

HSM1-40M SDR TRANSCEIVER

user manual

HAMBUILDER
RADIOWORK



HSM1 - 50W 40M
HAMBUILDER **SDR** MONO BAND HF TRANSCEIVER

hambuilder.com

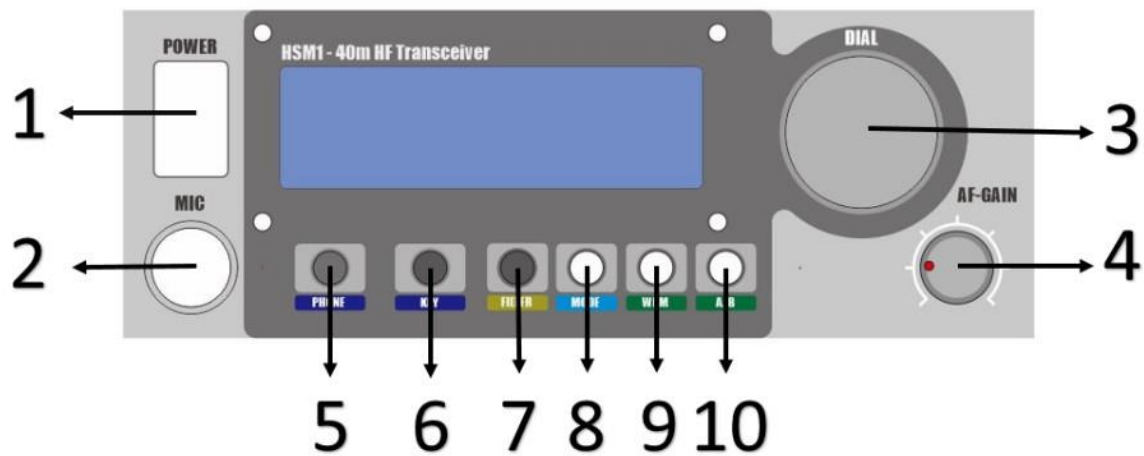
HSM1 - 50W Mono Band HF Transceiver (40m)

Hambuilder SDR Mono Band - Powerful, Simple, Reliable

The HSM1-40m is a 40-meter monoband HF transceiver designed for amateur radio operators who value efficiency, performance, and ease of use. Built on SDR (Software Defined Radio) architecture, RF signals are processed using precise I/Q mixing combined with advanced digital signal processing, including Hilbert Transform and FIR (Finite Impulse Response) filtering. Delivering an output power of up to 50 W, the HSM1 supports both SSB and CW operation, making it well-suited for beginners as well as experienced homebrewers looking for a compact yet powerful transceiver.

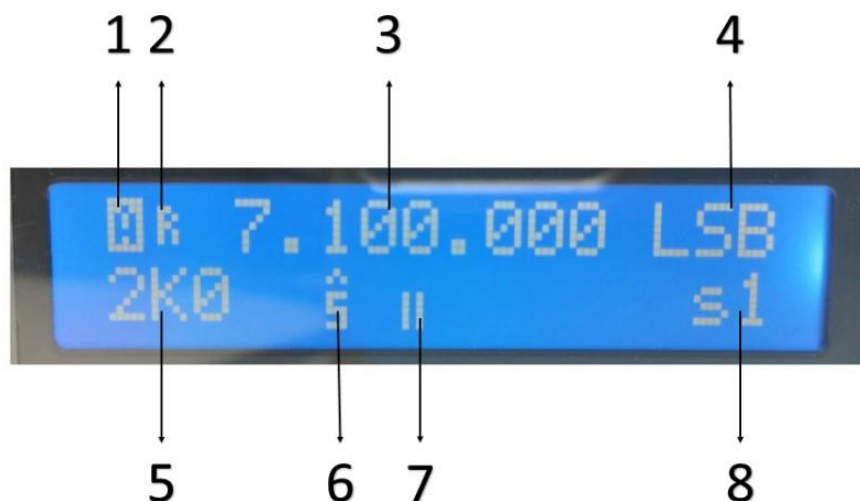
SPECIFICATIONS :

- Microcontroller: STM32F407
- Display: 16x2 character LCD
- Sampling Rate: 16 kHz (12-bit ADC/DAC)
- Local Oscillator: TCXO Si5351 I/Q Generator
- DSP: Hilbert, FIR, Noise Reduction, AGC, ALC Power
- Supply: 12–13.8 V DC
- Output Power: 50 Watts
- Modes: SSB & CW (straight/iambic)
- SSB Filter: 1600–3000 Hz
- CW Filter: 300–600 Hz
- Ports: Audio & Key socket
- PCB: Double-layer FR4
- Enclosure: Aluminum finish
- Dimensions: 5.5 x 15 x 16 cm (+3 cm heatsink)



FRONT PANEL CONTROLS AND CONNECTORS

1. **POWER**
Power switch for turning the transceiver **ON** or **OFF**.
2. **MIC**
Microphone input connector.
3. **DIAL**
Rotary encoder used to adjust the operating frequency and to navigate or change various functions.
4. **AF GAIN**
Audio gain control used to adjust the speaker or headphone volume.
5. **PHONE**
Headphone jack for connecting external headphones.
6. **KEY**
Morse key input for **CW operation**, supporting both **iambic** and **straight** keys.
7. **FILTER**
This button is used to select the IF filter
8. **MODE**
This button is used to change the operating mode (**LSB**, **USB**, **CW**) and to access the **SET (Setting Mode)**.
9. **WPM**
This button is used to adjust the keying speed
10. **A/B**
This button is used to select the active **VFO A** or **VFO B**.



DISPLAY INDICATIONS

The radio display provides the following information:

1. **A / B**
Indicates the currently selected VFO (**VFO A** or **VFO B**).
2. **R / T**
Indicates the operating state of the transceiver:
R = Receive mode
T = Transmit mode
3. **FREQUENCY**
Displays the current operating frequency.
4. **MODE**
Displays the selected operating mode (**LSB / USB / CW**).
5. **IF FILTER**
Displays the active IF filter bandwidth.
Available bandwidths: **1k6, 1k8, 2k0, 2k2, 2k4, 2k6, 2k8, 3k0**.
6. **FREQUENCY TUNING STEP**
Indicates the currently selected **frequency tuning step** for the rotary encoder.
Press the rotary encoder to change the tuning step.

Tuning step options:

- **0^** : 1 Hz step
- **1^** : 10 Hz step
- **2^** : 100 Hz step
- **3^** : 1 kHz step
- **4^** : 10 kHz step
- **5^** : 100 kHz step

7. SIGNAL BAR METER (S-METER)

The Signal Bar Meter provides a visual indication of the received signal strength. The number of bars increases as the received signal becomes stronger.

8. SIGNAL STRENGTH INDICATION (S1–S9 +20)

The signal strength meter indicates the level of the received signal using the standard **S-meter scale**, ranging from **S1 to S9+20 dB**.

- **S1** indicates a very weak signal.
- **S3** indicates a weak signal.
- **S5** indicates a moderate signal.
- **S7** indicates a strong signal.
- **S9** indicates a very strong signal.
- **S9+20** indicates an extremely strong signal level.

During **receive mode**, the meter operates as a **signal strength (S-meter)**.

During **transmit mode**, the indicator represents the **RF output power level**.



FUNCTION BUTTONS

- **FILTER**
This button is used to select the IF filter bandwidth:
1.6 kHz, 1.8 kHz, 2.0 kHz, 2.4 kHz, 2.6 kHz, 2.8 kHz, and 3.0 kHz.
- **MODE**
This button is used to change the operating mode (**LSB, USB, CW**) and to access the **SET (Setting Mode)**.
- **WPM**
This button is used to adjust the keying speed from **WPM 5 to WPM 40.**
- **A/B**
This button is used to select the active **VFO A or VFO B.**

ACCESSING and OPERATING SETTING MODE

To enter the **SETTING MODE**, rotate the **rotary knob** until the **Setting Mode** menu appears on the display.

Menu Navigation

- **Rotate the rotary knob** to scroll through the available menu items.
- **Press the rotary knob** to select or change the desired function.
- To exit the Setting Mode and return to normal operation, press the **MODE** button.

1. AGC SET

Used to enable or disable the **Automatic Gain Control (AGC)** function.

- **AGC ON** : Activates AGC. The system automatically adjusts the signal gain.
- **AGC OFF** : Deactivates AGC. Signal gain is controlled manually.

2. AGC ATTACK

Used to adjust the response speed of AGC to incoming signal changes.

- **FAST** : Very fast response to signal variations.
- **MEDIUM** : Balanced response speed.
- **LOW** : Slow response for more stable signal control.

3. TX XET

Used to set the output level of the transmitter.

- **HIGH** : High output level.
- **MEDIUM** : Medium output level.
- **LOW** : Low output level.

4. RX ATT

Used to adjust the attenuation level of the receiver signal.

- **0 dB** : No attenuation.
- **-1 dB** : Low attenuation.
- **-5 dB** : Medium attenuation.
- **-10 dB** : High attenuation.



REAR PANEL

- **ANTENNA**
Antenna connector (**PL-259 / SO-239 type**) for connecting a 50-ohm HF antenna.
- **POWER**
DC power input for an external **12–13.8 V DC** power supply.

USB PROGRAMMING INTERFACE



STM32 ST-LINK Utility

File Edit View Target ST-LINK External Loader Help

Memory display

Address: 0x08000000 Size: 0xFCD0 Data Width: 32 bits

Device STM32F405xx/F407xx/F415xx/F417xx
Device ID 0x413
Revision ID Rev 2.0
Flash size 1MBytes

Device Memory @ 0x08000000 : File : HSM1 20 new2.hex

Target memory, Address range: [0x08000000 0x0800FCD0]

Address	0	4	8	C	ASCII
0x08000000	2001FFFC	0000D4D1	0000E7F1	0000E7F1	üÿ. Ñ Ò .. ã ç .. ã ç ..
0x08000010	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000020	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000030	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000040	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000050	0000E7F1	0000E7F1	0000D1DD	0000E349	ã ç .. ã ç .. Ý Ñ .. l ä ..
0x08000060	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000070	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..
0x08000080	0000E7F1	0000E7F1	0000E7F1	0000E7F1	ã ç .. ã ç .. ã ç .. ã ç ..

13:22:42 : NO target connected
13:22:52 : ST-LINK SN : 182B180029135147324D4E00
13:22:52 : V2J29S7
13:22:52 : Connected via SWD.
13:22:52 : SWD Frequency = 4,0 MHz.
13:22:52 : Connection mode : Normal.
13:22:52 : Debug in Low Power mode enabled.
13:22:53 : Device ID:0x413
13:22:53 : Device flash Size : 1MBytes
13:22:53 : Device family :STM32F405xx/F407xx/F415xx/F417xx

Debug in Low Power mode enabled. Device ID:0x413 Core State : Live Update Disabled

PROGRAMMING PROCEDURE

Programming is performed using the **STM32 ST-LINK Utility** application.

1. Connect the **CB connector** to the **CB connector on the MIC port**.
2. Connect the programming interface to the computer using a **USB ST-LINK V2**.
3. Launch the **STM32 ST-LINK Utility** software.
4. From the menu bar, select **Target**, then click **Connect**.
The microcontroller device will be detected and displayed.
5. Select **File**, then click **Open File** to load the program (firmware) file.
6. Select **Target**, then click **Program & Verify**.
7. The programming process will start automatically.
Once completed, the device is successfully programmed.