Product Review Column from *QST* Magazine

December 1980

AEA MM-1/MK-1 Supplement

Alliance HD-73 Heavy-Duty Rotator

Comtronix-FM80 10-Meter Transceiver

Heath IB-5281 RLC Bridge

Improved Bencher Paddle

Kenwood R-1000 General Coverage Receiver

Macrotronics Ritty Riter

Mity-Time LCD Clock

Tandy Wire And Cable RG-8/M Coaxial Cable

Trio-Kenwood DM-81 Dip Meter

Product Review

Conducted By Paul K. Pagel,* N1FB

Kenwood R-1000 General Coverage Receiver

Technology has progressed to the point where a moderately priced, general-coverage receiver can offer the same performance characteristics that we've come to expect from our ham-band-only receivers. The Kenwood R-1000 is one example.

The receiver is designed to cover the frequency range of 200 kHz to 30 MHz. A VFO tunes any 1-MHz portion of spectrum in this range as selected by the BAND switch located at the bottom, right-hand corner of the panel. This switch is a 30-position rotary type with light, yet positive, detent — similar in feel to the uhf tuners on the newer TV sets. Four lighted push-button switches are used to select either the a-m or product detector and also automatically select either the a-m or product detector and also automatically select the i-f filter bandwidth. In the A-M WIDE position, a 12-kHz (at −6 dB)/25 kHz (at −50 dB) filter is switched in, and for A-M NARROW a 6-kHz (at −6 dB)/18 kHz (at −50 dB) filter is selected automatically. The USB and LSB/CW switches choose the 2.7-kHz (at −6 dB)/5 kHz (at −60 dB) filter. A cw-bandwidth filter is not provided with the unit.

The tone and volume controls are concentric, and no rf gain control is provided; rather, a four-position step attenuator (0 dB, 20 dB, 40 dB and 60 dB) is located to the right of the volume control. An i-f, diode-clipper type of noise blanker is controlled by a push-button switch located under the S meter. The blanker proved to be quite effective on several types of interference including automobile ignition noise, Loran and noise from light dimmers (a common source of interference when listening below the broadcast band).

The receiver is equipped with a digital readout that doubles as a clock. Either the frequency readout or time can be displayed as selected by the FUNCTION switch. The clock is a 12-hour type with indicator lights for A.M. and P.M. Two front-panel buttons, one for hours and one for minutes, allow setting the clock while listening to WWV or other time- and frequency-standard station; contrary to rumor, the clock module is *not* convertible to a 24-hour format. Additional circuitry is provided so that the clock can be programmed to turn the receiver on and off. High-impedance audio output and normally open and normally closed relay contacts are available for connection to automatic tape recorders. It is possible to record a program of interest without being present to do so.

On the rear panel are three antenna connectors, one for mw (200 kHz to 2 MHz) and two for hf (2 to 30 MHz); they are selectable with a small slide switch. A fuse, external speaker jack, line-voltage selector, remote jack and the ac receptacle are also located on the rear panel. The back of the receiver was designed so that it can fit flush against a wall or operating console. The receiver can be operated in a vertical position by resting it on the feet provided at the rear of the cabinet for that purpose. The rugged carrying handle serves as a bail to prop up the front of the receiver when mounted on a horizontal surface. The speaker (located on the top cover) provides adeqate sound to fill most any room.

Fig. 1 — Kenwood's R-1000 is a compact performer. The carrying handle also serves as a support if additional table clearance is desired.

The Circuit

The incoming signal is routed through one of six diode-switched filters. Each filter is comprised of a low-pass and high-pass filter section combined to provide a band-pass response. Good skirt selectivity and low passband ripple result from this arrangement. Output from the filter section is fed to a 3SK74 (agc'd) rf amplifier. The signal is then buffered and applied to a singly balanced 3SK74 mixer to produce an i-f of 48.055 MHz. The high-frequency PLL signal provides the necessary LO injection. Output from the first mixer is passed through a 48.055-MHz crystal filter and directly to the second mixer, also a singly balanced type. Injection for the second mixer is fixed at 47.6 MHz. The signal then encounters the noise-blanker gate and from there the diode-switched 455-kHz mechanical filters. Output from the mechanical filters is fed to two 3SK74 i-f amplifier stages and a shunt attenuator that is linked to the front-panel rf attenuator. From there, the signal is detected and applied to the audio preamplifier and output stage. BFO energy is supplied by one of two diode-switched crystal oscillators.

Operation of the PLL synthesizer is straightforward. The VFO output (in the range of 5.545 to 4.545 MHz) is mixed with the output from the 47.6-MHz crystal oscillator. The difference frequency is selected, buffered and applied to a second mixer, along with the output from the VCO, to produce an output signal in the 6- to 35-MHz range. This signal is divided by the programmable divider (programmed by the front-panel BAND switch) and compared in the MC4044 phase detector. The output from the phase detector is filtered and fed to the four VCOs that cover the 48- to 78-MHz range. As each VCO is expected to handle only a little more than 7 MHz, clean output should be ensured. An additional mixer combines the output of the VCO with the 47.6-MHz oscillator to produce a signal at the received frequency plus the second i-f. This signal is fed to the counter/clock LSI which presumably contains a preset countdown function. The BFO frequency is not counted directly. Outputs from the counter/clock LSI control a relay for connection to a tape recorder.

Operational Observations

If a knowledgeable user were blindfolded and asked to operate an R-1000 he might think he was listening to a quality, ham-band-only receiver! It has the feel of an expensive piece of equipment. The receiver was used on a continuous basis for a period of three months and within a few feet of high-power hf transmitting equipment. Unless the received frequency was quite close to the transmitter frequency, it was as though the transmitter wasn't even on the air.

*Assistant Technical Editor

Kenwood R-1000 General Coverage Receiver

Manufacturer's Claimed Specifications

Sensitivity (S + N/N of 10 dB or more):

	SSB	*A-M*
200 kHz to 2 MHz	3 μV	50 μV
2 MHz to 30 MHz	0.5 μV	5 μV

Image rejection: greater than 60 dB.
I-F rejection: greater than 70 dB.
Selectivity: *a-m wide* — 12 kHz at −6 dB, 25 kHz at −50 dB
a-m narrow — 6 kHz at −6 dB, 19 kHz at −50 dB
ssb/cw — 2.7 kHz at −6 dB, 5 kHz at −60 dB.
Frequency stability: ± 2 kHz maximum from 1 to 60 minutes after power on. ± 300 Hz maximum in every subsequent 30-minute period.
Power consumption: 20 watts.
Power requirements: 100, 120, 220 or 240 V ac, 50/60 Hz.
Dimensions (HWD): 4-1/2 × 12-3/4 × 8-1/2 in. (115 × 300 × 218 mm).
Weight: 12.1 lbs (5.5 kg).
Clock accuracy: ± 15 seconds maximum per month.
Price class: $500; BWK-1, $3; DCK-1, $6.

Although the receiver noise floor and IMD dynamic range were measured, these numbers cannot be compared directly with other receiver or transceiver measurements published previously. This is because the R-1000 does not contain a cw-bandwidth filter, and all other units checked had this option. Tests on the R-1000 produced the following numbers on 80 meters: noise floor, −133 dBm; blocking dynamic range could not be measured because of reciprocal mixing; IMD dynamic range measured 76 dB. On 20 meters, the following measurements were taken: noise floor, −132 dBm; blocking dynamic range again could not be measured because of reciprocal mixing, and the IMD dynamic range measured 82 dB. These numbers indicate reasonable receiver performance.

Each revolution of the VFO knob produces approximately a 50-kHz change in frequency. While this would be considered somewhat fast for a ham-band-only receiver, it is in line with what is needed for short-wave listening. This rate was not found to be uncomfortable for amateur band use.

The rf step attenuator positions are 0, 20 dB, 40 dB and 60 dB. In operation, the first 20-dB step was often too great and the 60-dB position was never found useful — even with large antenna arrays connected to the receiver. A modification, available from Kenwood, converts the 20-dB steps of the attenuator to 10-dB steps.

There were only two areas where I would register strong complaints. The first concerns the lack of a cw filter or the option for adding one. For the most part the receiver performs as well as many ham-band-only receivers; if it is to be used for ham-band reception, a cw filter is a must. Although an external cw audio filter could be added to the receiver, it would be a poor substitute for a good mechanical or crystal i-f filter.

The other complaint is with the digital-frequency readout. Although the correct frequency is indicated for a-m reception, an incorrect frequency is displayed on either upper or lower sideband. For example, on upper sideband, if a signal on 14.105 MHz is injected into the receiver, the frequency displayed on the readout is 14.106 MHz (when the receiver is adjusted for zero beat) — 1 kHz high. On lower sideband, the display will indicate a frequency of 14.103 MHz (when the receiver is adjusted for zero beat) — 2 kHz low. This error occurs because the BFO is not counted in this frequency-readout scheme. Although this may not be a great concern to some, when used with an amateur transmitter it could result in a station operating outside a particular band if the operator relies solely on the R-1000 frequency readout.

The manual supplied with the R-1000, written in English, German, French and Spanish, is heavy on the operational aspects and light on technical topics. For the intended purpose of the receiver, the manual is more than adequate.

Addenda

An option (DCK-1) is available that provides for 12-volt dc operation of the R-1000. Early production units may benefit from an agc and a-m filter bandwidth modification (BWK-1) available from Kenwood. These changes are incorporated in later production units. The a-m agc time constant is thereby shortened and the 2.7 kHz filter is switched in with the MODE switch in the AM NAR position; the 12-kHz filter is then out of the circuit and the 6-kHz filter is used in the AM WIDE position.

The R-1000 has a mute circuit for use in combination with a transmitter or transceiver. By grounding pin 7 on the REMOTE terminal (Fig. 3-9 of the owner's manual), the rf stage will be muted. This information was inadvertently omitted from early manuals, but is included for units with serial numbers 0030502 and above.

This reviewer would give the R-1000 an A-, should such ratings apply to receivers. At the price some of the larger distributors are charging for this receiver (under $400), it is well worth the money in terms of short-wave listening enjoyment and its use as an all-around test instrument. Additional information on this product can be obtained from Trio-Kenwood Communications, Inc., 1111 West Walnut St., Compton, CA 90220. — *Jay Rusgrove, W1VD*

HEATH IB-5281 RLC BRIDGE

☐ If you're an average ham, you've got some sort of junk box, that wonderland into which you may delve to produce the much-needed part for that long-awaited project. Ah! But are you certain of the value of that capacitor, inductor or desired matching resistor? If not, then perhaps the '5281 is just the item you need.

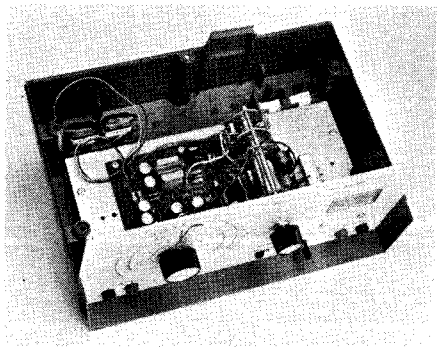

Fig. 2 — The IB-5281 RLC Bridge has compartments for two spare batteries located at the right rear of the chassis. The small vertical panel at the cabinet rear is replaced with an adapter plate when used with the external Heath power supply.

Heath IB-5281 RLC Bridge (S/N02951)

Manufacturer's Claimed Specifications

Resistance ranges: 10 Ω to 10 MΩ in three ranges.
Inductance ranges: 10 μH to 10 H in three ranges.
Capacitance ranges: 10 pF to 10 μF in three ranges.
External standard range: 1:1 to 10:1.
Cabinet dimensions (HWD): 5-3/4 × 11 × 7-3/4 in. (146 × 279 × 197 mm).
Price class: $45.

Heath introduced the IB-5281 RLC Bridge along with five other members of the same family in their 5280 series of test instruments. Aimed primarily at the beginning hobbyist, student or service technician, they were designated to permit the assembly of a low-cost test bench.

Operational Description

The '5281 is a solid-state unit that permits you to determine unknown values of capacitance, inductance or resistance within certain limits. It operates according to the principles of the Wheatstone bridge. To permit measurement of inductance and capacitance, the bridge must use an ac voltage source. In the '5281, this is provided by a Wien bridge oscillator. The oscillator has three output frequencies — 1000 Hz, 10 kHz and 100 kHz — which allow measurement of R, L and C in three separate ranges. In addition to using internal standards for matching purposes, the bridge furnishes a means of using an external standard comparison method. This becomes useful when attempting to match accurately one or more R, L or C components to each other.

The IB-5281 may be powered either by internal 9-V batteries (two required, not furnished) or a power supply capable of providing both ± 9 volts (such as the Heath IPA 5280-1) at less than 10 mA each. Unfortunately, Heath does not supply the external/internal power-supply selector switch, connectors or mounting plate for use with an outboard supply with the '5281 kit. As another alternative, the constructor of the bridge could build a power supply in the cabinet without too much difficulty; there's plenty of room.

Assembly and Calibration

There is no errata sheet to contend with and no problems were encountered during construction. The component quality is excellent. All resistors used are 5% tolerance, carbon-film types. As may be seen in the photograph, the majority of components are mounted on the single pc board or the multi-wafer RANGE switch. Assembly and testing of the IB-5281 took about four hours, not counting the time spent in tracing an incorrectly placed wire on the range switch (attributed to bleary 4:30 A.M. eyes!). Calibration of the bridge takes less than five minutes using a 100-ohm, 5% tolerance resistor supplied for the purpose.

An attractive blue and white plastic case is used to house the instrument. At the rear of the upper half of the unit is a small compartment which is used to store the clips, standard(s), or whatever else you feel you might need during

use of the instrument. Front-panel-mounted banana jacks are used to mate with banana plug/alligator clip connectors to introduce the unknown component into the bridge circuitry.

Results and Use

While the '5281 is not a precision lab instrument, the accuracy of the unit will certainly suffice for most Amateur Radio applications. After the unit was completed, I immediately set about checking some of the rf chokes, resistors and capacitors I had on hand. As many of you will appreciate, capacitor markings can be somewhat confusing, but the '5281 rapidly penetrates that cloud of confusion. Determining the values of those unmarked rf chokes in my junk box was not only fun, but enlightening: You can't "call 'em the way you see 'em" all the time! Using the '5281 is certainly a lot easier than using a GDO, some standards and a calculator to determine unknown component values.

Although no accuracy specification is given, I found that over most of the range I was able to easily interpolate the dial readings to within 10% of the actual value, and many times to within 5%. This was determined by comparing known capacitance, inductance and resistance values (measured on ARRL lab equipment) to the values indicated by the '5281. Dial markings at either extreme of the dial range are more closely spaced — and determination of the actual value somewhat more difficult — at those points. Don't forget, there also exists the ability to use an external standard (at the Z_S terminals) as a means of comparison when it is desired to closely match certain components for a specific purpose.

I feel that the low cost of this unit justifies its occupying a space on the work bench right alongside the TVOM and DMM; this is especially true if you're a tinkerer and "pack rat." Battery operation and light weight make the IB-5281 really portable — just the thing to take with you to a buddy's shack or a flea market. — *Paul K. Pagel, N1FB*

COMTRONIX-FM80 10-METER FM TRANSCEIVER

☐ With almost 400,000 amateurs in the United States, it is still a small world. After unpacking the Comtronix-FM80, I connected it to the tribander and answered WB6VZY, who was calling CQ on 29.6 MHz. We exchanged the usual information; then we found out each other's identity — I was doing a review on the FM80 and he is part owner of KonaCom, the importer of the FM80! Ten-meter fm is like that. It also has an "intercom" flavor reminiscent of 2-meter fm, but the DX aspect of it is much higher — at least while we are near a sunspot maximum.

The unit is "bare bones" with none of the bells and whistles that we have come to expect in the fm rigs designed for 2 meters. It is a 10-watt (1-watt low power), 10-meter fm-only, synthesized transceiver; the closest thing to a bell or whistle is the built-in repeater offset. It would appear that the FM80 has been built with the idea of keeping the cost as low as possible. In addition to economy, there are several advantages to taking this route. If the unit is being operated mobile, one can merely set it and forget it. This strikes me as being somewhat safer than some of the computerized rigs for 2 meters which, to be operated safely, require either a copilot to do the programming or a roadside stop to make any changes.

Comtronix FM80 10-Meter FM Transceiver (S/N 960421)

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 28.91 to 29.7 MHz.	Same
Size (less projections): (HWD) 2-1/8 × 6-1/2 × 8-3/4 inches (55 × 165 × 223 mm).	Same
Power output: 10 watts (reducible to 1 watt).	13 watts @ 13.8 V dc.
Operating voltage: 13.8 V dc (± 15%).	
Maximum current at 13.8 V dc: 2.2 A.	2.2 A
Weight: 6.5 pounds (3 kg).	
Receiver sensitivity: 0.5 μV for 20 dB of quieting.	
Price class: $260.	

In appearance, the FM80 resembles the ubiquitous imported CB rigs. Everything is broadbanded and pretuned, reducing the number of control functions to a minimum. Frequency coverage is from 28.91 MHz to 29.7 MHz in 10-kHz steps (that adds up to 80 "channels," which is presumably where the 80 comes from in the name). The 80 channels are selected by using a 40-position rotary switch to step the synthesizer up and down; in addition, two mixer crystals are switched in and out with a push-button-type switch. Two seven-segment LED displays provide readout of the "channel" number from 1 to 40. Unfortunately, there is no active visual indication differentiating between mixer crystals A and B; one must note whether the switch is "in or out." That's really a rather minor inconvenience and shouldn't be of any consequence — unless you happen to have a three-year-old harmonic who loves to push buttons (I have one). One could easily add one or two LEDs to give an active visual indication of which range the unit is tuned to.

The first nine channels of the A group are below 29 MHz, which virtually constitutes illegal operation in the U.S. FCC rules and regulations, Part 97.65(c), states: "On frequencies below 29.0 MHz the bandwidth of an F3 emission (frequency or phase modulation) shall not exceed that of an A3 emission having the same audio characteristics." It is not illegal to use fm below 29 MHz — it simply is not practical to use *legal* fm. Another problem area in terms of frequency coverage is that the satellite downlink frequencies are located in the midst of the 80 channels. Channels 10 through 20 of the B group appear on frequencies from 29.40 MHz to 29.50 MHz. Comtronix points this out in the owner's manual, but they make an error on the conservative side. They include the frequencies 29.51 through 29.55 MHz as part of the satellite frequencies. In actuality, those frequencies are in the repeater input section of the ARRL 10-meter band plan.

One of the questions that I pondered before using the rig was whether 10-kHz channel spacing had any value. (The ARRL band plan calls for 20-kHz spacing.) On a recent trip during a band opening on 10 meters I had a chance to make some first-hand observations. As seems to be usual, stations from all over the country east of the Rockies were showing up on 29.6 MHz. Operators were politely taking turns working each other. One station that I worked suggested that we "move up 10," which we did. We then carried on a "rag chew" for nearly one-half hour. In that time, I did not notice any adjacent-channel interference from the QSOs that were continuing on 29.6 MHz. On the other hand, I have tuned up or down 10 kHz when a very strong signal was on 29.6 MHz and found those tertiary channels subject to high levels of adjacent-channel interference. Probably, the prime consideration is whether or not the sidebands (from adjacent channels) that extend into the passband of the receiver are very strong. Thus, 10-kHz steps give the FM80 additional versatility by providing *possible* simplex frequencies that are sandwiched in between repeater frequencies.

Is 10 watts enough power to be useful? There is no clear cut answer — it depends. When the band is not open, if you want wide-area, simplex, mobile-to-mobile coverage, 10 watts probably isn't enough. On the other hand, when the band is open, 10 watts is more than sufficient for long-distance communications. While mobile recently, I worked an Indiana station simplex. He was using a half-wave vertical antenna at his QTH along with an FM80. I was operating the FM80 into a quarter-wave

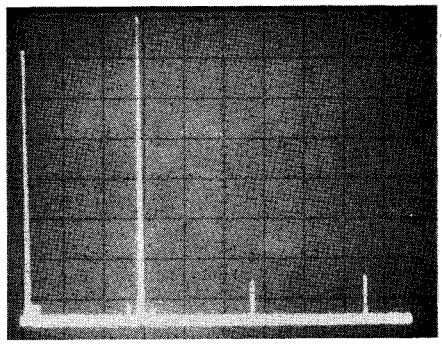

Fig. 3 — Spectral display of the Comtronix FM80 in the 10-watt position. Vertical divisions are 10 dB each. Horizontal divisions are 10 MHz each. The products close to the carrier frequency are 72 dB down. Second and third harmonics are down at least 60 dB.

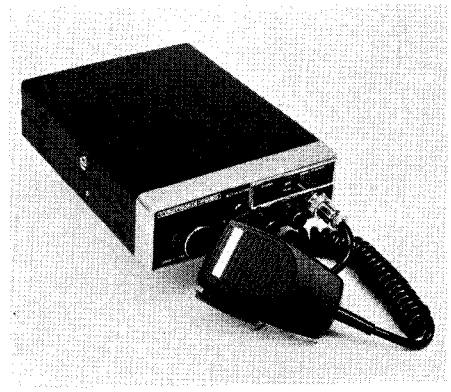

Fig. 4 — An easy way to 10-meter fm. The Comtronix FM80 presents a simple but functional control panel.

whip mounted on the bumper. He asked how much power I was using because my signal was pegging his S-meter. I replied that I was using the rig in the 10-watt position and that I would go to the 1-watt position to see if he could still copy me. I did, and he reported that the signal had fallen from S9-plus to S8, but that it was still full quieting! If an operator feels that 10 watts is not sufficient, it would be a simple matter to construct a small, solid-state power amplifier.

I am somewhat disappointed with the manual that is supplied with the FM80. Like the rig, it is "bare bones." The schematic diagram is reproduced on a single page. To say the least, the symbols on the diagram are small and densely packed. The description of the functioning of the circuits is sketchy. There are no board layout diagrams or trouble shooting hints; nor are there any alignment procedures. The manual is one place where a little elaboration would have gone a long way.

My overall impression of the FM80 is very good. It is a solid performer without a lot of frills. Additionally, it is a relatively inexpensive and easy way to get on a fun-filled band. — *Pete O'Dell, AE8Q*

THE IMPROVED BENCHER PADDLE

☐ With little fanfare and with a price increase scarcely befitting the ravages of inflation alone, Bencher, Inc., has brought out a significantly improved version of the original paddle, which was reviewed on these pages in May 1978. The improvements include: A heavier and thicker base — 5/8 in. (15.9 mm) instead of 1/2 in. (12.7 mm); crimped spring ends which pinch the adjustment screws and hold the spring captive; gold plating on the pure silver contact points; and lastly, elimination of the Achilles' heel of the basic FYO paddle design — the tendency of the mechanism to fly apart when the paddles were accidentally bumped or pushed in the wrong direction. Bencher has added pinion screws which act to limit the movement of the parts so they can never disengage from the pivots. These added screws do not interfere with the normal motion of the paddles during sending.

Some operators might prefer to have the two clear plastic finger assemblies positioned closer together than those supplied on the "stock" paddle, 11/16 in. (17.5 mm). It's an easy task to remove one of the finger assemblies and remount it on the *inside* of its metal support arm. This will reduce the spacing to 1/2 in. (13 mm).

The Bencher paddle is made by Bencher, Inc., 333 W. Lake St., Chicago, IL 60606. Price class is $43 for the steel-base model and $53 for the chrome model. — *John C. Pelham, W1JA*

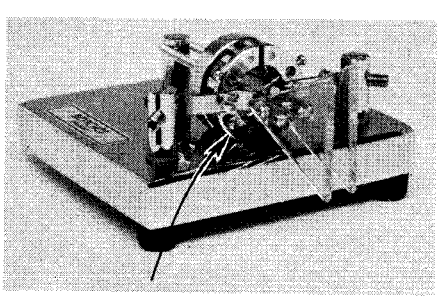

Fig. 5 — One of the two screws that secures the mechanism of Bencher's new paddle is shown by the arrow in the photo.

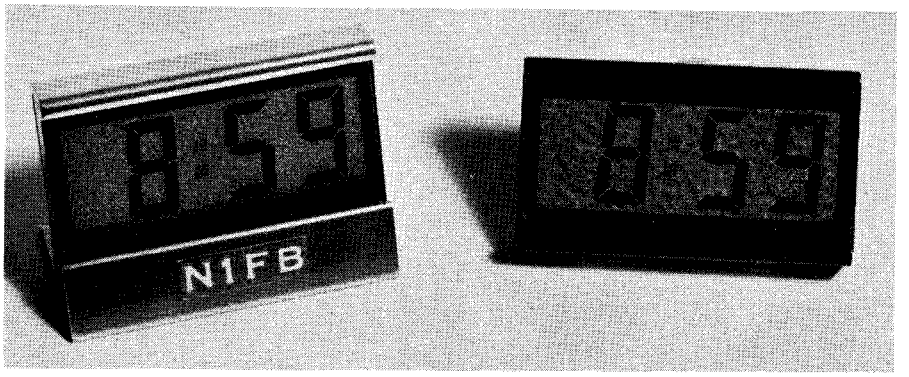

Fig. 6 — Two versions of the Mity-Time clock are shown here. The unit at the left is supported in a brushed-aluminum stand, while the right-hand unit is fitted with Velcro tape for use as described in the text.

THE MITY-TIME LCD CLOCK

☐ Timepieces have become smaller and smaller in recent years, with the advent of electronic clocks and wristwatches. The Mity-Time clock is an interesting and versatile unit, an effective timekeeper for many ham radio needs.

The clock is small — 2 × 1-1/4 × 1/2 inches (51 × 32 × 13 mm) and sports a 12-hour LCD display with 5/8-inch (16-mm)-high digits. The user has a choice of two modes of operation: The clock can either display time of day with a flashing colon for seconds, or can produce a readout with the time of day and day/month being digitally displayed. In the latter mode, the display alternates between time and date in one-second intervals. One would hope that the manufacturer would eventually produce a model with a 24-hour clock, which would be even more suitable for communications-oriented use.

The clock is supplied with a small piece of self-adhesive Velcro tape to facilitate mounting (such as on an automobile dash), and a small aluminum stand to permit desk mounting. The Mity's small size allows it to be located almost anywhere one might desire. Thanks to the Velcro tape, the clock's a natural for the car or even a motorcycle. One review unit spent some months affixed to the dash of my auto. On several occasions, the easy-to-read digits were convenient for reporting time of day when logging a repeater autopatch contact. Initially set to WWV, the clock has performed accurately within 10 to 20 seconds of that standard since then and seems to operate well despite widely varying temperature extremes. Once the display blanked out after the car had been parked in the sun for several hours. The clock was nearly too hot to touch! I turned on the air conditioner, and within a few minutes the display returned to normal; the accuracy didn't appear to have been affected at all. I haven't had the occasion to expose the Mity to extremely cold temperatures such as one would experience in a New England winter, but my initial impression is that there would be no problem.

The Mity-Time clock is made in the USA and is available from Grandview Audio Electronics, 13302 South 10th St., Grandview, MO 64030. Price class: $25. — *Sandy Gerli, AC1Y*

AEA MM-1/MK-1 SUPPLEMENT

☐ Because the reviewer initially used preliminary manuals, some discrepancies appeared in the AEA MorseMatic MM-1 and MK-1 "Product Review" in October 1980 *QST*. During memory overrun, the operator can continue loading into the MM-1 memory until the monitor frequency drops significantly. At this point, paddle entries do not enter memory, but overflow. Any message(s) loaded prior to the tone change are retained. To finish an interrupted message entry, simply clear one of the stored messages and then add to the desired message entry.

Separate audio outputs are available for the monitor and feedback tones. Either one may be independently disabled by removing a diode from the pc board. Thus, the auditory feedback need not be lost if a monitor note is not desired.

The MK-1 can key either positive- or negative-polarity key lines. Under some circumstances, it is necessary to short out a diode on the pc board. This procedure is explained in the operator's manual. — *Paul K. Pagel, N1FB*

TANDY WIRE AND CABLE RG-8/M COAXIAL CABLE

☐ A recent letter from an ARRL member inquired about the new "super coax," as he called it, referring to the RG-8/M coaxial cable offered by Radio Shack. He wrote, "The specs are better than my good . . . super low-loss RG-8/U that loses 2.0 dB per 100 ft at 6 meters. If what they say is true, than that should be front page of *QST*."

A person reading the literature about RG-8/M might well be skeptical. "Our new RG-8/M coax gives you the performance of large, bulky cable in a smaller, more flexible size — just slightly larger than RG-58/U!" Now most of us have been schooled to think "bigger is better" when it comes to coaxial line with low losses. Has Tandy Wire and Cable somehow discovered the combination of materials and manufacturing techniques to disprove the idea, showing that it doesn't necessarily have to be bigger in order to be better?

We obtained a 100-ft (30.48-m) length of Tandy's RG-8/M coax for examination. Removed from its shipping box, the roll weighed in at 3 lb 8 oz (1.59 kg). That's less than 0.6 oz per foot, or about 52 grams per meter, quite light in weight when compared to ordinary RG-8/U cable. The outside diameter of the line is approximately 1/4 in. (6 mm). Standard RG-59/U fittings may be used.

This cable bears the identification, TANDY WIRE & CABLE TYPE RG/8 MINI-FOAM, and is very flexible. It uses a low-density foam

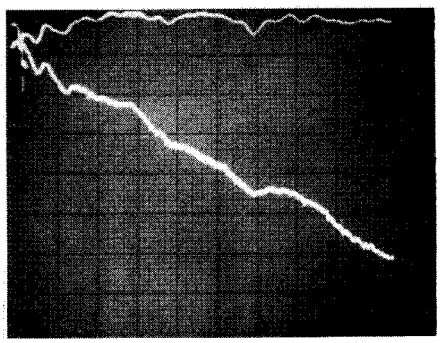

Fig. 7 — Attenuation versus frequency in Tandy's RG-8/M coax line. The line length for this measurement was 98 ft, 8-1/2 in. (30.09 m), so the attenuation data must be multiplied by a factor of 1.013 to obtain dB per hundred feet. The wavy line near the top of the photo represents the input signal level to the coax line, while the lower, thicker line in the photo represents the output into a matched load. The attenuation calibration thus is relative, rather than absolute, with the vertical scale at 2.0 dB per major division. The horizontal scale is 100 MHz per division, or 0 to 1000 MHz.

Tandy RG-8/M Coaxial Cable

Manufacturer's Original Specifications	*Measured in ARRL Lab*
Center conductor: 16 AWG, 19/29 ga. copper.	
Shield: Copper, 92.18% coverage.	
Jacket: Black PVC, 0.242-in. OD.	
Impedance: 52 Ω.	52 Ω nominal.
Capacitance: 25.5 pF per ft.	25.5 pF per ft.
Velocity of propagation: 76.4%.	76.4% at 10 MHz.
Attenuation per hundred ft.	
at 10 MHz: not specified.	1.0 dB.
at 30 MHz: not specified.	1.3 dB.
at 50 MHz: 1.5 dB.	1.5 dB.
at 100 MHz: 2.0 dB.	2.5 dB.
at 200 MHz: 2.5 dB.	3.8 dB.
at 500 MHz: 6.0 dB.	7.6 dB.
Power-handling capability: not specified.	

dielectric, but one that is quite tough and cannot be distorted by bending or scraping with a thumbnail. A short length of the line was given severe twisting motions to simulate the winding and unwinding of the line about a mast when used with a rotator, only more so. No harmful effects to the line were noted. The results of electrical measurements made in the ARRL lab are included in the accompanying chart and photograph. Our measurements did indicate the attenuation to be somewhat greater than Radio Shack originally specified. The Radio Shack catalog does not specify the power-handling capability, but similar line of another manufacturer[1] is rated at 1300 watts of input at 27 MHz, 450 W at 200 MHz, and 320 W at 400 MHz.

The manufacturer's attenuation specifications shown in the table are those published when the cable was first introduced. The manufacturer informs us now that the initial figures were in error and that the ARRL lab figures agree with measurements taken since that time.

Mini foam is available from Radio Shack stores, stock no. 278-1328. The price class in the U.S. is 21¢ per foot, with a minimum order of 25 feet. If you're planning to replace your 50-Ω transmission lines, this new "super coax" may interest you. — *Jerry Hall, K1TD*

TRIO-KENWOOD DM-81 DIP METER

☐ A refreshing addition to the usual Kenwood line of transmitting and receiving equipment was released recently. It is a solid-state, self-contained dip meter — the DM-81 — which operates from 700 kHz through 250 MHz. The unit is housed in a rugged aluminum case that includes a snap-in type of drawer at the bottom end of the case. This drawer is used to store the seven plug-in coils, a grounding clip, a capacitive probe and an earphone. Two of the plug-in inductors are printed-circuit coils. They are used for the two vhf tuning ranges. The coil ranges are (±3%): 0.7 to 1.6 MHz, 1.5 to 3.6 MHz, 3.0 to 7.4 MHz, 6.9 to 17.5 MHz, 17 to 42 MHz, 41 to 110 MHz and 83 to 250 MHz. The review model showed only one false dip of significance. This was noted at approximately 200 MHz, but it was not deep enough to impair the performance of the dipper.

The instrument employs one FET, three bipolar transistors and three diodes. The complete circuit is shown in Fig. 9, as copied directly from the instruction booklet.

Various functions can be performed with the DM-81. Among them are the field-strength (relative) and absorption frequency-meter operations. The unit can also be used as a signal generator. A mode switch enables the operator to apply modulation to the dipper signal for adjustment of a-m receivers; a 1000-Hz tone is used.

Crystals can be checked with the DM-81 by plugging them into the FT-243 and HC-25/U accommodating sockets at the top of the case. The crystal activity is indicated on the dipper sensitivity meter. Crystals can be used in this manner to generate marker frequencies, when desired; those in HC-6/U holders can be checked by holding them so they make positive contact in the FT-243-accommodating socket.

Unknown capacitances and inductances can be determined with the dip meter. The instruction book shows clearly how to conduct tests of this type. A chart provides the exact inductance of each plug-in coil. This information is useful when checking the unknown values of capacitors.

A capacitive probe ("searching needle") is provided for probing tuned circuits that can't be reached with the plug-in coils. The probe is useful for checking resonant frequencies of toroidal tuned circuits. Conventional inductive coupling is not effective because of the inherent self-shielding properties of toroids.

The dip meter can be used for the standard amateur applications of checking antenna and tuned-circuit resonances. We can't call it a GDO (grid-dip meter), because there's no tube in the oscillator, and hence no grid! A "base-dip meter" would be appropriate in this example, since the oscillator contains a bipolar transistor.

I checked the accuracy of the dial calibration in the various tuning ranges. The capacitive probe was coupled to an Optoelectronics 1.5-GHz frequency counter for this test. Calibration accuracy was outstanding for an

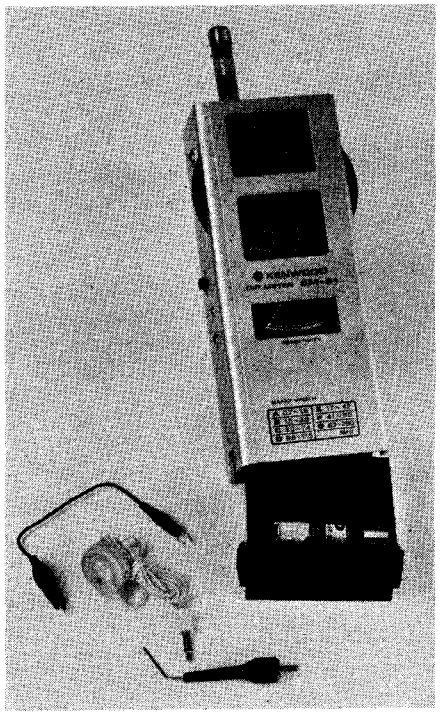

Fig. 8 — The Trio-Kenwood DM-81. The snap-in drawer at the bottom of the unit is shown here along with some of the accessories mentioned in the text.

Trio-Kenwood DM-81 Dip Meter

Manufacturer's Claimed Specifications	*ARRL Lab Results*
Freq. range: 0.7 to 250 MHz (±3%).	Same.
Modulation tone: 1000 Hz.	1067 MHz.
Power Source: 9-volt dc (battery).	
Power consumption: 9 mA.	9.4 mA.
Dial accuracy: None stated.	Excellent (see text).
Color: None stated.	Brushed aluminum with black knobs and trim.

Dimensions (HWD): 7-1/8 × 2-3/4 × 1-3/4 inches (180 × 70 × 45 mm).
Weight: 22 oz (690 g).
Price class: $125.
Manufacturer: Trio-Kenwood Communications Inc., 1111 West Walnut, Compton, CA 90220.

[1]See "Berk-Tek RG-8X Coaxial Cable," Product Review, December 1979 *QST*, p. 55.

instrument of the DM-81 variety. For example, while checking the highest range (83 to 250 MHz) the dial inaccuracy was only 100 kHz at 83 MHz and 250 kHz at 250 MHz (1%). Some of the inaccuracy was probably caused by coupling to the capacitive probe, thereby detuning the dipper.

Dip meters have long been a "standard" item in the ham shack, even if no other instrumentation was available. A dipper is somewhat a general-purpose "do all" sort of gadget, and is a valuable tool for testing or developing antennas and rf circuits. — *Doug DeMaw, W1FB*

THE MACROTRONICS RITTY RITER

☐ Are you a radioteletype aficionado who appreciates the "green key" artform? Are you using the Macrotronics M800 RTTY system with a Radio Shack TRS-80 microcomputer?

If you have answered both of these questions in the affirmative, you will appreciate Ritty Riter, Macrotronics' new TRS-80 program that provides the RTTY artist with a versatile paintbrush. Designed to be used in conjunction with Macrotronics M800 program (see the review of the M800 in November 1979 *QST*, page 50) by means of the M800 "external program" command, the key to the versatility of the Ritty Riter is the maneuverability of the TRS-80 cursor. A wide range of commands permits the user to quickly move the cursor all over the CRT display to create various kinds of RTTY art. The size of your artwork is limited by the amount of RAM installed in the TRS-80, while the creation itself is limited only by the artist's imagination.

Ritty Riter may be loaded into your computer by means of the "external program" command of the M800 or the TRS-80 BASIC "system" command for stand-alone use. In the stand-alone mode, artwork can be created, changed and saved on tape for future transmission. In the M800 mode, Ritty Riter is loaded first and then any previously recorded artwork can be loaded for transmission, or new artwork can be created on the spot. Note well — under M800, all artwork resides in the memory allocated to the M800 "big message," so do not use "big message" and Ritty Riter simultaneously.

All art created with Ritty Riter may be personalized by typing strings of the symbol "@" within the artwork. Before each transmission, the computer will ask you to personalize the artwork. By entering a call sign, name or any other statement, that entry will be repeatedly transmitted within the artwork, wherever the strings of "@" appear.

A word of advice: It is a good idea to make a hard copy of your artwork to verify that it looks like you intended it to look. My CRT display is more compact than the output of my printer and any artwork I create on the CRT tends to be elongated when a hard copy is printed. Check this out on your system and adjust your creations to compensate for any difference you may discover.

Ritty Riter is available on cassette tape and includes an adequate instruction manual. To use Ritty Riter to its fullest potential, you should have the M800 program — that requires at least 16 K of RAM, BASIC Level II and the M80 interface hardware. Ritty Riter is available from Macrotronics, Inc., 1125 North Golden State Blvd., Suite G, Turlock, CA 95380. Price class: $50. — *Stan Horzepa, WA1LOU*

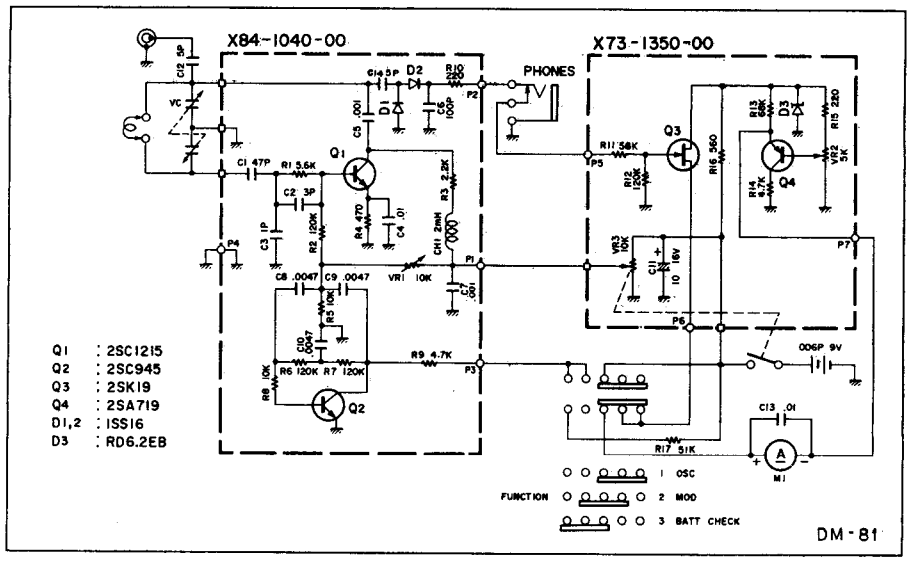

Fig. 9 — Schematic diagram of the Kenwood DM-81 dip meter. The electronic symbols do not conform exactly to those usually found in *QST*, since the diagram was taken directly from the instruction book. The dashed lines indicate individual pc-board modules.

ALLIANCE HD-73 HEAVY-DUTY ROTATOR

☐ When it comes to a rotator for that beam, most hams are of the opinion that "Well, you've seen one and seen 'em all." Many amateurs don't really stop to consider how a rotator is designed and what conveniences it might offer. After all, a rotator's only consideration is the capacity it'll handle, right? Wrong! Enter the HD-73.

The rotator head offers some interesting features that became apparent when I installed it. The mast clamp is designed to allow precise centering of the mast on the rotator body without the need for shims. Correct alignment reduces the possibility of undue stress and binding when the mast and antenna are rotated. In addition, a tight-fitting plastic cover surrounds the cable connections, ensuring that no moisture or dirt will harm the terminal strip. The ball race and gears are very substantial for a rotator head of its size, and the housing is cast aluminum and well-finished.

The control unit, finished smartly in black plastic with a brushed-aluminum face, contains the most interesting feature of the HD-73: There's no separate brake switch. What's more, there are two rotation speeds available on the control lever. Normal operation is about 1 rpm and the slow speed about 1/2 rpm. This feature is handy for turning an array slowly in high winds, or for more accurate aiming of narrow-bandwidth arrays such as might be found in vhf work. The automatic braking system uses a centrifugal friction brake rather than a locking-pin arrangement operated by a solenoid. It's well known that an antenna array will take longer to coast to a stop in high winds than if no wind were present. The brake in the HD-73 adjusts itself according to the turning forces against the array, to set the brake when turning has nearly ceased. Does this arrangement provide an adequate lock? I believe so. The rotator was installed in my tower to turn a Wilson System 40 tribander — about 13 square feet of antenna area including the masting. The HD-73's rated at 10.7 square feet! While working up on the tower recently, I observed some very strong wind gusts — I estimate nearly 50 mi/h. The rotator windmilled only once, and only for a few degrees. It appears to me that this indicates a good, strong braking system for the rated capacity, with some "breathing space" built in. Had the tribander been smaller, it's likely that there would have been no windmilling. This arrangement would seem to be more favorable than the solenoid type of positive lock that can be damaged permanently if the brake is set while the antenna system is still turning. A further fail-safe feature is a thermal limiter within the control unit that shuts down the rotator when the power transformer gets excessively warm from repeated operation. So far, the cutout hasn't opened up in my installation, which indicates that the transformer and power supply are more than adequate to handle loads the rotator is rated for.

In all, the HD-73 presents a well-designed unit. I was somewhat skeptical about using this system to turn an antenna and mast totaling 2 square feet more than its rated capacity. Alliance, however, had given me the go-ahead. Their confidence in the HD-73 is deserved — this rotator is entirely up to the task. The HD-73 is available from: Alliance Mfg. Co., Inc., 22790 Lake Park Blvd., Alliance, OH 44601. — *Sandy Gerli, AC1Y*

Alliance HD-73 Heavy Duty Rotator

Manufacturer's Claimed Specifications

Mast mounting size: 1-3/8" OD to 2-1/2" OD (38 × 63 mm).
Mounting: In tower (preferred) or on mast with extra brackets supplied.
Cable required: 6-conductor, equiv. to Belden-type 8448 with two wires not used.
Voltage input: 117 V ac, 60 Hz, ± 12 V.
Rotator weight: bare: 6-3/4 lbs (3.06 kg).
Rotator speed: dual — 1 rpm and approx. 1/2 rpm, selectable.
Power transformer protection: dual — fuse and thermal limiter.
Metering: north-centered.
Braking system: automatic, centrifugal.
Price class: $155.