HF / VHF Transceiver

Hilberling

PT-8000 A·B·C

Operating Manual

Version 1.0

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HF / VHF Transceiver

Hilberling PT-8000 A/B/C

Operating Manual

PT-8000, HN-8000 and T9
are
developed and manufactured in the EU

by

Hilberling GmbH

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Hilberling
ENTWICKLUNGSLABOR · HOCHFREQUENZTECHNIK

Important

Read and save this Operating Manual carefully before attempting to operate the HF/VHF PT-8000 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.

NEVER apply AC to the DC socket (13.8V and 100V for PT-8000 B) on the transceiver rear panel. This will ruin the transceiver and may cause fire.

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.

NEVER expose the PT-8000 A/B to precipitation like rain or any liquid nor operate the transceiver in excessively dusty or very humid environment.

NEVER allow children or any unauthorized persons to operate the transceiver.

AVOID placing and using the transceiver in areas with temperatures below -15°C or above +50°C.

AVOID placing the transceiver against a wall. This may inhibit proper air circulation and could cause overheat.

USE CARE when connecting the transceiver to a linear amplifier. Set the PT-8000 A/B 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 T-9 microphone. Others may have different pin assignments and connecting to the transceiver may cause damage to the transceiver and the microphone.

For U.S.A. only:

CAUTION: Changes or modifications to the PT-8000 A/B not expressively authorized by Hilberling GmbH could void your authority to operate this transceiver under FCC regulations

For Canada only:

This class digital apparatus complies with Canadian ICES-003.

Cet appareil numériqué de la classe est conformé à la norme NMB-003 du Canada.

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Part A Introduction

1 PT-8000 Series Of Transceivers - Characteristics

Hans Hilberling, DK7LG, the founder of Hilberling GmbH and a veteran Amateur Radio operator and RF engineer specified the design requirements of his “dream-transceiver”:

1. It must include a single high-quality transmitter with two independent receivers covering the entire HF and VHF spectrum.
2. VHF operation must be an integral part of the design, not an afterthought. VHF performance must match HF.
3. Its operational frequency range must be easily expandable through the use of transverters.
4. It must include independent sideband (ISB) capability.
5. The design must incorporate both analogue and digital signal processing, using the best of both technologies.
6. It must provide high output power on HF through the use of modern, efficient HF-MOSFETs at 50 V (PT-8000A) and 100 V (PT-8000B) drain voltage .

The result is the PT-8000 series of HF/VHF-Transceivers featuring cutting-edge design!

1.1 Receiver (RX)

Each of the two identical receivers are double super-heterodyne Rx with 70.7 MHz 1st intermediate frequency (IF) and 10.7 MHz 2nd IF. The PT-8000 incorporates high quality, state-of-the-art receiver design, including:

1. An automatically tuned preselector which is a series tuned circuit from 1.8 to 30 MHz. The main inductance is based on a T-200 toroid. Research has shown that the IMD characteristics correlate with the mass of the material and the transformation ratio used. The IP3 of this preselector is outstanding +50dBm. The series circuit is tuned through software by 5 inductor taps (5 bit) and an 8-bit capacitor set. A noise generator is used to tune and store all settings in a table. In order to enhance the filter characteristics the circuit is operating at approximately 3 ohms – there are down and up transformers at the input and output.
2. Precision-matched first and second mixers with third intercept points at +40 dBm. The mixers are designed specifically for Hilberling by Synergy Microwave, a respected name in the industry.
3. Three 6-pole roofing filters at 2.7 kHz, 6 kHz and 12 kHz for outstanding inband IMD and BDR performance.
4. Six hybrid amplifiers from LF to VHF with third intercept points at +50 dBm
5. The first local oscillator is designed with quadruple microwave VCOs which offer excellent phase noise characteristics: -130 dBc/Hz at 10 kHz and –145 dBc/Hz at 50 kHz. The first local oscillator design features microwave VCOs designed specifically for Hilberling. It includes a 0.05 ppm reference oscillator with organic DDS. Phase noise suppression is enhanced by means of 300 Hz crystal filtering.
6. The PT-8000 uses ultra-sharp 10.7 MHz IF filtering. The key to the receiver’s performance is its seven 16-pole ladder filters working in combination with DSP filters in the 10.7 MHz second IFs of each receiver. The filter shape factor is an excellent 1.3 at 2.4 kHz. The same high-quality filters are used in the transmitter stages as well. 17 of these filters are used in the PT-8000.

1.2 Transmitter (TX)

The transmitter frequency scheme follows the receiver design. In addition, the transmitter is capable of transmitting two sidebands independently (ISB-operation). For example, one can transmit an SSTV signal on LSB and a voice (phone) comment on USB for example. The transmit power is 100 or even 600 Watts with enhanced filtering:

1. The PT-8000 transmitter stage starts with a Class-A 10 W driver amplifier operating from 1.8 to 150 MHz. IMD3 is less than –50 dB at 2.5 W.
2. The 100 W power amplifier utilizes a 50 V HF-MOSFET which is actually a “Gemini” package hence comprising two HF-MOSFETs working push-pull (SD2932). This HF-MOSFET is capable to dissipate 500 Watts and delivering up to 300 Watts output power. The PA of the PT-8000A is limited to 100 Watts hence presenting a signal with outstanding IMD characteristics.
3. The 600 W final amplifier includes a pair of high-efficiency (70%) SD3933 HF-MOSFETs — a breakthrough in transmitter design.
4. The PT-8000 assures clean output thanks to innovating filtering, including the use of additional three 70.7 MHz roofing filters in the transmitter stages.
5. A diplexer-filter guarantees optimum performance of the finals. An automatic antenna tuner (ATU) is an integral part of the output design. In terms of power handling capability of these components there is no difference between the 100/600 W models.
6. For VHF operation (144 MHz to148 MHz) a 13,8 V VHF-MOSFET (RD70HVF1) is used, designed to deliver 25 watts output.

1.3 Power Supplies And Growth Potential

The HN-8000 consists of switching power supplies with full power factor correction (PFC) as demanded by many energy suppliers. It is capable of delivering up to 1,000 W 13.8/50 V DC-power for the PT-8000 A. The HN-8000 designed for the PT-8000 B is capable of delivering up to 2,000 watts DC power at 13,8/100 V supply voltage. Both power supplies are rugged in design and deliver ample power for the PT-8000 series. The DC-input power can easily monitored with the large front panel power meter.

As your operating horizons expand and new demands occur, your PT-8000 will respond:

1. The PT-8000 is the ideal platform for exploring the world above 50 MHz. Not only does it offer outstanding 6 and 2 meter transceiver performance, the PT-8000 is designed with UHF and microwave transverters in mind. It offers 1 Hz frequency resolution and the ability to connect transverters to both receivers simultaneously.
2. The PT-8000 provides output taps at the first and second IFs for analysis, monitoring and experimentation.
3. The PT-8000 firmware is easily upgraded – as described in Part D of this manual.

1.4 Technical Specifications

RX: Double Super Heterodyne 1st IF 70.7MHz and 2nd IF 10.7MHz					
Range	9 kHz ... 54 MHz / 110 ... 170 MHz (MAIN / SUB)				
Xtal-Filter 1st and 2nd IF (BW)	70.7 MHz (2.7 kHz / 6.0 kHz / 12.0 kHz) MAIN 10.698 / SUB 10.702 MHz (0.5 ... 6.0 kHz / 12.0 kHz)				
Sensitivity @ 10 dB S+N/N	AM	FM	SSB	ISB	CW
200 kHz ... 1.8 MHz	6 kHz / 2 µV	12 kHz / 0.5 µV	2.4 kHz / 1 µV	3.1 kHz / 0.5 µV	0.5 kHz / 0.5 µV
1.8 MHz … 54 MHz	6 kHz /1.2 µV	12 kHz / 0.25 µV	2.4 kHz / 0.22 µV	3.1 kHz / 0.4 µV	0.6 kHz / 0.15 µV
110 MHz ...170 MHz	6 kHz / 1.0 µV	12 kHz / 0.22 µV	2.4 kHz / 0.22 µV	3.1 kHz / 0.22 µV	0.6 kHz / 0.18 µV
IP3 @ 20 kHz	0.5 MHz ... 170 MHz +39 dBm				
IMD DR3 @ Spacing	@ 2 kHz 86 dB; @ 5 kHz 97 dB; @ 10 kHz 104 dB; @ 20 kHz 108 dB; @ 100 kHz 113 dB;				
Image Rejection And Spurious Signal Suppression >>70 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				
AF-Output	4.8 Watt (2 x 2.4 Watt MAIN / SUB); additional speaker in HN-8000 and optional alternate speaker				
TX: Independent Transmission Of 2 Sidebands – ISB					
Range	1.8 MHz … 54 MHz; 144 MHz … 148 MHz (160, 80, 60, 40, 30, 20, 17, 15, 12, 10, 6, 2 m-Band)				
Mode /Output (max.-HF; 6m)	AM / AME / ISB / FM	SSB/CW	IMD3 (PEP)	IMD3 (Class A)	
PT-8000 A	100 Watt	100 Watt	-40 dB	2.5 Watt / -50 dB	
PT-8000 B	125 Watt	600 Watt	-36 dB	2.5 Watt / -50 dB	
PT-8000 C	2.5 Watt	10 Watt	-36 dB	2.5 Watt / -50 dB	
VHF PT-8000 A / B / C	25 Watt	25 Watt	-36 dB	2.5 Watt / -50 dB	
Carrier Suppression	SSB / ISB – 70 dB / PEP				
Opposite Sideband Suppression	SSB / ISB – 70 dB / @1 kHz				
FM Frequency deviation	± 3 kHz FMN; repeater operations with variable shift 0 ... 2 MHz				
General					
Memory Channels	Organized in 3 banks @ 99 channels; automatic scanning mode				
Frequency Stability	0.05 ppm from 10C° to 60 C°; Reference Clock 20 MHz adjustable in 12 mHz steps; Ext. Clock 10 MHz				
Environmental Conditions	Temperatures 10C° to 60C° Avoid high humidity (operating below dew point) and dusty operating conditions				
Antenna Connectors N-type	2 x HF 50 Ohm; 1 x VHF 50 Ohm				
Dimensions (H x B x T)	approximately 175 mm x 425 mm (543 mm including handles) x 465 mm				
Weight	approximately. 52 lbs				
HN-8000 Switching Power Supply for PT-8000A/B/C					
Mains Power Requirement	90 … 260 VAC Power Factor Correction (PFC) 117 VAC / 13 Amp.; 240 VAC / 7 Amp.				
PT-8000A	DC 13.8 V / 10 Amp. , 50 V / 10 Amp.				
PT-8000B	DC 13.8 V / 10 Amp., 100 V / 12 Amp.				
Dimensions	approximately 175 mm x 225 mm x 440 mm				
Weight	approximately 15 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 - set of plugs				
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				

Table 1

1.5 Operating Limitations

TBD

Part B Installation

3 Unpacking And Installation Considerations

3.1 Unpacking

Examine your PT-8000 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-8000. Make sure you´ve received and unpacked everything:

Quantity	Description	Picture
1	Power Supply HN-8000	6
1	Microphone T9	7
1	AC Power Cord HN-8000	8
1	DC Power Cord HN-8000⇔PT-8000	9
1	Ground Wire HN-8000⇔PT-8000	10
1	Speaker Cabel HN-8000⇔PT-8000	11
1	Phono Plug 6.3mm	
2	Phono Plug 3.5mm	
1	DB-25 Male Plug	
1	DA-15 Male Plug	
2	DE-9 Male Plug	
1	RS232 Cabel For Software Update	12
4	Handles	15
1	Operating Manual	

Table 2

3.2 About This Manual

The PT-8000 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 RS232 interface. Owners will be informed about firmware upgrades as they are released – please have a look at chapter Part D.

The latest version of PT-8000 Operating Manual will be posted as a PDF-document at Hilberling GmbH website (www.hilberling.de)

In this handbook 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

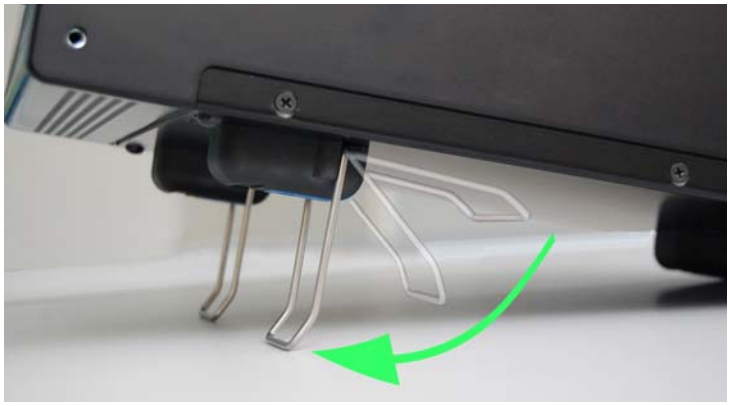
3.3 Initial Installation Considerations

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

Select a power outlet that is capable to handle the power requirements especially for the PT-8000B. Connect your PT-8000 to a proper ground system – which is important for optimum operation of any HF transceiver – especially when operating high power either with the PT-8000B or 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 PT8000 and the HN-8000 by unfolding and locking into position the front stand under the cabinet as shown on the picture.



Picture 1

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

3.4 Antenna Considerations

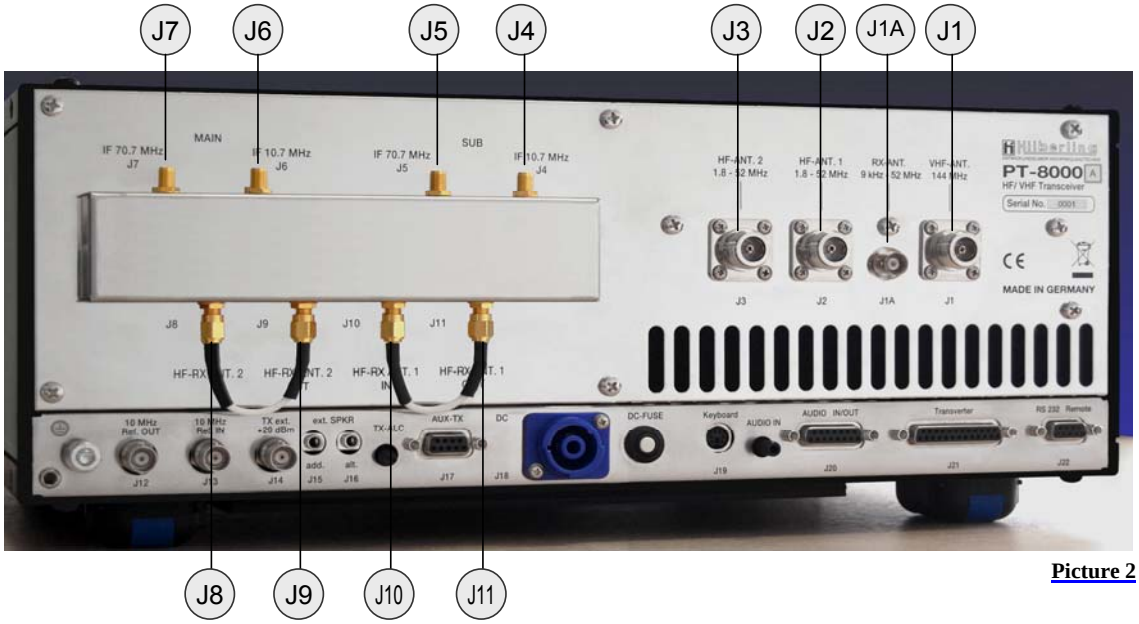
Standing wave ratio (SWR) may increase significantly when using an antenna outside of the specific frequency range for which it is tuned. The final power amplifier will operate at peak performance only when its load is resistive – i.e. the SWR is close to 1.0. Therefore the PT-8000 is equipped with an automatic antenna tuner (ATU) which does not actually tune the antenna. The ATU instead matches the feedline to the final amplifiers so they always “see” and SWR of 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 feedpoint 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-8000 and antenna system. Never try to hook up a symmetrical open feeder line (balanced, twin-lead, ladder line etc,) directly to the PT-8000. Instead use 50 ohm coaxial feeders only. The connectors supplied on the PT8000 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

4.1 Rear Panel

A variety of jacks are accessible at the rear panel. Please unfold Picture 1 - pointing out all connections.



Picture 2

HF/VHF-Connection Sockets J1 ... J11

No	NAME	Type	Description
J1	VHF-ANT 110 … 170 MHz	N-Type	Connect a VHF-Antenna for 110 to 170 MHz (RX) and 144 to 148 MHz (TX)
J1A	RX-ANT 9 kHz ... 54 MHz	BNC	Connect a VLF/HF/VHF-antenna for receive only from 9 kHz … 52 MHz / 54 MHz (USA). For DUPLEX mode the input may stay open during transmission.
J2	HF-ANT.1 1.8 ... 52 MHz	N-Type	Connect VLF/HF/VHF-antenna #1 frequency coverage 9kHz ... 52 MHz / 54 MHz (USA)
J3	HF-ANT.2 1,8 ... 52 MHz	N-Type	Connect VLF/HF/VHF-antenna #1 frequency coverage 9kHz ... 52 MHz / 54 MHz (USA)
J4	IF 10.7 MHz SUB	SMA	Output 1st IF 70.7 MHz of SUB-RX. The output is tapped after the 1st mixer and the IF-amplifier HV20-200 – thus being broadband when preselector is disengaged
J5	IF 70.7MHz SUB	SMA	Output 2nd IF 10.7 MHz of SUB-RX. The output is tapped after the 2nd mixer and IF-notch and noise blanker circuit. No AGC and no 10.7MHz xtal filter at that point. Thus bandwidths are determined by roofing filter.
J6	IF 10,7 MHz MAIN	SMA	Output 1st IF 70.7 MHz of MAIN-RX. The output is tapped after the 1st mixer and the IF-amplifier HV20-200 – thus being broadband when preselector is disengaged
J7	IF 70.7MHz MAIN	SMA	Output 2nd IF 10.7 MHz of MAIN-RX. The output is tapped after the 2nd mixer and IF-notch and noise blanker circuit. No AGC and no 10.7MHz xtal filter at that point. Thus bandwidths are determined by roofing filter.
J8	HF-RX ANT. 2 IN	SMA	J6/J7 disconnects RX (MAIN/SUB) from HF-ANT.2 – J6 is either connected to J7 or to output of external equipment (QRM-eliminator, ANT-switch panel etc.)
J9	HF-RX ANT. 2 OUT	SMA	HF-ANT.2 (in RX-mode) either connected to J6 or to input of external equipment (QRM-eliminator, ANT-switch panel etc.)
J10	HF-RX ANT. 1 IN	SMA	J8/J9 disconnects RX (MAIN/SUB) from HF-ANT.1 – J8 is either connected to J9 or to output of external equipment (QRM-eliminator, ANT-switch panel etc.)
J11	HF-RX ANT. 1 OUT	SMA	HF-ANT.2 (in RX-mode) either connected to J8 or to input of external equipment (QRM-eliminator, ANT-switch panel etc.)

Table 3

Picture 3

Connection Sockets J12 … J22

No	N	Type	Description
E		Banana Plug 4mm	Grounding wire – must be connected toHN-8000 power supply
		M6	Grounding stud – must be connected to HN-8000 power supply and to station ground
J12	10 MHz Ref. OUT	BNC	Output for an external 10 MHz reference signal (clock) for synchronization of PT-8000 to other equipment
J13	10 MHz Ref. IN	BNC	Input of internal/external 10MHz reference clock (internal: derived from 20 MHz system clock with 0.05 ppm) for synchronization of external equipment to PT-8000
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 Phone Plug / TRS 3.5mm	Additional external speaker output. Use to connect the speaker at HN-8000 in addition to built in speaker
J16	ext. SPKR alt.	EIA-453 / IEC 60603-11 Phone Plug / TRS 3.5mm	Alternate external speaker output. Use to connect an alternate speaker to the built in system
J17	AUX-TX (PTT/ALC)	DE-9 (D-Sub 9pol)	
J18	DC IN	CliffCon 4-pol	Power connector for interconnection cable to HN-8000 power supply
J19	Keyboard	mini-DIN PS/2 Connector	To be implanted later.
J20	AUDIO IN/OUT	DA-15 (D-Sub 15pol)	To be implanted later.
J21	Transverter	DB-25 (D-Sub 25pol)	To be implanted later.
J22	Remote RS 232	DE-9 (D-Sub 9pol)	Interface to update firmware of PT-8000

Table 4

Wiring of J15 … J22

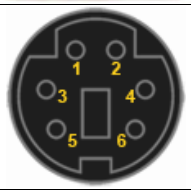
Nr.	Name	Typ	Function And Outline
J15 J16	ext. SPKR add. ext. SPKR alt.		Connect an additional (PT-8000 speaker will stay ON) or an alternate speaker (PT-8000 speaker will be OFF) **1** Tip + audio output (4,5 W max) **2** Ring + audio output **3** Sleeve GND **Caution**: Using mono type plugs will shorten the audio output and may damage the transceiver
J17	AUX-TX (PTT/ALC)		To be implanted later.
J18	DC IN		**PT-8000A** / **PT-8000B** / **PT-8000C** **1** (**2-**) 13,8 VDC / 13,8 VDC / 13,8 VDC **2** (**1+**) 50 VDC PA / <Not Connected> / <Not Connected> **3** (**1-**) GND / GND / GND **4** (**2+**) <Not Connected> / 100 VDC PA / <Not Connected>
J19	Keyboard		To be implanted later.
J20	AUDIO IN/OUT		To be implanted later.
J21	Transverter		To be implanted later.
J22	Remote RS 232		**1** <Not Connected> **2** RS232 TX **3** RS232 RX **4** RS232 DTR **5** GND **6** <Not Connected> **7** RS232 RTS **8** <Not Connected> **9** <Not Connected>

Table 5

Miscellaneous

DC-Fuse 13.8 V DC circuit breaker for final PA rated 13,8 V / 25 Amp. for PT-8000C and 50 V / 15 Amp. or 100 V / 15 Amp. for PT-8000A/B

TX-ALC Sensitivity of ALC input (J17, pin 6) from external PA to reduce TX power out.

AUDIO IN Sensitivity of Audio data input (J20, pin 2) – rated 0 dBm.

4.2 Connectors At Front Panel

Picture 4

Connection Sockets 1 ... 3

Nr.	Name	Typ	Beschreibung
1	MIC-PTT	Microphone Socket 8-pol	Microphone connector for Hilberling T9 and Data input 0 dBm
2	PHONE	EIA-453 / IEC 60603-11 TRS 6.3 mm	Headphones low impedance (8 Ω). When plugged in the speaker(s) will be cut off. NOTE: pushing the volume controls for MAIN and SUB will switch on the speaker(s) momentarily
3	CW-KEY	EIA-453 / IEC 60603-11 TRS 6.3 mm	Keyer for CW

Table 6

Wiring

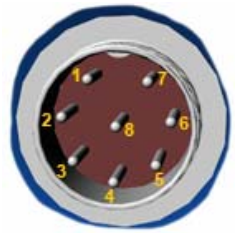
Nr.	Name	Typ	Funktion und Anschlussbelegung
1	MIC-PTT 0 dBm		**1** MIC-Audio **2** PTT **3** RX-MAIN Audio (headset) **4** 0 dBm IN **5** MIC IN +DC **6** RX-SUB Audio (headset)) **7** MIC-GND **8** PTT-GND Dynamic Mic Electret Mic
2	PHONE		**1** Tip + Audio OUT **2** Ring + Audio OUT **3** Sleeve GND 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		**1** Tip DOT CW-Key **2** Ring DASH <Not Connected> **3** Sleeve GND GND STATUS: **Keyer ON** **Keyer OFF**

Table 7

5 Power Supply

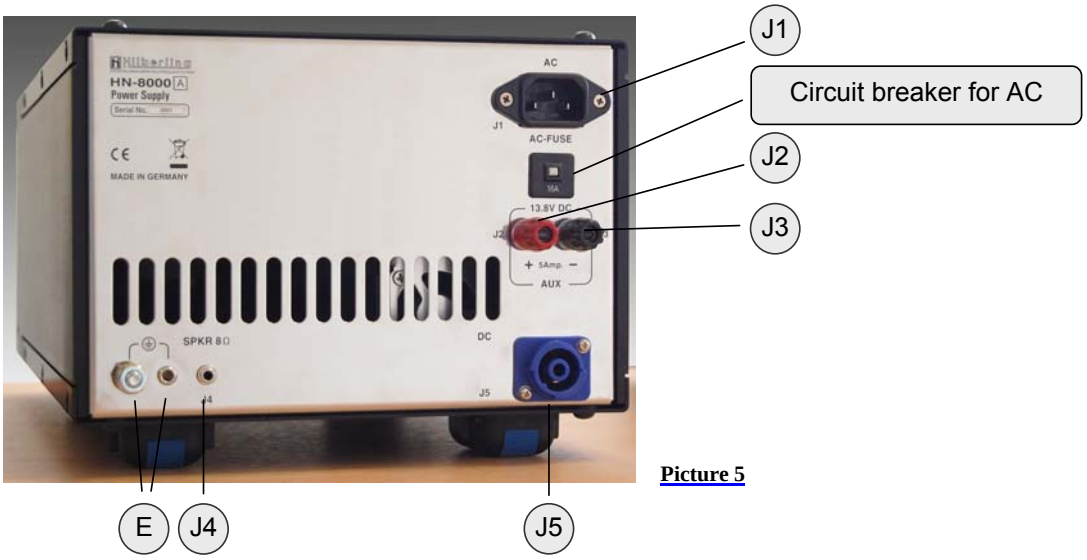
5.1 General

Each model PT-8000 A/B is equipped with its appropriate power supply all named HN-8000. The only difference in appearance for the PT-8000A-model and the PT-8000B-model is the final amplifier DC input power instrument at the front panel.

The HN-8000 is a switching power supply with industry standard. It complies with special regulations in some countries regarding power factor compensation (PFC).

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. The HN-8000 operating temperature is controlled by up to 4 fans (PT-8000B). The HN-8000 accompanied with the PT-8000A and PT-8000B delivers 50 VDC @ 15Amps and 100 VDC @15 A for the high power B-model.

5.2 Rear Panel



Picture 5

Connection Sockets J1 ... J5

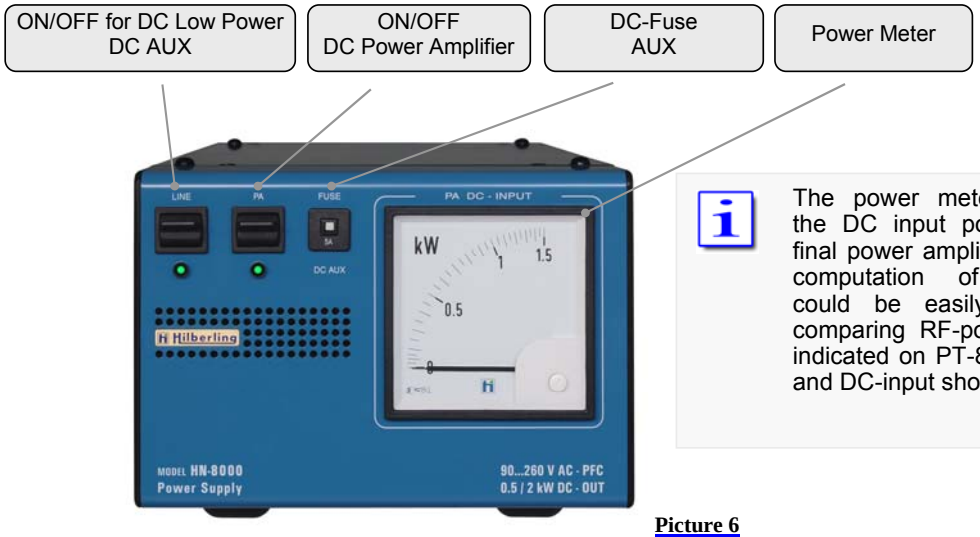
Nr.	Name	Type	Description
J1	AC	IEC-60320-C13	Input main power 90 – 270V AC
J2/3	13 C	Banana Plug 4 mm + Clamp	Auxiliary output 13.8V DC
E		Banana Plug 4 mm	Grounding wire – must be connected to PT-8000 transceiver
		M6	Grounding stud – must be connected to PT-8000 transceiver and to station ground.
J4	SPKR 8 Ω	EIA-453 / IEC 60603-11 Phonostecker / TRS 3.5 mm	Input for built in speaker from PT-8000 J15 or J16
J5	DC	CliffCon 4-pol	Power connector for interconnection cable to PT-8000 J18.

Table 8

Miscellaneous

AC-FUSE Circuit breaker for AC mains at rear panel plug J5 rated 16 A @ 90 … 270 V AC

5.3 Front Panel



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.

Picture 6

Miscellaneous

DC FUSE Circuit breaker for DC AUX at rear panel banana plugs J2/J3 rated 5 A @ 13.8 V DC

6 ACCESSORIES

6.1 Microphone Hilberling T9

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

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.

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

Picture 7

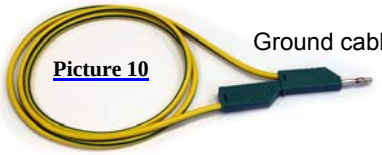
6.2 Wiring/Cables

Picture 8

AC-line voltage cable for HN-8000; length appr. 1,70 m

Picture 9

DC-cable HN-8000⇔PT-8000; length appr. 1,10 m



Picture 10

Ground cable HN-8000⇔PT-8000; length appr. 1,50 m

Picture 11

Speaker cable HN-8000⇔PT-8000; length appr. 1,50 m

BILD fehlt

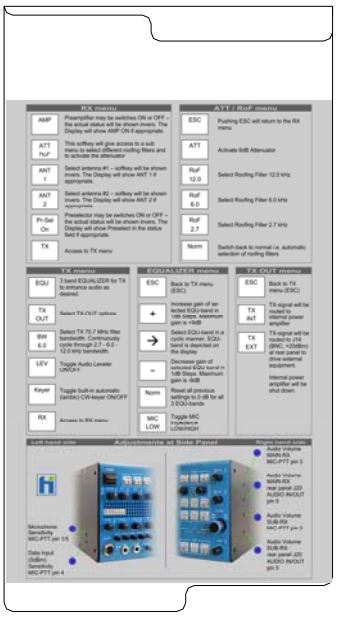
RS232-data cable to connect a PC; length appr. 1,80 m

Bild 12

6.3 Pull Out Instruction

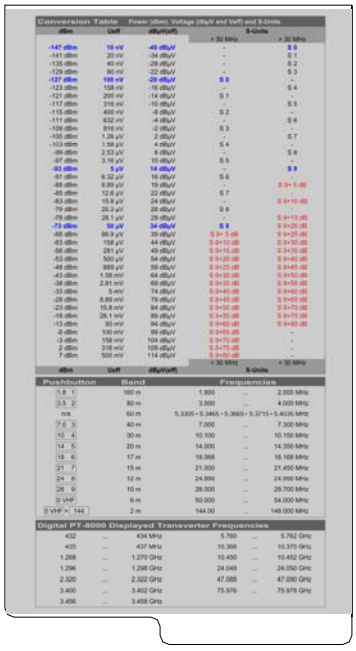
Just pull out the two quick reference cards to obtain useful information – a quick operating reference and A conversion table dBm – dBµV – S-units.

- Upper left hand card



Picture 13

- Lower right hand card

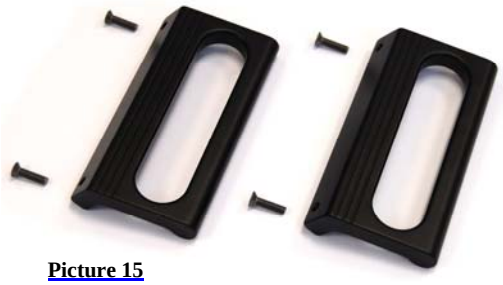


Picture 14

6.4 Operating Manual

This Operating Manual Version 1.0

6.5 Handles



Picture 15

Two handles may attached to the PT-8000 easily using the mounting material provided.

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7 INSTALLATION AND CONNECTIONS

Prior to any operation of the PT-8000 read this Operation Manual carefully.

Volume MAIN- and SUB-RX
Speaker ON⇔OFF

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

- The preselector is aligned and all data's are stored in RX-CPU memory which is buffered through a NiCd battery
- The transmitter is limited to the frequencies in compliance with FCC regulations

The default values for the operation variables are (these default values are set after a hard reset as well)

TBD

Prior applying main power to the power supply HN-8000 verify:

Rear panel

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

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

Front panel

- Microphone attached

These controls ahould be set fully counter clockwise:

- Volume controls MAIN/SUB
- TX-RWR
- MIC-GAIN
- PROC

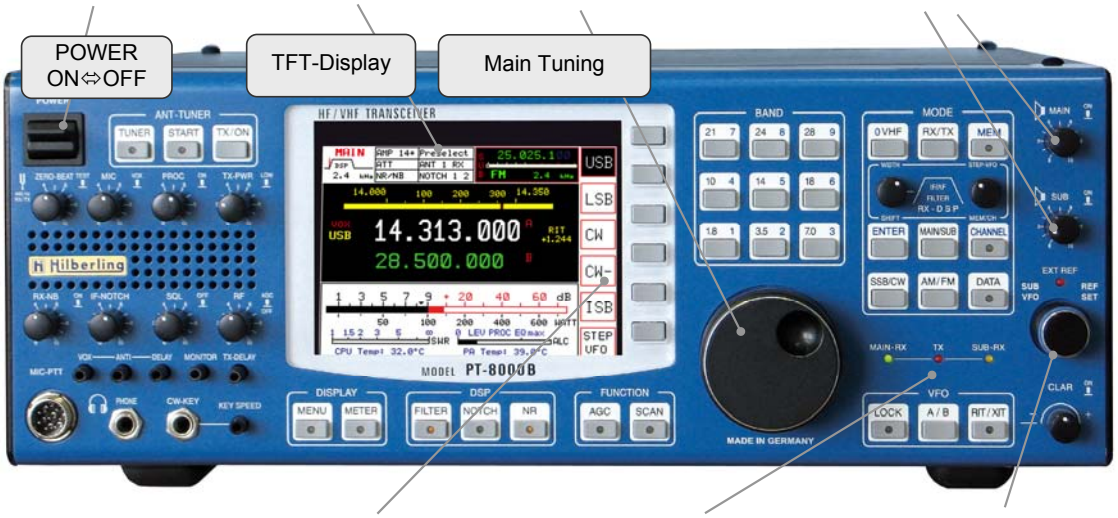
Power ON sequence PT-8000

- Turn ON both LINE and PA on HN-8000
- Turn ON POWER at PT-8000

The POWER switch at the PT-8000 does not switch the voltage from the PA power supply. This is done by the PA switch at the HN-8000 only.
It is up to the operator to switch PA OFF during reception only.

8 FRONT PANEL CONTROLS, DISPLAY AND THEIR FUNCTION

8.1 Front Panel Controls



Picture 16

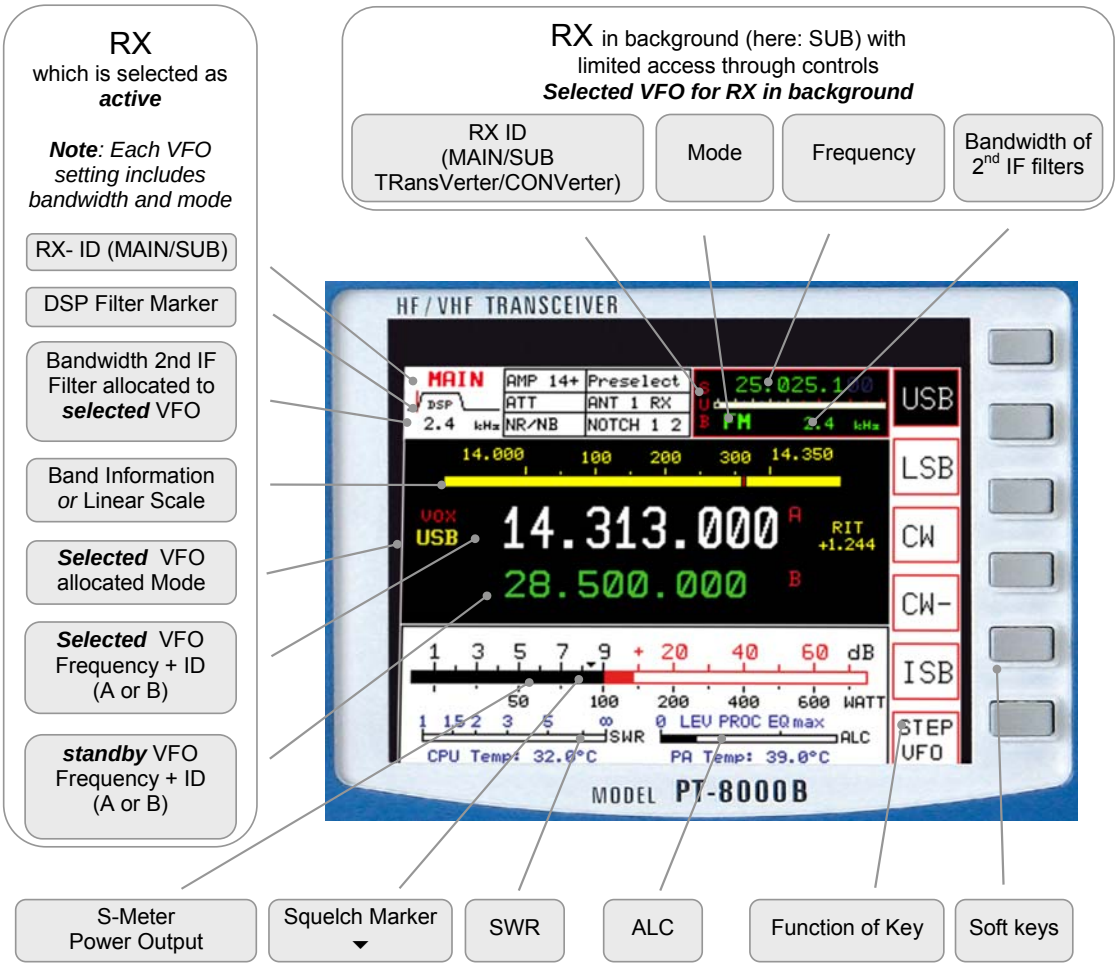
Function	NAME	Softkeys / LED for status MAIN-RX / TX / SUB-RX / Tuning 2nd RX
Power ON/OFF	POWER	wer is supp **Before turning ON verify audio volume settings for MAIN and SUB-RX are turned counter-clockwise.** After switching to ON: • LED MAIN-RX will illuminate • an intermitted beep will indicate that the initialization is in progress • the display will stay dark completed (approximately 5 seconds) until the initialization process is completed
Display	÷	The displayrepresents the primary means to control through soft switches and to show all relevant data for RX and TX operations.
Volume MAIN-RX	▶ 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 ON and OFF (depending on NORMAL or SPLIT Audio Mode – see page C42)
Volume SUB-RX	▶ 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 ON and OFF (depending on NORMAL or SPLIT Audio Mode – see page C42)
Primary Tuning Knob	÷	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 Tuning Knob	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
	REF-SET	When operating the PT-8000 with an external reference (10MHz-clock) this control will allow aligning the timing in small increments. This mode is indicated by the LED „EXT-REF“

Table 9

8.2 Display

The display of the PT-8000 shows relevant data of MAIN- and SUB-RX and the TX.

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



Picture 17

Soft keys and Soft key menu

The keys right next to the functions depicted on the display are the so-called „Soft keys“. They activate/select the functions named on the display. These functions will vary with the menu selected through pressing different controls on the front panel.

Statusfield – display options

AMP	AMP 7+	AMP 14+	Preselect

ON
for f ≥ 1.8 MHz

for f >7 MHz
Preamplifier

for f >14 MHz

ON
available between f = 1.8 ...30 MHz
Preselector

Attenuator

Selected antenne

DSP-
noise reduction
ON

RX-
noise blanking
ON

NR + NB

ON

DSP-
Notchfilter
ON

IF-
Notchfilter
ON

DSP + IF
Notchfilter
ON

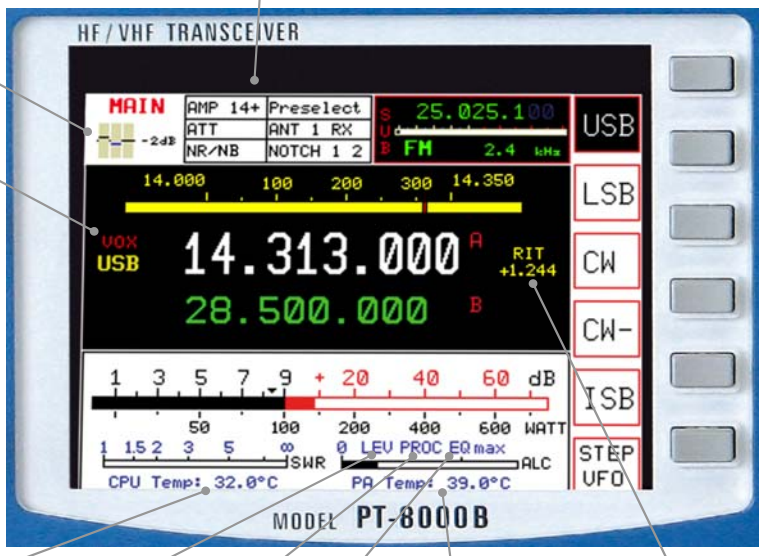
A blank status field indicates that the corresponding function is OFF (ATT; AMP; Presel; NB/NR; Notch etc.)

HF Mode

VHF Mode

TX 3-Band-Equalizer
if EQ-menu is selected

VOX ON



MAIN-CPU Temperature | LEVeler ON | PROC ON | EQ ON | PA Temperature | RIT/XIT ON

Picture 18

8.3 Clustered Front Panel Controls

Various controls are clustered – indicated through surrounding white boxes painted on the panel

ANT-TUNER and MOX
– Activation of Tuner
– Start tuning cycle
– Manual TX/ON - MOX

BAND
– Select HF-Ham Band
Note: 60m not present
– Numerical input of frequencies

MODE
– Select VHF-Band
„0"- Key for numerical Input
– Select basic RX/TX- menu
– Storage of frequencies
– Filter selection (Xtal and DSP)
– STEP-VFO
– Activate numerical Input
– Selct RX (MAIN or SUB)
– Recall channels and Channel storage management
– Select mode (SSB/CW/AM/FM/DATA)

DISPLAY
– Select special MENU

DSP
Activation of
– Digital Filter
– Automatic Notch Filter
– Automatic Noise Reduction (NR)

FUNCTION
– Automatic Gain Control (AGC)
– Activate Scan Function

VFO
– Lock VFO
– toggle VFO A/B
– Activation of RIT/XIT

Picture 19

8.4 Controls With Integrated Push-Button Function And Controls For Adjustments

ZERO BEAT Activate

MIC-GAIN VOX

PROCESSOR Activate

TX-POWER High/Low

NOISE BLANKER Activate

IF-NOTCH FILTER Activate

SQUELCH threshold and Override

RF-GAIN AGC Off

TX-Delay

Volume MONITOR

Sensitivity

ANTI TRIP

DELAY

Adjustments / settings for VOX

CW Key Speed

Picture 20

Volume MAIN RX
Push function switches speaker according to AUDIO Normal/Split

Volume SUB RX
Push function switches speaker according to AUDIO Normal/Split

See also AUDIO Menu on page C42

Filter WIDTH/SHIFT toggle

STEP VFO select digit

MEM/CH select channel

Picture 21

8.5 Side Panel Controls

Left hand side

Picture 22

P2 coarse adjustment of microphone sensitivity front panel 1: MIC-PTT pin 1/5

P6 adjustment of data input (0 dBm) sensitivity front panel 1: MIC-PTT pin 4

The adjustment of sensitivity from MIC and Data Input are twofold: coarse adjustment 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.

Right hand side

Picture 23

P1 coarse adjustment of audio volume MAIN-RX front panel 1: MIC-PTT pin 3

P3 coarse adjustment of audio volume MAIN-RX rear panel J20: AUDIO IN/OUT pin 5

P4 coarse adjustment of audio volume SUB-RX front panel 1: MIC-PTT pin 3

P5 coarse adjustment of audio volume SUB-RX rear panel J20: AUDIO IN/OUT pin 20

Use an appropriate tool to adjust the controls to prevent any damage to the variable resistors

8.6 Keys With LED And LEDs

Because the operator should be aware of some major functions whether they are active or deactivated certain push buttons incorporate a LED:

Picture 24

MEM MENU	
CHANNEL	METER
DATA	FILTER
LOCK	NOTCH
RIT/XIT	NR
TUNE	AGC
START	SCAN

MAIN RX and SUB RX

The PT-8000 incorporates a transmitter and two independent receivers (MAIN and SUB). 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:

- MAIN-RX is active and SUB is working in the background (green **MAIN-RX** LED is on) *or*
- SUB-RX is active and MAIN is working in the background (yellow **SUB-RX** LED is on)
- TX is operating (red **TX-LED** is on).

Note: The MAIN RX VFOs will always determine the transmit frequencies

The red LED **EXT REF** will be on when the PT-8000 20 MHz system clock is no longer the internal one. An external 10MHz signal is representing the frequency reference when this LED is on.

9 MAIN- AND SUB-RX OPERATIONS

Picture 25

The PT-8000 incorporates a transmitter and two independent receivers (MAIN and SUB). 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.

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

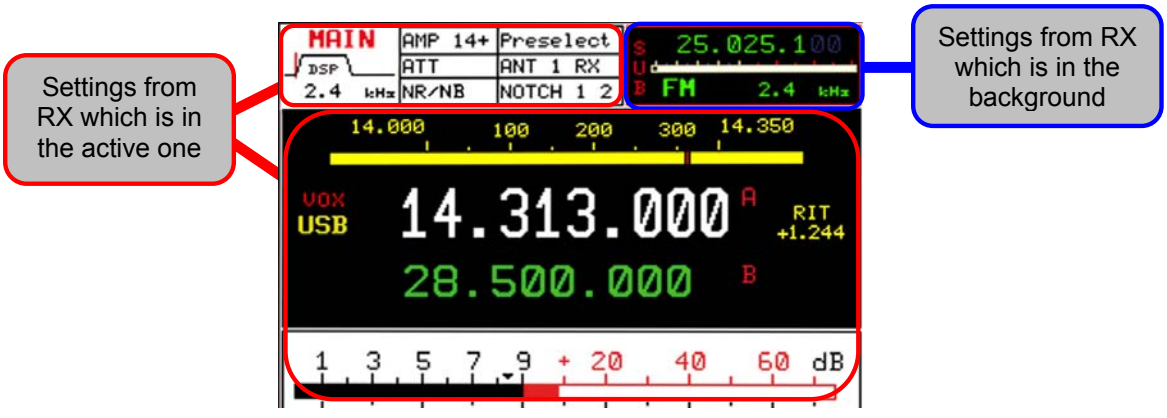
1. The selected VFO of the RX working in the background is always accessible through SUB VFO.
2. The volume of MAIN- and SUB-RX are permanently adjustable through the respective controls MAIN and SUB.
3. Both knobs have a “push” function: Depending on the AUDIO setting NORMAL/SPLIT the audio from MAIN and SUB are allocated to the speakers and are turned ON and OFF (see page C42)

The push button MAIN/SUB (see picture 27 page C11) toggles between the two RX changing their status „active“ or „background“. During initial start up the PT-8000´s MAIN-RX is the active one.

- LED MAIN-RX and LED SUB-RX indicate which RX is the active one

- The Display shows in the upper left corner MAIN or SUB
- Frequency, mode, filter bandwidths are displayed for MAIN and SUB respectively

Activation of noise blanker, DSP, DSP-notch and the squelch marker are displayed for the active RX exclusively.



Picture 26

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 fieldstrenght of the RX working in the background.

Pressing PTT when SUB-RX is the active one will toggle MAIN- and SUB-RX instantaneously. As mentioned before only the MAIN-RX can operate with the TX as a transceiver.

When transmitting 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 tranmitting frequency may be limited even by the superior dynamic characteristics of the PT-8000 receivers - which are of course finite.

10 Modes Of Operation (MODE)

Picture 27

In order to select different modes pushbuttons are available (see Figure ….) in the clustered area MODES:

- SSB / CW (where ISB is selectable)
- AM / FM
- DATA

When SSB/CW or AM/FM is pressed the last selected mode (SSB/CW or AM/FM) is memorized and reactivated. The display shows the activated mode inverse.

10.1 SSB / CW (Single Side Band / Continuous Wave)

Pressing SSB/CW will call up the SSB/CW soft key menu:

10.1.1 SSB (Single Side Band)

SSB/CW menu

Upper Side Band

Lower Side Band

Continuous Wave normal mode (CW-pitch in USB)

Continuous Wave inverse mode (CW-pitch in LSB)

Independent Side Band – the ISB menus will appear (see below)

Cyclic change of frequency tuning steps:
→ 1 Hz → 10 Hz → 100 Hz → 1 kHz →

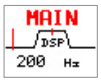
Picture 28

10.1.2 CW (Continuous Wave)

When CW or CW- is selected pushing the WIDTH/SHIFT control will cycle between **Pitch – Width – BFO**. Turn WIDTH/SHIFT to control:

Pitch - will change the beat frequency of the received signal. At the same time the center frequency of the DSP-filter is shifted accordingly.

Range 400 … 1000 in 50 increments



Width – will change the DSP-filter width with following values:
50 / 100 / 200 / 400 / 500 / 600 Hz
When DSP is disabled: 500 Hz fixed.

BFO – will change the beat frequency of the CW signal from –250 Hz to +250 Hz in 10 Hz increments without changing the center frequency of the DSP filter.

10.2 ISB (Independent Side Band)

During independent sideband operations MAIN- and SUB-RX are tuned to the same frequency but on different sidebands. Both sidebands are transmitted and modulated independently.

Pressing ISB will call up the ISB menu:

ISB Menü

„0dBm“ input (connected to MIC jack) will be transmitted on USB/LSB – depending on status of ISB NORM/INV

DATA input (connected to J17 on rear panel) will be transmitted on USB/LSB – depending on status of ISB NORM/INV

ISB normal - 0dBm or DATA input are transmitted on USB. Voice will be on LSB

ISB inverse - 0dBm or DATA input are transmitted on LSB. Voice will be on USB

Picture 29

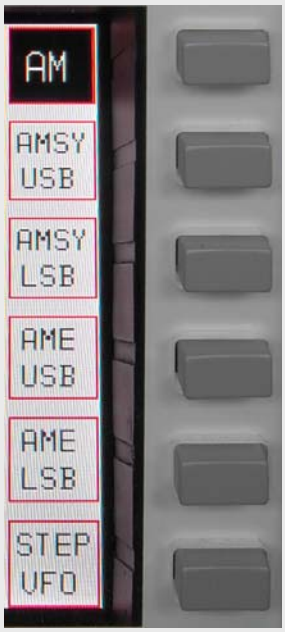
In ISB mode one sideband is selected for transmission of data either trough „0dBm“ or „DATA“ input either on USB (ISB normal) or LSB (ISB inverse). The other sideband will always transmit the voice signal fed trough the MIC-jack at the front panel.

10.3 AM / FM (Amplitude Modulation / Frequency Modulation)

Pressing AM / FM will place the PT-8000 in AM/FM mode whatever has been the last mode. If the mode is already AM or FM the alternate mode will be activated.

The according soft key menu (AM or FM) will be called up.

AM menu



Amplitude Modulation (carrier and two sidebands)

AM Synchronous (carrier and Lower Sideband)

AM Synchronous (carrier and Upper Sideband)

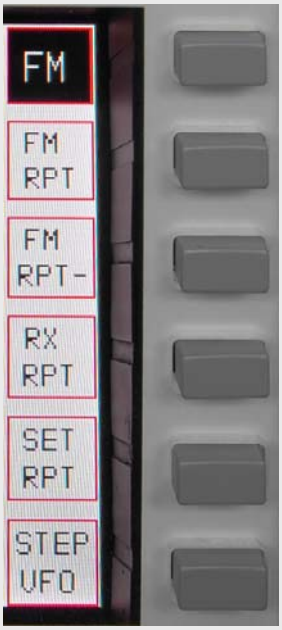
AM single sideband (AME – AM Equivalent) (carrier and Lower Sideband)

AM single sideband (AME – AM Equivalent) (carrier and Upper Sideband

Cyclic change of frequency tuning steps:
→ 1 Hz → 10 Hz → 100 Hz → 1 kHz →

Picture 30

FM menu



Frequency Modulation (standard mode)

FM repeater mode. The transmit frequency is lower than the receive frequency (standard). Frequency shift default value is 600 kHz

FM repeater mode. The transmit frequency is higher than the receive frequency (inverse). Frequency shift default value is 600 kHz

Press and hold to monitor the transmit frequency – squelch is deactivated ; RX RPT is displayed inverse. (Only available if repeater mode is selected)

Press to set the frequency shift for repeater mode (see note below)

Cyclic change of frequency tuning steps:
→ 1 Hz → 10 Hz → 100 Hz → 1 kHz →

Picture 31

How to set the repeater frequency shift

If the soft key SET RPT is depressed

- SET RPT will be inverse
- VFO display will show actual transmit frequency
- Set VFO to desired transmit frequency hence define the shift within a tuning range from 0 … 2.000kHz.
  The frequency resolution selected for the VFO will apply for this setting.
- Pressing the SET RPT pushbutton again will terminate the SET RPT modus.

Changing to a different mode will terminate SET RPT as well.

Numerical frequency input not possible

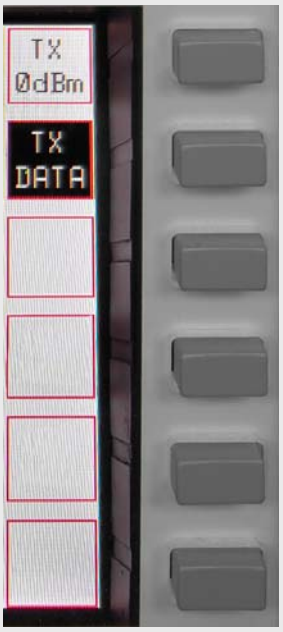
10.4 DATA Transmission

Pressing DATA will call up the DATA soft key menu:

- DATA - LED will turn on

- If ISB mode is activated the ISB menu will be called up. Otherwise the following menu will be displayed
-

DATA menu



Signals at the 0dBm input will be transmitted

Signals at the DATA input will be transmitted

Picture 32

TX 0dBm and TX DATA are working alternatively. Only one signal can be selected

DATA mode may be selected in all modes

If DATA mode is not selected PTT through RS232 handshake signal is not possible

Termination of DATA Operation

Pressing the DATA pushbutton again will terminate the DATA modus but only if the DATA menu is displayed. Call up of this menu is mandatory for the termination. After termination the DATA-LED will be off.

11 SELECTING FREQUENCIES

To select a frequency four different means are available:

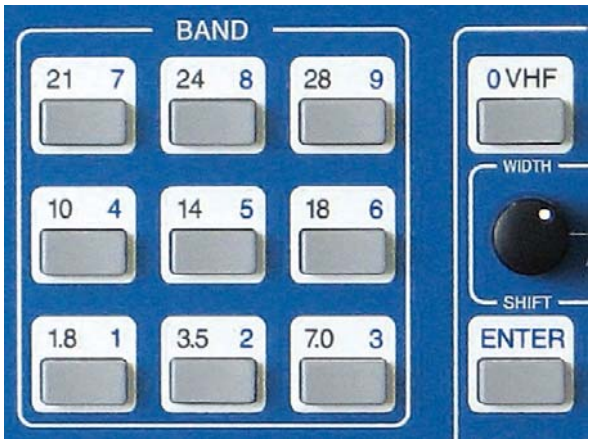
7. Select a BAND
8. Numerical input
9. Recall from a channel
10. Tuning with VFO

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

11.1 BAND select

11.1.1 HF BANDS



Picture 33

Pressing a BAND pushbutton selects one of two stored frequency within the desired BAND. The last used frequency of this BAND will be recalled. Pressing BAND again will toggle between the last two frequencies used within this BAND.

In case the BAND limits are exceeded trough tuning the last valid frequency that has been stored will remain.

Mode and bandwidth are stored together with the respective frequency.

The following BANDS are defined in the PT-8000 software

Pushbutton	Band	Frequencies
1.8 1	160 m	1.800 ... 2.000 MHz
3.5 2	80 m	3.500 ... 4.000 MHz
n/a	60 m	5.3305 / 5.3465 / 5.3665 / 5.3715 / 5.4035 MHz
7.0 3	40 m	7.000 ... 7.300 MHz
10 4	30 m	10.100 ... 10.150 MHz
14 5	20 m	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
0 VHF + Soft key	6 m	50.000 ... 54.000 MHz
0 VHF + Soft key	2 m	144.000 ... 148.000 MHz

Table 10

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

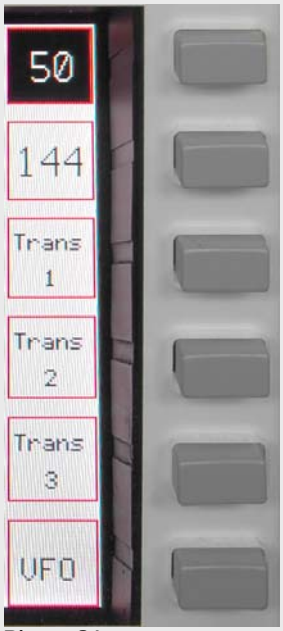
The two stored frequencies of a band are correlated to each VFO. Selecting the alternate VFO will give access to another two frequencies in that band (which were used with this VFO). Of course this is applicable for both MAIN- and SUB-RX.

11.1.2 VHF-Bands

Two VHF-bands are covered – 6m (50 MHz) and 2m (144 MHz). Pushing 0 VHF (located in the cluster MODE) will call up the VHF menu and will recall the last frequency used in VHF (50 MHz or 144 MHz). The respective band will be displayed inverse. Like on HF the last two frequencies used on VHF are recalled through the band pushbutton 0 VHF.

If a transverter has been used the last time VHF was activated the respective softkey will be displayed inverse. The specific transverter will be activated again.

VHF menu



Activates 6m band (here it is activated). Pushing repeatedly will toggle between the last two frequencies used in this band

Activates 2m band. Pushing repeatedly will toggle between the last two frequencies used in this band

Activates transverter #1

Activates transverter #2

Activates transverter #3

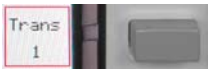
VFO menu will be called up

Picture 34

After selecting a tranverter the last used tranverter frequency will be displayed and the tranverter menu will be called up.

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.

11.1.3 Transverter Operation



Pushing Trans 1 softkey (VHF menu) will call up allocated Transverter menu (same applies to the other transverter settings):

TRANSVERTER menu

Transverter operation 28 MHz band (28 ... 30 MHz)

Transverter operation 50 MHz band (50 ... 52 MHz)

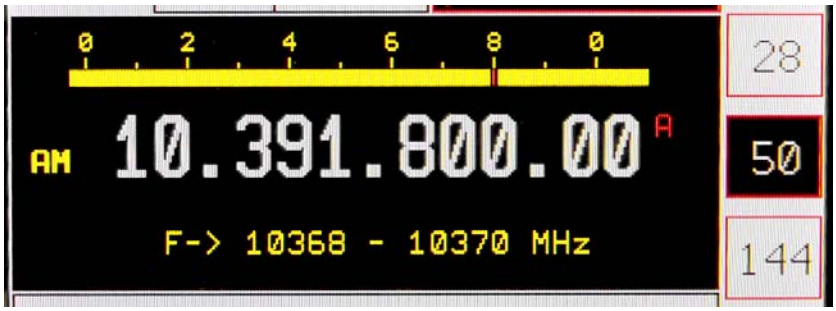
Transverter operation 144 MHz band (142 ... 148MHz)

Picture 35

The allocated band for the transverter will be displayed inverse. If the soft key is pushed and held the transverter operation frequency band are displayed instead of the standby VFO frequency.

Changing of allocated transverters

- Call up VHF menu (pushing = VHF)
- Select transverter #1 … #3
- Selects transverter band – push and hold respective soft key



Picture 36

The display shows instead of standby VFO frequency the transverter operation frequency band. Using control STEP VFO / MEM/CH gives access to all transverter operation frequency bands as listed below.

Transverter Operation Frequency Bands

Frequencies		
432	...	434 MHz
435	...	437 MHz
1.268	...	1.270 GHz
1.296	...	1.298 GHz
2.320	...	2.322 GHz
3.400	...	3.402 GHz
3.456	...	3.458 GHz
5.760	...	5.762 GHz
10.368	...	10.370 GHz
10.450	…	10.452 GHz
24.048	…	24.050 GHz
47.088	...	47.090 GHz
75.976	...	75.978 GHz

Table 11

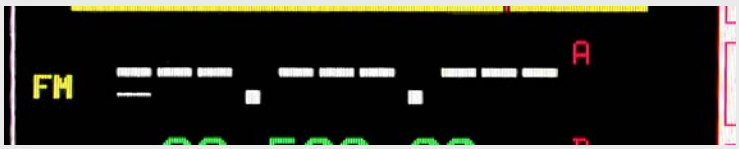
When operating with transverters the TX signal is only available at TX-ext. J14 at the rear panel. Max. power level at J14 is +20dBm. Hooking up multiple transverters requires external distribution of TX signals from TX-ext. J14

11.2 Numerical Frequency Input

Pressing ENTER (located in the cluster MODE) will activate the numerical frequency input.

When pressing ENTER

- The frequency display will show blanks for all digits. A cursor indicates which field can be edited.



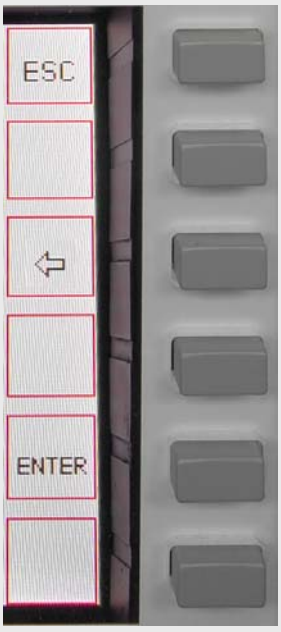
Picture 38

The number of blanks/digits shown depends on the resolution selected (see10.4 VFO menu).

- Pressing 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.

- The ENTER menu will call up

ENTER menu



Pushing ESC soft key will terminate the numerical input. The last used frequency will be displayed instead. The last used menu will be called up

Pushing ⇦ deletes the last numerical input. The curser will reappear at the position

Pushing ENTER soft key acknowledges the frequency input. The last used soft key menu will be called up.

Picture 39

It is not necessary to key all digits. 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.

After the least significant digit is typed in the numerical input is terminated and the frequency is transferred to the respective VFO.

In case the input is not acknowledged through ENTER soft key or finished after 10 seconds the numerical input will be terminated and the last frequency used will be selected again. The last used soft key menu will be called up.

In case the input frequency is a valid BAND frequency one of the stored frequency in that BAND will be overwritten by the numerical input.

11.3 CHANNEL Operation

Picture 40

Pressing CHANNEL (located in the cluster MODE) gives access to 3 banks of memory channels each storing 99 frequencies

When pressing CHANNEL

- the last used channel will be activated.
- the CHANNEL LED will be on
- the CHANNEL menu will be called up
- The frequency of the standby VFO will disappear. Instead information about the active channel are displayed (see page C24)

When a CHANNEL is selected toggling between MAIN-/SUB-RX and VFO-A/B is inhibited

The Channel softkey menu offers the following function:

CHANNEL menu

Picture 41

Selecting bank #1

Selecting bank #2

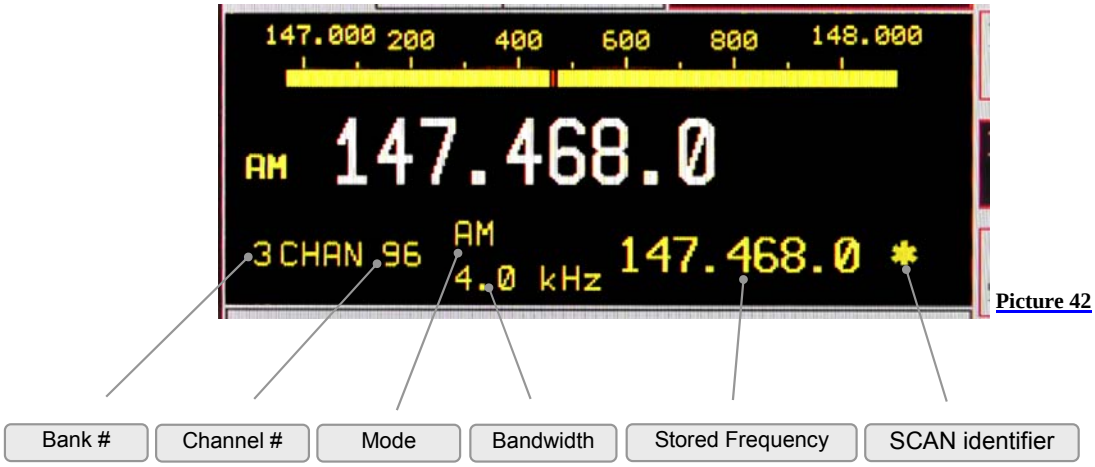
Selecting bank #3

Select (earmark) actual channel for SCAN-Modus

Writing channel to selected VFO (A or B) from active RX (MAIN or SUB)

Writing frequency of selected VFO (A or B) to selected channel

CHANNEL information display



Picture 42

After selecting the memory bank (#1 … #3) the control MEM/CH / STEP-VFO gives access to the 99 stored frequencies.

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

Channels which are selected for SCAN operation 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

Pushing CHANNEL again will terminate the CHANNEL operation:

- the last used VFO frequency will be activated
- the channel menu will be called up again in case a different soft key menu was activated during channel operations
- otherwise the channel soft key menu will be left and the last used soft key menu will be called up
- the CHANNEL LED will be off

11.4 MAIN Tuning Knob

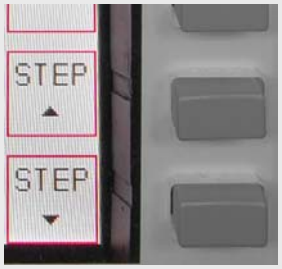
Primary means of tuning the **active** RX (Main- or SUB-RX) is the main tuning knob.

General frequency coverage is 9 kHz to 54 MHz and 110 MHz to 170 MHz. Due to the frequency scheme of the PT-8000 the frequency from 54 MHz to 110 MHz is blanked out.

Transmit operation is only possible on the allocated amateur radio bands (see Tab on page C20)

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

VFO menu



Picture 43

The tuning increments are adjustable through STEP selection, which is allocated to the VFO soft key menu.

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

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

The selectable increments are 1 Hz / 10 Hz / 100 Hz / 1 kHz.

Not displayed digits are set to 0.

Example

VFO frequency displayed	Transceiver-Frequency	Tuning with
1.234.567	1.234,567 kHz	1 Hz increments
1st pushing STEP up		
1.234.56	1.234,560 kHz	10 Hz increments
2nd pushing STEP up		
1.234.5	1.234,500 kHz	100 Hz increments
3rd pushing STEP up		
1.234	1.234,000 kHz	1 kHz increments

Table 12

Pushing STEP down will initiate the reverse process towards fine tuning

Each mode has been allocated a default tuning increment setting

- AM / FM: 100 Hz
- SSB / CW: 10 Hz

Changing modes will reset the current setting to the default values.

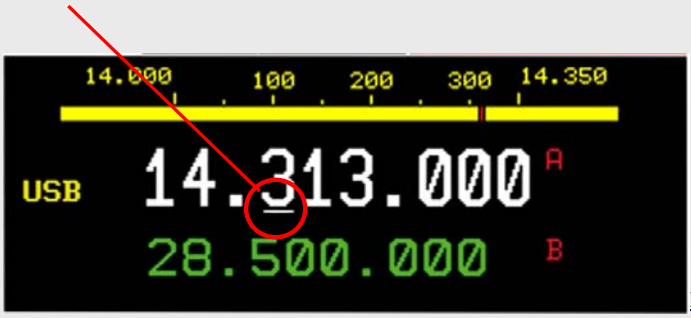
11.5 STEP-VFO Control

Picture 44

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

Pushing the knob activates the STEP-VFO function:

- A curser appears at the 100 kHz digit of the frequency display.



Picture 45

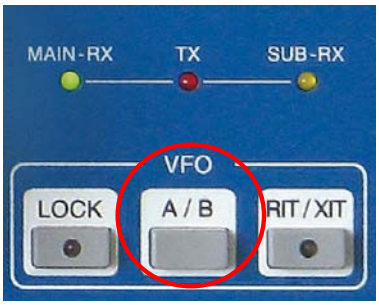
Turning the knob will now tune the VFO by **100 kHz** steps. Pushing the knob a second time will move the curser to the 10 kHz digit. Turning the knob will result in tuning the VFO by **10 kHz** steps. Pushing the knob another time will display the curser under the 1 MHz digit – hence tuning can now be established by **1 MHz** steps.

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

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 be at the place used at last.

When power up the PT-8000 the curser will initially alway occur at the 100 kHz (default value) position when activating STEP-VFO.

11.6 VFO Management



Picture 46

Both receivers (MAIN- and SUB-RX) have its own 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 the frequencies the VFOs store the filter (bandwidth) and mode information.

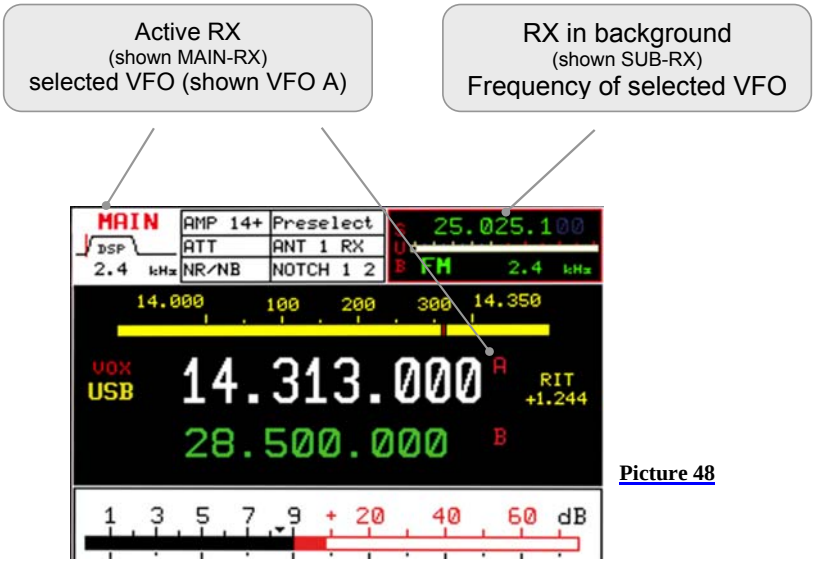
When pressing VFO A/B:

- In case the VFO softkey menu is already displayed the respective RX will change its VFO (A=>B or B=>A).
- If a different softkey menu is displayed the first push of VFO A/B will call up the VFO softkey menu. The second push will alter the VFO A an VFO B.

Picture 47

- 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/B.
- The smaller green display always shows the alternate VFO that is not selected and in red its identifier.

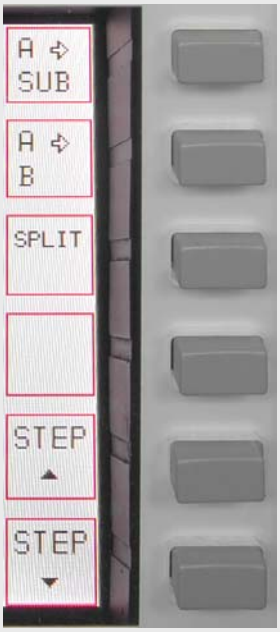
Only the SUB-RXs selected VFO frequency is displayed without its identifier.



Picture 48

The VFO softkey menu offers the following function:

VFO menu MAIN



Picture 49

The frequency of the selected VFO (shown VFO B) from the active RX (shown MAIN-RX) is copied to the selected VFO from the SUB-RX

The frequency of the selected VFO (shown VFO B) is copied to the alternate VFO

VFO SPLIT: The Frequency of the selected VFO (shown VFO B) will be used for receive; the alternate VFO (shown VFO A) will determine transmit frequency

SPLIT operation using VFO A and VFO B (= “VFO SPLIT”) is only possible with the MAIN-RX.

VFO menu SUB

Picture 50

The frequency of the selected VFO (shown VFO B) from the active RX (shown SUB-RX) is copied to the selected VFO from the MAIN-RX

The frequency of the selected VFO (shown VFO B) is copied to the alternate VFO

VFO SPLIT not applicable for SUB-RX

11.7 SPLIT Operation

There are various ways to split between transmit- and receive frequencies. Keep in mind that the PT-8000 represents a transmitter with two identical receivers. However, to link a receiver with the transmitter as a transceiver is only possible with the MAIN-RX. Hence only the MAIN-RX VFOs can determine the transmit frequency.

Three ways for SPLIT operation are available:

- Operating with MAIN-RX using SPLIT VFO function as described in 11.6. This is the “regular” method which gives you quick access to the desired SPLIT. This way the resources of the PT-8000 are used economical.
- Tuning MAIN-RX on the desired transmit frequency and using SUB-RX for receive. This way you can listen to the transmit and to the receive frequency simultaneously which can give some advantages in difficult (crowded) environments. However all resources of the PT-8000 are used. The SUB-RX can not be tasked with other valuable operations like band monitoring, transverter operation etc.
- Using MAIN-RX and detuning RX or TX through RIT and XIT. The least elegant method. SPLIT is limited to 10kHz.

SPLIT Operation using VFO SPLIT function

Tune with VFO A to the station you would like to call. Select VFO B and tune to the desired transmit frequency. Make sure the same mode is selected. Reselect VFO A. Press SPLIT. Now VFO A is for receive and VFO B is for transmit.

Of course you can tune with VFO B to receive and tune VFO A to the (split)transmit frequency. Selecting SPLIT will always chose the alternate VFO for transmit. Pressing VFO A/B will alternate RX and TX frequencies. Pressing SPLIT again will terminate SPLIT operation.

The actual operating frequency in RX/TX will always be displayed as the selected VFO frequency; i.e. during SPLIT the display will change with T/R switching.

SPLIT Operation using MAIN-RX and SUB-RX

Tune with SUB-RX (either VFO) to the station you would like to call. Tune with MAIN-RX to the desired transmit frequency. You can monitor the stations calling and the station to be called simultaneously. This might give advantages in crowded environments. Use the volume control for MAIN and SUB to adjust convenient monitoring.

SPLIT Operation using RIT/XIT

Tune with MAIN-RX to the frequency of the station you want to call. Engage XIT and select an offset that you desire to call the station.

Tune MAIN-RX to the desired transmit frequency to call a station that works split. Engage RIT and tune RIT to receive the station you want to call.

The offsets for XIT/RIT are limited to 9.999kHz.

11.8 RIT / XIT

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

The tuning range of RIT/XIT is always plus/minus 9.999 kHz

When pushing RIT/XIT located in the cluster VFO:

- RIT/XIT-LED will be on
- The RIT/XIT softkey menu will be called up - RIT or XIT are displayed inverse to show status
- CLAR control is enabled
- RIT or XIT and the offset is displayed right next to the frequency

In case of RIT only the display will show the actual frequency resulting from the RIT offset. During XIT always the receiving frequency will be displayed. The status RIT or XIT will be shown in the display together with the offset adjusted.

RIT/XIT menu / RIT/XIT offset

Activate RIT (shown)

Activate XIT

Clear the offset to 0

Only for RIT: resulting RX frequency

Offset RIT and XIT

RIT or XIT

When activating RIT/XIT the last used status (RIT or XIT) will be selected. Pushing RIT/XIT again will terminate the RIT/XIT function.

To adjust the offset frequency turn the knob called CLAR (clarifier) located next to the cluster VFO.

The tuning increments of the CLAR control is identical to the selected STEP rate.

RIT/XIT are not available for SUB-RX.

In case the SUB-RX is the active oneXIT/RIT and the offset are no longer displayed.

In case the SUB-RX is the active one and XIT is activated for the MAIN-RX, pushing PTT will display the MAIN-RX as the active one. XIT and the offset are indicated.

Termination of RIT/XIT operation

If the RIT/XIT softkey menu is displayed pushing RIT/XIT will terminate this modus. If the menu is not displayed pushing RIT/XIT will call it up and a second push will terminate ROT/XIT operation.

The RIT/XIT-LED will extinguish.

Changing MODE will always terminate RIT/XIT operation

11.9 LOCK Function

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

Picture 54

Engaging LOCK will turn its LED on

The following controls (knobs, buttons) are effected by LOCK:

- MAIN-RX VFO
- SUB-RX VFO
- STEP-VFO
- BAND
- CHANNEL / MEM
- RIT / XIT

- MAIN / SUB
- VFO A / B
- MODE

Pushing LOCK again will terminate locking of controls.

12 MEMORY OPERATION (MEM)

Pushing MEM in the cluster MODE will store the frequency of the active RX to one of the 99 memories organized in thee banks.

Other than CHANNEL operation (see page C-23) the RX will stay on its tuned frequency while MEM functions are executed.

Picture 55

- MEM-LED will be on

When activating MEM toggling between MAIN- and SUB-RX and VFO-A/B are inhibited.

- MEM softkey menu will be called up:

MEM menu

Selecting bank #1

Selecting bank #2

Selecting bank #3

Write displayed VFO frequency of active RX to selected memory (see below). MODE and filter selection will be stored as well.

Picture 56

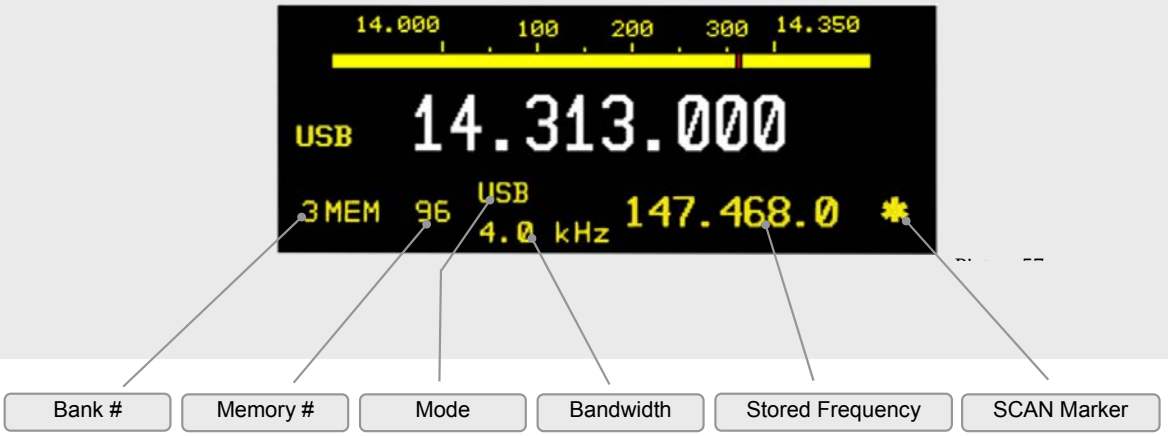
Pushing softkey BANK 1, BANK 2 and BANK 3 gives access to other banks. Use MEM/CH to select desired memory/channel. Pushing softkeys VFO > MEM“ will write the VFO frequency to the selected memory.

Always the last used bank # is selected and displayed with its first empty memory

In case all memories are written the last used memory will be displayed and overwritten.

- The frequency display of the standby VFO will be substituted by the information shown below:

Display Information



Memories are accessible from both MAIN- and SUB-RX.

When attempting to overwrite memories there will be no warning.

Termination of MEM modus

If the MEM softkey menu is displayed pushing MEM will terminate this modus. If the menu is not displayed pushing MEM will call it up and a second push will terminate MEM operation. MEM-LED will turn off.

13 Filter Bandwidth and Shift Function (Width/Shift)

Filtering in the PT-8000 is obtained by Roofing Filters (1st IF @ 70.7 MHz) and Channel Filters (2nd IF @ 10.7 MHZ). The channel filters can be further enhanced by a DSP (Digital Signal Processing) working in the audio range. The DSP filtering will:

- Interpolate between analogue filter bandwidths
- Sharpen the filter flanks
- Shift the placement of the filters

Acitvating DSP filtering is accomplished by the pushbutton FILTER in the cluster called DSP. If DSP filtering is engaged, FILTER-LED is on.

After power on the DSP filters are off (Default value).

Appropriate roofing filters are selected automatically

Picture 59

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

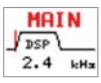
Pushing the knob will toggle between WIDTH and SHIFT function.

In case the FILTER-LED is off only the analogue (Xtal) filters are active. The selected bandwidth is dispayed and graphically expressed.

The position of the passband relative to the carrier frequency (represented by a vertical line) is indicated as well.

Pushing FILTER button will activate the DSP. Additional filter will enhance the overall filter response:

FILTER-LED will be on



The display will indicate DSP operation

Depending on the MODE there are analogue filters available which are interpolated in bandwidth by the DSP.

DSP OFF

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

LSB/USB

Width 1.8 / 2.0 / 2.4 / 2.7 / 3.1 / 6.0 kHz
Shift 100 Hz - 600 Hz in 100 Hz steps
The 2.7 kHz filter is the allocated roofing filter for SSB

CW

Width 0.5 / 1.8 kHz
Shift/Pitch400 Hz – 10000 Hz in 100 Hz steps
The 2.7 kHz filter is the allocated roofing filter for CW

AM

Width 6.0 / 15 kHz
Shift n/a
The 6.0 and 12.0 kHz filter are the respective roofing filter for AM

FM

Width 6.0 / 7.5 / 15.0 kHz
Shift n/a
The 6.0 / 7.5 and 12.0 kHz filter are the respective roofing filter for FM

For 7.5 and 15.0 kHz the 10.7 MHz Xtal filters are bypassed.

For FM the “bandwidth” is related to the audio response only; RF-bandwidth remains always 6 or 12 kHz respectively

DSP ON

Depending on MODE the following bandwidths (through the combination of digital and analogue filters) and passband shifts are available (using WIDTH and SHIFT control):

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 2.7 kHz filter is the allocated roofing filter for SSB

CW

Width 50 / 100 / 200 / 400 / 500 / 600 / ~~800 / 1000~~ Hz
Shift/Pitch400– 1000 Hz in 50 Hz steps
The 2.7 kHz filter is the allocated roofing filter for CW

AM

Width 4 / 5 / 7 / 8 kHz
Shift n/a
The 6.0 and 12.0 kHz filter are the respective roofing filter for AM

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 / 7.5 kHz / 8.0 kHz (Bypass)
Shift n/a
The 6.0 and 12.0 kHz filter are the respective roofing filter for FM

For > 4.6 kHz the 10.7 MHz Xtal filters are bypassed.

For FM the “bandwidth” is related to the audio response only; RF-bandwidth remains always 6 or 12 kHz respectively

14 NOTCH / NOISEREDUCTION / NOISEBLANKER

14.1 Notch Filter Functions

Two Notch filter of different type are available in the PT-8000. One is working at 1st IF 70.7 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 Notch Filter (ANF) – here called the DSP NOTCH.

DSP NOTCH and IF-NOTCH may be engaged simultaneously.

Notch filtering is not available in AM and FM. In case NOTCH filtering is active and modes are changed to AM/FM both NOTCHs will cease operation.

After power on both NOTCH filters are off (Default value).

14.1.1 IF-NOTCH

Picture 60

The IF-NOTCH will be activated by pushing the control IF-NOTCH which is located as depicted. On the display it is outlined as NOTCH 2.

AMP 14+	Preselect
ATT	ANT 1 RX
NR/NB	NOTCH 1 2

Picture 61

- The display will show NOTCH 2
- Turning IF-NOTCH will adjust the varable notch through the passband hence the interference will be almost nullified.

14.1.2 DSP-NOTCH

Picture 62

Pushing the button NOTCH located in the cluster DSP will activte the automatic notch filtering. On the display the DSP NOTCH is outlined as NOTCH 1.

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

- DSP NOTCH-LED will be on
- The display will show NOTCH 1

AMP 14+	Preselect
ATT	ANT 1 RX
NR/NB	NOTCH 1 2

Picture 63

14.2 Noise Reduction

Pushing the button NR located in the cluster DSP will active the Automatic Noise Reduction (ANR or NR). On the display the DSP NR is outlined as NR.

Picture 64

- DSP NR-LED w
- The display will

AMP 14+	Preselect
ATT	ANT 1 RX
NR/NB	NOTCH 1 2

Picture 65

After power on NR is off (default value)

14.3 Noise Blanker

Picture 66

The RX-NB will be activated by pushing the control RX-NB which is located as depicted. On the display it is outlined as NB.

- The display will

AMP 14+	Preselect
ATT	ANT 1 RX
NR/NB	NOTCH 1 2

Picture 67

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

After power on NR is off (default value)

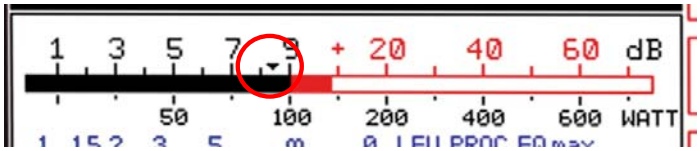
15 SQUELCH

Picture 68

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

The threshold for squelch operation is adjusted by turning the knob. Observing the S-Meter one can monitor the threshold adjustment through the squelch marker (triangle).

A triangle is moving in the S-meter according to the threshold setting of the SQL control.



Picture 69

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.

16 RX Gain Control (AGC / RF-GAIN)

The AGC (Automatic Gain Control) is active after power on, its hang time is 2 seconds (default value). Manual control of the AGC system is initiated through the AGC pushbutton located in the cluster FUNCTION.

Picture 70

AGC-LED is off during standard operation.

Pushing AGC will call AGC menu

- AGC-LED will be on.
- The AGC softkey menu will be called up:

AGC menu

Select AGC hang time 3 sec

Select AGC hang time 2 sec (default value)

Select AGC hang time 1 sec

Select AGC hang time 500 msec

Select AGC hang time 100 msec

The key toggles between RF-AGC / Audio-AGC (see below)

Picture 71

To prevent missing of weak signals during tuning the MAIN- or SUB-RX AGC hang time will be always 100 msec.

RF-AGC The AGC-voltage is derived from the RF-signal after it has passed the channel filters (10.7 MHz). The DSP will narrow the passband – hence out of (DSP)- filter signals may still derive AGC voltage. This can be annoying especially during CW operation. The solution is to switch to Audio-AGC.

Audio-AGC AGC is derived from the audio to overcome situations described above. Normal operation is RF-AGC.

The control knob RF is located as depicted. It allows to cut off AGC action by pushing and to adjust an RF threshold by turning.

Picture 72

AGC threshold

Turning the control RF will adjust the AGC threshold to a level which can be monitored by observing the S-Meter. The AGC threshold can be raised to a certain level where signals below are significantly less audible than signals above the threshold where AGC action will level out the audio.

AGC OFF

Pushing the RF control will cut off any AGC action.

- 1. The display will show AGC-OFF
- 2. AGC-LED will be on
- 3. S-Meter will fall back to zero

In case a signal is present the audio volume may exceed the comfort level

Turning the RF control allows to adjust the RF gain according to the situation.

17 FREQUENCY SCANNING (SCAN)

Pushing the button SCAN located in cluster FUNCTION will activate scanning of channels which are earmarked for scanning (see page C33). The receiver will scan any frequency between 9 kHz and 29.999 MHz, and it will scan frequencies from 50.0 to 54.0 MHz and 144.0 to 148.0 MHz.

These frequencies will be checked for a signal.

Picture 74

The RX will scan the channels from lower to higher frequencies with the stored MODE and bandwidth.

- If the squelch is engaged scanning will Stopp 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

Pushing SCAN will:

- SCAN-LED will be on
- The frequency of the standby VFO will disappear. Instead information about the scanned channel is displayed as in channel modus (see page C33)
- 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

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

18 CALIBRATION, VOICE RECORDER

Picture 75

The button MENU located in the cluster DISPLAY provides access to various settings and calibration routines of the PT-8000, to the spectrum display (band scope and channel scope) and the voice recorder.

Pushing the button MENU

- MENU-LED will be on
- MENU Softkey menu will be called up

MENU menu

Display software version RX CPU and access to update software

Internal reference and preselector

Brightness of display

Voice recorder (recording functions)

The key toggles between Audio Norm/Split (see below)

Various test functions may be activated TBD

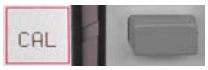
Picture 76

Audio-Norm Audio Normal will feed audio from MAIN and SUB to both speakers (PT-8000 and HN-8000). The volume of both RX is controlled by the appropriate knobs MAIN and SUB.

Pushing MAIN or SUB in Audio Normal will turn off PT-8000 speaker (MAIN) or HN-8000 speaker (SUB)

Audio-Split Audio Split will separate audio from MAIN and SUB hence MAIN is fed to PT-8000 speaker and SUB to HN-8000 speaker.

18.1 Reference Calibration And Preselector Calibration



Pushing CAL softkey will call up Calibration menu:

CAL menu

Return to MENU menu

Call Ref CAL menu (internal reference)

Call Pre CAL menu (alibration routine for preselector)

Picture 77

18.1.1 Reference Calibration

Pushing Ref CAL softkey will call up Reference Calibration menu:

Ref CAL menu

Return to CAL menu

Activate entry of correction value for reference oscillator through VFO MAIN/REF-SET control. Values are –16106 to +16106

Store the correction value

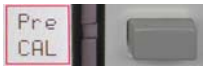
Set correction value back to zero

Toggle reference output ON / OFF

The display will change to a blue screen

(TBD)

18.1.2 Preselector Calibration



Pushing Pre CAL softkey will call up Preselector Calibration menu:

Pre CAL menu

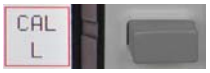
Return to the CAL menu

Start calibration routine

Call CAL L menu (adjust inductors of preselector manually)

TBD

TBD



Pushing CAL L softkey will call up a menu which allows to calibrate the preselector manually by tuning the L component. Segments of the main inductor may be added by activating A/B/C/D simultaneously:

The display will change

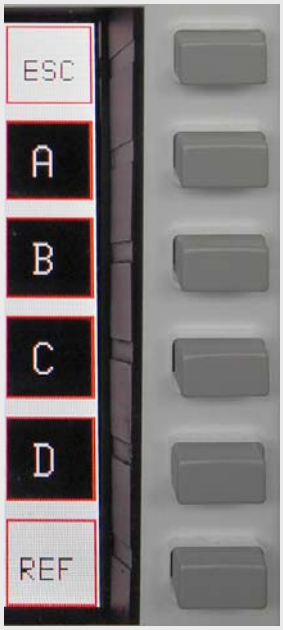
The alignment of the preselector can be done manually. Both C and L may be tuned. This function is preliminary – it will only work on the actual frequency tuned – i.e. there is no storage of data yet.

To align use a signal received on the tuned frequency or by means of a signal generator.

The capacitors of the preselector may be manually tuned by rotating the STEP-VFO control. Tuning range is between 1 and 255.

Tuning the Cs is possible without activating a software menu – unlike tuning L (see below).

CAL L menu



Return to the Pre CAL menu

Select part A of main inductor

Select part B of main inductor

Select part C of main inductor

Select part D of main inductor

TBD

Tuning of preselector is normally not necessary – the alignment has been done in the factory. However if done one should bear in mind preselector calibration will take around 30 minutes. No HF antenna should be attached to the unit during calibration.

18.2 Brightness Display (DIM)

Pushing DIM softkey will call up DIM menu:

DIM menu

Return to the MENU menu

Pushing repeatedly will dim the display

Pushing repeatedly will increase background light of display

18.3 Recording Functions (Voice Recorder)

Activation of voice recorder by pushing softkey VOICE REC:

The VOICE REC softkey menu will be called up:

VOICE REC menu

Leave VOICE REC submenu and get to MENU

Select source for recording in a sequential order: MAIN-RX; SUB-RX; TX – the respective sources will be displayed

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

Play and Stop playing (toggle mode); Play and Stop will be displayed accordingly

Clear recording memory; all records are deleted

Loop all recordings

Recording

- If the last recording is not deleted the actual recording will be added
- In case the memory has reached its capacity the recording will be ceased. Rec Start will be displayed. However a new record in not possible until the memory has been cleared.

The memory has a capacity to record 120 seconds

Playback

- Playback will always start at the very beginning of the records

If the records are to be transmitted simply key the TX

- 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

19 METERING OF PT-8000 (METER)

Picture 85

The button METER located in the cluster DISPLAY allows to change the units displayed for the S.Meter (active RX):

Hams radio units S + dB, dBm or dBµV.

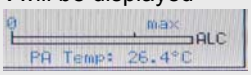
The meaning of the smaller right hand scale may also be altered from ALC and Compression level.

Pushing METER will:

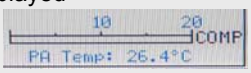
- METER-LED will be on
- The METER softkey-menu will be called up

METER menu

ALC (Automatic Level Control) from TX will be displayed



Compression level from TX will be displayed



S-Meter indicates ham radio standard: S + dB

S-Meter indicates: dBm

S-Meter indicates: dBµV

20 Basic Settings RX/TX

Picture 89

Pushing the 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.

If the last used menus (TX or RX) will be called up.

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

RX menu **HF**

RX menu HF

Picture 90

Select antenna #1 or – second press – antenna #1 for TX and an additional RX antenna. Softkey will be shown invers. The Display will show ANT 1 or ANT 1 RX if appropriate.

Select antenna #2 – softkey will be shown invers. The Display will show ANT 2 if appropriate.

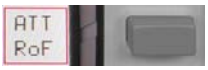
Preamplifier may be switches ON, ON + 7kHz HPF and ON + 14kHz HPF. Softkey will be shown invers. The Display will show blank, AMP, AMP 7+ or AMP 14+

Preselector may be switches ON or OFF. Softkey will be shown invers. The Display will show ***Preselect*** in the status field if appropriate.

This softkey will give access to a sub menu to select different roofing filters and to activate the attenuator

Access to TX menu

When working VHF preselector is not available (see below).



Pushing ATT / RoF softkey will call up ATT/RoF menu **HF**

ATT / RoF menu HF

Pushing ESC will return to the RX menu

Activate 6dB Attenuator

Select Roofing Filter 12.0 kHz

Select Roofing Filter 6.0 kHz

Select Roofing Filter 2.7 kHz

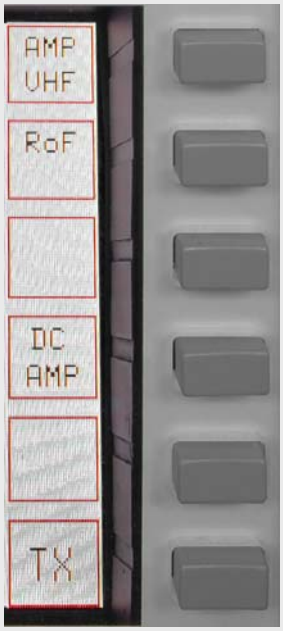
Switch back to normal i.e. automatic selection of roofing filters

If the Noise Blanker is activated the 12 kHz roofing filter will always be selected

If MODE is changed the selection will be normal, i.e. automatic. Same is true for power ON condition.

RX menu **VHF**

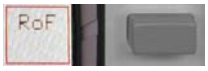
RX menu VHF



This softkey will give access to a sub menu to select different roofing filters

When activating this function 12 Volt DC are fed to the coaxial cable in order to run remote switches or remotely operated amplifiers through this supply voltage. The current is rated to 1 Amps.

Access to TX menu



Pushing RoF softkey will call up RoF menu **VHF**

RoF menu VHF

Pushing ESC will return to the RX menu

Select Roofing Filter 12.0 kHz

Select Roofing Filter 6.0 kHz

Select Roofing Filter 2.7 kHz

Switch back to normal i.e. automatic selection of roofing filters

The TX softkey menu offers the following functions:

TX menu

Access to 3 band EQUALIZER menu for TX to enhance audio as desired.

Toggle Leveler ON/OFF

Access to KEYER menu

Access to TX-Filter / TX-Shift menu

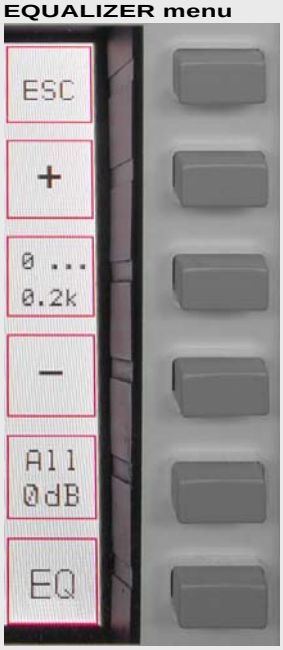
Toggle built-in automatic (iambic) CW-keyer ON/OFF

Access to TX Out menu

Access to RX menu

Pushing EQU softkey will call up the EQUALIZER menu:

EQUALIZER menu



Back to TX menu

Increase gain of selected EQU-band in 1dB Steps. Maximum gain is +9dB

Select EQU-band in a cyclic manner. EQU-band is depicted on the display

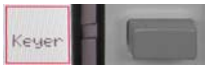
Decrease gain of selected EQU-band in 1dB Steps. Maximum gain is -9dB

Reset all previous settings to 0 dB for all 3 EQU-bands

Toggle Equalizer ON / OFF

Picture 95

The EQU-bands are defined:
0 ... 200 Hz / 200 ... 1500 Hz / 1500 ... 3000Hz



Pushing Keyer softkey will call up the KEYER menu:

KEYER menu

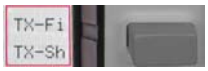
Back to TX menu

Selects “iambic” mode of the internal keyer

Selects “normal” mode of internal keyer

Reverses paddle function to accommodate left-/right hand operation

Shuts off internal keyer to allow use of external keying device



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

TX-Filter / TX-Shift menu

Return to TX menu

Press and hold while turning STEP-VFO control to select filter bandwidths between 2.5 kHz and 3.4 kHz

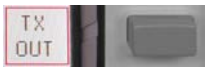
Press and hold while turning STEP-VFO control to adjust TX filter shift (TX-passband) from 0 Hz to +300 Hz in 25 Hz increments

Select 2.7 kHz 70.7 MHz bandwidth

Select 6.0 kHz 70.7 MHz bandwidth

Select 12 kHz 70.7 MHz bandwidth

Picture 97



Pushing TX-OUT softkey will call up TX OUT menu

TX-OUT menu

Return to TX menu

TX-signal will be routed to internal power amplifier

TX-signal will be routed to J14 (BNC; +20dBm) at rear panel to drive external equipment. Internal power amplifier will be shut down.

21 Transmitter Controls

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

21.1 ZERO-BEAT

Picture 99

Pushing ZERO-BEAT control will activate a 440 Hz tone in RX and TX mode.

In TX mode a 440 Hz tone will be transmitted.

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

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.

21.2 MIC

Picture 100

Turning MIC will adjust microphone sensitivity. Adjust not to exceed ALC limits shown on the ALC-meter.

Pushing MIC will turn ON and OFF VOX

21.3 PROC

Picture 101

Pushing PROC will turn ON and OFF microphone processor. Turning the knob will increase the processor level. Adjust not to exceed COMP limits shown on the COMP-meter.

If PROC is active COMP ON will be displayed

PROC is only available in USB/LSB

21.4 TX-PWR

Picture 102

Pushing the TX-PWR control will toggle the transmitter between low- and high power (10/25 Watts on HF/VHF and 100/600Watts on HF for Model A/B). Turning the knob allows continuous variation of power output in these two ranges.

21.5 VOX

Picture 103

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

21.6 ANTI-TRIP

Picture 104

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

21.7 DELAY (of VOX)

Picture 105

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

21.8 Monitoring Function (MONITOR)

Picture 106

Turning the MONITOR control will adjust the volume auf the audio to monitor the transmission of PT-8000.

21.9 TX-DELAY (CW)

Picture 107

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

21.10 KEY SPEED

Picture 108

Turning KEY SPEED controls the speed of the internal iambic keyer between 5 and XX WPM.

The CW weight remains constant.

22 Operating Auxiliary Equipment

TBD

Part D Annex

23 Software Update

TBD

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