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Amateur Radio

COMMUNICATIONS & TECHNOLOGY
JANUARY 2021



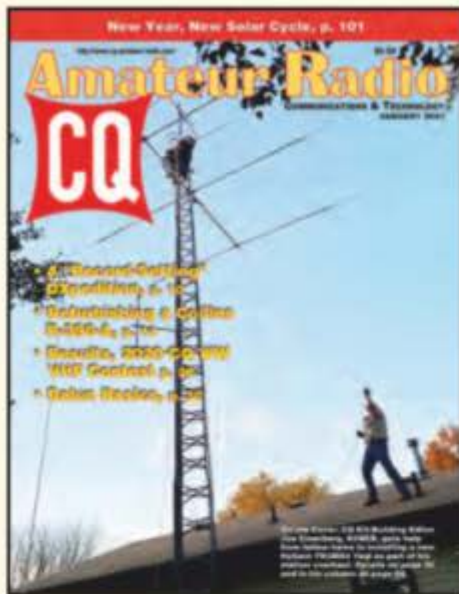
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On the Cover: CQ Kit-Building Editor Joe Eisenberg, K0NEB, gets help from fellow hams in installing a new HyGain TH3MK4 Yagi as part of his station overhaul. Details on page 50 and in his column on page 64.

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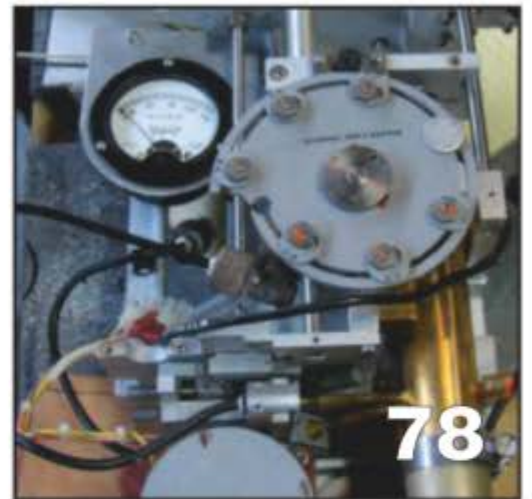
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64 COVER: KIT BUILDING: Getting it Up

By Joe Eisenberg, KØNEB

Gettin' by with a little help from his friends ... the Nebraska ARES tower crew helps install new antennas for CQ Kit-Building Editor Joe Eisenberg, KØNEB, at his home in Lincoln. Details on page 50 and in Joe's column on page 64.



FOCUS ON: We begin 2021 in our ham "shacks." We always strive to improve our stations, be it erecting new antennas, setting up new transceivers and amps, rewiring, or simply cleaning out our junkboxes. This month, CQ has articles on all types of ways to improve your shack, and even where we get the term "shack." You can find it on pages 14, 30, 38, 42, 64, 75, and 78.

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If you built K5PA's and WB2REM's circuit two years ago to use a wireless headset to operate your rig from any room in your house, and you have an ICOM transceiver, you might want to try this project as well, to let you transmit different memorized messages with a keyfob!

Untether Your Memories!

Remotely Operate Your ICOM Message Memories

BY GENE HINKLE, * K5PA AND JIM MILLNER, # WB2REM

Cutting the cord is never easy, but in our October 2018 *CQ* article entitled "Beyond Untethered ... Operating Your Station, Cell Phone, and Remote Simultaneously with a Wireless Headset," we presented a simple solution to solve this feat. Going wireless was accomplished by modifying the connections of the Plantronics W720 wireless headset and adding components to make it suitable for use on ham radio. Users who have adopted the wireless headsets have found them to be one of the best additions to their stations.

Like many other new technologies, once the wireless headset problem was solved, another need soon arose. As an enhancement to the article listed above, the authors have developed a wireless key-fob (remote controller) system, which allows the operator to remotely access, within a 200-foot radius, either four or eight voice memories (depending on the radio) stored in the memory of specific ICOM radios (see *Photo A*; list of radio models below).

Currently, ICOM voice memories can be triggered by pushing buttons either on the screen or on the front panel. A few years ago, I-Mate came out with a product that used four pushbuttons mounted on a small box which, when individually pushed, triggered one of four voice memories of the ICOM radio. The device plugged into the transceiver's microphone jack. The I-Mate was especially useful on DXpeditions and during contests by saving you from reaching over to the radio's front panel to access a voice memory. Unfortunately, I-Mate has been discontinued.

With the advent of the wireless headset, the authors believed there would be advantages to remotely accessing

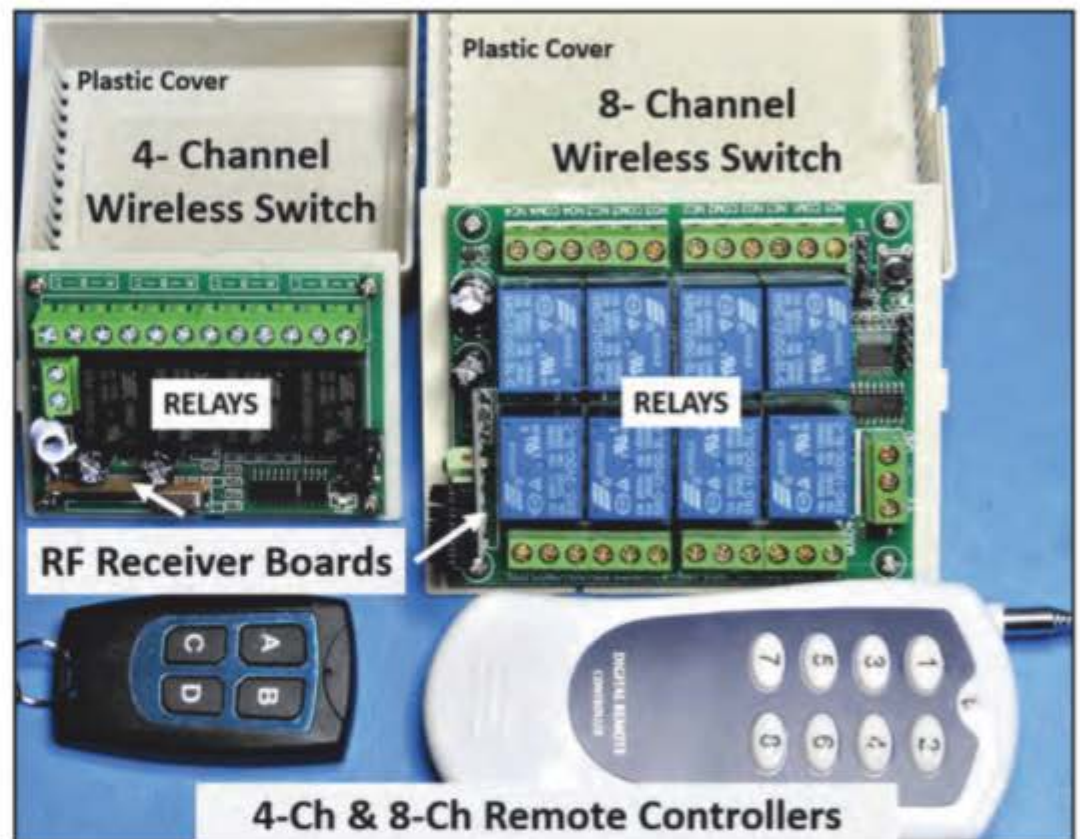


Photo A. The completed four-channel and eight-channel ICOM memory controllers. (Photo / figures by K5PA)

voice memories while away from the radio. This could be particularly beneficial to the DXpedition / contest operator who desires to operate away from a noisy environment or by the laid-back ham, who wants to watch TV or sit by the pool and push a button to call CQ DX. This article provides the needed information to build a remote key-fob voice memory switch with easy-to-follow steps and a cost of less than either \$30 or \$80, depending on whether a 4- or 8-button system is chosen.

During our survey of radios, we found the IC-705, IC-746, IC-756, IC-7100, IC-7600, IC-7610, IC-7700, and IC-7800 all have the same method of using resistors to create a voltage divider network for selecting the four memories

(modes include voice, CW, digital). The IC-7610 and IC-705 additionally have the option for a total of eight memories and a 1/8-inch TRS jack (Tip-Ring-Sleeve, stereo style) is provided on the rear of these transceivers for accessing all eight memories.

Our prototype for the 4-channel wireless unit is shown in *Figure 1* and includes the attached 12-volt DC power supply. The two gray wires connect to the Frequency Up / Down line on the ICOM microphone connector. The wires can also be connected to the rear EXT KEYPAD jack on newer model ICOM transceivers (e.g., IC-7800, IC-7700, IC-7610, and IC-705). The ICOM radio must be configured to change the function of the mic connector's Frequency

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Table 1

Manufacturer	Part Number	Model / Description	Qty	Web Links / Notes
INSMA, IN SMA1f40sAMG3	CECOMINOD029486 /GV-RK04S-12	Wireless RC Switch, 4-Channel Relays, 12 VDC, with Enclosure	1	https://tinyurl.com/y2lb2jmb
Ohmite	OD152JE / Mouser P/N 588-OD152JE	1.5K Ohm, 5%, 1/4W	2	Common resistor, but use 5% tolerance
Ohmite	OD152JE / Mouser P/N 588-OD222JE	2.2K Ohm, 5%, 1/4W	1	Common resistor, but use 5% tolerance
Ohmite	OD152JE / Mouser P/N 588-OD472JE	4.7K Ohm, 5%, 1/4W	1	Common resistor, but use 5% tolerance
CUI Inc.	SWM12-12-NV-P5 / Mouser P/N 490-SWM12-12-NV-P5	Wall-Mount AC Adapters 12W 12V 1A USA Vert 2.1 plug	1	Wall-Mount AC Adapters 12W 12V 1A with DC Coaxial Plug Size 5.5/2.1 mm, or Equivalent

Table 1. Four-Channel Relay Board Materials List

Up / Down pin to a “send message” command.

Wireless Relay Selections

Fortunately for ham radio operators, wireless relays similar to what we selected are a commodity on the internet. The authors have been selecting these for new applications and have

found them inexpensive and feature-rich. As a commodity, the competitive sourcing of these relays corresponds to models that could be changed by the manufacturers. Thus, we are always careful in selecting relays that appear to have longevity in the marketplace, but this cannot be guaranteed. So we felt compelled to explain some of the

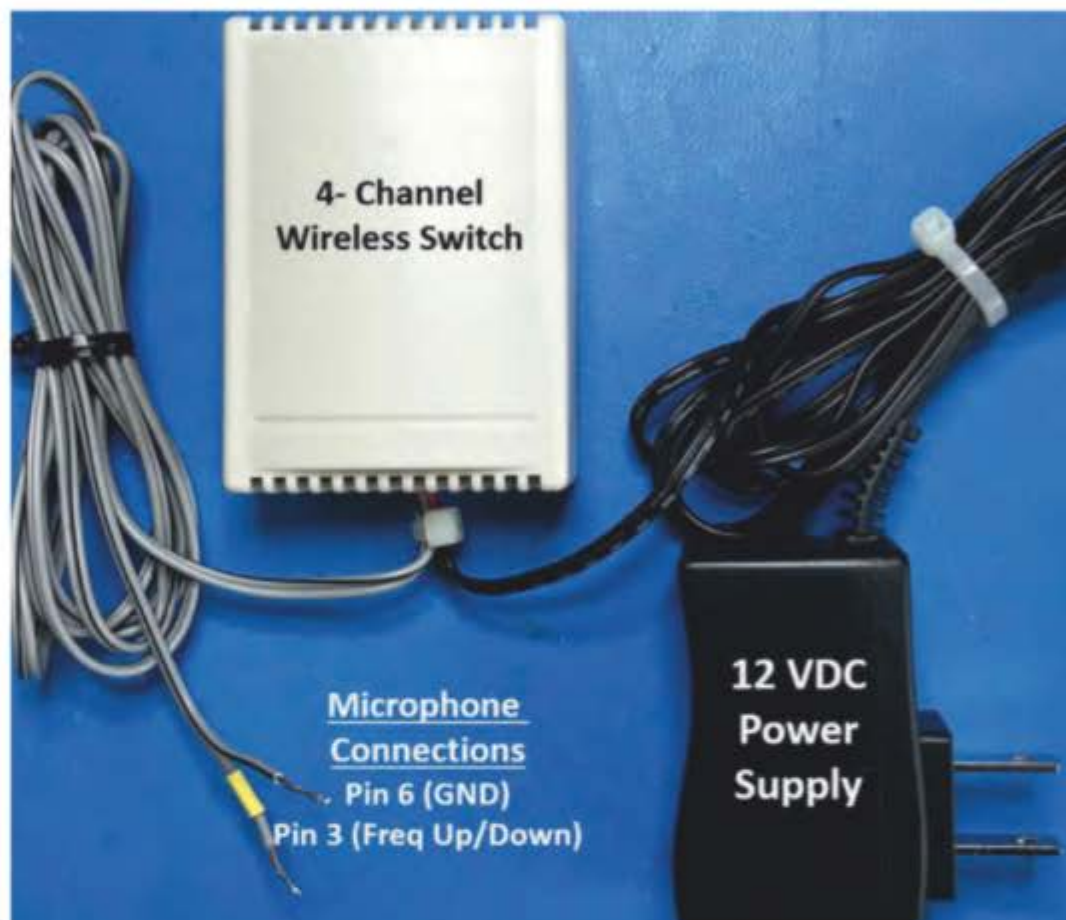


Figure 1. Completed four-channel wireless relay module with 12-volt power supply.

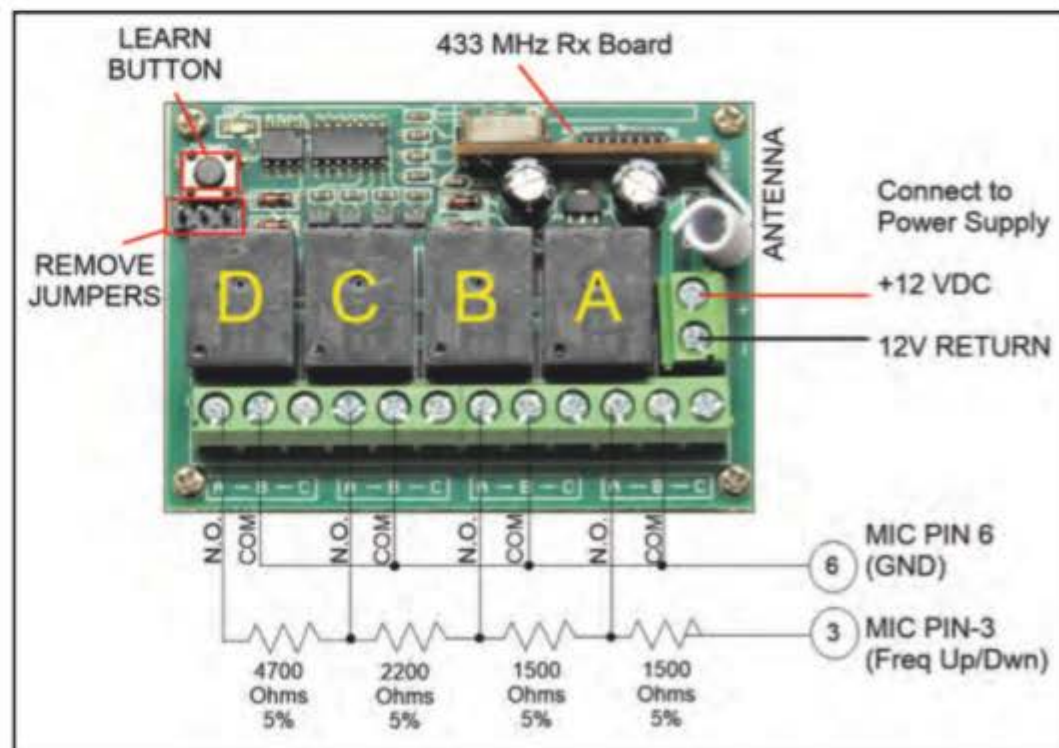


Figure 2. Four-channel relay board wiring. The ABCD relay labels correspond to the ABCD buttons on the remote controller.

Table 2

Manufacturer	Model / Part Number	Description	Qty	Web Links / Notes
Supplier: Quicksilver Radio	wr-octo	Wireless Relay Octo: 8-Channel Relays, 12 VDC, with Enclosure	1	https://tinyurl.com/y4uruwdg
Ohmite	OD152JE / Mouser P/N 588-OD152JE	1.5K Ohm, 5%, 1/4W	4	Common resistor, but use 5% tolerance
Ohmite	OD152JE / Mouser P/N 588-OD222JE	2.2K Ohm, 5%, 1/4W	3	Common resistor, but use 5% tolerance
Ohmite	OD152JE / Mouser P/N 588-OD472JE	4.7K Ohm, 5%, 1/4W	3	Common resistor, but use 5% tolerance
CUI Inc.	SWM12-12-NV-P5 / Mouser P/N 490-SWM12-12-NV-P5	Wall-Mount AC Adapters 12W 12V 1A USA Vert 2.1 plug	1	Size 5.5/2.1 mm, or Equivalent
HOSA CMM-105	Hosa CMM-105 3.5-mm TRS to 3.5-mm TRS (Cut 1 End Off)	TRS Stereo Interconnect Cable, 5-Feet	1	https://tinyurl.com/y6ctc5wo

Table 2. Eight-Channel Relay Board Materials List

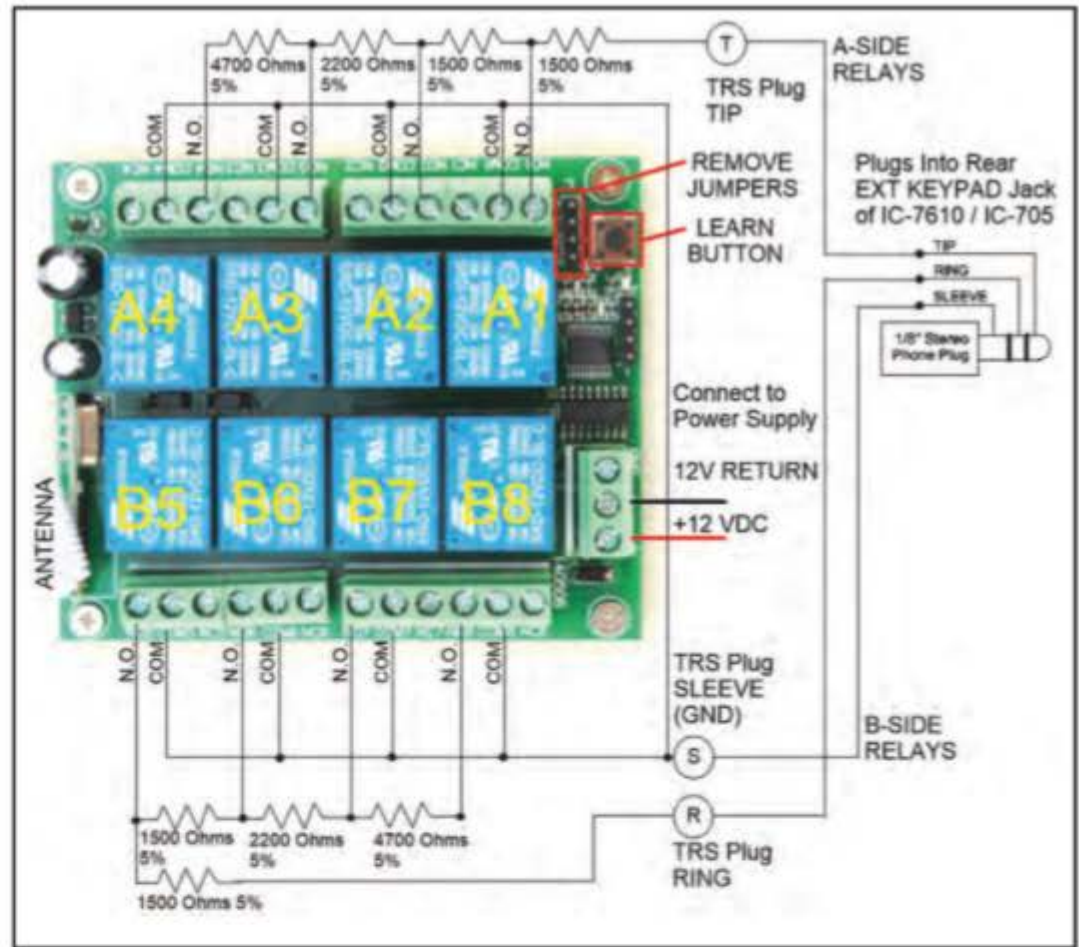


Figure 3. Eight-channel relay board wiring. Numbers 1-8 on the relay labels correspond to the 1-8 number buttons on the remote controller.

features that are important in our application.

One key feature is to have a wireless relay that can operate using a remote controller (key-fob) at a distance within an average home, usually greater than 100 feet. In our application, it is desirable to have a relay switch contact as opposed to a solid-state device output. This is based on having the relay attach near the microphone circuits (and ground) of the transceivers. The functionality of the switch activation is extremely important. Device manufacturers usually offer these relays with either three or four configuration settings. These include independent momentary toggled out-puts, latching, lockout (only one output at a time, current selection disconnects the previous selection), and time-interval operation (e.g., 1 second on, then automatically off). A momentary toggle mode is needed, so when the remote controller is pressed, the appropriate relay connects while the button remains pressed. When released, all relays are in the off state. That way, the currently pressed button corresponds to the message that is being sent, and if the button is pressed during the message transmission, the message will cease.

Another factor to consider is the ease (or difficulty) of the configuration setup. Some wireless relays require a press of

a configuration button in order to step through a series of configurations while watching a flashing LED indicator. Others, like the ones we selected, use a printed circuit board pin header with a shorting clip that can be moved between pin selections or removed completely. So the configuration is basically a hardware approach and the status can be determined simply by viewing the placement (or lack thereof) of the shorting clip.

Lastly, the wireless relay boards must accept the codes generated by the remote controller(s) shipped with the unit. To affect this pairing, a Learn mode button is located on each unit to permit the wireless relay to be programmed to another remote controller if necessary. Specific information is provided by the board manufacturer.

4-Channel Relay Board Wiring

Figure 2 shows the simple wiring of the four resistors needed to create the voltage divider network that is being controlled by the wireless relays. Only one relay at a time can be selected, giving each channel its own voltage reference pertaining to each message.

The circuit board has a terminal strip that provides access to all relay contact connections [normally open (N.O.), normally closed (N.C.), and common

(COM)] and the 12-volt DC power supply connection. As delivered, the three-position pin-header will have a shorting jumper in place that is not needed in this application. It is possible to mount all resistors and wiring by simply using the terminal strip.

A detailed parts list is shown in *Table 1* that provides the manufacturer, model and part number, description, quantity, and notes. Some of these parts may already be in your bench supply, such as the resistors and 12-volt DC power supply. The one item that will need to be purchased is the four-channel wireless relay module. Fortunately, these are easily obtained from vendors found on Amazon. The total cost of parts shown in the table, if purchased new, is about \$30.

The power supply is specified as a wall-mount 12-volt DC, 1-amp power supply. Since the wireless relays require only 12-volt DC at 50 mA per channel, the power supply listed is well within the requirements. The one listed has a coaxial DC plug included that is removed and the two wires stripped for attaching to the terminal strip on the wireless relay board. Due to manufacturing changes, it is important to verify the polarity of the wires using a voltmeter prior to attaching to the board. Color codes are not always followed by manufacturers so verification is very important.

8-Channel Relay Board Wiring (Alternate for the IC-7610/IC-705 Transceivers)

Some ICOM transceivers allow you to store and send up to eight messages. Fortunately, there are alternate relay boards that provide 8-channel relays and a remote controller giving eight push buttons. It is a simple matter of replicating the design shown and use a higher density, eight-channel relay board.

Figure 3 gives the wiring for the eight-channel message radios, such as the IC-7610. The radio's rear EXT KEYPAD jack (3.5-millimeters, or 1/8-inch TRS jack) requires a similar resistor divider network using the same value resistors. However, one set of four relays (Group A) attaches to the tip of the plug while the other four relays (Group B) attach to the ring of the plug. Depending on which of the eight relays are selected, one at a time, either one of the Group A relays is switched, or one of the Group B relays is switched. By the way, if the microphone connector is used instead of the EXT Keypad jack, only four messages are allowed.

The circuit board has terminal strips that provide access to all relay contact connections (N.O., N.C., and COM) and the 12-volt DC power supply connection. As delivered, the four-position pin-header will have a shorting jumper in place that is not needed in this application. It is possible to mount all resistors and wiring by simply using the terminal strip.

Please note the distinction between the four- and eight-channel printed circuit board power supply connections. They are not the same, so please pay close attention to polarity!

Configuring the Wireless Relay Board

Both wireless relay boards provide a pin header that comes with a shorting bar to select the desired configuration. For the board part numbers given, the shorting bar is removed. If a different board is selected, then the manufacturer's instructions will need to be followed.

Both wireless relay boards have a "learn" button near the pin header. The function of this button is to put the board in a mode to "learn" which remote controller will be attached to the board being programmed. For the part numbers we used, simply momentarily pressing the learn button and then pressing any key

on the remote controller will "pair" that controller to the relay board.

Configuring the ICOM Radio Settings

ICOM transceivers are configured using the external keypad settings found in the user manual. For newer radios, the setting is under the Connectors > External Keypad section and may include Voice, Keyer, RTTY, and PSK messages. Early radios may only have Keypad Settings for Voice and / or CW messages that will have to be enabled.

Summary

The logical evolution of wireless headset communications is to provide more functionality while operating outside of the radio shack. In this article, we presented a simple key-fob triggered relay solution, costing less than \$30 (or \$80 for the eight-channel version) to accomplish the goal. As you wander around the house in the early morning with the wireless headset in tow, you should no longer fear waking up your spouse by calling CQ. Just push a key-fob button accessing one of the prerecorded messages and let your voice recorder do the talking for you.

The authors have created a webpage devoted to the Plantronics Wireless Headset applications for amateur radio *plus* the use of wireless relay applications. The webpage provides radio interfacing information, wireless relay user manuals, and easy Do-It-Yourself (DIY) projects. You may check it out at <www.k5pa.com>.

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Untether Your Memories!

January 2021, CQ Amateur Radio magazine



Please make note of the following information.

Page #	Description	Date Entered
42	This page lists Icom transceiver model numbers that have remote voice memories. The IC-746 should have been listed as the pro version, IC-746Pro . The original IC-746 does not contain this feature.	1/1/2021
42	This page lists Icom transceiver model numbers that have remote voice memories. The IC-7300 should have been listed in the list of ICOM transceivers.	2/18/2021

Sorry for the inconvenience,

Gene, K5PA & Jim, WB2REM