Hilberling

HF / VHF Transceiver
PT-8000A

Operating Manual

Version 2.01.10

HF / VHF Transceiver

Hilberling   PT-8000A

Operating Manual

PT-8000A, HN-8000 and T9

are

developed and manufactured in the EU

by

Hilberling GmbH

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IMPORTANT NOTE AND PRECAUTIONS

Important

Read and save this Operating Manual carefully before attempting to operate the HF/VHF PT-8000A transceiver. This manual contains important safety and operating instructions for the transceiver.

Precautions

WARNING HIGH VOLTAGE !
Never touch an antenna or internal antenna connector during transmission. This may result in an electrical shock or burn of your skin by high-frequency.

WARNING !
Never apply AC to the DC socket on the transceiver rear panel. This will ruin the transceiver and may cause fire.

CAUTION !
Never allow any object touch any internal parts or connectors on the rear panel of the transceiver. This could cause electrical shock and severe injury.

PROTECT the transceiver from precipitation like rain or any liquid. Do not operate the transceiver in excessively dusty or very humid environment.

PROTECT the transceiver from operation by any unauthorized person notably children.

AVOID placing and using the transceiver in areas with temperatures below -15°C or above +50°C. If the environment temperature drops so low that the dew point is undercut, avoid operating before the devices are dried completely.

AVOID placing the transceiver and the power supply against a wall. This may inhibit proper air circulation and could cause overheat. Do not cover any air inlets and outlets at top, bottom and rear panel of the devices.

USE CARE when connecting the transceiver to a linear amplifier. Keep in mind the performance limits or operating ranges of electrical connectors and interfaces. Set the PT-8000A RF-output level to less than the linear amplifier's maximum input level to prevent amplifier damage.

USE CARE when not operating the transceiver with Hilberling T9 microphone. Others may have different pin assignments and connecting to the transceiver may cause damage to the transceiver and the microphone.

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A2   Firmware Update and Update Software (Windows® Program)

A3   Technical Documents

A4   Customer Information

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FEDERAL COMMUNICATONS COMMISSION (FCC) STATEMENT

The Hilberling PT-8000A was tested and found to be in compliance with 47 CFR, Part 15 of the FCC Rules, as an unintentional radiator and as a generic receiver. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

FCC ID: V84PT8000

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: *Changes or modifications to the PT-8000A not expressly approved by Hilberling GmbH could void your authority to operate this transceiver under FCC regulations*

3   INTRODUCTORY NOTES

3.1   Scope of Delivery

Examine your PT-8000A for signs of damage during shipping. Should any damage be apparent please take appropriate measures (contacting your carrier). We recommend to retain all packing material – it might be used for shipment of the radio.

Listed below are the hardware and all accessories delivered with your PT-8000A. Make sure you have received and unpacked everything:

Quantity	Description	Fig.
1	Power Supply HN-8000	6
1	Microphone T9	7
1	AC Line Voltage Cable (Power Grid ⇔ HN-8000)	8
1	DC Power Cable (HN-8000 ⇔ PT-8000A)	9
1	Ground Cable (HN-8000 ⇔ PT-8000A)	10
1	Speaker Cable (HN-8000 ⇔ PT-8000A)	11
1	Data Cable (PC/Notebook ⇔ PT-8000A)	12
1	Phono Plug 6,3mm	
1	DB-25 Male Plug (D-Sub 25pol)	
1	DA-15 Male Plug (D-Sub 15pol)	
1	DE-9 Male Plug (D-Sub 9pol)	
1	Operating Manual	13a
1	Software CD-ROM • PT-8000A IF Monitor Program (Windows®) • PT-8000A Update Program (Windows®) • Operating Manual (PDF)	13b

Tab. 1

3.2   About this Manual

The PT-8000A represents primarily state of the art analog RF-design. However digital signal processing and microprocessor controlled circuits add to this transceiver in a synergistic way. Hence, features and functions can be easily improved and/or tailored to customer needs through updating the Hilberling GmbH firmware using the USB interface (please have a look at Appendix A2).

In this manual the following signs and symbols are used:

The STOP sign indicates a warning that must be obeyed for safety reasons.

This sign indicates an important explanation or a specific advice which should be obeyed.

An additional information or explanation is indicated this way.

3.3   Notes on Placing

When selecting the place for operating the PT-8000A bear in mind the general limitation concerning environmental conditions as outlined in the specifications and the cautions at the very beginning of this manual (P. ii).

Always handle the PT-8000A with care – consider the weight of more than 50 lbs, please!

Please make sure proper air circulation. Do not cover any air inlets and outlets at top, bottom and rear panel of the devices.

Choose the place of installation so that all connectors of the PT-8000A are reachable any time.

Select a power outlet that is capable to handle the power requirements. Connect your PT-8000A to a proper ground system – which is important for optimum operation of any HF transceiver – especially when operating high power by using an external amplifier. In the past, a ground connection to a copper water pipe was often used for this purpose. Recent revisions to the National Electric Code has made this practice a code violation. Bear in mind that modern supply water installations utilize plastic pipe – which do not function grounding purposes. Never use a gas or electric pipe since the connection could cause an explosion or electric shock. A good grounding system not only prevents electrical shock but also helps to ensure trouble free operation and will diminish television and broadcast interference (TVI/BCI).

For your convenience you might raise the front of PT-8000A and HN-8000 by unfolding and locking tilt bails mounted at the front equipment feet into front position as shown on Fig. 1 (see next page).

If a large resistance will complicate the unfolding, please spread the bail easy for hurdle the locking nib to avoid damage of the equipment foot.
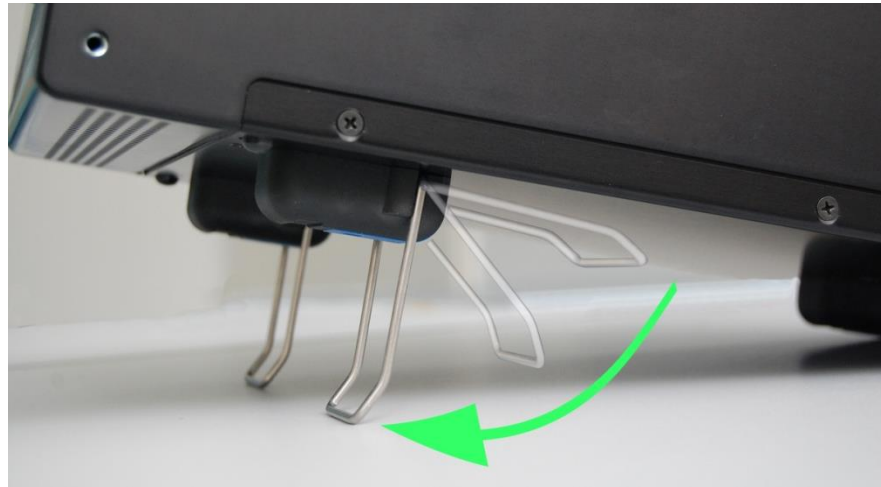
Fig. 1

3.4   Antenna Considerations / Antenna Tuner

Standing wave ratio (SWR) may increase significantly when using an antenna outside of the specific frequency range for which it is tuned. The final power amplifier will operate at peak performance only when its load is resistive – i.e. the SWR is close to 1.0.

Therefore the PT-8000A is equipped with an automatic antenna tuner (ATU) which does not actually tune the antenna. The ATU instead matches the feed line to the final amplifiers so they always "see" a SWR close to 1.0. The ATU has its limits – tuning mismatches with SWR greater than 2.0 become difficult and will exceed the capabilities of the ATU. Using a tuned or resonant antenna with 50 Ohm impedance at the feed point for the specific

frequencies is highly recommended. The purpose of the ATU is to ensure that a resonant antenna can be used at the limits of the band selected with optimum performance of both PT-8000A and antenna system.

Never try to hook up a symmetrical open feeder line (balanced, twin-lead, ladder line etc.) directly to the PT-8000A. Instead use 50 ohm coaxial feeders only. The connectors supplied on the PT-8000A are all Type N.

With the ATU it is acceptable to use a broadband antenna system like a log periodic or T2FD system which trade wide bandwidth for an SWR ranging as high as 2.0.

4   CONNECTORS PT-8000A

In this chapter the connectors at the front and rear panel of the PT-8000 are explained.

4.1   Connectors at Rear Panel

4.1.1   HF/VHF Connectors J1 - J11

Fig. 2

No.	Label	Type	Description
J1	VHF-ANT 50/70/144 MHz	N	Input / Output VHF Antenna Range 110 ... 143,990 MHz **(RX only)** 50 / 70 / 144 MHz Band **(RX and TX)**
J1A	RX-ANT 9 kHz ... 30 MHz	BNC	Input VLF/LF/MF/HF Antenna Range 9 kHz ... 30 MHz **(RX only)** For DUPLEX mode the input may stay open during transmission.
J2	HF-ANT 1 9 kHz ... 30 MHz	N	Input / Output VLF/LF/MF/HF Antenna Range 9 kHz ... 30 MHz **(RX and TX)**
J3	HF-ANT 2 9 kHz ... 30 MHz	N	Input / Output VLF/LF/MF/HF Antenna Range 9 kHz ... 30 MHz **(RX and TX)**
J4	IF 10,7 MHz SUB	SMA	Output 2nd IF 10.7 MHz of SUB-RX. The output is tapped after the 2nd mixer. No AGC and no 10.7MHz Xtal filter at that point. Thus bandwidths are determined by prefilters
J5	IF 40,7 MHz SUB	SMA	Output 1st IF 40.7 MHz of SUB-RX. The output is tapped after the 1st mixer – thus being broadband when preselector is disengaged
J6	HF-RX ANT SUB OUT	SMA	HF Antenna Signal for SUB-RX after passing internal antenna switch respectively TX/RX relay. Connected to J7 (by default) or to input of external equipment (QRM-eliminator, ANT-switch panel etc.)
J7	HF-RX ANT SUB IN	SMA	HF signal input for SUB-RX. Connected to J6 (by default) or to output of external equipment (QRM-eliminator, ANT-switch panel etc.)
J8	HF-RX ANT MAIN OUT	SMA	HF Antenna Signal for MAIN-RX after passing internal antenna switch respectively TX/RX relay. Connected to J9 (by default) or to input of external equipment (QRM-eliminator, ANT-switch panel etc.)
J9	HF-RX ANT MAIN IN	SMA	HF signal input for MAIN-RX. Connected to J8 (by default) or to output of external equipment (QRM-eliminator, ANT-switch panel etc.)
J10	IF 40,7 MHz MAIN	SMA	Output 1st IF 40.7 MHz of MAIN-RX. The output is tapped after the 1st mixer – thus being broadband when preselector is disengaged
J11	IF 10,7 MHz MAIN	SMA	Output 2nd IF 10.7 MHz of MAIN-RX. The output is tapped after the 2nd mixer. No AGC and no 10.7MHz Xtal filter at that point. Thus bandwidths are determined by prefilters.

Tab. 2

4.1.2   Connection Sockets J12 to J22 and Operating Elements
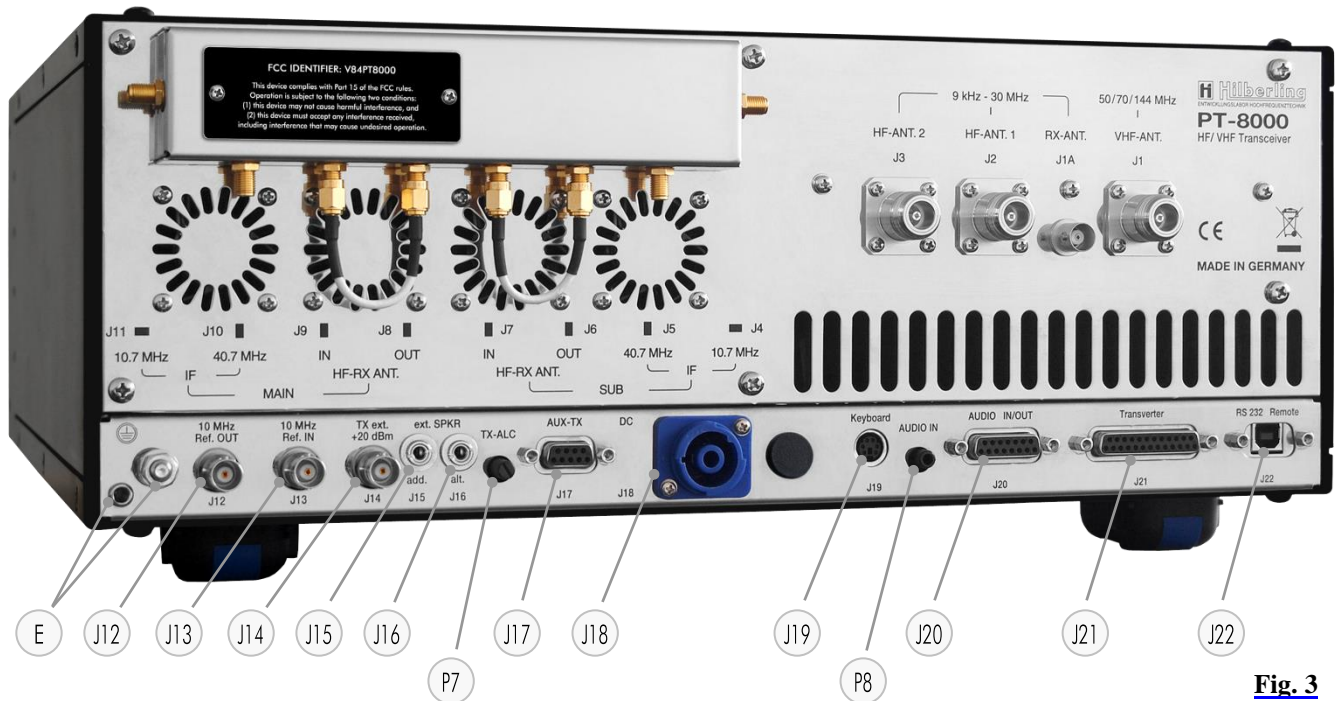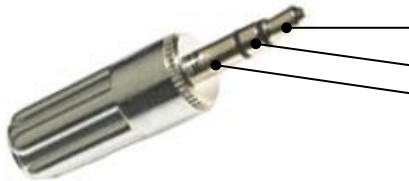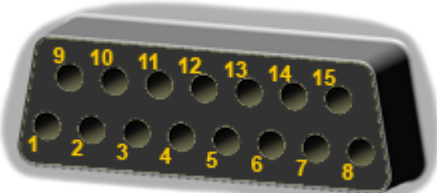
Fig. 3

No	Label	Type	Description
E	⏚	Socket 4 mm	Grounding wire (p 10 / Fig. 10) – must be connected toHN-8000 power supply
		Threaded Bolt M6	Grounding stud – must be connected to station ground
J12	10 MHz Ref. OUT	BNC	Input for an external 10 MHz reference signal (clock) for synchronization of PT-8000A to other equipment. The signal delivers +1dBm ±3dB level
J13	10 MHz Ref. IN	BNC	Output of an external 10 MHz reference clock for synchronization of external equipment to PT-8000A. Input 10 MHz signal level > -10dBm.
J14	TX ext. +20 dBm	BNC	TX external output (1.8…148 MHz). Level is +20 dBm to drive transverter or external power amplifier
J15	ext. SPKR add.	EIA-453 / IEC 60603-11 TRS 3.5 mm Socket	60 kHz output: Connection to sound card for panorama display/waterfall diagram. Requirements: Soundcard with 192 kHz sample rate / 24 bit resolution; Windows® PC ; Hilberling software „PT-8000A IF-Monitor", connecting cable
J16	ext. SPKR alt.	EIA-453 / IEC 60603-11 TRS 3.5 mm Socket	Output audio MAIN- and SUB-RX/ only SUB-RX (Audio Norm/Split); 4.5 W max. @ 8 Ohm; connection external speaker, by default to Power Supply HN-8000 (cable P. 10 / Fig. 11);
J17	AUX-TX (PTT/ALC)	DE-9 (D-SUB 9-pol)	Auxiliary output/input for TX (wiring see P. 6 / Tab. 4)
J18	DC IN	CliffCon 4-pol	Power connector for interconnection cable to HN-8000 power supply DC 13.8V / 50V (cable P. 10 / Fig. 9)
J19	Keyboard	mini-DIN PS/2 Socket	Access to Main-CPU; further functions TBD
J20	AUDIO IN/OUT	DA-15 (D-SUB 15-pol)	Various audio signals MAIN/SUB in- and output (wiring see P. 6 / Tab. 4)
J21	Transverter	DB-25 (D-SUB 25-pol)	• CAT interface RS232 RX and TX (=> COM 2) • 4bit band data / • DC band voltage • AGC Voltage / • Transverter control (pin assignment see P. 6 / Tab. 4)
J22	RS232 Remote	USB-B	Input/output data (cable P. 10 / Fig. 12) 1. Connect external equipment to remotely control the PT-8000A (CAT / => COM 1) 2. Interface to update firmware of PT-8000A
P7	TX-ALC		Sensitivity of ALC input (J17, pin 6) from external PA to reduce TX power out (0 … −10 V)
P8	AUDIO IN		Sensitivity of Audio data input (J20, pin 2) – rated 0 dBm @ 600 Ohm

Tab. 3

4.1.3 Wiring J15 to J21

No	Label	Figure	Pin Assignment
J15	ext. SPKR add.		**1** Tip 60 kHz OUT MAIN RX / **2** Ring 60 kHz OUT SUB RX / **3** Sleeve GND — Connector for Panorama Display / Waterfall Diagram. **Caution**: Using mono type plugs will shorten the audio output and may damage the transceiver
J16	ext. SPKR alt.		STATUS: Audio NORM Audio SPLIT / **1** Tip AUDIO OUT — MAIN and SUB RX — SUB RX / **2** Ring <not connected> / **3** Sleeve — GND — GND. **Caution**: Using mono type plugs will shorten the audio output and may damage the transceiver
J17	AUX-TX (PTT/ALC)		**1** PTT to HF-PA **6** EXT ALC IN (0 … −10 V [2]) / **2** PTT EXT IN **7** PTT to HF-PA / **3** PO FORWARD DC OUT **8** PO REFLECTED DC OUT / **4** PTT to VHF-PA [1] **9** EXT TUN/PA READY=LOW / **5** GND. [1] Circuit to ground [2] adjustable by P7
J18	DC IN		**2−** 13.8 V DC (RX ; switched by relay) / **1+** 50 V DC (PA ; switched by relay) / **1−** GND / **2+** 13.8 V DC (Relay HN ; switched to GND by PT8000 switch POWER
J19	Keyboard		**1** DATA / **2** <not connected> / **3** GND / **4** V$_{CC}$ / **5** CLK / **6** < not connected >
J20	AUDIO IN/OUT		**1** PTT AUDIO A **9** PTT AUDIO B / **2** AUDIO DATA IN [3] **10** AUDIO DATA GND / **3** AUDIO DATA GND **11** AUDIO DATA OUT / **4** GND **12** GND / **5** AUDIO OUT MAIN-RX **13** GND / **6** GND **14** AUDIO OUT SUB-RX / **7** GND **15** TP1 / **8** TP2. [3] 0 dBm @ 600 Ohm
J21	Transverter		**1** GND **14** AGC VOLTAGE MAIN / **2** AGC VOLTAGE SUB **15** DATA EXT PA A / **3** DATA EXT PA B **16** DATA EXT PA C / **4** DATA EXT PA D **17** GND / **5** +12V Transverter 1 [4] **18** PTT Transverter 1 A / **6** PTT Transverter 1 B **19** GND / **7** +12V Transverter 2 [4] **20** PTT Transverter 2 A / **8** PTT Transverter 2 B **21** GND / **9** < not connected > **22** < not connected > / **10** DC EXT PA CONTROL **23** GND / **11** GND **24** RS232 TX (CAT) / **12** RS232 RX (CAT) **25** GND / **13** GND. [4] max. 1 Ampere

Tab. 4

4.2   Connectors at Front Panel

4.2.1   Connection Sockets 1 - 3

Fig. 4

No.	Label	Type	Description
1	MIC-PTT	Microphone Threaded Socket 8-pol	Microphone connector for Hilberling T9, AUDIO input 0 dBm @ 600 Ohm, and MAIN-RX and SUB-RX AUDIO outputs.
2	PHONE	EIA-453 / IEC 60603-11 TRS 6.3 mm Socket	Headphones (impedance 8 … 600 Ohm)
3	CW-KEY	EIA-453 / IEC 60603-11 TRS 6.3 mm Socket	Connector: – Keyer for CW (morse key/ keyer with paddle / automatic keyer) – Control of the internal CW keyer

Tab. 5

4.2.2   Wiring

No.	Label	Figure	Pin Assignment
1	MIC-PTT 0 dBm		1 MIC AUDIO IN 2 PTT 3 MAIN-RX AUDIO OUT (e.g. headset) 4 0 dBm AUDIO IN [1)] Dynamic Mic 5 MIC AUDIO IN / DC +10 V internal 6 SUB-RX AUDIO OUT (e.g. headset) Electret Mic 7 MIC GND 8 PTT GND [1)] 0 dBm @ 600 Ohm
2	PHONE		1 Tip + Audio OUT MAIN-RX 2 Ring + Audio OUT SUB-RX 3 Sleeve GND NOTE: Audio for PHONE is derived from audio preamplifier especially designed for phone operations. **Caution**: Using mono type plugs will shorten the audio output and may damage the transceiver
3	CW-KEY		STATUS: Int. Keyer [2)] Ext. Keyer [3)] 1 Tip DOT CW-Key 2 Ring DASH <not connected> 3 Sleeve GND GND [2)] using the internal keyer (iambic or normal, P. 65) [3)] using an external keyer (P. 65)

Tab. 6

5   POWER SUPPLY HN-8000

5.1   General Description

Each PT-8000A is equipped with its power supply HN-8000, which delivers 13.8 V DC @ 8 A internal / 5 A external and additional 50 V DC @ 14 A max., i.e. the overall performance is about 900 W.

Operating voltages from the mains can be in the range of 90 VAC to 260 VAC without any degradation in output power. Only the efficiency will vary slightly. It complies with special regulations in some countries regarding power factor compensation (PFC). The HN-8000 provides triple HF shielding and feedthrough filters.

In addition the HN-8000 provides an auxiliary output 13.8 VDC @ 5 A at the back panel, e.g. to deliver further shack equipment.

5.2   Connectors at Rear Panel

Circuit breaker for AC/J1
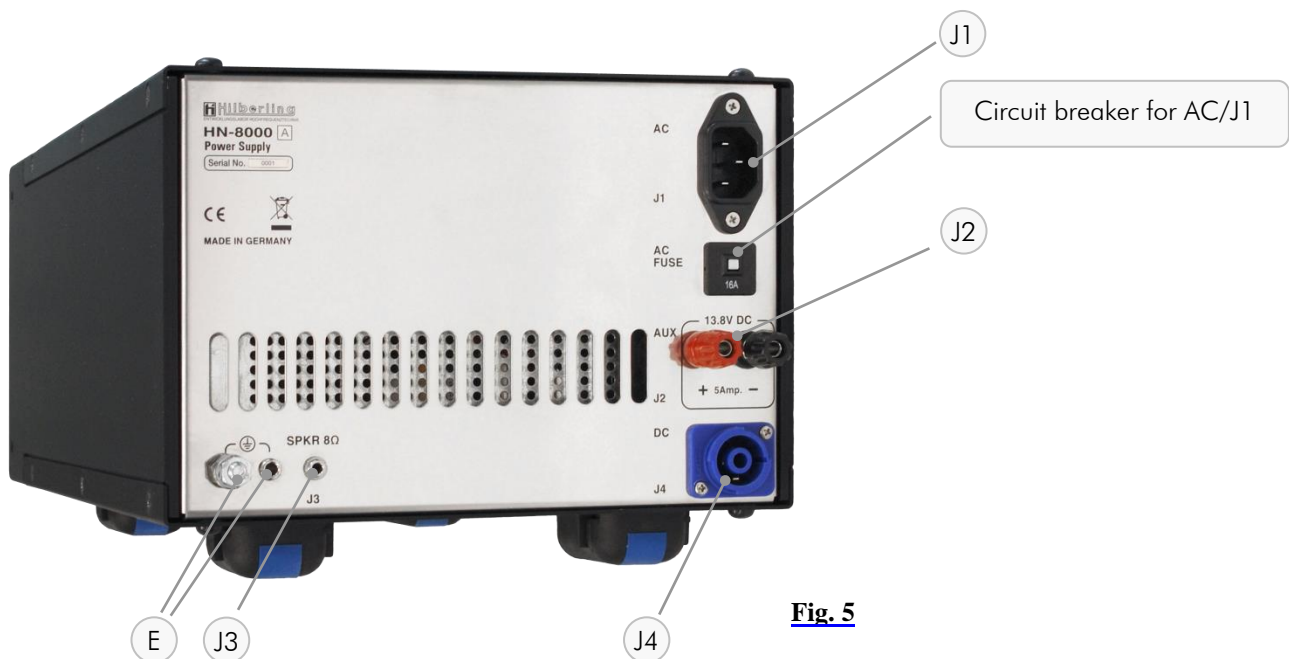
Fig. 5

Connection Sockets J1 - J4

No	Label	Type	Description
J1	AC	IEC-60320-C13 male connector	Input main power 90 – 260 V AC 50/60 Hz (cable P. 10 / Fig. 8)
J2	AUX 13.8 VDC	2x Socket 4 mm; + Clamp	Auxiliary output 13.8 V DC / 5 A
E	⏚	Socket 4 mm	Grounding wire – must be connected to PT-8000A transceiver (cable P.10 / Fig. 10)
		Threaded Pin M6	Grounding stud – must be connected to PT-8000A transceiver and to station ground
J3	SPKR 8 Ω	EIA-453 / IEC 60603-11 TRS 3.5 mm Socket	Input audio signal MAIN- and SUB-RX/ only SUB-RX (Audio Norm/Split) from PT-8000A socket J16 to built-in speaker; 4.5 W max. @ 8 Ω; (cable P. 10 / Fig. 11)
J4	DC	Cliffcon Socket 4-pol	Power connector for interconnection cable to PT-8000A (cable P. 10 / Fig. 9; PT-8000A Socket J18)
	AC-FUSE		Circuit breaker for AC mains at rear panel socket J1 rated 16 A @ 90 – 260 V AC

Tab. 7

5.3   Operating and Display Elements at Front Panel

ON/OFF for DC Low Power 13.8 V (J4) PT-8000A RX and DC AUX 13.8 V (J2) rear panel	ON/Off for DC Output 50 V (J4) PT-8000A TX Power Amplifier	Automatic Fuse for DC-Output 13.8 V / 5 A (J2) AUX rear panel	Power Meter PA DC-Input

The power meter indicates the DC input power of the final power amplifier – hence computation of efficiency could be easily done by comparing RF-power out as indicated on PT-8000 display and DC-input shown here.

Fig. 6

STOP Make sure before connecting to mains to turn OFF (press down) both mains switches (LINE and PA).

6   ACCESSORIES

6.1   Base Station Microphone Dynamic T9

Best suited for all voice operations is the Hilberling Dynamic T9 especially designed for the PT-8000A.

Isolated from any mechanical vibrations and designed to be used from more closer as well as from greater distance it will always guarantee high fidelity audio and if desired an extra punch to the signal.

It is equipped with a microphone preamp.

Impedance is 600 Ω @ 1 kHz. The acoustic characteristic is kidney-shaped.

Finish: Black anodized

Fig. 7

6.2   Wiring / Cables

AC line voltage cable (power grid ⇔ HN-8000) length approx. 1.7 m

Fig. 8

DC power cable (HN-8000 ⇔ PT-8000A) length approx. 1.2 m

Fig. 9

Ground cable (HN-8000 ⇔ PT-8000A) length approx. 1.0 m

Fig. 10

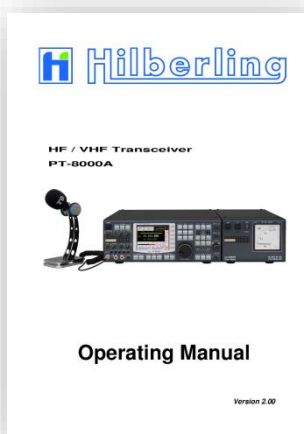Speaker cable (HN-8000 ⇔ PT-8000A) length approx. 0.9 m

Fig. 11

Data cable (PT-8000A / USB-B ⇔ PC / USB-A) length approx. 1.8 m

Fig. 12

6.3   Operating Manual and Software/Documentation CD-ROM

This manual version 2.01.xx
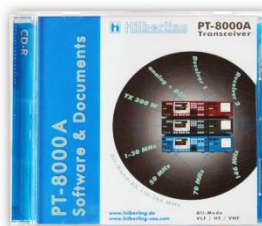
CD-ROM

Fig. 13a

Fig. 13b

7   INSTALLATION / INITIAL OPERATION

7.1   Introduction

Prior to any operation of the PT-8000A read this Operation Manual carefully notably before activating the transmitter.

The PT-8000A will be delivered with following presettings:

- The preselectors of both RX are calibrated and all data are stored in RX-CPU memory, which is buffered through a NiCd battery.

- The transmitter is unlocked according to the band plans of that IARU region (see Page 28) the PT-8000A is delivered.
  The IARU region can be changed by software update.

-

Prior applying main power to the power supply HN-8000 please verify the following points (7.2).

7.2   Cable Connections

Please check at the rear panel of PT-8000A and HN-8000:

- Antenna(s) is/are connected properly
- Grounding stud is connected to station ground
- Grounding wire is connected to both PT-8000A and HN-8000
- DC cable is connected to both PT-8000A and HN-8000

For initial operation we recommend not to connect external amplifier, transverter or devices for remote operation.

7.3   Initial Settings

Please check at the front panel of HN-8000 (see Page 9):

- Both switches (LINE and PA) are pushed down (off)

Please check at the front panel of PT-8000A (see Page 12):

- Main switch (POWER) is pushed down (off)
- Volume controls MAIN and SUB are set fully counter-clockwise
- TX-PWR knob is set fully counter-clockwise
- MIC-GAIN knob is set fully counter-clockwise
- PROC knob is set fully counter-clockwise
- Microphone T9 is connected

Power On

- Connect power supply HN-8000 to main power
- Turn on both LINE and PA on HN-8000
- Turn on POWER at PT-8000A

It is up to the operator to switch PA off (switch PA at the HN-8000) during _reception only_.

8 OPERATING AND DISPLAY ELEMENTS

In this chapter, the operating and display elements will be introduced.

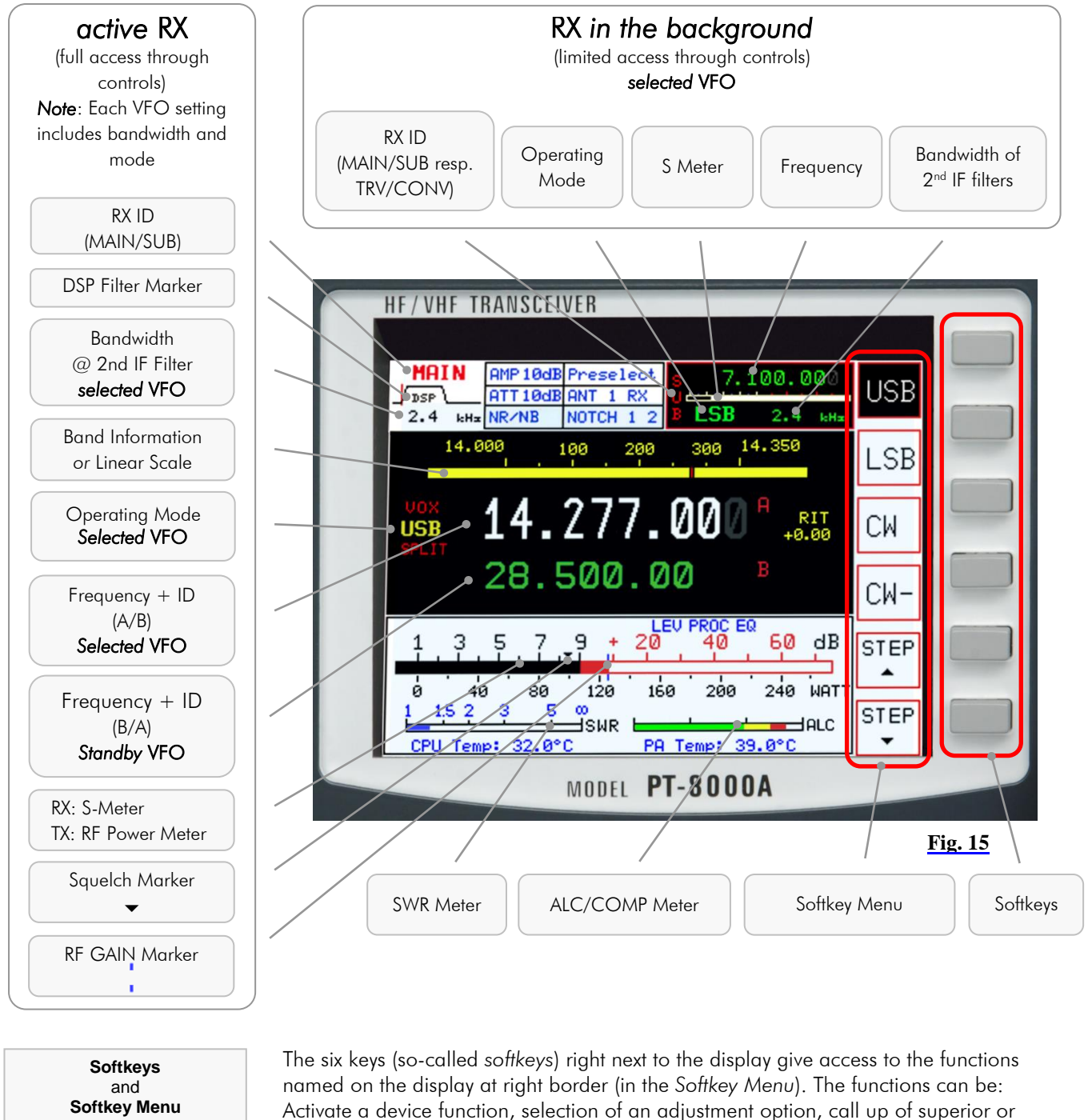## 8.1 Main Operating and Display Elements

Fig. 14

POWER ON⇔OFF	MIC-GAIN (s. P. 69)	PROC (s. P. 69)	TX-PWR (s. P. 70)	Volume MAIN- and SUB-RX Speaker ON⇔OFF

| TFT Display (s. P. 13) | Softkey menu (s. P. 13) | Softkeys (s. P. 13) | VFO (MAIN) Tuning „active" RX (s. P. 38) | MAIN-RX / TX / SUB-RX LED for status (s. P. 19) | VFO (SUB) Tuning RX „in the background" |

Function	Name	Description
Power ON⇔OFF	POWER	All supply voltages from power supply HN-8000 are disconnected by this switch **STOP** Before turning ON verify settings for MIC-GAIN, PROC, TX-PWR and audio volume settings for MAIN and SUB-RX are turned fully counter-clockwise. After switching ON: • LED *MAIN-RX* will illuminate • LEDs of all pushbuttons will illuminate for 1 second (functional check)
↻ Volume MAIN-RX (PT + HN / PT only) � ON⇔OFF Speaker (PT only)	▶ MAIN	Volume for audio MAIN-Receiver. The RX is always turned on – audio is always present regardless of RX-status (*active* or *in the background* – see below). Pushing toggles the speaker of PT-8000A ON and OFF (s. P. 54).
↻ Volume SUB-RX (PT + HN / HN only) � ON⇔OFF Speaker (HN only)	▶ SUB	Volume for audio SUB-Receiver. The RX is always turned on – audio is always present regardless of RX-status (*active* or *in the background* – see below). Pushing toggles the speaker of HN-8000 ON and OFF (s. P. 54).
TFT-Display	÷	The display represents the primary means to control through "Softkeys" and to show all relevant data for RX and TX operations.
Primary VFO Tuning Knob *active* RX	÷	Tuning of VFO A/B of *active* RX. MAIN- and SUB-RX are always receiving. The term *active* is used in the following context: *Active* means which RX (MAIN or SUB) is controlled by the main Display (through soft switches) and which RX-Data is completely shown in the display. Default setting: MAIN RX is the *active* RX.
Secondary VFO Tuning Knob *background* RX	SUB VFO	Tuning of VFO A/B of RX, which is not the *active* one i.e. working in the Background (see above). Default setting: SUB-RX is *in the background*
Set internal Reference	REF-SET	When operating the PT-8000A with its internal reference (10MHz-VCXO) this control will allow calibration the VCXO. Tuning range ± 1 ppm (s. P. 55). The LED *EXT-REF* will illuminate if an external reference signal is detected

Tab. 8

8.2   TFT-Display

The display of the PT-8000A shows relevant data of both receivers, MAIN-RX and SUB-RX, and the transmitter (TX):

- All settings for the *active* RX
- Main settings for the RX *in the background*
- General Data for RX and TX
- Functions to be activated by the adjacent keys (*softkeys*)

active RX
(full access through controls)
Note: Each VFO setting includes bandwidth and mode

- RX ID (MAIN/SUB)
- DSP Filter Marker
- Bandwidth @ 2nd IF Filter *selected* VFO
- Band Information or Linear Scale
- Operating Mode *Selected* VFO
- Frequency + ID (A/B) *Selected* VFO
- Frequency + ID (B/A) *Standby* VFO
- RX: S-Meter TX: RF Power Meter
- Squelch Marker ▼
- RF GAIN Marker

RX *in the background*
(limited access through controls)
selected VFO

- RX ID (MAIN/SUB resp. TRV/CONV)
- Operating Mode
- S Meter
- Frequency
- Bandwidth of 2nd IF filters

SWR Meter | ALC/COMP Meter | Softkey Menu | Softkeys

Fig. 15

Softkeys and Softkey Menu

The six keys (so-called *softkeys*) right next to the display give access to the functions named on the display at right border (in the *Softkey Menu*). The functions can be: Activate a device function, selection of an adjustment option, call up of superior or submenu.

Thus adapted softkey menus for almost all pushbuttons on the front panel allow direct access to many allocated functions.

More indications
on the
Display

Fig. 16

No	Module/Function	Description	Options	Page
1	VOX	Voice Operated TX	ON / OFF	70
2	3-Band TX-EQ Display	only visible if EQ Menu is active		64
3	Status-Field	Antenna and RX Adjustments	s. Tab. 10	14
4	Temperature MAIN-CPU		—	
5	LEVELER	TX Audio Dynamic Controller	ON / OFF	63
6	PROCESSOR	TX IF-2 Compression	ON / OFF	69
7	EQUALIZER	TX 3-Band EQ	ON / OFF	64
8	Temperature PA		—	
9	RIT / XIT		ON / OFF	43
10	SPLIT		ON / OFF	41/42

Tab. 9

Displayed Options
in the
Status Field

HF Mode   VHF Mode

Fig. 17a   Fig. 17b

No	Module/Function	Mode	Description	Options	Display	Page
1	Antenna Preamplifier	HF	1.8 ... 30MHz	ON / OFF	AMP 10dB	59
		VHF	50 ... 148MHz	ON / OFF	AMP VHF	61
2	Preselector	HF	1.8 ... 30MHz	ON / OFF	Preselect	59
3	Antenna Attenuator	HF		ON / OFF	ATT 10dB	59
4	Antenna Connector	HF	Alternatively select	HF-ANT 1	ANT 1	59
				HF-ANT 1+RX	ANT 1 RX	
				HF-ANT 2	ANT 2	
		VHF	Firmly assigned	VHF-ANT	ANT VHF	
5	Noise Reduction	HF/VHF	DSP NR	ON / OFF	NR	48
	Noise Blanker		RX NB	ON / OFF	NB	
				both ON	NR/NB	
6	Notch Filter DSP	HF/VHF	DSP Notch Filter	ON / OFF	Notch 1	47
	Notch Filter IF		IF Notch Filter	ON / OFF	Notch 2	
				both ON	Notch 1 2	
7	12V Power Supply	VHF	For external purpose	ON / OFF	AMP-DC	61

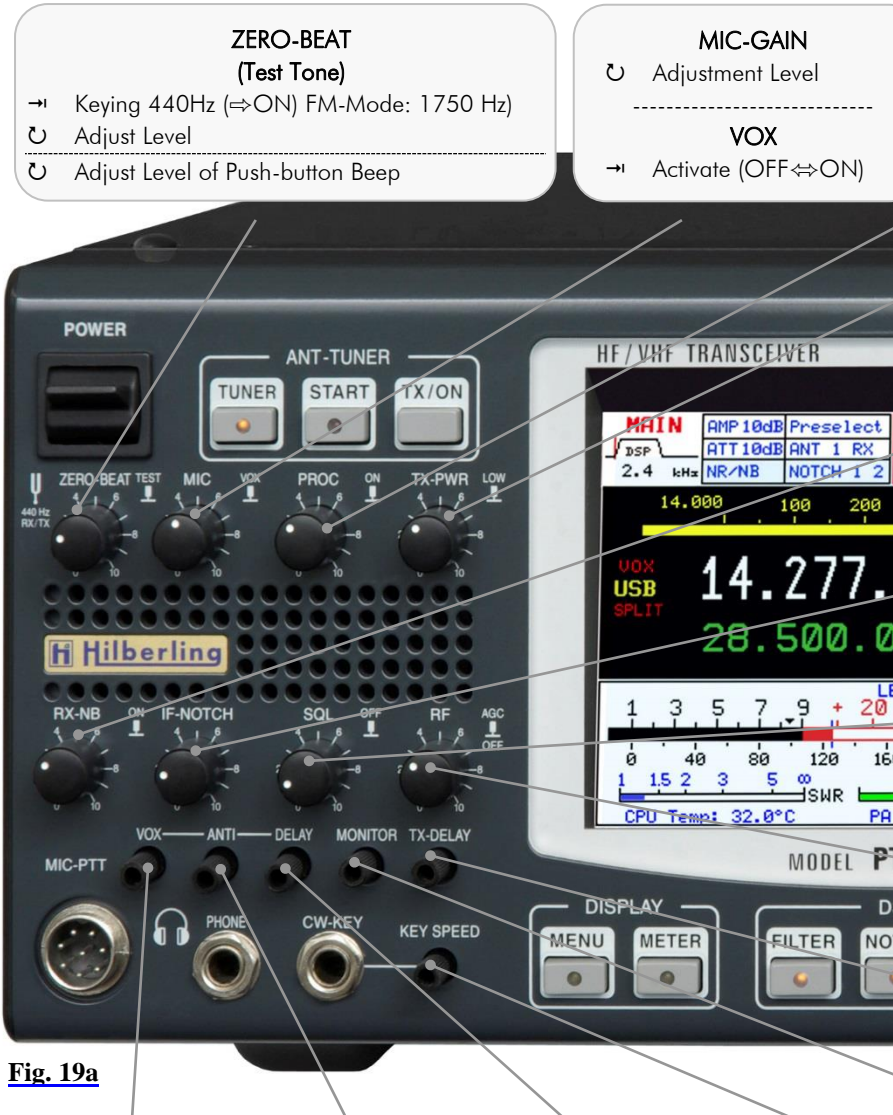**Tab. 10**

8.3   Clustered Front Panel Controls

Various fix function keys (pushbuttons; in opposite to softkeys with variable functions, right of display, see Page 13) are clustered in several button areas as shown below. Detailed description of functions starts at Page 20.

Pushing each (grey) button causes a beep; its volume is adjustable by the ZERO-BEAT knob (see next page).

ANT-TUNER
→ Activation Antenna TUNER
→ START Tuning Cycle
→ Manual TX/ON
  (MOX –Manually Operated Transmit)

BAND
→ HF Ham Radio Bands
  (except for 60m band)
  /
  Numeric Buttons for Numerical Frequency Input

MODE
→ VHF Ham Radio Bands /
  „0"- Key for Numerical Frequency Input
→ Basic Settings RX/TX
→ Memory Channels Write and – MEM
↻ Filter Selection (Xtal and DSP)
↻ STEP-VFO
→ Numerical Frequency Input - ENTER
→ Toggle MAIN-RX / SUB-RX
→ Channel storage management - CHANNEL
→ Operating Modes – SSB/CW
                  – AM/FM
                  – RTTY/DATA/Audio

Fig. 18

DISPLAY
→ MENU I
  – Software Update
  – Calibration
  – Brightness Display
  – Voice Recorder
  – Audio Norm / Split
→ MENU II
  – Baud Rate USB
  – Baud Rate J21
→ METER
  – ALC / COMP (TX)
  – S-Meter Scales

DSP
Activating:
→ Digital FILTERs
→ Automatic Multi NOTCH Filter
→ Automatic Noise Reduction NR

FUNCTION
→ Automatic Gain Control AGC
→ Search over Memory Channels   SCAN **

VFO
→ Locking the VFOs LOCK
→ Toggle VFO A⇔B
→ Activating RIT/XIT

*** Function temporarily disabled*

8.4 Controls with Integrated Push-Button Function and Controls for Adjustments

ZERO-BEAT
(Test Tone)
→ı Keying 440Hz (⇒ON) FM-Mode: 1750 Hz)
↻ Adjust Level
↻ Adjust Level of Push-button Beep

MIC-GAIN
↻ Adjustment Level

VOX
→ı Activate (OFF⇔ON)

MIC-PROCESSOR
(Speech Processor)
→ı Activate (OFF⇔ON)
↻ Adjust Compression Ratio 0 ... 20 dB

TX-POWER
(PA-Power)
→ı Switch10W⇔200W
↻ Adjust Power Level

NOISE BLANKER
→ı Activate (OFF⇔ON)
↻ Adjust Limit of Disturbance

IF-NOTCH FILTER
→ı Activate (OFF⇔ON)
↻ Adjust Frequency

SQUELCH
→ı Keying (⇒OFF)
↻ Adjust Threshold

RF-GAIN
↻ Adjust RF-Gain
→ı Deactivate AGC (ON⇔OFF)

TX-DELAY
↻ Adjust Switchover Time TX⇒RX

TX-MONITOR
↻ Adjust TX Volume

Fig. 19a

Threshold | **ANTI TRIP** | **DELAY**
↻ Adjustments / Settings for **VOX** Operation

CW KEY SPEED
↻ Adjust Automatic Key Speed CW

▶ MAIN-RX
↻ Adjust Audio Volume MAIN-RX
→ı Deactivate Speaker PT-8000A (ON⇔OFF)

▶ SUB-RX
↻ Adjust Audio Volume SUB-RX
→ı Deactivate Speaker HN-8000 (ON⇔OFF)

Fig. 19b

RX FILTER WIDTH/SHIFT
→ı Switch WIDTH⇒SHIFT⇒BFO
↻ Adjust WIDTH/SHIFT/BFO
↻ Select TX EQ Band

STEP-VFO / MEM/CH
→ı Select VFO Decimal Place
↻ Adjust VFO Frequency
↻ Select MEM/CHANNEL
↻ Select: TX Filter / VOICE REC Track / HF Delay TX-Ext / TRV Operating Band

8.5   Side Panel Controls (Level Adjustments)

Sometimes it can be necessary to customize the input and output level of the PT-8000A for special requirements. Boreholes in both left and right hand side enable the access to trim potentiometers which allow manipulating the preadjustment of levels.

8.5.1   Input Level – Left Hand Side

Fig. 20

P2   Microphone Sensitivity (Preadjustment)

- Socket MIC-PTT Pin 1/5 (front panel); fine adjustment with knob MIC (see Page 69)

P6   Adjustment Level 0dBm Audio IN

- Socket MIC-PTT Pin 4 (front panel)

> The adjustment of sensitivity from MIC and Data Input are twofold: Coarse adjustment (P2) is done at an early stage right after the input transformers. MIC gain settings from the front panel controls amplifier and gain leveler circuit on the TX board.

8.5.2   Output Level – Right Hand Side

Fig. 21

P1   MAIN-RX   Adjustment of audio volume Headphones ⇔ Speaker

- Socket MIC-PTT Pin 3 (front panel)
- Socket PHONE (Output Headphones) (front panel)

P3   MAIN-RX   Volume (Preadjustment)

- Socket J20 Pin 5 AUDIO OUT MAIN-RX (rear panel)

P4   SUB-RX   Adjustment of audio volume Headphones ⇔ Speaker

- Socket MIC-PTT Pin 6 (front panel)
- Socket PHONE (Output Headphones) (front panel)

P5   SUB-RX   Volume (Preadjustment)

- Socket J20 Pin 14 AUDIO OUT SUB-RX (rear panel)

> ⚠ Please use an appropriate tool to adjust the controls to prevent any damage to the variable resistors.

8.6   Pushbuttons with LED Status Display

Fig. 22a
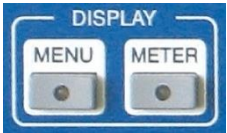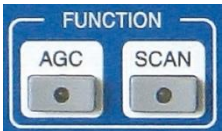
To inform about the status of several main functions of the PT-8000A – in addition to display information – some pushbuttons are equipped with LED, respectively the status of fundamental operating conditions are indicated by LED.

Status displays as follows:

LED glows	Meaning	Page
MEM	Memory mode activated	36
CHANNEL	Memory operation mode activated	34
DATA	Data mode activated	26
LOCK	VFO locking activated	44
RIT/XIT	RIT/XIT frequency deviation activated	43

Tab. 11a

Further status displays:

Fig. 22b

LED glows	Meaning	Page
TUNER	Antenna Tuner activated	68
START	Automatic Antenna Tuner Adjustment activated	68

Tab. 11b

Fig. 22c

LED glows	Meaning	Page
MENU I *	unallocated	
MENU II *	unallocated	
METER *	unallocated	

Tab. 11c

Fig. 22d

LED glows	Meaning	Page
FILTER	DSP Filter activated	45
NOTCH	Automatic DSP Multi-Notch Filter activated	47
NR	DSP Noise Reduction activated	48

Tab. 11d

Fig. 22e

LED glows	Meaning	Page
AGC	Automatic Gain Control _disabled_	50
SCAN **	Storage Frequency Scanning activated	52

Tab. 11e

* LED temporarily disabled   *** Function temporarily disabled*

8.7   LED Status Display

The three main modes of PT-8000A (MAIN-RX / SUB-RX / TX) are displayed with colored LED.

<table>
<tr><td>MAIN-RX
and
SUB-RX</td></tr>
</table>

The PT-8000A incorporates a transmitter and two independent receivers (MAIN RX and SUB-RX). Both receivers are permanently operating. Even if a receiver is *in the background* i.e. not fully accessible through all main controls the receiver is operating with its last settings when it has been the *active* one.

One transmitter and two receivers are operated in three main modes:

Fig. 22f

- MAIN-RX is *active* and SUB is working *in the background*
  (green **MAIN-RX** LED glows)

- SUB-RX is *active* and MAIN is working *in the background*
  (yellow **SUB-RX** LED glows)

- TX is operating (red **TX-LED** glows)

Note: The **MAIN RX VFOs** will always determine the transmit (TX) frequencies and other operating parameters.

Exception Split-Mode: In this case the *selected* (displayed) **SUB-RX-VFO** determines the transmit frequency (see Page 42).

Fig. 22g

The red LED **EXT REF** will be on when an external 10 MHz signal is representing the frequency reference.

The internal 10 MHz system clock no longer takes effect.

9   MAIN- AND SUB-RX OPERATIONS

Fig. 23

The PT-8000A incorporates a transmitter and two independent receivers (MAIN-RX and SUB-RX). Both receivers are permanently operating. Even if a receiver is *in the background* i.e. not fully accessible through all main controls the receiver is operating with its last settings when it has been the *active* one.

Using MAIN- and SUB-RX allows duplex operation mode.

Each of the two RX provides again two VFO: VFO A and VFO B. The active VFO is called *selected* VFO, the other is called VFO *in standby* (s. P. 40).

Two controls are doubled, hence for these functions MAIN-/SUB-RX are always accessible regardless of their status *active* or *stand-by*:

1. The *selected* VFO of the *active* RX (usually MAIN-RX) is always accessible through MAIN tuning knob. The *selected* VFO of the RX working *in the background* (usually SUB RX) is always accessible through SUB VFO knob.

2. The volume of MAIN- and SUB-RX is permanently adjustable through the respective controls ▶ MAIN and ▶ SUB.

Both knobs have a *push* function:
Pushing ▶ MAIN will turn off PT-8000A speaker, pushing ▶ SUB will turn off HN-8000 speaker. (see also Page 54).

The push button MAIN/SUB (located in the cluster MODE) toggles between the two RX changing their status *active* or *background*.

After power on the PT-8000A the MAIN-RX is the *active* one (corresponding SUB-RX is working *in the background*).

- LED MAIN-RX and LED SUB-RX indicate which RX is the active one and so which is accessible through all knobs and buttons on the front panel.

- In the upper left corner the display shows the label of the *active* one (MAIN or SUB).

- Frequency, mode, filter bandwidths and S-meters are displayed for MAIN *and* SUB respectively (see Figure 24).

- Activation of noise reduction (NR), noise blanker (NB), DSP Filter, DSP-Notch, IF-Notch, preamplifier, preselector and the squelch marker are displayed exclusively for the active RX.
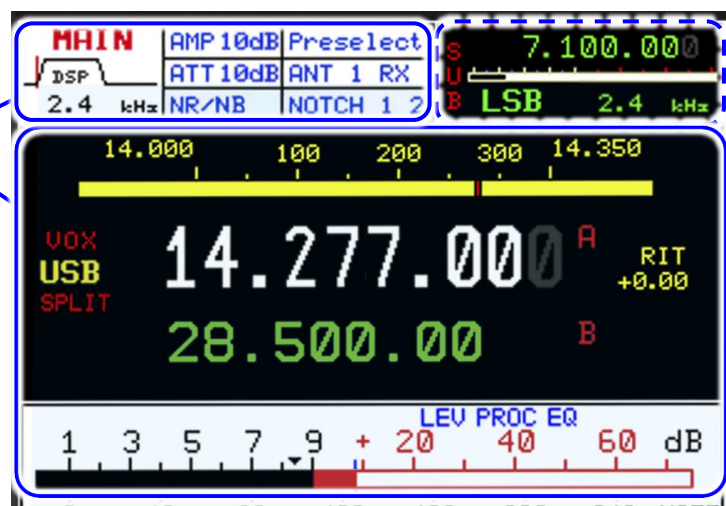
Fig. 24

When toggling between MAIN- and SUB-RX the actual settings of the controls used at last are _not_ transferred to the new *active* RX – instead the former settings of this RX are the actual one – until they are overwritten by the respective control.

Example

The squelch threshold set to the RX working *in the background* will stay the actual one when this RX becomes the *active* – until one touches the squelch control to set the threshold to a new setting.

The large S-meter is always allocated to the *active* RX. The smaller S-meter is indicating the field strength of the RX working *in the background*.

Transmitting (TX) is only possible when MAIN-RX is the *active* one and SUB-RX is working *in the background*.

When transmitting the SUB-RX may be used to monitor own RF-signal. Receiving with SUB-RX on a separate antenna is limited however: Excessive field strength may trip the protection circuits. Receiving at frequencies adjacent to the transmitting frequency may be limited even by the superior dynamic characteristics of the PT-8000A receivers - which are of course finite.

10   MODES OF OPERATION   MODE

Fig. 25

In order to select different operating modes three push buttons (keys) are available in the button area MODE:

Key	Operating Modes	Page
SSB / CW	USB / LSB and CW / CW–	s. b.
AM / FM	AM / AME USB / AME LSB and FM / FM RPT / FM RPT–	24
DATA	switchable „ operating sub mode" DATA / RTTY / Audio	26

Tab. 12

When SSB/CW or AM/FM button is pushed the last selected mode (SSB/CW or AM/FM) is memorized and reactivated.

When e.g. a band key with other adjustments were active before, the adjustments of the buttons SSB/CW and AM/FM are preserved.

The display shows the activated mode to the left of frequency. The corresponding softkey is shown inverse.

10.1   Single Side Band and Continuous Wave   SSB / CW
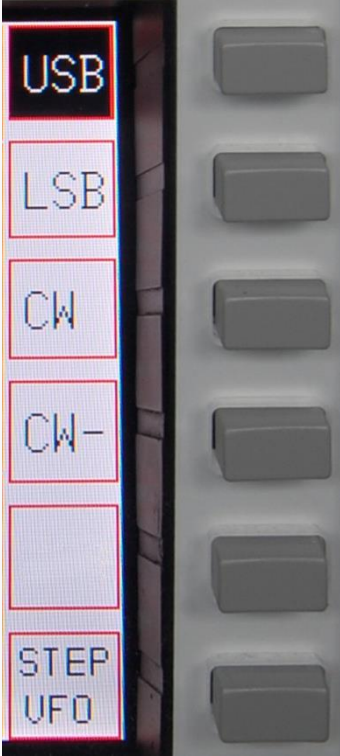
Pushing SSB/CW button activates the allocated last used mode (USB, LSB, CW or CW–) and will call up the SSB/CW menu.

If this is e.g. a SSB mode, a second press toggles to the last activated CW mode.

10.1.1 SSB   Single Side Band

Upper Side Band;
the softkey will be displayed inverse (as shown here);
the display will show USB (to the left of frequency).

Lower Side Band;
the softkey will be displayed inverse;
the display will show LSB (to the left of frequency).

Continuous Wave normal mode (CW-pitch in USB);
the softkey will be displayed inverse;
the display will show CW (to the left of frequency).

Continuous Wave inverse mode (CW-pitch in LSB);
the softkey will be displayed inverse;
the display will show CW– (to the left of frequency).

Cyclic change of frequency tuning steps:

$$\rightarrow 1\ Hz \rightarrow 10\ Hz \rightarrow 100\ Hz \rightarrow 1\ kHz \Rightarrow$$

Fig. 26

10.1.2 CW   Continuous Wave

Fig. 27a

In CW (resp. CW–) mode the parameters Pitch, Width and BFO as well as their specific value can be selected by using the knob WIDTH/SHIFT.

Pushing WIDTH/SHIFT knob will cycle between the parameters:

→ Pitch → Width → BFO →
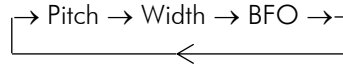
The chosen parameter and its current value are displayed left of status field in combination with a small graphic:

BFO Frequency

Transceiver Operation Frequency

Value   **Figure 27b**   Parameter
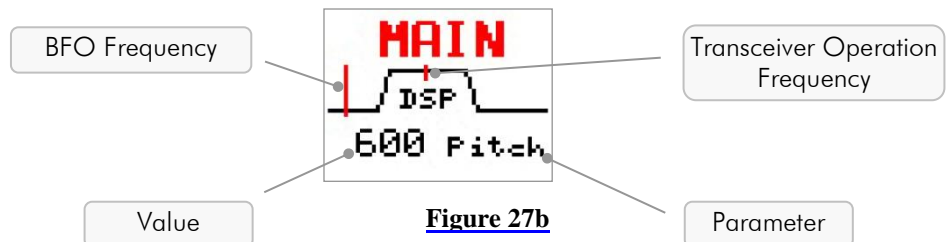
Turning WIDTH/SHIFT knob will allow the following:

Pitch   Varying the distance of the BFO frequency against the transceiver operation frequency (and against the filter center frequency; transceiver operation frequency and filter are linked).
The tone pitch of the received signal is changing.

Tuning range:	400 … 1000 Hz
Increments:	50 Hz (DSP on and off)

Width   Select filter bandwidth to following values:

DSP on:	50 / 100 / 200 / 400 / 500 Hz
DSP off:	500 Hz (fixed) (/ 250 Hz with optional hardware extension *)
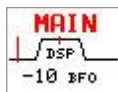
BFO   Shifting the filter (filter center frequency) against BFO frequency and transceiver operation frequency (BFO frequency and transceiver operation frequency are linked).
The tone pitch of the received signal does not change.

Tuning range:	–250 Hz ... +250 Hz
Increments:	10 Hz (DSP on and off)

After power on the BFO offset is set to zero (default value).

The frequency of the monitoring TX signal (800 Hz ; volume adjustable by the *Monitor* control, see page 71 ; 20.7 ; Fig. 109), is not influenced by the *Pitch* value.

* Factory hardware extension

10.2 AM / FM   Amplitude Modulation / Frequency Modulation

Pushing AM/FM button activates the last used mode (AM, AME USB, AME LSB, FM, FM RPT or FM RPT+) and will call up the allocated softkey menu (AM menu respectively FM menu). Is this e.g. one of the AM modes, pushing AM/FM again toggles to the last activated FM mode.

AM menu

Amplitude Modulation (carrier and two sidebands);
the softkey will be displayed inverse (as shown here);
the display will show AM (to the left of frequency).

AM Synchronous (AME – AM Equivalent; carrier and Upper Sideband);
the softkey will be displayed inverse;
the display will show AME (to the left of frequency).

AM Synchronous (AME – AM Equivalent; carrier and Lower Sideband);
the softkey will be displayed inverse;
the display will show AME (to the left of frequency).

Cyclic change of frequency tuning steps:

$$\rightarrow 1\ Hz \rightarrow 10\ Hz \rightarrow 100\ Hz \rightarrow 1\ kHz \rightarrow$$
$$\longleftarrow$$
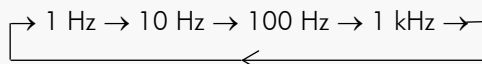
Fig. 28

FM menu

Frequency Modulation (standard mode);
the softkey will be displayed inverse (as shown here);
the display will show FM (to the left of frequency).

FM repeater mode "standard"; the transmit frequency is lower (0 … 2 MHz) than the receive frequency; the softkey will be displayed inverse;
the display will show FM– (to the left of frequency).

FM repeater mode "inverse"; the transmit frequency is higher (0 … 2 MHz) than the receive frequency; the softkey will be displayed inverse;
the display will show FM+ (to the left of frequency).

Push and hold to monitor the repeater receive frequency (the softkey will be displayed inverse); squelch is deactivated; only available if repeater mode is selected.

Push to set the frequency shift for repeater mode (the softkey will be displayed inverse flashing; range 0 … 2 MHz (see next Page).

Cyclic change of frequency tuning steps:

$$\rightarrow 1\ Hz \rightarrow 10\ Hz \rightarrow 100\ Hz \rightarrow 1\ kHz \rightarrow$$
$$\longleftarrow$$
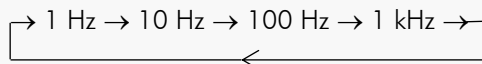
Fig. 29

10.2.1 Repeater Mode – How to Set the Repeater Frequency Shift

When pushing SET RPT softkey (FM menu):

- SET RPT softkey will flash inverse.
- VFO display will show the actual transmit frequency.
- Band- respectively linear scale changes (range 0 … 2.000)
- Set VFO to desired transmit frequency hence define the shift within a tuning range from 0 … 2000 kHz.
  The frequency resolution selected for the VFO will apply for this setting. It can be modified by STEP-VFO softkey in the same menu.
- Alternatively use STEP-VFO knob to set the frequency shift.

Pushing SET RPT again will terminate the SET RPT mode.

The frequency shift is used both for RPT– and RPT+.

Switch to a different operating mode will terminate the setting as well.

Numerical frequency shift input is not possible.

10.2.2 Repeater Mode – TX Frequency Display

Activation of PTT (pushing TX-ON button in the cluster ANT-TUNER respectively TX pushbutton at Microphone T9) changes frequency display of the selected VFO:

Now the TX frequency – decreased (FM-) or increased (FM+) by adjusted frequency shift - is shown.

10.3   DATA Transmission (Digital Operation Modes)

The function DATA enables to send out signals which modulate the transmitter by using following inputs:

- 0 dBm AUDIO IN (microphone socket MIC-PTT pin 4, see Page 7 Tab. 6)
- AUDIO DATA IN (J20 AUDIO IN/OUT pin 2, see Page 6 Tab. 4)

This is basically possible with all modes – where appropriate. Thus why it is called „operation sub mode"

When pushing DATA button located in the cluster MODE:

- DATA-LED will stay off.
- DATA menu will be called up.

DATA menu

In case this softkey is activated the signal at the 0dBm input (MIC-PTT Pin 4) will be transmitted when PTT is switched; the softkey will be displayed inverse; DATA-LED will turn on.

In case this softkey is activated the signal at the AUDIO DATA IN input (J20 Pin 2+3/10) will be transmitted when PTT is switched; the softkey will be displayed inverse as shown here; DATA-LED will turn on.

RTTY operation; the filter will be shifted according to the frequency offset of modulation tones (2125 Hz / 2295 Hz); the softkey will be displayed inverse; the display will show RTTY (to the left of frequency).

This softkey toggles the source of audio signals at AUDIO DATA OUT output (J20 Pin 11+3/10) between MAIN-RX and SUB-RX (display accordingly OUT MAIN or OUT SUB).

In case this softkey is activated the signal at the AUDIO DATA IN input (J20 Pin 2+3/10) will be transmitted when PTT is switched by an **external software command** (USB interface); the softkey will be displayed inverse.

Fig. 30

TX 0dBm, TX DATA and DATA Mike are only working alternatively.
DATA mode may be selected in all operating modes.

Only when DATA mode is selected a PTT signal can be fed through USB interface (handshake signal).

Alternative Termination of DATA Operation

In case the DATA softkey menu is displayed pushing DATA will terminate the currently active DATA mode (TX 0dBm, TX DATA or DATA Mike).

If the menu is not displayed pushing DATA will call it up and only a second push will terminate the currently active DATA mode:

- DATA-LED will turn off.

11   SELECTING FREQUENCIES

To select or change a frequency there are the following options:

- Select with band buttons (see below).
- Numerical input (see Page 32).
- Recall from a memory channel (see Page 34).

11.1   Select with BAND Buttons

Fig. 31

Pushing a band pushbutton selects one of two stored frequencies within the desired band (see Table 13 and 14 / Page 28).

The MF and each HF amateur radio band (excl. 60 m) is allocated to a pushbutton in the cluster BAND.

The VHF amateur radio bands and the RX-only range above 110 MHz are accessible by button 0 VHF in the cluster MODE and additional select in the VHF softkey menu.

Each band button stores two frequencies exclusively for this band. Pressing the button again will toggle between the last two frequencies used within this band.

The last used frequency within a band is stored automatically, so the stored frequency will change continuously when tuning *within* the band with VFO knob or STEP-VFO knob.

In case the BAND limits are exceeded through tuning *the last valid frequency that has been stored* will remain. Press button again for return the PT-8000A to the last used frequency.

The two stored frequencies of a band are correlated to each VFO. Selecting the alternate VFO will give access to another two frequencies in that band (which were used with this VFO). Of course this is applicable for both MAIN- and SUB-RX.

Mode, filter adjustments (width/shift), antenna and tuning increments (STEP VFO) are stored along with the respective frequency.

A numerical input of a frequency (see Page 32) within the selected band will overwrite one of the two stored frequencies (the last frequency used).

11.1.1 HF Amateur Radio Bands

Pressing e.g. button 14   5 (located in the cluster BAND) selects the last used frequency within the 20 m band of the selected VFO.
The VFO menu (see Page 41) will be displayed.

Pressing again will toggle between the last two frequencies used within this band.

Two more frequencies are allocated to the „stand-by"-VFO.

The following MF/HF amateur radio bands – slightly modified depending on IARU region the TRX will operate – are defined in the PT-8000A software as TX bands. They are directly selectable with band pushbuttons (except 60 m):

Button	Band	Sign	Frequency Range		
1.8 1	160 m	MF	1.810^1 /$1.800^{2,3}$	...	2.000 MHz
3.5 2	80 m		3.500	...	3.800^1 / 4.000^2 / 3.900^3 MHz
–	60 m		5.260	...	5.410 MHz
7.0 3	40 m		7.000	...	7.200^1 / $7.300^{2,3}$MHz
10 4	30 m		10.100	...	10.150 MHz
14 5	20 m	HF	14.000	...	14.350 MHz
18 6	17 m		18.068	...	18.168 MHz
21 7	15 m		21.000	...	21.450 MHz
24 8	12 m		24.890	...	24.990 MHz
28 9	10 m		28.000	...	29.700 MHz

[1] = IARU Region 1   [2] = IARU Region 2   [3] = IARU Region 3   **Tab. 13**

11.1.2 VHF Amateur Radio Bands

Pushing button 0 VHF located in the cluster MODE will call up the VHF menu (see Page 29) and will recall the last used frequency on the last used VHF band (50 MHz, 70 MHz, 144 MHz or 110 MHz, the corresponding softkey will be displayed inverse).

Pushing the button of the current band (the softkey is shown inverse) switches to the second frequency stored in this band.

The following VHF amateur radio bands are defined as TX bands in the PT-8000A and selectable via button 0 VHF and the respectively assigned softkey (plus one additional RX-only range):

Button	Band	Sign	Frequency Range		
0 VHF → Softkey 50	6 m		50.000	...	52.000^1 / $54.000^{2,3}$ MHz
0 VHF → Softkey 70	4 m	VHF	70.000^1	...	70.500^1 MHz
0 VHF → Softkey 144	2 m		144.000	...	146.000^1 / $148.00^{2,3}$ MHz
0 VHF → Softkey 110	RX Range		110.000	...	143.999 MHz

[1] = IARU Region 1   [2] = IARU Region 2   [3] = IARU Region 3   **Tab. 14**

If a transverter has been used the last time while VHF operation pushing button 0 VHF will activate the transverter again, the corresponding frequency will be shown on the display and the softkey Trans will be displayed inverse.

VHF menu
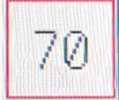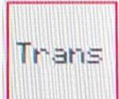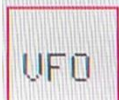
Select 2 m band; the softkey will be displayed inverse (as shown here); pressing this key again will toggle between the last two frequencies used within this band.

Select RX Range 110 … 143.990 MHz; the softkey will be displayed inverse; pressing this key again will toggle between the last two frequencies used within this band.

Select 4 m band; the softkey will be displayed inverse; pressing this key again will toggle between the last two frequencies used within this band.

Select 6 m band; the softkey will be displayed inverse; pressing this key again will toggle between the last two frequencies used within this band.

Transverter select menu will be called up (see next Page); in case a Transverter is already selected the softkey is displayed inverse.

VFO menu will be called up (see Page 41).

Fig. 32

Only one transverter can be activated at a time for each of the receivers. To operate two transverters MAIN- and SUB-RX must be allocated to different transverters.
It should be noted that it is not possible to form a transceiver with SUB-RX. Hereby the transverter only works as a converter.

11.1.3 Transverter Operation

Pushing softkey Trans (VHF menu) will call up the Transverter Select menu. If a transverter is already selected the softkey is displayed inverse.

Transverter Select menu

Return to VHF menu (see previous Page).

Select transverter #1; the softkey will be displayed inverse; pushing again will call up the Transverter Band Select menu (see below).

Select transverter #2; the softkey will be displayed inverse; pushing again will call up the Transverter Band Select menu (see below).

VFO menu will be called up (see Page 41).

Fig. 33

If transverter 1 is selected (displayed inverse) pushing again softkey Trans 1 will call up the Transverter Band Select menu (applies accordingly to Trans 2)

Transverter Band Select menu

Return to Transverter Select menu (see above).

Activates 2 m band (144 … 148 MHz); the softkey will be displayed inverse; push again and hold allows to select a transverter operating band using STEP-VFO knob (see Page 31).

Activates 6 m band (50 … 54 MHz); the softkey will be displayed inverse (as shown here); push again and hold allows to select a transverter operating band using STEP-VFO knob (see Page 31).

Activates 10 m band (28 … 30 MHz); the softkey will be displayed inverse; push again and hold allows to select a transverter operating band using STEP-VFO knob (see Page 31).

Fig. 34

Changing of allocated transverters	If one of the softkeys (144/50/28) is pushed and held, the transverter operation frequency band is displayed instead of the standby VFO frequency, see Figure 35.

Using control STEP-VFO / MEM/CH gives access to all transverter operation frequency bands as listed below (Table 15).
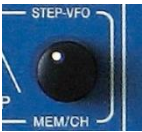
When releasing the transverter softkey the new frequency band is transferred and will be stored.

Fig. 35

Transverter Operation Frequency Bands	The following 13 transverter operation frequency bands are available:

No.	Frequency Range		
1	432	...	434 MHz
2	435	...	437 MHz
3	1.268	...	1.270 GHz
4	1.296	...	1.298 GHz
5	2.320	...	2.322 GHz
6	3.400	...	3.402 GHz
7	3.456	...	3.458 GHz
8	5.760	...	5.762 GHz
9	10.368	...	10.370 GHz
10	10.450	…	10.452 GHz
11	24.048	…	24.050 GHz
12	47.088	...	47.090 GHz
13	75.976	...	75.978 GHz

Tab. 15

When the PT-8000A operates in transverter mode the transmitter output is directed to the TX-ext. connector on the rear panel (see Page 5 / Table 3 / socket J14).

A transverter for one of the bands shown in Table 15 must be selected so that it can operate properly with drive power 10 m, 6 m or 2 m.

Maximum power level at J14 is +20 dBm.

Hooking up multiple transverters requires external distribution of TX signals from TX-ext. J14.

11.2   Numerical Frequency Input   ENTER

Fig. 36

Pushing button ENTER located in the cluster MODE will call up the ENTER menu and will activate the numerical frequency input:

- The frequency display will show blanks for all digits. A cursor indicates („_") which digit can be edited.

| MHz | kHz | Hz |
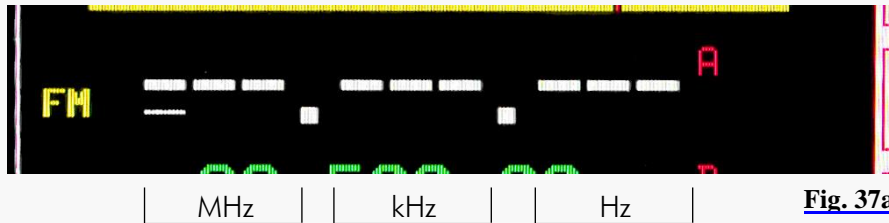
Fig. 37a

The number of blanks/digits are shown depends on the resolution selected by using the Softkeys STEP ▲ , STEP ▼ or STEP VFO (s. P. 41). E.g. the resolution is 1 kHz the frequency will be displayed as follows:

| MHz | kHz | Can not be edited |
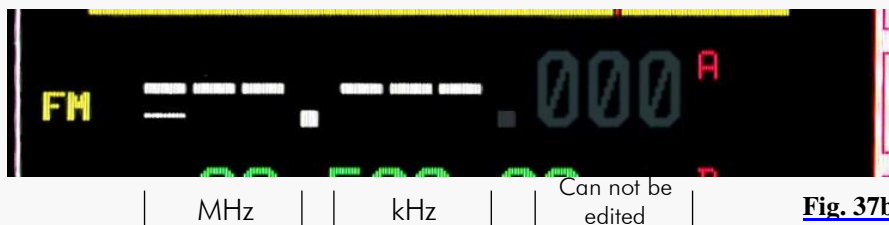
Fig. 37b

- Pushing the respective numbers from 1.8 1 to 28 9 allocated to the BAND buttons (located in the cluster BAND) and 0 VHF (located in the cluster MODE) will insert the digits from left to right.
- Pushing button ENTER (cluster MODE or softkey) again will complete the input; the RX transfers the frequency; the VFO menu will be displayed:

ENTER menu
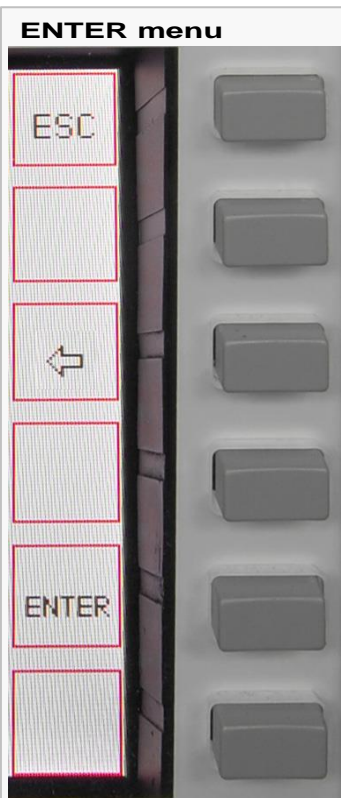
Fig. 38

Numerical input will be aborted;
the last used frequency will be displayed instead;
the last used softkey menu will be called up.

The cursor will jump to the next left position; the last digit input will be deleted; a leading empty digit will reappear.

Frequency input will be completed;
the RX transfers the frequency (function is the same as key ENTER in the cluster MODE does);the VFO softkey menu will be displayed.

Because the numerical input always starts with the 100 MHz digit possibly the 0 VHF button first must be pushed. So this digit disappears and the Cursor jumps one digit to the right to the 10 MHz digit. These can be deleted as well by pushing 0 VHF button again, the cursor jumps to the 1 MHz digit, etc.

It is not necessary to key all digits (e.g. "0"). Pushing ENTER after the last digit will set all lower digits to zero. After a valid numerical input is acknowledged the frequency will be displayed and the respective RX will operate on that frequency.

In case the least significant digit is typed in the numerical input is terminated and the frequency is transferred to the respective VFO (Pushing ENTER is not required). The RX operates with the new frequency.

In case the input is not acknowledged through ENTER or completely input or not aborted through ESC, after a period of 10 seconds without any activity the numerical input will be terminated and the last frequency used will be selected again. The last used softkey menu will be called up.

> If the entered frequency is outside of RX frequency ranges of the PT-8000A the VFO will jump to the upper border of the next lower RX frequency range. If input frequency is < 9 kHz it will jump to 9 kHz.

> In case the input frequency is a valid BAND frequency one of the two stored frequencies of this BAND will be overwritten by the numerical input.

Numerical Input Transverter Operation

In transverter operation two additional digits will be displayed for 1 and 10 gigahertz range:
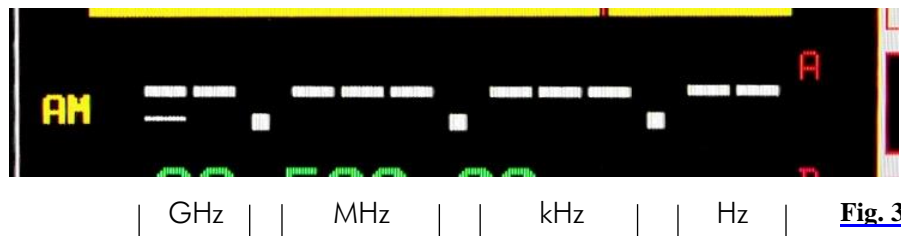
| GHz | MHz | kHz | Hz | **Fig. 39** |

In this case the 1 Hz digit is not available for numerical input.

11.3 Channel Operation

11.3.1 Recall of Stored Frequencies   CHANNEL

Fig. 40

Recalling of VFO adjustments (frequency, mode and filter bandwidth) will be done by pushing button CHANNEL located in the cluster MODE. It gives access to 3 banks of memory each storing 99 channels provided by PT-8000A.

When a memory channel is selected the stored adjustments are active with the current RX immediately. They can be transferred to the VFO permanently (CHAN⇨VFO) or can be restored with changed parameters as well (overwriting) (SET MEM).

When pushing CHANNEL:

- The last used channel will be activated and the RX operates with its frequency and the other stored adjustments.
- CHANNEL LED will be on.
- CHANNEL menu will be called up (see below).
- The frequency display of the *standby* VFO will be substituted by information about the active channel (see Page 35 Figure 42).

When CHANNEL function is active toggling between MAIN-/SUB-RX and VFO-A/B is inhibited.

CHANNEL menu

Fig. 41

Select bank #1; the softkey will be displayed inverse.

Select bank #2; the softkey will be displayed inverse.

Select bank #3; the softkey will be displayed inverse (as shown here).

Select (earmark) actual channel for SCAN mode **; this can also be done by pushing the knob MEM/CH / STEP-VFO.

Writing channel to *selected* VFO from *active* RX. The CHANNEL mode will be terminated and the VFO menu will be called up (see Page 35).

Writing current VFO adjustments to selected memory channel; if this channel was selected for SCAN mode the earmark will be deleted; it must be selected again if required (see also Page 36 – MEM).

*** Function temporarily disabled*

Displayed Memory Channel Information

CHANNEL Operation
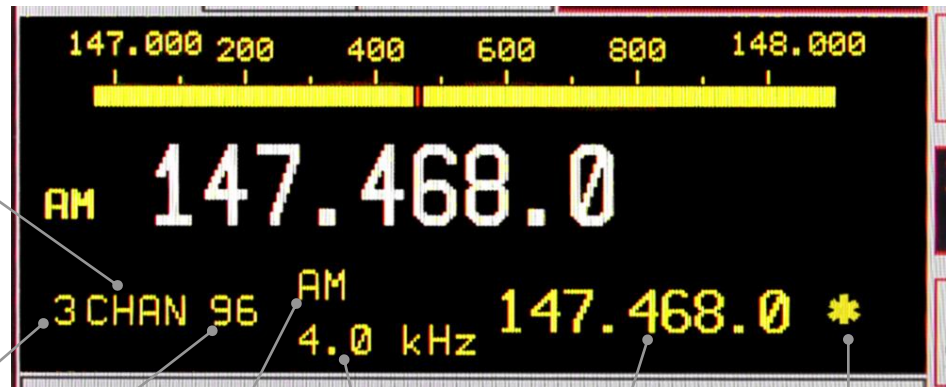
Fig. 42

| Bank # | Channel # | Mode | Bandwidth | Stored Frequency | SCAN Marker |

After selecting the memory bank through pushing softkeys BANK 1, BANK 2 and BANK 3 the control MEM/CH / STEP-VFO gives access to 99 memory channels by turning.

Both MAIN- and SUB-RX can read and write into the memory.

The frequency resolution of the stored value depends on the resolution of the current frequency. It will be written to the VFO in the same manner.

Channels which are selected for SCAN operation (see chapter 16, Page 52) are marked by an asterisk (*). If the frequency of the marked channel lies within the SCAN boundaries it will be used for SCAN operations. **

Termination of CHANNEL Operation

If there was no memory content written to the VFO by pushing softkey CHAN⇨VFO, pushing CHANNEL again will terminate CHANNEL operation.

If the CHANNEL menu is not displayed, pushing CHANNEL will call it up and second pushing will terminate CHANNEL operation:

- The last used VFO frequency will be activated.
- VFO menu will be called up.
- CHANNEL LED will turn off.

*** SCAN Function temporarily disabled*

11.3.2 Storage of Frequencies   MEM

Fig. 43

Pushing button MEM located in the cluster MODE will store the frequency and additional VFO values of the *active* RX to one of the 297 memory channels organized in three banks with 99 memory channels each bank.

Other than CHANNEL operation (see Page 34) the RX will stay on its current VFO adjustments while MEM functions are executed.

When pushing MEM:

- MEM LED will be on.
- MEM menu will be called up (see below).
- The frequency display of the *standby* VFO will be substituted by information about the selected memory channel (see Page 37 Figure 45).

When MEM function is activated toggling between MAIN- and SUB-RX is inhibited; same with toggling VFO-A and B.

MEM menu

Fig. 44

Select bank #1; the softkey will be displayed inverse.

Select bank #2; the softkey will be displayed inverse.

Select bank #3; the softkey will be displayed inverse (as shown here).

Writing current VFO adjustments to selected memory channel; if this channel was selected for SCAN mode the earmark will be deleted; it must be selected again if required (see also Page 34 – CHANNEL).

Pushing softkey BANK 1, BANK 2 and BANK 3 gives access to the banks. Use MEM/CH / STEP-VFO to select desired memory channel (0 … 99).

ℹ️	Mode and filter bandwidth are stored as well. When MEM function will be activated, at first always the last used bank # is selected and displayed with its first (lowest number) empty memory.
⚠️	In case all memory channels are written the last used memory channel will be displayed and when pushing VFO⇨MEM overwritten. When overwriting a memory channel there is no warning.

Displayed Memory Channel Information

MEMory Operation

14.000   100   200   300   14.350

USB **14.313.000**

3 MEM   96   USB   147.468.0   ✳
          4.0 kHz

Fig. 45

| Bank # | Channel # | Mode | Bandwidth | Stored Frequency | SCAN Marker |

ℹ️	Memory channels are accessible from both MAIN- and SUB-RX.

Termination of MEM Operation

If the MEM menu is displayed pushing MEM will terminate this mode and the VFO menu will be displayed.

If the MEM menu is not displayed pushing MEM will call it up and a second push will terminate MEM operation:

MEM

- VFO menu will be called up.
- MEM LED will turn off.

11.4 VFO Main Tuning Knob (*active* RX) and SUB VFO Tuning Knob (RX *in the Background*)

Primary means of tuning the *active* RX (MAIN- or SUB-RX) is the **Main Tuning Knob VFO**. With a full rotation it generates 512 steps, so that depending on the chosen tuning increments 512 Hz, 5.12 kHz, 51.2 kHz or 512 kHz can be run through.

The **Tuning Knob SUB VFO** generates 256 steps with a full rotation, so that depending on the chosen tuning increments 256 Hz, 2.56 kHz, 25.6 kHz or 256 kHz can be run through.

General frequency coverage of both RX is 9 kHz to 30 MHz, 50 to 54 MHz, 69.9 MHz to 70.7 MHz and 110 MHz to 148 MHz. Due to the frequency scheme of the PT-8000A the ranges between them are blanked out.

Transmit operation is only possible on the allocated amateur radio bands of that IARU region in which one the TRX will operate after delivery (see Page 28 / Table 13 and 14).

In case the transmit boundaries are to be modified (commercial application; signal generator operation; new amateur radio frequencies) please contact Hilberling GmbH for further information about a software update.

VFO menu (detail)
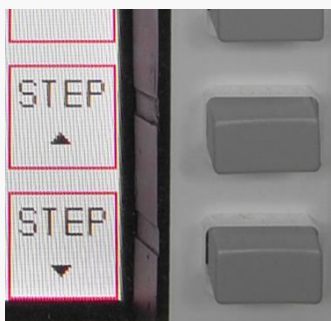
The tuning increments of the VFO are adjustable through STEP selection, which is allocated to the softkey menu VFO.

If the VFO menu is not displayed, push button VFO A/B (see Page 40).

Softkey STEP ▲ (towards fine tuning) decreases the tuning increments by power of 10. Additional digits appear at the VFO frequency readout.

Softkey STEP ▼ (towards coarse tuning) increases the tuning increments by power of 10. Lesser digits appear at the VFO frequency readout.

Fig. 46

Selectable increments are 1 Hz / 10 Hz / 100 Hz / 1 kHz.

Digits below the selected tuning width are set to 0 and will be displayed in dark grey.

Example

Displayed VFO Frequency	Transceiver Frequency	Tuning Increments
1.234.567	1,234.567 kHz	1 Hz
1st pushing STEP ▼		
1.234.560	1,234.560 kHz	10 Hz
2nd pushing STEP ▼		
1.234.500	1,234.500 kHz	100 Hz
3rd pushing STEP ▼		
1.234.000	1,234.000 kHz	1 kHz

Tab. 16

ℹ️	Each mode has been allocated a default tuning increment setting: • FM: 100 Hz • SSB / CW / AM: 10 Hz

⚠️	Changing the operating mode will reset the current setting to default values.

11.5   STEP-VFO Control

Fig. 47

Operation with knob STEP-VFO allows VFO tuning with further increments.

The STEP-VFO Control is placed in the cluster MODE. The control enables tuning in 10 kHz, 100 kHz and 1 MHz increments.

Pushing the knob activates the STEP-VFO function:

- A cursor appears at the 100 kHz digit of the frequency display:

Fig. 48

- Turning the knob will now tune the VFO by 100 kHz steps.

  Pushing the knob a second time will move the cursor to the 10 kHz digit. Turning the knob will result in tuning the VFO by 10 kHz steps.
  Pushing the knob a third time will move the cursor to the 1 MHz digit – hence tuning can now be established by 1 MHz steps.

  Pushing the knob again will result in a movement of the cursor again to the 100 kHz digit, then 1 kHz, 1 MHz, and so on.

⚠️	Neither pushing the knob nor turning the control for more than 3 seconds will terminate the STEP-VFO function. If re-activated by pushing the knob the cursor will appear at the last used position.

ℹ️	When power up the PT-8000A and STEP-VFO will be activated the cursor will initially occur at the 100 kHz position.

11.6 VFO Management
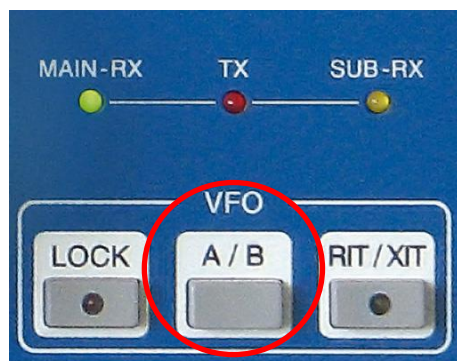
Fig. 49

Both receivers (MAIN- and SUB-RX) have its own two VFOs – VFO A and VFO B. Switching between VFO A and VFO B is established through VFO A/B pushbutton. The button is located in the cluster VFO.

In addition to frequencies the VFOs store filter bandwidth and operation mode.

When pushing button VFO A/B:

- In case the VFO softkey menu is already displayed the *active* RX will change its VFO (A⇨B or B⇨A).
- If a different softkey menu is displayed the first push will call up the VFO menu. The second push will alter the VFO A and VFO B.

- Both frequencies displayed for the *active* RX will alter its position. The white display always shows the *selected* VFO. The VFO can be identified through the red nominators A respectively B.

- The smaller green display always shows the alternate VFO that is in *standby* mode.

Fig. 50

Only the SUB-RXs *selected* VFO frequency is displayed without its identifier A or B.

active RX
(shown: MAIN-RX)
selected VFO (shown: A)

RX *in the background*
(shown: SUB-RX)
selected VFO (A or B)
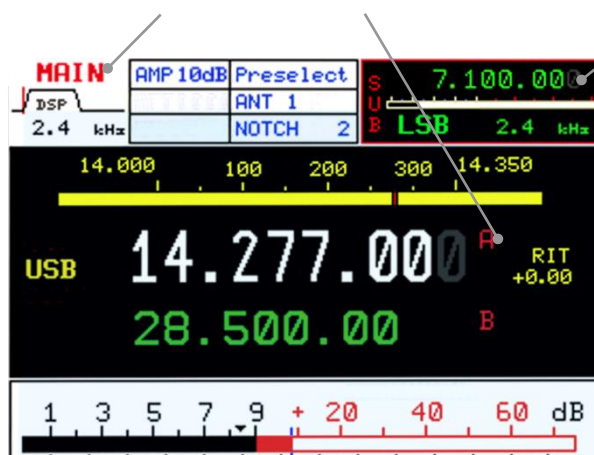
Fig. 51

| Example | In case the MAIN-RX is the active RX and its VFO A is the selected VFO, the VFO menu is displayed as follows: |

VFO menu	**active RX: MAIN-RX** with **selected VFO A**

The frequency of the *selected* VFO (shown: A) from the *active* RX (shown: MAIN-RX) will be copied to the *selected* VFO (without identifier) from the RX *in the background* (shown: SUB-RX).

The frequency of the *selected* VFO (without identifier) from the RX *in the background* (shown: SUB-RX) will be copied to the *selected* VFO (shown: A) from the *active* RX (shown: MAIN-RX).

The frequency of the *selected* VFO (shown: A) from the *active* RX (shown: MAIN-RX) will be copied to the VFO *in standby* (shown: B) from the *active* RX (shown: MAIN-RX).

VFO SPLIT: The Frequency of the *selected* VFO (shown VFO A) from the *active* MAIN-RX will be used for <u>RX</u>; the *selected* VFO (without identifier) from the SUB-RX *in the background* will determine the <u>TX frequency</u> (see also P. 42); to the left of the Display SPLIT will be displayed; the softkey will be displayed inverse.

Softkey STEP ▲ (towards fine tuning) decreases the tuning increments by power of 10. One more digit will appear at the VFO frequency readout each pushing.

Softkey STEP ▼ (towards coarse tuning) increases the tuning increments by power of 10. One digit less will be shown at the VFO frequency readout each pushing.

Fig. 52

⚠️ SPLIT operation using VFO A and VFO B (= *VFO SPLIT*) is only possible with the MAIN-RX (the *active* RX. SUB-RX is *in the background*).

| Example | In case the SUB-RX is the *active* RX and its VFO B is the *selected* VFO, the VFO menu is displayed as follows: |

VFO menu	**active RX: SUB-RX** with **selected VFO B**

The frequency of the *selected* VFO (shown: B) from the *active* RX (shown: SUB-RX) will be copied to the *selected* VFO (without identifier) from the RX *in the background* (shown: MAIN-RX).

The frequency of the *selected* VFO (without identifier) from the RX *in the background* (shown: MAIN-RX) will be copied to the *selected* VFO (shown: B) from the *active* RX (shown: SUB-RX).

The frequency of the *selected* VFO (shown: B) from the *active* RX (shown: SUB-RX) will be copied to the VFO *in standby* (shown: A) from the *active* RX (shown: SUB-RX).

VFO SPLIT is not applicable if SUB-RX is the *active* one; for SPLIT operation the MAIN-RX must be *active*, see above.

Softkey STEP ▲ (towards fine tuning) decreases the tuning increments by power of 10. Additional digits appear at the VFO frequency readout.

Softkey STEP ▼ (towards coarse tuning) increases the tuning increments by power of 10. Lesser digits appear at the VFO frequency readout.

Fig. 53

11.7 SPLIT Operation

VFO SPLIT operation in the PT-8000A is realized by using the MAIN and the SUB-RX. The *selected* VFO from MAIN-RX determines the RX frequency; the *selected* VFO from SUB-RX determines the TX frequency.

> To enable VFO SPLIT operation, MAIN-RX must be the *active* RX and SUB-RX operates *in the background*.

The PT-8000A stays in the current operation mode of MAIN-RX when transmitting, even though there is selected a different mode in SUB-RX. Only the frequency of SUB-RX will be used.

Procedure:

- Tune with the *active* VFO from MAIN-RX to the desired receive frequency.
- Tune with the *active* VFO from SUB-RX to the desired transmit frequency.

> When pushing softkey SPLIT (VFO menu):
>
> - When pushing PTT, the desired frequency from SUB-RX will be used for transmit instead of the receive frequency of MAIN-RX.
> - To the left of the Display, below operation mode indicator, SPLIT will be displayed
> - The softkey will be displayed inverse

Pushing SPLIT again will terminate VFO SPLIT operation.

11.8   RIT / XIT Operation

Fig. 54

RIT (Receiver Incremental Tuning) allows to shift/adjust the receiving frequency plus/minus 9.999 kHz against the transmit frequency. The MAIN-RX and the transmitter are no longer „transceive". RIT is only possible with the MAIN-RX.

XIT (Transmitter Incremental Tuning) allows to shift/adjust the transmitting frequency plus/minus 9.999 kHz against the receiving frequency. The MAIN-RX and the transmitter are no longer „transceive". RIT is only possible with the MAIN-RX.

When pushing button RIT/XIT located in the cluster VFO:

- RIT/XIT LED will be on.
- RIT/XIT menu will be called up. RIT or XIT will be displayed inverse (after power-on RIT will be activated = power-on default).
- CLAR knob will be activated (functions see below, Fig. 56).
- RIT or XIT and the offset frequency will be displayed right next to the frequency (after power-on RIT will be activated; the offset frequency will be set to 0.000 kHz = power-on default).

In case of RIT is activated, the display will show the RX frequency affected by offset frequency (= resulting RX frequency). When TX operation during XIT activation, the display will show the TX frequency affected by offset frequency (= resulting TX frequency).

RIT/XIT menu / RIT/XIT offset
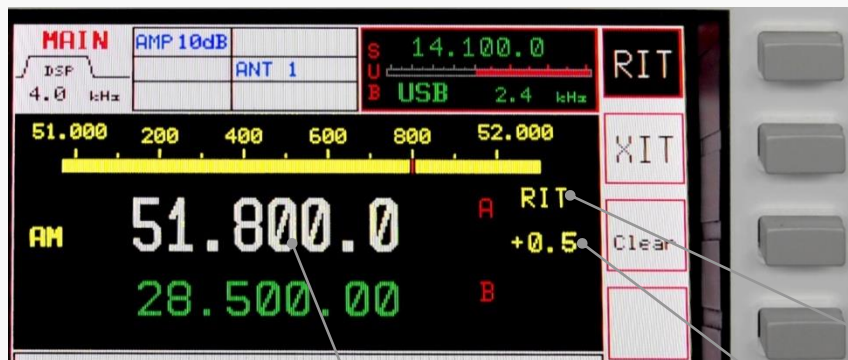
Activation RIT (as shown here)

Activation XIT

Reset the offset to zero

Fig. 55

RIT: Resulting RX Frequency when receiving
XIT: Resulting TX Frequency when transmitting

Offset Frequency
RIT / XIT

Status
RIT or XIT
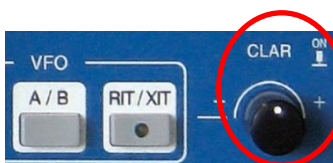
Fig. 56

↻ Turning knob CLAR (clarifier) located right next to the cluster VFO will adjust the offset frequency.

→| Pushing knob CLAR will toggle the offset frequency between selected value and 0.000 kHz.

The tuning range of RIT/XIT amounts to ±9.999 kHz.

The tuning increments of the CLAR control is identical to the selected STEP rate for frequency tuning of *selected* VFO.

RIT/XIT are not available for SUB-RX.

In case the SUB-RX is the *active* one (pushbutton MAIN/SUB) RIT/XIT and the offset are no longer displayed for the MAIN-RX which now operates *in background*.

Changing MODE will always terminate RIT/XIT operation.

Termination of RIT/XIT Operation

If the RIT/XIT softkey menu is displayed, pushing RIT/XIT will terminate this mode and the VFO menu will be called up.

If the RIT/XIT softkey menu is not displayed, pushing RIT/XIT will call it up and a second push will terminate RIT/XIT operation:

- VFO menu will be called up.
- RIT/XIT-LED will turn off.
- Display of RIT / XIT and the offset frequency will be blanked out.

11.9 Locking VFO Settings   LOCK

Fig. 57

All controls that will have an effect on the frequency selected can be locked through pushing LOCK button which is located in the cluster VFO.

When pushing LOCK:

- LOCK LED will be on.
- The following controls (knobs, buttons) are locked:
    - MAIN-RX VFO
    - SUB-RX VFO
    - STEP-VFO
    - BAND
    - CHANNEL / MEM
    - RIT / XIT
    - MAIN / SUB
    - VFO A / B

Pushing LOCK again will terminate locking of controls; LED will turn off.

12   FILTER BANDWIDTH AND SHIFT FUNCTION   FILTER WIDTH / SHIFT

Filtering in the PT-8000A is obtained in the 1st IF @ 40.7 MHz with a 6-pol. Filter and in the 2nd IF (IF-2) @ 10.7 MHz with an "IM$_3$ Protector" said prefilter with bandwidth 0.5 kHz, 3 kHz and 15 kHz.

Prefilters are selected automatically depending on operation mode (default filter; manual filter selection see Pages 59 to 62)

After passing through the 16-pol. quartz filter ladder the channel selection can be further enhanced by Digital Signal Processing (DSP) working in the audio range.

The DSP performs the following tasks:

- Interpolation between analogue filter bandwidths @ 10.7 MHz.
- Slope increase of the filter flanks @ 10.7 MHz and elimination of effects of group delays by the filters.
- Shift the placement of the filters (SHIFT function respective band-pass tuning).

Fig. 58
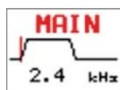
Activating DSP filtering is accomplished by the pushbutton FILTER located in the cluster DSP (Bandwidth and Shift/Pitch see Page 46 – 12.2).

In case the FILTER LED is off (shown in pic 58) only the analogue (Xtal-) filters are active. The selected bandwidth is displayed and graphically expressed (see Page 46 / 12.1).

When pushing FILTER:

- The DSP will be activated.
- FILTER-LED will be on.
- The display will indicate "DSP" operation.

Fig. 59a

WIDTH and SHIFT control located in the cluster MODE is used to adjust the filter bandwidth and to shift the passband across the spectrum.

Pushing the knob will toggle between WIDTH and SHIFT function, turning will select the current value.

Transceiver Frequency

DSP activated
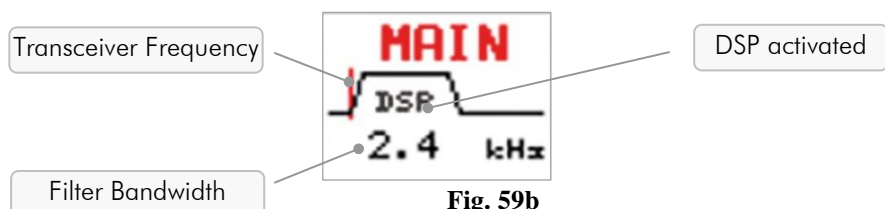
Filter Bandwidth

Fig. 59b

For specific feature in CW mode see Page 23.

Depending on operation MODE there are analogue filters available which are interpolated in bandwidth by the DSP (see Page 46).

12.1 Filter Bandwidth DSP Off

Depending on MODE the following Xtal-filters (analogue filters) and passband shifts are available (using WIDTH and SHIFT control) when DSP is not activated:

LSB/USB

Width   1.8 / 2.0 / 2.4 / 2.7 / 3.1 / 6.0 kHz
Shift   -200 Hz ... 600 Hz in 100 Hz steps
     The 3.0 and 15.0 kHz filter are the allocated IF-2 filter for SSB mode.

CW

Width   0.5 kHz (/ 0.25 kHz with optional hardware extension *)
Shift/Pitch   400 Hz ... 1,000 Hz in 100 Hz steps
     The 0.5 kHz filter is the allocated IF-2 filter for CW mode.

AM

Width   15.0 kHz
Shift   n/a
     The 15.0 kHz filter is the allocated IF-2 filter for AM mode.

FM

Width   15.0 kHz
Shift   n/a
     The 15.0 kHz filter is the allocated IF-2 filter for FM mode.

> **i**   When Noise Blanker is active, always the 15.0 kHz filter operates.

12.2 Filter Bandwidth DSP On

Depending on MODE the following bandwidths (Xtal-filters and analogue filters) and passband shifts are available (using WIDTH and SHIFT control) when DSP is activated:

LSB/USB

Width   1.0 / 1.2 / 1.4 / 1.6 / 1.8 / 1.9 / 2.0 / 2.1 / 2.2 / 2.3 / 2.4 / 2.5
           2.6 / 2.7 / 2.8 / 2.9 / 3.0 / 3.1 / 3.2 / 3.3 / 3.4 / 3.5 / 4.6 / 6.0 kHz
Shift   0 Hz ... 600 Hz in 50 Hz steps
     The 3.0 and 15.0 kHz filter are the allocated IF-2 filter for SSB mode.

CW

Width   50 / 100 / 200 / 400 / 500 Hz
Shift/Pitch   400 ... 1,000 Hz in 50 Hz steps
     The 0.5 kHz filter is the allocated IF-2 filter for CW mode.

AM

Width   2.4 / 2.5 / 2.6 / 2.7 / 2.8 / 2.9 / 3.0 / 3.1 / 3.2 / 3.3 / 3.4 / 3.5
           4.6 / 6.0 kHz
Shift   n/a
     The 15.0 kHz filter is the allocated IF-2 filter for AM mode.

FM

Width   2.4 / 2.5 / 2.6 / 2.7 / 2.8 / 2.9 / 3.0 / 3.1 / 3.2 / 3.3 / 3.4 / 3.5
           4.6 / 6.0 kHz
Shift   n/a
     The 15.0 kHz filter is the allocated IF-2 filter for FM mode.

> **i**   For FM the "bandwidth" is related to the audio response only; RF-bandwidth remains always 15.0 kHz.
>
> When Noise Blanker is active, always the 15.0 kHz filter operates.

*Factory hardware extension

13   NOTCH FUNCTIONS / NOISE REDUCTION / NOISE BLANKER

13.1   Notch Filter: IF-Notch and DSP Multi Notch

Two notch filters of different type are available in the PT-8000A.

One is working at 2nd IF @ 10.7 MHz – it´s the classical type of manual notch filtering using a Xtal bridge – the IF-NOTCH.

The other one is part of the DSP – it´s an Automatic Multi-Notch Filter (ANF/MNF) – here called the DSP NOTCH.

IF-NOTCH and DSP-NOTCH may be engaged simultaneously.

⚠️	Notch filtering is not available in AM and FM. In case NOTCH filtering is active and operation mode is changed to AM/FM, both NOTCH filters will cease operation.
ℹ️	After power on both NOTCH filters are off.

13.1.1 IF-NOTCH Filter

Fig. 60

The IF-NOTCH will be activated by pushing the control IF-NOTCH which is located as depicted:

Fig. 61

- On display, IF NOTCH is outlined as NOTCH 2.

Turning IF-NOTCH will adjust the variable notch through the passband hence the interference will be almost nullified.

13.1.2 DSP Multi NOTCH Filter („digital" MNF)

Fig. 62

Pushing button NOTCH located in the cluster DSP will activate the automatic multi-notch filtering (ANF/MNF):

Fig. 63

- On display, DSP NOTCH is outlined as NOTCH 1.
- DSP NOTCH-LED will be on.

The DSP will now detect even multiple interferences and will cancel them effectively.

13.2 DSP Noise Reduction NR

Fig. 64

Pushing button NR located in the cluster DSP will activate the Automatic Noise Reduction (ANR or short NR):
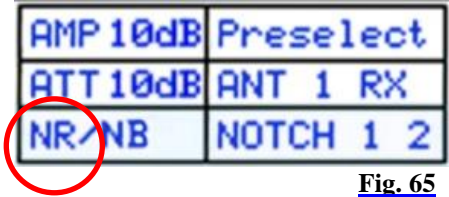
Fig. 65

- On display, DSP NR is outlined as NR.
- DSP NR-LED will be on.

i	NR is off after power on.

13.3 Noise Blanker NB

Fig. 66

The Noise Blanker will be activated by pushing control RX-NB which is located as depicted:
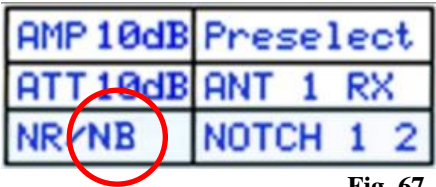
Fig. 67

- On display, RX-NB it is outlined as NB.

Turning control RX-NB will adjust the threshold of the noise blanker to the specific situation. Noise is dramatically reduced hence improving the readability of weak signals.

i	NB is off after power on.

14   SQUELCH SQL

Fig. 68

The SQUELCH (SQ) is activated by default and will be affected by the control SQL which is located as depicted.

The threshold for squelch operation is adjusted by turning the knob.

Once the SQL is activated and the threshold has engaged i.e. the RX is silent, push and hold the SQL to override the threshold momentarily.

To deactivate squelch function permanently turn knob SQL fully counter-clockwise.

A triangle ("▼") is moving in the S-meter (*active* RX only) according to the threshold setting of the SQL control.
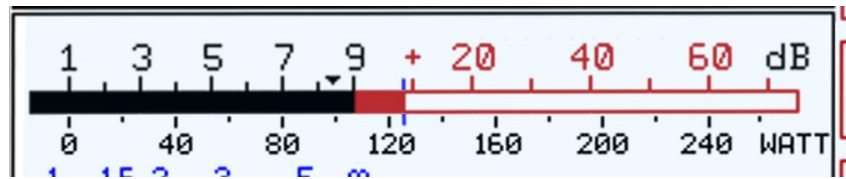
Fig. 69

Squelch function is not possible in any operation mode if AGC is deselected and manual gain control is engaged (see Page 51).

15　RX GAIN CONTROL　AGC / RF-GAIN

15.1　Automatic Gain Control　AGC

Fig. 70

The AGC (Automatic Gain Control) is active after power on. Its fall time of control voltage (hang time) is set to 1 second by factory setting and can be modified using the AGC menu. When PT-8000A is powered off the modified hang time is stored.

Deselect AGC by pushing knob RF (see bottom and Page 51)

Pushing button AGC located in the cluster FUNCTION will call up the AGC menu:

AGC menu
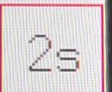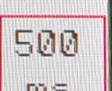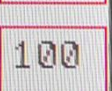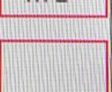
Select AGC hang time 3 s; the softkey will be displayed inverse.

Select AGC hang time 2 s; the softkey will be displayed inverse.

Select AGC hang time 1 s (default value); the softkey will be displayed inverse (as shown here).

Select AGC hang time 500 ms; the softkey will be displayed inverse.

Select AGC hang time 100 ms; the softkey will be displayed inverse.

Fig. 71

When pushing AGC the LED will **not** turn on! It is only switched on when AGC is deselected by pushing knob RF (see next Page).

To prevent missing of weak signals during tuning the MAIN- or SUB-RX the AGC hang time will be set to 100 ms automatically.

Fig. 72a

Turn knob RF GAIN to define the threshold of AGC control voltage. Pushing the knob will switch off AGC (see Manual Gain Control, next page).

The adjusted threshold will be depicted by the RF GAIN Marker on S-Meter.

15.2   Manual Gain Control   RF-GAIN

Pushing the control knob RF (RF-GAIN) allows switching from AGC operation to manual gain control. Turning the knob will set receiver control voltage to a constant value.

Full control range of the receiver is adjustable from 0 to 128 dB.

Fig. 72b

The RF GAIN Marker on S-Meter will depict the adjusted threshold.

Pushing knob RF:

- Automatic Gain Control will be terminated.
- AGC-LED located in the cluster FUNCTION will be on.
- S-Meter will fall back to adjusted receiver control voltage.

| Caution: | In case a signal is present, the audio volume may exceed the comfort level. |

Receiver
Control Voltage
AGC OFF

Turning knob RF will adjust the receiver control voltage to a constant value, which can be monitored by observing the S-Meter (*active* RX). This threshold voltage can be raised to a certain level where a signal below is significantly less audible than a signal above, which will not be levelled out.

The manual RF gain control allows adjusting the receiver control voltage according to the needs in special receiving situations.

Pushing RF knob again will reactivate AGC.

Pushing AGC button alternatively will reactivate AGC as well.

- AGC LED will turn off

Receiver
Control Voltage
AGC ON

Turning the knob RF will shift the receiver control voltage by a fixed value, which can be monitored by observing the S-Meter (*active* RX). This AGC threshold can be raised to a certain level where a signal below is significantly less audible than a signal above, where AGC action will level out the signal.

16　STORAGE FREQUENCY SCANNING　SCAN　FUNCTION CURRENTLY DEACTIVATED

Fig. 73

Pushing button SCAN located in cluster FUNCTION will activate scanning of channels which are earmarked for scanning (CHANNEL - see Page 34).

These frequencies will be checked for a signal.

The RX will scan the channels from lower to higher frequencies.

- If the squelch is engaged scanning will stop when a signal on a scanned channel opens the squelch
- If the squelch is open, the RX will pause on the scanned frequency for a time defined. After this time has elapsed the scanning will continue.
- If the squelch engages during the pause scanning will continue immediately.

When pushing SCAN

- SCAN-LED will be on
- the frequency of the standby VFO will disappear. Instead information about the scanned channel is displayed as in channel mode (see Page 34)
- SCAN softkey menu will be called up:

SCAN menu

5 s	Delay time is 5 seconds
10 s	Delay time is 10 seconds
15 s	Delay time is 15 seconds
20 s	Delay time is 20 seconds
25 s	Delay time is 25 seconds
∞	Delay time is infinite

Fig. 74

Scanning will be terminated upon activating PTT, VFO tuning, STEP-VFO or pushing SCAN. The frequency of the standby VFO will reappear, SCAN-LED will be off.

17   FIRMWARE VERSIONS / CALIBRATION / SPEAKER / DISPLAY / VOICE RECORDER   MENU I
BAUD RATES CAT-INTERFACES   MENU II

Fig. 75

The button MENU located in the cluster DISPLAY provides access to show (and to update, see appendix A2) the firmware versions, to calibrate the internal reference and to several properties like display brightness and RX audio routing, furthermore to the voice recorder and to the selection of baud rate of both CAT interfaces.

Pushing button MENU will call up the MENU I menu (see below).

Pushing button MENU again will call up the MENU II menu (see Page 54).

Pushing the button one more time will call up again the MENU I menu.

MENU I menu

The SOFTWARE menu will be called up to give access to update the PT-8000A firmware (see Appendix A2); the display will show the software versions of MAIN-, RX-, ANT-Tuner- and Display-CPU.

The CAL menu will be called up to calibrate the internal reference (see 17.2 / P. 55).

The DIM menu will be called up to set the brightness of the display (see 17.3 / P. 56).

The VOICE REC menu will be called up to give access to recording functions (see 17.4 / P. 57).

RX speaker allocation;
the key toggles between Audio Norm and Audio Split (see 17.1 / P. 54).

Fig. 76

If a different softkey menu than MENU I is displayed, pushing twice button MENU in the cluster DISPLAY will call up the MENU II menu:

MENU II -Menü

Cyclic change of data transfer rate at USB connector (J22 / „RS232 Remote")
→ 9600 → 19200 → 38400* → 57600 Baud →

Cyclic change of data transfer rate at D-Sub „Transverter"(J21 / Pin 12 RX, Pin 24 TX)
→ 9600 → 19200 → 38400* Baud →

* Factory Setting

Fig. 76b
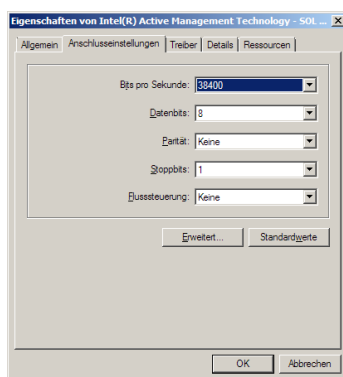
Make sure the parameters of the used interface of your computer (COM-Port) are the following (*Start button → Control Panel →System and Security →System →Device Manager →Ports (COM & LPT) →right mouse button on e.g. xyz(COM3) →Properties →Port Settings*):

- Bits per second (Baud): 38400 (factory setting of PT-8000A, see above; if changed there, then change also here)
- Data bits: 8
- Parity: none
- Stop bits: 1
- Flow control: none

Fig. 76c

17.1 RX-Speaker Allocation Audio NORM / SPLIT

Audio Norm will feed audio from MAIN-RX and SUB-RX to both speakers (PT-8000A and HN-8000).

Audio Split will separate audio from MAIN-RX and SUB-RX hence the MAINRX signal will be fed to PT-8000A speaker and the SUB-RX signal to HN-8000 speaker.

True for both settings of speaker allocation:

↻ Turning
- ▶MAIN will adjust the volume of the MAIN-RX signal.
- ▶SUB will adjust the volume of the SUB-RX signal.

↦ Pushing
- ▶MAIN will turn on/off PT-8000A speaker.
- ▶SUB will turn on/off HN-8000 speaker.

Fig. 77

17.2   Calibration of the Internal Reference

 Pushing softkey CAL (MENU menu) will call up the Calibration menu:

CAL menu

Return to MENU I menu (see previous Page).
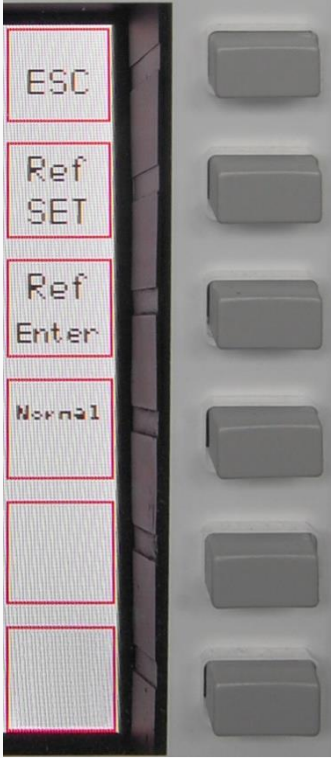
The REF CAL menu will be called up to calibrate the internal Reference (see below); a dialog box is displayed instead of the standby VFO frequency (see Page 55 Figure 80a).

Fig. 78

 Pushing softkey Ref CAL (CAL menu) will call up Reference Calibration menu; a dialog box is displayed instead of the *standby* VFO frequency (see next Page Figure 80a):

REF CAL menu

Return to CAL menu (see above).

Activating the input mask for correction value of reference oscillator; the softkey will be displayed inverse; see next Page Figure 80b.

Storing the correction value (see next Page Figure 80d).

Setting back the correction value to zero.

Fig. 79

The dialog box for calibration of reference when pushing Ref CAL :

Ref Frequency Offset: +0.00 Hz
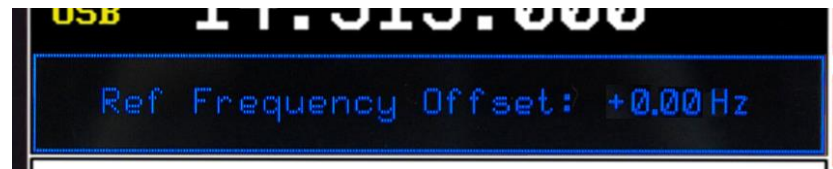
Fig. 80a

Pushing Ref SET will activate the input mask:

Offset: +0.00 Hz

Fig. 80b

The correction value for the reference oscillator is adjustable by turning the SUB VFO / REF SET knob. Tuning range ± 10 Hz Ref (±1 ppm).

Offset: +4.00 Hz

Fig. 80e

Fig. 80c

Pushing Ref Enter will terminate the input procedure; the new value will be stored permanently:

Offset: +4.00 Hz

Fig. 80d

17.3 Brightness of Display DIM

Pushing softkey DIM (MENU menu) will call up DIM softkey menu:

DIM menu

Return to the MENU menu.

Lightens up the display stepwise.
Display brightness is adjustable in ten steps.

Darkens the display stepwise.
Display brightness is adjustable in ten steps.

Fig. 81

17.4 Audio Recording   VOICE RECORDER

For audio signal recordings there are 4 recording tracks available with a capacity of 29.8 seconds each track.

Pushing softkey VOICE REC (MENU menu) will call up the VOICE REC menu; a graphic (Figure 82b) will be displayed right next to the frequency:

VOICE REC menu

Return to MENU menu.

Cyclic change of record source when pushing repeatedly.

→ MAIN (-RX) → SUB (-RX) → MIC (-TX) → 0dBm (-TX) → DATA (-TX) →

Start and Stop of recording (toggle mode); Start and Stop will be displayed accordingly.

Play and Stop playing (toggle mode) of all takes of the current track; Play and Stop will be displayed accordingly.

Clear recording memory (current track only).

Loop all recordings (current track only).

Fig. 82a

Fig. 82b

Graphics Display

- The selected memory track is shown as a blue number and a yellow marker above the track graphic; select track by turning STEP-VFO knob.
- Recording position and status is shown as R> [seconds] and a blue bar in the graphic.
- Play position is shown as P> [seconds] and a red marker line in the graphic.

Recording

- If one track is only partially written one or more recordings can be added.

- In case the memory track has reached its capacity the recording will be ceased. Rec Start will be displayed. However, a new record is not possible until the memory has been cleared.

Playback

- Playback will always start at the very beginning of the track.
- When playback is finished (end of record or Stop) Play softkey is displayed.
- The loop function may be activated during playback; the record will be repeated endless until Stop is activated.

All Audio Signals (CW, SSTV etc.) can be recorded.

If the records are to be transmitted simply key the TX (transmit key T9; TX/ON key) when playback is running.

18   SCALE SELECT   METER
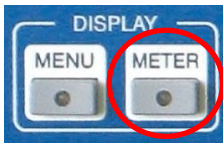
Fig. 83

Pushing button METER located in the cluster DISPLAY will call up the METER menu with the following options:

1. Selection of meter display right below the S-Meter (Figure 85a/b):
   - Control voltage of the Automatic Level Control (ALC)
   - MIC compression level (COMP)

2. Selection of scale units for input signal strength (Figure 86a/b/c):
   - Hams radio units (S + dB)
   - Input power @ 50 Ohm (dBm)
   - Input voltage @ 50 Ohm (dBµV).

METER menu

Control voltage of the ALC will be displayed (SSB mode only);
the softkey will be displayed inverse (as shown here).
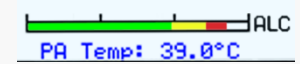
Fig. 85a

Compression level from MIC / TX will be displayed;
the softkey will be displayed inverse.
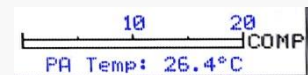
Fig. 85b

S-Meter indicates **S + dB;**
softkey displayed inverse (as shown here).

Fig. 86a

S-Meter indicates **dBm;**
softkey displayed inverse.

Fig. 86b

S-Meter indicates **dBµV;**
softkey displayed inverse.

Fig. 86c

Fig. 84
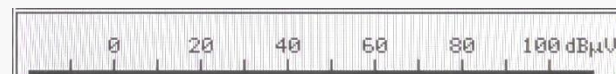
19   BASIC SETTINGS RX/TX

Fig. 87

Pushing button RX/TX located in the cluster MODE will call up two types of menus which gives access to various basic settings for RX and TX.

The last used menu (TX or RX) will be called up.

Depending on whether HF or VHF is selected the menus and display described below may vary.

19.1   RX Settings

19.1.1 **HF**: Antenna Select / Preamplifier / Preselector / Attenuator / IF-2 Filters
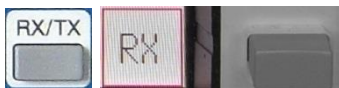
Pushing button RX/TX or softkey RX (TX menu) will call up the RX menu **HF** with following options:

RX menu HF

Select antenna #1 or – second press – antenna #1 for TX and an additional RX antenna; the display will show ANT 1 or ANT 1 RX if appropriate. (see Page 14, Table 10, No. 4), the softkey will display as well (inverse as shown). **See note below**.

Select antenna #2 – the display will show ANT 2 if appropriate (see Page 14, Table 10, No. 4), the softkey will be displayed inverse.

Activate Preamplifier (on / off); the display will show AMP 10dB (see Page 14, Table 10, No. 1); the softkey will be displayed inverse.
*** only available 1.8 to 30 MHz ***

Activate Preselector (on / off); the display will show Preselect (see Page 14, Table 10, No. 2); the softkey will be displayed inverse.
*** only available 1.8 to 30 MHz ***

Access to ATT/IF-2-Filter menu **HF** to activate the attenuator and to select a different IF-2 filter (see next Page).

Access to TX menu (see Page 63).

Fig. 88

Note

In case the antenna selection of MAIN- or SUB-RX will be changed from ANT 1 to ANT 1 RX (or vice versa), the other RX is also affected if it is not connected to ANT 2.

If one of both RX is connected to ANT 2, changing the antenna selection of the other RX from ANT 1 to ANT 1 RX (or vice versa) will take no effect.

19.1.2 **HF**: Attenuator / IF-2 Filter Select

Pushing softkey ATT / IF-2 (RX menu **HF**) will call up ATT / IF-2-Filter menu **HF**:

ATT / IF-2-Filter menu HF

Return to the RX menu **HF** (see previous Page).

Activate 10 dB Attenuator (on / off); the display will show ATT (see Page 14, Table 10, No. 3); the softkey will be displayed inverse.

Select 15.0 kHz IF-2 filter; default filter for AM and FM mode as well as for SSB if filter bandwidth > 3.0 kHz; the softkey will be displayed inverse.

Select 3.0 kHz IF-2 filter; default filter for SSB mode if filter bandwidth ≤ 3.0 kHz; the softkey will be displayed inverse (as shown here).

Select 0.5 kHz IF-2 filter; default filter for CW mode; the softkey will be displayed inverse.

Fig. 89

If the Noise Blanker (NB) is activated the 15 kHz IF-2 filter will always be selected.

If MODE is changed the default filters will be activated immediately. Same is true for power ON condition.

19.1.3 **VHF**: Preamplifier   PRE AMP / DC on Antenna OUT   DC AMP
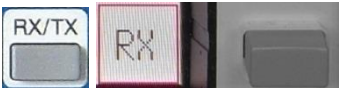
Pushing button RX/TX or softkey RX (TX menu) will call up the RX menu **VHF** with the following options:

RX menu VHF

Preamplifier will be activated; the display will show AMP VHF
(see Page 14, Fig. 17b and Table 10, No. 1);
the softkey will be displayed inverse.

Access to IF-2-Filter menu **VHF** to select a different IF-2 filter
(see next Page).

When activating this function 12 Volt DC are fed to the VHF antenna connector (J1) in order to run remote switches or remotely operated amplifiers through this supply voltage. The current is rated to 1 Amp;
the softkey will be displayed inverse.

Access to TX menu (see Page 63).

Fig. 90

19.1.4 VHF: IF-2 Filter Select

IF-2   Pushing softkey IF-2 (RX menu **VHF**) will call up IF-2-Filter menu **VHF**:

IF-2-Filter menu VHF
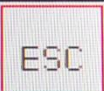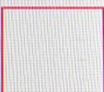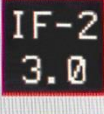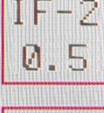
ESC   Return to the RX menu **VHF** (see previous Page).

IF-2 15.0   Select 15.0 kHz IF-2 filter; default filter for AM and FM mode as well as for SSB if filter bandwidth > 3.0 kHz; the softkey will be displayed inverse.

IF-2 3.0   Select 3.0 kHz IF-2 filter; default filter for SSB mode if filter bandwidth ≤ 3.0 kHz; the softkey will be displayed inverse (as shown here).

IF-2 0.5   Select 0.5 kHz IF-2 filter; default filter for CW mode; the softkey will be displayed inverse.

Fig. 91

⚠ If the Noise Blanker (NB) is activated, the 15 kHz IF-2 filter will always be selected.

If MODE is changed the default filters will be activated immediately. Same is true for power-on condition.

19.2   TX Settings

19.2.1 Leveler TX-Audio   LEV

Pushing button RX/TX or softkey TX (RX menu **HF** or **VHF**) provides access to the TX menu, which offers the following functions:

TX menu
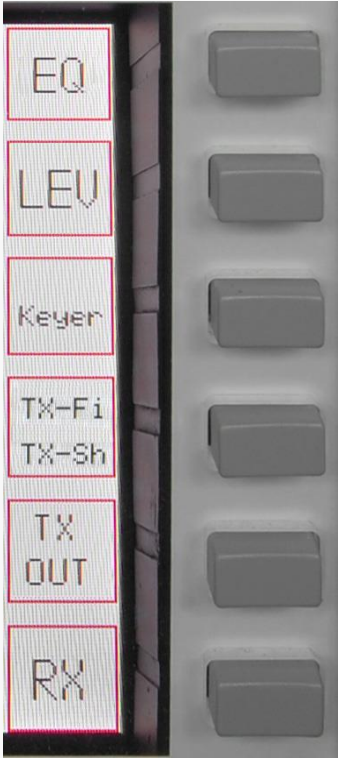
Access to 3 band equalizer for TX (see next Page).

Activating TX Audio Leveler (on/off); the display shows LEV (above S-Meter); the softkey will be displayed inverse.

Access to KEYER menu (see Page 65).

Access to TX filter / TX shift menu (see Page 66).

Access to TX OUT menu (see Page 67).

Access to RX menu HF (Page 59) respectively VHF (Page 61).

Fig. 92

19.2.2 Equalizer Operation TX-Audio EQ

To control the sound of TX audio signals the PT-8000A provides a 3 band equalizer featuring the following frequency bands:

EQ Band 1	EQ Band 2	EQ Band 3
0 ... 500 Hz	500 ... 1500 Hz	1500 ... 3000 Hz

Tab. 17

Fig. 93a

1   2   3
EQU bands

When pushing softkey EQ (on TX menu, see previous page):

- The display will show the EQ graphics in status "Off" in the upper left corner instead of filter adjustments.
  Cursors representing the values of the three bands are set to "0";
  the equalizer is inactive (yet).
- EQUALIZER menu will be called up:

EQUALIZER menu

Fig. 94

Return to TX menu (see previous Page).

Increase gain of selected EQ band in 1dB steps. Maximum gain is +9dB (adjustable only when EQ is activated).

Select EQ band in a cyclic manner (see Table 17 on top; here shown: Band 1).

→ Band 1 → Band 2 → Band 3 →
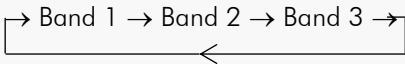
Decrease gain of selected EQ band in 1dB steps. Maximum gain is -9dB (adjustable only when EQ is activated).

Reset all previous settings to 0 dB for all 3 EQ bands (only possible if EQ is activated).

Activating the Equalizer (on/off); the display will show EQ (above S-Meter); the softkey will be displayed inverse.
The frequency band adjustments can be edited.

Fig. 93b

1   2   3
EQU bands

When pushing softkey EQ (on this EQUALIZER menu):

- The equalizer will be activated; the softkey will be displayed inverse; the frequency band adjustments will take effect and can be edited
- The display will show the current EQ settings in the upper left corner.
  The selected band cursor is blue colored; its value in dB for increase/decrease will be displayed next to it.
- The display will show EQ (above S-Meter)

Adjustment of EQ bands is also possible with WIDTH/SHIFT control (as long as the EQUALIZER menu will be displayed <u>and</u> EQ is activated):

- Pushing will select one of the three EQ bands in a cyclic manner.

$$\rightarrow \text{Band 1} \rightarrow \text{Band 2} \rightarrow \text{Band 3} \rightarrow$$
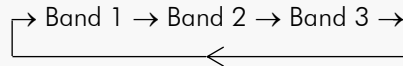
- Turning will adjust the value of increase/decrease.

Settings only will take effect when equalizer has been activated by softkey EQ (EQUALIZER menu, see Figure 94).

The EQ graphics will only be shown as long as the EQUALIZER menu will also be displayed.

19.2.3 Keyer Select
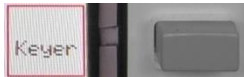
Pushing softkey Keyer (TX menu) will call up the KEYER menu:

KEYER menu

Return to TX menu (see Page 63).

Select one of the following modes of the internal keyer in a cyclic manner:

$$\rightarrow \text{Iambic Mode A} \rightarrow \text{Iambic Mode B} \rightarrow \text{Ultimatic} \rightarrow$$

The respective softkey will be displayed inverse (as shown here).

Select Normal mode of internal keyer;
the softkey will be displayed inverse.

Reverses paddle function to accommodate left-/right hand operation (on/off);
the softkey will be displayed inverse.

Shuts off internal keyer to allow use of external keying device;
the softkey will be displayed inverse.

Fig. 95

See also:

TX-DELAY – Adjust the time for transmit⇨receive switching for CW mode: Page 71

KEY SPEED – Adjust CW keying speed of the internal keyer: Page 71.

19.2.4 TX Filter Select / TX Shift Select

Pushing softkey TX-Fi / TX-Sh (TX menu) will call up the TX-Filter TX-Shift menu:

TX-Filter / TX-Shift menu
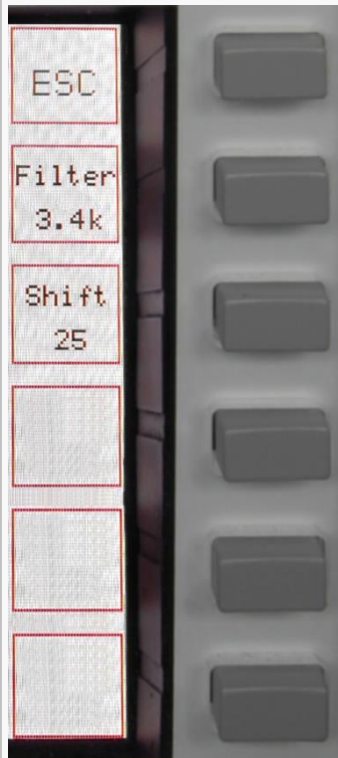
Return to TX menu (see Page 63).

Select TX filter bandwidth; softkey t will be displayed inverse for 4 seconds; along the way turn STEP-VFO knob to select new value; after a period of 4 seconds without any activity or when pushing the knob selecting mode will be terminated.

Select TX passband shifting: The Softkey will be displayed inverse for 4 seconds; along the way turn STEP-VFO knob to select new value; after a period of 4 seconds without any activity or when pushing the knob selecting mode will be terminated.

Fig. 96

Turning STEP-VFO/MEM/CH knob will allow the following:

Filter – Select TX filter bandwidth.

Tuning range:	2.2 ... 3.4 kHz
Increments:	0.1 kHz

Shift – Select TX passband shifting.

Tuning range:	0 ... 300 Hz
Increments:	25 Hz

Pushing knob STEP-VFO/MEM/CH or a period of 4 seconds without any activity will terminate selecting mode.

19.2.5 TX Signal Settings

Pushing softkey TX-OUT (TX menu) will call up the TX OUT menu:

TX OUT menu

Return to TX menu (see Page 63)

TX signal will be routed to the internal power amplifier; the display will show the 10 W or 250/100 W (HF/VHF) Power Meter Scale (see Page 70 , Fig. 104b/c/d); the softkey will be displayed inverse (as shown here) <default>.

Additional delay of the RF signal in relation to the PTT signal between 0 ms and 50 ms with 5 ms steps; pushing Delay (the softkey will be displayed inverse) and turn STEP-VFO knob; input mode will deactivate after 5 seconds of inactivity.

Activation "Wait for External Device": The PT-8000A sends out no RF signal unless an enable signal (e.g. from an external PA) is present at J17 pin 9.

TX signal will be routed to socket TX ext. +20dBm (J14; BNC; rear panel) to drive external equipment (power amplifier, transverter). The internal power amplifier will be shut down; the display will show the 100mW Power Meter Scale (see Page 70 ; Fig. 104e); the softkey will be displayed inverse.

Adjustment the Impedance (Microphone socket Pin 1/5+7) to low-ohmic (600 Ω @ 1 kHz (Hilberling T9); the Softkey will be displayed inverse [as shown here] <default<) and high-ohmic microphones (up to 50 kΩ @ 1 kHz).

Fig. 97

20   TRANSMITTER CONTROLS

Various controls for transmitter settings are located on the front panel as depicted.

Transmitting (TX) is only possible when MAIN-RX is the *active* one and SUB-RX is working *in the background*.

20.1   Antenna Tuner   ANT-TUNER

20.1.1 Activate   TUNER

Fig. 98

For protecting the power amplifier the output power will be reduced if SWR is greater than 1.5. Up to SWR close to 2.0 the internal antenna tuner enables to increase the antenna adjustment (see also Page 3)

Pushing TUNER button will activate the antenna tuner.

- TUNER-LED will be on.

20.1.2 Start Re-Tuning Cycle   START

Fig. 99

Pushing button START will start the detection and storage for optimal adjustment of the antenna tuner at the current frequency. The output power is reduced to driver power.
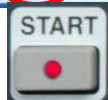
- START-LED will be on.

The antenna tuner starts its automatic alignment and will terminate automatically.

- START-LED will be off.

20.1.3 Permanent Transmit Operation   TX / ON

Fig. 100a

Pushing button TX/ON will switch PTT permanently.

E.g. when antenna tuner has been adjusted (20.1.1 and 20.1.2) the output power can be checked.

Fig. 100b

Pushing TX/ON will activate TX operation.

- TX-LED will be on.

Fig. 100c

Pushing TX/ON again will terminate TX operation.

- MAIN-RX LED will be on.

20.2   ZERO-BEAT

Push and hold knob ZERO-BEAT will activate a 440 Hz sinus tone in RX and TX mode, in FM mode there is a 1750 Hz sinus tone.

Fig. 101

In RX mode the tone will be heard in both RX. The volume might be adjusted by turning the knob.

In TX mode the tone will be transmitted with microphone signal.

Given both transmitting and receiving stations can activate a 440 Hz tone, an interference might be heard in case both station vary in RX and/or TX frequencies.

20.3   Microphone Sensitivity   MIC (Gain)

Turning knob MIC (Gain) will adjust microphone sensitivity.

When operating by microphone Hilberling T9 and in normal mode of speaking the knob should be adjusted between position clock 9 and clock 12.

Fig. 102

The correct modulation can be monitored on the ALC display (see Page 58, SSB mode only). If the yellow or red range is shown, the microphone sensitivity should be reduced.

> For preadjustment of microphone sensitivity see Page 17 , Fig. 20.

> ALC display is only available in USB/LSB mode.

Pushing the knob will (de-)activate VOX functions (see next Page).

20.4   Compression TX Audio   PROC

Pushing knob PROC will turn on and off microphone processor.

Turning the knob will increase the processor level (compression level).

Fig. 103

Adjust not to exceed COMP limits shown on the COMP-meter (s. P. 58).

> If PROC is active PROC will be displayed (above S-Meter).

> PROC is only available in USB/LSB mode.

20.5   Transmit Power Control   TX-PWR

Fig. 104a

Pushing the TX-PWR control will toggle the transmitter between low- (driver power 10 Watt) and high power (PA 200 Watt HF / 100 Watt VHF).

Turning the knob allows to adjust the power continuously between 10 mW and 10 Watt respectively 1 Watt and 200/100 Watt (HF/VHF).
Power is displayed in W_{PEP} .

The Power Meter is accordingly scaled:

Driver Power 10 W

Fig. 104b

PA Power 200 W (HF)

Fig. 104c

PA Power 100 W (VHF)

Fig. 104d

If the internal PA is deactivated for use an external one, (TX EXT is selected on TX OUT menu, Page 67), the scale below is always shown:

TX EXT Power 100 mW
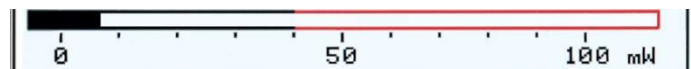
Fig. 104e

20.6   VOX Operation

Fig. 105

Pushing the knob MIC will activate VOX („**V**oice **O**perated T**X**") operation.

Voice operated transmission enables switching PTT without pushing TX button on microphone T9 nor button TX/ON.

- To the left of the display, above operation mode indicator, VOX will be displayed.

Turning the knob MIC will affect the microphone gain (MIC-Gain; see previous Page).

20.6.1 VOX Threshold

Fig. 106

If VOX has been turned on this control adjusts the trigger level for VOX activation. Adjust sensitivity to your convenience and speech habits.

20.6.2 ANTI-TRIP VOX

Fig. 107

Signals from the speaker(s) might trigger or trip the VOX unintentionally. VOX ANTI-TRIP will counteract this. Adjust to get both reliable action and anti-trip of VOX circuit.

20.6.3 Hold Time VOX   DELAY

Fig. 108

DELAY of VOX circuit allows adjusting the hold time of VOX activation hence to get smooth VOX operation and to counteract any VOX switching between fluently spoken voice.

20.7   Monitoring TX Signal   MONITOR

Fig. 109

Turning the MONITOR control will adjust the volume of the audio to monitor the transmission of PT-8000A (avoiding acoustic feedback). Setting control fully counter-clockwise for terminate MONITOR function.

20.8   Fall Time TX on CW   TX-DELAY

Fig. 110

Turning TX-DELAY will affect the time for transmit-receive switching (turn-around time) on CW mode. Setting TX-Delay fully counter-clockwise ensures the shortest possible T/R turn-around – called BK (break in).

Turning TX-DELAY clockwise will increase the turn-around which allows alignment to individual CW habits.

TX⇨RX turn-around time: about 15 ms … 2 s.

20.9   Keying Speed CW   KEY SPEED

Fig. 111

Turning KEY SPEED controls the speed of the internal keyer (Normal mode / Iambic keyer mode A and B / Ultimatic mode; see Page 65).

The CW weight remains constant.

CW keying speed: 5 … 60 WPM (words per minute).

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Appendix

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A1   IF-MONITOR SOFTWARE

A1.1   Introduction

This appendix gives a description how to install and setup the Hilberling IF-Monitor software on your PC. Using this software you can monitor a frequency band with a maximum range of 50 kHz (max. 25 kHz both left and right to the PT-8000A center frequency).

Please note: Installation and use of the IF-Monitor software needs basic knowledge in handling a Windows® computer. If you are unsure to install and setup of new programs please look for help in your personal environment or get in touch directly to your dealer or Hilberling GmbH.

A1.2   Hardware Requirements

The IF-Monitor software will work only with a PC or laptop (the following only refers to PC) with Microsoft Windows® operating system. Processing audio data sent by PT-8000A to the PC requires an audio input (sound card) with a 192 kHz sample rate and 24 bit resolution.

All in all is required:

1. Windows computer (administrator rights required!) featuring:
   - Windows XP/Vista/7/8.1/10®
   - 3 MB free disk space memory
   - Audio input (internal or external sound card) with a 192 kHz sample rate / 24 bit resolution
2. IF-Monitor program (will be installed on PC)
3. Audio connection cable stereo 3.5 mm phone jack

A1.3   Setup Software

The setup software is delivered with the PT-8000A transceiver on CD-ROM. It will install the Hilberling IF-Monitor program on your PC.

Load the CD-ROM into the CD/DVD/BD drive.

Say on your PC this drive is allocated to the character D: the setup file can be found in the following directory:

D:\Software

Alternatively, the setup file first can be copied to the Windows desktop or into any other directory on the PCs hard disk drive, e.g.:

C:\Downloads

A1.4   Installation of the IF Monitor Program

To start the installation double-click the file *setup_PT8000_IFMonitor.exe.*

On CD-ROM it can be found in the directory *Software*\\.

If the file was first copied to the Windows desktop or to another directory on the hard disk, e. g. to *C:\Downloads*, double-click it there.

- The IF-Monitor program will be installed by default into the standard directory depending on current Windows version.

- A program linkage (*PT8000_IF_Monitor*) will be added by default to the Windows start menu folder *Start → Programs → PT8000_IF_Monitor*.

- Optional a program linkage can be created on the Windows desktop.

A1.5 Connect PT-8000A to PC by Audio Cable

For transmission of the audio data connect audio input of the PC (*Line IN*, 3.5 mm stereo phone jack) to the PT-8000A (socket J15 *ext. SPKR **add.***, 3.5 mm stereo phone jack, see Operating Manual page 5).

A1.6 Start and set up the Program

The IF-Monitor program will be started from the Windows start menu:

Start → Programs → PT8000_IF_Monitor → PT8000_IF_Monitor

The program window will be opened to full screen size and can be minimized down to a 800 x 600 pixel window.
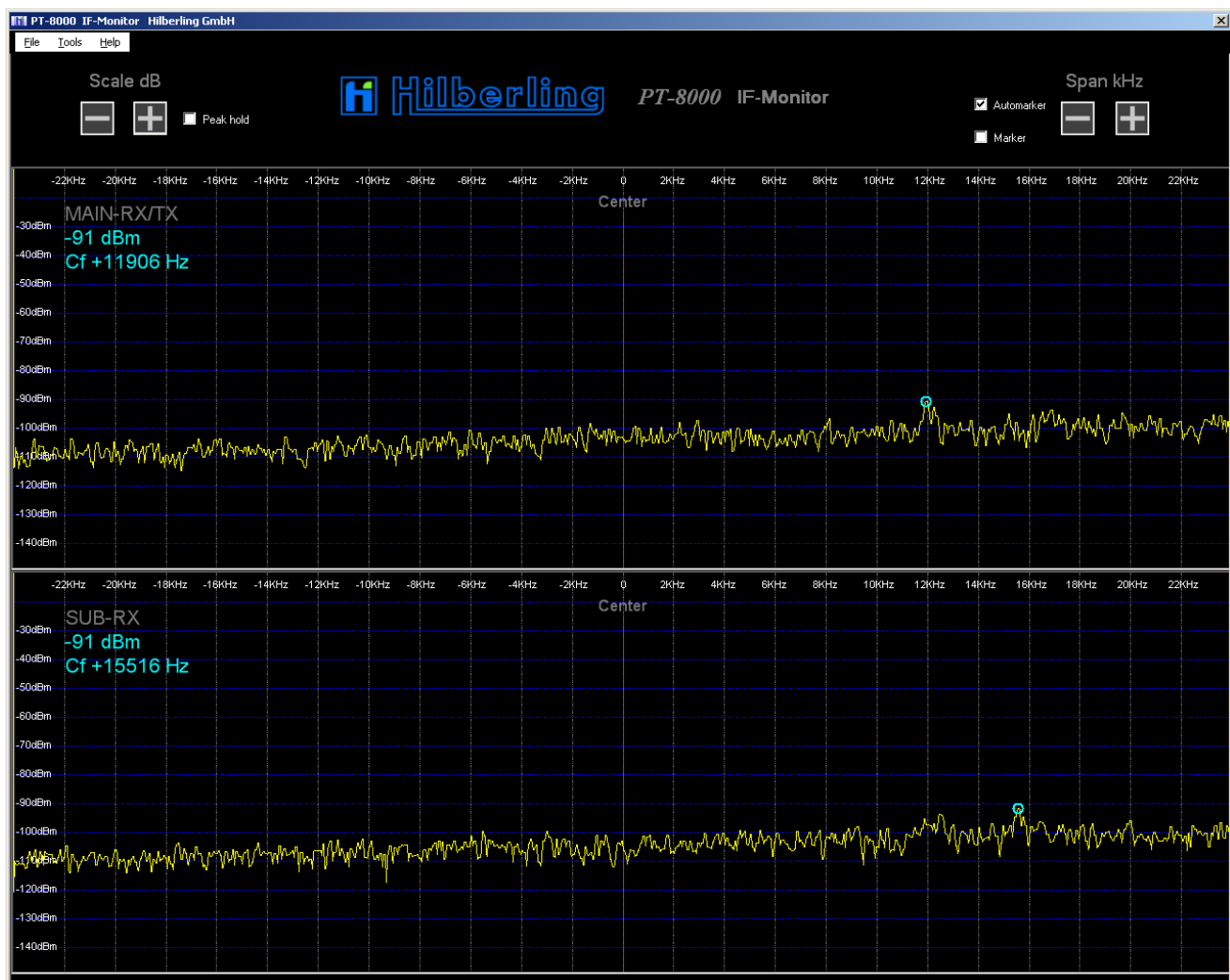
Fig. A1- 2

A1.6.1   Program Window

The program window is structured in three areas.

In the upper area (I) options are accessible for *Automarker*, *Marker* and *Peak Hold* (see chapter A1.6.2 and A1.6.3), as well as for scaling of signal level and panorama width (see chapter A1.6.6); below, the areas are arranged for the panorama display of *MAIN-RX/TX* (II) and SUB-RX (III).
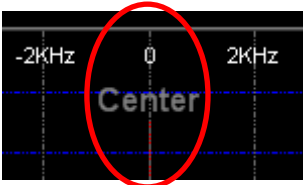
Fig. A1- 3

A vertical red line in the middle of both display areas depicts the center frequency of the panorama display and therefore it represents the current frequency of the PT-8000A. Right of center line is shown the frequency range above the PT-8000A frequency, left of it appropriate the frequency range below.

A1.6.2   Automarker and Marker

Automarker

The *Automarker* (light blue circular ring) indicates the strongest signal within the current panorama width, for each MAIN- and SUB-RX.

The strength of this signal and the frequency shifting against center frequency are displayed in the **upper left corner** of the relative display area using a light blue font (Fig. A1- 4b).
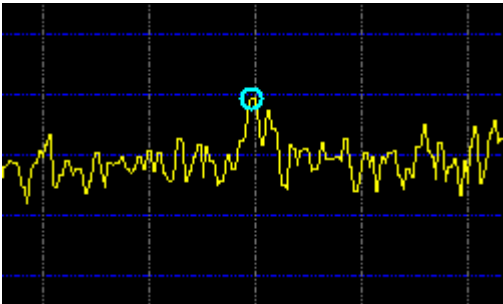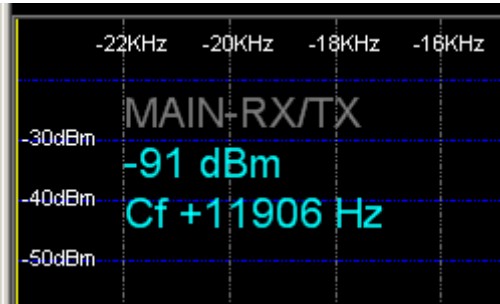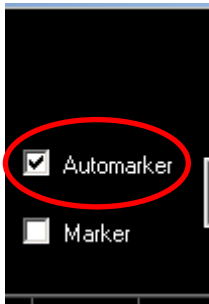
Fig. A1- 4a   **4b**   **4c**

Automarker is activated each time the program was started and can be de-activated by clicking ☑ Automarker (Fig. A1- 4c).

Marker

The *Marker* (light green circular ring) can be used for indication of strength and frequency of any desired signal in the panorama.

The strength of this signal and the frequency shifting against center frequency are displayed in the **upper right corner** of the relative display area using a light green font (Fig. A1- 5b).
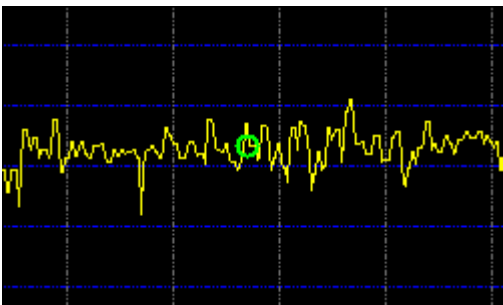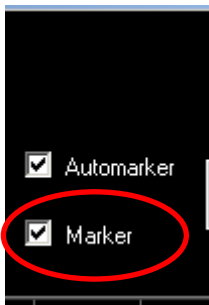
Fig. A1- 5a   **5b**   **5c**

Marker is deactivated each time the program was started and can be activated by clicking ☐ Marker (Fig. A1- 5c).

When *Marker* is activated click into the relative display area (MAIN- (**II**) or SUB-RX (**III**)) on a frequency shift (-line) of your choice.

A1.6.3 Peak Hold

The function *Peak Hold* stores the maximum value of each frequency in the panorama over a period of three seconds and displays them as a green curve. At the end of this period the curve will be deleted and the procedure starts from the beginning.
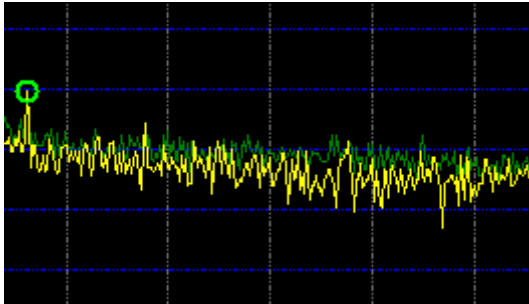
Peak curve (green)

Current curve (yellow)
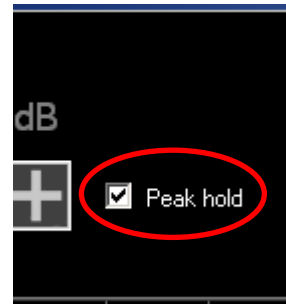
Fig. A1- 6a

6b

Peak hold is deactivated each time the program was started and can be activated by clicking ☐ Peak hold (Fig. A1- 6b).

A1.6.4 Sample-Rate and Buffer Setup

When the program is new installed it is recommended to check the settings for sample rate and buffer.

Click in the menu *Tools* the entry *Settings* (Fig. A1- 7).

Fig. A1- 7
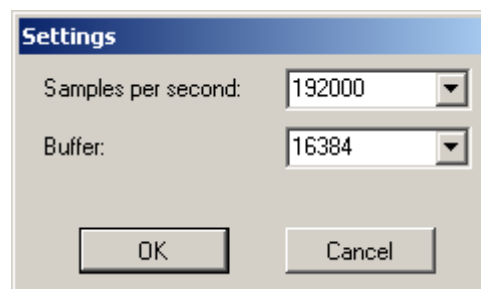
Fig. A1- 8

The window *Settings* will be opened (Fig. A1- 8).

Samples per second: This should be 192000 (required sample rate). If not, select this value from the drop down list.

Buffer: Interval width of frequency analysis. You may experiment with the given values of buffer size.

Optimal depiction of the panorama curves is the goal.

For every new value click *OK* and check the result.

A1.6.5   Signal Level Adjustment

Because of variation in audio settings of each single computer system (PC) it is necessary to synchronize the signal level display of IF-Monitor software and PT-8000A.

At first please check the following notes:

1. The PT-8000A is on, receives a constant signal and displays the signal strength with the dBm scale (see chapter 18 / page 57)

2. PT-8000A and PC are proper connected according to A1.5 (page A1- 2)

3. The PC is prepared for audio signal recording (192 kHz)

PC Adjustment

If note 1 and 2 are ok, but the PT-8000A receiving signal cannot be seen in the panorama display, check note 3.

Then proceed as follows:
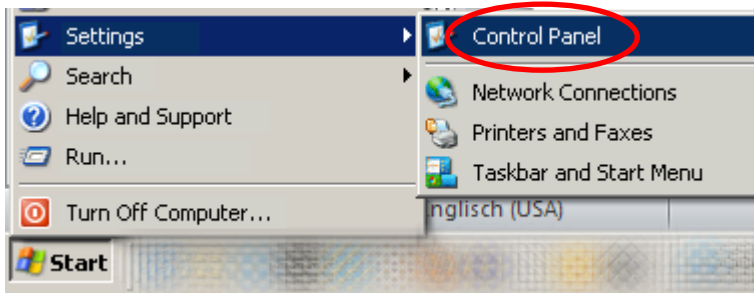
Fig. A1- 9

Click in the Windows start menu
Start → Settings → Control Panel.

- The window *Control Panel* will be opened (Fig. A1- 10).

Fig. A1- 10

Double-click the icon
Sounds and Audio Devices.

- The window *Sounds and Audio Devices Properties* will be opened (Fig. A1- 11).

Fig. A1- 11
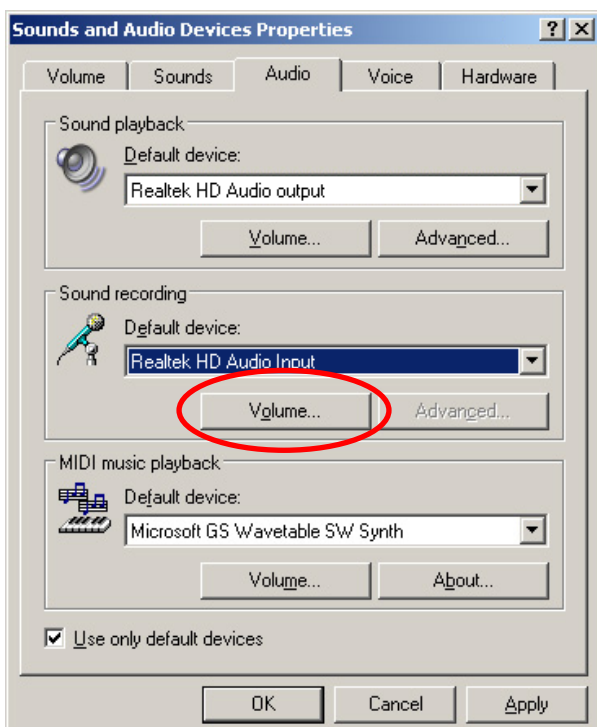
Click under *Audio* tab in the area *Sound recording* the button
Volume...

- The *Recording Control* panel will be opened (Fig. A1- 12).

Fig. A1- 12
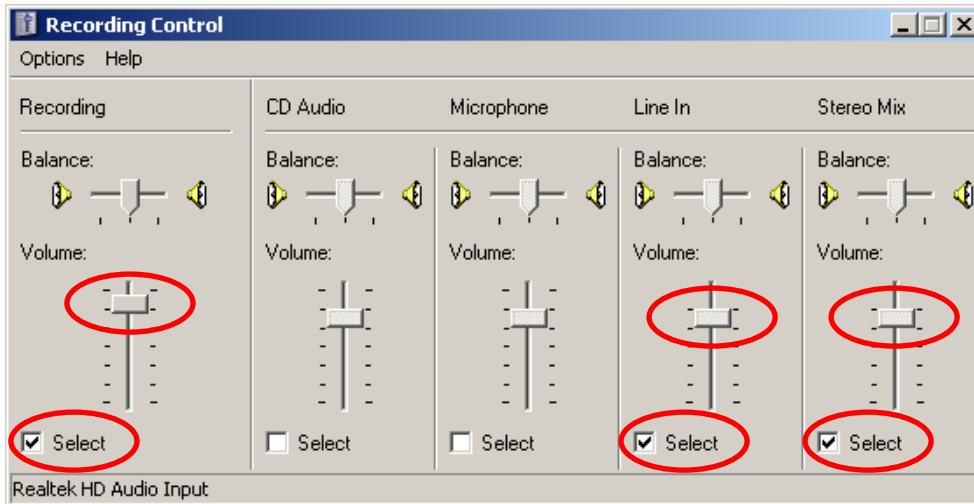
Make sure that sliders for *Recording, Line In* and *Stereo Mix* are located in upper position and the allocated *Select* boxes are checked.

Now the PT-8000A signal should be seen on IF-Monitor.

Fig. A1- 13
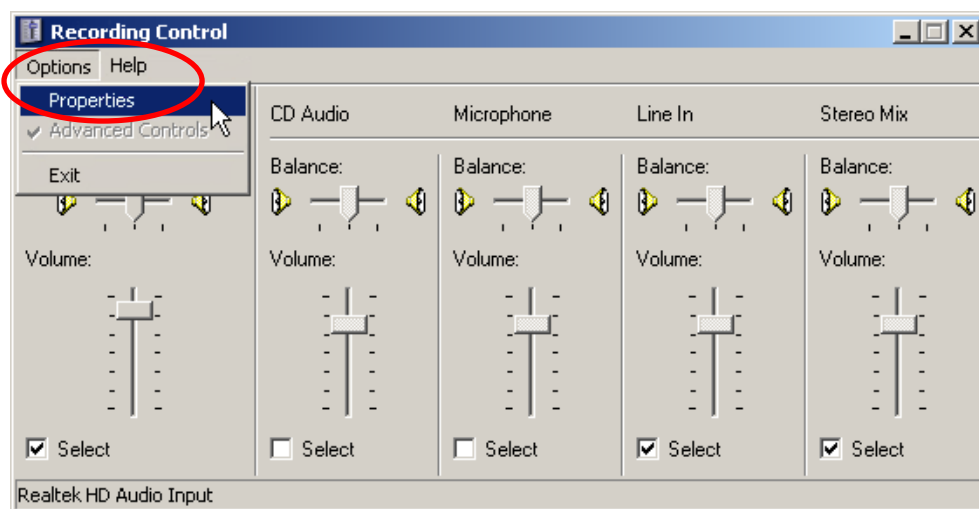
If not all controls are shown which should be verified, open the menu *Options* and click *Properties*.

- The window *Properties* will be opened (Fig. A1- 14).

Fig. A1- 14
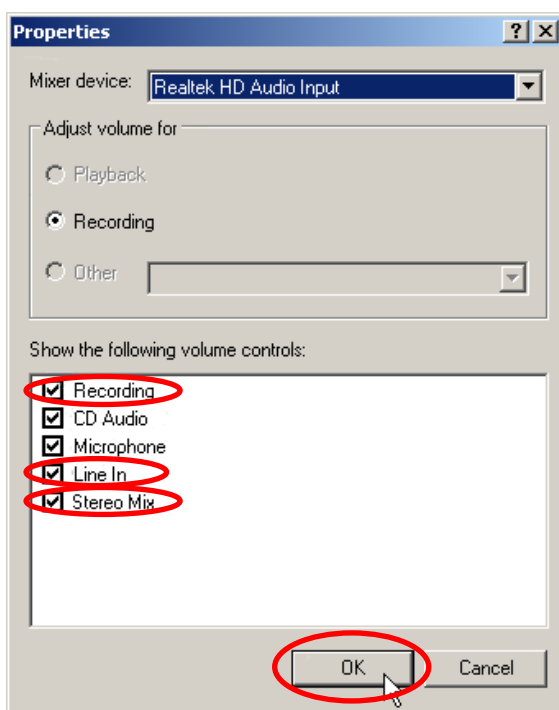
Make sure that the boxes of *Recording*, *Line In* and *Stereo Mix* are checked at least.

Click *OK*

Then proceed as described in Fig. A1- 12.

Close all opened windows of audio settings.
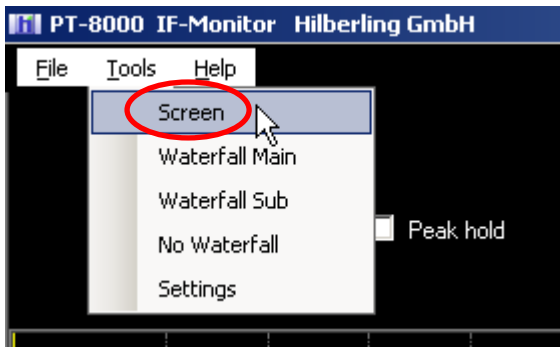
Fig. A1- 15

In the IF-Monitor window open the menu
> *Tools*

and click entry
> *Screen* (Fig. A1- 15).

- The window *Screen* will be opened
  (Fig. A1- 16).
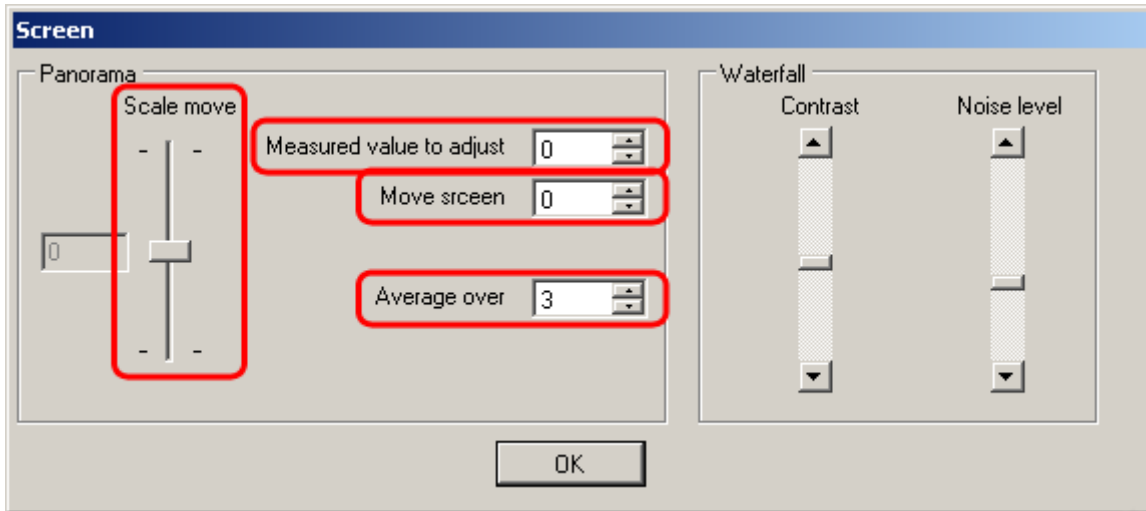
Fig. A1- 16

This window offers to you three options of settings to adjust the display of the signal level.

Proceed as follows:

| **Scale move** |

1. Use slider *Scale move* to shift dBm scale vertically, so that Automarkers displayed Peak value is close to the dBm value shown on the PT-8000A display.
   (Range ±50 dBm in 10 dBm steps, default value is 0)

| **Measured value to adjust** |

2. Use up and down arrows or input value directly to shift the curve up and down, so that Automarkers displayed Peak value is equal to value shown on the PT-8000A display.
   (Range ±20 dBm in 1 dBm steps, default value is 0)

| **Move screen** |

3. If the curve exceeds the display range, both dBm scale and curve jointly can be moved vertically by using up and down arrows or direct value input.
   (Range ±40 dBm in 1 dBm steps, default value is 0)

| **Average over** |

This parameter allows to control the smoothing of curve. The number of measured points which are the source of an average value can be modified by using up and down arrows or direct value input.
(Range 0 ... 20 increment 1, default value is 3)

Click *OK* to terminate the adjustment.

Made changes are stored and will be used when program has been started the next time.

A1.6.6   Signal Level and Panorama Width Scaling

The two display areas for MAIN and SUB-RX can be scaled both vertically (signal level / dBm) and horizontally (panorama width / kHz).

Signal Level Scaling
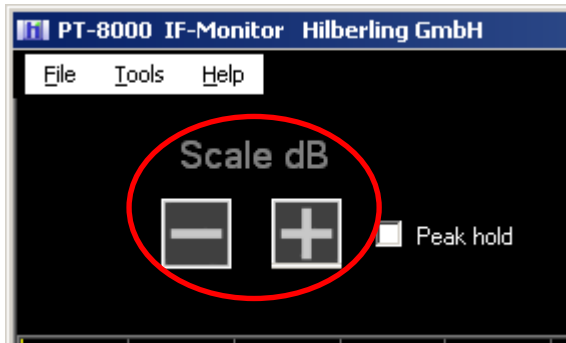
For scaling the signal level click the buttons ⊟ and ⊞ below *Scale dB* top left of the program window.

Fig. A1- 17

The following 6 scales are adjustable:

Width [dBm]	Range from ... to ... [dBm]
140	-10 ... -150
105	-45 ... -150
70	-80 ... -150
52.5	-97.5 ... -150
42	-108 ... -150
35	-115 ... -150

Table A1- 1

Default width is 140 dBm respectively -10 ... -150 dBm.

⚠️ In case other ranges of scale are displayed as shown in the right column, then at least one of the two values for *Scale move* and *Move screen* in the dialog window *Screen* is unequal to 0 (see Fig. A1- 16).

Panorama Width Scaling
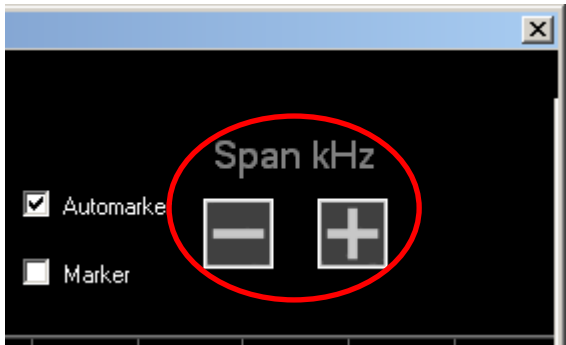
For scaling the panorama width click the buttons ⊟ and ⊞ below *Span kHz* top right of the program window.

Fig. A1- 18

There are panorama widths available of ± 25 kHz to ± 3 kHz with 1 kHz increments.

Default width is ±25 kHz.

ℹ️ Changes done to *Scale dB* and *Span kHz* are stored and will be used on program restart.

A1.6.7   Waterfall Chart

For each RX a waterfall chart can be shown in addition to its panorama display. The panorama display for the other RX will be omitted.
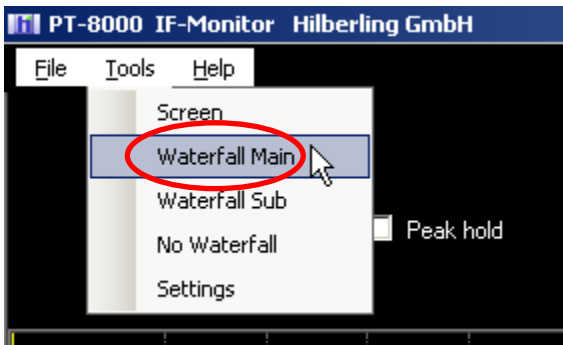
Fig. A1- 19

To view the waterfall chart of MAIN RX open the menu
Tools
and click entry
Waterfall Main.

The waterfall chart will be displayed instead of the panorama display of SUB-RX in the lower area (III) of the program window. It will begin to grow from the top straight down to the maximum display range of about 35 seconds.
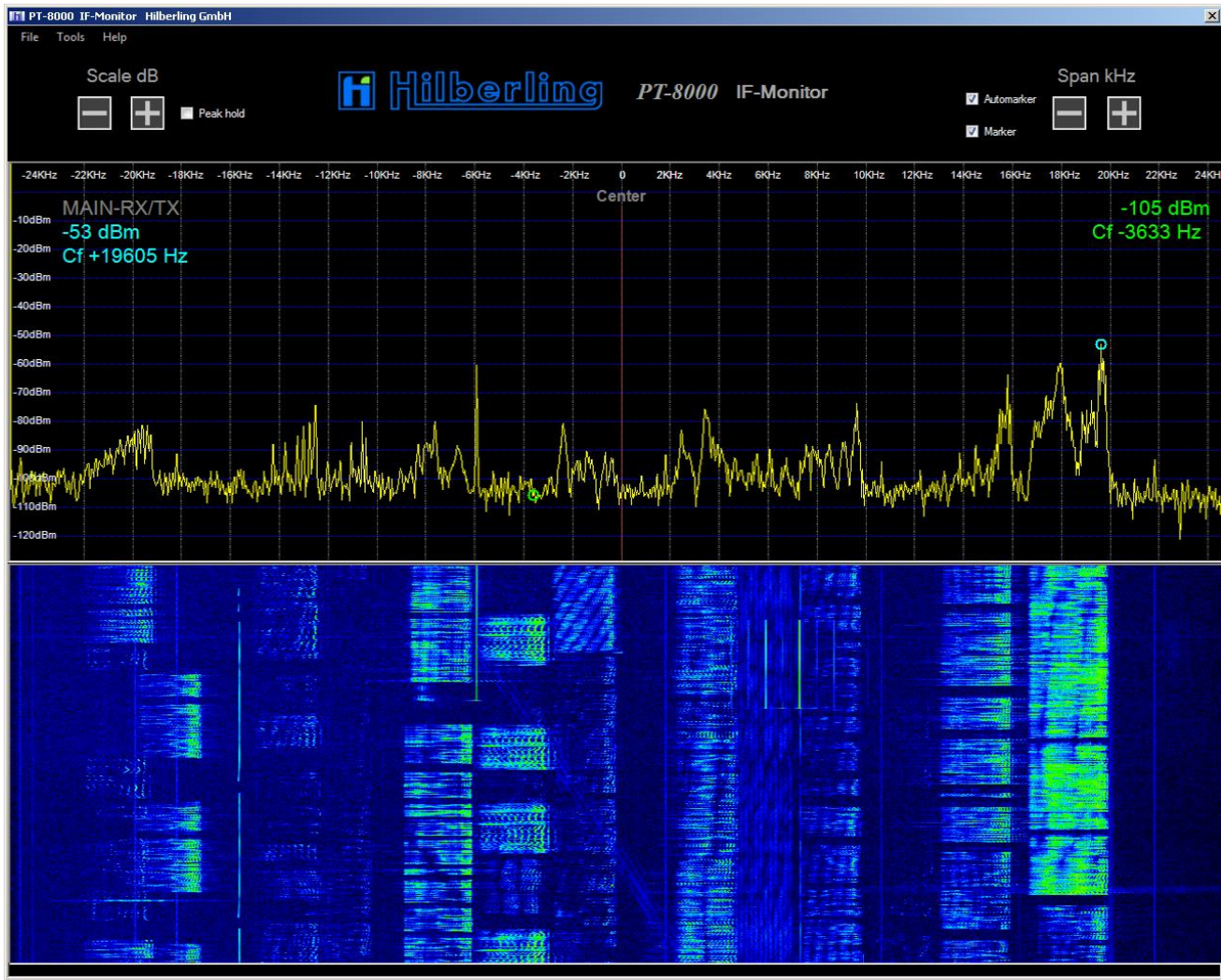
Fig. A1- 20
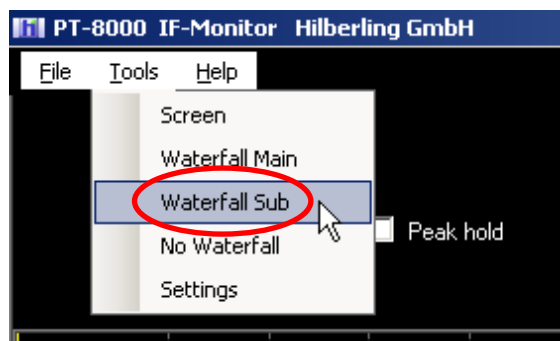
Fig. A1- 21

To view the waterfall chart for the SUB RX open the menu
    Tools
and click entry
    Waterfall Sub.

Now the frequency panorama of the SUB-RX will be displayed in the middle area (II), the corresponding waterfall chart in the lower area (III).
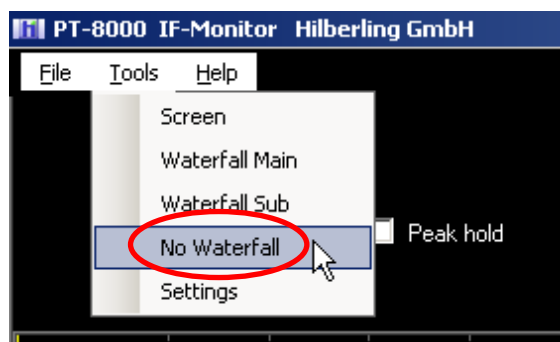
Fig. A1- 22

To stop the waterfall display, open the menu
    Tools
and click entry
    No Waterfall.

Now both panorama displays of MAIN- and SUB-RX will be displayed in the areas II and III of the program window.

Color Display Adjustment

To adjust the panorama display to make out useful signals and noise by different colors, proceed as follows:
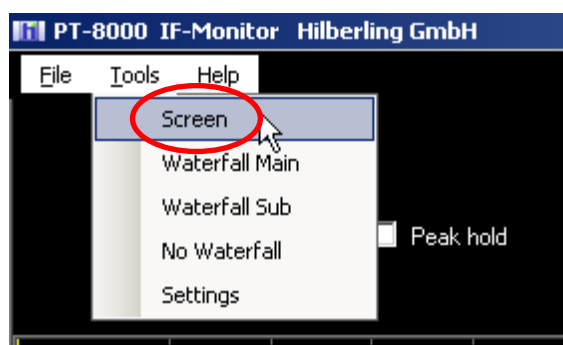
Fig. A1- 23

Open the menu
    Tools
and click entry
    Screen

- The window *Screen* will be opened (Fig. A1- 24)
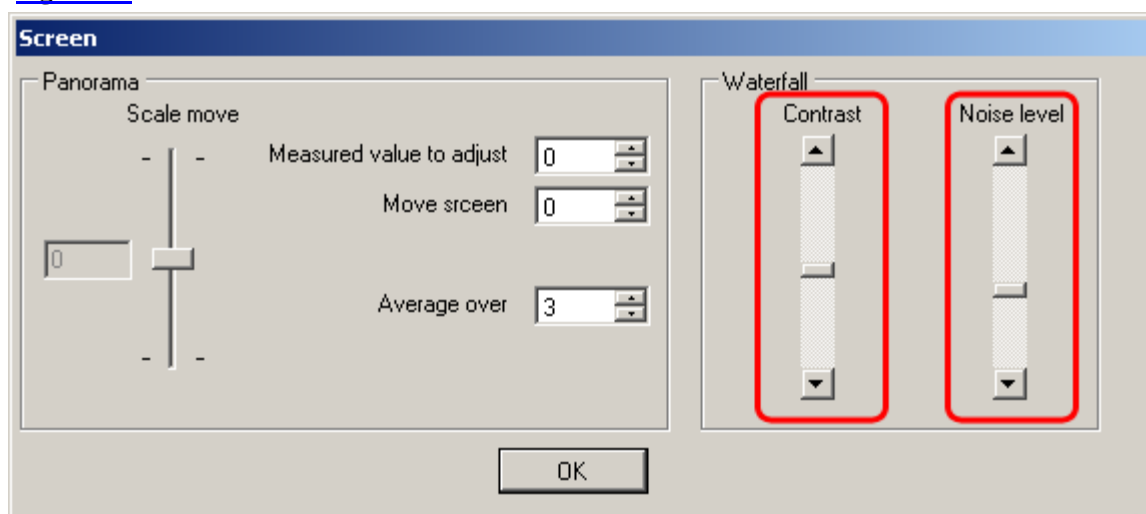
Fig. A1- 24

Vary the settings of the sliders *Waterfall contrast* and *Noise level*, until it reaches a good representation (useful signal light, noise dark).

A2   FIRMWARE UPDATE AND UPDATE SOFTWARE

A2.1   Preliminary Note

This appendix describes how to update the operation software of your PT-8000A transceiver (= firmware update).

Please note: Update of the PT-8000A operation software needs basic knowledge in handling a Windows® computer. If you are unsure to install and set-up programs on your computer please look for help in your personal environment or get in touch directly to your dealer or Hilberling GmbH.

A2.2   Introduction

The PT-8000A is controlled by 5 microprocessors. Therefore, a plurality of functions is defined by software. This has clear advantages: The insertion of new features and changes in performances are possible as well as the realization of special needs, especially for commercial applications. The update is done with a PC / laptop (hereafter referred only to the PC) running the operating system Microsoft Windows®.

A2.3   Requirements and Procedure

To update the PT-8000A operation programs (= firmware) are required:

1. Windows computer (Administrator rights are required!) featuring:
   - Windows XP/Vista/7/8.1/10®
   - 14 MB free memory space on hard disk drive
   - USB connector
2. Update program (will be installed on PC).
3. PT-8000A operation program (firmware) in the latest version (will be transferred by the update program to the PT-8000A); updatable is the firmware of the following microprocessors (CPUs):
   - MAIN-CPU
   - RX-CPU
   - ANT-Tuner-CPU
4. USB data cable (USB-A ⇔ USB-B, see Operating Manual Page 10 / Fig. 12)

For the entire update procedure we recommend the following execution, which is also reflected in the following chapter sequence:

Preparation:
   A2.4   Download the operation program(s) / the update program from the Internet
   A2.5   Install the update program
   A2.6   Connect the PT-8000A to the PC by USB data cable

Execution:
   A2.7   Start and setup the update program
   A2.8   Get PT-8000A ready to update
   A2.9   Update of the MAIN-CPU   or
   A2.10 Update of the RX- and the ANT-Tuner-CPU

A2.4   Setup Software and Firmware

The setup software is delivered with the PT-8000A transceiver on CD-ROM. It will install the Hilberling update program on your PC.

Load the CD-ROM into the CD/DVD/BD drive.

Say on your PC this drive is allocated to the character D: the setup file can be found in the following directory:

D:\Software

Alternatively, the setup file first can be copied to the Windows desktop or into any other directory on the PCs hard disk drive, e.g.:

C:\Downloads

Do the same with the new PT-8000A firmware. If you get it on CD-ROM it is located in the directory

D:\Firmware

If the firmware exists as a compressed archive file (ZIP file) it must be unpacked before further use.

A2.5   Install Update Program on PC

To start the installation double-click the file *setup_PT8000_Update.exe.*

On CD-ROM it can be found in the directory *\Software*.

If the file was first copied to the Windows desktop or to another directory on the hard disk, e. g. to *C:\Downloads*, double-click it there.

- The update program will be installed by default into the standard directory depending on current Windows version.

- A program linkage (*PT8000_Update*) will be added by default to the Windows start menu folder *Start → Programs → PT8000_Update*.

- Optional a program linkage can be created on the Windows desktop.

A2.6   Connect PT-8000A to PC by USB Data Cable

To update the software (see the following chapter A2.7) connect the PC (any USB connector; Type A) and the PT-8000A (connector J22, Type B, see Operating Manual Page 5) using the included USB data cable.

A2.7   Start and set up the Update Program

The update program will be started from the Windows Start menu:

Start → *Programs* → *PT8000 Update* → *Start PT8000 Update*

Fig. A2- 2

First the program checks whether the PC's internal serial port COM 1 is available and not already in use elsewhere.

If COM 1 is available the update program will be connected automatically and a message box will be displayed (Fig. A2- 2).

Click *OK* to close the message box; the program's main window will be opened (⇨ continue with chapter *A2.7.2 Select Firmware*).

Fig. A2- 3

If COM1 is currently not available on the PC because another application already has access to it, an appropriate error message will be displayed (Fig. A2- 3).

Now it is necessary to set the COM port manually (see the following chapter *A2.7.1*).

A2.7.1   Manual COM Port Setting
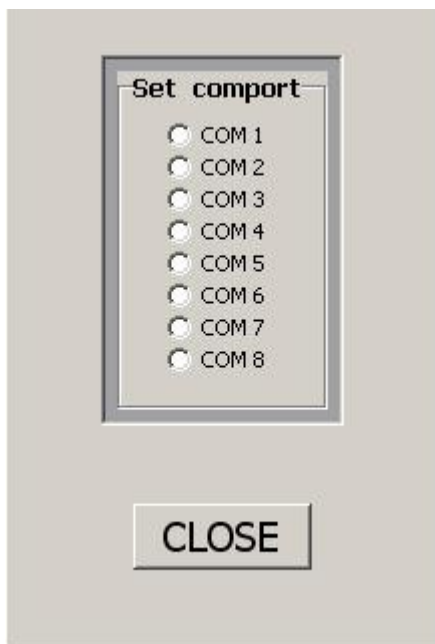
Fig. A2- 4

After clicking *OK* in the error message box (Fig. A2- 3), the *Set COM port* window (Fig. A2- 4) will be opened to select a different COM port (in the background the main program window already will be displayed).

It is advisable now to proceed in ascending order, i.e. next, select COM port 2 by clicking *COM 2*.

If there appears a message box similar to Fig. A2- 2, then COM Port 2 is connected. Click *OK* to close both this box and the Set COM port window (⇨ continue with chapter *A2.7.2 Select Firmware*).

However, if there appears a message box similar to Fig. A2- 3 (error message), then next, select COM port 3, etc.

If no unconnected COM port can be found, close the Set COM port window (Fig. A2- 4) by clicking *Close*.

Fig. A2- 5

The program's main window will open (Fig. A2- 7). The large button in the middle of the main window labeled *NO COM PORT* (Fig. A2- 5) indicates the missing link.

Fig. A2- 6

In this case stop the update program (click *Exit*) and all other applications running on the PC.

Then restart the update program and try again as described above to get a COM port connection.

A2.7.2 Select Firmware
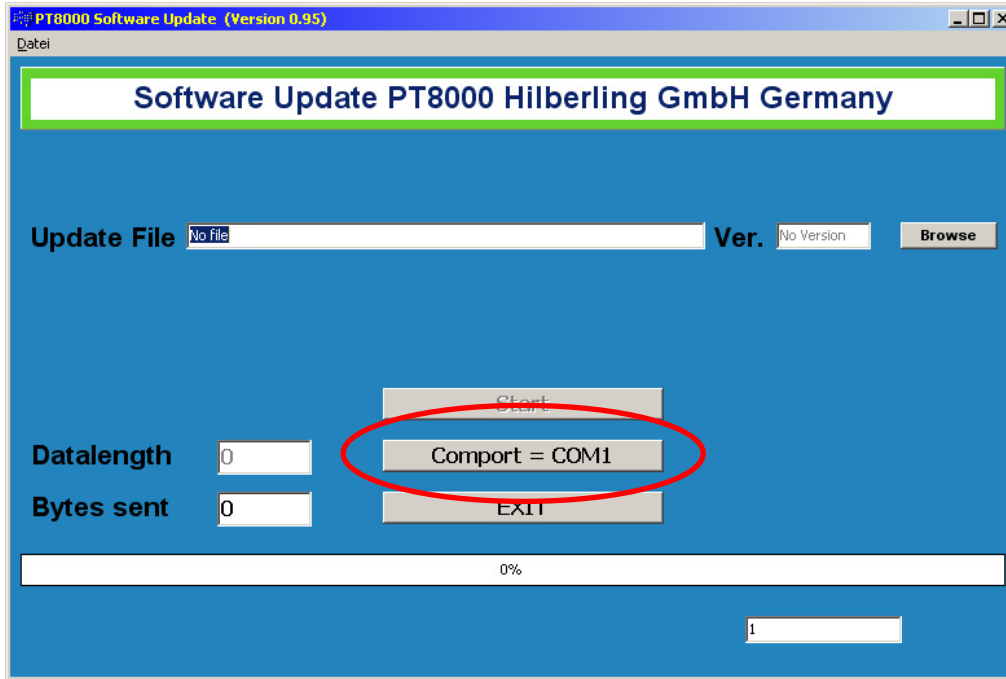
If COM port 1
(or another port) is
available, the program's
main window will open
with a corresponding
entry in the large
middle button. (If a
different COM port is to
be used, click the
button).

Fig. A2- 7

The entry *No file* in the field *Update File* indicates that no operation program has been
selected yet:

Fig. A2- 8

Use the *Browse* button to navigate to the directory where you have stored the new
operation program(s) (firmware) received from Hilberling GmbH, e.g. *C:\Downloads*.
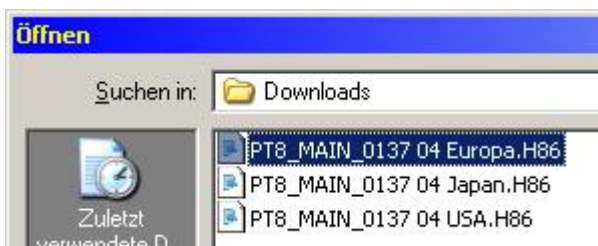
Select from the dialog box *Open* the new operation program
(in this example, the operation program for the MAIN-CPU /
Europe in the *Downloads* directory) and then click *Open*.

Fig. A2- 9

Now the selected new operation program will be displayed in the field *Update File*, the
version number in the field *Ver.*:
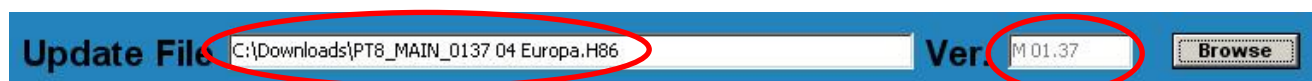
Fig. A2- 10

The field *Data Length* displays the file size in bytes of the operation program.

Fig. A2- 11

Fig. A2- 12

The *Start* button is now set to active (black font) and thus the update program is ready for program transfer
(⇨ continue with chapter *A2.8 Get PT-8000A ready to update*).

No operation program

If in the *Open* dialog box no program will be selected (by clicking *Cancel*), the following message will be displayed:

Fig. A2- 13

Fig. A2- 14

In this case the *Start* button remains inactive (grey font).

Terminate update program

Fig. A2- 15

Using the *Exit* button the update program may be terminated at any time.

Each PT-8000A CPU is updated separately. The filename gives a hint to the CPU, as well as the version number:

CPU	File Name	Version
MAIN CPU	PT8_MAIN_0137 04 Europa.H86	M 01.37 04
RX CPU	PT8_RX_0118.hex	R 01.18
ANT-Tuner CPU	HFKoppler_V112.hex	K 01.12

Tab. A2- 1

A2.8   Get PT-8000A ready to update

Once the PC is ready for update, now the PT-8000A needs to be set to the update standby mode.

1. Pushing MENU button located in the cluster DISPLAY:
    * The MENU menu will be displayed (see Manual Page 53).

2. Pushing Soft softkey:
    * The SOFTWARE menu will be called up (Fig. A2- 16).
    * An overview of the currently loaded software versions will be shown on display (Fig. A2- 17).

SOFTWARE menu

Return to MENU menu (see Manual Page 53).

Select MAIN-CPU for Update, see A2.9.

Select RX-CPU for Update, see A2.10.

Select ANT-Tuner-CPU for Update, see A2.10.

Fig. A2- 16

The screen *Software Version PT-8000A* with a list of the currently loaded software versions will be shown on the main display area.

An update of the DISPLAY software is currently not required.
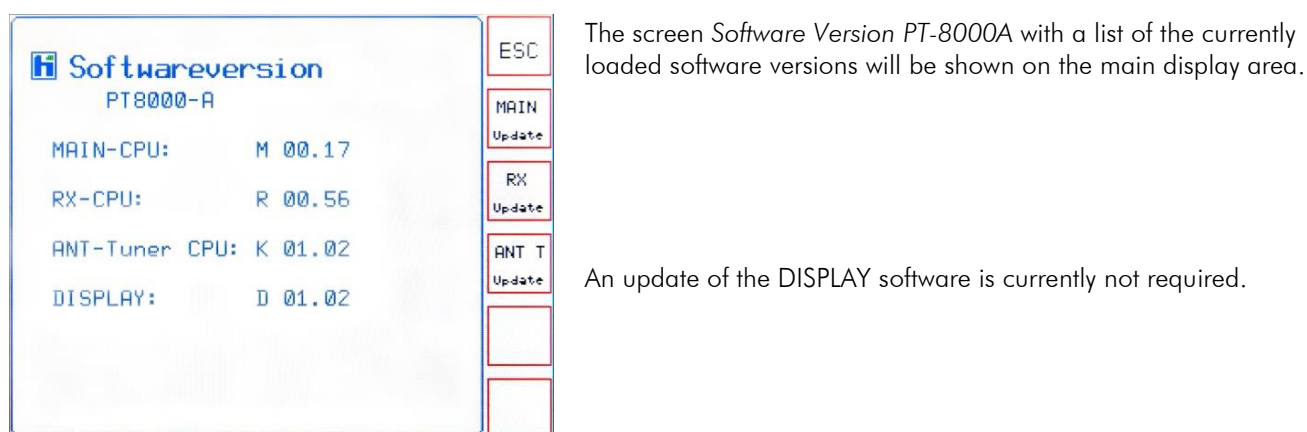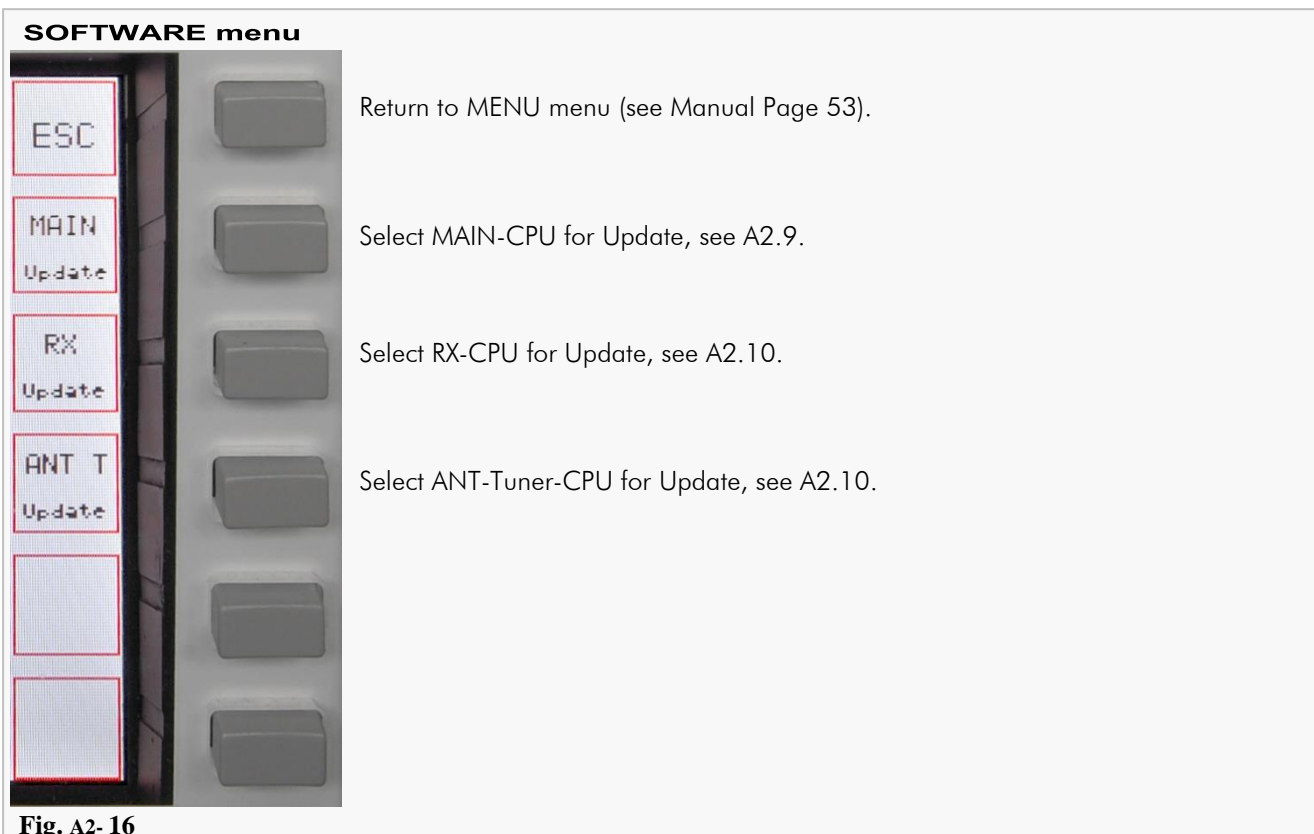
Fig. A2- 17

CPU selection

Select from the Software menu (Figure A2-16 resp. 17) the one CPU of which new operation program you have selected in Chapter A2.7.2 to the PC program.

Depending on CPU selection the update process will be slightly different:

- The update of the MAIN-CPU is described in the following chapter A2.9.

- The update of the RX- and the ANT-Tuner-CPU is described in the after next chapter A2.10

A2.9   Update of MAIN-CPU

Pushing MAIN Update softkey (SOFTWARE menu; Fig. A2- 16 resp. 17) will start the update process for the MAIN-CPU.
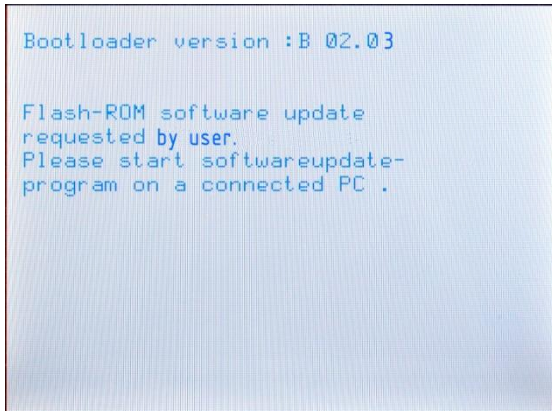
The display will show the *Bootloader* screen with a prompt to start the update program on connected PC.

If the update procedure should not be further continued at this point, the PT-8000A is set back to the normal mode by turning off (POWER) and restart (after a wait of about 10 seconds).

Fig. A2- 18

The PT-8000A is now ready to update and the program transfer can begin.

Requirements for a successful program transfer are:

1. PT-8000A and PC are connected via USB cable (A2.6).
2. The update program has been started, a COM port is connected and the new operation program (update file) is loaded (A2.7).
3. The PT-8000A is ready to update (A2.8).
4. The Update standby mode of the PT-8000A and the loaded operating program agree respecting the CPU (MAIN-CPU).

Click the *Start* button in the main window of the update program.

The adjacent message box prompts you to set the PT-8000A ready to update.

This is already done here, so click *OK* (Otherwise please catch up before clicking, see chapter A2.8).

Fig. A2- 19

Error Messages

If a connection error is occurred (e.g. PT-8000A is not ready to update), the adjacent message box will be shown (Fig. A2- 20).

Fig. A2- 20

Check the correct connection of PT-8000A and PC (by the supplied USB data cable).

Fig. A2- 21

Does the new operation program loaded in the PC not match to the selected CPU of the PT-8000A, this is pointed out with an error message box (Fig. A2- 21).

Note that the selected CPU of the PT-8000A matches to the operation program loaded in the PC's update program (letters M, R and K are prefixed to the version number).

Comparing Version Numbers

Now the update program compares the version numbers of the current and the new operation program. Depending on the outcome different messages are shown on the PT-8000A display and PC message boxes.

Fig. A2- 22

In case the new operation program has a higher version number than the current version on PT-8000A, the display will show these numbers in the lower area.

Fig. A2- 23

On PC screen a message box prompts you to start the program transfer.

Click *OK* to start the program transfer.
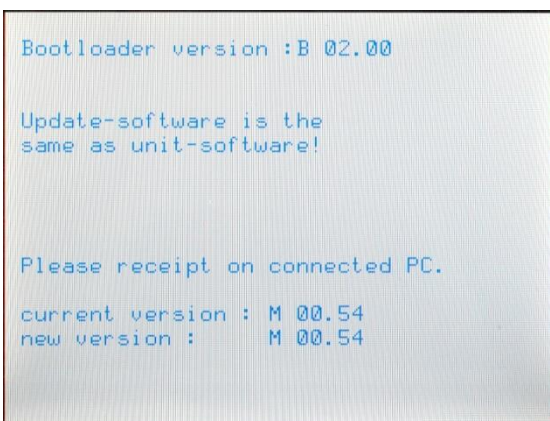
Warning Notice

Fig. A2- 24

In case the new operation program has the same version number as the current version on PT-8000A, the display will show a warning notice and in the lower area these (identical) numbers.

If the update procedure should not be further continued at this point, the PT-8000A is set back to the normal mode by turning off (POWER) and restart (after a wait of about 10 seconds).

Fig. A2- 25

On PC screen a message box will show a warning notice that the new program version number is identical to the current version.

The message box prompts you to start or abort the program transfer.

Click *OK* to start the program transfer.
By clicking *Cancel* the program transfer will not be performed.

Update Process starts

total bytes :   00695084
prog. bytes :

Fig. A2- 26

If the prompt in the message boxes (Fig. A2- 23 and 25) has been answered with *OK*, the display will show the amount of data to be transferred in bytes.

The data transfer will be prepared by memory erasing.

Erase sectors
Sector 7

Fig. A2- 27

The display will show the erasing of memory sectors 1 ... 15.

The update program will show an appropriate notice:

Update File C:\Downloads\PT8_MAIN_0137 04 Europa.H86   **Ver.** M 01.37   **Browse**

Erase Flash
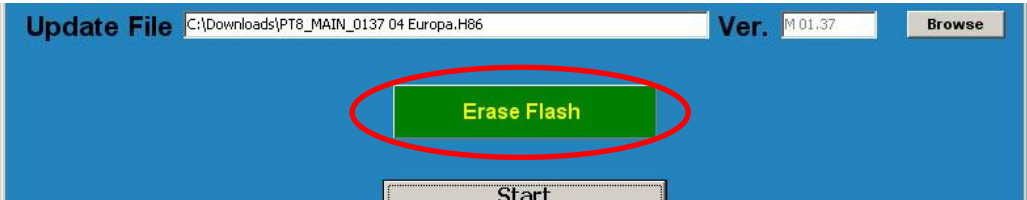
Start

Fig. A2- 28

Bootloader version :B 02.03

Programming Flash-ROMs

Please receipt on connected PC.
total bytes :   00693036
prog. bytes :   00051380

Fig. A2- 29

When erasing is complete the data transfer starts.

Now the display of PT-8000A will show the total number of bytes to be transferred and the state of the bytes current transferred.

Start
Datalength 791324   Comport = COM1
Bytes sent 63538   EXIT

8%
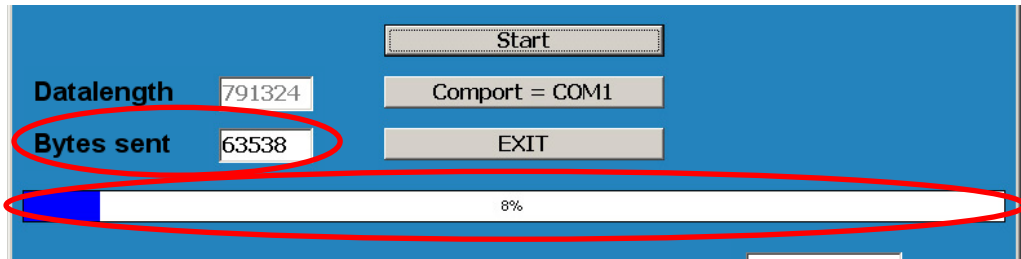
Fig. A2- 30

In the PC update program both the field *Bytes sent* and the blue progress bar will show the state of the transfer.

It is: Total Bytes   = Data Length (entire amount of data to be transferred)
                Prog. Bytes   = Bytes Sent (amount of data transferred by now)

Bootloader version :B 02.00

Application startup

Please receipt on connected PC.
total bytes :   00693036
prog. bytes :   00693036

Fig. A2- 31

When data transfer is complete, on the display of the PT-8000A the message *Application startup* will point out the automatic restart of the transceiver after a short waiting period.
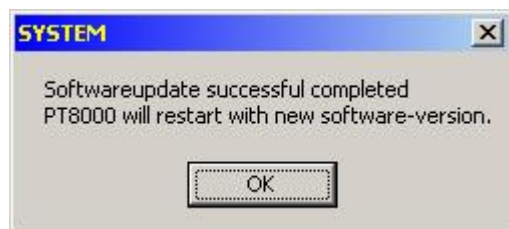
Abb. A2- 32

On the PC, the update program displays in a message box the successful transfer of data and points out the automatic restart of the PT-8000A as well; click *OK*.

Abb. A2- 33

On the PC, another message box appears and points out the automatic restart of the transceiver after a short waiting period; click *OK*.

The PT-8000A will now restart automatically with the new MAIN-CPU software.

If you would like to do no more updates, exit the update program by clicking the *EXIT* button.

A2.10   Update of RX- and ANT-Tuner-CPU

At this point, an example of the update process for the RX CPU is displayed. The ANT-Tuner CPU is updated in the same manner.

Pushing RX Update softkey (SOFTWARE menu; Fig. A2- 16/17) will start the update process for the RX-CPU. The Display will show the *Softwareupdate RX-CPU* screen.

At first a confirmation prompt and a warning notice will be shown (Fig. A2- 34).

Fig. A2- 34
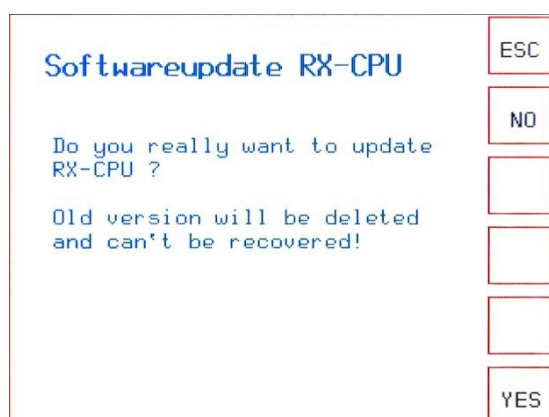
The ESC and NO softkeys lead back to the screen and the softkey menu *Softwareversion* (Fig. A2- 16/17).

Confirmation prompt if the RX CPU is really to be updated.

Warning notice: The old version will be deleted and cannot be restored!

The YES softkey confirms the update process.

Pushing YES confirms the update process. Now the display will prompt to start the update program on the connected PC (Fig. A2- 35).
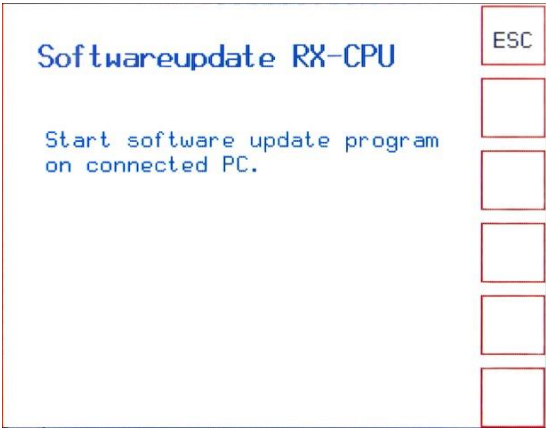
Fig. A2- 35

Pushing ESC softkey leads back to the screen and the softkey menu *Softwareversion* (Fig. A2- 16/17).

Prompt to start the update program on the connected PC (if not already done).

The PT-8000A is now ready to update, and the program transfer can begin.

Requirements for a successful program transfer are:

1. PT-8000A and PC are connected via USB cable (A2.6).
2. The update program has been started, a COM port is connected and the new operation program (update file) is loaded (A2.7).
3. The PT-8000A is ready to update (A2.8).
4. The Update standby mode of the PT-8000A and the loaded operating program agree respecting the CPU (MAIN-CPU).

Click the *Start* button in the main window of the update program.

Fig. A2- 36

The adjacent message box prompts you to set the PT-8000A ready to update.

This is already done, so click *OK* (Otherwise please catch up before clicking, see chapter A2.8).

Error Messages

Abb. A2- 37

If a connection error is occurred (e.g. PT-8000A is not ready to update), the adjacent message box will be shown (Fig. A2- 37).

Check the correct connection of PT-8000A and PC (by the supplied USB data cable).

Abb. A2- 38

Does the new operation program loaded on PC not match to the selected CPU of the PT-8000A, this is pointed out by an error message box (Fig. A2- 38).

Note that the selected CPU of the PT-8000A matches to the operation program loaded into PC's update program (letters M, R and K are prefixed to the version number).

Comparing Version Numbers

Now the update program compares the version numbers of the current and the new operation program. Depending on the outcome different messages are shown on the PT-8000A display and PC message boxes.

In case the new operation program has a higher version number than the current version on PT-8000A, the display will show these numbers in lower area.
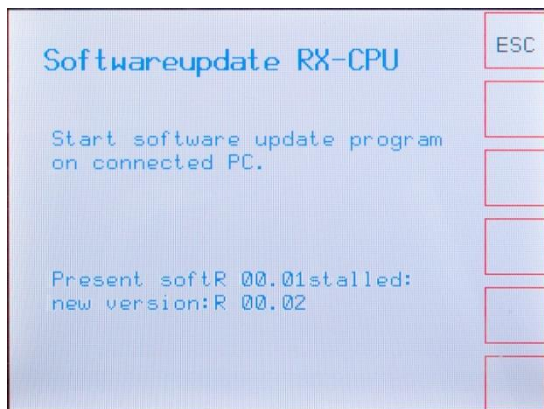
Fig. A2- 39

Pushing ESC leads back to the screen and the softkey menu *Softwareversion* (Fig. A2- 16/17).

(Prompt see Fig. A2- 35).

Display of current and new program version.

Fig. A2- 40

On PC screen a message box prompts you to start the program transfer.

Click *OK* to start the program transfer.

Warning Notices

In case the new operation program has the same version number as the current version on PT-8000A, the display will show a warning notice and in the lower area these (identical) numbers.
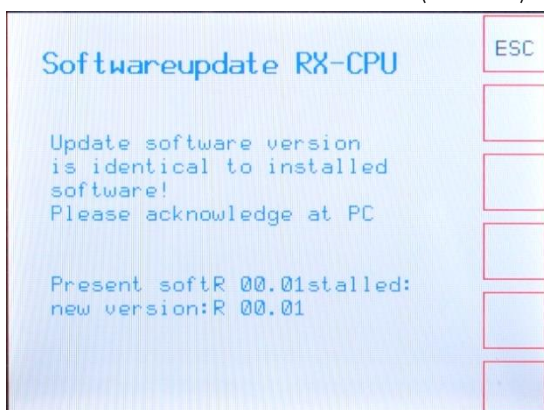
Fig. A2- 41

Pushing ESC leads back to the screen and the softkey menu *Softwareversion* (Fig. A2- 16/17).

Warning notice: The new program version is identical to the current one!
Prompt to confirm the program transfer on PC screen.

Display of current and new program version.
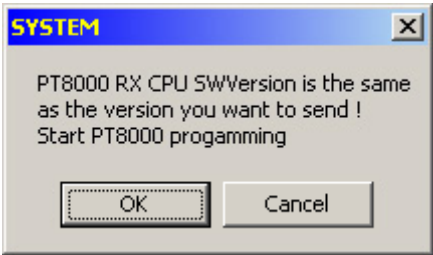
Fig. A2- 42

On PC screen a message box will show a warning notice that the new program's version number is identical to the current version.

The message box prompts you to start or abort the program transfer.

Click *OK* to start the program transfer.

By clicking *Cancel* the program transfer will not performed.

In case the new program's version number is lower than the current one used by PT-8000A, the display will show a warning notice and below the version numbers of both the current and the new operating program.
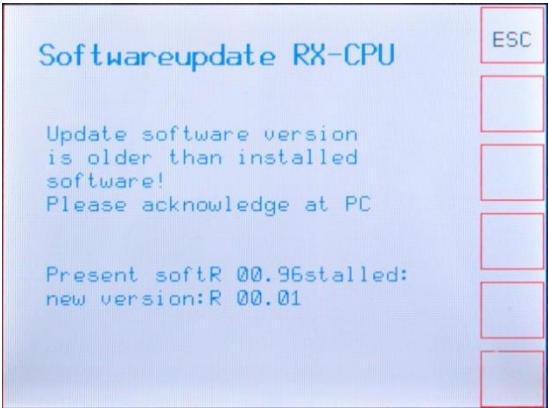
Fig. A2- 43

Pushing ESC leads back to the screen and the softkey menu *Softwareversion* (Fig. A2- 16/17).

Warning notice: The new program's version number is lower than the current one!

Prompt to confirm the program transfer on PC.

Display of current and new program version.

Fig. A2- 44

On PC screen a message box will show a warning notice that the new program version is older than the current one.

The message box prompts you to start or abort the program transfer.

Click *OK* to start the program transfer.

By clicking *Cancel* the program transfer will not be performed.

Update Process starts

If the prompt in the message boxes (Fig. A2- 40/42/44) has been answered with *OK*, the display of the PT-8000A will show a message as well as the state of data transfer.
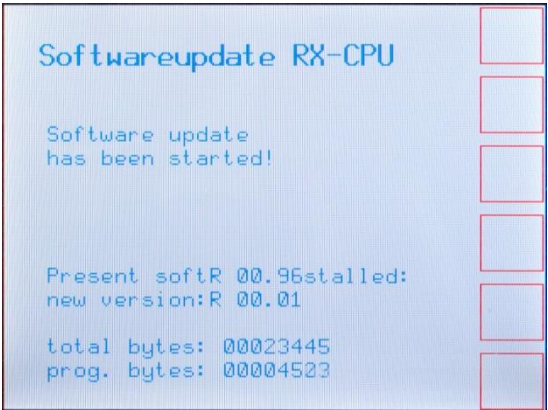
Fig. A2- 45

Message, that the transfer of the operating program has been started.

Display of current and new program version.

The display will now show the total number of bytes to be transferred and the state of the bytes current transferred.
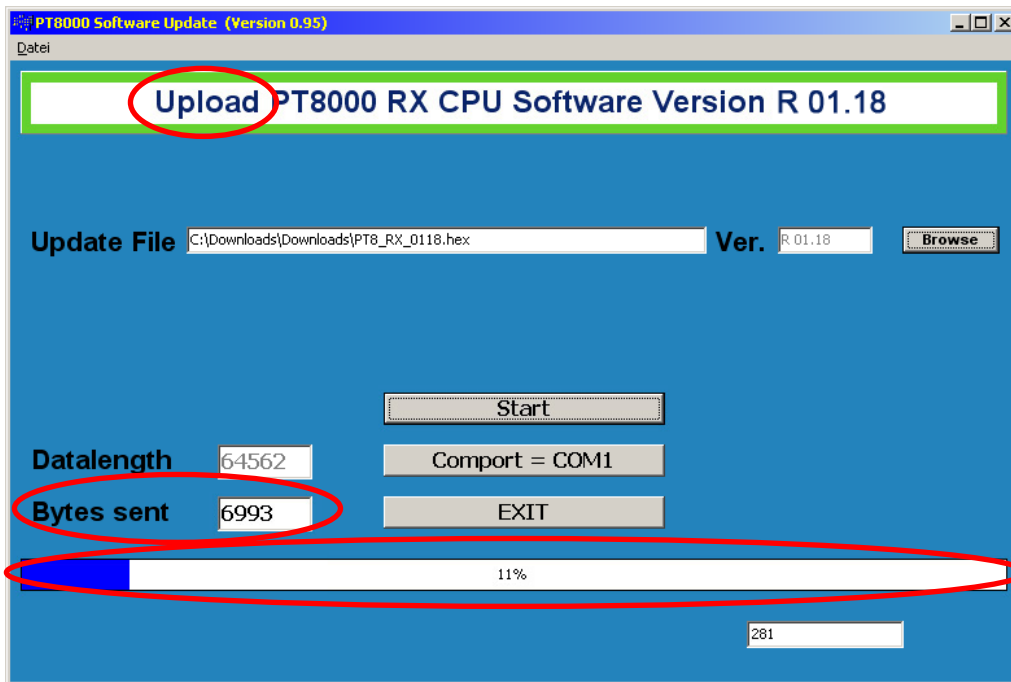
Fig. A2- 46

On PC screen the title bar of the main window will show that program transfer has been started (*Upload*).

Both the field *Bytes Sent* and the blue progress bar will show the state of data transfer.

Regarding amount of data in the display of the PT-8000A and the program window on PC screen the following applies:

Total Bytes = Data Length (entire amount of data to be transferred)

Prog. Bytes = Bytes Sent (amount of data transferred by now)

The program transfer may take up to 30 minutes - depending on the size of the operation program.

When data transfer is completed, the display of the PT-8000A will show a new message.
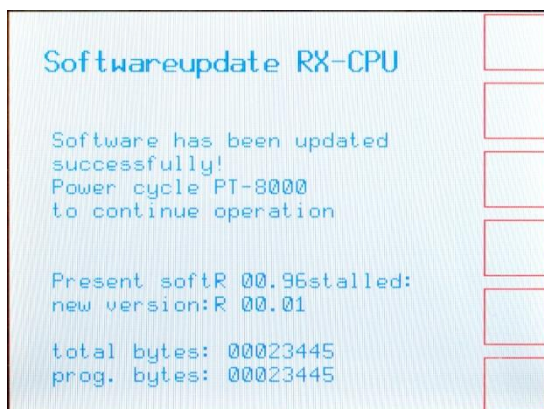
Fig. A2- 47

Message: The program transfer has been completed successfully. Prompt to restart the PT-8000A.

Display of current and new program version.

The display will now show the total number of bytes to be transferred and the state of the bytes transferred.
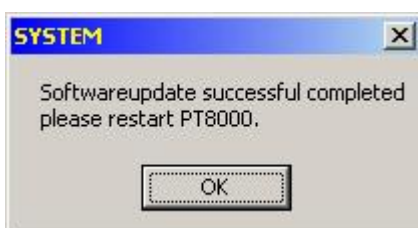
Fig. A2- 48

The PC also reports in a message box that the program transfer has been completed successfully and prompts to restart the PT-8000A.

Click *OK* to close the message box.

Switch off the PT-8000A by POWER switch and restart after a waiting time of about 10 seconds.

After restart, the transceiver operates with the new transferred operation program.

Quit the update program on PC (*EXIT* button) or start another CPU update.

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A3　　TECHNICAL DOCUMENTS

A3.1　　Technical Data

RX Double Super Heterodyne 1st IF 40.7 MHz and 2nd IF 10.7 MHz				
RX-Range MAIN/SUB	9 kHz ... 30 MHz / 50 ... 54 MHz / 69.9 … 70.5 MHz / 144 … 148 MHz / 110 ... 143.99 MHz			
Xtal-Filter 1st and 2nd IF (BW)	40.7 MHz (BW 50 kHz) ; 10.7 MHz (BW 0.5 ... 6 kHz / 15 kHz ; Option CW-BW 250 Hz)			
Sensitivity @ 10 dB S+N/N	AM	FM	SSB	CW
9 kHz ... 1.8 MHz *	6 kHz / 2 μV	15 kHz / 0.5 μV	2.4 kHz / 1 μV	0.5 kHz / 0.5 μV
1.8 ... 30 MHz	6 kHz / 1.2 μV	15 kHz / 0.18 μV	2.4 kHz / 0.25 μV	0.5 kHz / 0.1 μV
50 ... 54 MHz	6 kHz / 1.0 μV	15 kHz / 0.16 μV	2.4 kHz / 0.25 μV	0.5 kHz / 0.1 μV
69.9 … 70.5 MHz	6 kHz / 1.0 μV	15 kHz / 0.16 μV	2.4 kHz / 0.24 μV	0.5 kHz / 0.09 μV
144 ... 148 MHz	6 kHz / 1.0 μV	15 kHz / 0.15 μV	2.4 kHz / 0.24 μV	0.5 kHz / 0.09 μV
110 ... 143,99 MHz *	6 kHz / 1.5 μV	15 kHz / 0.18 μV	2.4 kHz / 0.36 μV	0.5 kHz / 0.14 μV
IMD DR3 @ 2 kHz (typ.) **	105 dB / 1,8 … 30 MHz			
Blocking @ 100 kHz (typ.)	142 dB / 1,8 … 30 MHz			
Image Rejection and Spurious	1.8 … 30 MHz	50 … 54 MHz	69.9… 70.5 MHz	144 ... 148 MHz	110 ... 143.99 MHz
Signal Suppression	> 98 dB	> 86 dB	> 121 dB	> 142 dB	> 104 dB
Digital Signal Processing (DSP)	variable bandwidth for 2nd IF 10.7 MHz Xtal filters; multiple automatic audio notch filtering; almost undistorted audio when engaging automatic noise reduction through enhanced algorithms			
IF Outputs BW 50 kHz	center frequencies: 40.7 MHz ; 10.7 MHz ; 60 kHz			
AF Output	4.8 Watt (2 x 2.4 Watt MAIN / SUB) ; additional speaker in HN-8000 connectable			
* technical specs in subareas not guaranteed　　** 3rd Order Intermodulation Distortion Dynamic Range				

TX All-Mode			
Frequency Range	1.8 … 30 MHz (160 / 80 / 60 / 40 / 30 / 20 / 17 / 15 / 12 / 10 m-Band)		50 … 54 MHz / 69.9 ... 70.5 MHz / 144 ... 148 MHz (6 / 4 / 2 m-Band)
Mode	AM / AME	SSB / CW / FM	AM / AME SSB / CW / FM
Output Power	50 Watt	200 Watt	25 Watt 100 Watt
PA IMD3 @ 10,1 MHz (typ.) / PEP	50 W / ≥49 dB ; 100 W / ≥ 44 dB ; 200 W / ≥38 dB		
Carrier Suppression	SSB ≥70 dB / PEP		
Opposite Sideband Suppression	SSB ≥70 dB / @1 kHz		
FM Frequency Deviation	± 3 kHz FMN ; repeater operation with variable shift ±0 ... 2 MHz		

General	
Memory Channels	organized in 3 banks ; 99 channels each bank ; automatic scanning mode
Frequency Stability	0.005 ppm from 10°C to 50°C ; reference clock adjustable ±1.5 ppm ; 10 MHz oven ; int/ext ; in/out
Environmental Conditions	temperature range 10°C to 50°C (50°F … 120°F) ; avoid high humidity (operating below dew point) and dusty operating conditions
Antenna Connectors	N-type: 2 x HF 50 Ohm and 1 x VHF 50 Ohm ; BNC-type: 1 x HF RX 50 Ohm
Dimensions (W x H x D)	approx. 425 mm x 175 mm x 465 mm
Weight	approx. 28 kg (62 lbs.)

HN-8000 Switching Power Supply for PT-8000A	
Mains / Power Requirement	AC 90 … 260 V Power Factor Correction (PFC) / 12.5 Amp. / 50 … 60 Hz
Output	DC 13.8 V / 11 Amp. ; 50 V / 14 Amp. ; 13.8 V / 5 Amp. (AUX)
Dimensions (W x H x D)	approx. 225 mm x 175 mm x 440 mm
Weight	approx. 10 kg (22 lbs.)

Accessories	
All Versions	Cable Set (AC, DC, Ground, Speaker)
Ham Version	Desk Microphone T9 ; 600 Ohm @ 1kHz ; dynamic ; RFI-proof ; kidney-shaped acoustic response

Specification Professional Version	
	TX-range according to customers specification ; extended temperature range ; UL-listed and more ; for additional information and special requirements please contact Hilberling GmbH

Technical specs subject to change without notice　　　　　　　　　　　　　　　　　　　　　**Tab. A3- 1**

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A4   CUSTOMER INFORMATION

A4.1   User Information

A4.1.1 Declaration of Conformity (shortened version)

Hilberling GmbH hereby declares that the PT-8000A amateur radio transceiver complies with Directive 2014/53/EU. The complete declaration of conformity can be found on the website www.hilberling.de.

A4.1.2 Note Amateur Radio Operation

The Hilberling GmbH is obliged as a manufacturer of transmitter devices to draw attention to the following legal provisions:

The following restrictive conditions apply:

This device is intended for use by radio amateurs within the meaning of the law on amateur radio in the valid amended. During operation of the device, the amateur radio law and supplementary laws and regulations must be observed.

In Germany, as in other EU countries, special provisions for the acquisition, ownership and operation of amateur radio apply. Acquisition and ownership of this device by unauthorized persons can already be punishable!

Even if the devices PT-8000A should have extended frequency ranges, radio amateurs are generally allowed to use only the assigned ham radio frequencies depending on their country.

A4.2   Warranty Terms

Guarantee

For amateur radio transceiver PT-8000A, power supply HN-8000 and microphone T9 legal guarantee determinations apply only if the device is operated in a manner corresponding to its intended use. This includes in particular the compliance with the operating limits mentioned in this manual.

A4.3   Disposal Rules

Used electrical and electronic equipment must not longer be placed in unsorted municipal waste in accordance with European standards. They must be collected separately and have to be disposed of by a public-service-disposer or equivalent private companies.

The symbol of the crossed out wheeled bin on rear panel indicates the need for separate collection

According to the German *"Gesetz über das Inverkehrbringen, die Rücknahme und die umweltverträgliche Entsorgung von Elektro- und Elektronikgeräten"*, short ElektroG, the Hilberling GmbH is registered by the *Stiftung Elektro-Altgeräte Register* as a distributor of electrical and electronic equipment under WEEE registry number DE 19129052 and thus participate in the common disposal of electrical and electronic waste.

For questions, please contact Hilberling GmbH as follows:

by E-Mail	info@hilberling.de
by Phone	+49 (0) 4331-20171-0
by Fax	+49 (0) 4331-20171-10
by Mail	Hilberling GmbH
	Heinrich-Hertz-Strasse 2
	24790 Schacht-Audorf

A-5   LISTS

A5.1   Index

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A5.2   List of Figures

A5.3   List Of Tables

A5.4 Glossary

AGC	Automatic Gain Control	Automatische Lautstärkenanpassung
ANF	Automatic Notch Filter	Automatisches Kerbfilter
ANT-TUNER	Antenna Tuner	Gerät, um Antennen bzw. Speiseleitungen an den Sender/Empfänger anzupassen
ATT	Attenuator	Antennensignal-Abschwächer
BITE	Built In Test Equipment	Eingebauter Selbsttest
CLAR	Clarifier	„Korrigierer"; siehe RIT
CW	Continuous Wave	Unmodulierte Aussendung; (zumeist Telegrafie)
DDS	Direct Digital Synthesis	Direkte digitale Synthese
DSP	Digital Signal Processing	Digitale Signalverarbeitung
DRM	Digital Radio Mondiale	Standard für digitalen Rundfunk auf Lang-, Mittel- und Kurzwelle
IF-Notch	Intermediate Frequency Notch	Zwischenfrequenz-Kerbfilter
ISB	Independent Side Band	Unabhängige Seitenbänder
MAIN (-RX)	Main-Receiver	Hauptempfänger
MNF	Multi-Notch-Filter	Mehrfach-Kerbfilter
NB	Noise Blanker	Störaustaster -> gegen impulsförmige Störungen
NR	Noise Reduction	Rauschunterdrückung
PTT	Push To Talk	Schaltung in den TX-Betrieb
RF	Radio Frequency	Hochfrequenz (HF, nur in DL)
RIT	Receiver Incremental Tuning	Nachstimmung der Empfangsfrequenz (siehe auch CLAR)
RX	Receiver	Empfänger
SPLIT		„Aufspaltung" – d.h. Trennung von TX-/RX-Frequenz; kein Gleichwellenbetrieb
SCAN		Frequenzsuchlauf über Speicherplätze
SQL	Squelch	Rauschsperre
SSB	Single Side Band	Einseitenbandsignal
STEP-Encoder	Gerasteter Pulsgeber	Drehregler, „Endlos-Poti" (ohne Anschlag) beim PT-8000A alle mit Drucktasten-Funktion
SUB (-RX)	Sub-Receiver	Neben-/ Zweitempfänger
TCVR=XCVR=TRX	Transceiver	Sende-Empfänger
TX	Transmitter	Sender
VFO	Variable Frequency Oscillator	durchstimmbarer Frequenz Oszillator
VOX	Voice Operated Transmission	Sprachgesteuertes Senden
XIT	Transmitter Incremental Tuning	Nachstimmung der Sendefrequenz (siehe auch RIT)
ZERO-BEAT		Ablage zwischen zwei Stationen geht gegen Null

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