VT-2000

Secondary Surveillance Radar Transponder Mode-S

User manual

Add this manual to the flight instruction manual of your aircraft

GARRECHT Avionik GmbH

Record of Revisions

Always keep this page in front of this document.

Datum	Revision	Seiten	Änderungen	Bearbeitet von
01.03.2007	1.0	all	initial release	JG
11.02.2008	1.1	all	added: Features of UI FW-Rel. 1.20	JG
11.04.12	1.2	Alle	added: Manual VT-2000	JG

Table of content

Preface

This manual contains operating instructions for the Mode-S transponder VT-2000. It should be read before operating your VT-2000 transponder. Please contact your supplier in any case of doubt or for additional questions.

Safety symbols:

The following symbols and terms are used in this manual:

	***Warning*** ***Warning statements identify conditions or practices that could result in injury or loss of life***
	***Caution*** ***Caution statements identify conditions or practices that could result in damage of this product or other property.***
	***Important note:*** ***Indicates important or usefull information. It is strongly recommended to read, understand and follow the statement.***

The pilot is always responsible to respect all legal aspects and obligations resulting in operating this installed VT-2000

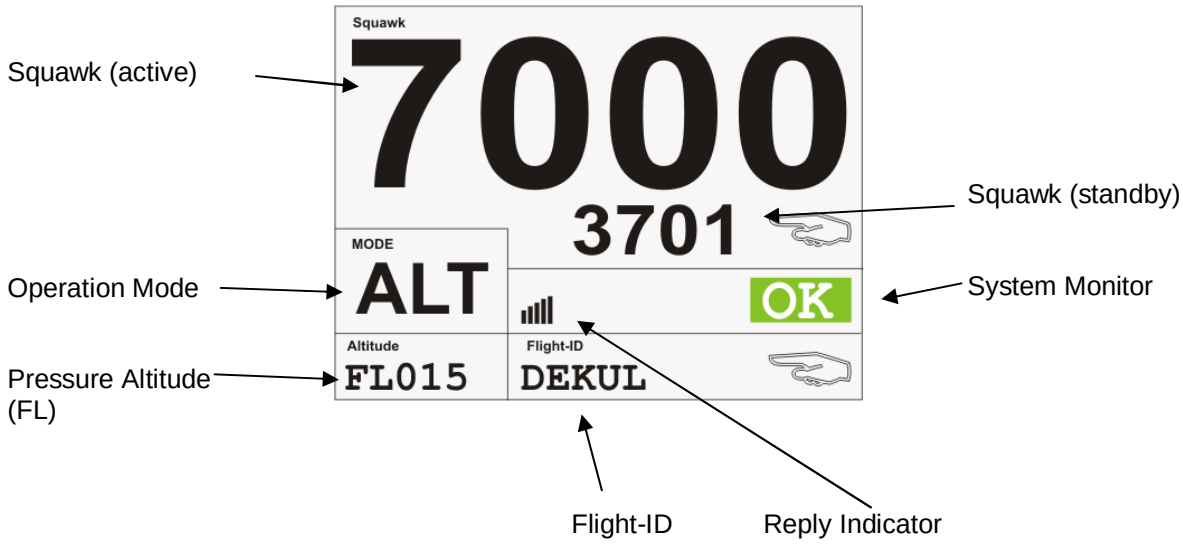
To prevent damage caused by overvoltage or voltage spikes, always switch off the system when starting or stopping the aircraft's engine. Damage caused by spikes or overvoltage can be determined by the manufacturer and are not covered bythe manufacturer's warranty.

1. Switching ON and OFF

	Switch ON the VT-2000 by Pressing one of the keys **SBY**, **GND**, **ON**, **ALT**. The unit starts in the selected mode. Press key **OFF** and hold until the units switches off.
	Startup screen after powering on the device. The screen informs about the firmware version installed in the **control unit**. NOTE: Firmware and FPGA version information can be found in Main Menu.Setting.Info of the device

2. Normal Operation

When in normal operation mode, the following screen is shown by the system:

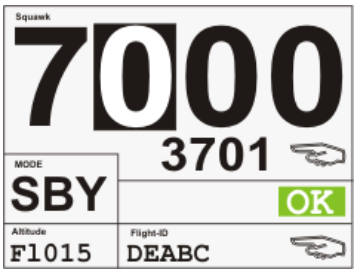


Notes:

- If no Mode-S Adress has been entered, the Flight-ID is replaced by a blinking text **`No Mode-S.`** The system operates in Mode-A/C then
- The pressure altitude refers to 1013,25 hPa and is displayed in flightlevels (FL)

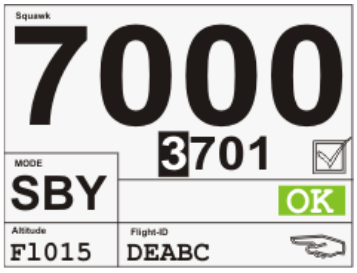
2.1. Entering a Squawk (Reply Code)

Use the keypad for entering the desired squawk



- After pressing the first numeric key, the selected entered value will be indicated in the first position of the squawk string. The cursor jumps to the next position automatically.
- Undesired inputs can be changed by pressing **CLR**. The Cursor jumps one digit to the left and the wrong input can be overwritten by entering the correct value.
- After inputting the last digit, the squawk is complete and will be activated immediatly.
- Pressing **VFR** invokes the presetted VFR squawk The previous entered squawk will be moved into the standby squawk
- Pressing  toggles between active and standby squawk.

2.2. Entering a Standby Squawk

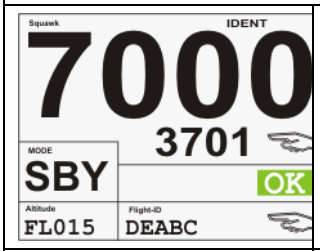
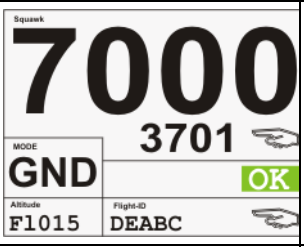
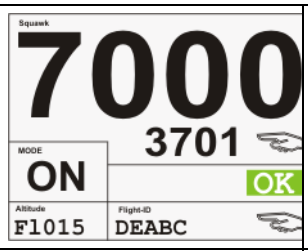
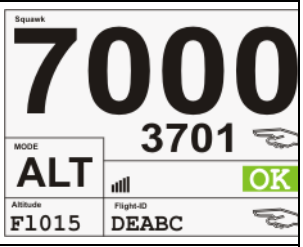


Enter the standby squawk using the VT-2000 keypad.

- Activate the edit mode by pressing the upper softkey. The symbol ☜ near the standby squawk changes to ☑.
- Enter now the desired standby squawk using the keypad.
- Undesired inputs can be changed by pressing **CLR**. The Cursor jumps one digit to the left and the wrong input can be overwritten by entering the correct value.
- After inputting the last digit, the squawk is complete and will be activated immediatly.
- Pressing  toggles between active and standby squawk.

2.3. Selecting a Mode

Select the desired mode by pressing one of the keys **SBY**, **GND**, **ON**, **ALT**.

			
Standby Modus	**On-Ground Modus**	**ON-Modus**	**ALT-Modus**

Display	Mode	Description
SBY	Standby	Standby - System is switched on, no replies or squitters will be sent.
GND	Ground	Mode-A/C/S intermode All-Calls will not be replied
ON	System operating, no alticode will be replied	Selected reply code will be replied for Mode-A/C interrogations, altitude information is set to zero, squittering is enabled, Mode-S interrogations will be replied. Switch to this mode only if required by ATC .
ALT	System operating, alticode will be replied	Selected reply code will be replied for Mode-A/C interrogations, altitude information is set to indicated value, squittering is enabled, Mode-S interrogations will be replied (standard operation mode)

If the airframe provides an Weight-on-Wheels switch and the transponder has been configured properly, manual switching to ON or ALT mode is not possible while aircraft is on ground.

2.4. IDENT Function

Pressing **IDT** invokes the ident mode for 18 sec.

Press the ident key only if requested by ATC!

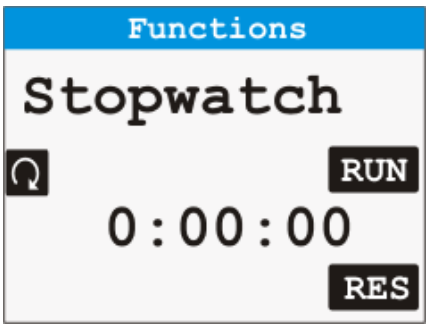
2.5. Additional Functions

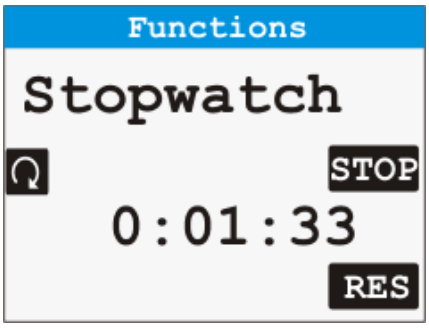
The VT-2000 provides some usefull features (stop watch, countdown and altitude monitor)

Press **PGE** to enter the first page of this additional functions.

Press  to switch between the different function pages (softkey ↻).

2.5.1. Stop Watch





RUN	starts the stop watch
STOP	stops the stop watch
RES	resets the running or stopped watch to 0:00:00 zurück

2.5.2. Altitude Monitor

REF sets the current pressure altitude for reference and acitvates the altitude monitor

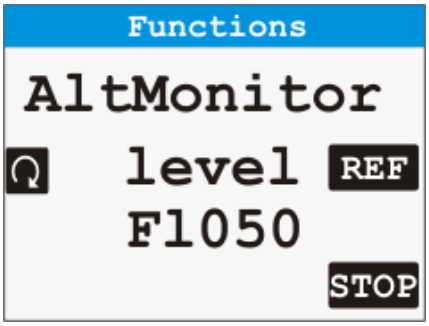
Deviations from the presetted reference are indicated optical and audible

STOP stops the altitude monitor

GO resumes the altitude monitor function wit the stored reference

0 decreases reference altitude by 100ft.

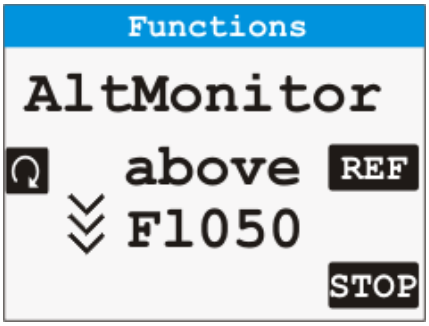
2 creases reference altitude by 100ft.



Example:

Alt - monitor active. Current reference: FL 050

No deviation (=**level**)

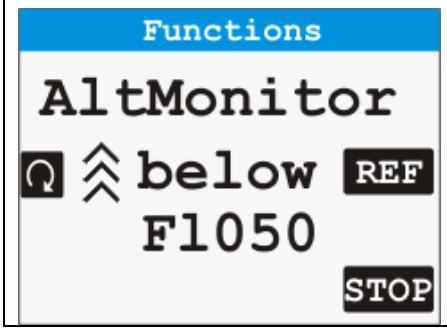


Alt - monitor active. Current reference: FL 050

Deviation: 300 ft above reference (=**above**)

One ^ indicates a 100ft deviation.

The chevron's direction commands: Sinken



Alt - monitor active. Current reference: FL 050

Deviation: 300 ft below reference (=**below**)

The chevron's direction commands: Climb

2.5.3. Count Down

Setting the contdown initial value:

2 increases the initial value by 30 sec.

0 decreases the initial value by 30 sec.

Press and hold the keys to increase the step size to make inputs more comfortable

RUN starts the count down

STOP stops the count down

2.6. More Settings

Pressing **PGE** twice in the normal operation screen enters the main menu. Some unprotected setting can be made up to the pilot's preferences.

2.6.1. Rudiments of Operation:

2.6.1.1. Menue Navigation

	Navigate through the menues using the VT-2000 keyad. 2 moves the cursor up 0 moves the cursor down **SEL** selects the inverted menu item **EXIT** leaves a submenu

2.6.1.2. Value Input

Handle input fields as follows:

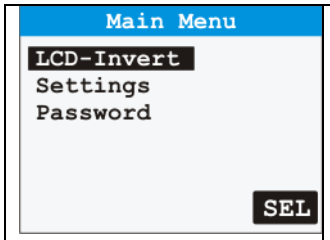
- Select a field using 2 or 0 .
- **SEL** activates the edit mode for the selected field. Editable fields are displayed in inverted style.
- If the first digit of a string is inverted, use the 4 or 6 to navigate to the desired postion.
- Change values in the string using 2 or 0 .
- If the entire string is displayed inverted, no single digits can be changed. Use 2 or 0 to select from presetted values.

ESC quits the edit mode without saving changes

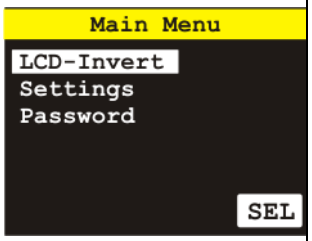
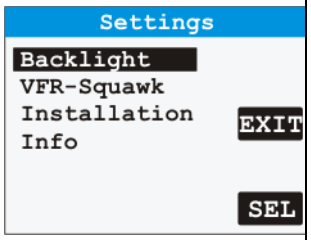
SAVE saves the value entered in the field and quits the edit mode.

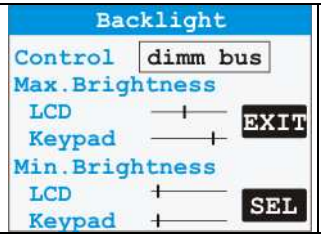
EXIT leaves a sub menu

2.6.1.3. VT-2000 Menu Tree

<table>
<tr><td> 
</td><td colspan="3">

- LCD-Invert: switches manually between day mode and night mode
- Settings: invokes submenu settings
- Password: invokes password page for extended setup

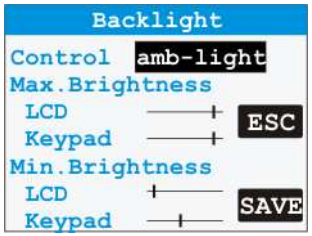
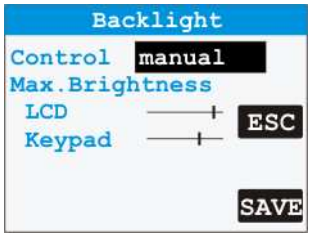
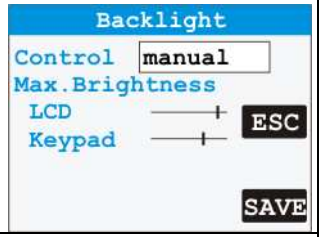
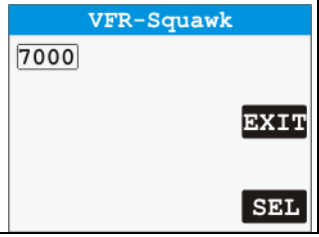
</td></tr>
<tr><td> 
</td><td colspan="3">LCD night mode</td></tr>
<tr><td></td><td> 
</td><td colspan="2">Submenu Settings:

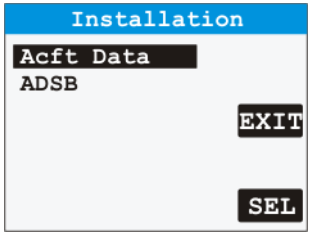
- Backlight (Control of LCD and keypad backlights)
- VFR Squawk (Presettings for VFR-Taste
- Installation
- Info (shows info screen / firmware version information)</td></tr>
<tr><td></td><td></td><td> 
</td><td>Submenu Backlight.

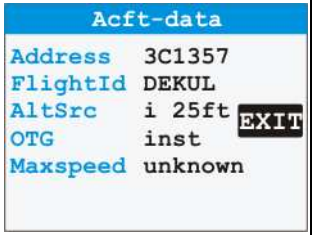
Select the the desired backlight control using the 

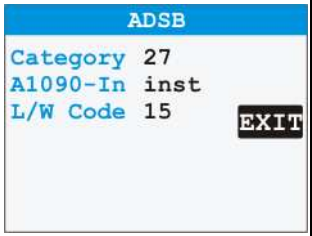
or 

Possible selections:
• Dimm bus: Brightness control via aircraft dimm bus</td></tr>
</table>

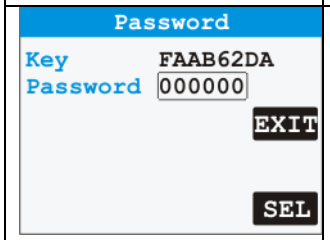
		  	• Amb-light: Brightness control via internal sensor • Manual: Manual brightness control **NOTE** Calibrations for dimm bus and amb light settings is possible via system setup (password protected). Please Consult your avionics workshop for assistance.
			Submenu VFR Squawk • Sets uo the VFR squawk, that can be invoked pressing the **VFR**.

<table>
<tr>
<td></td>
<td></td>
<td> 
</td>
<td colspan="2">Submenu Installation (READ ONLY)
• Acft Data: Shows aircaft specific data
• ADSB: Shows ADS-B specific data

<u>NOTE:</u>
Settings are password protected (=read only) in normal operation mode.
Please consult the VT-2000 installation manual or your avionic workshop for modifications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td> 
</td>
<td>Adress: 24-Bit Mode-S Adresse
Flight-ID: Aircraft registration or company Callsign
AltSrc: Altitude source
OTG: Configuration of OTG (on the ground) switch
Maxspeed: Aircraft max. cruising TAS

Please consult the installation manual for detailed information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td> 
</td>
<td>Category: Aircraft category
A1090-In: ADS-B 1090 in capability installed in the aircraft
L/W Code: informatio about aircraft dimension

Please consult the installation manual for detailed information.</td>
</tr>
</table>

			Submenu Info: Shows version information about control unit, central unit and FPGA.
	For extended setup or maintenance, a password is required. Consult the VT-2000 installation manual for password and instructions for extended setup. The key is reqired for generating passwords for maintenance.		

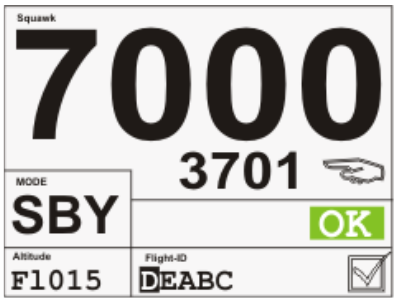
2.7. Setting Up Flight Specific Data

2.7.1. Flight id / aircraft registration / company callsign

A Mode-S transponder broadcasts the flight id (FID, company callsign for commercial aircraft or the aircraft registration for smaller private operated aircraft).

The flight id may be changed if required. Usually the FID is the callsign of your aircraft unless field 7 of the flight plan contains other data. Always check before each flight if your flight id has been set correctly.

Follow these steps to set the flight id / aircraft registration:



Flight-ID in edit mode

- Set the unit to standby (SBY) mode
- Press the lower softkey ☜
- The ☜ symbol changes near the Flight-ID cahnges to ☑.
- Use 4 or 6 to navigate to the desired position and change the values using 2 or 0.
- Quit the edit mode by pressing the lower softkey again. The Symbol ☑ changes to ☜.

Please consult the VT-2000 installation manual for instructions how to set up aircraft specific parameters.

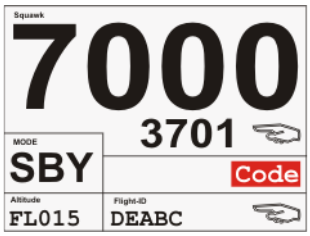
3. Warnings / Error messages

System failures will be detected by the internal self test function that is performed continuously.
Failures are detected malfunctions, which can not be eliminated by the user. Warnings are conditions, which may be followed by a failure. Warnings can be eliminated by the user under several conditions.

Failures and warnings will be indicated by a visual and audible signal.

If restarting the unit continues to generate the same error, please contact your avionic shop or your dealer.

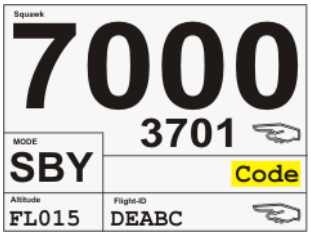
3.1. Failure Messages

 **Code** indicates a failure code.	In case of detecting a severe failure, the system will be switched into Standby (SBY) mode. All system operating will be terminated to prevent damages to system components and an audible alarm appears. Quit the audible alarms by pressing **CLR** Dadurch wird verhindert, daß Systemkomponenten beschädigt werden oder das Flugsicherungssystem gestört wird. The system monitor indicates a failure code red underlayed. In case of failure, try to restart the system by pressing **ON** or **ALT** . If the failure is still present, the system returns into failure mode.

If a system failure has been detected by the system, always inform ATC, if you are flying in a transponder mandatory zone or other airspace, where a transponder is required. Never try to find the reason for a system failure or warning during the flight!!!

3.2. Warnings

The system warns the pilot if malfunctions have been detected that could lead to a severe failure. It is up to the pilot to eliminate these conditions.
Warnings are indicated in case of undervoltage or operating the system out of the certified altitude range.

 **Code** indicates a failure code.	In case of warning, the system shows a yellow underlayed warning on the LCD screen. Additonally, a frequently repeated audible signal occurs. Both can be terminated by pressing **CLR**. The system continues operation, but it may be limited. If an error of the alticoder unit is detected or the system is operated out of the certified altitide range, the replied alticode will be set to zero (same as mode **ON**)

If a system failure has been detected by the system, always inform ATC, if you are flying in a transponder mandatory zone or other airspace, where a transponder is required. Never try to find the reason for a system failure or warning during the flight!!!

3.3. Error Codes

The following table shows the meaning of displayed failure and warning codes. Failures marked with an * may be caused in the system installation. Other failure or warning codes are caused by internal malfunctions. In this case the system needs to be repaired by an authorised repair shop.

Code		Description	Possible reason
SQUIT		Squitter Error	Malfunction in transmitter module
VSUP		Supply voltage low	Supply voltage low
ANT	*	Antenna failure	Bad antenna or antenna cable
PRSS		Pressure sensor failure	Internal malfunction of pressure sensor
COMM	*	CAN bus communication error	Short in CAN-bus or internal malfunction
TXPL		Transmitter PLL failure	Internal malfunction PLL unit
FPGA		FPGA checksum failure	Internal malfunction FPGA
V36		36 V power supply failure	Internal malfunction power supply 36V