HF Power Amplifier

INSTRUCTION MANUAL

- Intelligent, automatic and synchronous frequency band switching
- Multiple types of alarm protection
- Optional four level amplification gains

TO USERS

This power amplifier is mainly used for linear power amplification of full band 15W HF transceivers, and can also be used in conjunction with any low-power HF transceivers such as Recent RS-918/RS-978, ELECRAFTKX3 ultra-portable HF radio station, ELAD FDM-DUO, YAESU FT-817/818, Xiegu X6100, etc.

Please read all instructions carefully and completely before using the amplifier.

Main Functions:

- Intelligent, automatic and synchronous frequency band switching
- Multiple types of alarm protection including overvoltage, undervoltage,overcurrent, overheating and abnormal standing-wave ratio
- Automatic temperature detection to control the fan for heat dissipation
- Display of voltage, current, power and temperature
- Optional parameter graphic display
- Manual and automatic band switching selectable
- Optional four level amplification gains of G1/G2/G3/G4

PRECAUTIONS

- Please follow the following precautions to prevent fire, personal injury and damage to HF power amplifier.
- Do not continously transmit for long time, it may lead to overheat of HF power amplifier.
- Do not attempt to modify this HF power amplifier unless otherwise specified in this manual.
- Do not expose HF power amplifier to direct sunlight for long time, and do not place it near the heating device.
- Do not place the HF power amplifier in areas with excessive dust, moisture or splashing water, nor on unstable surfaces.
- Please immediately turn off the power of HF power amplifier if it emits abnormal odor or smoke.
- This working voltage of HF power amplifier is 13.8V DC, do not use the 24V DC power supply.

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Supplied Accessories

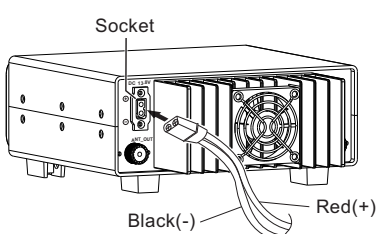
The following accessories are supplied:

No.	Name of Accessory	Quantity
1	RF Coaxial Feeder (50Ω, Optional)	1
2	DC Power Cable	1
3	PTT Synchronous Data Cable	1
4	Fuse	2
5	Instruction Manual	1

Power Supply Connection

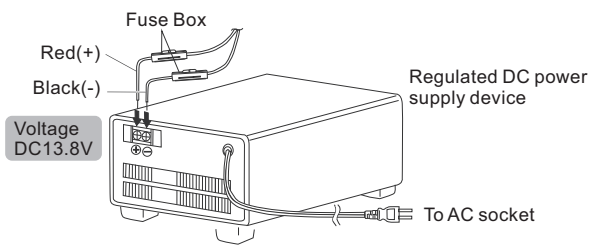
A separate 13.8V DC power supply device(to be purchased by the user) is required for the use of HF power amplifier. It is recommended to use the power supply device with the current capacity at 30A or above.

1.Connect the positive and negative terminals of the DC power cable, red - positive (+), black - negative (-), to the positive (+) and negative (-) terminals of the HF power amplifier, and tighten them with a screwdriver.



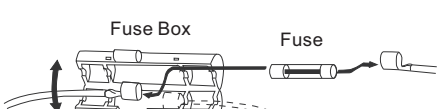
2. Connect the DC power cable to the regulated DC power supply device and check whether the polarity is correct: red - positive (+), black - negative (-).

- Do not connect the DC power cable to the AC socket directly.
- Connect the HF power amplifier to the regulated DC power supply device with the supplied DC power cable.
- Do not replace the cable with wires at smaller wire gauge.



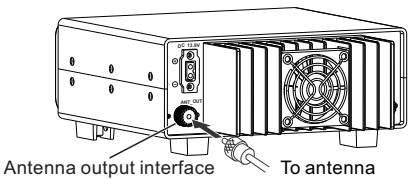
◆ Fuse Replacement

Please identify the cause first and then correct the issue if the fuse blows. Replace with 40A fuse after solving the problem. Please disconnect the power cable and contact the dealer for assistance if the newly installed fuse continues to blow.



Antenna Connection

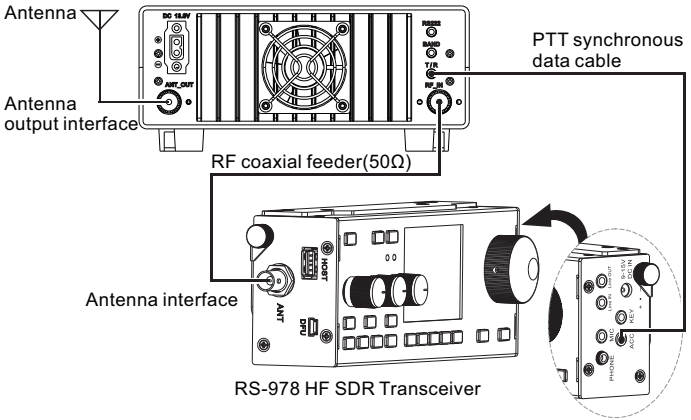
Connect the antenna suitable for this power amplifier to the [ANT-OUT] antenna output interface, and note that the antenna impedance should be 50 Ω. The antenna terminal should be tightened to ensure tight contact and no looseness.



Connection of HF SDR Transceivers

Connect the [ANT_IN] antenna input interface of HF power amplifier to the supplied 50Ω feeder, and connect the other end of the feeder to the antenna interface of HF SDR transceiver. Users may need to add their own interface converters due to possible differences in the antenna interfaces of HF SDR transceiver.

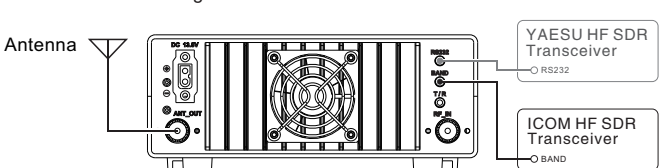
Connect the PTT synchronous data cable (standard supplied, plug size 3.5mm) to the [T/R] receiving and transmitting conversion control interface of the HF power amplifier, and connect the other end of the PTT synchronous data cable to the PTT control signal output interface of HF SDR transceivers (such as the ACC interface of RS-918/RS-978). It will output a low level and control the HF power amplifier to enter the transmission state through the [T/R] interface when pressing the [PTT] button of HF SDR transceiver; The HF power amplifier switches to receiving mode when releasing the [PTT] button of HF SDR transceiver.



◆ Band Switching Data Synchronization

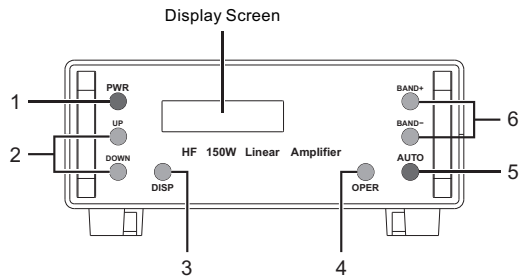
For the HF SDR transceiver with the interface for band switching data synchronization, it can be connected to the [BAND] or [RS232] interface of this power amplifier to achieve automatic band synchronization switching.

- For ICOM HF SDR transceiver, it can be connected through the [BAND] band switching data interface to achieve synchronous band switching.
- For YAESU HF SDR transceiver, it can be connected through the [RS232] serial band data synchronization interface to achieve synchronous band switching.



PANEL DESCRIPTION

Front Panel



1. [PWR] Power Key

→ In shutdown state, short press [PWR] key to power on and enter standby mode.

→ In standby mode, long press [PWR] key to power off.

→ When quitting the setup menu mode and selecting whether to save the setting data, press [PWR] key to choose not to save it.

→ In alarm mode, press [PWR] key to cancel the alarm.
Multiple types of alarm protection including overvoltage, undervoltage, overcurrent, overheating and abnormal standing-wave ratio.

2. [UP] [DOWN] Keys

→ In standby mode, short press [UP]/[DOWN] key to switch power amplification gain levels upward/downward.
Optional four level amplification gains of G1/G2/G3/G4.

→ In standby mode, long press [UP]/[DOWN] key to continuously switch power amplification gain levels upward/downward.

→ In setup menu mode, short press [UP]/[DOWN] key to switch menu item value upward/downward.

→ In setup menu mode, long press [UP]/[DOWN] key to continuously switch menu item value upward/downward.

3. [DISP] Display Key

→ In standby mode, short press [DISP] key to select the internal parameter display items.
5 kinds of parameter display items selectable, including output power, SWR, power supply voltage, amplifier current and temperature.

→ In standby mode, long press [DISP] key to enter setup menu mode.

→ In setup menu mode, short press [DISP] key to switch setup menu items.

→ In setup menu mode, long press [DISP] key to continuously switch setup menu items

4. [OPER] Operation Key

→ In standby mode, press [OPER] key to select standby/amplification working state.
Standby working state: STBY displays.
Amplification working state: OPER displays.

→ In setup menu mode, press [OPER] key to exit the setup menu mode and select whether to save the setting data.

5. [AUTO] Automatic Band Detection Key

→ In standby mode, press [AUTO] key to turn on/off automatic detection of band and display.

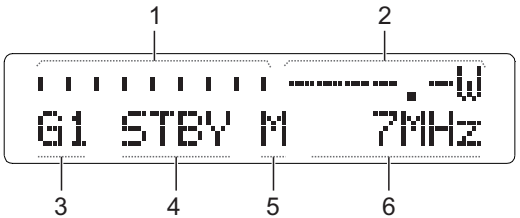
6.[BAND+] / [BAND-] Manual Band Switch Keys

→ In standby state, press [BAND+]/[BAND-] key to select the next/previous band. 9 bands are selectable, including 1.8MHz, 3.5MHz, 7MHz, 10MHz, 14MHz, 18MHz, 21MHz, 24MHz, 28MHz.

→ When quitting the setup menu mode and selecting whether to save the setting data, press [BAND+] key to save it.

Notice: Not any band detection protection is provided for manual band switch, so this setting should only be used as a last resort. It may seriously damage the output filter and RF power amplifier tube if the wrong band is accidentally chosen!

Display Screen



1. Internal Parameter Item Indication

5 kinds of parameter display, including Output Power (W), SWR, Power Supply Voltage (V), Amplifier Current (A) and Temperature (℃).

2. Internal Parameter Item Graphic Display Indication

Convert the values of internal parameter items into a bar graph signal display.

3. Amplification Gain Level Indication

4 levels of amplification gain display: G1, G2, G3, G4.

4. Working Status Indication

Working status display: STYB (Standby), OPER (Operation), TX (Transmitting).

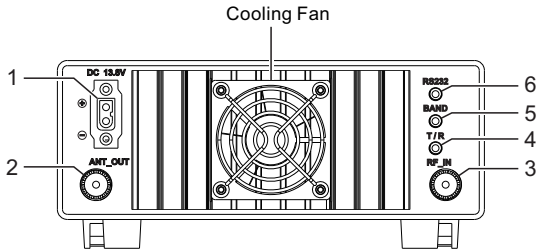
5. Band Switching Mode Indication

Band switching mode display: M (Manual band switching), A (Automatic band switching).

6. Band Indication

9 kinds of band display: 1.8MHz, 3.5MHz, 7MHz, 10MHz, 14MHz, 18MHz, 21MHz, 24MHz, 28MHz.

Rear Panel



1. [DC13.8V] Power Interface

The rated voltage is DC13.8V, attention should be paid to the positive/negative electrode when connecting the power cable.

2. [ANT_OUT] Antenna Output Interface

Connect the antenna.

3. [RF_IN] RF Signal Input Interface

Connect to the antenna interface of HF SDR transceiver with the supplied 50Ω feeder. An attenuator must be added in series connection to the RF antenna interface when output power of HF SDR transceiver exceeds 15W.

4. [T/R] Receiving and Transmitting Conversion Control Interface

Connected to the PTT control signal output interface of HF SDR transceivers with the PTT synchronous data cable (standard supplied, plug size 3.5mm). It will enter the transmission state when the PTT signal is low; And it will convert to receiving mode when the PTT signal is high.

5. [BAND] Band Switching Data Interface

Connected to the voltage band signal synchronization interface of ICOM HF SDR transceivers for synchronously switching bands.

6. [RS232] Serial Band Data Synchronization Interface

Connected to the serial band data synchronization interface of YAESU HF SDR transceivers to achieve synchronous band switching.

SETUP MENU

Multiple options are provided to make flexible modifications in accordance with actual usage needs.

Setup Menu Operation

1. In standby mode, press and hold [DISP] key until you hear a beep to enter the setup menu mode.
2. In setup menu mode, press [DISP] key to switch menu items.
3. In setup menu mode, press [UP]/[DOWN] key to select menu item values.
4. In setup menu mode, press [OPER] key to exit the setup menu mode and select whether to save the setting data.

- Press [PWR] key to choose not to save it and return to standby mode.
- Press [BAND+] key to save it and return to standby mode.

Menu Items	Descriptions	Options	Default
Auto Band Detect Select	Automatic Band Detection	TRX2-HF-1/KX3/ /F-Sense FT-817	F-Sense
Serial Test Mode	Serial Test Mode	Off/On	off
Serial Speed Baud Rate	Serial Speed Baud Rate	1200/2400/4800/9600/ 19200/38400/57600/115200	9600
Polling Timer Interval	Polling Timer Interval	Disabled/0-10Sec	2Sec
LCD Display Backlight	LCD Backlight Brightness	50-1000(Step 10)	300
LCD Display Contrast	LCD Display Contrast	0-3000(Step 50)	2000
SWR Trip Limit	SWR Alarm Limit	1.0-10.0(Step 0.1)	3.0
Temperature Uints	Temperature Units	Fahrenheit/Celsius	Celsius
Fan Control Mode	Fan Control Mode	Normal/Low/Medium/High	Normal
Overtemp Limit	Over Temperature Limit	50-100℃(Step 1)	70°C
Fan Cut-In Temp Start	Fan Start Temperature	0-69℃(Step 1)	40°C
Band Display Units	Band Display Units	MHz/Metres	MHZ
Graphical Limits Display	Graphic Display Switch	Off/On	Off
Graphic Display Type	Graphic Display Type	Original/Large/Small	Original
Start-Up Display Page	Start-Up Display Interface	O/P Power/SWR/Voltage /Current/Temperature	O/P Power

Auto Band Detect Select

It controls the operation of the [AUTO] key for automatic band detection function. 4 modes are selectable.

- TRX2-HF-1
  This mode should be selected when this amplifier is connected to the JUMA TRX2 HF SDR transceivers,and the port baud rate of the amplifier and HF SDR transceivers should be set to be consistent.
- KX3
  This mode is used with ELECRAFT KX3 ultra-portable HF SDR transceivers. (Used with any HF SDR transceivers using the ASCII command protocol).
- F-Sense
  The frequency of the RF signal input from the HF SDR transceiversis measured in this mode and the results will be used to select the correct low-pass filter.To use this mode, please select TUNE mode on the connected HF SDR transceiver and input 100mW-10W, the signal will be automatically detected by this amplifier to select a suitable filter.

- FT-817

  It will allow automatic band detection when connected to YAESU FT-817 or similar HF SDR transceivers with appropriate accessory cables.The output of HF SDR transceiver can be detected by the amplifier and used to automatically select the correct band step DC voltage.The rear accessory BAND socket should be used.

Serial Test Mode

Set the test mode of RS-232 port to be turned on or off.

Serial Speed Baud Rate

Set the baud rate of RS-232 port with range of 1200-115200bps.

Polling Timer Interval

The polling timer interval is used for automatic band detection, which polls the detection at a certain time to obtain band information, with 0-10 seconds selectable.

LCD Display Backlight

LCD backlight brightness, with 50-1000 (Step 10) selectable.

LCD Display Contrast

LCD display contrast, with 0-3000 (Step 50) selectable.

SWR Trip Limit

SWR alarm limit can be adjusted within the range of 1.0-10.0 (Step 0.1).
Note: SWR alarm is valid only when the HF power amplifier is in amplification mode.

Temperature Units

2 kinds of temperature units are available, including Celsius degree (℃) and Fahrenheit degree(℉).

Fan Control Mode

4 optional speeds are available for the fan, including normal, low speed, medium speed and high speed.
Normal: The operation of fan is entirely determined by the temperature of the radiator.
Low Speed: The fan operates continuously at low speed, but will switch to medium or high speed based on the temperature of the radiator.
Medium Speed: The fan operates continuously at medium speed, but will switch to high speed based on the temperature of the radiator.
High Speed: The fan operates continuously at high speed.

Overtemp Limit

Over temperature limit is used to set the temperature threshold value for overheating alarms, with 50-100℃(Step 1) selectable.
Note: When the device overheats, "TEMP" displays and the amplifier stop working when it overheats.

Fan Cut-In Temp Start

The fan starts working when the amplifier temperature rises to a certain value, which is the fan start temperature, with 0-50℃(Step 1) selectable.The fan automatically switches among low, medium, and high speed to achieve the best heat dissipation effect as the temperature of the amplifier increases and decreases.

Band Display Units

2 kinds of band display units are available, including MHz and m(meter).

Graphical Limits Display

Set whether to convert the values of internal parameter itemsinto a bar graph signal display.

Graphic Display Type

3 kinds of bar graph display are available, including original, large, small.

Original

Large

Small

Start-Up Display Page

Set the content of displaying parameters on startup.
O-Off,P Power-Power, SWR, Voltage, Current, Temperature.

The main function of this amplifier is to amplify the transmitting power of HF SDR transceivers.

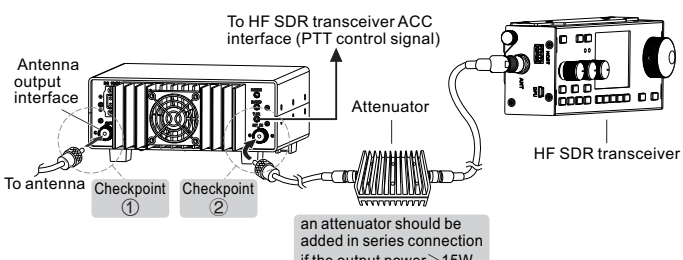
Inspection Before Transmitting

It is necessary to conduct the following inspections before transmitting.

1. Check Input Power

The input power of HF power amplifier cannot exceed 15W, that is, the output power of the HF SDR transceivers cannot exceed 15W, otherwise it will damage the amplifier.

Recommendation: If the output power of HF SDR transceiver exceeds 15W, an attenuator can be added in series connection to the RF antenna interface of it (for example, the power can be reduced by half with a 3dB attenuator), so that the RF power can be reduced to below 15W and then connected to the input interface of the HF power amplifier, as shown in the following figure.



2. Check Antenna Connection

It is necessary to check whether the antenna output interface of HF power amplifier is properly connected with an antenna at impedance of 50Ω before transmitting. Never transmit if the antenna is not connected, otherwise it will damage the HF power amplifier. (Note: Checkpoint ① in the above figure)

RF_IN—Connected to HF SDR transceiver

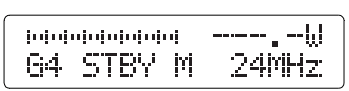
ANT_OUT—Connected to antenna

Transmitting Amplification

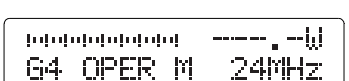
The basic operation process of transmitting amplification is as follows:

1. Power on after inspections.
2. Press [DISP] key to switch the internal parameter display item to be power.

3. Press [UP]/[DOWN]key to switch power amplification gain levels upward/downward.Optional four level amplification gains of G1/G2/G3/G4.



4. Press [OPER] key to enter amplification working state, OPER displays.



5. Power amplification is performed when HF SDR transceiver enters the transmission state.

Alarm Protection

Multiple alarm protections are available. After an alarm is triggered, should wait for the alarm conditions to be resolved and restored to normal before pressing [PWR] key to exit the alarm state.

◆ Overvoltage Alarm

The default threshold for overvoltage alarm is 14.8V. If exceeding the threshold, the overvoltage alarm will be triggered, and "BATT" flash displays, then "Hi_V" continues to flash and sound an alarm until the voltage returns to normal before pressing [PWR] key to exit the alarm state.

◆ Undervoltage Alarm

The default threshold for undervoltage alarm is 11.0V. If below the threshold, the undervoltage alarm will be triggered, and "BATT" flash displays, then "Lo_V" continues to flash and sound an alarm until the voltage returns to normal before pressing [PWR] key to exit the alarm state.

◆ Overcurrent Alarm

The default threshold for overcurrent alarm is 24.0A. If exceeding the threshold, the overcurrent alarm will be triggered, and "CURR" flash displays, stop transmitting.

◆ Overheating Alarm

When the overheating alarm is triggered, "TEMP"flash displays, sound an alarm and stop transmitting until the temperature returns to normal before pressing [PWR] key to exit the alarm state.

◆ Abnormal SWR Alarm

When the abnormal SWR alarm is triggered, "SWR" flash displays, sound an alarm and stop transmitting.

SPECIFICATIONS AND TROUBLESHOOTING

Main Technical Specifications

Items	Specifications	Items	Specifications
Frequency Range	0.5 ~ 30MHz	Maximum Input Power	≤15W
Working Voltage	DC13.8V ± 15%	Maximum Output Power	≤150W
Standby Current	≤400mA	Maximum Working Current	≤25A
Working Temperature	–20℃ ~ +60℃	Receiving Loss	–1 ± 0.4dB
Storage Temperature	–40℃ ~ +85℃	Dimensions (L×W×D)	215 X 96 X 262mm
Modulation Mode	FM/AM/SSB/CW/FT8	Weight	2100g
Working Mode	Half-duplex		

Note: All stated specifications are subject to change without notice or obligation.

Troubleshooting

The problems described in the following table are some common operating faults. These types of errors are generally caused by improper connections and incorrect operation settings. These problems are usually not caused by circuit failures. Before you suspect that the amplifier has malfunctioned, please refer to these tables and relevant parts of this manual.

Problem	Possible Cause	Solution
Cannot turn on.	1. The power cable is not connected well. 2. The power cable fuse is blown. 3. Operating voltage is more than 17V or less than 9V.	1.Check whether the power cable is connected correctly: red (+); black (-). 2. Find the cause of the blown fuse, replace the new fuse with 40A current. 3. Adjust the power supply to be 13.8V.
Power transmission without output.	1. Antenna, feeder, attenuator, etc. are not properly connected 2. Amplifier in alarm protection.	1. Check whether the antenna, feeder and attenuator are connected correctly. 2. Check whether the amplifier is in alarm protection, have it resolved and restored to normal before pressing [PWR] key to exit the alarm state.
Frequent overheating alarm protection.	1. The fan is broken. 2. Transmit for long time. 3. The input power of HF SDR transceiver is too high.	1. It should be replaced immediately or a temporary household electric fan should be used for heat dissipation if the fan speed is too slow or damaged. 2. Should not transmit continuously for long time, it is recommended to stop transmittingfor a while. 3. An attenuator should be added in series connection to the RF antenna interface of HF SDR transceiver, so that the RF power can be reduced to below 15W.

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