Product Reviews

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ACOM 500S 160-4-Meter Linear Amplifier

Product Review

ACOM 500S 160 – 4-Meter Linear Amplifier

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ACOM's product line includes a wide variety of solid-state and tube-type amplifiers with RF output levels up to the 1500 W legal limit. Over the past 20 or so years, Bulgarian manufacturers' products have developed a reputation for quiet, reliable operation, and *QST* has reviewed many of their products. ACOM's latest offering, the 500S, uses solid-state technology to deliver 500 W from 160 through 4 meters (the 70 MHz band, available to amateurs in some countries outside North America).

Amplifiers in this power class have long been popular. They offer a 7 dB (more than 1 S-unit) improvement in signal strength compared with a 100 W transceiver, and are significantly less expensive than full-power models. Modern 500 W solid-state amplifiers such as the ACOM 500S are easy to operate. They switch bands automatically and require no tuning. Extensive protection circuitry helps keep them safe in case of operator error or failure in another part of the station (such as a broken feed line).

Documentation

The ACOM 500S does not include a printed manual, but a 66-page PDF manual is available online. The manual includes many color illustrations and covers installation, hookup, operation, remote control, maintenance, and troubleshooting. Other support files and firmware updates are available from ACOM's website.

I liked the **HELP** button available on most of the menu screens. That brought up information that answered most of my questions without having to consult the manual.

Overview

The ACOM 500S measures 6.2 × 11.5 × 10.7 inches (height, width, depth) and weighs just 17 pounds. You could easily take it along for a DXpedition or portable operation in addition to home station use. The 500S can operate with 100 to 240 V ac and requires 25 to 45 W of RF drive power depending on the band (see Table 1), and will deliver 500 W into a standing wave ratio (SWR) below 1.5:1. Output power folds back as SWR rises above 1.5:1. ACOM offers two optional antenna-matching units that integrate with the 500S and other ACOM solid-state amps. The 04AT can be mounted indoors or outdoors, while the 06AT is a desktop unit with styling that matches the amplifier.

The **ON/OFF** rocker switch on the rear panel controls ac to the power supply input and is left on to keep the amplifier in a low-energy standby mode when not in use. Pressing the front-panel **POWER** button for a few seconds begins the amplifier's start-up routine and turns on the display. After about 10 seconds, the 500S is ready for operation. Pressing the front-panel **POWER** button again returns the amplifier to the low-energy standby mode.

The 500S shares a simple front-panel design with other ACOM solid-state amplifiers. Control, metering, and monitoring functions are handled by a 5-inch color screen with six pushbuttons below (see Figure 1). On-screen labels for the pushbuttons are context sensitive and change depending on what you're doing. During normal operation, the screen shows the

Bottom Line

The ACOM 500S solid-state linear amplifier operates from 160 through 4 meters and easily provides 500 W output with 25 to 45 W of drive. It's compact and easy to operate.

Table 1
ACOM 500S, serial number 230136, firmware v1.0

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency range: All amateur frequencies in the range of 1.8 to 70.5 MHz.	160, 80, 40, 30, 20, 17, 15, 12, 10, and 6 meters.*
Primary power requirements: 100 to 240 V ac.	As specified. Tested with 120 V ac supply.
Power output: 500 W ± 0.5 dB PEP or continuous carrier with no mode limitations.	As specified.
Driving power required: Typically, 45 W for 500 W RF output.	Drive level for 500 W output: 1.8 MHz, 41 W; 3.5 MHz, 35 W; 7 MHz, 42 W; 14 MHz, 45 W; 18.1 MHz, 46 W; 21 MHz, 25 W; 24.9 MHz, 30 W; 28 MHz, 41 W; 50 MHz, 45 W. See Figure A.
Spurious and harmonic suppression: Below 30 MHz >50 dBc, above 30 MHz >70 dBc below rated output.	58 dB worst case band (10 meters); 67 dB, 6 meters. Meets FCC requirements.
Third-order intermodulation distortion (IMD): >30 below rated PEP.	14 MHz, 3rd/5th/7th/9th: At 500 W PEP: –35/–39/–62/–58 dB. See Figure B.
Keying time: Unkey to key, 10 ms.	Unkey to key, 13.4 ms; key to unkey, 28 ms.

Size (height, width, depth): 6.2 × 11.5 × 10.7 inches.

Weight: 17.2 pounds.

*Reminder: US amateurs must observe a limit of 200 W PEP output on the 30-meter band.

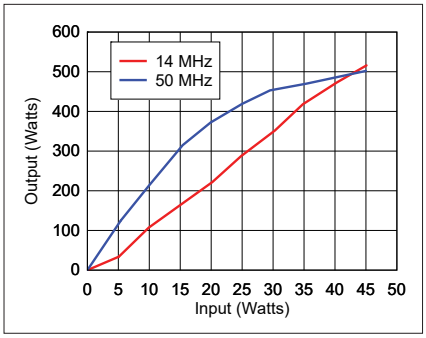

Figure A — ACOM 500S, RF power input versus RF output.

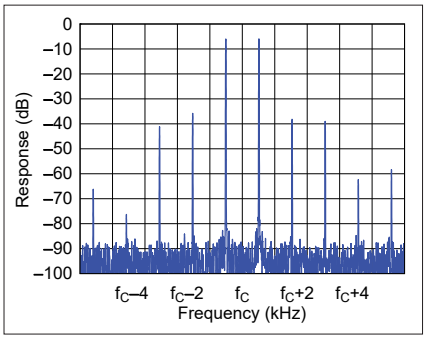

Figure B — ACOM 500S, the 20-meter band third-order IMD performance at 500 W.

band of operation, forward and reflected power, and power amplifier (PA) temperature as well as two additional user-selected parameters in the yellow bar above the frequency band display.

The yellow bar below the frequency band section indicates **OPERATE**, **STANDBY**, or **AUTO OPERATE** mode, transmit-receive relay status, whether or not the amplifier operating frequency is set to follow the transceiver (**CAT/AUX CONTROL**), and if the amplifier is under remote control.

When you turn on the amplifier, it goes into the **STANDBY** mode. Press the **OPR/STB** button to switch it to **OPERATE**. If you select **AUTO OPERATE** from the **USER PREFERENCES** menu, the amplifier goes into **OPERATE** mode when you turn it on.

Pressing the **MENU** button brings up a list of screens for monitoring or changing amplifier operation, as shown in Figure 2. The **AMP MEASURE** menu shown in Figure 3 selects the two user-selectable parameters shown on-screen. Choices include input or output power, forward or reflected power, SWR, amplifier gain, PA bias, PA voltage, or PA current. The **AMP SERVICE** menu is used to check the drain current of the PA transistors and to test relay and fan operation.

The **CAT/AUX SETTINGS** menu is used to set up the amplifier to interface with a transceiver via band data or RS-232. The manual includes settings for transceivers from Elecraft, Icom, Kenwood, and Yaesu. Note that the 500S will switch bands automatically when it senses RF at the input, but the CAT connection ensures that the amplifier follows your radio and is always set to the correct band before you start transmission. Transceiver interface cables are available from DX Engineering (ACOM's US distributor), or you can consult documentation from ACOM's website to make your own.

In addition to the **AUTO OPERATE** feature described previously, the **USER PREFERENCES** menu controls beep volume and display brightness. It's also used to add your call sign or other text to the message displayed at start-up. The **FAULTS LOG** menu displays information such as amplifier serial number, hardware and firmware versions, and total hours of operation. Along the bottom of the screen is information that can be used for troubleshooting in the event of an amplifier

Figure 1 — The main operating screen shows important operating parameters such as selected band, forward and reflected power, drive power, and PA temperature. It's not a touchscreen — selections are made using the buttons below the screen. The **MENU** button at the lower right brings up various setup and monitoring screens.

Figure 2 — The **MENU** screen is used to set up the amplifier. Several of the screen selections are not active without an ACOM automatic antenna tuner connected.

Figure 3 — The **AMP MEASURE** screen is used to select the parameters displayed in the bar just above the band display.

fault. Using the **RESTORE DEFAULT SETTINGS** menu, you can restore the amplifier's factory settings, reset the user preferences to default values, erase the faults log, or reset the hours counter.

Protection Features

The 500S incorporates an automatic protection system similar to other ACOM solid-state amplifiers. The control unit monitors drive frequency and power, transmit-receive (TR) relay switching times, final transistor drain voltage and current, gate bias voltage, power supply temperature, heatsink temperature, forward and reflected output power, and other parameters.

If a monitored value approaches the protection threshold, a clear warning message appears on the screen in a yellow bar above the **BAND** and **OPR/STB** buttons below the frequency display. If you correct the problem (for example, lower the drive level), then the warning goes away. The next level is a "soft fault" where the amplifier switches to standby and displays a detailed error message. If **AUTO OPERATE** is active, the amplifier will stay in standby for 4 seconds before returning to operation. It will return to standby if the problem is not corrected.

The most serious problems trigger a "hard fault," which shuts off the main power supply, stores data about the fault in memory, blanks the front panel, and sounds a string of Morse code **F** characters. After a hard fault, the amplifier may or may not power up again depending on the problem. If it does, a fault message appears on the screen. In the event of a hard fault, the amplifier stores diagnostic data that may assist with troubleshooting.

Setting Up the 500S

The power supply can operate from 85 to 132 V ac with 10 A fuses, or 170 to 265 V ac with 6.3 A fuses. The ac line fuse holders are on the rear panel. Just install the correct power plug for your station, make sure the right fuses are installed, and plug it in — no jumpers or switches are needed to select the ac mains voltage. The review amplifier came with fuses and a plug for 120 V operation installed. I had no problem operating it from a standard household 120 V, 15 A circuit in my station.

The rear panel (see Figure 4) has SO-239A jacks for the transceiver and antenna. If you have one of the matching ACOM automatic antenna tuners, use **RF OUTPUT 1.** Otherwise, use **RF OUTPUT 2**. There's a phono jack for TR switching (**KEY-IN**), 15-pin **CAT/AUX** connector for band data, and 9-pin **RS-232** connector.

Figure 4 — The rear panel, showing the cooling fan and available connections.

The **KEY-OUT** phono jack is for controlling a transmit inhibit function if one is available on your transceiver.

To switch bands, you can either connect an appropriate cable between your transceiver and the 500S, rely on the amplifier's built-in frequency counter, or use the **BAND UP/DOWN** buttons on the front panel.

We didn't order a compatible cable for this review, so I relied on the frequency counter. The amplifier will switch bands automatically when it senses RF at the input, but you need to make a brief transmission (such as a single CW character or voice syllable), then allow the amplifier to change bands. There is a slight switching delay, so you need to pause before resuming transmission. On digital modes such as FT8 or RTTY, the transmission is continuous (no convenient way to send a character or two and pause). If you don't pause until the band change is complete, there is no power output and a warning to remove drive power immediately flashes on the screen. For permanent installations, I highly recommend using a CAT cable so the amplifier follows the transceiver instantly at band changes.

The 500S has no automatic level control (ALC) connection to adjust transceiver drive power automatically. You need to adjust your transceiver's power output to drive the amplifier to 500 W without tripping the amplifier's overdrive protection. I found that the drive power varied from about 25 to 45 W depending on the band.

I didn't try it, but the 500S includes some remote control and monitoring features via the amplifier's RS-232 jack or ACOM's optional eBox Ethernet remote control device. You can turn the amplifier on and off, switch between operate and standby, switch between transmit and receive, change bands, and adjust some of the options. More information is available from ACOM's website or the eBox manual.

Operation

According to the manual, the 500S will work into an SWR below 1.5:1 at full power, and that is sufficient for most of my antennas. Above 1.5:1, the power output folds back quickly. Although the 500S protection kicks in if the SWR is too high, in a number of places the manual stresses the importance of keeping the antenna system SWR under 1.5:1.

TR switching is relay-based, and the 500S doesn't offer full break-in (QSK) capability. Be sure to set your transceiver for a 14-millisecond or longer TR delay time to avoid potential damage to the amplifier from hot switching (applying RF before the amplifier relay contacts are fully closed).

The ACOM 500S is rated for 500 W continuous duty, so I used it while working weak DX stations on FT8/FT4 and also for a few hundred contacts in the CQ World Wide RTTY DX Contest. The PA temperature indicator stayed well within the safe range even during extended operating periods.

During receive periods, the amplifier cooling fans run at low speed. Fan speed increases as soon as the amplifier goes into transmit mode. During extended transmitting periods, especially when using digital modes, the fans run at higher speed all the time. While the fans are quieter than some high-power solid-state amplifiers I've used, they are not as quiet as my ACOM 1000 tube-type amplifier. I normally wear good headphones, so fan noise generally doesn't bother me.

Wrapping Up

ACOM's compact 500 W amplifier will find a spot in many stations where legal-limit power isn't desired or needed. Documentation is excellent, and the amplifier is simple to set up and use. Support is available from the factory in Bulgaria and from DX Engineering, the US distributor. ACOM amplifiers are also supported by user communities on **https://groups.io** and Facebook.

Manufacturer: ACOM Ltd., Sofia, Bulgaria, **www.acom-bg.com**. Available at US distributor DX Engineering. Price: $3,400 without ac plug; $3,475 with ac plug; transceiver interface cables, $50.

W2IHY Multi-Switching System: 3 × 4 Switch Plus Controller, iPlus Audio Switch, and iBox Interface

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This review includes many products offered by W2IHY Technologies. It's hard to understand the complete value of these products by reviewing them separately. So, this review consists of a solution using four W2IHY products: the 3 × 4 coax switch plus controller, the iPlus audio switch, the iBox audio interface, and the eight-band audio equalizer that was reviewed in the December 2000 issue of *QST*.

As soon as you have more than one HF radio and want to use it in the same station, you need to be careful if you want to keep the two connected and ready to use; otherwise, you may damage one of the receivers. You can use different radios on different bands/antennas using band-pass filters, or you can set up a switching solution to use them independently. That's what I did, as my radio usage depends on the operating modes, not the band. In June 2019, I posted on my personal YouTube channel a video about how I safely managed multiple HF radios in the same station. To view the video, titled "Safely connect several HF radios with multiple antennas," see **https://youtu.be/9FntelKOjoc?si=sb0PV4krwBRzkp3N**. This setup has served me well over the years, and I've never damaged anything, which is the most important. But it doesn't allow me to enjoy my different HF radios quickly. Yes, it protects my rigs from switching mistakes, but it takes too long to compare my radio performance in a particular situation. Although I can switch the coax, all radios have their own speakers. My PTT connections are going through homemade splitters hanging from the wires behind the desk.

I started looking for a better solution. My plan was to keep my current coax antenna switch that is located outside, but replace my radio switch with something that can also switch the PTT and ALC, and it has to offer the same isolation protection or better than my current setup. In parallel I was looking for a speaker switch. The goal was to make some room on my shelves by removing some extra speakers. I also wanted to be able to use any of my radios with my bhi audio equalizer with DSP noise filtering. If everything can switch together, it will simplify and facilitate the comparison between my radios, as they will be using the same set of speakers. In my online search, I found some interesting products, but I kept coming back to the W2IHY website. My first impression was that it was expensive — until I understood its value. After a lot of reading, I couldn't find any equivalent. At the end, I concluded that the W2IHY coax switch and the iPlus were the best integrated solution for my needs.

Bottom Line

W2IHY Technologies offers one of the most advanced switching solutions for a station using multiple radios with multiple antennas. With its well-thought-out product integration, one-switch knobs allow switching safely between three radios, the microphone, the audio speaker output, the PTT, the amplifier keying, the ALC, and the coax input.

My initial intention was to buy only three out of the four units, but I soon found that if I added the W2IHY eight-band audio equalizer and noise gate, I would be able to use only one microphone that would be switched at the same time as the coax, PTT, ALC, and speakers. This also means that I can use an Icom, Kenwood, or Yaesu microphone that will work on all three HF radios.

The W2IHY 3 × 4 Switch Plus Controller

The 3 × 4 switch plus controller lets you control up to three radios to a single coax output. It's built to last with a rugged steel chassis, and it screams quality. The unit is 16 × 3⅜ × 5 inches. It's also possible to rack it into a 19-inch rack mount (an optional bracket is available for $40). It can handle up to 10,000 W of RF (PEP) and offers isolation between its coax ports greater than –70 dB, according to the manufacturer. My observations confirm that this is accurate and similar to my previous setup (more on this later; not tested by the ARRL Lab).

With this coax switch you can switch and route up to three radios to a single amplifier or one antenna output, plus the amplifier keying (PTT). The ALC and the speaker's output will automatically follow the selected radio.

There's another option that you can buy to switch multiple antennas to multiple radios — the 1 × 4 coax switch. But I wanted to keep my outside remote switch for my HF antennas, so I didn't need it. The 1 × 4 coax switch combined with the 3 × 4 coax switch plus will provide more output connection, allowing for the ability to switch three radios to up to three amplifiers or up to four antennas. If you have more than three radios, you can cascade another 3 × 4 switch if you wish.

The Front Panel

On the front panel, from left to right, you have the **POWER** switch with a yellow LED on top that will be lit when turned on. When the switch is in the off position, coax for all three radios will be put to ground. This is automatic and very convenient. Then you have the **TUNE** switch. When the red LED above is off (switch down), the amplifier PTT will be keyed, but when the switch is up, the LED will be on and your amplifier will not be keyed. Next, you have the **LOCAL / REMOTE INPUT SELECT** switch for the **RF INPUT** (the radios). You have four positions that you can switch using this rotary knob: radio **A**, **B**, **C**, and **REMOTE**. Obviously, this lets you switch between three radios —**A**, **B**, and **C** — and the **REMOTE** position is used when the switching is controlled by another box, like the iPlus (more on this later). For each radio you have a rotary knob with three positions for the **RF OUTPUT**, **1**, **2**, and **3**. If you have only one output connected on the coax switch and no 1 × 4 remote switch (like me), then all three radios' **RF OUTPUT** will be the same even if they are set to different positions (**1**, **2**, or **3**). If you have the 1 × 4 remote switch, you can set different output for each of the three radios. The final switch on the front panel is the **AUX** switch, which is to be used when the coax input of the optional 1 × 4 switch is connected to the auxiliary coax output of the 3 × 4 switch. In my case, this one is off.

The Rear Panel

On the rear panel (see Figure 5), from left to right, on top you have five DIN types of connectors. The first two have six pins and are for power — **POWER IN** and **POWER OUT** — if you need to power a second switch. The power requirements are 10 to 15 V dc at 1 A for powering one 3 × 4 controller and one 1 × 4 antenna switch. You will need 2 A if you want to power two of each. The power cable is included but you will need to connect it to your station's power supply. Keep in mind that the cable has no fuses but there is a fuse inside the unit. I used a dc power distribution outlet that is already fused.

The three other DIN connectors use five pins. The first one, **INPUT SEL**, is used when the **LOCAL / REMOTE** input select switch is in the **REMOTE** position. It allows the selection of the **A**, **B**, and **C** coax inputs (the three radios) to be selected remotely. The **OUTPUT SEL** is used to identify which of the three coax outputs (1, 2, or 3) on the optional 1 × 4 switch is active. This DIN connector can also be used to connect to the input select (**INPUT SEL**) of a second 3 × 4 switch when adding more radios, and an additional level of switching is required. The **OUT TO 1 × 4 SEL** connection switches the coax input of the 1 × 4 switch to one of the four coax outputs. If you want to switch the coax input with the iPlus audio switch, only the RCA connectors need to be connected, and you will

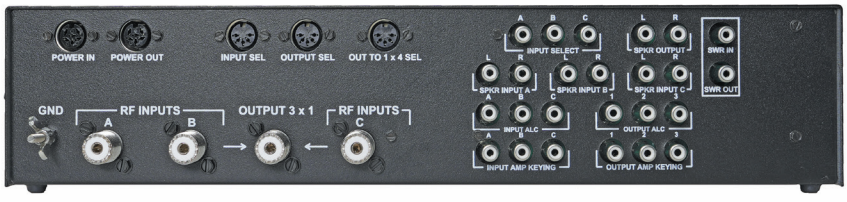

Figure 5 — The W2IHY 3 × 4 Switch Plus controller rear panel.

be able to switch remotely if the coax switch is in the **REMOTE** position.

Below the DIN connectors you have an obvious **GND** connection and four SO-239 connectors. The first two are for radios **A** and **B** (**RF INPUTS**). Then you have the RF **OUTPUT 3 × 1**, where you connect your amplifier or your antenna depending on your setup. The next one is for the third radio input (**RF INPUTS C**).

From the middle to the right of the rear panel, you have multiple RCA connectors, along with all the input and output for radios **A**, **B**, and **C** for the PTT, ALC, and speakers. Other than the input and output mentioned previously, you have three RCA connectors for remote switching, **INPUT SELECT** (where I connected the iPlus audio switch). You also have two RCA connectors for **SWR IN** and **SWR OUT**, which prevent keying the amplifier in case of high SWR or for other reasons. They may be connected to an SWR meter, an antenna tuner, or a SteppIR controller that has circuitry to disable amplifier keying when required. If you want to enable the PTT feature at all times and have nothing to connect to the **SWR IN** and **SWR OUT**, you will need to connect them; otherwise, the PTT won't work.

For more information about the 3 × 4 switch plus controller, you can download the manual online at **https://w2ihy.com/wp-content/uploads/2020/06/3x4SwitchManual.pdf**.

The W2IHY iPlus Audio Switch

The iPlus audio switch can be used to switch between three radios, the audio speaker output, the audio mic input, and the PTT. It must sound similar to the coax switch, but it can use one or two audio inputs to any of the three connected radios, plus it's meant to work in combination with the coax switch, as it can remotely control the radio selection. This means that if you have both units, you have only one switch that will switch everything to any of the three radios. I needed the iPlus audio switch to have two audio inputs and three audio outputs to the radios (the mic inputs). The first audio input is for the microphone (in my case it's the eight-band EQ), and the other is used to connect the iBox interface that is used for the LP-700 two-tone audio output. This allows me to inject a two-tone audio signal to the selected radio, a very convenient option.

The Front Panel

On the iPlus front panel, the first rotary knob on the left is the main switch for the three radios. If you connect the iPlus to the **INPUT SELECT** RCAs on the 3 × 4 switch plus controller, the iPlus will remotely switch the coax as well if the controller is in the **REMOTE** position. Next, there is a flip switch named **INVERT PHASE ON**, which reverses the phase of the audio output 180 degrees for proper AM modulation asymmetry. The other three knobs are for the **OUTPUT LEVEL**. These allow you to adjust the audio level output to the radio's microphone input independently.

The Rear Panel

On the rear panel (see Figure 6), from left to right, you will find the first two audio inputs (there are a total of three). The **AUX INPUT** uses a five-pin DIN connector, and the other uses an XLR named **AUDIO INPUT**. Next, on the right you have three other five-pin DIN audio outputs, named **AUDIO OUT**. I use these to connect up to three radio microphone inputs. On the right side of the rear panel, you have several RCA connectors to connect the speaker output and the PTT of all three radios to one output. In my case, the iPlus is used only for audio input, and all the PTT, speakers, and ALC connections are made into the 3 × 4 controller.

The iPlus is passive equipment, and no external power is required. The unit dimensions are 9 × 3 × 5.5 inches. There is no ground connector, but I used a screw on the chassis to ground the iPlus to the station common ground.

For more information about the iPlus audio switch, download the manual online at **https://w2ihy.com/wp-content/uploads/2020/06/iPlus_manual_8_21_12.pdf**.

The W2IHY iBox Audio Interface

The iBox is a variable attenuator and an interface box. Its dimensions are 4 × 1¾ × 1¾ inches. It's small (see the lead photo), and it doesn't require any power. You can buy it in a kit or as a fully assembled unit. This unit is simple but very useful, as it can serve many purposes, like interfacing an external audio device to your radio equipment, matching impedance, isolating your audio from hum caused by ground loops, providing RFI isolation, and interfacing with balanced and unbalanced audio gear. On top of the

Figure 6 — The W2IHY iPlus audio switch rear panel.

unit, you have a variable attenuator to adjust the output audio level. On one side is an audio input of 600 Ω using a ¼-inch stereo jack, named **AUDIO IN**. According to the manual, this input can accept a balanced source and run the iBox as a balanced input. It can convert a balanced source to an unbalanced input to the iBox, or accept an unbalanced source and run the iBox input unbalanced. On the other side you have the five-pin DIN **AUDIO OUT**. The DIN plug wiring can be modified to obtain a low-Z balanced output, a hi-Z balanced output, or a low-Z unbalanced output. The only other connector is an RCA type for the **PTT**. The **PTT** input jack offers an access point for your switch.

There are many reasons that you would need an iBox, but in my case it was to connect the audio output of my Telepost LP-700 to the iPlus in order to be able to send a two-tone signal to any of my HF radio mic inputs. What's funny is that on page 10 of my LP-700 user guide, Telepost suggests using the W2IHY iBox to interface the two-tone output to the radio.

For more information about the iBox, download the manual online at **https://w2ihy.com/wp-content/uploads/2020/06/iBox_Operating_Manual_8_21_12.pdf**.

Planning and Making the Connections

Shortly after you place an order for a 3 × 4 controller on the W2IHY website, you will receive an email from the owner, Julius Jones, W2IHY, who will want to talk to you in order to understand your specific setup. After your conversation with him, he will provide custom pictorials specific to your configuration, showing in detail how the switch should be connected. Considering the level of service he provides, it's better to know in advance; if there are any issues, he knows your setup and can easily help you remotely if needed.

I decided to buy from W2IHY all the necessary cables to connect my radios and equipment. I could have bought all the connectors and cables and soldered them myself, but I would still have to buy the cables, connectors, etc., and I would have to do the soldering of many small pins, which is always a struggle for me. So, I bought the 3 × 4 switch cable package ($60) and three pre-made 8-foot mic cables for my three radios ($41 each). I also got the W2IHY to iPlus 4-foot cable ($35) and some 3.5-millimeter TRS cables (another $35).

Julius had carefully prepared the diagram and all the cables to connect my equipment. Figure 7 is just one example, as there were many in the custom manual. Every diagram comes with a text description, and there's one for each type of connection, like the speakers, microphone inputs, ALC and PTT amplifier connections, etc. — this includes all your gear you need to connect. Julius sent the custom diagrams to me prior to shipping the equipment to ensure we were both confident it would be correct for my setup.

The package arrived well packed and well identified, with plug-and-play instructions. First, I unboxed the W2IHY equipment and noticed that all the cables were packed in bags grouped by the type of connection with all the necessary identification. Then I connected all the cables to the W2IHY equipment on a table in the garage (see Figure 8). I used hook-and-loop straps (not included) to tie the cables in order to move everything in the shack, and did the other end of the connections on my equipment, and it worked on the first try. I know there are a lot of cables involved, but it was worse before I added the W2IHY equipment. If you order all the cables from W2IHY, it's very easy to set up. The good news is that you won't have to do it again; now everything will switch without manipulating any cable.

On-the-Air Operation

Since I added the W2IHY equipment to my station, the way I operate my HF radios has changed com-

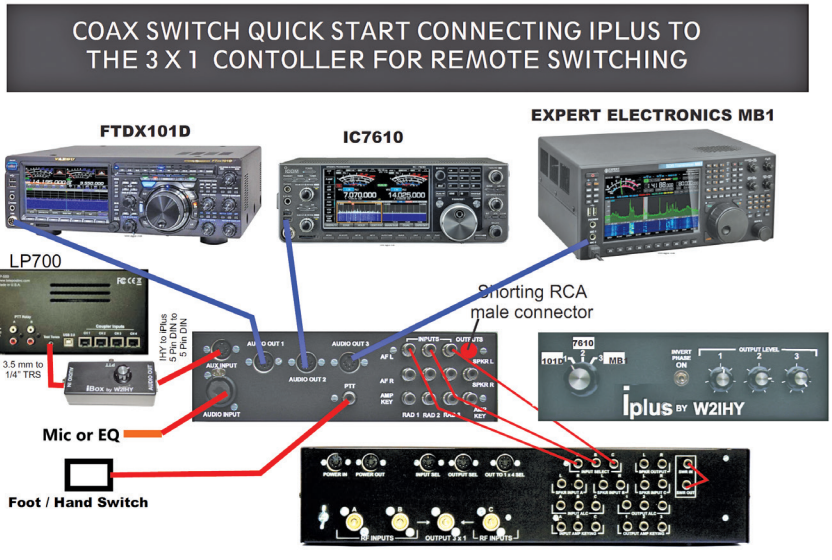

Figure 7 — The customized diagram prepared by W2IHY for my particular setup.

Figure 8 — The complete pre-wiring of all four pieces of W2IHY equipment.

pletely. Sometimes I even switch radios in between a transmission while in a QSO, and the receiving station can't even tell. It's such a pleasure to be able to enjoy my radios with a flip of a single switch. Now I do it all the time, just for fun.

I have only one microphone on the desk and only one set of speakers connected to the bhi audio equalization amplifier with DSP noise filtering that switches along with the other radio connections. At any moment I can send a two-tone audio signal to the active radio without touching any cables or going into any menus to change the mic input. All followed the only switch I used, the one on the iPlus. I can switch quickly and safely between radios and compare them in different situations.

When I switched radios before, I put the unused transceivers on another band (usually 6 meters), as far as possible from the transmitting frequency. While doing the tests with the Expert Electronics MB1 after installing the W2IHY equipment, I forgot to put the Icom IC-7610 to 6 meters, so both radios were set at the same frequency. I was running 1 kW on 80 meters and didn't hear any feedback while transmitting as the speaker was on the active radio, but when I looked at the Icom IC-7610, the received signal was only +20 over S-9, so the coax switch was doing a great isolation job. This is good to know, and with the coax switch, the speakers switch automatically. It's like putting the other transceiver on mute. Switching radios has never been easier, and I'm confident that it's safe.

Conclusion

The W2IHY Multi-Switching System is a great addition to my setup. I'm very pleased with the result and the simplicity of operations that it provides.

I already knew that the W2IHY service was incredible, not only because of the reputation of the company but also from a past personal experience. In 2003, I bought a used W2IHY eight-band equalizer on eBay, and when it arrived it didn't work. I contacted Julius, W2IHY, and he tried to solve the issue over the phone. Ultimately, however, he asked me to ship the unit to him. When the unit was returned, it was repaired for free as the unit was still under warranty, so I only had to pay the shipping. This tells a lot about the manufacturer backing its products. Even if I didn't buy the unit from him, he still provided the support service. Plus, if you're not totally satisfied, he offers a 30-day, no-questions-asked, money-back guarantee.

If you have many radios and want to use them safely without disconnecting any cables, W2IHY can help you set up a safe and efficient multi-switching system to suit your operating needs.

Manufacturer: W2IHY Technologies Inc., 19 Vanessa Ln., Staatsburg, NY 12580, **www.w2ihy.com**. Price: 3 × 4 Switch Plus Controller, $549.99; iPlus, $239.99; iBox, $79.99; Eight-Band Audio Equalizer, $299.99. Shipping and cabling not included.

DVMEGA Globetrotter Digital Voice Companion

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One of the fastest-growing segments of the radio hobby is the use of digital voice modes, and one of the significant devices catering to this growth is hotspots. As an avid user of the D-STAR digital mode, I've explored various radio frequency hotspots and dongles over the years. These devices act as bridges, connecting radios to the internet and facilitating communication through digital modes. Most digital hotspots have become increasingly popular, necessitating the use of a digital radio for operation. In contrast, some AMBE (Vocoder Chip) dongles/servers ("server" is the term used by DVMEGA) offer a unique advantage, as they don't necessitate a digital radio for this mode of communication, making them a compelling addition to your communication tool kit.

The DVMEGA Globetrotter stands out as a powerful digital voice communication AMBE dongle, offering an array of features for amateur radio enthusiasts. Utilizing *BlueDV* and *Peanut* software, in partnership with David, PA7LIM, this dongle transforms into a versatile digital voice communication tool, enabling radio-less communication from any location with an internet connection and a personal computer. Supporting various digital radio protocols, such as D-STAR, C4FM (Yaesu System Fusion), DMR, and NXDN, the Globetrotter is an upgraded version of the DVMEGA DVstick30, both manufactured by Guus, PE1PLM, and Dooren Electronic Systems. You can find new coverage on digital protocols and modes in the 100th edition of *The ARRL Handbook*.

Build and Design

The Globetrotter features a compact and rugged design suitable for both indoor and portable use. While not waterproof, its splash-resistant membrane-covered front panel enhances durability. The well-thought-out setup using front-panel buttons ensures fast and easy configuration. The bright and crisp 1-inch OLED display, along with a screensaver option, adds to the user-friendly design.

This palm-sized dongle connects to your computer via the supplied Micro USB-B cable, utilizing your computer's soundcard, microphone, and speaker (see Table 2). It also draws power from the PC USB port. The Globetrotter serves as a Swiss Army knife for digital voice communications, eliminating the need for a dedicated radio. Dual connectivity options set the Globetrotter apart. It is essentially an AMBE server and AMBE dongle in one, with the ability to switch between the two modes.

Setup Instructions

To get started with the Globetrotter, follow these steps to configure Wi-Fi settings and choose between the two AMBE modes. The *BlueDV* software is a crucial component to make everything work and is the equivalent of a physical radio front panel.

For digital voice communication with other radio operators, it is imperative to be registered for various digital modes, ensuring inclusion in their infrastructure trust access list. Visit **www.radioid.net** to facilitate your registration process and obtain the required IDs.

Bottom Line

The DVMEGA Globetrotter paired with *BlueDV* software allows radio-less digital voice communications using your internet-connected personal computer.

Table 2
DVMEGA Globetrotter Digital Voice AMBE Hotspot

Manufacturer's Specifications (not tested in the ARRL Lab)

Digital modes	Support for DMR, D-STAR, NXDN, and C4FM (Yaesu System Fusion)
Boot time	Less than 2 seconds
Display	1-inch bright OLED display
IP addressing	Static or DHCP (dynamic)
Software update	Automatic feature
Dimensions	3.5 × 2.5 × 1.2 inches (90 × 62 × 30 millimeters)
PC connection	Micro USB-B to USB-A (cable included)
Power	5 V dc via Micro USB-B
Baud rate in dongle mode	230400

Given the absence of provided instructions, I visited their website and found a helpful video link. The setup process for the *BlueDV* software is straightforward (see Figure 9). Shu, JA3GQJ, has crafted a comprehensive manual for this software, available at **http://radioham.mydns.jp/bluedv/BlueDVWindows.pdf**. Familiarize yourself with this manual before initiating the configuration process, as it explains the essential configuration parameters and user guide. I followed the video instructions and took notes, and after a few attempts to program both the Globetrotter and *BlueDV* application, I got it working.

Navigation through menus and inputting alphanumeric characters using the Globetrotter front-panel **MENU** and **OK** buttons are user-friendly, contributing to an overall positive user experience.

I configured the Globetrotter as an AMBE dongle, establishing a direct connection to the USB port on my Microsoft Windows PC. You may have to identify the COM port for your Globetrotter using the Windows Device Manager. Configure *BlueDV* for the COM port, and click **SAVE**. After rebooting the Globetrotter, I successfully monitored an ongoing QSO on a D-STAR Reflector REF030C.

Configuring the AMBE server mode is just as straightforward, this time utilizing Wi-Fi for connectivity to the *BlueDV* application. Employ the Wi-Fi **<SCAN>** function to locate your Wi-Fi router, input the password, and click **EXIT AND SAVE**. Configure *BlueDV* to enable **USE AMBE SERVER**, entering the host IP address of the dongle and clicking **SAVE**.

Use Cases

The Globetrotter, functioning as an AMBE dongle, is exceptionally well-suited for radio-less communication, catering perfectly to my operating preferences at home, during travel, and in portable setups. All that's needed is access to a Wi-Fi network connected to the internet.

For fixed mobile applications, connecting your PC to a Wi-Fi travel router or utilizing the shared Wi-Fi connection on your smartphone is an optimal setup.

Operating from various locations, such as parks, campsites, coffee shops, or club meetings, where Wi-Fi is available, is seamless and mirrors the experience from the comfort of your home.

During a recent club meeting, the Globetrotter garnered interest, particularly from individuals unable to set up high-frequency antennas. It serves as an alternative, enabling QSO activity in the hobby using the internet as your ionosphere.

I also used Globetrotter as an AMBE server. This time, I powered the device with my Goal Zero Sherpa 100PD power bank, allowing me to leave the Globetrotter in my shack while moving freely around the house with my laptop for seamless communication. This convenience proved invaluable,

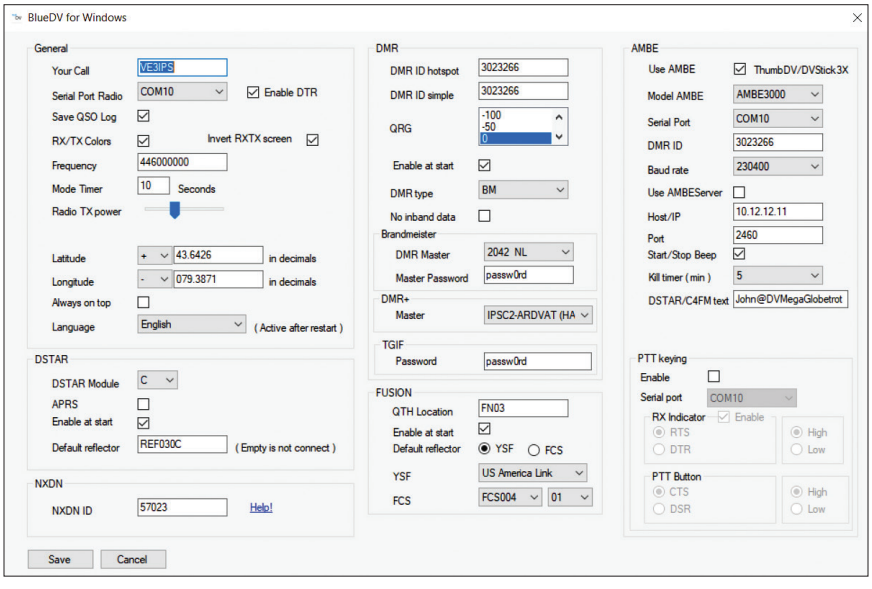

Figure 9 — The PC software screen capture of the *BlueDV* AMBE dongle settings.

Figure 10 — The DVMEGA Globetrotter in AMBE dongle mode on the kitchen table.

especially when transitioning from my shack to the kitchen for various tasks (see Figure 10).

I also enjoyed making contacts from a local coffee shop, but this time I used my Bluetooth headset.

I configured *BlueDV* to default to D-STAR REF030C, Fusion America Link, and NXDN Talk Group 65000, facilitating enjoyable participation in diverse conversations with fellow hams. Globetrotter, as its name implies, opens up global digital voice communication opportunities with just a click.

I now keep Globetrotter in my computer bag for digital voice communications without the need for radios, batteries, chargers, and rubber duck antennas. In the past when traveling, I would bring multiple radios with me, and now I bring just a handheld radio for local repeater access and my Globetrotter.

Looking ahead, I am eager to explore the possibilities of using Globetrotter with the available *BlueDV* and *Peanut* Android software, anticipating further experimentation and expanded capabilities.

Performance

The Globetrotter stands out with remarkable audio quality and signal clarity. Whether utilizing the PC's internal microphone and speakers, Bluetooth speakers, or wired gaming headsets, its sound quality surpasses that of other dongles and hotspots. The Globetrotter excels in monitoring all four digital radio modes using *BlueDV* simultaneously, offering the flexibility to select the desired mode for transmission by clicking on the mode icon. Dashboards allow "last heard" and other information to be available in the side bar windows.

I was able to operate using an i7 Core Windows 10 laptop, an HP Stream netbook, and a Microsoft Surface Go 2 laptop. With a dongle boot-up time of less than 2 seconds, the Globetrotter proved to be highly stable, with no observed issues or reboots necessary.

I conducted a power drain assessment with an external power source, using my USB analyzer and measured approximately 180 mAh in idle mode and 250 mAh in transmit mode. It's worth noting that this power consumption could impact your PC's battery life. After a few usage instances, you'll gain a better understanding of its influence on your PC's operating time.

Software and Updates

The manufacturer's dedication to ongoing support is evident through regular software updates. The auto-update mechanism streamlines the updating process by checking for new software versions upon power-up. Executing a simple menu command initiates the software update. Additionally, don't forget to update the *BlueDV* software to ensure seamless compatibility with the Globetrotter. Keeping both pieces of software up to date ensures optimal performance and functionality.

Conclusion

At its price point, balancing performance, versatility, and build quality, the Globetrotter presents a sound investment for amateur radio enthusiasts. Its ability to directly communicate using a PC offers cost savings compared to acquiring multiple digital radios.

Enhancements could include the storage of multiple Wi-Fi access-point SSIDs as profiles in the dongle, streamlining reconfiguration steps. Additionally, adopting a USB-C connector and providing an instruction leaflet with step-by-step instructions would enhance the overall user experience.

In summary, the DVMEGA Globetrotter stands out as an excellent choice for amateur radio operators seeking a reliable device supporting various digital radio formats without the need for a dedicated radio. Its robust build, dual connectivity options, and impressive performance make it a standout in its category, offering enthusiasts a high-quality digital radio experience and a welcome addition to your communications tool kit.

Manufacturer: DVMEGA, Dooren Electronic Solutions, Boomdijk 6C, 4417BE Hansweert, Netherlands, **www.dvmega.nl**. Price: $149.95.