

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**

Frequency range: All amateur frequencies in the range of 1.8 to 70.5 MHz.

Primary power requirements: 100 to 240 V ac.

Power output: 500 W $\pm$ 0.5 dB PEP or continuous carrier with no mode limitations.

Driving power required: Typically, 45 W for 500 W RF output.

Spurious and harmonic suppression:

Below 30 MHz >50 dBc, above 30 MHz >70 dBc below rated output.

Third-order intermodulation distortion (IMD): >30 below rated PEP.

Keying time: Unkey to key, 10 ms.

Size (height, width, depth): 6.2 $\times$ 11.5 $\times$ 10.7 inches.

Weight: 17.2 pounds.

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

Measured in the ARRL Lab

160, 80, 40, 30, 20, 17, 15, 12, 10, and 6 meters.*

As specified. Tested with 120 V ac supply.

As specified.

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.

58 dB worst case band (10 meters); 67 dB, 6 meters. Meets FCC requirements.

14 MHz, 3rd/5th/7th/9th: At 500 W PEP: -35/-39/-62/-58 dB. See Figure B.

Unkey to key, 13.4 ms; key to unkey, 28 ms.

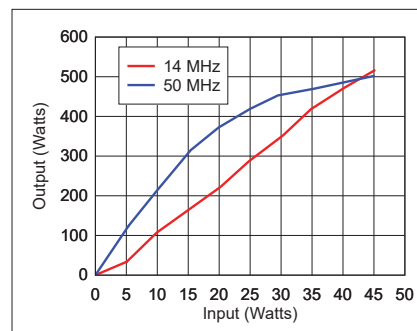


Figure A — ACOM 500S, RF power input versus RF output.

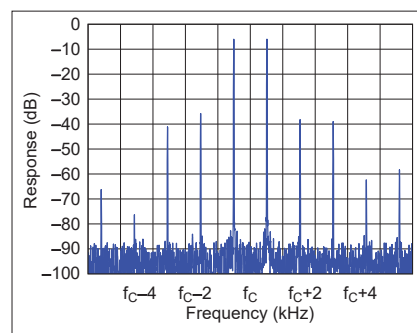


Figure B — ACOM 500S, the 20-meter band third-order IMD performance at 500 W.

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 ampli-

fier 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.

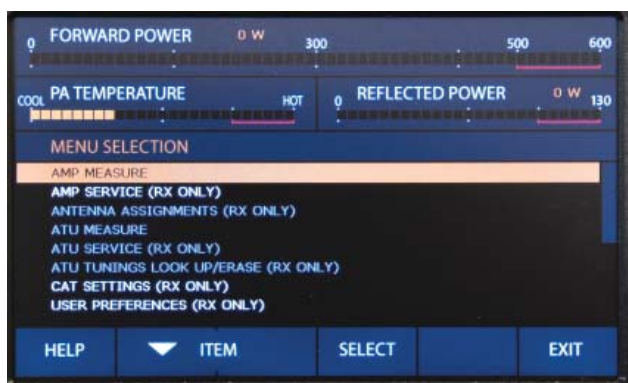


Figure 2 — The **MENU** screen is used to set up the amplifier. Several of the screen selections are not active without an ACOM automatic antenna tuner connected.



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.