ACOM 1000 HF + 6-Meter Linear Amplifier

Reviewed by Mark Wilson, K1RO
QST *Publisher*

ACOM caught the attention of US hams with the 1999 introduction of the ACOM 2000A, a rugged, legal-limit autotune HF amplifier with a current list price of $5895. The 2000A, reviewed in the May 2000 *QST*, received high marks for its quiet, effortless operation.

ACOM introduced a second—and significantly different—amplifier to the US market last year. The ACOM 1000 uses a single Svetlana 4CX800A (GU74B) tube and is rated at 1000 W output (PEP or continuous carrier with maximum key down times of 15 minutes on, 3 minutes off). For higher duty cycle operation, an auxiliary fan is recommended. The 1000 is manually tuned, covering 160 through 6 meters with a broadband tuned input circuit and a pi-L output circuit. Marginal antennas are no problem—the output circuit works with up to 3:1 SWR. The power supply is built-in, and the amplifier includes extensive monitoring and protection features. QSK (using a vacuum relay) is standard. The amplifier weighs 49 pounds. It carries a list price of $2750.

Most of the front panel is very familiar—an ON/OFF switch, TUNE and LOAD controls, and a BAND switch. Metering and control functions are handled by a backlit LCD and OPERate, PREVious and NEXT pushbuttons. The top half of the LCD always displays PEP output power. The bottom half serves several functions. It displays additional information about operating parameters, serves as a tuning aid, and shows troubleshooting information from the automatic protection system.

Rear-panel connections are equally simple. The 1000 uses a phono jack labeled KEY IN for the T-R key line (ground to transmit) and SO-239s for RF INPUT and RF OUTPUT. There's another phono jack labeled KEY OUT. According to the manual, you can use it to improve T-R switching with transceivers that have a TX-inhibit, mute or similar input. If your station isn't set up to use this feature, no problem—everything works just fine without it. A ground post, fuse holders and LINE power switch round out the back panel.

Using the ACOM 1000

Our amplifier was shipped with tube and transformer installed. It's shipped ready to operate from 240 V ac, but you can change primary taps for 200-240 V or 110-120 V in 10-V steps. The manual suggests contacting ACOM for details. We supplied the appropriate 15-A, 250-V plug for the line cord. As required by FCC rules, 10 and 12 meter operation is disabled. If you provide a copy of your Amateur Radio license at purchase time, ACOM will provide details on enabling operation on these bands.

There are two power switches. The one on the real panel controls all power to the amplifier; when it's off, nothing is powered. The manual refers to the one on the front panel as controlling on line or off line states. When it is off, the tube and blower functions aren't powered but the microprocessor control circuitry and LCD are to provide access to some information screens and control functions.

There is a 2.5 minute warmup period when you first turn the amplifier on. The LCD displays "Warming Up" and counts down from 150 seconds during this period. When the warmup period is over, you can place the amplifier in-line using the OPER button. One of the first things I noticed about the ACOM 1000 is that it is exceptionally quiet. I held my hand over the blower exhaust the first time to make sure it was running.

Tune-up is different from other amplifiers that I've used. First, preset the TUNE and LOAD controls according to a chart in the manual. Next, press the PREV and NEXT buttons simultaneously. This inserts a 6-dB attenuator at the input and puts the LCD into the TRI (true resistance indicator) mode. The attenuator allows you to tune up the amplifier at reduced power without adjusting your transceiver. Apply drive and adjust the LOAD control until the V-shaped marker is centered on the scale. Arrows show which way to turn the LOAD control. Then turn the TUNE knob to peak forward power and you're done. The ACOM easily tuned up to 1000 W output on each band with drive power between 60 and 70 W.

You can also select the TRI scale without the input attenuator and manually adjust your transmitter power to 20 W or less. Or if you transmit at normal power and the amplifier isn't tuned, the protection circuitry will automatically select the attenuator and TRI mode.

During normal operation, the PREV and NEXT buttons are used to switch the LCD to show important operating parameters including forward, reflected and output power, antenna SWR, drive power, plate current, high voltage, peak plate RF voltage, screen current, dc power input and exhaust air temperature. The LCD's brightness and contrast are adjustable. It's best viewed straight-on; I found the display a little hard to read with the amplifier is on a small stand to the lower left of my operating position.

The 1000 includes a number of protection features aimed at making the amplifier idiot-proof and accident-proof. If you come close to exceeding normal operating parameters (say, excessive an-

Bottom Line

Quiet, easy to operate and compact, this 160-6 meter 1000 W amplifier is a great companion for your HF + 6-meter transceiver, at home or in the field.

Brennan Price, N4QX ♦ Assistant Technical Editor ♦ n4qx@arrl.org

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Table 1
ACOM 1000, serial number 020136

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency range (US units): All amateur frequencies, 1.8 to 54 MHz.	As specified.
Power output: 1000 W PEP, all modes and continuous or modulated carrier.	As specified for SSB and CW.
Driving power required: Not specified.	70 W typical.
Input SWR: Less than 1.3:1.	As specified.
Output matching: Up to 3:1 SWR.	Not tested.
Spurious signal and harmonic suppression: 50 dB below rated output or greater for HF; 66 dB for 6 meters.	53 dB, worst case on HF; 63 dB on 6 meters. Meets FCC requirements.
Intermodulation distortion (IMD): –35 dB.	–44 dB. See Figure 1.
Primary power requirements: 100-120 V (in three user-settable taps) and 170-264 V ac (in five user settable taps).	
Size (HWD): 7.2 × 16.6 × 14 in; weight, 48.5 pounds.	

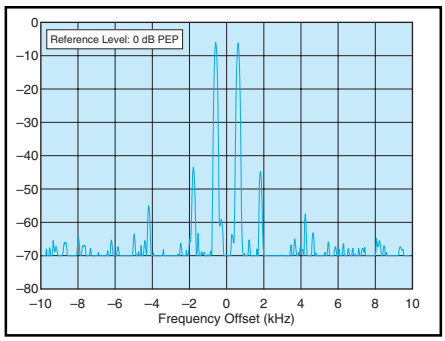

Figure 1—Worst-case spectral display of the ACOM 1000 HF + 6-meter linear amplifier during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 44 dB down, and the worst-case fifth-order product is approximately 55 dB down. The transmitter was being operated at 1000 W output at 14.020 MHz.

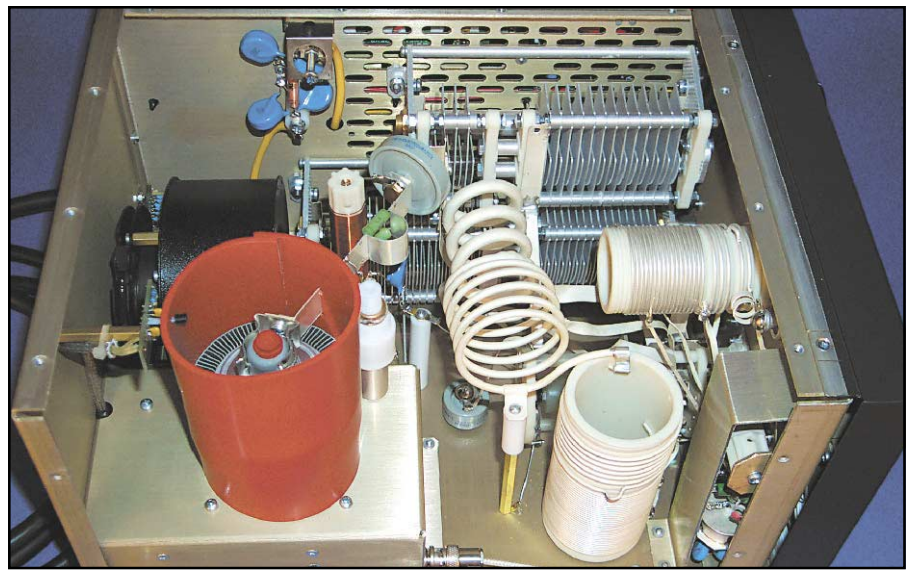

Figure 2—The RF circuitry inside the ACOM 1000. The front panel is to the right.

tenna SWR), the LCD flashes a warning. If safe operating parameters are exceeded, the 1000 switches to standby mode and displays an error message, such as, **REFLECTED POWER**. One interesting feature is the Auto Operate mode. If you have Auto Operate enabled and the amplifier faults, it will reset the amplifier to the operate mode automatically. Of course it will trip again if the problem (excessive reflected power, excessive drive power or whatever) persists.

The amplifier also displays information about internal faults—when it occurred and the type of fault—as an aid during troubleshooting. The amplifier stores information about the seven most recent faults. Error codes are a bit cryptic—for example, 1ASB2E indicates that a 24 V dc power supply fault was detected in standby after the warmup period. But with a little patience, you can decode them using information in the manual.

Other protection features allow the

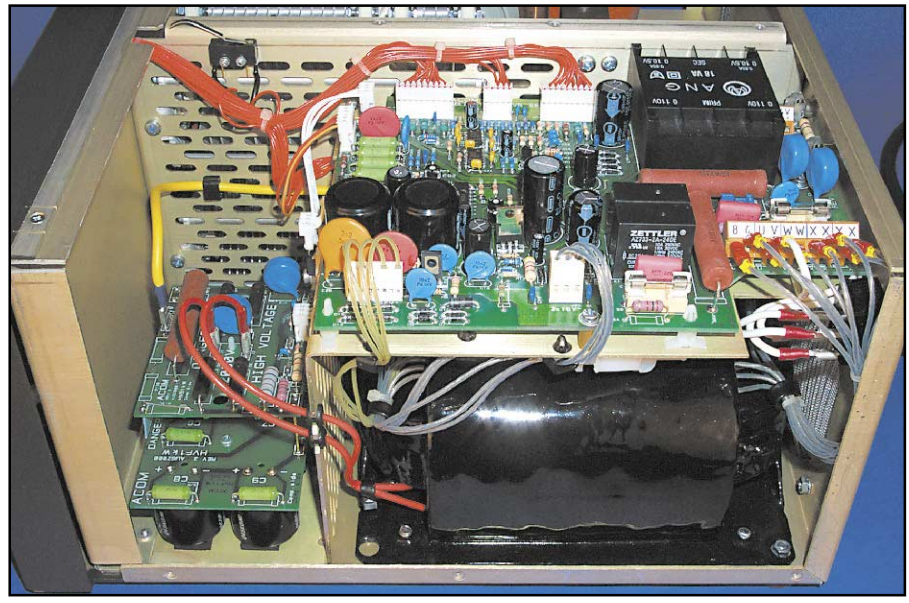

Figure 3—The power supply circuitry inside the ACOM 1000.

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amplifier to withstand up to 300 W reflected power (we didn't test it above 250 W), short duration overdrive spikes, low ac line voltage, and up to 15% line voltage spikes. These last two features make the 1000 attractive for DXpeditions or Field Day operation.

Speaking of DXpeditions, the frequency coverage and compact package make the ACOM 1000 attractive for travelers. NCJ "Contest Expeditions" columnist Kenny Silverman, K2KW, notes that he has taken an ACOM 1000 on three contest operations to 6Y5 (Jamaica). "The amp is a really great one-suitcase DXpedition amp," he says. "With a Pelican 1650 carrying case and custom high-density foam, the package weighs in at 70.5 pounds. Most airlines have a 70-pound limit, and there has never been an issue at the check-in counter."

Kenny also noted that his pre-production model produced receiver birdies on 6 meters. ACOM came up with modifications to suppress the birdies and indicates that all US production models were shipped with the mods in place. That was the case with our amplifier, and we noticed no 6-meter birdies in the Lab or during operation.

On the Air

I used the ACOM 1000 with my ICOM IC-746 transceiver and gave it a workout on all the bands. Thanks to the quiet fan and vacuum relay, it adds little to the noise in my station. My antennas aren't perfect, and I appreciated the wide tuning range. In particular, my Cushcraft X7 multiband beam works on 17 and 12 meters, but the SWR is just over 3:1 on those bands. I was able to operate the ACOM at nearly its rated output without exceeding any of the operating parameters. My dipole for 40 meters is cut for the low end of the band, but I had no trouble using it on the phone end without a tuner. The one challenge that was just too great was using a low 80-meter dipole cut for CW on the phone band.

I really didn't miss the 500 W that the 1000 gives up to legal-limit class amplifiers, and I consider 6 meter operation a huge plus. The TRI tuning indicator made tune-up a snap, once I got used to using it. I appreciated the extensive protection circuitry and never felt that I needed to worry about hurting anything if I made a common mistake like changing bands and forgetting to change the band switch.

Fellow HQ staffer Dennis Motschenbacher, K7BV, gave the ACOM 1000 a good workout on 6 meters during the ARRL September VHF QSO Party. New to 6 meters, during the summer he had gained a lot of experience on the band with 100 W and a 7-element Yagi. The ACOM 1000 performed flawlessly during the contest, allowing him to make a number of marginal QSOs on scatter and other weak signal modes. The extra power helped attract the attention of weaker stations and extended his normal coverage area. "I want one," he says.

If you're looking for a companion amplifier for your HF + 6-meter radio, or if you are looking for a Field Day or expedition amplifier, this is definitely one to consider.

US Distributor: ACOM International, 71 West St, Medfield, MA 02052, tel 508-359-5990; fax 508-359-5989; **www.hfpower.com**. Manufacturer's suggested retail price: $2750.

Alinco DJ-296T 222 MHz VHF FM Transceiver

Reviewed by Dan Henderson, N1ND
Contest Branch Manager

For several years, I served as Quartermaster for all club equipment as well as one of the control operators for its very active VHF repeater. It was necessary to delve into the world of 222 MHz equipment, as that was the chosen means for remote control of the equipment. At that time I remember trying to find a handheld that would be simple to operate and reliable at a reasonable cost, but nothing was available at that time. So, I settled on an Alinco mobile radio for the task at hand.

Today, there would be an easy solution—the Alinco DJ-296T 222 MHz VHF FM transceiver. The DJ-296T is the latest addition to the popular Alinco family of products for VHF/UHF enthusiasts. It incorporates many of the features from the popular DJ-596T—Alinco's successful 2-meter/70-cm dual-band handheld—into a user-friendly, easy-to-use product.

Over the years the single biggest negative comment many of us hear from active hams is that the newer radios, with all their "bells and whistles," are too complicated to operate with instructions too difficult to understand. Perhaps the strongest endorsement I can give to the DJ-296T is that within about 10 minutes of removing it from its box, I was able to get on the air. Consider that the only handheld of any kind I own still has thumb-wheels for dialing in the frequency, a slide switch to adjust the offset and doesn't have tone-squelch … well, the DJ-296T can't be too complicated if you can teach this old dog a new trick or two easily.

The first thing I noticed was that a single DIAL knob was used to adjust all settings—from volume and squelch to the various user functions. Turning it without the FUNCTION, VOL or SQL key pressed, it operates the VFO. I quickly learned that to adjust volume and squelch all you had to do was press the VOL or SQL buttons and turn the DIAL. With that, I was set to operate the rig.

Unlike many available HTs on the market, where you may have to hold down several buttons to get to the desired FUNCTION control, the DJ-296T is about

Bottom Line

Alinco's newest full-power, single band handheld provides affordable access to a band more and more FM enthusiasts are flocking to: 1.25 meters. The DJ-296T is a worthy successor to its older brother, the DJ-280.

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