# Product Review & Short Takes Columns from *QST* Magazine

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**Product Reviews**

Yaesu FT-7100M Dual-Band FM Mobile Transceiver

Ameritron ALS-600 Solid State No Tune FET Amplifier

**Short Takes**

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# Yaesu FT-7100M Dual-Band FM Mobile Transceiver

*Reviewed by Joe Bottiglieri, AA1GW*
*Assistant Technical Editor*

Yaesu has managed to incorporate nearly all of the capabilities and features of their most deluxe model—the FT-8100R—into a stylish new transceiver—the FT-7100M.

Like its predecessor, the '7100 is a "true" dual-band VHF/UHF radio. It contains independent main and sub receivers, allowing transceive operation on the main band while monitoring the sub band. Couple this with its impressive expanded receive frequency coverage (see Table 1), multiple scan and search modes, ample memory storage capacity, and CTCSS and DCS tone systems, and it seems likely that this new model will be particularly popular with hams who also enjoy scanner listening.

Dual in-band receive—where both the main and sub receivers are set up on the same band (VHF/VHF or UHF/UHF)—is also supported. Cross band repeater operation—a feature that allows a transceiver to automatically retransmit signals it receives on one band on a second band—is not.

## Feature Rich

Notable highlights include 262 memories with alphanumeric tagging; 50 W VHF/35 W UHF maximum RF power output; direct frequency entry and limited remote control from the microphone; 16 DMTF autodial memories; CTCSS and DCS encode, decode and tone scan; 1200/9600 bps data capabilities and Yaesu's exclusive "Smart Search" and "ARTS" systems.

Yaesu's Smart Search feature can make mining the bands for radio activity a breeze. The system scans once through a band or preset range of frequencies and stores up to 50 active frequencies into a special memory bank. Once the pass is complete (or all 50 memory positions are loaded), the main encoder can be used to step the receiver through the stored frequency information.

This feature could be helpful for finding active repeaters while traveling, and is definitely a handy tool for exploring the expanded receive coverage. The memories are temporary, though. You'll need to transfer interesting hits into the regular memory positions before you exit the Smart Search mode.

ARTS (*Auto Range Transponder System*) is a Yaesu exclusive that's become standard fare on most of their FM gear. It works in conjunction with other ARTS-equipped transceivers to alert operators when they have moved out of communications range. Once enabled, this system automatically transmits DCS pings with each press of the PTT button—or every 30 seconds during periods of inactivity. If one transceiver fails to receive the pings of another ARTS-equipped radio for more than a minute, the units will sound a warning and show a message in the display to inform the operators of the out-of-range condition. A CW ID can be set up to identify the DCS pings.

## Touring the Facilities

The front panel of the FT-7100M can be easily removed for remote mounting purposes. It latches onto a plastic receiver on the front of the chassis. The panel is dominated by a $2^{5}/_{8} \times 1^{1}/_{8}$-inch LCD display. Displayed segments appear on an orange background. The level of the background illumination can be varied; the contrast level is fixed.

The main band frequency information appears in the upper half of the window; the sub band data is shown just below. A single curving S/RF meter—along the left edge of the window—indicates the signal strength or the relative RF power output level on the main band. An extensive collection of icons shows the state of important settings.

Independent concentric volume and squelch controls are provided for each band. These are located on the left edge of the panel. A large 24-step rotary encoder serves as the main tuning knob.

There are two columns of four control keys—one to the left of the display window and a second along the right edge of the panel. The keys all perform multiple operations, but are only labeled with their primary assignments. A quick press of a key evokes its primary operation. Pressing and holding a key provides access to secondary operations.

Primary assignments cover most of the control commands that are necessary for typical operation—switching bands, selecting the VFO or memory mode, changing the output power level, and setting up and enabling the tone systems for example. Secondary assignments include operations such as memory channel writing, activating dual in-band receive, initiating a priority scan and toggling the

### Bottom Line

Yaesu's FT-7100M is a full-featured FM dual-band transceiver—and a well-equipped scanning receiver—in a compact, flexible package.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
Yaesu FT-7100, serial number 1D040208

| Manufacturer's Claimed Specifications | Measured in the ARRL Lab |
|---|---|
| Frequency coverage: Receive, 108-180, 320-480, 810-1000 MHz;[1] transmit, 144-148, 430-450 MHz. | Receive and transmit, as specified. |
| Power requirement: Receive, 0.5 A; transmit, 11.5 A (high power). | Receive, 0.73 A; transmit, 9.6 A. Tested at 13.8 V. |
| Modes of operation: FM. | FM, AM (AM receive only).[2] |
| Size (HWD): 1.5×5.5×6.6 inches; weight, 2.2 pounds. | |
| **Receiver** | **Receiver Dynamic Testing** |
| FM sensitivity, 12 dB SINAD: VHF and UHF, <0.16 μV. | For 12 dB SINAD: VHF, 0.14 μV; UHF, 0.16 μV. |
| AM sensitivity: Not specified. | 10 dB (S+N)/N, 1-kHz tone, 30% modulation, 120 MHz: 0.6 μV. |
| FM adjacent channel rejection: Not specified. | 20 kHz channel spacing: VHF, 64 dB; UHF, 63 dB. |
| FM two-tone, third-order IMD dynamic range: Not specified. | 20 kHz channel spacing: VHF, 59 dB; UHF, 61 dB; 10 MHz channel spacing: VHF, 67 dB; UHF, 70 dB.[3] |
| FM two-tone, second-order IMD dynamic range: Not specified. | 82 dB. |
| S-meter sensitivity: Not specified. | Maximum indication: VHF, 2.0 μV; UHF, 2.3 μV. |
| Squelch sensitivity: 0.1 μV. | At threshold: VHF, 0.08 μV; UHF, 0.10 μV. |
| Receiver audio output: 2.0 W at 5% THD into 8 Ω. | 2.3 W at 5% THD into 8 Ω. |
| IF rejection: not specified; image rejection: 70 dB. | First IF rejection, VHF, 105 dB; UHF, 141 dB; image rejection, VHF, 133 dB; UHF, 82 dB. |
| **Transmitter** | **Transmitter Dynamic Testing** |
| Power output (H/M1M2/L): VHF, 50 / 20 / 10 / 5 W; UHF, 35 / 20 / 10 / 5 W. | VHF, 51 / 19 / 9.4 / 4.2 W; UHF, 32 / 18 / 9.4 / 4.2 W. |
| Spurious-signal and harmonic suppression: ≥60 dB. | VHF, 65 dB; UHF, 62 dB. Meets FCC requirements for spectral purity. |
| Transmit-receive turn-around time (PTT release to 50% audio output): Not specified. | S9 signal, VHF, 180 ms; UHF, 160 ms. |
| Receive-transmit turn-around time (tx delay): Not specified. | VHF, 170 ms; UHF 140 ms. |
| Bit-error rate (BER), 9600-baud: Not specified. | 146 MHz: Receiver: BER at 12-dB SINAD, $2.5\times10^{-3}$; BER at 16 dB SINAD, $5.6\times10^{-4}$; BER at –50 dBm, $1.6\times10^{-4}$. Transmitter: BER at 12-dB SINAD, $3.0\times10^{-2}$; BER at 12-dB SINAD + 30 dB, $1.4\times10^{-2}$. 440 MHz: Receiver: BER at 12-dB SINAD, $1.9\times10^{-3}$; BER at 16 dB SINAD, $2.5\times10^{-4}$; BER at –50 dBm, $8.2\times10^{-5}$. Transmitter: BER at 12-dB SINAD, $3.4\times10^{-2}$; BER at 12-dB SINAD + 30 dB, $1.7\times10^{-2}$. |

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
[1]Cell blocked from 823 to 850 MHz and 868 to 895 MHz.
[2]AM receive mode available from 108 to 180 MHz.
[3]See text.

display between frequency digits and alphanumeric memory tags. Getting a handle on the unlabeled assignments of the secondary key operations can take a while (you'll want to keep the *Operating Manual* close at hand), but the key presses required for the most common operations are simple and intuitive (and labeled!).

A 34-item menu system handles "set-and-forget" parameters—such as the repeater offset frequency, the tuning step size, the automatic repeater shift and the display illumination level—and also includes selections that are used to activate advanced features. These include the CTCSS and DCS tone scan, AM mode receive, the ARTS system, the time-out timer and the automatic power off timer, for example.

The chassis enclosure is almost entirely made up of a die-cast aluminum shell. The underside and rear apron are covered with cooling fins. A small "pancake" fan is bolted to the back. A sheet metal top cover completes the cabinet. An internal speaker is mounted in the top cover.

The rear panel supports a chassis-mounted SO-239 antenna connector, a $^1/_8$-inch mini phone jack for an external speaker, a 6-pin mini DIN jack for connecting terminal node controllers for packet operation and a short dc power pigtail with a conventional T-type connector. A 9-foot fused dc power cable and a mobile mounting bracket are also provided.

### The Cure for Separation Anxiety

Yaesu has made some significant—and welcome—changes to the optional remote faceplate mounting system for this transceiver. Most of their other remote mount kits use tiny screws to secure the radio end of the remote cable to the front of the transceiver's chassis. This makes it inconvenient to remove those radios from the vehicle for short-term fixed sta-

tion or alternative applications.

The system for the '7100—the YSK-7100 Remote Mounting Kit—employs 6-pin modular plugs on both ends of a 19½-foot long remote cable. Mating jacks are located on the front of the chassis and the back the faceplate. (The radio comes with a 4-inch jumper installed between these jacks.) The kit also includes a bracket that the front panel latches into and an extension cable for an external speaker.

An optional quick-release mounting bracket for the chassis (the MMB-60) can further simplify things. The chassis and front panel could then be easily installed or removed from the vehicle without the need for any tools.

Be forewarned, though: You'll definitely want to keep close tabs on the whereabouts of that short jumper cable!

### Multitalented Mike

The US version of the FT-7100M comes with Yaesu's MH-48A6J DTMF hand mike. It has a 16-button keypad that's used for manually transmitting DTMF tones when the radio is in transmit, and directly entering frequency digits or memory channel numbers while receiving.

There are four additional buttons located just below the keypad. Their factory default assignments are band selection, VFO/memory operation, tone mode (CTCSS/DCS encode/decode) and setting, and power output level. These can be reprogrammed—via menu settings—to mimic the functions of nearly any of the transceiver's front panel keys. This is a neat feature, as it allows you to customize the mike controls to best suit your particular needs.

The right side of the microphone sports two slide switches. One controls the backlighting of the DTMF pad, the second locks out the **UP** and **DOWN** buttons on the top of the mike and the programmable function keys. The lock feature does not disable the PTT button or the DTMF/entry keypad.

### Thanks for the Memories

The FT-7100M has ample memory capacity. There are 240 "regular" memories, 10 pairs of upper and lower band scan limit memories and two "Home" channels. Each band also contains 50 additional slots for temporarily storing the frequencies encountered during a Smart Search.

The 240 regular memories are initially divided into two 120-memory banks—one for each band—but a menu setting allows these to be reallocated (196 memories could be set aside for the VHF band and the remaining 44 memories would be available for the UHF band, for example).

Each of the regular memories can be assigned an alphanumeric name up to six characters long. The main band display area is only capable of showing the first five characters though—the sixth character only appears when a memory tag is displayed in the lower (sub band) portion of the window.

### Unlimited Access

The '7100 comes equipped with a full-featured tone squelch system. CTCSS and DCS (digital code squelch) encode and decode are provided, and tone and code scan systems can be employed to determine access requirements. The CTCSS system includes 50 tones; the DCS system offers 104 codes. A menu setting is provided that allows you to "invert" the DCS tones, and the FT-7100M's *Operating Manual* includes an excellent explanation—the best I've encountered to date—of why this adjustment is sometimes necessary.

The '7100 also features CTCSS "Bell Paging." When this system is enabled, the radio will remain silent until it receives a signal with the correct CTCSS tone superimposed. The rig will then "ring," and the squelch will temporarily open.

The transceiver is not specifically set up to allow the use of independent transmit and receive tones or codes on a single frequency, but savvy operators can work around this by employing the dual in-band receive feature.

### In Search Of...

The FT-7100M offers several different scanning modes and two scan-resume conditions.

While in the VFO mode, the scan will search the entire band or just between upper and lower limits that you've programmed into the band scan limit memories. In the memory mode, the scan will—of course—check for activity on your programmed memory channels. Scans are initiated by pressing and holding either the **UP** or **DOWN** button on the mike. You can use the PTT button, the **UP** or **DOWN** buttons or the **V/M** key to stop the scan.

Specific memories can be temporarily locked out of a memory scan, but the directions for doing so that are provided in the manual are incorrect. The instructions call for dialing up the desired memory and then pressing and holding the **TONE** key for ½ second. The correct procedure is to dial up the desired memory and then press and hold the **V/M** key until the main and sub displays begin blinking. A quick press of the **TONE** key will then activate the skip feature. Repeat this process to disable the skip feature.

A menu setting allows you to program the scan to stop on an active frequency and remain there until the carrier drops, or to pause on an active frequency for 5 seconds and then resume scanning.

A related feature is "Priority Channel Operation." This system will periodically (every 5 seconds) check for activity on a memory channel while you are operating in the memory channel, VFO or Home channel modes.

### On the Air and In the Lab

I initially set the FT-7100M up in my home station. I programmed in a few local frequencies and spent some time getting familiar with the controls.

The 57-page 6×8-inch *Operating Manual* is well organized, and the step-by-step programming instructions—supplemented by a generous number of diagrams and charts—are easy to follow.

I used the transceiver while serving as the net control station for our local club's weekly VHF net. The net usually attracts a couple of dozen check-ins, and concludes with a near-continuous transmission of the *ARRL Audio News*. Needless to say, this is a serious test of a transceiver's cooling system.

The cooling fan on the '7100 automatically switches on when transmitting, but the level of the noise it generates is extremely low. The chassis got very hot—even at the 20 W power output level—but the radio continued to operate without any difficulties. Bear in mind that the transmit duty cycle for net control operation *far* exceeds that of typical operation.

Transmit audio reports universally garnered comments of "sharp" sounding audio. Listening to it in a second receiver confirmed that it generates what I'd describe as "communications grade" audio. It's not as full and natural sounding as my permanent shack transceiver. Receive audio—even when using just the internal speaker—is plenty adequate for fixed station operation, and is sufficiently robust for fairly noisy mobile environments.

I temporarily substituted the FT-7100M for my mobile transceiver. I found the radio easy to use while mobile, and the display is very legible over a wide range of viewing angles and vehicle interior lighting conditions. The microphone control capabilities help reduce the amount of distraction involved with typical mobile operation.

A look at the data in Table 1—specifically the FM two-tone third-order IMD dynamic range—points to a rather poor

level of immunity to strong nearby signals both within (the 20 kHz numbers) and just outside (the 10 MHz numbers) of the amateur VHF and UHF bands. This quickly manifested itself as a scary symphony of odd noises spewing forth from the receiver during a drive through our local "intermod alley."

It turns out that our product review unit is from one of the first batches of '7100s that were released in the US, and Yaesu has subsequently made an update that has improved the 10 MHz offset performance. A second—post update—unit that we borrowed from a local Yaesu distributor showed significant improvements. The VHF IMD dynamic range in the updated version measured 81 dB (up from 67 dB on the product review unit), and the UHF number measured 73 dB—a 3 dB improvement. All of the FT-7100Ms currently on dealer's shelves have been updated. If you purchased an early release unit and are experiencing problems in strong signal environments, a call to your dealer may be in order. Needless to say, ours will be heading back to California for the updates before it shows up in our Bid List.

A second significant shortcoming that turned up during lab testing involves 9600 bps packet performance. While it's not unusual to encounter rather poor high speed packet performance in FM-only transceivers, the BER (bit error rate) is usually small enough at strong signal levels for reasonable throughput. This wasn't the case with either of the FT-7100Ms we tested. Yaesu reports that they have developed a solution for this problem and are implementing it in current production units. It's important to note that this does not point to problems with 1200 bps operation.

### Conclusion

The FT-7100M is a feature-packed true dual-band FM transceiver—and a sophisticated scanner receiver—in one very compact package. Yaesu's improved optional remote mounting system makes it flexible enough to serve double-duty as both your fixed station and mobile transceiver.

*Manufacturer*: Yaesu USA, 17210 Edwards Rd, Cerritos CA 90703; 562-404-2700, fax 562-404-1210; **www.yaesu.com**. Manufacturer's suggested list price: $550. Typical current street price: $445. List prices of selected optional accessories: YSK-7100 remote mounting kit, $69; MMB-60 quick release chassis mounting bracket, $31.

# Ameritron ALS-600 Solid State No Tune FET Amplifier

*Reviewed by Rick Lindquist, N1RL*
*ARRL Senior News Editor*

Years ago a good friend of mine gave me a 4-400A amplifier that had been homebrewed in Canada—apropos to this review since that's where these words are being written. With this transaction we were doing each other a favor. He wanted to clear out some excess baggage in his basement shack, and I needed (or thought I did) an amplifier.

Like the Ameritron ALS-600—which is, after all, the subject at hand—this amp came in two pieces—an RF box and a power supply. Unlike the ALS-600, both pieces were massive. The RF cabinet featured huge black knobs—one with a crank and counter controlled a vacuum variable for tuning; another was for loading. There were at least two, possibly three, meters on the RF box. The power supply was built into a short rack that sat on the floor. It boasted its own meter to read the line voltage to the transformer, which, as it turned out, was faulty and necessitated surgery (that's a veritable "tale of laminations" best held for another occasion).

On the back of the RF box, its maker had appended a huge, ugly blower that left nothing to chance in terms of moving copious amounts of air past the tubes. The 4-400As could crank out a lot of heat along with the 1 kW of RF, and the amp maker had neglected chimneys.

Suffice it to say, this amp turned out to be both project and problem child over the years I had it in operation. Sometimes it would snap and hiss at me unexpectedly. One time, it blew up in the middle of a contest and took out my exciter's T/R relay in the process. In short, it never was quite "right," yet it always demanded a great deal of respect. One needed to ap-

**Bottom Line**

The Ameritron ALS-600 is a cool and convenient way to pump up your signal. It's reasonably quiet and runs off 120 V ac, so you don't need to call in the electrician to install a 220 V ac outlet.

## Table 2
## Ameritron ALS-600, serial number 12727

| *Manufacturer's Claimed Specifications* | *Measured in the ARRL Lab* |
|---|---|
| Frequency Range: 1.5-22 MHz.[1] | As specified. |
| Power output: 600 W PEP SSB, 400 W CW. | As specified for SSB and CW. |
| Driving power required: 100 W maximum. | Typically 100 W. |
| Input SWR: 1.5:1 maximum. | As specified. |
| Spurious signal and harmonic suppression: Not specified. | 49 dB. |
| Intermodulation distortion (IMD): 25 dB. | See Figure 1. |
| Primary power requirements: 50 V dc at 25 A, ±14 V dc at 1 A. | |
| Size (HWD): main unit, 7.1×9.5×12 inches; weight, 12.5 lb; power supply, 7.1×9.5×12 inches; weight, 36 lb. | |

[1]As shipped from the factory, operation on 12 and 10 meters is disabled. The ALS-600 can be modified for operation above 15 meters (by the purchase of an option kit). Information on this kit is available by written request, which should include a copy of the owner's valid Amateur Radio license.
[2]Not including external power supply.

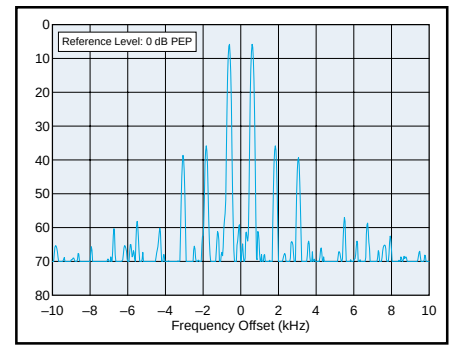



**Figure 1—Worst-case spectral display of the Ameritron ALS-600 amplifier during two-tone intermodulation distortion testing. The worst-case third-order product is approximately 37 dB below PEP output, and the worst-case fifth-order product is approximately 40 dB down. The amplifier was being operated at 500 W at 14.020 MHz. The levels of the third- and fifth-order products are higher than those that we have observed on recently reviewed tube-type amplifiers.**

proach this amp with fear and loathing.

After it took out the SWR circuit in yet another exciter, I phased it out in favor of a Heath SB-220, which took up far less space in the shack and was far less intimidating.

### The Age of the Little Amp

Small, table-top amps are nothing new. My urge to run anything approaching "big" power was tempered by my experiences with the 4-400A monster. Today I run—if I use an amp at all—a vintage Collins 30L-1, which has four 811s in the output. What's nice is that it's small and undemanding, puts out 500 to 600 W, and is easy to tune. What's not nice is that it generates substantial heat, does not cover 160 meters, and I still must twist knobs each time I change bands. (Collins also used a phono jack for the RF input from the exciter—and all along you thought Heath came up with that on its own!)

The ALS-600 is a great compromise for operators such as myself, who neither want nor need *huge* power but want to be able to quickly and easily pop a "half gallon" on the air to compensate for deteriorating conditions or to attract the attention of that DX station that's not responding to your dim 100 W and compromise antenna. Best of all, this little amp—the RF box weighs a bit more than 12 lbs—doesn't take any time to warm up, because it's solid-state, and it doesn't require anything more than the turn of a selector knob to put it into the correct operating range. There's no tuning or loading or dipping involved. As they like to say in those TV gadget ads, "It's just that simple."


**Figure 2—The rear panel of the RF deck.**

### A Good Fit

I found the ALS-600 to be a good fit, not only for my operating style but for my rather compact operating desk. Because it comes in two pieces, the ALS-600 takes up far less space than even my 30L-1. The power supply can sit out of sight on the floor. Ameritron has supplied a 5-foot long cable to connect the power supply to the RF box. You also can stack the two units, as I did for part of the "field" testing. The two boxes are almost exactly the same size.

Hookup is simple, and if this is your first amplifier, Ameritron has included everything you need to know in the *Instruction Manual*. It even covers the oft-misunderstood subject of automatic level control—ALC—and details how to get the amp talking to your exciter to minimize splatter problems.

One important point the manual makes is that there is no industry-wide ALC standard for input voltage, input resistance or attack and decay times. As the manual cautions, "the exact operation of the ALC circuit will vary with the exciter's response to external ALC control voltages." In the case of the ALS-600, the ALC will work on most exciters that

require less than –10 V.

After setting up the unit—which took about 10 minutes or less—I had it putting 500 W or so of RF into a dummy load, just to see if everything was working as it was supposed to be. The RF deck utilizes the combined strength of four MRF-150s in a push-pull parallel circuit.

The ALS-600 does generate some blower noise, somewhat more than my 30L-1, but it's not nearly as noisy as some of the economy tube-type amps on the market. In fact, the ALS-600 involves two blowers—one in the power supply box and one in the RF box. Both run continuously. That's all the more reason to stick the power supply somewhere away from the immediate operating position—although not out of reach or sight (the reasons for this will become clear). More important, however, was that the RF and power supply boxes seemed to run quite cool, even with extended use.

The metering is great. The RF box boasts a nice large, illuminated cross-needle analog meter that measures output power on one scale (forward power) and reflected power on the other, with the SWR appearing at the point where the needles cross. Another smaller, lighted meter on the power supply—a dual-needle affair—reads out the voltage and current. It showed about 50 V and 8 A of current.

Front-panel controls on the RF deck include the **ON-OFF** power switch, the **STANDBY-OPERATE** switch—both just below the meter—the **ALC SET** knob and the **FREQ MHz** range selector. Ameritron has included a **NORMAL-RTTY** switch on the power supply box that lets you adapt the unit for operation in continuous-duty modes (such as RTTY or maybe AM or FM). Ameritron says the RTTY position limits the no-load voltage to about 42 V dc. According to an "update" in the manual, the RTTY position will permit operation for "10-minute key down" at 50% duty cycle. This will give you a maximum of about 350 W output.

There are three LED indicators on the front panel—a yellow **ALC** light, a green **XMT** light and a red **LOAD FAULT** lamp.

Peeking at the rear apron: There's a back-panel **ALC LIMIT** control on the RF deck. This lets you limit the amount of ALC voltage going to your transceiver since—as mentioned earlier—no industry standard exists.

In addition, the rear panel includes SO-239 connectors for the RF input and output. There's also a 12 V dc jack (RCA type) to run an accessory (up to 200 mA), plus RCA jacks for RELAY and ALC. There's a multi-wire connector for power and switching. A wing-nut ground terminal rounds out he back panel. A considerable portion of the rear panel is given over to the fan outlet. The ac cable connects to the back of the power supply deck.

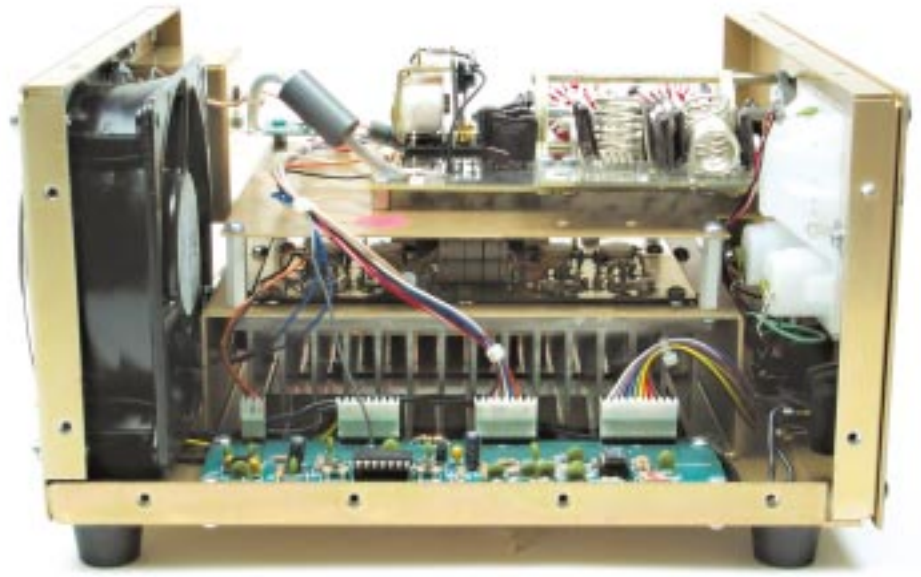


**Figure 3—An internal view of the RF deck.**

The ALS-600 can operate from a range of line voltages. It comes factory-wired for 120 V ac operation, but it can operate on anywhere from 100 to 130 V ac or 210 to 250 V ac, so it's ready to travel. You'll need to change some jumpers inside the power supply box to adjust the line voltage range. Ameritron recommends against operating the unit on higher-voltage ac mains unless lower voltage is not available. By the way, the power supply is a choke-input design, and it does include "inrush" protection to preserve the filter capacitors.

## Switching in the Afterburner

Once you've got the ALS-600 interconnections in place and the input and ALC adjustments set up for your station, a bigger signal is just the flick of a switch away. Well actually, a couple of switches.

You don't select bands, you select frequency ranges. It covers 1.5-2.3; 2.3-4.4; 4.4-8.0; 8.0-14.5; and 14.5-21.6. The ALS-600 employs a broadband, five-pole lowpass filtering system on the output side. See the ARRL Lab test results (Figure 1) for an idea of how well this system did in minimizing undesired output.

By the way, there's an **AUX** position on the amplifier's range switch to add 12 and 10-meter coverage. Ameritron will supply licensees with a kit to include these bands, but it will cost you around $30.

The unit should be in the correct transmit range before you flip the ALS-600 from **STANDBY** to **OPERATE**. I found that it would still produce output—sometimes substantial output—when the unit was not switched to the correct range, and this is something that's extremely easy to do in the general course of things.

The switching relay is on the noisy, clacky side. For push-to-talk operation on SSB, this is acceptable, but it could get tiresome if you plan to run in VOX mode using this amp. Other than that, the ALS-600 runs rather quietly. The ALS-600 is not equipped for full-break-in CW.

The broadband output network seems to know its limitations. I went to 10 MHz on the exciter with the amp still on the 4.4-8.0 MHz setting, and it still appeared to be putting out around 450 W (don't fret—I was doing this into a dummy load at the time). But when I went to 14 MHz, it tripped off, and the **LOAD FAULT** lamp came on.

The manual says the **LOAD FAULT** LED will come on if the band switch is set on the incorrect frequency range, if the load SWR is too high or if output is too high. A little experimenting showed, however, that there's some "overlap" on the **FREQ** ranges in terms of what the amplifier can live with. In the 4.4-8.0 MHz position, it continued to put out full or nearly full output up to around 10.1 MHz, where it began to drop off. Somewhere between 12 and 13 MHz, it finally tripped the **LOAD FAULT**.

On the other side, still in the 4.4-8.0 MHz position, the output actually increased as I went through the 75 and 80-meter bands. There was somewhat less output in the 2.2-4.4 MHz range position when

I was driving it on 80 and 75 meters. The output in that range seemed to peak at around 600 W at 2.15 MHz. Output in the 1.5-2.3 MHz range peaked at just under 600 W also at 2.15 MHz. Output dropped to about 550 W at 1.85 MHz input.

The ALS-600 includes thermal overload protection as well that bypasses the amp if it gets too hot. There's no indicator to tell you the amp has tripped out on high temperature, however. It just stops amplifying and goes into bypass mode, where the exciter's output will show up at the antenna terminal.

In operation, we found that 400 W was a reasonable output for CW operation with about 75 W of drive. You can run the ALS-600 a bit harder on SSB without any problems. One disturbing observation in CW was a little uptick in SWR between the transceiver and the amp upon the initial CW character—as if the exciter were operating into an open load or a mismatch for just a fraction of a second. No one complained about missing characters, and this might not be a problem with other transceivers. In general, the amplifier presented a 1.5:1 SWR (according to my digital SWR meter) or better to the transceiver.

### So, What Does This Buy Me?

Some amplifier makers used to talk about "dollar-per-watt" values—maybe they still do. If that makes sense to you, then it will cost you on the order of $2 per watt for the luxury of owning this solid-state, no-tune linear.

More to the point is what a 600-W class amplifier will do for your signal. Remember that doubling your power is equivalent to a 3 dB increase in output. With the ALS-600, you can—at least theoretically—gain around 7.5 dB in power output over your 100 W "barefoot" signal. What this translates into on the other end of the circuit will vary from path to path, of course, and from antenna to antenna. But let's call it roughly one S unit (there's no real industry standard here either, but that's typically 6 dB).

Let's put this into perspective. In general terms, with an ALS-600, you're around three-fifths of the way to a full legal limit amplifier, which will give you most of another S unit—or around 12 dB of gain over your barefoot signal. You can make up that difference with a gain antenna.

The *Instruction Manual* was complete and easy-to-follow. It includes circuit diagrams of both the amplifier RF deck and the power supply. This is a real plus for troubleshooting, should it come to that.

*Manufacturer*: Ameritron, 116 Willow Rd, Starkville, MS 39759; 662-323-8211, fax 662-323-6551; **mfjcustserv@ameritron.com**; **www.ameritron.com**. Manufacturer's suggested list price: $1299. Typical current street price: $1130.

## GOING ONCE, GOING TWICE...

### SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from dealers. ARRL receives no remuneration from anyone involved with the sale or manufacture of items presented in the Product Review, Short Takes or New Products columns.—*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices. All equipment is sold without warranty.

ICOM IC-910H VHF/UHF multimode transceiver with UX-910 1200 MHz Band Unit and FL-132 500 Hz CW filter, serial number 01242 (see "Product Review," May 2001 *QST*). Minimum bid: $1445.

ICOM IC-PW1 HF/6-meter linear amplifier, serial number 01203 (see "Product Review," Feb 2001 *QST*). Minimum bid: $3565.

ICOM IC-R3 communications receiver, serial number 01372 (see "Product Review," Feb 2001 *QST*). Minimum bid: $325.

Ten-Tec Jupiter HF transceiver with Model 701 hand-held microphone, serial number 12C10820 (see "Product Review," Jun 2001 *QST*). Minimum bid: $825.

Yaesu VR-5000 communications receiver, serial number 0K030164 (see "Product Review," Jun 2001 *QST*). Minimum bid: $590.

Yaesu FT-817 multiband multimode transceiver with YF-122C 500 Hz CW filter, serial number 0M050276 (see "Product Review," Apr 2001 *QST*). Minimum bid: $610.

Sealed bids must be submitted by mail and must be postmarked on or before Oct 1, 2001. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, clearly identify the item you are bidding on, using the manufacturer's name and model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by ARRL. Please include a daytime telephone number. The successful bidder will be advised by telephone or by mail. Once notified, confirmation from the successful bidder of intent to purchase the item must be made within two weeks. No response within this period will be interpreted as an indication of the winning bidder's refusal to complete the transaction. The next highest bidder will then have the option of purchasing the item. No other notifications will be made, and no information will be given to anyone other than successful bidders regarding the final price or the identity of the successful bidder. If you include a self-addressed, stamped postcard with your bid and you are not the high bidder on that item, we will return the postcard to you when the unit has been shipped to the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111-1494. [Please note that the bid submission period has been extended by one month.—*Ed.*] QST

## NEW PRODUCTS

### MAGNETIC LOOP DESIGN SOFTWARE

◊ Glenn, KI6GD, has written a magnetic loop antenna design program for *Windows*. It will calculate the design parameters in standard or metric units for small loop antennas to operate from 1 to 30 MHz. This is freeware for everyone interested in building a mag-loop antenna. The file *LoopCalc.zip* is available on his ftp site at **ftp://ftp.cts.com/users/g/c/gcsperry/**. QST

## FEEDBACK

◊ Two schematic diagram errors appeared in "Simple RF-Power Measurements" in the June 2001 *QST*. The first, in Figure 1, relates to U2. The input and the output are interchanged. The second relates to the 10 dB pad in the inset part of Figure 6. The words "to DVM" at the right hand side of the 10 dB pad, next to R4, should read "to the coaxial cable between the tap and the power meter." QST

# *MMSSTV* Version 1.01

Makoto Mori, JE3HHT, has done it again. I don't know how he finds the time to write such remarkable sound-card programs—which he distributes as *freeware* to the amateur community—but I'm glad he does.

If you're curious about the world of Slow Scan Television (SSTV), *MMSSTV* is probably one of the easiest, least-expensive ways to give this mode a try. All you need is a PC running *Windows 95/98/ME/2000* or *NT* and a 16-bit sound card (all modern sound cards are at least 16 bit). The computer clock speed must be at least 100 MHz. *MMSSTV* will run on a 100-MHz Pentium system, for instance, but with some effort. I'd recommend something in the 200 MHz or faster range.

**An SSTV image of the home of N4QZE received on 20 meters using *MMSSTV*.**

## Setup

You can start receiving SSTV transmissions by simply installing an audio cable between your transceiver's speaker or auxiliary audio *output* and the microphone or line *input* of your sound card. Download the *MMSSTV* software, install it and you're in business.

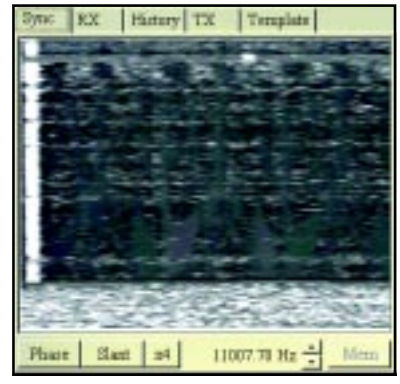
To transmit you'll need a cable from your sound card speaker or line *output* and the microphone or auxiliary audio *input* of your transceiver. You can place your rig in the transmit mode manually, rely on the VOX if you are using the microphone input, or use your computer COM port to key the transmitter through an interface such as one sold by West Mountain Radio (**www.westmountainradio.com**) or TigerTronics (**www.tigertronics.com/**).

## *MMSSTV* on the Air

*MMSSTV* is flexible and easy to use. Click on the **RX** (receive) tab on the main screen. When you find an SSTV signal (try around 14.230 MHz), you can tune the signal on the spectral display (I usually tune until the 1200-Hz sync pulse falls on the green line), or you can use the waterfall display. Assuming you've selected the proper SSTV format (*MMSSTV* supports every popular format from Robot 36 to Martin 2 and many more), the image should begin to appear on the main screen, painting from top to bottom. *MMSSTV* also supports automatic reception, which means that it will attempt to decode the image format and display it whenever an SSTV signal is received.

One of the frustrating aspects of using some types of SSTV software is adjusting for *slant*. Images will appear slanted on the display if your sound card clock is not correctly calibrated. Correcting the slant can be a tedious process. If the response of the software is sloppy, you'll often overcorrect, weaving back and forth like a car with a malfunctioning steering wheel. With *MMSSTV*, however, you can correct slant problems on the fly by simply clicking the **SYNC** tab on the main display, then clicking **SLANT**. The received image appears along with a thick white line that represents the sync signal. Click on the top of the sync line, drag the cursor to the bottom of the line and then click again. That's it! Click the **MEM** button and the slant setting is saved.

Transmitting is even easier. *MMSSTV* displays your library of images at the bottom of the screen (*MMSSTV* can store up to 300 images). Find the one you want to send, click your mouse on the image and drag it into the main window. Click on the **TX** button and *MMSSTV* will begin transmitting. You can apply various text templates to your images such as your call sign, a "CQ" and so on. You can even superimpose the image you just received into the image you are transmitting (so the other operator can see how his signal actually looks on your end).



**The *MMSSTV* slant adjustment screen. The thick white line represents the sync signal.**

## Conclusion

In addition to the features I've already mentioned, *MMSSTV* includes a neat logging function that will save an image along with the standard log data. And the *MMSSTV* **OPTIONS** menu allows you to tweak the program functions to suit your particular needs. You can even change the various colors used in the *MMSSTV* displays. These features add even more value to what is already an astonishing program, especially when you consider the cost—*nothing*. You can stretch your ham horizons to include SSTV by just jumping on the Web and downloading *MMSSTV* today at **www.geocities.com/mmhamsoft/mmsstv/index.htm**.

Steve Ford, WB8IMY ♦ Editor