# Product Review Column from *QST* Magazine

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Maxcom Antenna Matcher And Dipole Cable Kit

Yaesu FT-980 HF Transceiver

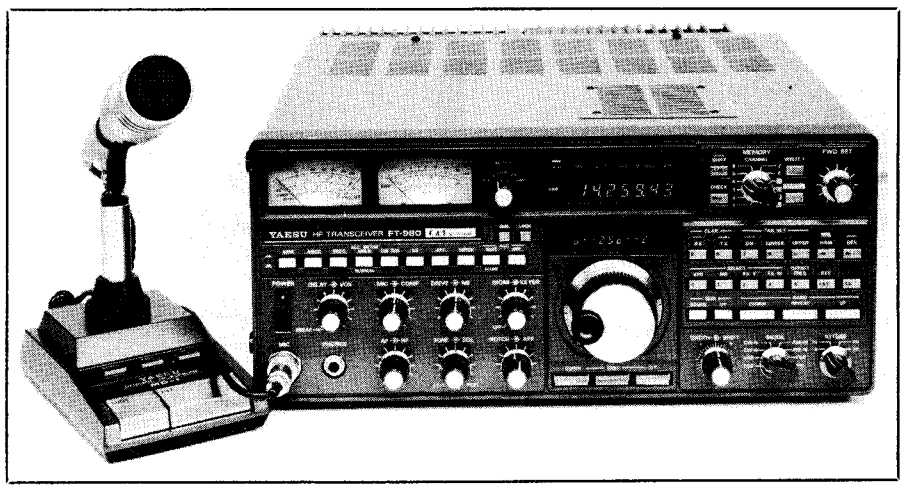
# Product Review

Conducted By Paul K. Pagel,* N1FB

# Yaesu FT-980 HF Transceiver

In 1983, Amateur Radio saw the birth of a new category of transceivers: the "big rigs." These rigs cover the seven currently available HF bands and the 17- and 12-meter WARC bands. They usually have a couple of VFOs; several frequency memories; a general-coverage receiver; dozens of knobs, buttons and connectors; and an on-board microprocessor to keep track of all of the "bells and whistles." The FT-980, Yaesu's entry in this category, goes one step further, offering the ability to control all of the frequency-related functions from an external computer.

With 60 front-panel controls and about 25 rear-skirt controls and connectors (Table 1), the FT-980 is a lot more complex and flexible than the TS-520S that I'm used to. However, I quickly learned enough to operate the rig. After a dozen contacts, I was able to use many of the advanced features of the '980 to great advantage.




### Frequency Control

The FT-980 has two VFOs. One is the HAM VFO, which is used to transmit and receive within the existing and proposed ham bands. The other VFO is the general (GEN) VFO, a receive-only VFO used for 150-kHz to 30-MHz coverage. While this is straightforward, the novice '980 operator might be confused by the number of ways the rig can be tuned.

Three momentary-contact push buttons (DOWN, REPEAT and UP) comprise the BAND switch. When tuning the HAM VFO, these buttons move the VFO up or down into the next amateur band. When tuning the GEN VFO, each touch of the button moves the frequency up or down 500 kHz. Simultaneously pressing the REPEAT button and one of the other buttons causes the selected action to repeat about six times per second.

That's the simple part. After band selection, there are no fewer than six ways to change operating frequency: the main tuning dial, the DOWN-FAST-UP buttons, the 5-kHz DOWN and UP buttons, the keyboard and the MEMORY-select knob.

The main tuning dial has a knurled rubber sleeve around it, and a "speed knob" for fast tuning. The dial has a nice feel, although some operators might want it to be heavier. The VFO tunes in 10-Hz steps, and the tuning rate is a constant 10 kHz per dial revolution.

Immediately below the tuning dial (and on the base of the MD-1 microphone) are the DOWN-FAST-UP buttons. Holding just the DOWN or the UP button changes the VFO frequency at 300 Hz/s. Holding either of the buttons and the FAST button tunes at 30 kHz/s. Although these tuning rates are adequate for scanning through the band, it is usually necessary to use the main dial for final frequency adjustments.

The 5 kHz DOWN and UP buttons are used to tune in 5-kHz steps. Either of these buttons can also be used with the REPEAT button from the band switch for fast scanning.

**Table 1**
**FT-980 Front- and Rear-Panel Controls and Connections**

*Front Panel*

MOX
Automatic MIC gain control (on/off)
PROCESSOR (on/off)
ALC METER (peak HOLD/NORMAL)
CW CALibrate tone (on/off)
Noise Blanker (on/off)
Audio Peak Filter (on/off)
IF NOTCH (on/off)
AGC FAST/SLOW
AGC (on/off)
Display DIMMer (on/off)
Frequency LOCK (on/off)
POWER
VOX gain
VOX DELAY (and BREAK-IN)
COMPression
MIC gain
Noise Blanking time constant
DRIVE level
KEYER speed (for optional keyer)
IF MONitor level
MIC connector
headPHONES connector
RF gain
AF gain
SQUELch
AF TONE
Audio Peak Filter frequency
IF NOTCH frequency
IF SHIFT
IF WIDTH
MODE selection
ATTenuator selection
DOWN-FAST-UP freq. control
MEMORY CHANNEL selection
memory SHIFT
memory CHECK
memory WRITE 1
memory WRITE 2
Least significant DIGIT blanking
VHF/UHF display selector (for outboard transverters)
SWR FORWARD SET adjustment

*Keypad Area*

CLARifier TX and RX
TAB SET (ON LOWER UPPER)
VFO selection HAM and GEN
frequency control SELECT
  VFO
  memory
  VFO receive
  memory receive
OFFSET FREQuency display (on/off)
KEY/ENTRY
clear entry
5 kHz (DOWN UP)
BAND (DOWN REPEAT UP)

*Rear Skirt*

ANTenna jack
KEY (MANUAL AUTO) jacks
ground lug
LINear AMPlifier (QSK or not)
KEYboard TONE (on/off)
MARKer generator (on/off)
EXTernal receiver jack
EXTernal receiver switch
SEPerate ANTenna jack
FSK jack
RF OUT jack (for transverters)
PTT jack
AF OUT jack
IF OUT jack
PATCH IN jack
EXTernal speaker jack
computer control jack
ACCessory jack (1) (CPU I/O)
ACCessory jack (2) (Linear amplifier)
EXTernal control jack (CAT)
FSK SHIFT (170, 425, 850-Hz)
CW PITCH (500, 600, 700-Hz)
VOX Anti-TRIP adjustment
AC line cord plug
Line FUSE holder

*Assistant Technical Editor

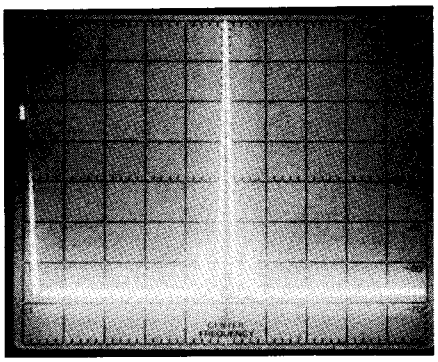


Fig. 1 — Worst-case spectral display of the FT-980. Vertical divisions are each 10 dB; horizontal divisions are each 5 MHz. Output power is approximately 100 W at 24 MHz. All spurious emissions and harmonics are at least 56 dB below peak fundamental output. The FT-980 complies with current FCC specifications for spectral purity.

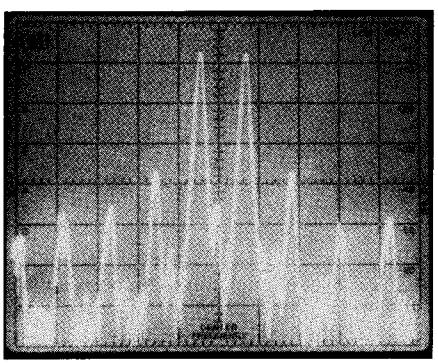
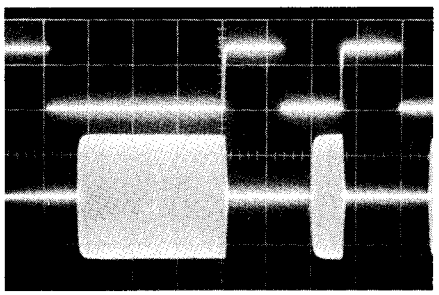
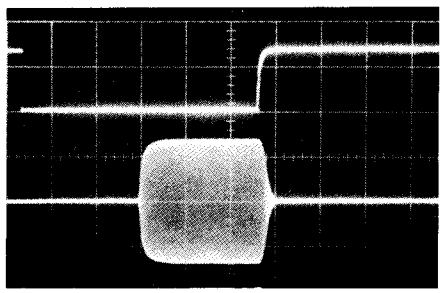


Fig. 2 — Spectral display of the FT-980 output during two-tone IMD test. Third-order products are 37 dB below PEP, and fifth-order products are 45 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated in the 20-meter band.



(A)



(B)

Fig. 3 — CW keying waveforms of the FT-980. The upper trace is the actual key closure; the lower trace is the RF envelope. At A, each horizontal division is 20 ms. For this photo, the transceiver was being operated in QSK mode. The output waveforms for QSK and semi-break-in are identical; there is no noticeable change in weighting. At B, each horizontal division is 5 ms. There is an approximate 15-ms delay between key down and the generation of RF; the output pulse is also shortened by the same amount.

Perhaps the nicest way to change frequency on the '980 is via the front-panel keypad. To do this, you press the ENT key, enter the frequency you want, and then press the ENT key again. When you QSY a few kilohertz, you don't have to enter the entire new frequency; simply use the right arrow key to go over the digits that are to remain the same, and change only those digits that have to change. There is also a left-arrow key for backing up to fix entry errors. If you use the keyboard to enter frequency, you do not need to use the band switches to change bands. Selecting your favorite net frequency, or a frequency from which you want to "look around the band," is as easy as entering a number on a calculator. No more wearing out your wrist getting from one portion of the band to another.

The '980 has 12 memories that store operating frequency, mode and VFO. To store the displayed frequency in one of the first eight memory channels, simply press the WRITE 1 button. To store in memories 9 through 12, both the WRITE 1 and the WRITE 2 buttons must be pressed. To operate from a memory frequency, select the correct memory channel with the MEMORY CHANNEL knob, and then press the MR button (in the keyboard area). The CHECK button allows you to check the contents of a memory without affecting your operating frequency. The SHIFT button allows you to tune off of the selected memory frequency without affecting memory contents. Traffic handlers, DX chasers and contesters will love this generous allocation of memories.

Instead of the common RIT/XIT knob, the FT-980 uses the main tuning dial for these functions. Pressing the TX CLAR button turns the main dial into an RIT knob, and has a similar effect for XIT; RIT and XIT excursion is ±10 kHz.

If you work a lot of DX or 10-meter FM, or have some other need for split-frequency operation, the '980 has several split-frequency modes. Aside from the RIT and XIT, you can receive on a memory frequency and transmit on a VFO frequency, or vice versa. When receiving, the receive frequency is displayed. When transmitting, the transmit frequency is displayed. Or, you can press the OFFSET FREQ button and display the difference between the receive and transmit frequencies. Unfortunately, if you are trying to move your transmit frequency some known distance from your receive frequency, the OFFSET FREQ display is of little help, since it will be updated only when you transmit. Those who operate split frequency should also remember that they can't transmit using the GEN VFO, or memory channels saved from the GEN VFO.

It may seem that the '980 has more ways to change frequency than anyone could ever remember, let alone use. Every operator will have some preferred mode of operation, and use only those controls needed. For the demanding operator, there are no tuning abilities missing.

The FT-980 has a blue digital display, with 10-Hz resolution. The operator can suppress the 10-Hz digit by pressing a couple of buttons. The '980 also has a "synthesized analog display." This display is difficult to describe and almost as difficult to read. It's hard to understand why it was added to the rig.

**The Receiver**

The '980 receiver section is truly state of the art. It is blessed with versatile RF, IF and AF sections, but is also cursed with digital noise.

*Audio*

The review '980 is equipped with the optional SP-980 speaker. The SP-980 has an audio filter with three choices of low-frequency cutoff and four choices of high-frequency cutoff. This filter makes it easy to tailor the audio to your tastes. The speaker can handle audio from two sources, using a front-panel switch to select the active source. With its headphone jack and rear skirt auxiliary output, the SP-980 is a useful station accessory.

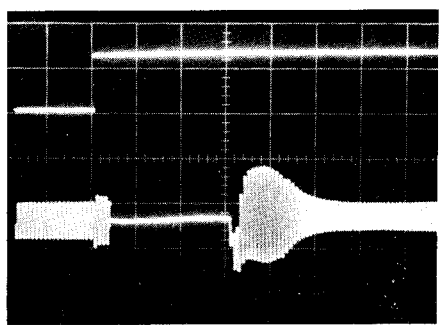


Fig. 4 — FT-980 receiver recovery time. The upper trace shows the key opening; the lower trace shows receiver audio output. Horizontal divisions are each 5 ms. There is an approximate 18-ms delay before receiver recovery. (See the sidebar for a further discussion of receiver recovery time.)

The FT-980 transceiver has a well-designed audio section. The TONE control, which used to be standard on general-coverage receivers, has been restored on the '980. Yaesu also added an effective audio peak filter (APF) to the rig. This filter is activated and tuned from the front panel. It provides a noticeable increase in selectivity when used in the CW mode, and can be used to greatly enhance the performance of an external CW demodulator.

*IF*

The FT-980 also has several well-thought-out IF controls. Concentric with the APF control is an IF NOTCH control. The notch, which can be turned on and off with the NOTCH button, tunes from 500 to 2700 Hz (when demodulated). This notch is useful for eliminating heterodynes when listening to broadcast stations on shortwave bands or when trying not to listen to broadcast stations on the 40-meter band. The '980 also includes the now-common IF WIDTH and SHIFT controls, and a noise blanker for "woodpecker"-type noise.

Pleasant surprises are in store for the CW operator: a way to zero-beat received stations and a way to change the CW receiver offset. For zero-beating, the transceiver will produce a tone at a frequency equal to the offset between the transmitter and receiver. When the incoming CW note matches this tone, the FT-980 transmitter will be on the same frequency as the station being received. A switch on the rear skirt allows the

### Some Thoughts on Transceiver Turnaround Time

In this FT-980 product review, you will notice that we have measured "transceiver turnaround time." With many amateurs using AMTOR and experimenting with packet radio, the time that it takes a rig to switch from receive to transmit and from transmit to receive is becoming important. The AMTOR specification leaves only 170 ms for a block of characters to be acknowledged by the receiving station. In this time, the transmitting station, among other things, must switch to receive and the receiving station must switch to transmit. These switching times often limit the distance over which two AMTOR stations can operate. Whenever possible, we will publish turnaround statistics for radios reviewed.

Transmitter turn-on time can be read directly from the CW waveform figure. It is the time between key closure and full RF output.

Receiver recovery time is measured by injecting a signal into the receiver antenna jack and keying the transmitter on and off via the PTT line. The recovery time is the time between when the transmitter is turned off (the PTT is unkeyed) and receiver audio comes back up to nearly 100%.

What are "good" transceiver turnaround characteristics? Obviously, if it takes 170 ms for your rig to generate RF, you cannot use it for AMTOR. If you want to figure it out, the longest path length that can be used on AMTOR is equal to ([0.170 − turn-on time]/2) × speed of light. [Path length is not the great-circle distance between the two stations, but the distance that the RF wave travels from one station to the ionosphere and back down to the other station. The path length is always greater than the great-circle distance between the two stations. — Ed.] Your receiver recovery time limits the closest stations you can work. Your receiver must recover within twice the propagation delay plus the other station's transmitter turn-on time.

Transceiver manufacturers have not had to worry about these performance characteristics of their radios before, so many radios now on the market do not switch quickly. Now that manufacturers are aware of the requirements for transceiver turnaround, we should notice some improvement in newer models.

### Yaesu FT-980 HF Transceiver, serial no. 040313

| *Manufacturer's Claimed Specifications* | *Measured in ARRL Lab* |
|---|---|
| Frequency coverage: Receive — 150 kHz to 29.9999 MHz; Transmit — 1.5-1.99999, 3.5-3.99999, 7.0-7.49999, 10.0-10.49999, 14.0-14.49999, 18.0-18.49999, 21.0-21.49999, 24.5-24.99999, 28.0-29.99999 MHz. | As specified. As specified. |
| Modes of operation: CW, FM, SSB, AM, FSK. | As specified. |
| kHz/turn of knob: Not specified. | 10. |
| S meter sensitivity (μV for S9 reading): Not specified. | 160 m, 69; 80 m, 57; 40 m, 63; 30 m, 86; 20 m, 55; 17 m, 55; 15 m, 55; 12 m, 55; 10 m, 80. |
| Transmitter power output: 100 W — SSB, CW; 25 W — AM; 50 W — FM, FSK. | Power output: 160 m, 110 W; 80 m, 115 W; 40 m, 110 W; 30 m, 110 W; 20 m, 115 W; 17 m, 120 W; 15 m, 120 W; 12 m, 125 W; 10 m, 110 W. |
| Harmonic suppression: Better than 50 dB. | 56 dB (see Fig. 1). |
| Third-order IMD: Better than −40 dB. | −37 dB (see Fig. 2). |
| Receiver sensitivity: (2-30 MHz) less than 0.25 μV for 10 dB S+N/N. | Receiver dynamics measured with optional 600-Hz CW filter installed. |

| | *80 m* | *20 m* |
|---|---|---|
| Noise floor | −137 dBm | −138 dBm |
| Blocking DR | Noise limited | Noise limited |
| IMD DR | Noise limited | Noise limited |
| Third-order intercept | Noise limited | Noise limited |

IMD measurements were attempted at 20, 30 and 50-kHz signal spacing, but could not be made because of synthesizer noise.

Size (HWD): 6.2 × 13.8 × 14.6 in (157 × 350 × 370 mm).
Weight: 7.7 lb (37 kg).

selection of 500, 600 or 700-Hz CW offset. Changing the offset actually recenters the IF passband, changing the sidetone and the CW CAL note. The range of sidetones should be fine for most operators. Unfortunately, some CW demodulators need a higher tone.

*RF*

The receiver has two dual-FET RF amplifiers — one for the GEN VFO, and one for the HAM VFO. While general-coverage signals are passed only through a low-pass filter, the ham-band signals are subjected to both low-pass and high-pass filtering, resulting in better image rejection. As well as the usual RF gain control, the '980 has selectable 10, 20 and 30-dB RF attenuators.

**Receive Problems**

It is unfortunate that the digital technology that makes some of the aforementioned receiver flexibility possible also creates some receiver weaknesses. Phase-locked loops and digital control signals generate RF noise, and there is plenty of this noise to be heard in the FT-980 receiver. Lab measurements of the receiver dynamic range were limited by phase noise, and operation on 80 meters (with at least one FT-980) was disturbed by noise from the digital display.

Will this noise bother you in normal operation? That depends on what you call "normal." For casual operation (which includes much of my operating), the receiver is fine — the added IF and AF controls are outstanding. In demanding applications, such as contesting or weak-signal DXing, the receiver weaknesses will begin to show. During contests and in crowded shortwave broadcast bands, strong signals in the receiver passband will mix with PLL noise and degrade reception of nearby signals. When you're searching the bands for weak DX stations, it is hard enough dealing with external QRM and QRN without having to contend with unwanted signals generated within the receiver. Designing the perfect digitally synthesized receiver is no small task.

**The Transmitter**

The '980 has a solid-state, no-tune transmitter. It is rated at 100-W PEP output for CW and SSB, 50 W on FSK and FM, and 25 W on AM. The transmitter will operate only within the ham bands; in fact, the transmitter will operate only on frequencies derived from the HAM VFO. Even if you are within the ham bands, you can't transmit using the GEN VFO or memory frequencies stored from that VFO.

The transmitter power will be automatically reduced if the SWR goes above 3:1. The SWR shutoff circuit does not seem to be oversensitive, as some of the circuits in earlier no-tune rigs were.

*The Fan*

When the transceiver temperature rises above some (unspecified) threshold, a fan comes on to cool the final amplifier section. The fan is quiet, but not so quiet that you can't tell that it's on. Unfortunately, the fan often comes on when you are only receiving. Perhaps the temperature threshold could have been higher.

*SSB Operation*

Since the fan does make some noise, it is good that Yaesu included an "automatic mic-gain control" (AMGC) for use during SSB transmission. Signals from the microphone that are below the AMGC threshold will not be amplified. Thus, background noises (like the fan noise) will not be transmitted. The AMGC can (and must) be defeated for AFSK transmission.

The '980 also has an RF speech processor for SSB operation. On-the-air reports indicate that the processor, when correctly adjusted, produces intelligible signals and provides some increased copy on marginal paths. For adjusting the processor, one of the '980 meters can be switched to read RF compression (in decibels) and the IF monitor can be used to listen to the processed signal.

*Other Modes*

Non-SSB operators are not neglected by the designers of the FT-980. The rig has full QSK for CW ops, and direct FSK (with 170, 425 or 850-Hz shift) for RTTY operators.

*Metering*

The transceiver has two meters. One of them can be switched to read final-amplifier voltage or current, processor compression (dB), power out (W), FM discriminator (zero center) or relative forward power. The second meter is used as an S meter, an ALC meter (with selectable peak-reading ability) or an SWR meter.

**The CAT System**

One reason I was excited by the prospect of reviewing the FT-980 is that it is the first of Yaesu's CAT System radios. The CAT System is a series of Computer-Aided Transceivers to be offered by Yaesu. The CAT rigs, with appropriate interfaces and software, can be controlled by an external computer. For my Apple II+, the interface and software come as the Yaesu FIF-65. Interfaces for other computers should be supplied soon.

Hooking up the FIF-65 is easy. The interface card plugs into an Apple II peripheral card slot, and a cable connects the interface to a socket in the back of the FT-980. The software disk does not contain Apple's disk operating system (DOS). A disk containing DOS must be loaded before the Yaesu CAT program can be run. When you run the program, you are greeted by some animated graphics, and then you can get down to business.

What can you do with this CAT now that you have brought it into the shack? From your computer keyboard you can control selection of frequency, VFO, mode, split-frequency operation, RIT/XIT, memory channels (loading, recalling, scanning, shifting), IF shift and width, and FSK shift. You can also put the rig into a few interesting scanning modes. There's a "programmable memory scan," which scans between any two memory channels. The '980 scans in 10-Hz, 100-Hz or 5-kHz increments, up or down. In addition, you can perform TR switching. Each of these functions is controlled by a three-character command, and the current status of the FT-980 is displayed on your computer screen, updated as necessary.

The software is not easy to use. The three-letter commands are hard to remember. The computer's memory and versatility are not tapped, and all I have is the radio front panel duplicated by my computer keyboard and monitor. Also, my computer can't be used simultaneously to send and receive RTTY, which is usually what I want to do when I'm on the air.

I think that computer control is useful, but I don't think this software takes advantage of the potential of computer control. Yaesu did include enough information in the FIF-65 manual to write some interesting and useful software. Perhaps they are waiting for someone else to write it.

Aside from possessing more of that elusive quality "user friendliness," what should CAT software do? It should take advantage of the computer! Why should the computer be tied to scanning at a fixed rate between two memory channels? It could be switching between several frequencies (say a few DX pile-ups), waiting a few seconds on each one (maybe a bit longer on that rare one), and then moving on. This is possible, just not implemented.

All of which is not to say that I found the CAT system useless or boring. Being able to see the RIT/XIT and the IF shift and width right on the screen is great. Having all of the radio data and control accessible at one receptacle on the back of the rig made me think of remote control, remote bases and message systems that could be commanded to move to a quiet frequency or a better band. The applications of the CAT system are limited only by your programming skill and your imagination.

There is one bug to watch out for. If you turn off your computer without explicitly returning control to the transceiver, your FT-980 will not respond to its front-panel controls — even if you turn it off and back on. You must turn on your computer, load the program and issue the "REM 2" command.

**Conclusions**

As one of the "big rigs," the FT-980 is a great transceiver. It is versatile and convenient to operate, and has features that will appeal to SSB and CW operators. The rig's only weakness is the receiver, which did not rise above the digital noise that dominates most of the available synthesized receivers.

For most operators, the CAT system is a novelty. For those interested in remote bases and other remote-control applications, it's great. When there is one program that will control the rig, keep the log and operate RTTY, the CAT system will really purr. — *Jeff Ward, K8KA*

## MAXCOM ANTENNA MATCHER AND DIPOLE CABLE KIT

☐ Wouldn't you like to have an antenna-matching unit that automatically matches your dipole or long-wire antenna to 50 ohms with an extremely low SWR over several HF amateur bands? Imagine the convenience of flipping the band switch and merely tuning the rig into the antenna for any HF band! Let's include the 1.8- and 50-MHz bands as well, just for good measure, okay?

Sure you would like to own such a unit! Probably what comes immediately to your mind is some kind of elaborate mechanical tuner with servo mechanisms and sophisticated control circuits. We've all heard that such units exist (they are actually used in military communications) and we've read articles from time to time about home-constructed automatic motor-driven matching units for various antenna installations.

The Maxcom High Speed Automatic Antenna Matcher is marketed as a very broadband matching device with all these capabilities, and it uses *no moving parts.* The manufacturer claims that it offers an SWR of less than 1.5:1 over the frequency range from 0.3 to 70 MHz. This applies when the device is used with a dipole of any length greater than 70 ft, including drooping dipole (inverted V) arrangements, or any "long wire" greater than 35 ft in length.[1] And what's more, the matcher insertion losses are 2.8 dB or less from 1.5 MHz upward in frequency, according to the specifications.

That sounds too good to be true, doesn't it? Is this really possible in a small white box that weighs only 2 pounds? You can't tell by removing the cover of the box, for the inner parts are obscured by epoxy filling.

Four versions of the antenna matcher are available: the Maxcom 200, the Maxcom 500, the Maxcom 1000 and the Maxcom 2000. These numbers refer to the maximum PEP ratings in watts for the different versions. The 200, 500 and 1000-W models each weigh 2 pounds and come in aluminum boxes measuring 4¾ × 3¾ × 2¼ inches. The 2000-W model weighs 4 pounds and comes in an enclosure measuring 7½ × ¾ × 2¾ inches.

In November 1983, a Maxcom 200 antenna matcher was submitted to *QST* for advertising examination. Because of the epoxy filling we couldn't examine the inner parts, so we had to resort to external measurements only. These measurements indicated the presence of resistive elements inside the box. To confirm this finding, we had X-rays taken of the unit. Sure enough, three power resistors, along with a toroidal matching transformer, revealed themselves in the X-rays.

Our conclusion then was that the device amounts to a swamping resistance placed directly at the feed point of the antenna. Because that matcher was submitted only for brief examination, it was not put on the air. Instead, it was returned to the would-be advertiser at the conclusion of our tests, and advertising of the product was not accepted.

**The Product Review Unit**

Wanting an off-the-shelf matcher for the preparation of this review, we arranged for its purchase through an amateur whose name and call are not associated with the ARRL as an elected official or as an employee. We purchased the 200-W model and, to ensure that the device was operated exactly as recommended by the manufacturer, we also purchased the optional dipole cable kit for use with the matcher.

X-rays were also taken of this unit, and the views showed it to contain the same types of components as the first unit received. These X-rays are shown in Fig. 5. Three power resistors are clearly visible inside the enclosure.

A 2000-W version of the matcher was donated to ARRL Hq. after it had been subjected to testing by another purchaser. Fig. 6 is a photograph of this matcher after much of the epoxy filling was removed. Eight power resistors are used in the high-power version, to provide a greater dissipation level. Four of the resistors are 800 ohms in value, and the other four are 80 ohms. These are 50-watt resistors, the same size used in the 200-W version.

Removing the cover of the Maxcom 2000 revealed several components mounted on a circuit board, just beneath the cover. X-rays of this unit taken before the expoxy was removed showed the board to be "floating" inside the enclosure, with no connections to any of the other components. This circuit board is visible at the left in the photo, and is apparently a scrap surplus board; a portion was sliced off to enable a fit inside the enclosure. The board serves no operational purpose in the matcher.

**Mechanical Details**

The materials used in the manufacture of the Maxcom Matcher are top quality. The enclosure is a sturdy aluminum box with a white enamel finish. The porcelain feed-through insulators are rugged, with heavy nickel plating on the terminals. The SO-239 connector is not an economy item.

Available as an optional extra is a dipole cable kit. Included in the kit are two 50-ft lengths of heavy stainless steel aircraft-type cable, assembled with crimped lugs for connection at one end to the matcher and with porcelain end insulators at the other. This is used as the dipole radiator.

Also included is a 100-ft length of top-quality 50-ohm coaxial cable (foamed dielectric), assembled with PL-259 connectors at each end. These are soldered connectors, not the economy crimp type. In addition, there is 50 ft of braided nylon line for supporting the antenna and a roll of Coax-Seal® for weatherproofing the installation. All are materials for a first-class installation, to be sure.

**But How Did It Check Out?**

Laboratory measurements with a General Radio 1606-A RF impedance bridge revealed that with the 100-ft length of coax supplied in the dipole cable kit, the SWR was indeed less than 1.4:1 in spot checks of every U.S. amateur band, 1.8 through 30 MHz. However, *these results were obtained with the Maxcom Matcher alone — no antenna attached.* These tests indicated the equivalent swamping resistance of the matcher is approximately 63 ohms at 1.8 MHz, and decreases with frequency to about 31 ohms at 28 MHz. That's just about what you'd expect

[1] m = ft × 0.3048; mm = in × 25.4; kg = pounds/2.2.

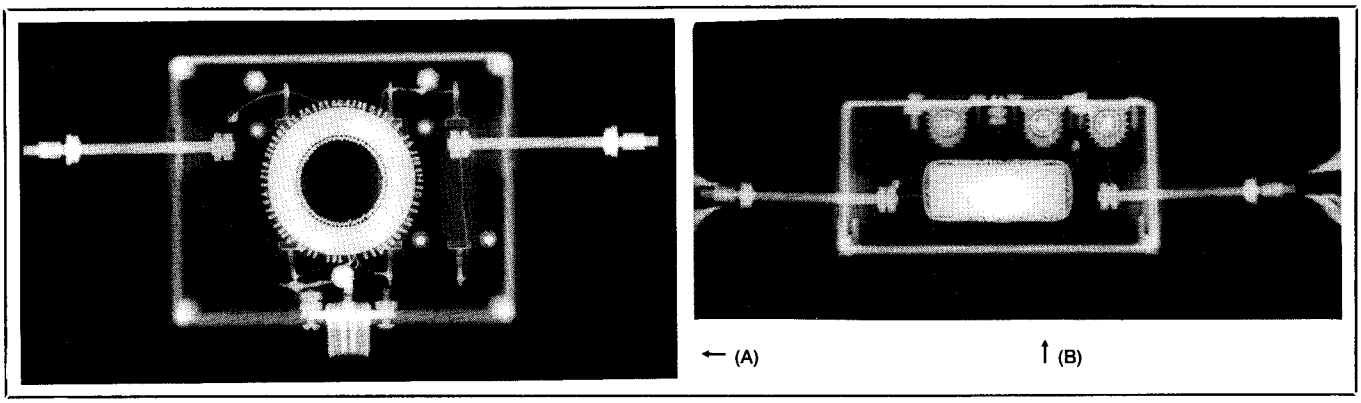



Fig. 5 — At A, an X-ray view from the top of a 200-watt Maxcom Antenna Matcher. A toroidal transformer and its windings are evident in the center, and three power resistors show up faintly in the background. At B, a view from the coaxial-connector end shows an edge-wise look at the toroid. The three power resistors with their cooling fins are evident at the top of the enclosure in this view.

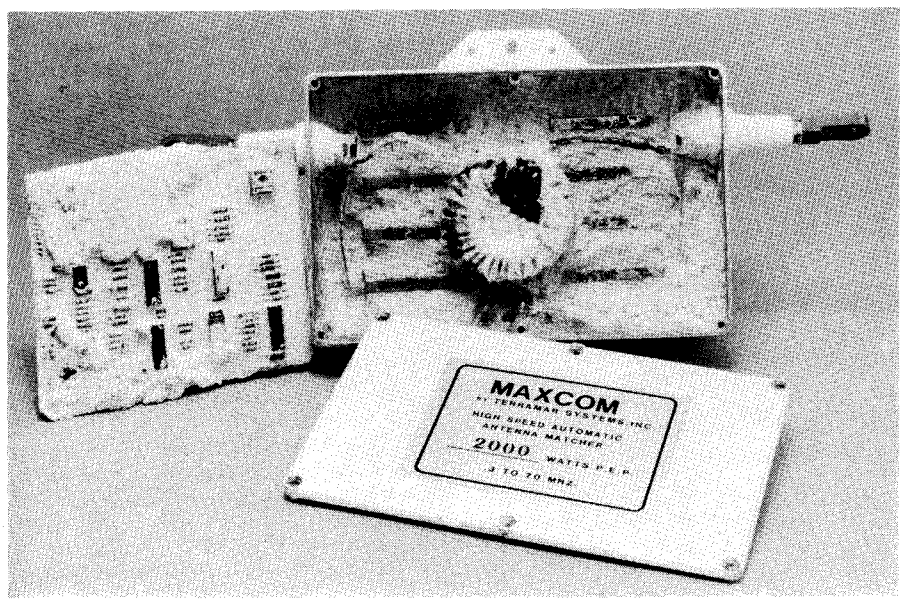



Fig. 6 — A 2000-watt Maxcom Matcher with much of the epoxy filling removed. The circuit board scrap at the left was merely "floating" inside the enclosure, with no operational purpose. Eight 50-watt resistors are used in this high-power model.

from a dummy antenna.

The Maxcom system was installed in a drooping dipole configuration with the center at a height of 50 feet. The ends were 20 feet in the air. The matcher is placed at the feed point of the antenna. As a receiving antenna, the system is not bad ... signals can be heard. During tests the loudest received signal peaked at S9 plus 10 dB on a receiver that is very generous in signal-strength readings. In several hours of operation, contacts were difficult to come by on 75 meters with a 150-watt SSB transmitter. I was unable to make any contacts on higher frequency bands (below 75 meters) during the test period, using the same 150-W transmitter. Bands above 21 MHz were unusable at the time.

How does the Maxcom system compare with other antennas? Antenna experts know that comparative gain tests with a reference antenna are unreliable unless made on an antenna test range, a facility the ARRL does not own. Further, signals propagated via the ionosphere undergo random fading, making comparative tests even less reliable, especially on a short-term basis. As a very rough comparison, however, S-meter indications were that the response of the Maxcom system on reception appeared to average 20 dB or so below that of a small 2-element triband beam on 14 MHz, with differences ranging from 15 to 35 dB at various times. (Comparison numbers will change with different antenna wire lengths on the matcher.)

The Maxcom Automatic Antenna Matcher is manufactured by Magnum Distributing Inc., 1000 S. Dixie Hwy. W. no. 3, Pompano Beach, FL 33060, tel. 305-785-2002. The sole distributer is N & G Distributing Corp., 7201 N.W. 12th St., Miami FL 33126. Price classes: Maxcom 200, $600; Maxcom 500, $800; Maxcom 1000, $900; Maxcom 2000; $1000. The dipole cable kit is offered for an additional $100 with each Maxcom Matcher. — *Jerry Hall, K1TD*

## Strays

**I would like to get in touch with...**

☐ anyone who knows the whereabouts of an indicator for a Calorimetric RF wattmeter, Model 641. Leonard L. Jezorek, W4LC, 20 Celestial Way, Juno Beach, FL 33408.

☐ anyone with a schematic diagram for a Galaxy III, serial no. 51203M1032, and power supply, serial no. 5408N1578. William Peck, 1028 West Ash, Salina, KS 67401.

☐ anyone involved in a technical net. Jordan Hillrich, VE5AGC, 732 Queen St., Regina, SK S4T 4A3, Canada.

☐ anyone with a schematic diagram or manual for an EICO Model 425 oscilloscope. Brett Orr, 255 Cameron Ave., Windsor, ON N9B 1Y5, Canada.

☐ anyone who has information on the alignment procedure for an Allied AX-190 receiver. Graig Hinton, WBØIAH, 2668 N. Riviera Dr., White Bear Lake, MN 55110.

☐ anyone with assembly instructions for a Telrex TB3-H triband beam antenna. Mac McCarthy, WH6ARS, 46 Ohukai St., Kihei, Maui, HI 96753.

☐ anyone having a schematic diagram for a 1914 Grebe Radio, CR-9. Kenneth M. Hout, KA3LEF, RFD 3, Box 514, Everett, PA 15537.

Steven Rich, WA1DFL, of Revere, Massachusetts, gets fellow ham travelers coming and going with his license plate. Pictured are Lynne (left), daughter of photographer VE1GO, and her friend Erin.