XIEGU

Portable HF SDR Transceiver

G90

Operation manual

XIEGU

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FC C€0678① RoHS
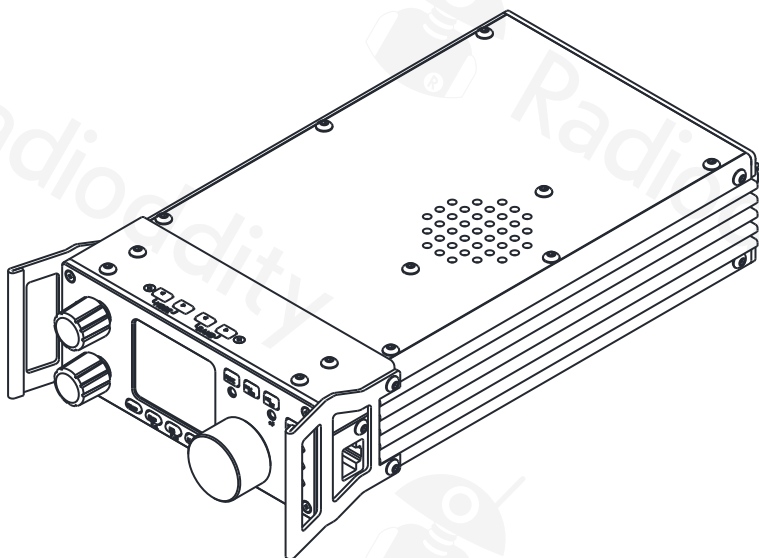
Ultra-Miniature 24 Bit SDR

V4.0
August. 2020

About Radioddity
www.radioddity.com

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Thank you for purchasing XIEGU products from Radioddity. Through strong partnerships which allow us to bring you the latest technology from brand XIEGU and on behalf of our caring and responsive Customer Support team, we srtive to fulfill that promise and better meet your needs every day.

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GSOC Large Screen Controller	XPA125B 125W Power Amplifier	G90-H1 Holder Cooling Fan	CE-19 Data Interface Expansion Card
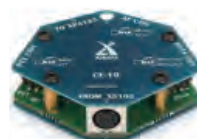
All the above information are available on www.radioddity.com

Warning

1. Please read this manual fully before operation so as to get a good understanding of the G90's capabilities and functions.

2. When using an external power supply, carefully check the polarity of the power cord and do not reverse the polarity.

3. The limited warranty of this radio does not include damage caused by an external power connection error or damage caused by improper power supply voltage.

4. Qualified technicians shall service this equipment only.

5. Do not tamper the transceiver for any reason.

6. Do not use any transceivers with a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

7. Turn off your transceiver prior when entering any area with explosive and flammable materials.

8. Do not charge your transceiver in the area with explosive and flammable materials.

9. To avoid electromagnetic interference and/or compatibility conflicts, please turn off your transceiver in any area where posted notices instruct you to do so.

10. Turn off your transceiver before boarding an aircraft; any use of a radio must be in accordance with airline regulations or crew instructions.

11. Turn off your transceiver before entering a blasting area.

12. Do not place a transceiver over an airbag area or in the airbag deployment area for vehicles with an airbag.

13. Do not expose the transceiver under direct sunlight over a long time, nor place it close to a heating source.

14. When transmitting with a transceiver, hold it with the microphone 3 to 4 centimeters away from your lips; also make sure the antenna stays at least 2.5 centimeters away from your body when transmitting.

Copyright

We would like to extend sincere gratitude to Radioddity's ham friends -- Bob Nagy (AB5N) and Garry F. Decker, S.E.(K9WHF), for their instructive advice and useful suggestions on G90 English manual.

Handbuch wurde von W. Kraml – OE1WKL – anhand des englischen Handbuchs und einiger zusätzlicher, am Internet verfügbarer, Informationen, sowie eigener Beobachtungen am G90 erstellt.The G90 is an amateur HF portable 20W transceiver using the latest 24 bit SDR technology. It is a new member of the Xiegu product family and our first portable SDR model in the new G series.

Based on a 24bit-CODEC, the G90 brings superior transceiver performance and a highly configurable user experience. The separate head design allows you to flexibly position the radio's main body. It includes a built-in high-performance ATU capable of matching a very wide range of antennas.

Features Include:

- High-performance RF front end – Superb Selectivity
- Mode include USB/LSB//CW/CWR/AM
- 1.8 inch high-contrast color TFT LCD display
- ±24k bandwidth spectrum display & waterfall display
- Adjustable DSP narrow-band filters
- (CW mode can be as narrow as 50Hz) Built-in CW Decoder
- Separable head design
- Built-in Antenna SWR scanner
- Built-in Wide-range automatic antenna tuner

Please read this manual carefully for a better experience and a full understanding on operation of the G90.

※ **G90S is a version in the People's Republic of China, and G90 is a version in other countries or regions. This operation manual is applicable to the both models.**

Specifications

General parameters

Frequency range	RX	0.5MHz~30MHz
	TX	1.8~2.0MHz
		3.5~4.0MHz
		7.0~7.3MHz
		10.1~10.15MHz
		14.0~14.35MHz
		18.068-18.168MHz
		21.0–21.450MHz
		24.89-24.99MHz
		28.0-29.7MHz
Operating mode		USB/LSB/CW/CWR/AM
Minimum step		10Hz
Antenna impedance		50Ω
Working Temperatures		0°C ~ +50°C
Frequency stability		±1.5ppm in the 10~60min after startup @25°C: 1ppm/hour
Power supply voltage		10.5~16.5VDC, negative electrode grounding
Current consumption		Receiving: 700mA@ Max Transmitting: 6A@ Max
Frame size		120x45x210mm (WxHxL) (excluding protrusions)
Weight		About 1.63kg (main body)

Transmitter parameters

RF output power	20W(SSB/CW)
	5W (AM carrier wave) @13.8VDC
Spurious suppression	≥50dB
Carrier suppression	≥40dB
Microphone impedance	200~10k (600Ω in general)

Receiver parameters

Circuit type	ZIF	
Neighbor channel suppression	≥60dB	
Sideband suppression	≥60dB	
Sensitivity		SSB/CW	AM
	0.5~1.79999MHz	/	10uV
	1.8~1.99999MHz	0.35uV	10uV
	2.0~27.9999MHz	0.25uV	2uV
	28.0~30.0MHz	0.25uV	2uV

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

Mirroring suppression: 70dB
Sideband suppression: 60dB

Audio output: 0.5W (8Ω, ≤10% THD)
Audio output impedance: 4~16Ω

- Above specifications may be changed without notice.
- Working frequency range of transceiver varies with the version of the radio. Ask your dealer for details.

Accessories	Quantity
Multi-function hand microphone	1
USB cable	1
DB9 extension line	1
Separating head fixing stud	2
Hexagon wrench	1
Power line	1
Warranty card	1
Instructions	1
Quality certificate	1

※ **Optional components:**

CE-19: host ACC adapter (can be used as data communication to transmit audio signal or to connect to XPA125B amplifier).

XPA125B: 100W power amplifier + automatic antenna tuner.

Definition of microphone interface

MICE ——— PTT
MIC ——— MSVSW
GND ——— NC
MDATA ——— +8V

MIC

Wiring diagram of COMM plug

RXD ——— GND

TXD

Wiring diagram of COMM plug

signal ———————— GND

signal ————————

ACC terminal

PTT ———————— BAND
AF_OUT ————————
AF_IN ———————— ALC
                8V DC
NC ———————— GND
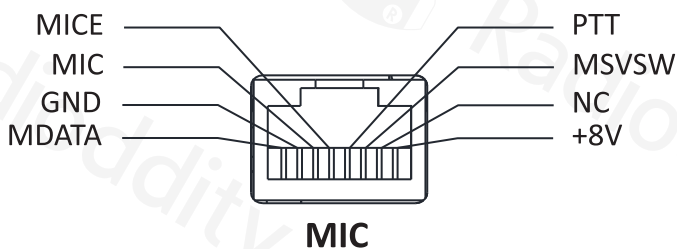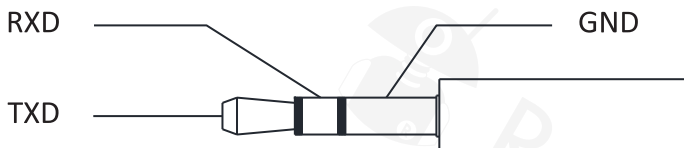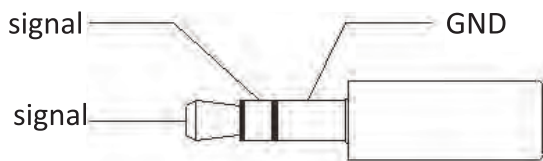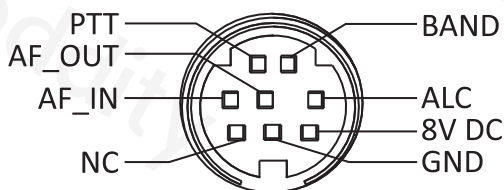
Rear ACC socket

Wire connection of CW keys

di da Common

di da Common
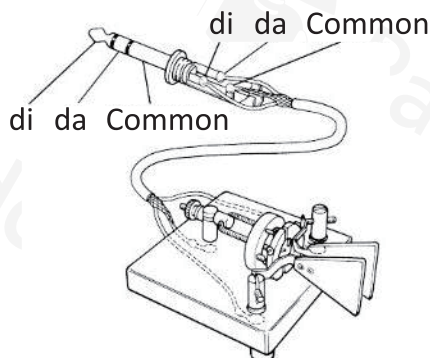
Note:

● If the connector of the CW key is a 6.5mm 2-wire plug, please change it to a 3-wire 3.5mm stereo plug according to the wiring method shown in the figure above.

● Be careful when using 2-core to 3-core adapters because incorrect wiring may put the radio in CW transmission mode all the time.

Machine Interface
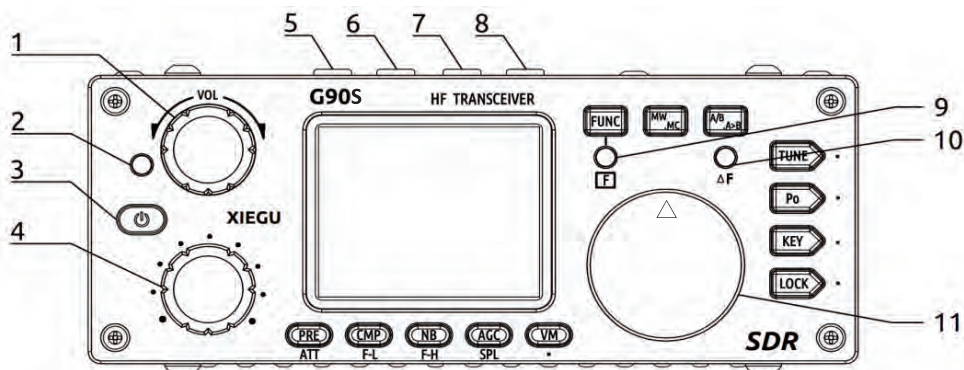
1 Volume knob

● Turn the knob to increase or decrease the volume.
● Short press the knob to alternate to the headphone output mode.

2 Power supply /transceiver indicator light

● Standby /receiving state: yellow-green
● Turns red in transmitting state.

3 Power switch

● In the power off state, short press this key to turn it on.
● In the power on state, long press this key to shut it down.
  Under startup state, short press the key to turn off the screen display and save electricity.

4 Multi-function Adjustment Knob

● By default, turning this knob will step at 100kHz.
● Long press this knob to switch to the Select Custom function.

5-6   MODE switching

● Mode switching. It will cycle among the several modes.

7-8   BAND switching

● Band switching. It will cycle up or down through the Amateur bands.

9   FUNC indicator

● This LED will be on when the second funcon of the key is operated.

10   △ F indicator

● This LED blinks when the CW signal is aligned correctly to the receiving frequency in CW mode.

11   Main VFO/Mem tuning knob

● Change the current frequency by controlling this knob. Also changes the menu sengs when seng the menu items.
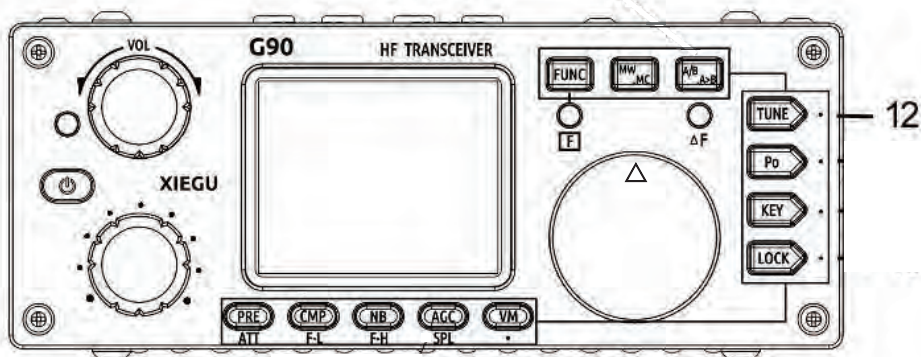
12   Funcon keys

● The key definions and funcons are detailed in the operaon secon (Pages 14-15).
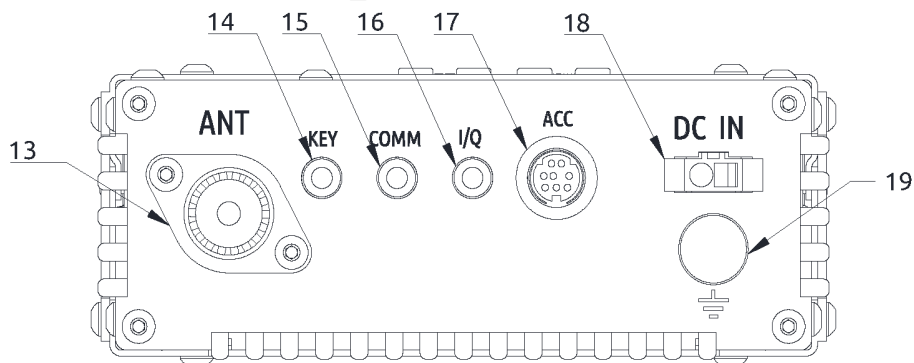
13 Antenna interface

- SQ-239 type - impedance 50Ω.

14 KEY interface

- 3.5mm stereo jack used to connect manual/paddle CW keys. (See Page 5 for the wiring method)

15 COMM interface

- It is used for updating the radio body's Firmware.

16 I/Q signal output port

- It is a 3.5mm connector (3 wires) used for IQ signal output.

17 ACC interface

- This is an 8-pin mini-type DIN interface. See the interface definition for details. (See Page 5 for the definition of pins)

18 DC power interface

- External DC power input interface. The round hole is the negative connection and the square hole is the positive connection.

19 Grounding terminal

● Excellent grounding can improve the receiving and transmitting performance of the G90.
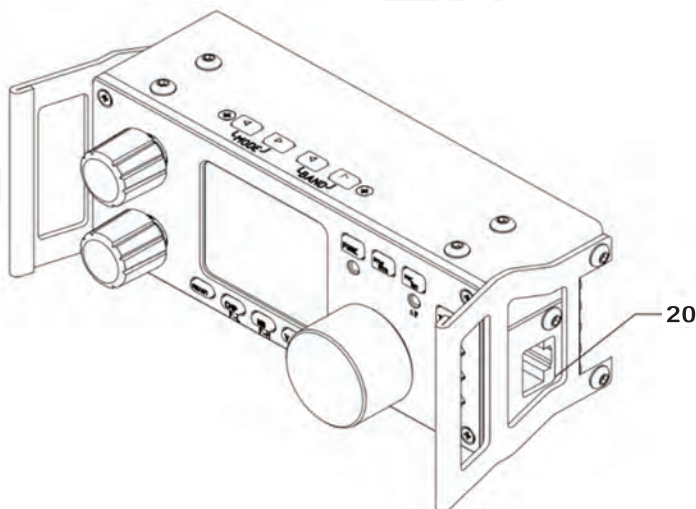
20 MIC (microphone) interface (located on the right side)

● It is used to connect included multi-function handheld microphone.

21 Headphone interface (located on the left side)

● It is a 3.5mm stereo connector (3 wires) used to connect earphones. (See Page 5 for the wiring method)

22 Communication interface (located on the left side)

● It is used for updating the Firmware of head unit and CAT control communications protocol with your computer.

Notes:

1. It is required to insert the USB cable into this port for completing the data communication.
2. Do not insert the cable into this port before startup of the G90.

Hand Microphone Keys

01
02
03
04
05
06
07
08
09
10
11 Mic element
12
13
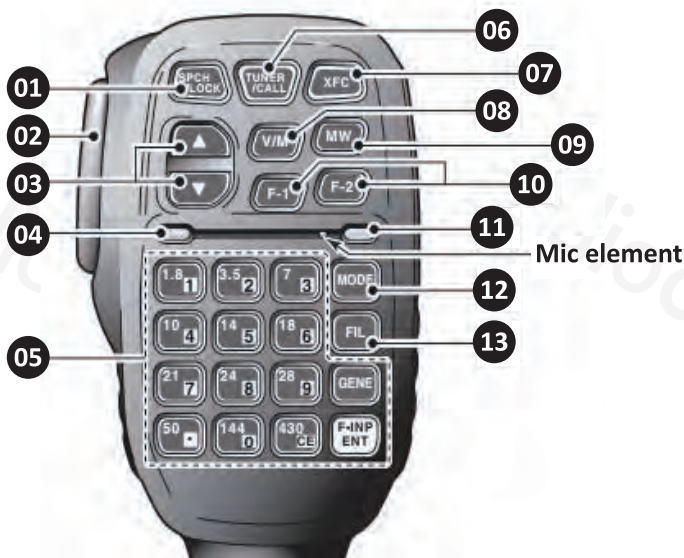
01 LOCK key
Lock button

02 PTT key
Press to transmit

03 Up/down
Frequency increase/ decrease key
(user-defined, detailed in system menu 1)

04 Transceiver indicator light
Hand microphone operation indicator light

05 Main key area
Main keyboard area

06 TUNER key
Press it in a long time to start antenna
tuner for tuning

07 XFC key
No function

08 V/M key
Frequency/channel switching

09 MW key
Memory operation

10 Function keys
F1/F2 key (user-defined, detailed
in system menu 2&3)

11 Functional indicator light
No

12 MODE key
Selection of working mode of radio

13 FIL key
Filter selection

Power Source Connection

Connect your power supply or battery to this connector. Current capability of the DC power supply shall be 8A at least. Batteries should be 11-17VDC and have a capacity of at least 20 A/H. Typical TX current requirements are generally less than 8A. Use the provided cable to connect the G90 to your DC supply. The G90 transmitter is designed in such a way that sagging supply voltage from a weak battery has little effect on the TX power output.

DC power supply shall be connected in strict accordance with following figure to avoid reverse polarity connection.

● Red line shall be connected with the positive pole of power supply and black line shall be connected with negative pole of power supply.

Black Wire

Red Wire
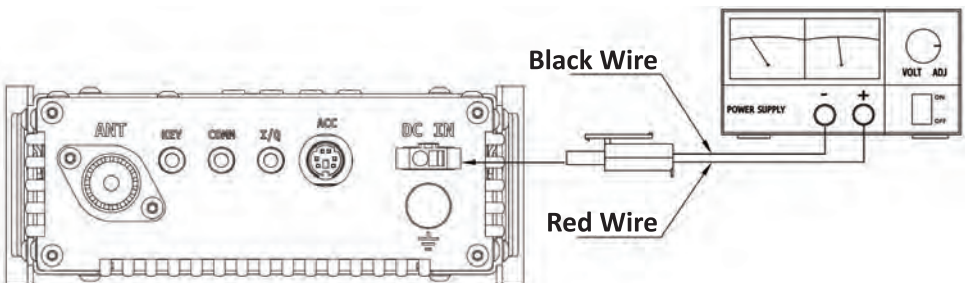
● A Ferrite Choke can be attached to the power wires to prevent external RF from entering radio via power lines and RF interference inside the radio from radiating externally via power lines. Install a ferrite choke closest to the radio on the DC wires.

● **Polarity of power lines should be checked carefully to avoid reverse polarity when connecting your power supply.**

● **Reverse connection of power may cause severe damage to the radio.**

Functions of Keys

Button	First function (short press, cycle)		Second function (FUNC+)		Long press
PRE/ATT	PRE - ATT - Normal. Cycles through these three states.		/		/
CMP/F-L	Turn it on to transmit voice with compression		Digital filter F-L, low-pass cutoff frequency selection		Reset parameters
NB/F-H	NB SW-NB Level-NB Width		Digital filter F-H, high-pass startup frequency selection		Reset parameters
AGC/SPL	Open AGC, Fast-Slow-Auto Cycles through settings.		Turn on the pilot frequency transceiver operation mode		RF GAIN
VM.	Switch frequency mode or channel mode. VFO/MEM		/		Call Sign Editor
MW/MC	Turn on channel memory function		Channel clearing		/
A/B.A>B	Switch between VFO-A and VFO-B		Copy the current VFO to the background VFO		/
TUNE	Turn on/off the antenna tuner		/		Antenna tuning
POW	POWER	Transmitting Power Setting	MICGAIN	Hand microphone MIC gain setting	Standing-wave scanning
	SWR THR	Standing-wave protection threshold setting	INPUT	Voice input mode selection	
KEY	SPEED	Automatic key rate setting	CW Volume	Side tone volume setting	CW automatic decoding
	M/L/R	Manual/ automatic left and right mode switching	CW TONE	Side tone frequency setting	
	MODE	iambic A/B mode switching	/		

Button	First function (short press, cycle)		Second function (FUNC+)		Long press
KEY	QSK	Insert/non-insert selection	/		
	QSK Time	Hang time setting	/		
	Ratio	Setting of automatic key dot-and-dash interval proportion	/		
LOCK	/		SCALE	Spectrum reference level setting	Lock button
			AVE FFT	Mean value setting, ranged 1~10	
Volume Knob	Loudspeaker / earphone switching		VOX ON /OFF	Voice control switch	/
			VOX GAIN	Voice control gain setting	
			ANTI-VOX	Hand microphone and speaker echo suppression setting	
			VOX DLY	Voice control transmission turnoff delay	
Multi-knob	Filter center mode setting		/		/
	Filter bandwidth mode setting				
Main knob	Frequency step selection		Open RIT		/

The operation of the second function:

Press the [FUNC] key first, then the F indicator LED will be on, then press the corresponding function key.

Press the [FUNC] key again to exit the second function. At this time, the F indicator LED will go off.

● In any function (including FUNC second function) setting interface, short press of the main knob to save. It exits the function setting mode and returns to the main interface.

Screen Display Icon

Status display area

Mode display

VFO display area

Multi-function indicator
Receiving state is meter s
Transmission state is power meter

Waterfall diagram display area

Power supply voltage indication

Volume indication

Receive bandwidth indication

Standing-wave display area

Receiving level display

Spectrogram display area
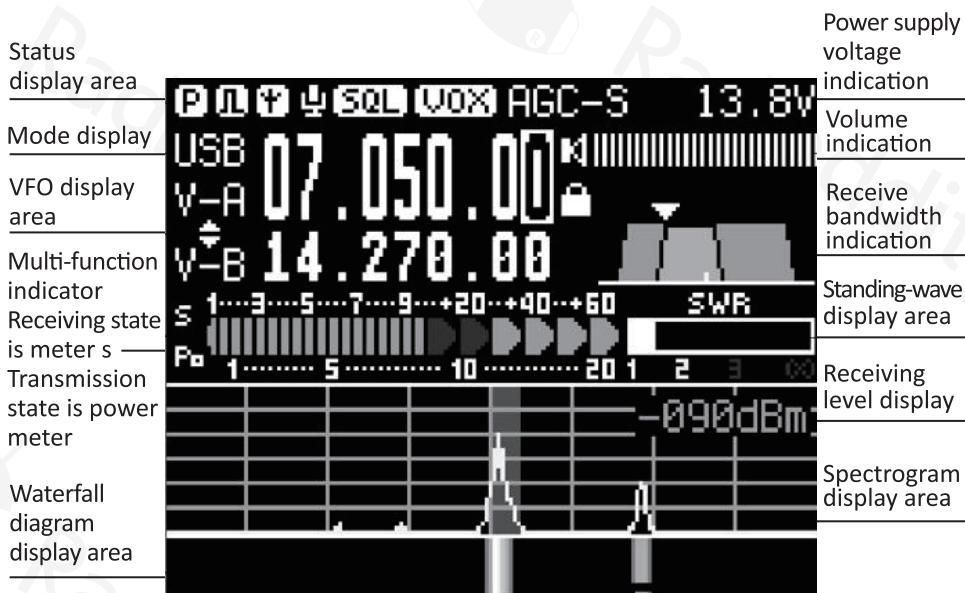
Function and definition of display icons:

Pre-amplifier is ON. The icon character A indicates that the attenuator is in-line. No character is Normal mode.

Noise blanker is ON.

Automatic antenna tuner is ON.

CMP voice compressor is open.

Squelch is ON.

Voice TX control function is ON.

AGC control is at Slow (AGC-F, AGC-AUTO, AGC settings are available).

External power & voltage display.

USB Current working mode is USB. (LSB, CW, CW-R and AM modes are available)

V-A **V-B** VFO-A is current working frequency (in the figure, SPL is open, and VFO-B is the transmitting frequency)

SPL split frequency receiving & transmitting mode is ON.

Loudspeaker mode. Short press the volume key to switch to the earphone mode. Alternates between earphone and speaker.

Key lock sign.

While receiving, S levels refer to the strength transmitting status of current received signal. Po refers to the current transmitting power level. The S meter is calibrated to the standard received microvolt ratings.

During transmission the SWR meter displays the standing-wave value of your antenna.

Shows the status of your DSP RX filter settings.

Operation

Dear user, in order to familiarize you with the functions and capabilities of the G90 portable transceiver, please read the operation guide of this manual to understand the powerful functions of the G90/S.

Transceiver start and shutdown

1. **Start the transceiver**: short press key. ⏻
2. **Shut down the transceiver**: press and hold key ⏻ for 1s.
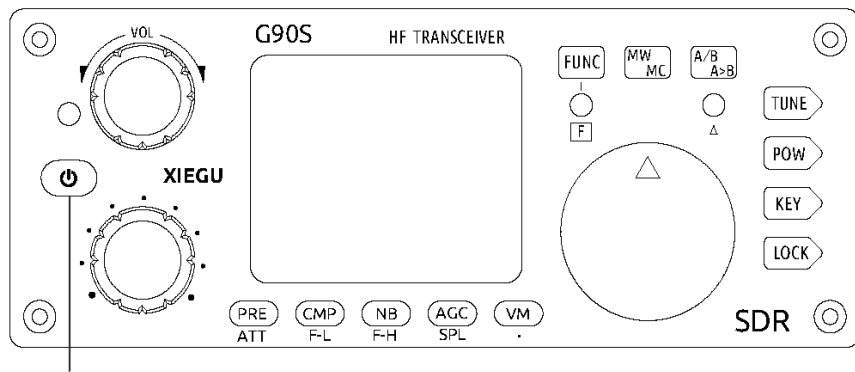
ON/OFF key

Turn off the LCD screed to save power

While on, press the power key quickly to turn off the screen display.

● When the screen is turned off, the radio is still working normally. Pressing any key or turning the knob will turn on the screen display.

Display of Power Voltage

After turning on the radio, the upper right corner of the screen will display the externally connected DC voltage.

The external voltage is 13.8V.

● Do not supply over-voltage power to the radio, or the radio will be seriously damaged!

● The displayed voltage may vary ±0.3V from the actual value.

The G90 is designed uniquely such that lower voltages do not result in significantly reduced TX power or RX performance.

Selection of Working Frequency Range

Frequency range of G90 covers 0.5~30MHz. Amateur bands are divided into 10 frequency ranges.

Frequency band decrease   Frequency band increase

[MODE]   [BAND]
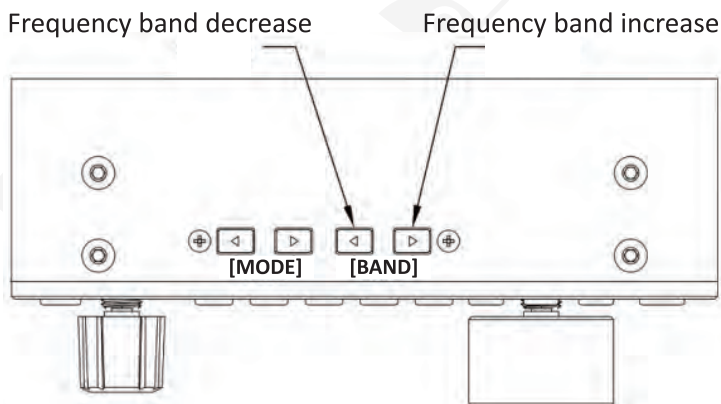
Operation methods:

Pressing the [<] or [>] BAND buttons will cycle through these bands.

1.8MHz ⟷ 3.5MHz ⟷ 5.3MHz ⟷ 7.0MHz ⟷ 10MHz ⟷ 14MHz

28MHz ⟷ 24MHz ⟷ 21MHz ⟷ 18MHz
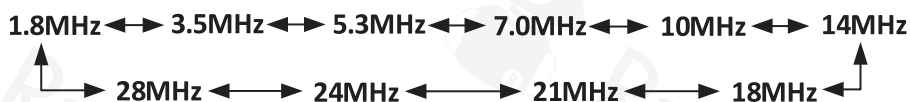
● Each amateur band has a user-defined frequency range that is appropriate for your location. You do have control of having the amateur bands only or adding others.(as detailed in Item 8 of the system menu).

● 60m frequency band shall be available according to regulations of the country (or region).

● Frequency ranges for radios of different versions will be according to the regulations of the country (or region).

● VFO-A and VFO-B are two independent VFO modes that can be set to different operating states. See [VFO Settings] for details.

Operating Mode Selection

Press [MODE] key and switch the fixed sequence below among all modes:

Mode left cycle — — Mode right cycle

[MODE]   [BAND]

LSB -- USB -- CW -- CWR -- AM
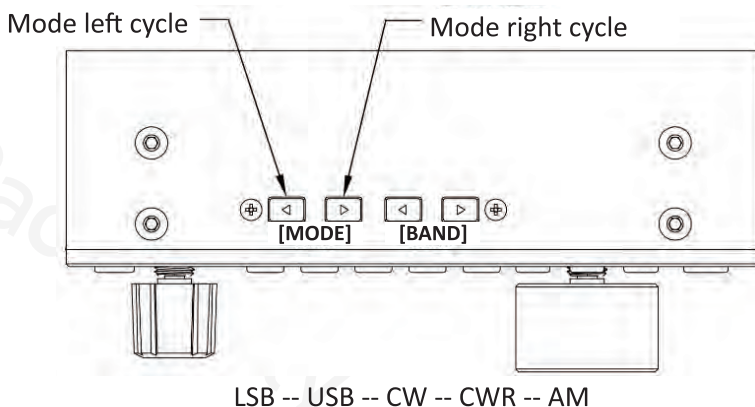
Volume Adjustment

Speaker mode

Turn the volume knob to the left or right to adjust the output volume.

Headphone mode

1. Short press the volume knob to enter the headphone mode.

2. Turn the volume knob to the left or right to adjust the headphone volume.

Volume knob

● Please turn the volume to the minimum before using earphone for the purpose of protecting your ears. Gradually adjust the volume to be appropriate as required after the earphone is inserted.
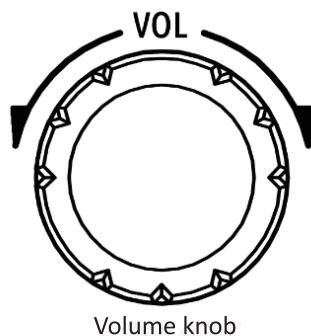
Call Sign Editor

This G90 can set the call sign information displayed on the startup screen.

1. Long press [VM] key to enter the text editor.

2. The bottom of the screen is the character selection area. Rotate the main knob to select the desired character. Press the main knob in a short time to select the character;

3. Press the key corresponding to BACK to delete the last character; press the key corresponding to QUIT to exit the editor interface; press the key corresponding to SAVE to save and exit the editor interface.

4. When the radio is started, the edited text message will be displayed on the screen.

The corresponding relationship between functions and keys:

SAVE: Corresponding to the [PRE] key

BACK: Corresponding to the [NB] key

QUIT: Corresponding to the [VM] adjustment of transmitting power

These LCD screen names will be close to, but not exactly aligned with the buttons below.

Working Frequency Setting
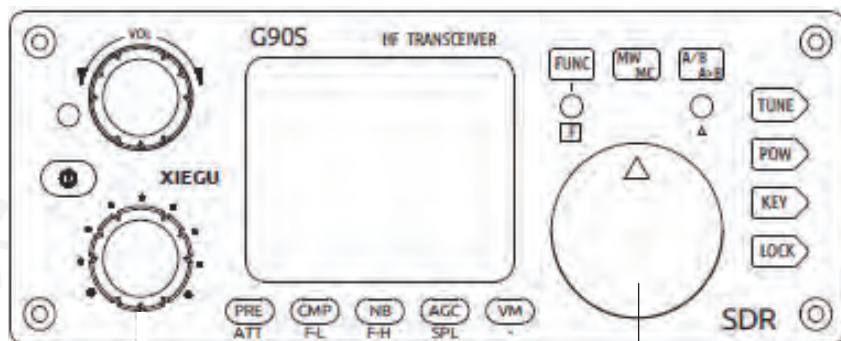
Main knob

There are three methods for setting working frequency of G90/S. You may use the large main knob, the multi-function knob or the hand microphone.

1. Set frequency by using main knob

Press the main knob in a short time to select the 100Hz, 1kHz, 10kHz and 100KHz stepping positions.

Rotate main knob and set the frequency using the current step.

2. Set frequency by using multi-function hand microphone.

Press [F-INP ENT] key on hand microphone, and the G90 will be in frequency setting state. The cursor will be blinking at the first place on the left of frequency display position.

Input desired frequency values one by one, and then press [F-INP ENT] again to complete the frequency setting.

> For example, press keys in following sequence to set current frequency as 14.09000MHz:
>
> 1. Press [F-INP ENT] key firstly;
>
> 2. Press ⬚1 ⬚4 ⬚. ⬚0 ⬚9 ⬚0 ⬚0 ⬚0 number keys one by one;
>
> 3. Press [F-INP ENT] key again to complete the setting.

3. Quick adjustment of the frequency with the multi-function knob.

The Multi-function Adjustment Knob of G90 provides a method of quickly moving around the band. The function knob's default increment is 100khz. Hop from CW to SSB areas of the band in seconds.
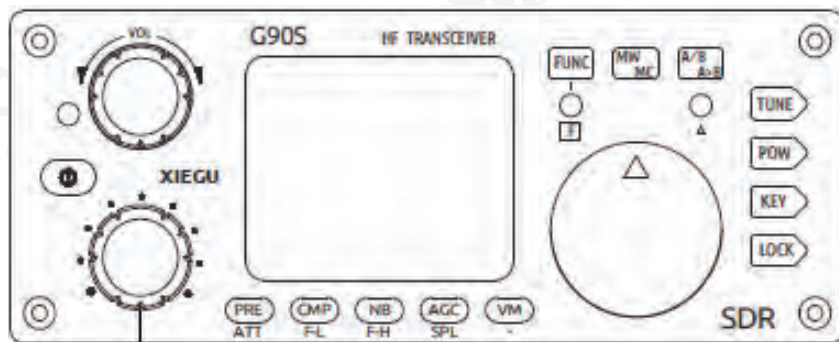
Multi-function adjustment knob

Adjustment of RF Gain and Muting Level RF Gain / SQL

Proper RF gain adjustment can improve the quality of received signal. In general, reducing the RF gain level on low-frequency bands which have strong interference can significantly improve receive quality. (40/80/160)

Adjustment methods of RF gain:

1. Long press of the [AGC] key at the bottom of the screen to allow setting RFGAIN.
2. Rotate the main tuning knob to adjust the RF gain value.
3. After setting your RF gain level, press the main knob inwards momentarily to exit the RF gain setting mode

SQL setting

You set the Squelch level when you want to mute static in between transmissions normally on AM and FM modes (FM with new GSOC display unit)

Squelch Operation

1. Long press [Multi-function Adjustment Knob] to enter the user defined function menu. Rotate the main knob to select the SQL Level function. Press the SAVE key at the bottom of the screen in a short time to select the function, save and exit.
2. Rotate the [Multi-function Adjustment Knob] to set the squelch muting level. At the same time, the muting level will show on the S meter..

● The muting strength gradually strengthens from S1 ~S9, corresponding to strength. For example, when the muting level is set to be S3. it indicates that the speaker will sound when the signal strength is more than S3. Otherwise, the speaker will in the silent mode.

Multi-function Adjustment Knob

The multi-function knob has several operating options whose functions can be customized.

Default: 100kHz frequency stepping position. (most common use)

Press in a short time for entering the receiving filter mode control selection.

Multi-Function knob long press: Enter the user defined function menu. Rotate the main knob to select the corresponding function. Press the SAVE key at the bottom of the screen in a short time to select that function. Rotation of tthe knob will now control that function.

Functions that can be customized are as follows:
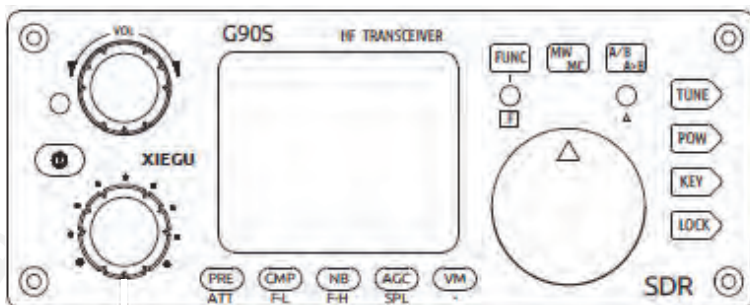
1	Freq 100k	100kHz stepping
2	SQL Level	Muting setting
3	Po Level	Transmitting power setting
4	Key Speed	Automatic key rate setting
5	FFT Scale	Spectrum reference level setting

Receiving and Transmitting Operation Using the SPL and VFOA/B Settings
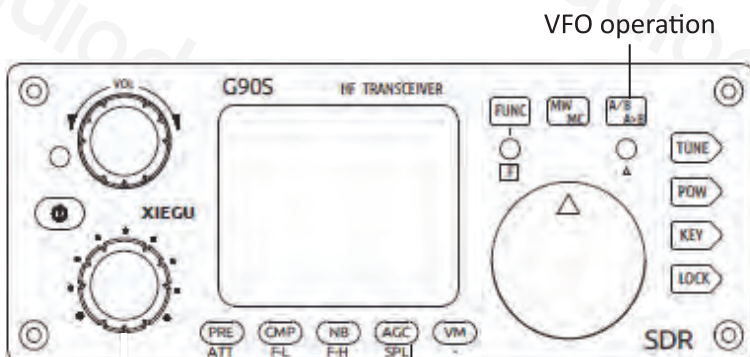
VFO operation

Pilot Frequency Operation

G90/S transceiver has two built-in independent VFOs which can respectively be set to different frequencies and different modes. Using the SPL function, you can have split frequency operation.

VFO setting:

1. Press [A/B / A>B] key in a short time to switch between VFO-A and VFO-B;
2. Set current VFO working frequency and mode while switching to a certain VFO state.

Split Operation (SPL);

1. Set received frequency and mode (on VFO-A) first;
2. Set transmitting frequency and mode on (VFO-B);
3. Operate the second function of the [AGC/SPL], turn on the SPL function. The double-triangular icon will display on the VFO area of the screen.

● VFOA/B can be fully used to set different frequencies and modes so you can quickly switch the two frequency points in real time.

Automatic Gain Control (AGC)

Selecting the appropriate AGC time constant for best receiving quality:

1. Momentarily press the AGC button at the bottom of the screen to cycle through the three AGC selections:

<div align="center">AGC-S → AGC-F → AGC-A → AGC--</div>

AGC-S	Slow AGC control	Recommended settings	AM mode: AGC-S CW AGC-F SSB: AGC-S
AGC-F	Fast AGC control		
AGCA	Automatic AGC control		
AGC	AGC OFF See below		

2. When the AGC-A mode is selected, the radio will automatically select the appropriate AGC control parameter according to the current mode.

● After AGC is disabled, the receiver will be in the maximum gain state and noise received will be significantly increased.

NOTE:

You should experiment with AGC Off mode if the received signal is not changing in strength due to fading (QSB). You must fully control the RF gain level so that you do not have distortion from the incoming signal. Set it to AGC off, then go into the RF gain setting (Hold AGC button in for 2 sec) then adjust the main knob until the signal sounds clear. This can result in a very nice improvement of signal quality under good receiving conditions!

PRE-AMP/ATT

The pre-amplifier can improve reception of some weak signals in the higher frequency range. These are normally the bands above 20 meters.

1. Press [PRE] key at the bottom of the screen in momentarily and the character P will appear on the top left corner of the screen indicating that the pre-amplifier is turned on.

2. Press [PRE] key again and the character A will appear on the top left corner of the screen, indicating that the attenuator is turned on.

3. Press [PRE] key again and no character will appear on the top left corner of the screen, indicating that the current state is straight through.

● The receiver is sensitive enough that under 18mhz, no improvement of the signal to noise ratio will occur with use of the pre-amp. To maintain the best reception performance, limit use of the pre-amp to over 20 meters.

● When the S meter displays that the received signals exceed S9+20dB, turning on the attenuator is recommended to provide the best performance.

Pulse Interface Suppressor – Noise Blanker

Pulse interference suppression can effectively eliminate some kinds of pulse noise, especially the interference caused by automobile ignition systems.

1. Press [NB] key at the bottom of the screen in momentarily to enter the NB function setting - and a corresponding menu will display on the screen.

2. Continued short presses of the [NB] key will select different NB function setting menus. Rotate the main knob to set these values.

The NB funcon menu includes the following opons:

NBSW: NB funcon switch ON/OFF. Default is OFF
NB Level: seng of NB suppression level.
NB Width: seng of NB suppression width

● Adjust the Level and Width while listening to the noise you want to suppress for best effecveness.

● Improper NB parameter sengs will severely degrade receiving.

Do not have the NB on unless you are needing to suppress pulse noise.

Voice Compression CMP

Voice compression can increase the average TX power output during the voice communicaon so that TX communicaons is possible under poor condions.

1. Press [CMP] key at the bottom of the screen in momentarily and the Indicator of voice compression ON will appear on the screen.

2. Press [CMP] key at the bottom of the screen again to disable voice compression.

Use voice compression only when you need it, as all compression degrades TX audio quality slightly. When condions are good, leave it off.

CW Communicaon

You may use CW keys or an external keying unit. Insert their output connectors into the KEY port on the rear of the radio. (See Page 5 for the definion of wiring)

1. Insert CW Key/Keyer into the KEY port on rear;

2. Press [MODE] key to switch to CW (or CWR) mode;

3. Enable the QSK funcon in the [KEY] key funcon and set the appropriate QSK me;

4. Radio will key into transmit as expected.

Pracce mode

You can use the G90 as a CW code trainer using the following method:

● Disable the QSK funcon in the [KEY] key funcon. Only CW sidetone of the transceiver will be heard when using the CW keys. Signals will not be transmitted externally.

CW automatic decoding

Long press [KEY] key to enable the CW automatic decoding. Rotate the main knob to do the fine tuning of the received frequency until the indicator light A flashes with the code. CW decoding will appear at the bottom of the screen. The LED will not blink exactly to the incoming CW, just illuminate and blink.

●Since the accuracy of CW automatic decoding is related to the received station's CW accuracy, received signal quality, and frequency accuracy of the other radio, Auto CW decoding is only an addition to using your own mind for decoding! It is also useful when learning CW.

When automatic CW decoding is used, for best results, the bandwidth of the receiving filter should be 300Hz. Also, adjust the keyer speed on the G90 to approximately the speed of the incoming CW for best decoding. The G90's CW decoder is capable of excellent performance when adjusted correctly.

The [KEY] key function includes common function setting items during CW communication. Press the key in a short time to select:

SPEED: automatic key rate setting

M/L/R: settings of manual/ automatic left and right hand modes

MODE: Iambic A/B mode setting

QSK switch: switch setting

QSK Time: QSK time setting

Ratio: setting of automatic key dot-and-dash interval proportion

Indicator A

Keys
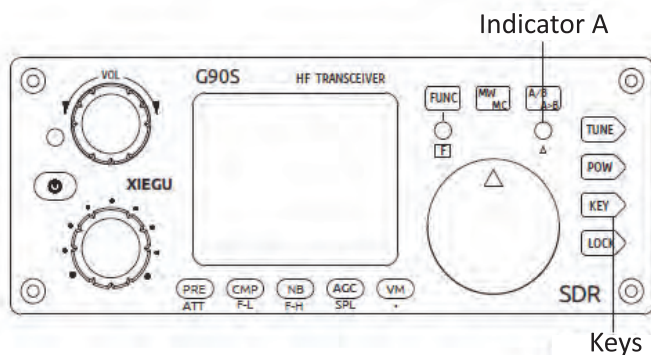
Enter the second function of [KEY] key to set CW sidetone volume and tone, and press [KEY] key in a short time to switch the options:

CW Volume: sidetone volume setting

T800Hz: sidetone tone setting

B500: CW receiving band setting (the default value is 500Hz)

SSB Communication

Insert the hand microphone into the MIC port on the right side of the radio head unit. After inserting, the green indicator light on the hand microphone will be on.

1. Press [MODE] key (<Or>) at the top of the head to switch between LSB or USB mode.

2. Enter the second function of [POW] key for the following settings:

1) MIC GAIN: setting of hand microphone voice gain.

2) INPUT: setting of input mode. (the default is MIC and select MIC during voice communication)

3) B2400: SSB mode defaults to be bandwidth setting, indicating that the band width is 2.4kHz. (a good starting point)

3. The normal function of [POW] key: Press the key in momentarily to set the transmitting power value:

1) POWER: transmitting power setting. (the default is 1W -20W max)

2) SWR THR: setting of standing-wave protection threshold (the default is 3.0). Over this value the radio will reduce power to protect itself.

4. After the above settings are completed you are ready for SSB communications.

The default hand microphone voice gain value is appropriate in most cases. Watch the spectral display when transmitting and if you see extra lines above and below the main audio trace, reduce the mic gain until they disappear. Normally a setting of 10 is a good place to start. You should see the TX power readings peak at 20W. Average will be lower.

Voice-control Transmission VOX

The voice-control transmission (VOX) can automatically judge whether there is hand microphone connected or line input signal. It will automatically control the radio to switch between the receiving and transmission when audio is detected. When the VOX function is activated, it is unnecessary to press the hand microphone PTT key to start the transmissions.

After pressing [FUNC] key to activate the second function, press the volume knob IN to enter the VOX function setting options. Rotate the main tuning knob to change values. Press the VOL knob in again to go through the different settings selections.

     VOX OFF/ ON: VOX function off/ on

     VOX GAIN: voice control gain setting (the recommended setting: 50)

     ANTI-VOX: echo suppression settings of hand microphone and speaker (the recommended setting: 50)

     VOX DLY: VOX hang time (the default: 0)

● The VOX voice TX control function can be used for both the hand microphone and the line input LINE. This is very handy because you can simply connect audio from your radio's audio output and TX audio input lines to the rear connector (or CE-19 accessory) and the VOX will handle keying the radio automatically without needing to make a transmit control line as well.

Setting Line level Input into ACC connector:

When the AF-IN pin of the ACC interface is used for line input audio, set the appropriate input volume in the "AUX IN Volume" option in the system menu. Set it at a mid level value first. Then watch TX power output (while keyed) and adjust your incoming audio from the PC. (using the PC's sound card output volume level control) Remember that you want to set the radio at 20 W output in digital modes and lower the audio level coming from the PC such that the average power level on TX is around 10W. Digital modes can have long key-down times and the radio will heat up more. Plus, digital modes require a very clean signal and a lower audio drive level will achieve this.

With a good antenna, 10W average out is easily sufficient for most all digital mode communications, as they are very efficient. Keep a check on the warmth of the radio when you operate digital modes (and in general). Your ambient temperature might be 55°F or 105°F and this has a great effect on heat build-up. If the radio becomes very hot, you'll need to reduce power or give it cool-down rest. The radio's transmit section is very conservatively designed, but any radio can be over-heated under certain challenging operating conditions.

Automatic Antenna Tuner

There is an efficient ATU integrated inside the G90 radio to help you quickly use many kinds of antennas effectively.

1. Press [TUNE] key in momentarily to connect with built-in antenna tuner. There will be an antenna icon at the top of screen.

2. To initiate a tune, hold the [TUNE] button for > 2 sec.

Note:

1. Pressing the (TUNE) button momentarily will show the antenna icon on the screen. This indicates that antenna tuner in in-line. You may need to perform a tuning by holding the Tune button in for >2 sec.

2. After the antenna tuner is tuned, leave the ATU ON so that it will provide the antenna match.

3. If "SWR" icon is displayed at the top of the screen and flashes once transmitting is enabled - after the tuning, it indicates that standing-wave of current antenna is too high and another tuning may be attempted.

4. When doing a "tuning" by long-hold of the Tune button, the tuner will go through its procedure and return to receive mode after completion. (after several seconds)

5. When your antenna is very close (or say a vertical mobile antenna), strong radio frequency interference may be caused to the unit or electronic equipment nearby.

Standing-wave Scanner SWR

The G90 has an antenna SWR scanning function. It can scan the standing-wave values of the current antenna to help you adjust the antenna.

1. Long press [POW] key to enable the standing-wave scanning function. It will scan the SWR of the antenna currently connected.

2. Press the key corresponding to BW displayed on the screen momentarily to switch the frequency stepping of the scan.

3. In the middle of the bottom of the screen, the frequency of the lowest point of the scanned standing wave is displayed.

4. Press the key corresponding to FAST/ SLOW on the screen in momentarily to select the scanning speed.

5. Press the key corresponding to QUIT displayed on the screen to exit the standing-wave scanner.

Corresponding location of keys VS. screen text:
(They are not perfectly aligned vertically)

BW: Corresponding to the [PRE] key

FAST: Corresponding to the [NB] key

QUIT: Corresponding to the [VN] key

The SWR scanner is for a quick reference only and is not meant to replace a dedicated antenna analyzer. It is a very useful tool though for trimming and adjusting an antenna in the field.

Fine Tuning of Received Frequency (RIT)

Operation method:

1. Long press of the main knob to enter RIT adjustment interface.

2. Rotate the main knob left or right to adjust the RIT value. The adjustment range is ±500Hz. Relevant information is displayed on the screen.
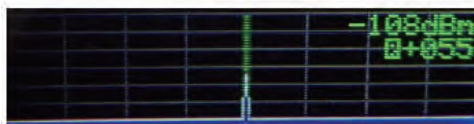
● After RIT function is used, reset the RIT value to 0.

Line Input and Output

The G90 has an external line input interface. When the G90 is used for data communication in conjunction with a computer or an external modem, the correct signal input options need to be selected.

1. Input the external audio signal into the corresponding pin of the ACC port (see the interface description for the definition of the pin).

2. Enter the second option of the INPUT button [FUNC+POW] to select: LINE.

3. In the system menu, select: AUX IN VOLUM to set the appropriate input volume. (see below)

Operation of line output:

In the system menu, select: AUX OUT VOLUM to set the appropriate output volume. Your software package will have a meter showing best input levels.

● When using digital communications and the ACC port is used for TX audio input, the audio drive level coming in should be capable of 200mv.

● Level output from the computer to the radio should be adjusted so that the ALC value displayed on the screen ranges from 30 to 85. The lower the ALC, the better. You should set the radio at 20W output and adjust the PC's sound card output so that your ALC is within range. Excessive high input signal level may overload the input amplifier, resulting in the modulation signal distortion. With ALC correct, the TX power output reading may jump around rapidly under digital modulation - but average power levels will be in the correct range for a clean and effective signal. Digital modes are highly efficient and require much less TX power.

In the system menu, the following two settings are the ones to adjust during the data communications:

5	AUXIN Volum	Line input volume setting
6	AUXOUT Volum	Line output volume setting

● During data communications, the volume output level (sound card output) of the PC is adjusted together with the "Line input volume" (your TX audio). The volume of the input to the computer (normally the mic input) needs to be adjusted in conjunction with the "Line output volume" (received audio going to the PC). The PC settings are normally found under "Sound devices". It is best to set the radio to mid level settings and then adjust the PC's levels to get correct operation. Fine tuning from that point can be done with the G90's menu settings.

Channel Memory Write (MW) and Clear (MC)

Basic operations:

1. In VFO mode, adjust the required frequency, mode, and any other parameters you desire.

2. Press [MW/MC] key in momentarily and the CH 00 (channel number) character will appear on the screen and flash. Rotate the main tuning knob to select an empty channel. At this time, the character E will appear after the channel number, indicating that the channel is empty and can be used for memory.

3. Press [MC/MC] key again in momentarily to save the current set frequency information to the selected channel.

Call the memory channel:

1. In VFO mode, press the [VM] key on the panel in momentarily to enter channel mode.
2. Rotate the main knob to switch the current channel.

Clear the channel memory:

1. In channel mode, press both the [FUNC] + [MW/MC], at this time, the channel number starts to flash;

2. Rotate the main knob to the channel to be cleared. Press [MW/MC] key again to clear the selected channel.

Transmitting Power Setting

1. Press [POW] key in momentarily to enter power setting mode. The display area on the right side of the screen will display the Po power setting value in watts.

2. Rotate the [Multi-Function Adjustment Knob] to set the power with steps of 1W.

POW key
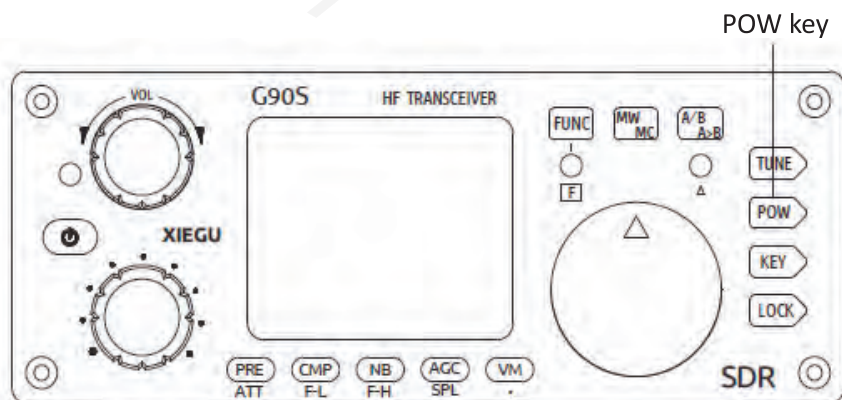
● It is always good to start with reduced TX power if you are unsure of your antenna's condition or are very new to the operation of your G90. Once you know your SWR is low and grounding is good, the radio is designed to operate at full power comfortably.

Digital Filters

The G90 has a built-in variable digital filter that can continuously adjust the bandwidth of the receiver to improve reception of the desired signal.

The G90 has two filter adjustment modes: center frequency point mode and bandwidth mode.

1. Press [Multi-function adjustment knob] in momentarily to respectively switch between these two filter modes.

2. When the center frequency point mode is selected: The prompt text "Cxxx" appears on the filter icon ("xxx" refers to the center frequency point value) and the green vertical line displays on the orange trapezoidal center.

3. When the bandwidth mode is selected: The prompt text "Cxxx" appears on the filter icon ("xxx" refers to the bandwidth value) and the green vertical line displays on the both sides of orange trapezoid.

4. When either the center frequency point mode or the bandwidth mode is selected, rotate the [Multi-function adjustment knob] to adjust the values.

Adjustment of the low and high cutoff frequencies of the filter

1. Press [FUNC] key in momentarily to enable the operation of the second alternate function.

2. Respectively press [CMP/F-L] key or [NB/F-H] key and rotate the main knob to adjust the lower or upper cutoff frequencies of the filter. Press the [CMP/F-L] key or [NB/F-H] key again in momentarily to display the currently selected bandwidth values in the function display area of the screen. 200/2750 is a good starting point for SSB operation.

    F-L: Adjust the low-end cutoff frequency of the filter

    F-H: Adjust the high-end cutoff frequency of the filter

The method to reset the default filter parameters:

1. Press [FUNC] key in a short time to enable the operation of the second function.

2. Long press [CMP/F-L] key or [NB/F-H] key to reset the starting and cutoff frequencies of the filter to be initial values.

In the Center frequency mode (see above) you can slide the center of the bandpass filter around the center frequency so as to reduce interference from adjacent signals either above or below your operating frequency.

• Properly adjusting the filter parameters can greatly improve the performance of the receiver as well as its sensitivity and signal to noise ratio.

• In CW mode, the digital filter can be lowered to 50Hz, but there will be obvious deterioration of the resulting audio at extremely narrow settings. 300-500 hz is normally ideal.

Spectrum/ Waterfall Display

The G90/S radio can display the radio spectrum and waterfall diagrams of received signals and can quickly observe whether there is a signal on the desired frequency of operation. You can also easily identify a clear frequency to QSY(more freq.) to in case QRM (interference) occurs on the frequency you are operating on currently.

Spectrum display bandwidth: 48kHz

The spectrum signal strength value displays the accuracy: ±2dB

The sensitivity of the spectrum display (scale) can be adjusted for the conditions of the band you are operating on. If the scale is set too high, very strong signals may have their display tops cut off. You may adjust the scale by doing the following:

1. Press [FUNC] key in a short time to enter the SCALE reference level setting.
2. Rotate the main knob to adjust the SCALE value till the display effect is appropriate.
3. Press the main knob in a short time, save and exit the setting interface.

● The SCALE reference values gradually increase from 1 to 10. When strong signals are observed, scale values need to be lowered. When looking at weak signals, the SCALE values can come up. Generally, bands under 20 meters will need less sensitive settings.

● SCALE value in each frequency range can be independently set.

The second function meter of the [LOCK] key is as follows:

SCALE: reference level setting

AVE: average value setting

AVE "average" values gradually increase from 1 to 10. The effect on the display is to smooth out rapid changes and provide a better representation of band activity. This setting is a matter of personal taste. It is one of the best features that improve usability of the spectrum display.

Data Communication

The G90/S supports all amateur data communication modes and the full-function control of the computer software to the radio. Only simple wiring is needed for the amateur data communication.

Appropriate digital work mode shall be selected before operation. The recommended common work modes are as follows:

Data mode	Radio setting mode	* The radio TX mode setting required for other digital modes is set to whatever the commonly accepted TX mode for that digital signal is.
PSK31	USB	
RTTY	LSB	
FT8	USB	

When amateur radios and a computer communicate with digital data communication, the computer is used as a "modem". While receiving, the audio of the signal received is sent to the computer for demodulation. When transmitting, the audio signal created by the computer is sent to the radio for transmission. Thus, the computer's audio output level effects the TX power output and ALC readings. The pathways are as follows:

Receiving: Received audio from the receiver→ computer audio IN

Transmitting: The computer-generated audio signal → radio TX Audio IN

Preparation:

The radio USB data cable (USB-3.5mm plug). You must FIRST install the data cable's driver before inserting the USB cable for the 1st time.

A CE-19 expansion card (optional) provides convenient connections.

A few snap-on ferrite RF chokes.

Connection steps:

1. Insert the 3.5mm plug of the universal data cable into the communication port on the left side of the G90 head, and insert the USB into the computer.

2. Insert the provided 8-pin ACC cable into the ACC port at the rear of the G90 and the other end into the corresponding port on the CE-19 (it only has one 8-pin connection

3. Insert one end of the delivered audio cable into the AFCON interface of the CE-19. The other end plugs into your PC's audio input connector. This cable provides both RX and TX audio at the PC. On the CE-19 side, the tip of the connector is audio out from the radio and the next (ring) connection on the stereo plug is the TX audio in. Ground is of course the third connection. (so you can make your own cable)

4. Set G90/S to "Line input" mode. (See Page 24 for instructions)

5. Set the G90/S to the appropriate TX mode for the particular digital mode you are operating in. For most digital modes, that is USB.

At this point, the wiring is complete.

● Remember to keep the PC audio (speaker) level output low and watch your ALC level when going into transmit. Raise that PC output level until you see the ALC just start to respond...and stop. TX power output will be lower than the wattage set on the radio's power output setting. This is so the signal is perfectly clean for digital operation.

● You can clamp on ferrite RF chokes on the USB data cable and the audio cable close to the computer. This will keep any stray RF from getting from the radio into the PC. For better performance, loop the wire through and then around and through the choke again if possible- then clamp it shut. Additional wire passes through the ferrite choke improve filtering.

The audio head wiring diagram is on CE-19 panel
The joint definition in this diagram indicates the output signal terminal of the radio.

8-core ACC connecting line

The audio cable is connected as follows:
AF_OUT: Audio input accessing to the computer
AF_IN: Audio output accessing to the computer

Insert the computer voice frequency Input/ output port

Insert into the USB port of the computer

Left side of the computer

Insert into the communication port

XIEGU general data wire
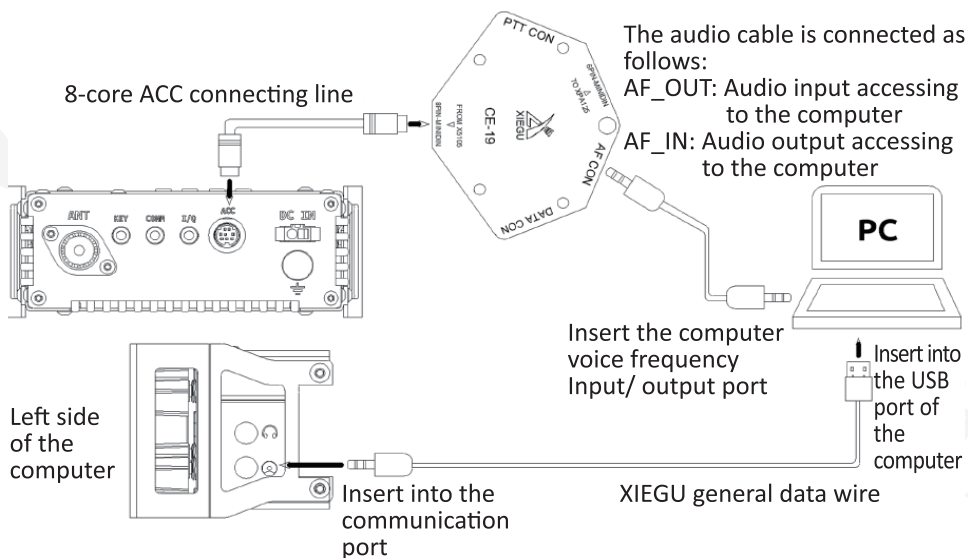
Schematic Diagram of Wiring between G90 Data Communication

Connection between the G90/S and XPA125B (optional)

After the G90/S connects with XPA125B power amplifier using the CE-19 adapter, the output power will be 100W or more. The XPA-125B's antenna tuner is rated for full power output from the amp.

G90S

ACC interface
8-core wire

CE-19

TO XPA125
6-core wire
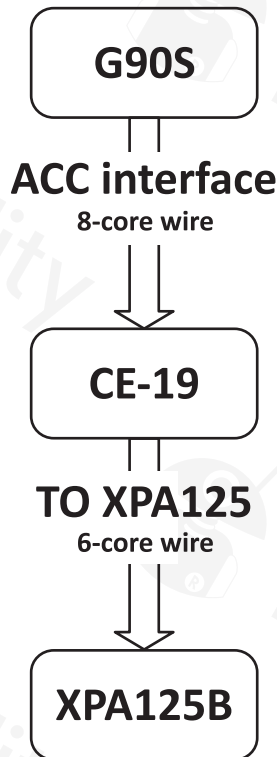
XPA125B

Schematic Diagram of Wiring between G90 and XPA125B

After connection, the G90/S can automatically control the band switching of XPA125B. As well, the ALC connection is also handled through the CE-19 adapter. When the G90/S output power exceeds the power limit of the XPA125B input, the ALC control will automatically decrease the output power of the radio so that the output power of the XPA125B will be kept to about 100W.

We suggest that the output power of the G90/S is set to be ≤2.5W to protect the amplifier equipment. The amplifier can make full power with very little input.

●The 8-pin ACC wire is included with the CE-19 kit. The 6-pin ACC wire is included with the XPA125B.

Description of System Menu

System Menu

The system menu enables a good amount of customization. Many of these are a matter of personal preference.

Operation method: Hold the [FUNC] key 1-2 sec. to enter the system menu.

The definitions of menu functions are as follows:

S/N	Menu name	Function description
1	Handle up/down	Hand microphone up/down key function setting
2	Handle F1	Hand microphone F1 key function setting
3	Handle F2	Hand microphone F2 key function setting
4	LCDBL	Screen backlight brightness setting
5	AUX IN Volum	ACC port input audio volume setting
6	AUX OUT Volum	ACC port output audio volume setting
7	RCLK Tune	Reference clock adjustment
8	Band Stack Mode	Band stack setup
9	ON/OFF Beep	ON/OFF of system prompt tone
10	Version	Firmware version No.

Description of the multi-function key displayed at the bottom of the screen:

PREV: previous page.

SAVE: after adjusting the system menu settings, press this key to save and exit.

EXIT: exit the system menu interface directly.

NEXT: next page.

Use the main VFO tuning dial to change settings.

Menu item 1: Handle up/down
Function: Customize the function of [▲▼] key on multi-purpose hand microphone.

Optional value	FREQCH+/-	Frequency/channel+/-
	BAND+/-	Band+/-
	VOLUM+/-	Volume+/-

Default: FREQCH+/-
Menu item 2: Handle F1
Function: Customize the function of [F1] key on multi-purpose hand microphone.

Optional value	PRE/ATT
	SPLT
	NB
	COMP
	AGC

Default: PRE/ATT
Menu item 3: Handle F2
Function: Customize the function of [F2] key on multi-purpose hand microphone.

Optional value	PRE/ATT
	SPLT
	NB
	COMP
	AGC

Default: SPLT
Menu item 4: LCD BL
Function: Set the brightness of displayer backlight
Adjustable range: 10°%~100%   The larger the percentage, the higher the brightness

Default: 80%
Menu item 5: AUX IN Volum
Function: Set the volume of ACC port input audio signal
Adjustable range: 0~15   The large the value, the greater the volume

Default: 8
Menu item 6: AUX OUT Volum
Function: Set the volume of ACC port output audio signal
Adjustable range: 0~15   The large the value, the greater the volume

Default: 15
Menu item 7: RCLK Tune
Function: Adjust the reference clock of radio's internal frequency synthesizer. To correct the frequency accuracy of the radio.
Adjustable range: -1000Hz~+1000Hz

Default: 0Hz
Ie: If you are showing an offset of 20hz when you are talking to stations- and this is consistent- you can adjust the setting by 20hz to re-calibrate. If you are 20hz low on your frequency display, adjust for Plus 20hz.
Menu item 8: Band Stacking Mode
Function: Set band stacking mode. When switching through frequency bands, you can enable or disable the shortwave bands being in the rotation.
Optional: HAM Band   Only display amateur frequency bands
           FULL Band   Display all frequency bands

Default: HAM Band
Menu item 9: ON/OFF Beep
Function: Enable/disable and the system prompt tone. Enable/disable the prompt tone at startup & shutdown.
Optional: Enable/Disable

Default: Enable
Menu item 10: Version
Function: Display the firmware version No. of head and body.
APP: V1.XX   Head firmware version No.
BASE: V1.XX   Body firmware version No.

Factory Reset

If the radio's operation was to become abnormal in any way, you can restore the radio to the factory settings.

Operation methods

1. Hold the FUNC key and power up the radio to enter the restoration of factory settings mode.

2. Press PRE key to confirm reset. Press VM key to cancel the operation.

●Default parameters can meet most operating needs. This way you can see if your radio is operating normally.

CIV control instructions

Computer Control Instructions

G90/S uses the standard CIV instruction sets. You can remotely control the transceiver based on standard instructions or configure control instructions for other software.

See specific specifications of CI-V instructions in *CI-V COMMUNICATIONS INTERFACE-V REFERENCE MANUAL.*

Wave Band Voltage Data

The ACC socket of the BAND terminal of G90/S outputs the band voltage of each frequency band. This band voltage is associated with the current frequency band of operation and can control peripherals for automatic band switching. It is useful for a variety of peripherals.

Wave band	Voltage	Wave band	Voltage	Wave band	Voltage	Wave 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	/	/

Additional new features as of Firmware 1.71

RF Gain Control: Long press of the AGC button. Rotate the main VFO knob to change values. RF gain does not effect the S meter or FFT scale.

DSP Filter: Short press of the multi-function knob. Alternates between setting the center frequency and adjusting the bandwidth of the filter.

FFT Averaging: Func key and then Lock key to open Averaging function. Adjust it to your personal preference.

Firmware Updates

Xiegu regularly releases firmware updates for the G90. You can go to radioddity.com and follow the Support link. All info for updating your G90 will be there. The USB cable for performing updates is included with the G90. Be sure to install the cable driver from the site before inserting the USB cable into your PC.

NOTE: The G90 is easily modifiable for MARS transmit frequency ranges.

NOTE: Your antenna will have a great impact on the quality of your communications. Many simple wire antennas offer excellent performance for field operations.

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