

**Operating Manual
SWL IR Remote Control for ICOM
For
Firmware Version 1.43**

Web Site: <http://www.swl-remotes.com/>

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Overview

Thank you for purchasing the SWL IR Remote. We are confident that you will get many hours of listening pleasure from your radio using the remote. Don't hesitate to contact us at support@swl-remotes.com if you have any problems or questions. We want your experience with our products to be as positive and enjoyable as possible. We also appreciate any comments on how we can make our products better.

The SWL IR Remote is a microcontroller-based device that decodes the Infrared pulse stream from a Universal Remote control and converts it into the remote commands for shortwave receivers and transceivers. Several versions of the SWL IR Remote are available for different models of Receivers and Transceivers.

The SWL IR Remote is connected to your ICOM radio using a 1/8in (3.5mm) audio type cable connected from the SWL IR Remote to the Remote (CI-V) jack on the radio.

Power for the SWL IR Remote is provided by the included wall power supply. Alternatively, 9-12Volts DC at 100ma max can be supplied to the power connector. The center pin of the coax power connector is positive. There is a blocking diode in the circuit, so reverse polarity will not harm the SWL IR Remote control unit. Customers in Europe receive a DC cable that connects to the coax power jack on the SWL IR Remote control unit and has pig tail leads on the other end for connecting to a DC power supply.

All keys on the Universal Remote are indicated in this manual with bold type. The keys used for radio control are the digits **0, 1, 2, 3, 4, 5, 6, 7, 8, 9, Mute, Power, Enter,** and **Last** or **Previous**. All references to the **Last** key also refers to the **Previous** key on the remotes that have that key.

Any Universal Remote control should operate the SWL IR Remote. Follow the instructions in the remote manual to set the remote to operate a Sony TV. The remote needs digit keys, **Power, Enter,** and **Last** or **Previous** buttons. The remote should be in TV mode to operate properly. Make sure you do not have Cable or VCR modes selected. The codes from the keys when in Cable or VCR mode are different and will not operate the SWL IR Remote.

None of the settings are changed in the radio with the exception of memories that you write with the remote. All settings are temporary in the remote control. You can go back at any time to using your radio from the front panel.

Keep the Quick Commands Reference sheet by your remote as reference on the SWL IR Remote operation.

Connection to Radio

The ICOM CI-V cable has a 1/8in (3.5mm) audio type plug on each end. Connect the cable to the back of the SWL IR Remote control unit and then connect to the back of your radio to the connection marked REMOTE. This will be a 1/8in (3.5mm) jack.

Plug in the wall power supply and plug into the back of the SWL IR Remote control box. The power connector is located on the back left hand side of the control unit. The SWL IR Remote draws very little power and does not include or need a power switch.

Note: If you use the RS-232C connector on the back of your Transceiver, leave the SWL IR Remote powered at all times or remove from the CI-V port if not powered. The RS-232C connector will be disabled if the SWL IR Remote is plugged into the CI-V port and not powered on. If the SWL IR Remote is connected and powered, it does not interfere with the normal operation of the radio front panel, or the RS-232C computer port.

The default CI-V address is 5A. The default baud rate is 9600.

Radio Addressing

Be sure that the CI-V setting and baud rate on your radio are the same as the SWL IR Remote. If you are unsure about whether or not your radio is set up correctly, check your user's manual for instructions on how to check and verify these settings. The SWL IR Remote CI-V address and baud rate can be changed if necessary to fit your requirements. Just be sure that the settings match those of your radio.

Remote Control Operation

Description

The following describes the operation of the remote control. Some of these operations are only available on certain radios. Refer to the Universal Remote Commands tables, or the Commands Quick Reference guides for specific features.

Once you begin to use the remote you will get very comfortable with the operation. There is a lot of functionality achieved by just a few remote buttons. You can stick with the basic operations of the remote (frequency, and memory) and still achieve a lot of control over your radio. The biggest problem you will have in the operation of the remote is the **Enter** key. If you do not enter the codes exactly you will end up trying to enter a direct frequency. Direct frequency entry can occur in either VFO or memory modes.

Power

Most Transceivers do not have the CI-V command implemented for power on and off, so the SWL IR Remote will not be able to power the Transceiver.

Direct Frequency Entry

When entering frequencies directly, be sure to press a digit key before the first decimal point. The **Mute** button functions to mute the radio, as a decimal point when entering frequencies, and as a clear to abort any key entry to that point. When using the **Mute** button as a clear, be sure to press it enough times to get the LED to blink twice, or for the volume to mute. This is confirmation that the clear command has been accepted. When entering frequencies directly, the **Mute** key will operate as a decimal point only after a digit key has been pressed before the first decimal point. As an example, you can enter **0 Mute 3 Enter** for 300KHz. Pressing the **Mute** a second time during direct frequency entry will then enter 100Hz values. To enter 15.235.500 you would enter **1 5 Mute 2 3 5 Mute 5 Enter**. Zeroes are assumed when not entered. You can enter 15.235.500 by pressing **1 5 2 3 5 Mute 5 Enter**. You can enter the frequency without any decimal places, but you need to enter all the zeros so the frequency is not misunderstood. To enter 15.235.500 without using the decimal key, enter **1 5 2 3 5 0 0 Enter**.

The SWL IR Remote assumes that you are entering frequencies in kHz. Any frequency in kHz can be entered directly. 9565kHz would be entered as **9 5 6 5 Enter**. The decimal place (**Mute**) is not necessary in this case. The decimal place is only needed to save zero entries or optionally when entering a frequency less than 1MHz. When entering frequencies below 1MHz, press a leading zero before the frequency and then **Enter**. For example: **0 7 0 0 Enter** for 700kHz. Or use the **Mute** key as a decimal place before or after the frequency entry. For example: **7 0 0 Mute Enter** for 700kHz or **0 Mute 7 Enter** for 700 kHz.

After a frequency has been entered, you can then use the **CH+/-** to step the frequency in the VFO mode. Frequency steps of 1Hz, 10Hz, 100Hz, 1kHz, 5kHz, 9kHz, 10kHz, 100kHz, and 1MHz can be used to adjust an entered frequency very quickly or step through stations with set frequency spacing. The 1Hz step is not available on the Yaesu FRG-100 or the Drake R8/A/B. The frequency resolution on the Yaesu FRG-8800 is 10Hz (frequency changes by 25Hz). The 1Hz, 10Hz, and 100Hz steps are not available on the Lowe HF-225. You can set User Defined Tuning Steps for tuning CW and SSB below 1kHz. Press a numeric key corresponding to the frequency step desired (see commands below), and then the **CH+/-** and the step frequency will be

used. The step frequency is kept and used again the next time the **CH+/-** keys are used. The step is permanently kept when the radio is powered off and back on with the remote **Power** button. The **CH+/-** keys will change the frequency when in the VFO mode, and change memories up and down when in memory mode.

Frequency pacing is the rate at which the frequency is increased or decreased when the **CH+/-** keys are held down. The pacing is a configurable parameter that can be set by the user. You can speed up or slow down the rate at which the frequency changes by setting the frequency pacing.

The **CH+/-** keys are used to step the frequency up and down when in VFO mode. The first press of the **CH+/-** in this mode will be slightly delayed. If the key is held down it will then begin stepping the frequency at the current slewing rate. Use single presses of the **CH+/-** keys to move slowly up or down in frequency. Hold the keys down continuously to step the frequency very quickly.

The FRG-8800 and the HF-225 interfaces are unidirectional. Because of this the remote has no way of knowing the current frequency setting on the display. When the SWL IR Remote control unit is first powered, it sets the frequency to 10MHz. You can then move around from there and the remote tracks the frequency. The current frequency is kept as long as the remote control unit is powered. If the power is removed, the frequency goes back to 10MHz.

Last Frequency Recall

The last directly entered frequency can be recalled. Use this when looking for other frequencies being used by a shortwave broadcaster. You can set a frequency directly, enter another frequency, and return to the original frequency. You can then enter another frequency and return, etc. The last frequency entered is lost if power is removed from the remote control unit. It is kept if the radio is powered off.

Tuning Steps

Pre-set Tuning Steps can be selected by entering a single digit before using the **CH+/-** keys on the remote. The tuning step stays until changed again by the user. The Kenwood R-5000 has built in tuning steps that are overridden by the radio when using the remote. You can tune all modes except FM to 100Hz. Only SSB and CW modes can be tuned to 10Hz. FM steps are 5kHz and 2.5kHz.

Five User Tuning Steps can be defined for special tuning requirements. Set these tuning steps to half the value of your filters. Tuning off frequency by half the filter bandwidth will improve audio response without degrading the signal or losing synch lock. For example if you have a 2.4kHz filter, set User Tuning Step 1 to 1.2kHz and then tune off frequency when the 2.4kHz filter is selected. This procedure is similar to using a PBT control, but you can see on the display how much off frequency you are tuned. With the PBT, you can only adjust and listen for improved response. You could also set a User Tuning Step to 5Hz and use it to quickly zero-beat the frequency in SSB mode on the R75. A similar method will work for other receivers that don't have 1Hz resolution.

Even though you can set User Tuning steps on the Lowe HF-225, they really don't make much sense. The keyboard interface on the HF-225 only accepts frequency values to 1kHz. Frequencies sent from the SWL IR Remote are truncated below 1kHz, so anything below 1kHz will be taken as zero. A step of 100Hz will do nothing to tune the HF-225 until the 1kHz digit is

changed. If you were to increment from 1kHz to 2kHz by 100Hz steps, the tuning would not be affected until 2kHz was to show on the display. This would take 10 presses of the **CH+**.

Memory Operation

When moving through the memories, you can directly select a memory channel using the **x (x) (x) Last** key sequence. For example, to select channel 23 you would press **2 3 Last**. You can select a memory channel in VFO or memory mode. You can also write the VFO to the currently selected memory. Once the channel is selected, you can move the memory to the VFO using **0 Last**, or move through the channels one at a time using the **CH+/-** keys. The **CH+/-** will change the memory channel when in memory mode only.

There is one idiosyncrasy with memory channels on ICOM transceivers. The remote keeps track of which memory it has operated on last, but there is no way to know which memory channel is currently selected once a memory scan has been started. At times the memory may seem to be off of where you expect it to be. Just directly select a memory, or move through memories until you have the memory desired. This issue comes about because in the CI-V interface there is no way to query the radio and get the current memory channel selected. The remote will do the best job it can to track the current memory. When the radio is powered off with the **Power** key on the remote, the current memory channel is put into semi-permanent memory so it can be restored even after the remote control unit is powered off.

Mute Operation

There is a lot of functionality in the **Mute** key. The **Mute** key is used during frequency entry as a decimal point. Any time a digit key is pressed before the **Mute**, the control unit then understands the **Mute** to be a decimal point. At any time you can press the **Mute** key to clear any keys pressed. The **Mute** may have to be pressed several times to get the LED to blink twice, indicating that the keys have been cleared. If the radio mutes then you can be sure that the sequence is cleared. The remote needs to know whether the **Mute** is being used for a decimal or it is intended to be a clear. A clear function is interpreted by the remote control by multiple presses of the **Mute** key.

Memory or Programmed Scan

You can initiate a memory scan while in the memory mode, and a programmed scan in the VFO mode by pressing the **Last** key. Pressing keys other than the **VOL+/-**, **Mute** and several of the mode keys (for example mode selection and filter selection) will stop the scan. A memory scan is when the radio scans through the stored memory channels. This is not a select memory scan – all memories are scanned. A programmed scan is where the radio scans the frequency starting at the current frequency. See the radio manual for a description of these modes of scanning and how they operate. The SWL IR Remote only initiates a scan. It has no control over the way the scan operates.

Universal Remote Commands

Radio Power

Power

Radio power on /off. This only works on ICOM Transceivers if the command is implemented in the CI-V interface on that radio.

Direct Entry of Frequencies (Examples)

0 8 3 0 Enter	830kHz
0 Mute 7 Enter	700kHz
5 0 0 Mute Enter	500kHz
3 Mute 2 5 9 Enter	3259kHz
1 5 Mute Enter	15000kHz
1 5 Mute 2 3 Mute 5 Enter	15230.5kHz
1 5 2 3 5 Enter	15235kHz
9 5 6 5 Enter	9565kHz
3 Mute 5 Enter	3500kHz
Mute (Mute) (Mute)	Clear key entry during numeric entry. LED will blink twice.

Frequency and Memory Channel stepping

	<u>VFO Mode</u>	<u>Memory Mode</u>
CH+	Freq+ by tuning step	Memory+
CH-	Freq- by tuning step	Memory-

Tuning Steps

x before **CH+/-** to set a tuning step. It stays until changed again.

1	1Hz
2	10Hz
3	100Hz
4	1kHz
5	5kHz
6	10kHz
7	100kHz
8	1MHz
9	9kHz

User Tuning Steps

0 before CH+/-	Last Used User Tuning Step
0 x before CH+/-	User Tuning Step (x =1, 2, 3, 4, 5)

Scan Control

	<u>VFO Mode</u>	<u>Memory Mode</u>
Last	Start/Stop Programmed Scan	Start/Stop Memory Scan

Enter Commands – Toggles/Selects radio features

- Enter** VFO/Memory mode.
- 2 Enter** Attenuator on/off.
- 7 Enter** AM; FM and CW (configurable).
- 8 Enter** LSB, or USB modes.
- 9 Enter** Wide, Normal, or Narrow filters.
- 0 x Enter** Announce with speech synthesis. Only works with Speech Synthesis (UT-102) option installed.
 - 0** – All data.
 - 1** – Frequency and S-Meter.
 - 2** – Receive Mode.

Direct Enter Commands – Directly Selects radio features

- 8 x Enter** Modes
 - 1** – LSB
 - 2** – USB
 - 3** – AM
 - 4** – CW
 - 5** – RTTY
 - 6** – FM
- 9 x Enter** Filter Selection
 - 1** – Wide
 - 2** – Normal
 - 3** – Narrow

Memory management

- x x Last** Select Memory Channel xx. Used for channels 10 – 99.
 - or
 - x Last** Select Memory Channel x.
- 0 Last** Memory to VFO. Frequency and mode are transferred from memory to VFO and VFO mode is selected. This will only work when not scanning.
- 0 0 Last** Recall last directly entered frequency and select VFO mode
- 1 0 0 Last** Write VFO Frequency and mode to currently selected memory channel. This will only work when not scanning and in the VFO mode.

Configuration Parameters

- 0 9 1 Enter** Set CI-V address
x x Enter CI-V address set to xx
or
x Mute y Enter y converted to hex (e.g. 1 – A, 2 – B, etc)
5A would be entered as: **5 Mute 1 Enter**
- 0 9 2 Enter** Set Radio Port baud rate
1 9 Enter 19200 Baud
9 6 Enter 9600 Baud (Factory Default)
4 8 Enter 4800 Baud
1 2 Enter 1200 Baud
- 0 9 3 Enter** Set RS-232C Level Converter baud rate
1 9 Enter 19200 baud (Factory Default)
9 6 Enter 9600 baud
4 8 Enter 4800 baud
- 0 9 4 Enter** Set Frequency Pacing
x x Enter Value from 1 to 99 to control pacing. 1 is the fastest and 99 is the slowest.
- 0 9 5 Enter** Set Configuration Parameters to Factory Defaults.
Enter Reset Configuration Parameters to Factory Default.
CI-V 5A
Radio Baud 9600 baud
Frequency Pacing 30
Optional Modes Disabled
- 0 9 6 Enter** Enable/Disable Optional Mode Selections
0 Enter Disable FM and CW modes in selections.
(Factory default)
1 Enter Enable FM mode in selections.
2 Enter Enable CW mode in selections.
3 Enter Enable both FM and CW in mode selections.
4 Enter Disable AGC off (Factory default)
5 Enter Enable AGC off in AGC selections.
- 0 9 7 Enter** Define User Tuning Steps
x Mute f f f f Enter
The User Tuning step x (1, 2, 3, 4, or 5) is defined as frequency **ffff**, converted to f.ffffkHz. You must enter all digits, even zeroes; e.g. define Tuning Step 2 with a value of 1.4kHz would be **2 Mute 1 4 0 0 Enter**. The display on the radio will show the value as 2.140.000Hz when you are done to confirm the entered value. It is best to set these tuning steps with the receiver on and in the VFO mode. These steps are saved in non-volatile memory and are never changed except using this configuration mode.

LED Operation

The LED provides feedback on the mode and operation of the SWL IR Remote. The LED blinks slowly whenever there is a communications error (such as NAK from ICOM radios) or the communications has timed out waiting for a response when a response is expected. The most common reason that the LED blinks slowly is a command that is not understood by the ICOM radio, and the radio has returned a NAK. The NAK means that the radio does not understand the command, or the command contains a parameter out of bounds. This can also occur if the radio is powered off and you try to initiate commands.

Communications Error

The LED blinks continuously at a slow rate when the communication times out from the radio, or a command is NAK'd. If the radio power is off and you try to initiate any command but power on, the radio will NAK all commands and the LED will indicate a communications error. If this occurs on every function and the radio is powered on and not responding, check the cable connection, the CI-V address and baud rate setting on the radio. Also verify that the SWL IR Remote is correctly configured for the CI-V address and baud rate for the radio. If optional modules are not installed in the radio and you try to use those functions, the radio will NAK the message. This is normal when the optional modules are not installed and will not cause improper operation or hang up.

Clear Input

After the **Mute** is used to clear key entries the LED will blink twice.

Confirmation of Command

After a valid command has been issued and acknowledged the LED will blink once and go out. The LED will appear to be on continuously when the **CH+/-** is held in the frequency mode, because the commands repeat and the LED doesn't always time out.

Configuration Mode

When you enter the parameter configuration mode, the LED will blink continuously at a fast rate until the configuration operation is completed or canceled.

RS-232C Level Converter

Description

The RS-232C Level Converter option connects to a computer through the DB9 connector on the back of the SWL IR Remote unit. Just plug your computer into the SWL IR Remote and you can use any software program that can communicate with your receiver. It is possible to use the RS-232C Level Converter to convert baud rates between your radio and computer. You can use newer programs on your computer at higher baud rates (9600 or 19200) and radio baud rates of a different value. This is quite valuable if you want to use newer computer programs to control older radios. This is a great way to interface an older radio with a newer software program.

Operation

The Level Converter takes in characters from a computer and sends them on to the radio, then waits for return characters from the radio if the communications gets a response. Most Level Converters just convert the electrical signals from RS-232C to TTL as required by the radio. The SWL IR Remote has two serial channels (called a UART). One connects to the radio using TTL level signals for the radio. The other channel is converted to RS-232C level signals and connects to a computer. Going through the SWL IR Remote controller permits control over the flow of traffic to and from the radio. IR commands can be interjected into the time between the computer commands permitting operation by the computer and the Universal Remote.

Having two independent communications channels allows each channel to communicate at a different speed (baud rate). ICOM radios respond to all CI-V messages and this then provides a “pacing” of the commands from the computer. If properly implemented, commands are sent from the software and the software waits for a response. Because the software waits for a response to all commands, it should not initiate another command until it gets a response, or enough time has gone by to be sure a response is not coming. This will synchronize commands to the radio and the radio will not be overrun.

There is a delay of about one character time when using the Level Converter. This is not enough of a delay to cause any problems with most computer software. There is a normal turn around time in the communications and the software, if properly implemented, should handle this delay.

The CI-V interface is a single line, half-duplex mode of communications. The computer sends a command, and then waits for a response on the same line. Because of the single line of communications, characters sent to the radio are echoed back to the sender. The Level Converter mimics this so that software thinks that it is talking directly with a radio, which will echo back all characters sent.

Troubleshooting

Nothing happens when using the Universal Remote.

- Make sure the radio is powered.
- Verify that the Universal Remote is in the TV mode. Check that the remote control box is connected to the wall power supply and that the wall power supply is connected to the AC supply.
- Check the batteries in the Universal Remote and change if necessary.
- Verify that the TV mode of the Universal Remote is set for a Sony TV.

The LED on the remote control unit blinks slowly.

- If no remote operations function, check cable connection to the radio.
- Check CI-V address, and baud rate in the radio and the SWL IR Remote control box. Use configuration command **0 9 5 Enter Enter** to reset to factory defaults. Then re-program as necessary.
- Verify that the Transceiver is turned on. If radio is not turned on, it will NAK all commands except power on.
- Check that the CI-V cable is connected to the REMOTE jack.
- Commands that are not implemented in the radio are NAK'd; e.g. initiating speech synthesis without the speech synthesis module will cause the LED to blink.

The LED on the remote control unit blinks fast.

- The configuration mode has been selected and the operation needs to be completed. Push **Mute** to cancel the operation or **x x Enter** to complete the operation. See chart above on the configuration command parameters.

Some buttons on the control work, and some don't.

- Verify that the Universal Remote TV mode is selected. If CABLE or VCR modes are selected, only a few buttons will work. The power and mute will work in both modes. None of the other keys will work in cable or VCR mode.
- Operate the buttons with more time between button presses. There is a 100 msec delay between key presses so the remote control unit can tell if the button on the remote is held continuously or has been released and pressed again. Each press of the remote will cause a continuous stream of IR pulses to be sent (the LED on the Universal Remote will be lit continuously). The remote control unit knows that the button has been released if the IR pulse stream stops for 100 msec or longer.

Erratic Operation of the remote

- Check the batteries in the Universal Remote and replace if necessary.
- Be sure to aim the Universal Remote at the front panel of the control unit. The IR sensor is behind the front lens to the left of the LED. This is more critical the further you are away from the remote control box.
- Confirm that the interface cable is connected securely to the radio and the SWL IR Remote control box.
- Check the power connection to the back of the SWL IR Remote control box.

Memory on the radio and the SWL IR Remote are not synchronized.

- If the memories are changed in any fashion other than the Universal Remote, the SWL IR Remote can lose track of the currently selected memory. Use the SWL IR Remote to perform memory operations, or select the memory channel directly with the SWL IR Remote to synchronize the current memory channel after making memory changes other than by using the remote.