrival time at last turning point of route.
- **ETE**: estimated time enroute: estimated flying time until reaching the next route point.

**Map / Sector :**

- In the **Map Display (Fig. 12)** the *glidepath indicator* is only made for points which deviate by a maximum of half the angular value from the value entered in the *Map sector* from the *track*.
- Values between 0 and 360 degrees can be entered.

**Language support :**

- There are the following language supports :  
**English, German, French, Spanish, Italian.**

**Delete all flights**

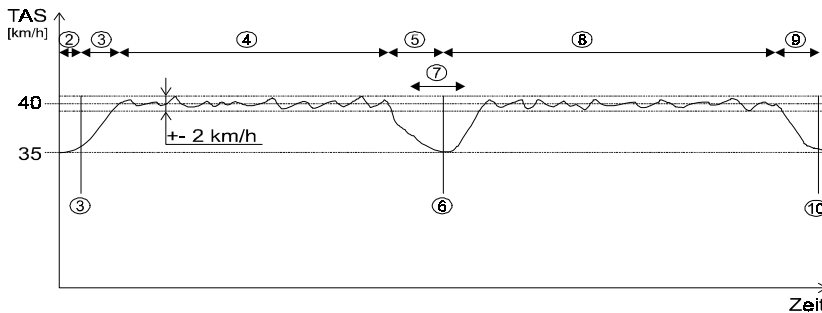
- see [**Delete** all flights from storage of TOP-NAVIGATOR].

**Calibrate speed probe**

- The propeller speed probe must be calibrated carefully from time to time, protected against rough environmental influences as well as checked for smooth running and unbalanced mass.
- **SPEED OFFSET** serves for frictional force compensation of the wind wheel and must usually not be changed (1 km/h).
- The calibrating constant of the speed probe can be set between 1004...3984 pulses/sec with 100 km/h.
- The pilot can thus roughly adapt his *TAS* (of the propeller speed probe) to the *SOG* (of the GPS module) (Example: The *TAS* measured at the trapeze hang-glider is approx. 10% smaller than the *SOG* measurement : impulse frequency from 2000 P/s to 90% → 1800 pulses/sec).
- To calibrate the propeller precisely, the propeller speed probe must be pre-set at  $\pm 2$  km/h.

## Precise calibration of the propeller speed probe

1. The flight mode must be started at the altitude of the takeoff location by means of a *fast start* at least 30 seconds before takeoff. Leave the GPS switched on. Apart from the 3 *flight marks* asked for hereafter, do not set any more.
2. During the calibration flight (altitude wind < 2 km/h ) with trimming speed (*TAS* = 30 .. 35 km/h) fly against or with the wind direction.



**Fig. 49 : Calibrate speed probe**

3. Set a *flight mark* with the - KEY.
4. Increase the *TAS* to 40 km/h ( $\pm 2$  km/h) and fly into one direction for approx. 1 minute.
5. Reduce the *TAS* to trimming speed.
6. Set another *flight mark* with the - KEY.
7. Change track by 180°.
8. Increase the *TAS* again to 40 km/h ( $\pm 2$  km/h) and fly into the opposite direction for approx. 1 minute.
9. Reduce the *TAS* to trimming speed.
10. Set the third *flight mark* with the - KEY.
11. Exit flight on landing-strip immediately by switching off.
12. In [Fig. 26: Polar Display] read the correcting factor for the propeller speed probe (7) and multiply the propeller speed probe calibration constant (see [Calibrate speed ]) with the correcting factor.

Example.: propeller speed probe – calibration constant : 2000  
 correcting factor : 0,970  
 propeller speed probe– calibration constant to be set :  
 $2000 * 0,970 = 1940$

## QNH calibration

- In the *QNH* calibration, the definition between *QNH* and sea level is made. The date of the last calibration is stored.
- This value must only be changed if the pressure sensor of the **TOP-NAVIGATOR** has been changed.

### Note !

- The **TOP-NAVIGATOR** is only certified for a documentation according to FAI if no *QNH* calibration has been made.
- Only **AIRCOTEC** is allowed to make a *QNH* calibration for a device suitable according to FAI.

## Vario zeroizing

- Is necessary if the **TOP-NAVIGATOR** in quiet condition always indicates a low climb or descent.
- The zeroizing lasts for 2 minutes and should be performed in a calm place without any variations in air pressure. The **TOP-NAVIGATOR** calibrates itself during this period of time and thereby slightly changes the internal Vario constant.

## Transmit data between TOP-NAVIGATOR, PC and onto printer

### General

- For the data transmission between two **TOP-NAVIGATORS** a cable with each a 4-channel **TOP-NAVIGATOR** plug is available.
- To transmit data between the **TOP-NAVIGATOR** and the **PC** or the **printer**, the cable with the **TOP-NAVIGATOR** plug and the 9-channel plug and the 9-channel serial plug (for COM1 or COM2) as well as the auxiliary program **TNCOMM.EXE** is utilised.
- All the cables can be plugged in or out of the **TOP-NAVIGATOR**, **PC** and serial printer when they are switched on or off.

### Operating the transmission program **TNCOMM.EXE**

1. The program **TNCOMM.EXE** is suitable for the operating systems Dos (from 3.0 on), Windows 3.11 or Windows 95 .(not Windows<sup>o</sup>NT )
2. Start the **TNCOMM.EXE** program.
3. Select the serial interface utilised (COM1 or COM2) with the arrow keys (right, left).
4. Set the direction for the transmission (**PC → TOP-NAVIGATOR** or **TOP-NAVIGATOR → PC**).
5. Enter the file name in the DOS format (max. 8 characters for the description and separate optionally by a dot, 3 letters for possible extensions).
6. **NAVIGATOR → PC** : if the file name is confirmed with the **ENTER**-key, the program assumes that the transmission is started from the **TOP-NAVIGATOR**. The message „**Ready for receiving Data**“ is indicated.


**PC → TOP-NAVIGATOR** : confirm file name with the **ENTER**-key. After the **TOP-NAVIGATOR** is ready to receive, the transmission can be started with the **ENTER**-key.

7. During the transmission, the message „**TRANSMITTING DATA**“ or „**RECEIVING DATA**“ appears.
8. If the transmission is completed successfully, the message „**TRANSMISSION SUCCEEDED**“ appears.

## Transmit flight summary to PC

- The *flight summary data* of all the flights (max 256) which are still stored in the **TOP-NAVIGATOR**, can be transmitted to the PC in an ASCII file and printed on a printer.


### Procedure :

1. Connect **TOP-NAVIGATOR** - PC transmission cable to **TOP-NAVIGATOR** and to PC.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program **TNCOMM.EXE**]).
3. **TOP-NAVIGATOR** : Main menu 2 - **SETTINGS** → Settings Menu Display – **SUMMARY PRINTOUT** → Summary Menu Display - **LOG** -  - KEY to start the transmission.
4. During the transmission the **TOP-NAVIGATOR** indicates the running number of the currently transmitted flight on the right.

## Transmit flight in the TOP-NAVIGATOR format to the PC

- The *flight data* of every flight which is still stored in the **TOP-NAVIGATOR** ([**Display** description- Logbook Data Display]), can be transmitted to the PC.
- The file is transmitted to the PC in the ASCII format. To evaluate data yourself, you can request the description of the data format from **AIRCOTEC**.
- The *flight data* can be transmitted directly to a second **TOP-NAVIGATOR** in the same way.

### Procedure :

1. Connect the **TOP-NAVIGATOR** - PC transmission cable to the **TOP-NAVIGATOR** and to the PC.
2. **TOP-NAVIGATOR** : Main menu 2 - **LOG** → Logbook Data Display : select flight desired -  - key → Logbook Menu Display – **FLIGHT TO TNCOMM**.
3. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program **TNCOMM.EXE**]).
4. Start the transmission on the **TOP-NAVIGATOR** with the **START**-key. During the transmission the **TOP-NAVIGATOR** indicates the currently transmitted flying time on the bottom on the right.

## Transmit flight from PC to TOP-NAVIGATOR

- *Flight data* stored on the **PC** can be transmitted back to the **TOP-NAVIGATOR** at any time.
- The flight is added at the end of the flights already stored.
- In the **Logbook Data Display** (see : **Fig. 28 (4)**) the flight is marked with „**PC-FD**“ (PC - Flight Data).

### Note :

**If a flight is transmitted from the PC to the TOP-NAVIGATOR, all the other flights in the storage are marked with „noFAI“ and are invalid for a documentation according to FAI.**


### Procedure :

1. Connect the **Top-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. **Main menu 2 - LOG → Logbook Data Display** : press **TNCM**-key for 3 seconds → the **TOP-NAVIGATOR** is now ready to receive and indicates the message **START TNCMM**.
3. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program TNCOMM.EXE]).
4. Start transmission on the **PC** with **ENTER**-key.

## Flight print out (also FAI print)

- The data is printed in a 10 second interval.
- The printer must be HP PCL3/5/6 or Epson FX80 compatible and have a serial interface.
- The transmission is performed serially with 9600Bd (XON/XOFF handshake).
- For printers with Centronics parallel interface a serial – parallel interface with XON/XOFF handshake (e.g. SP100e) is necessary between the **TOP-NAVIGATOR** and the printer.
- It is possible to set up a print file with **FLIGHT PRINT OUT** via **TNCOMM** and to print it afterwards via **PC**. (**NOT for FAI!**)

### Procedure when printing :

1. Connect cable to printer and **TOP-NAVIGATOR**.
2. Switch on printer, check paper and operation („ON LINE“).
3. Confirm menu point **more / Off 4 sec → main menu 2 - LOG → Logbook Summary Display** -  - **KEY → Logbook Data Display** – select flight.

4. Confirm selection with the  - KEY → **Logbook Menu Display** - **FLIGHT PRINT OUT** → **Print Display** – start print either with fixed (**FIX**) or optimal (**OPTIMAL**) altitude scale.


#### Procedure when printing according to FAI :

see [Documentation of record flights according to FAI].

### Transmit list of takeoff locations to PC

- The 10 takeoff locations which are stored with their pertaining altitude in the **Modify takeoff location Display (Fig. 19)** are transmitted according to their running number into an ASCII file on the **PC**.

#### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program **TNCOMM.EXE**]).
3. **TOP-NAVIGATOR** : **Main menu 2 - SETTINGS** → **Settings Menu Display** – **SUMMARY PRINTOUT** → **Summary Edit Menu Display** – **TAKEOFF LOACTIONS** -  - KEY to start transmission.
4. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted takeoff location on the right.






### Transmit *waypoints* between two TOP-NAVIGATORS

- *Waypoints* can be transmitted between 2 **TOP-NAVIGATORS**.
- The *waypoints* can be inserted into the *waypoint list* at any position required.

#### Procedure :

1. Connect the transmission cable **TOP-NAVIGATOR** - **TOP-NAVIGATOR** to both the devices.




2. For both **TOP-NAVIGATORS** : **Main menu 2 - WAYPOINTS → Waypoints Display**.
3. Select the *waypoint* to be sent in the transmitting **TOP-NAVIGATOR** with the **FORW**-key and the **BACK**-key.
4. Select the *waypoint*, after which the new one should be inserted, in the receiving **TOP-NAVIGATOR** with the **FORW**-key and the **BACK**-key.
5. On both the **TOP-NAVIGATORS** : press the  - **KEY** to change the key functions of the  - **KEY** and the  - **KEY** to **SEND** and **DEL**. If this key function is active, the **TOP-NAVIGATOR** is ready to receive data (indicated by the message „**auto-receive mode**“).
6. Transmission of the *waypoint* by quickly pressing the **SEND - KEY** (short acknowledgement signal) on transmitting **TOP-NAVIGATOR**. If there is a mistake during the transmission, the message „**ERROR**“ appears quickly at the bottom on the left of the display.
7. If a *waypoint* is transmitted correctly, the transmitting **TOP-NAVIGATOR** automatically switches to the next *waypoint*. Thus it is possible to transmit several *waypoints* successively by longer pressing of the **SEND - KEY**.
8. Define with the  - **KEY** the key functions of the  - **KEY** with **Exit**. Press **Exit - KEY** to return to the **main menu 2**.

### Transmit *waypoints* to PC

- All the *waypoints* are transmitted to the **PC** in alphabetical order as an ASCII file.






#### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program **TNCOMM.EXE**]).
3. **TOP-NAVIGATOR** : **Main men 2 - SETTINGS → Settings Menu Display – SUMMARY PRINTOUT → Summary Edit Menu Display - WAYPOINTS** -  - **KEY** to start transmission.
4. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted *waypoint* on the right.

## Transmit *waypoints* from PC to TOP-NAVIGATOR

- *Waypoints* are continuously transmitted from an ASCII file to the **TOP-NAVIGATOR**.
- For detailed information on the format of the ASCII file see **TNCOMM instruction manual**.


### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for the transmission (see [Operating the transmission program **TNCOMM.EXE**]).
3. **TOP-NAVIGATOR** : Main menu 2 - **WAYPOINTS** → **Waypoints Display**.
4. Select in the **TOP-NAVIGATOR** with the **FORW - KEY** and the **BACK - KEY** the *waypoint* after which the new ones should be added.
5. Press the - **key** to change the key functions of the - **KEY** and the -**KEY** to **SEND** and **DEL**. When this key function is active, the **TOP-NAVIGATOR** is ready to receive data (indicated by the message „**auto-receive mode**“).
6. Start the transmission of the *waypoints* on the **PC**. If there is a mistake during the transmission, the message „**ERROR**“ appears quickly at the bottom on the left in the display.
7. Define with the - **KEY** the key functions of the - **KEY** with **Exit**. Press the **Exit - KEY** to return to the **main menu 2**.
8. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted *waypoint* on the right.

## Transmit *active route* to PC

All the marked *route points* of the **active route list** are transmitted to the **PC**.

### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program TNCOMM.EXE]).
3. **TOP-NAVIGATOR** : Main menu 2 - **SETTINGS** → Settings Menu Display – **SUMMARY PRINTOUT** → Summary Menu Display – **WAYPTS-ACT. ROUTE** -  - **KEY** to start transmission.
4. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted *route point* on the right.

## Transmit *route* from PC to TOP-NAVIGATOR






- Like [Transmit waypoints from PC to TOP-NAVIGATOR] – however instead of the menu point **WAYPOINTS** select the menu point **ROUTE (main menu 1)**
- For detailed information on the format of the ASCII file see **TNCOMM – Instruction manual**.

## Transmit lifts between two TOP-NAVIGATORS

- Lifts can be transmitted between 2 **TOP-NAVIGATORS** like *waypoints*.

### Procedure :


1. Connect the transmission cable **TOP-NAVIGATOR** - **TOP-NAVIGATOR** to both the devices (can be performed with device on or off).
2. On both the **TOP-NAVIGATORS** : Main menu 2 - **LIFTS** → Lift Data Display

3. Select in the transmitting **TOP-NAVIGATOR** with the **FORW**-key and the **BACK**-key the lift to be transmitted.
4. Select in the receiving **TOP-NAVIGATOR** with the **FORW**-key and the **BACK**-key the lift after which the new ones should be added.
5. On both the **TOP-NAVIGATORS** : press  - **KEY** to change the key functions of the  - **KEY** and the  - **KEY** to **SEND** and **DEL**. When this key function is active, the **TOP-NAVIGATOR** is ready to receive data (indicated by the message „**auto-receive mode**“).
6. To transmit the lift, quickly press the **SEND - KEY** (short acknowledgement signal) on the transmitting **TOP-NAVIGATOR**. If there is a mistake during the transmission, the message „**ERROR**“ appears quickly at the bottom on the left of the display.
7. If an lift is transmitted correctly, the transmitting **TOP-NAVIGATOR** automatically switches to the next lift thereby enabling to successively transmit several lifts by pressing the **SEND - KEY** for a longer period of time.
8. Define with the  - **KEY** the key functions of the  - **KEY** with **Exit**. Press the **Exit - KEY** to return to the **main menu 2**.

## Transmit lifts to PC

- All the lifts are transmitted to the **PC** in alphabetical order as an ASCII file.






### Procedure:

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program **TNCOMM.EXE**]).
3. **TOP-NAVIGATOR** : **Main menu 2 - SETTINGS** → **Settings Menu Display – SUMMARY PRINTOUT** → **Summary Menu Display - LIFTS** -  - **KEY** to start the transmission.
4. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted lift on the right.

## Transmit lifts from PC to TOP-NAVIGATOR

- Lifts are continuously transmitted from an ASCII file to the **TOP-NAVIGATOR**.
- For detailed information on the format of the ASCII file see **TNCOMM – Instruction manual**.


### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare **TNCOMM.EXE** for transmission (see [Operating the transmission program TNCOMM.EXE]).
3. **TOP-NAVIGATOR** : Main menu 2 - **LIFTS** → **Lift Display**.
4. Select in the **TOP-NAVIGATOR** with the **FORW**-key and the **BACK**-key the lift after which the new ones should be added.
5. Press  - **KEY** to change the key functions of the  - **KEY** and the  - **KEY** to **SEND** and **DEL**. When this key function is active, the **TOP-NAVIGATOR** is ready to receive data (indicated by the message „auto-receive mode“).
6. Start the transmission of the lifts on the **PC**. If there is a mistake during the transmission, the message „**ERROR**“ appears quickly at the bottom on the left of the display.
7. Define with the  - **KEY** the key functions of the  - **KEY** with **Exit**. Press **Exit** - **KEY** to return to the **main menu 2**.
8. During the transmission the **TOP-NAVIGATOR** indicates the running number of the just transmitted lift on the right.

## Transmit flight in Baromaster format to PC

- The *flight data* of every flight which is still stored in the **TOP-NAVIGATOR** ([**Display** description- Logbook Data Display]) can also be transmitted to the PC in the Baromaster format.
- The ASCII file will be transmitted in a compressed form to the PC. To evaluate data oneself, the description of the data format can be requested from **AIR-COTEC**.

### Procedure :

1. Connect the **TOP-NAVIGATOR** - **PC** transmission cable to the **TOP-NAVIGATOR** and to the **PC**.
2. Prepare the **BAROMASTER SOFTWARE** for transmission (see **BAROMASTER instruction manual**).
3. **TOP-NAVIGATOR** : Main menu 2 - **LOG** → **Logbook Data Display** : select flight desired -  - **KEY** → **Logbook Menu Display** – **FLIGHT TO BAROMASTER**.
4. **POL. – KEY** : The *barogram* is transmitted in 1 second cycles with the pertaining *TAS* (for polar evaluation – only useful if flown with propeller speed probe).
5. **BARO – KEY** : The *barogram* is transmitted in 5 second cycles without *TAS*.
6. During the transmission the **TOP-NAVIGATOR** counts backwards to zero at the bottom on the right.

# Annex

## Basic settings

### Takeoff locations

- All the 10 takeoff locations include the word „**alti**“ instead of the altitude in meters and the word „**takeoff-loc**“ instead of the name of the takeoff location.
- The altitude is pre-set on a QNH of 1013 hPa.

### Standard - Polars

Value	V <sub>min</sub>	V <sub>max</sub>	V1		V2		V3		Silence window		Time constant
Polar	km/h	km/h	km/h	m/s	km/h	m/s	km/h	m/s	m/s	km/h	sec.
PARA 1 BASIS	18.0	37.0	26.0	1.50	31.0	1.80	36.0	2.50	0.0	2.0	3
PARA 2 INTERMED.	20.0	40.0	28.0	1.30	31.0	1.50	38.0	2.50	0.0	2.0	3
PARA 3 SUPER CL.	20.0	45.0	28.0	1.20	37.0	1.60	45.0	2.50	0.0	2.0	3
PARA 4 HIGH PER-	20.0	50.0	28.0	1.00	37.0	1.30	45.0	2.00	0.0	2.0	3
DELTA 1 INTERMED.	27.0	90.0	38.0	1.10	55.0	1.80	70.0	4.60	0.0	4.0	3
DELTA 2 SUPER CL.	27.0	100.0	38.0	1.00	58.0	1.60	80.0	4.20	0.0	4.0	3
DELTA 3 HIGH PER-	27.0	110.0	38.0	0.90	58.0	1.50	80.0	3.90	0.0	4.0	3
DELTA 4 PEGASUS 1b5	36.0	115.0	43.0	0.74	69.0	1.48	95.0	3.46	0.0	4.0	3

### Logbook

- The Logbook includes a demo flight which can however be cleared in the Logbook Menu Display.
- If the pilot clears all the flights with the function **DELETE ALL FLIGHTS** (see [Delete all flights from storage of TOP-NAVIGATOR]) the demo flight regenerates itself.



## Varioacoustic

- **CLIMBING TONE:** +0.1 m/s
- **DESCENDING TONE :** -1.2 m/s
- **SILENCE WINDOW :**  $\pm 0.5$  m/s
- **SINK ALARM :** -5.0 m/s
- **GLIDEPATH SIGNAL :** ON
- **TIME CONST. ACOUSTIC :** 1 s
- **TIME CONST. NUMERIC :** 1 s
- **CLIMBING TONE INTERVAL :** slow, tone - break = 1 : 1

## Local time offset

00:00 (hh:mm)

## Units and languages

- **UNITS :** m m/s km/h km °C
- **GEODET. DATE :** WGS84
- **LAT/LON :** ddd mm.mm
- **MAP SECTOR :** 360°
- **MAP ROUTE:** ETA
- **LANGUAGE :** GERMAN

## Speed probe

- **PULSES PER SECOND (with 100 km/h) :** 2000P/sec
- **SPEED OFFSET :** 1.0 km/h

## Abbreviations

AVE	: <u>a</u> verage wind speed
BRG	: bearing
COG	: <u>c</u> ourse <u>o</u> ver ground
LA	: <u>l</u> anding- <u>s</u> trip
LAT	: <u>l</u> atitude
LON	: longitude
fTP	: last flown <i>turning point</i> in the active <i>route</i> ( <u>f</u> rom <u>t</u> urning <u>p</u> oint)
G	: maximum altitude gain
GPS	: <u>G</u> lobal <u>P</u> ositioning <u>S</u> ystem
PDOP	: precision factor GPS (Position Dilution of Precision)
mc	: <u>M</u> cc <u>C</u> ready
MX	: <u>m</u> aximum altitude
S	: sum of all altitude gains
SOG	: <u>s</u> peed <u>o</u> ver ground
ST	: takeoff location (start)
TAS	: <u>t</u> ru <u>e</u> <u>a</u> ir <u>s</u> peed - (is measured by the propeller speed probe)
TPT	: <u>t</u> urning <u>p</u> oint
tRP	: next <i>route point</i> ( <u>t</u> o <u>r</u> oute <u>p</u> oint) of the active route
tTP	: next <i>turning point</i> ( <u>t</u> o <u>t</u> urning <u>p</u> oint) of the active route
UTM	: <u>U</u> niversal transverse <u>M</u> ercator
WGS 84	: <u>W</u> orld <u>G</u> eodetic <u>S</u> ystem 1984

## Definitions

**Active route** : *Waypoints* with various properties are activated in a certain order as a *route*. The *distance* and *glidepath calculator* is performed on these points.


**Drift flag** : The direction of the *drift flag* (with the symbol of the lift in the *Map*) corresponds to the anti-wind direction which was prevailing during the flight for which the lift was flown.

**Glidepath indicator** : (see **Fig. 12(19-20)**) indicates the distance as well as the assumed altitude reserve for active *route points*, as well as also for certain *waypoints* and lifts.

**Glidepath calculation** : is performed for all the *waypoints*, however is only indicated for certain *waypoints* in the *glidepath indicator*.

**Lift list** : List of lifts (max. 768).

**Barogram** : diagram in which the altitude is indicated above the time.

**Flight mark** : If a *flight mark* is set during the flight with the  - **KEY**, it appears again at the corresponding place in the flight and in the *barogram* when analysing the flight.

**Distance indicator** : (see **Fig. 12(6-7)**) indicates the distance to the next route point.

**Flight data** : Every second all the important data as time, climbing speed, *TAS*, *SOG*, *COG*, *LAT*, *LON*... are stored during every flight. The overall storage capacity of the **TOP-NAVIGATOR** is about 16 hours. When the storage is full, the *flight data* of the oldest flight is cleared.

**Flight summary data** : includes all the data which is indicated in [**Fig. 28: Logbook Data Display**]. The *flight summary data* remains also in the storage if the *flight data* has already been cleared. The storage capacity of the **TOP-NAVIGATOR** includes 256 flight summaries.

**Speed distribution curve** : The average *SOG* is indicated above the wind rose on this curve (see **Fig. 11 (6)**).

**Landing-strip** : (Lpl) Geographic location where the pilot lands.

**Map** : Map area in the **Map Display (Fig. 12)** with the pilot as the centre and display of the *waypoints (route points)* and the *lifts* with their symbols.

**McCready value** : (**Fig. 11 (9)**) should be set such that it corresponds to the expected average climb in the next lift. This value is included in the *speed to fly calculation* and the *glidepath calculation* (altitude reserve).

**Map Sector** : In the **Map Display (Fig. 12)** the *glidepath indicator* is only performed for points deviating from the track at the most by half the angular measure from the value set in the *Map Sector*.

**Track indicator** : indicates the current track. (**Fig. 12 (10)**)

**QNH** : The air pressure indicated corresponds to the pertaining air pressure at sea level of the altitude set.

**Route** : The active *route* includes all the important geographical points to be flown during a flight.

**Route list** : List of *waypoints* (max. 75) which are included in the *route* and from which successive *route points* can be activated by marking.

**Route point** : *Waypoint* which is included in the *route* and is activated there.

**Fast start** : With the *fast start* the **TOP-NAVIGATOR** changes immediately into the flight mode. All the GPS functions are inactive until at least 4 satellites can be received.

**Speed to fly** : (S2F) calculates the optimal pertaining gliding speed depending on flight polars, descent speed, *McCready* value, wind speed and wind direction.

**Speed to fly indicator** : (**Fig. 12(2)**) indicates optically to the pilot how the current *TAS* is to be corrected.

**Speed to fly time constant** : The **TOP-NAVIGATOR** averages the values calculated for the *speed to fly* with the value indicated here.

**Speed to fly acoustic** : informs the pilot acoustically in addition to the *speed to fly indicator* whether he flies too fast or too slowly according to the *S2F calculation*.

**Bearing indicator** : (**Fig. 12(8)**) indicates the direction to the next *route point*.

**Standard polars** : In the **TOP-NAVIGATOR** 8 *standard polars* can be selected. The values of these 8 polars can be adapted to one's own requirements.

**Takeoff location** : (Spl) Place where the pilot starts or lifts off the ground.

**Swissgrid** : coordinate system for Switzerland in meters.

**Temperature gradient** : indicates how many degrees the temperature decreases at a certain altitude per 100 meters (Example.: Temp = -0,7 : the air temperature decreases by 0.7 °C / 100 m).

**Replay mode** : is used to replay a flight from the flight data storage.

**Waypoint list** : List of geographical points for which certain properties can be defined and which are indicated in the **Map** with varying symbols.

**Waypoints** : all the points which are included in the *waypoint list*

**Turning point : (TPT)** *Turning point* which can clearly be identified geographically in a map and with which the *assessed distance* is flagged out.

**Assessed distance :** Except for the flight task „triangle with start at the side“ (Fig.29) the *assessed distance* always results from the distance between the *takeoff location* and the *target of the assessed distance* considering all the *turning points* flown. All the *waypoints* with other properties are not considered for the distance calculation in the **Logbook**.

**Wind shift compensation :** The wind shift of the lift is compensated in the **Centering Display** whereby facilitating the finding of an lift at various altitudes.

