

Product Review Column from *QST* Magazine

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Austin Custom Antenna's Metropolitan Triband VHF/UHF Antenna

ICOM IC-228H 2-Meter FM Transceiver

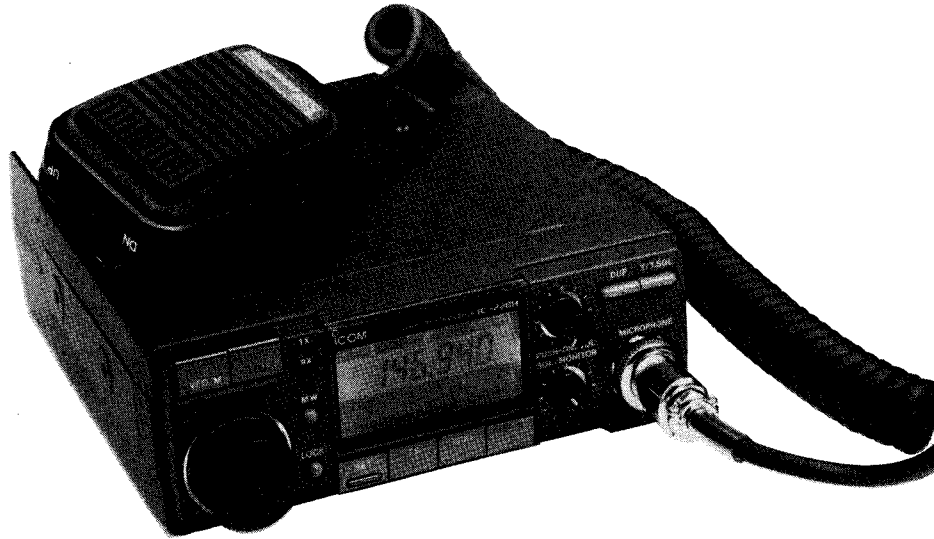
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ICOM IC-228H 2-Meter FM Transceiver

Reviewed by Rick Palm, K1CE

You would think that after tens of years in business, and producing countless models, ICOM would have the production of high-quality 2-meter rigs down to a T. Well, you're right—they do. The IC-228H continues a long tradition of excellence in 2-meter FM rigs. I know—I've owned or operated most of them. My classic six-year old IC-25A is still ticking, even after being brutalized by two years of 24-hour-per-day use with my packet-radio bulletin-board system. So, there's one item you can count on—reliability.

There are others, beginning with user friendliness. All IC-228H functions are front-panel controlled, and yes, you can play with them safely while driving. To test this, I used the '228 while driving through the downtown Hartford "mixmaster"—the intersection of two interstate highways rated in the top five most hazardous in the nation. In rush-hour traffic, I successfully selected one of four frequency display backlighting levels and entered into memory two repeater channels with irregular split—all without incident! I even made an autopatch telephone call without hitting anything—powerful testimony to the rig's ergonomics, considering that many other hapless drivers (with both hands on the



wheel) enter the mixmaster, never to be seen or heard from again!

Front Panel

The front panel is utilitarian, but attractive. One large tuning knob takes care of memory and frequency selection. The buttons are easy to use while driving. Special mention goes to the power/volume

control—pushing it toggles between power off and on, but the volume stays the same. The controls have an avionics-quality feel. Nice!

The very first thing I look for in a 2-meter FM transceiver is frequency display readability. Can the frequency be read easily? In inky blackness? In direct sunlight? With the IC-228H, the answer is yes. The frequency display is incorporated in an LCD that occupies almost a third of the front panel. The frequency display characters are oversized black numbers on a yellow background that stand out in the

Table 1

ICOM IC-228H 2-meter FM Transceiver, Serial no. 671-001094

Manufacturer's Claimed Specifications

Frequency coverage: receiver, 138.0 to 174.0 MHz; transmitter, 140.0 to 150.0 MHz. Specifications apply from 144 to 148 MHz only.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ($\pm 15\%$) at 9.5 A max on transmit and 800 mA on receive.

Transmitter

Power output: Low, 5 W; high, 45 W.

Spurious signal and harmonic suppression: Better than 60 dB.

Receiver

Receiver sensitivity: Better than 0.18 μV for 12 dB SINAD.

Squelch sensitivity: Not specified.

Receiver audio output: More than 2.4 W at 10% distortion (THD) with an 8- Ω load.

Color: Black.

Size (height, width, depth): 1.97 \times 5.5 \times 6.25 inches.

Weight: 2.45 lbs.

Measured in ARRL Lab

As specified.

As specified.

6-digit LCD, black digits with amber background.

As specified.

13.8 V dc at 8.0 A on transmit (high power) and 3.0 A (low power), and 630 mA on receive.

Transmitter Dynamic Testing

Low, 5.1 W; high, 43 W at 146 MHz.

See Fig 1.

Receiver Dynamic Testing

0.16 μV for 12 dB SINAD.

0.28 μV for 20 dB quieting.

0.05 μV min, 0.27 μV max.

3.13 W at 10% THD with an 8- Ω load.

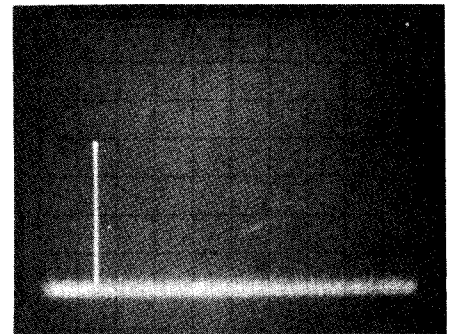


Fig 1—Worst-case spectral display of the ICOM IC-228H. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 43 W at 146 MHz. The fundamental has been reduced approximately 31 dB by means of notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 70 dB below peak fundamental output. The IC-228H complies with current FCC specifications for spectral purity.

most intense glare of the sun. At night, excellent backlighting highlights the display characters. Four levels of display backlighting—dim to bright—are available. So, when you're with your spouse, you can "set the mood" as you would with your dimmer-controlled dining room chandelier! Seriously, adjustable backlighting is a nice feature, and I used it a lot.

In addition to operating frequency, the LCD shows more than a dozen other operating parameters. Displayed parameters include selection of duplex operation (+ or - offset), VFO or memory operation, memory channel in use and selection of low (5 W) transmit power. Also shown are received-signal strength and relative RF-power output.

Other Features

Audio quality, both received and sent, is excellent. Full, deep, loud received audio is a key factor in enjoying QSOs in my noisy truck. Transmitter audio reports were good. The microphone didn't pick up ambient noise in my vehicle.

I hate things that beep at me. The IC-228H beeps when you touch just about any control. Fortunately, it's possible to turn the beep function off so you can enjoy blissful operation without the obnoxious beeps. Nice! (The way things are going, next year's models will have synthesized voice advisories like "you're 5 kHz off frequency," or "illegal to order pizza via autopatch, patch disconnected.")

Memory programming is a breeze: weird offsets, ups and downs—no problem. Priority and calling features allow you to listen on one frequency while spot-checking (every five seconds) another for calls. A touch of the CALL button brings you immediately to your favorite repeater. Tuning steps are easily programmed from 1 MHz down to 5 kHz, a useful feature when tuning large chunks of band space (the receiver covers 138-174 MHz).

If you're looking for someone to talk to on a lonely stretch of interstate, or if you want to mind somebody else's business in the public safety band, then scanning is essential. With the '228H, you can scan the entire band or selected frequencies within boundaries you set. You can scan just the memories, too. Memory skip allows you to skip selected channels.

Here are some other IC-228H features.

- The microphone has a 16-digit keypad, as well as UP/DN buttons for memory or frequency selection and scanning start/stop.

- If you press the MONITOR button, the squelch opens and you hear the input frequency of the repeater you're using so you can determine if your contact is within simplex range.

- The transmitter's 45-W output is handy if you're mobiling in some repeater's fringe, or in a mountainous area.

- The rig is durable. It survived bumps,

jolts, grinds, beer and pizza spills, in my dilapidated old pick-up truck.

- IC-228H is small. This is a big plus for owners of small cars; the '228H can be mounted just about anywhere. But, be sure to leave room for air circulation around the radio: At full power, the deep heat sink on the back of the chassis gets hot!

Summary

There's no sense in hiding it: The IC-228H is expensive! More than \$500 is a lot of money to pay for a 2-meter radio. But, it's no more expensive than other comparably equipped Japanese rigs. The yen is strong, and prices are high. If you're in the market for a new 2-meter mobile rig, and ready to plunk down big bucks, take a look at many models and brands, bells and whistles, and choose carefully. After having used this rig for four months, I'll bet my emergency brake release warning beeper that the IC-228H will be among your finalists.

Price class: \$540. Manufacturer: ICOM America, Inc, 2380-116th Av NE, Bellevue, WA 98004, tel 206-454-7619.

AUSTIN CUSTOM ANTENNA'S METROPOLITAN TRIBAND VHF/UHF ANTENNA

Reviewed by Larry Wolfgang, WA3VIL

As I prepared to install the ICOM IC-900 multiband radio in my car to do a Product Review¹, I realized that I did not have an antenna for 220 MHz. One of my favorite 2-meter repeaters in the Hartford area is linked with a 440-MHz repeater. Both repeaters use antennas from Austin Custom Antenna. In fact, a member of the repeater group had often told me about the performance of Austin antennas; it sounded almost too good to be true!

Several of the regulars on these repeaters were also using Austin mobile antennas, and one of them had recently installed a multiband antenna for use with a 144- and 440-MHz dual-band radio. About this same time, I saw some information about an Austin mobile antenna that covers 144, 220 and 440 MHz. So when I began to think about an antenna to go with the IC-900, I naturally wondered about reviewing the Metropolitan, as this triband antenna is called.

The 18-7/8-inch-long Metropolitan antenna consists of three sections (see the accompanying photo). The bottom section is 6¾ inches long and just over ½ inch thick. The middle section is also 6¾ inches long, but only about 5/16 inch thick. These two sections are rigid, and they are covered with a heavy layer of material that appears to be heat-shrinkable tubing. The top

section is a 5-3/8 inch long steel whip. The bottom antenna section features a length of 3/8-inch threaded rod, so it can be attached to just about any standard mobile antenna mount. I used the review antenna with an optional Austin magnetic mount that includes a length of coaxial cable and a very powerful magnet.

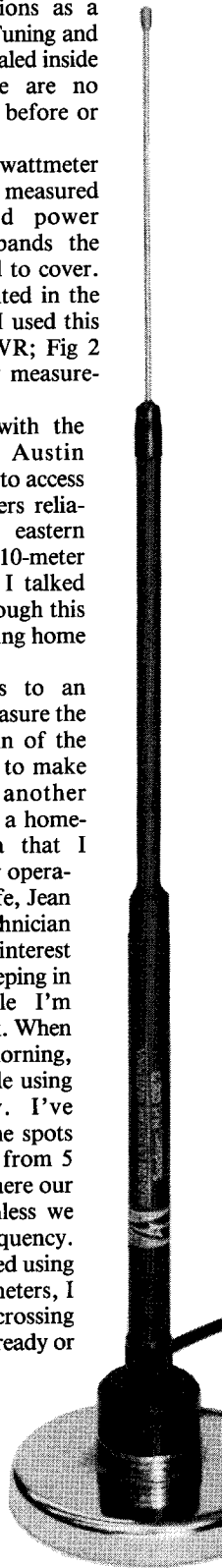
The Metropolitan operates as a ¼-wave-length vertical on 144 and 220 MHz. On 440 MHz, it functions as a ¾-wavelength antenna. Tuning and matching networks are sealed inside the antenna, and there are no adjustments to be made before or after installation.

I borrowed an RF wattmeter from the ARRL lab and measured forward and reflected power throughout the three bands the Metropolitan is designed to cover. (The antenna was mounted in the center of my car roof.) I used this data to calculate the SWR; Fig 2 shows the results of my measurements.

I was very pleased with the operation. Of the Austin Metropolitan. I was able to access several 220-MHz repeaters reliably, including one in eastern Connecticut that has a 10-meter link. On one occasion, I talked with a ham in Texas through this repeater while I was driving home from work.

I didn't have access to an antenna test range to measure the radiation pattern or gain of the antenna, but I was able to make a comparison with another 2-meter antenna. I have a home-made on-glass antenna that I normally use for 2-meter operation from my car. My wife, Jean (WB3IOS), has a Technician license. Most of Jean's interest in ham radio involves keeping in contact with me while I'm driving to and from work. When I leave for work in the morning, we often chat for a while using a simplex frequency. I've become familiar with the spots where I have to switch from 5 watts to 25 watts and where our conversation is over unless we change to a repeater frequency.

The first day that I tried using the Metropolitan on 2 meters, I suddenly found myself crossing the "conversation over, ready or not" line and wondering how much farther I would still be able to talk with Jean. When she mentioned that I was getting pretty noisy, I was about to sign clear until I real-



¹L. Wolfgang, "ICOM IC-900 Multiband VHF/UHF FM Mobile Transceiver," QST, Dec 1988, pp 37-40.

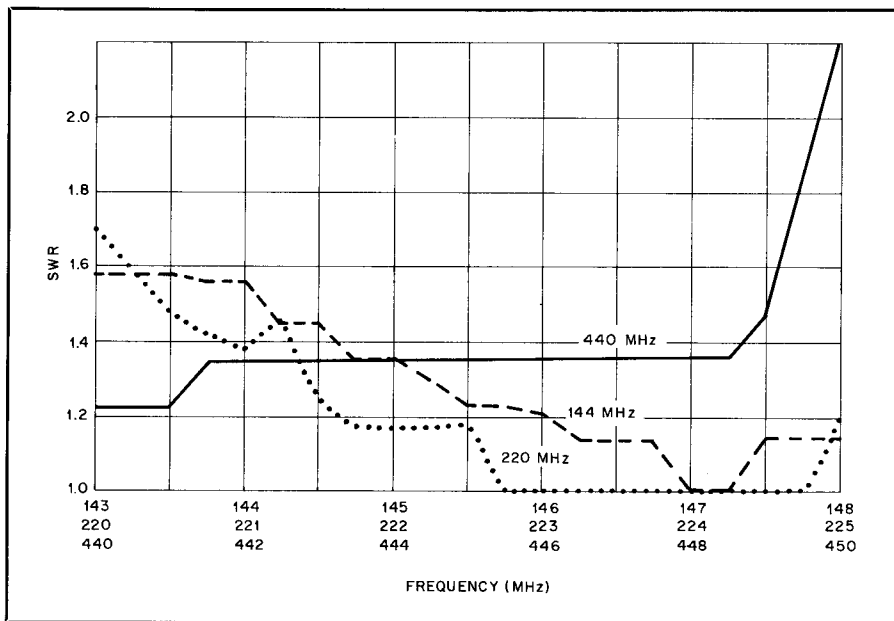


Fig 2—Graph of the measured SWR with the Austin Custom Antenna's Metropolitan Triband Antenna over the 144, 220 and 440-MHz bands. The antenna is usable over a wide range, including MARS frequencies between 143 and 144 MHz.

ized that I was still using low power! I switched to high power and was able to continue the conversation until I went over a hill that would block my signal no matter how much power I was using. We repeated that exercise for several days and then I switched back to the on-glass antenna. Sure enough, we lost contact at the old spot again. I don't know how much gain the Metropolitan has, but it works better than anything else I've used on my car.

The Metropolitan has been on my car continuously for several months. The antenna itself is in excellent condition. It has collected a bit of dirt and a few bugs between washings, but otherwise shows no negative effects from the weather. The heat-shrinkable tubing that covers the bottom two sections of the antenna is an effective seal against moisture. The

magnetic mount, however, is beginning to show some signs of weathering. Some rust is starting to show through the chrome on the top of the magnet. That surprises me.

To use this one antenna on two or three bands with the IC-900, you need a duplexer (or triplexer), since each band module has its own antenna connector. Some other dual-band radios have a built-in duplexer so they only have one antenna connector. The Metropolitan antenna is ideally suited for use with that type of radio. If you are looking for mobile antennas to cover the 144, 220 and 440-MHz bands, this one antenna may be just what you need.

Price class: Metropolitan triband antenna, \$40; magnetic mount, \$22.50. Manufacturer: Austin Custom Antenna, PO Box 357, Sandown, NH 03873, tel 603-887-2926.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns. —Ed]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before January 27, 1989. 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.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number, or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.

ICOM IC-900 VHF/UHF FM transceiver, serial no. 654-001349, with UX-29A 2-meter band unit and UX-39A 220-MHz band unit (sold as a package only; see Product Review, December 1988 *QST*). Minimum bid, \$673.

Yaesu FT-212RH 2-meter FM transceiver, serial no. 7N050451 (see Product Review, December 1988 *QST*). Minimum bid, \$264.

Yaesu FT-712RH 70-cm FM transceiver, serial no. 8C050021 (see Product Review, December 1988 *QST*). Minimum bid, \$290.

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New Products

MFJ-986 DIFFERENTIAL-T ANTENNA TUNER

MFJ Enterprises of Starkville, Mississippi, has introduced the MFJ-986, a 3-kW roller inductor differential-T antenna tuner. The MFJ-986 tuner employs a single differential capacitor in place of two variable capacitors, simplifying the



antenna matching process. Other features of the MFJ-986 include an illuminated, two-color, peak or average cross-needle SWR/wattmeter, three-digit inductor position readout, and six-position antenna switch. The MFJ-986 is housed in a 10 3/4 x 4 1/2 x 15-inch black aluminum cabinet. Price class: \$239. For more information, contact MFJ Enterprises, 921 Louisville Rd, Starkville, MS 39759. —Tom Francis, NMIQ