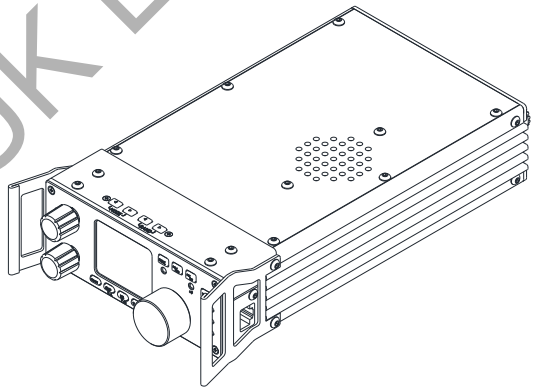
G90

Portable SDR HF Transceiver with inbuilt ATU

Operating instructions



V1.0.04.2

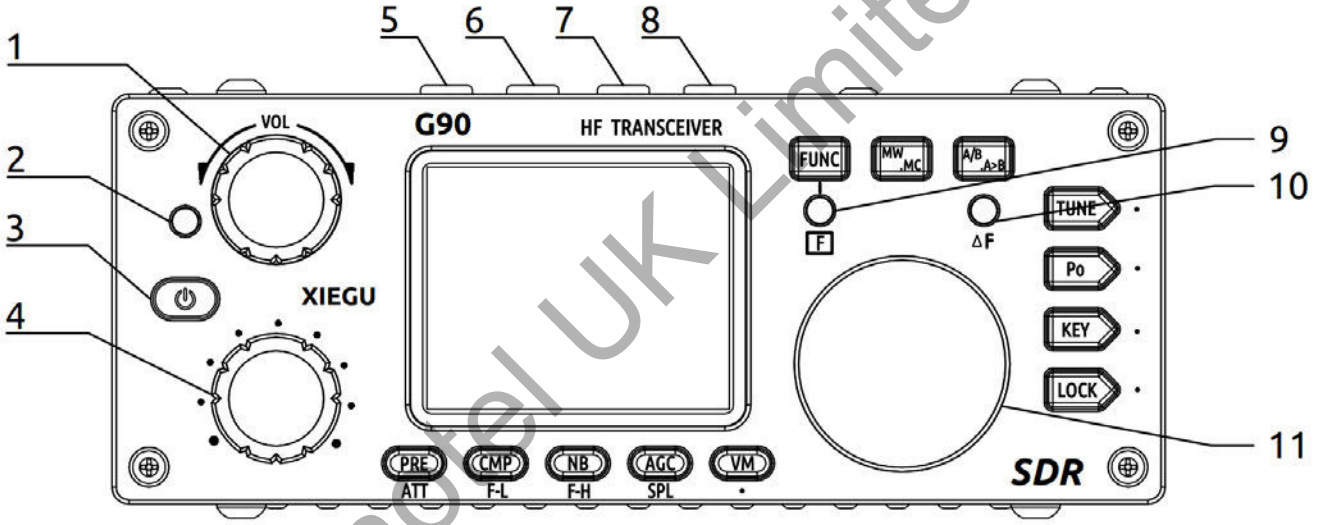
Table of Contents

The Xiegu G90 is a portable 20W HF amateur radio transceiver with 24-bit 48 kHz SDR architecture and a built-in automatic antenna tuner. The display panel and the main unit can be separated to enable remote mounting of the display panel. It delivers excellent performance on both transmit and receive and is highly configurable. Standout features include the following:

- High performance front end with pre-selectable filter options;
- Frequency range of 0.5-30MHz, SSB/CW/AM/ FM[*1] operating modes;
- 30 x 35 mm high brightness full colour TFT LCD screen;
- ±24 kHz bandwidth spectrum display with waterfall function;
- Software defined narrowband filter (CW mode: 50 Hz);
- Detachable display panel;
- Up to 20W RF output power;
- Built-in wide range ATU;
- Diversified interfaces, In particular, the baseband I/Q output allows it to interface with any external device that can handle baseband I/Q, including sound card-based or PC-bas d ap lications such as XDT1.

In order to derive the max mum utility from your new transceiver, please read this manual carefully before use.

***1: The FM mode can only be turned on when the forthcoming GSOC controller/panadapter is used.**



1. Volume knob

- Turn to adjust the AF volume.
- Short press to switch to headphone mode.

2. Power/Receive/Transmit LED

- Standby/receive status - yellow-green;
- Transmitting status - red;
- CW decoding status – flashes yellow.

3. Power switch

- Press and hold to power on.
- Press and hold to shut down.
- Press briefly to cycle display on/off.

4. Multifunction adjustment Knob (MFK)

- Turn to change frequency – default step s 100 kHz.
- Press to enter DSP filter customizat on mode (page 17).
- Press and hold to customize MFK operation (page 17).

5-6. Mode switching

Mode switching.

7-8. Band Switching

Band switching.

9. Function Indicator light

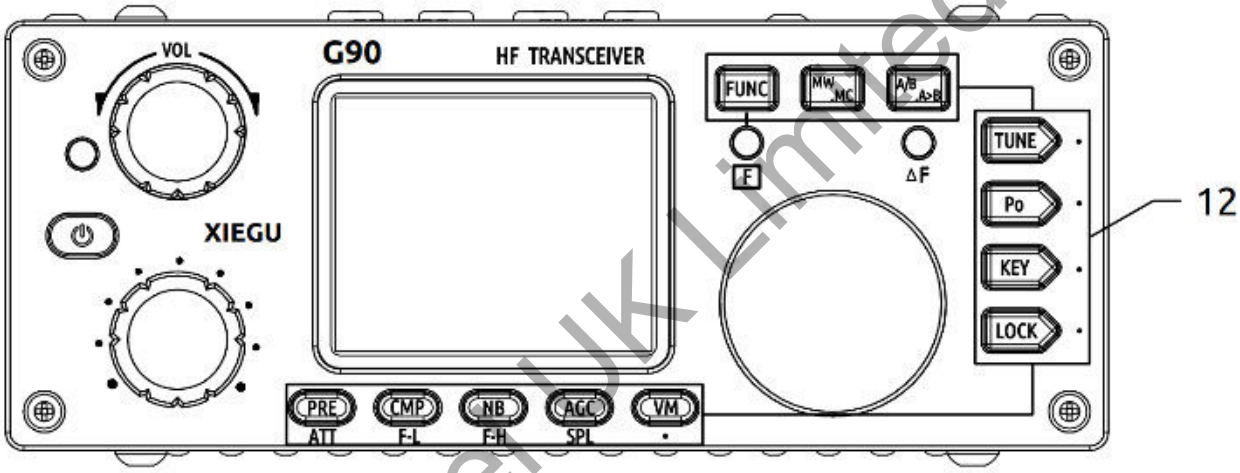
This indicator lights up when the second function of the buttons below the display is selected (page 21).

10. △F LED

CW decoding RX lock indicator.

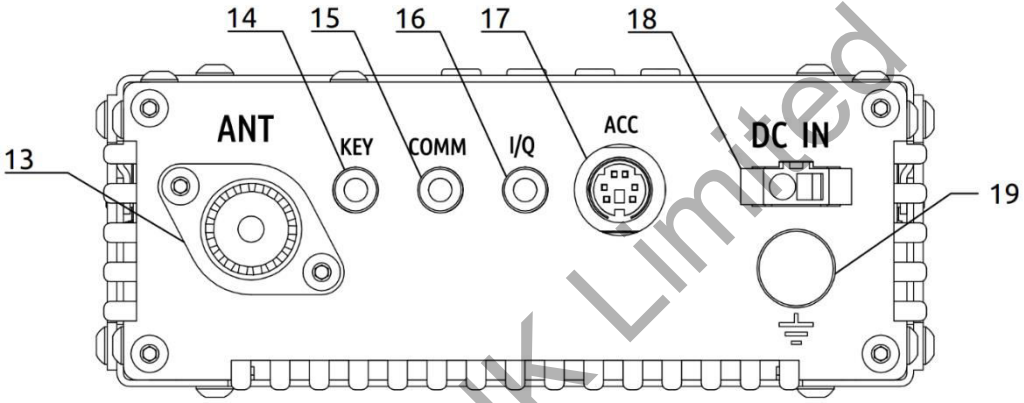
11. Main Control Knob

Turning this knob will change the selected frequency in VFO mode. In memory (channel) mode it can be used to select stored memory channels. Push & hold to select RIT mode, then turn to adjust. Push to cancel.



12. Function buttons

Button definitio and functions are detailed in the operation sec ion star ing on page 21.



13. Antenna interface

SO-239 type，impedance 50 Ω.

14. CW KEY socket

3.5mm **stereo** jack socket for connectio of manual/automatic CW keys

15. Comm socket

3.5mm **stereo** jack socket for base unit firmware updates.

16. I/Q Signal low level baseband output socket

3.5mm **stereo** jack socket to output the spectrum/waterfall display on a PC via a soundcard with a **stereo** input.

17. Accessory socket

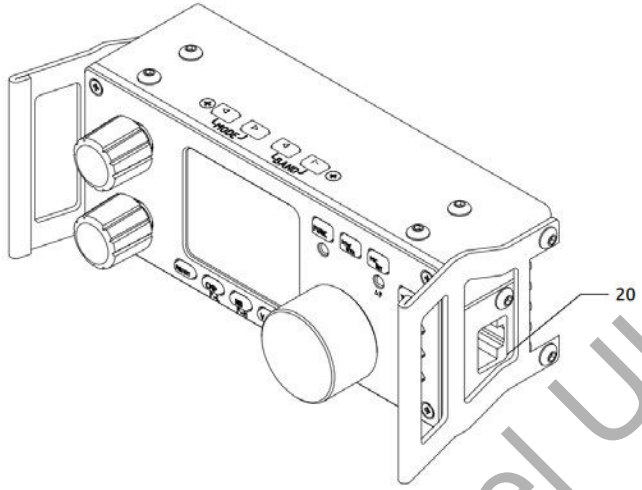
8-pin mini DIN socket for digital modes & CE-19 connection, wiring diagram shown on page 8.

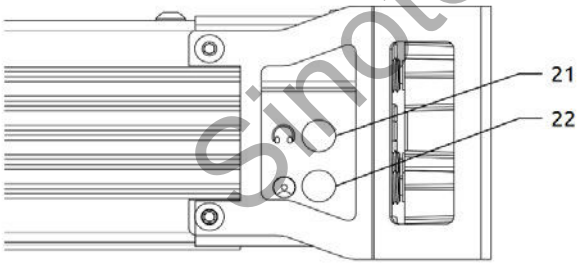
18. DC power socket

External DC power input socket.

The round hole is - , the square hole is +.

19. Ground terminal





20. MIC Connector (Right side of the display unit)

P ug the multi-function microphone into this connector.

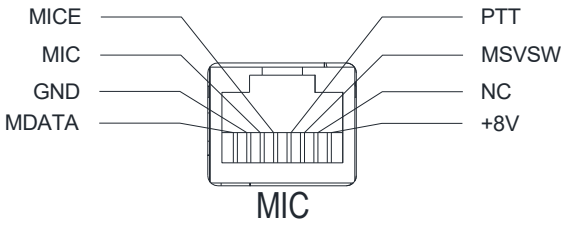
21. Headphone socket (Left side of the display unit)

3.5mm stereo jack socket for connecting headphones (stereo only).

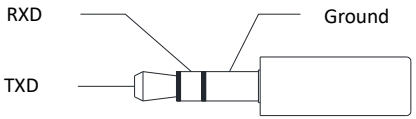
22. Communication interface (Left side of the display unit)

For firmware updates to the display unit.

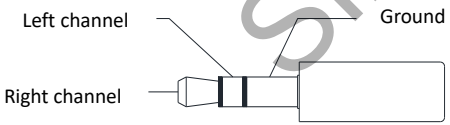
1. MIC interface



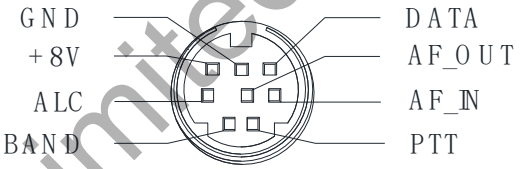
2. COMM plug



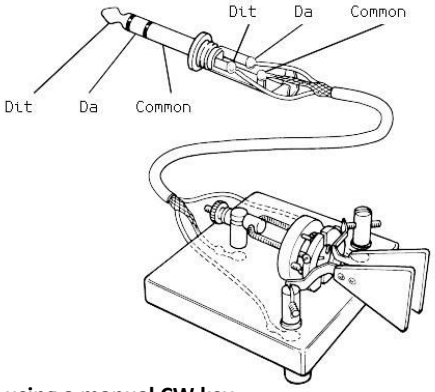
3. Headphone plug



4. ACC Socket

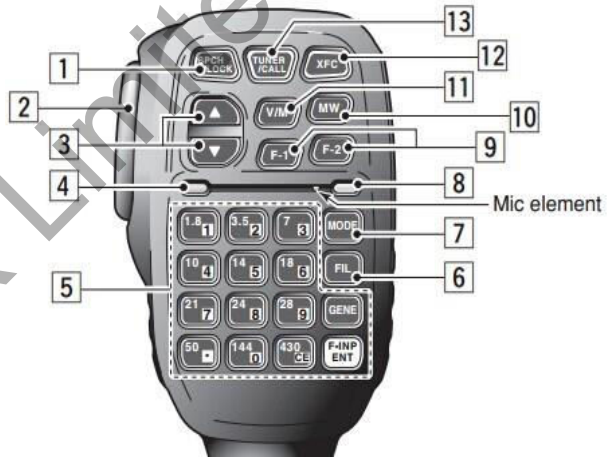


5. ambic CW key wiring diagram



Note: When using a manual CW key, connect "dit" and "da" together.

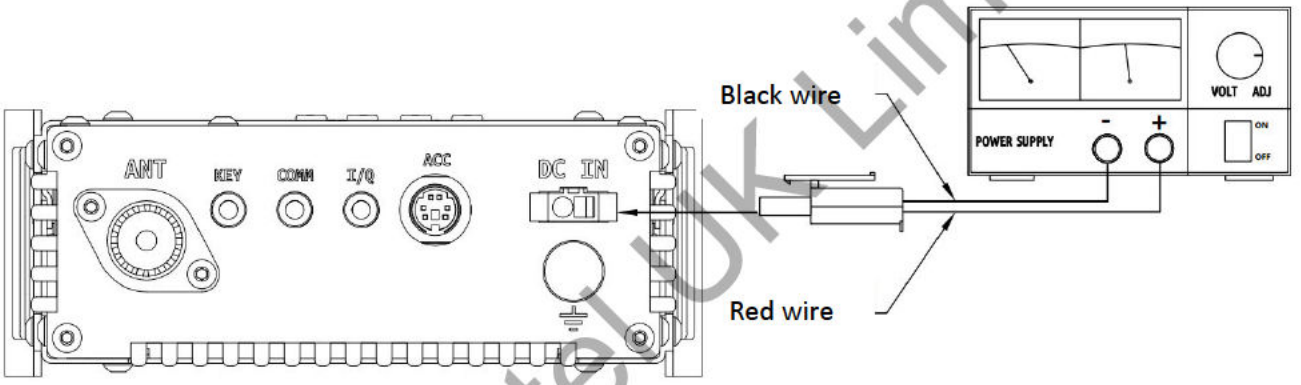
1.	**LOCK**	Lock button
2.	**PTT**	Transmit control button
3.	**UP/DOWN**	Frequency up/down buttons
4.	**Receive/transmit LED**	RX/TX operation indicator
5.	**Numeric keypad**	Numeric keypad area
6.	**FIL**	Filter selection
7.	**MODE**	Operating mode selection
8.	**Function indicator**	*Not used*
9.	**Function button**	F1/F2 self-defined setting button
10.	**MW**	Memory storage operation
11.	**V/M**	Frequency/channel switching
12.	**XFC**	*Not used*
13.	**TUNER**	Press & ho d to activate the built-in ATU



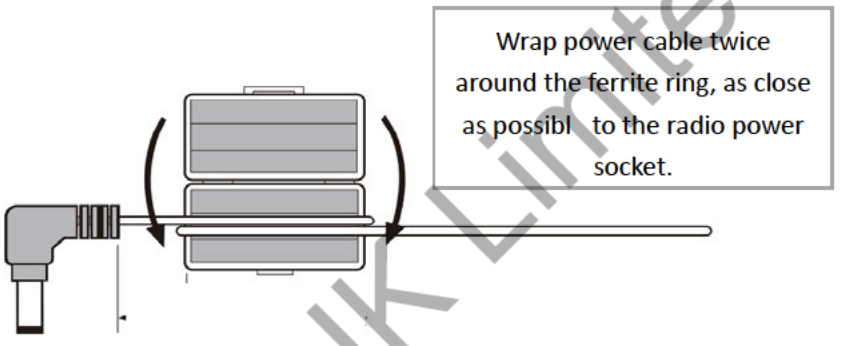
The G90 will operate best with a 13.8V external DC power supply with a continuous current load capacity of at least 10A. The supplied power cable must be used to connect the radio to the DC power source.

Please note the polarity of the wiring before connecting your radio to a power source. Reversing the polarity can cause damage to the transceiver that will not be covered under warranty.

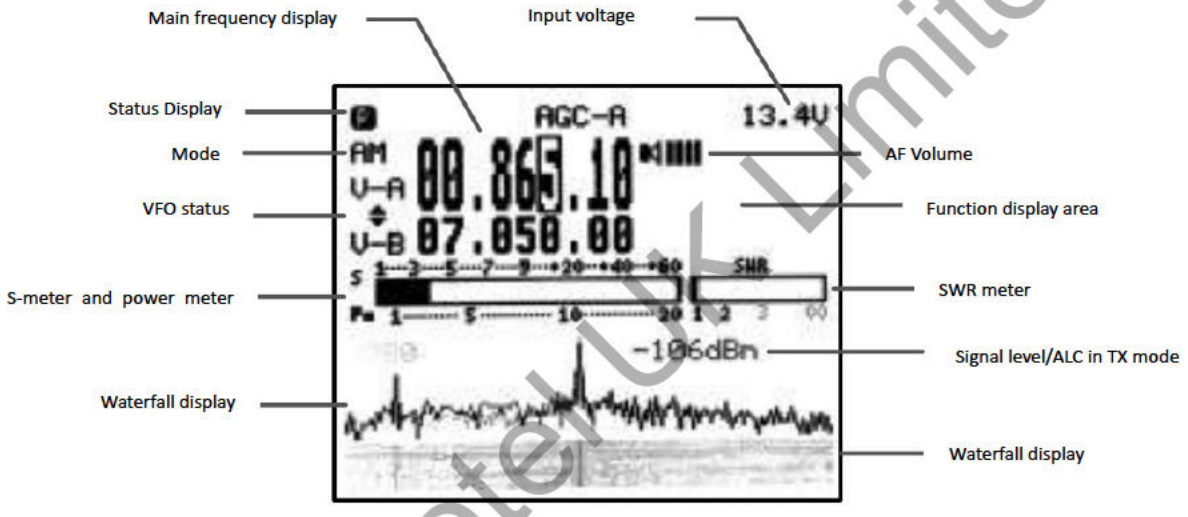
The red wire is connected to the positive terminal of the power supply, and the black wire is connected to he negative terminal.



When using an external power supply, a ferrite ring can be fitted to the power supply cable to help minimize external interference from entering the radio, or to prevent RF from the radio being radiated via the power cable. The ferrite ring should be installed as close as possible to the radio's power socket.



The G90 employs a multifunction menu system to access various functions. The LCD display shows functions and operating parameters as follows:

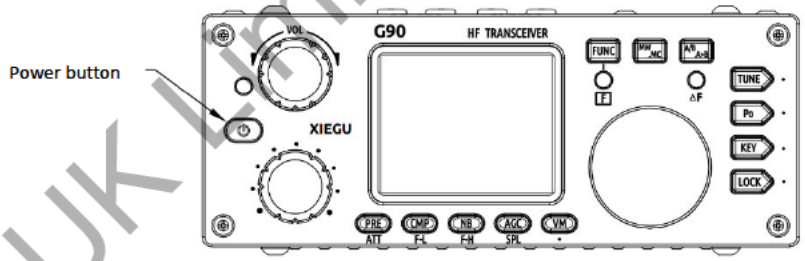


Powering the transceiver on and off

To turn on, press and hold [⏻] button.

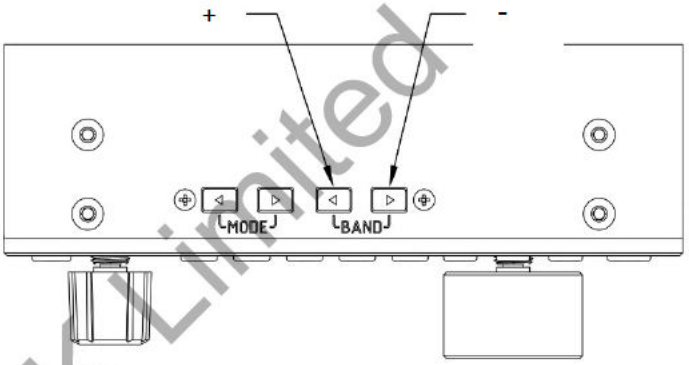
To turn off, press and hold [⏻] button for one second or more.

To turn off the display, press the [⏻] button briefly. To reactivate the display, press [⏻] again, or press any other button or rotate any control knob.



Frequency band selection

The G90 covers the 10 HF Amateur bands located between 0.5 and 30 MHz. Band- and mode switching can be performed using the buttons on top of the display unit or those on the multifunction microphone.

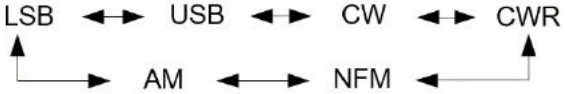


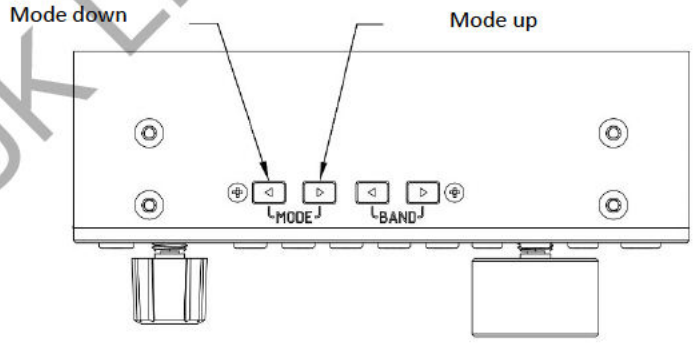
Press the BAND **<** or **>** buttons to cycle through the available frequency bands as follows:

- Available frequencies may differ depending on the regulations applicable to the specific country or region in which the G90 is sold.

Operating mode selection

Press either [**MODE**] button to cycle through the operating modes as follows:

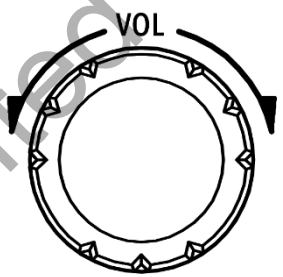




- Different operating modes can be set for VFO-A and VFO-B.

NOTE: The FM mode can only be activated when the GSOC controller/panadapter is connected.

Volume Control



Rotate the volume knob left or right to adjust the AF output volume.

- **Briefly press the volume knob inwards to select headphone mode.**

VOX mode

Press the [FUNC] button, then briefly press the volume knob inwards o access the VOX menu settings as follows:

VOX OFF/ON: To activate/deactivate the Vox function.

VOX GAIN: Vox Gain adjustment.

ANTI-VOX: For suppressing audio feedback between the microphone and internal speaker.

VOX DLY: Vox turn-off delay setting

The Vox function can be enabled for both the hand microphone and the line input socket. This can be useful when running digital modes using RX and TX audio cables, as TX keying can be done automatically with the need for CAT control.

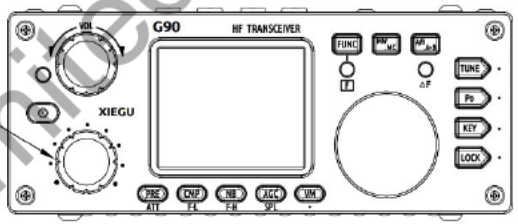
When using the AF IN port of the ACC interface for line input voice control, set the appropriate input volume level in the system menu. This also affects the VOX level setting.

Multifunction knob (MFK)

The operation of the multifunction knob can be customized according to your own preference.

Use of the MFK:

By default, turning the MFK will change the selected frequency in 100 kHz steps.



Multi-function adjustment knob

To allocate a different function, press and hold the MFK for two seconds, then rotate the main tuning knob to select one of the options that appear on the display screen:

1) Change frequency in 100 kHz steps;

2) Squelch level;

3) Transmit power level;

4) CW key speed;

5) FFT Scale – adjusts the sensitivity of the waterfall display.

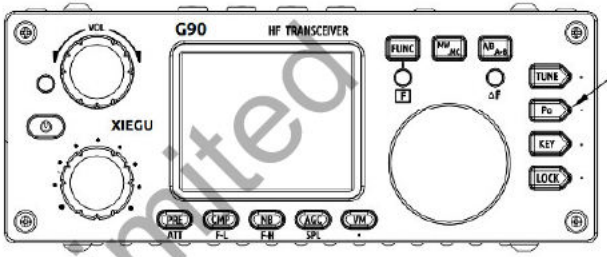
Once the desired function has been selected, p ess the CMP button to save or the AGC button to exit. Rotating the MFK will now adjust the selected function.

To adjust the centre frequ ncy r bandwidth of the DSP filter , briefly press the MFK (once for centre frequency, twice for bandwidth) and then turn the MFK to adj t the parameters as shown on the right of the display panel in the function display area.

Press the [POW] button to confirm the setting.

Setting RF TX Power

Briefly press the [Po] button. The power level will be displayed on the right hand side of the screen. Rotate the main control knob to vary RF TX power output in steps of 1 Watt. Press the knob in to confirm the setting.



PO

Setting RF Gain

Press and hold the [AGC] button. The RF gain level will be displayed on the right hand side of the screen. Rotate the main control knob t adjust. Press the knob in to confirm the setting

R T (Receive Incremental Tuning)

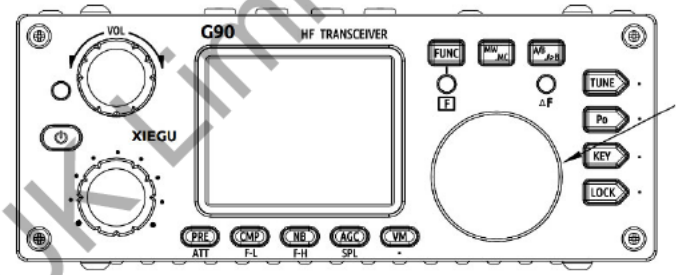
Press and hold the main control knob. RIT will be displayed on the right hand side of the screen. Rotate the main control knob to adjust. Press knob in to confirm the setting or cancel.

- ***When using the G90 transceiver for the first time with a new antenna, we recommend setting the RF transmit power to the lowest possible lev l to avoid damaging the transceiver due to an antenna mismatch.***

Setting the operating frequency (tuning)

This can be done using the main control knob, the MFK or the microphone keypad.

- When using the MFK, the frequency will change in steps of 100 kHz (this is the default stepping).
- When using the main control knob, the frequency stepping can be changed by successive presses of the knob. The cursor on the frequency display will move accordingly.



Main control Knob

Inputting a frequency directly using the microphone keypad:

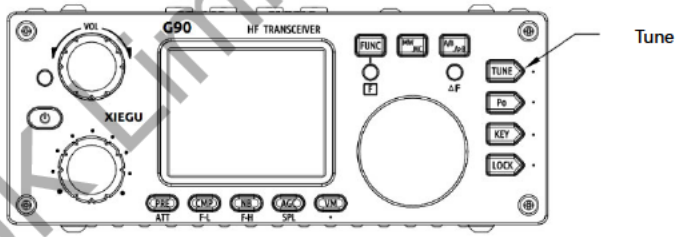
- Press the [F-INP ENT] button on the microphone. On the G90 display, the cursor will flash awaiting input;
- Enter the frequency value you want to select, including point separator, and press the [F-INP ENT] button again to confirm.

For example, to set the current frequency to 14.09000MHz, key in as follows:

1. First press the [F-INP ENT] button;
2. Press the 1 4 . 0 9 0 0 0 number keys in sequence;
3. Press the [F-INP ENT] button again to confirm.

Automatic Antenna Tuner (ATU)

The G90 is equipped with an efficient integrated automatic antenna tuner (ATU) that can help you quickly match your antenna to the desired frequency.



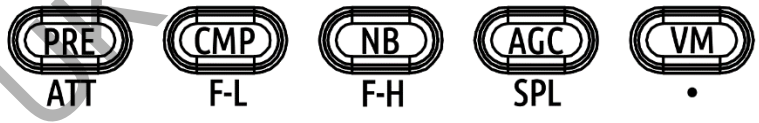
- Briefly press the [TUNE] button to activate the ATU. "TUNE" will be displayed at the top of the screen;
- Press the [TUNE] button for 1 second and tuning will begin. The radio will automatically revert to receive status once tuning is complete.
- If the flashing “SWR” icon appears on the display, the inbuilt ATU has not been able to match the antenna. Stop transmitting immediately and either tune the antenna manually or connect a different antenna.
- If your antenna is resonant on the frequency you are using, turn off the ATU.
- When using a whip antenna, activat ng the ATU can result in RF interference to other electronic devices nearby.

Function buttons

The buttons below the display each have two functions.

The second function is accessed by first pressing the [FUNC] button (the LED below it will light up yellow), and then pressing the appropriate button.

To return to the first function, press the [FUNC] button again.



Press the main control knob to exit the function settings and return to the main menu.

Function button table

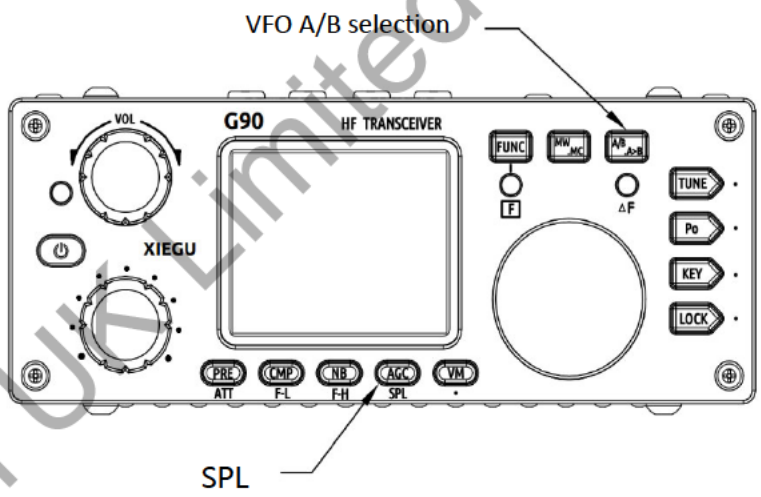
Button	Function 1	Function 2	Press & hold
PRE/ATT	Preamp/attenuator switching in/out		/
CMP/F-L	Transmit voice compression on/off (SSB/AM only)	Digital filter F-L lower frequency selection	/
NB/F-H	Noise blanker on/level/width (set level/width with main control knob) Not operative in AM mode.	Digital filte F-H upper frequency selection	/
AGC/SPL	Automatic Gain Control Off/Slow/Fast/Auto Select	T rn on split frequency transceiver operation mode	RF Gain
VM.	Switch frequency mode/channel mode	*TBA*	/
MW/MC	Turn on channel storage memory	Turn on channel clear mode	/
A/B.A>B	Switch between VFO-A and VFO-B	Copy the current VFO to the background VFO	/
TUNE	ATU on/off	/	Start ATU tuning
POW	POWER Transmit power setting	MIC GAIN MIC gain setting	/
	SWR THR Set SWR protection thresho	INPUT Input selection	/
KEY	SPEED CW key rate setting	CW Volume Side-tone volume setting	CW Decoder on/off
	M/L/R Manual/automatic/ ef /right mode switching	CW TONE Side-tone frequency setting	/
	MODE Iambic A/B Mode switching	/	/
	QSK Insert break se ction	/	/
	QSK Time Insert time setting	/	/
LOCK	5-level screen backlight brightness setting	SCALE/AVE Spectrum display level/average setting	Lock controls

Split frequency operation (SPL) and VFO A/B settings

The G90 has two independent VFOs. Different frequencies and modes can be set for VFO A and B. This is useful for split frequency operation.

VFO Selection：

1. Press the [A/B/A>B] button to switch between VFO-A and VFO-B.
2. Once the desired VFO has been selected, the required operating frequency, mode and other settings can be made.



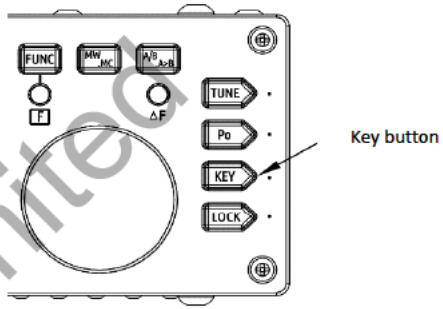
Split frequency transceiver (SPL) operation method:

1. Set the receiving frequency and mod fo VFO-A;
2. Set the transmit frequency and mode for VFO-B;
3. Select the second function of the [AGC/SPL] button,
4. Turning on the SPL functio ac ivates the split transceiver mode.

◆ *You can use VFO A and B to set different frequencies or modes and switch between two frequencies in real time.*

CW communication

Requires connection of a CW key or external keying device.



Operation:

1. Insert the stereo key plug into the KEY socket (see page 8 for wiring diagram);
2. Press the [MODE] button to select CW or CWR mode;
3. Select the QSK function using the [KEY] button and set the desired QSK time;
4. Perform CW communication;
5. For CW decoding, press and hold the [KEY] button until the b ue waterfall at The bottom of the display disappears. Fine tune the RX frequ ncy until the △F LED flashes to indicate RX lock.

Practice mode:
You can use the G90 as a CW code t ainer.
To do so, switch the QSK function off using the [KEY] button function. When the CW key is operated, the G90 will emit CW tones, but no RF signal will be emitted,

The [KEY] button adjusts parameters that are commonly used during CW communication:

- SPEED
- M/L/R
- Iambic mode A/B
- QSK on/off
- QSK Time
- Ratio: auto key "." "-" interval

Standing wave ratio (SWR) scanning

The G90 has an SWR scanning function which can give an indication of the SWR of the antenna connected to the transceiver. You can also set the threshold of the high SWR warning provided on the display to any level between 1.8 and 3.6.

Operation：

1. Press and hold the [POW] button to start SWR scanning. The display will switch to the SWR scanner screen.
2. After the first sweep of the scanner, the SWR and the frequency will be displayed at the bottom of the screen.
3. The following adjustments can be made during scanning using the buttons below the screen:

    - Press the [PRE] button to change the frequency step of the scan (there are five preset ranges: 50, 300, 450, 600 and 700 kHz);
    - Press the [NB] button to select between slow and fast scanning speed;
    - Press the [VM] button to exit SWR scanning.

4. Press the [POW] button twice in succession to set the SWR warning threshold between 1.8 and 3.6. SWR THR appears in the display. Rotate the main control knob to set the desired threshold, press the [POW] button again to confirm the setting.

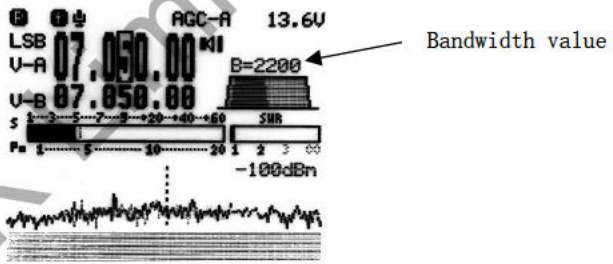
◆ ***The SWR scan results are intended for guidance only. The scanner cannot deliver the accuracy of a professional antenna analyzer.***

Digital filter

The G90 has a built-in digital filter. The bandwidth and centre frequency of the filter can be adjusted to suit band conditions and your own listening preference.

Operation:

1. Press the [FUNC] button;
2. Press the [CMP/F-L] button to adjust the lower filter boundary, or the [NB/F-H] button to adjust the upper boundary.
3. Rotate the main control knob to achieve the desired bandwidth.
4. Press the [CMP/F-L] button or [NB/F-H] button again to display the current bandwidth value (B) on the screen.
5. To adjust the centre frequency or bandwidth of the DSP filter see page 17.

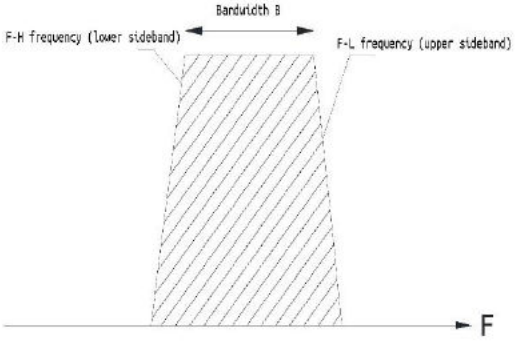


Schematic diagram of filter bandwidth parameters:

F-L: Low pass cutoff frequency of the filter (upper boundary).

F-H: High pass start frequency of the filter (lower boundary).

B: Overall filter bandwidth.



Line input/output selection and adjustment

The G90 has an external communication (ACC) socket. When connecting to a computer or an external interface for data communication, the appropriate settings should be selected as follows:

Line input selection and level adjustment：

- Insert the 8-pin DIN cable into the ACC socket (see wiring diagram on page 8);
- Press [FUNC] button;
- Press [POW] button twice;
- Rotate the main control knob to select LINE input (see function area in display);
- Press [FUNC] button twice to enter the system menu;
- Select menu item 5. (AUX IN VOLUM) and use the main control knob to set the required audio input level.

Line output level adjustment (this function is independent of the main volume setting):

- Press and hold [FUNC] button to enter the system menu;
- Select menu item 6. (AUX OUT VOLUM) and use the main control knob to set the required audio output level.

◆ ***When using the ACC socket as an input for digital mode operation, the audio input level should be no more than 600mV PTP.***

Storing and deleting memory channels

64 Memory channels are provided.

Storing a channel in the memory:

1. In the VFO mode, set the desired frequency, operating mode and any other required parameters;
2. Press the [MW/MC] button. CH 00 (the channel number) will appear on the display and flash. Rotate the main control knob to select the required channel. The character E will appear on the display to the right of the channel number, indicating that a channel is empty.
3. By default you must store a channel in position 00. Thereafter any channel number can be used when storing.
4. Press the [MW/MC] button again to save the current frequency and related information to the selected channel.

Recalling the stored channel:

1. Press the [VM] button to switch from VFO mode to memory (channel) mode;
2. Rotate the main control knob (or use the up/down buttons on the microphone) to select the required channel.

Clearing a stored channel:

1. In memory mode, press the [FUNC] button followed by the [MW/MC] button. The channel number will flash red;
2. Rotate the main control knob to select the channel you want to clear. Press the [MW/MC] button again to clear the selected channel.

Power-on display call sign setting

The G90 can be set to show your call sign or other text on the display when powering up.

Setting：

1. Press and hold the [VM] button to enter the text editor;
2. At the bottom of the display is the character selection area. Rotate the main control knob to select the desired character. Press the main control knob to select the character;
3. Press the [NB] button to delete the last character; press the [VM] button to exit the editor; press the [PRE] button to save and exit the editor;
4. When the G90 is powered up, the text informat on you saved will appear on the display.

Text editor function buttons:

SAVE: [PRE] button

BACK: [NB] button

QUIT: [VM] button

System menu description

1. Press and hold the [FUNC] button to enter the system menu;
2. Press the [VM] and [PRE] buttons to move through the menu items;
3. Rotate the main control knob to select the required function parameter;
4. Press the [CMP] button to save and exit, or the [AGC] button to exit without saving

The various menu functions are defined as follows:

Menu item number	Menu name	Function Description
1	Handle up/down	Hand mi up/down button function setting
2	Handle F1	Hand mic F1 button function setting
3	Handle F2	Hand mic F2 button function setting
4	LCD BL	Screen backlight brightness setting
5	AUX IN Volum	ACC port input audio volume setting
6	AUX OUT V lum	ACC port output audio volume setting
7	RCLK Tune	Reference clock fine tuning (set to 0)
8	Band Stack Mode	Select band stacking for amateur bands/all
9	ON/OFF Beep	Enable/disable beep sound at startup
10	Version	Current firmware version number

NB: Handle = hand microphone

Connecting to a computer for amateur radio data mode communication

The G90 transceiver can be connected to a computer to perform data communication in conjunc ion with the appropriate control software.

Operation:

1. Connect the data cable between the USB port on your PC and the commun cation port on the left side of the G90 head unit;
2. Ensure that the appropriate driver for the USB cable is correctly installed on the PC;
3. Connect the G90's audio output (AF_OUT pin of the ACC port) to the computer's audio input port. Set the output signal level (see page 27);
4. Connect the audio output of the computer to the audio i put port of the G90 (AF_IN pin of the ACC port). Set the input signal level (see page 27);
5. Set the G90 to line input mode (see page 27);
6. Select the desired working mode to perform data communication.

To prevent interference, the radio and computer must be well grounded. We also recommend installing ferrite rings on the data- and audio cables, as close as possible to the adio, to minimize the possibility of electromagnetic interference.
The amplitude of the output signal of th radio and the amplitude of the output signal of the computer should be set appropriately to avoid overloading. A good rul of humb is to set the PC's audio output level so the transceiver is delivering no more than 10 Watts RF output, ALC meter showing between 30 & 90 during TX. As digital modes operate on a 100 percent duty cycle, TX output power should never be set at maximum. Monitor the temperature of the transceiver closely, as additional cooling may be required.

Computer control instruction set

The G90 uses the standard CIV instruction set. You can use the standard instructions of this instruction set to remotely control the transceiver. It can also be used to configure the control instructions of other software to control the G90

Band voltage data

The G90's ACC port provides band voltage outputs for each band (see diagram on page 8) as per the table below.
This voltage output can be used to control peripheral devices such as linear amplifiers, allowing them to automatically switch bands in tandem with the G90.

Band	Voltage	Band	Voltage	Band	Voltage	Band	Voltage
1.8MHz	230mV	7MHz	920mV	18MHz	1610mV	28MHz	2300mV
3.5MHz	460mV	10MHz	1150mV	21MHz	1840mV	/	/
5.0MHz	690mV	14MHz	1380mV	24MHz	2070mV	/	/

Factory Reset

To reset the G90 to factory default settings, press and hold the [FUNC] button while powering on. Press [PRE] to confirm or {VM] to cancel.

Specifications

General

Frequency Range：

Receive:	0.5 - 30 MHz
Transmit:	0.5 - 30 MHz (amateur bands only)
Transmission modes：	A1A(CW)/A3E(AM)/J3E(SSB)
Minimum frequency step：	10 Hz
Antenna impedance:	50 Ω
Operating temperature：	0℃ to +50℃
Frequency stability：	±10 ppm for 10 to 60 min after power on; @25℃：1ppm/h
Supply voltage:	10.5 to 16.5V DC, Negative ground
Current draw：	Receive：500 mA (max.) Transmit：8 A (max.)
Dimensions (W x H x L)	120x45x210mm (excl. protrusions)
Weight：	2.6 kg

Transmitter

RF output power (max.)：	20 W (SSB/CW/FM) 5W (AM Carrier) @13.8 VDC
Stray radiation suppression：	≥50 dB
Carrier suppression：	≥40 dB
Microphone impedance：	200 Ω to 10 kΩ

Receiver

Adjacent channel suppression： ≥60 dB
Sideband suppression： ≥60 dB

Sensitivity：

	SSB/CW/FM	AM
0.5 - 1.79999MHz	-	10uV
1.8 - 1.9999MHz	0.35uV	10uV
2.0 - 27.9999MHz	0.25uV	2uV
28 - 30MHz	0.25uV	2uV

(PRE=on，ATT=off，NB=off，NR=off，SSB/CW/AM = 10 dB S/N，FM = 12 dB SINAD)

Image rejection： 70 dB
IF suppression： 60 dB

Audio output： 0.5W (8 Ω @ ≤10% THD)
External speaker impedance： 4 – 16 Ω

- *All specifications are subject to change without notice.*
- *The actual operating frequency range of the transceiver may vary according to the regulations applicable in the country in which it is sold.*

Packing List

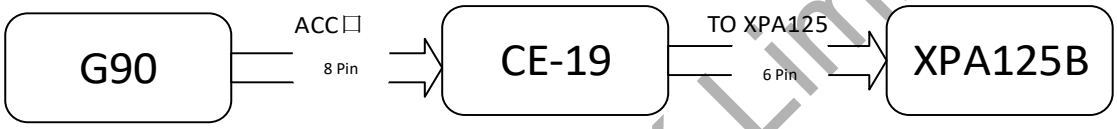
Item	Quantity
G90 transceiver	1pc
Multi-function Microphone	1pc
USB Data cable	1pc
Power cable	1pc
Operation Manual	1pc
Warranty Card	1pc
Fixed stud for remote head use	2pc
Allen key	1pc
Certificate	1pc

* Optional accessories

Item	Descriptio
CE-19	ACC expansion adapter
XPA125B	100W powe amplifier with built-in ATU
GSOC*1	Large screen controller

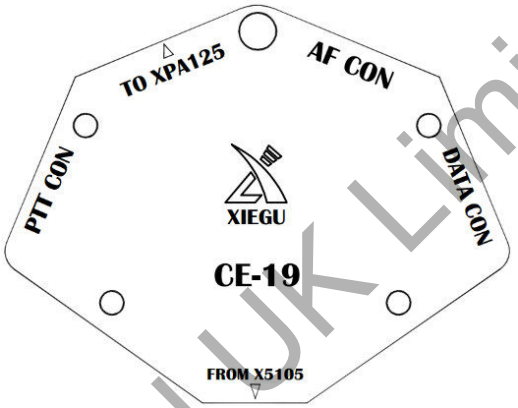
*1 The GSOC controller is expected to be available in 2020.

Connection diagram between G90 and XPA125B using the optional CE-19 interface



*Note：The 8-core ACC control cable is included in the CE-19 kit.

CE-19 expansion adapter interface diagram



PTT CON	PTT signal/BAND signal o tpu port. The PTT signal at this port is completely isolated from the transceiver and provides a low level trigge ou put.
TO XPA125B	XPA12B dedicated interf ce.
AF CON	Audio input/outpu port. The audio output from this port is directly output after demodulation, unfiltered.
DATA CON	Data output port in NFM mode. The two terminals of this port are in parallel and both output the same signal

This edition revised & amended November 2019 by Alan Clunnie (M0RYZ) of Sinotel UK Limited.

NOTE: SOME FUNCTIONS WILL ONLY BE AVAILABLE WITH FIRMWARE 1.7.2 INSTALLED.

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