

Product Review Column from *QST* Magazine

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A&A Engineering Deluxe Memory Keyer Kit

ICOM IC-575A 50- and 28-MHz Multimode Transceiver

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ICOM IC-575A 50- and 28-MHz Multimode Transceiver

Reviewed by Mark Gamble, N1FOZ, and Kirk Kleinschmidt, NT0Z

With the introduction of the IC-575A, ICOM has filled an important niche in its latest series of compact, VHF all-mode transceivers. Among its features are AM, FM, SSB, and CW operation, full 10- and 6-meter coverage (plus receive coverage of almost everything in between), built in ac-operated power supply (rear panel dc supply connectors are also provided), a fast (5 ms) TR turnaround DATA mode, memories and scanning, passband tuning and notch filter, and full-break-in CW operation. The operating features and functions of the IC-575A are essentially identical to those of the 144-MHz IC-275A, reviewed in October 1987 *QST*, and the 220-MHz IC-375A, reviewed in March 1988 *QST*. Refer to those reviews for a detailed description of the radio's many controls and connections.

Frequency Control

Like the other radios in the series, the IC-575A features VFO A/B selection, 99 programmable memories, RIT and the ability to enter any frequency split (necessary for repeater work) from 1 kHz to 9.999 MHz. In DUPLEX mode, the LCD displays both the transmit and receive frequencies.

Receiver

The '575A's receiver covers 26 to 56 MHz. In addition to amateur frequencies, you can listen to CB radio, maritime mobile and cordless telephones. For serious 6-meter operators, it's handy to be able to listen to the spectrum between 6 and 10 meters to hear rising MUF in anticipation of a band opening.

The receiver has excellent sensitivity, but the built-in preamp (activated by a front panel push-button switch) is helpful for digging out weak signals. The main tuning knob feels exceptionally smooth, and sliding up and down the band is a breeze.

The only complaint we have about the receiver is its noise blanker. According to the ICOM instruction manual, "This operation effectively reduces unwanted pulse-type noise from outside sources such as ignition noise from vehicles." And, "The noise blanker may not work as well . . . when the noise is continuous rather than pulse-type." This is certainly true: The noise blanker proved totally ineffective against power-line noise at several locations. We ran across several other IC-575A owners who voiced similar complaints. If you live near a noisy power line, make arrangements to test the rig at your QTH.

The passband tuning and notch filter work well. In fact, when the PBT is used



to slice away adjacent-frequency QRM, the desired signal remains intelligible—even when the control is turned "deep" into its range. The selectable-rate AGC control is another nice touch.

Receiver performance is good. Lab tests indicate that it has adequate sensitivity, and the dynamic range approaches that found in mid-priced HF transceivers.

Transmitter

Unlike the 25-W-output IC-275A (2 meters) and IC-375A (1¼ meters), the IC-575A's output power is only 10 watts. The output level is continuously adjustable from a front panel control. Tuneup is easy. Simply set the mic gain to provide the proper ALC level, and adjust the drive control for the desired power output. On-air signal reports included favorable comments on the rig's SSB audio quality with

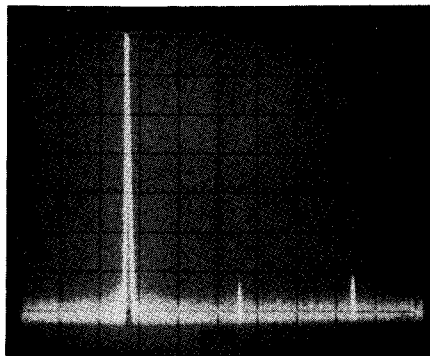
the speech processor on or off.

The built-in SWR meter is a nice feature, but to use it you have to move a slide switch located on the rear panel (it's down near the bottom, underneath another connector). This isn't a big deal for most fixed operations, but in the field it's often necessary to check the SWR more frequently.

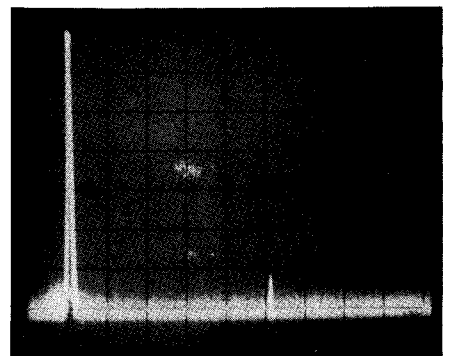
The full-break-in CW operates smoothly and silently. There are no annoying clicks or pops between characters. That's probably to be expected in a rig that's designed for a 5-ms turnaround time!

Manual

The manual that comes with the IC-575A is well written and easy to read. It not only explains the operating procedures and functional options in a straightforward manner, but also depicts them graphically. That's a far cry from the manuals that used to



(A)



(B)

Fig 1—Worst-case spectral display of the ICOM IC-575A. Horizontal divisions are each 10 MHz; vertical divisions are each 10 dB. In the photo at A, output power is approximately 10 W at 28 MHz. All harmonics and spurious emissions are at least 60 dB below peak fundamental output. In the photo at B, output power is 10 W at 50.2 MHz. All harmonics and spurious emissions are at least 62 dB below peak fundamental output. The IC-575A complies with current FCC specifications for spectral purity.

Table 1**ICOM IC-575A 28- and 50-MHz Multimode Transceiver, Serial no. 01012****Manufacturer's Claimed Specifications**

Frequency coverage: Receiver, 26 to 56 MHz; transmitter, 28 to 29.7 and 50 to 54 MHz.

Modes of operation: AM, FM, USB, LSB, CW.

Frequency display: 6-digit LCD, black on an orange background, 3/8-inch high digits.

Frequency resolution: Not specified.

Power requirement: 13.8 V dc ($\pm 15\%$) at 5.2 A max.

Transmitter

Transmitter output power: FM, SSB, CW, 1 to 10 W adjustable; AM, 1 to 4 W adjustable

Spurious signal and harmonic suppression: Greater than 60 dB below peak power output.

Third-order intermodulation distortion products: Not specified.

Keying waveform: Not specified.

Transmit-receive turnaround time (PTT release to 90% audio output with an S9 signal): Not specified.

Receiver

Receiver sensitivity:

SSB and CW: less than 0.13 μV for 10 dB S/N (preamp on).

FM: less than 0.25 μV for 12 dB SINAD; less than 0.35 μV for 20 dB quieting (preamp on).

AM: less than 1.0 μV for 10 dB S/N (preamp on).

Receiver dynamic range: Not specified.

S-meter sensitivity (μV for S9 reading): Not specified.

Squelch sensitivity: FM: less than 0.1 μV ; AM/SSB: less than 0.7 μV (preamp on).

Receiver audio output at 10% THD: More than 2 W.

Color: Black.

Size (height, width, depth): 4.25 x 9.6 x 11.6 inches.

Weight: 13.4 lbs.

[†]Blocking dynamic range and two-tone, third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.

Measured in the ARRL Lab

Receiver, as specified. Transmitter, 28.0 to 30.0 and 50.0 to 54.0 MHz.

As specified.

As specified

100 Hz.

As specified.

Transmitter Dynamic Testing

28 MHz: FM, SSB, CW, 1 to 10.4 W, AM 1 to 4.6 W; 50 MHz: FM, SSB, CW, 1 to 12.3 W, AM, 1 to 4.6 W.

See Fig 1.

See Fig 2.

See Fig 3.

3 ms.

Receiver Dynamic Testing

Minimum discernible signal (noise floor) with 2.3 kHz filter:

Preamp off

28 MHz: -131 dBm

50 MHz: -132 dBm

Preamp on

28 MHz: -136 dBm

50 MHz: -137 dBm

Preamp on

28 MHz: 0.17 μV for 12 dB SINAD; 0.26 μV for 20 dB quieting.

50 MHz: 0.16 μV for 12 dB SINAD; 0.2 μV for 20 dB quieting.

For 10 dB (S + N)/N, test signal 30% modulated with a 1-kHz tone, preamp on:

28 MHz: 0.15 μV

50 MHz: 0.15 μV

Blocking dynamic range[†]:

Preamp off

28 MHz: 123 dB

50 MHz: 127 dB

Preamp on

28 MHz: 128 dB

50 MHz: 126 dB

Two-tone, third-order intermodulation distortion dynamic range[†]:

Preamp off

28 MHz: 90 dB

50 MHz: 89 dB

Preamp on

28 MHz: 88 dB

50 MHz: 87 dB

Third-order input intercept:

Preamp off

28 MHz: 4 dBm

50 MHz: 1.5 dBm

Preamp on

28 MHz: -4 dBm

50 MHz: -6.5 dBm

Preamp off: 29 MHz, 16; 52 MHz, 13.

FM: 0.08 μV min, 0.3 μV max; AM/SSB: 0.5 μV min, >1 mV max.

2.0 W.

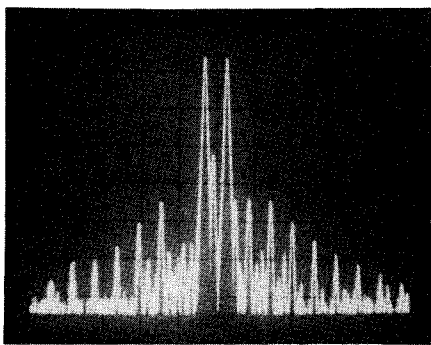


Fig 2—Spectral display of the ICOM IC-575A during two-tone intermodulation distortion (IMD) testing. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver is being operated at 10 W PEP output on 50 MHz. Third-order products are approximately 44 dB below PEP output, and fifth-order products are approximately 45 dB down.

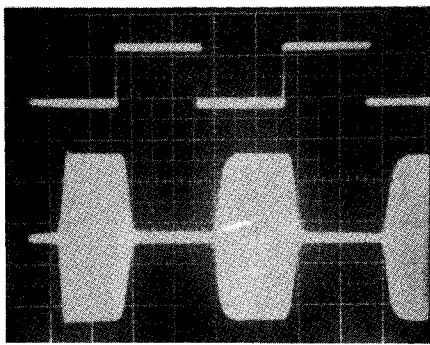


Fig 3—CW keying waveform for the ICOM IC-575A, with the transceiver in the semi-break-in mode. The lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 10 ms.

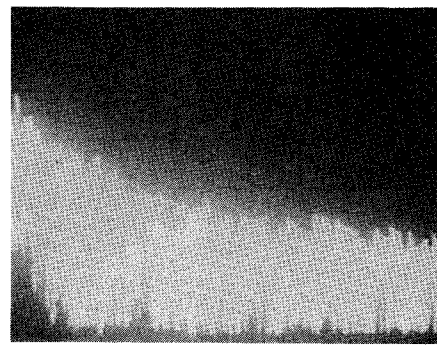


Fig 4—Spectral display of the ICOM IC-575A transmitter output during phase-noise testing. Power output is 10 W at 28 MHz. Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which this photo was taken is calibrated so that the log reference level (the top horizontal line on the scale in the photo) represents -60 dBc/Hz and the baseline is -140 dBc/Hz. Phase-noise levels between -60 and -140 dBc/Hz may be read directly from the photograph. The carrier, which would be at the left edge of the photograph, is not shown. This photograph shows phase noise at frequencies 2 to 20 kHz offset from the carrier.

come with many older Japanese-made rigs! Also included is a large-size schematic diagram (you won't need a magnifying glass for this one).

Operation

Taking the ICOM-575A on a field test was simple. Its compact size was a real advantage for N1FOZ's portable operation to grid square FN51 (Cape Cod) during the June VHF QSO Party. Using a marine battery and a three-element quad, Mark was easily able to hear anything on the band—although an amplifier would have been nice for working them from a 10-feet-above-sea-level location.

We really enjoyed using the memory channels during the contest (and at home during band openings). It's easy to program several stations up and down the band into different memory channels and

quickly flip back and forth between them.

Bart Jahnke, KB9NM, another HQ staffer, used the review transceiver and shared his thoughts. Bart has used an IC-551D—the '575A's predecessor—for many years. Bart found the newest ICOM to be more convenient for repeater operation on both 6 and 10 meters, and he noted that the memory channels make short work out of monitoring several beacon frequencies (one of the rig's SCAN modes allows rapid access to any or all programmed memory frequencies). (The '551D has no memories.) The selectable tuning rate makes large excursions up and down the band much easier (the '551D has only one tuning rate—slow). Bart's impression is that the receiver is good—better than the '551D—with a couple of exceptions. The preamp is susceptible to overloading from very strong adjacent-channel signals, and the preamp was unusable during periods of strong and frequent power line noise. Bart also noted that the noise blanker is ineffec-

tive against some types of noise.

The IC-575A is a well-designed, top-notch rig. It also carries a top-dollar price tag. If the price is within your budget, however, and the lack of an effective noise blanker is not a problem, you won't be disappointed. The rig is decked out for any and all operating modes, including the popular and not-so-popular digital modes. It has connections for every conceivable outboard accessory.

Manufacturer: ICOM America, 2380-116th Ave NE, Bellevue, WA 98004, tel 206-454-7619. Price class, \$1400.

A&A ENGINEERING DELUXE MEMORY KEYSER KIT

Reviewed by Bruce S. Hale, KB1MW

The A&A Engineering memory keyer kit is based on a design presented in Chapter 29 of *The ARRL Handbook* by Tom Miller, NK1P. A full description of the project can be found in the *Handbook*, so I'll briefly discuss the keyer's features and talk mostly about the A&A Engineering kit version.

This keyer features eight memories, a sidetone, MOSFET keying transistors and a nonvolatile memory. Basic keyer functions are excellent, thanks to the use of a

Curtis 8044 keyer chip. The keyer has an internal 5-V regulator and can be powered from the supplied wall transformer or from any 7.5- to 15-V dc source. You'll have no trouble finding a spot for this keyer on your operating table—it measures only $2 \times 8.25 \times 6.25$ inches (height, width, depth).

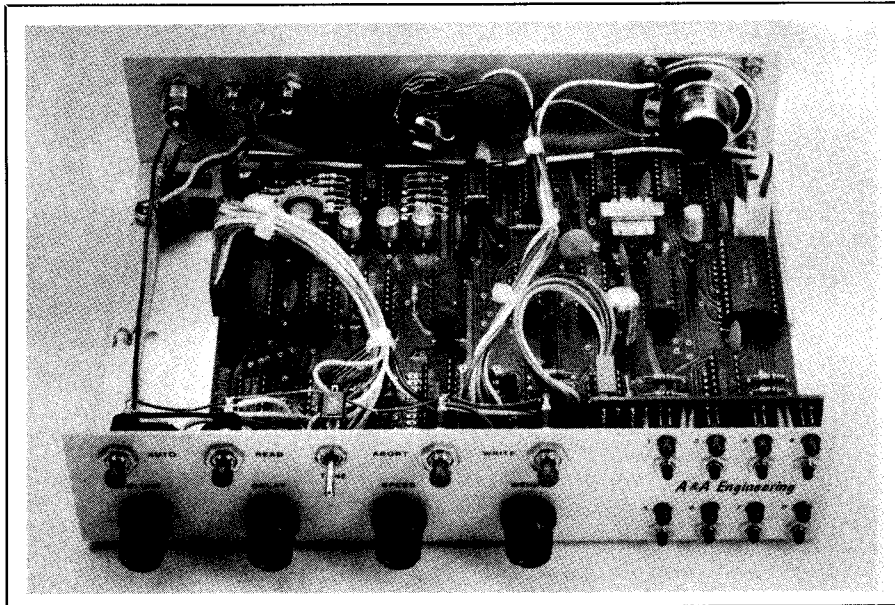
The Kit Version

The A&A Engineering kit consists of a complete set of parts, two PC boards (the main board and a smaller one for memory push buttons) and a cabinet. The PC boards and all parts are of excellent quality.

Front-panel controls are arranged in two rows. The top row includes these switches:

AUTO (automatic message repeat), memory READ, transmitter TUNE, message ABORT and memory WRITE. The bottom row includes potentiometers for sidetone VOLUME, DELAY (between message repetition in the AUTO mode), keyer SPEED and character WEIGHTING. Memory selection push buttons are at the right-hand side of the front panel (more on this later). Rear-panel connections include a three-circuit $\frac{1}{4}$ -inch phone jack for your keyer paddle, phono jacks for + and - keying outputs and a power jack. The sidetone speaker also mounts on the rear panel.

A&A's kit varies slightly from the *ARRL Handbook* version. The *ARRL Handbook*



version uses battery-backed-up RAM (random-access memory) to store information. The A&A version uses an EEPROM (electronically erasable programmable read-only memory) for this function. The EEPROM retains contents when power is turned off, so no battery backup board is offered (the *Handbook* version shows NiCd battery power as an option).

Assembly

I started assembly with the main PC board. It took me about an hour to stuff and solder all the components on the board. There are no step-by-step assembly instructions like a Heathkit®, but A&A supplies a detailed parts list and parts-placement diagram. With a little common sense applied to the sequence of part installation, the whole process goes very smoothly. I installed the IC sockets first so I could be sure they were all seated flat on the board, then the resistors and diodes, followed by the connector headers and finally the capacitors. The only problem I had was making the two-pin power connector fit into the PC board mounting holes. The pins on the connector were spaced a bit narrower than the mounting holes, but I was able to persuade the pins to fit the PC-board spacing with a pair of needle-nose pliers.

The second PC board holds the memory push-button switches, a few ICs and LEDs that are used to show which memory is in use. Called the "mouse" board (similar to a computer mouse), it's mounted behind the keyer's front panel. For an additional \$10, you can order the remote mouse option. The remote mouse option mounts the small PC board in a separate enclosure to place at a convenient spot on your operating bench. For this review, I assembled one keyer with a "remote mouse" and one with a "local mouse."

The mouse PC board went together very smoothly. There are eight LEDs on this board, and they must be mounted up off the board so that they stick through the front panel. Mounting the push-button switches first allows you to turn the board upside down to rest the tops of the LEDs even with the switches when you solder them in. Again, a little common sense is required, but the process is not difficult. This assembly took about 15 minutes.

The keyer is supplied with an unpainted, undrilled aluminum cabinet. A&A also supplies a drilling template that you can cut out and tape to the front and back panels. There is a detailed drawing showing the correct diameter for each hole. With all this information, it was easy for me to drill the cabinet. I used a drill press and a complete set of bits in the ARRL Lab; it might be a bit more difficult for someone with only a hand drill and a few bits. The key to ending up with all the holes the right size and in the right place is to start with center-punched holes and work your way up to the final hole size with smaller bits. Drilling and deburring the cabinet took me about an hour.

As I said, the cabinet is supplied unpainted. I don't like painting cabinets, but I also don't like how careful I have to be not to scratch a factory-painted cabinet when I drill it. I guess there just is no easy way to end up with a nicely drilled and painted cabinet. I used light blue paint for the top and a cream color for the front and back. I painted the cabinet right after I drilled it and put on a few coats of paint while I assembled the PC boards. I left everything to dry overnight before I finished the assembly.

Panel labeling is another task I really don't enjoy. A&A makes this relatively painless by providing clear Scotchcal® panel lettering. Once the cabinet is painted,

you cut the Scotchcal to fit the panel and line up the markings on the Scotchcal with the holes in the panel. It's a bit difficult to apply the Scotchcal and get all the bubbles out from under it, but the result looks pretty good. This is *much* easier than trying to get dry-transfer letters applied correctly.

After the cabinet is drilled, painted and labeled, you can start the final assembly. Again, A&A has made this a lot easier by providing a front-panel wiring diagram. There are four potentiometers to wire on the front panel, and I've always found that if there is a 50/50 chance of wiring a potentiometer wrong, it *always* comes out wrong! (This must be one of Murphy's Corollaries.) The wiring diagram takes all the guesswork out of the assembly and ensures that Murphy stays home. With the cabinet drilled according to the drilling guides, the potentiometers, switches and connectors fit nicely around the PC board and the whole assembly process goes very smoothly. Assembly takes a little while, because there are several connectors to wire and each connector requires several wires, each with a pin connector soldered on at least one end. It took me about two and a half hours to complete the assembly.

I assembled two kits. One board worked from power up with no problems, but the memory did not work on the other board. The keyer functions worked correctly, but I could not load or play the memory. I tried replacing the memory chip with no success, so I started troubleshooting with an oscilloscope. Since it was a memory problem, I checked all the signals at the memory chip. The WRITE signal was not making it to the memory chip from one of the gates elsewhere on the board. I traced the problem to a bad solder connection on a header connector. Once this problem was fixed, the board worked correctly. This was *not* a problem with the kit itself; any time you assemble a piece of equipment from components to finished unit, there is a chance that some debugging will be required before the unit functions correctly.

The A&A deluxe memory keyer is a pretty simple kit to assemble. Although the keyer itself is fairly complex, the kit goes together well and A&A provides enough aids to make it *much* easier to assemble the kit than it would be to build the keyer from a bare PC board. I estimate the total assembly time for the keyer at about six hours, not including the time it takes the paint to dry on your cabinet.

You won't be disappointed with your finished keyer. The unit is compact and attractive, and it performs well. With up to eight memories to choose from, you can store a *lot* of information. The output keying transistors allow easy connection to virtually any transmitter.

Manufacturer: A&A Engineering, 2521 W LaPalma Ave, Unit K, Anaheim, CA 92801, tel 714-952-2114. Price class: model 217 (local mouse), \$150; model 223 (remote mouse), \$160.