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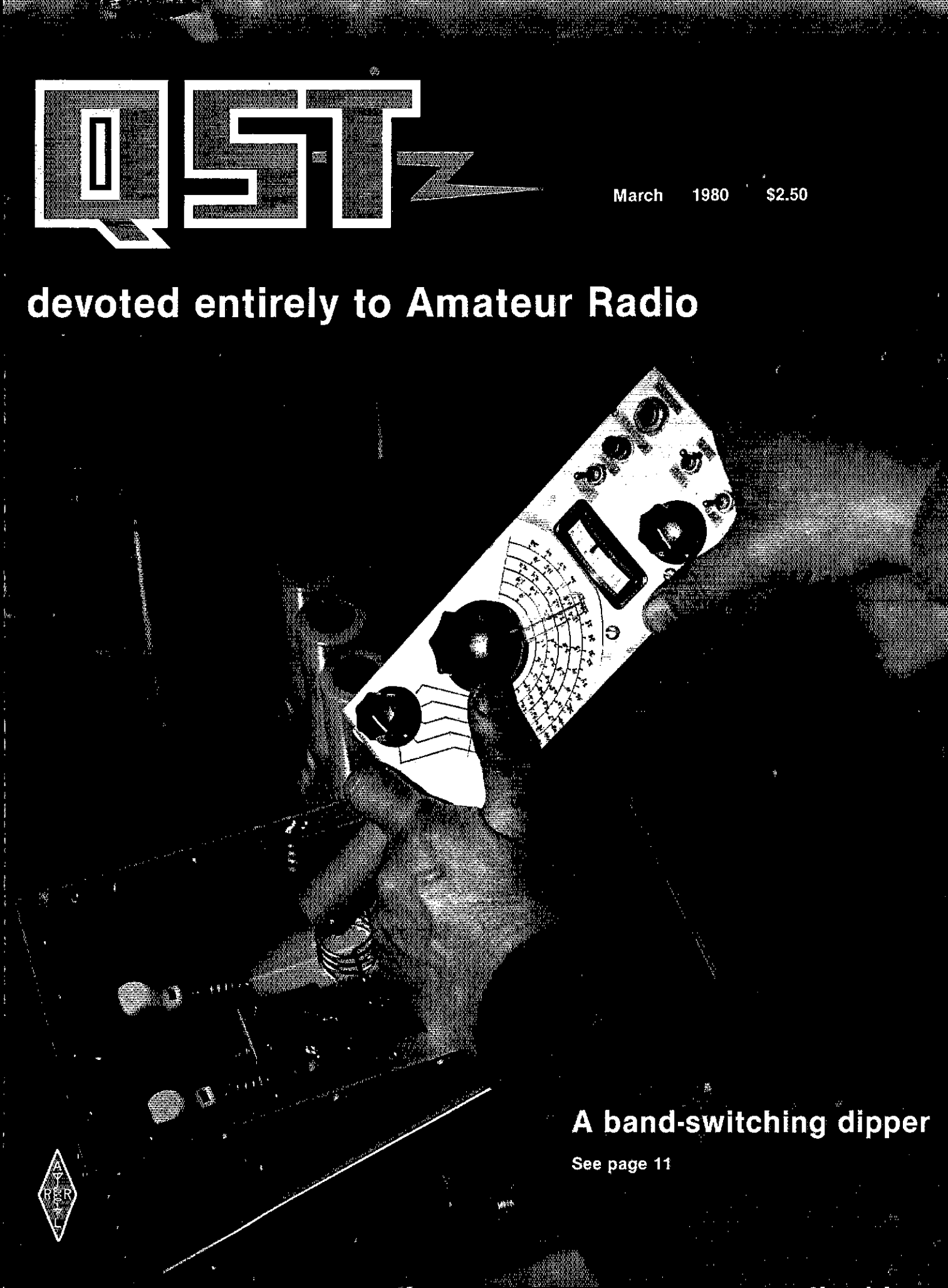

A band-switching dipper

See page 11

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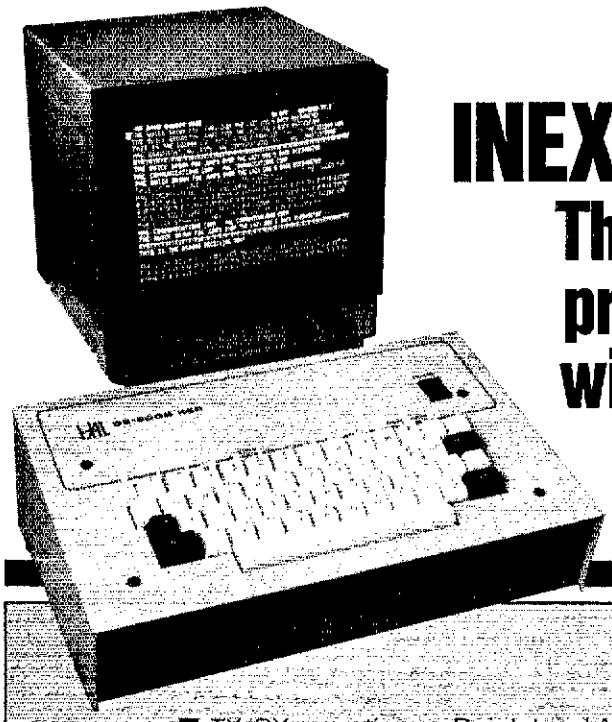

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THE COVER

It's a wide-range dip-meter, and a great deal more. Why not build this useful, state-of-the-art instrument for your shack? See page 11.

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DXpedition...The Ultimate Fantasy

Clipper ships sailing to foreign shores. Sixteen amateurs primed for adventure, coming together as the first group in 20 years to set foot on the remote French Island, Clipperton. Their goal: 30,000 QSO's in just 7 days.

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Wind Sfc. area	5.6 Feet²
Weight	35 Pounds
Turn Radius	16' 9"
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Fasteners	Zinc Plated Steel
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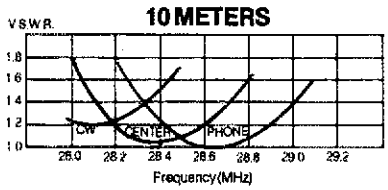

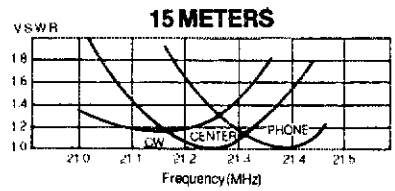

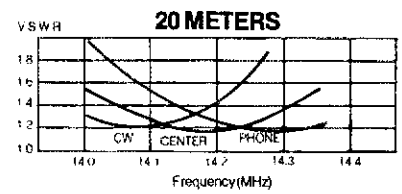

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FEATURES:

- All solid-state with wideband RF amplifier stages. No final dipping or loading, no transmit drive peaking, and no receive preselector tuning! *Just dial your frequency and operate!*
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- Digital frequency display (standard). 100-Hz resolution. Six digits. Special green fluorescent tubes eliminate viewing fatigue. Analog subdial, too, for backup display.
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- Attractive, compact design. Measures only 3½" high X 9¼" wide X 13½" long, and weighs only 4.9 kg (11.7 lbs.). A perfect size for convenient mobile operation and rugged enough for either mobile or portable use. Also has all the desired features for optimum ham-shack operation at home.
- Noise blanker. You'll wonder where the ignition noise went.
- Operates with PS-30 base-station power supply, which turns on and off remotely with TS-120S power switch.

See the big little TS-120S rig and matching accessories (VFO-120 remote VFO, SP-120 external speaker, PS-30 AC power supply, MB-100 mobile mounting bracket, AT-120 antenna tuner and YK-88C CW Filter) at your nearest Authorized Kenwood Dealer!

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- All solid-state... including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate!
- High power... 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters (entire band provided). Also covers more than 50 kHz above and below each band (MARS, WARC, etc.), and receives WWV on 10 MHz.
- Improved dynamic range.
- Adaptable to all three proposed (WARC) bands.
- Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.
- Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate "out of band." Monoscale dial, too.
- IF shift... Kenwood's famous passband tuning that reduces QRM.
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- Improved RF speech processor.
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All of these advanced features can be yours... and at an attractive price! Visit your local Authorized Kenwood Dealer and inquire about the exciting TS-180S with DFC!

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San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — D. Paul Gagnon, N6MA, 3800 So. J St., Oxnard, CA 93030 (805-484-1951)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Roger D. Coday, N5FN, 213 Ave. G, RFD 4, Brazoria 77422 (713-798-7920)

THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us..."

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

Malicious Interference

In the early 1950s Amateur Radio faced a crisis because of TVI. That crisis was solved through a several-pronged attack. In the League's lab, we developed circuit and shielding designs which radically reduced the radiation from amateur transmitters. A League staffer journeyed all over the United States and Canada demonstrating how TVI problems could be handled, and TVI committees were formed throughout the country in order to coordinate local efforts in tracking down sources of TVI and educating not only amateurs and TV viewers but also other users of the spectrum on how to solve what was then a much more serious problem than it is today.

Now, in the 1980s, Amateur Radio faces another crisis, and it's one that's brought upon us by ourselves. As the guy in the comics said, "We have met the enemy, and he is us."

Malicious interference to amateurs by amateurs is causing increasing consternation. Repeaters are being disrupted. Nets handling emergency traffic are being harassed. The appearance of a rare DX station triggers off a veritable barrage of deliberate interference. What kind of sick people are loose in our midst? Must we suffer these indignities? What can we do? League headquarters and Directors are receiving an increasing number of communications on this subject, and it was the topic for much discussion — both formally and informally — at the January Board Meeting.

One suggestion that seems to warrant careful consideration is the formation of local committees to combat the problem. These committees might be composed of responsible and competent amateurs who would organize an effort on a local level to educate amateurs on how to improve operating behavior and how to track down (by, for example, radio direction-finding means) those responsible for the interference. A network of such committees all over the country could exchange notes on how to proceed, on where interfering transmitters seemed to be located, on technical information that would help the individual committees. ARRL headquarters could publish updated addresses and rosters of such committees, and could act as a clearing house for the exchange of pertinent information, perhaps by a regular printed bulletin.

There may be other and better solutions, and at its January meeting (at Minute 65) the Board directed President Dannals to appoint an Ad Hoc Committee to study the problems of malicious interference. The Chairman of the Committee is ARRL's First Vice President Carl L. Smith, WØBWJ, with the other members being Director Garfield Anderson, KØGA; Director Ray Wangler, W5EDZ; Vice Director George Diehl, W2IHA; and Vice Director Pete Matthews, WB6UIA. Perry Williams, W1UED, is Hq. liaison. The Committee needs and wants your participation, and any input that you have ought to go to WØBWJ at his home address (1070 Locust St., Denver, CO 80220) or via Newington.

Amateur Radio needs your help, desperately. Amateur Radio faces a crisis, and if we don't solve the problem of malicious interference, we will find the Amateur Radio Service descending to a despicable level of behavior that is not in keeping with our fine and vaunted tradition.

Ergo, we damn well better do something about it. — *Richard L. Baldwin, W1RU*

League Lines...

ASCII, an encoding system for digital transmissions that is compatible with most "personal computers," will be permitted on amateur frequencies 30 days after publication of amended rules in the Federal Register. Though the Order in Docket 20777 implementing the amendment had not been published at press time, ARRL has learned that the amendment will change Section 97.69 of the Amateur Rules. The new Section 97.69 will include a new preamble to explain the purposes of digital transmissions. Other changes in this section referring to ASCII include the following: (1) ASCII shall conform to the American National Standard Code for Information Interchange (ASCII) as defined in the American National Standards Institute (ANSI) Standard X 3.4-1968. (2) ASCII encoding using F1 emission shall be permitted on those frequencies between 3.5 and 21.25 MHz where F1 emission is already authorized; however, the sending speed shall not exceed 300 bauds. (3) ASCII encoding using F1, F2 and A2 emissions shall be permitted on those frequencies between 28 and 225 MHz where F1, F2 and A2 emissions are already authorized; however, the sending speed shall not exceed 1200 bauds. (4) ASCII encoding using F1, F2 and A2 emissions shall be permitted on those frequencies above 420 MHz where F1, F2 and A2 are already authorized; however, the sending speed shall not exceed 19.6 kilobauds. Full information will appear in the April QST "Happenings" column. Please note that this information updates the ASCII item in this month's "Happenings" on page 74.

United States radio amateurs holding the Novice or Technician class license may now operate in Canada with the privileges of mode and frequency authorized to them in the United States. Similarly, Canadian Digital Class operators may operate in the U.S. with the frequency privileges authorized them on vhf and uhf in Canada. All visitors to the U.S. must stay within the U.S. mode and band privileges, however, and all visitors to Canada must stay within Canadian mode and band privileges. Since reciprocity between Canada and the U.S. is automatic, no written permit is necessary,

A reciprocal operating agreement between the United States and Spain has gone into effect. U.S. amateurs seeking operating permission in Spain should contact the Union de Radioaficionados Espanoles, P.O. Box 220, Madrid 4, Spain, for information on application procedures.

Canada and Jamaica have concluded an agreement permitting Amateur Radio third-party traffic between the two countries.

This year's ARRL DX Contest is an innovation aimed at making the contest more universally attractive. After the contest, we would like to have your reactions. Do you like this year's contest format, or would you like to return to the previous set-up? Please send your comments to the Contest Advisory Committee, c/o ARRL hq., by June 15th, so that any suitable changes can be included in the 1981 ARRL DX Contest rules.

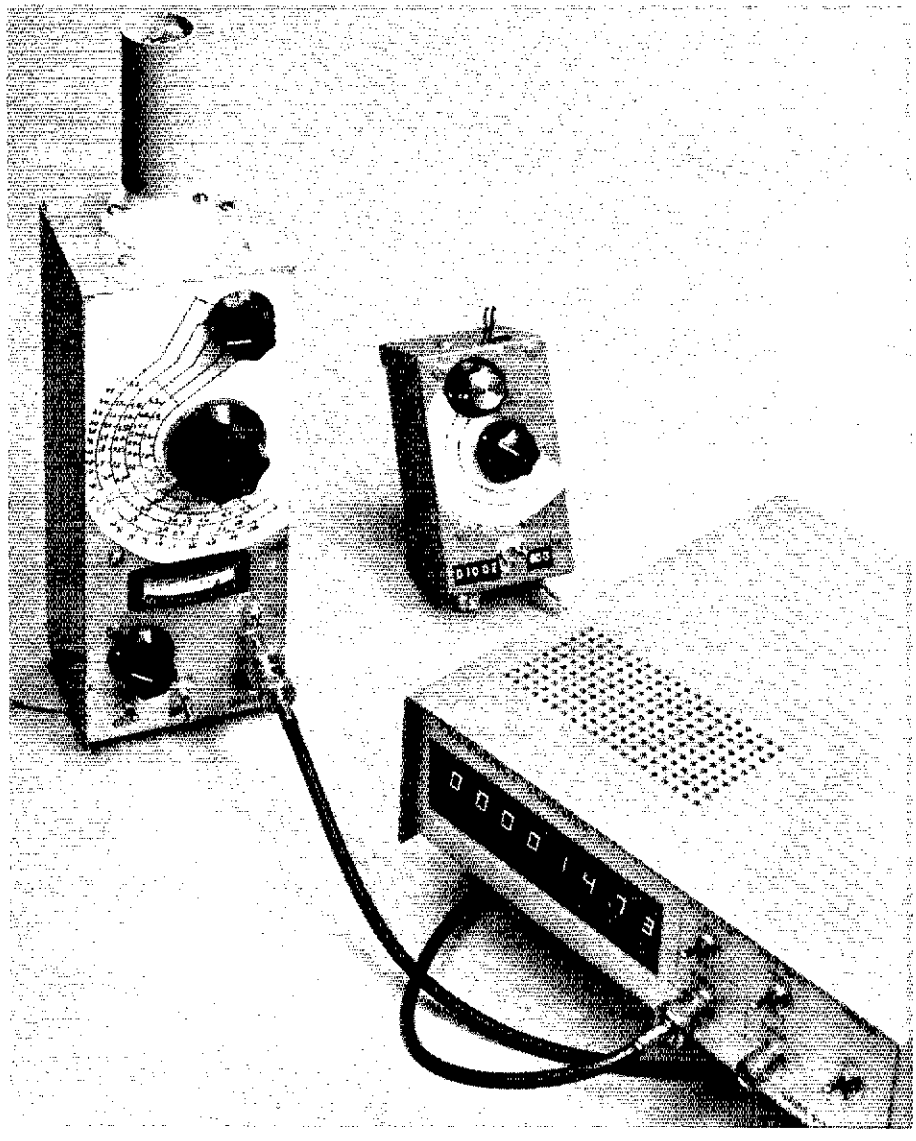
ARRL organizational changes too late for inclusion in "Happenings." ARRL President Dannals has appointed O.D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory, TN 37138 to be the new vice director for the ARRL Delta Division to replace Lionel A. Oubre, K5DPG, who becomes director. Also, Mrs. Evelyn Gauzens, W4WYR, 2780 N.W. 3rd St., Miami, FL 33125, has been appointed as vice director for the ARRL Southeastern Division to replace Frank M. Butler, Jr., W4RH, who becomes director. See pages 8 and 9 of this issue for a complete list of ARRL directors, vice directors and officers. John C. Sullivan, W1HHR, ARRL director for the New England Division, has been named Board liaison to the ARRL Emergency Communications Advisory Committee, and George A. Diehl, W2IHA, ARRL vice director for the Hudson Division, has been named Board liaison to the ARRL VHF Repeater Advisory Committee. The Ad Hoc Committee on Malicious Interference, set up at the Board meeting, will have these members: WØBWJ, Chairman, KØGA, W5EDZ, W2IHA and WB6UIA, members; W1UED, Hq. Liaison. See the editorial, page 9, for more information.

More good work by the Commission's monitors! During the early morning hours of February 7, 1980, U.S. Marshals and FCC agents closed down a Miami station which had been making broadcasts of a political nature to Cuba, using frequencies in the amateur 40-meter band. The Commission's long-range direction-finding network and the Miami District Office were instrumental in locating and identifying the operator of the station, who was not an amateur but who was using several thousand dollars worth of high-powered amateur equipment. The transmissions from this station had been the subject of interference complaints from radio amateurs throughout the United States and from neighboring countries. The single station had used several identifiers, giving the impression that several stations were involved.

A 1980 Dipper

This state-of-the art dip meter covers 1 to 57 MHz without plug-in coils. It features several innovations not found in commercial models.

By Fred Brown,* W6HPH



The W6HPH dip meter at the left has features not found in many commercial dip meters. Among the advantages offered by the W6HPH design are band-switched frequency coverage, an output jack for a frequency counter and square-wave modulation. Use of an "edgewise" meter leaves more panel space for controls. The frequency scales are hand lettered on opaque paper. An additional tuning head for extending the frequency range into the vhf/uhf range is shown between the dipper and the frequency counter.

Grid-dip meters, or simply dip meters, (most are now solid-state) have undergone only minor improvements since they were first introduced by *QST* in 1926. Current models still use "old-fashioned" plug-in coils and most do not provide for connection to a frequency counter. The author's first band-switching dipper, built over a decade ago, covered 1.3 to 36 MHz.[1] It has served well over the years, but many times the need was felt for a more versatile model with a wider range.

The instrument described here, besides performing the basic dip-meter, wavemeter and signal-generator functions, has the following features not found in commercial versions:

- Band-switched frequency coverage from 0.83 to 57.4 MHz.
- A frequency-counter output jack for precise digital readout.
- A capacitance probe for dipping toroidal, pot-core or shielded tuned circuits.
- 1000-Hz square-wave modulation.
- An accessory socket for connection of additional tuning heads to extend the frequency coverage into the vhf or uhf range.

The Circuit

As shown in Fig. 1, JFET Q1 functions as a conventional Colpitts oscillator. Its frequency is determined by C1 and the value of inductance switched in by means of S1A. Another section of this 5-position switch, S1B, connects the correct value of capacitance to the source of Q1 to control the level of feedback.

The rf voltage on the source of Q1 is rectified by D1, and the resulting dc voltage is applied to JFET Q2 through the 1-megohm sensitivity control, R2. D2 provides a fixed source bias for Q2. These two components act as one arm of a bridge. The other arms consist of R3, R4 and R5. Dc voltage from D1 unbalances the bridge and results in deflection of the 0- to 1-mA meter. Audio from the drain of Q2 is capacitively coupled to emitter-follower Q3. The low output impedance of Q3 feeds headphones when the dipper is used as a wavemeter or signal tracer for a-m signals or as a heterodyne receiver for cw signals.

Transistor Q4, in series with the source of Q1, acts as a switch for square-wave modulation of the oscillator. Square-wave modulation was chosen because it avoids the fm problems associated with sine-wave modulation. During the modulation cycle the oscillator is turned either completely off or on by the square wave. The result is a-m *without fm. The square wave is* generated by the multivibrator, Q5 and Q6.

*1169 Los Corderos, Lake San Marcos, CA 92069

[1]Brown, "A Band-Switching Grip-Dip Meter," *CQ*, February 1966, p. 60

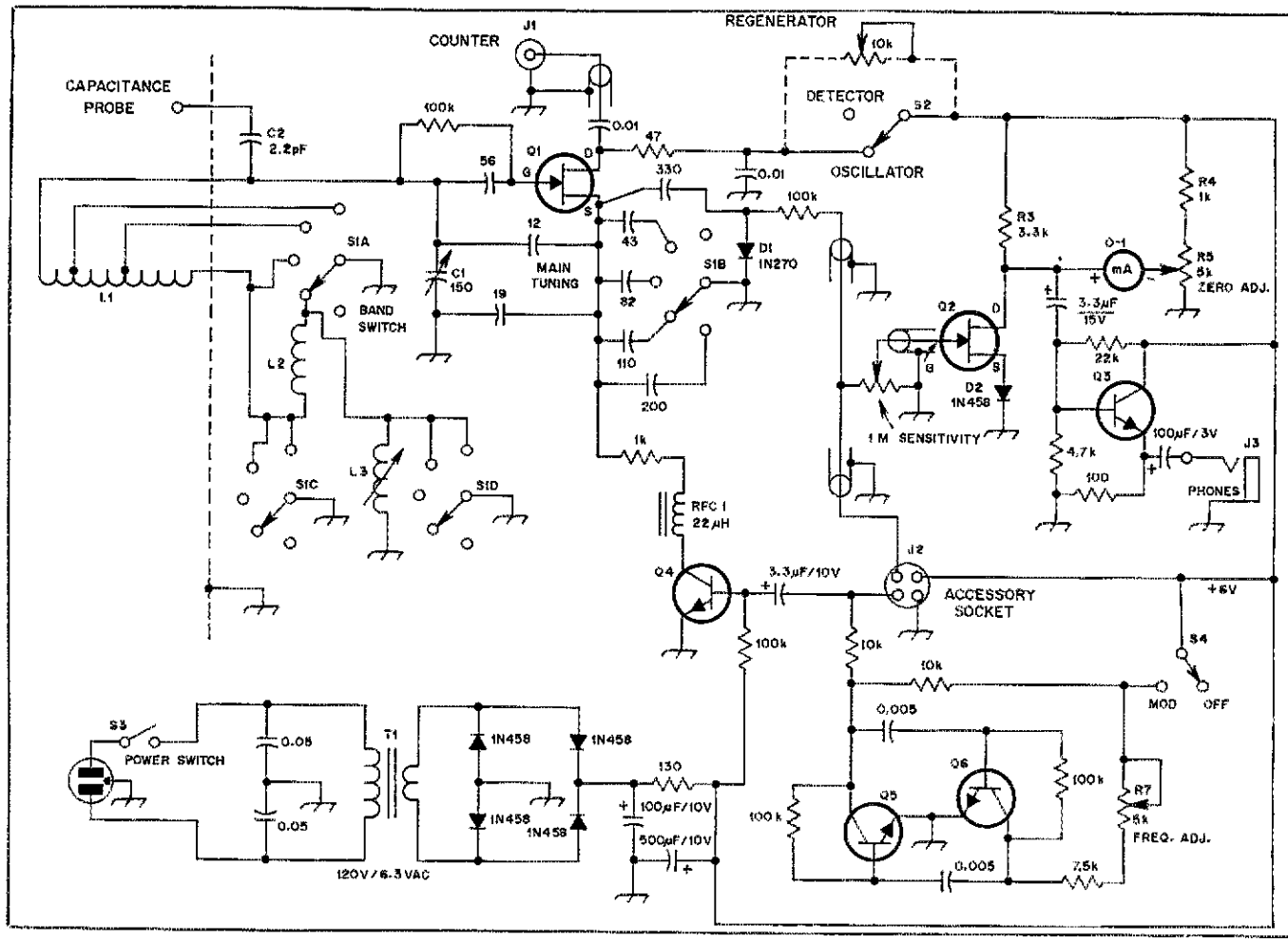


Fig. 1 — The W6HPH dipper circuit. Power is supplied through a small 6.3-volt filament transformer (T1). Q1 and Q2 are 2N3819s. All other transistors are 2N2222s or equivalent. Resistances are in ohms. Except as indicated decimal values of capacitance are in microfarads (µF). Other capacitance values are in picofarads (pF).

J1 — Coaxial jack.
J2 — Four-pin jack.
J3 — Phone jack.
L1 — 7.7 µH, 39 turns of 3/4-inch Miniductor, 16 turns per inch. Tapped 2-1/4 turns and 10-1/4 turns from the "hot" end.
L2 — 36.5 µH, 22 turns of no. 30 enam. wire on Amidon FT-50-61 toroidal core.
L3 — 167 µH, Archer no. 27-1430 or J. W. Miller no. 43A154CBI.
RFC1 — 22-µH iron core rf choke, J. W. Miller no. 70F225AI or equiv.
S1 — See text.
S2, S4 — Spdt switch.
S3 — Spst switch.

Some commercial instruments, such as SWR meters, have narrow-band amplifiers tuned to 1000 Hz. To accommodate such an amplifier requirement, a frequency control, R7, is included in the dipper circuit for precise setting of the modulation frequency. Surprisingly, the modulation frequency turned out to be remarkably independent of power-supply voltage. A line voltage change of 10 percent moves the frequency only 9 Hz.

A 47-ohm resistor in series with the drain of Q1 develops about 250 mV of rf voltage across it, more than enough to drive a frequency counter. This signal is delivered to a phono jack located on the front panel — a jack which also can be used as a signal-generator output.

The primary purpose of J2 is to accommodate additional rf needs for vhf and uhf coverage. It also provides a 6-V dc source and low-level 1000-Hz audio for general experimental work. Furthermore, J2 serves as an input for the audio amplifier, with the output appearing at J3. Finally, a 6-V battery may be connected to this socket for the purpose of making the dipper a completely self-contained portable unit.

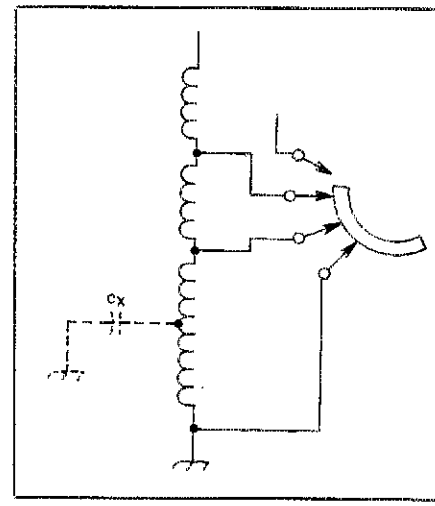


Fig. 2 — Stray-capacitance path in an inductive circuit. Even though both ends of a coil are grounded, the distributed and stray capacitance between the coil and ground, C_X, can still give rise to a resonance.

Band Switching

One problem with a band-switching dipper is the presence of false dips caused by resonances within the switched inductor. Fig. 2 shows how a resonance can occur even though both ends of a coil are grounded by a switch. The stray capacitance between the coil and ground, in conjunction with the coil inductance, forms a parallel-tuned circuit. If its resonant frequency lies within the tuning range of the dipper, it will cause a permanent dip at that frequency.

This dipper, however, is entirely free of false dips. Ideally, a shorting-type switch, such as shown in Fig. 2, should be used for switching the inductance, so that all

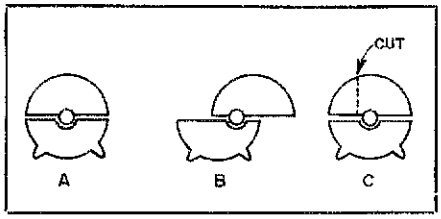


Fig. 3 — A straight-line variable capacitor with straight-line capacitance characteristic is shown at A, and a straight-line-wavelength variable is shown at B. C illustrates how a straight-line capacitance unit can be modified to approximate a straight-line-wavelength response by cutting off the left-hand part of the rotor plates. To avoid possible erratic operation resulting from dirt collecting around the bearings on the capacitor assembly, solder a piece of braid between the shaft and rf ground.

taps on the unused part of the coil will be grounded. Since a shorting type switch was not available, an ordinary 5-position, 4-section wafer switch was used. Two of the extra sections, S1C and S1D, are employed to ground unused taps on the upper frequency ranges.

False-dip problems are also minimized by placing the lowest-frequency coils, L2 and L3, inside the box where there is no inductive coupling to L1. As a result, most of the inductance on the two lowest bands is contained inside the box. This reduces the amount of inductive coupling available for dipping an external LC circuit, which makes the dip weak or hard to find at times, on the lowest band. Where weak coupling is a problem, capacitive coupling, by means of C1, can be used. Of course, capacitive coupling is necessary, in any case, for toroidal or shielded coils.

Receive Mode

When switch S2 is in the detector position, the dipper functions as an indicating wavemeter. The sensitivity was checked at 10 MHz by link coupling L1 to a signal generator. To produce a noticeable deflection of the meter, 50 mV was needed, but when the signal was 70 percent amplitude modulated it could be heard in headphones even when the level was down to 1 mV.

This instrument can also be used as a heterodyne receiver of weak or unmodulated carriers by placing S2 in the *oscillator* position and carefully tuning for a beat note. In this mode, signals as weak as 100 μV can be heard. It's interesting to note that the heterodyne receiver was a predecessor of the superheterodyne. In recent years the heterodyne type of receiver has been rediscovered, and renamed the "direct conversion" receiver.

If a 10-kilohm regeneration control is connected across S2, as shown in Fig. 1, the dipper can serve as a regenerative receiver. With careful adjustment, signals as weak as a few μV can be heard. In fact, several 40-meter cw and ssb stations can be copied when the dipper is coupled to an antenna. Nevertheless, the dipper is definitely not recommended as a substitute for a communications receiver! In the author's case, the regeneration control is not incorporated as a permanent feature.

Construction

This instrument is built in a 2-3/4- × 3- × 8-inch (70- × 76- × 203-mm) LMB chassis box, but a smaller box could have been used. Parts are so arranged as to keep rf leads short. A miniature switch is recommended for S1. It should be mounted between the tuning capacitor, C1, and the external coil, L1. Q1 and associated components can be mounted on a terminal strip or small circuit board and placed near S1.

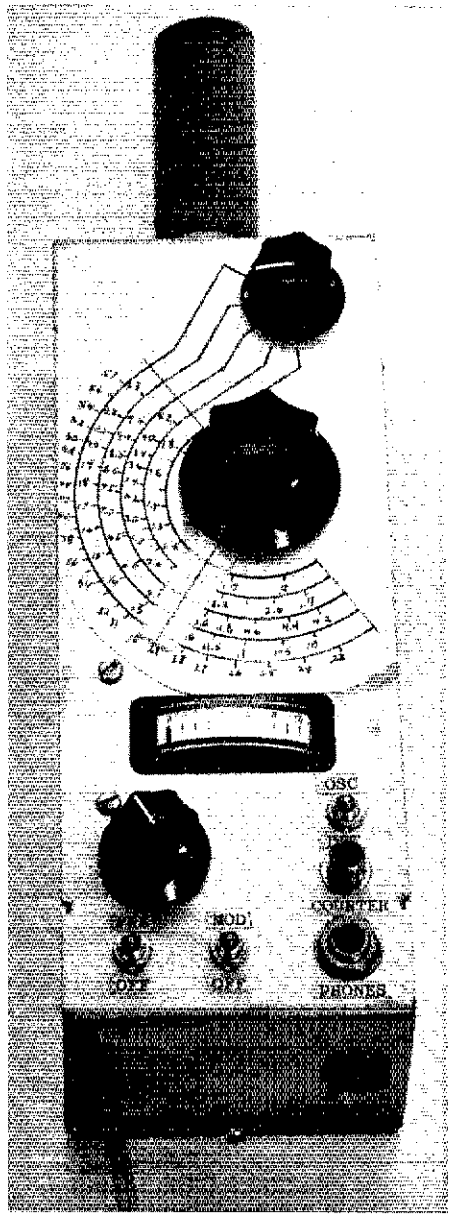
If a straight-line-capacitance variable capacitor is used for C1, the frequency scales will be badly crowded at the high-frequency ends. A straight-line-wavelength capacitor is recommended. Fig. 3 shows the difference. Because the author was unable to find a straight-line-wavelength 150-pF variable capacitor, a straight-line-capacitance 420-pF unit was modified by diassembling the capacitor, cutting down the rotor plates, and reassembling it. The task is not easy, especially with a close-spaced capacitor. If the reader should want to tackle such a project, however, Fig. 3C shows how a straight-line-capacitance variable can be modified to give fairly linear frequency scales. It will be necessary to start with a 300-pF (or larger) variable capacitor to end up with 150 pF after modification. If, after cutting down the rotor plates, the maximum capacitance is over 150 pF, it can be lowered by removing stator plates one at a time.

Taps on L1, and the inductance values of L1, L2 and L3, should be adjusted so that there is a small amount of overlap at the ends of the tuning ranges. The ranges in this particular dipper ended up as follows: 0.83-1.88 MHz, 1.8-4.2 MHz, 4.0-9.8 MHz, 9.4-23 MHz and 22-57.4 MHz. The Q of L2 and L3 must be fairly high: If the Q is below 50, the dipper will not oscillate over the entire range. Ordinary slug-tuned coils wound on 1/4-inch or 3/8-inch (6- or 10-mm) dia forms will not provide adequate Q. If toroids are used, inductance can be trimmed by removing or adding turns.

A short length of 3/4-inch (19 mm) PVC pipe is slipped over L1 and anchored to the box in order to prevent damage to the coil from accidental collisions. With some dippers, readjustment of the sensitivity control is necessary when coils are changed or when tuning from one end of a band to the other. This dipper is remarkably uniform in sensitivity. The variation in meter reading is only ±15 percent throughout the entire frequency range.

The 2-volt dc output at D1 is sufficient to give full-scale deflection when the sensitivity control is completely advanced, provided Q4 has sufficient transconductance. Most 2N3819s do, but the variation among those devices is greater than 3:1. Those units at the low end of the transconductance range may not have sufficient gain. The I_{DSS} of the 2N3819 also varies over a wide range (10:1) and, depending on the individual FET, use of two silicon diodes in series for D2 may be necessary. One may suffice, however, or even none at all.

The capacitance probe, C2, is connected to a test-prod jack on the front apron of the box next to L1. When capacitive coupling is used next, a test prod, connected through a short flexible lead with an alligator clip, is plugged into this jack. Capacitive coupling works so well it is surprising that this feature was never incorporated into a commercial dipper.



This view of the W6HPH dip meter shows the accessory socket which is mounted on the apron at the right side of the photograph.

Observations of Long-Delayed Echoes on 28 MHz

The LDE mystery solved?

By A. K. Goodacre,* VE2AEJ/3

Observations of wireless echoes of long delay were first reported more than 50 years ago by Stormer and van der Pol.[1] Since then, many occurrences have been documented in the literature[2] but systematic searches for long-delay echoes have either proved negative[3,4] or produced only a few examples.[5] My interest in long-delay echoes was first kindled by the report of Hans Rasmussen, OZ9CR, of the simultaneous reception of lunar echoes (delay 2-1/2 seconds) and "ghost" echoes (estimated delay 4 to 5 seconds) on 1296 MHz.[6]

While operating Amateur Radio station VE7AIZ in Victoria, BC, I carried out several trials in late 1959 and early 1960 on the 50-MHz band to hear lunar echoes from signals transmitted by Gail Allwine, W7RDY, near Seattle, WA. I have retained my chart recordings over the intervening years so, out of curiosity, I decided to look at these charts again. Much to my surprise, several possible long-delayed echoes appear to have been accidentally recorded.

The delay times of the 50-MHz echoes range from about 1 second to possibly as much as 17 seconds. I noticed that sometimes echoes obtained within a short inverval of time exhibit delays which are very nearly in the ratio of 2:1 (e.g., 3.31 and 1.67 seconds; 11.37 and 5.67 seconds; 7.85 and 3.93 seconds). This suggests that some sort of periodic structure may exist in the delay times. Using the method of Broadbent[7] to search for periodicities, I discovered that most of the delay times were integral multiples of 138 milliseconds. This result must be treated with some caution, as a statistical analysis of the timing errors associated with my homemade chart recordings indicated that my equipment was only marginally capable of detecting a time quantum as small as 138 ms. But, such a value immediately suggested to me that the unusual features on my charts were probably associated with ionospheric propagation, as it takes about 138 ms for a radio wave to travel around the world or to go to the antipode, be reflected, and return by the same path.

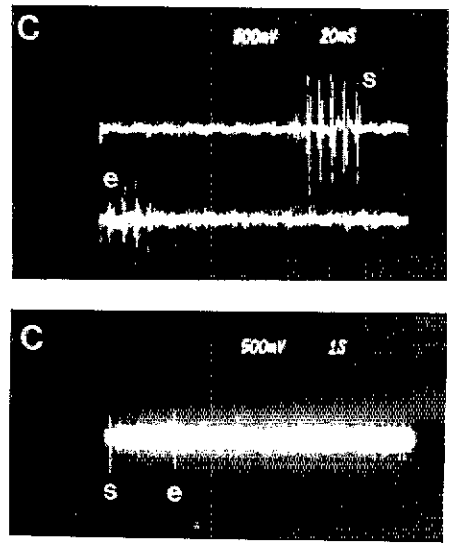


Fig. 1 — 28-MHz transmitted signal (s) and long-delayed echo (e) received on Dec. 1, 1978, at approximately 2300 UTC. Delay time is 2.05 seconds.

With the idea of ionospheric control in mind, I tried, from September 1977 to January 1978, to receive long-delayed echoes on the 14-MHz amateur band. In order to refract my transmitted signal into the ionosphere, I generally operated when the band was ceasing to support ground-to-ground communication. Using this technique I heard a total of 19 weak echoes. Doppler shifts were observed in all cases where I was able to measure the difference between the received and transmitted frequencies. Twelve of the echoes were distinct enough to measure their delay times. But unlike the postulated 50-MHz echoes, the 14-MHz echoes tended to be integral multiples of 133 ms or 144 ms rather than 138 ms. The difficulty with the 14-MHz experiments was that the transmitted pulses were not particularly distinctive, being single pulses a few hundred ms in duration. The received signals could conceivably be from other transmitters, although I took care to operate in those parts of the amateur band where Morse code transmission does not normally occur.

On February 14, 1978, I happened to be searching for long-delayed echoes on the 28-MHz amateur band and recorded a very strong, clear echo in which each of the four consecutive transmitted pulses was Doppler-shifted by different amounts ranging up to about 1 kHz and delayed by different intervals of time ranging from 9 to 10 seconds. This indicated that better results might be obtained on 28 than on 14 MHz, but that it would be necessary to use a fairly wide bandwidth to allow for Doppler shift and to keep the duration of the transmitted signal short enough so that the individual pulses would not be scrambled in the echo. With these requirements in mind, I have been able to document a few good examples of what I believe to be long-delayed echoes on 28 MHz.

Experimental Technique

I feed approximately 400 watts at 28 MHz to a wide-spaced 5-element Yagi antenna and use a receiver bandwidth of 4 kHz to listen for possible long-delayed echoes. My antenna concentrates the radiation toward the horizon and points to the west to minimize the effects of man-made electrical noise originating from the city of Ottawa, to the east. I generally operate when the band is just ceasing to support ground-to-ground communication. Forecasts by the Geomagnetic Service of Canada enable me to concentrate on the periods when the earth's

*1286 Woodside Dr., Ottawa, ON K2C 2G9
[1]Notes appear on page 16.

Table 1

Delay Times of Echoes Depicted in Figs. 1 through 3.

Echo	*Date and approx. time, UTC*	*Delay time in seconds*
A	Nov. 14, 1978 0000	7.04
B	Nov. 17, 1978 2300	5.38
C	Dec. 1, 1978 0000	2.05
D_1	Dec. 1, 1978 0000	2.76
D_2	Dec. 1, 1978 0000	4.28
E	Dec. 1, 1978 0000	1.53
F	Dec. 14, 1978 0100	2.21
G	Jan. 13, 1979 0100	8.97

geomagnetic field is quiet. To obtain a distinctive signal I send groups of three to nine pulses at a rate of 130- to 150-pulses per second (PPS). I avoid rates of 60- and 120-PPS since most repetitive electrical noise exhibits one or the other of these rates. I transmit a signal every 10 to 20 seconds. The receiver output is recorded on magnetic tape and the counter reading is noted whenever a possible echo occurs. Timing calibration is provided by recording CHU time signals before and after each attempt to hear echoes. Then the tape is played back into an oscilloscope and the echoes and time signals are photographed. I then carefully measure the photographs to obtain the delay times. The combined error, because of errors in measuring the photographs and slight irregularities in the speed of the tape recorder, is estimated to be about 20 ms.

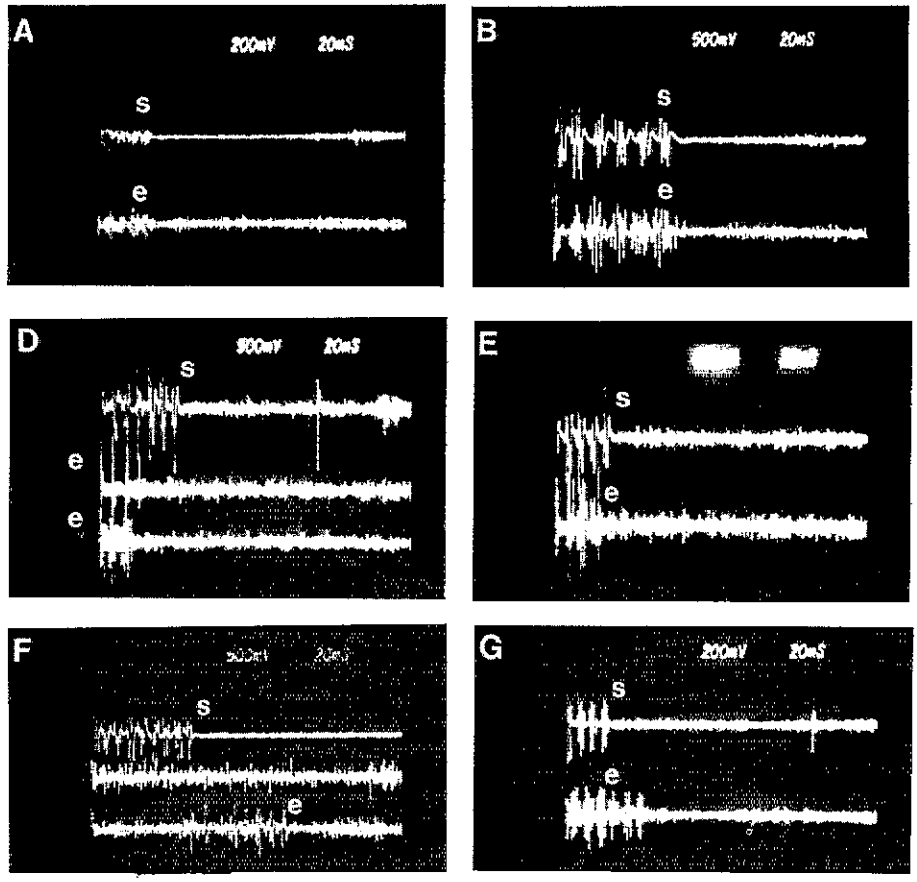


Fig. 2 — Other examples of 28-MHz long-delayed echoes. The transmitted signal is labeled s; the echo is labeled e. Details are given in Table 1.

Results

While operating for a total of about eight hours from the middle of November 1978 to the middle of January 1979, I obtained a few echoes that are sufficiently strong and clear to be displayed photographically. See Fig. 1 to 3. The echoes are labeled chronologically from A to G. One of the better examples is echo C, given in Fig. 1. The upper part shows the details of the transmitted signal (s) and the echo (e). The bottom part shows the signal, the echo and the general background noise. The signal is, in reality, much stronger than the echo, but it appears to be about the same strength because of the nonlinear response of the receiver to strong signals. Although echo C is not too strong, it reproduces the features of the transmitted signal quite well.

Figs. 2D and 3D show what appear to be two echoes originating from the same transmitted pulse. The second echo is somewhat questionable, but the first echo exhibits exactly the same pulse repetition rate as the signal. Note that the first echo is either truncated or fades into the background noise. Echo G (Fig. 2) seems to consist of two overlapping echoes, the second one only slightly weaker than the first. Echo E may also be two overlapping echoes but, if so, the second one is much weaker than the first.

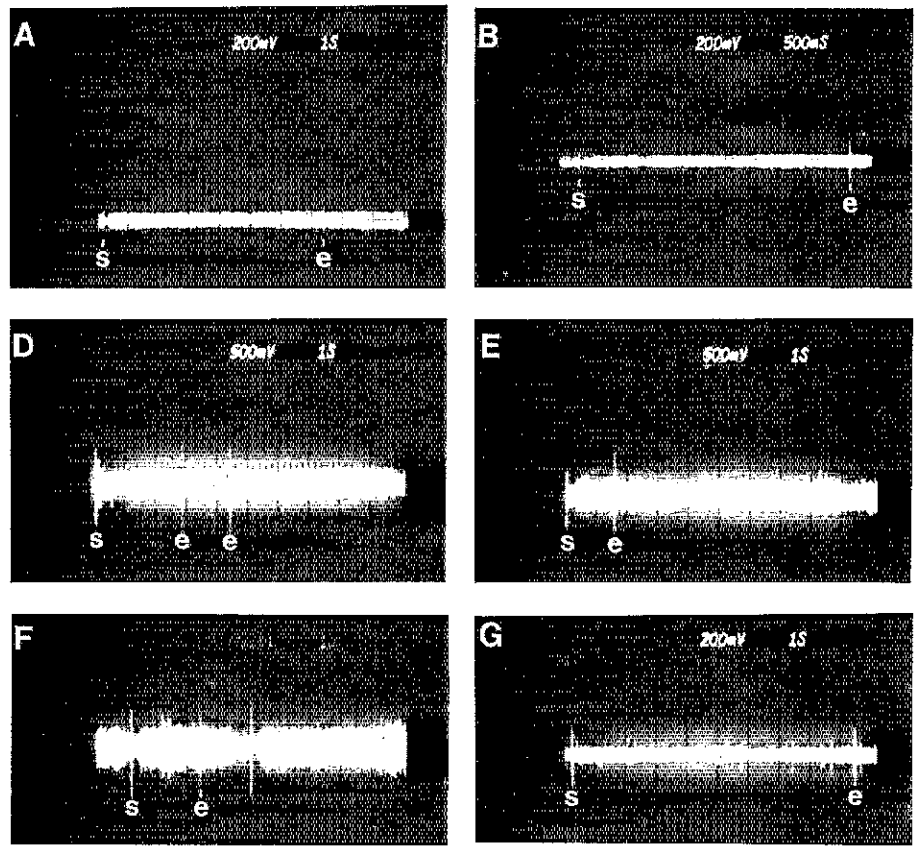


Fig. 3 — Long-delayed echoes as in Fig. 2, but showing general background noise in addition to the transmitted signal (s) and echo (e).

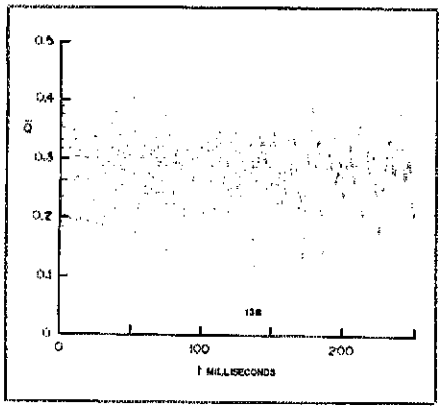


Fig. 4 — Plot of $\bar{Q}$ vs t for the eight delay times given in Table 1. See text for definition of Q. Note the pronounced minimum at t = 138 milliseconds.

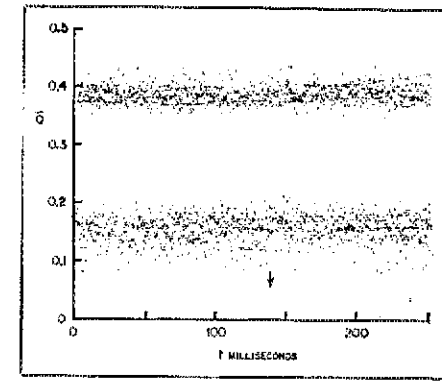


Fig. 5 — Plot of extreme upper and lower values of $\bar{Q}$ vs t as obtained from 100 sets of random numbers used as input data. Note how the minimum in Fig. 4 (marked by arrow) falls well below most of the points in this plot.

In most cases the echo returns within the passband of the receiver, but in the case of echo F, the returned signal is characterized mainly by the switching transients which occur as the transmitter is turned on and off. In this case the main part of the echo may have been Doppler shifted outside of the receiver passband. Although it is not good engineering practice, I allow switching transients to remain in my signal so as to render the signal more distinctive.

Echo A is weak and of marginal quality but exhibits the same pulse repetition rate as the transmitted signal. In Fig. 2, echo B is quite strong but somewhat blurred; in this picture the tape has been played at one-half speed to enhance the detail.

Analysis of the Delay Times

The delay times of echoes A to G are given in Table 1. It can be seen that any unit of time which might be common to these delay times is much less than one second, but it is not obvious what this unit might be. In order to see whether the delay times are "quantized," I have used the method of Broadbent, referred to earlier, to search for periodicities in the range from 10 to 250 ms. Briefly, the procedure is to take a number, t, and form the ratio, E_j/t, where E_j is the delay time of the j^{th} echo and see how far the quotient departs from being an integer. For example, if $E_j/t = 13.7$, the closest integer is 14; but if $E_j/t = 13.4$ the closest integer is 13. In the first case the difference is -0.3; in the second case it is 0.4. If the departure of E_j/t from the nearest integer is termed q_j then the root-mean-square value

$$\bar{Q} = [1/N \sum_{j=1}^{N} (q_j)^2]^{1/2}$$

will be a measure of whether a given periodicity, t_o, exists in the delay. If all of the delay times are exact integral multiples of t_o, $\bar{Q}$ will be zero; but if the process is carried out using uniformly distributed random numbers, the quantity $\bar{Q}$ tends to be a normally distributed random variable with a mean value of 0.29 and a standard deviation of $0.013/N^{1/2}$ where N is the number of delay times considered.

Fig. 4 shows $\bar{Q}$ as a function of periodicity, t, for the eight delay times in Table 1. A distinct minimum occurs at 138 ms, a value that has some physical meaning, but the question is whether such a minimum might not occur even with a set of random numbers. To demonstrate that this is unlikely, I have calculated $\bar{Q}$ as a function of t for 100 different sets of random numbers and plotted, for each value of t, the greatest and least values obtained for $\bar{Q}$ (Fig. 5.) In only two cases out of 100 is a value of $\bar{Q}$ obtained that is as small as that obtained from the delay times in Table 1. As a conservative estimate, I believe there is only about one chance in 20 that the delay times of echoes A to G are not related to each other through the time quantum of 138 ms.

Discussion

Since the time for a radio wave to travel around the world is about 138 ms, the periodicity of 138 ms contained in the delay times of the long-delayed echoes presented here strongly suggests some form of ionospheric control of the phenomenon. This is consistent with the results of Sears, who generally observed long-delayed echoes when the operating frequency was near the F2-layer critical frequency. In his case, the antenna was radiating mainly vertically upwards and most power would be coupled into a horizontally traveling wave under this condition. In my experience, the best long-delayed echoes occur when long-distance, east-west propagation is good. Of course, this may not be the only condition conducive to the production of long-delayed echoes.

I believe that the long-delayed echoes that I hear have been trapped in a duct, possibly between the E layer and the F layer, and that the signals have either traveled around the world several times or have been confined to either the daytime or nighttime ionosphere, traveling back and forth repeatedly from one end of the duct to the other. I believe the signal escapes from the duct and returns to earth by reflecting off an ionized meteor trail. This would explain the Doppler shifts which both Sears and I observe.

Recently, Muldrew has suggested a mechanism to generate long-delayed echoes that involves signals from two transmitters interacting to produce a ducted electrostatic wave.[8] Muldrew's mechanism could explain the occurrence of long-delayed echoes up to ultrahigh frequencies (≈2000 MHz) and, hence, explain Rasmussen's observations, but it is not clear whether this mechanism can explain the time quantum apparent in my results.

Finally, although I believe that the delay times of long-delayed echoes are quantized, the actual value of the time quantum may be different under different circumstances. For example, the periodicites in the 14-MHz data referred to in the introduction are 133 and 144 ms, and the 50-MHz data exhibited additional periodicities of 120 and 152 ms. It is interesting to note that the arithmetic mean of the 14-MHz periodicities is about 138 ms. The arithmetic mean of the 50-MHz periodicities is 136 ms. If the earth's shadow on the ionosphere defines a discontinuity between the daytime and nighttime ionosphere, the maximum two-way travel time on the daytime side is about 160 ms and about 120 ms on the nighttime side. I have recorded short-delayed echoes on 28-MHz Morse code transmissions from other stations. In one case, delays of 115 ms were observed and in another case the delay was 156 ms. The presence of ducts in both the daytime and nighttime ionosphere might, therefore, produce periodicities other than 138 ms in long-delayed echoes. QST

Notes

[1]Stormer; van der Pol, "Short-wave Echoes and the Aurora Borealis," *Nature*, vol. 122 (1928), pp. 681 and 878 (two articles).

[2]Villard, Graf and Lomasney, "There Is No Such Thing As A Long-Delayed Echo ÄR Long-Delayed Echo ÄR . . .," *QST*, February 1970.

[3]Budden and Yates, "A Search for Radio Echoes of Long Delay," *Journal of Atmospheric and Terrestrial Physics*, vol. 2 (1952), p. 272.

[4]Duffet-Smith, "An Automated Search for Radio Echoes of Long Delay," *Journal of Atmospheric and Terrestrial Physics*, vol. 37 (1975) p. 455.

[5]Sears, "Long-Delayed Radio Echoes," *SU-IPR Report No. 584*, Stanford University, 1974.

[6]Rasmussen, "Ghost Echoes on the Earth-Moon Path," *Nature*, vol. 257 (1975) p. 36.

[7]Broadbent, "Quantum Hypotheses," *Biometrica*, vol. 42, p. 45, and vol. 43, p. 32 (1955 and 1956).

[8]Muldrew, "Generation of Long-Delay Echoes," *Journal of Geophysical Research*, vol. 84 (1979), p. 5199

[Editor's Note: The author's mention of ionospheric ducting as a likely cause of long-delayed echoes makes an article on this subject that appeared in September 1979 *QST*, page 20, of interest.]

Microcomputers and Radio Interference

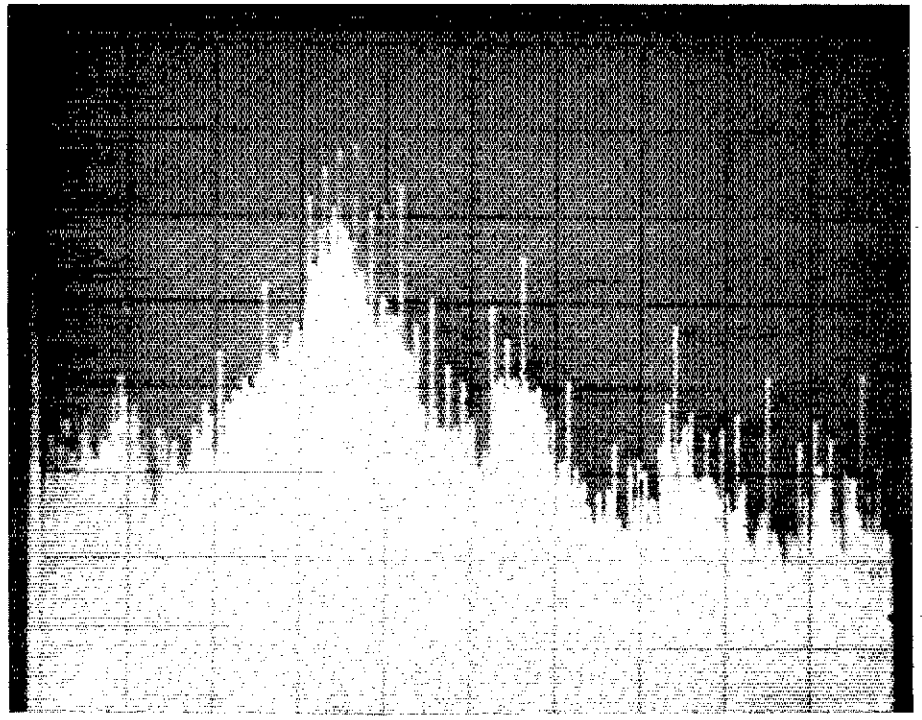
A microcomputer can perform wonders in the ham shack. It can also be an abominable polluter of the radio-frequency spectrum.

By Paul E. Cooper,* N6EY

Just about every amateur already is, or soon will be, deeply involved with microprocessors and microcomputers. The number of things they can do around the ham shack alone is enough reason for this involvement, but in addition the darn things are so seductive that a ham is sure to get hooked.

Unfortunately, too little has been said about the problem of microprocessor or microcomputer compatibility in a communications environment. All microprocessor-based devices, and especially the microcomputer, are a potential source of interference. They are also vulnerable to interference from strong electromagnetic fields. These devices utilize shifts in voltage levels for logic operation, and in modern devices these level shifts are *very* fast, of the order of fractions of a microsecond.

Some idea of the interference problem can be obtained by visualizing the spectrum of a steady stream of short pulses at a fixed repetition frequency. Such a wave shape produces many frequency components, each separated from the next by the repetition frequency. These components extend up in frequency to a limit depending on the sharpness of the rise and fall times of the pulses. If a train of pulses with a repetition frequency of 50 kHz and a rise-and-fall time of a small fraction of a microsecond is generated near a communications receiver, signals can be observed every 50 kHz throughout the tuning range of the receiver. These signals will vary in amplitude (the pattern of the amplitude variations depending on the pulse duration) and will gradually show an overall decreasing trend in amplitude as the frequency of observation is increased. Unfortunately, the sensitivity of the modern receiver is such that this decrease seems to take place all too slowly!



Spectrum analysis of "hash" radiated from a microcomputer system, taken in the ARRL lab. This display was obtained with a short antenna placed a few feet away from an unmodified Radio Shack TRS-80 system, with the antenna coupled directly to the analyzer input. The horizontal axis displays frequencies from dc to 100 MHz, each reticle division representing 10 MHz. Each vertical division represents 10 dB, so it may be seen that there is approximately 48-dB difference in signal strength from spike peaks to valleys across the spectrum. It is significant to note, however, that the frequencies of the spikes shift around, depending in part on the program sequence being executed and in part on the information being fed to the video display.

Now, if pulses are removed from this pulse train at more or less random intervals, the effect is to add background "hash" all across the spectrum. In digital devices, a counter following a crystal clock oscillator produces frequency spikes closer together as the frequency decreases. The net result of all this is that the typical microcomputer produces interference in the form of many multiple cw-type interfering carriers all across the spectrum, broadband hash that shifts in

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nature as the computer program progresses. Some microcomputers even have programs that will produce musical selections on an a-m radio held near the keyboard. This kind of "music" we could do without!

In the presence of a strong electromagnetic field, voltages can be produced by nonlinear action in the active devices of the computer. These voltages can produce false operation. Most amateurs have experienced or heard about false operation of electronic keyers and keyboards when the linear amplifier is being used. In the case of the computer, this can be even more severe and at times more subtle.

Obviously, the answer would seem to be proper shielding and grounding. Amateurs have always had to contend with interference problems — first the a-m radio, then television and high-fidelity systems, and surely there will be more. Each case has its own problems and we have gradually learned to cure or live with each.

. . . the typical microcomputer produces interference in the form of many multiple cw-type interfering carriers . . .

We all know that consumer electronics often leaves a great deal to be desired from the compatibility point of view. No manufacturer wishes to add anything to the product that will add to the cost! The "personal computer" follows the same pattern. The Radio Shack TRS-80 microcomputer is by far the largest-selling microcomputer at this time — over 100,000 units have been sold. The TRS-80 is a very attractive machine to many amateurs — low price, lots of software, plenty of peripherals and good distribution and repair facilities. To illustrate, Macrotronics produces a communications interface device and software for RTTY and cw for the TRS-80 (and also the PET microcomputer). The same machine can be used for logging, contests, calculations and so on. K4TUZ also offers an interface device and software for the TRS-80.[1] Programs are available for just about all the common microcomputers. HAL, Microlog, Info-Tech and others have microprocessor-based dedicated communication terminals.

Compatibility with the Ham Shack

Since the TRS-80 is the most common microcomputer, an examination of this unit will serve to illustrate the compatibility problems, and perhaps help in attacking the problems when they arise. Examining a TRS-80 is a little discouraging. The basic unit is in a plastic case, the video monitor is in a plastic case, the expansion interface is in a plastic case, etc. Obviously the Tandy Corporation didn't make many concessions to eliminating radio-frequency interference! This is understandable from the manufacturing point of view — it wouldn't make the machine work any better, and cost was an uppermost consideration. We see the same problem with hi-fi equipment. Also, the TRS-80 uses dynamic RAM for memory storage, and the "refresh cycle" makes the machine somewhat busier from the RFI point of view. Again, cost, but that is what makes it an attractive unit in the first place!

Fortunately, a well-designed unit incorporates a good ground plane on the pc boards, which is the first important step in minimizing RFI. Leads that are close to a good ground plane have a reduced radiation resistance, thereby minimizing the radiation from the leads. On this score the TRS-80 does quite well. Thanks to this, the machine, although very noisy, isn't hopeless.

Ideally, what should be done to optimize compatibility? Interference from any such device has two components — the radiation field and the induction field. The magnetic induction field is a real problem in that it requires a magnetic (ideally mu-metal) shield for containment. Ordinary aluminum enclosures have little effect. Fortunately, the induction field decays rapidly with distance, so generally a spacing of a few feet from the receiver is sufficient to minimize this problem. Nevertheless, induction must be considered in the ultimate case.

Assume that the machine has a well-designed ground plane on the pc boards, and is in a metal enclosure. Most microcomputers include a keyboard as a part of the basic unit. The usual keyboard uses plastic keys, and there is a big hole the size of the entire keyboard in the enclosure. This is a definite "no-no" from the RFI point of view. A better design would be one in which *each* key comes through an individual hole, resulting in much less leakage. Efforts to contain all rf radiation inside the enclosure are tough enough at best. As an example, in one case a cw keyboard became very "unhappy" when the linear amplifier was used. This keyboard was in a metal enclosure. In order to cure the problem, copper wires were strung horizontally below each row of keys and connected to the chassis. The vertical staggering of the keys prevents this from being done vertically, but in an extreme case a foil shield could be fabricated to fit below the keys.

Many enclosures fail to be effective shields because of the fabrication process in which things are painted and then assembled. The paint often prevents the elements of the enclosure from making a good electrical contact. Anyone who has examined a good "rf-tight" box with welded seams, bronze finger stock around removable panels and so forth, will realize the care that must be exercised. To ensure good metal-to-metal contact, clean paint off joints, use star washers under nuts and put in more bolts.

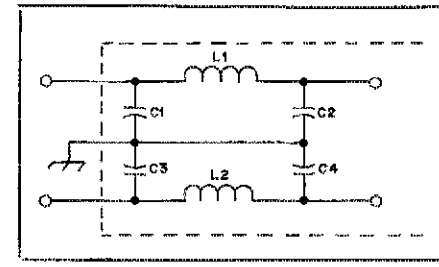


Fig. 1 — A "brute-force" type of filter suitable for bypassing the ac power line as it enters an enclosure. Filters of similar configuration may be used for dc lines.
C1-C4, incl. — 0.01 μF, disc ceramic.
L1, L2 — Approx. 13 μH; 3-inch winding length (75 mm) of no. 16 enam. wire closewound on 3/4-inch (20 mm) dia maple dowel.

Peripheral Connections

Now, assuming the enclosure is tight, what about the peripheral connections? These fall into two categories — those which carry signals completely outside the rf spectrum (60-Hz power, dc, and audio) and those which carry signals whose spectrum lies in, or overlaps, the rf range (video signals, pulse trains and so forth).

The first can be handled by "brute force" filters. The ac line, for example, can be isolated by the filter shown in Fig. 1. *Do not* depend on electrolytic capacitors for dc lines. Use a filter similar to that of Fig. 1 to decouple dc lines. Audio lines should also be decoupled for rf by a filter; there the inductance can of course be much more compact. Commercial feedthrough insulators are available with the entire filter self-contained.

For video or pulse signals and the like, decoupling cannot be used, so well-shielded leads to other shielded enclosures must be utilized. Use a good grade of shielded cable and good plugs and jacks. Every *peripheral* device which is connected must be debugged from an RFI standpoint. In some cases, a peripheral may not be necessary and can simply be unplugged. For example, after using the TRS-80 and a cassette unit for loading programs, *unplug the cassette unit* at the TRS-80 body (DIN plug). All effort at minimizing RFI can be undone by plugging in a peripheral that hasn't been debugged!

Any consideration of shielding and RFI always brings up the question of "grounding." There are two reasons for "common" grounds. First is the hazard of electrical shock, which has been covered repeatedly in various publications. *All* metallic conductors that the

[1] R. E. Barnwell, 1266 Sycamore Dr., Lilburn, GA 30247

human operator can touch should be solidly connected to what our British friends call an "earth." The best way to achieve this is by driving two or more ground rods into the ground as close as possible to the operating position and tying everything to these rods with heavy copper wire. Connecting to water pipes may not be sufficient — there is such a thing as an insulated union to reduce corrosion in pipes, so remember Murphy's Law!

The second reason for a common ground is to attempt to reference *all* signals to the same common reference potential. Herein lies the rub — the ground leads have a finite resistance, and even at low frequencies heavy currents in the ground connections may produce "ground loops" which cause hum difficulties. Most amateurs have encountered this type of problem at one time or another, especially in the era of heater currents with vacuum tubes. This problem can be eliminated by referencing signals, whenever possible, to a "local" ground point, and interconnecting in such a way as to minimize circulating currents.

At high frequencies we are faced with a more severe situation. As the wavelength becomes shorter, physical separation of units becomes comparable to a wavelength, and it is literally impossible to be sure that all "common grounds" are at the same potential. Therefore, each unit must reference its own "local" ground. These are then interconnected, and shielding must be as complete as possible. Even so, strong rf fields can produce such high circulating currents that occasionally the difficulty is handled more by "art" than science, since each specific case is different.

One final word. Ideally the station antenna should be at least 100 feet from the operating position, fed by a good-quality coaxial feed line into a quality balun at the antenna (assuming the antenna is of the balanced type). If properly connected, only signals received by the antenna enter the receiver. The computer interference also must reach the antenna in order to enter the receiver. Try your receiver with a well-shielded dummy load and see if the received signals are really down to zero. If not, you may have some work to do on your receiver!

Case History

The following case history of a TRS-80 illustrates the process and may serve to assist in similar situations. The stations started with a reasonably compact, well-grounded installation, adhering to usual good practice. The equipment complement is given in Table 1.

First-Stage Effort — The Macrotronics M-80 interface was used with the 16-K Level II TRS-80. No special efforts of any kind were made to reduce interference. The M-80 was exposed on the table in back of the computer. Shielded audio and keying leads about 8 feet long ran to the TS-820. The M-80 power module was plugged into a wall socket. This was the "let's plug it in and see what happens" stage.

Table 1

Equipment Used in Case-History Evaluations

Transceiver	Kenwood TS-820S
Linear amplifier	Drake L4B
Matching network	Drake MN 2000
Low-pass filter	Drake TV-3000
Antenna	Hy-Gain 18AVT vertical, 100 feet away, 16 feet above ground (Other antennas were available but this was used as a standard.)
RTTY afsk demodulator	Flesher TU-170
Cw processor	Homemade, variable bandwidth, pulse regeneration
Computer	Radio Shack TRS-80, 16-K level II TRS-80, 4-K Level I
Video monitors	Radio Shack, Sanyo
Cassette units	Radio Shack CTR-41, Superscope C-190
Teleprinter	Teletype model 19
Interfaces and Software	Macrotronics M-80 interface Macrotronics software for RTTY and cw K4TUZ Bit Byter interface K4ZUY software for RTTY

Many enclosures fail to be effective shields . . .

Results — RTTY reception was disappointing because of marginal performance of the RTTY demodulator on the M-80 board. Cw decoding was quite good. Interference (RFI) was very bad when the TS-820 was used on lower sideband for RTTY. Operation was much better on the fsk mode, because the TS-820 is fitted with a cw crystal filter which is automatically switched in for fsk. It became immediately apparent that using 170-Hz shift with the narrow filter made a big improvement on the RFI problem. But signals below about S5 were still marginal unless they fell in a noninterference "slot." There were spikes up to S8 or so on all bands, and a lot of background hash. Cw reception with the filter was much better, but RFI was still present to an objectionable degree. The keyboard was functional on both modes at low-power level, but exhibited very erratic behavior at higher power. In the process of trying different "fixes," it was found that unplugging the cassette unit after loading the program helped tremendously in the transmit mode. This procedure also made a definite improvement in the receive mode, although interference was still objectionable.

Second-Stage Effort — The same setup as described earlier was used, but with a Flesher TU-170 afsk decoder for RTTY and the homemade cw signal processor for cw.

Results — Much-improved performance was noted on RTTY and some improvement on cw. The cw processor on the M-80 actually works very well. The chief improvement on cw arose from the extra flexibility of the homemade processor. The major improvement was on RTTY. This configuration was considered to be a workable one when used with the crystal filter in both modes. Unfortunately, the TS-820 can only be used with fsk when using the crystal filter, and many amateurs would like to use afsk. Shifting to lower sideband to evaluate this mode with the ssb filter resulted in an interference level that was considered too high to be tolerable. The TS-820 can be modified to take care of this problem (I have since done so), but it is a bit involved. As an alternative, an active bandpass filter was constructed with approximately 400-Hz bandwidth, centered on the afsk tones. With this filter inserted in the audio channel ahead of the audio monitor and TU-170, usable performance was once more restored on RTTY. It should be noted that the software behaved perfectly and was a pleasure to use on both cw and RTTY. It supplies essentially unlimited buffer space and very clean keying. The cw decoder was found to be excellent, and did about as good a job on "sloppy" fists as could be expected. No cw decoder can decipher some fists, which are so nonuniform that even the most experienced human decoder is hard-pressed! Until there are more keyboard-sent cw signals on the air (please — I am something of a manual cw-nut myself!), the real value of automated cw decoding is doubtful. On machine-sent code, however, it works perfectly.

Third-Stage Effort — An Intra-Fab enclosure measuring 3 × 3 × 12 inches (76 × 76 × 305 mm) was obtained. The M-80 interface, the cw signal processor, a TRS-80 power-supply module, the M-80 power transformer and an accessory 12-volt dc supply were fitted into the enclosure. The front of the cabinet held the necessary switches for control functions, including control of the remote teleprinter and transmitter-distributor. The TU-170 was modified to include a buffered TTL-compatible output to drive the M-80 simultaneously with the loop driving the teleprinter. The printer motor could be turned on and off with dc relays operated from the panel. The connection from the M-80 to the TRS-80 was rewired into a shielded cable that passed through a grommet on the front of the control cabinet to the output port on the TRS-80. The ac line into the cabinet was decoupled

with a brute-force filter. The power cord from the TRS-80 power module was passed through the front of the control cabinet and also shielded. All audio and keying signals, as well as relay controls and the teleprinter loop, were in shielded cables. Good-quality plugs and jacks were used at the back of the cabinet. This unit was placed in the operating console about three feet from the transceiver. The TRS-80 was connected in front of the unit on the operating table. The control unit was grounded to the rather heavy common ground bus, which was connected to all units in the console.

Results — Much-improved performance on all counts was obtained *in this case.* It should be obvious that all physical configurations may not behave the same way, but the general technique should be applicable. The arrangement of antennas, the feed system, TVI filters, station ground system, routing of ac lines in the walls, and so forth, all influence the outcome. In this case, the results were considered to be perfectly acceptable on all counts, although some spikes of about S2 still remained and background hash could still be heard on lower sideband without the filter. A considerable amount of on-the-air testing, both at 60- and 100-wpm RTTY, and lots of ragchewing on cw, were done to test the "livability" of this system. The testing led to the conclusion that, as far as this operator is concerned, it was completely satisfactory, although not perfect. About this time, the Bit Byter interface was obtained and promptly stuffed into the same box. No tests were made on the initial configuration of the unit, which is supplied in a shielded box. When placed in the control enclosure, including its own shield, it was found to perform essentially the same as the M-80. The software for this unit is for RTTY only, and produces a very attractive "split screen" presentation which allows composition of one's reply during reception, allows editing, has word wrap-around, and transmits line-feed/carriage-return (LF-CR) automatically at the proper time. It also ignores LF-CR on receive so that the 64-character line of the TRS-80 is always "packed." The software eliminates receiving RTTY pictures, but a printer is required for that anyway. This program was also checked on a 4-K Level I machine and was found to work fine — there is even plenty of buffer space!

At this time, some other "trial and error" schemes were tried. First, a "pan" of aluminum with 1-inch (25-mm) sides was fabricated, just large enough for the TRS-80 to fit in and still allow air circulation. Then a handful of leads from 6 to 18 inches long were made up with alligator clips on the ends. Next a lot of trial-and-error grounding was done between various units and in various combinations. The presence of the pan alone, as expected, gave some improvement. Then configurations were found that could reduce the S-meter readings to zero deflection at all points, although RFI could still be heard. Turning the agc off and setting the S meter for a reading of S2 by adjusting the manual gain control resulted in an apparently RFI-free situation. This really isn't a valid technique, however, because what is really being done is a form of "neutralization," where the magnitude and phase of the signals are being shifted to reduce the magnitude of the total, and this technique is frequency sensitive. It is mentioned, however, as one "port in a storm" if all else fails.

A comparison was made between the Sanyo monitor and the Radio Shack monitor. The Sanyo was found to be somewhat better, as might be expected, since it is in a metal enclosure. The Radio Shack monitor uses an opto-isolator, which undoubtedly improves things somewhat as far as this unit is concerned. No attempt was made to modify either monitor at this stage.

Fourth Stage Effort — Later an all-out attack on the problem was started. The returns are not yet all in, but the initial tests indicate that a complete solution *is* possible. This requires complete repackaging of the TRS-80 into a copper-plated steel enclosure, a copper-foil grid under the keys, some modifications to the TRS-80 electronics, improved interface isolation, better-shielded monitors, and so on. Shades of a HAL 3100! This approach is beyond the scope of the average amateur. It should be pointed out that this effort is mostly the result of outright stubbornness on the part of a retired professor of electrical engineering who doesn't seem to know when to let well enough alone. The second-stage effort was sufficient for the operator who likes to work occasional RTTY and cw in addition to his phone operation. This person will get a tremendous kick out of the operating ease provided by his computer, which he also uses for many other things. Stage three is for the dedicated RTTY and cw man, and the level of interference is easy to live with. All too often I found myself sweating, trying to eliminate interference that was still there when I turned off the computer! We have to live with the bands as they exist. When the "woodpecker" is on, you can't hear any interference! Stage four was undertaken just to prove that a solution is possible, and that a communication computer interface that is totally non-obtrusive can be constructed. One thing has resulted from these tests — once the operating ease and convenience of a flexible computer-based communication terminal is experienced, it is impossible to go back. Let's see now, how about automatic beam heading based on prefixes . . .

. . . a complete solution *is* possible.

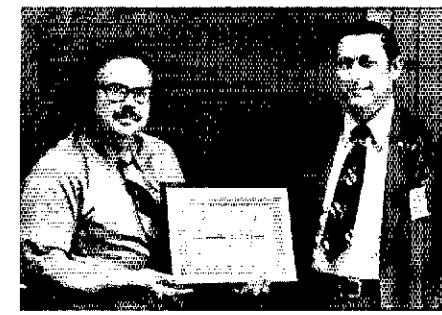
Strays

WORKED WA3ZRY LATELY?

☐ The start of the new decade was less-than-pleasant for one dedicated amateur, Arthur Shorey, WA3ZRY. A mid-January fire gutted his home, destroying his shack — and his extensive QSL card collection. In fact, Art, a sightless amateur from Dover, Deleware, had nearly qualified for 5-Band WAS. If you've worked WA3ZRY, please send another QSL card to Art Shorey, 8-B Bradys Ln., RFD 6, Dover, DE 19901.

HAM OF THE YEAR AWARD

☐ Do you know a ham who is worthy of recognition? The Dayton Hamvention awards chairman is soliciting nominees for Ham of the Year, to be honored at the Dayton Hamvention in April. Send nominations and correspondence to: Dayton Hamvention, P. O. Box 44, Dayton, OH 45401, Attention: Awards Chairman.



West Gulf Division Director Ray Wangler, W5EDZ (right), presents the ARRL Club Affiliation Certificate to Bill Dow, W5VRI, president of the Datapoint Amateurs and Technicians Association (DATA). The club's 30 members are all employees of Datapoint Corporation, a San Antonio, TX, computer manufacturer.

MANY MILES PER WATT

☐ C. J. Page, G4BUE, of West Sussex, England, had a 4400-mile, 28-MHz QSO with W4OO in West Palm Beach, FL. G4BUE used an input of 750 microwatts on the PA of his Argonaut for the contact, on December 9, during the ARRL 10-meter contest. — *Gene Sykes, W4OO*

QST congratulates . . .

☐ Julian R. Benjamin, W4RZN, who has been selected to the rank of Rear Admiral in the Judge Advocate General Group of the United States Naval Reserve.

• *Basic Amateur Radio*

The Nitty-Gritty of Simple Receivers

Simple receivers are fascinating gadgets. This treatise on how they work can help make your experiments more successful.

By Doug DeMaw,* W1FB and Bob Shriner,** WAØUZO

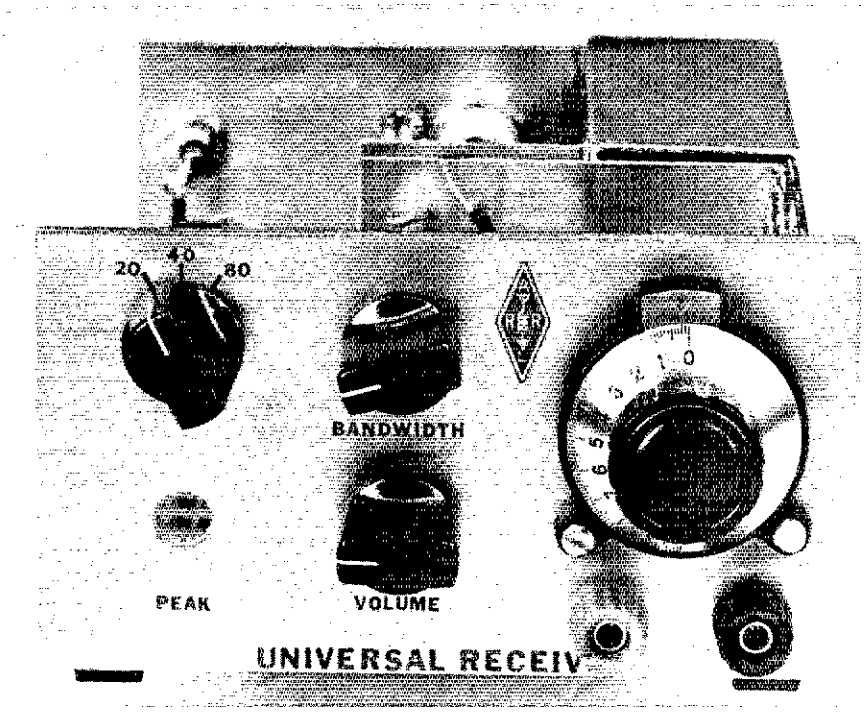
Have you wanted to build your first solid-state receiver, but lacked the fortitude to try? Well, "learning by doing" is an excellent motto. We hope you'll apply that philosophy as you follow this continuing Basic Radio series.

This month we'll examine the roots of receiver circuitry and explain what each part of the circuit must do in order to provide acceptable performance. These ground rules can be applied to any direct-conversion type of receiver and need not be confined to the workshop project in this article.

The Simplest Receiver

As a new enthusiast in the art of radio experimenting you may have tried the circuit of Fig. 1. It is the most basic form of the "crystal set" or crystal detector. This type of radio is suitable for the reception of amplitude-modulated (a-m) signals, such as one finds in the commercial broadcast band between 550 and 1600 kHz. In the early days of Amateur Radio, a-m was the common voice mode, so a receiver of this kind could be used to monitor the quality of one's signal. If it were used today, and if a long piece of wire (50 feet — 15 m — or more) were used for an antenna, bc-band signals would be heard. However, only a jumble of stations would be present unless you lived very near one of the commercial stations. That being the case, the nearby one would predominate by virtue of sheer brute force.

The circuit of Fig. 1 routes rf energy from the antenna to D1, a small-signal rf type of diode. The diode acts as a half-wave rectifier to produce a dc voltage which pulsates in accordance with the modulated wave from the transmitted signal. These variations in dc voltage "excite" the earphone and cause its diaphragm to vibrate at an audio rate. The resultant sound is detectable by the human ear. The longer the antenna (and the better the earth ground) the greater will be the rf voltage applied to D1. This results in a higher dc output from D1, and therefore a louder response from the earphone.



This view of the direct-conversion receiver shows a band switch at the upper left. This and a peaking control (to be added at the lower left) will be used later in the circuit of an 80-, 40- and 20-meter down-converter.

A better circuit is seen at Fig. 2. The fundamental difference over that which is presented in Fig. 1 is the added selectivity provided by C1 and L2. They are tuned to the frequency of the desired station. This circuit permits a degree of separation between the wanted and unwanted signals. That is why this capability is called *selectivity* (it helps you to *select* the desired signal). The higher the Q of the tuned circuit the greater the selectivity or sharpness of response at the frequency to which the C1/L2 combination is tuned. Stations above and below this frequency are rejected in varying amounts, depending on how close their operating frequencies are

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to the desired one. The farther away the greater the rejection. This can be envisioned by examining the curve in Fig. 2 at B. The station we wish to hear (B) has been tuned in by adjusting C1 so that it forms a resonant circuit with L2. This gives maximum signal response to station B and places stations A and C quite far down on the response curve of the tuned circuit, thereby rejecting them by many decibels (dBs). There can be no such rejection of the unwanted stations when using the circuit of Fig. 1. The steeper the sides of the curve (resulting from higher values of Q, or by using additional tuned circuits ahead of D1) the greater the rejection of the unwanted stations, A and C. Tuned circuits of this general variety, when used in the early stages of a receiver, provide what is known as *front-end selectivity*.

An elaboration of front-end selectivity is demonstrated in Fig. 3. Here we continue to employ a simple diode detector (D1), but to make the receiver more sensitive we have added an rf amplifier between the antenna and the detector. As shown, Q1 will boost the incoming signal some 10 to 15 dB. This will make all signals louder in the earphones — a distinct advantage when listening to the weaker bc-band stations. But of equal or greater significance is the extra tuned circuit (C2 and L3). This coil and capacitor form a tuned circuit which is resonant at exactly the same frequency as C1 and L1, assuming they have each been tuned to the desired listening frequency. The resultant response curve will be much narrower (bottom edges pulled closer in toward the center) than that of Fig. 2B. This will provide even greater rejection of signals which fall above or below the one we have tuned in. We encourage the readers of this article to experiment with the circuits of Figs. 1, 2 and 3. The performance traits we have just discussed will become readily apparent when using these circuits for reception of the standard bc band.

The overall sensitivity of the three circuits can be improved by adding a bipolar-transistor audio amplifier between D1 and the earphones. This will provide another 10 dB of volume. A sample circuit is given in Fig. 4. Almost any audio type of npn transistor will work at Q1 with the values shown.

What About CW and SSB Reception?

We've already admitted that the circuits just discussed are suitable for a-m reception only. So, how can we change them to permit cw and ssb reception? Well, first let's understand why the simple receivers of Fig. 1, 2 and 3 aren't satisfactory for cw and ssb use. They depend upon the carrier being transmitted along with the desired audio intelligence (modulation). In the case of an ssb signal the carrier is suppressed by some 50 dB within the transmitter. Therefore, the carrier must be reintroduced *in* the receiver. This provides the equivalent of an a-m signal during detection. This steady carrier is mixed with the pulsating rf signal to produce a modulated carrier. The detector used for this function is called a *product detector*, since what comes out of it is the product of the internally generated carrier or *beat-frequency oscillator* (BFO) and the voice-rate rf energy (minus a carrier) that is received on the antenna and amplified within the receiver.

When receiving cw signals with one of

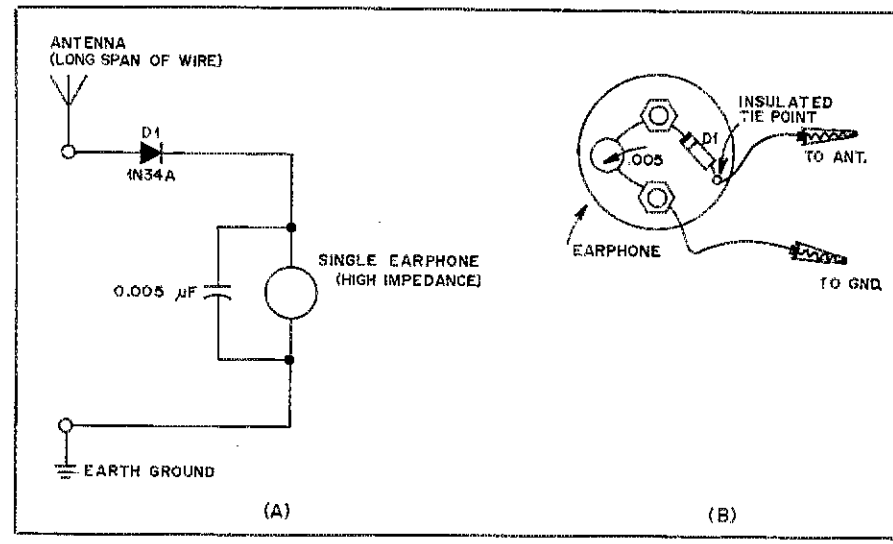


Fig. 1 — A diagram is provided at A for a very basic type of receiver. It is shown pictorially at B.

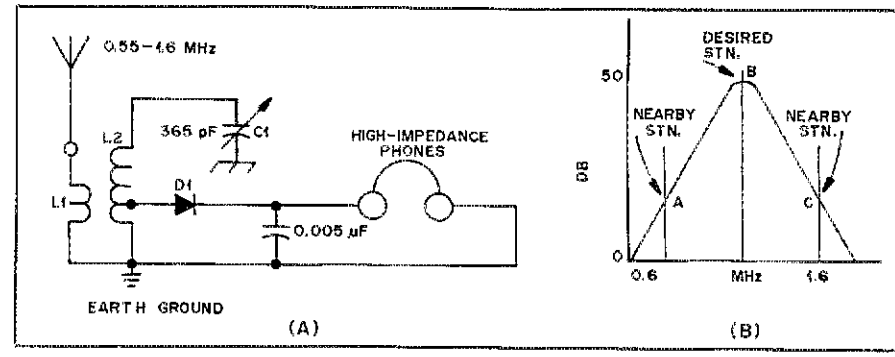


Fig. 2 — At A is a means by which to add rf selectivity to the simple circuit of Fig. 1A. The curve at B illustrates in relative terms the response of the tuned circuit at A.

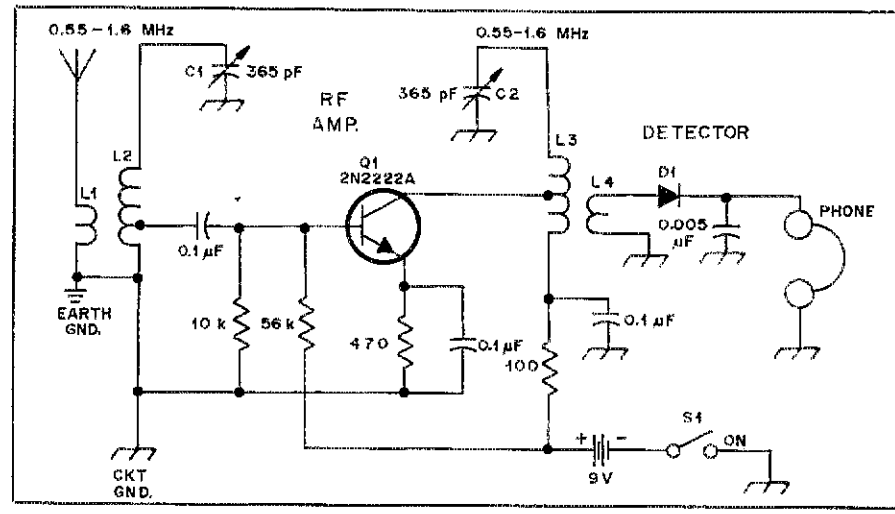


Fig. 3 — Greater receiver sensitivity can be obtained by adding an rf amplifier (Q1) ahead of the diode detector (D1), as shown here. The additional tuned circuit (C2/L3) aids the rf selectivity.

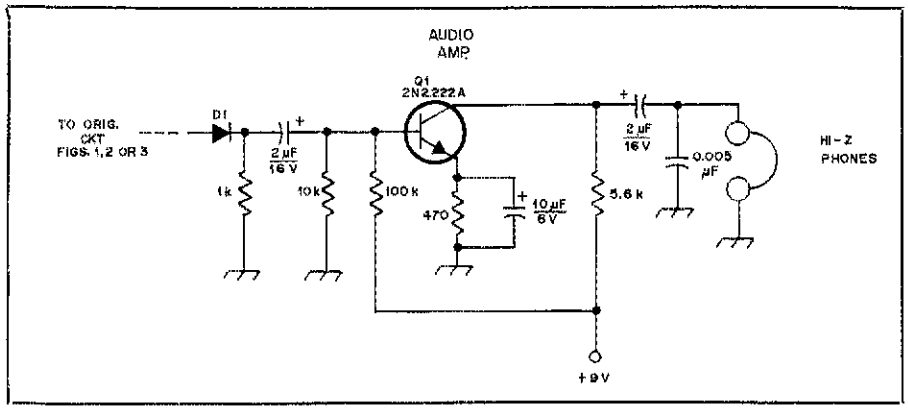
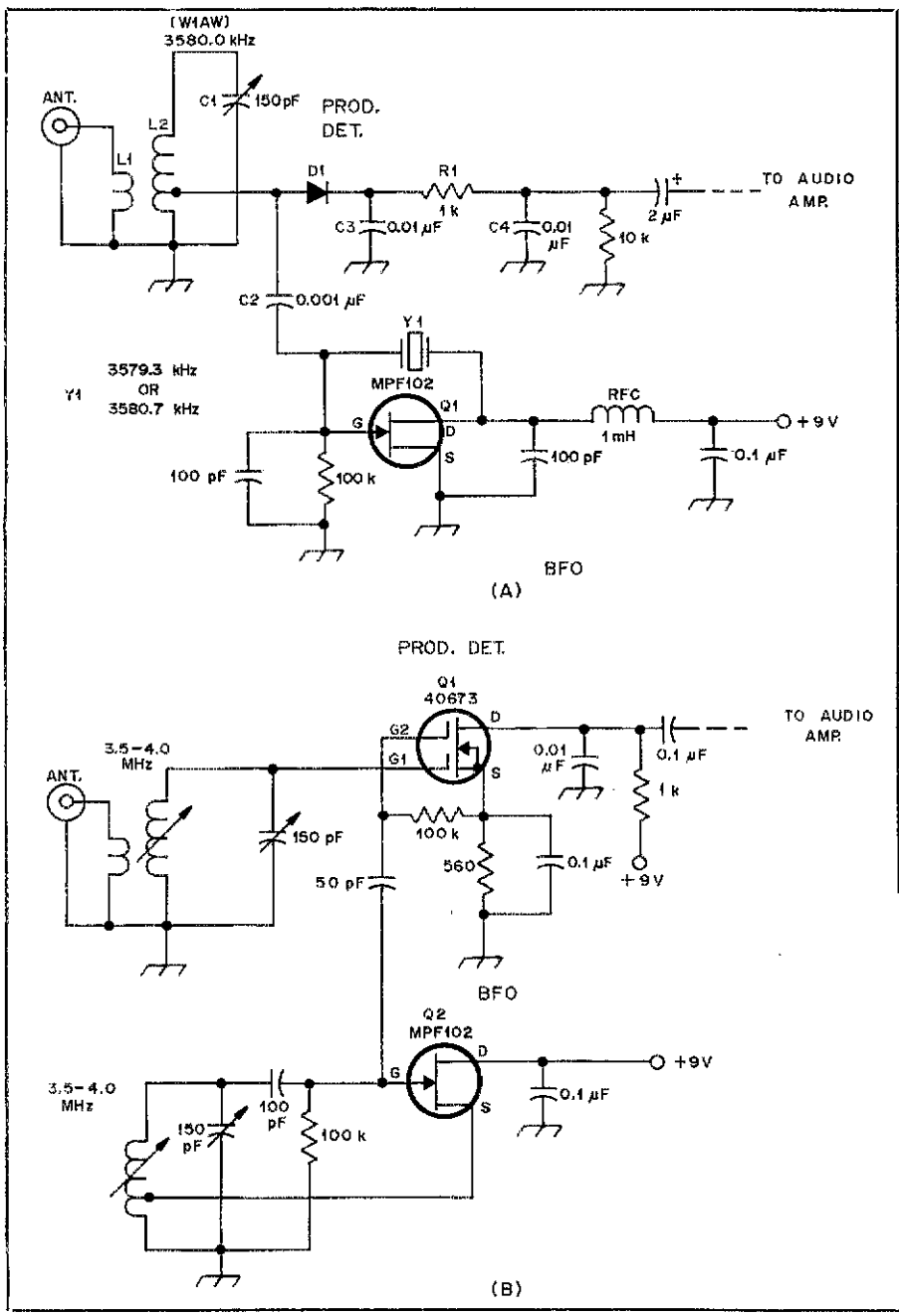


Fig. 4 — An audio amplifier can be used after D1 to improve the overall sensitivity of a simple receiver, such as that of Fig. 3.

the circuits discussed earlier, all that we'd hear in the earphones would be thumps each time a code character was sent. Although this kind of signal could be copied with difficulty, it is much better to have a tone between 200 and 1000 Hz (depending on individual preference) present in the earphones or speaker. This is also accomplished by using a product detector. The BFO carrier is mixed with the cw signal in the detector. The two frequencies are separated by whatever difference the operator prefers (200 to 1000 Hz). The resulting output from the detector is a note at that frequency each time a code character is sent.

Diodes can be used as detectors, or we can use active devices (components that require an operating voltage), such as bipolar transistors, FETs or ICs. The diode detector introduces a loss (conversion loss) in signal level, where an active detector can produce some gain (conversion gain) while acting as a detector. The BFO can be thought of as a small transmitter which generates a steady carrier at some specified frequency. In a superheterodyne type of receiver the BFO operates at the receiver intermediate frequency (i-f). In a direct-conversion receiver (more on that later), the BFO operates at approximately the incoming-signal frequency. There is a slight frequency offset to provide a *difference frequency* for copying upper sideband, lower sideband or cw. We can, for the purpose of this discussion, regard a product detector as a mixer. In both examples two frequencies are mixed to produce a third frequency. The resultant *mixer* frequency (intermediate frequency) is at rf, whereas the *product-detector* output is at audio. Fig. 5A shows how a BFO can be applied to a simple diode mixer. If the BFO is crystal controlled, only *single-frequency* reception will result in this circuit. If the BFO is made tunable — making it a *VFO* (variable-frequency oscillator) — coverage of a wide frequency range is possible.



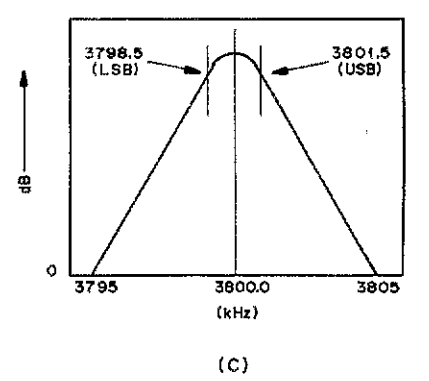


Fig. 5 — Diagram A shows a basic form of the direct-conversion (synchrodyne) receiver. It is set up in this example to receive W1AW on 80 meters as a fixed-frequency receiver. The circuit at B shows how a variable-frequency beat oscillator (VFBO) can be used to give broad coverage of an amateur band. An active detector is shown in this example (Q1). The curve at C shows the frequency relationships between the incoming signal and the two choices of VFBO injection voltage.

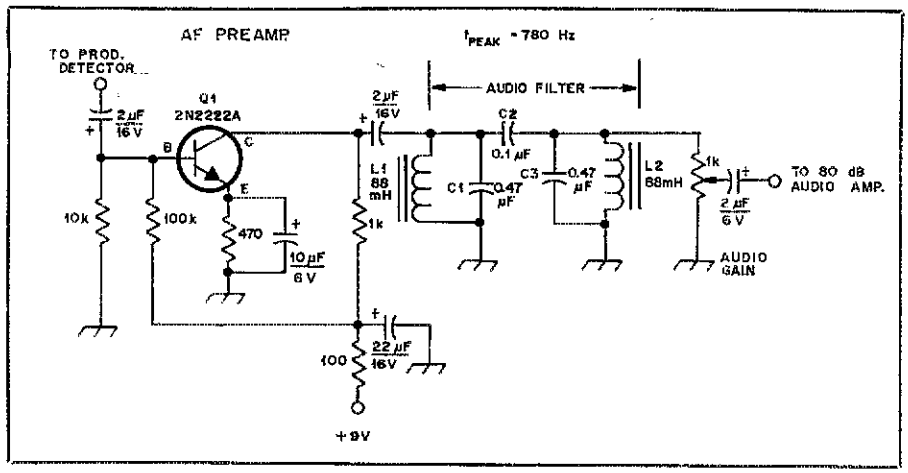


Fig. 6 — An LC audio filter can be used to develop satisfactory selectivity for cw and ssb reception. L1, L2 and the related capacitors comprise such a filter.

Fig. 5B shows such an arrangement in which an active product detector is employed. If we were to label the BFO with a truly meaningful name (when it is tunable) we might call it a "variable frequency beat oscillator," or "VFBO." For the remainder of this article, at least, we'll refer to it as such.

Fig. 5A shows an FET BFO supplying a steady carrier to the detector, D1. Upper- or lower-sideband reception is possible with this direct-conversion receiver by selecting the appropriate crystal frequency at Y1. Since W1AW can't legally operate ssb on 3580 kHz, we have shown crystal frequencies which will provide a 700-Hz cw beat note when C1 and L1 are tuned to W1AW at 3580.0 kHz. In other words, the BFO can be placed 700 Hz above or below 3580.0 kHz to obtain the desired cw audio tone. For ssb reception the crystals would be cut for 3578.5 kHz (lsb) or 3581.5 kHz (usb). This kind of receiver is called a "direct-conversion" one because the signal from the antenna is converted to audio immediately or *directly* after the antenna. In some parts of the world this kind of circuit is called a "synchrodyne." When working with a conventional superheterodyne receiver, the signal is converted to an intermediate frequency (single conversion), and sometimes to a second (double conversion) or even third intermediate frequency (triple conversion) before it is changed to audio frequency. Therefore, a superheterodyne receiver is anything but a direct-conversion type!

The simple circuit of Fig. 5A is not recommended for use with a resonant antenna. This is because the BFO signal will be radiated by the antenna and may cause QRM to amateurs nearby. An rf amplifier stage between the antenna and D1 would greatly reduce the radiation probability. This is true of most direct-conversion receivers. R1, C3 and C4 of Fig. 5A comprise an rf filter which prevents the BFO energy from reaching the audio-amplifier stages.

A direct-conversion receiver which uses an active product detector and a VFBO is shown at B of Fig. 5. With the proper inductance value at L1 and L2 (both the same value) all of the 75/80-meter band can be covered. Radiation of the VFBO via the antenna will not be as severe with this circuit as when using the one at A. This is because the dual-gate MOSFET (Q1) provides several dB of isolation between gates 1 and 2. (We must assume that the physical layout of the circuit is arranged to prevent unwanted stray coupling between the components and conductors relating to the gates of Q1.) The VFBO is tuned slightly above the desired ssb signal for usb reception or slightly below it for lsb reception. A cw beat note can be effected by the same means — above or below the desired signal. The greater the separation between the desired signal and the VFBO frequency the higher will be the cw-note pitch. We can learn from this discussion that a direct-conversion receiver does not provide "single-signal reception." Rather, there is a response *either side* of zero beat. A superheterodyne receiver with a selective i-f system (tuned circuits or filters) will provide single-signal reception, thereby rejecting QRM which may be present on the opposite side of zero beat.

Fig. 5C shows a front end response curve with relation to VFBO output placement. The VFBO offset is 1.5 kHz above or below the desired ssb signal to provide upper- or lower-sideband reception. For cw reception we would move the VFBO frequency closer to the desired signal to avoid having an excessively high-pitched beat note.

Shortcomings of Direct-Conversion Receivers

The principal failing of receivers which use the direct-conversion scheme has already been discussed: They do not provide single-signal reception. This means that under conditions of heavy QRM it is possible to experience twice as much QRM as when using a selective superheterodyne receiver. This is because there is no rejection of unwanted signals which may appear on the unused side of zero beat.

Another problem is that the overall gain of a receiver should be on the order of 80 to 100 dB (antenna to audio output). In a superheterodyne circuit a large part of the required gain is obtained at the rf and i-f sections of the receiver. All, or nearly all, of the gain must be provided by the audio channel in a direct-conversion receiver. This means that for good headphone volume the audio-amplifier section should produce 80 to 100 dB of gain: Care must be exercised to design an audio amplifier that will not break into self-oscillation or pick up hum and amplify it. For the purpose of experimentation, the circuits of Fig. 3 and 5 could be fed directly into a hi-fi amplifier. That would provide plenty of audio!

Another difficulty we must contend with when using direct-conversion receivers is the inherent lack of overall selectivity. Since there is no i-f at radio frequency (the i-f is at audio), we can't add a crystal or mechanical filter to obtain the desired selectivity. The usual practice is to employ an *audio* filter after the product detector. This type of filter can be made from toroid coils or pot-core inductors. It should be designed for a cw or ssb bandwidth, although an ssb audio filter will permit good reception of cw signals if we're willing to sacrifice some selectivity. Many amateurs prefer to use an RC (resistance/capacitance) active audio filter which uses ICs. This type of filter can produce some gain, whereas the coil/capacitor type of filter causes some loss in the audio level. Fig. 6 shows an ssb type of audio filter which contains two surplus 88-mH toroid coils.[1] It will work satisfactorily during cw reception also. The filter can be installed immediately after the first audio amplifier in the manner shown. This style of filter is known as an LC (inductance/capacitance) bandpass filter. It will reject unwanted signal energy above and below the frequency of interest.

Circuit Comparison

Two block diagrams are presented in Fig. 7 to illustrate the fundamental differences between a direct-conversion receiver and a "superhet" type. The circuit at A has a VFBO which is tunable over the range of the desired incoming signals (3.5 to 4.0 MHz). The remainder of the receiver (all after Q1) operates at audio frequency.

A basic type of superheterodyne receiver is depicted at B of Fig. 7. In this

[1]References appear on page 28.

example the local oscillator (VFO) is not on the same frequency as the incoming signal. Rather, it is tunable from 5.0 to 5.5 MHz. This frequency, when added to that of the incoming signal, results in a *sum* frequency of 9 MHz, which is the intermediate frequency (i-f) at the mixer output. Thus, for reception of a 3.6-MHz cw signal, the VFO would be tuned to 5.4 MHz (3.6 + 5.4 = 9 MHz). The 9-MHz mixer output is routed through a selective crystal filter (FL1) to sharpen the receiver selectivity, then amplified at 9 MHz by means of Q3, Q4 and Q5 in this circuit function in a manner similar to Q1 and Q2 of Fig. 7A. The output from Q4 is at audio frequency. The BFO (Q5) uses two crystals. They are offset from 9 MHz to provide usb and lsb reception.

This Month's Project

The performance of a direct-conversion receiver can be improved by designing it as a double-conversion type of unit. This can be done by making the main part of the receiver function as a tunable i-f system over a frequency range below the amateur bands of interest. The early stages of the receiver comprise a crystal-controlled converter, the output from which is at the tunable intermediate frequency. Fig. 8 shows a block diagram of such a receiver. Q3, Q4, Q5, FL1 and U1 can be thought of as a separate direct-conversion receiver which tunes from 2.5 to 2.7 MHz. In other words, we could attach an antenna to the input of Q3 and actually hear commercial signals in the 2.5- to 2.7-MHz range.

In order to receive the amateur bands (40 meters in this example) we must place a converter between the antenna and the 2.5- to 2.7-MHz receiver. In Fig. 8 we have specified Q1 and Q2 as the converter section. The 7-MHz signals are fed into a mixer (Q1) which also receives an injection frequency at 9.7 MHz (from Q2). The *difference frequency* is 2.7 MHz (9.7 minus 7.0 = 2.7 MHz). If we were to tune in a signal at 7.2 MHz, the difference frequency (i-f) would be 2.5 MHz. This is the range the tunable i-f accommodates. In essence, we have "married" a superheterodyne receiver to a direct-conversion receiver. However, we still won't have single-signal reception: There will be a response either side of zero beat, just as with the receivers we discussed earlier in this article.

The advantages of this circuit are increased gain at rf and better frequency stability. It is much easier to obtain good VFO frequency stability at 2.5 MHz than it is at, say, 14 MHz. The stability of the crystals used at Q2 of Fig. 7 will be excellent, however. Some commercial products contain receivers of this general variety (Heath HW7, HW8 and the Ten Tec Century 21).

The tunable i-f receiver we shall construct is shown schematically in Fig. 9. A dual-section 365-pF variable capacitor (C1A/C1B) tunes the input of the product detector (Q1) and the VFBO (Q3). The slugs in L2 and L4 are adjusted so that both tuned circuits *track* (are on the same frequency when C1 is adjusted). Audio output from Q1 is amplified by means of Q2.

A simple high-Q audio tuned circuit (L3 and C2) is used between Q2 and Q4 to provide variable cw and ssb selectivity. A Q control (R1) is included in the circuit:

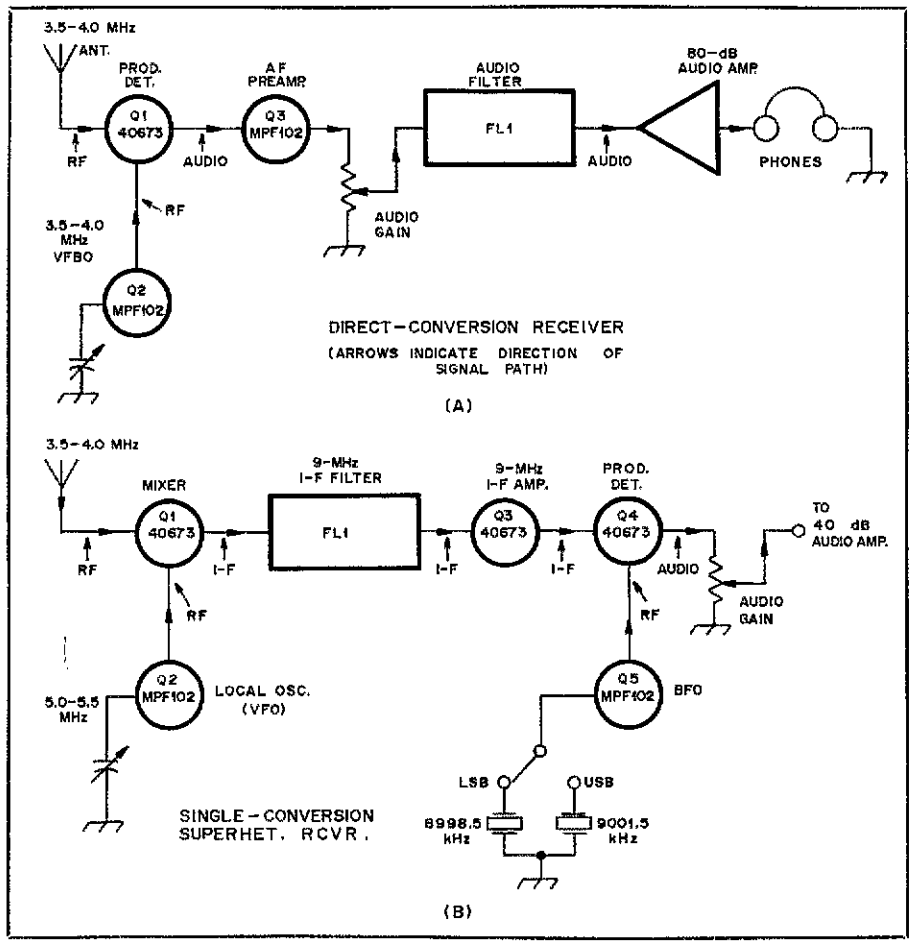


Fig. 7 — The block diagrams at A and B show the fundamental differences between a direct-conversion and a superheterodyne receiver. See text.

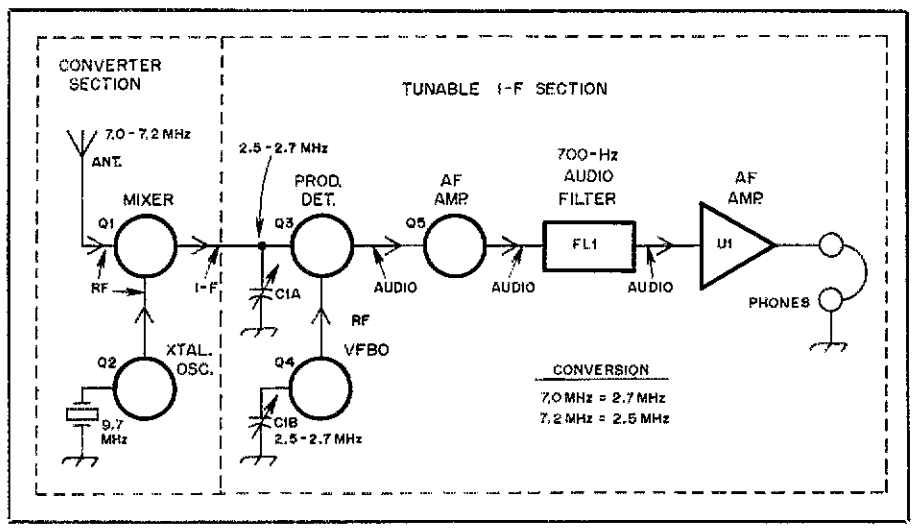


Fig. 8 — Block diagram of our tunable i-f receiver, showing how the down-converter (Q1/Q2) will be connected to it for reception on 80, 40 and 20 meters. The example is for reception on 40 meters.

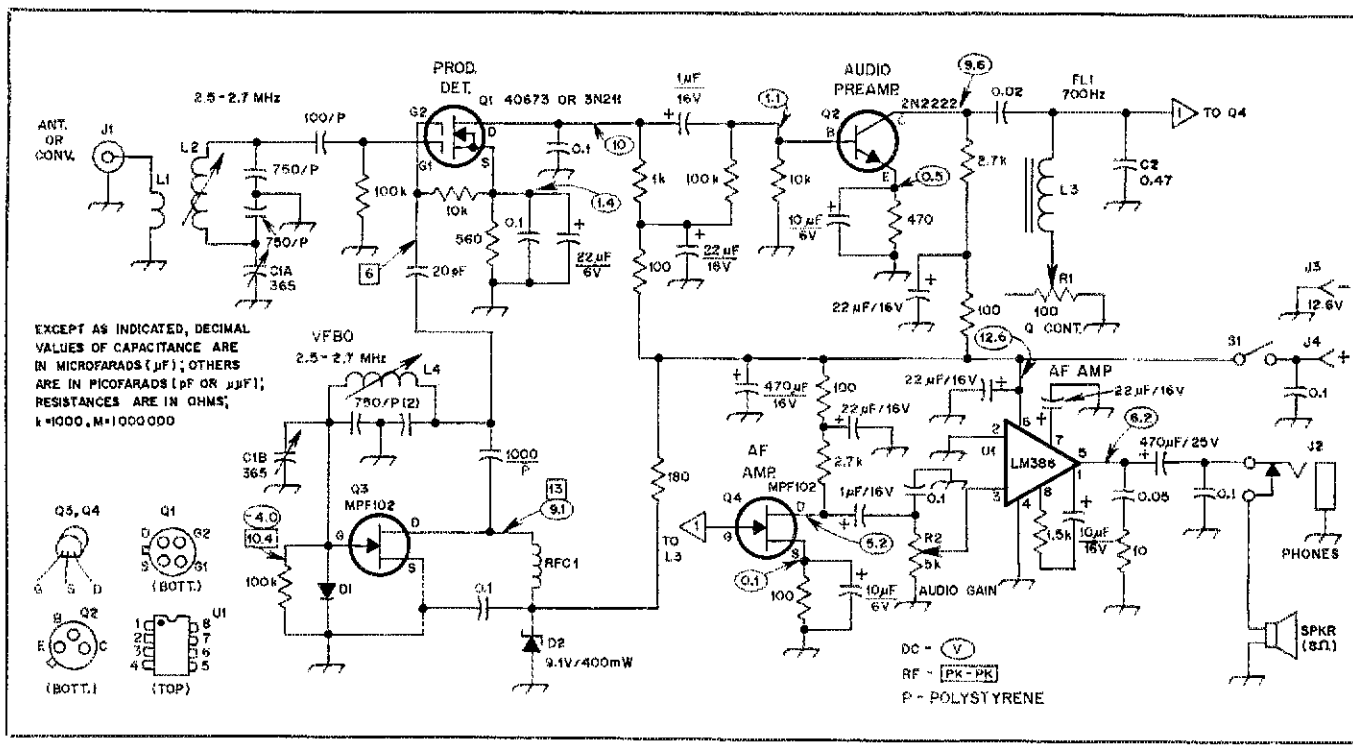


Fig. 9 — Schematic diagram of the 2.5- to 2.7-MHz receiver. Fixed-value capacitors are disc ceramic unless otherwise indicated. Fixed-value resistors are 1/4- or 1/2-watt composition types. Polarized capacitors can be electrolytic or tantalum units.

C1 — Miniature two-section transistor-radio variable, 365 pF per section. (Circuit Board Specialists part used in this model.)
C2 — Mylar or other high-quality capacitor, 0.47 µF.
D1 — High-frequency silicon diode, 1N914 or equiv.
D2 — Zener diode, 9.1 V at 400 mW or 1 W.
J1 — RCA phono jack, single-hole mount.
J2 — Miniature closed-circuit phone jack.
J3, J4 — Insulated binding post. Use red for + and black for −.
L1 — 4 turns of no. 24 enam. wire over the center part of the L2 winding.
L2 — Slug-tuned inductor, 9 µH nominal. J. W. Miller Co. no. 42A826CBI or equiv. (19070 Reyes Ave., Box 5825, Compton, CA 90224, catalog avail.)
L3 — Pot-core inductor. 153 turns no. 28 enam. wire on bobbin of Amidon Assoc. PC-2616-77 pot core. (12033 Otsego St., N. Hollywood, CA 91607, catalog avail.)
L4 — Same as L2.
R1 — Linear-taper, 100-Ω composition control.
R2 — Audio- or linear-taper, 5000-Ω composition control with spst switch.
RFC1 — Miniature 1-mH rf choke. J. W. Miller 70F103AI or equiv.
S1 — Spst, part of R2.

The higher the resistance in series with L3 (R1), the lower the tuned-circuit Q and the wider the tuned-circuit response. Therefore, we will obtain the narrowest response (best selectivity) when R1 is effectively out of the circuit and the bottom end of L3 is grounded directly. Our peak frequency for this circuit is 700 Hz, as determined by the 110-mH inductor (L3) in parallel with the 0.47-µF capacitor (C2).

Additional audio amplification is provided by Q4. U1 increases the audio level so that it is sufficient for operating headphones or a speaker.

Assembly Data

Double-sided pc board (copper on both sides) is used for the receiver panels and partitions. Two Universal Breadboards are employed in order to leave sufficient space for the hf-band down-converter we will add later in the series. This open space is along one side of the receiver.

The VFBO is located in a compartment at the right-rear of the receiver. The compartment is 2-1/4 × 1-1/4 × 2-1/2 inches (57 × 32 × 63 mm) HWD. A press-fit metal cover is made from a scrap of aluminum, flashing copper or tin can. It is U shaped.

A miniature 8-Ω speaker is located just

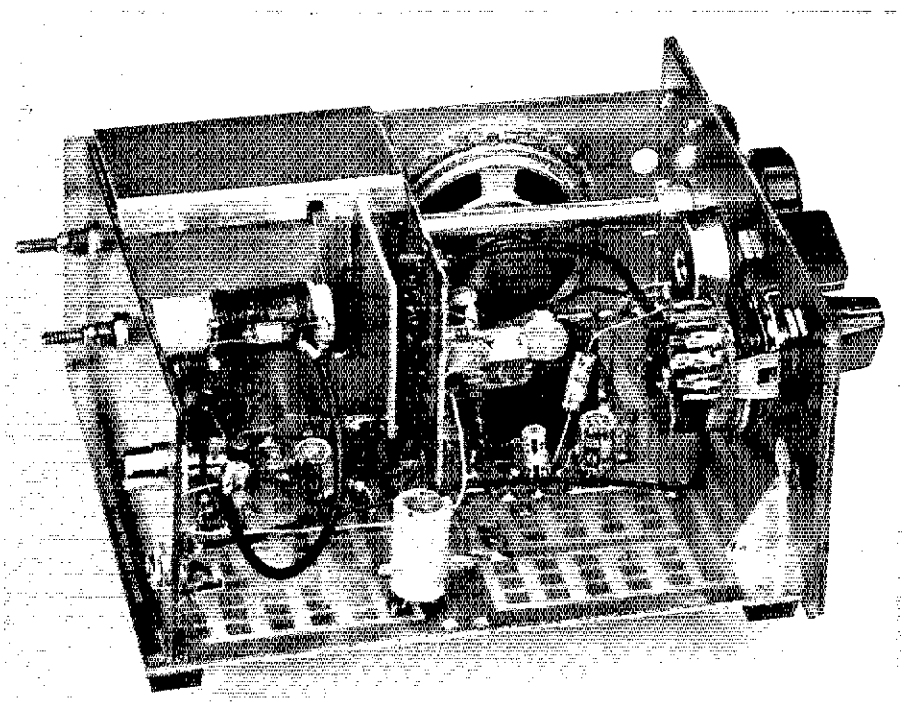


Fig. 10 — Interior view of the assembled receiver with one side panel removed. C1 is located inside the VFBO compartment, as is L4. A press-fit metal cover (see text) encloses the top of the VFBO compartment during operation. Miniature RG-174/U coax cable is used between L1 and J1. It is used also between R2 and the input to U1. Be sure to ground the shield braid at each end of each cable. Miniature shielded audio cable can be used in place of the RG-174/U.

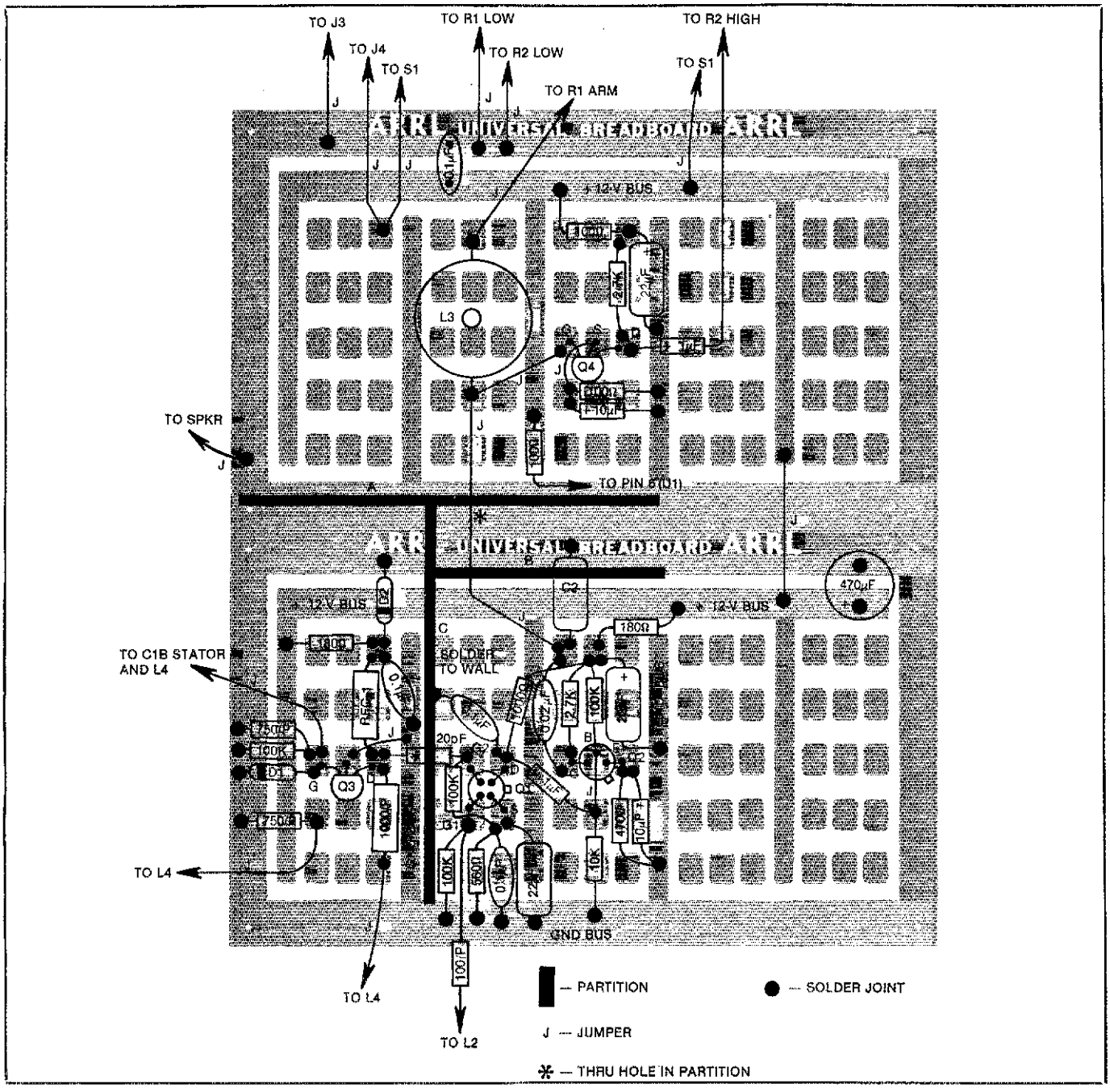


Fig. 11 — Parts-placement guide for the main circuit board. The unused area at the right is reserved for the 80-, 40- and 20-meter converter which we will build later in the series. The black dots indicate solder joints. The scale black-and-white pattern for this board was presented in Basic Radio, September 1979 *QST*.

ahead of the VFBO compartment on the side wall of the receiver. A perforated metal protective screen is glued over the speaker opening in the side wall (epoxy glue), then the speaker is cemented in place on the screen. Be careful to avoid letting the glue get on the speaker cone. Use just a light coating around the outer perimeter of the speaker face.

A 2-3/4 × 1/4-inch (70 × 6.3 mm) length of hobby-style brass tubing (thin wall) is used as a coupler between C1 (in the VFBO compartment) and the vernier drive on the front panel. Epoxy cement is used to affix the tubing to the shaft on C1.

U1 and the associated components are installed on a small pc board (partition A) which is soldered to the front of the VFBO box and the ground foil on the Universal Breadboard. The U1 assembly is mounted vertically, as shown in the photograph. A shield made from double-sided pc board (1-1/2 × 1-1/2 inches — 38 × 38 mm) is installed between the back side of the U1 pc board and the end of L2. The lead from L2 is passed through a small hole in partition C (on the Q1 side of partition B), then into the VFBO compartment. This shield prevents rf energy from being coupled into the U1 board from L1/L2 (VFBO energy from L4 which can be radiated via L2).

Fig. 10 shows the interior of the assembled receiver with one side wall removed. The unused rotary switch will be employed for band switching when we build the converters. The U-shaped metal cover for the VFBO compartment has been removed for this photograph.

The parts-placement guide is provided in Fig. 11. The components which are mounted on the front and rear panels are not shown, but the leads which join them to the circuit are clearly identified. Partition A contains the printed circuit for the audio output stage while serving as a shield baffle. Partition B has sufficient space below it to allow clearance for C2.

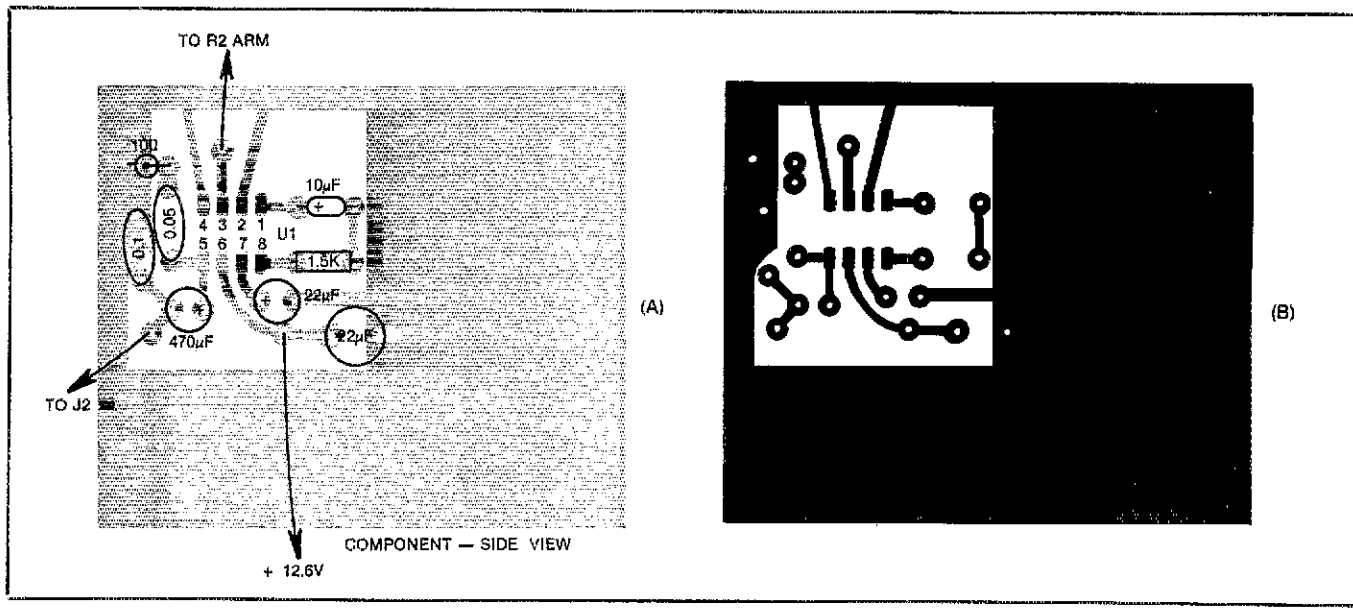


Fig. 12 — Parts-placement guide for the U1 audio circuit. Part of this board serves as a shield for the VFBO compartment. The scale black-and-white pattern for this board is presented at B.

A small notch is cut in partion C so it can "straddle" the 20-pF capacitor between Q1 and Q3. We suggest that you install the partitions after most of the components are soldered to the main circuit board. They are held in place by means of solder, joining them to the side panel, rear panel and circuit board, as appropriate.

Although two Universal Breadboards can be joined to form the large main board used in this project, a single circuit board containing the two grids can be purchased.[2] Epoxy cement can be used to join two individual boards if they are already on hand.

A parts-placement guide for the audio amplifier pc board/baffle plate is provided in Fig. 12A. It is shown from the components side.

Coils L2 and L4 are mounted on the rear panel of the receiver. A generous coating of Polystyrene Q Dope or similar low-loss coil cement should be applied to the winding of L4. This will help to ensure good VFBO stability. J1 and J2 are also located on the rear panel.

Checkout and Alignment

Our first obligation before applying operating voltage to the completed circuit is to conduct a visual inspection. We must be certain that no unwanted short circuits exist (solder bridges between pads, component leads shorting together, etc.). Make certain that all electrolytic capacitors are installed in accordance with the polarity markings (+) shown in Fig. 11. Similarly, be absolutely sure that the transistors and U1 are oriented properly on the circuit board.

Connect a signal generator (set at 2.5 MHz) to J1. Apply 12 volts to J3 and J4 (observe polarity!) and advance the audio-gain control to maximum (fully clockwise). Set C1 so the plates are fully meshed (maximum capacitance). Next, set the vernier dial so that it reads zero (0), then tighten the shaft set screw. The slug in L4 is adjusted next until a 2.5-MHz signal is heard in the phones or speaker. Turn the generator output down until the signal is weak (noisy sounding), then adjust the slug in L2 for maximum signal. There will be some interaction between L2 and L4, so the foregoing procedures will have to be repeated two or three times in order to get optimum results. Now, when C1 is set at minimum capacitance (10 on the vernier dial), the receiver should be tuned to approximately 2.7 MHz. Later on, after we build the 80-, 40- and 20-meter down-converter, we will be able to tune 200 kHz of each of those bands — cw or ssb segments, depending upon the settings of L2 and L4.

Adjustment of the Q control (R1) will sharpen or broaden the received signal. The narrowest response will be had when R1 is set for finite (zero) resistance.

If a signal generator is not available the receiver can be aligned (at night) by connecting an antenna to J1 and adusting L2 and L4 for optimum reception of WWV at 2.5 MHz. It is for this reason that a tuning range of 2.5 to 2.7 MHz was chosen.

If the receiver is working properly the antenna noise (QRN) should be louder than the receiver noise. This can be checked by attaching and detaching the antenna lead at J1 after the alignment is completed. Don't expect this receiver to send signals blasting out of the speaker. Ample gain exists, but until the down-converters are built and installed there will not be high volume from the speaker during weak-signal reception: Headphones will be more suitable for weak-signal listening.

Those who wish to listen to the 160-meter band while waiting to build the hf-band converter can do so by adjusting L2 and L4 for 1.8 MHz with C1 at maximum capacitance. If the receiver won't tune low enough in frequency, simply add some additional fixed-value capacitance across each coil (L2 and L4). Two 100-pF capacitors should suffice for this purpose. The one used on L4 should be a silver-mica or polystyrene type, but a disc ceramic unit will be satisfactory across L2.

In Summary

This receiver is suitable for reception of a-m, cw and ssb signals. The Q control (bandwidth) should be set at approximately midrange for voice reception. It will provide excellent cw reception when adjusted for the narrowest bandwidth. The sensitivity of the circuit in Fig. 9 is such that a 0.5-µV signal (from a signal generator) is plainly discernible.

Best on-the-air results will be had when the antenna is resonant at the receive frequency. This means a dipole, end-fed wire or vertical antenna which is tuned and matched for 50-ohm transmission line (coax) is recommended. Those who have 80- or 40-meter antennas may wish to tie the feeders together and secure a match to 50 ohms (using a Transmatch) if the receiver is to be tuned to the 160-meter band, as discussed earlier.

The 80-, 40- and 20-meter converter will be described in April *QST* for 1980. Keep your soldering iron hot, for we're sure you'll want to build that circuit into your direct-conversion receiver. QST

References

[1]Toroid coils of the type mentioned are sold as surplus material. Check the *QST* Ham Ads for suppliers.

[2]Circuit boards, negatives and parts kits for this and other League projects are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

A Simple and Sensitive Impedance Bridge

Spring is coming soon! That's antenna-project time. Be prepared with this easy-to-build impedance bridge.

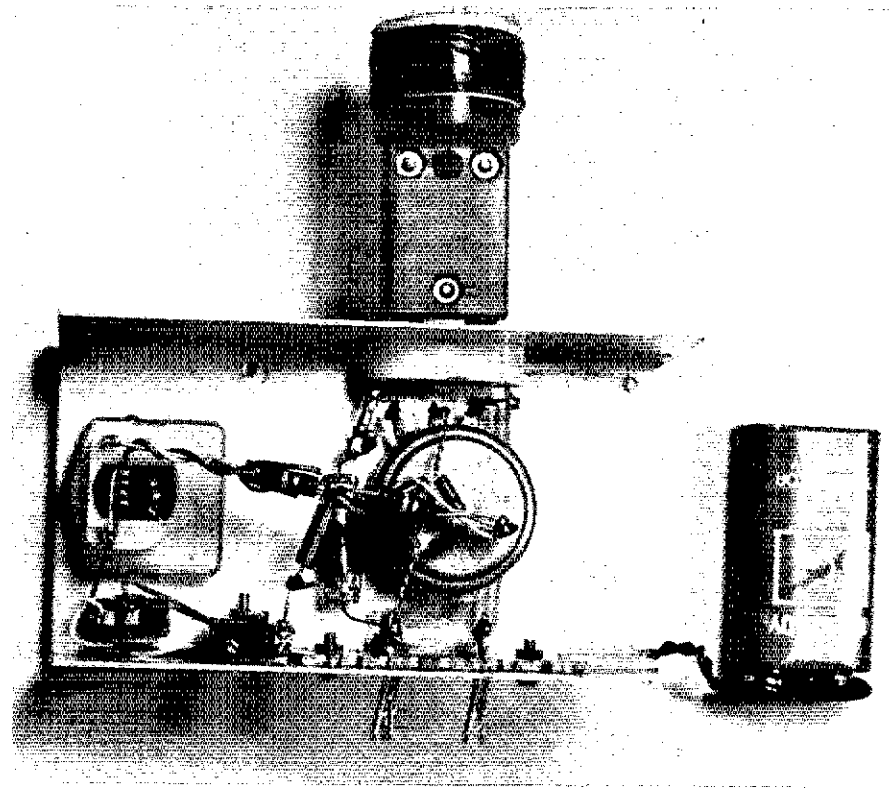
By Frank M. Thompson,* WØOD

The ideas presented here are aimed at those of you who like to tinker with antennas. Up 'til now, many amateurs never really felt the need for an impedance bridge. But if the interest shown today in antenna-matching networks and VSWR indicators may be used as a guideline, perhaps you're ready for an impedance bridge as well.

The Basic Circuit

For years, this writer used a homebuilt impedance bridge that employed a differential capacitor and was built along the lines of one shown in earlier ARRL Handbooks.[1] This old standby worked long and well when used within the frequency range it was designed for. Its usefulness is evidenced by the hand-worn sheen of the aluminum case. Since the first bridge was built, several attempts have been made to produce a bridge that would work well over a wider range of frequencies. But nothing really "clicked" until recently.

The desire was to develop a simple, sensitive circuit capable of being used over a wide spectrum of frequencies and exhibiting minimal stray reactances. The basic circuit used in the development of this bridge is shown in Fig. 1. Mechanically, the unit can be packaged in a small box



The construction of the balanced impedance bridge. The null potentiometer may be seen behind the four diodes. The meter-zeroing potentiometer is the small object at the bottom left of the photo. In this unit, the signal source is coupled to the bridge by means of a homemade coil assembly. The coil consists of 16 turns of no. 24 enameled wire close-wound on a 1-inch plastic form (a sawed-off pill bottle). This is bolted to an FT-243 crystal holder. For use above 30 MHz, two turns of no. 14 wire (self-supporting) will work well.

*Rte. 1, Box 226C, Baudette, MN 56623

[1]Notes appear on page 31.

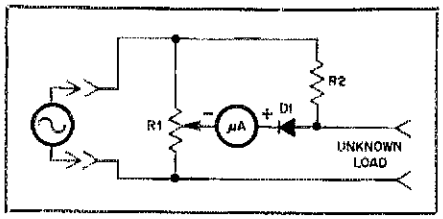


Fig. 1 — Diagram of the basic bridge circuit used during development. As explained in the text, the circuit does not perform well with low signal input levels.

with very short leads between components. Unfortunately, such a basic circuit does not work very well at low signal levels. The resultant null is so broad that the bridge is useless as a practical device. The cause of this broad null will be explained shortly.

Components

It was found that at the impedance levels involved here, an Allen-Bradley type J 250-ohm potentiometer introduces negligible strays — even when mounted in the metal enclosure. Other satisfactory potentiometers are no doubt available. The use of good carbon-film resistors at R2 contribute no difficulties. The meter, too, may be eliminated as a source of trouble. It is typical of many miniature meters available on the market. Measuring about an inch (25.4 mm) square, it has a full-scale deflection of 150 microamperes and an internal resistance of 1 kΩ. What's left? The diode . . .

D1 is a germanium diode. These diodes conduct at low levels of forward bias but the dynamic forward resistance of these devices increases with diminishing forward current. This may be seen in the plot shown in Fig. 2. At the extremely low current levels present when searching for the bottom of a null, the diode resistance is very high. The resultant indicated null is therefore quite broad.

In an effort to obtain a sharper and more easily discernable null indication, a fixed forward current was provided through the diode. This current forward-biases the diode, placing it at a lower resistance region of its forward-resistance characteristic. The resulting down-scale meter defection ("bias") is compensated for by using an equal and opposite voltage drop across a fixed resistor. The circuits just described are shown in Fig. 3A and 3B as the bridge and detector, respectively.

The circuitry is housed in an enclosure measuring 2-1/4 × 1-1/2 × 4-1/4 inches (57 × 38 × 108 mm). Note that no electrical connection was made to the enclosure. The entire circuit "floats" above ground. The unknown impedance is connected to two insulated terminals. This facilitates measuring balanced loads such as the input of a balanced line. In addition to fixing approximately 45 μA of bias current through the diode, R3, R6 and R7 effectively isolate the battery from the rf circuit of the bridge. R4 provides a means of adjusting and matching the voltage drop across the diode bridge to that across R5, allowing a no-signal zero adjustment.

The performance of this impedance bridge satisfies the design targets. Nulls are readable with the drive available from a grid-dipper. Sample resistors show consistent readings from dc through the 250-MHz upper limit of the signal source used.

A Second Bridge

Another bridge was assembled for checking unbalanced loads such as those presented by coaxial lines. This bridge,

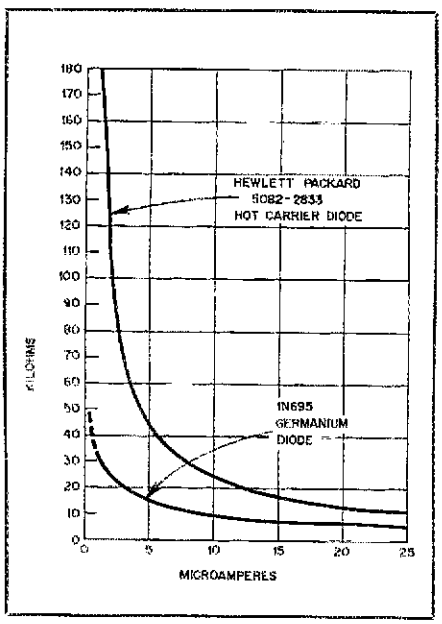


Fig. 2 — It may be inferred from this graph that at zero current the forward resistance of the diode becomes infinite. Inasmuch as a search for a null is really a search for zero current, a dilemma is evident. The advantage of using a "keep-alive" current through the detector is explained in the text.

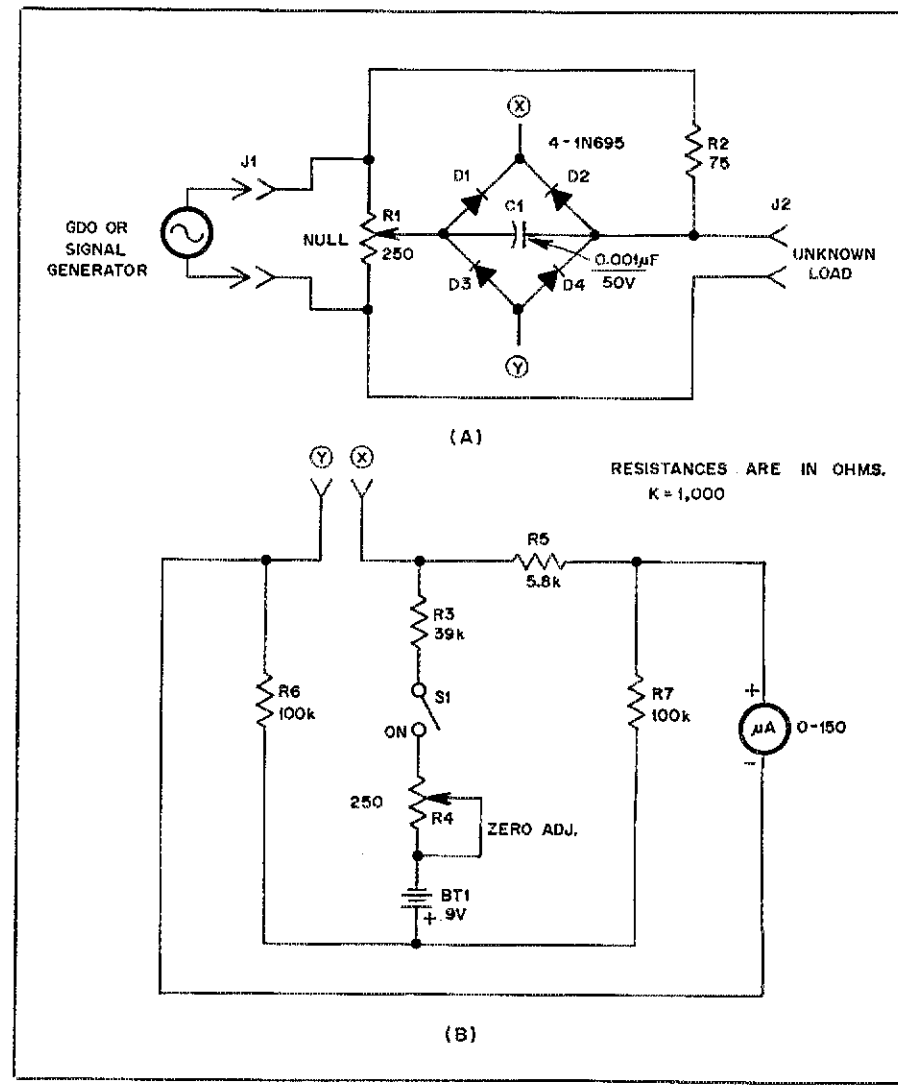
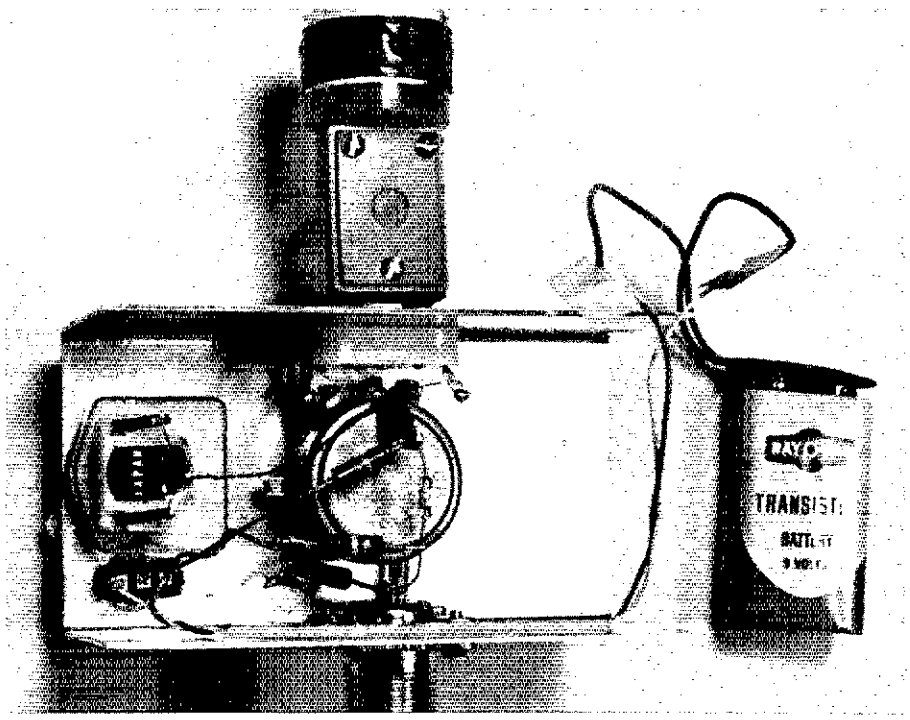


Fig. 3 — At A, the diagram of the first satisfactory bridge circuit built by the author. The circuit is capable of operating over a frequency range from dc to 250 MHz. The metering circuit is shown at B. R1 is discussed in the text. Note that no portion of the circuit of Fig. 3 is connected to the metal enclosure. J1 is an FT-243 crystal socket. J2 may be any type of insulated jack.



A bridge for use with unbalanced lines. Note the relatively small number of parts required. A single germanium diode is used in this model. An FT-243 crystal socket is used as the input coil jack, J1, in both bridges.

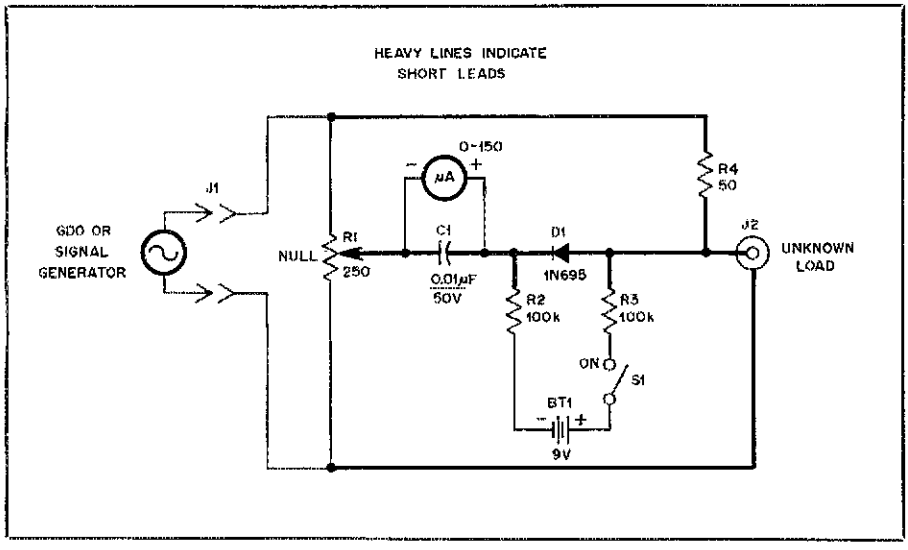
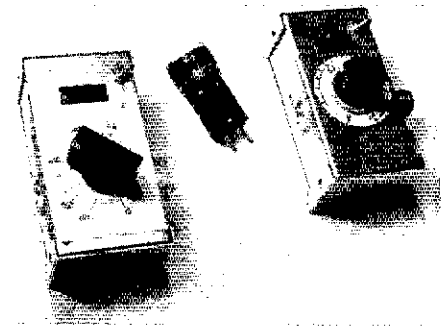


Fig. 4 — The second bridge described in the text was designed for use with unbalanced loads. Refer to the text for the method used to set the meter zero point. R1 should be mounted with the terminals next to the load side (J2) of the bridge to avoid significant measuring errors at high frequencies. J1 is an FT-243 crystal holder while J2 in this instance is a standard SO-239 coaxial connector. Resistances are in ohms; k = 1000.



The two completed impedance bridges. The one used for balanced loads is at the left. Dial calibration is performed using resistors of known value across the load terminals and coupling a signal source to the input.

shown in Fig. 4, is contained in an aluminum box measuring 2-1/8 × 1-5/8 × 4 inches (28 × 42 × 102 mm). In this bridge, resistors R5 and R7 were eliminated and a single germanium diode was used in the detector. Upscale "bias" for the meter was provided by adjusting the meter movement zero-adjusting spring for approximately a 45 μA reading on the meter scale in the absence of any current through the meter. The voltage drop across the diode when the bias current is present returns the needle to zero. This bridge worked well at all frequencies up to approximately 200 MHz where the resistance readings began to drift. Initially, the cause for this error was not known. Later it was discovered that the potentiometer had been mounted with its terminals adjacent to the input side of the bridge. This resulted in the leads on the "unknown" arm of the bridge being about an inch longer than they should have been. Better results will be obtainez if the terminals of the potentiometer are mounted adjacent to the load side. Additionally, good readings were obtained when measuring voice-coil impedances while using an audio-frequency generator as the signal source.

There are possibilities for improving the circuits described. If others are prompted to seek such improvements, this discussion will have served its purpose. QST

[1]*The Radio Amateur's Handbook*, 48th edition (1972), p. 562.

Strays

MOVING? UPGRADING?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL hq. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive *QST* without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each separate request.

Walking Your Tower Up? Can You Do It Safely?

Have any idea how much force you'll have to exert to walk up a 60-foot tower? Better find out before you start. The load can be more dangerous than you think!

By P. B. Mathewson,* W9IR

Have you ever attempted to "walk" a tilt-over tower up to the vertical position, only to discover that about half-way up the tower is too heavy to handle? This article provides a simple formula for calculating the maximum force a person must exert for such a task. For those of you who have programmable calculators, the exercise in math becomes a matter of fun.

You have probably noticed that when you initially pick up a tilt-over tower, you are surprised to find how light it seems. Nevertheless, as you attempt to walk it up, it feels heavier and heavier until a point is reached where it begins to feel lighter again. Finally, when it is in the vertical position, the weight, as far as you are concerned, is zero. Even the lightest tower can be deceiving because the apparent weight can become many times the actual weight as it is being walked up. Many people have been injured and towers have been damaged in an attempt to erect a mast in this manner. Amateurs planning such an operation are therefore advised to calculate the maximum apparent weight first. If raising the tower will be too much for you to handle, get one or more of your friends to give you a hand.

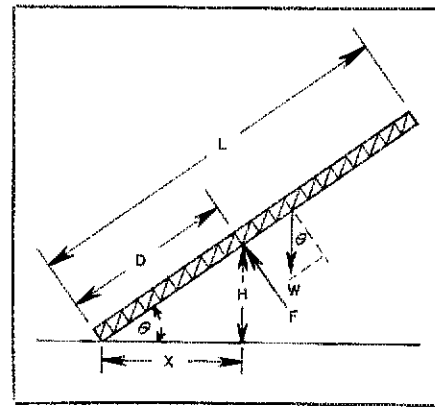


Fig. 1 — The parameters for determining the force required at any given point along a tower to walk it into an upright position. Feet × 0.3048 = meters; pounds × 0.453 = kilograms.
L = Total length of tower, feet
W = Total weight of tower, pounds (assuming equal weight distribution)
H = Your shoulder height, feet
F = Force you must exert on tower, pounds
θ = Angle between tower and ground, degrees
D = Distance along tower from you to base, feet

Calculating Tower Weight

Consider Fig. 1. The weight of the tower can be assumed to be concentrated in the center if the tower weight is distributed uniformly over the entire length. By summing the moments (ΣM) at the base of the tower, we can eliminate any forces at the base from our calculations.

ΣM_{BASE}:

$$FD - W\cos\theta \ \frac{L}{2} = 0$$

$$\text{Or } F = \frac{LW\cos\theta}{2D}$$

$$\text{But } D = \frac{H}{\sin\theta}$$

$$\text{Therefore } F = \frac{LW\cos\theta\sin\theta}{2H}$$

By using this formula, you can calculate the force (F) you must exert on the tower at any angle (θ). The quantity $\sin\theta\cos\theta$ maximizes at 45 and is equal to 0.5. Therefore, the force exerted (F) reaches maximum when the tower is at an angle of 45° above ground. The maximum force can then be expressed as:

$$F_{MAX} = \frac{LW\,(0.5)}{2H}$$

$$F_{MAX} = \frac{LW}{4H} \qquad \text{(Eq. 1)}$$

Let's use an example of a tower 60 feet long and weighing 120 lb. Let us also presume that your shoulder height is 5 feet. Therefore, L = 60, W = 120 and H = 5.

$$F_{MAX} = \frac{60\,(120)}{4\,(5)} = 360 \text{ lb!}$$

To walk up a 60-foot tower, you would have to exert 360 lb of force. The question then arises: Can you do it? Of course, if you had a shoulder height of 6 feet, you would have to exert only 300 lb of force. So you shorter guys had better get some help with your tower!

*5860 Glen Ora Dr., Bethel Park, PA 15102

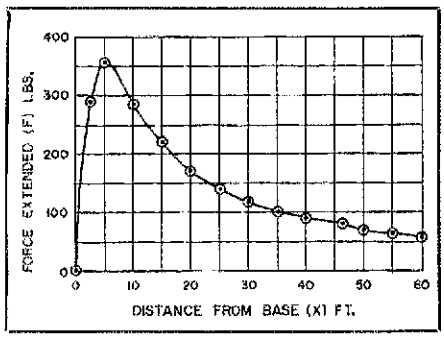


Fig. 2 — A graph of the exerted force (F) versus distance from the tower base (X). (See text.) The tower is 60 ft long and weighs 120 lbs. A shoulder height of 5 ft is assumed.

You'll find it interesting to calculate, by means of a programmable calculator, the amount of force required as a function of distance from the base of the tower. The distance X in Fig. 1 can be expressed as:

$$X = \frac{H}{\tan \theta}$$

To find the angle θ at a distance X, simply take the arc tangent of H/X.

$$\theta = \tan^{-1} \frac{H}{X}$$

Then substitute this angle into the formula:

$$F = \frac{LW \cos \theta \sin \theta}{2H}$$

Thus:

$$F = \frac{LW \cos\left(\tan^{-1} \frac{H}{X}\right) \sin\left(\tan^{-1} \frac{H}{X}\right)}{2H} \qquad \text{(Eq. 2)}$$

Fig. 2 shows a graph of exerted force (F) versus distance from the base of the tower (X) for the previous example. This curve shows that the maximum force occurs after you have walked almost 60 feet! At this point, if the load seems unbearable, you are faced with a long walk back should you decide you can't handle the tower. Here is where most accidents occur. Even if you can lift 360 lb, you must remember that you have already walked quite a distance supporting over 100 lb.

In conclusion, therefore, I strongly suggest that you use Eq. 1 to calculate the force necessary to raise your tower. Do not overlook the additional weight of an antenna if you installed one on the tower, as it will add considerably to the force required. Indeed, by carefully planning your installation, you can avoid the potential hazards of such work and provide yourself with a tower that will render years of trouble-free use. QST

Strays

FLORIDA BEACON BACK ON THE AIR

☐ For several years, Bob Davis, N4RD, of Englewood, FL, operated a beacon transmitter on 28.207.5 MHz. The beacon's operation was coordinated with the IARU 10-Meter Beacon Project and, in conjunction with the other beacons that operate just above 28.2 MHz, provided a very useful propagation indicator.

Bob became a Silent Key in November, and the beacon went off the air. Knowing how much the beacon meant to Bob, and how useful it had been to amateurs the world over, members of the Tamiami Radio Club took on the project of returning it to the air as a memorial to N4RD. A committee of three — WD4MSN, WB4AGT and WA4IWL — was appointed to oversee its operation. The Florida Beacon was reactivated at 0025 UTC on January 16 under the call sign WD4MSN. The FCC no longer issues *in memoriam* calls to club stations, but this does not make the Florida Beacon any less a memorial to an amateur who deserves to be remembered, N4RD. — *David Sumner, K1ZZ*

ARRL INTERNATIONAL DX CONTEST AWARDS PROGRAM

☐ The South Florida DX Association's donation of a plaque for the top European single-band score on 3.5-MHz cw was inadvertently left out of last month's listing on page 32. In addition, several more sponsors have donated plaques.

DX Phone

Single Operator

7 MHz	K6OYE Contest Machine

Multiop-Single Transmitter

Oceania	Carl Smith, WØBWJ

Multiop-Multi Transmitter

Europe	Grosse Pointe Farms DXA

DX CW

Single Operator

3.5 MHz	Earl D. Merry Memorial (donated by W8KI)
28 MHz	West Jersey Radio Amateurs

Multiop-Single Transmitter

Oceania	K6OYE Contest Machine
Europe	Martti Laine, OH2BH

Multiop-Multi Transmitter

North America	Ventura County ARC., K6MEP

W/VE CW

Single Operator

QRP	Hollywood ARC (Florida)

Special

Single Operator

Canada (cw)	CANADX
Japan (phone)	Western Washington DX Club
Japan (cw)	Randy Thompson, K5ZD
W/VE Operator (combined)	National Contest Journal

ATTENTION INSTRUCTORS

☐ This is a reminder that we ask you to send $1.50 with your order to help cover expenses on the Novice, General and Advanced/Extra Instructor Guides. This amount should accompany your order or it can be charged to your VISA, Master Charge or BankAmericard account. The Novice Student Workbook is available as part of *Tune in the World with Ham Radio*. — *Maureen Thompson, KA1DYZ, ARRL Club and Training Department*

MICHIGAN HAMS TURN TABLES

☐ Steve Gabridge, WB8AHJ; Ron Pal, WD8NNM; and Dave Tokarski, WD8QVA, recently did a good deed *for* Boy Scouts in the Macomb District of the Clinton Valley (MI) Council, Boy Scouts of America. These hams set up an Amateur Radio station at the home of Scout Commissioner Joe Waltzer for the Jamboree-on-the-Air. Under the direction of the three amateurs, over 50 scouts and leaders made contacts from Michigan to as far away as Germany. Special certificates were prepared for the event and awarded to each scout who made a contact. QSL cards are arriving daily, and arrangements are underway for the next Jamboree-on-the-Air. — *Joe Waltzer, Scout Commissioner*

Clinton Valley (MI) Boy Scouts take some time out for instruction. The scouts made contacts as far away as Germany. *(photo courtesy Joe Waltzer)*

QST congratulates . . .

☐ Robert L. Wendt, W2JAN, who has been named president of the Sperry division of the Sperry Corporation.

☐ ARRL Central Division Director Don C. Miller, W9NTP, recipient of the Indianapolis Radio Club outstanding amateur plaque.

A Universal Touch-Tone Decoder

Hold it! You don't need repeater control? Well, these novel circuits can be used for other functions as well.

By Robert D. Shriner,* WAØUZO

Since fm repeater systems throughout the country are becoming mighty sophisticated, there's a need for a good, reliable method of controlling their various functions. The control unit described here is extremely reliable, flexible and immune to false signals. Any number of control functions can be built into this modular unit. Starting with a simple, single-digit, on/off control, it may be expanded to provide up to 45 different control functions, including a three-digit on/off command. The application of the decoder system described here is not limited to repeater use. With a little ingenuity one might adapt the simpler systems to turn on house lights or open garage doors.[1] And there's a neat little voltage-to-frequency converter, too. More about that later.

The heart of the system is the NE567 tone decoder. Note the unique method of interconnection as shown in Fig. 1.[2] In other systems, seven ICs are used to provide all the decoding functions. These decoders may respond to false signals and are critical of input tone levels, however. In this unit 24 ICs are used, two for each digit (0 to 9) and two each for the asterisk (*) and pound (#) signs. This may at first seem to be a waste of ICs, but the selectivity of the decoders is greatly enhanced and this arrangement allows the use of other capabilities of the IC.

Circuit Description

Refer to Fig. 1. U1 is used to decode the

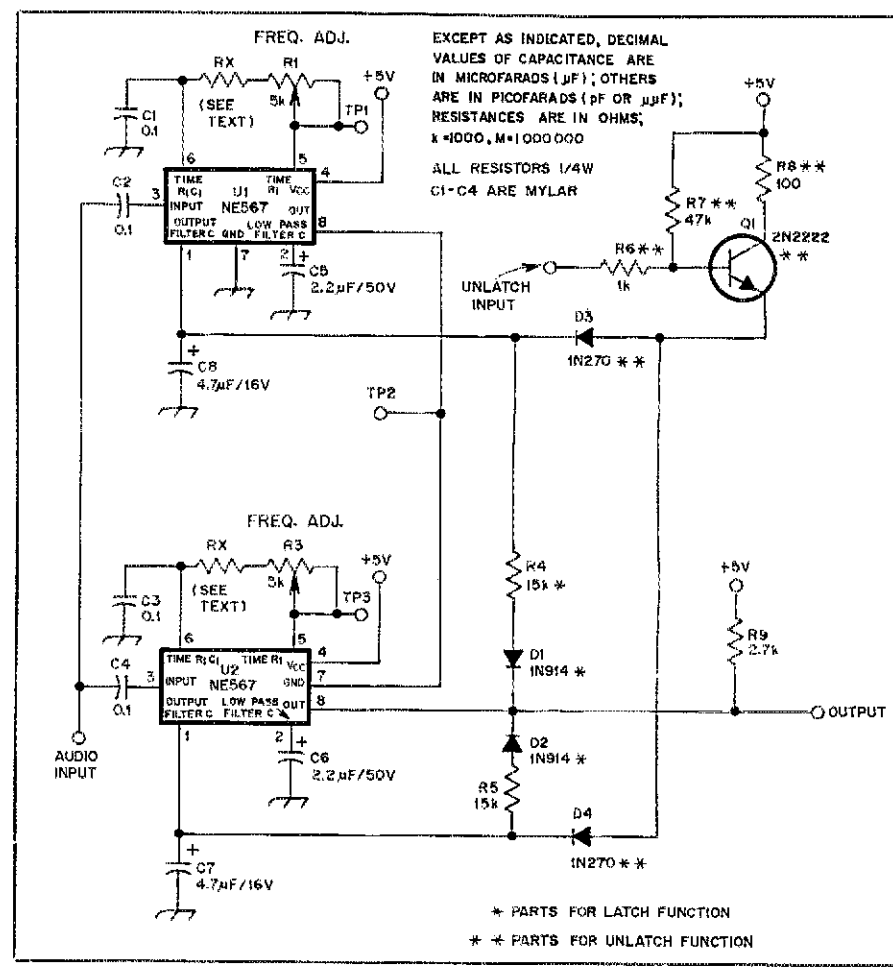


Fig. 1 — The circuit diagram of the Universal Touch-Tone Decoder. A pair of ICs is used to provide better reliability and immunity to "falsing." If desired, the capacitor at pin 1 of each IC may be increased to 100 µF to provide a two-second decoding delay.

*1740 E. 15th St., Pueblo, CO 81001

[1]Notes appear on page 40.

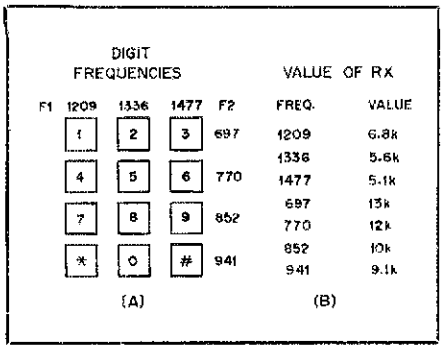
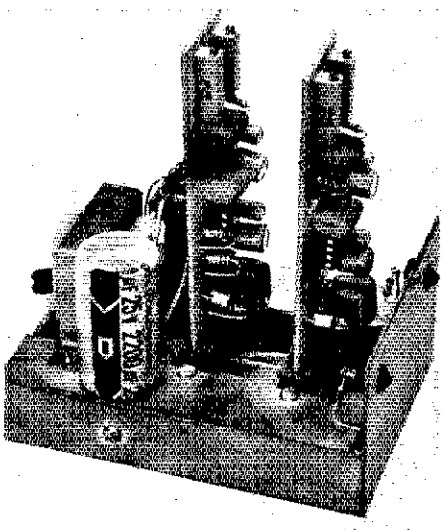


Fig. 2 — The layout of the 12-key pad and the frequencies associated with each line and row are shown at A. Fig. 2B gives the values required for RX for the various frequencies to which the decoders of Fig. 1 are tuned.



With a little ingenuity, this simple version of the decoder can find many uses.

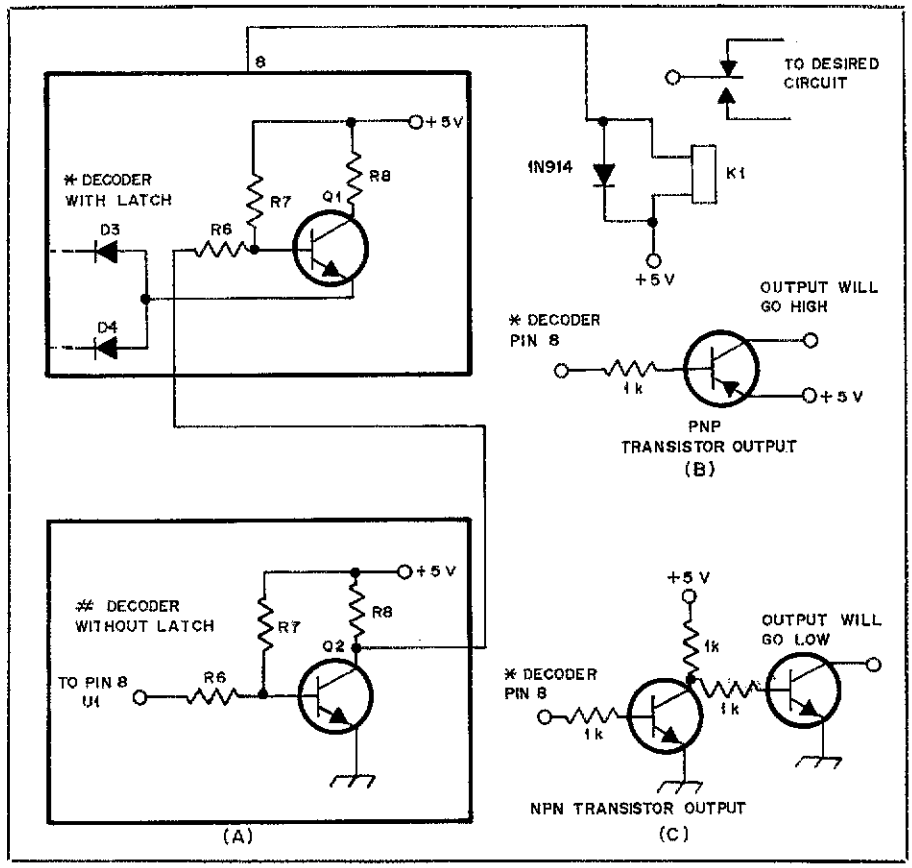


Fig. 3 — A simple two-button, on/off decoder. A relay is shown at A, but transistor switches may be substituted as at B and C.

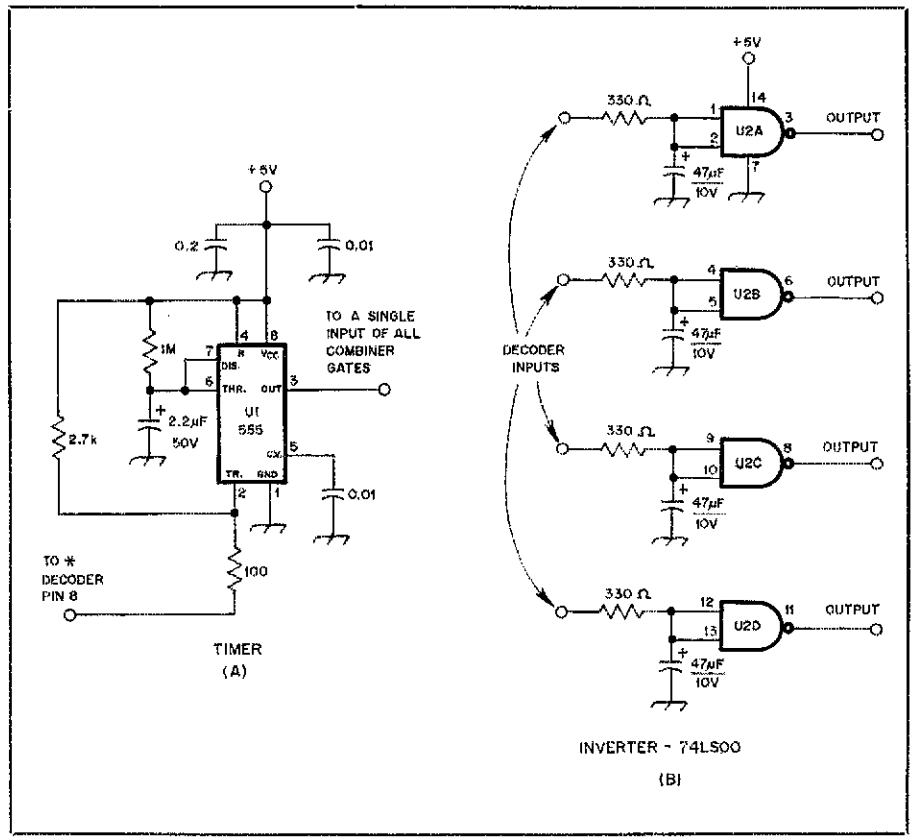


Fig. 4 — The diagram of the TIMER-INVERTER board. The timer is used to provide a "window" through which the control data must be passed. Only one inverter IC is shown, but there are actually three on the board. The 47-µF capacitors at the input to the gates slow down the action of the inverters and prevent system "falsing" due to voltage "spikes."

higher frequency (f1) of the Touch-Tone pair (see Fig. 2A). When U1 receives the correct tone, the output (pin 8) will supply a low to U2, pin 7, enabling it to decode the lower frequency of the pair (f2). Upon reception of the frequency pair, the output of U2 will go low. This low will be used in several different ways in this system.

The first way this low is used is to "latch" the digit into the system. D1, D2, R4 and R5 are used for this purpose. If the latch feature is not desired, omit these components. To "unlatch" the unit, Q1 will be used. When the base of Q1 is low (grounded), the latch is enabled. If the base is high (ungrounded) the system will unlatch.

Note that the decoders may be built one at a time on a small board or in groups of four on a larger board. Both boards can be plugged into a standard 0.156-in. (4.0-mm) card socket. A 6-pin socket is used for the single-digit model and a

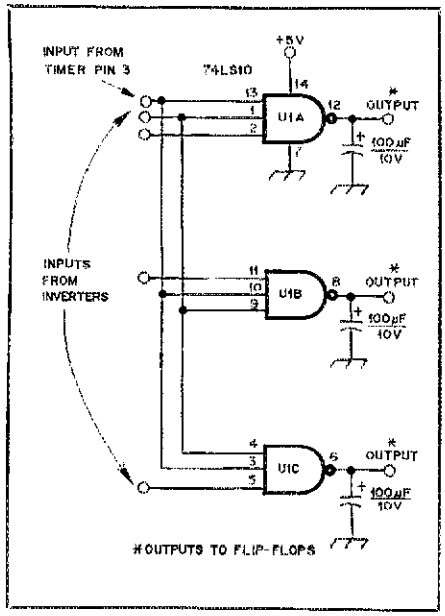


Fig. 5 — There are three 74LS10 ICs on each COMBINER board although only one is shown.

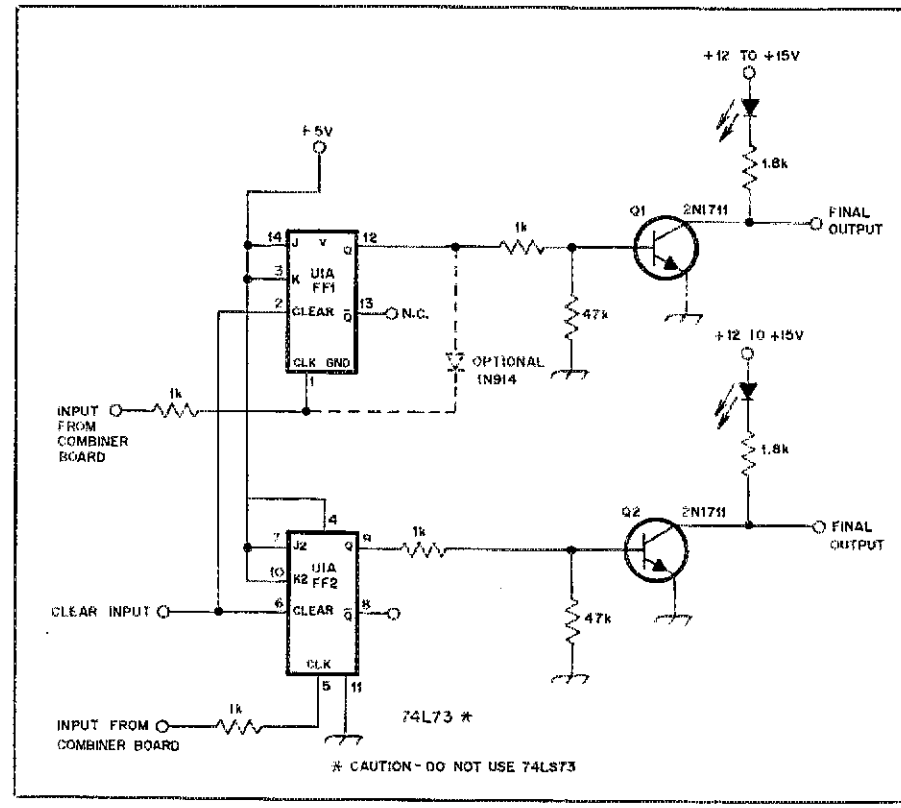


Fig. 6 — A diagram of one section of the FINAL board. FF1 and FF2 are both part of the same IC, a dual J-K flip-flop. Four of these dual flip-flops and eight of their accompanying output transistors are mounted on each board. See Fig. 8D and the text concerning the installation of the optional diode shown in dotted lines.

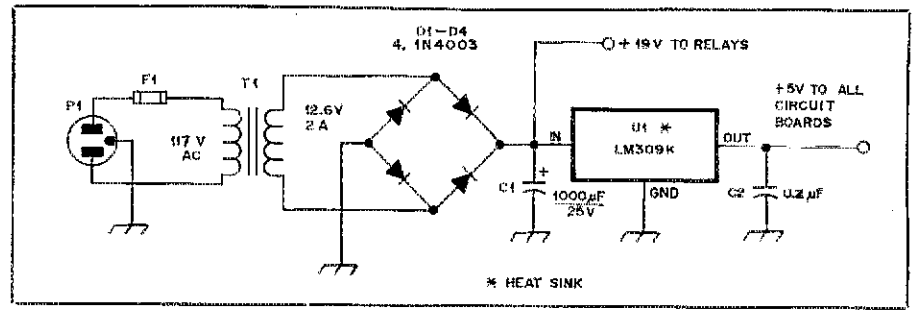


Fig. 7 — A diagram of a representative power supply which may be used to power the Universal Touch-Tone Decoder.
C1 — 1000-µF, 25-V electrolytic.
C2 — 0.2-µF, 35-V Mylar.
D1-D4, incl. — 1N4003 or equivalent.
F1 — 1-A, 125-V fuse.
P1 — 3-circuit ac plug.
T1 — 12.6-V, 2-A transformer.
U1 — LM309K voltage regulator.

28-pin socket for the four digit board.[3]

Construction

As a start, a single-tone decoder will be constructed and its operation examined. Select a frequency pair from Fig. 2A. Choose the appropriate resistor value for RX from Fig. 2B. Mount the components on the board with the exception of those required for the latch/unlatch circuitry. Install short wires at TP1, TP2 and TP3 for attaching test leads. Apply power to the circuit and connect a frequency counter to TP1. Use a low-value capacitor (approximately 300 pF) between the counter and TP1 to prevent the counter from loading the IC. Adjust R1 to provide the correct chosen frequency.

To adjust U2, a signal source at f1 is required. A Touch-Tone pad may be connected to the audio-input point of Fig. 1. The pad will generate a single-frequency tone (f1) when two buttons in a vertical row are pressed simultaneously. Any two coincidentally pressed buttons in a horizontal line will generate f2. Feed f1 into the decoder and adjust the amplitude of the tone so that TP2 goes low. With the counter at TP3, adjust R3 for f2 with f1 still applied. Now, when the digit corresponding to the frequency pair (f1/f2) is pressed with the output of the pad applied to the decoder, the output of U2 (pin 8) will go low. When the tones are removed, pin 8 will return to a high.

Install the components associated with the latch function. Now, when the frequency pair is recognized by the decoder, the output of U2 will go low and remain low after the tones are removed. Mount the unlatch function components and ground the base of Q1. You should note that pin 8 will go low when the tones are received and remain low until the base of Q1 is ungrounded or taken high.

To become even more familiar with the circuitry, a simple * (on) and # (off) decoder will be constructed. Build the * decoder with the latch function and the # decoder without the latch. Connect the transistors (Q1, Q2) as shown in Fig. 3. A relay is shown at the output although either a relay or transistor may be employed. When the * is received, the relay will close and remain closed (latched) until a # signal is received.

Topsy Grows

Let's proceed to construct a complete system offering up to 45 different control functions and using a three-digit entry. Use of either the * or # sign as the first entry for a control function is recommended, especially if the repeater is equipped with an autopatch. In this manner, numbers alone cannot initiate a control function. Personal preference is to use the * symbol to initiate the command and the # sign as an "all clear"; this also permits system reset.

To carry the logic required for the larger system, other circuit boards will be needed. All are of the 28-pin plug-in variety. A timer is also needed; an NE555 serves nicely. The timer, activated by the *

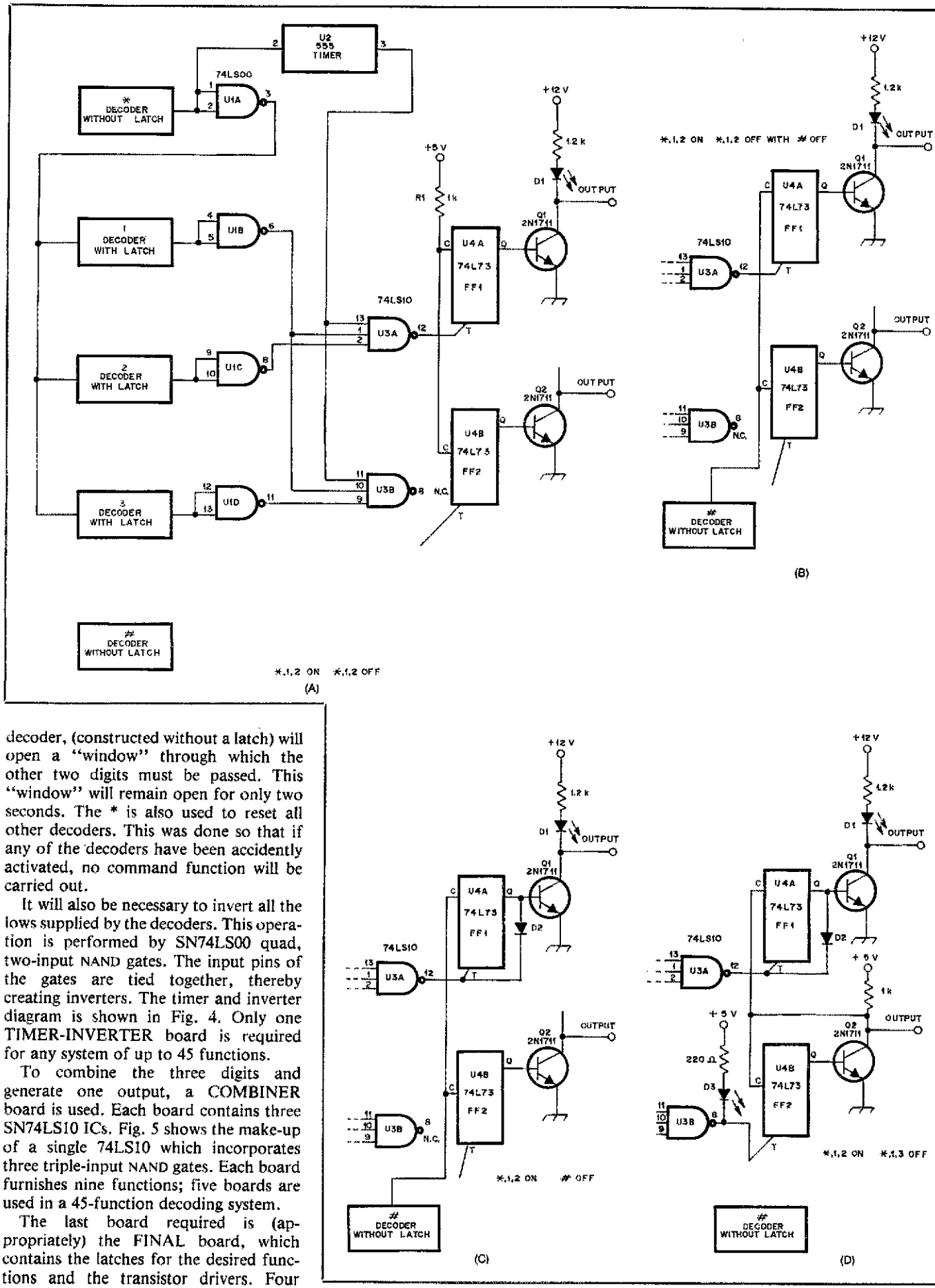


Fig. 8 — The four circuits diagrammed here are discussed in the text. The most simple circuit (A) does have a weak point, while that at D is the most reliable.

decoder, (constructed without a latch) will open a "window" through which the other two digits must be passed. This "window" will remain open for only two seconds. The * is also used to reset all other decoders. This was done so that if any of the decoders have been accidently activated, no command function will be carried out.

It will also be necessary to invert all the lows supplied by the decoders. This operation is performed by SN74LS00 quad, two-input NAND gates. The input pins of the gates are tied together, thereby creating inverters. The timer and inverter diagram is shown in Fig. 4. Only one TIMER-INVERTER board is required for any system of up to 45 functions.

To combine the three digits and generate one output, a COMBINER board is used. Each board contains three SN74LS10 ICs. Fig. 5 shows the make-up of a single 74LS10 which incorporates three triple-input NAND gates. Each board furnishes nine functions; five boards are used in a 45-function decoding system.

The last board required is (appropriately) the FINAL board, which contains the latches for the desired functions and the transistor drivers. Four SN74L73 dual J-K flip-flops and eight 2N1711 transistors are mounted on each

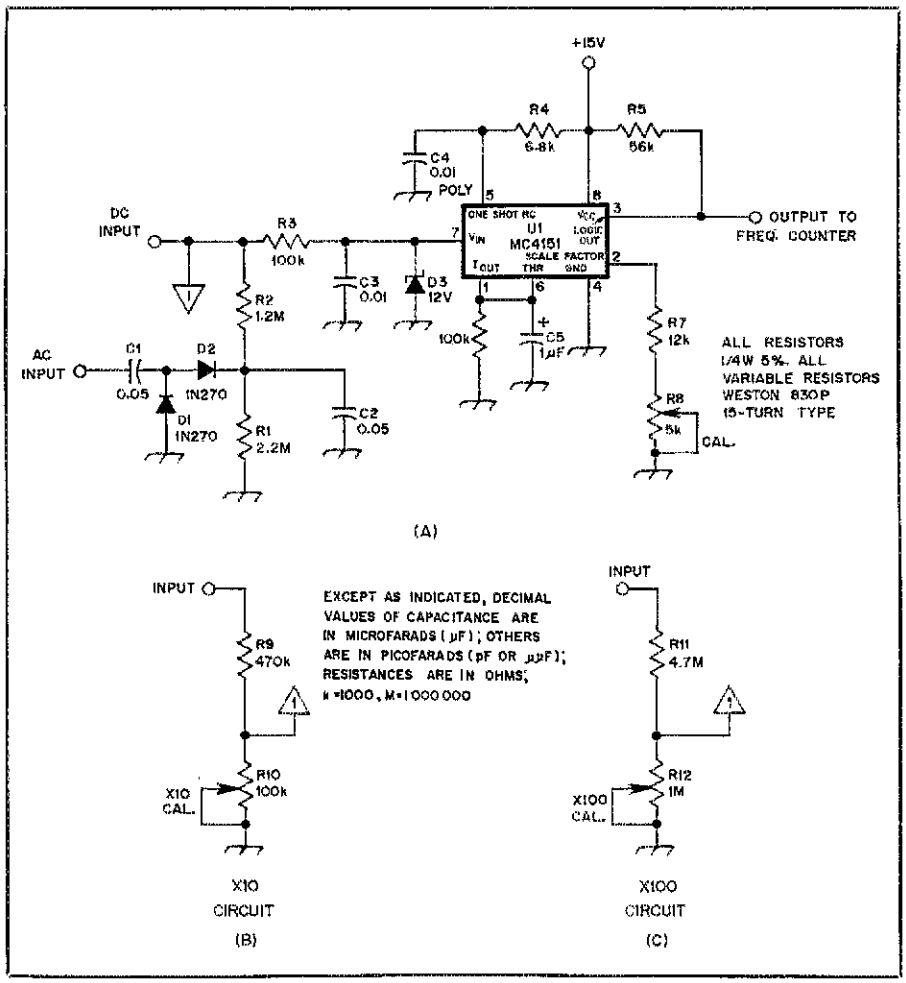
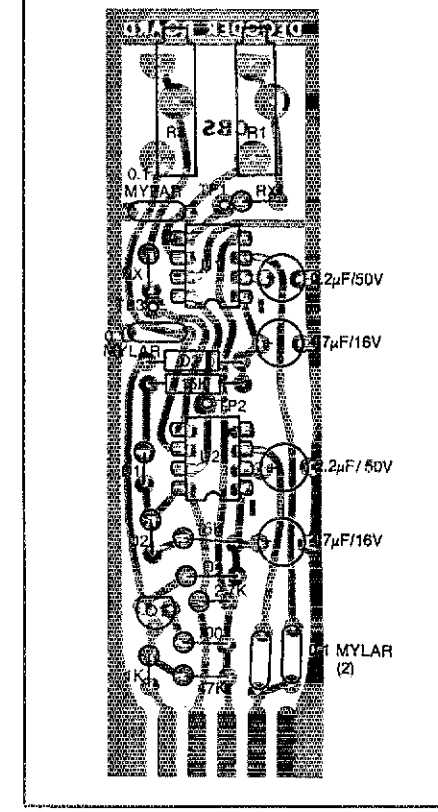
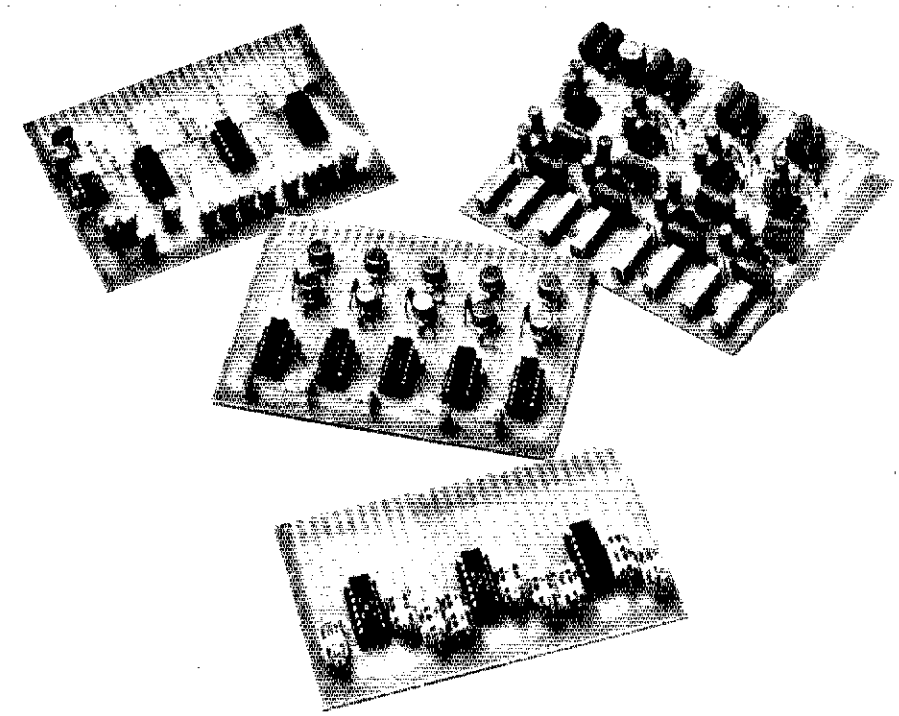


Fig. 9 — The voltage-to-frequency converter is shown at A. Both dc and ac voltage amplitudes may be read out on a frequency counter at the output of the IC. The circuits at B and C may be used as X 10 and X 100 multipliers at the input to the converter.



The component placement for the smaller DECODER board is shown here. The same arrangement is used on the larger board which houses four decoders.



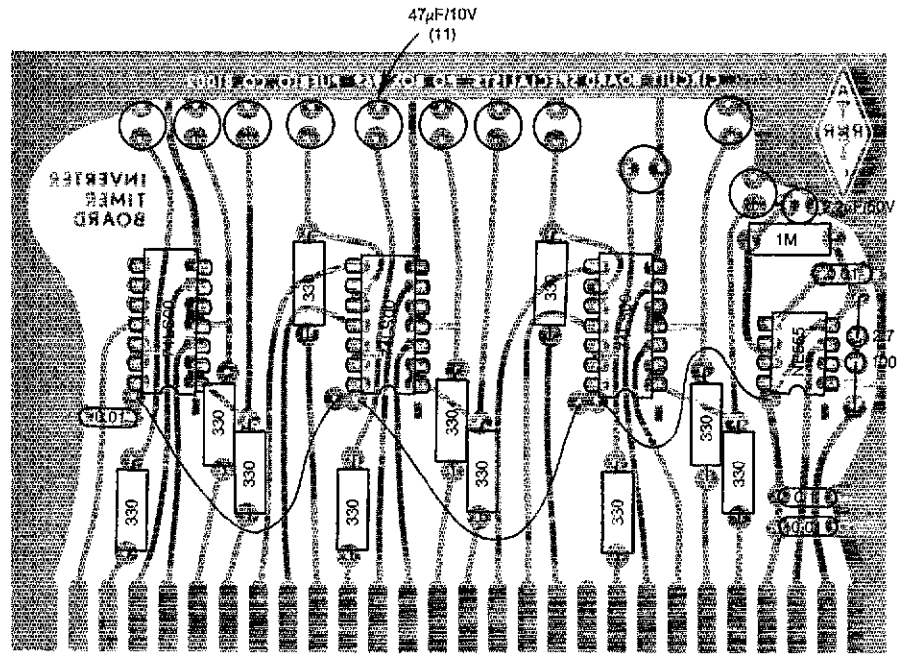
The four printed-circuit boards used in the decoder. At the upper left, the INVERTER-TIMER; upper right, the DECODER; center, the FINAL and at the bottom of the photograph, the COMBINER board. See note 3, page 40, about etching patterns.

board. Five boards are used in the 45-function system with 5 functions left open for possible use later. A single SN74L73 is shown in Fig. 6.

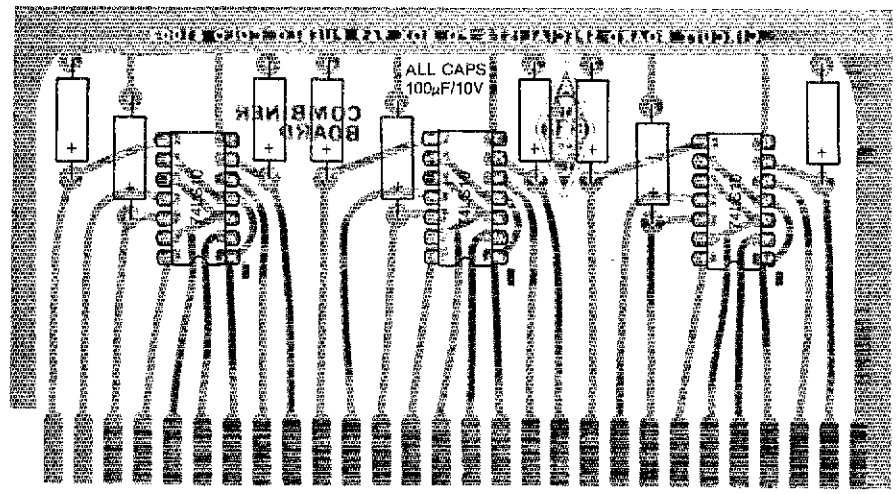
To power the described circuits, a supply similar to the one shown in Fig. 7 will be needed. The supply chosen should be capable of delivering approximately 750 mA to the decoder system and sufficient current for the operation of any relays that will be used.

Construction of a *,1,2, ON function will be described next. Then, several options will be discussed to reverse the state ending with the use of a *,1,3 OFF command. The diagrams shown in Fig. 8 illustrate the various options available. The * and # decoders should be built without the latching feature; all the other decoders will use the latch function. An INVERTER-TIMER board, at least one COMBINER board and one FINAL board will be needed as well.

To contain the system, a card cage or "shoe box" was made out of double-sided, printed-circuit-board material. The function-control outputs are brought out to card sockets mounted on the rear of the case. This allows everything to be disconnected easily for servicing. LEDs are mounted on the front panel of the enclosure to provide an indication of the status of all of the functions. A Touch-



Component placement guide for the INVERTER-TIMER board. Only one of these boards is required for any system employing up to 45 functions.



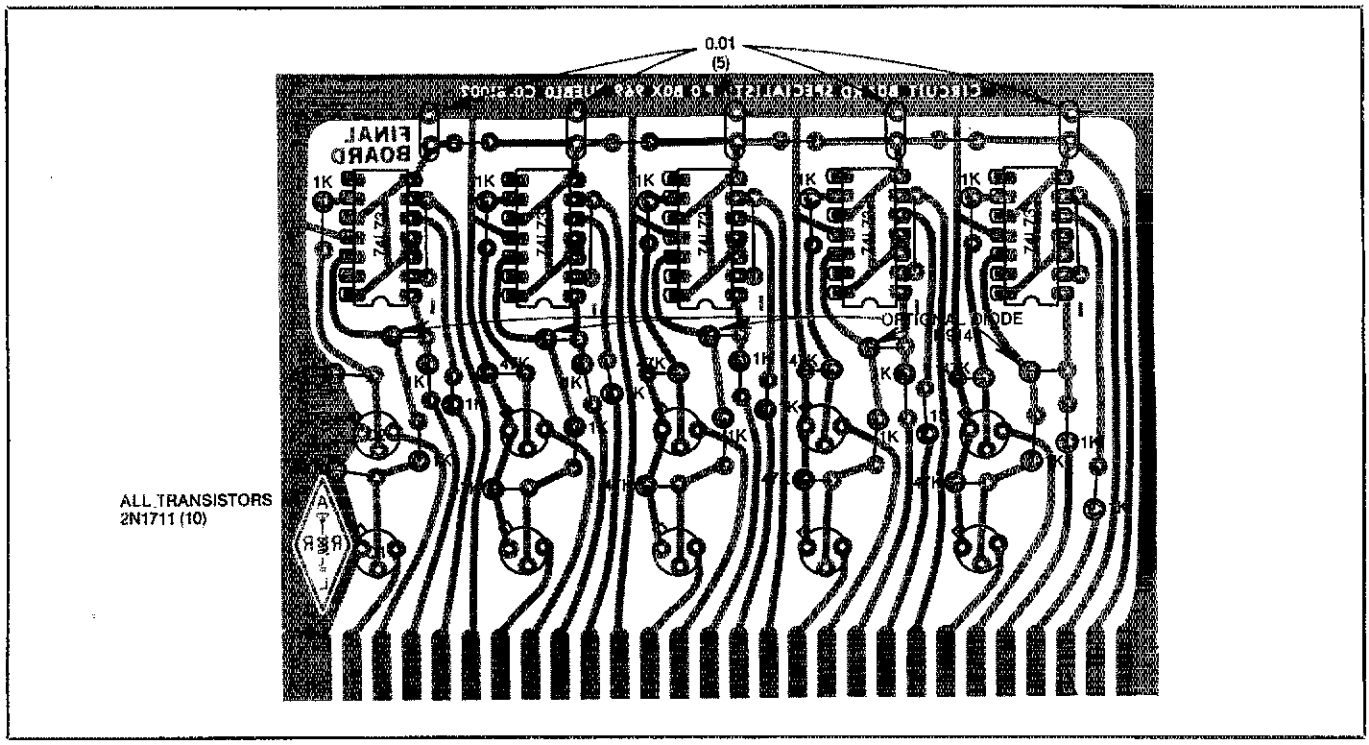
The COMBINER board component placement is shown above.

Tone pad was also installed on the front panel. This pad may be switched into the system for local checks of the unit.

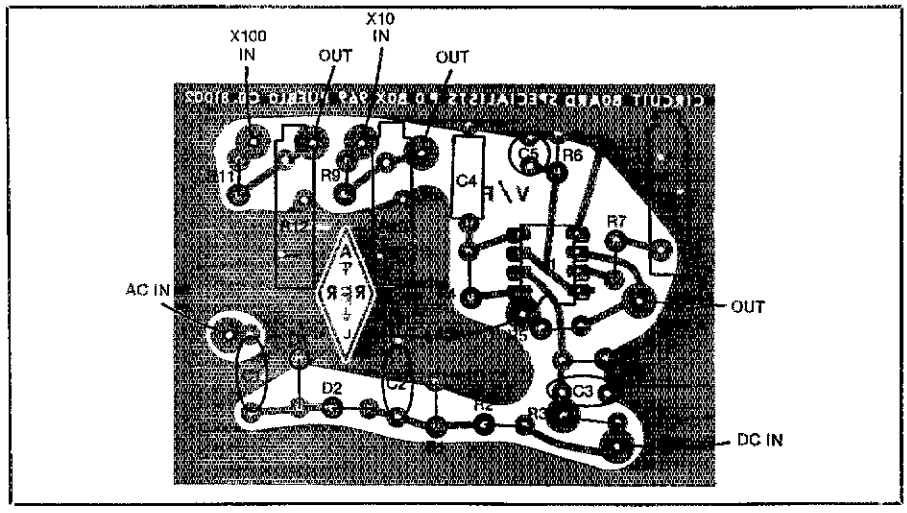
Refer to Fig. 8A. Note that the output of the * decoder is used to start the timer and reset all the decoders. The output of U2 is applied to one input of the three-input gate, U3A. The second input of the gate is satisfied by the output of the "1" decoder and the third input by the "2" decoder. This forces the output of U3A low. This low toggles the J-K flip-flop U4A (note that the clear or C input of U4A is held high through R1). The Q output of U4A will go high and remain high. This causes transistor Q1 (the output transistor) to conduct. The corresponding LED will glow, indicating that the function has been carried out. If desired, a relay could be used at the output of Q1. With this simple system, one must use the same codes (*,1,2) to turn off the function. This is not a sound idea since one cannot tell (from a remote point) whether the function was being keyed on or off. A better method is shown in Fig. 8B. The clear (C) input of U4 is connected to the # decoder. The basic action of the decoder will be the same as before, but now, use of the # key will ensure the function is in its off state. An extra bit of insurance may be obtained through the addition of D2 as shown in Fig. 8C. This will prevent the same code (*,1,2) from turning the function off; now the *only* way this may be done is with the # key.

In Fig. 8D, a system is shown which uses an ON code of *,1,2 and OFF code of *,1,3. Remove the # decoder output from the clear input of U4 and connect that input to the collector of Q2, the output transistor of the *,1,3 decoder. Add the LED, D3, as shown.

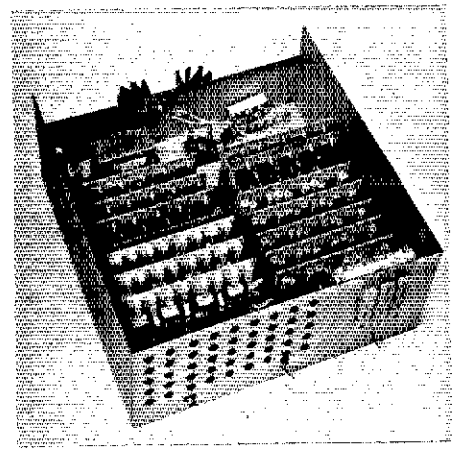
It is best to use a number of decoder chips and separate inputs to each chip for a couple of reasons. Some of the decoder audio inputs can be connected to the repeater receiver so that a number of users



Component positions for the FINAL board. Five boards are needed for a 45-function system.



This is the voltage-to-frequency converter component arrangement.



The completed 45-function Touch-Tone decoder. Double-sided printed-circuit board soldered along the seams makes a sturdy enclosure.

can key them up, as in autopatch use. Other decoders can be used with a 450-MHz control receiver and still others properly coupled to the telephone line for other uses.

A highly accurate voltage-to-frequency converter circuit is presented in Fig. 9A. Calibration is straightforward. Couple a frequency counter to the output of the converter and connect a +12V source to the input. Adjust the calibrate potentiometer for a reading of 12 kHz, as read on the frequency counter. A +1.5-V source should provide a reading of 1.5 kHz, and so on. Provisions have been made on the printed circuit board for inclusion of a X 10 and X 100 multiplier circuit. These additions are shown in Fig. 9B and C, respectively. The ac-to-dc converter permits measurement of ac voltage and will be read as an RMS voltage on the frequency counter. This novel voltage-to-frequency converter circuit can be utilized in many ways such as providing a digital readout of signal levels. Or, if your repeater is equipped for telemetry, you could use this circuit to provide signal level readouts. The circuits presented here should provide many hours of building and learning enjoyment and find both practical and fun applications.

Notes

[1]If such operation is intended, one should pay particular attention to sections 19.34(b), 19.35 (c), 97.61, 97.89 and 97.99 of the Communications Act of 1934. See *The Radio Amateur's License Manual*, ARRL, $4.

[2]*FM and Repeaters for the Radio Amateur*, first edition, p. 119.

[3]Circuit boards and parts kits are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002. Printed circuit board etching patterns are available from the ARRL for 50 cents and an s.a.s.e.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu FT-7B Mobile/Base HF Transceiver and YC-7 Frequency Display

Are you thinking about doing some mobile or portable operating? If so, you should take a look at the FT-7B, Yaesu's new hf transceiver. If not, you should look at it anyway, because it's also suitable for fixed service. An improved version of the FT-7, intended for the market generated by the Japanese no-code license, the B model features 100-W PEP input on ssb, a-m and cw. The transceiver covers 80 through 10 meters. The bandswitch has four 10-meter positions, each covering a 500-kHz segment. A crystal for 28.5-29.0 MHz is standard equipment; the others are optional. Other features of the FT-7B include a noise blanker, an rf attenuator, a crystal calibrator, concentric rf and af gain controls, a clarifier (RIT) and one fixed channel per band (crystals not supplied).

The FT-7B transceiver with optional YC-7 remote frequency display. The microphone and mobile mounting bracket are supplied with the transceiver.

Circuitry and Performance

The unit is completely solid-state. It contains 54 transistors, 78 diodes and 8 ICs. The usual premixing arrangement is employed to produce an i-f centered on 9 MHz. A 6-pole crystal filter having a shape factor of 1.67 (6 dB/60 dB) establishes the selectivity under all conditions except a-m transmitting. In the receive mode, a monolithic filter precedes the noise blanking gate to provide "roofing" against strong signals outside the crystal filter passband.

The VFO operates at 5 MHz and uses a bipolar transistor. The transceiver performs within its stability specification, but I would expect better performance from an FET. At room temperature the unit stabilized after one hour of operation, during which time it drifted 1 kilohertz. This performance is acceptable for home station environments, but the mobile operator trying to have a QSO during his half-hour drive to work may have trouble on a cold morning. The tuning mechanism operates smoothly and features anti-backlash gears.

The noise blanker is worth looking into because it appears to lack the ills characteristic of other units. This circuit contains seven transistors, six of which are FETs. One of these is used in an 8545-kHz crystal oscillator that establishes a 455-kHz i-f for the blanker. The significant feature of the FT-7B noise blanker is that it doesn't appear to degrade the receiver's dynamic range. Yaesu achieved this improvement at the expense of a slightly higher blanking threshold. Noise pulses must be somewhat more offensive than usual before they are blanked.

In the cw mode, a two-pole RC active audio filter follows the product detector. This filter has a 6-dB bandwidth of 80 Hz, but as would be expected from the simple design, the skirts

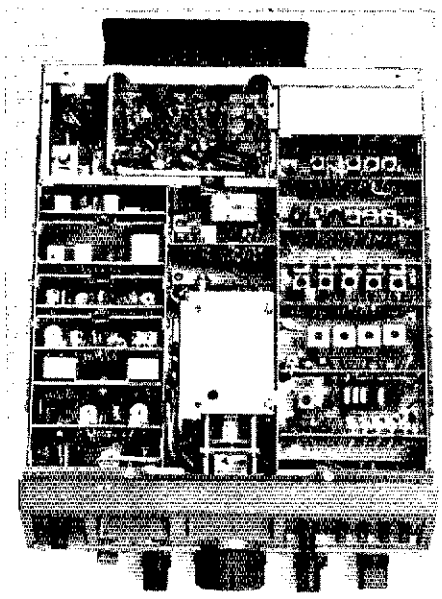
*Assistant Technical Editor, ARRL

Table 1

FT-7B Mobile/Base HF Transceiver

Frequency Coverage: 500 kHz of 80-15 meters, four 500-kHz segments of 10 meters (crystal for 28.5-29.0 MHz supplied).
Operating modes: lsb, usb, a-m, cw
Power requirements: 13.5 V dc ± 10 percent at 10 A transmit, 0.6 A receive.
Dimensions (HWD): 9- × 3-1/8- × 12-9/16-inches (230- × 80- × 320-mm) including heat sink.
Weight: 12 lbs (5.5 kg)

Claimed Specifications	*Measured in ARRL Lab*
Input power: 100 W PEP ssb, a-m 100 watts dc cw	50-55 watts rf output over frequency range
Carrier suppression: >50 dB below rated PEP output	>50 dB
Unwanted sideband suppression: >50 dB at 1000 Hz	>50 dB
Spurious emission: >40 dB below fundamental	>50 dB below fundamental
Distortion products: 31 dB below PEP output	31 dB below PEP
Frequency stability: <100 Hz per half-hour after warm-up	90 Hz per half-hour after one hour
Microphone input impedance: 500 ohms, nominal	
Antenna output impedance: 50 ohms, nominal	
Sensitivity: 0.5 μV for 10 dB S + N/N	0.25-0.5μV over frequency range
Image rejection: 50 dB	50-60 dB over frequency range
I-f rejection: 50 dB	50 dB over frequency range
Selectivity: 2.4 kHz (−6 dB), 4.0 kHz (−60 dB) cw audio	
Peak filter: 80 Hz (−6 dB)	
Audio output power: 3 watts at 10 percent THD	
Audio output impedance: 4 ohms	
Price class: $675	
Manufacturer: Yaesu Musen Co., Ltd., Tokyo, Japan	



Inside view of the FT-7B. The top cover of the PA module has been removed. A fan bracket could be made from the plate attached to the heat sink. The loudspeaker is on the underside.

aren't very steep. The receiver age bandwidth is 2.4 kHz in all modes, so the audio filter isn't the lifesaver it could be.

It would be nice to have cw selectivity at the i-f, but I don't know of a simple way to get it. On 80 meters, the sense (usb/lsb) of the signal is inverted, causing it to be located in a different part of the i-f passband than on the other bands. The cw offset frequency is 800 Hz on 40 through 10 meters and 1200 Hz on 80. If you peak the received signal on the nose of the audio filter, you can't transceive on frequency in the 80-meter band unless you shift the clarifier 400 Hz. The clarifier has plus or minus 3 kHz of range, which was enough to allow me to contact a DX station who was operating on split frequencies.

On ssb, the receiver audio sounds clean and the age action is smooth. A diode envelope detector is used in the a-m mode. The 2.4-kHz filter is used in both voice modes, so only one sideband reaches the a-m detector, resulting in a poorer signal-to-noise ratio in the detector. Additional i-f and af amplification is used with the a-m detector in an apparent attempt to equalize the a-m and ssb sensitivities, but the result is a somewhat noisier receiver on a-m.

The manual states that the transceiver is spurious-free. With the antenna input terminated by a 50-ohm resistor, I found internally generated responses at 14.001, 21.201 and 28.801 MHz. All of these spurs were weak (below 1 μV equivalent antenna input), but I found the one at 14.001 MHz to be offensive, the futility of competing on that frequency with 50 watts into a vertical antenna notwithstanding.

The overall performance of the receiver is good. We didn't perform the Hayward dynamic-range measurements because the cw-selectivity characteristics aren't the same as those of other transceivers. The numbers derived from the tests wouldn't be directly comparable to previously published results. However, the real test for receivers in Newington is how closely you can tune to W1AW while copying weak signals. My house is one mile from W1AW. So long as I tuned W1AW out of the i-f passband, I couldn't tell it was on the air. This was *without the attenuator activated.*

The transmitter works well on ssb. Using the hand-held microphone supplied with the transceiver, I received a good audio-quality report from N1FB during a 10-meter ground-wave contact. He reported high voice recognizability, even though my signal was too weak to move his S-meter (our stations are 10 miles apart and our antennas are cross-polarized). When I switched to a-m, he couldn't hear me at all. Suspecting a malfunction, I made some a-m measurements, and found the FT-7B to be working perfectly well. Why couldn't N1FB hear me? A-m simply isn't as efficient as ssb for weak-signal work. The FT-7B has considerable circuitry devoted exclusively to the a-m function. Rather than merely unbalancing the modulator and transmitting an "a-m compatible" signal through the filter, Yaesu chose to modulate the control gate of a dual-gate MOSFET amplifier following the cw carrier oscillator. The crystal filter is bypassed, resulting in a genuine dsb a-m emission. As can be seen in the a-m envelope photograph, Fig. 3, the modulation linearity is adequate for voice work. The waveform is similar to that obtained with screen modulation (remember screen modulation?). When I applied nearly 100 percent sinusoidal modulation, the average power increased from 12 watts to about 16 watts. A separate a-m alc circuit prevents the final amplifier from being overdriven on positive modulation peaks, but it's still possible to generate plenty of splatter from the negative excursions. If the mic gain and drive controls are adjusted as prescribed by the manual, the unit modulates cleanly.

I'm a cw operator, so I looked forward to using the FT-7B on the mode where its 50 watts of output would be most effective. I made several contacts using the hand key, and all of the receiving operators said the rig sounded good. Then I called a station who was sending faster (about 25 wpm), and he asked me to reduce the weighting on my keyer. This puzzled me, because I was sending with a bug! The next day I arranged tests with W1VD and N1FB, who recorded my signal. When he played the tape for me, I couldn't copy it! The dual-trace oscilloscope photo of the keying signal and the resultant rf envelope, Fig. 4, documents the problem. After the keying pulse has ended, the rf output continues for at least 20 milliseconds before it even begins to decay. I tore into the circuit and didn't stop until the unit produced the waveform shown in Fig. 5. My modification is radical, but it allows independent control of the attack and decay slopes. The details of the modification appear in the "Hints and Kinks" section of this issue. Realizing that my approach was somewhat of an overkill, I asked Yaesu for a simpler solution. The engineers reported that R1015 and C1012 have been changed to 47 kΩ and 0.33 μF in current production models. I restored the circuit to its original configuration and changed the two components. The third keying photo, Fig. 6, shows the results of Yaesu's fix. The performance is superior to that of the original circuit, but is somewhat sensitive to temperature variations and component tolerances. Yaesu also suggested changing C1012 to 0.047 μF and placing it between collector and base of the keying transistor in a Miller integrator fashion. If you plan to operate cw with the FT-7B, listen to it critically on a local ham's receiver.

A phase-shift oscillator generates the cw sidetone. The nearly pure sine wave is a pleasant departure from the raucous notes produced by the multivibrators in some other rigs. The sidetone output is rectified and used to activate the T-R relay for "semi-break-in" cw. The relay hang time is adjustable.

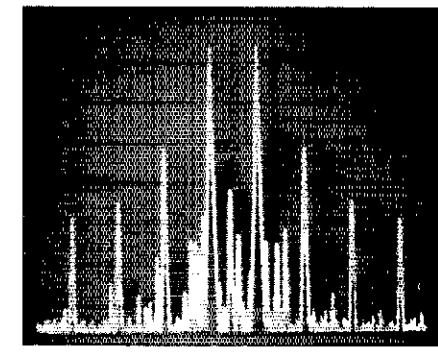


Fig. 1 — IMD spectrum of the FT-7B. Each tone is 6 dB below the rated PEP output. The test tones were 700 Hz and 1900 Hz. Vertical scale: 10 dB per division. Horizontal scale: 1 kHz per division. Test frequency is 14 MHz.

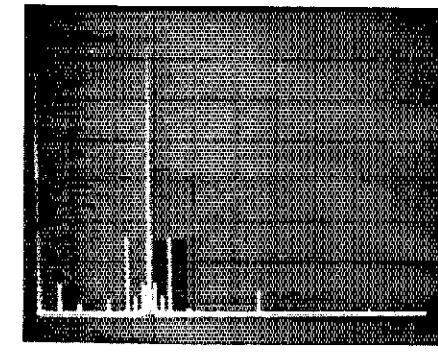


Fig. 2 — Worst-case harmonic and spurious spectrum (28 MHz). At full power input, all spurious outputs are more than 50 dB down. Vertical scale: 10 dB per division. Horizontal scale: 10 MHz per division. The tall pip at the extreme left of the photo is generated within the spectrum analyzer. The FT-7B complies with current FCC spectral purity requirements.

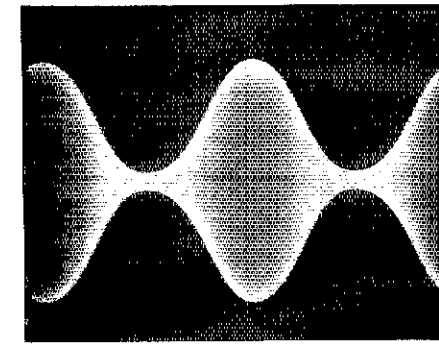


Fig. 3 — When was the last time you saw an a-m envelope? The FT-7B is capable of reasonably good linearity at high modulation percentages. For this test, the carrier frequency was 28.5 MHz and the modulation frequency was 1000 Hz.

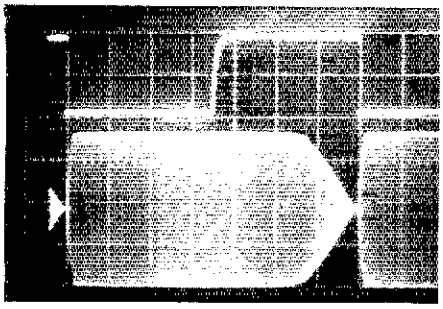


Fig. 4 — Rf envelope vs. keying waveform of the unit as received. The upper trace is the switching waveform at the FT-7B key jack and the lower trace is the output envelope. The horizontal scale is 10 msec per division.

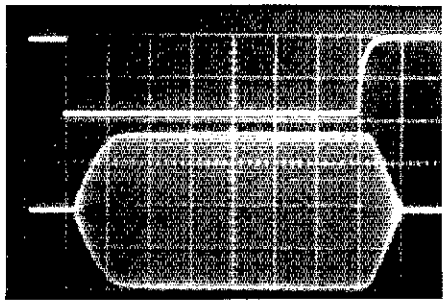


Fig. 5 — After radical surgery, the keying looked like this. In this photo, the horizontal scale is 5 msec per division. The modification information is printed in "Hints and Kinks."

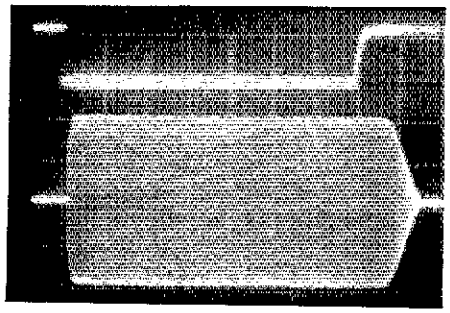


Fig. 6 — Here's the keying resulting from Yaesu's suggested modification (see text). Horizontal scale is 5 ms per division.

The YC-7B Frequency Display

Mobile operators must be able to determine their frequency quickly, with no more than a glance away from the road. The YC-7B remote digital display fills this need. The unit is an optional accessory that plugs into a rear-panel socket of the FT-7B. Stick-on Velcro strips allow the display to be mounted anywhere within reach of the umbilical cable.

The YC-7B counts the final mixer injection frequency. Preset commands from the FT-7B ensure proper carrier frequency readout on all modes. On 80 meters, an 18-MHz crystal oscillator heterodynes the LO signal to the proper range for the counter. The time-base frequency is 655.36 kHz. No special temperature compensation is used, but the overall stability should be at least an order of magnitude better than that of the FT-7B VFO. The readout resolution is 100 Hz, but the instrument counts down to 10 Hz, with a 0.1-second gate time. This unit does not add any spurious responses to the receiver.

Table 2

YC-7B Remote Digital Frequency Display

Specifications

Resolution: 100 Hz
Clock frequency: 655.36 kHz
Gate time: 0.1 sec.
Operating temperature: 0-40° C
Power connections: from FT-7B
Dimensions (HWD): 1-5/8 × 3-5/8 × 5-3/8 inches (40 × 93 × 135 mm)
Weight: 12-1/2 oz (360 g)
Price class: $110
Manufacturer: Yaesu Musen Co., Ltd., Tokyo, Japan

Construction

Most of the FT-7B circuitry is assembled on a dozen phenolic pc cards which plug into three mother boards. The card sockets are individual gold-plated spring pins soldered into the mother boards. The mobile operator needn't worry about the reliability of the sockets — the cards are held firmly in place by the top cover. Two wired-in pc boards and the VFO and PA modules complete the electronics. The VFO and PA are shielded, of course. Most of the tuned circuits are on the mother boards, so you can repeatedly remove and reinstall the plug-in cards without upsetting the alignment. The PA heat sink protrudes from the rear panel. The sink is adequate for voice and cw duty cycles. The a-m rating applies to RTTY and SSTV service. Two screws secure a flat plate to the heat sink fins. A small fan could be mounted to this plate very conveniently.

Aesthetics and Impressions

The unit certainly is compact. That's not surprising, considering the cars it was designed to be installed in. At a time when the styling of Amateur Radio equipment is diverging toward the "military" and "hi-fi/furniture" looks, the FT-7B represents a refreshing alternative to these extremes. The cabinet is painted a businesslike metallic blue that won't look out-of-place in your car or on your kitchen table. The four-color dial and meter are highly visible, yet not at all garish. For fixed service, the analog dial is easy to read, and with its 1-kHz resolution and good linearity, you really don't need the optional digital readout. It's handy, though, for precise clarifier tuning and keeping track of the VFO. All of the controls are conveniently located.

I experienced a small amount of TVI while operating the rig into a dummy load on the same table with my plastic-encased television set. You may have to scrape some paint off the mating metallic surfaces of the FT-7B enclosure if you live in a weak TV signal area.

A *QST* advertisement for the FT-7B reads: "Enough power to drive those linears!" The manual makes no mention of using the transceiver with an external amplifier, but if you dig into the schematic diagram, you'll find that the alc line and the 13.8-volt transmit line (to control a relay) are brought out to the power connector. There's an unused set of contacts on the T-R relay, but they aren't accessible from outside the transceiver.

The attention Yaesu paid to the a-m mode is perplexing. If the intent was to make the transceiver compatible with converted CB rigs, a better solution is to install BFOs in the CB rigs. If you want to participate in the second genesis of a-m, you'll never compete with those plate-modulated Valiants and DX-100s! I would much prefer to see the a-m mode scrapped in favor of some advanced ssb/cw features, such as sharp i-f selectivity, full break-in, VOX and even (bite my tongue) speech processing.

Tinkerers will love this rig, for one can remove most of the cards without unsoldering any wires. If you like, you can fabricate a completely new set of cards. Serious experimenters will undoubtedly conceive numerous worthwhile modifications. With a little ingenuity, a remote VFO could be plugged into one of the fixed-channel crystal sockets. Another possible improvement would be a VFO drift correction circuit using feedback from the YC-7B. If you apply the correction voltage to the wiper of the dial calibration potentiometer, you won't have to violate the VFO compartment.

The FT-7B offers something for everybody. You can have plenty of fun with it just like it is. And if you're ambitious, you can turn it into a truly deluxe station. The equipment is covered by a three-month limited warranty. — *George Woodward, W1RN*

HEATH SB-221 LINEAR AMPLIFIER KIT

How does the SB-221 differ from the earlier SB-220[1] amplifier? The major difference, electrically, is an unfortunate by-product of FCC action to prevent amateur-equipment manufacturers from including our 10-meter band in linear amplifiers: The SB-221 does not operate on 10 meters! The band-switch panel markings read only "80, 40, 20 and 15" (meters).

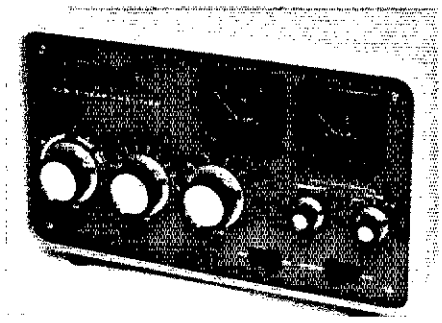
Heath Company and other commercial manufacturers of hf-band amateur amplifiers are required to ensure that all amplifiers require at least 50 watts of driving power and that they must be incapable of operation at 27 MHz. They can't, therefore, operate at 28 MHz without elaborate and highly expensive circuitry which is beyond manufacturing reason. All of this came to pass because of widespread illegal operation by CBers who purchased amateur-band linear amplifiers and employed them at 27 MHz. The FCC's inability to enforce the CB regulations imposed a severe economic and marketing hardship on the amateur-equipment manufacturers as well as the amateurs. These regulations, fortunately, do not apply to vhf and uhf types of amplifiers.

SB-221 Features

The popular and reasonably priced amplifier can be made to work satisfactorily on 10 meters by converting it back to an SB-220. More on that later. But, let's examine the circuit and features for the benefit of those who are contemplating the purchase of a "pair of shoes" for that presently "barefoot" exciter.

In its present form, the SB-221 operates in the 80, 40, 20 and 15-meter bands. The required driving power is 100 watts maximum. Rf power amplification is accomplished by means of two 3-500Z triode tubes which are forced-air cooled. These well-proven tubes

[1]"Recent Equipment," *QST*, August 1970, p. 45.



The Heath SB-221 linear amplifier. Though it may appear to be "stock," this '221 operates in five bands. Modification information is given in the text.

Table 4

Results of SB-221 Tests Performed in ARRL Laboratory

Band	$P_{IN(watts)}$	$P_{OUT(watts)}$	*Input VSWR*	*Drive Power (watts)*	*Efficiency (%)*
80	1000	560	1.53:1	70	56
80	1900	1150	1.42:1	100 +	60
40	1000	600	1.41:1	70	60
40	1900	1200	—	100 +	63
20	1000	580	1.6:1	75	58
20	1900	1100	—	100 +	58
15	1000	560	1.79:1	75	56
15	1900	1050	—	100 +	55
10	1000	500	1.42:1	67	50
10	1900	1000	—	100 +	53

offer reliable service and good efficiency. They are the instant-heating-filament type. Hence, operation is permissible the moment the amplifier power switch is turned on.

Maximum dc power input is 2-kW PEP on ssb, 1 kW on cw and 1 kW on RTTY. This amplifier is rated, in terms of its duty cycle, for continuous voice modulation on ssb. For cw use the maximum key-down (steady carrier) time is 10 minutes. When operating the RTTY mode the manufacturer specifies a 50 percent duty cycle, or a *maximum* transmit time of 10 minutes.

The metering system enables the operator to monitor the plate current at all times by means of a 0- to 1-ampere dc meter. A second meter and related switch permits the monitoring of grid current, relative output power or dc plate voltage. There is a two-level plate-voltage setup which is programmed from the front panel by means of a rocker switch. One position provides the proper operating voltage for tune-up and cw. The alternate switch position is for ssb operation. In the latter position the plate voltage and current are elevated to provide the 2-kW PEP power input level while keeping the plate impedance the same as it is in the tune position. Therefore, no readjustment is needed when going from tune to the ssb mode.

Driving power is supplied to the grounded-grid 3-500Zs through switched, broadband pi-section matching networks. The amplifier input impedance is approximately 50 ohms. Hash noise is prevented during the standby period by automatic application of beyond-cutoff bias to the tubes. The proper idling current for the tubes during transmit is established with Zener-diode-regulated bias.

During transmit, an automatic limiting control (alc) circuit in the amplifier develops negative voltage which can be routed to the exciter to reduce its gain when the exciter output is sufficient to overdrive the amplifier. A phono jack is provided on the rear apron of the amplifier for alc takeoff. Another jack is located on the rear of the amplifier for a control line from the exciter which actuates the amplifier changeover relay. When this line is shorted, the relay closes. Fig. 7 shows the amplifier third- and fifth-order distortion product levels. Fig. 8 is a spectrum display of the amplifier spurious products. The harmonic levels are well within FCC limits. Additional TVI protection is offered by the double-shielding technique used in the SB-221: The rf deck has a perforated metal enclosure. The amplifier cabinet serves as the second shield. Rf bypassing is employed at the power-supply primary, the alc jack and the relay-control jack.

What About 10-Meter Operation?

This reviewer couldn't make an ounce of sense out of having this fine amplifier on the operating desk without being able to use it on 10 meters. So, a check was made between the schematic diagrams of the earlier SB-220 and the SB-221. Most of the circuit remained the same. The new version contained a sealed filter in the excitation line to prevent 27- or 28-MHz operation. The band switch lacked the necessary contacts for 5-band use. There was no 10/15-meter plate coil and the 10/15-meter input coil was missing. There were other differences (slight), but none that couldn't be resolved easily.

The lineup of required components was obtained from Heath. Here is the list needed for conversion back to the SB-220 format: 63-561 rotary switch, 63-562 wafer switch, 20-99 22-pF mica (2), 20-120 220-pF mica, 20-113 470-pF mica (2), 20-103 150-pF mica, 20-124 115-pF mica (2), 40-966 40-meter input coil, 40-964 10/15 meter input coil (2), 40-968 10/15 meter plate coil, 595-1122 SB-220 manual. The cost of the foregoing parts at the time of this writing is $31.50. Heath has agreed to sell these parts to SB-221 owners if a photocopy of the purchaser's valid amateur license accompanies the order. The filter in the SB-221 must be removed by drilling out the rivets which hold it to the main chassis. There is no 10-meter marking on the front-panel band switch. A white press-on decal can be added if that band position needs to be identified.

Converting an already-built SB-221 to the SB-220 format will require a certain amount of "unbuilding" first. Fortunately, the reviewer started from scratch with the amplifier kit and wired it as an SB-220. Everything went smoothly by working from the SB-220 manual. Now, the 10-meter band is situated in the "nothing" position on the panel, respective to band-switch indexing. Assembly time for an experienced amateur builder should be on the order of 20 hours. Neophytes should plan to spend up to 35 hours for a project of this nature. — *Doug DeMaw, W1FB*

Table 3

SB-221 Specifications

Size (HWD): 8-1/4 × 14-7/8 × 14-1/2 inches (210 × 378 × 368 mm).
Weight: 50 pounds (22.7 kg).
Color: Two-tone light and dark green.
Power requirements: 117 V ac at 50/60 Hz (20 A max.), or 240 V ac at 50/60 Hz (10 A max.).
Driving power: 100 W max.
Dc input power: 2-kW PEP for ssb and 1 kW for cw and RTTY.
Key-down maximum at full power: 10 minutes.
Frequency range: 3.5 through 21 MHz.
Price class: $620.
Manufacturer: Heath Company, Benton Harbor, MI 49022.

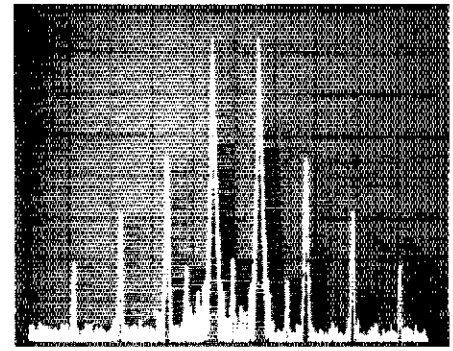


Fig. 7 — Spectral display of the SB-221 IMD characteristics at 3.5 MHz during a two-tone test. Vertical divisions are 10 dB; horizontal divisions are 1 kHz. Third-order distortion products are down approximately 35 dB from the PEP output. The individual tones are 6 dB down from the PEP output. All measurements were taken in the ARRL lab.

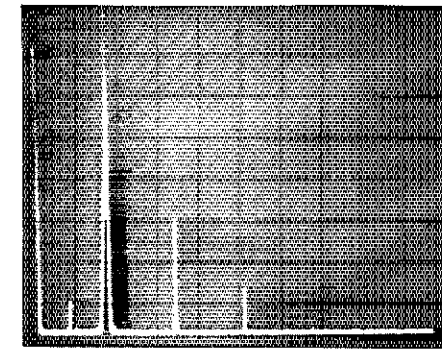


Fig. 8 — Spectral display of the SB-221 amplifier on 3.5 MHz. Vertical divisions are 10 dB; horizontal divisions are 2 MHz. The full-scale pip is the 3.5 MHz carrier with a low-level spur off to its left. The signal immediately to the right of the carrier is the second harmonic at approximately 50 dB below peak power. The third harmonic is 66 dB below peak power.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

IMPROVED KEYING FOR THE FT-7B

Early production units of the Yaesu FT-7B transceiver exhibit less-than-ideal keying characteristics. At speeds over about 20 wpm, the dits run together. If you intend to do any serious cw work, listen to your signal critically on an external receiver. Don't depend on the sidetone to give you the true story, because it's keyed independently. The keying circuit is located on the predriver card (PB-1632). Drawing A shows the original circuit. The problem is that C1012 must discharge almost completely before Q1004 comes out of saturation. In the second-generation transceiver, Yaesu changed C1012 and R1015 to 0.33 μF and 47 kΩ, respectively. Recently, the circuit has been updated to the Miller integrator configuration illustrated in Drawing B.

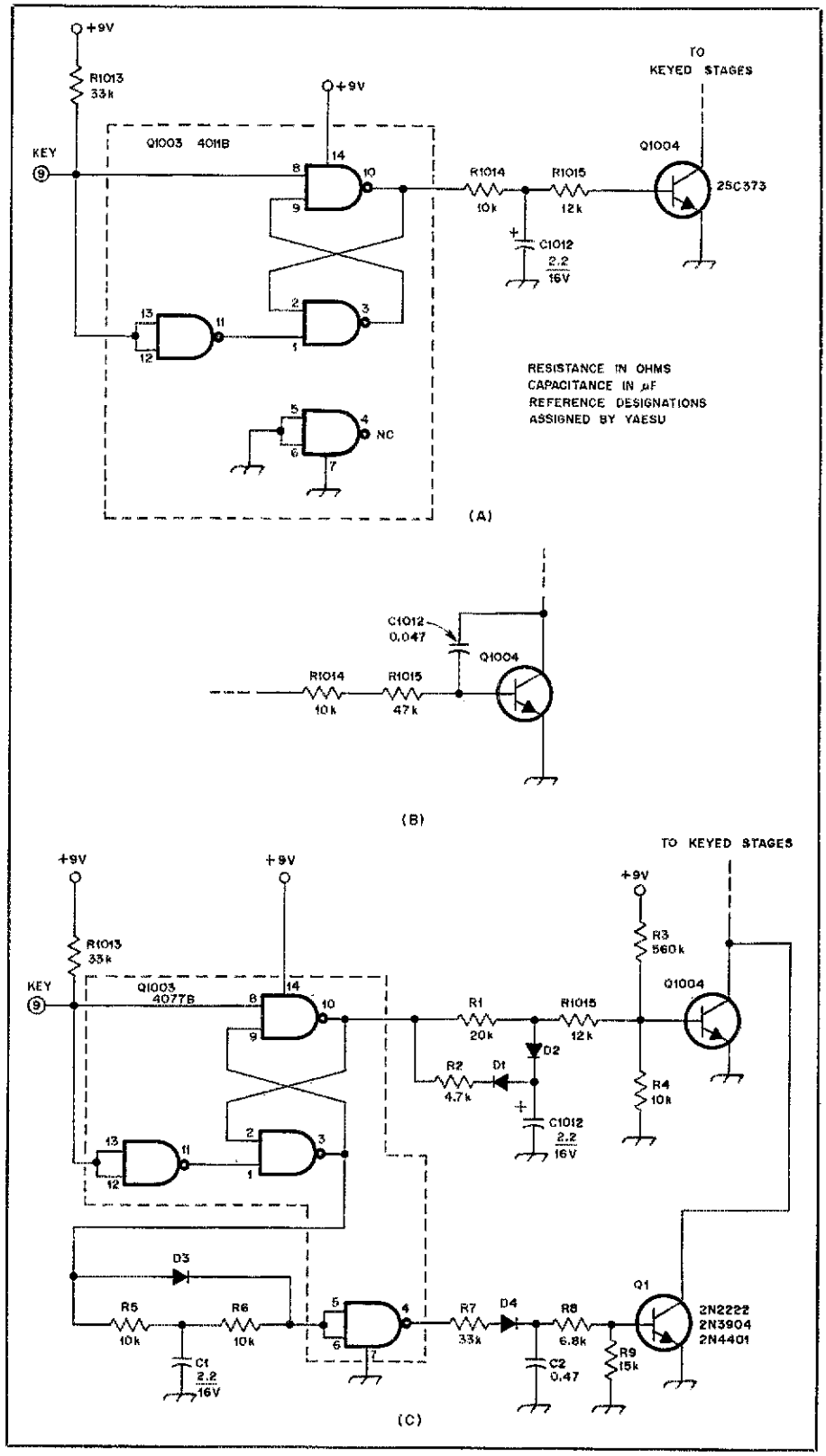
If you're still not satisfied with the keying after trying these fixes, reach for an X-acto knife and rework the circuit as shown in Drawing C. C1012 now has independent charge and discharge paths. Because of the 0.6-volt conduction threshold of D2 and the Q1004 base bias supplied by R3 and R4, the time-constant network doesn't come into play until Q1004 begins to conduct. After the rf envelope has attained maximum amplitude, Q1 is switched on in parallel with Q1004. The turn-on delay for Q1 is governed by R5, R6 and C1. When the key is opened, Q1004 is turned off immediately, and the envelope decay is controlled by C2 discharging into the base of Q1. D3 defeats the Q1 delay network during the key-up interval.

The "Product Review" section contains an oscillograph of the keying waveform produced by this circuit. The rise and decay times are controlled independently by C1012 and C2. Some operators prefer a somewhat harder "make," but I suggest a minimum rise time of 3 ms to avoid key clicks. The resistance values were chosen in consideration of the transistor betas, conduction thresholds, and the current source and sink capabilities of the gates, as well as the RC time constants. In designing the circuit, a few decade boxes got as much work as my calculator!

To preserve your warranty, you may wish to start with a new predriver card. There are a lot of extra parts in this modification, but you can squeeze them in. If you build the circuit like a space truss, with short component leads, it will be rigid enough for mobile service. When working on the pc card, give due respect to the CMOS IC. — *George Woodward, W1RN*

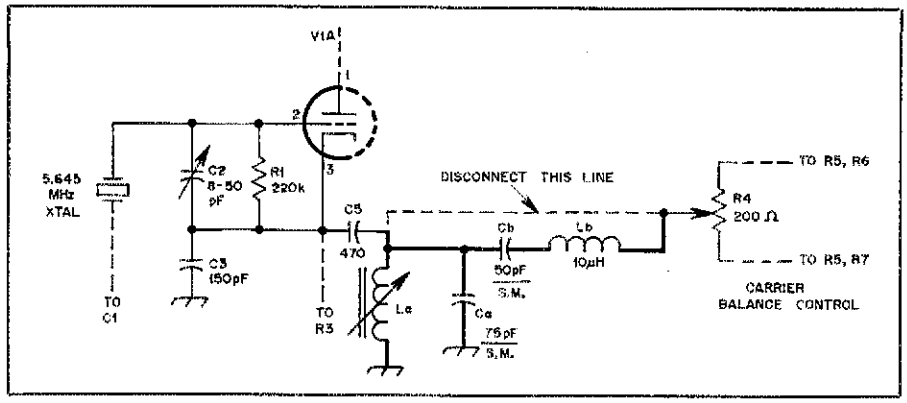
ANTI-TVI MODIFICATION FOR THE T-4XB

In the "Hints and Kinks" section of June 1979 *QST*, J. H. Mehaffey described a TVI problem with his TR-4 very similar to one that had plagued me for some time. I have a Drake T-4XB. His simple and successful modification of the TR-4 to clear up the harmonic output of the 9-MHz carrier oscillator clearly pointed the way for me.



Original keying circuit for the FT-7B. Changing C1012 and R1015 to 0.33 μF and 47 kΩ will improve the high-speed performance (A). Current production models of the FT-7B have this shaping circuit (B). FT-7B modification for the perfectionist. The rf envelope can be shaped to taste by the DXer or QRQ enthusiast (C).

*Assistant Technical Editor, *QST*



The W6HB anti-TVI modification for the Drake T-4XB. Heavy lines show added circuitry.
C_a — 75 pF silver mica, 5 %.
C_b — 50 pF silver mica, 5 %.
L_a — 24 turns, no. 24 enameled wire, close spaced on open end of Miller coil form no. 4400-2.
L_b — 10-µH Miller coil no. 4612.

Unlike the TR-4 with a 9-MHz oscillator, the T-4XB carrier oscillator is at 5.645 MHz, so different values of components are required to make the fix. In my case, those used were "junk box" values, ones at hand close enough to what seemed to be needed. The diagram is drawn in a manner to match that of the Drake manual.

There is sufficient chassis room for the few required parts under and around R4, the carrier-balance potentiometer of the T-4XB. L_a, the slug-tuned coil, is easily mounted in the extra hole of the left-rear chassis apron. With the adjustment screw on the outside, access to it is easy, although this is a seldom-needed tuning adjustment. L_b and the two capacitors are supported by a small double tiepoint and the respective leads. The short ground connections are made to the socket frame of V1.

I also took Mr. Mehaffey's suggestion regarding linearizing the final by disconnecting C53 and C58, the 470-pF cathode bypass capacitors of the 6JB6 output tubes. L_a can be peaked with a grid-dip meter. Touch-up tuning for maximum drive, as shown by increased final-amplifier plate current, should follow. To complete the adjustment, realignment of the carrier oscillator ought to be carried out using the procedure in the Drake manual.

Lacking the proper test equipment to measure harmonic attenuation, I cannot tell you how much those obnoxious harmonics were reduced. I'd guess reduction is comparable to the amounts shown in Mr. Mehaffey's report. I do know, however, that the TVI problem is cured. — *Hank Brown, W6HB, Los Osos, CA*

PREVENTING ICE BUILDUP ON ANTENNAS

Every year *QST* prints photos of otherwise solid antenna installations that have come crashing down because of ice buildup on the antenna. A quarter-inch of radial ice on a tribander can add 20 pounds or more to the weight of the antenna, as well as additional windloading. What's more, a quarter-inch of ice is nothing compared to what a real ice storm can dump on your antenna. An inch of ice would not be unusual — that is, if your antenna stays up long enough for an inch to collect.

There is a very simple yet remarkably effective way of preventing any ice build up: apply that no-stick, space-age material, Teflon, to the antenna elements. Water will bead up on the Teflon, and when the droplet is heavy enough it simply slides around to the bottom of the element and falls off. If any ice does form, it too will quickly slide off. Because Teflon has excellent rf properties, it will not affect the normal operation of the antenna.

The simplest way to apply Teflon to a ham beam antenna is to wrap the elements and boom with self-adhesive Teflon tape. I used Connecticut Hard Rubber Company[1] Temp R Tape, type T, which comes in rolls 1 inch (25 mm) wide by 18 yards (15.5 m) long, obtainable at a local industrial distributor. The antenna is spiral-wrapped, mummy style. The Teflon tape has a lot of stretch, which makes for a very tight and long-lasting installation. An fm broadcast antenna so treated has been in use through four severe winters and several ice storms without noticeable icing.

For quads, wrap the spreaders with the tape. This will have the additional benefit of prolonging the life of the spreaders, especially if they are the bamboo variety. Unfortunately, ice can and will build up on the wire quad elements. To combat this, I suggest trying Teflon insulated hookup wire for the quad elements. I haven't tried this yet, but expect to on my next quad. Of course, the same idea would apply to any wire type antenna.

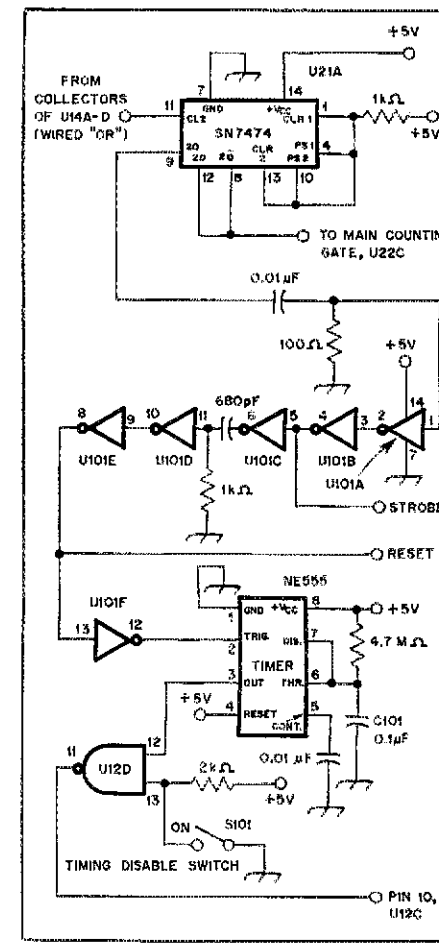
One last comment. Teflon is expensive. Yet it is still a lot cheaper than a new antenna to replace that twisted mass of metal gracing your back yard. — *Jacob Z. Schanker, W2TSM, Rochester, NY*

[1]Connecticut Hard Rubber Co., 407 East St., New Haven, CT 06509.

COMPETITION-GRADE RECEIVER MODIFICATIONS

I would like to pass along two modifications of Wes Hayward's "Competition-Grade CW Receiver" described in April 1974 *QST* and the ARRL publication *Solid State Design*. Both modifications replace discrete components with MSI circuits, reduce the number of parts used and, in my experience, result in more reliable operation.

The first revision is to the differentiation network which generates strobe and reset pulses from the time base. I replaced the two 2N3904 transistors and their associated biasing networks with an SN7404 hex inverter and two one-pole RC networks. The input of this new



WB6NCJ provides this modification for Wes Hayward's "Competition Grade CW Receiver." Reduction of the number of parts for the set and improved performance is reported. Part numbers greater than 100 represent new parts not included in Hayward's original design.

circuit is taken from the Q output of U21A, the SN7474 flip-flop. I used a 10-MHz time-base crystal. Only one flip-flop is required to derive a 1-ms to 0.1-s positive pulse from the $\overline{Q}$ output of the SN7474 to open the main counting gate, U22C. The complementary Q output provides a positive going signal as the main counting gate is closed. Two inverters (U101A and U101B) function as a differentiator and a level shifter to provide a short duration, sharp, positive strobe pulse immediately after the main counting gate is closed (pin 13 of U22C becomes low).

Three additional inverters (U101C, U101D and U101E) provide a positive reset pulse by differentiating the negative going edge of the strobe pulse. Hayward adds a cautionary word that the TTL ICs are "Out-of-spec" when the inputs are taken negative, but should work without problem. I found this circuit results in a cleaner pulse signal than the original circuit.

Furthermore, I used the popular NE555 timer as the one-shot in place of the relaxation oscillator circuit. Upon a negative trigger pulse, derived from the reset pulse by inverter U101F, the NE555 flip-flop is set. The NE555 output is high, which is inverted through U12D and closes the clock oscillator gate, U12C. The NE555 timing capacitor, C101, charges until the impressed voltage reaches 2/3 Vcc. Then the NE555 output is driven low, driving the output of U12D high and allowing the clock-

oscillator signal to be applied to the main dividing chain. Consequently, the main dividing chain is only operative intermittently and reduces the amount of digital noise generated. When closed, S101 will disable the timing circuit and permit continuous operation of the counter, a useful feature for troubleshooting the circuitry.

The original impetus for the new design was the low price and easy availability of the NE555, along with my desire to experiment with this device. The parts count was reduced from the original circuit. Nevertheless, I find that the modification works well. No doubt the MSI circuits of the original project may soon be supplanted by LSI chips. Until then, however, the price, availability and reliability of TTL chips will undoubtedly make them attractive to amateur builders. — *Douglas Blayney, M.D., WB6NCJ, San Diego, CA*

OVERVOLTAGE PROTECTION FOR FIELD-DAY EQUIPMENT

Part of my assignment for the last Field Day was to provide a means of protecting the station rig from generator overvoltage. I became more concerned when we decided to use my TS-820S as the station rig. My overvoltage-protection circuit, made for this purpose, helped me breathe easier. It should help you, too, if you find your rig "on the line."

The core of the circuit is an LM111 voltage comparator. The line voltage is divided, rectified and filtered. This input to the comparator is compared to a Zener reference diode. Normally the reference voltage is higher than the divided line voltage and a high level is present on the comparator output. Should the line voltage rise, the comparator will switch to a low output state.

The latching relay, K1, proved to be too slow to kick out. Therefore, a CMOS latch was added. This latch is initially in an unknown state. The reset switch sets it to a known state and if the line voltage is below the switching level of the comparator, it will turn on Q1 and illuminate the LED. This indicates that it is all right to turn on the output relay, K2.

The enable switch, S2, applies power to relay K1, and if Q1 is turned on the relay will close. Doing so applies power to the relay, K2. Lamps DS1 and DS2 indicate an open-circuit condition or on-line, respectively.

An overvoltage condition results in the CMOS latch being set, turning Q1 off. This opens K1, which in turn opens K2. The response of the circuit is tailored so that small spikes which can be filtered easily by the transceiver power supply do not trip the circuit, but an overvoltage condition existing for a few cycles will trigger it.

The circuit can be calibrated to trip out at 130-V ac by using a Variac. With the input voltage at 120 V ac, adjust R4 so that the reset button will reset the CMOS latch. Then further adjust R4 so that 130 V ac on the input causes the circuit to trip.

Once calibrated, circuit operation is simple. First depress the reset button, S1. If the voltage is safe, the LED will come on. (The open-circuit lamp, DS1, will be on when the unit is plugged in.) Next, depress the enable button, S2. This will close the line relay, K2. The on-line lamp, DS2, will come on and the open-circuit lamp, DS1, will go out.

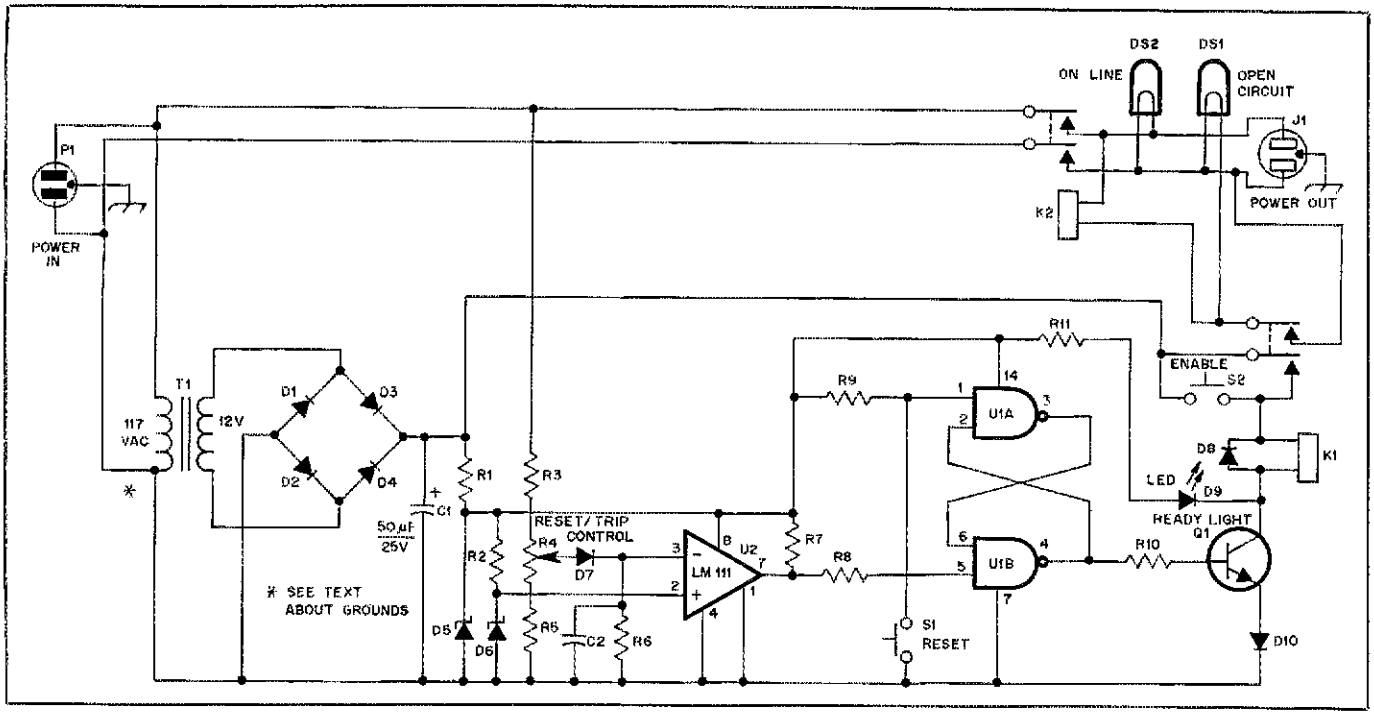
A word of caution: Be sure to completely isolate the circuit from the chassis on which it is installed. The line neutral is not isolated from the circuit ground. My thanks to Otis Hanby, W5TKK, for his advice and comments on the circuit design. — *Greg McIntire, AA5C, Lewisville, TX*

INSULATOR CLEANING SOLVES MLA-2500 FUSE-BLOWING PROBLEM

My Dentron MLA-2500 amplifier (no. 29) was shipped to my new home here in Montserrat this past spring. After it arrived, I unpacked it, then gave it a trial run that proved that the amplifier was in good working order.

Other MLA-2500 owners may be interested in one minor problem that did concern my unit. After operating for years in a dusty basement, the amplifier began blowing the fuse resistors in the final amplifier. I tried to find a short, but the problem lasted only a fraction of a second, with the amplifier immediately returning to normal operation (as it did most of the time) or giving way to blown fuse resistors.

In desperation, I completely cleaned every component in the final box. Finally, I spotted the Teflon insulator between the rf choke and the chassis. It had a thin film of dust on it which would break down, causing a short circuit to the chassis. Cleaning the insulator completely eliminated the difficulty. To avoid a similar breakdown, it looks like a regular cleaning of the final area is in order for heavy uses of the amplifier. — *Chod Harris, VP2ML, Spanish Points, Montserrat*



A Field Day overvoltage protection circuit provided by AA5C. It is designed to protect equipment being used with a gasoline generator.

C1 — 50 µF, 25-V electrolytic.
C2 — 0.1 µF, 50-V ceramic.
D1-D4, D10 — 1N4001.
D5 — Zener diode, 1N4960, 12 V, 1 W.
D6 — Zener diode, 1N749A, 4.3 V, 400 mW.
D7 — 1N914.
D8 — 1N645 or 1N4001.
D9 — LED.
DS1, DS2 — 117-V pilot lamps.
J1 — Ac receptacle.
K1 — 12-V dc, dpst relay.
K2 — 115 V ac, dpst relay.
P1 — Ac plug.
Q1 — 2N2222.
R1 — 270 Ω, 1/2 W.
R2, R11 — 470 Ω, 1/2 W.
R3 — 30 kΩ, 1/2 W.
R4 — 5-kΩ Trimpot.
R5, R6, R8, R10 — 1 kΩ, 1/4 W.
R7 — 2.2 kΩ, 1/4 W.
R9 — 4.7 kΩ, 1/4 W.
S1, S2 — Spst, n.o. pushbutton switch (momentary).
T1 — Power transformer, 117 V ac pri., 12 V ac, 300 mA sec.
U1 — CMOS quad 2-input NAND gate.
U2 — Differential comparator LM-111.

Technical Correspondence

Conducted By
Doug DeMaw,* W1FB

VHF RECEIVER DYNAMIC RANGE

☐ For some time now I have been following the joint efforts of W1FB and W7ZOI on strong-signal performance of receivers through the pages of *QST*, and would like to comment on the Technical Correspondence by W7ZOI in the November 1979 issue. My interest in strong-signal performance of receivers is mainly related to vhf, where (I submit) the requirements for high dynamic range are even greater than at hf, for the following reasons.

1) With the advent of widespread high-power operation on vhf (at least at the low ends of the bands) with high-gain antennas, strong local signals can be very big indeed; and of course you want to work the DX most badly when the band is open and all the locals are on!

2) There is much less scope on vhf than on hf for trading-off NF (noise figure) against dynamic range, for the low background noise levels allow one to work routinely with signals of tens of *nano*volts. For example, in DX work on 144 MHz, experience suggests that 3 dB is the acceptable upper limit of NF (i.e., MDS = −147 dBm in 500 Hz). Most commercial transceivers are significantly "deafer" than the 3-dB limit, so we see many users fitting preamplifiers which, while achieving an acceptable system NF, further degrade an already mediocre dynamic range.

3) Because background noise levels are so low, great demands are placed on in-band spectral purity of amateur vhf transmissions. These demands *can* be met with the aid of constructive and friendly criticism of one's signal by other band users; but only if their receivers have a high enough dynamic range to render their comments valid and useful.

As a contribution to solving some of the problems of strong-signal handling on vhf, I have been developing a ring-mixer front-end board for the FT221 transceiver. I wrote up the design recently for a European vhf magazine.

When measured with ham-shack equipment, using the "Hayward methods" as far as possible, the front end gives very good performance. You probably won't be surprised to learn that reciprocal mixing proves to be the limiting factor on strong-signal handling (the FT221 has a very noisy PLL), or that I had a lot of trouble in measuring the blocking performance. I tried to do so at a frequency corresponding to a dip in the LO noise spectrum, but subsequent laboratory measurements by G4DGU suggest that the dynamic range with respect to blocking is probably about 120 dB. However, he did confirm all the other "ham-shack" measurements, which was comforting.

Experiments continue (of course!), particularly with respect to reducing the noise sidebands of the LO and increasing the dynamic range of the post-mixer i-f stage. G4DGU's small electronics company has also production-engineered the FT221 board for those who would rather buy than build from a circuit.

Having introduced myself and explained my interest in your own work, may I now comment on the W7ZOI Technical Correspondence and the W1FB reply which followed it? I fully agree with your criticisms of the IMD-intercept concept. Its usefulness and technical validity are limited by the preconceptions that IM is of practical importance (which is not usually the case unless the front-end is very susceptible to strong signals), and that two-tone IM behavior follows a strictly third-order law (promises, promises!). But the most important criticism of the use of IMD-intercept in evaluating amateur receivers is the abstract nature of the concept: It is not directly related to *any* observable aspect of performance on the air, so it has little chance of being readily accepted or understood by amateurs.

W1FB implies that the greatest problem in expressing dynamic range(s) by the Hayward method in *QST* reviews is that a comparison of two receivers which overload at the same strong-signal level will spuriously favor the unit with the narrower i-f bandwidth, since its MDS will be lower and its dynamic range thus appears the greater. But in practice this error will rarely exceed 6-7 dB. Is this significant in comparison with the wide variations in dynamic range encountered among different commercial receivers? I hardly think the discrepancy will influence the consumer habits of the readers of *QST* reviews, or place the League in an embarrassing position with respect to equipment manufacturers. At least, it won't if you explain (again) the basis of the tests.

The greatest strength of the Hayward method of receiver evaluation is that it measures the effects of practical importance on the air, under realistic conditions. For this reason it should not be abandoned lightly in favor of a more abstract concept which offers only a spurious promise of greater technical rigor. Although you're evidently experiencing some difficulty in conveying the meaning of your present test methods to all your readers, *please* keep faith with your original ideas. They are sound and useful.

Finally, may I again thank you both for sharing the results of your continued work with the rest of the world through the pages of *QST*. — *Ian White, G3SEK, 83 Portway, Didcot, Oxfordshire OX11-OBA, England*

*Senior Technical Editor, ARRL.

CORRECTIONS FOR A SIMPLE RF SNIFFER FROM OCTOBER 1979 *QST*

☐ In order to function as intended as a voltage doubler, the circuit in Fig. 1 requires an additional capacitor, C_0 = 0.01 μF, as shown. Perhaps you'd like to make this correction in an upcoming issue of *QST*.

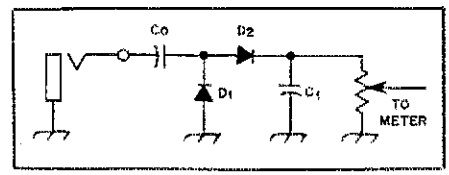


Fig. 1 — Diode detector shown correctly as a voltage doubler. C_0 is required for doubler action. It was omitted from the original *QST* presentation through error.

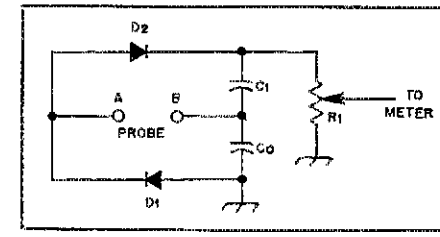


Fig. 2 — Suggested circuit presentation for more obvious voltage-doubler function.

I personally think many beginning hams would have difficulty understanding how this circuit "works." A more obvious voltage doubler with the same components is, in my opinion, that of Fig. 2. C1 charges through D2 when V_{AB} positive and C_0 charges through D1 when V_{AB} negative. — *Dr. Gethro Meek, DJØTT, Brahmsallee 33, XI, 2000 Hamburg 13, Germany.*

QUAD CORRECTION

☐ I recently received a letter from WD4GRI, who built the October 1979 "Hints and Kinks" quad. He found he could not get the SWR down below 2.0. He rightly points out that the feed impedance of a quad with 0.2-wavelength reflector spacing should be 110 ohms, which would explain his results.

In rechecking my SWR measurements I found that the 1.3 SWR figure was evidently caused by a faulty SWR above 2.0. My apologies for this goof.

The quad can be matched easily to 50 ohms if the choke balun is replaced with a quarter-wave matching section of RG-187/U (75 ohms) rather than RG-175/U (50 ohms). The length works out to be 13.36 inches (339 mm). My SWR is now below 1.5 across the entire 2-meter band. RG-187/U is flexible enough to be formed into a 2-1/2 turn coil, as specified. This small-diameter coax may be hard to find, although it is listed in the Allied Electronics catalog. If RG-59/U is substituted the choke-balun/matching-section will have to be only 1-1/2 turns, as RG-59 is too stiff to make 2-1/2 turns. The word "jacket" in the drawing should read "bracket." This was a drafting error. — *Fred Brown, W6HPH, 1169 Los Coderos, Lake San Marcos, CA 92069*

THE MONTGOMERY WARD DISH FOR WEFAX

☐ Recently I needed a 4-foot dish for 1691-MHz WEFAX (Western Electric Facsimile) reception — a rather scarce item in most parts. N5US saw a 44-inch (1.1-m) uhf TV dish in the Montgomery Ward catalog and wondered if it might solve the problem. In desperation one was ordered, and lo, on delivery, a full 4-foot job it was, and sturdily

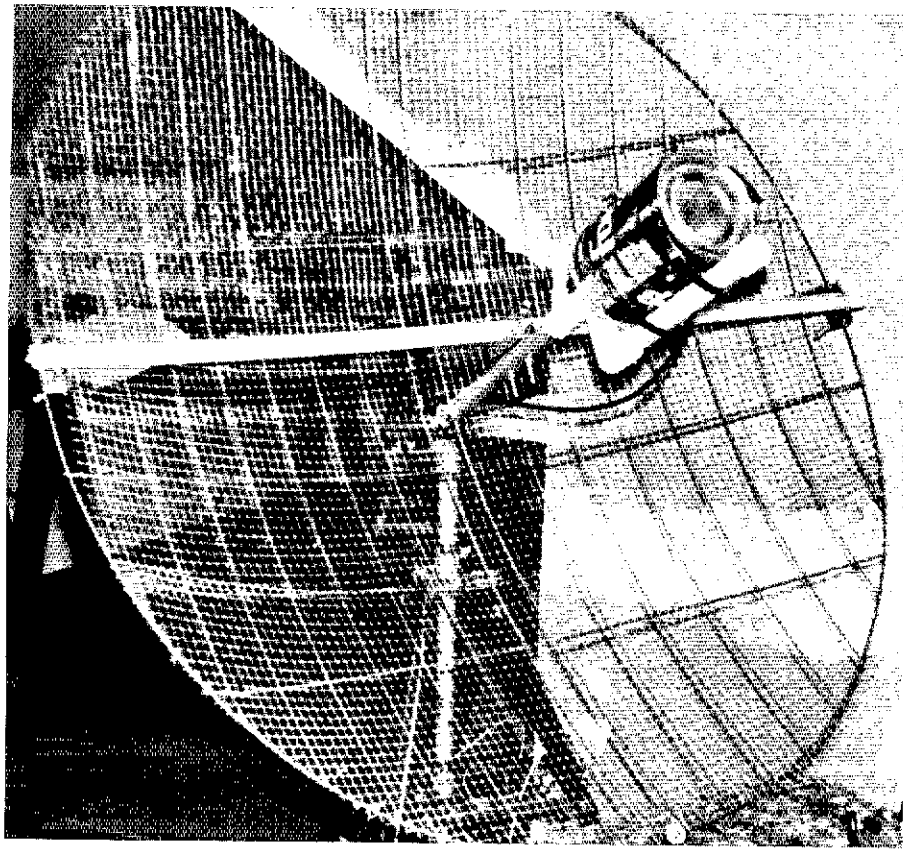


Fig. 3 — Photograph of the Montgomery Ward uhf TV antenna after the W7AVE modification for use as a 1691-MHz WEFAX receiving antenna.

constructed of welding rod, too!

It was found that the original construction with two horizontal halves worked out better for satellite purposes if the whole construction was rotated 90°. In this manner the original mast became a horizontal bar which was used only for lateral stabilization of the dish and for support of the feed-can supporting rod. The original folded dipole/splasher and supporting unit were replaced with a new contraption to enable use of a more efficient feed-horn system, as shown in Fig. 4. This item was compounded from a 15-inch (381-mm) length of 3/4-inch (19-mm) electrical conduit. It was silver-soldered into a 3/4-inch plumber's tee after having been flattened somewhat, 10 inches (254 mm) from the far end until it was the exact thickness of the discarded assembly unit. The original unit may be used as a model for the appropriate drilling and orientation. The now-horizontal "mast-substitute" I used was cut from a piece of one-inch (25 mm) wooden dowelling covered with heat-shrinkable tubing, originally sold as a shower-curtain rod.

A 3/4-inch, inside-threader pipe-to-PVC coupler makes the transition to the PVC can support. The threaded end is cemented onto the end of the conduit with Weldwood brand epoxy (advantage: it does not run). Two elbows and stray lengths of 3/4-inch PVC pipe complete the assembly. The feed-horn is held in place by means of two large hose clamps obtained from an auto parts supply house.

The feed horn is the WA7MOV design used extensively in the West. Briefly, it is a 2-lb coffee can with the 44-mm probe located 3 inches (76 mm) from the closed end of the can and with the focal point of the dish at about an inch inside the mouth of the can.

The dish must be recovered with a screen. The writer used the more-expensive 1/2-inch (13-mm) mesh hardware cloth; a 4-foot (1.2-m) square is sufficient. It is cut in strips and fastened firmly between the horizontal rods of the dish. Some piecing is necessary. These strips are fastened firmly in place with short loops of no. 18 iron which are twisted firmly in place with pliers.

Some who have duplicated this dish have used window screen in place of the hardware cloth. It is less expensive and easier to put on, but has more wind resistance. But the heavier hardware cloth, if firmly applied, helps to strengthen the dish assembly. A final spray job with polyurethane varnish (to further firm up the joints and prevent tarnish) is envisioned before it is moved outside.

The dish is supported by a 3/4-inch elbow, and is threaded into the side of the aforementioned tee. Its movement provides for the elevation of the dish. The new supporting mast is 3/4-inch water pipe, supported in a Radio Shack 3-foot (0.9-m) tripod. Maintenance of elevation is still "Mickey Moused" in place by an appropriately located box and a pile of books!

Vital statistics of the original dish are: diameter — 48 inches (1.2 m); depth — 8 inches (203 mm); focus — 18 inches (457 mm) and f/d ratio — 0.375. Montgomery Ward lists the unit as no. 63A19293R and calls it a "44-inch Parabolic-Screen UHF Antenna." The price is in the $25 range.

The dish serves well in my set-up inside the absorptive layers of the house. Duplicators report performance that is similar to that of commercial dishes. The conversion has the advantage that nothing is modified from the original antenna and it can be easily replaced in uhf TV service, should one so desire. — *Lindsay R. Winkler, W7AVE, Rte. 1, Box 209, Walla Walla, WA 99362*

Feedback

☐ In "Adding Receiver Incremental Tuning to the HW-104 or SB-104 Transceiver" (January *QST*, page 18, Fig. 2), the identification of the base and collector leads of Q2 are reversed.

☐ In "Bug Box QSK," February *QST*, page 31, the polarity of C12 is wrong. The positive terminal of C12 should connect to the junction of R5 and R6.

☐ An error occurred in "Improving the SB-104A/SB-644A" (August 1979 *QST*). On page 31, at the bottom of the middle column, step 2 should read: "Disconnect the jumper wired from lug 3 of the TUNE switch to lug 2 of the CW switch."

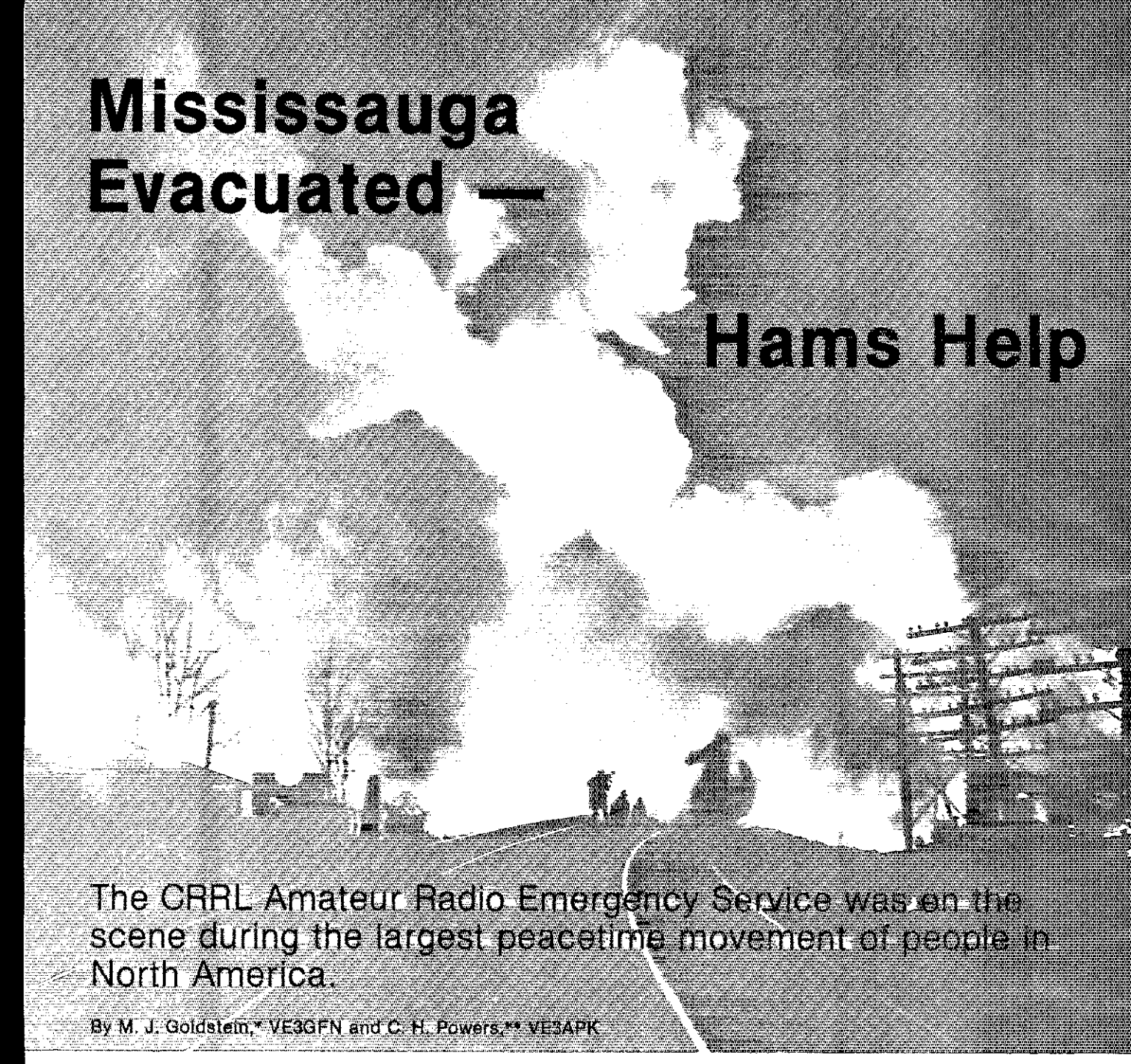
☐ Two errors appeared in the December 1979 *QST* article, "Simple, Band-Switching Receiver Design" (page 20, Fig. 5). Author Baber points out the omission of a connection dot between the +12-V input line and the vertical line immediately to the left that connects to Q5, Q6 and the 16-kΩ resistor at the base of Q12. Also, at S1A there should be no connection at the 80-meter position of the switch. C5 and the associated padding capacitor are connected to the 40-meter switch position.

☐ There is an error in Table 1 of "The Geneva Story" (February *QST*, page 53). For the amateur-satellite service, 5650-5670 MHz is restricted to *uplink* only and 5830-5850 is restricted to *downlink* only.

☐ The photograph of the *DaVinci Trans America Balloon* ("Stray," January *QST*, page 29), was taken from a light plane piloted by John C. Shildeler II, WAØNEV.

☐ With apologies to all RTTY stations, please change suggested "YL Activity Day" cw frequencies to 14,058, 21,058 and 28,058 kHz.

Mississauga Evacuated — Hams Help



The CRRL Amateur Radio Emergency Service was on the scene during the largest peacetime movement of people in North America.

By M. J. Goldstein,* VE3GFN and C. H. Powers,** VE3APK

A train derailment and the subsequent explosion and burning of several tank cars was just the beginning of more than 80 hours of emergency operation in Mississauga. *(photo by Pete Martin, compliments Gulf Canada, Ltd.)*

November 10, 1979 — It was a quiet Saturday evening in Mississauga, on the west side of Toronto. The hour approached midnight, as a freight train loaded with chemicals sped through an industrial area near Lake Ontario.

Moments later the train derailed — flames from the twisted wreck reached as high as an apartment building. VE3BEA called his wife to the window of their home in nearby Oakville to observe the glow of the "aurora" in the eastern sky. Strange for this time of year. Their house shook, as tanks of propane began to explode. The realization dawned that they weren't seeing aurora — the Mississauga madness had begun.

By early Sunday morning, officials realized that the train contained tanks of highly toxic chlorine gas and began evacuating people from the immediate area of the wreck. (Chlorine gas was used with deadly effect in World War I and it was leaking into the air in a densely

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**1393 Bridge Rd., Oakville, ON L6L 2C8

populated area.) The large shopping plaza known as "Square One" became an evacuation center.

At approximately 1300 local time, Ontario Section Emergency Coordinator (SEC) VE3APK contacted the director of Emergency Services, Canadian Red Cross-Ontario division, who advised that as soon as the location of the evacuation center was known, Red Cross would require Amateur Radio Emergency Service (ARES) assistance. At 1630, however, VE3APK was advised that "Square One" itself was now being evacuated! Communications would be required as soon as the new centers were established.

The evacuation area was widening as the wind shifted. Eventually the entire population of the city of Mississauga, a quarter of a million people, would be evacuated.

At 1930, the word came from Red Cross that the International Center in Malton, northwest of Toronto, had been opened for evacuees. Red Cross required a station there, as well as one in downtown Toronto at Red Cross headquarters. As emergency coordinator (EC) for Toronto, VE3GFN was responsible for setting up this station. VE3JPP was dispatched to do this, with assistance from the Pickering ARC. The Pickering Club's call sign, VE3SPC, was used at Red Cross hq. VE3JPP did not emerge from the Red Cross building for three days.

VE3IXB was the brand new EC for the Mississauga area. The operation became his "baby" (with the help of assistant EC VE3HGC and the ARES group) and he had already established radio links with evacuation centers at Streetsville, Brampton and Malton. Think of it: VE3IXB was heading one of the largest operations ever experienced by Canadian amateurs and the ink was barely dry on his EC certificate. What an initiation! The Mississauga ARES was backed by manpower from the Toronto area as well, activated by VE3GFN. VE3IMR, Oshawa EC, was standing by with a task force. The Burlington group had 20 mobiles ready to go where needed and the Hamilton ARES, under EC VE3FCU, was on alert too.

With Amateur Radio communications established at evacuation centers in the Brampton/Streetsville area, it was decided that the Brampton repeater, VE3MHZ, would be used as the main control station, using the Peel ARC call sign VE3PRC. VE3GOL handled a major part of the control duties, which linked all evacuation centers, Red Cross headquarters, and even the disaster site itself.

Health-and-welfare (H & W) inquiries began pouring in soon after the evacuation centers were opened, so it was decided to use a second repeater to handle the overflow of traffic. Thus VE3SKY, the Skyride ARC repeater, was put on emergency service.

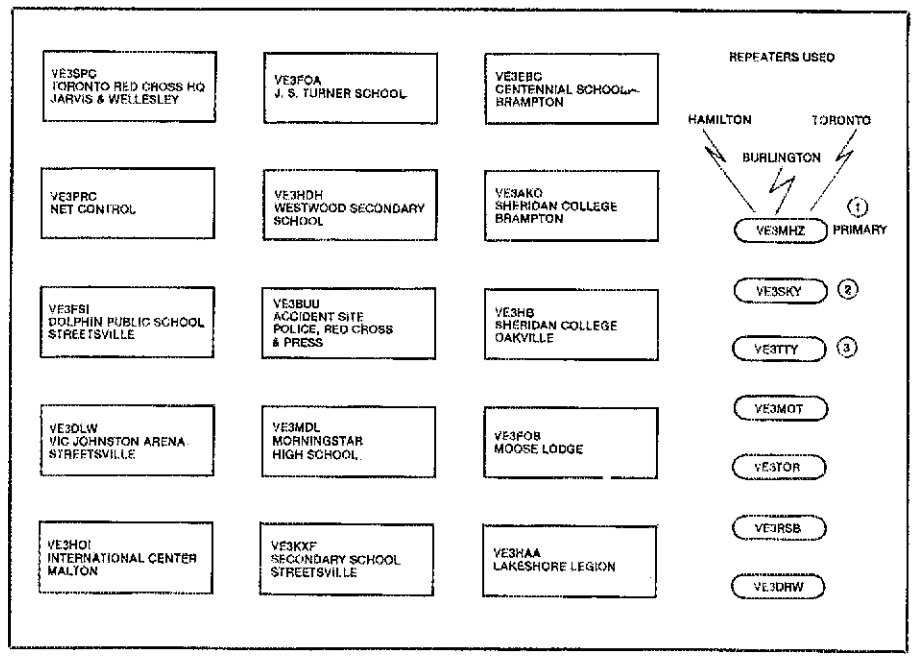


Fig. 1 — The Mississauga Emergency Network

Meanwhile, the fires continued to burn — hospitals in the immediate area were evacuated early Sunday afternoon, with patients being transported to Toronto-area hospitals.

On the Scene

VE3FPF was one of the citizens being evacuated from his home near the disaster site. He called in on the repeater and offered to stay in the area, once his family was on the move to safe ground. He reached the spill site and after some persuasion, managed to reach the Red Cross official at the Command Post, where police, fire and government officials were controlling the evacuation and containment. Suddenly Red Cross had a direct ARES link between their Toronto headquarters and the commanders on site. This link was assigned a priority and manned by a rotating shift of operators throughout the entire emergency.

As the evening wore on, the evacuation boundaries widened. At approximately 2200, word was received that the Oakville hospital was to be evacuated as a precautionary measure. VE3GUH, a doctor on the hospital staff, put out a call for assistance. There were 70 ambulances coming to transport patients to Hamilton; it was absolutely necessary to coordinate movement between the hospitals. The telephone systems were overloaded but Amateur Radio was available. VE3FCU arranged the communications links — all went well.

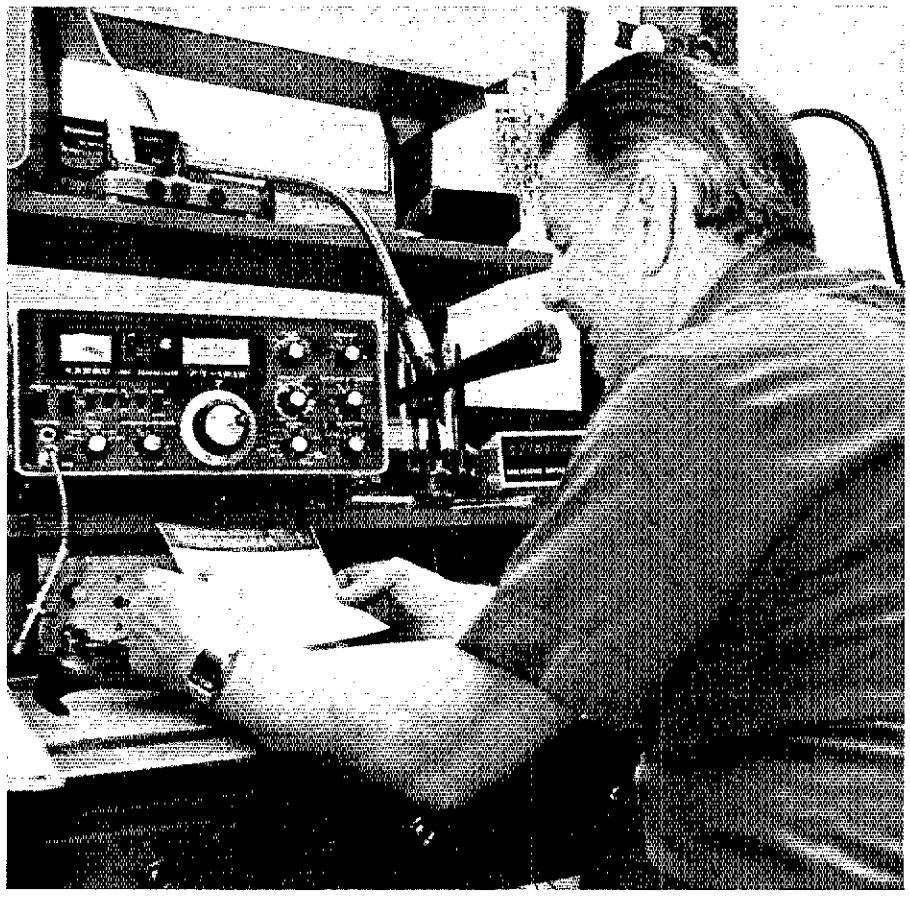
At 2230, the boundary to the west became Maplegrove Avenue in Oakville. An evacuation center for Oakville residents was established at a large school in Burlington; more equipment and operators were supplied by the Burlington/Hamilton ARES. And another center was established at the community college in Oakville.

"This is VE3SPC at Red Cross. We Need a Head Count of Evacuees at All Centers"

By 0600 Monday morning, a total of 12 evacuation centers were in operation, and two command centers plus the net control station were all directly involved. Auxiliary nets were being maintained during the daylight hours. The Burlington ARES group initiated a 75-meter net to handle H & W inquiries. VE3AML activated his COMSONT net on 40 meters and supplied coverage to the entire province. The ONTARS net, which meets daily on 3755 kHz, was also used extensively.

By Tuesday evening, some 56 hours after beginning, the scope of the operation had crested and the first tentative indications of a return home by evacuees appeared. Some centers were closing, the remaining people and supplies moved to other centers. Now the hams were assisting with transport problems, finding out who needed a bus and trying to minimize vehicular traffic, and related tasks.

By Wednesday morning, about 150,000



Charles H. "Chuck" Powers, VE3APK, Ontario SEC at the controls during the recent Mississauga accident. *(photo by Scott Powers, Oakville* Journal Record*)*

evacuees were permitted to return home. VE3PRC was still active but handled little traffic. A call to the Red Cross affirmed that the services of ARES were still needed. The circuits were kept open, despite a shortage of personnel. The day wore on and the boundaries began, at last, to shrink. At 1930 three centers were still in operation. Word was received that the railway involved would billet all remaining evacuees in Toronto hotels free of charge until they could return home. ARES provided a head count for the Red Cross and was able to advise transportation needs. A final tally was passed and the buses started to roll. At 1945 the following message was sent on all nets in operation:

199 R VE3APK 68 OAKVILLE ON 0045Z NOV. 15
TO: ALL ONTARIO AMATEURS AND PARTICIPANTS MISSISSAUGA EVACUATION CRISIS
ONTARIO DIVISION CANADIAN RED CROSS WISH TO EXTEND THEIR SINCERE APPRECIATION AND ADMIRATION FOR THE SUPPORT GIVEN TO THE SOCIETY DURING THE MISSISSAUGA EVACUATION CRISIS X
THE HIGH DEGREE OF DEDICATION AND PROFESSIONAL SKILL EVIDENCED BY ALL PERSONNEL OF ARRL ONTARIO SECTION IS DESERVING OF THE HIGHEST PRAISE X
AS OF 2359 EST 14 NOVEMBER 79 THE OPERATIONS REQUIRING THE SERVICES OF ARRL ONTARIO SECTION ARE ENDED X
BRIGADIER GENERAL J. F. WESTHEAD - MBE ED CD (RETIRED) CHAIRMAN - EMERGENCY SERVICES
MR. KEN MCBRIDE - DIRECTOR - EMERGENCY SERVICES
MRS. MILLIE BLAIR - ASSISTANT DIRECTOR -EMERGENCY SERVICES
CANADIAN RED CROSS - ONTARIO DIVISION

Some 80 hours had elapsed since the first call for assistance was received from Red Cross. A total of 255 amateurs volunteered their services from across the province, 174 were actively involved on 2 meters, others were on standby or operated the hf bands. Twelve repeaters were used at various times and nine ARES groups were active.

At 2359, the following message was read by VE3GOL:

943 R VE3APK 32 OAKVILLE ON 2359 NOV. 15/79
NET BULLETIN - VE3PRC - MISSISSAUGA EMERGENCY NET
ON BEHALF OF THE ONTARIO SECTION OF ARRL WE EXTEND SINCERE THANKS TO ALL AMATEURS FOR THEIR SUPERB OPERATION X YOU HAVE DEMONSTRATED THE TRUE SPIRIT OF THE AMATEUR RADIO FRATERNITY 73.
LARRY VE3GT SCM
CHUCK VE3APK SEC
NOREEN VE3GOL STM
THIS EMERGENCY NET IS OFFICIALLY CLOSED.

November 11 is Remembrance Day in Canada, when we honor those who gave their lives during two world wars. It will be a day to remember in Mississauga for years to come. QST

Moved and Seconded...

LIFE MEMBER APPLICANTS
JANUARY 16, 1980

John L. Altman, WA4AIP; Lorene Allen, K7JUC; David Angel, WA6TJM; Bruce R. Aplin, WD4HDT; Ronald T. Armstrong, WB9WRW; Robert B. Barrows, WA2HVE; Kenneth E. Beal, W3ZCO; Phillip A. Beistel, WB3DHF; Derrick J. Belbas, VE4VV; Allan Berg, WB7SIC; Billy T. Blackwell, K8LO; Ed J. Blase, KA6COH; Larry J. Blouin, K1MNS; Paul T. Borne, KB4FH; Robert B. Brine, WB6RYO; Alwyn H. Broaddus, K6GIZ; Paul F. Brown, WB5UWS; Samuel G. Brown, WA4IUM; William A. Brown, WB8HYL; Ted L. Bryant, K4SXD; Malcolm R. Burkholder, Jr., WA4VRB; James A. Burness, Jr., K3YAF; Roy C. Butler, VP9HM; Ernest C. Capell, WB4DRO; Thomas P. Carroll, Jr., W4OBZ; Michael E. Casciolo, K1DZH; Michael A. Cauley, AK8Y; D. Richard Chesser, W9UIL; Anthony J. Chiovari, AD9J; Robert S. Chronister, WD4NUW; William D. Coe, WB4UNH; Richard E. Cofer, WD5HYA; Bill Coleman, Jr., KA4DAP; Henry E. Corcoran, K1JLK; Joseph M. Costa, W7FRG; William C. Coupland, W0OWT; Raymond D. Covington, K4TSV; Charles W. Crawford, WD0DBZ; Robert Crepeau, WB2SHZ; Gerald Crosby, WB8YUO; Stuart Crump, Jr., WB2KNY; Charles Cyphert, WD4IEF; Floyd Davis, WA4KFX; Maynard C. Davis, Jr., WB0VEY; Robert A. Deisinger, W9INO; Christopher I. Denney, N2ANI; Joe DiMare, K5THB; Gary Dixon, K5RE; Alexander E. Dodge, Jr., WA5STR; Scott R. Douglas, WB6CDM; Bruce W. Downs, WB0QHU; Peter G. Drexel, AE1T; George R. Dudick, K2HKH; Guylin W. Dudley, N6YK; Paul S. Edwards, WB8BFO; James W. Elkins, KI4A; Hugh E. Empey, WA7ETH; Roger M. Engle, K0EKK; Bernard Franz, K2HM; James R. Frysinger, WB1ELJ; William M. Fisher, WA8RHT; Florian O. Forcier, W1FA/W1TVP; William D. Ford, WA4HDD; Victor C. Fordham, WA7BQT; Kenneth Fuchslocher, WB2LBB; David G. Garner, W3XB; Gregory B. Gary, WB8YYS; Daniel E. George, WA2DUU; John W. Glenn, WB7DUS; Gordon M. Goldman, WB0DKK; Theodore J. Gradjelick, Sr., W6TOQ; Edward D. Graham, Jr., N5HH; Rickey L. Hampton, WD8KEL; James W. Hartwell, K7UDG; Bill C. Haynes; James A. Henson, W4UFP; William M. Hinely, W6SKL; Raymond W. Holcomb, WB5ZGW; James L. Horn, WB9SYN; Harry H. Howey, Jr., KB2FC; Cary Hughes, Jr., WA4KBG; Robert C. Hughes, W9IET; John H. Huschart, WB8TDD; Alfred L. Ivatt, WB7SYB; Bernie J. Jackson, Jr., WB4IJR; Jon F. Jacquot, WA7BIL; Frank L. Jamison, W5YSM/VE2AIX; Richard A. Jamsek, K8CYK; William F. Jordan, AE4S; Keith D. Kaiser, WA0TJT; Erich C. Kather, W6LID; Gary G. Kay, WA6MKS; Corwin E. Kelly, K9CK; Richard R. Kendrick, WA7TWI; Robert W. Kennedy, WB3KNL; Jerry E. King, W4MLA; John K. King, W9KXQ; Robert W. Knight, KA7FMZ; Frederick F. Kokaska, N6DG; James M. Koski, WB6PZT; William Kukes, WB7ESK; Allan E. Kukoski, WA2JVI; Karl A. Lambert, WB4UDS; Robert E. Larsen, WD0CGP; Sheila Lindsey, N0DF; Abel J. Lovas, WB5UIH; Fred Maccioccchi, N9IE; Jules Manford, WB2NPT; John M. Mann, VE2ADZ; Stephen R. McDonald, WA7RUU; Raymond L. McIntyre, W6ARN; R. M. McKay, WD5IQH; Charles E. Michalski, WA2KPV; Bob Miklos, K6LPF; Douglas R. Milbourn, KA0S; Charles F. Molesworth, AF7S; Thomas L. Montag, W8JDO; Kenneth K. Moor, WA4ZDW; Ronald D. Morais, K1MNR; Donald J. Moriarty, AJ9W; Donald B. Munroe, K2PDD; John L. Neumann, VE3DDN; Larry T. Nitz, WB8HGR; Janice K. O'Brien, K6HHD; David Odden, WD0CJM; Larry D. Oldag, K4PON; Donald A. Olson, WB5QAZ; David Oman, VE3HCR; Thomas F. Overman, AH4AA; Steven E. Palmer, WA6ALW; Tom R. Panko, WB9VXU; James Paterson, VE3CU; Delton L. Patterson, W0JCY; Edwin E. Perry, WB7NWE; George S. Perry, WB5OAC; Robert L. Pettegrew, Jr., WA2NAT; Michael G. Pettus, WB6VZY; Richard W. Phelps, K7TPN; James R. Phillips, WA6DAJ; Robert H. Phillips, AA4HP/DA1TN; Peter C. Polk; Richard D. Pollett, KL7JBW; Mark H. Rackin, W4LGN; Clifford J. Ramsey, WA2ZJP; D. Neil Rapp, WB9VPG; Walter E. Reeves, K8DCF; Verlin E. Reiter, WA0KRL; Philip A. Rheinschild, W6LJD; Thomas O. Riley, WA5KHU; Roger R. Roberts; John H. Robertson, WB3ELB; Gary J. Robinson, K1UDW; Peter Rosamilia, WA2ZAZ; Johnny B. Royster, WA4VEK; Gordon C. Sahnow, Jr., W7WHB; Jeffrey B. Salzman, WB6QAY; Craig Sande, WB7CJA; William B. Schaffstein, WA4SCK; Katherine Schaffstein, WA6FAH; William J. Schmidt, Jr., WB0DRH; Charles E. Schneider, III, WA3ZTY/WB3ZEJ; Roy N. Schumaker, KB2BV; Jerry C. Schwannen, WB8YNB; James D. Scott, WB0IYC; Dan A. Sewell, KB7AC; Lee A. Seymour, Jr., K3JLZ; Thomas A. Sharp, WA9OXY; Timothy J. Shepard, WD8OAI; Sidney D. Shusterman, K3SME; John O. Sikes, Jr., W5NQG; Edward C. Silva, WA6UVK; Willard C. Silva, Jr., N4ARM; Ted Sisco, WB5UJR; Patrick C. Skinner, K5AVA; Gerald P. Smedley, WB3BLG; Larry E. Smith, WB5BPG; Thomas Softley, W3ZSX; Randall F. Sobol, KH6XX; Stan Sommers, Jr., W5VAX; Robert G. Steeneck, WA2ATT; Lawrence W. Stein, WB4SMS; Leon A. Streng; Robert Surprenant, VE2EXR; John A. Thernes, WB4AIN; William I. Thomas, WB4BUM/WA3VRM; Harry D. Tirrell, W1LQU; Guy D. Tressler, III, WA3MJY; Larry D. Tyree, N6TR; Marianne Vander Zanden, AE9X; Robert J. Varljen, WB3CDB; Ramon Velazquez, WB4OOB; Leonardo J. Vidal, KP4DPE; David A. Vittum, W1DV; Edwin B. Walker, WA4DFS; Michael B. Walton, VE7CEW; James A. Wegner, WD0CRD; Kenneth L. Weinbeck, WB1DFV; Glenn E. Welman, WB0OWT; William F. Werenski, W1CJK; Ralph Wilkerson, WD8OHF; David E. Wolfe, WA4VVX; Ronald E. Wolfe, WB1BSX; Robert S. Yablans; Ben T. Yamamoto, W6POG; Ronald D. Yoder, W9CG; Ronald W. Zborowski, WA3DIP; Michael V. Zbrozek, K8XF; James A. Zimmerman, WB7DGU. QST

With NBVM to China

A visit to China gave this ham the rare opportunity to demonstrate narrow-band voice modulation and scan the bands in several cities in China.

By Tom Lott, *VE2AGF/VS6FW/G2CIN

When a longtime friend, the president of a large Hong Kong electronics corporation, asked if I would accept an invitation to visit the Peoples Republic of China (PRC) to give some technical talks at electronics factories, it took me several microseconds to say yes. My wife, Mary, and I began the process by assembling and sending detailed biographical and passport information. Preparations terminated with a terse Telex message from my friend asking us to hasten to Hong Kong. It had taken several months to receive the official invitation.

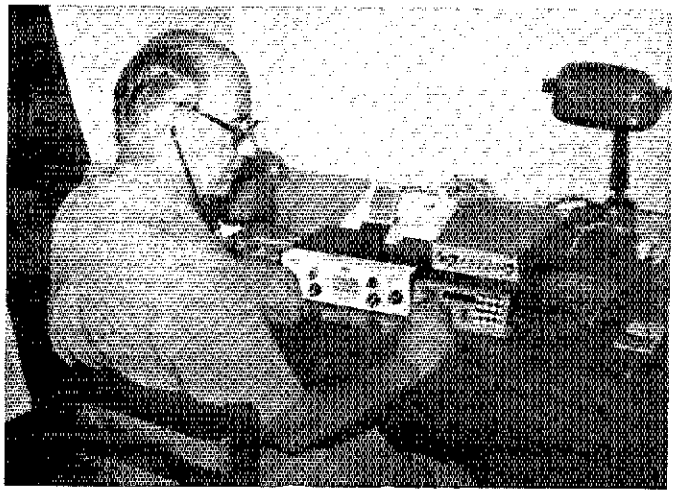
Through the miracle of modern communications, word of our impending visit to mainland China had reached ARRL/IARU hq. We received a call from the League's general manager, who gave us the address and telephone number of the China Radio Amateur Association (CRAA) in Peking, a division of the All China Sports Federation. The CRAA had recently informed the IARU of its existence in order to get liaison started. Armed with this information, we left for Hong Kong.

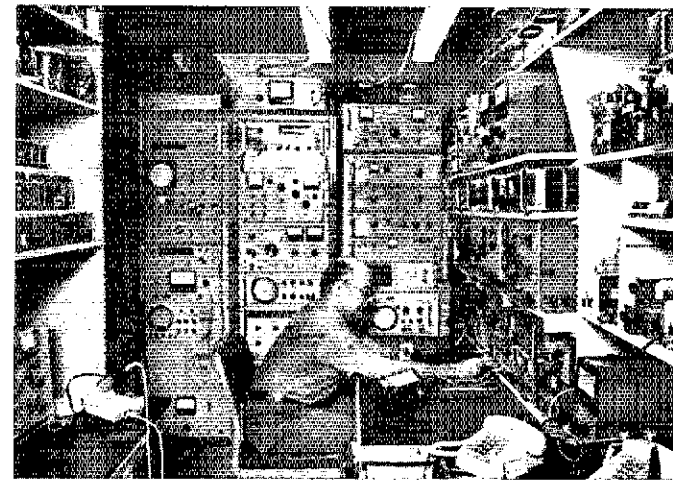
*55 W. Santa Inez, San Mateo, CA 94402

Unexpected Delay

Unfortunately, the old saying, "The best-laid plans of mice and men . . . " proved to be only too true. We were delayed for five days by one of the snafus that can occur no matter where in the world one is. When our passports were taken into "China Travel" for the visas there was no record of our invitations and visas. It took five days to discover that the paperwork had gone astray in Canton.

We were able to pick up the visas at the border, where we boarded the fast train bound for Canton. We still hoped it would be possible to contact the amateur association upon arrival and through them convince the "powers that be" that a much better test of the capabilities of nbvm would be live, on-the-air, ham band demonstrations rather than the closed-circuit and tape demonstrations we had originally planned. In this hope we decided that in addition to the two sets of our VBC nbvm adaptors and cassette recorder we would also take the hf transceiver we had used for 20-meter nbvm tests with Win Smith, W6MBA, in Fullerton, CA. To avoid temptation and the possibility of being accused of transmitting without permission, we took a miniature plug-in power supply capable of powering the unit only in the receive mode. Since I





These two photos show the author, Tom Lott, VE2AGF/VS6FW/G2CIN, in widely separated operating locations. At left, he is recording W6MBA's 20-meter nbvm transmissions in Peking, China. At right, Tom is back home in his well-supplied basement shack. *(photo at right by John Storey)*

would be working with electronics factories it was assumed that a high-capacity, 12-volt supply or battery would be no great problem, should we be granted permission to give on-the-air demonstrations. We took the precaution of declaring the hf transceiver on the ingoing customs declaration and informing the customs authority that we planned to use it for demonstrations to the China National Light Industrial Products Corporation, the government organization sponsoring our visit.

Arrival in Peking

After a very pleasant flight from Canton, we arrived in Peking late in the evening. We were met by two car loads of management and technical personnel from the sponsoring organization and escorted to the Peking Friendship Hotel. This enormous complex, some 20 minutes from downtown Peking, is used to house foreign technical and professional consultants and visitors. A more modern downtown Peking hotel is used for foreign diplomats, businessmen, VIPs, tourists and entertainers.

From a ham standpoint, the Friendship Hotel turned out to be ideal since we were in a corner suite on one of the top floors. There was a balcony running the entire length of the hotel with easy access from our bedroom. We experienced no difficulty in running a longwire down its entire length.

I had worked Win Smith, W6MBA, from my VS6FW location in Hong Kong before leaving for Peking, and had asked him to call me on nbvm each night on our usual 14.235-MHz frequency. I was not too sanguine about the possibility of getting on the air, but hoped to be able to make recordings of his transmissions from locations in China. The first tests were run during our first day in Peking.

On the Air — Receive Only

Following a sightseeing tour of Peking, we returned to the hotel, had a Chinese dinner and retired to our room. I fired up the rig. It was almost sked time, but there was time for a quick look around the bands. It was dead on 80 meters, while 40 was incredibly noisy, with no readable ham signals. The receiver was switched to 20 meters and there it was — my first ham signal in China! A UK9 calling CQ DX in English. There was time for a quick listen to some of the other signals booming in from all over Asia, and it was time to check 14.235.

I quickly dialed up the frequency, and bingo, there was Win calling me with a beautiful S9+, 1600-Hz, narrow-band signal. The recorder was running and his signal was put on tape. It was fortunate that I had no power supply capable of operating the transmitter, as there was no way I could have resisted the temptation to answer those S9 calls. The next morning I called my colleague in Hong Kong and asked him to cable Win that reception was fine and to keep up the good work. So it went; late each night and early each morning, in the various cities we visited, I tuned the bands and made cassette recordings of conditions. Late at night, Peking time, seemed to be best for reception of California signals. Some very good recordings were obtained, both in Peking and Shanghai, of W6MBA calling me on nbvm and in contact with other nbvm stations.

Ham Radio in China

Unfortunately, we were never able to get in touch with the China Amateur Federation and arrange for a permit to operate from China. I asked my hosts if they knew anything about the Federation and if they could try to locate the vice-secretary general, who had contacted IARU hq., or some other official. They said they would try but that they knew very little about the Amateur Radio Federation as it was very new. They did not believe that there were any hams on the air, but they had heard some talk that youth radio groups were being formed and that they might someday build very-low-power, low-frequency transmitters to enable them to communicate with each other, presumably on cw.

We were quite surprised at the proliferation of parts in the radio stores that we visited in our ramblings around the shopping areas of Peking and Shanghai. These emporiums were large and well stocked with every conceivable type of part that the radio hobbyist could desire, all made in China. The shops seemed to be well supplied with salespeople and customers, most of the latter being young men with parts lists and schematics eagerly buying the parts for their pet projects in a manner that brought back pleasant memories of my youth. We noted that all transmitting tubes had a sign saying "Not for cash purchase, available only on written purchase order," presumably from a government department.

Many of the things we encountered on our trip we had heard about or seen in pictures. But no pictures can convey the immensity and awesomeness of The Great Wall or the complexity and magnificence of the Winter Palace or Forbidden City, which covers an area of over seven million square feet. We knew that bicycles were the major form of transportation in China, but had never envisioned an area the size of a football field covered with the cycles of those attending a meeting. Everywhere we went we passed streams of bicycles on the roads. Other things we had not really been prepared for were the extreme kindness and friendliness of all the people we met and the friendly smiles of those we merely saw in passing. The whole trip was one of the most fascinating experiences of my life.

Strays

FUND TO AID WA6YQW

☐ Jan Gould, WA6YQW, of Anaheim, California, was very seriously injured when the plane in which she was a passenger crashed upon landing for the Palmyra/Kingman DXpedition. Jan suffered multiple factures, and is faced with a long stay in the hospital. There was no insurance coverage, and a fund has been set up to aid her. Please send contributions to W6ORD, payable to "Norm Friedman, in trust for Jan Gould," 5400 Lindley Ave., Apt. 312, Encino, CA 91316.

1980 SCHOLARSHIP ANNOUNCEMENT

☐ The Atlanta Radio Club is offering two $500 cash scholarships. Applicants must be licensed amateurs and high school graduates entering an accredited college or university as freshmen in the fall of 1980. Applications must be completed and postmarked not later than midnight, May 15, 1980. Write to Atlanta Radio Club Scholarships, P. O. Box 77171, Atlanta, GA 30357, for application forms and additional information. — *Phil Latta, W4GTS*

A-M IS NOT DEAD

☐ No, a-m is not dead. It's alive and kicking daily at 7 P.M. on 145.05 MHz in the New York City area. The 2-meter a-m net has been meeting here for the past 2-1/2 years.

"We win when we work willingly" is written in Morse code on this Canadian nickel. Read clockwise, beginning at the bottom of the coin, near the letter N. *(W8WEG photo)*

New FCC Study Guide for All Amateur Exams

The outlines that follow are the syllabi issued by FCC for a new set of Amateur Radio examinations. The FCC "Study Guide" is reproduced in full, exactly as it was released in January 1980 (except for minor style changes). According to George Petrutsas, chief, FCC Private Radio Rules Division, new Amateur Radio examinations "are taken from, and correspond precisely to, these syllabi."

FCC plans to begin using new written examinations for the Novice, Technician/General, Advanced and Amateur Extra classes of license sometime in March or April of this year. Anyone studying for one of the new examinations should find the ARRL *License Manual*, ARRL *Q&A Books*, and other League Publications to be very helpful in preparing for these tests. However, the FCC outlines printed below should be used as first authority on the *subjects* to be covered on each examination. For example, if the ARRL *License Manual* covers a topic in the Advanced class chapter and the FCC outline indicates that the topic will be on the General class examination, you should read the appropriate portions of the Advanced class chapter to prepare for the General class test.

Remember: These outlines are for the *new* tests, and at this writing the exact date the Commission will begin using the new examinations is not known. Listen to WIAW for late-breaking news related to the implementation date of these examinations.

PR Bulletin 1035
January 1980

Federal Communications Commission
Private Radio Bureau
Washington, D.C. 20554

Study Guide for the Amateur Radio Operator License Examinations

This Bulletin contains syllabi for the FCC Amateur Radio examinations.

Why are Amateur Radio operator examinations required?

The examinations determine if you are qualified for the privileges conveyed by an Amateur Radio license. Those privileges are many and diverse. As an Amateur Radio operator, you will be allowed to build, repair, and modify your radio transmitters. You will be responsible for the technical quality of your station's transmissions. You will be allowed to communicate with Amateur Radio operators in other countries around the world and, in some cases, send messages for friends. As you upgrade to the higher operator license classes, you will be allowed to communicate using not only telegraphy and voice, but also teleprinting, facsimile, and several forms of televisions. For such a flexible radio service to be practical, you and every other Amateur Radio operator must thoroughly understand your responsibilities and develop the skills needed to operate your Amateur Radio station properly.

What subjects do the Amateur Radio examinations cover?

The examinations cover the rules, practices, procedures, and technical material that you will need to know in order to operate your Amateur Radio station properly. Each examination element is composed of questions which will determine whether you have an adequate understanding of the topics listed in the corresponding syllabus. For example, all Element 3 examination questions are derived from the Element 3 syllabus. To properly prepare for an examination, you should become knowledgeable about all of the topics in the syllabus for the element you will be taking. Every examination covers nine general subjects:

- •Rules and Regulations
- •Electrical Principles
- •Signals and Emissions
- •Circuit Components
- •Practical Circuits
- •Operating Procedures
- •Antennas and Feedlines
- •Radio Wave Propagation
- •Amateur Radio Practice

Periodically, the syllabi are updated to reflect changing technology and Amateur Radio practices. Comments on the study guide contents are welcome. Mail them to:

Personal Radio Branch
Federal Communications Commission
Washington, DC 20554

Where can study manuals be obtained?

A study manual can be helpful in preparing for an examination. Several publishers offer manuals or courses based upon the material in this Bulletin. These may be found in many public libraries and radio stores. The FCC does not offer such manuals, nor recommend any specific publisher. However, you will find two FCC publications, *Part 97 — Rules and Regulations for the Amateur Radio Service*, and *How to Identify and Resolve Radio-TV Interference Problems*, useful when preparing for the Amateur Radio examinations.[1] Copies are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Specify stock number 004-000-00357-8 for Part 97 and stock number 004-000-00345-4 for the Radio-TV interference booklet.

[1][Editor's Note: Part 97, "Rules and Regulations for the Amateur Radio Service," is reproduced in its entirety in ARRL's *The Radio Amateur's License Manual* ($4). "How to Identify and Resolve Radio-TV Interference Problems" is contained in Chapter 6 of ARRL's *Radio Frequency Interference* ($3).]

Novice Class Amateur Radio Operator License Examination

(Element 2 Syllabus)

A. Rules and Regulations

Define:
1) Amateur Radio Service 97.3(a)
2) Amateur Radio operator 97.3(c)
3) Amateur Radio station 97.3(e)
4) Amateur Radio communications 97.3(b)
5) Operator license 97.3(d)
6) Station license 97.3(d)
7) Control operator 97.3(o)
8) Third-party traffic 97.3(v)

Novice class operator privileges:
9) Authorized frequency bands 97.7(e)
10) Authorized emission (A1) 97.7(e)

Prohibited practices:
11) Unidentified communications 97.123
12) Intentional interference 97.125
13) False signals 97.121
14) Communication for hire 97.112(a)

Basis and purpose of the Amateur Radio Service rules and regulations:
15) To recognize and enhance the value of the Amateur Radio Service to the public as a voluntary, non-commercial communication service, particularly with respect to providing emergency communications. 97.1(a)
16) To continue and extend the Amateur Radio operators' proven ability to contribute to the advancement of the radio art. 97.1(b)
17) To encourage and improve the Amateur Radio Service by providing for advancing skills in both the communication and technical phases. 97.1(c)
18) To expand the existing reservoir within the Amateur Radio Service of trained operators, technicians, and electronics experts. 97.1(d)
19) To continue and extend the radio amateurs' unique ability to enhance international good will. 97.1(e)

Operating rules:
20) U.S. Amateur Radio station call signs 2.302 and FCC Public Notice
21) Permissible points of communications 97.89(a)(1)
22) Station logbook, logging requirements 97.103(a), (b); 97.105
23) Station identification 97.84(a)
24) Novice-band transmitter power limitation 97.67(b), (d)
25) Necessary procedure in response to an official notice of violation 97.137
26) Control operator requirements 97.79(a), (b)

B. Operating Procedures

1) R-S-T signal reporting system
2) Choice of telegraphy speed
3) Zero-beating received signal
4) Transmitter tune-up procedure
5) Use of common and internationally recognized telegraphy abbreviations, including: CQ, DE, K, SK, R, $\overline{AR}$, 73, QRS, QRZ, QTH, QSL, QRM, QRN

C. Radio Wave Propagation

1) Sky wave; "skip"
2) Ground wave

D. Amateur Radio Practice

1) Measures to prevent use of Amateur Radio station equipment by unauthorized persons

Safety precautions:
2) Lightning protection for antenna system
3) Ground system
4) Antenna-installation safety procedures

Electromagnetic compatability — identify and suggest cure:
5) Overload of consumer electronic products by strong radio frequency fields
6) Interference to consumer electronic products caused by radiated harmonics

Interpretation of SWR readings as related to faults in antenna system:
7) Acceptable readings
8) Possible causes of unacceptable readings

E. Electrical Principles

Concepts:
1) Voltage
2) Alternating current, direct current
3) Conductor, insulator
4) Open circuit, short circuit
5) Energy, power
6) Frequency, wavelength
7) Radio frequency
8) Audio frequency

Electrical units:
9) Volt
10) Ampere
11) Watt
12) Hertz
13) Metric prefixes: mega, kilo, centi, milli, micro, pico

F. Circuit Components

Physical appearance, applications, and schematic symbols of:
1) Quartz crystals
2) Meters (D'Arsonval movement)
3) Vacuum tubes
4) Fuses

G. Practical Circuits

Block diagrams:
1) The stages in a simple telegraphy (A1) transmitter
2) The stages in a simple receiver capable of telegraphy (A1) reception
3) The functional layout of novice station equipment, including transmitter, receiver, antenna switching, antenna feedline, antenna, and telegraph key

H. Signals and emissions

1) Emission type A1

Cause and cure:
2) Backwave
3) Key clicks
4) Chirp
5) Superimposed hum
6) Undesirable harmonic emissions
7) Spurious emissions

I. Antennas and Feedlines

Necessary physical dimensions of these popular high-frequency antennas for resonance on Amateur Radio frequencies:
1) A half-wave dipole
2) A quarter-wave vertical

Common types of feedlines used at Amateur Radio stations
3) Coaxial cable
4) Parallel-conductor line

Technician/General Class Amateur Radio Operator License Examination

(Element 3 Syllabus)

A. Rules and Regulations

1) Control point 97.3(p)
2) Emergency communications 97.3(w); 97.107
3) Amateur Radio transmitter power limitations 97.67
4) Station-identification requirements 97.84(b), (f), (g); 97.79(c)
5) Third-party participation in Amateur Radio communications 97.79(d)
6) Domestic and international third-party traffic 97.114; Appendix 2, Art. 41, Sec. 2
7) Permissible one-way transmissions 97.91
8) Frequency bands available to the Technician class 97.7(d)
9) Frequency bands available to the General class 97.7(b)
10) Limitations on use of Amateur Radio frequencies 97.61
11) Selection and use of frequencies 97.63
12) Radio-controlled model crafts and vehicles 97.65(a); 97.99
13) Radioteleprinter emissions 97.69

Prohibited practices:
14) Broadcasting 97.113
15) Music 97.115
16) Codes and ciphers 97.117
17) Obscenity, indecency, profanity 97.119

B. Operating Procedures

1) Radiotelephony
2) Radio teleprinting
3) Use of repeaters
4) VOX transmitter control
5) Full break-in telegraphy
6) Operating courtesy

7) Antenna orientation
8) International communication
9) Emergency-preparedness drills

C. Radio Wave Propagation

1) Ionospheric layers; D, E, F1, F2
2) Absorption
3) Maximum usable frequency
4) Regular daily variations
5) Sudden ionospheric disturbance
6) Scatter
7) Sunspot cycle
8) Line-of-sight
9) Ducting, tropospheric bending

D. Amateur Radio Practice

Safety precautions:
1) Household ac supply and electrical wiring safety
2) Dangerous voltages in equipment made inaccessible to accidental contact

Transmitter performance:
3) Two-tone test
4) Neutralizing final amplifier
5) Power measurement

Use to test equipment:
6) Oscilloscope
7) Multimeter
8) Signal generators
9) Signal tracer

Electromagnetic compatibility; identify and suggest cure:
10) Disturbance in consumer electronic products caused by audio rectification

Proper use of the following station components and accessories:
11) Reflectometer (VSWR meter)
12) Speech processor — rf and af
13) Electronic T-R switch
14) Antenna-tuning unit; matching network
15) Monitoring oscilloscope
16) Non-radiating load; "dummy antenna"
17) Field strength meter; S-meter
18) Wattmeter

E. Electrical Principles

Concepts:
1) Impedance
2) Resistance
3) Reactance
4) Inductance
5) Capacitance
6) Impedance matching

Electrical Units:
7) Ohm
8) Microfarad, Picofarad
9) Henry, millihenry, microhenry
10) Decibel

Mathematical relationships:
11) Ohm's law
12) Current and voltage dividers
13) Electrical power calculations
14) Series and parallel combinations; of resistors, of capacitors, of inductors
15) Turns ratio; voltage, current, and impedance transformation
16) Root mean square value of a sine wave alternating current

F. Circuit Components

Physical appearance, types, characteristics, applications, and schematic symbols for:
1) Resistors
2) Capacitors
3) Inductors
4) Transformers
5) Power-supply-type diode rectifiers

G. Practical Circuits

1) Power supplies
2) High-pass, low-pass, and band-pass filters
3) Block diagrams showing the stages in complete a-m, ssb, and fm transmitters and receivers

H. Signals and Emissions

1) Emission types AØ, A3, F1, F2, F3
2) Signal; information
3) Amplitude modulation
4) Double sideband
5) Single sideband
6) Frequency modulation
7) Phase modulation
8) Carrier
9) Sidebands
10) Bandwidth
11) Envelope
12) Deviation
13) Overmodulation
14) Splatter
15) Frequency translation; mixing multiplication
16) Radioteleprinting; audio frequency shift keying, mark, space, shift

I. Antennas and Feedlines

Popular Amateur Radio antennas and their characteristics:
1) Yagi antenna
2) Quad antenna
3) Physical dimensions
4) Vertical and horizontal polarization
5) Feedpoint impedance of half-wave dipole, quarter-wave vertical
6) Radiation patterns; directivity, major lobes

Characteristics of popular Amateur Radio antenna feedlines; related concepts:
7) Characteristic impedance
8) Standing waves
9) Standing-wave ratio; significance of
10) Balanced, unbalanced
11) Attenuation
12) Antenna-feedline mismatch

Advanced Class Amateur Radio Operator License Examination

(Element 4A Syllabus)

A. Rules and Regulations

1) Frequency bands available to the Advanced class Amateur Radio operator and limitations on use 97.7(a); 97.61
2) Automatic retransmission of Amateur Radio signals and signals from other radio services 97.3(x); 97.113; 97.126
3) Amateur Radio stations in repeater operation 97.3(1); 97.85; 97.61(c)
4) Amateur Radio stations in auxiliary operation 97.3(1); 97.86; 97.61(d)
5) Remote control of Amateur Radio stations 97.3(m)(2); 97.88
6) Automatic control of Amateur Radio stations 97.3(m)(3)
7) Control link 97.3(n)
8) System network diagram 97.3(u)
9) Station identification 97.84(c), (d), (e)
10) Station log requirements 97.103(c), (d), (e), (f), (g)
11) Height limitations for Amateur Radio station antenna structures, including FAA notification criteria, and calculation of height above average terrain 97.45; 97.67(c); Appendix 5

B. Operating Procedures

1) Facsimile transmission
2) Slow-scan television transmission

C. Radio Wave Propagation

1) Sporadic-E
2) Selective fading
3) Auroral propagation
4) Radio-path horizon

D. Amateur Radio Practice

Use of test equipment:
1) Frequency measurement devices
2) Grid-dip meter; solid-state dip meter
3) Performance limitations of oscilloscopes, meters, frequency counters; accuracy, frequency response, stability

Electromagnetic compatibility:
4) Intermodulation interference
5) Receiver desensitizing
6) Cross-modulation interference
7) Capture effect

E. Electrical Principles

Concepts:
1) Reactive power
2) Series and parallel resonance
3) Skin effect
4) Fields, energy storage, electrostatic, electromagnetic

Mathematical relationships:
5) Resonant frequency, bandwidth, and "Q" of R-L-C circuits, given component values
6) Phase angle between voltage and current, given resistance and reactance
7) Power factor, given phase angle
8) Effective radiated power, given system gains and losses
9) Replacement of voltage source and resistive voltage divider with equivalent circuit consisting of a voltage source and one resistor (an application of Thevenin's Theorem, used to predict the current supplied by a voltage divider to a known load)

F. Circuit Components

Physical appearance, types, characteristics, applicants, and schematic symbols for the following:
1) Diodes; zener, tunnel, varactor, hot-carrier, junction, point contact, PIN
2) Transistors; npn, pnp, junction, unijunction, power, germanium, silicon
3) Silicon-controlled rectifier, triac
4) Light-emitting diode, neon lamp
5) Crystal-lattice ssb filters

G. Practical Circuits

1) Voltage-regulator circuits; discrete and integrated
2) Amplifiers; Class A, AB, B, C; characteristics of each type
3) Impedance-matching-networks; PI, L, PI-L
4) Filters; constant K, M-derived, band-stop, notch, modern-network-theory, PI-section, T-section, L-section (not necessary to memorize design equations; know general description, characteristics, responses, and applications of these filters)
5) Oscillators; various types and their applications; stability

Transmitter and receiver circuits — know purpose of each, and how, basically, each functions:
6) Modulators; a-m, fm, balanced
7) Transmitter final amplifiers
8) Detectors, mixer stages
9) rf and if amplifier stages

Calculation of voltages, currents, and power in common Amateur Radio oriented circuits:
10) Common emitter class A transistor amplifier; bias network, signal gain, input and output impedances
11) Common collector class A transistor amplifier; bias network, signal gain input and output impedances

Circuit design; selection of circuit component values:
12) Voltage regulator with pass transistor and Zener diode to produce given output voltage
13) Select coil and capacitor to resonate at given frequency

H. Signals and Emissions

1) Emission types A4, A5, F4, F5
2) Modulation methods
3) Deviation ratio
4) Modulation index
5) Electromagnetic radiation
6) Wave polarization
7) Sine, square, sawtooth waveforms
8) Root-mean-square value
9) Peak-envelope power relative to average
10) Signal-to-noise ratio

I. Antennas and feedlines

1) Antenna gain, beamwidth
2) Trap antennas
3) Parasitic elements
4) Radiation resistance
5) Driven elements
6) Efficiency of antenna
7) Folded, multiple wire dipoles
8) Velocity factor
9) Electrical length of a feedline
10) Voltage and current nodes
11) Mobile antennas
12) Loading coil; base, center, top

Amateur Extra Class Amateur Radio Operator License Examination

(Element 4B Syllabus)

A. Rules and Regulations

1) Frequency bands available to the U.S. Amateur Radio operator and limitations on their use including variations for Regions 1 & 3 97.61; 97.95
2) Space Amateur Radio stations 97.3(i)
3) Purity of emissions 97.73
4) Mobile operation aboard ships or aircraft 97.101
5) RACES operation Part 97, Subpart F
6) Points of communications 97.89

B. Operating Procedures

1) Use of Amateur Radio satellite
2) Amateur fast-scan television

C. Radio Wave Propagation

1) EME; "Moonbounce"
2) Meteor Burst
3) Trans-equatorial

D. Amateur Radio Practice

Use of test equipment:
1) Spectrum analyzer; interpret display; display of transmitter output spectrum, such as commonly found in new product review articles in Amateur Radio magazines
2) Logic probe; indication of high or low state, pulsing state

Electromagnetic compatability:
3) Vehicle-noise suppression; ignition noise, alternator whine, static
4) Direction-finding techniques; methods for location of source of radio signals

E. Electrical Principles

Concepts:
1) Photoconductive effect
2) Exponential charge/discharge

Mathematical relationships; calculations:
3) Time constant for R-C and R-L circuits (including circuits with more than one resistor, capacitor or inductor)
4) Impedance diagrams; basic principles of Smith Chart
5) Impedance of R-L-C networks at a specified frequency
6) Algebraic operations using complex numbers; real, imaginary, magnitude, angle

F. Circuit Components

Physical appearance, types, characteristics, applications, and schematic symbols for:
1) Field-effect transistors; enhancement, depletion, MOS, CMOS, n-channel, p-channel
2) Operational amplifier and phase-locked loop integrated circuits
3) 7400 series TTL digital integrated circuits
4) 4000 series CMOS digital integrated circuits
5) Vidicon; cathode ray tube

G. Practical Circuits

1) Digital logic circuits; flip-flop, multivibrator, AND/OR/NAND/NOR/ gates
2) Digital frequency divider circuits; crystal marker, counters
3) Active Audio Filters using integrated operational amplifiers

High-performance receiver characteristics
4) Noise figure, sensitivity
5) Selectivity
6) Dynamic range

Calculation of voltages, currents, and power in common Amateur Radio-oriented circuits:
7) Integrated operational amplifier; voltage gain, frequency response
8) FET common-source amplifier; input impedance

Circuit design; selection of circuit component values
9) LC preselector with fixed and variable capacitors to tune a given frequency range
10) Single-stage amplifier to have desired frequency response by proper selection of bypass and coupling capacitors

H. Signals and Emissions

1) Pulse modulation; position, width
2) Digital signals
3) Narrow-band voice modulation
4) Information rate vs. bandwidth
5) Peak amplitude of a signal
6) Peak-to-peak values of a signal

I. Antennas and Feedlines

1) Antennas for space radio communications; gain, beamwidth, tracking
2) Isotropic radiator; use as a standard of comparison
3) Phased vertical antennas; resultant patterns, spacing in wavelengths
4) Rhombic antennas; advantages, disadvantages
5) Matching antenna to feedline; delta, gamma, stub
6) Properties of 1/8-, 1/4-, 3/8-, and 1/2-wavelength sections of feedlines; shorted, open

The Show-offs

Sometimes it takes one to know one . . . right?

By John G. Troster,* W6ISQ

Hey Charlie, ya listening to them 'birdies' around 14230?"

"Yeah, I hear them TV fellas. Smack in the middle of the best part of the band. I don't believe they're sending out TV pictures. Who's to know? I think they're just modulating with bird whistles and foolin' everybody that they're sending pictures."

"Agree. They're just wastin' frequencies. Why don't somebody make 'em go up to the other end of the band?"

"Yeah. And talk about wastin' frequencies, what about them fellas on the low end of 20 sendin' that fast cw?"

"Aw, sure. They can't really send that fast and *nobody* can receive it."

"They must send it slow on a recorder and then speed up the record. And receive visee versa. They're just faking things, that's all, and just showin' off and wasting good frequencies."

"Yeah, almost as bad as them QRP fellas. You know they ain't working any DX with 5 watts."

"I know. They're running kWs like everybody else. They're making a big deal out of fooling everybody they're running low power. Just showing off — right?"

"Right. A big waste a frequencies. They oughta put them QRPers and fast cw fellas together someplace. And did ya ever listen to them message net fellas? All them Q signals and QNIs and 'up 3 — down 2.' Who they showing off for?"

"I hear they just make up them messages themselves and play 'em back and forth to each other. A real waste of good frequencies and definitely showing off for somebody. Should put them in with the QRPers and fast cws too."

"Yeah. All them types is the same. They're sending 'birdies' or fast dits or Q signals nobody never heard of trying to make everybody think they're smart er somethin'."

"Break break."

"Go ahead breaker."

"You fellas work the 'FZ3' yet?"

"Where?"

"027 . . . long path . . . up 2 . . . tail end OK . . . he's under the policeman."

"Thanks. Back in a minute, Charlie."

"Get him, Charlie?"

"First call, but short path better. New one here."

"Me too. Ahhhh, now where was we? Oh, about them fellas always showing off and goofing up the bands."

"Yeah, I believe them RTTY 'burble' fellas has got to be almost the worst showoffs there is. I mean, really, they play them burbles all the time and how do they know anybody out there can read all them burbles?"

"Oh yeah, they really waste a lot of good frequencies. Put them in with 'birdie' TVers too."

"And how about them fellas they call 'Moon Bouncers'? They gotta be just showing off. 'Cause who's to believe they really hear signals coming back from the moon?"

"Yeah, same as them OSCAR fellas. And them phone patchers. They're all a real menace to the frequencies. And, ohhhh, them ragchewers is terrible. And how about them fellas with the new calls? Oh, I tell ya, Amateur Radio is really somethin' these days."

"Break break . . . a JK7 at 195 . . . listening 223 but moving up 1 kHz at a time."

"Thanks. QRX one, Charlie."

"Back again, Charlie. Nice to see the long path hold in so long."

"Yeah. Maybe a few a them 8T7s and YZ4s will be showing up. Maybe better check the 'gray line' tomorrow."

"Good idea. Yeah Charlie, it's too bad to see Amateur Radio disintegrate so fast with all these fellas showing off up and down the good frequencies and ruining things for the rest of us. I mean, what's Amateur Radio comin' to?"

*82 Belbrook Way, Atherton, CA 94025

The WARC Warriors

With our WARC gains in hand, it's time to recognize those whose contributions to the ARRL Foundation helped make it all possible.

By Richard K. Palm,* K1CE

The World Administrative Radio Conference is now history, and Amateur Radio has scored a monumental victory. It seems that the world's opinion of the amateur community is stronger than ever. The ARRL/IARU has spent a major portion of its energies in the preparation for WARC during the past several years. The result was a highly organized and professional WARC team representing Amateur Radio before the rest of the world. It turned out that this team was one of the best-prepared at the Conference.

The success at WARC was made possible to a large extent by the ARRL Foundation and the outstanding support it received from ARRL life members. As a result of this past year's solicitation, over $60,000 was donated to the Foundation for the WARC effort! This demonstration of dedication to Amateur Radio and the IARU's efforts on behalf of Amateur Radio has helped to make the hobby what it is today.

What is the ARRL Foundation?

Established by the ARRL as a separate entity, the Foundation is chartered as a nonprofit corporation in the state of Connecticut, and has been granted tax-exempt status by the U.S. Internal Revenue Service. Its affairs are governed by a Board of Directors of distinguished radio amateurs. The Foundation is involved with the OSCAR program, scholarship funds, and special projects such as the WARC program.

Think of the benefits you've received from Amateur Radio — fun and relaxation, pride of accomplishment, a chance to be of public service, possibly a first rung on the career ladder. This is your chance to do something for Amateur Radio. Perhaps your contribution will give one of today's youngsters somewhere in the world the opportunity to discover the excitement you have known as a ham. Or you may want a "piece of the action" in supporting the many fine efforts based almost solely on the inspired cooperation of dedicated volunteers everywhere. Or you may just wish to make yourself a part of tomorrow. That's what the ARRL Foundation is all about. Send your tax-deductible contribution today to the ARRL Foundation, 225 Main St., Newington, CT 06111.

Contributors of $100 or More

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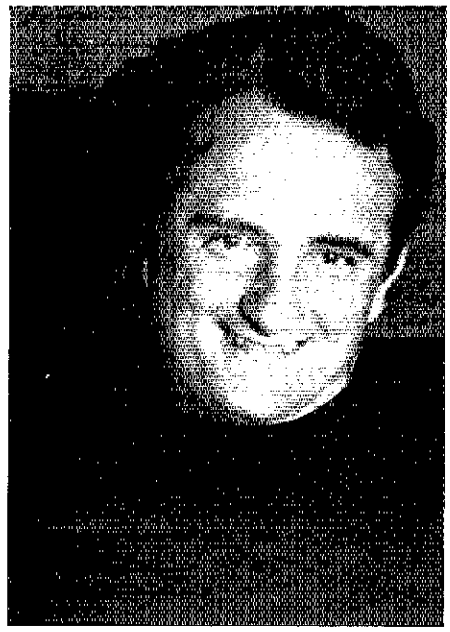

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The ARRL Foundation would like to give special thanks to Shozo Hara, JA1AN, president of the Japan Amateur Radio League, for his outstanding support.

Contributors of $1000 or More

Richard L. Baldwin, W1RU; Samuel C. McCluney; Joseph Mullan, W3RLR; Harold E. Johnson, W4ZCB; Alice Wicker, WA4ZMA; L. Phil Wicker, W4ACY.

Jubilant Board Welcomes WARC Win

Triumph of teamwork at Geneva, new sense of dedication to international cooperation mark the 1980 Annual Meeting of ARRL directors January 17-18 at Hartford.

By Perry F. Williams,* W1UED

"WHEREAS, a considerable effort has been put forth by dedicated radio amateurs and friends of the Amateur Radio Service in preparation for and in the course of the 1979 World Administrative Radio Conference and,

"WHEREAS, this effort has culminated in assurance of a highly satisfactory family of frequencies to be made available for use by the Amateur Radio Service during the years ahead, now, therefore,

"BE IT RESOLVED that the ARRL Board of Directors, by means of this Resolution, and in behalf of the radio amateurs of the United States of America and of Canada, extends sincere congratulations and expresses its deep and heartfelt appreciation to all those who played a part in this important undertaking, in particular:

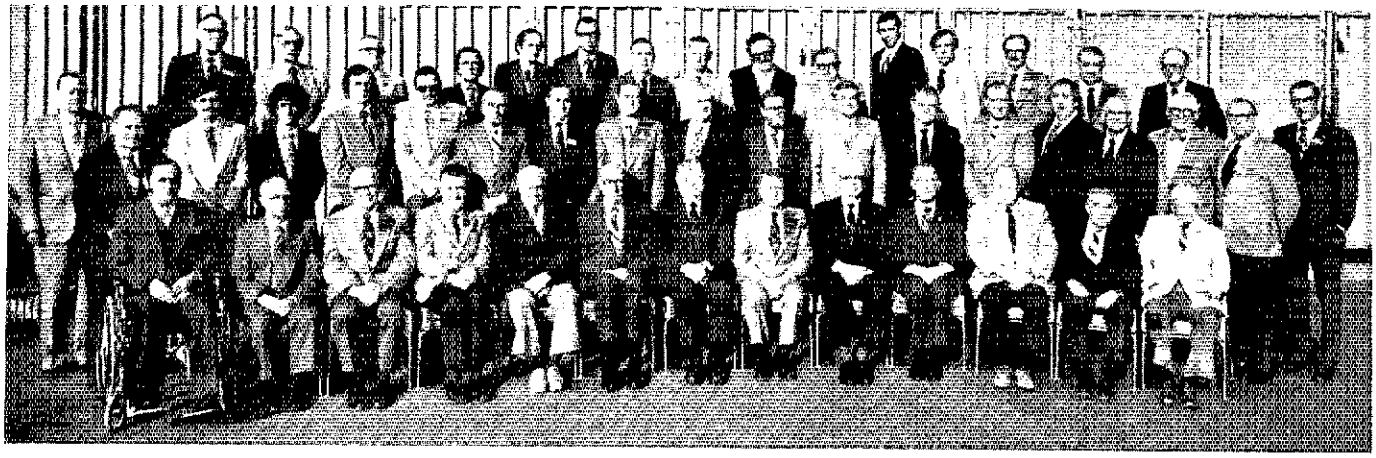
- The members of the official U.S. and Canadian delegations to the WARC,
- The members of the IARU WARC-79 team, which included G2BVN, G5CO, HK3DEU, JA1NET, K1ZZ, SP5FM, VE3CJ, W1RU, W4KFC, WA6IDN, WØBWJ, YV5BPG, ZL2AZ and 9V1RH,
- Those who served as representatives of Amateur Radio as members of their national delegations, including: CP5EC, DL1FL, DU1JJT, DU1MCT, DU1RLM, EL2BA, HP1ND, HS1WR, LA4ND, LA6A, VE3UD, VK3ADW, VK3KI, W3OKN, XE1SR, YN1FI, YU1NQM, ZL2AMJ, 5NØOBA and 7X2AJ,
- And finally, those members of national delegations, many of *them* radio amateurs who, in the course of the conference, lent vital and timely support by presenting the case for Amateur Radio and by clarifying the role and frequency needs of the service."

The success of the Amateur Radio effort at the World Administrative Radio Conference, assuring frequency space for our service through the remainder of the century, was the dominant motif of the 1980 Annual Meeting of ARRL's Board of Directors. And the resolution quoted above, introduced by Stan Zak, K2SJO, chairman of the International Affairs Committee, sums up the Board's — indeed, all of Amateur Radio's — gratitude toward the team who made it happen.

The theme bubbled out of reports by the officers, popped up during coffee breaks and emerged in another resolution, Minute 59, calling for letters from the ARRL president to each of the Member Societies of the International Amateur Radio Union thanking them for the preparatory efforts behind the scenes of WARC and pledging ARRL support to sustain and strengthen the bonds of international cooperation through IARU in the years ahead. Another motion, Minute 72, encourages ARRL participation in international discussions which might lead to reorganization of the Union; since its founding in 1925, officers of ARRL have been the officers of the Union *ex-officio*, and with the maturity of the world amateur movement a new look could be welcome. Cooperation flows in both directions, of course, and the Board, at Motion 63, seeks the help of the IARU Region II Executive Committee with the problem of improper third-party communications. Finally, on a matter which bridges world and domestic affairs, the Board created the office of International Affairs vice president, and elected Noel B. Eaton, VE3CJ, to the post. (Noel also serves as president of IARU.)

In the remaining ARRL elections, the following were elected unanimously for two-year terms (Minutes 32 through 34): President, Harry J. Dannals, W2HD; First Vice President, Carl L. Smith, WØBWJ; Vice President, Larry E. Price, W4RA; and Secretary, Richard L. Baldwin, W1RU. Max Arnold, W4WHN, won election as the third vice president, garnering 11 votes to five for Gar Anderson, KØGA. The election of a treasurer to replace John Huntoon, W1RW, was postponed until the July meeting, pending a report on candidates by the Management and Finance Committee; John continues in office until then under Bylaw 6. Directors Len Nathanson, W8RC, Phil Wicker, W4ACY, and Frank Butler, W4RH, along with Andrea T. Parker, K1WLX, were chosen for the ARRL Foundation Board of Directors, Minute 37. Directors Stan Zak, K2SJO, Bill Stevens, W6ZM, Gar Anderson, KØGA, and Phil Wicker, W4ACY, were elected to the Executive Committee, Minute 35, and the Articles of Association changed so that the first vice president and the general manager are nonvoting members of the Committee (Minute 16). Concluding the roster of officials, Victor C. Clark, W4KFC (no. 71), J. Lincoln McCargar, W6EY (no. 84), and John R. Griggs, W6KW (no. 88), were designated Honorary Vice Presidents in recognition

*Manager, Membership Services, ARRL



It was nearly shirt-sleeve weather in Hartford for the Annual Meeting January 17-18, sharp contrast to the near-blizzard during the January 1978 session! Lined up on the pool deck at the Holiday Inn Civic Center are, left to right, front row: K5DPG, W6ZM, KØGA, W9NTP, W7PGY, W4KFC, W2HD, W1RU, VE3CJ, WØBWJ, W1HHR, W3KT and W1JFF. Second row: W3PS (gray suit), W3OKN, N3AKD, K1FHN, W6EJJ, K9EN, VE1SH, VE2VW, W5EDZ, VE6XX, W1RW, KØTO, W4RA, K2SJO, W1FB, W4ACY, W1QV, W4UG, KØPGM. Third row, WØFIR, W4WHN, WØJCP, W8RC, K1ZZ, W4RH, W3ABC, KØHRZ, W1UED, W2IHA, WB6UIA, W1XX, VE3OT, W6ZRJ and W6JZU.

of their past contributions to ARRL. All three are former directors, while Clark and McCargar are also former vice presidents.

Turning now to government relations, regulations and such: There is a non specific request for the president and general manager to look into ways in which cooperation between FCC and radio amateurs may be strengthened (Minute 70). FCC has proposed rules for the Amateur Satellite Service in Docket 19852; as a result of Minute 73, ARRL will generally support the proposals but with modifications to include new bands authorized by WARC-79 and to allow for the possibility of manned amateur space stations. ARRL will, responsive to Minute 50, urge FCC to resume giving exams at weekend conventions and hamfests. Finally, the problem of malicious interference caused to amateurs, presumably by other amateurs, is perhaps the most irritating and difficult for the fraternity. The Board adopted back-to-back proposals in this area. Minute 64 calls for completion of a plan in cooperation with FCC for enforcement of rules in such cases, while Minute 65 would have a special committee formulate guidelines for "self-policing" activities, including education in operating ethics, development of local interference committees, and methods of locating and dealing with offenders.

In other types of cooperative action, the Vhf-Uhf Advisory Committee and the Vhf Repeater Advisory Committee have been asked (Minute 19) to consult with appropriate groups of amateurs to develop a frequency-allocation plan for cw, a-m, ssb, and narrow and standard fm on the 50-MHz band. The repeater committee also was directed to produce plans for continuous-tone squelch systems (CTSS, Private Line, subaudible tone control) for the 29-MHz repeater subband, and 15-kHz repeater channels for the 146- to 148-MHz subband.

Some other matters of miscellaneous membership interest involve, for the recent past, a recheck into membership attitudes toward the list of radiogram texts, CD-3, December *QST*, page 27, seeking suggestions on possible further changes (Minute 42). Also, the rules for the 1980 DX Test, December *QST*, page 94, will be reexamined after the contest (Minute 44). Input from members is earnestly sought prior to June 15. As to the present, directors have asked (Minute 66) for a slide show with tape cassette, showing League hq. operations as they now are. In similar vein, Minute 43 calls for a *QST* article or short series describing ARRL, its organization and function; the material would then be made into a booklet for permanent reference by members. Future stuff? Most important is the work of the Long-Range Planning Committee. One tool it needs is a survey of amateur (both member and nonmember) attitudes on many subjects. Minute 25 endorses the LRPC plan to have such a survey conducted by Florida State University. The concept of an ARRL Prepaid Legal Service Plan was adopted by the Board (Minute 14), giving the insurance administrator encouragement to continue developing such a plan. The final form would be put before the Executive Committee before implementation. The Plans and Program Committee recommendation that *QST* seek articles on digital transmission, to encourage more thought and experimentation in this area, was commended to Hq. attention by the directors at Minute 56. And the future will include a National ARRL Convention in Cedar Rapids, IA, in July 1982 (Minute 38), to be staged by the group which did such a fine job with the Midwest Division Convention last October.

Also in the future are some great new Amateur bands. The 10.1-10.15 MHz band could be here as early as January 1982 on a shared, secondary basis, and a portion of 902-928 MHz possibly sooner (subject to no interference being caused in neighboring countries). A special committee is to study the 10-MHz band — with the help of membership views — presenting recommendations at the July meeting, which then could be the basis of international discussions at the Region 2 Triennial meeting in October. The Plans and Programs Committee, with the help of the two vhf advisory committees, is to study the various possibilities in 902-928 MHz, bringing in a report no later than the summer meeting and possibly earlier. The band is already being studied by FCC for a new private radio service; perhaps the Amateur Service could receive consideration at the same time. Plans and Programs also is to study a proposal to expand 20-meter phone with 14.150-14.350 for Extras, 14.175-14.350 for Advanced, and 14.200-14.350 for Generals. Studies were also ordered on a possible biweekly DX bulletin; changes in Article 11 on eligibility of candidates for ARRL officer and the forms in which information on qualifications is conveyed to members at voting time; varying rates of membership dues for various categories of members; official responsibilities of vice directors; a personnel manager for the Hq. staff; means for decreasing the workload while increasing efficiency of QSL bureaus; and a thorough study on the role and operation in the post-WARC era of the Intruder Watch Program.

The Board Meeting officially lasted two full days, but really about four when you count director visits at headquarters, director/staff and director/director consultations, committee meetings, and the like. Concentrated, exhilarating, useful — turn to the official minutes in "Moved and Seconded" for the full story.

Moved and Seconded...

MINUTES OF THE 1980 ANNUAL MEETING
OF THE BOARD OF DIRECTORS
THE AMERICAN RADIO RELAY LEAGUE, INC.
January 17-18, 1980

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Holiday Inn Civic Center, Hartford, Connecticut, on January 17, 1980. The meeting was called to order at 9:28 A.M., with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, KØGIA, Dakota Division; Max Arnold, W4WHN, Delta Division; Jesse Bieberman, W3KT, Atlantic Division; Maurice O. Carpenter, KØHRZ, Rocky Mountain Division; Paul Grauer, WØFIR, Midwest Division; Jay A. Holladay, W6EJJ, Southwestern Division; Don C. Miller, W9NTP, Central Division; Leonard Nathanson, W8RC, Great Lakes Division; A. Mitchell Powell, VE3OT, Canadian Division; Larry E. Price, W4RA, Southeastern Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; Raymond B. Wangler, W5EDZ, West Gulf Division; L. Phil Wicker, W4ACY, Roanoke Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Victor C. Clark, W4KFC, First Vice President; Noel B. Eaton, VE3CJ, Vice President; Carl L. Smith, WØBWJ, Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following vice directors: Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, KØPGM, Rocky Mountain Division; George A. Diehl, W2IHA, Hudson Division; Claire Richard Dyas, WØJCP, Midwest Division; Kenneth A. Ebneter, K9EN, Central Division; Fred Evans, W1JFF, New England Division; Peter F. Matthews, WB6UIA, Southwestern Division; Clay E. Milius, Jr., W4UG, Roanoke Division; Tod Olson, KØTO, Dakota Division; Lionel A. Oubre, K5DPG, Delta Division; Robert C. Smithwick, W6JZU, Pacific Division; and Hugh A. Turnbull, W3ABC, Atlantic Division. There were also present Ronald J. Hesler, VE1SH, President, Canadian Radio Relay League, Inc.; Honorary Vice Presidents Robert York Chapman, W1QV and Jean A. Gmelin, W6ZRJ; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS, and Chris Imlay, N3AKD of his office; Canadian Counsel B. Robert Benson, QC, VE2VW; Merle Glunt, W3OKN, Consultant for Frequency Management and WARC Preparation; Assistant General Manager David Sumner, K1ZZ; Technical Department Manager Doug DeMaw, W1FB; Communications Department Manager John F. Lindholm, W1XX; Membership Services Manager Perry F. Williams, W1UED; and Washington Area Coordinator Harold M. Steinman, K1FHN.

2) The assembly observed a moment of silence in recollection of ARRL members who had become Silent Keys since the July meeting of the Board. The Chair welcomed new Directors Bieberman, Nathanson, Wangler and Powell; Vice Directors Oubre and Turnbull, and Mr. Imlay to the meeting.

3) The Board next considered the agenda for the meeting. Item 6(c) Membership Affairs Committee, amended to read "Mr. Wicker, Chairman;" item 6(f) Contest Advisory Committee, amended to read "Mr. Olson, Liaison;" item 6(j), amended to add "RFI Task Group, Mr. Smith, Liaison;" and item 6(k) added, "Ad Hoc Committee on Nonionizing Radiation, Mr. Wangler, Chairman." Item 12(h), West Gulf Division, amended to read "Mr. Wangler." Item 13(h) amended to add "Administrative Expenses, Canadian Radio Relay League;" and item 13(i) added to read "Additional Appropriations for 1979 Reimbursable Expenses." Whereupon, on motion of Mr. Sullivan, seconded by Mr. Thurston, the agenda as amended was unanimously ADOPTED.

4) On motion of Mr. Thurston, seconded by Mr. Anderson, unanimously VOTED that the Minutes of the 1979 Second Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) Reports of the officers were presented here. In his written report, and in supplementary oral comments, the President covered the successful outcome of the World Administrative Radio Conference (WARC-79) due to the dedicated performance of the International Amateur Radio Union (IARU) Team; the need to begin to study the eventual use of the new bands made possible by WARC; a related subject of frequency management; areas of disagreement between the Federal Communications Commission and radio amateurs; the slight downward trend in the growth of Amateur Radio; FCC's discontinuance of exams at hamfests and conventions; measures to increase League membership and the ranks of radio amateurs; the incorporation of the Canadian Radio Relay League; the post-WARC role of the Intruder Watch; promotion of the VHF/UHF bands, particularly 220 MHz; the new ARRL flag (displayed later in the meeting); and the kind remarks of Bob Barker, CBS-TV, concerning radio amateur support for the Rose Bowl Parade. First Vice President Clark, in his final report to the ARRL Board, stressed the need to further strengthen and broaden the bonds of cooperation within IARU that were developed during preparation for WARC. He also called for further improvement in membership services, the League's interface with the government, the efficiency of its management processes and involvement of the membership in ARRL decision making. His oral remarks extended to the Long-Range Planning Committee, the planned continuance of his term as President of IARU Region 2, and his participation with the IARU Team in Geneva. Vice President Eaton, who is also President of IARU, presented a lengthy report on the World Administrative Radio Conference with the help of Consultant Glunt, Vice President Clark, Assistant General Manager Sumner, and General Manager Baldwin. Highlights included financial support for the IARU Geneva Team from around the world, in particular some $20,000 from IARU Region 1; the many amateurs who contributed to the final outcome of WARC-79 as members of the IARU Team, as members of national delegations, and in preparatory work through their national societies (some 150 amateurs in Geneva, and many behind the scenes). Among reasons for success were advance contact travel; knowing many delegates on first-name basis; advance work by societies; the assistance of King Hussein, JY1, and the Jordanian Government; the common plan adopted by all of IARU and the selection of the IARU Team members from all over the world. A preview copy of the February *QST* story on WARC, by Messrs. Baldwin and Sumner, was distributed. Vice President Smith's report touched on the Ad Hoc Committee on Canadian Reorganization; meetings of the Legal & Regulatory and Management & Finance Committees; the work of the VHF Repeater Advisory Committee; and the need to keep IARU active and aware in eventual preparation for the next general WARC. During the course of the above, the Board was in recess from 10:29 to 10:53 A.M. At 10:58 Frederick H. Towner, VE6XX, Vice Director from the Canadian Division, joined the meeting.

6) General Manager Baldwin's report touched on the team's success at WARC; preliminary financial figures for 1979, the first year in which taxes on unrelated business income apparently will be due; matters concerned with the staff of 114 full-time and 6 hourly employees; the need for about 10 additional people to restore membership services to adequate levels; membership figures with comparisons for the previous year; plans for a membership campaign; reactivation of the training program; a status report on the proposed in-house computer; and a review of the ARRL numbered radiogram list, in which he was assisted by Communications Manager Lindholm.

7) During the course of the above, the Board was in recess for luncheon at 12:37 P.M., reassembling at 1:50 P.M. with all persons hereinbefore mentioned present except Messrs. Benson and Oubre, who rejoined the meeting at 2:02 and 2:07 respectively. Mr. Glunt departed from the meeting at 2:40 P.M.

8) Treasurer Huntoon's preliminary report covered both the general portfolio and Life Membership investments. General Counsel Booth presented his written report and added oral comments concerning relations with FCC; Washington contact; reciprocal license problems; antenna cases; and the Personal Communications Foundation. During the course of the above, the Board was in recess from 3:40 to 3:58 P.M. Canadian Counsel Benson reported on incorporation of the Canadian Radio Relay League; a recommendation of the Tariff Board concerning elimination of duty on major Amateur Radio equipment; and problems involving individual amateurs, such as antenna height limitations. Honorary Vice President Chapman presented a report in his role as President of the ARRL Foundation concerning contributions of Life Members in excess of $62,000 toward WARC expenses.

9) Reports of the Standing Committees came next. Mr. Zak, as Chairman, presented the report of the International Affairs Committee, expressing appreciation for the work of the WARC team and international consideration related to the new bands at 10, 18 and 24 MHz. Mr. Zak moved, Mr. Arnold seconded, adoption of the following resolution:

WHEREAS, while WARC-79 has now been concluded with a favorable result for Amateur Radio and

WHEREAS, the importance of the IARU and international matters have not diminished and will continue to grow in the coming years, now, therefore,

BE IT RESOLVED by the Board of Directors of ARRL, in Annual Meeting assembled, that Article 8 of the Articles of Association be amended by the addition in line two of the words, "International Affairs Vice President" after the words, "First Vice President." A roll call vote being required, the question was decided in the affirmative with all directors present voting in favor. On further motion of Mr. Zak, seconded by Mr. Stevens, the following resolution was unanimously ADOPTED with applause:

WHEREAS, Noel B. Eaton, VE3CJ, has served the members of the American Radio Relay League in voluntary leadership positions for more than two decades; and

WHEREAS his service began in 1960 with his election as Vice Director of the Canadian Division with succession to the post of Director almost immediately; and

WHEREAS during his 14 years as Director of the Canadian Division Mr. Eaton took a keen interest in international matters affecting Amateur Radio, and especially in the founding of IARU Region 2 in 1964; and

WHEREAS Mr. Eaton served for 10 years as Treasurer of IARU Region 2; and

WHEREAS Mr. Eaton was elected a Vice President of the ARRL and President of the International Amateur Radio Union in 1974, and has served with distinction; and

WHEREAS this distinguished service included the

leading of the IARU preparations for the 1979 World Administrative Radio Conference, and serving as head of the IARU Team which represented Amateur Radio so effectively in Geneva; and

WHEREAS, while WARC-79 has now concluded, the importance of the IARU has not diminished and will continue to grow in the coming years; and

WHEREAS the worldwide Amateur Radio community has benefited greatly from Noel Eaton's talents and experience; now, therefore,

BE IT RESOLVED that Noel B. Eaton is declared elected as International Affairs Vice President of ARRL for the ensuing two-year term.

10) Mr. Holladay, as Chairman, read the report of the Plans and Programs Committee including the ongoing study of *QST*, due to be concluded by July; an article or a short series for *QST* concerning staff and officer responsibilities; the possibility of digital data transmission by Amateur Radio; and a comprehensive study of ARRL publications.

11) Mr. Wicker, as Chairman, gave an oral report for the Membership Affairs Committee, which reached negative conclusions with respect to Minute 49 of the summer meeting concerning an award for working 100 IARU countries and a similarly negative report on Minute 55 of the summer meeting concerning a one-time membership certificate to which annual stickers could be added.

12) Mr. Price, as Chairman, presented the report of the Management and Finance Committee. On motion of Mr. Price, seconded by Mr. Sullivan, it was unanimously RESOLVED, at 5:32 P.M., that the Board resolve itself into a Committee of the Whole for the purpose of considering matters of staff remuneration. Members of the staff present were excused. At 5:55 P.M. the Committee arose and reported to the Board. On motion of Mr. Sullivan, seconded by Mr. Thurston, it was unanimously VOTED to adopt the report of the Committee.

13) The Board thereupon recessed for dinner, reassembling at 8:00 P.M. with all persons herein before mentioned present except Mr. Glunt and Mr. Towner.

14) Mr. Price continued the discussion of the Management and Finance Committee report. With respect to Minute 42 of the summer meeting, the Committee reviewed advertising policies of *QST*, agreeing that the policy is being adhered to and does not require revision. Donation of excess *Handbooks* and other ARRL publications to schools and the like was recommended, and comment was invited on distribution. A review of insurance matters came next. Whereupon, it was moved by Mr. Stevens, seconded by Mr. Sullivan, that the Board of Directors adopt the concept of offering a prepaid legal service plan as outlined in the January 1980 report of the Management and Finance Committee. The Management and Finance Committee shall present the detailed plan to the Executive Committee for approval prior to its implementation. The Ayes and Nays being ordered on request, the question was decided in the affirmative, 12 votes in favor to 4 votes opposed. All of the directors voted in the affirmative except Messrs. Arnold, Carpenter, Grauer, and Nathanson, so the motion was ADOPTED. Mr. Towner rejoined the meeting at 8:20 P.M.

15) On motion of Mr. Price, seconded by Mr. Sullivan, it was unanimously VOTED that, because of changes in accounting standards and procedures promulgated by the American Institute of Certified Public Accountants, the Board rescinds its 1964 action establishing a separate reserve for the Defense of Amateur Frequencies, with the understanding that this action by the Board in no way diminishes the dedication of the League to doing everything that is necessary to defend Amateur Radio frequency allocations.

16) Moved, by Mr. Sullivan, seconded by Mr. Stevens, to strike the following in Article 6: "The President, the First Vice President, the General Manager and four Directors," and to insert therefor "The President, five Directors selected by the Board of Directors, and, without vote, the First Vice President and General Manager." On motion of Mr. Zak, seconded by Mr. Nathanson, VOTED, 9 votes to 7, that the motion is amended to specify four Directors instead of five. Whereupon, a roll call being necessary, the question was decided in the affirmative, 16 to 0. All of the directors voted in favor, so the Article was AMENDED.

17) Mr. Price concluded the review of the extensive written report, covering securities purchased for the Life Membership portfolio; its regret over the decision of Treasurer Huntoon not to seek reelection with praise for his stewardship; approval of the 1980 budget utilizing principles of Zero Base Budgeting; tax liability for "non-related business income" from advertising; the new Employee Handbook for ARRL Headquarters; and a plan to forestall potential conflicts of interest by staffers engaged in outside employment.

18) Mr. Carpenter, as Chairman, presented the report of the Legal and Regulatory Committee concerning its study of the benefits and the problems arising from reciprocal operating privileges in the United States and its study of Article 11 concerning eligibility of officers and directors. It was moved by Mr. Carpenter, seconded by Mr. Thurston, that the text of Article 11 of the Articles of Association and By-Laws of the American Radio Relay League be amended to read, "No person shall be eligible for the office of Director, Vice Director, President, Vice President, or Treasurer who has not been a Full member of the League for at least four continuous years, and who has not held continuously during that period a valid authorization as a radio amateur in accordance with the applicable laws and regulations of the United States or Canada prevailing at the time of his election and throughout his term of office. No person shall be eligible for, or hold, the office of Director, Vice Director, President, Vice President, or Treasurer who is commercially engaged in the design, manufacture, distribution, sale, rental, installation, servicing, or repair of apparatus intended for use in radio communication; is commercially or governmentally engaged in frequency allocation planning or implementation; or is engaged commercially in the authorship or publication of books, manuals, or periodicals directed in whole or in part for consumption by radio amateurs or is commercially engaged in offering or performing services primarily for or on behalf of radio amateurs. Apparatus, as used in this Article, means a number of components which, when assembled, performs a function." After extensive discussion, on motion of Mr. Zak, seconded by Mr. Wicker, the matter was laid on the table.

19) Mr. Smith, as Liaison, presented a brief report for the VHF Repeater Advisory Committee. On motion of Mr. Wangler, seconded by Mr. Wicker, it was unanimously VOTED that the VRAC and VUAC are directed to consult with appropriate groups to develop a cooperative plan of frequency allocation for A1, 6A3, 3A3, 5F3, and 16F3 operation in the 50 MHz band.

20) Mr. Olson, as Liaison, presented the written report prepared by the outgoing chairman of the Contest Advisory Committee. Mr. Olson commented orally on changes in the 1980 DX Test rules which he felt were not made in compliance with Standing Order 65 and which accordingly should be reexamined after the 1980 Test.

21) Mr. Milius, as Liaison, presented the report of the DX Advisory Committee, touching a review of the DXCC Awards Program; the DX operating techniques and ethics report in "How's DX?", September *QST*; ongoing revision of the Countries List criteria; negative decisions on several places as "new countries"; name changes for Kiribati; and lack of committee support for the proposal for a new 100 IARU country award.

22) Mr. Zak, as Liaison, presented a report of the new Public Relations Advisory Committee whose first business will be dealing with alternatives to the title of Public Relations Assistant; researching what other organizations are doing in public relations; and assessing the present status of ARRL's activities in this field.

23) Mr. Arnold, as Liaison, presented the report of the Emergency Communications Advisory Committee covering revisions to National Traffic System operations subsequently adopted by the area staffs; publication of information pertinent to RACES; and recommendations on simulated emergency tests. The Committee voted in favor of establishing a formal arrangement with REACT and began a revision of the EC Workbook.

24) Mr. Holladay, as Liaison, reported briefly for the VHF/UHF Advisory Committee, expressing the Committee's view that the ARRL stand on the six-meter FM matter was reasonable; that the New Frontier column should concentrate on two-way amateur communication above 1 GHz; and that a common liaison person for VUAC and VRAC is a good idea. The Board was in recess from 10:05 to 10:16 P.M.

25) Mr. Clark, as Chairman, presented a report of the Long-Range Planning Committee concerning the ways it has sought input, composition of the Committee, and its activities in the past year. Areas of concern identified by the Committee include disciplining offenders; a stronger and more effective relationship with government, especially FCC; strengthening international cooperative relationships; emphasizing quality rather than quantity in recruiting new amateurs; stimulating interest in both public service and experimental dimensions of Amateur Radio; increased membership involvement in League affairs; stabilization of the Headquarters staff and reassurance concerning the financial stability of ARRL. Plans for a survey of radio amateurs were outlined, and the Committee recommended that Florida State University be awarded the contract for conducting the survey. On motion of Mr. Price, seconded by Mr. Holladay, VOTED that the Board approves the report of the Long-Range Planning Committee dated January 8, 1980 and endorses the plan to conduct an attitude survey of ARRL members and non-members as set forth in that report. Mr. Grauer requested to be recorded as voting opposed.

26) The Board recessed at 10:33 P.M., reconvening at 8:30 A.M., January 18, in the same place, with all persons hereinbefore mentioned except Messrs. Glunt and Hesler.

27) Mr. Holladay delivered an oral report on behalf of the Amateur Satellite Service Council, noting progress in preparations for launch of the Phase III-A Satellite, the new amateur satellite allocations from WARC-79, and the new rules for the Amateur Satellite Service proposed by FCC in Docket 19852.

28) Mr. Sullivan reported for the Official Availability Committee, responsible for identifying qualified candidates for the post of ARRL Treasurer. On motion of Mr. Sullivan, seconded by Mr. Stevens, unanimously VOTED that the report of the Official Availability Committee is received and the information contained therein on candidates for the post of ARRL Treasurer is transmitted to the Management and Finance Committee. The Management and Finance Committee shall interview in person no fewer than three candidates and shall make a nomination of a candidate for Treasurer at the July 1980 meeting of the Board. This action shall not preclude the opportunity for members of the Board to make additional nominations from the floor following the report of the Management and Finance Committee. Until such time as the process described herein is completed, the incumbent Treasurer shall continue in office pursuant to By-Law 6.

29) Mr. Smith reported for the RFI Task Group. The report noted the need for continued vigilance by the group on this important subject.

30) Mr. Wangler, as Chairman, delivered the report of the Ad Hoc Committee on Nonionizing Radiation. Comments by the League in FCC General Docket No. 79-144 have been prepared and submitted, thus completing the first phase of the Committee's work. It was noted that there had been a tremendous response from the membership to the request for experts in the field to volunteer to serve on the Committee, and, while it was not possible for all of the qualified volunteers to be placed on the Committee, it is expected that this source of expertise can be utilized in the next phase of the Committee's work, which is to monitor regulatory activities at all levels of government in the area of nonionizing radiation.

31) On motion of Mr. Sullivan, seconded by Mr. Thurston, unanimously VOTED to accept the reports of the officers and directors.

32) The Chair announced the opening of nominations for the office of President and named Messrs. Diehl and Turnbull as Tellers. Mr. Grauer nominated Mr. Dannals. On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: 16 votes for Mr. Dannals with no blanks. Whereupon, Harry J. Dannals, W2HD, was declared elected President of the League for the ensuing term (applause).

33) On motion of Mr. Nathanson, seconded by Mr. Sullivan, unanimously VOTED that, in the event of a contest for one or more of the Vice Presidencies, the outcome shall be determined by a plurality of the votes cast. The Chair announced the opening of nominations for the office of First Vice President. Mr. Wicker nominated Mr. Clark, who declined the nomination. Mr. Carpenter nominated Mr. Smith. On motion of Mr. Nathanson, seconded by Mr. Zak, it was unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: 16 votes for Mr. Smith, with no blanks. Whereupon, Carl L. Smith, W0BWJ, was declared elected First Vice President of the League for the ensuing term (applause). The Chair announced the opening of nominations for an additional Vice President. Mr. Stevens nominated Mr. Price. On motion of Mr. Thurston, seconded by Mr. Sullivan, unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: 16 votes for Mr. Price, with no blanks. Whereupon, Larry E. Price, W4RA, was declared elected as Vice President of the League for the ensuing term (applause). The Chair announced the opening of nominations for an additional Vice President. Mr. Zak nominated Mr. Arnold. Mr. Stevens nominated Mr. Anderson. On motion of Mr. Sullivan, seconded by Mr. Zak, it was unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: 11 votes for Mr. Arnold, and 5 votes for Mr. Anderson, with no blanks. Whereupon, Max Arnold, W4WHN, was declared elected as Vice President of the League for the ensuing term (applause).

34) The Chair announced the opening of nominations for the office of Secretary. Mr. Sullivan nominated Mr. Baldwin. On motion of Mr. Zak, seconded by Mr. Nathanson, unanimously VOTED

that nominations are closed. The Tellers announced the result of balloting as follows: 16 votes for Mr. Baldwin, with no blanks. Whereupon, Richard L. Baldwin, W1RU, was declared elected Secretary of the League for the ensuring term (applause). The Board was in recess from 9:45 to 10:00 A.M.

35) The Chair announced that the Board would now proceed to the election of four directors to the Executive Committee for the ensuing year. Mr. Arnold nominated Mr. Thurston, Mr. Sullivan nominated Messrs. Grauer and Zak. Mr. Miller nominated Mr. Anderson. Mr. Grauer nominated Mr. Stevens. Mr. Anderson nominated Mr. Holladay. Mr. Stevens nominated Mr. Wicker. On motion of Mr. Sullivan, seconded by Mr. Zak, it was unanimously VOTED that nominations are closed. The Tellers announced the result of the first ballot as follows: Mr. Zak, with 13 votes, Mr. Stevens, with 12 votes, and Mr. Anderson, with 10 votes, were elected. On the second ballot, none of the remaining candidates obtained a majority. On the third ballot, the contest being between the two candidates who had received the greatest support in the second balloting, Mr. Wicker was elected with 11 votes. During the course of the above, ARRL Honorary Vice President David H. Houghton joined the assembly, at 10:18 A.M., and was greeted with a standing ovation. The Board was in recess from 10:22 to 10:45 A.M.

36) At this point the following Committee appointments were announced:

International Affairs Committee: Mr. Zak, Chairman; Mr. Bieberman, Mr. Powell, Mr. Eaton (ex-officio).

Plans and Programs Committee: Mr. Holladay, Chairman; Mr. Miller, Mr. Oubre, Mr. Wangler, Mr. Smith (ex-officio).

Membership Affairs Committee: Mr. Sullivan, Chairman; Mr. Butler, Mr. Grauer, Mr. Arnold (ex-officio).

Management and Finance Committee: Mr. Stevens, Chairman; Mr. Anderson, Mr. Wicker, Mr. Price (ex-officio).

Legal and Regulatory Committee: Mr. Carpenter, Chairman; Mr. Nathanson, Mr. Thurston, Mr. Price (ex-officio).

37) The Chair announced the opening of nominations for Directors of the ARRL Foundation from among the Directors of the League. Mr. Zak nominated Mr. Nathanson. Mr. Sullivan nominated Mr. Wicker. Mr. Zak nominated Mr. Butler. On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that nominations are closed. On motion of Mr. Stevens, seconded by Mr. Thurston, unanimously VOTED that a single ballot be cast for each candidate, and that they be declared duly elected. The Chair then announced the opening of nominations for Director of the ARRL Foundation from outside the ARRL Board. Mr. Sullivan nominated Andrea T. Parker, K1WLX. On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that nominations are closed. On motion of Mr. Nathanson, seconded by Mr. Grauer, unanimously VOTED that a single ballot be cast for Ms. Parker, and that she be declared duly elected.

38) On motion of Mr. Grauer, seconded by Mr. Thurston, unanimously VOTED that the 1982 ARRL National Convention be held at Cedar Rapids, Iowa, on July 16, 17, and 18, 1982.

39) On motion of Mr. Thurston, seconded by Mr. Holladay, unanimously VOTED that the Plans and Programs Committee, in cooperation with designated staff personnel, conduct a thorough study of the support required by the Intruder Watch Program in order to assure that (a) sufficient volunteers are recruited to observe and catalog intruders on the amateur bands in the post-WARC era, (b) they are given adequate direction and are motivated to perform their monitoring tasks effectively, (c) their efforts receive appropriate recognition in *QST* and elsewhere, and (d) IW reports are suitably processed, summarized and reported to the appropriate authorities in a timely manner.

40) On motion of Mr. Stevens, seconded by Mr. Zak, unanimously VOTED that the President name a committee to study possible uses and subdivision by mode of the new 10-MHz amateur band, taking cognizance of membership views and considering the shared nature of amateur occupancy of this band, with a recommendation to be developed for the July 1980 Board meeting which will provide a suitable basis for a proposal to the IARU Region 2 Triennial meeting scheduled for October 1980.

41) On motion of Mr. Wicker, seconded by Mr. Arnold, unanimously VOTED that the Plans and Programs Committee, in cooperation with the VHF/UHF Advisory Committee, the VHF Repeater Advisory Committee, and the General Manager, is instructed to study the various possibilities for use of the 902-928 MHz band, leading to early preparation of a formal proposal to FCC for assignment to radio amateurs of frequencies and modes within this band, with a report to be rendered no later than the July 1980 Board meeting.

42) On motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED that the General Manager is directed to solicit via all appropriate channels membership input regarding possible further changes in the current edition of the list of numbered radiograms (form CD-3) desired by traffic-minded amateurs. The General Manager is further directed to keep the Board fully informed of all steps taken and changes made as a result of this instruction.

43) On motion of Mr. Holladay, seconded by Mr. Wangler, unanimously VOTED that the General Manager publish an article or a short series of articles in *QST* describing the ARRL, its organization and functions. This information is to subsequently be published as a booklet to serve as a permanent reference for the membership.

44) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the General Manager be directed to announce in the next possible issue of *QST* that the rules for the ARRL DX Contest will be reexamined for possible restoration in whole or part to their previous status and that comment is solicited prior to June 15, 1980.

45) On motion of Mr. Miller, seconded by Mr. Anderson, unanimously VOTED that consideration be given to the publication of a bi-weekly DX publication by the ARRL. Study of this motion should be referred to the Membership Affairs Committee and reported upon at the July Board meeting.

46) Moved by Mr. Anderson, seconded by Mr. Stevens, that the Articles of Association be changed to strike the words "But no less often than quarterly," at the end of the second sentence in Article 6, and substitute the words "as required." After discussion, on motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED that the matter is laid on the table.

47) On motion of Mr. Arnold, seconded by Mr. Holladay, unanimously VOTED that, because of the clear need for encouraging and supporting international amateur activities in the years ahead, and in light of ARRL's vital role as IARU Headquarters Society, the General Manager is instructed to accord full and continuing staff attention to the matter of disseminating information and encouraging rapport and cooperation among the member societies of IARU, including sustained assistance to the work of the Region 2 IARU organization.

48) Moved by Mr. Nathanson, seconded by Mr. Grauer, that in consideration of the desirability of encouraging Life Membership and further, recognizing the economic limitations placed upon Senior Citizens, that there be promulgated in the official journal *QST* a six-month offer of Life Membership to amateurs who have attained the age of sixty years (60). Further, that this offer be for one hundred sixty dollars ($160.00) and that the offer expire six months after its announcement in *QST*. But, after discussion, the motion was LOST.

49) On motion of Mr. Zak, seconded by Mr. Grauer, VOTED that a study be made by the Membership Affairs Committee of reducing or scaling membership rates for various categories of members, *i.e.*, senior citizens, students, handicapped, etc.

50) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the President is directed to take all necessary steps to seek a reversal of the recently announced policy of the FCC which abolishes their participation in administering amateur examinations at conventions and hamfests.

51) On motion of Mr. Wicker, seconded by Mr. Thurston, unanimously VOTED that the Management and Finance Committee, employing input from all available sources, is instructed to study the possibility for expanding the range of official responsibilities of Vice Directors so as to provide for greater opportunity for involvement in and contribution to League organizational affairs, making appropriate recommendations to the Board of Directors at the July 1980 meeting.

52) Moved by Mr. Price, seconded by Mr. Sullivan, that the General Manager is directed to prepare for filing by the General Counsel with the FCC a petition for rulemaking seeking the addition of the following provision to Subpart G of Part 97 of the Commission's Rules: Except in emergency situations involving the immediate safety of life or property, the operation of an amateur station by an alien amateur under a permit issued by the Commission shall not include international third-party traffic as defined in Section 97.3(v) of the Commission's Rules. After discussion, moved by Mr. Clark, seconded by Mr. Smith, that the matter be referred to the Legal and Regulatory Committee for study in cooperation with the Membership Affairs Committee. After further discussion, on motion of Mr. Thurston, seconded by Mr. Sullivan, unanimously VOTED that the matter is laid on the table. The Board was in recess for luncheon from 12:23 to 1:21 P.M., reconvening with all persons hereinbefore mentioned except Messrs. Glunt, Hesler, Ebneter, and Smithwick.

53) On motion of Mr. Holladay, seconded by Mr. Sullivan, at 1:24 P.M., unanimously VOTED that the Board does now resolve itself into a Committee of the Whole to discuss malicious interference on the amateur bands. The Committee arose at 2:01 P.M.

54) On motion of Mr. Smith, seconded by Mr. Wangler, unanimously VOTED that the VRAC is directed to present plans for 1) the 29 MHz repeater sub-band (considering CTSS, PL, sub-audible tone control), 2) 15 kHz repeater channels in the 146-148 MHz sub-band, and 3) such other recommendations as the Advisory Committee may deem appropriate; the Committee report to be presented to the Executive Committee or the Board of Directors no later than the July 1980 meeting.

55) On motion of Mr. Bieberman, seconded by Mr. Grauer, unanimously VOTED that the Membership Affairs Committee be directed to study the QSL Bureau organization with the object of increasing the efficiency of the service and decreasing the workload on the Bureaus, and report back to the Board of Directors at the July 1980 meeting.

56) On motion of Mr. Miller, seconded by Mr. Anderson, unanimously VOTED that the Board commends to the particular attention of Headquarters, Section 4C of the report of the Plans and Programs Committee relating to *QST* articles on digital transmission.

57) On motion of Mr. Anderson, seconded by Mr. Zak, unanimously VOTED that the Membership Affairs Committee study the format of candidate information used on ARRL ballots, and recommend standards to be followed in future elections.

58) On motion of Mr. Arnold, seconded by Mr. Holladay, unanimously VOTED that the Management and Finance Committee, in cooperation with the General Manager, is instructed to study and report upon the desirability and feasibility of establishing the permanent staff position of Personnel Manager, with the objective of placing this important area of Headquarters management under the full-time direction of a qualified individual and freeing other management level personnel to deal with the other important dimensions of organizational affairs.

59) On motion of Mr. Zak, seconded by Mr. Thurston, unanimously VOTED that the General Manager is instructed to prepare for the president's signature suitable letters to each of the member societies of the International Amateur Radio Union expressing, on behalf of the ARRL Board of Directors, hearty approval for preparatory efforts made by those societies which led to the successes achieved at the 1979 World Administrative Radio Conference, and offering assurance that the ARRL Board of Directors is committed to and will cooperate in efforts to sustain and strengthen the bonds of international cooperation through IARU during the years ahead.

60) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the 1982 July Board meeting be held on July 14 and 15, 1982, in Cedar Rapids, Iowa. Mr. Clark assumed the Chair at 2:44 P.M.

61) Moved by Mr. Stevens, seconded by Mr. Thurston, that the General Manager of the ARRL in conjunction with the General Counsel petition the FCC to change the 20-meter phone sub-band to the following plan of allocation: 14.150 to 14.350 MHz Extra Class; 14.175 to 14.350 MHz Advanced Class; 14.200 to 14.350 MHz General Class. After discussion, on motion of Mr. Zak, seconded by Mr. Anderson, VOTED that the matter is referred to the Plans and Programs Committee for study. Mr. Ebneter rejoined the meeting at 3:05 P.M. The Board was in recess from 3:16 to 3:35 P.M., at which time Mr. Dannals resumed the Chair and Mr. Houghton left the meeting.

62) On motion of Mr. Carpenter, seconded by Mr. Thurston, unanimously VOTED that the motion concerning proposed changes in Article 11 be lifted from the table. On further motion of Mr. Carpenter, seconded by Mr. Thurston, unanimously VOTED that the matter is referred to the Legal and Regulatory Committee for further study.

63) On motion of Mr. Price, seconded by Mr. Holladay, unanimously VOTED to remove from the table the motion concerning reciprocal operating. On motion of Mr. Clark, seconded by Mr. Wicker, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: Moved that the matter of improper use of international third-party traffic, both by alien and indigenous licensees, be referred to the IARU Region 2 Executive Committee for discussion at its forthcoming meeting in April with the objective of obtaining cooperative action by Region 2 societies in order to correct these problems on a hemispheric basis. A report of the results and appropriate recommendations should be presented to the ARRL Board of Directors at its July 1980 meeting. The question then being on the motion as amended, the same was unanimously ADOPTED.

64) On motion of Mr. Holladay, seconded by Mr. Zak, unanimously VOTED that the ARRL General Counsel is urged to work toward the timely completion of a plan for cooperation with FCC on enforcement matters involving cases of malicious interference.

65) On motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the President name a special committee to formulate guidelines for combatting the increasing number of cases of malicious interference being experienced on the amateur bands, including education in operating ethics, development of local interference committees, and methods of locating and dealing with offenders.

66) Moved by Mr. Miller, seconded by Mr. Wangler, that Headquarters is directed to generate a current set of 2 × 2 slides depicting League operations for use by the directors and staff in the campaign to bring in new members to the ARRL. Slides from individual directors are requested to supplement the set as determined by the staff. After discussion, on motion of Mr. Wicker, seconded by Mr. Powell, it was VOTED to amend the motion by inserting the phrase "including an appropriate cassette tape" after "League operations." The question then being on the motion as amended, the same was unanimously ADOPTED.

67) Moved by Mr. Anderson, seconded by Mr. Wicker, that the General Manager is instructed to provide suitably-equipped office space in the Headquarters building for the principal use of members of the ARRL Board of Directors. After discussion, on motion of Mr. Sullivan, seconded by Mr. Price, VOTED that the matter is laid on the table.

68) Moved by Mr. Arnold, seconded by Mr. Price, that the ARRL approve a formal cooperative agreement with the Radio Emergency Associated Citizens Teams, Inc., to promote improved communication and cooperative efforts between ARES and REACT during communications emergencies at the local level. Moved by Mr. Price, seconded by Mr. Thurston, that the matter is laid on the table; but the motion to table was lost. Whereupon, the original motion was LOST.

69) On motion of Mr. Zak, seconded by Mr. Sullivan, the following resolution was unanimously ADOPTED:

WHEREAS, a considerable effort has been put forth by dedicated radio amateurs and friends of the Amateur Radio Service in preparation for and in the course of the 1979 World Administrative Radio Conference and,

WHEREAS, this effort has culminated in assurance of a highly satisfactory family of frequencies to be made available for use by the Amateur Radio Service during the years ahead, now, therefore,

BE IT RESOLVED that the ARRL Board of Directors, by means of this Resolution, and in behalf of the radio amateurs of the United States of America and of Canada, extends sincere congratulations and expresses its deep and heartfelt appreciation to all those who played a part in this important undertaking, in particular:

- The members of the official U.S. and Canadian delegations to the WARC,
- The members of the IARU WARC-79 team, which included G2BVN, G5CO, HK3DEU, JA1NET, K1ZZ, SP5FM, VE3CJ, W1RU, W4KFC, WA6IDN, WØBWJ, YV5BPG, ZL2AZ and 9V1RH,
- Those who served as representatives of Amateur Radio as members of their national delegations, including: CP5EC, DL1FL, DU1JJT, DU1MCT, DU1RLM, EL2BA, HP1ND, HS1WR, LA4ND, LA6A, VE3UD, VK3ADW, VK3KI, W3OKN, XE1SR, YN1FI, YU1NQM, ZL2AMJ, 5NØOBA and 7X2AJ,
- And finally, those members of national delegations, many of *them* radio amateurs who, in the course of the conference, lent vital and timely support by presenting the case for Amateur Radio and by clarifying the role and frequency needs of the service.

70) On motion of Mr. Stevens, seconded by Mr. Wicker, unanimously VOTED that the President and General Manager are instructed to examine possibilities which may exist for further strengthening cooperative relationships with the Federal Communications Commission, and to report on the results and make any appropriate recommendations to the Board of Directors no later than its July 1980 Board meeting.

71) Moved by Mr. Wicker, seconded by Mr. Eaton, that Victor C. Clark, W4KFC, is nominated for ARRL Honorary Vice President. Whereupon, the motion was unanimously ADOPTED and Mr. Clark was declared duly elected (applause).

72) On motion of Mr. Miller, seconded by Mr. Anderson, unanimously VOTED that the ARRL Board of Directors endorses participation by representatives of ARRL in discussions which are proposed among representatives of the IARU regional organizations and individual member societies leading to a possible reorganization of the International IARU leadership structure, with the goal of further strengthening IARU and facilitating future international cooperation among its member societies.

73) On motion of Mr. Holladay, seconded by Mr. Sullivan, VOTED that the General Manager is directed to prepare for filing comments in FCC Docket 19852, concerning rules for the Amateur-Satellite Service. The comments shall support in general the Commission's proposals, with modifications to take the results of WARC-79 into account and to not preclude the possibility of manned space operation. Mr. Powell abstained.

74) On motion of Mr. Wangler, seconded by Mr. Holladay, unanimously VOTED that the Border Amateur Radio Society, Del Rio, Texas, be affiliated with the ARRL.

75) On motion of Mr. Anderson, seconded by Mr. Price, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1980 in the proper administration of ARRL affairs in their respective divisions, up to the amounts as follows: Canadian Division $7500, Atlantic Division $6600, Central Division $6500, Dakota Division $2500, Delta Division $4000, Great Lakes Division $5500, Hudson Division $4000, Midwest Division $5000, New England Division $5200, Northwestern Division $4800, Pacific Division $7800, Roanoke Division $6500, Rocky Mountain Division $2200, Southeastern Division $6795; Southwestern Division $7000; West Gulf Division $6000.

76) On motion of Mr. Sullivan, seconded by Mr. Arnold, unanimously VOTED that the annual appropriation for committees of the Board is raised to $3500 per committee.

77) On motion of Mr. Thurston, seconded by Mr. Anderson, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1980 a total amount not to exceed $28,000 under terms prescribed by the Communications Manager, following the general pattern established by the Board.

78) On motion of Mr. Stevens, seconded by Mr. Arnold, unanimously VOTED that to continue the Board's policy of reimbursing QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1980 a total amount not to exceed $4000 under terms prescribed by the General Manager, following the general pattern established by the Board.

79) On motion of Mr. Zak, seconded by Mr. Wicker, unanimously VOTED that to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1980 a total amount not to exceed $9000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

80) On motion of Mr. Arnold, seconded by Mr. Bieberman, unanimously VOTED that to continue the Board's policy of reimbursing National Traffic System officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1980 a total amount not to exceed $7000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

81) On motion of Mr. Wicker, seconded by Mr. Arnold, unanimously VOTED that to continue the Board's policy of reimbursing Section Traffic Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1980 a total amount not to exceed $9000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

82) On motion of Mr. Anderson, seconded by Mr. Price, unanimously VOTED that the General Manager is hereby authorized to reimburse actual expenses incurred in the administration of CRRL Headquarters during the year 1980 a total amount not to exceed $4000.

83) On motion of Mr. Thurston, seconded by Mr. Arnold, unanimously VOTED that the additional sums of $75.64 for the Legal and Regulatory Committee and $500.00 for the National Traffic System are authorized as additional reimbursable expenditures during the year 1979.

84) On motion of Mr. Stevens, seconded by Mr. Price, it was unanimously VOTED that Mr. J. L. McCargar, W6EY, is hereby duly elected as an ARRL Honorary Vice President. The Board was in recess from 4:53 to 5:08 P.M.

85) On motion of Mr. Stevens, seconded by Mr. Wicker, unanimously VOTED that the ARRL Board of Directors, in light of the forthcoming plan of the Library of Congress to reorganize its program for reading and distributing *QST* and other Amateur Radio tapes to the blind, and the resulting termination of the ARRL reading program, expresses its appreciation to those who have taken part as volunteer readers in this activity over the past several years, including W1FB, W1RW, W1YL, WB1GHT, W1NJM, W4KFC and WB8PBC.

86) On motion of Mr. Stevens, seconded by Mr. Thurston, the following resolution was unanimously ADOPTED:

WHEREAS, Ney R. Landry, W6UDU, has served the public as a staff member of the Federal Communications Commission since 1940 and,

WHEREAS, he has, throughout all this time, treated his fellow amateurs and applicants for amateur license with fairness and compassion, understanding the nervousness of his clients in the examination room and,

WHEREAS, he has attended scores of hamfests and conventions on weekends, at his own expense and on his own time when FCC's budget forbade official attendance, making himself available to his fellow amateurs for questions and suggestions and,

WHEREAS, this activity is in the highest tradition of the "radio inspector," and

WHEREAS, Ney R. Landry, W6UDU, now retires from his post as Regional Director of FCC and from active Government Service, now therefore,

BE IT RESOLVED that the Board of Directors of the American Radio Relay League in Annual Meeting assembled in Hartford, Connecticut, this 18th day of January, 1980, heartily thanks Ney R. Landry, W6UDU, for his long and faithful service to Amateurs and the public, and wishes him a happy retirement of golfing and ham radio to his heart's content.

87) On motion of Mr. Holladay, seconded by Mr. Stevens, the following resolution was unanimously ADOPTED:

WHEREAS, Dave Bell, then W8GUE/3, first brought fame to Amateur Radio through ABC's John Hopkins File 7 segment, *Ham's Wide World* in 1958 and,

WHEREAS in 1969, Dave Bell, then W6BVN, recycled the title for a brand new movie, *The Ham's Wide World* starring K7UGA, K4LIB and W2SKE, to great acclaim and,

WHEREAS, a bit later Dave Bell recycled some footage, but *not* the title to produce another fine movie, *This is Ham Radio*, with the wettest Field Day scene ever recorded on film and,

WHEREAS, Dave Bell, now W6AQ, convinced scads of CBers they could come through the grinder to Amateur Radio through another film, "Moving Up to Amateur Radio," with NBC science editor, Roy Neal, K6DUE and,

WHEREAS, Dave Bell has capped all this with his masterpiece, "The World of Amateur Radio" featuring Dick Van Dyke, K7UGA, K4LIB, K6DUE, Stu Gilliam, WD6FBU and His Majesty King Hussein of Jordan, JY1 and dozens of other Amateurs, now, therefore,

BE IT RESOLVED, that the Board of Directors of the American Radio Relay League, Inc., in Annual Meeting assembled does hereby convey the title, "The Cecil B. DeMille of the Airwaves" on Dave Bell, W6AQ, and heartily commends him for his skill, craft and generosity in making all of these fine films.

88) On motion of Mr. Holladay, seconded by Mr. Zak, it was unanimously VOTED that John R. Griggs, W6KW, is duly elected an ARRL Honorary Vice President. The Board was in recess from 5:56 to 8:00 P.M., during which time Messrs. Benson, Sullivan, and Thurston left the meeting. Mr. Evans came to the table to represent the New England Division.

89) On motion of Mr. Clark, seconded by Mr. Arnold, it was unanimously VOTED that, in view of the agreement by the World Administrative Radio Conference, Geneva, 1979, that LORAN-A operations in Region 2 should cease no later than December 31, 1982, the President is directed to seek the elimination of the existing restrictions on amateur operations in the 1.8-2.0 MHz band at the earliest possible date.

90) All those present were given the opportunity for informal closing comments. During the course of the above, Mr. Smithwick returned to the meeting, at 10:22 P.M. There being no further business, on motion of Mr. Clark, seconded by Mr. Wicker, the Board adjourned, *sine die* at 11:01 P.M. Total time in session as a Board 18 hours, 11 minutes; as a Committee of the Whole 1 hour; total direct authorizations $149,470.64.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

[The list of newly elected ARRL life members appears on page 52. — Ed.]

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

Your New CRRL Organization

Although the CRRL received its federal charter of incorporation around the end of October 1979, the formal operations of the corporation could not really commence until after the final results of the Canadian Division elections were realized late in the year.

Early in January therefore, the new Canadian Radio Relay League, Inc., began operations with an Executive Committee meeting which, amongst other things, ratified the following organization for the 1980 calendar year:

Officers and directors: President, Ron J. Hesler, VE1SH; Executive Vice President, Mitch Powell, VE3OT; Honorary Vice President, Noel J. Eaton, VE3CJ; Secretary, Fred Towner, VE6XX; Directors, Thomas B. J. Atkins, VE3CDM, A. George Spencer, VE6XN, Albert Daemen, VE2IJ; General Counsel, B. Robert Benson, VE2VW.

Executive Staff: Executive Administrative Assistant, Noreen Nimmons, VE3GOL; Executive Public Relations Assistant, Harry Maclean, VE3GRO; Executive Assistant to the President, Ray Perrin, VE3FN; Executive Assistant Directors, Fred Hammond, VE3HC, Martin Rosenthal, VE3MR, and Central QSL Bureau Manager, Brit Fader, VE1FQ.

Regional Officials: Senior Assistant Director, Gordon Steane, VE3BMG; Assistant Directors, Randy Smith, VE3SAT/1, W. W. Loucks, VE3AR, George Davis, VE3BBW, William Hardie, VE3EFX, Roy Tuttle, VE3BNV, Sid Jones, VE6MJ, and Percy Crosthwaite, VE5RP. Public Relations Assistant, Tom McKee, VE3KO, Al d'Eon, VE3AND, Wilf Antheuinis, VE3FEA, Rick Proudfoot, VE3ILP, Mel Christian, VE3JTY, and Gil Frederick, VE4AG.

Other matters considered and acted upon by the Executive Committee included the novice license proposals, opposition to the continuance of *wholesale* issuance of special prefixes, basic agreement to the proposed GRS operations in the 900-MHz band, relationships with other organizations, the new CRRL Newsletter, public relations, official bulletin stations, and program and other organizational matters.

To quote from the ARRL President's Annual Report, "A major organizational change has taken place in our bi-national society. The Canadian Radio Relay League (CRRL) was born during 1979. Congratulations and best wishes to CRRL President Hesler, VE1SH, and his volunteer board of directors as they continue to provide League members in Canada with representation and service. While any new organization will undergo certain 'growing pains,' it is hoped that CRRL will have few and their efforts will be fruitful."

MEET YOUR CRRL DIRECTOR

This month we are pleased to introduce you to our director for Quebec and the Atlantic Provinces, Albert J. Daemen, VE2IJ. Albert is married and boasts two children and three grandchildren. He has had a most varied career in manufacturing, field application, marketing, sales and administration in areas of product inspection, telephone, broadcasting, hf-vhf-uhf two-way radio communications, in addition to government marketing for well-known Canadian and foreign companies.

His amateur activities commenced in 1930, and in 1932 he was licensed with the call he still retains. He is active on both cw and phone and holds WAZ, DXCC (305 confirmed) and CHC (252 awards). In addition to being a member of the ARRL/CRRL, he also is an active member of the OOTC and QCWA. He was the chairman of the ARRL National Convention held in Montreal during the Expo year of 1967. He was the founder and president of RASO (Radio Amateurs Serving the Olympics) during the summer Olympics and was the custodian of the official amateur station, CZ2O. Albert is a past president of the Montreal Amateur Radio Club, Inc., and has been the QSL Bureau Manager for VE2-land since 1972.

His other hobby is that of collecting antiques, in addition to being a long-time skilled craftsman with a well-equipped shop. He is currently an executive with a large electronics-manufacturing organization in Montreal.

CRRL AMATEUR OF THE YEAR

We are now calling for nominations for CRRL Amateur of the Year for 1979. As determined by the CRRL Board, the new procedure for electing the recipient of this honor shall be as follows:

(1) Any Canadian League member and/or constituted amateur organization may submit a nomination (together with resume). (2) The CRRL Executive Committee will determine the eligibility of all submitted nominations for the final ballot. (3) All recipients of the CRRL Certificate of Merit for the year of the Award, plus the year immediately previous, shall automatically appear on the ballot. (4) The CRRL Board shall elect the Amateur of the Year.

The closing date for nominations is June 30, 1980. The Board will then vote on the ballot to be submitted to them, as soon as possible after this closing date, and the Award plaque will be presented at the RSO Convention to be held in Toronto in October. Please submit nominations to CRRL Administrative Headquarters, P. O. Box 418, Sackville, NB E0A 3C0. All nominations will be acknowledged.

Previous recipients of this Award have been: Brit Fader, VE1FQ (1976), Noreen Nimmons, VE3GOL (1977) and Fred Hammond, VE3HC (1978).

DOC AMATEUR NEWS

A working arrangement has been concluded between the Federal Communications Commission and the Department of Communications to the effect that registration permits will not be required after January 21, 1980, for visiting amateurs who intend to operate their stations temporarily while visiting in the other country. U.S. amateurs holding Novice or Technician class licenses may now operate in Canada with the mode and frequency privileges authorized them in the U.S. Similarly, Canadian Digital Class operators may operate in the U.S. with the vhf and uhf frequency privileges authorized them in Canada. Additionally, however, all visitors must operate in accordance with the regulations of the host country.

Examination dates for 1980 are: January 16, April 16, June 18 and October 15.

In December of last year, CRRL President Hesler and Executive Vice President Powell met with DOC officials to discuss the new examinations and procedures. Vice President Powell shall be following up at various times. The CRRL shall be producing, during the current year, a training manual and text book for Canadian license classes.

Following our appeal to the Prime Minister concerning the "Russian Woodpecker" we have received the following letter from the Minister of Communications: ". . . when the interference first occurred, my Department's monitoring service was able to determine that the transmissions originated in the vicinity of Riga, Latvia. Representations were made to the U.S.S.R. requesting mitigation of the interference, and the matter was also referred to the International Telecommunication Union in Geneva. In addition, as you have noted, representations to the U.S.S.R. have been made by the ITU and several other member countries of the Union on a number of occasions. These efforts have met with some success in the past. During the past few months, officials of my Department have again been pursuing this matter with the U.S.S.R. Administration. We are continuing to press for a solution to the interference problem in accordance with the International Radio Regulations of the ITU and will be pleased to advise you of any new developments. Thank you for bringing this matter to my attention." (Signed) David MacDonald.

We previously advised that a tri-organization (CARF-CRRL-RSO) committee had earlier been established to respond *jointly* to the DOC proposals to add the GRS in the 900-MHz band. We are pleased to report that this Committee arrived at a conclusion and recommendation which would permit the GRS 900-MHz activity; however, at the last moment, we were advised that CARF would be withdrawing as a signatory to the joint submission; therefore the submission shall be that of the CRRL and the Radio Society of Ontario.

*President, CRRL

Correspondence

Conducted By Perry F. Williams,* W1UED

The publishers of QST assume no responsibility for statements made herein by correspondents.

TEAMWORK AT WARC

☐ I wish to acknowledge the excellent job you and your team did at Geneva. I have heard from others on the U.S. Delegation and they have praised the job done by the Amateurs. — *Bill Eitel, W6UF, Dayton, NV*

☐ The Members of the Albany Amateur Radio Association express their appreciation to the ARRL officers, staff and members who worked long and successfully on behalf of Amateur Radio in preparation for and during the WARC-79 Conference. The results were far better than most of us ever had hoped. Our club is proud to have been an early contributor toward meeting the heavy expenses of WARC-79.

The victory for Amateur Radio shows what can be accomplished by amateurs working together through their own organization. It now is up to us all, again working through our organization, to show the world that we can put the new frequency allocations to worthwhile use in advancing the science and technology of communications. — *Michael L. Kardos, K2QF, Albany, NY*

☐ Congratulations for wonderful achievements at WARC. — *Ernest Amarasinghe, 4S7EA, Boralesgamuwa, Sri Lanka*

☐ It would be grossly unfair if you did not receive the credit which you so richly deserve for all the work which you did prior to and during WARC-79. Your dedication to Amateur Radio and unswerving pursuit of first principles in spite of possible divisiveness and the unwarranted criticism of the ill-informed have undoubtedly played a major role in the success of Amateur Radio at the conference. There is no doubt that the leadership came from ARRL in the first instance, but what is heartening is the way in which the International Amateur Radio Union has banded together into a cohesive, effective and truly international organisation.

We owe thanks to many people (not the least of whom are the long-suffering wives of team members) in countries around the world who rose to the occasion and actively worked in support of the Amateur Service.

I hope that in the years ahead we will continue to foster this truly international organisation and never become complacent. Amateur Radio was much better prepared for this conference than any other; it will have to be even better prepared in the future. — *Colin C. Dumbrille, VP9BK/VE2BK, Hamilton, Bermuda*

☐ Congratulations on the most noteworthy service to Amateur Radio in the past 50 years. Had WARC been a disaster to us, you would have been the goat. You deserve, and I hope receive, the reverence due a worker of miracles. To those of us harboring the strongest of misgivings about the outcome of the conference, walking on water would not have been a more remarkable achievement! — *George Hatherell, K6LK, Sunland, CA*

☐ Please accept and pass along, to all those who worked so hard, my congratulations and sincere thanks for the fine job of preparation for WARC. The result were gratifying, to say the least. — *A. Lee Tippett, W7LVB, Lake Havasu City, AZ*

☐ Congratulations to ARRL and IARU for excellent work at Geneva Conference. — *Bill Orr, W6SAI, Menlo Park, CA*

☐ How can any ham not be proud of his ARRL after WARC-79? You all have my continued support. — *James Apsey, K8JA, Toledo, OH*

☐ I wish to state my complete satisfaction and gratitude with regard to the frequencies allocated to Amateur Radio during the WARC. It really shows what the most conscientious effort — put forth by the ARRL and other allied groups in preparation for this momentous radio conference — was able to achieve. I am looking forward especially to the day when I will be able to make contacts on our new 10-, 18- and 24-MHz bands, not to mention the 902-928 MHz segment.

Let us begin our preparations for the next WARC right now. This is how hams can show their overwhelming appreciation for the events which have just transpired. — *James B. Didriksen, K1VJL, Hamden, CT*

[Editor's Note: February *QST*, pages 62 through 71, carried a full report on the outcome of the World Administrative Radio Conference 1979, at which radio allocations for all services through the year 2000 were agreed upon. The ARRL Board of Directors at their annual meeting not only offered congratulations to the IARU team, but took steps to preserve and enhance the international cooperation which brought home the Geneva victory. See the separate Board Meeting article in this issue.]

CONTESTS — PRO AND CON

☐ In reference to the Operating News lead, "The Price of Boiled Ham," page 105, September *QST* and letters on page 77 of February *QST* here are my views on the debate. I don't think the guy who claims he can't find a clear spot because of the contest has a legitimate beef. He can — if he wants to, and doesn't let himself be influenced by the contest; he hates it and doesn't *want* to operate in the middle of it.

What would happen if the contest were given up and the only way the contester could stay active was to ragchew? The QRM would be worse, tenfold! Contest contacts last only a few moments, whereas ragchews last 10 minutes to a half hour or more. Contesters can operate only on weekends, too. Spectrum space can handle only so many QSOs at the same time. Therefore, many more short-contact operators can be accommodated than ragchew operators. So if the DXers and contesters stayed in ham radio, gave up contests but didn't drop out, the QRM would be many times worse than it is now!

On the other hand, what would happen if there were no contests, or the number was severely limited and the contesters dropped out? This would be a severe loss to ham radio as contesters are the better operators.

However, I like your ideas about bringing order to the proliferation and poor scheduling of contests. There should be coordination, and some way of weeding out the less serious type of contest, but not to the extent of causing contesters to lose interest in ham radio. That would be discrimination of greater consequence than the less-serious ragchewer who might drop out in disgust at contests. The serious ham will adjust, remembering that if all those contesters decided to ragchew the QRM would be worse. There is room for everybody if we give each other room. — *Ted Chernin, KH6GI, Honolulu, HI*

☐ This year on Field Day we were in the California wine country having a family picnic and I took along the HW-8. I made only one feeble contact. Every time I answered a CQ, I got clobbered by somebody's superzonker at 40 over S9. I was simply too embarrassed to tell my wife why the radio didn't work on Field Day, as the week before she was quite favorably impressed by my QSOs with VK, JA and UK lands, using the HW-8 and a dipole in the clear.

It is a specious argument that contests build operating skill. Operating skill for what, may I ask? At best for another contest, not for emergencies!

I can tell you this; I will design and build my own cw rig which will have MARS, Coast Guard and Forest Service frequencies besides amateur, just in case there happens to be a contest taking place when we are out in the wilderness and an emergency develops. With only 10 watts and a dipole along when we're backpacking, it would be simply hopeless to get out by ham radio on a contest weekend!

In my opinion, the League has been rather unimaginative in finding solutions to the congestion of the hf bands that occurs as a result of a contest. Limiting the duration of contests is no solution whatever. Limiting the frequencies used may help some, but then I have heard local hams on ssb around 7060 kHz during a raging contest, and they were not operating split!

Hams may have a right to competitive banality. However, hams do not have this right if such activity interferes with the privileges of other amateurs. In the case of emergencies, this interference would be a violation of the rules.

There is a direct analogy with transportation systems. Suppose a competitive group of ferry boat riders declares a contest on a given weekend in the Bay Area. The object is to ride as many ferries as possible, any destination will do, any number can play. Then suppose all ferries are so completely jammed that the native San Franciscan, who rides the ferry to work every day, and the tourist from Iowa, who has saved all year for his vacation, are simply excluded. The sheer numbers of contestants overload the system. They are out of control in a sense, yet they are not breaking the law in any obvious way. But this takes away the privileges of the tourist and the native. — *Eugene Tomer, KB5IQ, San Francisco, CA*

*Manager, Membership Services, ARRL

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

The Hot Stove League

I get letters, and I appreciate them all — thank you. Many of the letter writers express opinions concerning various fm and repeater topics. Their views are often unique, sometimes controversial, and always interesting. Following are excerpts from two letters received recently that express interesting viewpoints (not necessarily my own.) One addresses the matter of closed repeaters, while the other concerns obfuscation of our mother tongue via repeaters. If you agree or disagree with these writers, I would like to hear from you. My mailbox is always open.

Closed Repeaters

First, here is a letter from WB6FAK concerning closed repeater operation.

"I, as a repeater user and not a repeater owner, either coordinated or uncoordinated, feel that the real repeater pirates are the owners and coordinators of the many closed repeaters. I contend that these people have stolen my spectrum space and expect all who are not a part of their 'in group' to stay away from their private playground.

"The Los Angeles area is a prime example of what can happen. I have been told that the 220-MHz band is now completely coordinated and there are no more repeater-pairs available. Several days spent tuning across the entire band revealed little activity, with the exception of a couple of open repeaters. Where was everyone else? I understand that they were all out there in front of squelched receivers waiting for one of their 'in group' to key their private, PL-accessible repeater. My response to this kind of activity is *nuts!*

"May I make a proposal? Why not take all of the private repeaters and allocate them to two or three frequency pairs? With various types of tone-access controls, there would be very little interference among the users of the private repeaters, and those frequencies would get a lot more use than they do today. Then, the rest of us could get around to the business of using the rest of the band. I would respect the privacy of those who do not wish to talk to me as long as they do not hold for themselves a major portion of the band which has been allocated to all amateurs."

Repeat-Speak

Next, here are KØGAE's comments concerning repeat-speak, an English dialect found on our repeaters.

"I heard a disturbing QSO on 2 fm this weekend. The gist of the conversation was a riot act being administered by a well-meaning repeater operator. A fellow amateur mobile operator, looking for a signal check, had committed the heinous crime of breaking a busy channel. The repeater 'regular' began his tirade by passing this information: '*Break* means an emergency, *break-break* means a more severe threat to life and property and, of course, *break-break-break* means the most dire of disasters.' The mobile apologized and continued on his way, to this day afraid to key up anything above 50 MHz.

"Let's get back to international standards, using the English language and universally recognized terms like *Pan* and *Mayday*. They apply equally in the land-mobile service, as well as in maritime and air-mobile communications. The *QST* Stray entitled 'Mayday' (November 1979, page 21) comes to mind. I can visualize this downed airman calling 'Mayday' and getting a reply — 'We'll get to you in a few minutes. Right now we have a *break-break* flat tire on I-65.' Come on, folks. Vhf operation doesn't mean we have to throw out all of the established rules. This operator recognizes all standard international operating procedures and accordingly, *break* still means what it always did."

TEN AND SIX ARE COOKING

Activity on 52.525 MHz — the national fm-simplex frequency — has been notable in recent months. Many contacts between the East and West Coasts have been completed and shorter-distance QSOs occur regularly.

Under normal conditions, contacts on 52.525 may be made without any difficulty. When propagation is good, however, there may be 20 to 30 stations on both coasts trying to work each other, all on the same frequency. A lot of the folks on 52.525 are using one-channel commercial equipment and can't move to another frequency, but there are a few lucky ones with multi-channel transceivers. To alleviate the congestion on "525" when propagation is good, the lucky ones should crystal-up for the other simplex frequencies. The next time New England is being heard in Los Angeles, some of the stations can spread out and everyone will benefit. By the way, the 6-meter simplex frequencies (according to the VRAC band plan) are 52.490, 52.510 and 52.525 MHz.

Have your tried 10-meter fm yet? The reports I've read about 29-MHz fm activity are fantastic (propagation being what it is). Shortly, I'll have a first-hand report. That is, as soon as I finish converting a CB rig to 10 fm.

REPEATER SERVICE

Repeaters continue to fulfill their responsibility, according to regulations, to provide service to the public. Dozens of repeater club names come to mind that have a continual program dedicated to public service. Look at the monthly "Repeater Log" in *QST*'s "Public Service" column. K1XA will attest that, on the local level (that's where we're all at), fm and repeaters lead the way in public service communications.

When disaster strikes, hams with their 2-meter portables in hand, are often the first on the scene to offer communication assistance. Emergency coordinators realize this, and often structure their Amateur Radio Emergency Service (ARES) groups around the local repeater.

Public service on the local level is also achieved by means of traffic nets that operate on repeaters. The number of these nets continues to grow, as does their popularity, because of the number of repeater users that check in and provide outlets for traffic (outlets that are sometimes difficult to find on the hf nets). A lot of traffic can be handled when a lot of check-ins are available. And moving traffic is the name of the game.

If you are interested in joining a traffic net, consult the latest edition of the *ARRL Net Directory* for the nearest repeater conducting a net. If there are none in your area, your area needs a repeater traffic net — so why not start one? If you'd like to join the local emergency communications group, contact your area's emergency coordinator or your section communications manager (listed on page 8).

TRAVELERS' NEWS

Good news for mobile and portable operators — you no longer have to carry your original FCC license when you operate away from the home QTH — a photocopy of the license will suffice. In addition, a U.S. operator traveling in VE-land or a Canadian journeying stateside no longer have to apply to the FCC or DOC to get permission to operate across the border. All they have to do is carry along their ham license and restrict their operating to the privileges extended by their license class. For example, a U.S. Technician class operator would be limited to his U.S. Technician class privileges when operating in Canada.

METROPLEX — THE BIG APPLE REPEATER

The Metroplex repeater system was the brainchild of K2KLN and WB2MGB. Their plan was to establish repeaters on all allocated FCC frequencies utilizing state-of-the-art equipment and technology. At this time, they are well on their way to achieving their goal with repeaters now operating on 29, 144 and 440 MHz.

The 10-meter repeater operates from dual sites; the receiver is in North Bergen, NJ, and the transmitter is in New York City and this combination provides worldwide fm coverage, propagation permitting. The 10-meter repeater is linked to the 2-meter repeater so that 2-meter operators can take advantage of the DX on 29 MHz.

The 2-meter repeater on 144.85/145.45 is located near the George Washington Bridge in Manhattan at 560 feet above sea level with an erp of 260 watts. The repeater is carrier accessible and includes a fully computerized autopatch facility. When using the autopatch, you are actually dialing all of the information into a computer. The computer verifies the dialed number, selects the least expensive circuit for the call by inspecting the first six digits of the number and redials the information into the outgoing circuit. This is part of a very large long-distance network containing local trunks, foreign exchange lines, WATS lines and microwave communications channels.

The 440-MHz repeater is also located in the city and is an open machine, but requires a 4A or 5Z tone for access. The repeater runs 600 watts erp.

In keeping with the goal of providing emergency communications services, all Metroplex repeaters are set up on an emergency-generated power system. So, when you are traveling in the New York City metropolitan area, in a power blackout or otherwise, you'll be assured of solid-state communications on the Metroplex repeater system. QST

*72 Stiles St., Waterbury, CT 06706

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KHT

Simple Microwave Video

Of all the amateur shf bands offering real communication possibilities, the 10-GHz assignment has attracted the highest degree of worldwide interest. Getting started in the 10-GHz fun is relatively inexpensive (using either self-constructed Gunn-diode gear or starting off with the Gunnplexers from Microwave Associates) and, thanks to some of the pioneers who have already been there, no longer as mysterious as it once was thought to be.

In the next few columns we will be looking at the innovations of Bob Richardson, W4UCH/2, (P. O. Drawer 1065, Chautauqua, NY 14722) who has shown us all how utterly simplistic broad-band (as in video or wide-band data) interlinks can be with the 10-GHz Gunnplexer as a basic building block.

Most Gunn-device engineers assume that because of the electrical properties of the Gunn diode, it does not take kindly to amplitude modulation; this is, apparently, valid. Therefore, transmitting a-m-video through a Gunnplexer device requires that you "fm" the Gunn transmitter and demodulate the fm signal to base-band, pure video, at the receiver before applying it to a video monitor (or through a remodulator to an NTSC/PAL/SECAM standard television receiver). Richardson has made discoveries that contradict this assumption.

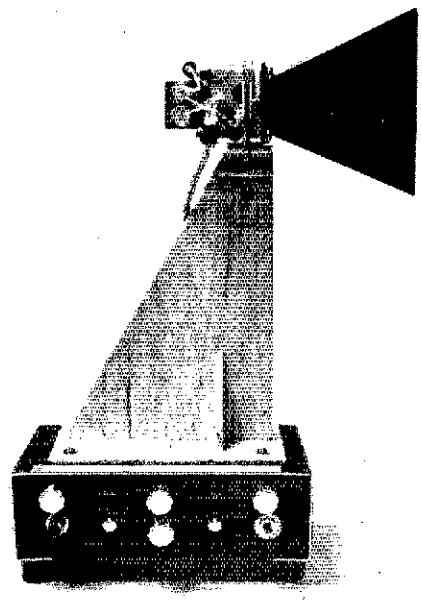
The "Richardson Effect" produces high-quality video (with the accompanying fm subcarrier audio) by simply applying a base-band video (and audio) signal to a standard, straight-out-of-the-box, Gunnplexer, as shown in Fig. 1. Then it takes a standard, straight-out-of-the-box, Gunnplexer that is offset in frequency by an amount equal to a standard TV receiver channel assignment (i.e., channel 2 in the NTSC system is 55.25 MHz) and connects the i-f output of the receive-assigned Gunnplexer directly into the TV receiver antenna terminals.

How's that again? Recovering frequency modulated video (and subcarrier audio) on an a-m televison receiver? Yes, and it works.

How well? The quality is surprising. Color comes through without smear or ringing, directly comparable to that received directly at the Gunnplexer transmitter end. What type of range is possible? With the straight 17-dB Gunnplexer horn antennas and no modifications or additions to the Gunnplexer receiver, range is perhaps 1/8 to 1/4 mile with typical 10-15 mW sources. By building up a good low-noise i-f for the receiver, and upgrading to 2-foot dish antennas on both ends, Richardson sends high-quality (snow- or noise-free) pictures over paths as long as 5.5 miles. Not bad for 10 to 15 mW!

Why does this work? Apparently NTSC receivers (i.e., TV) have stagger-tuned i-f stages that function quite accidentally, as excellent slope detectors. AF9A, who works with such things professionally, verifies Richardson's findings and believes the TV set's i-f slope is the friendly culprit.

*Rte. 5, Box 364, Guthrie, OK 73044



W4UCH/2 Gunnplexer package transmitter with video and audio baseband modulation system.

Richardson has produced this effect with transmitter-receiver operating-frequency separations as high as 211.25 MHz (i.e., NTSC channel 13) and has in fact "stacked" multiple Gunnplexer transmitters, each modulated with different base-band video and audio subcarrier sources, and then received them all on a *single* receiver which steps through NTSC vhf channels 2, 4, 6, 7, 9, 11 and 13. Multiple-channel video (plus subcarrier-audio) relay!

Since the only difference between 1/4-mile range and 5.5-mile range is the addition of a suitable "i-f" amplifier at the receiver, and some gain in the antennas, it is worth noting that both are very inexpensive to come by. The i-f in this scheme is within the vhf TV band and a good quality TV-signal pre-amplifier will amplify the Gunnplexer receiver i-f output suitably. In the commercial market a Radio Shack no. 15-1134 with 18-dB of gain or a Winegard no. 7A2664-4 with 24-dB of gain do the job. The 2-foot dishes are in reality oversized "dish pans" sold this time of year at discount stores and through catalogs such as Sears Roebuck in the $7-and-under range as "Snowsleds" or "Snowdishes."

Why has this gone previously undetected? Richardson suggests that creating truly linear wide-band fm video at vhf is still very difficult (a 55.25-MHz signal + 4.5-MHz subcarrier and a modulation index of 1 would occupy nearly 16 percent of the 55.25-MHz center frequency) but generating the same fm "swing" at 10 GHz requires linearity of only 0.1 percent or less. He believes that keeping the deviation down to limits the TV receiver can handle as a slope detector, and keeping it linear, is the key. Next month we'll look at a system of modulating the Gunnplexer transmitter with both video and 4.5-MHz subcarrier audio. QST

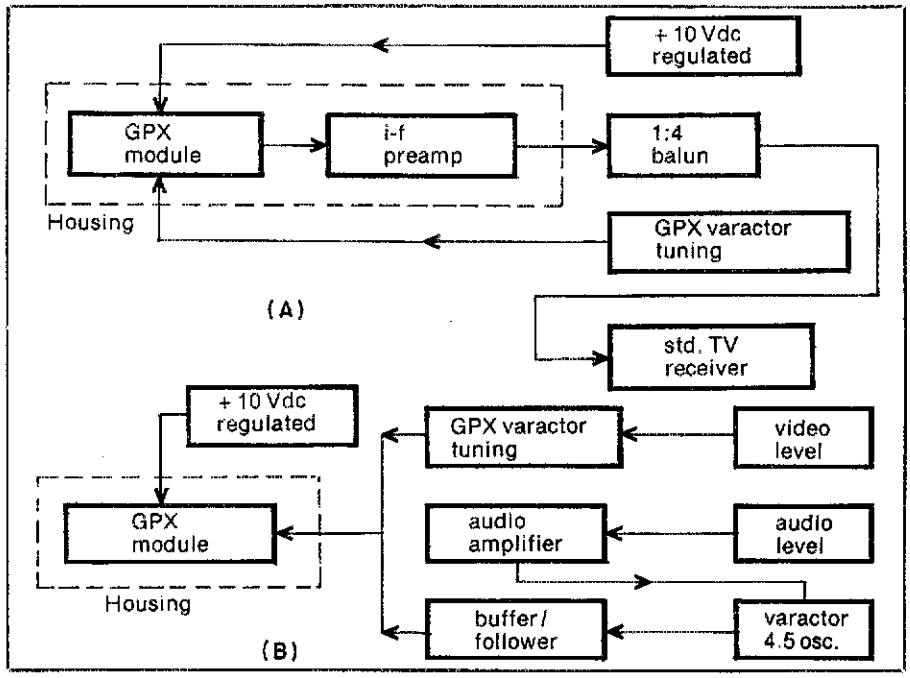


Fig. 1 — The fm/fm "Richardson Effect" TV receiver system (A) and transmitter (B) produce high-quality video and audio signals.

Happenings

Conducted By W. Dale Clift,* WA3NLO

Amateur Rules Amended to Protect FCC Monitoring Stations from Interference

A new subsection (d) has been added to Section 97.41 of the Amateur Rules to protect FCC monitoring stations from interference by nearby stations. The rule change provides for a nonmandatory procedure of consulting with the Commission's Field Operations Bureau if an Amateur Radio station is to be established near an FCC monitoring station. The Report and Order in General Docket 78-365 adds the following subsection to Part 97 of the Rules:

§97.41 Applications for Station License.

(d) Protection for Federal Communications Commission Monitoring Stations:

(1) Applicants for an amateur radio station license to operate in the vicinity of an FCC monitoring station are advised to give consideration, prior to filing applications, to the possible need to protect the FCC stations from harmful interference. Geographical coordinates of the facilities which require protection are listed in Section 0.121(c) of the Commission's Rules. Applications for stations (except mobile stations) in the vicinity of monitoring stations may be reviewed by Commission staff on a case-by-case basis to determine the potential for harmful interference to the monitoring station. Depending on the theoretical field strength value and existing root-sum-square or other ambient radio field signal levels at the indicated coordinates, a clause protecting the monitoring station may be added to the station license.

(2) Advance consultation with the Commission is suggested prior to filing an initial application for station license if the proposed station will be located within one mile of any of the above-referenced monitoring station coordinates and is to be operated on frequencies below 1000 MHz. Such consultations are also suggested for proposed stations operating above 1000 MHz if they are to be located within one mile of any monitoring station designated in Section 0.121(c) as a satellite monitoring facility.

(3) Regardless of any coordination prior to filing initial applications, it is suggested that licensees within one mile of a monitoring station consult the Commission before initiating any changes in the station which would increase the field strength produced over the monitoring station.

(4) Applicants and licensees desiring such consultations should communicate with: Chief, Field Operations Bureau, Federal Communications Commission, Washington, DC 20554, Telephone 202-632-6980.

(5) The Commission will not screen applications to determine whether advance consultation has taken place. However, applicants are advised that such consultation can avoid objections from the Federal Communications Commission or modification of any authorization which will cause harmful interference.

The Report and Order in General Docket 78-365 also amended Part 0 of the Commission's Rules to give the precise location of each of the Commission's 13 monitoring stations. The new Section 0.121(c) is as follows:

§0.121 Location of field installations.

(c) Monitoring stations are located at the following addresses and geographical coordinates: Allegan, Michigan 49010, 42° 36' 20" N. Latitude, 85° 57' 20" W. Longitude; Anchorage, Alaska 99502, 61° 09' 43" N. Latitude, 149° 59' 55" W. Longitude; Belfast, Maine 04915, 44° 26' 42" N. Latitude, 69° 04' 58" W. Longitude; Canadaigua, New York (Delete Entire Entry); Chillicothe, Ohio (Delete Entire Entry); Douglas, Arizona 85607, 31° 30' 06" N. Latitude, 109° 39' 10" W. Longitude; Ferndale, Washington 98248, 48° 57' 21" N. Latitude, 122° 33' 13" W. Longitude; Fort Lauderdale, Florida 33314, 26° 06' 08" N. Latitude, 80° 16' 42" W. Longitude; Grand Island, Nebraska 68801, 40° 55' 24" N. Latitude, 98° 25' 59" W. Longitude; Kingsville, Texas 78363, 27° 26' 29" N. Latitude, 97° 53' 00" W. Longitude; Laurel, Maryland 20810, 39° 09' 54" N. Latitude, 76° 49' 17" W. Longitude; Livermore, California 94550, 37° 43' 30" N. Latitude, 121° 45' 12" W. Longitude; Powder Springs, Georgia 30073, 33° 51' 44" N. Latitude, 84° 43' 26" W. Longitude; Sabana Seca, Puerto Rico 00749, 18° 27' 23" N. Latitude, 66° 13' 37" W. Longitude; Waipahu, Hawaii 96797, 21° 22' 45" N. Latitude, 157° 59' 54" W. Longitude.*

The text accompanying the amendments in FCC's Report and Order in Docket 78-365 emphasized that the Commission already has the authority in its existing rules to prevent interference to its monitoring stations. *"This rule-making does not give the Commission any new authority or create any new regulatory requirements,* but rather, *it publishes notification* to potential applicants that the Commission may place limitations on stations which may interfere with monitoring stations and only *recommends* that potential applicants consult the Field Operations Bureau if they expect the field strength from their facility will exceed 10 mV/m over a monitoring station" (emphasis supplied). The Commission stated that a great many of the rulemaking comments were from Amateur Radio operators and Amateur Radio organizations who apparently misinterpreted the scope of the proposed amendments. It suspected that many of these comments were written not in response to the Notice of Proposed Rulemaking, but in response to an editorial entitled "Clouds on the Horizon" in January 1979 *QST*. The Commission felt that because the *QST* editorial failed to mention that the proposed rule changes would apply to all radio services, it probably gave the impression that amateurs were being singled out by these proposed amendments. In fact, the proposed amendments applied to all radio services.

The Commission further stated: "It is obvious from the comments that the Notice of Proposed Rulemaking struck an emotional chord in the amateur community, with a variety of objections raised on philosophical, as well as technical, issues." All but 13 of the 89 comments and one reply comment were from radio amateurs or radio amateur organizations, and they were nearly unanimous in opposing the proposed amendments.

Most of the comments argued that the Commission's monitoring stations are poorly located and should be moved. The Commission's response was that the cost to move each monitoring station would be anywhere from 1 to 10 million dollars, and that "the slight burden this rule-making would impose on radio licensees does not warrant moving the monitoring stations." Though several respondents suggested that "profits" from the sale of valuable, presently owned land could be used to buy new land and finance the move, the FCC said this would not be possible because the Commission is not permitted by law to sell real property. It would first have to declare it as excess to the General Services Administration which, in turn, would make it available to other federal and state agencies, local governments, and finally to the public if no government entity were interested.

Accordingly, the FCC has ordered that, effective January 31, 1980, Parts 0, 5, 21, 22, 23, 25, 73, 78, 81, 87, 90, 94, 95, 97 and 99 of the Commission's Rules are amended, and the proceeding in General Docket 78-365 is terminated. For further information on this Report and Order, or explanation of the proceedings, contact David L. Means, Engineering Division, FCC, Washington, DC, Tel. 202-632-7593.

*Satellite Monitoring Facility.

LEAGUE FILES COMMENTS ON 6-METER FM, BIOLOGICAL EFFECTS OF RF RADIATION, AND 900-MHz CB DOCKETS

Six-meter fm: ARRL has filed comments on the Notice of Proposed Rulemaking (NPRM) in PR Docket 79-285, which concerns enlarging the 6-meter subband on which amateurs may use standard bandwidth fm emissions. (See December 1979 *QST*, page 79). Standard bandwidth fm, 16F3, is presently limited to 52.5-54.0 MHz on the 50-MHz band. The Commission's proposal would allow 16F3 from 50.1 to 54.0 MHz.

*Deputy Manager, Membership Services, ARRL

The views of two ARRL advisory committees, the vhf/uhf Advisory Committee (VUAC) and the vhf Repeater Advisory Committee (VRAC) were very important in determining the final outcome of the League's position. Members of the VUAC might best be described as "weak-signal" enthusiasts, while members of the VRAC represent a high level of interest and experience in repeater operations. The VUAC did not support the Commission's proposal in its entirety and suggested that 16F3 emissions be restricted to 51.0 MHz and above. Also, members of the VRAC recognized the importance of propagation studies and operation with modes other than fm and recommended that 16F3 operation not extend below 51.0 MHz.

Based on the views of these advisory committees, which are composed of amateurs who are especially qualified to comment on the potential uses of the 50-MHz band, the League has submitted a counterproposal that 16F3 emissions be permitted between 51.0 and 54.0 MHz with no changes in the modes now permitted between 50.0 and 51.0 MHz.

Biological effects of rf radiation: The League has filed with the FCC a report of the ARRL Ad Hoc Committee on the Biological Effects of Nonionizing (rf) Radiation in response to the Notice of Inquiry (NOI) in General Docket 79-144. The NOI is an inquiry into the FCC's responsibility to consider the biological effects of radio frequency radiation when authorizing the use of radio frequency devices. (See August 1979 *QST*, page 68; September 1979 *QST*; and December 1979 *QST*, page 78.)

The Ad Hoc Committee on Nonionizing Radiation responded to those questions in the NOI which it determined to be applicable to the Amateur Radio community. It located no reference to any ill effect caused to people from radio frequency radiation generated by an Amateur Radio station. The report admitted that there has been no organized effort to evaluate Amateur Radio stations in terms of the radio frequency exposure levels and field intensities generated, but it included in its 20-page report a chart of field-strength measurements made at typical Amateur Radio stations. The study demonstrated that field intensities are well below 10 mW/cm^2 for the typical amateur and his adjacent neighbors.

The Committee concluded that nothing in the literature it surveyed showed a hazard to humans from exposure to 10 mW/cm^2 of rf energy. "If 10 mW/cm^2 is safe, there is no need to be more safe," the committee stated. It recommended that the present Occupational Safety and Health Administration (OSHA) standard of 10 mW/cm^2 be retained.

900-MHz Personal Radio Service: The League has also filed comments in PR Docket 79-140, which is a Notice of Inquiry (NOI) inviting suggestions concerning a new Personal Radio Service in a portion of the radio spectrum between 894 and 947 MHz. (See December 1978 *QST*, page 59). ARRL supports both the creation of a new Personal Radio Service and a new band for the Amateur Radio Service in the vicinity of 900 MHz. However, the League cautioned against *contiguous* amateur and CB-type bands. It noted the problems that arise when manufacturers design and sell transceivers which, though ostensibly intended for the Personal Radio Service, can be operated in nearby amateur bands. The League's comments urged the Commission to avoid the problems of the 11-meter CB band where ineffectual enforcement efforts have allowed tens and even hundreds of thousands of illegal stations to use excessive power between the upper edge of the CB band and the lower edge of the 10-meter amateur band. The League also noted that "increasing numbers of unlicensed stations have appeared within the 28-29.7 MHz amateur band, often posing as amateur stations using self-assigned call signs or unlawfully appropriating the call signs of licensed amateurs." Rather than have similar circumstances befall the Commission at 900 MHz, the League urges the FCC to issue a Notice of Proposed Rulemaking (NPRM) for new, but separate, amateur and personal radio bands in the 894-947 MHz bands.

The League also urged the Commission to require mandatory automatic identification systems (ATIS) for all personal radio service transmitters to aid in enforcing the rules, and that all modulation modes, including fm, ssb and am, be considered for the new service.

SINGLE-SIDEBAND-ONLY FREQUENCIES IN THE CB RADIO SERVICE TO BE PROPOSED

At an open meeting on December 19, 1979, the Commission instructed the Private Radio Bureau to prepare a Notice of Proposed Rulemaking (NPRM) for exclusive single-sideband (ssb) communications in the Citizens Band (CB) Radio Service. Specifically, the Commission directed the Bureau to draft a proposal to:

- reallocate frequencies between 27.410 and 27.450 MHz to the Citizens Band Radio Service for ssb-only operation;
- amend the rules to permit limited transmitter tuning (a VXO control) on all channels for single-sideband only;
- amend the rules to permit domestic communications beyond the existing 150-mile (250 km) limit, provided that such an amendment does not conflict with international radio regulations;
- eliminate the five-minute transmission time rule;
- allow modification of existing CB equipment to include new features and channels;
- inquire into the possibility of testing ssb-only operators as part of the licensing procedure.

The decision came as a result of the Commission's favorable consideration of a report presented by the Bureau which evaluated a number of alternatives for solving problems in the CB service, including the problems of incompatibility between ssb and a-m operations, channel congestion and a regulatory plan unsuitable for ssb-type operation. The report was developed in response to and largely based upon two rulemaking petitions — RM-3299 from *CB Magazine* and RM-3317 from the Washington State Radio Association — received early last year suggesting solutions to single-sideband problems.

Following considerable discussion, the Commissioners agreed in a unanimous vote to adopt the Bureau-recommended alternatives, proposing expansion of the existing CB Radio Service to include a new ssb subservice featuring operator testing and relicensing, and to modify the current CB Radio Service Rules and proceed to the NPRM. However, the Commission wished to inquire further into the issues of operator testing and a possible international limitation on working "skip," since these additions might cause the service to more closely resemble the Amateur Radio Service, perhaps conflicting with the intent of the international rules prohibiting codeless amateur-style operations below 30 MHz. The administrative resources impact of testing and special licensing will also be further explored.

The Commission hopes to release the NPRM early in 1980, with a possible report and order coming late in 1980 following a three-month (approximate) comment period. Of primary interest during this period will be the issues of operator testing as part of the licensing process and possible limitations on communicating over long distances.

It should be stressed that no change in current rules has yet occurred. However, this most recent policy decision is seen as a step toward solving some significant problems for single-sideband users in the CB Radio Service.

Action by the Commission December 19, 1979. Commissioners Ferris (Chairman), Quello, Washburn, Fogarty, Brown and Jones. This is an unofficial announcement of the Commission's action. For additional information, contact Ronald Stone, 202-254-3301. — *FCC News Release*

"GRANDFATHER CLAUSE" TO END FOR AMATEUR EXTRA FIRST CLASS

Effective August 1, 1980, former holders of the Amateur Extra First Class license will no longer be granted credit for the telegraphy portion of the present Amateur Extra class license. The Commission said it has averaged less than one application per year for this credit over the last few years, so it assumes that those who were eligible have already applied for and received credit during the past seven years.

Amateur Extra First Class licenses were issued by the Federal Radio Commission from 1922 to 1933. Since then, equivalent FCC licenses, designated Class A and then Advanced, have been issued. In 1952 the FCC created the Amateur Extra Class license, with more stringent written examination requirements than the Amateur Extra First Class; however, the telegraphy-proficiency requirement, 20 words per minute, was the same. Because of this identical requirement, the FCC in 1972 amended §97.25(d) to give credit for the telegraphy portion of the exam to applicants who have *continuously held* the Amateur Extra First Class license *and* its successor licenses. The Commission's action in this proceeding, PR Docket 79-22, will delete §97.25(d) from the Rules.

PETITION FOR MORE "GRANDFATHER CREDIT" DENIED

The Federal Communications Commission has denied a petition that asked that General and Advanced class amateurs first licensed prior to 1925 be "grandfathered" to Amateur Extra Class. RM-3001, filed by Frank Carman, W7KBF, of Otis, OR, would have granted credit for examination elements 1(c), 4(a) and 4(b) to these amateurs.

The Commission said that although the length of licensed operation can be valuable for establishing eligibility for the Amateur Extra Class license, it is not sufficient by itself. The Commission also felt that granting the Extra Class license on the basis of age or term of license alone would discourage other amateurs from studying toward license achievement. Rather, the only appropriate basis for granting

an amateur license is the successful completion of the examination elements required for a particular class of license.

FCC SCORECARD

The following is a list and a brief summary of pending dockets affecting Amateur Radio:

Docket 19852: Amateur Satellite Rules. Notice of Proposed Rulemaking (NPRM) adopted November 20, 1979. Comments were due February 5, 1980. Reply comments are due March 6, 1980. See February 1980 *QST*, page 80.

Docket 20654[1]: Notice of Inquiry (NOI) into interference from spark-type ignition systems in motor vehicles.

Docket 20777[2]: New Inquiry and Further Notice of Proposed Rule Making (FNPRM) to set up standards for ASCII (American National Standard Code for Information Interchange). ASCII use by the Amateur Service has been approved by the Commission; however, the new rules had not been implemented as of press time. (See December 1979 *QST*, page 78.)

Docket 20990[1]: NPRM to allow security and remote-control devices in the amateur bands above 220 MHz on a shared basis. (See February 1977 *QST*, page 71.)

Docket 21116[1]: Amplifier Ban Docket. Prohibits marketing of external radio-frequency amplifiers capable of operation between 24-35 MHz. (See February 1980 *QST*, page 81.)

Docket 21117[3]: Type Acceptance Docket. Requires type acceptance of equipment for the Amateur Service. (Considered in conjunction with Docket 21116.)

Docket 21135[3]: Call Sign Docket. Simplification of the licensing and call-sign assignment systems. FNPRM on the issuance of club call signs still pending.

Docket 21418[2]: FCC inquiry into the improper issuance of licenses and call signs in the Amateur Radio Service. (See January 1980 *QST*, page 71.)

Docket 78-250[1]: NOI into the administration of code tests to handicapped applicants. (See October 1978 *QST*, page 54.)

Docket 78-307[1]: NOI investigating a consumer-oriented grading system for TV receivers. (See January 1979 *QST*, page 63.)

Docket 78-316[2]: FCC Fee Refund Docket. (See December 1979 *QST*, page 80.)

Docket 78-352[1]: Quiet Zone Docket. NPRM would establish a quiet zone for amateur repeater stations to protect the National Radio Astronomy Observatory and Naval Research Laboratory from harmful interference. (See January 1979 *QST*, page 62.)

Docket 78-369[1]: NOI on the susceptibility of electronic equipment to radio frequency interference (RFI). (See March 1979 *QST*, page 9.)

Docket 79-140[1]: NOI on the creation of a new Personal Radio Service at 900 MHz. See the article about this subject elsewhere in this column.

Docket 79-144: NOI to solicit comments on the effects of rf exposure standards on radio services and equipment and whether FCC should consider the biological effects of radio-frequency radiation when authorizing the use of radio-frquency devices. Comments were due January 2, 1980. Reply comments are due March 15, 1980. See the article in this month's "Happenings."

Docket 79-285[1]: NPRM to extend the subband on which amateurs may use standard-bandwidth fm on 6 meters. See the article elsewhere in this month's "Happenings."

[1]Filing deadlines for comments passed. Awaiting Commission action.
[2]Some provisions adopted, others pending.
[3]Adopted by the Commission. ARRL is appealing the decision.

ARRL ORGANIZATIONAL MATTERS

At the recent ARRL Board meeting, Vice President Noel B. Eaton, VE3CJ, was named to the new post of International Affairs vice president. In addition, Larry E. Price, W4RA, and Max Arnold, W4WHN, were elected vice presidents of ARRL, while Carl L. Smith, WØBWJ, was elevated to first vice president. Other officers continue in their present positions. Directors Zak, Stevens, Anderson and Wicker were elected to the Executive Committee. New ARRL honorary vice presidents are Victor C. Clark, W4KFC, who did not seek reelection as first vice president, and past directors John Griggs, W6KW, and J. Lincoln McCargar, W6EY.

Vacancies created by the Board elections resulted in Frank Butler, W4RH, assuming the directorship in the Southeastern Division; and Lionel Oubre, K5DPG, assuming the reins in the Delta Division. Full details on the ARRL Board meeting appear elsewhere in this issue.

ARRL Foundation Board Meets

The ARRL Foundation Board of Directors held their annual meeting at ARRL headquarters on Saturday, January 19, 1980. New directors are Andrea Parker, K1WLX; Frank Butler, Jr., W4RH; Leonard Nathanson, W8RC; and L. Phil Wicker, W4ACY. Plans for the upcoming year were discussed. A special Foundation meeting will convene in March at Gaithersburg, MD.

GANT RESIGNS, WANGLER NEW DIRECTOR; COMSTOCK BECOMES NEW V-DIRECTOR

Jack Gant, W5GM, who has served as ARRL director from the West Gulf Division since 1976, has resigned so that he will be better able to attend to an unexpected rush of personal and business matters. Before being elected director, Jack served five years as vice director under Roy Albright, N5RA.

Raymond B. Wangler, W5EDZ, of San Antonio, TX, succeeds Jack as director of the division. Ray became vice director in the November 1978 ARRL elections. Presently employed as a director of safety and industrial hygiene Southwest Research Institute, Ray is a senior member of IEEE and holds a B.S. in chemistry and a B.A. in physics. He has also done graduate work in industrial engineering. A lifelong resident of Texas, Ray is married, 53 years of age, an Advanced class amateur, and a life member of ARRL. He is a member of the board of directors of his local Red Cross chapter, a former president of the San Antonio Radio Club, and presently chairman of the ARRL Ad Hoc Committee on the Biological Effects of Nonionizing Radiation. An avid radio amateur since 1952, Ray's on-the-air activity includes operation on all amateur frequencies from 80 meters to 450 MHz. He is a member of AMSAT, SWOT, SMIRK, 10-10, QCWA, STEN, SARO and the Texas VHF-FM Society.

Dr. Thomas W. Comstock, N5TC, of College Station, TX, has been appointed vice director to succeed Ray Wangler. Tom, age 49, is a professor in the Department of Engineering Technology at Texas A & M University, where he is also faculty advisor for the Texas A & M club station, W5AC. Besides being RACES officer for Brazos County, Tom is assistant SCM for South Texas, STM, NCS of the Texas CW net, member of STEN, liaison station with the Central Area Net, member of the 7290 Net, and a member of the Texas VHF-FM Society. Also, Tom holds the Amateur Extra Class license and DXCC (mixed modes and cw). Tom's wife, Judith, is WB5QCI, and his son, David, is WB5ODI. Tom is a life member of ARRL.

AMATEUR EXTERNAL AMPLIFIERS ACCEPTABLE FOR MARKETING

On April 28, 1978, the Commission banned the manufacture and marketing of any external radio-frequency power amplifier or amplifier kit which was capable of operation on any frequency or frequencies below 144 MHz unless the Commission has issued a grant of type acceptance for that model amplifier. This grant would not be issued if the amplifier, as manufactured and marketed, operated in the frequency range of 24 to 35 MHz.

On December 1, 1978, this Commission released a Public Notice denoting those models of amplifiers which have been issued a grant of type acceptance. This list is repeated and updated below:

1) Dentron Radio Co., Inc., models: CL-16015, DTR-2000L, GLA-1000, GLA-1000B, MLA-2500B

2) Ehrhorn Technological Operations, Inc. (ETO), models: PA-76AF, PA-76PAF, PA-77DF, PA-78F, PA-374AF

3) Heath Company, models: SB-201, SB-221

4) Henry Radio, models: 1KD-5, 2K-4A, 2KD-5

5) R.F. Power Labs, Inc., model: V360

6) R. L. Drake Co., models: L4B-1, L-7

7) Swan Electronics, models: Mark 2A, 1200Z, 1500Z

8) Trans World Electronics, Inc., models: Metron A1000, Metron MA 1000B

9) Trio-Kenwood Communications, Inc., model: TL-922A

10) Yaesu Electronics Corp., model: FL-2100F

The above amplifier models may continue to be manufactured and marketed. The manufacture or marketing of any model external amplifier that has not been issued a grant of type acceptance would be a violation of Section 2.803 and Section 2.815 of the Commission's regulations and Section 302 of the Communications Act of 1934, as amended, subject to the penalties contained in that Act. Certain exceptions to this marketing restriction were detailed in another Public Notice entitled "Marketing and Use of Amateur External Amplifiers" that was released on December 1, 1978.

Any questions regarding this material should be directed to Mr. John A. Reed, Room 7202 FCC, Washington, DC 20554, Tel. 202-632-7040. — *FCC News Release*

A CORRECTION

Apparently we caused some problems for amateurs in the third call area when we reported in the January issue that Jesse Bieberman, W3KT, *operated* an outgoing QSL bureau. What we should have said was that Jesse *presently operates* an outgoing QSL bureau.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Call Signs Revisited

In January of last year, the FCC implemented Phase II of its new call sign assignment system. This action was to herald the beginning of a year of confusion for many amateurs as the Commission proceeded to issue calls in accordance with the new system. Here it is, 1980, and confusion still reigns supreme. This month's installment will attempt to sort out some of life's intricacies as they pertain to Amateur Radio's beloved call signs.

Q. Is it still possible to request a specific call sign?
A. The 64 dollar question. At one time, Extra Class licensees could request a specific "1 × 2" or "2 × 2" call. This is no longer the case. Requests for specific call signs will *not* be honored and will only result in processing delays.

Q. Is it possible to request a call sign that reflects my license class?
A. Yes. Refer to the Table. Under the present system, newly licensed amateurs are eligible for a call sign reflecting their license class. Novices receive Group D calls; Techs/Generals, Group C; Advanced, Group B; and Extras will be issued Group A calls. Also, amateurs are eligible for a new call at the time of upgrading. If you were to successfully complete the Advanced exam, you would be eligible for a new call sign from Group B, for example. In other cases, Amateur Extra Class licensees not already holding a Group A call are eligible, at *any time*, for a new call sign from *this group only*. Extras no longer have the option of requesting call signs from other groups. Advanced class licensees not already holding Group B call signs may request a call sign change *only at the time of renewal*. Remember that the applicant must file for renewal in this case no earlier than 60 days before the expiration date of their current license term. Advanced class licensees will be issued Group B call signs only.

Q. I think I am eligible under this system for a new call sign. Does this mean I will automatically receive one from the Commission?
A. An important point. No. Unless you are a newly licensed ham, you will not automatically receive a new call. If you are eligible, and want a new call, check box 13A on Form 610, "Request for Special Call Sign," when filing your application. If you do not check this box, you will retain your present call.

Q. I will soon be moving to a new address in a different call area. When I notify the FCC of this address change, will they issue my station a new call sign?
A. You have the option of retaining your present call sign or requesting a new call reflecting your new call area. It is important to note that if you elect to request a new call sign, you will receive one from the same group as the relinquished call. However, there is one very important exception: If you presently hold a "preferred" call because of seniority or other considerations by the old rules, you may lose this preferred status if you elect a new call. For example, an old timer holds the call sign W1MJ, but he holds a General, not an Extra Class, ticket. If he were to move to a new call area and request a new call, he would receive a Group C call sign which is a "1 × 3." The FCC will issue you a call no higher than is consistent with your license class.

Q. How does this block system actually work?
A. Group A is divided into 92 blocks. Blocks 1, 2 and 3 are the familiar K-, N-, and W-prefixed "1 × 2" calls. Block 83 contains the AA-prefixed "2 × 2" calls. As one block is used up, the FCC will move on to the next block, issuing calls sequentially. In Group A, the Commission started issuing calls from Block 4. Thus, the first call sign issued for the first call district was AA1A. The second call sign issued was AA1B, and so forth through AA1Z. After AA1Z, the next block was used, beginning with AB1A and ending with AB1Z. In Group B, the Commission began with block 2, except in the first call area, where block 1 was used first. Group C calls began with block 2, and Group D started with block 1.

Q. How many call signs are available for distribution under this system?
A. For the contiguous 48 states, there are approximately 100,000 calls in Group A. Groups B and C have roughly 500,000 calls. Group D has approximately 7.2 million. There should be enough to go around for a while!

Q. Is it still possible to receive a secondary station call sign?
A. No. Secondary station licenses will not be issued, renewed or modified. A holder of a secondary station license may request that his secondary station call sign become his primary station call. Note that this request must be made before the secondary license expires.

Q. Is this also true for club, repeater and RACES station licenses?
A. Club station licenses are presently being renewed but new club licenses will not be issued. The trustee's call sign would be used for station identification. Repeater station licenses are not being renewed, issued or modified. Again, the trustee would use his primary station call sign with a "/RPT," or "/R." RACES station licenses are presently not being issued, but they will be renewed and modified.

Q. Occasionally I receive cards from stations that I've never worked. Is it possible that someone else is using my call sign?
A. Since the implementation of the present call sign system over a year ago, it appears that "bootlegging" has become more of a problem. But, don't jump to conclusions; it's possible that many stations are not copying call signs correctly. In a contest or pile-up, sometimes the QRM makes copy difficult: WA1IGJ instead of WA1YGJ, for example. But if you receive a significant number of QSLs confirming contacts you never made, consider protecting yourself. Keep a detailed log of your operation. You should note all your contacts, even brief ones, including date, frequency, time and so forth. Write a letter to the FCC engineer-in-charge of your district explaining the situation. Include photocopies of the QSLs or other evidence to substantiate your suspicions. Then, if your call *is* being bootlegged, and the operation results in a citation, you'll be able to respond effectively. QST

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by FCC staff. Interpretations contained herein concur with those of the FCC's Personal Radio Branch. Numbers in parentheses refer to specific sections of the FCC rules.]

Group A Call Signs

Block no.	Contiguous USA
* 1	K#cc
* 2	N#cc
* 3	W#cc
4-13	AA#c-AK#c
14-36	KA#c-KZ#c
37-59	NA#c-NZ#c
60-82	WA#c-WZ#c
83-92	AA#cc-AK#cc
93	Group B

The following prefixes will *not* be assigned to stations in the contiguous 48 states: AH KH NH NL NP WH WL WP. Pacific-area stations will be assigned AH#c KH#c NH#c WH#c, then Group B. Alaska-area stations will get AL7c KL7c NL7c WL7c, then group B. Atlantic-area stations will be assigned KP#c NP#c WP#c, then Group B.

Group B Call Signs

Block no.	Contiguous USA
1[1]	KA1cc
2-23	KB#cc-KZ#cc
24-46	NA#cc-NZ#cc
47-69	WA#cc-WZ#cc
70	Group C

[1]KA prefixes will be assigned only to persons living in the first call district. Other KAs are assigned to U.S. personnel living in Japan.
The following prefixes will *not* be assigned to stations in the contiguous 48 states: KH KL KP NH NL NP WH WL WP. Pacific-area stations will be assigned calls in the format, AH#cc; Alaska-area stations, AL7cc; and Atlantic-area stations, KP#cc. Once these blocks are used up, assignments will be made from Group C call signs.

Group C Call Signs

Block no.	Contiguous USA
* 1	K#ccc
2	N#ccc
* 3	W#ccc
4	Group D

Pacific-area stations will be assigned KH#cc NH#cc WH#cc, in that order; Alaska-area stations KL7cc NL7cc WL7cc; Atlantic-area stations NP#cc WP#cc. After these are depleted, Group D will be used.

Group D Call Signs

Block no.	Contiguous USA
1-23[1]	KA#ccc-KZ#ccc
24-41	WA#ccc-WZ#ccc

[1]Except KC4AAA-AAF and KC4USA-USZ
The following call sign formats will *not* be assigned to stations in the contiguous 48 states: KH#ccc KL#ccc KP#ccc WC#ccc WH#ccc WK#ccc WL#ccc WM#ccc WP#ccc WR#ccc WT#ccc. Pacific-area stations will be assigned KH#ccc WH#ccc; Alaska-area stations KL7ccc WL7ccc; Atlantic-area stations KP#ccc WP#ccc.

***Call signs using these prefixes are not currently being issued.**

*Membership Services Assistant, ARRL

QST Profiles

Conducted By Dave Bristol,* KA2BNV

Amateur Radio and Medical Research

Ted Henry, W6UOU, president of Henry Radio Inc., in Los Angeles, and Henry Electronics Inc., was born January 25, 1920 in Butler, MO. He was the fourth son in a family which included four brothers and one sister. All five became Amateur Radio operators. Ted's immediate family consists of his wife Meredith, W6WNE, son Ted, W6YEY, and daughters Sharyn and Kathy. In 1941 Ted moved to Los Angeles and founded Henry Radio of Los Angeles. He was graduated from UCLA in 1946. Ted earned his first license, W9AYG, in 1937 and has held W6UOU since 1941. Amateur activity has included all bands from 1.7 to 440 MHz and Ted is eagerly looking forward to operation on the three new hf bands recently gained at WARC. DXing on the hf bands has remained his most persistent radio interest. He has been active on ssb since 1955 and has sponsored repeater stations on 146 and 220 MHz for many years.

The Amateur Radio career of Ted Henry, W6UOU, has given him the chance to know and admire outstanding individuals from every part of the world.

QST: *How did you get started in Amateur Radio?*

Henry: In a sense, I was born to Amateur Radio. My father, Walter Henry, while not an amateur, was gifted with a brilliant, inquisitive mind. He encouraged his two oldest sons, Bob and Walt, to secure their Department of Commerce radio licenses in 1926 when they were assigned 9ARA and 9CVY. I was six years old at the time and the mystery and excitement of the Henry household communicating to all parts of the world remains with me even today, and undoubtedly was the fountainhead of my lifelong commitment to long-distance amateur communications.

QST: *How has Amateur Radio helped you?*

Henry: Amateur Radio has unquestionably made me a more complete and understanding human being. It has exposed me to people from every part of the world and allowed me, in Amateur Radio's unique way, to become a member of the world community without in any way diluting my commitment to the other communities nearer to home. Moreover, it has permitted me to fully experience the miracle of modern communication technology.

QST: *How have you helped Amateur Radio?*

Henry: Someone besides me will have to provide the final answer to that question. Hopefully I have provided a voice of reason in the world amateur community during the last 40 years. Certainly, it has been my privilege to provide responsible marketing of amateur equipment on a world wide basis, and in view of certain persistent industry practices, this may be no small achievement. Having grown up in a small midwestern community in the 1920s and 1930s and in a loving family environment, it was only natural that I should develop a strong sense of personal responsibility. So, very early in my business career, I resolved that insofar as it was possible, I would treat every customer as I, myself, would want to be treated if I were the customer. That is one of my personal goals that has never changed, even though its practice may be considered old-fashioned by some; I decided long ago that the "Golden Rule" would never go out of style.

QST: *You have been engaged in a UCLA medical research program. Can you briefly explain your involvement?*

Henry: For many years, Henry Electronics has manufactured high-power rf amplifiers for amateur and commercial communication service. By a fortuitous set of circumstances one of these rf devices was adaptable to a research program initiated by the UCLA Department of Oncology for the treatment of large, self-contained malignant tumors. The rf power is used to elevate the temperature of the tissue in which the tumor is located. Since normal tissue can cool itself more efficiently than certain types of tumors, the tumor under treatment eventually reaches temperatures that are destructive to the malignant cells. This therapy is called hyperthermia. The UCLA program has been going forward for more than three years now, and the results have been so dramatically positive that it now seems very likely that in the coming years hyperthermia will become the fifth accepted modality for the treatment of such tumors. If this occurs, it will probably be used in conjunction with chemotherapy, radiation or surgery. We are proud indeed that our devotion to the technology of Amateur Radio led us to this contribution to human welfare. Continuing research seems to indicate that a modified form of the same therapy may offer substantial benefits when applied as physical therapy for a number of diverse bodily functions.

QST: *What effect do you believe the energy crisis will have on high-power amateur equipment?*

Henry: None at all, if the question implies that amateur equipment is not energy efficient. In fact, a 2000-watt PEP ssb amplifier uses energy so efficiently that, on an overall basis (considering that it is in the receive mode for at least 50% of the time), such an amplifier consumes barely more energy than a 300-watt lamp turned on for the same length of time. From another point of view, the energy crisis will greatly encourage Amateur Radio communication, since communication of any kind is vastly more energy efficient than "going." It is always more efficient to talk than to go.

QST: *What effect has the FCC 10-meter linear amplifier ban had on your products?*

Henry: From a technical point of view it has had a negligible effect. From a business point of view it has had a substantial impact. First, it has caused greater cost of production, since different models must be made for export and domestic markets. If our costs are higher, then eventually the selling price has to be higher. This is a classic case of hasty government regulations being dumped on the nearest available victim. The amateurs were blameless for the CB mess; the original CB concept and structure were at fault. Yet, when the time came to pay for the mistakes, the amateurs were asked to pay.

QST: *Would you please comment on the new amateur bands?*

Henry: Amateurs throughout the world should be exhilarated by the confidence WARC demonstrated in assigning three new hf bands to the Amateur Service. The U.S. delegates are especially to be congratulated for their role in this happy development. Since occupancy is some distance in the future, we have a unique opportunity to structure their use carefully and wisely. The ARRL Long-Range Planning Committee should of course be requested to make recommendations on this subject. To me, many possibilities suggest themselves. Since all three bands are narrow, it is essential that they be protected from over-occupancy. Certainly, spectrum-efficient technology should carry a high priority. Is it not possible that provision should be made to accommodate promising new communication technologies of the future? If incentive licensing is to remain as a permanent part of the Amateur Service, does it have a role to play with respect to one or more of the new bands? These are typical of the numerous questions that need to be studied. QST

*Editorial Assistant, *QST*

How's DX?

Conducted By Clarke Greene,* K1JX

A Visit With Uncle Bill

Everyone seems to have an uncle who practices some far-out hobby. Of course, when you're 14 years old, that hobby is the most appealing avocation you ever came across. Maybe, despite waves of protest from your parents, you might actually get a chance to participate; to be like your uncle. If by chance the unique hobby delved into by that uncle is ham radio — DXing to be precise — it's not hard to imagine the following exchange happening a few years from now. The scene: Uncle Bill's study. Our hero has just returned from taking the blood test and fingerprinting required before taking his pre-Novice apprenticeship exam, part IA. Bubbling with enthusiasm he goes to visit his Uncle Bill, his mother's "eccentric" brother, to report the events of the day. After all, it was Uncle Bill who sparked our hero's interest in Amateur Radio. We enter, part way through the conservation.

"Of course there are no more wars. After all, this is 1985 and Earth is a civilized planet. Since the beginning of the 20th century we've slowly learned how to handle ticklish situations — through negotiations. SALT, SALT II, NATO, SEATO, The Canal Zone Treaty, WARC; the list goes on and on. We've been treatied to death, if you ask me. Anyway, we amateurs have always prided ourselves on being at the forefront of everything technological and sociological. We have our own treaties; after all hams are civilized people too!

"In fact, it was the hams who really devised the present solution to settle those all-too-common disputes that occur despite the plethora of national and international treaties. The solution is 'the national DX champion.'

"We old-timers, who can remember the 'uncivilized period' from WARC-79 back to the very beginnings of Amateur Radio, certainly recall the distasteful job of searching the bands on an individual basis, looking for DX stations to work, and the horror of actually having to compete with other stations to work that DX. You can't imagine what a mess that was. Absolutely no fun at all.

"The first ray of hope to relieve this madness appeared in the mid-1970s — the list. The list really helped, but it was still a hassle; competing to get on the list, especially with the emergence of the 'super lid.' You know, these guys were part of the great uncouth hordes who ignored the list-taker's directions. The moronic 5-lander, who kept shrieking in the pile-up despite the call for W2s. The Willy Two station who incessantly called the DX station after the list-taker had asked for the Norway Fire Foxtrot station only. The North American, who tries to bully his way onto the European list; the WB, who begged and pleaded for a cw QSO, wasting valuable time from a DX station who was doing a first-class job on phone. I'd better stop — the thought of all that is making me ill.

"I never would have guessed at the time that these list-breakers, who were referred to by the endearing term, 'scum of the Earth,' would emerge today to be our very own *heroes*, our national DX champions.

"The times really have changed, thank goodness. Anyone who hunts DX these days can do so in a gentlemanly manner, as it should be. We can rest assured that our DX champions (one each for phone and cw) have gone through the proper training and have the background to get the job done. Our phone DX champion has spent countless years running grossly illegal power, running roughshod over the weaker stations trying to work DX stations, and has generally proven (in national competition) more than sufficiently obnoxious to meet the objective. Our cw champion has impressive credentials of his own. A lot of years of truly creative pleading for crossmode QSOs and general inconsideration to those waiting patiently to work the DX, have gone into the grooming of the champion.

"Of course, the very success of DXing today rests with the formal registration program. Like everything else nowadays, everyone has to register their call with ARRL hq. to work DX. Every country with more than 50 hams is required by treaty to register their DXers. Usually the local IARU society, like our ARRL, handles all this. Every DXer in the world now is registered with his national society.

"The beauty of the whole idea really becomes obvious when some rare DX shows up. You see, *only* the DX champions, each country's official DXer, can call in the pile-up for that new country. The QRM is reduced dramatically from what it used to be, because only these guys, who are the world's experts in cracking pile-ups, are calling. It makes for an awesome battle.

"Whichever country's champion breaks through to the DX station really *is* the winner. Actually, every DXer in that country is the winner. Everyone officially registered to work DX in the victorious DX champion's home country gets a QSL in the mail a few weeks later. All the DXers in the other countries lose out. Think of it; being on the DXCC Honor Roll without being the cause of QRM. All that energy is conserved because you don't have to get on the air. The national economy doesn't suffer from all those guys buying those Japanese radios."

"But Uncle Bill . . ."

"Don't interrupt. I know, you're probably worried about what would happen if our national DX champion doesn't get through. Don't worry; our champs have put in lots of hours QRMing lists, training in obnoxiousness and practicing general harassment of anyone silly enough to try to abide by the instructions of any given DX station or list taker. Our DX champions are the very best, bar none.

"Hold on a second. I just heard the mailman . . . (Uncle Bill leaves, then walks back in, beaming from ear to ear.)

"Here's a new one. Heard Island! I've never ever heard Heard. It's great not to have to do that menial searching for DX, and then trying to work what little you find. It's great to be a DXer. It's great to be civilized . . ."

IT'S ABOUT TIME

"Anyone who works DX soon learns that you cannot get a return QSL unless you put down the UTC (Zulu or Greenwich Time) on your QSL card, remembering that the calendar date changes at 0000Z.

For more years than I care to remember, all the nets on NTS have had preambles which give the time in Zulu, but the date is invariably given in local time. This becomes highly confusing when a person wants to check the date/time that a message originated and for other reasons.

It seems to be that a way out of this dilemma would be for all of us to adopt the military method. They use a 6-digit group. With this idea we would all know what net we are talking about and what date it is.

Most of us think of time as something a watch tells us and forget that even the year and month are a measure of time, too. With four time zones in the contiguous 48 states, and more when Alaska and Hawaii are considered, we do have a real problem on the regional and area nets. This is compounded by the changeover each year to Daylight Savings Time from Standard.

Take, for example, a message which bears the time of 2358Z and a date of December 25. By the time I relay this message it is the following day, December 26.

It seems far more accurate and a lot easier if we started using the 6-digit group. The full date/time in the above example becomes simply 252358Z. The first two figures are the date and the following four are the time. It isn't necessary to tell the month and year except for DX cards. On the traffic nets we all know what month it is and none of us hold messages longer than 24 hours (do we?), so we know what month it is.

As another example, if I had a message to be originated by me on November 30 at 0100Z, I simply say 300100Z. Even though the message falls into December 1 or even the 2nd, we would recognize that the figure 30 certainly meant the month of November and not December.

When the various traffic managers of all the nets get reports using the "complete" and accurate method outlined here we would all have less confusion and things would run on a more-even keel.

Think it over, and if you agree with this then let's get Headquarters to officially adopt this and make it a part of "How to Operate an Amateur Radio Station." — *Joe Rice, W4RHZ*

*7815 Mandan Rd., Apt. 102, Greenbelt, MD 20770

MOST EVERYONE NEEDS SOMETHING

Ever wonder what country that guy near the top of the DXCC Honor Roll needs? Most of us just wonder, but K1KI and K1WJ took the time to go through the DXCC files to find out what country each of the stations occupying the number-two spot on the mixed Honor Roll needed. Keep in mind when going through this list that it is based on the summer Honor Roll submissions; the winter submissions had not arrived yet.

1) Okino Torishima	7J	21
2) Peoples Republic of China	BY	6
3) Bouvet	3Y	5
4) Kingman Reef	KP5K	4
5) Kamaran	VS9K	3
5) Annabon	3CØ	3
5) Neutral Zone	8Z4	3
6) Heard Island	VKØ-H	2
6) Equatorial Guinea	3X	2
7) San Felix	CEØX	1
7) Juan Fernandez	CEØZ	1
7) Comoros	D6	1
7) Mt. Athos	SV-A	1
7) South Sandwich	VP8-SA	1
7) Laccadives	VU7-L	1

7) Burma	XZ	1
7) Iraq	YI	1
7) Albania	ZA	1
		58

Here is Rick Dorsch, HC5EE, with his family on his latest expedition in the Galapagos. Rick, (WB8ABN, HC5EE, HC8EE) is holding Christian, age 3-1/2. His wife, Maria (HC1MM, HC8MM), is shown holding Gabi, age 2-1/2. The family is hoping to return there for another go in mid 1980, and is planning on *living* there for a year beginning in 1981. That ought to put HC8 off the wanted list for a long time. QSL to HC5EE, Box 665, Cuenca, Ecuador.

QSL Corner

Administered By Joan Becker

Last month we discussed the way to make use of the ARRL Overseas Membership QSL Service. The April, June, October and December issues of *QST* will contain information about these outgoing services. This month you will find information on a completely separate operation, the ARRL DX Incoming QSL Bureau System. You will find incoming bureau writeups in May, July, September and November *QST*.

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of 22 call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.

How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

Claiming your QSLs

Send a 5- × 7-1/2-inch self-addressed, stamped envelope to the bureau serving your district. Neatly print your call sign in the upper left corner of the envelope. A preferred way to send envelopes is to affix a 15-cent stamp and clip extra postage to the envelope. then, if you receive more than 1 oz of cards, they can be sent in the single package.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The exact arrangements can be obtained by sending your inquiry with an s.a.s.e. to your area bureau. A list of bureaus can be found below.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- × 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

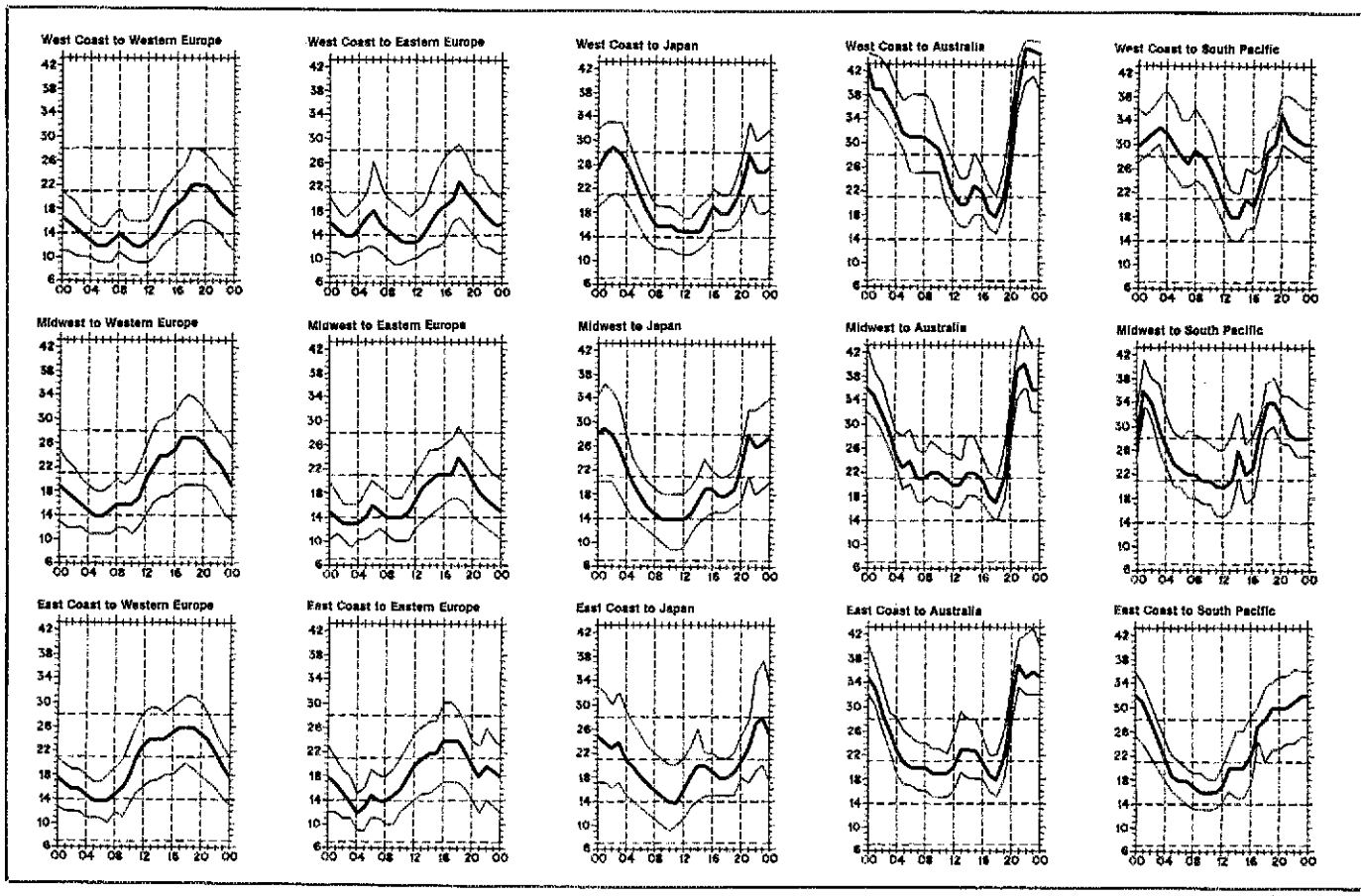
Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade.

Do include an s.a.s.e. with any information request to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see the bulletin, "ARRL - Membership Overseas QSL Service").

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

ARRL DX QSL Bureau System

First Call area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

Third Call Area: all calls* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: All single-letter prefixes — National Capitol DX Assn., Box DX, Boyce, VA 22620.

Fourth Call Area: All two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls* — ARRL W5 QSO Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls* — Northern Illinois DX Assn. Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, SK S4S 5E3.

VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K OX2.

VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Rd., Ruskin, BC V0M 1R0.

VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

V01, V02 — CRRL V0 QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in December 1975 *QST*, page 64.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

QSL Tips

If you work 4U1ITU in the future, ask for the operator's home call and QSL to that operator, not to 4U1ITU or to any "QSL manager." Each guest operator who has been given the privilege of operating 4U1ITU is also expected to take the responsibility of confirming his QSOs by himself. Otherwise the Geneva staff would have to be expanded considerably.

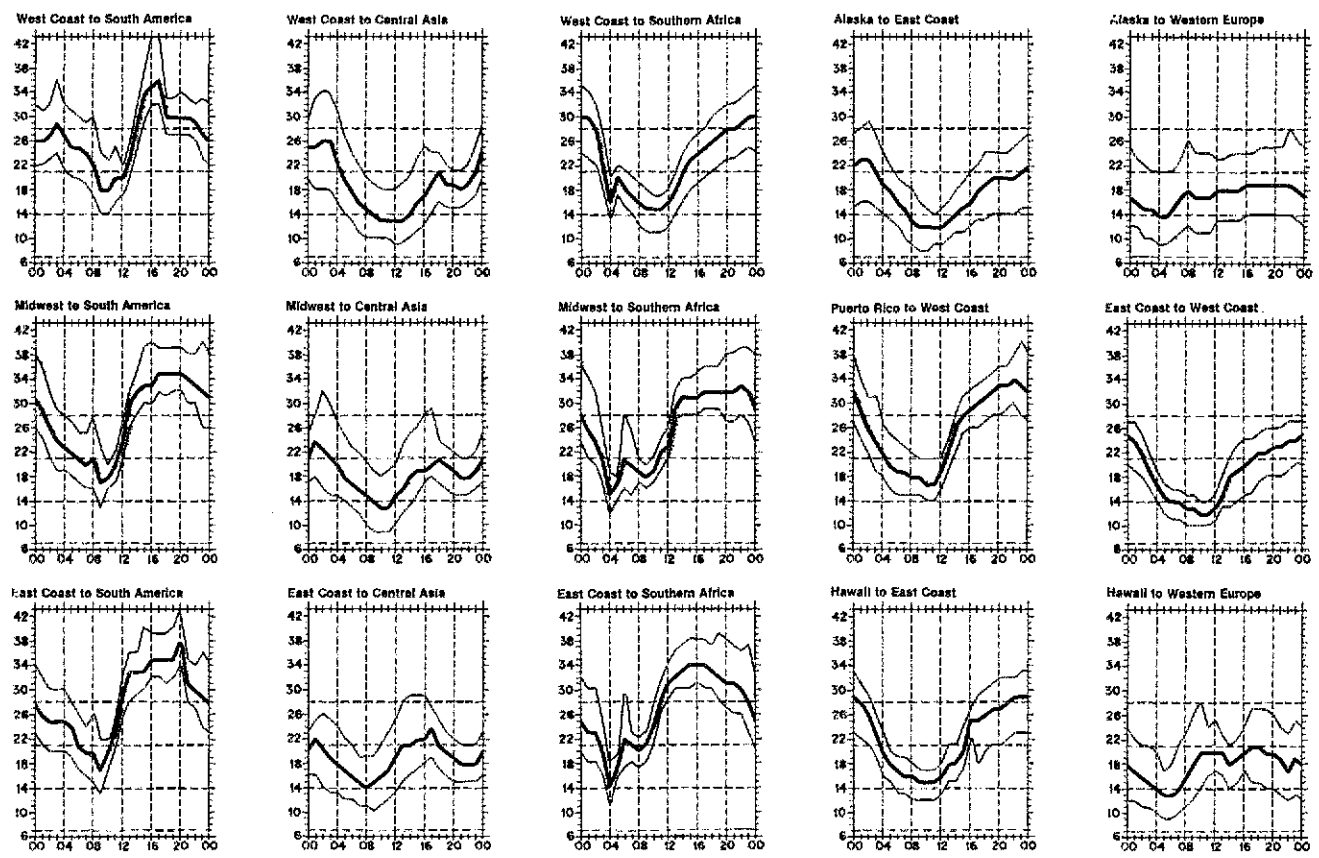
Here is some QSL information for those of you who would like to QSL direct. It is passed along as we receive it and therefore may not be entirely accurate.

AJ9D	(HH2A)	TLØBQ	(I8KDB)
A4XHJ	(DF4YK)	VE1AI/Sable	(VE1AI)
A4XGB	(G4CTQ)	UØY	(UK0AAA)
C31MJ	(EA3NE)	VP2MZZ	(VE3BXY)
C6ACY	(K4ZGB)	VP2SAX	(YASME)
EA8AK	(EA8CR)	VU2LQA	(DK3LQ)
HKØBKX	(WB4QFH)	ZF2DA	(N4AJO)
HM2TN	(JA1HBC)	ZS2CW	(W6RIA)
OD5FB	(WA2QAU)	4W2AA	(I2MQP)
OK3TAB/ D2A	(OK3ALE)	5L2BS	(K9QXY)
		5NØSID	(G4CTQ)
PJ2FR	(K2TJ	8Z4A	(WA3HVP)
S2BTF	(W5RO)		

QSL MANAGER VOLUNTEERS

KM4Q
VE4ADS
AJ7V
K8RLQ

The following list of QSL Managers are *not* valid:
HH2M (Cancel W7OQ)
TI&TG (Cancel W8HV)
C5AAA (Cancel P. O. Box 273, Banjul)
Many thanks to K2TV, DL7SU, WA4WTG and VERON for your help.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions, for March 15 to April 15, 1980, assume a sunspot number of 160, which corresponds to a 2800-MHz solar flux of 203.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1 through October 31, 1979. An s.a.s.e. will bring your the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DJ3AS/126	JJ1HEY/137	OE1DEW/103	YU3TGN/166	WB1FDY/102	WB2MMB/104	WB3GWS/112	WA4LRF/108	KA5BML/108	WD5EWP/105	K8XF/119	WB8TDR/102
DK5ZZ/106	JK1GDD/120	OE1XBC/121	YU8KOP/180	AD2S/102	WB2YJQ/113	WB3IMA/102	WA4TKR/K/100	KC5I/202	AA8PY/101	K8BIZ/107	WB8ZJW/106
OK0SA/103	JA2CXH/219	OZ9JB/101	AC1C/102	K2YL/122	AI3Y/105	K4CRR/118	WB4AXN/209	W5ADH/105	WA8TDX/100	WB8AJC/125	AA8UI/108
EA1SQ/153	JE2KSM/105	PY1YP/101	K1LGM/106	KA2ACM/104	K3QMR/110	K4JYD/101	WB4EGX/100	W5DOZ/310	WB6VQY/115	K9US/325	K8SI/107
EI2CR/126	JA4FCC/105	SM3EVR/303	K1VKO/115	N2AGM/102	KA3BFX/124	KB4QI/100	WD4IZR/120	W5IMJ/129	W7IMZ/105	W9ON/209	WB8VIY/100
FP8MD/106	JA7ARM/101	SM6HEP/106	WA1KSF/106	WA2CWP/101	KB3ES/137	KJ4S/101	WB4QIT/110	WB5NQW/103	WB7RBA/102	W9QUT/104	WB8GCN/102
IT9ODS/164	KL7HHX/112	SM6JDR/109	WB1ACI/100	WA2TCG/108	WB3CQD/110	W4RIM/280	WB4RZN/109	WB5NXH/111	K8CXI/221	W9TP/100	WB8YMB/102
J6LGK/107	KP4DOP/100	TF3SV/223	WB1AGO/106	WA2TPU/100	WB3FID/100	W4WN/103	K5FUV/117	WD5DKT/147	K8MNG/112	WB9JBF/103	WB9YRN/109
J6LGL/116	LA2AV/125	YU1NHV/137									

New Phone

CT2AX/117	EA7ASW/105	JA2CXH/210	PT7TP/109	ZL2AYF/105	KB2CV/102	WB2YJQ/108	WA4LRF/106	WD4LFD/103	WB5UDU/123	WA8LOD/102	K9RJ/333
DF2FZ/105	F3PY/125	JA8AS/148	SM6HEP/104	3A2EE/238	N2KA/238	K3ZUF/108	WA4STN/100	WD4NDD/102	WB5CGC/106	WB8PSY/102	N9AHM/104
DJ2HZ/105	FG7XA/131	JH8BZU/114	SM6JDR/103	9X5PP/100	W2AKW/104	KA3BFX/120	WB4EGR/101	AB5G/158	WD5CKA/110	WB6VGY/111	N9AKM/102
DJ3AS/114	HC5EA/229	JA8NEN/102	SV1JG/138	AD1S/147	WA2DZD/114	WB3GWS/112	WB4FSN/150	KA5AZT/129	WD5DKT/144	K9TDA/110	W9CZ/136
DL1EV/103	HC6NW/199	LA5WN/108	YE1BUG/109	K1IAG/101	WA2HFT/135	WB3JQF/104	WB4GOI/104	KA5BML/103	WD5EWP/105	W7FRY/109	WA9WGJ/102
DL2KC/121	HS31M/106	OE2WJL/138	VE3YE/113	W1EJ.Z/151	WA2IZN/251	K4BKX/104	WB4RZN/107	KA5Q/100	AD8V/208	WA7YXM/102	WB8RJO/132
EA1UQ/103	I3AAV/107	OK1DKS/109	VE5QY/100	WA1SMI/102	WA2JOX/100	KB4DKI/154	WD4EFD/169	N5AZK/103	W6TIO/103	WB7PXA/109	WD8BBJ/108
EA1VG/135	I5ZGG/216	PA3ABW/100	YU1NHV/107	K2PZ/106	WA2TJF/106	WA4GKR/261	WD4HYE/100	W5KZT/119	WA8CUP/101	K8CX/183	K8JS/262
EA6ET/151	JK1GDD/115	PY1NCJ/100									

CW

EI4BK/103	JH6BZI/157	VE1AXT/112	AC1C/100	W2FCC/104	WB4AXN/109	W5QKZ/106	N7OA/108	WA7ZVI/101	K8CX/122	N9ACZ/100	W9NG/126
I4ANDI/152	LA2AV/107	VE1BLX/102	N2KW/180	WA2CBB/105	W5IMJ/113	A65KC3/106	W7EKM/101	K8AQM/111	K8KBB/111	K9SI/102	WA9VBW/101
JJ1HEY/112	SM3EVR/267	VE3EPN/101									

RTTY

JA8ADQ	DJ8BT										

SATELLITE

G3IOR											

5BDXCC

K5AQ	K9AJ	M1C	N2UN	PA0CLN	YU2CAL	W8LU	K9UWA	EI6S	4Z4DX	DM3EA	DM3WMJ
N8NN	W3SQ	LA3SG	W9RN	YU2CQ	WZCVW	WA0TKJ	SP3GEM				

Endorsements

Mixed

DJ1BV/290	JA2EIV/256	PT2LS/136	N1ACW/256	W2BTG/260	K3NS/230	K4KFH/264	WA4GKR/281	N5DD/287	N6YI/203	WA7OBH/181	K9SM/327
DK3PO/327	JA3ANW/222	SM4EMO/243	N1UN/261	W2FQ/330	K3RT/281	K4KJZ/151	WA4HDD/271	N5HB/209	W6CQ/280	WA7OSO/248	K9YBC/224
DL1EV/209	JA4ESR/151	SM6CST/272	W1BWS/135	W2FP/326	K3WS/305	K4LJX/273	WA4JXN/171	N5NW/310	W6GMF/329	WB7BOA/128	W9AG/319
DL1HH/349	JA7ZF/285	VE3KIK/125	W1DQH/262	W2FXA/350	W3CDG/305	K4QN/260	WA4MAV/253	N5RQ/250	W6QA/148	K8KBB/144	W9CL/284
DL1PM/305	JA8CDT/292	XE1KS/327	W1GDO/310	W2IQZ/162	W3KT/353	K4QPR/285	WA4MOQ/165	N5RR/327	W6HQ/239	K8RAJ/314	W9DO/334
DL1QT/269	JA9AQE/190	YU1BCD/338	W1HSS/203	W2IYX/309	W3LDD/120	K4SE/270	WA4NGG/180	W5AQ/351	W6MUM/326	K8ZA/180	W9DQX/226
DL3RK/356	JF1EZH/262	YU1NEO/303	W1KGH/309	W2MIG/301	W3LMZ/290	N4CC/321	WA4OUF/270	W5GJ/344	W6RDS/137	K8ZE/221	W9HB/354
DL9UI/146	JH1EIG/320	YU1NFR/222	W1SP/337	W2NJ/250	W3YT/232	N4OQ/120	WA4QFK/180	W5IJW/316	W6SWM/247	KB8CR/130	W9LW/311
F9YZ/306	JH1KUK/185	YU3EY/327	W1UN/305	W2PPG/331	W3YY/250	N4TJ/240	WA4WPO/181	W5MQ/329	W6SN/325	W8DMD/359	W9NN/277
FG7XA/202	JH6HYC/168	YU3JS/180	W1VV/280	W2SY/320	WA3GJZ/292	N4TX/290	WB4LTD/150	W5VSZ/258	W6TC/302	W8ILC/328	W9RY/300
G3AEZ/179	JJ1KUV/130	YV5AB/358	W1WLW/275	W2TP/349	WA3IKG/329	N4WX/263	WB4HOL/284	WB5ZCP/175	W6VQ/251	WA8TOO/251	W9RZB/202
G3FVC/180	JR1TNE/250	YV5AIP/347	WA1ZLK/184	W2TXB/278	WB3DDS/136	N4XX/323	WB4IWW/205	WD5DUD/223	WB6APX/316	W8WKH/295	W9TH/202
G3TXF/269	KG6RT/200	ZE3JO/241	WB1CCH/230	W2WZ/198	AA4CK/258	N4ZC/316	WB4NFO/196	WD5HRX/142	WB6VSC/159	W8LKG/199	W9ZA/352
G4BUE/269	KH6JA/120	ZL4JS/327	WB1DGX/156	WA2FUE/201	AA4MW/172	N4ZS/219	WB4OSS/327	AA6DX/160	WB6ZHD/252	WB8ZAP/325	WA9WWT/180
HB9AAU/300	KL7HR/203	ZL1AMO/310	K2KGB/317	WA2IZN/251	AA4US/240	W4BDJ/283	WB4PAB/280	K6CBL/260	WD6ATC/150	WA8OVG/240	K9BS/323
HB9HIT/263	LA5HM/341	ZS4MG/326	K2LE/337	WA2JBV/308	AE4Z/300	W4BFR/345	WB4SXX/252	K6EXO/332	K7ABV/334	WA8QIY/269	K9CY/128
I2DMI/155	LA5NM/200	4X4GD/150	K2MFY/261	WA2OVG/122	K4AEB/288	W4CEB/220	WN4KKN/120	K6GWN/305	K7BHM/225	WB8YQX/124	K9YST/280
I2KMG/339	LA8LF/328	AD1S/149	K2OF/328	WA2PAT/141	K4BBF/328	W4ETT/152	AB5G/186	K6IRS/263	K7RLS/283	WB8VPA/202	KB8FZ/197
I2SM/334	OE1ERI/361	AG1J/243	K2QOU/318	WA2QAU/203	K4BVO/329	W4EX/364	K5AAD/341	K6PUI/336	K7SEN/250	WD8BOH/255	N9ES/243
I4AND/280	OE8RT/325	AG1K/211	K2SPI/259	WA2YEX/161	K4CEB/331	W4FX/327	K5BLV/262	K6RIK/286	N7RO/318	K9APW/187	W9BA/260
I5ARS/342	OH2FS/282	K1CC/275	KB2EN/202	WB2LOF/280	K4CIA/335	W4GD/360	K5BZU/300	K6ZM/343	W7FLD/155	K9CT/308	W9MYN/327
I5EFO/202	OH2KF/321	K1DRN/338	N2AC/290	WB2YQH/324	K4DJ/335	W4NO/321	K5DUT/301	N6AV/341	W7IYW/279	K9HMB/305	W9RYW/166
I7WL/325	OH3SR/331	K1SA/269	N2KA/278	N3II/294	K4EEK/322	W4ONA/141	K5LIL/333	N6CW/331	W7LR/275	K9IL/283	W9UO/327
I7ZPB/340	OH4NS/338	K1TO/221	N2WS/201	N3UN/296	K4FJ/338	W4QM/345	K5OD/256	N6FX/347	W7PF/280	K9UF/310	WA9HMP/213
JA1DFQ/330	ON6RR/129	K1VJH/211	W2AG/350	K3AO/272	K4FW/263	W4SNR/261	K5PR/159	N6GM/333	W7RVM/278	K9KA/331	WB9KGO/170
JA1GTF/319	PY5EGI/175	K1WCI/228	W2AXZ/260	K3ND/300	K4IKR/337	W4WW/257	KA5ACC/151	N6PV/140	WA7IRD/145	K9QVB/270	WB9RSH/139
JA1ZZ/328	PY6TM/268	K1XA/200									

Radiotelephone

CT1UA/300	I2SM/334	KP4AE/146	YV5AIP/347	N2KW/254	WB2SZH/220	K4BVO/316	W4ZBA/153	W5MQ/328	W6RMN/9217	K8VIR/240	W9DQX/226
G3GCF/132	I4AND/239	KZ5JM/296	YV5ANQ/325	N2SS/317	K3BCG/270	K4EEK/250	WA4GUZ/315	W5VSZ/243	K7BDH/224	W8ILC/316	W9HB/348
G3TXF/280	I4FAF/198	LA5HE/330	ZP5RS/240	W2FCR/261	K3RT/263	K4FJ/327	WA4HDD/270	WA5IEV/326	K7RLS/270	W8KNH/283	W9IFJ/251
DJ1BV/277	I5EFO/202	LA5NM/165	AA1U/129	W2FGI/317	K3WS/269	K4IKR/324	WA4INC/220	WD5DIV/180	K8ZT/202	W8LBM/312	W9IGK/180
DL3RK/322	I6FLD/340	LA8LF/319	AG1J/241	W2FI/318	N3UN/288	K4KJZ/150	WA4OEJ/202	WD5DUD/223	N7RO/310	W8NXF/313	W9RY/277
DK3PO/324	I7RNH/298	LU2AFH/284	K1CMI/275	W2IYX/309	W3CDG/280	K4QPR/281	WB4INC/200	AE6T/180	W7BG/243	W8TA/249	W9ZA/279
DF8FD/181	IBACB/280	OH3SR/328	K1DRN/336	W2MIG/293	W3EFA/210	K4RSB/276	WB4IWW/203	K6DQ/144	W7EZ/322	WA8QIY/219	W9ZX/171
DL8XL/255	IBKNT/279	PY2CYK/329	K1MIZ/128	W2MPI/250	W3KT/354	K4SEJ/253	WB4NFO/196	K6EXO/327	W7HX/156	WB8HLI/160	KB8S/322
EA3GD/222	IT9GCD/280	PY2LS/336	K1MLC/250	W2NC/280	W3YY/250	N4CC/307	WB4OSS/309	K6KII/240	W7ILR/270	WB8VPA/202	KB8PE/271
EA7GF/335	IT9JT/330	PY6TM/265	W1CRL/160	W2NCL/239	WA3FEU/139	N4TJ/238	WB4SWI/160	K6PU/278	W7KZE/124	WB8YQX/124	N8SS/214
EA8OZ/270	I8CEP/210	SM6ATN/320	W1MMV/346	W2PFQ/220	WA3IKG/328	N4ZC/302	K5MK/199	K6RK/268	WA7OYL/199	WD8BAD/200	W9BA/250
F2EX/226	JA1DFQ/305	VE3BSJ/287	W1HSS/202	W2SY/300	WA3YGQ/140	N4XX/318	K5SSB/153	N6AHU/222	WB7BQA/126	K9APW/184	W9MYN/327
F2MO/335	JA1GTF/258	VE3CKP/255	W1SP/335	W2TP/346	WB3EFC/179	W4BFR/282	KA5BWU/135	N6JN/160	WB7BQP/180	K9HMB/300	W9YDB/306
F6BDS/290	JF1EZH/216	VE7KL/124	W1TPK/259	W2TXB/183	AA4CK/255	W4EX/362	KA5VI/200	W6BZ/136	WB7NCD/213	K9KA/320	WA8ABT/126
G3TXF/242	JH1EIG/315	VP9CP/240	WA1ZLK/180	W2WZ/151	AA4MW/158	W4LXL/284	KB5DN/165	W6SWM/242	K8ES/184	K9QVB/201	WA8HMP/211
G4BUE/258	JH1KUK/166	XE1GBM/233	K2GAT/220	WJYYL/341	AE4Z/148	W4RE2/315	N5NW/294	W6TGI/174	K8IQB/163	K9SM/311	WA8LHK/136
I2DMI/152	JR1BFT/288	XE1KS/312	K2KGB/312	W3ARM/180	K4AFB/288	W4UW/187	W5AQ/312	W6ZPV/202	K8MG/160	N8BA/230	WB8QDV/170
I2KMG/335	JA7ZF/278	XE1NII/200	K3QOU/314	WB2NIC/255	K4BBF/328	W4WW/238	W5LDH/260	WA8VHZ/180	K8SOE/302	W8DC/329	WB8TNY/171
I2SLA/303	KH6BB/330	YV5AB/356	K2SPI/257	WB2HLK/VE1/290							

CW

DL1PM/244	G4BUE/186	JA3ARM/128	K1SA/203	W1JR/250	W2WZ/141	W3TVB/162	N4RJ/295	N5RR/142	W7IGE/151	KB8KW/160	N9KW/150
DL9UI/140	I1QJC/139	JH8HYC/168	K1TG/143	W1WLW/150	WA2OFX/164	AA4CK/123	N4TJ/144	N6PV/140	W7LR/249	W8GKM/204	W9ZA/201
F3AT/280	JA1GTF/280	KL7AF/141	K1UO/178	W2AGW/180	K3NS/188	AB4Z/160	N4WX/248	W8ISQ/209	K8SW/181	K9QVB/181	KB8FZ/162
FG7XA/182	JH1EIG/244	OZ3Y/250	W1DA/265	W2NC/250	W3KT/267	K4SE/212	W4YN/182	N7RO/139	K8VM/175	K9KA/120	W9BW/250
G3TXF/175	JA2EIV/222										

DXCC NOTES

Annual List Corrections

Missed in listing: Mixed, N9EV/140, K2CP/104, Phone, W8MAW/280. Corrections: Mixed, WØIUB/167 should be 267, K3GL/355 should be 356, Phone, W4EBO/280 should be 254.

Strays

I would like to get in touch with . . .

☐ Armenian-American hams in the U.S. for a ragchew in Armenian. Contact Stefan Karadian, N8BGD, 7127 Brookridge Dr., West Bloomfield, MI 48033.

☐ Novices interested in forming a 15-meter national net or an 80-meter local net. Contact Greg Sharp, KA7CJP, 687 Meadow Dr., Emmett, ID 83617.

☐ TRS-80 owners. Socrates Martinez, Jr., WB3JFL, 625 Kingston Rd., Middle River, MD 21220.

☐ anyone interested in forming an international net of breeders or exhibitors of pure-bred cats. Ann Geissert, KA6AYJ, 439 Calle de Castellana, Redondo Beach, CA 90277.

☐ all hams working for, or retired from, the family Lines Railroad System. Contact L&N ARC, WB4KOJ, 908 West Broadway, Louisville, KY 40203.

☐ hams interested in hydroelectric power. Contact Ron Roy, WB1HGN, P. O. Box 6, Averill, VT 05901.

☐ anyone who has a service and repair manual or builders instructions for an EICO Model 232 VTVM. William Champlin, WD6FUZ, 4603 Darien St., Torrance, CA 90503.

Club Notes

Recently we received a copy of a letter that concerned club call signs. Charles Burke, WA2SLK, wrote the letter and sent it to his U.S. senator. The letter was so well written and Charles expressed his thoughts with such clarity, that we wanted to share it with you. Charles is club advisor for Matawan Regional High School Radio Club in Aberdeen, NJ.

"Dear Senator Williams,

"Last September, I started a radio club here at the high school, in response to a great deal of interest by the students. The club has been very successful, not only has it created a worthwhile institution, but has stimulated an interest in the field of electronics.

"The club has both a citizen band radio and an amateur radio. When the club started, applications for licenses were submitted to the FCC on the correct forms. Within a few weeks the citizen band radio received its license, but the forms for the amateur radio were returned. Attached was a letter indicating that the FCC had suspended issuing club licenses pending a restructuring of their entire licensing procedure.

"Several months later another letter was sent asking if the new procedure had been developed and I received the same letter in the mail. Many months passed and I wrote to you regarding this matter and received the letters which are attached hereto. Since this time the FCC has again been contacted and the same nonsense continues, so we are writing you once again. As you can see from their letter, the FCC indicated that the club license would be dealt with 'soon,' but I fear that what constitutes 'soon' may be years by their definition. This inability to address this situation has created a slight hardship upon our club in that the license serves as a means of identification. Each licensee who is granted a license is included in a register called the 'Callbook' and the obvious problem here is that not having a license excludes the club and makes it difficult for others to locate us. We also have experienced some problems with donations, for questions are sometimes raised concerning our authenticity. A club license would certainly support our validity and be of help in such situations.

"What prompts this letter, is that the students are beginning to wonder if the FCC is some sort of governmental joke and I am beginning to believe they are correct. Also, the students have seen 'proof' of the agency's incompetency in two very graphic situations. The FCC banned the sale of rf amplifiers that can be used over that portion of the spectrum now used by the CB operators. In the past three months students have brought in magazine advertisements, as well as ads from local newspapers, in which these devices are openly being offered for sale. These ads were sent to the local FCC offices and to the best of our knowledge nothing was ever done about it. We have not received a confirmation that our letters were even read. A second example of their inability to function properly is also noted daily when the kids hear literally thousands of CB operators misusing the CB band. Of particular perplexity is the open violation of the law when they (CBers) operate illegally in other portions of the radio spectrum that has been set aside for industrial usage. These operators, called 'hfers,' openly give their names and locations over the air and operate unrestrained by the Commission. What upsets me and is raising questions in the minds of the students is that here they are abiding by the law and are being harassed by the Commission while others openly violate the law and are ignored by the same Commission.

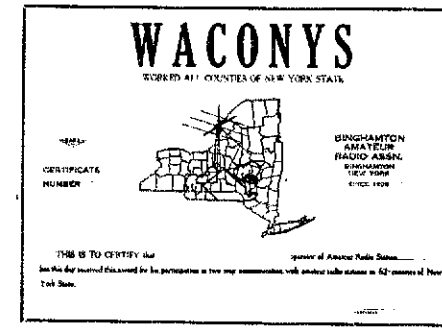
"If you would like to see the sad situation for yourself, we would be glad to put on a demonstration. The citizen band service is a joke which is now starting to undermine the confidence our students have in the government's ability to serve all of the people.

"In closing I would like to ask that you consider our charges and look into this matter for yourself. At stake are two issues. First why is the Commission dragging its feet in regard to the issuing of club licenses to bona fide groups, such as this club, especially since a real need exists? Secondly, why on the other hand do they actively support the lawlessness being perpetrated on the citizen band service by failing to curtail it and openly ignoring the public when it tries to supply information on violators.

"Thanking you in advance for giving this letter your immediate attention, we look forward to hearing from you very soon.

Yours truly,
Charles C. Burke, WA2SLK, KXD-3053
Club Advisor"

Charles had previously related similar information to his senator several times prior to this letter. In response to this one, Senator Williams' assistant reported that the FCC stated that the earliest date on which the FCC would be able to look into club licensing (let alone do something about it) was mid-1980. Keep writing the FCC and your representatives! — *Rosalie White, WA1STO* QST



Would this certificate enhance your wall? Send a list of contacts verified by your local Amateur Radio club or send QSL cards. Include return postage and $1 to the club at P. O. Box 853, Binghamton NY 13902.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AEH, Joseph L. Vogel, Hyde Park, MA
W1FXA, Albert W. Moser, Portland, ME
ex-K1KAS, Robert L. Burgess, Portland, ME
WA1RFG, Walter L. Johnson, Plaistow, NH
W1ZAW, Robert H. Main, Hillsboro, NH
W1ZBC, Joseph Morris, Pawtucket, RI
K2AIU, Helen L. Reed, Uniondale, NY
W2BGO, Vincent T. Kenney, Valley Cottage, NY
W2BMP, Georges E. Bravard, Vineland, NJ
W2BO, Meylert A. McIntire, Cutchogue, NY
W2CJJ, George L. Bose, Wantagh, NY
W2EII, Joseph A. Reilly, Keansburg, NJ
W2FGI, T. Warren Cox, Katonah, NY
K2ROD, Harold E. Wiggins, Camden, NY
WA2SCN, George Clair, Wychioff, NJ
K3GJU, Vergil A. Ratcliffe, Jr., Odenton, MD
W3IDX, Frank Mazza, Harbor Creek, PA
W3MTK, Philip H. Barnes, Pocomoke City, MD
W3NC, Clinton B. Dawes, Trout Run, PA
W3QMG, Henry Thomfordt, Silver Spring, MD
K3RAD, Graydon H. Cook, Pittsburgh, PA
W4BRT, Ross H. Reynolds, Raleigh, NC
K4CWU, John C. Standish, Port Charlotte, FL
K4EGD, Philip H. Faulstick, Margate, FL
WA4MNX, Benjamin S. Symons, West Palm Beach, FL
W4NTE, Jacob J. Pultzer, Ft. Pierce, FL
K4OCU, Russell E. Amerson, St. Charles, SC
WD4OLZ, Fred Beynon, Ormond Beach, FL
W4PUV, John J. Hurd, Seminole, FL
W4QDD, George Bitterman, Miami, FL
K4RXV, Henry A. Darsch, Winter Haven, FL
WA4TRR/W2BGP, Henry E. Meyer, Hollywood, FL
K4VNA, Walter C. Cook, Lake Mary, FL
KA5ADQ, Walter Washington, Little Rock, AR
WD5AFY, Grady Y. Jackson, Shreveport, LA
W5ANN, Baylis G. Fletcher, Winters, TX
W5DGG, George B. Lambert, Wichita Falls, TX
K5JCS, Raymond E. Miller, Mineral Wells, TX
WD5JLY, Charles E. Whitfield, Lubbock, TX
K5KOQ, Ershall E. Dallas, Tulia, TX
WB5OTZ, Hoyt F. Hall, Biloxi, MS
W5OUA, Robert Crossman, Corpus Christi, TX
K5RAC, Hubert C. Prichard, Garland, TX
W5RXG, George H. Medziak, Houston, TX
W5VPT, Wesley D. Cook, Garland, TX
WA6BTR, Benjamin C. Riley, Vallejo, CA
W6EBJ, Emil E. Sedlacek, Glendora, CA
W6EIR, LeRoy A. Ward, Santa Ana, CA
W6GEJ, Arthur H. Swenson, Vallejo, CA
W6LFZ, Richard A. Hyde, Santa Ana, CA
W6MNM, Anthony J. Bernal, Clarksburg, CA
W6UHR, William H. Reisinger, Sacramento, CA
WA6VNE, Thomas V. Maddigan, Santa Ana, CA
N6ZW, Hal D. Randolph, Santa Clara, CA
W7MGN, Harland G. Hoit, Tacoma, WA
K7ONU, Walter M. Stroy, Oregon City, OR
W8BXX, Fred Williams, Harrison, OH
K8CZU, Louis M. Lackey, Atwater, OH
W8MEA, Frank M. Tschappat, Columbus, OH
W8VE, Douglas M. King, Marlette, MI
W9CAX, Marion "Hank" Henley, Aurora, IL
K9CRT, Merle M. Anderson, Decatur, IL
WD9CSY, Harold Clark, Laurel, MS
W9DWM, Peter J. Snopko, Sr., Wayne, IL
WD9EWX, Robert H. Ebert, Williamsport, IN
WA9GLF, Ciro "Chick" Gulino, Stone Park, IL
W9OTE, John McCarthy, Elk Grove Village, IL
ex-W9QBT, Alex Roth, Chicago, IL
*K9STF, Theodore J. Ziemba, Chicago, IL
W9TMM, Leon W. Martin, Sandwich, IL
WBØGBB, Alex L. Olsen, Elko, MN
WAØHAR, John C. McCourt, Dexter, MO
WBØNJX, Roland Hageman, Leavenworth, KS
WØNKS, Edwin A. Stumpf, Cherryville, MO
WAØNNR, Harold L. Snowbarger, Ottumwa, IA
WBØQAA, Delbert C. Lupton, Davenport, IA
WAØQZT, Claude W. Smith, Minden, IA
WØRP, Loren M. Tate, Springfield, MO
WØTSZ, Miles E. Squires, Poplar Bluff, MO
WBØZJL, John T. Buckmaster, Fort Dodge, IA
KL7FMA, Eugene A. Guerra, Kodiak, AK
VE3IHM, Kalman Becsei, Toronto, ON
*VE3IZ, W. Al Porter, Toronto, ON
VE3KHH, Victor Valliere, Ottawa, ON
VE3LM, Louis Guy Eon, Ottawa, ON
VE3PN, Joseph A. Norton, Pakenham, ON
VE4GR, Henry Roth, Winnipeg, MB
VE5XW, Ian M. Wallace, Saskatoon, SK

*Life Member, ARRL

Strays

MARITIME MOBILE EMERGENCY MEDICAL SERVICE

☐ The Memorial Hospital Medical Center of Long Beach, CA, offers a new emergency service to Amateur Radio operators who are in contact with maritime mobile stations having medical emergencies. The hospital emergency department has agreed to accept collect calls from CA, NV, OR and WA amateurs at 213-595-2133.

QST congratulates . . .

☐ Bolivar E. Garaicoa, HC2BE, recent recipient of the U.S. State Department's Meritorious Honor Award medal.

At an AMSAT brunch for Harry Yoneda, JA1ANG (left to right): Bud Schultz, W6CG, AMSAT West Coast OSCAR controller; Jay Holladay, W6EJJ, ARRL Southwest Division director; and Colonel John Browning, W6SP, Southern CA DX Club, got together to discuss OSCAR matters. (*photo by Harry Yoneda, JA1ANG/N3AMW*)

Hamfest Calendar

***Florida:** The Treasure Coast Hamfest is March 22-23 at the Vero Beach Community Center. Prizes, drawings, QCWA luncheon. Admission $3 per family; $3.50 at the door. Talk-in on 146.13/73, 146.04/64 and 222.34/223.94. For info write P. O. Box 3088, Vero Beach, FL 32960.

***Florida:** The 10th annual North Florida Swapfest, sponsored by the Playground ARC, will be held March 22-23 at the Fort Walton Beach Fairgrounds. Admission $1 in advance; $1.50 at the door. ARES/NTS and QCWA meetings. For more info send s.a.s.e. to PARC, Box 873, Ft. Walton Beach, FL 32548.

Florida: The Martin County ARA will hold its annual Stuart Hamfest on Saturday, March 29, from 8-4 at the Knights of Columbus Hall, 6 miles southwest of Stuart on SR 76 at Gaines Avenue. Admission $1; swap tables $5. For tables, reservations and info contact Matt De Carlo, KA4GPY, 1900 Palm City Rd., 35-F, Stuart, FL 33494.

Georgia: The Columbus ARC will hold their annual hamfest March 8-9 at the Columbus Municipal Auditorium, U.S. 27 and 280. Free admission. Prizes. Table rental $5 per day. Free outside flea market. Overnight camping. Friday night set up and free parking available. Advance tickets from N4ATI, 263 Logan Ave., Ft. Benning, GA 31905. Table rentals from K4RHU, 2701 Peabody Ave., Columbus, GA 31904, Tel. 404-322-7001.

Illinois: The Libertyville and Mundelein ARS (LAMARS) will hold its annual hamfest on Sunday, March 23, at the J-M Club, 708 Greenwood Ave., Waukegan, IL. Doors open at 7 A.M. Large indoor facility. Food and drink. Seven-foot tables $4 each. Prizes. Tickets $2 at the door; $1.50 in advance. Talk-in on 52 simplex and local repeater, 147.03. Send s.a.s.e. for tickets or tables to LAMARS, P. O. Box 751, Libertyville, IL 60048.

***Indiana:** The Randolph County ARA will hold their hamfest from 8-5 on March 15-16 at the 4-H building in Winchester. Prizes, exhibits, speakers and flea market. Talk-in on 147.90/30, 52 and 223.30/224.90. Tickets $1.50 in advance; $2.50 at the door. Info from Hugh Life, W9VJX, 407 High St., Winchester, IN 47394.

***Iowa:** The 4th annual Hamboree, sponsored by the 3900 Club and Sooland Repeater Association, will be held Saturday, March 29, at the Oasis, Sioux City Airport. Entertainment, exhibitors, flea market, technical problems panel, cw contest, Novice meeting, 3900 club quarterly meeting, ARRL forum, dinner banquet. Advance registration including banquet $6.75; $7.75 at the door. Hamboree only (no dinner) $2. Write for advance tickets and motel reservations to: Lorcen Barbee, WBØYOW, 1518 W. 30th, Sioux City, IA 51103. Reserved tables $2 from Al Smith, WØPEX, 3529 Douglas, Sioux City, IA 51103. Talk-in on 37/97.

***Louisiana:** The Lafayette ARC will hold its hamfest Saturday, March 8, from 12-5, and Sunday, March 9, from 9-2, at the Scott Lions Club Building in Lafayette. Flea market tables $2 each. Saturday night banquet $10 a person. Ladies activities and tours. Prizes. Info and pre-registration from AARA, P. O. Box 51174, Lafayette, LA 70505.

***Maryland:** The Greater Baltimore Hamboree and Computerfest, sponsored by The Baltimore ARC and Calvert Hall, will be held March 30 at the Maryland State Fairgrounds, Timonium. Admission $3. Indoor flea market tables $5; outdoor tailgating $5. For info and table reservations contact Joseph A. Lochte, Jr., WA3LAD, 2136 Pine Valley Dr., Timonium, MD 21093, Tel. 301-252-8682.

Michigan: The Southern Michigan ARS, Calhoun County Repeater Association and the Amateurs of Marshall Schools will hold their 19th annual Michigan Crossroads Hamfest on Saturday, March 15, at Marshall High School. Doors open at 7 for exhibitors, 8 for the general public. Admission $1.50 advance, $2 at the door. Free parking, unloading help. Food service, prizes, forums and displays. Tables 50 cents per foot. For info and table reservations contact SMARS, P. O. Box 934, Battle Creek, MI 49016. Talk-in on 146.52 and 07/67.

Michigan: The Amateur Radio Public Service Association will hold their annual hamfest Sunday, March 23, at Glen Oaks Community College, Shimmel Road, Centerville, beginning at 7 A.M. Tickets $1.50 advance or $2 at the door. Tables $2. Prizes. Talk-in on 147.66/06 and 52. Info and reservations from Sharon Tilbury, KA8EGJ, 607 Oak St., Three Rivers, MI 49093, Tel. 616-273-8301, or Dave McClain, WD8RGR, 13926 Riverside Dr., Constantine, MI 49042, Tel. 616-435-7422.

Missouri: The Jefferson Barracks ARC will hold their annual hamfest and auction on March 14 at the Electricians Hall, 5850 Elizabeth Ave., St. Louis. For further info contact Vivian K. Scott, WDØEMS, 4121 Fabian Dr., St. Louis, MO 63125.

***Missouri:** The Central Missouri Radio Association will sponsor a hamfest on Saturday, April 5, at the Boone County Fairgrounds, Columbia. Advance tickets 2 for $5 or 5 for $10; $3 each at the door. Undercover flea market. Tailgate area. Prizes and forums. Buffet dinner Friday evening at Heritage House, $7 each. Talk-in on 146.16/76. For further info contact Hamfest Chairman, P. O. Box 283, Columbia, MO 65205.

***Nebraska:** The Midway ARC will hold the 1980 Midway Spring Ham Convention on March 29-30 at the Holiday Inn Holidome, Kearney. Ladies day, code contest, exhibitors, flea market, technical symposiums, ARRL forum, QCWA luncheon, State Army MARS meeting, Flying Hams breakfast banquet. For further info and brouchure contact Chuck Kemery, WØCRK, 3605 Third Ave., Kearney, NE 68847.

New Jersey: A ham radio and computer flea market, sponsored by the Chestnut Ridge RC, will be held on Saturday, March 29, at the Education Building, Saddle River Reformed Church, East Saddle River Road at Weiss Road, Upper Saddle River (new site). Tables $5, tailgating $3. No admission fee. Refreshments. For further info contact Jack Meagher, W2EHD, at 201-768-8360, or Neil Abitabilo, WA2EZN, at 201-767-3575.

***Ohio:** The Toledo Mobile Radio Association (TMRA) presents its 25th annual auction and hamfest on Sunday, March 23, at the Lucas County Recreation Center, Key Street, Maumee, from 8 to 5. Free auction at 10. Free day and overnight parking. Tickets $2 advance; $3 at the door. Flea market tables and displays are limited to electronics and ham gear. Exhibits, prizes and refreshments. Area repeaters are 146.01/61, 19/79, 34/94, 147.87/27 and 975/375. Talk-in on 146.52. For info write TMRA, P. O. Box 24, Temperance, MI 48182.

***Ohio:** The Lake County ARA will hold its 2nd annual Lake County Hamfest on Sunday, March 30, at Mentor High School. Over 20,000 square feet indoors, heated on one floor. Commercial and flea market tables available. Doors open at 6 for exhibitors and 8 for the public. Auction at noon. Prizes. Plenty of paved parking. Tickets $2.50 advance; $3 at the door. For further details send s.a.s.e. to LCARA Hamfest Committee, 37778 Lakeshore Blvd., Eastlake, OH 44094, or Tel. 216-953-9784.

Texas: The Midland ARC is having its annual swapfest Saturday, March 15, from 12-7 and Sunday, March 16, beginning at 8, at the Midland County Exhibit Building, east of Midland on Highway 80. Preregistration $4.50; $5 at the door. Talk-in on 146.16/76. Tickets and info from MARC, Box 4401, Midland, TX 79701.

Wisconsin: The Tri County Hamfest will be held Sunday, March 16, at the Jefferson County Fairgrounds, Jefferson. Advance tickets $1.50. Tables $2 in advance; 6-ft. space $1. Send s.a.s.e. to Glen Eisenbrandt, WA9VYI., 711 East St., Fort Atkinson, WI 53538, for info or reservations.

*ARRL Hamfest

Coming Conventions

March 22-23
Roanoke Division, Charlotte, NC

March 28-29
Great Lakes Division, Muskegon, MI

April 18-20
Missouri State, Kansas City, MO

May 16-18
New York State, Rochester, NY

May 24-25
Midwest/Central Division, St. Louis, MO

May 31-June 1
Kansas State, Salina, KS

June 7-8
Delta Division, Senatobia, MS

June 7-8
West Gulf Division, Dallas, TX

June 21-22
Georgia State, Atlanta, GA

July 5-6
West Virginia State, Jackson's Mill, WV

August 2-3
Louisiana State, Shreveport, LA

August 30-September 1
Pacific Division, San Jose, CA

August 31
Illinois State, Rockford, IL

September 5-7
Southwestern Division, Los Angeles, CA

October 3-5
New England Division, Boxborough, MA

October 10-12
Midwest Division, Lincoln, NE

November 7-9
Hudson Division, South Fallsburg, NY

ARRL NATIONAL CONVENTIONS

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

ROANOKE DIVISION CONVENTION

March 22-23, 1980, Charlotte, NC

The 1980 Roanoke Division Convention and annual Charlotte Hamfest will be held March 22-23 in the modern Charlotte Civic Center. With over 140 commercial booths and a tremendous flea market area, you will be treated to the ultimate in indoor hamfest enjoyment and comfort. Major equipment manufacturers will host technical programs throughout the entire two-day event. Come see the latest in equipment from all leading manufacturers.

As last year, the DXer will find an agenda featuring programs on the latest DXpeditions and operations from all over the globe. Charlotte is noted for its large DX-oriented format, and you will find it "better than ever" in 1980.

Forums will be presented on numerous technical topics, a follow-up program on WARC and a multitude of programs related to the ARRL Communications Department on

emergency-preparedness and traffic-handling activities. The Carolinas-Virginia Repeater Association will also provide several programs of special interest to repeater users and clubs.

The FCC will be at the Convention on Saturday administering examinations — no appointment required.

Interested in getting involved in computers, seeing demonstrations and attending programs on applications? You will have your chance in Charlotte in March.

Convention headquarters will be in the adjoining Radisson Plaza Hotel. Contact the Radisson immediately for reservations and ask for the special Hamfest discount — 2 NCNB Plaza, Charlotte, NC 28202, Tel. 704-377-0400. Several other motels in the convention area are also featuring special discounts.

Registration for the convention is $3.50 in advance, $4.50 at the door. Children 12 and under admitted free. Flea market tables are $3 each for the two-day event and may be purchased in advance or at the door. A wide variety of prizes will be awarded all during the convention.

For more information or preregistration, write: Charlotte Hamfest, W4BFB, 2425 Park Rd., Charlotte, NC 28203.

GREAT LAKES DIVISION CONVENTION

March 28-29, 1980, Muskegon, MI

The Muskegon Area Amateur Radio Council once again sponsors the ARRL Great Lakes Division Convention and Hamfest at Muskegon Community College, a facility with free parking for over 2000 vehicles, dining/cafeteria service and clean modern facilities. Friday evening, March 28, at the Muskegon Holiday Inn, the "Ham Hospitality" is open to all. Also at the Inn, at 11:00 P.M. there will be a film presentation of the Spratly and Brunei Island DXpedition by Bob Schenck, 1S1DX. The Wouff Hong initiation will be put on by the MAARC Players at midnight.

Saturday, March 29, at the Muskegon Community College, doors/registration open at 8:00 A.M. The event features many technical forums, annual net meetings, commercial exhibits and large swap and shop. Besides the ARRL Forum and other special sessions, Bob Schenck will again present the Spratly and Brunei DXpedition.

MAARC has made great efforts to present a varied and interesting ladies program featuring demonstrations of crafts, luncheon at Muskegon Mall, hospitality room during the day of convention and an opportunity for the gals to see what others have done during the year.

Saturday's tickets are $2.50 each. No advance or mail ticket sales. Swap and Shop table space may also be purchased on Saturday. Advance registrations are required for the Saturday evening dinner program with guest speaker John Lindholm, W1XX, ARRL communications manager.

Overnight reservations should be made directly with the Holiday Inn, Ramada Inn or other motel in the greater Muskegon area. For additional information write to MAARC, P. O. Box 691, Muskegon, MI 49443, or contact Club President Clarke Cooper, K8BP, at 616-865-6198. QST

50 Years Ago

March 1930

☐ The lead article, "Frequency Standardization," tells about the new General Radio Co. primary frequency standard now available. Authors J. K. Clapp (the 1948 inventor of the high-stability series-tuned Colpitts) and John D. Crawford tell about a system based on a 100-kc. crystal oscillator and divide-by-ten multivibrators that drive a (not-60-but) 1000-cps clock. The clock is checked against the precise time signals broadcast by the Naval Observatory, based on star time. Elaborate two-stage temperature stabilization was required (the exotic crystal cuts of the '70s had not yet been discovered).

☐ Editor Warner's editorial spelled out the need for considerably better frequency measurements by amateurs, citing the disgraceful out-of-band violations on 40 and even 80 meters. (In those days there were relatively few crystal-controlled ham stations, and most frequency "measurements" were based on staying away from commercial stations.)

☐ Bev Dudley's extensive "how-to" technical article on 14-Mc. phone — a.m., crystal control, Class-A "Heising" high-level modulation — described several blind alleys before the satisfactory result: push-pull 210s delivering a stable 10 watts output on 20 meters. The modulator was two 250s in parallel.

☐ George Grammer's meaty constructional article described winding receiver plug-in coils on old vacuum-tube bases and making neat transmitter coils with copper tubing.

☐ Rodimon, W1SZ, recounted experiences with the newly announced electrolytic capacitors ("condensers" in those days) and how to series-connect them for higher-voltage use. The secret, like 50 years later, was the use of resistance voltage dividers. The electrolytics had a maximum rating of 425 volts, and it was emphasized that they were "self-healing" (which tells us something of the popular approach to ratings observance).

☐ A. L. Budlong listed in the IARU column the recipients of the WAC award during its first year, 1926. Thirty-five certificates were issued, 18 to USA amateurs and one to a Canadian (Assmussen, NC4GT).

☐ Potential hi-fi buffs read a detailed description by George Fleming of the direct-coupled Loftin-White circuit. With a bit of neutralization the response could be made flat from 30 to 10,000 cps. (No mention of what loudspeaker to use!)

25 Years Ago

March 1955

☐ Buchanan tells about his "W3DZZ Multimatch Antenna" that offers an acceptable SWR on bands 80 through 10 meters. It uses a single tuned circuit in each half. His beam version of the principle is the (now) familiar tri-band beam.

☐ Jensen, WØMIQ, describes a compact 20/40-meter two-element beam using relays to switch the center loading coils. Fanned elements contribute to the bandwidth.

☐ One of the great buys in WWII surplus is the BC-453 190- to 550-kc. receiver. Thomason, W4SUD, describes how to revise it slightly and add a crystal-controlled converter to furnish an excellent mobile receiver for 40/80-meter a.m., c.w. and ssb reception. An interesting observation is that unsatisfactory image rejection when testing with a large antenna disappeared when the center-loaded whip car antenna was used. (Nothing like having more selectivity!)

☐ McCoy, W1ICP, describes the simple resistance bridge for indicating minimum SWR, and the Recent Equipment section reviews the latest Jones "Micromatch" that reads forward and reflected power at high levels. The original Micromatch described in *QST* by Jones and Sontheimer was the first in-line SWR indicator. (Sontheimer, in the late '70s, introduced the food processor "Cuisinart" to the U.S.)

☐ Also in Recent Equipment is a description of the B&W 5100 Transmitter and its companion 51SB Sideband Generator. The 5100 is an 80- through 10-meter transmitter with the VFO in the 160-meter band, followed by frequency multipliers and driving a pair of 6146s. On a.m. a pair of 6146s supply the audio power. For c.w., the second buffer stage following the VFO is keyed. A low-pass filter is included between the pi-network output and the antenna terminal, as one might expect with a Class-C output stage. The 51SB Sideband Generator uses the phasing system of sideband generation. When properly interconnected, it takes r.f. output from the multiplier string, generates the ssb signal at output frequency and pipes it back to the grids of the rf output stage (now running AB1). (Relative newcomers to ssb who know only the filter system and heterodyning for band changes might well be interested in this description of an interim design in the history of amateur ssb.)

☐ Hidden-transmitter hunts on 10 meters is a popular activity among mobile hams. Duncan, W7OTA, shows his effective loop and variable-sensitivity S-meter arrangement. From another section of the country, Amfahr, WØWLR, describes a unidirectional loop that shortens the mileage required to find the "fox," since the need for triangulation is eliminated. — *W1DX* QST

Strays

BARC ASSISTS WITH MARATHON

☐ The Baltimore Amateur Radio Club (BARC) provided communications for the Maryland Marathon held in Baltimore on Sunday, December 2. Club members braved semi-frigid temperatures and gusty winds to give radio coverage for the 26-mile race. Using the club's 34/94 repeater, club members, organized by F. (Chappy) Chapelle, KB3BJ, and net-control operator Bruce Strem, WA3KZF, covered the course at the 3-mile, 6-mile, 9-mile turnaround and finish-line checkpoints. BARC members also rode with race officials and supply vehicles providing communications coverage for this event. — *Howard Buckholtz, N3ARL*

OLD OLD TIMERS CLUB QSO PARTIES

☐ OOTC CW Party will start February 12 at 2300 UTC and end at the same hour on February 14. The phone party will begin at 2300 UTC on February 22 and continue for 48 hours.

Amateur Radio can be a fun, family affair. Brian, son of Mitch, WDØCHE, and Linda Vitko, WDØCHF, of Surry, ND, likes to listen to Morse code and watch the signal patterns presented on the oscilloscope. This "NODAK" family enjoys nice, warm indoor sports during the long, cold winter months. *(photo by WDØCHF)*

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

Our Forgotten Bands

Well, not quite, but many of us have been neglecting our higher bands in favor of 6 meters during these last few months of phenomenal propagation. This is not too surprising, since our lowest-frequency vhf band has been so good and many consider winter to be the doldrums for the higher frequencies. But spring is on the way and along with it lots to look forward to: the promise of better weather for antenna work, improved tropo conditions, the imminence of auroral propagation and the distinct possibility, on 2 meters at least, of Es come May, June and July. No, I'm not suggesting that we abandon 6 meters. There are lots of interesting things to do on that band in the months and years to come, but we do need to increase our activity on 2, 1-1/4 and 70 cm. In many parts of the country, activity is down on these bands over what it was a year or two ago. Either people have been spending their time on 6 or the hf bands which, like 6 meters, have certainly benefited from this period of high solar activity, or, they have taken up new hobbies altogether. Maybe home computers are the culprits. As I have noted in these pages before, many useful things can be done around the ham shack with computers. So I again urge those who we may have lost to the boxes with the flashing lights: When you get tired of playing tic-tac-toe or Star Trek, give some consideration to what your machines can do to increase your enjoyment of your first love, Amateur Radio.

No matter what the reason for straying, let's all resolve to spend a little more time on the forgotten bands in the months to come. Get back into the nets, or start one. Set up some long-haul skeds or just get on and ragchew, whatever your preference might be. But whatever your favorite vhf pastime, become active again. You'll meet a lot of new, interesting people and renew acquaintances with many old friends. And, you'll have fun doing it. See you on the bands!

VHF SS SUMMARY

For two weeks preceding the VHF Sweepstakes wide areas of the country experienced excellent tropo. On the previous weekend 6 meters was wide open for two days of Es and some F2. Even 2 meters had a brief burst of E skip. Nevertheless, by the time the VHF SS rolled around, conditions had settled into their usual January state.

The 6-meter gang had to eke out the sections on scatter. Tropo, on all bands, was only fair — not the worst ever, but hardly good. Aurora put in a brief appearance on Sunday evening, but it too didn't amount to much and figured little in the scores. So, what many of us were hoping would be a riproaring contest turned out rather average. One thing about a contest with conditions like this — it sure shows what can be done under normal conditions with good stations and reasonable operating ability. Flat conditions or not, activity was quite high, at least in the eastern part of the country. This contest has always had the reputation for generating high participation. Better luck on conditions next year.

SPRING VHF QSO PARTY

With the announced purpose of filling the gap between the VHF SS, in January, and the June VHF QSO Party, the Ramapo Mountain ARC is sponsoring a vhf contest March 29 to 31. See "Contest Corral" on page 98 for additional details.

ON THE BANDS

6 Meters — As this is being written, just prior to the VHF SS, F2 propagation is continuing, although not at the same level that prevailed in November and December. The second half of December was quite a disappointment, especially for those of us who were off work for the holidays. But we didn't expect a lot from December and the first half was a pleasant surprise. The last few days in the old year did pick up, with openings to the south apparently caused by disturbed geomagnetic conditions. The "A" index was up to 23 on December 29. The FY7THF beacon was in for several mornings, usually peaking around 1300 UTC. FY7AS was worked by many eastern U.S. stations, including this conductor. JA1PIG/PZ and HC1JX also made a number of contacts. But this is the winter Es season and F2 wasn't all the band had to offer. December produced several winter-type openings. The surprise came the first weekend in the new year. When I arrived home from work Friday afternoon, January 4, the band was open to the southern Midwest. In company with WD4MUO, in the VA suburbs of Washington, who had just picked up a new IC-551 and was feeding it into a 5/8-wave, 2-meter vertical, I held an hour-long three-way with K8JRM/5, OK. I call that a solid Es opening for any time of year. The summertime-type skip continued Saturday and throughout most of Sunday. There were even numerous double-hop contacts reported. Sunday evening it became intense enough to reach 144 MHz. See the 2-meter section for more on that. To keep everyone busy, the Es was mixed with F2, producing crossband contacts with Europe in the mornings and afternoon breaks to the West Coast. Sometimes it was hard to tell whether F2 or double-hop Es was responsible for the transcontinental signals.

In a recent letter, W1HDQ raises the question that has been bothering many of us. Why was it that transcontinental openings all but vanished in the second week of December as conditions between North American and Europe peaked producing raucous video from Europe for hours each morning and the muf reached 60 MHz? When someone figures it out, let me know. As evidence of the high muf, Ed quotes Smitty, G8KG, operator at G3SSO, as receiving the Bangor, ME, channel 2 sound at 59.75 MHz and also channel 3 video on 61.25 from an unknown source during that period.

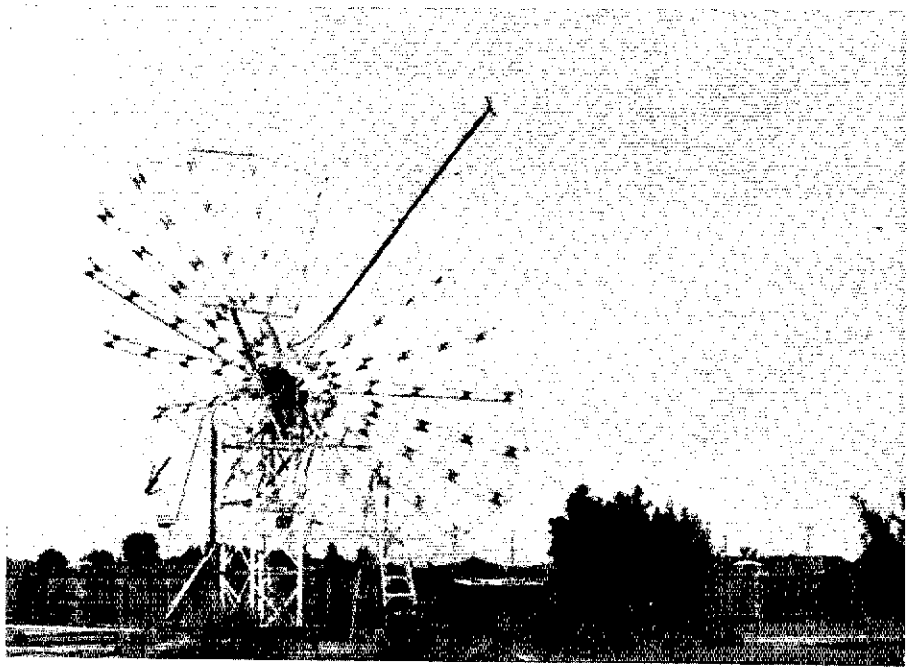
One of the new stations operating on 6 meters, and one especially sought after, is TF3SG. According to AC1T, Sveinn received a temporary permit to operate the band December 13. John believes he was the first to work the Icelandic station, completing a cw contact at 1640 UTC on December 16. A few days afterward, VE1AVX had an exchange on ssb. But the first big break came the morning of January 8, when a number of East Coast stations were successful in putting the new country in their logs. Another new one for many was W5DZF/C6A. Scotty picked the right weekend to go to the Bahamas. He worked some 100 stations that great weekend of January 5 and 6, including VE7SI on F2, and a number of 7s in AZ, probably via double-hop Es. For those wishing cards, his QSL address is Jeff Scott, 1307 Kasim St., Opa-Locka, FL 33054.

One of the interesting facets of conducting "The World Above 50 MHz," particularly during this period, is the opportunity it affords to see copies of so many logs. Among those regularly submitting copies of their logs are N6CT and K6PHE. All material giving details of various kinds of openings are being preserved and will be available to those who may wish to conduct studies in the future. One particularly interesting log is that of KØGUV, northern MN. Ed's log, which was forwarded to me by WØQIN, shows one day, November 18, in which KØGUV and WØQIN participated in a marathon roundtable via direct F2 and backscatter which lasted from 1830 until 2040 UTC and involved stations from OH to HI. Included were such stations as K8AT, AH6AP, KH6NS, VE5LY and XE2BC, to name only a few. On the following day, Ed's log lists a string of 49 JA contacts. The sight of all of those Japanese calls sure makes an Easterner's mouth water!

I must end this section on a sour note. I have received many complaints, some over the air and some by letter, of the continuing practice on the part of some who repeatedly call a rare station they have already worked to say "how nice it is to work you again" or "I received your QSL card, thanks a lot." This kind of thing may be all right on the hf bands where propagation is likely to continue for some time to come. But on 6 meters, where it is a fleeting thing, such repeat calls may well deprive others of their only chance to work the station or country. So, please, unless you are sure that the DX station is not getting answers, don't call him if you have already worked him. The same may go for a different station that you have worked in a particular country. Please use a little judgment, and give everyone a chance.

2 Meters — Would you believe that the major 2-meter stories for late December and early January would be tropo and Es? Unusual but true. For Christmas and several days following, Santa brought a first-class tropo opening to a large portion of the country. K9EFX, Valparaiso, IN, reports contacts with WØKRX MN on Christmas Eve, W2DRZ WNY and WA4VWR TN two nights later and then, on the 29th, John worked K3HFI, WPA, K2TXB WNY and WA8QMK WV. The following morning he added another WV station, K8UC. Heard, but not worked, were W4GJO GA and K5CZO AR. Altogether, 13 states were worked during the week using a TV-2B and 15-element HY-Gain antenna. More news on this session can be found in the 70-cm section. That Es session described in the 6-meter section put in an appearance on 2 meters as well. For about 30 minutes, centered around 0000 UTC January 7, many stations took part in a rare winter E-skip session. WB5LUA near Dallas reports contacts with WA4LBT and WA4ZIA NC, WA4HHP and W4ATC VA, WB2DIN/8 WV, K8AXU OH, K3ARN MD, K3MKZ PA and KØIE/2 NY. In addition to WB5LUA, WB2DIN/8 snagged TX stations K5GW and WB5ERD, along with WB5LFV OK. The latter was running just 45 watts but, nevertheless, was putting in

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.



The 24-foot dish used on 70-cm EME by W6ABN. It can also be aimed at the horizon for tropo work.

an S9 plus 20-dB signal at Bob's Martinsburg, WV, QTH. Several 10-watt-class stations here in the Washington area did well also, among them K4LHB and W3OTC. Both Thom and Bob worked WD5CAN, AR.

The Geminids shower was productive for WØRT, netting Rick state number 30 in the form of KØALL, ND. Also contacted were W2PGC, NY and VE3UH. Needed now are skeds with Western states. Those wishing to try may call 316-421-4913. He says EME is next. W2PGC landed three new states, bringing his total to 37. In addition to WØRT, Sam contacted WA4CQG, AL and WB5LBT, LA.

KØRDF, ND is back on after an absence. A kW is already going, with EME capability to follow by spring. Those desiring skeds should call 701-859-5285.

The latest to claim contact with all 50 states is WØRWH. Don accomplished this feat in just 27 months.

From Poland, SP2GGZ informs us that he is operational on 2-meter EME. So far he has heard WBØQMN, K1WHS and K5GW. Those wanting skeds can contact him as follows: Waclaw Miler 81-703 SOPOT, Wladyslawa IV 6/8, M-1, Poland.

W4WWQ's OVS report states that tests are scheduled in April involving amateurs and installations within the National Radio Quiet Zone (NRQZ). Amateurs are assembling quite an array of equipment. Pete explains that installations in the zone have reported interference thought to result from amateurs. Those reporting the interference have not been able to identify any calls, however, hence the tests.

70 Cm — It isn't often that tropo forms a major portion of the 70-cm news during the winter months, but this has been an unusual winter for vhfers in a number of ways. WB9SNR, near Chicago, reports a tropo opening worthy of September which visited the Midwest in the waning days of 1979. Jim says that between December 27 and 29, his part of the country was under the influence of a high-pressure system that produced very loud 70-cm signals, if not super DX by warm-month standards. Nevertheless, he overheard KØVXM, SD, provide that hard-to-get state to a number of IN and OH stations. In addition to working KØVXM, WB9SNR contacted quite a few new 70-cm stations, many running 10 watts or less but, nevertheless, putting in S9-plus signals. Among these were KB8GU near Cleveland, KØCNS in the St. Louis area, K9CIS, Decatur, IL and W4AUZ Lexington, KY. As testimony to the strength of the opening, Jim notes receiving TV channel 48 from Huntsville, AL, on an indoor antenna. A few days later, the East Coast was the beneficiary of some quite good tropo conditions also, although not the super signals that the Midwest enjoyed. On January 2, the regular Wednesday evening 70-activity night, K2RIW and N2MB were putting excellent signals into the Washington area. This conductor enjoyed a fine ragchew with both of them. W3IWI, who was trying out his new QTH on 70 cm for the first time, also joined in. In Tom's shack was house guest ZL1AOX who, being a 70-cm operator in his home country, was quite interested to observe, first-hand, the state of affairs here.

The following moonbounce tidbits are lifted from the monthly "432 EME Newsletter," published by K2UYH. ZL3AAD, reported active a few months ago, is doing well indeed. Graham has now completed contacts with K5JL, VE7BBG, I5MSH, JA6CZD and K2UYH. Nevertheless he is not satisfied with his station's performance and plans to expand his array to 16 Yagis before long. Skeds with European stations are particularly desired. After being out of town for several weeks, SM6CKU was pleasantly surprised when he fired off a CQ and was answered by VK5MC. This contact completed WAC for Ben. Others worked in the ensuing days included LU3AAT, K5JL, K2UYH, JA6CZD, G3WGD, YU2RGC, W1YU, K3NSS, W7GBI and F79WARC, a special call being used by F9FT. An ssb exchange was completed with K2UYH. Speaking of ssb via the moon, W1JR believes that the better-quality stations are that way because of lower distortion, which means that they are putting more of their energy where it can do the most good. [Just sounding better should make them easier to copy under weak-signal conditions also — Ed.] K5JL reports greatly improved receiving since he replaced his trusty 648 preamp with one using a DEKEL GaAs FET. The new unit provides a noise figure of 0.4 compared to 0.8 for the former setup.

Operationally, the big news was K2UYH's DXpedition to DE. Using his portable, 20-foot stressed dish, complete with polarization rotation, Al contacted 14 stations in just a little over seven hours while operating from the QTH of long-time 70-cm stalwart W3CGV. K2UYH was assisted in the project by W3CGV (whose hospitality he praises highly), W3HQT and KB2AH. The lucky stations to salt away a DE contact were: I5MSH, F9FT, DL9KR, W4WD, VE7BBG, K5JL, WB5LUA, KØTLM, W5FF, W7JF, W7GBI and WA7BBM. Also worked were two stations that hardly needed a DE contact. These were K3NSS and W1JR. But it was nice to QSO them, nevertheless.

The December "EME Newsletter" contains information on an interesting preamp which looks quite simple to build. It uses an SK-98 and is said to yield a noise figure of 0.8. An s.a.s.e. to me will bring details. QST

Strays

QST congratulates . . .

☐ Shelby Ennis, W8WN/W4WNH, of Clio, MI, who was recently presented the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's public service award for his outstanding work in storm preparedness and public safety. Shelby was instrumental in the organization of the Genesee County Radio Emergency Services (ARES) spotter group and in the expansion of this network to over 300 Amateur Radio club members in a 10-county area.

Keith Kaiser, WAØTJT/Ø, of Burnsville, MN, had the opportunity to operate "ladder-sled mobile" following a recent repeater-antenna maintenance chore. Taking a ladder down a steep ice- and snow-covered hill led to this energy-saving form of transportation. *(photo courtesy WAØTJT)*

The Tri-County (WI) ARC presents annual scholarships to electronics students from the Tri-County area. The 1979 winners are Douglas Folts (left center) and Thomas Strom (right center). Club officials shown presenting the awards are (left to right) Ron Virnig, vice president; Norman Folts, president; Doug and Tom; Dr. K. N. Walters, treasurer, and Glen Eisenbrandt, scholarship committee chairman. *(photo courtesy WA9SAB)*

YL News and Views

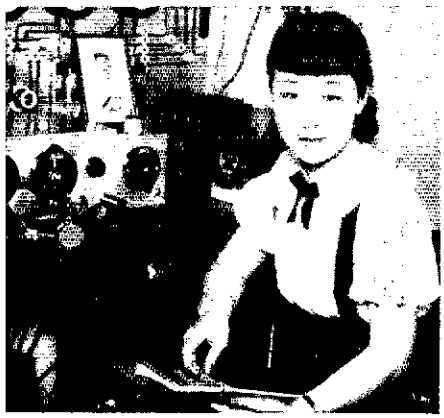
Conducted By Jean Peacor,* K1IJV

Seeking Out the Olden and Golden

The search is on for the YL among us, still active, who has been licensed the longest. As the search progresses, some exciting stories from those older and wiser are and will be forthcoming as tribute is paid to many YLs for their many years of service in the Amateur Radio ranks. As these stories unfold, keep remembering "the good old days." They had a charm and excitement that will always be cherished.

Japan's Grand Old Dame

Katashi Nose, KH6IJ, kindly submitted news of "The Grand Old Dame" of Amateur Radio in Japan, not even knowing that a search was on. She is Mrs. Chiyono Suzuki, JH1WKS, affectionately known as Suzy. Suzy is the only woman member of the "Old Timer's Club of Tokyo."



Suzy, JH1WKS, Japan's first woman Amateur Radio operator, in her 1933 station. *(photo courtesy KH6IJ)*

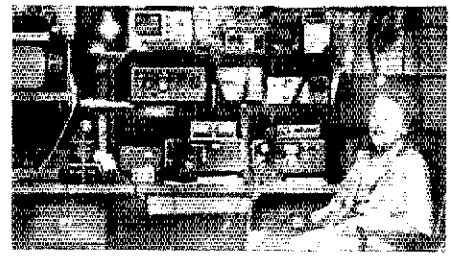
J1DN was her deceased brother's call sign, which she inherited in the early '30s. She consented to a proposal of marriage only on the condition that she be allowed to continue her interest in Amateur Radio. Such a stipulation, unheard of in Japan in those days, made unique newspaper headlines at the time.

When the J1 prefixes were abolished in the '30s, Suzy became J2IX, then later JH1WKS. Today her shack, located in a corner of her home in Odawara, about 100 miles south of Tokyo, is sometimes the meeting place of the Old Timers.

Suzy really is an OT, having been the first woman Amateur Radio operator in Japan.

Involved and Ionized

Meanwhile, back in St. Louis in 1934, Ernestine Seybolt and another YL joined about 150 OMs at the FCC office to take an Amateur Radio license examination. Both YLs passed the exam and Ernie became W9GXM. She quickly learned to inhale coffee while her Patterson PR-12 inhaled 160 meters most of the night. Her words of wisdom were given over a double-button mic hooked to a homebrewed transmitter.



Ernie McMasters, W4KOH, was first licensed in 1934.

A decade passed and at the beginning of World War II Ernie was a lieutenant in the CAP where she was a code instructor. Later during the war, she became the only delivery manager who wore a skirt for Van Hoffman, deliverer of Bell System phone books. It was then that she met a Western Electric engineer, W4BCZ, and became Mrs. Philip McMasters.

After much travelling, they settled in Key West, FL, where Ernie attained her now well-known call of W4KOH (Kind Old Ham). She befriended Blanche Randles, W4GXZ, YLRL's present president, and together they became charter members of Floridora YL.

When 10 meters was opened for ham use, Ernie used an RME-45 and a custom-built rig hooked to a WECo salt-shaker mic, complete with baffle. Now, at Lake Placid, FL, she uses an SBE-33, FT-101B and Omni-D Series B to drive the amplifier, controlled by a TRS-80, level II 16-k, an FRG-7 plus 2-meter equipment. How well she knows that things are a bit different from where she started it all, in St. Louis, in 1934.

With two of their three sons very involved in electronics, one being WB8ZED, she'd been not only involved but ionized by electronic gadgets for many years. To quote Ernie, "I have to keep up in order to understand what our sons are talking about with the OM."

Tune for the Blue Spark

Prior to the '30s, Ridgewood, NJ saw the birth of a YL radio operator when Dot Chapman, a high school sophomore, became 2BY in April, 1927. The June 1927 edition of *Amateur Radio Stations in the U.S.*, published by the U.S. Department of Commerce, listed Dot as the only YL, at that time, in the 2nd District.

She soon met "her Elmer," 2BBB, who helped her build a transmitter and receiver, since one could not go out and buy them in 1927. Each unit was laid out "breadboard" style, meaning no sides or top, just an inch-thick piece of wood with the parts screwed to it and soldered together with bell wire. As everyone did at that time, Dot used a Quaker Oats carton wound with heavy copper wire to make the transmitter coil. This allowed her operation on 40 meters, cw only, as was true for all other hams she knew. Her first transmitter used a 199 receiving tube with an input of about 5 watts. Then she went to high power, about 15-watts input, using two 210 tubes in a tuned-plate, tuned-grid (TPTG) "push pull" circuit, with an ac note of course. Her receiver was a three-circuit tuner with two-stage af.

Horsetrading a young neighbor out of his model train step-down transformer gave Dot her first filament transformer. She also had a large relay placed on a lower shelf below the rig. This relay often would stick in the middle of a QSO. That's when she'd take to the floor to push its contacts back and forth with her fingers to send code and complete the QSO.

One called CQ for long periods of time in those days with no answers. No VFOs existed, so operators just tuned from one end of the band to the other listening for responses — it made for very long calls. Many is the night that Dot burned the midnight oil talking with other "boiled owls." She used a long-wire Zeppelin, end-fed to her transmitter. Tuning was simple — a large variable condenser with a large vernier dial was tuned until a blue spark jumped out to a pencil held near the coil. Then the operator knew that there was some output to the antenna.

Dot Saunders, W4UF, received the QCWA 50-year certificate in 1977. *(photo by W1SX)*

Just this past summer, W2CVF sent Dot a copy of her QSL mailed to him in October 1928. Although her call 2BY had no official prefix at that time, it was common to add NU in front of the call; N for North America and U for U.S. The W calls became official a couple of years later.

Dorothy Chapman Saunders is now well known to so many as W4UF and lives in Vero Beach, FL. QCWA awarded her with their 50-year certificate in 1977, when she celebrated her golden year as an Amateur Radio operator.

The search will continue and as it does, it's a definite privilege to share these facts. Not only does it take us back a bit, it lends a greater appreciation to what we have at our fingertips today. QST

*Country Club Dr., Monson, MA 01507

Results, 1979 IARU Radiosport Championship

The competition keeps increasing!

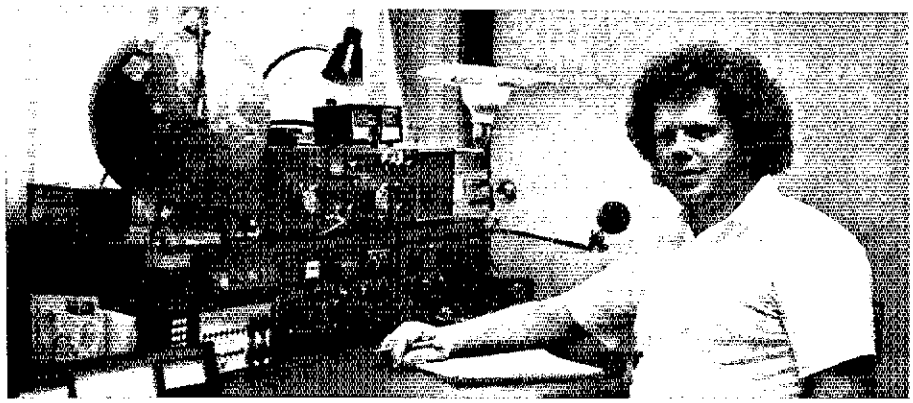
By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI

In retrospect, the Radiosport Championship, sponsored under the auspices of the International Amateur Radio Union (IARU), might have been overshadowed by the preparations that the member IARU societies were making for the World Administrative Radio Conference (WARC) of 1979, which at the time of the contest was just a few short months away. WARC, of course, is the conference held every 20 years where the radio frequency spectrum is "divided up" among the different users, worldwide.

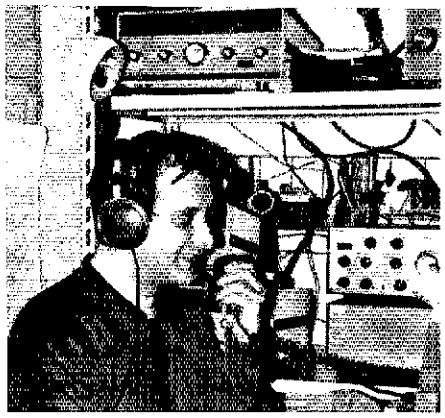
We like to think that those operators who participated in the third annual IARU Radiosport Championship, held 14 and 15 July 1979, would not mind if we dedicated the results of this contest to those who worked so diligently on behalf of the world Amateur Radio community, through their IARU chapters, to help make the WARC so successful. Successful at least in the regard that Amateur Radio's position as a worldwide service was very firmly established. Amateur Radio's positions in the rf spectrum have been ably represented through the long hours and hard work of these IARU stalwarts. Thanks.

Radiosport III appears, at first glance, to be nearly a carbon copy of the 1978 contest. Of the 1513 logs received, 571 were from the U.S. and Canada and 942 from the rest of the world, as compared to 1467 entries (599 U.S./VE, 868 DX) in 1978.

Looking at the scores, top-10 listings on all modes are filled with familiar call signs from the 1978 contest. LU8DQ repeats as the top cw



AA6DX, number two, mixed mode in zone 6.



I2MQP, top phone-mode-only from Italy.

Top Scorers

Phone and CW				*Phone*			
ZL1ADI	2,015,384	3031	136	VP2ML	1,511,880	3560	120
G3FXB	1,502,875	2485	125	K7RI	1,380,080	3362	104
VE7CC	1,277,822	2871	118	5L2AV	1,333,644	2602	103
UA1DZ	1,093,064	2029	123	UB5WE	1,172,626	2813	91
UB5MCS	1,086,512	2129	112	UR2QD	891,204	2229	92
WB5NXH	953,042	2394	113	W9RE	804,843	1806	117
W1NG	874,104	1662	132	HA5NP	804,816	2018	92
UY5OO	865,278	1909	106	KP4EHP	763,920	2595	90
N3RD	860,860	1894	110	WA1TFF	663,612	2058	102
VE7CMK	852,235	2201	105	HB9BAM	631,722	—	89
CW				*Multioperator*			
LU8DQ	1,386,948	2267	123	CK7WJ	2,870,544	4628	158
UP2NV	1,075,522	2166	119	VK8BG	2,847,564	3523	166
K1KI	947,702	1578	139	UK2GKW	2,325,862	4192	121
UR2QI	760,084	2049	94	UK1AAA	1,935,076	3079	143
W1RM	725,040	1635	114	UK2BBB	1,908,012	3169	141
N2LT	720,120	1680	102	DT7DK	1,860,093	3744	113
UA4WPX	682,180	1413	115	UK5MAF	1,795,955	3521	115
W1RR	657,459	1749	99	UK2PCR	1,786,722	3222	133
N4KG	631,444	1443	113	KL7D	1,575,385	3273	115
K6LL/7	621,716	1836	94	G3XBN	1,526,294	3036	106

Multiplier Leaders

Phone and CW	*Total*	*160*	*80*	*40*	*20*	*15*	*10*	*6*	*2*
ZL1ADI	136	3	4	27	48	34	20	—	—
W1NG	132	1	13	18	43	33	22	1	1
G3FXB	125	3	14	17	41	33	16	—	1
UA1DZ	123	6	10	18	42	39	7	—	1
UA9MS	120	—	10	15	39	35	11	—	—
CW									
K1KI	139	—	14	25	47	36	16	2	—
LU8DQ	123	—	12	27	30	31	23	—	—
UP2NV	119	6	10	15	40	34	13	—	1
UA4WPX	115	—	9	20	41	36	9	—	—
W1RM	114	3	11	14	39	34	12	—	1
Phone									
VP2ML	120	1	12	13	35	33	26	—	—
W9RE	117	1	7	15	39	40	15	—	—
K7RI	104	—	7	15	42	30	10	—	—
5L2AV	103	—	6	9	34	29	24	—	1
WA1TFF	102	—	6	16	37	28	15	—	—
Multioperator									
VK8BG	166	1	6	8	52	47	44	5	3
CK7WJ	158	3	15	26	51	45	14	2	2
N4WW	148	3	14	21	46	40	23	—	1
UK1AAA	143	7	11	16	48	50	10	—	1
UK2BBB	141	5	14	24	49	38	11	—	—

that there were more stations to be worked with fewer operators willing or able to submit an entry. Contrary to the received figures, interest in working the Radiosport is growing. Witness the rather large jump in the number of multipliers (see the multiplier-leader box) available. We dare say that the FB conditions as we approach the peak of solar cycle 21 (what, no solar flare this year?) were what really made the high bands productive multiplier hunting grounds.

Three new members joined the IARU during 1979. The addition of the Fiji Association of Radio Amateurs (3D2), Cayman Radio Society (ZF) and Amateur Radio Club of Tonga (A3) brings the total to 107 members.

One of the keys to running up a big total in this contest is the multiplier total. Unlike many other worldwide contests, the multiplier is particularly important in this one. For example, top scorers have totals of about 2000 QSOs and 110 multipliers, meaning that one multiplier is worth 19 QSOs. Rather than working 50 stations per hour, if you could find three new multipliers, your score would have increased more. In other DX contests, a ratio of about six QSOs to one multiplier is average, making it more worthwhile to concentrate on QSO totals.

Those who ran up the big multiplier totals had to spend extra time at sunrise and sunset to catch the rare ones, to endure the QRN on the low bands, and the limited summertime 10-meter openings. Twenty and 15 meters proved to be the bands to run up big multiplier totals, with 24-hour DX.

SOAPBOX

Almost made myself a crispy critter while fixing an 1100-foot-long beverage antenna during an electrical storm. AA3B nearly got a new hairdo moments later when lightning came down the rotator cable. Amidst the confusion of blue light and deafening arcs, we were sure that the dreaded Wouff Hong had arrived (The K3FD crew). Thirty six hours seems like a long time. I must be getting old. I ran across KA2DX, zone 45, calling CQ — with no luck — a victim of the new call assignments (K9NE). Last year on contact number seven, only five minutes into the contest, my finals went. This year I didn't even plan to participate . . . 33 hours and over 1000 QSOs later, I was still in there. The scoring format is interesting and motivates the participant to search for multipliers and DX QSOs. On the other hand, when conditions go to pot, you can still get in some stateside activity (KB8EC). This was my first international contest. I could only work about 22 hours on the high bands. However, I was able to make contacts with many DX stations and worked two new ones towards my DXCC, using only 300 watts and a homemade ground-plane antenna for 14, 21 and 28 MHz (I5JFG). Great contest, but I still deplore the many "5-9" reports. Too many "repeat info" four or five times QSOs. What happened to honest reporting in contests? (N4UH). I am appreciative of the fact that this is the only contest in which a maritime mobile station may participate. Wunderbar . . . the ships antenna amplifier system has a trap that is very effective for only 15 meters. The captain requested me to make the maximum operation on that band and to limit my time on 20 and 10. Thus my multipliers are way down on 10 and 20 meters . . . Hope some year to be in a zone that has no land areas in it, making me the only multiplier there . . . that would be worth a 30-hour effort instead of the less than 14 hours that I was on this time out . . . Am looking forward to many more Radiosport Championships . . . P.S. also got my own zone without working the captain, whose rig is in the cabin next to mine, Sea Room . . . not sporting to do so Hi! (WA7ZLC/nnm Region 1). Worked at a real disadvantage — borrowed rig and inverted Vee antennas. Saturday morning, WB6WWY brought over some RG-58 and I got a vertical working. It didn't really help except to get me two extra "qs" on 10 meters and a couple of dB on some 15-meter stations. Next year, I'll either have a beam antenna or a jillion more ground radials on the vertical (the roof already looks like a spider went berserk up there.) (W2KVA/6). I didn't work too much DX outside of Europe (N4ZG). I would never have gotten on for this contest except that I had dropped a bottle of pure sulphuric acid on my arm at work. The contest was a great distraction from the pain (K1BE). Incredible conditions Saturday on 15 meters. Both Japan and Europe coming in simultaneously during a 12-hour period! (AA4M). Despite losing out to WBØZGD by 5k points, I enjoyed the contest. Didn't seem like Radiosport, though, without an HF blackout! (WDØELL). Please print a list of the post office state abbreviations for all those who sent me QSL cards for Maine. MA stands for Massachusetts (K1ST). Lost a lot of sleep and tried to squeeze in some operating time between shifts at work (W7LPF/DU2). For some reason, QSO rates almost doubled when I changed my general call from "CQ TEST" to "CQ RS". I assume RS stands for Radiosport as it does in the name of the Soviet Amateur Satellites (WB1ANT) . . . I did manage to catch a KL7 to complete (finally) my WAS. Other new countries included J6, 5T5, 5L2 and a near miss on a 5N2. It was a productive weekend at 'YSW. Guess I'll be working the next contest (SS) from W1MX. Have fun checking all those logs! Remember, it's only once a year (WA3YSW). (Once a year is more than enough — logchecker). This was my first contest and I didn't make very many QSOs, but I did make some strides towards my DXCC and WAS. Also got my 10-X number from QSOs made in this contest (WD4HSA). Had just recovered from Field Day when this contest came along. It took a couple of weeks to get the strength to go through all the paperwork to figure out my score. Hi! (WDØFGY). Don't know how the cw boys do it . . . nobody sends the other station's call . . . At least in the beginning and at the end of the transmission, each station should send both calls, but I couldn't find too many guys willing to take the time . . . rather send CQ TEST for 15 minutes straight (KZ5HI).

Scores are listed by ITU zone, then by country within that zone. The line score (example — DM3BF 211,919-803-73-B) indicates the call sign used, total score, number of contacts, number of ITU zone multipliers, and entry class. The entry class letters are A — single operator, mixed mode; B — single operator, cw only; C — single operator, phone only; D — multioperator, single transmitter.

Almost Too Late

Zone 28

Hungary

HA5NP 804,816-2018- 92-A
HA@DU/9 118,755- 454- 65-A
HA5KBM 23,770- 166- 34-A
HA4YU 16,776- 132- 36-A
HG8KQX 5628- 126- 14-A
HA8EK 313,140- 914- 85-B
HA1TJ 218,178- 832- 62-B
HA5LZ 144,210- 518- 69-B
HA7MC 144,120- 603- 60-B
HA7PQ 72,765- 409- 49-B
HA1ZG 50,796- 307- 38-B
HA6OA 41,495- 281- 43-B
HA5LN 33,195- 216- 35-B
HA7TM 28,875- 372- 21-B
HA2MN 14,160- 188- 20-B
HA3NU 10,972- 258- 13-B
HA5BA 10,494- 131- 22-B
HA1SX 6544- 127- 16-B
HA7PL 5863- 151- 13-B
HA8KAX 5820- 160- 10-B
HA3PT 1872- 74- 8-B
HA7UL 1463- 42- 11-B
HA2MG 1140- 34- 10-B
HA3GO 845- 37- 5-B
HA3GJ 364- 31- 4-B
HA4XH 264,808- 782- 79-C
HA1ZD 42,207- 257- 37-C
HA5KFL 1,310,190-2937-102-D
HA4KYH 454,790-1464- 73-D
HA1KZZ 423,873-1336- 81-D
HA7KSV 383,724-1366- 66-D
HA1KSA 311,524-1053- 76-D
HA2KRZ 242,624- 923- 68-D
HA8KAZ 209,022- 817- 66-D
HA3KHC 168,405- 903- 46-D
HA5KJD 105,259- 548- 49-D
HA3KHB 13,702- 140- 26-D
HA0KLU 9408- 104- 24-D
HA2KMG 5111- 66- 17-D

W/VE

Zone 1

Alaska

KL7BV(K2WI,opr)
367,070-1421- 71-A
KL7HBK 124,392- 601- 53-B
KL7CW 65,646- 389- 42-B
KL7ICF 264,880-1000- 56-C
KL7CQ 65,072- 301- 49-C
KL7D(+AL7S D H J,KL7s H HDS ITG JHD JHI,WB6FZN)
1,575,385-3273-115-D

Zone 2

Alberta

VF6LU 198,480- 768- 60-B
VE6APN 115,752- 668- 52-B
VE6AGV 36,010- 388- 26-C

British Columbia

VF7CC 1,277,822-2891-118-A
VE7CMK 852,235-2201-105-A
VE7DTA 45,738- 307- 42-B
VE7CPT 92,640- 554- 48-C
VE7AWT 54,560- 370- 44-C
CK7WJ(N6KT,WA6s DGX VEF, oprs) 2,870,544-4628-158-D

Zone 3

Manitoba

VE4QY 275,535-1220- 65-B
VE4ACH 32,184- 278- 36-C
VE4XK(+VE4UO)
733,449-2505- 89-D

Saskatchewan

VE5AAD 53,691- 623- 33-B

Zone 4

Ontario

VF3GCE 66,199- 291- 49-A
VE3FEA 53,850- 299- 50-A
VE3FHZ 44,308- 299- 44-A
VE3DAP 62,764- 328- 52-B
VE3GCO 317,775-1031- 75-C
VE3DLR 159,545- 579- 55-C
WA2KGN/VE3 25,443- 201- 33-C
VE3KIK 9152- 110- 22-C

Quebec

VE2JR 6992- 73- 23-A
VE2FU 304,418-1184- 78-B
CK2DU 149,400- 724- 50-C

Zone 6

6

East Bay

K6XO 325,380-1078- 87-A
N6VV 66,820- 404- 52-A
WD6DPL 32,010- 458- 35-A
K6CSL/6 16,762- 182- 34-A
AE6C 112,158- 515- 62-B
WB6IYS 3612- 74- 14-B
K5QOE/6 13,920- 106- 40-C

Los Angeles

K6AA(WB6HEU,opr)
413,772-1294- 87-A
AI6Z 60,300- 404- 50-A
WD6FYP 24,242- 261- 31-A
N6QB 22,350- 131- 30-B
N6GL 15,216- 208- 24-B
KA6CPL 8600- 132- 24-B
WA6TAF 5075- 43- 29-B
WB6KOU 344,718-1556- 66-C
W6GNS(WB6RXW,opr)
112,224- 649- 56-C
W6CN 86,457- 511- 69-C
W6OK 20,194- 261- 23-C
WA6YCL 1380- 46- 10-C
W6VRA(FJ0PU,K5VT,AI6K, KA6GSW,WA6MPX,WB6LHO, WD6BAY,oprs)327,452-1217- 71-D

Orange

WB6JMS 69,070- 337- 55-A
AC6H 7038- 117- 18-A
N6PE 123,735- 443- 73-B
WD6EWG 16,352- 138- 32-B
W6HJ 1904- 26- 17-B
KA6DSM 25,024- 228- 32-C
WB6ZIS 10,920- 174- 21-C

Santa Barbara

WA6ZYG 40,902- 361- 34-A
W2KVA/6 33,364- 280- 38-A
K6ELQ 93,534- 516- 51-B
WB6BWZ 15,579- 147- 27-B
N6MB 212,024- 827- 68-C
WA6NHB 19,460- 188- 35-C
AB6R 3600- 80- 15-C

San Diego

WA6DBC 254,533-1029- 67-A
K6ZH 13,319- 213- 19-B
WA6WSI 46,552- 306- 44-C
KB6PI 28,735- 286- 35-C
WA6UFY 21,385- 197- 35-C
W6RDF(N6s CW KA ND ZI,W6UQF oprs) 1,456,563-3027-127-D

San Francisco

WD6EEQ 190,393- 896- 59-A
WA6TOE 153,341- 695- 59-A
K6LRN 13,035- 121- 33-B
N6QC 53,956- 339- 41-C
W6SSC 42,958- 318- 47-C
WB6VGY 6084- 39- 39-C

San Joaquin Valley

WA6KMW 172,064- 704- 76-A
WB6YKY 54,432- 376- 42-C
WD6FLB 7613- 97- 23-C
W6DPD 2941- 51- 17-C

Sacramento Valley

AA6DX 388,800-1533- 80-A
N6XI 38,843- 336- 31-A
WD6ERA 26,763- 296- 33-A
WD4ELG/6 4351- 77- 19-A
AA6KB 126,112- 590- 56-B
N6UW 42,075- 215- 56-B
KB6G 41,192- 305- 38-B
W6SX 27,001- 275- 31-B
WA6HAD 1260- 28- 14-B
W6BJB 21,600- 159- 36-C
N6TU(+AA6UO,N6BT,JA3ODC)
1,310,626-2680-118-D
W6YX(W1ARR,N6s IG NE, WA6ITV,WD6AGJ,oprs)
1,091,640-2826-110-D
K6RLY(+K6ZBV)
541,696-1705- 92-D

Zone 7

5

Arkansas

WB5NBC 405,180-1164- 90-A
WA5SOG 29,874- 178- 39-B
W5EIJ 3000- 30- 25-B
WD5HSX 60,438- 441- 42-C

Louisiana

K5KLA 563,958-1615- 97-A
WA5NUK 220,601-1003- 59-B
W5WG 97,595- 409- 65-B
W5OB 23,564- 121- 43-B
WB5UWI 1808- 78- 8-B
WD5DUD 65,208- 410- 52-C
K5LVZ 58,184- 275- 56-C
N5AN(+W5WMU)
1,056,258-2935-101-D
W5XZ(+K3JT,KB5AS,WB5UZK, WB8HXW) 708,233-1762-107-D

Mississippi

K5YPV 15,572- 116- 34-A

New Mexico

K8TE/5(+W5VBQ)
351,278-1396- 74-D

Northern Texas

KA5W 64,100- 408- 50-A
AA5C 43,129- 200- 59-A
N5TP 307,146- 771-103-B
AG5N 143,160- 642- 60-B
K5HM 84,694- 512- 53-B
WB5OON 51,552- 338- 48-B
N5JB 41,762- 286- 38-B
N5AW 37,721- 157- 67-B
N5XU 27,200- 185- 40-B
KA5Q 26,071- 257- 31-B
WD5GRW 23,825- 279- 25-B
AG5B 1896- 58- 12-B
K5LAC 299,022- 996- 86-C
K5CU/5 165,288- 674- 71-C
WB5KTD 78,068- 355- 58-C
N5ANN 30,800- 225- 40-C
K5JA(+AF5K,KA5COH,K5FUV, N5s AUITR) 1,272,586-2822-118-D

Oklahoma

K@JPX/5 100,914- 417- 66-A
W5KI 138,690- 630- 69-B
W5AS 20,325- 261- 25-B
AD1S/5 154,736- 683- 64-C
K5DEC 35,098- 232- 46-C
WD5IRR 1720- 60- 10-C
WA5MLT(+WB5TZZ)
279,300-1154- 76-D
KA5CES(+KA5FGW)
26,910- 301- 30-D

Southern Texas

WB5NXH(K5ZD,opr)
953,042-2394-113-A
K5KG 421,574-1240-101-A
KB5Y 5886- 111- 18-A
WD8DKJ/5 624- 26- 8-A
AA5Y(KA5CHW,opr)
572,117-1616- 91-B
W5VX 564,152-1513- 97-B
K5WA 354,816-1376- 72-B
KA5T 35,376- 207- 48-B
W5NR 6596- 102- 17-B
WD5BCK 6224- 129- 16-B
WD5JJS 24,704- 250- 32-C
KB5FU 24,190- 178- 41-C
KB5KZ 9804- 178- 19-C
W5AC(K5s MW VK,WB5YQT, WD5DLZ,oprs)517,128-1571- 87-D
W5UW(KA5APW,WD5ABR,oprs)
227,500-1049- 65-D

7

Arizona

K6LL/7 621,716-1836- 94-B
WA7NXL 27,968- 300- 32-B
WA7YUI 13,675- 247- 25-B
WB7BRB 840- 41- 7-C
N7CW(+N4QS,N7CM)
225,855-1073- 63-D

Idaho

AA6EE/7 540- 37- 6-B

Montana

W7JYW 169,684- 935- 52-A

Nevada

WB7VVH 24,984- 197- 36-C

Oregon

AG7M 634,938-2122- 86-A
W7NI 549,486-1415- 98-B
W7KMB 166,326- 789- 54-B
W7TC 127,857- 767- 51-B
W7YAQ 53,040- 256- 52-B
WB7ROE(+WB7QER)
52,338- 429- 39-D

Utah

WA7JBE 59,532- 339- 44-C

Washington

W7BUN 124,704- 680- 48-A
WB7BFK 47,320- 226- 65-A
WB7NUJ 7455- 111- 21-B
N7CT 721- 30- 7-B
K7RI 1,380,080-3362-104-C
WA7GVM 19,840- 244- 40-C

Wyoming

N7BDH 26,333- 482- 17-A

Ø

Colorado

NØZA 64,729- 362- 49-A
WØSWJ 8694- 84- 27-A
WØGUY 12,100- 175- 20-B
WØRTB 4000- 80- 20-C

Iowa

NØADI 42,252- 346- 42-A
WDØFGY 7174- 148- 17-A
WDØAYT 4826- 74- 19-A
WBØUCP 27,093- 283- 33-B
WBØNSF 24,864- 233- 32-B
WBØUBL 1760- 80- 8-B
KØJEP 92,560- 400- 65-C
WBØCHS 45,760- 324- 44-C
WØPPF 37,758- 249- 42-C
KAØCKN 1340- 48- 10-C

Kansas

AAØMD/Ø(KBØAA,opr)
22,912- 152- 24-A
WBØDOX 22,356- 292- 27-A
K5GN/Ø 286,122- 951- 86-B
KØWA 115,899- 588- 53-B
WBØYLP 16,926- 293- 21-B
KØNE 8085- 57- 35-B
KØVGB 113,280- 545- 64-C
KØEQH 42,189- 327- 41-C
KØCS(ABØs W X,KØs BRO UAA XR,KAØBCW,NØXA,WØYR, WBØUX1,oprs) 980,976-2392-107-D
WBØBMB(+KØs RWL,VØJ, WBØVWW,WAØZHY,WBØs LFY TNY) 572,634-1710- 87-D

Minnesota

KØJEV 263,016-1149- 72-A
KBØCV 80,840- 582- 43-A
KØMPH 36,252- 296- 38-A
AFØO 35,906- 409- 26-B
WØHW 28,182- 216- 33-B
WAØLKL 390,348-1512- 84-C
WAØQIT 36,556- 328- 38-C

Missouri

WBØZGO 49,194- 299- 54-A
WDØELL 43,809- 281- 51-A
NØDX 336,804-1061- 78-B
KØSI 18,496- 172- 32-B
WDØATR 5814- 105- 18-B
KØVUW 379,525-1127- 95-C
WBØNSA 18,436- 259- 22-C
WØCDC 16,632- 129- 33-C
WBØTPK 15,690- 170- 30-C
WBØWQZ 2660- 54- 14-C
NØAQK(+WDØCPS)
278,040-1072- 84-D

Nebraska

KØSW 3570- 71- 14-B
KØGND 49,320- 371- 40-C
KØTVD(+NØAON)
36,060- 390- 30-D

South Dakota

KØJV 50,617- 268- 49-A
NØSD 43,020- 312- 45-C
WAØARZ 21,049- 225- 31-C
WDØEMB(+WDØCXU)
76,793- 663- 41-D

Zone 8

1

Connecticut

W1NG 874,104-1662-132-A
K1WB 542,568-1365-104-A
WB1FVO 93,200- 50-A
WB1ADR 53,576- 601- 37-A
W1CNU 26,660- 180- 43-A
W1WEF 26,016- 267- 32-A
K1KI 947,702-1578-139-B
W1RM 725,040-1635-114-B
K1TN 453,600-1412- 80-B
K1XA 387,150-1229- 89-B
WA1YEC 56,836- 315- 52-B
W1VH 52,605- 299- 45-B
K1EBY 51,870- 352- 39-B
K1PR(K1XM,opr) 6936- 166- 12-B
K1TO 5950- 76- 17-B
WB1CEG 3210- 96- 15-B
WA1LOU 108,570- 501- 77-C
K1YXG 101,760- 398- 64-C
W1AW(W3AZD,opr)
38,580- 462- 30-C
KA1BB 1062- 39- 9-C
KA1ARB(+WA1YKK)
3504- 96- 16-D

Eastern Massachusetts

W1MX(AG1E,opr)
283,360-1160- 70-A
WB1DFV 34,749- 250- 39-A
WB1ANT 23,579- 395- 19-A
W1UQ(N1EE,opr)
357,600-1196- 75-B
W1WLW 159,616- 723- 58-B
WB1GIT 23,839- 252- 31-B
KA1API 15,168, 162- 32-B
W1OPJ 4340- 57- 20-B
K1MC 2244- 61- 12-B
W1BB 27- 7- 3-B
N1GB 29,520- 258- 36-C
KA1CC 1740- 41- 12-C
AG1C(+W1YN)
522,340-1526- 91-D
WB1ELU(+KA1s BAH CEI)
3536- 108- 13-D

Maine

WA1PDG 19,068- 333- 26-A
WA1SUH 20,244- 285- 28-B
N1AFC 28,350- 309- 30-C
K1BZ 1350- 28- 15-C

New Hampshire

KA1EP 74,842- 507- 46-A
W1RR(WA1LKX,opr)
667,459-1749- 99-B
WA1NPZ 68,992- 442- 49-C
AC1Z 24,780- 325- 30-C

Rhode Island

K1ZRS 21,812- 273- 28-A
WA1KIP 15,850- 258- 25-A
W1GL 100,340- 446- 58-B
WA1TEF 663,612-2058-102-C
KA1ADW 25,992- 302- 36-C

Vermont

WB2JSJ 26,430- 330- 30-C

Western Massachusetts

N1YY 556,998-1534-111-A
WB1AGO 24,436- 152- 41-B
N1PF 14,297- 146- 29-B
K1BE 6260- 76- 28-C
K1ST(+AB1A) 831,050-2354-110-D
W1YK(K1s IR TK,oprs)
398,566- 83-D

2

Eastern New York

WA2STM 70,151- 674- 41-A
N2AZS 24,165- 256- 27-A
W2XL 287,180- 958- 83-B
WA2AZO 173,355- 637- 65-B
K2GBH 53,325- 385- 45-B
K2QF 41,268- 322- 38-B
N2EF 9548- 107- 28-B
K2MN 7260- 66- 29-B
WA2KLV 15,022- 177- 29-C
WA2RNX 6321- 81- 21-C
WB2KHE 931- 27- 7-C
WB2NFG(+KA2DSY,WA2MJX)
7618- 112- 76-D

New York City - L.I.

N2GC 265,959- 993- 87-A
WA2MUA 110,464- 522- 64-A
KA2AEV 19,020- 232- 30-A
K2SX 139,444- 622- 71-B
N2UN 29,951- 131- 61-B
WB2QEU 122,452- 900- 46-C
WB2SZS 50,862- 254- 49-C
WA2SEL 26,464- 257- 32-C
N2ALD 13,243- 259- 19-C
W2KZE 2632- 72- 14-C
K2RO 1078- 98- 11-C
WA2BOT(+AE2E)
387,828-1385- 76-D

Northern New Jersey

K2BK 182,575- 635- 67-A
W1QD 38,732- 310- 44-A
WA2PQU 12,990- 121- 30-A
WA2UDT 12,744- 253- 18-A
WA2JAX 8088- 132- 24-A
K3OX/2 4029- 73- 17-A
N2LT 720,120-1680-102-B
AC2U 229,824- 896- 72-B
N9RR 154,935- 737- 55-B
WB2FUE 60,930- 404- 45-B
KA2ACM 22,988- 316- 28-B
WA2LWT 10,836- 28-B
W2HCA 4684- 65- 24-B
WA2POW 59,040- 336- 48-C
WB2VFK 45,780- 261- 42-C
WB2LUD 10,450- 156- 25-C
WA2TJF 8164- 110- 26-C
N2OL(+N2HE) 199,327- 708- 63-D

Southern New Jersey

W2KI 381,765-1137- 93-A
AI2O 180,544- 856- 62-A
N2ATX 97,730- 593- 58-A
N2CC 3520- 70- 20-A
N2IT 44,758- 223- 46-B
K2HPV 13,580- 137- 28-B
W2BHK 155,675- 711- 65-C
WB2VFT 60,844- 330- 53-C
W2HXF 54,990- 198- 65-C
WA2PAT 36,297- 263- 37-C

Western New York

K2VV 70,950- 518- 33-A
WA2QAU 63,920- 300- 47-A
KB2KN 10,360- 120- 28-A
W2TZ 238,260-1039- 66-B
W2FTY 120,888- 532- 69-B
WA2EYA 53,634- 376- 42-B
WB2LJK 45,990- 292- 45-B
AD2J(+N2ALK)
301,644-1079- 84-D
WA2DHZ(+WB2TUM)
74,280- 498- 40-D

3

Delaware

WB3GXD 43,335- 306- 45-C

Eastern Pennsylvania

N3RD(W3XU,opr)
860,860-1894-110-A
W3EAN 32,414- 203- 38-A
W3ARK 159,670- 494- 70-B
WB3DCT 94,050- 431- 57-B
N3ALF 25,738- 211- 34-B
K3YL 22,248- 287- 24-B
N3KR 19,915- 170- 35-B
K3MA 82,080- 304- 60-C
KB3BW 21,384- 182- 36-C
K3FO(+AA3B,WB3DJF)
709,323-1762-101-D
N3AIU(+WB3KWE,KA3s AHC BOD)
86,242- 501- 62-D
WB3FPA(+K3s CXP EUH,WA3s VUE ZGL,WB3s FYL HYX)
41,814- 231- 46-D
W3SK(K3FKW,KA3BER, WA3YTI,WB3JKG,oprs)
26,250- 244- 35-D
WB3LHW(+KA3BXQ)
1359- 61- 9-D

Maryland - D.C.

N3RL 106,344- 379- 72-A
WA3VPL 56,050- 368- 50-A
N3AVA 36,288- 328- 42-A
WA3YSW 28,730- 263- 34-A
W3FQE 2023- 39- 17-A
WA3UPH 15,730- 200- 22-B
K3ZJ 365,911- 947- 91-C
K3VY 7920- 112- 24-C
AI3C(+N3MG,WB3FOG,WB4QPL)
1,072,806-2128-123-D
WB3FHO(+WB3FSB)
73,179- 443- 47-D

Western Pennsylvania

WA3FYJ 295,100-1228- 65-A
AF3B 55,160- 377- 40-A
KB3DS 10,166- 156- 23-A
K3UA 541,814-1622- 91-B
W3IW 24,570- 200- 35-B
AD8J 8550- 87- 25-B
KA3AVD 7106- 132- 19-B
W3KWH(N3MC,opr)
307,584-1014- 89-C
K3LL 78,176- 404- 56-C
N3AEU 8775- 103- 25-C
K3LR(+AF3P,WB3EUB,K8s AZ N2J 1,189,533-2668-113-D
K3TO(+WA3WZR)
99,620- 441- 68-D

4

Alabama

WB4ASV 72,100- 296- 70-A
AC4X 31,878- 237- 46-A
N4KG(WN4KKN,opr)
631,444-1443-113-B
AD4Y 125,001- 569- 57-B
N4CCT 26,758- 309- 34-B
KI4M 169,824- 635- 61-C

Georgia

AA4GA 109,560- 546- 66-A
W4OUN 83,944- 450- 56-A

K4PHF	55,728-	282-	54-A
W4GTS	51,788-	329-	44-A
KI4Y	4572-	132-	18-A
K4BAI	319,396-	1167-	77-B
AA4U	138,653-	671-	61-B
KB4HZ	41,120-	364-	40-B
WD4LRB	47,550-	275-	50-C
AK4T	41,600-	268-	50-C
KA4C	33,820-	258-	38-C
N4BFA	23,712-	271-	32-C
WA4OPV	19,720-	124-	40-C
WD4ICC	4356-	33-	33-C
WD4NAE	2325-	69-	15-C
WD4ALD(+WD4LPQ)	95,555-	315-	71-D
W4MGX(+Net)	82,200-	425-	50-D
WB4BDP(+WA4UNV,WD4ACO)	61,705-	595-	45-D

Kentucky

WA4QMQ	108,927-	555-	67-A
WB4RRI	107,750-	515-	50-A
WA4OBL	33,282-	254-	43-A
N4XM	207,142-	899-	62-B
W4YDL	16,456-	208-	22-B
WB4OSS	112,056-	346-	84-C
WA4PAB	66,352-	447-	44-C

North Carolina

AA4S	460,548-	1236-	99-A
W4OMW	61,620-	335-	52-A
KB4AP	23,596-	262-	34-A
K4HF	6525-	71-	25-A
AA4NC	166,708-	707-	71-B
AB4Z	148,488-	561-	69-B
K4JYS	135,184-	547-	56-B
WB4ERM	60,892-	403-	52-B
K4JEX	28,536-	160-	41-B
WA4TNI	1752-	50-	12-B
N4UH	526,870-	1476-	95-C
WD4AAM	237,225-	775-	75-C
WD4AVY	89,648-	556-	52-C
WA4YOM	48,457-	273-	47-C
WA4KWC	1885-	38-	13-C
WA4YNP	1824-	54-	12-C
WB4ERO(+N4AVY,KB4FQ,WB4s FHI SXX,WD4IHV)	111,120-	560-	48-D
WD4MKQ(+N4BQW)	4338-	92-	18-D

Northern Florida

N4ARP	5940-	145-	20-A
N4KE	3276-	69-	25-A
WD4HSA	2299-	57-	19-A
W4ZTW	32,976-	299-	36-C
W4FDA	3895-	45-	19-C
N4WW(+KB4BU,N4SA,WB4YFF)	1,303,584-	2487-	148-D
N4IB(+N4KE)	650,541-	1743-	113-D
N4UF(+K4LK,WA4DUD,WD4ITK)	522,144-	2209-	84-D
WD4HNY(+WA3UBA,WD4MSR)	251,181-	1633-	63-D
WD8NZV(+N4BLN,WA4ZIL,WD4SGB)	190,402-	924-	74-D
KB4CD(+N4AXH,W4s BSO SME)	181,675-	801-	65-D

South Carolina

WA4VXG	201,498-	611-	86-A
WA4VUY(KØEJ,opr)	7896-	278-	14-A
N4ZG	48,342-	353-	42-B
WA4YUU	31,900-	201-	44-C

Southern Florida

K4LQ	52,182-	157-	78-A
WA4FYZ	24,416-	306-	32-A
N4BP	416,936-	1763-	76-B
W4BV	67,100-	329-	55-B
WA4OML	58,050-	378-	43-B
K4PB	42,228-	206-	46-B
WA4LWL	46,800-	264-	50-C
WD4FGI	23,746-	374-	31-C
KD4M(+KD4S,WB4s BQZ YRW,WD4CNO,K9IJ)	327,132-	1340-	78-D

Tennessee

KB4EX	3330-	63-	18-A
AA4AK	123,039-	643-	63-B
N4IR	74,440-	559-	40-B
WB4FEC	46,784-	309-	43-B
KA4R	44,160-	270-	46-B
K4OAQ	12,470-	209-	29-B
WD4HUT	20,398-	261-	31-C

Virginia

K4RZ	114,305-	387-	68-A
WA3NGL/4	57,408-	298-	52-A
N4FS	56,264-	272-	52-A
K4PQL	572,945-	1409-	95-B
AA4M	402,910-	1141-	86-B
W4XD	13,932-	156-	27-B
W4KFC	2760-	50-	15-B
N4XD	96,971-	503-	49-C
N4MM	69,504-	273-	64-C
WB4NFO	45,115-	283-	35-C
WB4PIQ	34,047-	261-	39-C
N4BDM	8649-	85-	31-C
N4DW(+KA4AHU,KB4EX,WA4s LAZ SCE,WB4PAT)	423,948-	1438-	98-D
KG4F(+KM4Z,WA4s KYS OGV OHG)	228,735-	946-	69-D
N4HB(+N4ZJ,WB4BVY)	150,394-	642-	58-D

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Michigan

AC8Y	223,443-	1113-	61-A
KB8EC	202,232-	1072-	68-A
K8CC	117,715-	508-	65-A
WD8BDU	63,856-	382-	52-A
WD8KXN	27,869-	322-	31-A
WD8ECT	22,330-	264-	35-A
WA8RRR	306,504-	1143-	72-B
K8SIA	54,238-	290-	47-B
KB8EQ	45,318-	381-	42-B
K8DU	23,868-	225-	36-B
N8BEA	11,781-	220-	17-B
KB8CR	65,016-	324-	54-C
KB8BE	59,339-	360-	52-C
N8AKY	53,768-	420-	44-C
K8ZZU	41,790-	251-	42-C
AD8X	37,367-	274-	43-C
K8QT(+N8MK,K8s TU WS,KA8s ETH ETI,WD8RIN)	204,476-	803-	68-D

Ohio

WB8JBM(WB8DQP,opr)	661,914-	1665-	99-A
K8HV	197,068-	709-	76-A
WD8ALG	142,890-	829-	55-A
W8FN	169,344-	626-	64-B
WB8KKI	111,333-	645-	59-B
AA8S	86,140-	486-	59-B
N8BC	71,852-	420-	46-B
W8GOC	44,296-	220-	49-B
K8MR	33,152-	276-	32-B
K8DL	24,210-	150-	45-B
WD8QMP	11,875-	253-	19-B
W8EAO	4110-	74-	15-B
W8NPF	3135-	43-	15-B
AF8C	306-	23-	6-B
WB8VPA	47,823-	257-	57-C
WD8MHK	32,472-	251-	36-C
W8LKG	22,515-	95-	67-C
N8AKF	9801-	100-	27-C
K8UFW	3312-	48-	18-C
AD8I(+N2MA,K8s DL EM ND NU,WB8VLR)	647,520-	1767-	96-D
K8URE(+WA8EEA,WB8s ENR GJP,N9AG)	615,162-	1420-	111-D
K8OCL(+KB8AC,W8BTW,WB8s MMW YIJ,WD8s JLM OTO)	169,644-	840-	67-D

West Virginia

N8II	554,800-	1335-	100-A
WD8KAC	432-	14-	8-B
KB8FJ	14,322-	156-	31-C

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Illinois

K9RF(K9GL,opr)	650,793-	1728-	111-A
AA9D	149,075-	765-	67-A
K9BG	133,666-	433-	97-A
W9QWM	57,702-	326-	59-A
N9AQT	46,176-	258-	52-A
K9HV	39,312-	264-	52-A
K9RHY	35,343-	198-	51-A
AA9F	9660-	90-	35-A
K9GS	5697-	119-	27-A
WB9TIY	3264-	75-	16-A
K9MK	470-	15-	10-A
W9OA	111,440-	488-	56-B
WD9IIC	33,796-	294-	34-B
W9REC	10,846-	99-	34-B
K9UQN	3724-	64-	14-B
W9HPG	2720-	46-	20-B
W9PNE	1351-	39-	7-B
K9US	420,970-	1408-	89-C
WD9IIX	155,160-	779-	60-C
KB9AW	32,618-	260-	47-C
KA9CQM	24,200-	263-	40-C
WB9TDR	17,622-	158-	33-C
K4VUD/9	16,492-	241-	28-C
WB9ZMO	13,310-	263-	22-C
N9ANP	10,440-	126-	30-C
WD9IDK	3640-	42-	20-C
K9SD(+VE3CDP,K9s BGL DZY FU HWU,WD9BGS)	615,077-	1779-	97-D
W9RW(+K8KIX,WB9IWN)	405,888-	1220-	96-D
WD9COA(+N9AEJ,W9AYH)	304,138-	1071-	82-D
KB9BR(+N9LE)	127,110-	698-	57-D

Indiana

N9MM	585,486-	1420-	99-A
K9CLO	275,265-	993-	84-A
K9FN	288,464-	806-	88-B
K9FW	127,125-	627-	45-B
K9REW	89,216-	432-	64-B
N9AFU	23,232-	351-	22-B
W9RE	804,843-	1806-	117-C
K9IU(W3EP,opr)	57,362-	341-	46-C
K9NE	37,796-	235-	44-C
K1TH	8211-	119-	23-C
WB9IWN	7061-	81-	23-C
WD9HDH(+KA9BHX)	25,868-	292-	29-D

Wisconsin

WB9WFJ	56,100-	410-	55-A
WB9TSL	4186-	100-	23-A
K9EYA	66,748-	421-	44-B
WB9YLR	59,512-	392-	43-B
W9HE	36,480-	283-	48-B
WB9SVM	53,318-	282-	53-C
WD9GRI	34,374-	258-	51-C
W9OEJ	16,770-	265-	26-C

Zone 9

Maritime - Newfoundland

VE1BNN	25,939-	-	37-A
VE1ANU	69,384-	422-	42-B
VE1BGD	51,170-	-	43-B
VE1AXT	38,824-	196-	46-B
VO1AW	38,280-	216-	44-B
VE1BLG	16,956-	170-	27-B
K6HNZ/VE1	251,494-	871-	82-C
VE1UNB(VE1s BEC BHA,oprs)	490,131-	1584-	81-D

Quebec

VE2RV	144,240-	596-	60-B

DX

Zone 10

Mexico

XE1LLS	143,195-	601-	65-C
XE1ZZA	118,035-	575-	61-C
XE1RM	36,150-	287-	30-C

Zone 11

Dominican Republic

HI8LC	9042-	120-	22-A

Panama

HP1AC	5066-	72-	17-B
HP1XDL	8341-	-	19-C

St. Lucia

J6LIR	119,658-	1053-	37-A

Puerto Rico

KP4V	356,265-	1107-	87-B
KP4ERK	6678-	96-	21-B
KP4EHP	763,920-	2595-	90-C
K4IIF/KP4	25,740-	220-	36-C

Canal Zone

KZ5HI	60,686-	517-	38-A

Guatemala

TG9ML	196,900-	1004-	55-B

Montserrat

VP2ML	1,511,880-	3560-	120-C
VP2MFA	1,202,079-	4046-	87-D

Bermuda

VP9IB	260,268-	1401-	69-A

El Salvador

YS1GMV	165,240-	1010-	45-C

Zone 12

Ecuador

HC5EA	217,040-	1100-	40-C

Colombia

HK1AMW	40,021-	259-	31-B

Venezuela

YV1OB	341,767-	1023-	67-B
YV5EED	47,996-	196-	52-C
YV2IF	16,180-	165-	20-C
YV5GMN	15,334-	98-	34-C

Guyana

K9EF/8R1	42,920-	298-	29-A

Zone 13

Brazil

PY8ZLC	11,873-	79-	31-A
PT7TP	83,620-	454-	37-C
PT7ZMG	5067-	113-	9-C

Zone 14

Argentina

LU8DQ	1,386,948-	2267-	123-B

Paraguay

ZP5GLS	76,400-	384-	40-C

Zone 15

Brazil

PY1DHG	123,858-	-	63-B
PY1BOA	114,444-	360-	66-B
PY3CB	285,634-	929-	62-C
PY1NEZ	237,016-	-	43-C
PY1DHN	8265-	551-	15-C
PY1BKA	7958-	67-	23-C
PT2LS	322-	10-	7-C

Zone 18

Norway

LA9HW	72,928-	504-	43-A
LA5KW	33,920-	-	40-B
LA7SI	1638-	-	9-B
LA6ZW	300-	10-	6-B
LA2GN	27,093-	251-	33-C
LA2AD	12,537-	184-	21-C
LA8ZX	8580-	193-	12-C
LA5QK	816-	34-	8-C
LA4YW	408-	24-	6-C
LAØCA	380,858-	1584-	53-D

Finland

OH7NW	13,257-	125-	27-A
OH2KI	11,313-	99-	27-A
OH7UV	9219-	119-	21-A
OH8PF	423,555-	1250-	85-B
OH3XS	22,240-	193-	32-B
OH3KS	9911-	-	17-B
OH1FM	8339-	63-	31-B
OH3TY	6528-	-	24-B
OH1MQ	4807-	71-	19-B
OH7SQ	760-	38-	4-B
OH2AA(OH2BNP,opr)	95,038-	519-	38-C
OH2KP	68,304-	373-	48-C
OH2LU	11,747-	151-	17-C
OH2ZY	9476-	98-	23-C
OH2JG	2288-	31-	16-C
OH1PU	1092-	18-	14-C
OH1VR	1,463,908-	2843-	118-D

Aland Islands

W1XX/OHØ	402,600-	1656-	66-A
OHØDX	31,200-	320-	20-D

Denmark

OZ1CTK	209,142-	617-	81-A
OZ1CCB	57,017-	303-	37-B
OZ1EE	35,588-	289-	28-B
OZ1FRR	31,680-	174-	40-B
OZ1LO	29,952-	262-	26-B
OZ3XH	12,512-	101-	34-B
OZ6KS	6403-	109-	19-B
OZ1FAO	1920-	28-	20-B
OZ4CG	1200-	36-	8-B
OZ8E	726-	41-	6-B
OZ5EV	227,642-	631-	86-C
OZ1ZE/P	12,224-	88-	32-C
OZ1EEH	9234-	135-	19-C
OZ8T	7248-	82-	24-C
OZ4MD	5850-	-	25-C
OZ3KE	4994-	57-	22-C
OZ6PI	2717-	67-	11-C
OZ1BII	230,874-	920-	69-D

Sweden

SM5BDV	3680-	-	20-A
SMØGNU	529,356-	1316-	93-B
SM4GLC	377,520-	1128-	80-B
SM3DXC	217,350-	767-	70-B
SM3DNI	180,432-	813-	63-B
SM6FKF	127,038-	451-	62-B
SM5BAX	88,200-	398-	50-B
SM5ACQ	84,240-	455-	45-B
SMØGMG	50,952-	306-	44-B
SM6JY	5094-	-	18-B
SM5AHK	2534-	-	7-B
SM6CST	1386-	26-	11-B
SM7CZC	360-	17-	6-B
SMØATN	6058-	-	26-C
SM5CSS	3542-	37-	22-C

Zone 19

European Russian S.F.S.R.

UA1DZ	1,093,064-	2029-	123-A
UW1YY	126,266-	607-	58-B
UA1ZCX	22,130-	252-	28-B
UA1NBD	17,316-	194-	26-B
UA1OBQ	16,852-	218-	22-B
UK1AAA	1,035,076-	3079-	143-D

Zone 20

Asiatic R.S.F.S.R.

UA9KAM	18,090-	145-	27-B
UA9KAN	6360-	-	12-B
UK9CDG	156,111-	641-	51-D

Zone 21

UA9JAX	98,882-	485-	49-C

Zone 23

Asiatic R.S.F.S.R.

UAØQCA	55,576-	281-	56-A
UKØQAM	58,674-	335-	42-D

Zone 26

Asiatic R.S.F.S.R.

UAØKBC	73,226-	453-	38-B

Zone 27

France

F6FBQ/P	58,140-	446-	30-A
F81M	41,031-	211-	47-A
F6BVB	3195-	53-	15-A
F6EQV	41,976-	299-	33-B
F8VJ	41,814-	134-	69-B
F9BB	28,224-	158-	42-B
F6BLZ	564,300-	1832-	66-C
F6EXQ	97,396-	437-	52-C
F6BDN/P	82,882-	340-	58-C
F6KEZ	48,444-	370-	33-C
F6FHA	9048-	95-	24-C

England

G3FXB	1,502,875-	2485-	125-A
G5CMX	30,444-	-	43-A
G3YBH	8018-	102-	19-A
G3TXF	366,955-	1107-	79-B
G3ESF	262,203-	929-	71-B
G6NK	13,398-	-	22-B
G4HQN	74,450-	-	50-C
G4HLN	10,448-	-	16-C
G3XBN	1,526,294-	3036-	106-D

Northern Ireland

GI3JEX	158,578-	405-	94-B

Scotland

GM3RAO	22,848-	-	24-C
GM5AXY	2424-	54-	12-C

Wales

GW3NYY/P	23,912-	274-	28-A

Belgium

ON6NL	252,140-	824-	70-A
ON4FD	265,064-	938-	68-B
ON6NW	199,325-	701-	67-B
ON6FT	146,304-	1010-	32-B
ON4XG	118,617-	483-	57-B
ON6GB	134,832-	-	48-C
OS6AH/A	128,160-	-	45-C
ON5NR	14,688-	-	24-C

Netherlands

PA3AEB	65,670-	303-	55-A
PAØDIN	79,695-	334-	63-B
PA3AIC	72,292-	358-	53-B
PAØTA	68,904-	259-	66-B
PAØLOU	49,932-	297-	38-B
PAØKOR	21,622-	-	38-B
PAØIJM	51,832-	280-	44-C

Zone 28

Federal Republic of Germany

DF2HL	114,239-	849-	71-A
DL7BP	11,322-	-	17-A
DF3TP	77,367-	481-	51-B
DJ1YH	75,126-	310-	57-B
DJØIV	63,687-	335-	39-B
DA1UI	35,217-	259-	39-B
DL1TH	31,040-	253-	40-B
DL1AM	25,284-	-	42-B
DF2SL	11,800-	-	25-B
DF3QN	10,075-	77-	31-B
DL1RB	5841-	-	11-B
DL1JC	5400-	98-	12-B
DK7QI	5054-	85-	14-B
DKØNH	4224-	-	12-B
DF3QL	74,100-	315-	60-C
DL8PC	44,950-	218-	50-C
DF2RG	10,244-	88-	26-C
DL5TS	8004-	-	23-C
DA1MV	2100-	42-	12-C
DF6UQ	1599-	-	13-C
DG2AD	13-	13-	1-C

German Democratic Republic

DM4SDA	285,600-	982-	85-A
DM4VUG	278,920-	891-	76-A
DM3JMO	211,820-	728-	68-A
DM3LE	167,524-	602-	62-A
DM3PFF	142,464-	529-	64-A
DM4REE	120,560-	616-	55-A
DM3XZN	45,495-	268-	45-A
DM3UE	12,305-	137-	23-A
DM3OAA	8554-	103-	26-A
DM2CUA/A	6700-	80-	25-A
DM3EL	2560-	119-	8-A
DM4SOG	740-	32-	10-A
DM3BI	285,105-	919-	83-B
DM3XM	109,200-	518-	56-B
DM2CRJ	72,325-	388-	55-B
DM3NKF	62,054-	448-	38-B
DM3FZN	34,920-	243-	36-B
DM2DLE	15,300-	136-	30-B
DM2GHL	12,300-	141-	20-B
DM2OUD	12,034-	177-	22-B
DM2FTL	6064-	43-	16-B
DM2CJA	6048-	127-	16-B
DM4ZFL	5543-	58-	23-B
DM3ZLIE	3978-	57-	18-B
DM4SF	3296-	56-	16-B
DM4TOM	2403-	67-	9-B
DM2CMA	1932-	48-	14-B
DM4WH	1746-	40-	9-B
DM3VNM	1656-	50-	12-B
DM2CTL	1008-	54-	9-B
DM2CHN	768-	30-	6-B
DM3PAA	192-	10-	6-B
DM4XCE	32,186-	217-	38-C
DM4TBK	17,100-	152-	25-C
DM4WZA	16,092-	134-	27-C
DM2BRK	8930-	140-	19-C
DM3YDB	8778-	172-	21-C
DM5BI	7314-	83-	23-C
DM2FBN	6612-	84-	19-C
DM2FLN	6345-	121-	15-C
DM5TGL	2639-	51-	13-C
DM2CIB	774-	39-	6-C
DM5WVL	210-	10-	5-C
DM2CPD	110-	6-	5-C
DT7DK	1,860,093-	3744-	113-D
DM3GM	1,002,150-	2307-	102-D
DM4YK	229,604-	1010-	61-D
DM5RA	138,714-	707-	61-D
DM4FA	22,904-	287-	28-D

Switzerland

HB7AW	145,984-	629-	64-B
HB9DX	28,280-	215-	40-B
HB7BRQ	4294-	62-	19-B
HB7ASJ	2158-	45-	13-B
HB9BAM	631,722-	-	89-C

Italy

I4JCC/5	644,955-	1559-	93-A
I5JFG	92,232-	454-	54-A
I4DVT	302,438-	1115-	67-B
I7PXV	100,045-	575-	55-B
I5YDI	38,378-	333-	31-B
I2MQP	139,095-	554-	55-C
I4CSP	18,704-	-	28-C
I3EJ	6562-	84-	17-C

Sardinia

ISØXIE	38,410-	-	46-A
ISØOMH	94,696-	481-	51-B

Bulgaria

LZ1YE	31,892-	273-	34-A
LZ2KR	124,564-	873-	44-B
LZ2XW	36,972-	438-	26-B
LZ1KDZ	4950-	113-	18-B
LZ2GS	4000-	65-	20-B
LZ1YG	1120-	64-	7-B
LZ2KPB	49,802-	370-	37-C
LZ1KWZ	108,584-	566-	56-D
LZ1KDP	83,164-	639-	34-D

Czechoslovakia

OK2BLG	371,772-	1023-	92-A
OK2QX	236,447-	697-	79-A
OK2BTI	134,461-	548-	59-A
OK1KZ	91,850-	448-	55-A
OK2TBC	74,208-	385-	48-A
OK3CEE	62,568-	347-	44-A
OK2SWD	23,340-	194-	30-A
OK2BEC	18,525-	156-	25-A
OK2BBJ	12,720-	92-	30-A
OK3YDP	9156-	143-	21-A
OK1AVG	2340-	61-	13-A
OK3CJK	309,258-	918-	81-B
OK1IAR	103,610-	416-	65-B
OK1DKW	91,156-	477-	52-B
OK1KRQ(OK1AYQ,opr)	56,560-	399-	35-B
OK2BWL	53,685-	314-	45-B
OK1FCA	46,506-	227-	46-B
OK2PBG	43,785-	224-	45-B
OK3CES	26,790-	221-	30-B
OK2BEM	23,373-	263-	24-B
OK3CJO	22,594-	211-	26-B
OK1MKU	20,860-	199-	28-B
OK1AOU	16,126-	165-	22-B
OK2BCJ	14,927-	143-	23-B
OK1AJY	14,601-	165-	21-B
OK3CAR	10,740-	-	20-B
OK1KZQ	8690-	115-	22-B
OK1DMJ	8160-	145-	15-B
OK1MAA	7744-	140-	16-B
OK3TCK	6953-	-	17-B
OK3ZFB	6928-	107-	16-B
OK1MHI	5520-	102-	15-B
OK2SGW	5225-	53-	25-B
OK1MIZ	2981-	76-	11-B
OK1CIJ	979-	21-	11-B
OK1DVK	464-	14-	8-B
OK3CO	456-	56-	4-B
OK2SOD	413-	23-	7-B
OL1AUX	150-	14-	5-B
OL3AXS	110-	12-	5-B
OL9CJB	100-	11-	4-B
OK1DWF	95-	11-	5-B
OK1OPT/P	42-	4-	3-B
OK2YAX	278,272-	1035-	64-C
OK2BKR	107,991-	598-	39-C
OK2BBI	74,556-	-	57-C
OK1DKS	28,008-	188-	36-C
OK1JBL/P	17,668-	135-	28-C
OK2KJT	6460-	88-	20-C
OK1HCH	6405-	-	15-C
OK3KXR	1500-	-	12-C
OK3TDN	198-	9-	6-C
OK3KAG	572,936-	1339-	104-D
OK3VSZ	425,126-	1260-	83-D
OK2KMR	253,760-	1002-	65-D
OK3KTY	199,545-	955-	53-D
OK1KOK	64,792-	-	56-D
OK1KYS	2040-	32-	15-D
OK1KIR	1128-	22-	12-D
OK1KCF	553-	21-	7-D

Poland

SP8ES	48,092-	319-	44-A
SP9HWN	33,110-	270-	43-A
SP9AKD	9450-	91-	27-A
SP7HOV	9104-	114-	16-A
SP6JTR	47,556-	269-	36-B
SP9RRP	32,676-	403-	21-B
SP6FER	32,604-	279-	39-B
SP9EEE	9597-	119-	21-B
SP6BAA	7680-	126-	16-B
SP6LK	7240-	106-	20-B
SP9EMU	2706-	74-	11-B
SP3IBS/1	45-	9-	3-B
SP6IHE	46,874-	240-	46-C
SP9AGS	29,146-	217-	38-C
SP7FBQ	1498-	29-	14-C
SP6DVP	897-	29-	13-C
SP9KOT	626,550-	1866-	75-D
SP2ZFJ	402,616-	1203-	84-D
SP6PAZ	217,854-	860-	63-D

SP9BRO 5994- 91- 18-D

Greece

SV1IW 55,125- 339- 45-C
SV1JG 44,802- 378- 38-C

Romania

YO8FZ 67,230- 334- 46-A
YO8VZ 4558- 377- 15-A
YO3CR 149,534- 568- 77-B
YO8FR 75,600- 484- 48-B
YO8DD 47,515- 336- 43-B
YO3ARQ 12,410- 196- 17-B
YO9YE 9540- 150- 18-B
YO9HP 6544- 107- 16-B
YO3RF 4945- 45- 28-B
YO4CAH 1750- 107- 7-B
YO8CEZ 1589- 111- 7-B
YO3BYF 1022- 56- 7-B
YO3CDN 236- 19- 4-B
YO4AYE 8700- 86- 30-C
YO6BTY 26- 9- 2-C
YO6KEB 64- 16- 2-D

Yugoslavia

YU1ELM 408,645-1258- 81-A
YU2OB 167,850- 520- 75-A
YU1NZW 113,640- 464- 60-A
YU1OQL 219,730- 821- 70-B
YU4VWQ 59,400- 264- 55-B
YU1SF 1222- 32- 13-B
YU1KWX 689,409-1742- 93-D

Zone 29

European Russian S.F.S.R.

UA3ST 140,868- 586- 63-A
UW3ZU 63,168- 372- 47-A
UA3VFI 51,689- 447- 37-A
UA4CM 28,378- 266- 37-A
UA3DLN 11,575- - 25-A
UA1WBL 8920- 134- 20-A
UW1HW 610,136-1569- 97-D
UW3UO 266,463- 979- 71-B
UA4CDC 196,650- 885- 69-B
UA3EZ 178,190- 809- 65-B
UA3LAB 174,964- 797- 68-B
UA3AGL 171,912- 900- 58-B
UA3DCG 118,985- 701- 53-B
UV3NT 118,314- 496- 63-B
UA3QGO 111,756- 462- 62-B
UA3WBA 97,632- 511- 48-B
UA3TDK 90,650- 525- 50-B
UA3ZP 87,906- 508- 46-B
UA3SBW 84,396- 503- 52-B
UA4ACA 68,453- 401- 49-B
UA3RDH 65,385- 503- 45-B
UA3AAH 48,645- 349- 45-B
UA3KDJ 48,001- 275- 53-B
UA3IDT 40,392- 290- 34-B
UA4PAA 38,304- 234- 42-B
UA1TAT 33,888- 334- 32-B
UA4NED 30,052- 402- 28-B
UA4YAT 29,069- 170- 41-B
UA1DF 25,382- 160- 37-B
UA3TAK 25,146- 310- 18-B
UW6QF 23,880- 279- 24-B
UA6LDF 22,806- 307- 21-B
UA3AAJ 22,775- 299- 25-B
UA4NEJ 21,804- 309- 23-B
UA3AEZ 16,874- 271- 26-B
UA4CH 15,850- 154- 25-B
UA3AGX 11,130- 262- 18-B
UA3TBQ 9500- 101- 19-B
UA3RO 9112- 120- 17-B
UA3AJR 6300- 264- 10-B
UA3WCA 5894- 253- 14-B
UA3EAU 5202- 90- 18-B
UA4ACD 3732- 87- 12-B
UA3ICJ 3670- 116- 10-B
UA4FDJ 3597- 165- 11-B
UA3AEX 2112- 88- 12-B
UA3EAT 1224- 43- 9-B
UW3CE 76- 7- 4-B
UW3EH 102,720- 504- 48-C
UV3CF 69,920- 437- 38-C
UA3TTN 50,985- 253- 55-C
UA6AKB 37,160- 285- 40-C
UA4NAA 22,765- 231- 29-C
UV3CS 21,034- 267- 26-C
UA3SAL 15,662- 215- 17-C
UA4ACP 10,080- - 28-C
UW4CI 3139- 157- 19-C
UK6LBM 669,312-1626- 91-D
UK6APA 517,825-1786- 77-D
UK6AAJ 397,936-1426- 77-D
UK1APA 401,880-1170- 85-D
UK3SAB 358,911-1153- 81-D
UK4LAZ 251,680- 950- 80-D
UK3XAM 225,576-1238- 72-D
UK3ACE 165,016- 988- 57-D
UK4ABW 109,566- 602- 54-D
UK3DAH 87,966- 382- 54-D
UK3DBV 78,303- 536- 43-D
UK6HCZ 71,188- 589- 37-D
UK6ACQ 69,782- 629- 37-D
UK4NCF 48,240- 398- 45-D
UK4AAN 41,344- 383- 38-D
UK3DBW 38,520- 433- 36-D
UK4CBL 27,650- 374- 25-D
UK4YAL 14,231- 238- 19-D

Kaliningradsk

UA2DC 15,096- 274- 24-B
UA2FCZ 19,011- 309- 17-B

Ukraine

UB5MCS 1,086,512-2129-112-A
UY5OO 865,278-1909-106-A
UT5RT 639,639-1645- 91-A
UB5EAX 83,190- 494- 47-A
UB5ZA 64,112- 374- 46-A
UB5QCK 61,722- 329- 54-A
UB5ABJ 35,575- 225- 45-A
UT5HP 35,604- 334- 36-A
UB5ZEL 976,800-1480-103-B
UB5LR 201,936- 629- 84-B
UB5IAM 113,211- 555- 63-B
UB5UWG 94,640- 546- 57-B
UB5AAL 76,388- 492- 52-B
UB5LII 66,120- 537- 40-B
UB5QBJ 64,845- 317- 55-B
UB5IJZ 59,942- 469- 41-B
UB5VAW 54,516- 378- 42-B
UY5TE 45,494- 377- 45-B
UB5JFJ 36,301- 320- 31-B
UB5DW 34,884- 253- 34-B
UB5LJD 34,441- 427- 31-B
UB5MHP 32,816- 313- 28-B
UB5/RF 30,818- 269- 38-B
UB5MDD 26,900- 293- 25-B
UB5HK 23,896- 251- 29-B
UB5NAO 16,092- 337- 18-B
UB5MMJ 13,125- 191- 21-B
UB5ZDF 8303- 116- 23-B
UB5IRO 6968- 288- 13-B
UB5WE 1,172,626-2813- 91-C
UB5UBI 81,540- 447- 54-C
UB5LU 28,530- 281- 30-C
UK5MAF 1,705,955-3521-115-D
UK5IAZ 1,053,404-2657- 89-D
UK5QBE 708,372-2008- 84-D
UK5IFM 464,958-1696- 78-D
UK5IBB 155,328- 749- 64-D
UK5ZAC 125,552- 607- 59-D
UK5JAF 64,294- 587- 31-D
UK5SAG 47,196- 422- 38-D
UK5CBB 28,244- 311- 24-D
UK5DAD 6300- 114- 18-D

White R.S.F.S.R.

UC2WAZ 128,148- 644- 59-B
UC2WBL 40,180- 360- 35-B
UC2SE 33,210- 285- 41-B
UC2ACT 29,238- 309- 33-B
UC2OBA 28,210- 262- 31-B
UC2WBM 25,916- 308- 31-B
UC2TA 19,980- 220- 30-B
UC2AFJ 9960- 294- 15-B
UC2AFJ 4927- 181- 13-B
UC2OBJ 3010- 95- 14-B
UC2AF 1360- 37- 10-B
UC2AFA 2365- 63- 11-C
UK2CAZ 16,276- 75- 52-D

Azerbaijan

UD6CN 126,730- 573- 58-B
UD6DLJ 31,929- 315- 29-B
UD6BW 1715- 83- 7-B
UK6DAJ 16,733- 197- 29-D

Georgia

UF6FDF 22,572- 366- 22-B

Armenia

UG6GAT 4248- 84- 18-B
UK6GAA 65,520- 368- 63-D

Moldavia

UO5OGX 33,966- 336- 34-B
UO5ODA 7950- 205- 15-B
UK5OBS 86,926- 624- 49-D

Lithuania

UP2BAQ 378,148-1228- 83-A
UP2BFE 248,346- 930- 81-A
UP2BBF 11,408- 168- 23-A
UP2NV 1,075,522-2166-119-B
UP2BEL 119,000- 706- 52-B
UP2GF 108,438- 693- 53-B
UP2BF 69,574- 537- 43-B
UP2DT 58,812- 307- 32-B
UP2PCE 23,432- 231- 29-B
UP2BB 15,460- 221- 20-B
UP2AW 14,345- 217- 19-B
UP2BEX 9087- 317- 13-B
UP2BDV 3890- 182- 10-B
UP2BGK 3600- 180- 10-B
UP2OU 296,946-1020- 78-C
UP2PAD 10,962- 279- 14-C
UP2AV 7098- 116- 21-C
UP2PBW 3598- 99- 14-C
UK2BBB 1,908,012-3169-141-D
UK2PCR 1,786,722-3222-133-D
UK2PAO 331,917-1145- 83-D
UK2BBQ 38,640- 330- 35-D

Latvia

UQ2GDM 52,847- 339- 43-B
UK2GAB(UQ2GID,opr) 30,360- 314- 22-B
UQ2GCP 29,333- 380- 23-B
UQ2GEC 21,392- 311- 22-B
UQ2MU 84,266- 570- 37-C
UK2GKW 2,325,862-4192-121-D

Estonia

UR2RL 65,340- 263- 54-A
UR2RCU 492- 17- 12-A
UR2QI 760,084-2049- 94-B
UR2RHF 63,360- 487- 40-B
UR2CR 4381- 106- 13-B
UR2QD 891,204-2229- 92-C

Zone 30

European Russian

UA4WWS 91,052- 469- 52-A
UA4WPX 682,180-1413-115-B
UA4HBP 43,475- 311- 37-B
UA4WAG 32,604- 296- 33-B
UA4WBJ 16,696- 255- 18-B
UA4PAU 138,624- 560- 64-C
UK4WAB 681,226-1753- 91-D

Asiatic R.S.F.S.R.

UA9MS 828,000-1732-120-A
UW9WB 129,952- 448- 62-A
UA9WS 105,476- 410- 57-A
UA9WDV 139,860- 700- 45-B
UA9CKC 72,050- 599- 25-B
UA9AHS 51,604- 469- 28-B
UA9FGD 41,256- 327- 27-B
UA9LBM 14,250- 111- 30-B
UA9FGJ 10,854- 125- 18-B
UA9MY 4464- 65- 18-B
UK9ADT 1,341,396-2600-126-D
UK9ADY 700,304-1817- 88-D
UK9WAC 91,086- 436- 47-D
UK9CDI 82,670- 550- 35-D
UK9FCX 30,100- 257- 25-D
UK9MDL 27,792- 233- 27-D
UK9AAP 10,110- 153- 15-D

Kazakh

UL7NAC 295,128- 821- 72-A
UL7PBI 47,006- 328- 38-A
UL7TA 6580- 65- 29-A
UK7FAS 16,212- 139- 28-D

Turkoman

UH8BAX 13,872- 254- 12-B

Uzbek

UI8GAJ 72,732- 508- 38-B
UK8AAC 64,400- 344- 46-D

Zone 31

Asiatic R.S.F.S.R.

UA9QO 415,425-1217- 87-A
UA9HBJ 125,018- 306- 34-B
UA9HAB 43,986- 340- 31-B
UA9UGA 4771- 294- 16-B
UK9UAO 320,000- - 82-D
UK9OAD 69,048- 448- 36-D
UK9UAC 45,243- 367- 33-D

Kazakh

UK7GAA 557,120-1712- 80-D

Kirghiz

UM8NNN 10,296- 94- 24-C

Zone 32

Asiatic R.S.F.S.R.

UA9SGL 29,736- 290- 24-A
UA9ACM 189,552- 636- 66-B
UA9SY 49,810- 327- 34-B
UA9ACJ 15,461- - 27-B
UK9AAC 88,680- 355- 60-D

Zone 33

Asiatic R.S.F.S.R.

UA9JDD 33,092- 330- 27-B
UA9UBG 16,915- 319- 17-C

Zone 34

Asiatic R.S.F.S.R.

UA9NR 67,948- 364- 46-B
UA9DP 5472- 82- 18-B
UA9CDA 5406- 76- 17-B
UA9LCF 4642- 135- 11-B
UA9CDM 3392- 52- 16-B
UA9LLO 124,640- 621- 48-C
UA9CCW 18,368- 78- 56-C
UK9FAD 131,657-1052- 31-D

Zone 35

Asiatic R.S.F.S.R.

UA9ZCR 236,670- 879- 70-B
UA9ZBW 70,356- 398- 41-B

Zone 36

Canary Islands

EA8TY 155,196- 583- 54-C

Zone 37

Portugal

CT4OQ 50,986- 264- 53-B

Spain

EA2OP 22,338- 169- 34-B
EA3AIN 425,079-1338- 73-C
EA7ABO 90,882- 386- 54-C
EA4WC 23,409- - 27-C
EA4HD 15,488- 199- 18-C
EA7ABV 6060- 116- 15-C
EA7APD 5320- 129- 14-C
EA3LS 1300- 30- 13-C

Region 2

WA7ZLC/MM 161,200- 624- 52-C

Zone 39

Israel

4Z4TA 12,393- 249- 17-B

Kuwait

9K2DR 31,044- - 26-C

Zone 41

Chagos Islands

VQ9MR 162,642- 283- 56-D

Zone 44

Korea

HM1QD 82,181- 857- 31-C
HM1SN 28,244- 584- 16-C
HM1RD 8040- 264- 10-C

Zone 45

Japan

JA2HLX 310,203- 774- 86-A
JA2VUP 243,350- 819- 62-A
JA5MOU 179,620- 626- 70-A
JH2FFR 130,764- 381- 78-A
JA1EOY 103,124- 406- 58-A
JA4GXS 51,465- 273- 47-A
JI1VZI 46,617- 301- 41-A
JA9BMS/1 38,124- 250- 36-A
JA1EF 13,923- 75- 39-A
JA9GZ 7911- 65- 27-A
JH1MTR 5720- 58- 20-A
JA4EOY 3840- 72- 16-A
JA5BYL 459- 15- 9-A
JA1YFL(JA9JCJ,opr) 559,130-1169-110-B
JA1MRM 272,300- 607-100-B
JA2YAC(JE2QIZ,opr) 232,584- 633- 88-B
JA9CWJ 203,840- 682- 64-B
JH1EYS 181,830- - 66-B
JA2UA 156,570- 396- 85-B
JG1IMM 91,977- 303- 69-B
JH2JEV 88,480- 314- 70-B
JI1TWZ 84,336- 368- 56-B
JH4HLN 69,690- 353- 46-B
JG1EIQ 63,855- 267- 55-B
JG1RIA 63,609- - 49-B
JA3JF 62,220- 224- 61-B
JR3WXA 59,950- 269- 50-B
JE3CYH 55,276- 285- 52-B
JA7GAX 52,380- 258- 45-B
JA2EIV 46,008- 348- 27-B
JA2MYA 45,720- 216- 45-B
JE3CCN 43,010- 261- 34-B
JH7BRG 37,730- 227- 35-B
JA1HQS 36,916- 205- 44-B
JA1OP 34,604- 176- 41-B
JA8DIO 33,618- 290- 26-B
JE2KPM 21,385- 140- 35-B
JA1DNZ 19,764- 117- 36-B
JH1KRX 11,500- 105- 23-B
JA6FYM 1596- 27- 12-B
JA3BCT 1425- 21- 15-B
JA1KKA 640- 22- 5-B
JA7ECI 836- 16- 11-B
JA1DCL 5- 1- 1-B
JH6GHZ 3- 1- 1-B
JR1WHW 467,443-1265- 79-C
JH6RYY 67,431- 370- 39-C
JA7DOT 61,152- 264- 49-C
JA6CM 26,775- 129- 45-C
JJ1WGO 21,216- 264- 26-C
JR6PPG 20,619- 337- 29-C
JA1DCO 18,415- 164- 29-C
JH1UUT 10,815- 113- 21-C
JA6PL 9821- 111- 23-C
JA5BEN 8778- 90- 22-C
JK1JSB 5400- 64- 18-C
JL1EBL 5220- - 18-C
JK1QLP 4440- 50- 20-C
JA6QDU 3587- 51- 17-C
JA0FMB 3393- 43- 17-C
JH5GYG 2184- 90- 12-C
JA9JKL 2160- 34- 15-C
JA3PZL 1708- - 14-C
JA3PIS 1392- 19- 16-C
JH2IJC 1176- 22- 12-C
JF2FHQ 1080- 24- 10-C
JA6XX 228- 8- 6-C
JF2KQV 228- 16- 6-C
JF2LTH 12- 2- 2-C
JA3YKC 719,304-1560-102-D
JA7YCQ 486,160-1536- 80-D
JA2YKA 380,630- 972- 85-D
JA4YFH 320,048- 818- 83-D
JA7YAA 255,512- - 76-D
JA0YCW 30,415- 143- 55-D
JR1YKP 24,108- 146- 42-D

Zone 46

Liberia

5L2AV 1,333,644-2602-103-C

Mauritania

5T5CJ 457,932- 996- 93-A

Nigeria

5N0DOG 589,832-1743- 68-D

Zone 48

Kenya

5Z4QS 8128- 102- 16-C

Zone 49

Thailand

HS1ABD 529,632-1708- 72-B
HS1ALP 43,384- 460- 29-C

Zone 50

Republic of Philippines

W7LPF/DU2 105,028- 503- 44-B
N7ET/DU6 990- 22- 10-B

Zone 52

Angola

OK3TAB/D2A 319,872-1005- 64-C

Zone 54

Indonesia

YB2SV 353,192-1052- 68-C
YB2CR 131,366- 704- 38-C
YB0AE 54,612- 296- 41-C

Singapore

9V0TL 120,420- 560- 54-B
9V0RH 5236- 76- 17-C

Zone 55

Australia

VK4VU 117,900- 790- 30-C
VK8BG 2,847,564-3523-166-D

Zone 57

South Africa

ZS2CW 12,432- - 28-B
ZS6ABO 288,782-1001- 58-C

Zone 58

Australia

VK6IE 86,298- 312- 57-B
VK6NE 23,450- 381- 25-C

Zone 59

Australia

VK3AEW 82,080- - 57-B
VK5ARR 41,731- 291- 29-B
VK1NBQ 19,550- 173- 23-C
VK2ATZ 16,156- - 28-C
VK2AOI 7416- 63- 24-C

Zone 60

New Zealand

ZL1ADI 2,015,384-3031-136-A
ZL2HE 304,497- 903- 69-C

Zone 61

Hawaii

KH6CKJ 214,544- - 53-A
KH6NO 495,978-1025- 98-B
KH6GQZ 199,670- 741- 55-B
KH6JGE 126,157- 617- 41-B
KH6CP 39,776- 200- 44-B

Zone 62

Western Samoa

5W1BZ 115,810- 323- 74-B

Zone 64

Guam

WH2ABE 521,211-1505- 71-A

Check Logs

DM2AHI/A,DM2BWK,DM2CCM,DM2DTG,DM2FIL,DM2FMH,DM2GDL,DM2GWL/DM2FEI,DM3LF,DM3WPL,DM3XRF,DM4CK/DM4SBK,DM4NJG,DM4VCE,DM4VFA,DM4ZFA,DM4ZM,DM5XIG,G2AJB,JH3BJN/4,JH9FGM,K1GSX,K6FM,KP4AS,LA7KW,LZ2KBA,OH2BLD,OH2BRH,OH2PM,OH2PQ,OK1AYX,OK1DIS,OK1FIM,OK1MAW,OK1ONC,OK1TJ,OK2BNK,OK2KPS,OK2KVI,OK3TAY,OK5MVT,OL6AUL,OL8CJO,ON5FV,OZ6SF,OZ7BW,PA0LEG,PA0PLM,PA0TU,PA9RZL,PA9WES,PY1MGH,SM6CVM,SP2KPT,SP5EAQ,SP5ENA,UA1OAI,UA3ADO,UA3AH,UA3DEA,UA3DFV,UA3DGI,UA3DNK,UA3ESN,UA3PBY,UA3RAO,UA3RFZ,UA3TAG,UA3TAM,UA4HFR,UA4HJA,UA4QK,UA4WBG,UA4YAU,UA6ACK,UA6ADV,UA6AJO,UA6LLW,UA9AAB,UA9ADF,UA9CAM,UA9CBO,UA9FM,UA9LCU,UA9LCU,UA0LEO,UA9MDJ,UA9NN,UA9SDB,UA9SDL,UA9UBT,UA9UOZ,UA9UTT,UA9XSQ,UA0QNH,UB5ABK,UB5EU,RB5IOV,UB5KAK,UB5LCN,UB5QAE,UB5QCP,UB5QFE,UB5UCH,UB5UWB,UB5VAA,UB5VAZ,UB5ZBG,UC2AFE,UD6DGA,UF6BN,UF6FCZ,UI8ADQ,UK1ZZA,UK2BAS,UK2FAA,UK2LAF,UK2WAJ,UK3AAC,UK3DAU,UK4PAR,UK5MAA,UK5MCK,UK6AJS,UK6FAA,UK9ABA,UK9ACP,UK9OAW,UK9SBH,UL7PAZ,UO5OEW,UO5OWN,UP2BCG,UP2BFB,UP2BV,UP2PQ,UV3FL,UW3WZ,UW6CV,UW9CC,UY5GG,VP9BK,W4YN,WA2WOV,WA2INO,WA9ITU,WB4BBH,WB4FYS,WB9YUU,WD8OEP,YO5AY,YO5DC,YO6LV,YO8MH,DL-H33-1793271,DM-9278/G

Multiop Operators

VP2MFA(AC8W,KA8AMX,K8DD,oprs)
LA9CA(+LA9CD)
OH1VR(+OH3HC,OH5UX)
OH9DX(OH2BH BRW,oprs)
OZ1BII(+OZ1EQC)
UK1AAA(UA1s ALZ ADN BX ARF AFN,UW1AE)
UK9CDG(UA9COC,opr)
G3XBN(+G3ZQW)
DT7DK(DM2s AYK CEK DUK, oprs)
DM3GM(DM2AGM,DM3s BGM FGM SGM,oprs)
DM4YK(+DM4YYK)
DM5BA(+DM5s YBA ZBA)
DM4FA(DM4s TFA VFA ZFA, oprs)
OK2KMR(OK2SEO,opr)
OK1KOK
OK1KYS(OK1FRF,opr)
OK1KIR(OK1DCI,opr)
SP2ZFJ(SP2s ASJ FAP,oprs)
SP6PAZ)SP6s DVP HEK,oprs)
SP9BRO(SP9ERV,opr)
UK6LBM(UA6s LFX LFY,UW6LI, oprs)
UK6APA(UA6s APR APW ARX, oprs)
UK4LAZ(UA4s LAR LBQ,oprs)
UK3XAM(UA3XBY,opr)
UK6HCZ(UW6FCA)
UK5MAF(UB5s MNM MNQ MNX MNY MNZ MOA,UY5LK,oprs)
UK5IAZ(RB5IXF,opr)
UK5ZAC(UA4PBC,opr)
UK5JAF(UB5SL,opr)
UK5CBB(UB5s CCW CDG,oprs)
UK2BBB(UP2s BAS BBB BCI OX PX PAX TYB,oprs)
UK2PCR(UP2s BBT BCR BCT BCU BDF BEG BFL,RP2BET,oprs)
UK2PAO(UP2PAQ,opr)
UK2GKW(UQ2ON,opr)
UK9ADT(UA9s AAM ACZ,oprs)
UK9AAP(UA9s AAX ADH ADI AFH AFZ WDD,oprs)
UK9FCX(UA9FGF,RA9FCB, oprs)
UK9AAP(UA9AIN,RA9AMU,oprs)
UK9AAC(UA9AAQ,opr)
VQ9MR(+VQ9s JJ KK)
JA3YKC(JA3EUL,JE3 BLA MAS, JH3VOT,JR3s KEG RIU, JH4ETH,oprs)
JA7YCQ(JI1s FLB OFP JGI SLY, JH7s FZI QMG ROP XOZ, JA9SL,Y,oprs)
JA2YKA(JE2RQT,JR2GMC, JH2QXG,JR3URO,JA4UDP,oprs)
JA4YFH(JA4XKZ,JH4s FMI MVB SQJ,oprs)
JA7YAA(JH7s AEF DAG IMN LDN WTC,oprs)
JA9YCW(JH9s BFB ELZ LHB NKM,oprs)
JR1YKB(JH1AET,JK1RKS, JR1LRU,oprs)
5N0DOG(5N9NAS,*HB9s BNY* OGA,oprs)
VK8BG(+VK8s NCT NPC NTG)

Field Day Rules Changes

Your timely and knowledgeable response to our call for assistance on clarification of several points pertaining to Field Day administration prove that FD is, indeed, the "A-number-one event" of the year in amateur circles. The number of letters we received after the Field Day writeup last October was overwhelming. We asked for comments on the existing Field Day rules to see where some changes might be desired. The answer in nearly all of your letters was that the basic Field Day rules were generally favored — in other words, no major changes were in order.

After considerable discussion of your input by the ARRL Contest Advisory Committee (CAC), Emergency Communications Advisory Committee (ECAC), several meetings of the ARRL Awards Committee, and approval by the Communications Manager, a number of relatively minor changes were made for Field Day in 1980. Complete rules will appear in May *QST*.

Most suggested changes fall into three categories. The first is the length of time available before FD to be used to set up the FD site. One of the basic concepts of FD is that it should be an emergency training exercise, and that learning to set up a portable station is an integral part of that exercise. Some stations were so involved in the competitive end of FD that they were setting up the preceding weekend. Beginning with the 1980 FD this set up time will be limited to 24 hours before the contest. This will give you Friday afternoon and Saturday morning to put together your station. You can still choose to participate in the "Chinese fire drill" and set up and operate within the 27-hour FD period, which gives you a possible three extra hours of operating time.

The second most common suggestion was to modify the FD exchange so that something more meaningful than the traditional 599 is sent. Suggestions ranged from complete simulated emergency messages to just the state or province. After considerable study by both the CAC and the ARRL Awards Committee, the exchange was modified to be operating class (1-A, 5-A, 2-B, 1-D, etc.) and ARRL section. If you are operating in the 5-A category you would send "5 A West Virginia" or whatever your section may be. If it turns out that you don't get all five transmitters on the air, or you get an extra one going, feel free to change to 4-A or 6-A if necessary.

Many suggestions were received on modifying the bonus structure. In response to this, the bonuses for a successful satellite contact, sending a message to your SCM from the FD group, and publicity were increased to 100 points. Relayed messages now earn 10 points each (up to 10 messages).

The Natural Power Bonus, last used in 1976 or 1977, was reinstated, with a minimum of five QSOs necessary to earn it. This means that the QSOs must be made without using power from commercial mains or petroleum derivitives. Intuitively, this means an "alternate" energy source of power.

Because of the possibility of real "emergency" situations developing during FD it was felt that some mechanism was needed to make sure that FD participants were aware of emergency frequencies. A bonus will be given for copying an ARRL bulletin sent over WIAW on its regularly announced frequencies. Bulletins will be broadcast periodically just before and during FD. This message can be received directly from WIAW or by any relay method. The important concept is to "get the message."

The requirement that portable stations must sign portable has been dropped, except for those who operate outside of their traditional call areas. For example, W9AA operating in Indiana would sign just W9AA, while W8AA, licensed in or portable in Florida, would indicate W8AA/4, W8AA in Florida or W8AA portable 4.

One small change was made relating to the "free" Novice station permitted in the 2-A and up category. The rules were modified to permit assistance, guidance, advice and instruction from higher-class licensees (in setting up the station only) so that Novice/Technician operators would gain from the experience of those more knowledgeable and to prevent a potentially unsafe situation. To clarify an existing rule, the "free" Novice station can only be used in the Novice-band segments.

Again, many thanks for your very considerable input and carefully thought out letters. We think these changes will make Field Day in 1980 the best ever. Hope your planning is underway! — *Tom Frenaye, K1KI*

April Open CD Party

The April CD (Communications Department) Party is open to *all* members of the ARRL family. It's a good time to get on and see just how many of the CD family or the over-160-k ARRL members can be worked during the allotted time.

For those who've played before, a few new wrinkles have been added. The CD Party Rules allow for 10 hours of operation per mode out of a designated 12-hour period; and the scoring structure has changed — simply multiply your total number of valid QSOs (do this separately for each mode) by the number of different ARRL sections worked for your total score.

The weekend of April 5-6 is reserved for cw, and the phone weekend is April 12-13 (see the accompanying Table for specific starting times).

Simply operate any 10 out of the 12-hour period, making sure your off times are of at least 30 minutes' duration. You may work each station only once per band (per mode). Section multipliers count only once regardless of band. Transmit your "status" plus ARRL section. Non-appointees transmit member (MBR), life member (LM) or charter life member (CLM) — whichever is applicable — plus ARRL section. See the Table for rules, suggested frequencies and list of eligibles.

Reports should be on ARRL CD Party Report Forms or a *reasonable* facsimile. Send an s.a.s.e. to Hq. now for yours; request form CD-136. Entries *must be received* at League hq. by May 2.

All participants will receive copies of the issue of *QCD* (formerly known as the *CD Bulletin*) containing the results. Good luck.

CD Party Facts and Figures

CW			*Phone*		
Starts:	1800Z	April 5	Starts:	1800Z	April 12
Ends:	0600Z	April 6	Ends:	0600Z	April 13

Eligibles: Member, Life Member, Charter Life Member, President, Vice President, Past President, Past Vice President, Director, Past Director, Assistant Director, Vice Director, General Counsel, Associate Counsel, QSL Manager, Section Communications Manager, Assistant Section Communications Manager, NTS Officials, Technical Advisor, Advisory Committees, Intruder Watch, Public Relations Assistant, SEC, EC, DEC, STM, NM, HQ, OO, OBS, OTS, OES, OVS.

Rules: Logs must be submitted in UTC, not local time. Operate a maximum of 10 hours; timeouts must be at least 30 minutes long. Exchange status and ARRL section. Dupe sheets must be included with logs of 200 QSOs or more. You may work each station once per band. Number new sections in the log as worked. Phone and cw contests are separate. Entries must be received at ARRL headquarters no later than May 2, 1980.

Scoring: Multiply valid QSOs by number of different ARRL sections worked (max. 74).

Suggested frequencies: Phone: 3870-3900, 7200-7235, 14,265-14,285, 21,340-21,360 and 28,600-28,630. Cw: Up from 3535, 3715, 7035, 7115, 14,035, 21,035, 21,115, 28,035 and 28,115. Try 10 on the hour 1800-2100 UTC; 160 at 0430 and 0530 UTC. Check the Novice bands frequently. Don't forget 6 and 2 meters.

Public Service

Conducted By Robert J. Halprin,* K1XA

District Emergency Coordinator Now Official

On January 1, a new ARRL field organization appointment, the District Emergency Coordinator, became a reality. It was a matter of much discussion with ARRL appointees via the Communications Department publication, *QCD*, and with that input, the new appointment is now in effect.

The Amateur Radio Emergency Radio Service (ARES), sponsored by the League, has undergone an evolution through many years. The structure is again modernized to keep pace with the changing role of Amateur Radio's response to Section 97.1 (a), to provide communications for the public during times of emergency.

With the advent of 2-meter fm and repeaters, those involved in ARES structure have long ago adopted this mode as their home for local emergency communications. And thus Amateur Radio's response capability has increased dramatically. Progressive leadership officials have kept pace with this changing aspect of radio emergency communications. But the recognized structure has not.

And so the recognition that Amateur Radio emergency groups fall into districts is now officially adopted. What is a district? That depends on where you are. Many state governments have divided their state civil preparedness or emergency services agencies into zones or districts. Red Cross is divided into chapters which have area or district coverage. And very importantly, repeaters dedicated to emergency communications usually cover geographical areas greater than a single community. Few if any disasters are limited to a single community but can cover several cities or towns that respond to the core of the disaster. The District Emergency Coordinator (DEC) is the natural person to head up this coordinated wider area of jurisdiction. Enter stage left, the DEC.

This concept can serve another rather important unifying role. It is well known that there is a tremendous amount of variation in the manner in which the government-sponsored Radio Amateur Civil Emergency Service (RACES) and ARES coexist. How many of us have heard the war stories that RACES doesn't work? Maybe it doesn't where you are, but elsewhere it thrives. Likewise ARES, with a somewhat broader capability for servicing helping agencies, is comatose in some communities, usually because there is no local Emergency Coordinator. In many areas, the District Emergency Coordinator and the area Radio Officer can be synonymous, thus marrying RACES and ARES into a single unifying effort. Pipe dream? It's happening in many parts of the country now and has been for years. By ARRL formally recognizing the district concept there seems little excuse for any amateur so inclined to be prevented from participation in his district ARES — even if a local Emergency Coordinator cannot be found. Every active amateur can sign up in his district to the cause of providing emergency communications.

Some are afraid of the regimentation. They don't want to play war games. You may also have no interest in formal, written third-party traffic. Under the new district concept, all are welcome. We do not advocate an approach lacking discipline. But you may be surprised that your District Emergency Coordinator is realistic in assessing the limited capabilities of us all.

A couple of years ago I had an interesting experience while trying to enlist operators for an ARES team for one of the larger Connecticut cities. Informally addressing a repeater group, I advocated emergency preparedness through ARES participation. An adversary from the group was not willing to "give up" the repeater to pseudo-military types who would march in straight lines and say "over and out." The group was sympathetic to the emergency preparedness concept, but just wanted "a bunch of guys" to provide the communication. After a couple of hours of neither side really "hearing" the other, it finally dawned on all concerned that the ARES that I was advocating was indeed "just a bunch of guys." Right on the spot, the group elected an Emergency Coordinator, and the chief spokesman against became the Assistant EC. To top it off, the club formed a daily NTS-affiliated traffic net which exists to this day. This city and the surrounding communities form a very nice *district*, ripe for DEC direction.

The District EC must be an extremely able person. He/she must make contact with several clubs in the district, especially repeater clubs, and organize different repeaters for different missions. This requires close cooperation with the repeater groups' hierarchy. Diplomacy must be the order of the day. Many districts have a repeater dedicated to formal third-party traffic, another for "tactical" communications, and still another for "informational" purposes. There are more than enough jobs. The DEC must make contact with the town officials of several townships. He must be sure that his district is operating in concert with the rest of the state or section. Therefore, he must be cognizant of and devoted to the section emergency plan as detailed by the Section Emergency Coordinator. And he must be in constant touch with his subordinates, the local Emergency Coordinators, if any, and be sure they are functioning in harmony with the objectives of the district; no small task. He has lines of communication both above and below. In making this very important appointment, the SCM must select a devoted, knowledgeable amateur.

Notice that, with the implied geographical status in the new appointment's name, only a limited number of these appointments are available per ARRL section. And who knows best how to organize the districts? Certainly not Newington, for that decision lies with your elected Section Communications Manager, who will define the district's area of jurisdiction. He is the one in control of the operating activities for your section. And so he has all the latitude and flexibility necessary to incorporate this structural revision into the best interests of the section. Some of the smaller geographical sections in particular may find that the district is not a necessary partition. It is important that we do not end up with all chiefs and no Indians.

Our goal is to bolster our entire response capability during times of emergency. To that objective, we must all reaffirm our resolve to this common good. If you are not already a registered member of the Amateur Radio Emergency Service, why not contact your SCM to find out in which District you reside, and join one of the many groups dedicated to an organized response in providing public service communication. — *John F. Lindholm, W1XX*

☐ SEC Reports. For December 1979, 33 SEC reports were received denoting a total ARES membership of 15,892. This represents a 2.9% decrease in reports received one year ago (34), and a 1.4% decrease in ARES membership (16,119). Sections reporting were Ala, Alta, Ariz, Del, Ind, Kans, KY, La, Me, Mar/NFld, Mich, Minn, Mont, Nev, NFla, NTex, Ohio, Ont, SV, SDgo, SJV, SBar, SCV, Sask, SFla, SNJ, Va, Wash, WVa, WMass, WPa, Wisc, Wyo. At the deadline for this issue, SEC reports received for 1979 total 404 from 56 different sections.

Compared with the 1978 figures, there was a decrease in total reports (438), but an increase in the number of sections reporting (51). Twelve SECs reported every month; this is a decrease of 11 over 1978's total. Including late reports, the following sections had 100% reporting; the number in parentheses shows how many years of complete reporting has occurred: Alta (2), Ariz (5), Del (6), Mich (11), NFla (4), Ohio (2), SDgo (9), SJV (2), SFla (28), SNJ (1), Va (3), WVa (4). Over-90% reporters included Ind, Kans, Mont, NTex, Okla, Org, WPa. The all-time record of 100% reporting still belongs to SFla with 28 consecutive years of reporting.

On the negative end, nonreporters numbered 18, a decrease over 1978's 21. These sections were BC, CZ, Colo, Ga, Ida, Ill, LA, Man, MDC, NMex, NC, ND, SC, SD, Tenn, Vt, WI, WNY.

COMMUNICATIONS SERVICE OF THE MONTH

A Mission for David — On September 4, the Virginia ARES was informed by the Commonwealth of Virginia Office of Emergency and Energy Services that Hurricane David was expected to pass through the state and that a full alert had been declared to commence 7 A.M. on September 5. As of April 1978, the ARES in Virginia has also been recognized by the state as the RACES organization and we had participated in five "full dress" drills. Some of the local ARES groups had been activated for Skylab and local weather emergencies last winter, but this was the first activation for an actual situation involving the entire state. Through the years, ARES had participated in all of Virginia's disaster situations. The difference now was that a statewide plan had been worked out with regard to both frequencies and grouping of ARES units.

In order to cover the entire state, the 138 independent political jurisdictions were divided into 14 districts, conforming roughly to planning districts used by the state in setting up their programs. Further, special emergency coordinators were appointed to handle problems within these districts so that the SEC could spend full time interacting with officials in Richmond where the Emergency Services headquarters are

*Assistant Communications Manager, ARRL

located. (Most of the information in an emergency will flow in and out of Richmond, in the form of requests for materials and services and dissemination of information and resources.)

The requested mission for David involved activation of all the ARES units in the state to collect rainfall, wind and weather information. This information was to be used by the meteorologists and hydrologists to plot the course of David, as well as the risk from flooding. By getting this information by radio, they would not only save time but the telephone lines would be kept open for emergency communications. In the event the telephone lines failed, the amateur circuits would already be in place and operating to take up the load. It would also be extremely difficult to achieve the required organization of incoming information on telephone circuits, while such organization occurs naturally in traffic nets following procedures outlined in the ARRL *Public Service Communications Manual*.

During the evening of September 4, VA SCM K4BKX and I went over to the state headquarters to check out the hf and vhf equipment. We checked into the Virginia Fone Net and then into the Virginia Sideband Net to announce the activation for the following morning and also to explain the kinds of weather information that were desired. Two of the most important pieces of information in a situation like this are the rate of rainfall and the accumulated rainfall since the beginning of the storm. We explained how a soup can and a ruler could be used to provide the information at hourly intervals. Of course, many of the amateurs were already equipped with rain gauges and barometers would be useful. Even if accurate wind speeds are not possible without a measuring device, the general direction of the wind and increases/decreases in intensity are simple to monitor using a piece of cloth tied to a stick, pole or tree.

At this point, there was a bit of concern evidenced by many of the amateurs as to the availability of some key personnel in their ARES units. Several ECs were out of the state and more were away from home at other locations on job-related assignments. Also of concern were the conditions we had heard on the hurricane nets and some of the others previously activated during David's progress in our direction. Without discipline and cooperation on the nets, only a fraction of our useful potential can be realized.

Promptly at 7 A.M., W4JK called up the first session of the Virginia Emergency Net-Bravo on 3947 kHz. This net is used to get traffic into Richmond with another net (Alpha) called up on 3907 kHz when there is also a lot of traffic flowing out of Richmond. In this case, only one net was needed. The net was called every hour for the next 18 hours. Feeding into the net were the weather reports and other traffic being collected on the state's 14 ARES nets. The 34/94 repeater in Richmond was used for local coordination of stations receiving traffic in the Richmond area for final relay to state headquarters when the traffic built up late in the day. At the state headquarters, two electric typewriters were outfitted with rolls of Teletype paper which made two copies directly of incoming messages. At hourly intervals (or less), the messages were delivered to the next room for meteorologists and hydrologists to plot while the carbon copy was kept for ARES records. Net discipline was excellent and each session went smoothly. The information was extremely helpful to the state in terms of spotting problem locations and judging local activities. This was especially important later in the day when David's path changed, taking the rains away from the Tidewater area in the Southeast portion of the state into the South Central and Southwest portions that had been battered in previous hurricanes (Camille in '69 and Agnes in '72). David was treacherous in that as the hurricane shifted to the west, it brought tornado activity to the Eastern and Central portions of the state, moving North with the double threat. Tornados touched down in Hampton, King George County, Dinwoodie County, Fairfax County and Loudon County. In some areas, the ARES groups were mobilized for flood watch and evacuation duty. As the evening of the 5th wore on, the net on 3947 kHz became essentially a continuous session with an hourly pause to shift NCS and get the traffic lists of this hour's reports.

It is impossible to give credit to all who performed such excellent work during the crisis. In one of the sessions, there were over 100 check-ins to the net and yet traffic was passing continuously and there was no confusion. Several hundred Virginia amateurs participated in local net activities. Additional NCS credit during the period goes to W4SUS, W4SQQ and K4BKX who, along with W4JK, made it run smoothly. Members of both Virginia nets that usually met on the frequency (VSBN and VFN) participated, and neither net ran its regular sessions. The 2-meter nets and the repeaters that held many of these nets together did an excellent job. Early in the day, reports from the South Tidewater ARES net and the York County ARES net were of critical importance. Later, the information from the Shenandoah Valley Emergency Net and the Northern Virginia Emergency Net warned of shifting pattern. The Shenandoah Valley group filed composite reports covering several localities in their coverage area. Other key stations in Lexington, Lynchburg and Martinsville provided information at key times in David's progress.

The highlight of the operation from the viewpoint of service value occurred in the evening of September 5, when the state officials approached us at headquarters with a list of locations from which they needed rainfall rates and accumulations to date. An announcement over the net brought most of the required data in a matter of minutes as repeaters were used to spread the word to those not immediately checked in. We also were advised that the National Weather Service and DCPA monitored portions of the net. We were asked to set up a monitoring station at the Richmond office of the Weather Service, and W4DKL from the Richmond ARES volunteered and was set up in a matter of minutes. I was later advised that the information we were providing was "way ahead" of comparable information that was coming through Weather Service channels and, of even greater importance, covered areas where they had no good way of efficiently and rapidly obtaining information.

In the aftermath of the operation which was secured at 1 A.M. September 6, it was obvious that the training, drills and organization done prior to the need had really paid off. Many of the stations present in the net would be familiar to those who frequent NTS. For example, WB4PNY relayed over 50 messages to Richmond hq. and WA4CCK provided reports from Yorktown. At the Richmond hq., 238 messages were delivered to state officials and several dozen more were handled concerning ARES business and other state information, including three priority messages advising the status of flood-watch conditions. It was also noted that the information coming from some of our OES appointees was indistinguishable from professional meteorological reports. Special commendations in the data-quality and message-content department go to the teams under WB4UHC, WB4NEE, WA4STO, K4EJ, W4WWQ and N4AZI.

The success of the operation leads me to believe that we will see more of this type of public service in the future. It is an ideal way to have the net ready for the telephone line failures that often accompany severe weather; plus we have weather information that would be very difficult to accumulate by any other means. It is already evident, based on comments from our public officials, that we were part of an operation that we can remember with pride. — *Bill Farone, N4NK, SEC Va.*

[Editor's Note: For more information on the hurricane emergency, see February *QST*'s "Hurricane Anthology."]

REPEATER LOG

According to reports received between December 20 and January 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Miscellaneous	Total
WR1ADN				1				1
K3PSP				1				1
WR4AOA					1			1
WR4AXO			1	2		1		4
WR5ABA				2				2
WR5ABE				2				2
WR5ABI		1		2				3
WR5ABY		1		12	1			14
WR5ACJ			1	1				2
WR5ADP				2				2
WR5AJG				1				1
WR5ANO				1				1
WR5APK				2				2
WR5APN				1				1
K5DI				3				3
WA5JCJ	1							1
K5XY				2				2
WR8ADP				2				2
W8UPV				1	1			2
K9PD	2			1			2	5
Simplex						1	1	2
Total	3	2	2	39	3	2	3	54

NATIONAL TRAFFIC SYSTEM

December was an exceptional month for the system, with a new record in message handlings. EAN-E reports its best year ever, clearing 30,000 messages for the month, including a few nights with over 300 QSP. Records were also set on 2RN-D, helped by yeoman efforts of KA2CNN, among others. Both components of RN7 broke the rate *sound barrier*, i.e., one message per minute. Welcome WBØMTA as new manager of PAN-D (the second "MTA" in NTS officialdom) and WD8KZX taking over 8RN-D. Our sincere thanks to WAØYNP and WD8NKA for their fine efforts. The Bill Shaw, WB2VEJ, memorial award, presented to the Second Region's most outstanding operator, went to Joe Krone, WA2SPL, for calendar year 1979. Congratulations. First annual 2RN-E wallpaper to WB2MCO and WB2ZCM. Mary, KL7P, doing an outstanding job with the out-of-net liaison circuit on RN7. 4RN-E certificates to N4NK KB4N and WB4DBK. TWN bi-modal certificates to W5JOV WA7JRC NØACW and WØHXB.

December Reports

Area Nets

	1	2	3	4	5	6	7
EAN	91	8978	98.7	2.175	95.7		
CAN	93	4359	46.9	.997	100.0		
PAN	62	4743	76.5	1.381	99.6		
Region Nets							
1RN	113	2412	21.3	.776	91.2	96.8	
2RN	144	2168	15.1	.788	87.3	97.8	
3RN	93	1491	16.0	.763	99.7	96.8	
4RN	124	4065	32.8	.970	84.4	95.7	
RN5	87	2221	25.5	.736	84.5	100.0	
RN6	122	2905	23.8	.569	71.2	98.9	
RN7	124	3766	30.4	1.240	99.8	100.0	
8RN	124	1603	12.9	.543	93.8	96.8	
9RN	154	1560	10.1	.404	98.0	100.0	
TRN	93	1414	15.2	.542	74.4	100.0	
ECN	62	842	13.1	.730	94.6	90.3	
TWN	91	1273	13.9	.411	90.3	100.0	
TCC							
TCC Eastern	299*	3098					
TCC Central	226*	2566					
TCC Pacific	136*	2356					
Sections†	6440	47,798	15.1				
Summary	7904	97,206	12.3				
Record	6694	90,829	28.5				

*incomplete report

‡TCC functions not counted as net sessions.
†Section and local nets reporting (208): ASN (AK), AENB AEND AENJ AENM AENR AENS (AL), ARN OZK SCARC (AR), ATEN HARC SWN (AZ), NCN NCNI/VHF NCTN SBARES SCN SCN/RTTY SCN/VHF (CA), CN GWN HNN (CO/WY), WESCON (CT), DEPN DTN (DE), AFPN FPON FPTN GN MEN NFPN PBTN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), CGVN GCN GSN GSSBN GTFCN GTN MAEN (GA), 175MN IACN TLCN (IA), IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN KWN QKS QKS/SS (KS), KNTN KRTN KSN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRIPN HHTN NEEPN RIEMN WMN WMPN (MA/RI), MEPN MMN MTN WRIN (MB), MDD MEPN (MDC), AEN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN MSSN (MN), ACE MEOW MON NEMOE TNT (MO), APN (MR/NF), MTN (MS), CMN CNCTN JFK M2MEN NCSSBN THEN (NC), WNN (NE), GSFMN NHN (NH), MCN NJN NJPN NJVN OBTTN SJVN UCETN (NJ), NMRRN SWN (NM), NSN (NV), BAVTN CDN CNY HVN NLI NLIPN NLIVHF NYPON NYS OCTEN SDN STAR WDN (NY), BN BNR ONN OSN (OH), NWOKSN OAN OFON OLZ ONON OTWN STN (OK), CMN ODN OLN LN OPN OSN (ON), 16/76 AREST BSN JCARES LBARES OSN PDXAARES (OR), EPA EPAEPTN LVN NWPATMTN PTTN WPA WPA2MTN WPAPTN (PA), WOV/UHF (PO), SCSSBN (SC), NJQ SDEN SDN SDWN (SD), SATN (SK), MGRN METEN MTPSN TN TNN TPN WTVHFN (TN), DFW TEX TTN (TX), BUN UCN (UT), VN VNTN VSBN VSN (VA), WARTS WSN (WA), BEN BWN NWTN WIN WIXPO WSBN (WI), BDTN HBN WVMDN WVN WVNN WVPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

K3KW reports the best month TCC-E(E) has ever had. Certificates were also awarded: W4UQ (18th annual), W2FR (17th annual) W8PMJ (9th annual), WA2ICB (5th annual), W2CS (5th annual), K1EIR (4th annual), VE3GOL (4th annual), W3FAF (3rd annual), K3KW (2nd annual). TCC-C(E) handled some of its skeds on RTTY. Improved liaison between Eastern and Pacific TCC resulted in improved efficiency.

	1	2	3	4	5
TCC Eastern	303	98.7	8203	3098	
TCC Central	245	92.2	4628	2566	
TCC Pacific	150	90.1	4712	2356	
Summary	698	93.7	17543	8020	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (December): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA EIR GN SSH XA, W2s CS CQB EFU FR GKZ MTA RQ ZOJ, K2NY, N2YL, WA2s ICB SPL SYR, W3s FAF PQ, WA3WQP, K3s KW NGN, N3SJ, W4s JK MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, KB6FR/3, W8s PMJ VPW, WA8WPW, WB8WTS, K8s AAZ KMQ, VE3s CWA GOL SB. Central Area (W5GHP/W9JUJ, Directors) — W4ZJY, WD4HIF, K4YZU, WN4KKN, N4MD, W5s KLV RB. WA5s BHF INJ RKU, WB5s MVR NKC NKD OXE, YDD, WD5HHK, K5s GM MC. N5s RB TC TS, W9s CXY DND HOT JIJ JUJ NXG, N9TN, WB9WGD, W0s AM HI, WAØTNM, KØs CW EZ, AFØO. Pacific Area (W5KH, Director) — N5s MR NG, W5KH. K5s FLE MAT. N6s GW PZ, W6s EOT OA SX VZT. WA6s AMK UAZ, WB6PVH, W7s DZX EP GHT LYA VSE. K7s HLR KSA MC, WA7GYQ, ADØA, KØs BN DJ, WØFG, VE7ZK.

Independent Nets (December 1979)

	2	3	4
Amateur Radio Telegraph Society	31	2664	473
Central Gulf Coast Hurricane	31	326	2706
Clearing House	31	765	700
Early Bird	31	1213	—
Empire Slow Speed	31	157	454
Hit and Bounce	31	841	595
Hit and Bounce Slow	31	119	185
IMRA	26	403	979
Mission Trail	31	616	1447
New England Novice	23	51	100
New England Teleprinter	15	137	55
North American Traffic and Awards	29	85	693
Piconet All Day Watch	162	338	3873
Washington Region PON	17	37	360
West Coast Slow Speed	30	137	285
20-Meter ISSB	26	890	461
75-Meter ISSB	31	1656	1331
7290 Traffic	45	1106	2824

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll December 1979

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

104
K1BA
K7GXZ
N6AWH
W5DTR

103
K4ZK
KA5CDX
WA4STO
WB2PJU
W88MTD

102
W2YJR
WD4HIF
WD5EUE

101
K4BKX
WA1VAB
WB1CPF
WD9BCM

100
N2AJG
N9AUG
VE3JRT
WA4YIU
WB1ANT

99
AG2R
K4ZN
N1AMF
WA8WPW

98
W2SQ

97
AA5J
WB8YDZ
WD5IVD

96
N7AFZ
VE3DPO
WA4SRD

95
W2CS
W4ANK
W9NXG
WB2RMI

94
K4GCN

93
K3ORW
N5TC
WA7MEL
WB2HDU
WB4FVV

92
N8ABA

WB5MMI

91
K9UN
KB4OG
KB8MX
WB4ZOJ
WB5LAT

90
AE5I
AK5N
K4EV
N3AKC
VE5WM
WØFT
W5VMP

89
WAØTNM

88
WB5YDD
WB7OFI
WB9JSR

87
KA2CNN
W4NWM
W5JOV
WB1BYR

86
N4AZI

85
K1JHC
KB8GC
N3AIU
VE1BMN
WB2OTC
WB8ITT
WB8SYA

84
W1EOF

83
AF1L
WA2OVE
WB3KDQ

82
W5HMR
WB1FZX
WB2LCC

81
KB2GT
W4JK
WB3FEH

80
KØEZ
W4FMN

79
KAØAIT
KB4OW
W4CKS

78
K3JL
K4VHT
KB2KW
W9XD
WB8YTD

77
KB2HM
WA2MVQ

76
N6GW

75
AJ5F
N4LE
W1RWG
W4NQL
WA2AFE

74
KA9ALR
N5RB
W2XD
WA4EYU
WB5CIT
WD4CNQ
WD5JYI

73
AF4T
K5AO
W2TCA
WD5HHK

72
WDØFBP

71
W4ZJY
W7LNE
W9IEM
WA8GMT

70
K7JV
WA2EQW
WBØHOX

69
KB3AP
W1TM
W1WP
WA7GYQ
WD4POZ

68
W3YQ
W4IBU
W9JIJ
WAØLVG
WA5QFD

67
K5DG
N4WA
W9HOT
WBØPYD

WBØVHN
WB8WTS
WD4PDK
WD8KBW

65
KA1CGP
KA2DBW/T
KA4IVO
KA6ACD
KH6JNQ
KK4M
KM4G

64
WØOTF
WB8SIQ

63
W5SBE
WD4LUG

62
K4XE
N2BC
WB3GZW

61
NØAHA
N9ASX
W5BGE
W7LYA
WB2ZCM
WB7URE
WDØBMR

60
KB5EK
VE3JRO
W2FR
W6JXK
WAØTFC
WA1LOU
WA2ONW
WA7JRC

59
WD4CFZ/T

58
KA2BGX/N

56
WB2RMJ/T

53
WD8BHE/N

47
N2BDW/T

46
KA2GTY/T

43
WA2MEE/T

42
WA2WUL/T
WD4SIH/T

Brass Pounders League December 1979

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WA2EQW, KB4N, N4CCT, WA4VKD and W3EGJ.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

WB5NKC	41	336	424	24	825
K4TH	29	380	234	172	815
WB1EZT	336	70	400	2	808
N4MD	6	461	311	17	795
WD8NYN	17	377	393	6	793
W3VR/4	210	221	344	14	789
WD4HIF	18	353	357	36	764
VE3CWA	57	320	319	66	762
N4PL	100	253	357	52	762
W2UEZ	1	399	345	15	760
KA1CC	48	303	356	33	740
WAØTFC	0	352	375	1	728
WB2TOM	2	344	369	10	725
WAØRWM	40	379	35	269	723
AJ3R	16	329	360	13	718
W4SQQ	0	359	357	1	717
WA4STO	50	310	365	2	717
WB2LCC	23	338	338	17	716
N4NK	0	344	363	8	715
WAØAUX	42	460	205	3	710
VE3KK	218	147	260	78	703
WØBMA	81	269	281	69	700
WA4CNY	10	324	280	82	696
W2YJR	105	190	350	42	687
WB8KWD	1	338	341	6	686
W8PMJ	7	346	324	2	679
WA3ATQ	285	201	183	4	673
WA4CRI	175	137	251	110	673
WA1VAB	0	362	265	32	659
W6OA	0	322	333	4	659
WB7WOW	126	185	277	63	651
N4CCT	41	288	292	25	646
W1TN	1	295	317	18	631
K3NGN	3	322	295	10	630
K4KNP	0	310	320	0	630
AFØO	4	326	295	5	630
WA3PXA	9	312	269	37	627
WB8MTD	0	316	296	10	622
W5TI	5	353	252	7	617
K1BA	0	326	260	28	614
W6NL	80	226	305	3	614
W2MTA	1	329	277	4	611
K4SCL	4	308	249	36	597
KB6FR/3	75	230	230	59	594
KA1BJY	10	301	271	10	592
K4ZK	6	286	283	14	589
WA2HSB	13	291	274	9	587
W5SBE	11	282	285	9	587
WA2ELD	0	282	304	0	586
W7LUP	136	157	244	49	586
KØONK	21	429	115	19	584
K3ORW	7	281	290	4	582
KM4G	5	279	278	11	573
W9NXG	0	270	292	11	573
W5UH	102	243	227	0	572
KB4OZ	66	203	290	11	570
K7HLR	14	285	264	6	569
WB8AKQ	2	282	267	12	563
WD4CNQ	50	227	277	5	559
W9CXY	0	268	287	2	557
W1PEX	2	273	271	9	555
K4DHX	81	196	272	5	554
K4ZN	42	232	273	7	554
W1UD	0	278	243	32	553
WA2ZJP	7	261	272	5	545
VE5AE	211	75	231	26	545
K4GCN	35	257	240	4	536
WAØVRE	125	228	180	0	533
WB5YDD	12	247	256	34	529
W2SQ	0	259	266	2	527
WB8WTS	16	243	265	3	527
K1BSO	0	277	240	7	524
WA2MFV	3	252	256	12	523
WA7IHS	3	265	200	55	523
W1TM	2	263	252	4	521
W6JXK	27	246	239	7	519
W6RNL	11	248	259	0	518
WA4LJI	4	248	256	9	517
WB2EAG	2	258	246	10	516
WB4WYG	12	260	215	28	515

Operating News

Conducted by John F. Lindholm,* W1XX

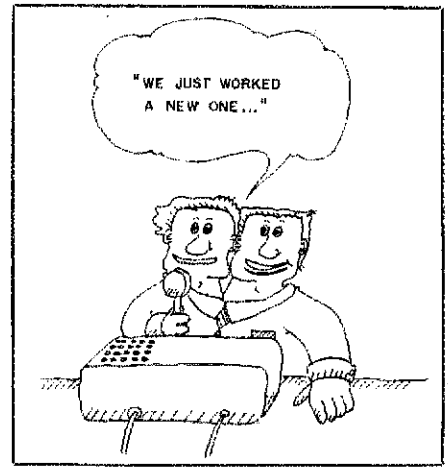
Jargon

Jargon, according to the dictionary, is "the technical or secret vocabulary of a science, art, trade, sect, profession or other special group." Pundits (no, those aren't jokes on cw) such as Edwin Newman or William Safire make their living by pointing out the grammatical imperfections of modern lingo. But this column won't deal with grammar (what do you want — good grammar or good taste?). We will discuss the color and richness, with all logic aside, of the language of our special group — ham radio operators.

By the way, the editorial *we* is okay, but have you ever heard hams conducting QSOs refer to themselves as *we?* You know, "we worked a new state," or "we fixed the amplifier." This would be fine in the case of a clone or a special-events station from the Pittsburgh Pirates' club house ("We are Family") but it is somewhat inappropriate elsewhere. After all, hams are hermits, some with as much personality as a ton of condemned veal.

The funniest statement we (editorially speaking) heard as a neophyte DXer was uttered by a W6, following the abrupt disappearance of a coveted station during a large pile-up. "He must have gone to the sandbox" was the perceptive analysis by the West Coast operator. It took a while, but we finally grasped the significance of this news bulletin. Very diplomatic. The DX station ultimately got back on, worked many stations, and those amateurs who later got confirmations accompanied their QSL with, you guessed it, a *green stamp.*

To continue in this vein, despite the fact that ham radio is supposed to be a noncommercial service, it's amazing how much business is discussed. Fine business, very fine business, "any further business for the net?" and then there are those awards nets where everyone is



trying to give each other "a pair of nickels." If the nickels are exchanged successfully, the voice of the deity will proclaim, "that was a roger contact!" Scandalous! And how about the blatant violation of federal regulations regarding privacy — specifically, all those people arrogantly admitting, admitting right on the air mind you, that they've been "reading the mail."

Some ops aren't as plain with their meaning, otherwise they wouldn't use Q-signals on phone so much. And that great unsilent majority who insist on affirmatively answering a question with "that's a roger." Translated, this means "that's a received." On the other end of the spectrum, some of our colleagues carry over the telegraphic dahdidahdit (for correct) by saying "that's a charlie," or "that's a charlie charlie" or even "that's a Charlie Brown."

Suppose Roger is having a chat with Charlie on one of the amateur bands. They may be pretty confused already by the above. Roger will describe his "working conditions." Now that conjures up an image of a burly foreman with garlic breath in a sweat-shop somewhere. Actually, it's a rundown of Roger's amateur gear. If he is not that strong, Charlie might say he is *PW*, which is a laid-back way of indicating the state of being puny-weak. A more formalized approach is to mention that he is *light*. Heavy. He may well be *barefoot*. Roger then can put on his *shoes* or even his *afterburner.*

Amateurs also give an exalted status to those in the medical and/or religious field in the on-the-air pecking order. "Is Doctor Bill on frequency?" might be heard in the course of a roundtable, since just plain Bill is not respectful enough. Should a DX station be also a member of the clergy, so much the better: "QZ5AA from W1XX, Father." Was that W1XX or W1XXF? Or one might hear, "Stand by Doctor Pepper while I get an 807." How about Doctor Frank (as in Stein) with that nice hilltop location and those big antennas? Could have sworn he just said he's going to throw the *big switch.* Hmmm, sounds ominous. Then another quick spin of the dial might reveal "YO1CD from W1XX, Count. Transylvania is a new one for me. . . ."

We could continue but it's getting late. Time to modulate the pillow. So, see you down the coax (with or without pins) and down the log (popular in the Pacific Northwest).

Readers are cordially invited to send in more of these ham colloquialisms and the origins thereof. So, if you have info to contribute, please, uh, dump it in. — *Robert Halprin, K1XA*

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning April 1, 1980:

Uncontested:

Pacific	Pat Corrigan, KH6DD
San Diego	Arthur R. Smith, W6INI

W1AW NOTE

The complete W1AW winter operating schedule appears in October *QST*, page 111. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

MIDNIGHT SPECIAL RESULTS

The last Saturday night/Sunday morning of 1979 found more than 500 people geared up for the second ARRL Midnight Special. At 0500Z 40 meters came to life and the tricky business of maximizing QSOs in a two-hour period began. Why 40 meters? Certainly a lot of people cursed at the megawatts of foreign broadcast which covered the phone end of the band, and not a few cursed those who picked 40 meters at that time of day.

How well were you prepared for 40-meter contesting? Did your receiver front end overload because of the foreign broadcast carriers? Did you wish you had a notch filter? Or did you spend more time on cw than you had planned to? Whatever the answer, those who ran up the biggest scores did spend most of their time on phone, enduring the carriers, possibly using a couple of different receiving antennas or filter systems. Those with the high antennas may have discovered that all they could hear were those 1500 miles or more away, while those with the low antennas (and the higher angle of radiation) worked more stations closer in.

John, KA9AUS, vows he'll be back when the next ARRL Special takes place.

It looks like the "special" type of contest is here to stay — with the success of this second one and the recent unanimous support of the Contest Advisory Committee. From the comments noted on the 150 logs received, many people would like to see "specials" much more often. The general feeling is for them to be on 160, 80 and 40 meters and maybe only one mode at a time (if mixed modes are allowed, the big scores are run up on phone). Check "Contest Corral" monthly for the next Special announcement.

SPECIAL QRM

The station that gave me 021780, I figured was just about on borrowed time, so I sent him a Form 610 (WØLFF). I found that within two hours, there was never a break in the amount of stations you could work (WB3HVS). The QRM was bad but I know 40 hasn't been used by that many stations at once in 10 years! When is the two-hour Sunday afternoon 10-meter contest going to be? (KA1GM). You are all quite nuts, you know! (WAØZHY). Whoever selected 40 meters and the time should have his coax pinned (W4WWQ). The "big guns" could sit on a frequency and run little guys. Most contests have section or state multipliers, giving some chance to the QRP operator with patience or skill (KB5MU). Thought it was a lousy contest, just not much action. Found out the next day on 2 meters that I was a day early! Incredible! (call sign mercifully withheld). Contest Utopia! Not only was it fun but I had all the contest bookwork done before going to bed (W9HE). Most enjoyable for my first contest ever (KB7IJ). The contest almost drowned out the broadcast stations (N5HD). The narrow spectrum used produced some heavy QRM that should have tested even the most seasoned operator's

*Communications Manager, ARRL

ability (AE1X). Reminded me of the good old days when there were fewer "superstations" calling the tune (K4JM). — *Tom Frenaye, K1KI*

ARRL 40-Meter Midnight Special Results

Call	Score	Call	Score
K1UO	166	WB5OFB	90
K1RT	146	WD5DUD	72
K1KI	141	N5HD	70
W1XX	116	W5WG	52
WB1ANT	97	AC5R	41
W1KKF	92	KB5MU	41
K1XA	92	WA5GYX	41
WA1UZH	84	WA4JZB/5	28
K1VUT	68	AB5N	27
W1TN	58	WB5JZP	25
K1CBR	54	WD5BCI	20
WB1HIH	48	KA5EMI	20
N1ADE	39	WB5PIZ	15
KA1DUJ	39	WD8DKJ/5	8
K1WJ	34	KA5GDJ/N	5
W1SE	27	WA6BOB	84
W1ICH	24	N6PE	82
KA1GM	23	K6WI	67
AE1X	11	NØND/6	33
W2GD	178	W6SX	23
W2RQ	153	KA6IDE/N	14
K2SX	122	K6LL/7	162
W2PA	112	W7NQ	154
WB2RMI	85	KB7IJ	95
K2GBH	80	K5MM/7	86
K9CW/2	76	AC7P	78
W2GKZ (N1EE, op)	73	W7YS	67
N2ADH	70	N7DF	61
N2ALK	67	K7AWB	42
KB2GG	31	KL7FDQ/7	37
K2TWK	25	W7GB	30
K2UL	23	WB7EEI	21
KA2AEV	15	W8KIC	176
W2CC	12	WB8JBM (WB8DQP, op)	163
K3UA	149	AC8Y (+ K8LF)	146
WB3GCG	126	AG8W (K8MJZ, op)	135
K3MD	121	K8URE	93
K3CR (W3AS, op)	117	KB8FJ	91
WA3VPT	80	K8DL	57
AF3B	70	K8ILO	45
W3TS	59	AA8S	39
AA3B	55	N8AFE	34
WB3CFG	49	K8CCV	29
WB3GAV	46	WB8TGS	23
WA3NOM	37	AF8C	15
WB3HVS	34	WA9BWY	174
KA3BER	31	K9GL	144
W3CEI	30	AF9R	119
K4AF (WB3DNL, op)	170	WD9IIX	113
K4LSP	168	K9GS	104
N4NJ	151	N9NO	102
K4JM	130	W9HE	100
K4PQL	120	K9KM	93
AA4FF	105	KA9AUS	80
KB4N	80	AG9A	79
K4JEX	79	K9FW	76
WA4NTP	73	WB9OTX	66
WA3NAZ/4	60	KA9BJO	48
KB4T	59	N9HR	44
N4PY	57	KA9FQV/N	11
W4XD	42	WAØTKJ	127
WB4PNY	41	KØNA	106
N4NK	39	KØMPH	76
N4AXR	36	KØII	71
N4AZI	35	KØBR	63
W4OMW	32	WBØUKP	50
WB4MUZ	32	KØCI	32
W4KMS	28	WAØZHY	25
WA4KQL	27	WØLFF	37
N4UZ	27	WØUPS (WBØLYQ & WDØDND, ops)	36
N4BDM	25	WDØHAP	34
N4AOE	25	WBØUBL	25
WD4PRJ	25	KAØEDW/N	9
WD4AHZ/N	24	VE3JTP	65
K4RKN	13	VE2QO	40
K5ZD	173		
W5XX	164		

	OSCAR 7			OSCAR 8			
DATE (UTC)	*Orbit No.*	*Time UTC HR MN*	*Eqx W. Long. Degrees*	*Orbit No.*	*Mode*	*Time UTC HR MN*	*Eqx W. Long. Degrees*
1 Mar.	24,208	0043	79.4	10,132	J	0021	55.0
2 Mar.	24,221	0137	73.0	10,146	J	0026	56.3
3 Mar.	24,233	0036	77.9	10,160	A	0031	57.5
4 Mar.	24,246	0131	91.5	10,174	AJ	0036	58.8
5 Mar.	24,258	0030	76.3	10,188	X	0041	60.0
6 Mar.	24,271	0124	89.9	10,202	A	0046	61.3
7 Mar.	24,283	0024	74.8	10,216	AJ	0051	62.5
8 Mar.	24,296	0118	88.3	10,230	J	0057	63.8
9 Mar.	24,308	0017	73.2	10,244	J	0100	65.0
10 Mar.	24,321	0111	86.8	10,258	A	0105	66.3
11 Mar.	24,333	0011	71.6	10,272	AJ	0110	67.5
12 Mar.	24,346	0105	85.2	10,286	X	0115	68.8
13 Mar.	24,358	0004	70.1	10,300	A	0120	70.0
14 Mar.	24,371	0059	83.6	10,314	AJ	0125	71.3
15 Mar.	24,384	0153	97.2	10,328	J	0130	72.5
16 Mar.	24,396	0052	82.1	10,342	J	0135	73.8
17 Mar.	24,409	0146	95.7	10,356	A	0140	75.0
18 Mar.	24,421	0046	80.5	10,369	AJ	0001	50.5
19 Mar.	24,434	0140	94.1	10,383	X	0006	51.7
20 Mar.	24,446	0039	79.0	10,397	A	0011	53.0
21 Mar.	24,459	0134	92.5	10,411	AJ	0016	54.2
22 Mar.	24,471	0033	77.4	10,425	J	0021	55.5
23 Mar.	24,484	0127	91.0	10,439	J	0026	56.7
24 Mar.	24,496	0027	75.8	10,453	A	0031	58.0
25 Mar.	24,509	0121	89.4	10,467	AJ	0036	59.2
26 Mar.	24,521	0020	74.3	10,481	X	0041	60.5
27 Mar.	24,534	0114	87.9	10,495	A	0045	61.7
28 Mar.	24,546	0014	72.7	10,509	AJ	0050	63.0
29 Mar.	24,559	0108	86.3	10,523	J	0055	64.2
30 Mar.	24,571	0007	71.7	10,537	J	0100	65.4
31 Mar.	24,584	0102	84.7	10,551	A	0105	66.7
1 Apr.	24,596	0001	69.4	10,565	AJ	0110	67.9
2 Apr.	24,609	0056	83.1	10,579	X	0115	69.2
3 Apr.	24,621	0150	96.6	10,593	A	0120	70.4
4 Apr.	24,634	0049	81.5	10,607	AJ	0125	71.7
5 Apr.	24,646	0143	91.5	10,621	J	0130	72.9
6 Apr.	24,659	0043	79.9	10,635	J	0135	74.2
7 Apr.	24,671	0137	93.5	10,649	A	0140	75.45

Orbit predictions by Project OSCAR, Foothill College, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Soviet RS data have been discontinued.

O 7 progresses an average of 28.736363° W. per orbit in a period of 114.943333 minutes.
O 8 progresses an average of 25.801665° W. in a period of 103:206666 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. OSCAR locators for O 7, O 8 and Soviet RS are available in the new *Satellite Communications* package at your dealer or direct from ARRL; $4.75 U.S., $5.50 elsewhere.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

MARCH

1-2

ARRL International DX Contest, phone, December *QST*, page 94.

5

West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z March 6 (9 P.M. PST March 5). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large self-addressed envelope will help expedite your awards/endorsements.

8-9

YL-OM Contest, cw, February *QST*, page 98.

Virginia QSO Party, February *QST*, page 98.

Nebraska QSO Party, from 0000Z March 8 until 2400Z March 9. Suggested frequencies are the top 20 kHz in the phone bands and 50 to 75 kHz from the lower edge on cw. Score one point per QSO and mail entries to Reynolds Davis, KØGND, 3437 Anaheim Dr., Lincoln, NE 68506.

12

W1AW Qualifying Run, 10-35 wpm at 0300Z on March 13 (10 P.M. EST March 12). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. The complete W1AW schedule appears on page 111 of October *QST*, or send an s.a.s.e. to ARRL for a copy. Other details are the same as the March 5 listing.

15-16

Marconi International DX Contest, cw, January *QST*, page 95.

Bermuda Contest, sponsored by the Radio Society of Bermuda, the full 48-hour period, UTC. Operate 36 hours maximum with minimum three-hour off times noted in log. Single operator only from own private residence or property. 1976-1979 top winners eligible for area awards only. Eighty through 10 meters, no crossband or cross-mode contacts permitted. (No phone contacts between VE/W and G or West Germany on 40 meters.) All contestants exchange signal report. Canadians send province, U.K. send county, U.S. send state. West Germany exchange DOK number. U.S. and Canada work West Germany, U.K. and Bermuda only. U.K. and West Germany work only W/VE/VP9. Five points per QSO. Final score is QSO points times total number of VP9s worked on each band. Top scorers in each state, province, U.K. County and DOK area receive certificates. Top U.S., Canada, U.K. and West German scorers receive trophies. Log in UTC, check for dupes, sign a statement that you've complied with the rules and the terms of your license. Logs must be received by the Contest Committee, Radio Society of Bermuda, Box 275, Hamilton 5, Bermuda by June 30. (Parishes: Sandys SAN, Pembroke PEM, Southampton SOU, Hamilton HAM, St. George STG, Devonshire DEV, Warwick WAR, Smiths SMI, Paget PAG.)

All-Asia Contest, phone, sponsored by the Japan Amateur Radio League. Still awaiting confirmation of new date for 1980; last year's rules follow. Thirty-hour contest from 1000Z March 15 until 1600Z March 16 (cw will take place in August). All bands below 30 MHz may be used. Entry classifications: single-op, single band; single-op multiband; and multi-multi. Note cw only on 160 meters. W/VEs call CQ AA. Exchange RST plus two figures denoting the age of the operator, YL operators use 00. No crossband contacts permitted. Only one signal per band regardless of category. Scoring: Non-Asians count one point for each complete contact with an Asian station. The multiplier is the number of different Asian *prefixes* worked on each band. Note: Only JD1 stations on Ogasawara (Bonin & Volcano) count for Asia. Contacts with KA stations do not count. (They are considered military rather than amateur.) Scoring: Multiply the sum of contact points on each band by the sum of multipliers on each band. Log separately for each band and use a complete summary, note the first time a new prefix is worked on each band. Awards. Usual disqualification procedures. The JARL Asian countries list: A4 A51 A6 A7 A9 AP BV BY CR9 EP HL/HM HS HZ/7Z JA/JE/JF/JG/JH/JI/JJ/JR JD1 (Ogasawara) JD1 (Okino Torishima) JT JY OD5 S21 TA UA/UK/UV/UW/9-0 UD6/UK6C-D-K UF6/JK6F-O-Q-V UG6/UK6G UH8/UK8H UI8/UK8A-G-I-L-O-T-Z UJ8/UK8J-R UL7/UK7 UM8/UK8M-N VS6 VS9M/8Q6 VU VU (Andamans) VU (Laccadives) XU XV XW8 XZ YA YI YK ZC4/5B4 IS (Spratly) 4S7 4W 4X/4Z 7O (Yemen) 70 (Kamaran) 8Z4 9K2 9M2 9N1 9V1 and Abu Ail. Contest results may be obtained by enclosing one IRC and an addressed envelope with your entry, which must arrive no later than June 30 (for phone) or November 30 (cw). Send to: JARL, Box 377, Tokyo Central, Japan.

22-23

Spring RTTY Contest, sponsored by the British Amateur Radio Teleprinter Group, from 0200Z March 22 until 0200Z March 24. Only 30 hours of operating permitted, with off periods at least three hours long. 80 through 10 meters, single or multioperator. Exchange time (UTC), signal report and serial number. Count two points for QSOs with your own country, 10 points for others. Bonus of 200 points for each country worked. Each W/VE/VK call area counts as a separate country. For final score multiply contact points times number of countries worked. Also multiply number of countries worked by 200 and then by the number of continents worked. Add the two numbers together for the final score. Awards. Mail complete log data with two IRCs for results. Entries must be received by May 31. Send to Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England EN1 4DX.

Tennessee QSO Party, sponsored by Tennessee Council of ARC from 2100Z March 22 until 0500Z March 23 and 1400Z until 2200Z on March 23. No repeater contacts. Single-transmitter entries only. No county-line operation for mobiles. Portable stations set up per Field Day rules. TN stations exchange signal report and county. Others send signal report and state/province/country. Suggested frequencies: Phone — 3980 7280 14,280 21,380 28,580 kHz; cw — 50 kHz from bottom, and Novice bands. Count one point per phone contact, 1.5 points per cw contact, except 2 points per 80-meter cw contact. TN stations multiply QSO points by TN counties plus states plus provinces. Others multiply QSO points by TN counties. Separate logs for each band with more than 50 QSOs and dupe sheets required for more than 200 QSOs. Plaques and awards. Participation certificate for 15 QSOs. S.a.s.e. for results. Mail by May 1 to Dave Goggio, W4OGG, 1419 Favell, Memphis, TN 38116.

24

W1AW Qualifying Run, 10-35 wpm at 1400Z (9 A.M. EST). See March 12 listing for more details.

29-30

CQ World Wide WPX Contest, phone, sponsored by *CQ* Magazine. 48-hour period with 30 hours of operating permitted. Only five periods of off time permitted. Multioperator stations may operate the full 48 hours. Two-way ssb only, all bands 160 through 10 meters. Competition categories: single op all band; single op single band; multiop all band only, single transmitter, only one signal permitted and multi-transmitter, one signal per band permitted. Exchange RS plus serial starting with 001. Multi-transmitter stations use separate numbers on each band. Points: contacts between stations on different continents count 3 points on 20-15-10 meters, 6 points on 40-80-160 meters. Contacts between stations in the same continents but not in the same country count 1 point on 20, 15 and 10 meters, 2 points on 160, 80 and 40. Exception: Contacts between different North American countries count 2 points on 20, 15 and 10; 4 points on 160, 80 and 40. This applies only to North American countries. Multipliers are prefixes, to be counted once only. A prefix is considered to be the two- or three-letter/number combination which forms the first part of an amateur call, as in W1, AB2, 4X4, 5A1, etc. For single op: score is total QSO points from all bands multiplied by the number of different prefixes worked; for single band score, QSO points on that band multiplied by the number of prefixes. Scoring for multiops is the same as the all-band scoring for single ops. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken once only regardless of the band. Awards. Usual disqualification criteria. Entries must be received by May 1. Send to CQ WPX SSB Contest Committee, 76 Broadway, Hicksville, NY 11801.

Worked All Britain Contest, from 0900Z until 2100Z on March 30. 20-15-10 meters only. Single operator all band and single band, multiop single transmitter all band or single band, and mobile categories. Exchange signal report and QSO number. British stations will also send WAB area and county. Count five points per QSO. Multiply QSO points by the total number of WAB areas, counties and G prefixes (G, GI, GM, etc.) worked. Awards. IRC for results. Complete log details must be received by May 10. Send to Contest Manager, R. L. Senter, G4BFY, 27 Station Rd., Thurnby, Leicester, England LE7 9PW.

YL ISSB QSO Party, sponsored by the YL ISSBers, full 48-hour period with two six-hour rest periods (phone contest April 19-20). Team categories for YL/OM and DX/W, otherwise single operator. Exchange name, signal report, ISSB number (if any), state/country, and partner's call (if any). Count six points per QSO with members (three on phone), and one point for nonmembers. Multipliers are number of different states, countries and teams worked (members only). Suggested frequencies: cw — 3665 7070 14,070 21,070 28,070 kHz; phone — 3925 7290 14,333 21,373 28,673 kHz. Avoid standard net frequencies. Mail entries with complete exchange/log information by May 15 to Lyle F. Shaw, 52340 Tallyho Dr., South Bend, IN 46635.

Spring VHF QSO Party, sponsored by the Ramapo Mountain ARC, from 1800Z March 29 until 0400Z March 31. Rules are the same as for ARRL VHF QSO Parties (see August 79 *QST*, page 62), except fm operation not permitted below 450 MHz. Exchange signal report and ARRL section. One QSO point for 50-144 MHz contacts, two points for 220-430 MHz contacts and three points for 1215 MHz and up. Multiply by sum of ARRL sections per band. S.a.s.e. to RMARC for entry forms. All who submit entries will receive a copy of the results. Mail by April 28 to Ramapo Mountain ARC, P. O. Box 364, Oakland, NJ 07436.

Wisconsin QSO Party, sponsored by the West Allis RAC, from 2100Z March 29 until 0300Z March 31. Operate a maximum of 24 hours. WI stations send signal report and county, others signal report and state. Phone QSOs count one point each, cw two each. Multiply by number of WI counties worked (or WI counties plus states for WI stations). Novices also multiply by 2.5 for final score. Suggested frequencies: Phone — 3990 7290 14,290 21,390 28,590; cw — 60 kHz from bottom and Novice bands. Complete log details (and dupe sheets if more than 100 QSOs) should be sent before May 1 to Wisconsin QSO Party, c/o West Allis RAC, Box 1072, Milwaukee, WI 53201.

APRIL

1

West Coast Qualifying Run, 10-35 wpm at 0500Z on April 2 (9 P.M. PST April 1). See March 5 listing for more details.

5-6

ARRL Open CD Party, cw, this issue, page 92.

*Asst. Communications Manager, ARRL

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ OTS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, S. T. Jones, VE6MJ — SEC & Asst SCM: E. Roy Ellis, VE6XC. NM: (APSN) VE6AFO. NM: (ATN) VE6BBL. The end of December finds our SCM, VE6MJ, packing his bags, rig, etc. for a trip to the west coast in search of more pleasant climate. He will decide by end of June whether to make his call a permanent VE7. The Alberta Amateur Radio Communication Service Net operating each Monday night on 3750 kHz at 0145Z has come up with the idea of each member taking turns as NCS and conducting a simulated mini emergency. Traffic: VE6BBL 291, VE6HO 207, VE6ABC 84, VE6AMM 18, VE6ON 16, VE6WN 12, VE6XC 12, VE6CE 10, VE6BID 9, VE6ARN 8, VE6CFO 5, VE6VS 4, VE6AAT 4, VE6BAT 3, VE7ATG 2, VE6BHP 2, VE6YW 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Christmas traffic sent over the BCEN Net (CW) and all the other nets in North America as reported to their SCMs would make an impressive December report. But they don't and we have to beg to make a traffic report. Why? Nanaimo ARA news letter reports the efforts of VE7DFY and others on their emergency plan and net for the club members. North Okanagan ARS officers for 1980: VE7DLF, pres.; VE7AOO, secy. Their news letter included the Great Circle Computations book by VE3HC. Burnaby ARC officers for 1980: VE7BFN, pres.; VE7CGE, secy. Best of 1980 to You All. Traffic: VE7ZK 185, VE7COA 160, VE7FB 82, VE7DFY 42, VE7CCJ 30, VE7BLO 29.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst SCM: VE4JP. SEC: VE4TR. STM: VE4RO. NMs: VE4s VJ TE NM IZ AGB. Several newsworthy items will be in QST in the future. One is regarding a rescue mission where a icebreaker and amateur radio was involved. Another from the old days when Manitoba first got involved in ham radio. Don't forget this is the year when we vote for a SCM. MEPN: QNI 1297, QTC 97, sess 31; MTN: QNI 217, QTC 116, sess 30; MMN: QNI 606, QTC 32, sess 31; WRIN: QNI 154, QTC 2, sess 5. Traffic: VE4PG 182, VE4IZ 149, VE4RO 96, VE4QU 71, VE4OJ 35, VE4ACX 32, VE4JA 28, VE4NM 27, VE4TE 26, VE4LU 24, VE4JI 23, VE4AEJ 20, VE4FK 19, VE4NE 16, VE4AAU 15, VE4AAF 11, VE4GR 10, VE4ID 9, VE4EAE 7, VE4AAD 5, VE4JK 3, VE4AEE 2, VE4GW 1, VE4HH 1.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — A/SCM: VO1FG. STM: VE1WF. SEC: VE1ASW. NMs VO1JN VE1WF. Silent Key: David Hutchings, ret. RI, Moncton, NB. Also VO1EG. Hospital: VE1NZ VE1TA. Speedy recovery. Congrats VE1WF, new SCM eff. April 1. Medallion for heavy tfc, APN & ECN. He is NM both nets. Congrats on FB job to APN tfc. Handlers on Xmas tfc. VE1UT attended DOC symposium in Mont. Que. VE1AWS busy Hfx. area erecting towers & beams. VE1BXC now operating in Virginia as AK4L. VE1Ef running Beacon 144.9025 kHz. Rpts from pts N.& E. pse. VE1DAR Dartmouth rptr. on air 146.25/146.85 kHz VE1AZT & VE1AUT transferred to VE6-Land. VE1CF ex.-VE1RI has new position CRTC in Hfx. VE1CK author of new book "St. Paul Is.- Gr. of Gulf" 19 HARC oprs. part. GR. Search Cole Harbour Hfx. Co. XYL VE1QF pub. series on 'Radio Pioneers' in Dart. APN: sess 31, QNI 160, QTC 229. Free Press. QTC 221. Traffic: VE1WF 857, VE1LCR/RO 258, VE1BXA 74, VE1XF 45, VE1BMN 94, VE1OC 34, VE1KR 11, VE1AUL 8, VE1AYI 5, VE1ASW 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3APK. STM: VE3GOL. Congrats to VE3OT on being elected the Canadian Division Director. He resides in London. Holiday season traffic was heavy and all our nets were busy. VE3s HB/3 KK and AYZ helped by generating traffic from senior citizen homes while VE3JPP and the South Pickering ARC were active from a local mall. BPLs were earned by VE3s GOL JIR CWA KK. VE3AOJ has a beacon with the call sign VE3RDL, operating on 50.077 MHz, 10 watts cw continuous to a Squato at 130 feet. VE3EYW, who has been editor of the Algoma Amateur, moves further north to Manitouwadge and VE3JIZ will take over as the new editor. Planning to visit the Pacific Northwest this summer? The 1980 ARRL National Convention will be held in Seattle, WA from July 25th to 27th. Convention theme is "World Friendship Through Amateur Radio." Details available from Box 68534, Seattle, WA, 98168. London Seniors are using a familiar call, VE3LS. VE3GDJ attempting to activate a high school/college net on 7170 kHz at 1130 to 1300 and 1515 local time. About 15 stations are active and a mailing list is available from VE3IDM. Niagara Peninsula ARC Bulletin received favourable comments on a recent article on AMSAT by VE3TW. Several clubs are caught in a bind with the rising publishing and mailing costs and whether club dues should be raised to support their bulletins. VE3JST has been transferred to Houston, TX. The Sydney NS ARC is hosting the 1980 Maritime Convention, HAM CEILIDH 80 on Labour Day weekend, August 29th thru Sept. 1. VE3AR was presented the Paul Helary Memorial Trophy by VE3DBY as Westside's Amateur of the Year. New amateurs are VE3s LZA LPW and LPV. VE3IJT has his Advanced. Nice to hear VE3s CWA and FAS on the cw nets. The following have become Silent Keys: VE3s CN and FB. Those sporting new gear include VE3s DEF HBV ZU HPN EGO HJ KUA and KUB. Traffic: (Dec) VE3GOL 1253, VE3JIR 856, VE3CWA 762, VE3KK 703, VE3CYR 430, VE3GT 314, VE3DPO 277, VE3JRT 214, VE3BB 193, VE3FGU 185, VE3ISW 157, VE3GYD 131, VE3GJG 118, VE3EWD 88, VE3WM 86, VE3BVG 74, VE3JPP 73, VE3JRO 73, VE3APK 65, VE3FZG 53, VE3DVE 47, VE3IFP 42, VE3DUK 40, VE3ANJ 37, VE3IMR 33, VE3WG 31, VE3AWE 27, VE3EST 27, VE3GNW 27, VE3EBC 26, VE3JJK 26, VE3KXB 21, VE3FPI 18, VE3ILT 18, VE3JHE 15, VE3BB 14, VE3BZB 13, VE3IXB 13, VE3AIZ 10, VE3DZH 6, VE3FGV 2, VE3LVE 2. (Nov) VE3HOI 7.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. New appointees: VE2DEA. New appointees: VE2FKI as OTS and VE2BDM as OBS. VE2FKI and VE2FFE are steady check ins on the ECN for the QSN. We are in need of few more. VE2BMK and VE2DDY have done a great job at Chapais, handling traffic with help from VE2MO and the Val d'Or gang. Encore cette annee VE2AUF a conduit un reseau pour echange de souhaits a l'occasion de Noel et aussi au jour de l'an. Felicitations Marc et ton equipe Felicitations a VE2FEX pour son DXCC. Silent Key: VE2AOP St-Lambert. Traffic: VE2FKI 155, VE2FFE 71, VE2BP 46, VE2EC 31, WB1EZI/VE2 16, VE2EKC 13.

SASKATCHEWAN: SCM, Norm Waltho, VE5AE — SEC: VE5WM. NMs: VE5DC VE5HG. The Old-Folks Roundup went over very well this year with over 200 pieces of traffic picked up from the old folks homes around Moose Jaw and Regina, using the NTS to pass most of the traffic to friends and relatives. The Battleford repeater is now up with the duplexer and can be worked from Saskatoon. The Weyburn repeater is now up and working FB on 146:10/146:70. I guess the RTTY boys will have to find another frequency to work on. Traffic: VE5AE 543, VE5HG 240, VE5WM 123, VE5DC 93, VE5QY 86, VE5XC 78, VE5AAT 31, VE5NJ 20, VE5XS 20, VE5RP 16, VE5BBH 15, VE5CX 13, VE5RQ 12, VE5AK 2, VE5LC 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3WD W3QQ. PSHR: N3AKC 90, K3JL 78. 1980 Officers of the Sussex Amateur Radio Association: K3JL, pres.; WA3VDJ, vice pres.; N4AIG, secy/treas. WA3AUP gave an excellent program at the Dec. AWARE Club meeting. The topic, "Evolution of Electronics from 'Cat Whisker' to 'Microcomputor'." Featured were microcomputor bio-rhythm printouts. DEPN: QNI 63, Tfc 9; DTN: QNI 326, Tfc 81. Reminder: Send reports of all Tfc handled to W3DKX. Traffic: W3PQ 374, W3QQ 133, N3AKC 130, WA3WIY 67, W3DKX 47, WB3DUG 43, K3JL 37, WB3GOI 23, W3WD 21, AC3T 7.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3NGN W3VA WA3WQP AG3R. STM: K3NGN. Net Repts: PFN QNI 361, QTC 511; PTTN QNI 324, QTC 153; EPAEP&TN QNI 450, QTC 249; EPA QNI 302, QTC 516; AREC(2) QNI 14; LVN QNI 13, QTC 32; LVN(2) QNI 20, QTC 18. 00 Repts: K3RDT W3KCM W3KEK K3NSN W3GOA W3FAF. OBS repts: AJ3R W3VA W3ID W3CL N3AIU W3AVL. OVS repts: W3GOA W3CL WA3BJQ K3RHI WB3AZE WA3YOE. BPL: K3NSN WA3WQP AJ3R WA3ATQ KB6FR/3 K3NGN WB3JYZ. PSHR: WB3GZW WB3FEH W3DP AJ3R K3RHI WB3JYZ WA3WQP. WB3JZA now AJ3R! Got a few complaints about the new ARL msgs. KB6FR/3 made BPL on half month! New Club Tamaqua Area Amateur Radio Assn: W3VA, pres.; WA3OFD, vice pres.; K3PGZ, secy W3IVW, treas. W3BUR working on a cw keyboard, a different kind of finger talking! K3AKN cleaned out a drawer and mailed a form 1 dated 1963! New ARES starting in Luzerne Co, contact WA3YOE it interested. Thanks to N3EK for getting the Lehigh Co Reptr going. W3EU says price of oil makes VP land look better all the time. KA3CHG reports a new harmonic 9 lbs 6 oz! Ole Murphy got into the act at W3CUL/W3VR/4, almost built their new QTH on wrong lot! Hope all is well by now. The club papers are still looking real professional these days. Elections are coming up so let me know of the new officers. If the band openings hold for the VHF contest the scores will be wild! SCM elections coming up, don't forget to vote. Traffic: K3NSN 4272, WA3WQP 1383, AJ3R 718, K3NGN 630, WA3ATQ 673, KB6FR/3 594, WB3JYZ 505, K3PA 422, K3YL 403, K3KW 398, W3FAF 374, W3IPX 255, WA3CFJ 238, WB3FEH 168, W3DP 167, N3AIU 165, WB3GZW 150, W3VA 137, WB3GUR 117, WA3INW 85, AG3R 76, WB3TRH 53, KA3BER 51, K3EIP 48, W3ID 40, W3ADE 39, WA3TAV 32, KA3CHG 31, AA3B 29, WA3YOE 27, WA3VIL 16, W3AVJ 15, W3CL 14, W3BUR 12, K3EBZ 10, N3CP 9, K3RHI 6, K3AKN 4, WB3JGP 4, WB3AZE 3, W3HK 3, WA3BJQ 2, WA3CKA 2, WB3FPL 2, K3AI 1, W3GOA 1, W3KEK 1, W3TU 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Three BPL men and five PSHR men for Dec. See the listings and congrats. Other were close, check requirements to be sure you are not missing out. WB3JRW is out of Form 1's and they are no longer available. W3WBY keeps 'em honest on the rptr circuits. W4MLR/3 is an OO too. W3ECN is having a ball with his new liaison duties. W3ZNW combines EC and Tfc reports. KB3AP is a pretty active ham for a medical doctor. W3OYY hopes the snow blower remains idle. N3AFM, out resident six meter man, makes your mouth water with his log. FAR, So. MD ARC and Anne Arundel RC send interesting bulletins. W3DFW is host for the popular WR PON. WB3CES and K3ORW have little opportunity to make deliveries, but K3ORW visited enough nets to make BPL. Congrats. AA3S is making arrangements for the MEPN picnic at Gambrills State Park. W5NZ/3 will be on two soon via the gift from Santa. WB3GZU is overwhelmed at the traffic load he handled, congrats. K3IU is working high level NTS, these days. W0VJD/3 almost made BPL and PSHR. WB3KDQ made BPL the easy way! W3FZV got in the CT QSO party as our regular party man! WA3YNW has been the busy link between CO and the Eastern Shore. WA3FUJ fairly booms with his amplifier on full power. We lose N3AQV to Spain. The cw boys will miss his steady hand. N3QA has that antenna back up. WB3KYL should be surprised and pleased with his December traffic results. With the nets: Net/Manager Sessions/Tfc/QNI avg: MDC PON/W3OYY 4/12/24.3; WR PON/W3DFW 17/37/21; MEPN/AA3S 30/331/26; 100% W3ADQ WB3BFK and WA3IHW. Others N3AGM AA3S AE3W and WA2YFM. MDD/W3PQ 62/501 10.7. Top Brass W3QQ N3AKC and W3FA. For November MDD 60/427/10. Top Brass W3FA N3AKC and N3AQV. Traffic: WB3GZU 1256, K3ORW 582, W0VJD/3 445, WB3KDQ 360, K3IU 216, N3AQV 170, AA3S 158, W3FA 134, WB3KYL 122, WA3YNW 90, KB3AP 73, W3ECN 64, WB3JRW 60, WB3CES 28, W3WBY 24, N3QA 21, W3ZNW 15, W3FZV 13, WA3FUJ 11, W5NZ/3 7.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. Dec was a busy month for traffic handlers, with the usual Christmas crush. The net totals were outstanding, and are thus worth printing.

Net	Mgr.	Time	Freq.	Sess.	QNI	QTC
NJN/E	W2UEZ	7PM	3695	31	523	486/402
NJN/L	W2UEZ	10PM	3695	31	286	359/341
NJPN	K2VX	6PM	3950	36	684	762/625
MCN	AA2H	10:30PM	.075	31	260	159/151
SJVN	WB2LCC	10:30PM	.27	31	311	333/318

As you can see these statistics are quite impressive. Special congrats go to those hardworking SNJ people who qualified for BPL and PSHR. They are, in decreasing order of total points, W2ZQ WB2LCC N2AJG WA2ONW WB2GTW (BPL) and AA2H W2ZQ N2AJG WB2LCC WA2ONW WA2WUL (PSHR). Due to their hard work and that of others, SNJ amassed an impressive traffic total of 4469 for Dec! Special thanks for ham radio publicity go to those groups setting up Amateur Radio exhibits in local shopping malls. These included the Delaware Valley Radio Assn under the directions of K3CPF at the Quaker Bridge Mall, Camden County ARES under the direction of WA2ONW at the Echelon Mall and West Jersey Radio Amateurs under the direction of N2ME at the Moorestown Mall. Many thanks for a job well done! Traffic: W2ZQ 1792, WB2LCC 716, WA2ONW 406, N2AJG 321, AA2H 286, WB2GTW 271, KC2A 104, WA4JRP 102, WA2CUW 86, WA2WUL 60, W4NLC 51, KA2GTE 50, K2UL 50, N2ALS 44, N2AEP 32, WA2HEB 28, WA2GXU 26, KC2J 23, WA2GTJ 11, WB2GFM 10.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. I regretfully accepted WB2FTX's resignation as SEC effective 1/1/80. I have approached many clubs about a possible choice to replace him, and a new appointment will be taking place shortly. If you haven't let me know your thoughts, do it today! Russell, NY repeater, N2MD/R, now operational with a new system and antenna. W2ROF has added a Yaesu FT-225RD to the shack. W2ZOJ reports the new CNY traffic net (daily, 0215Z, WR2AOC 90/30 in Syracuse) is going great guns. KA2CFK now on 6m fm. 1980 Buffalo Area Dx Club officers are: WA2ECA, pres.; N2CU, secy/treas. N2APB reports that the WDN (nitely, 9:30 P.M., W2ZIA/R 04/64 in Batavia) now up to 250 members, averaging over 25 QNI per session. K2GWN reports that the Dec. issue of QST has an error in my net listing. The Hit & Bounce net sessions are opposite of my listing - they meet at 7 A.M. on 3.600 MHz and at 8:30 A.M. on 7.070 MHz. RAGS vice pres., WB2ELM, has taken he reigns as pres. from WB2MMU who had to resign due to job constraints. W2WSS reports ESS for Dec very active, with QNI up 25% and QTC up 42% over Nov. Nf2APB announces the WNY CW Traffic Training Net, will meet on Sun. nights at 8:00 P.M. on 28.160 (Novice 10m band), which, as its name implies, is to learn the ropes about traffic. Maximum speed 7-10 wpm. WB2DSH is /1 in MA with new employment. Traffic: (Dec) W2MTA 611, WA2HSB 587, WA2ELD 586, WA2ZJP 545, WA2MFV 523, W2ZOJ 442, W2FR 294, N2APB 269, W2RUF 193, KA2BGX 186, WA2KOJ 164, K2GWN 129, W2PZL 108, WB2OMZ 94, WB2OTC 94, WA2AFE 91, WA2MFU 76, KB2GT 70, W2RQF 49, AF2K 33, WB2OWO 32, N2ALB 25, WB2VSJ 14, WA2ANU 4, WB2NAO 4, K2VR 3, (Nov) W2RQF 49, WB2VSJ 9.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM. STM: W3YQ. SEC: WA3VUP. Ass't SECs: WA3LJW WA3JBQ. NMs W3NEM W3KUN W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPSCW	31	365	298	3585	7:00 P/Dy
WPAPTN	31	663	393	3983	6:15 P/Dy
WPA2MTN (Nov)	31	511	104	146.28/88	8:00 P/Dy
WPA2MTN (Dec)	31	517	151	146.28/88	8:00 P/Dy
NWPA2MTN	23	115	1	146.04/64	9:00 P/Dy

We have two Silent Keys to report this month: W3LKC and WB3GTI who was killed in a tragic car accident Nov 30. Our sympathies are extended to their families. South Hills Brassbounders new officers for 1980 are: WB3ACC, pres.; WB3DHF, vice pres.; WA3ZNP, secy.; WA3KOD, treas.; W3QNI W3MML and K3VX dir. I also want to apologize to the Brasspounders for failing to list them for the great job they did in Allegheny County's SET operation, they did more than their share. Indiana County ARC's new officers are: WB3EUQ, pres.; W3IYI, vice pres.; W3FVU, secy/treas. Washington County WACOM's new officers are: K3PSP, pres.; WA3DIP, treas.; WB3GWR, treas. The following amateurs of Allegheny County brought Santa Claus to the children at Childrens Hospital via 2-mtrs. W3MML, Santa Claus, WB3DXQ Mrs. S. Claus, his helpers at the hospital where WA3LVA WA3JBQ WA3ZNP WA3YAI. WA3LVA started this fine operation three years ago. Traffic: WA3PXA 627, W3EGJ 422, N3EE 379, W3YQ 318, N3FM 280, W3SMV 265, W3UHL 167, W3NEM 154, W3GV 144, WB3HUJ 134, KB3DT 120, WA3UNX 92, WB3JDI 91, W3MML 88, N3AZH 80, W3KUN 75, W3SN 74, W3KMZ 70, WA3HJC 62, K3SMB 60, N3KB 47, W3RUL 45, K3HCT 41, K3VQV 33, WA3JBQ 33, KA3DJM 28, WA3UNX 28, K3ISO 23, WB3KBV 23, WA3VRE 20, N4DR 19, W3EXC 16, WB3GWJ 13, AF3B 12, KA3DXP 12, W3TTN 10, AB3X 8, WB3BOB 6, WB3IAB 6, W3KYN 4, W3TDW 4, WB3JCW 4, K3UA 3.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst SCM: W9RYU. SEC: W9AES. NMs WA9KFK WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Days	Tfc.	Sess.
ILN	3690	0030/0400 Dy	546	62
ILL Phone	3915	2130 Dy	109	31
NCPN	3915	1200/1700	316	52
IEN	3940	1400 Su	19	5
W9VEY Mem				
Stn	2 meter net	—	5	5

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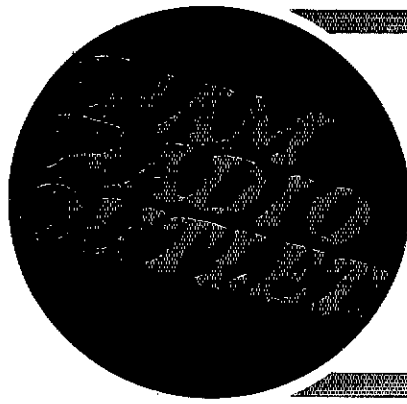

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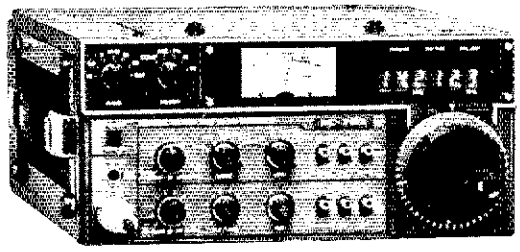

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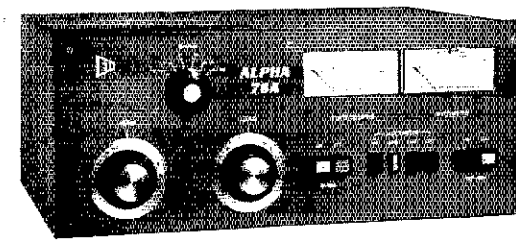

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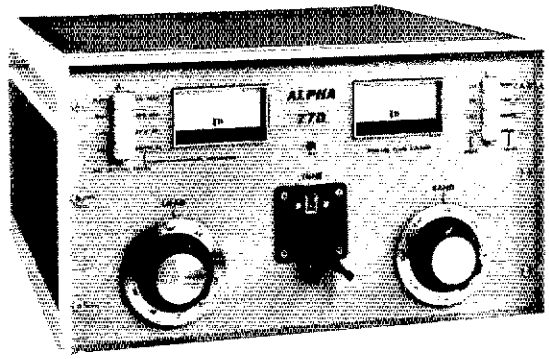

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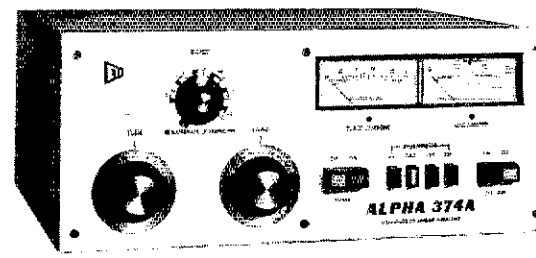

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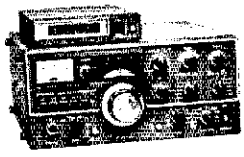

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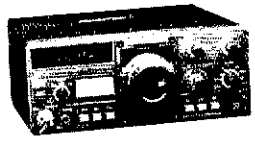

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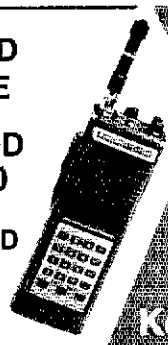

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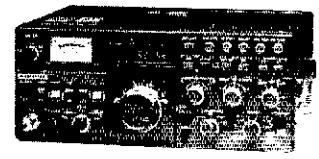

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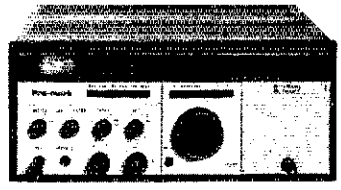

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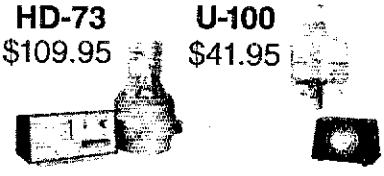

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good year end with all the allocations below 30 MHz remaining the same. Small allocations were added at 10, 18, and 24 MHz. Also 902 to 982 MHz on a shared basis. This column's sympathy to the family and many friends of Christian C. Kessler of Jerseyville who recently joined the ranks of the Silent Keys. N9MX is now the Illinois MARS Director. K9DQ is resurrecting WW II wireless set No. 19 and would like to hear of others experience with this tank radio. New call heard was KA9GAW. W9PNY has been appointed supervisor to the town board of his township. The officers of the Starved Rock Radio Club for the coming year are AA9R WB9ZBF and W9OLZ. New appointment this month is KN9BAM as OTS. N9CF N9AKW W9IWI, WA9EEB and W9FO are the new officers of METRO Amateur Radio Club. The Chicago Six Meter Club held their annual Christmas dinner on December 14 at Cafe Europe. The CAND passed 1445 messages during 62 sessions in December and Illinois participation was 100% with W9OJN WD9EVV W9YCE WB9WGB W9MXG W9HOT and W9JIJ checking in. KA9GIU has upgraded to General class. W9TT has a new Alpha 770 amplifier. WB9VLW WD9CLX WB9YJD WA9LRO WA9WFK WB9RLX WB9SOQ and WB9VUG participated in the Boy Scout Klondike Derby, near Pontiac, Illinois. WA9RKI was installed as master of the Belleville Masonic Blue Lodge. W9HOT reports that the 9RN's traffic was 593 during 92 sessions and that Illinois had 100% participation with stations W9JIJ W9MXG W9YCE WB9WGD WD9FDB WD9EVV WA9LSE. W9NXG W9JIJ and WD9BEX are BPL recipients for December. Traffic: (Dec) W9JIJ 1026, W9NXG 573, W9HOT 475, K9BVE 459, WB9JSR 380, N9TN 344, WD9BEX 290, WB9WGD 264, WD9EVV 263, K9PNG 250, W9OBS 240, W9OK 207, W9YCE 172, KA9ALR 153, WB9PUK 151, W9LTU 134, K9UN 123, KN9BAM 108, WA9KFK 100, K9EEA 84, W9RJW/9 78, KA9DTE 70, W4IZI/9 68, K9SW 65, K9IOH 52, W9LNQ 46, N9MX 43, W9HBI 42, W9OYL 38, W9KR 20, W9PRN 20, WD9HZF 16, WD9EBQ 15, K9DQU 8, WD9EBQ 15. (Nov) K9BVE 403, WB9PUK 127, N9TN 122, K9EEA 90, K9SW 44, WD9EBQ 2.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. STM: W9JIJ. NMs: ITN W9QYY, QIN WB9UYU, ICN N9AEI, VHF W9PMT. December net reports. Times in UTC, Freq. in kHz.

Net	Freq.	Time	QNI	QTC	Sess.
ITN	3910	1330/2300 Dy	2200	506	63
QIN	3656	1430/0100/0400 Dy	857	248	92
ICN	3708	0015 Dy	124	36	31
IPN		2130 Dy	1219	268	31
IPON	3910	1300 Su.	140	3	5

Ind 100% D9RN in Dec. We received good news from Geneva this month. Our (ind) thanks to the many who spent many hours making WARC '79 a success for Amateur Radio. VHF nets continued

Net	Freq.	Day	Time	Net Mgr.
JC	146.325	M/Th	7:00 P.M.	WA9KWH
JC RACES	146.52	M-F	8:00 P.M.	WB9RTO
OP ARES	146.07/67	Thu	8:00 P.M.	W9WEI
KC Emerg	52.525	Wed	6:30 P.M.	W9ENU
KC Emerg	146.25/85	Wed	6:45 P.M.	W9ENU
NW ARES	147.84/24	M-F	7:30 P.M.	WB9TIZ
LC Emerg	146.01/61	Sa	9:15 A.M.	K9BSL
MiC Info	146.37/97	Sa	8:00 P.M.	N9AWJ
HH ARES	146.13/73	Su	8:00 P.M.	WB9VIW
MC ARES	146.10/70	Wed	7:30 P.M.	WB9BAA
MC Races	146.16/76	Tue	7:00 P.M.	WB9WPV
State CD	146.52	Wed	7:20 P.M.	W9NBO
MC ARES	145.52	Su	8:30 P.M.	WB9FNR

To be continued. Complete list for s.a.s.e. to SCM. Silent Key: WB9UHW. Traffic: (Dec) W9JIJ 2316, W9EC 341, WD9CIS 310, WB9UYU 274, WA9TJS 265, W9TG 246, W9XD 223, W9DLF 192, W9EI 186, WB9LCN 167, W9WWI 136, WD9DWD 126, WA9QCF 125, WD9GXW 117, WB9CSZ 95, WB9VWV 92, WB9VJE 85, N9PS 72, W9WEI 58, W9PMT 55, W9HUF 53, WA9GJZ 52, K9WWJ 50, N9AEI 49, W9IOH 36, K9DIY 33, W9UEM 28, K9KTB 24, KA9CVZ 20. WA9OKK 15, WB9DP 6, W9RTH 5. (Nov) WA9QCF 83, K9SBW 2.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. NMs: W9DM K9LGU WD9EAQ WB9ICH W9IEM W9AYK. WD9BFL went from Novice to Advanced. Sheboygan Swaptest July 19 at Wilson Town Hall. KA9AGJ has General, now N9BCA. Dane County 2-meter Net 46 QNI for Nov. New Novice Prairie du Chein KA9FQA. W9IEM has been operating portable from his local library getting more traffic for the nets. Waukesha swap est Jan. 19. W9OBB is now N9BCX, welcome back to Wisconsin. K9GTQ received 1st place in the Michigan QSO party from Wisconsin. NWTN had 511 QNI, 65 QTC in 1214 minutes. BPL to KA9CPA. Dane County Traffic Net had 78 QNI, 4 QTC for Dec. D9RN and CAND are doing good, thanks to the Wisconsin stations checking these nets. N9BM is working QRP. WB9CAJ has General. BPL to W9CXY. WNA picnic July 13 at Elderon County park near Wittenburg. W9YCV has Extra Class. Wisconsin QSO party March 29, 2100Z to 0300Z March 31. Congrats to W9IQ who has Code Proficiency Certificate 40 wpm. Traffic: (Dec) KA9CPA 1189, W9CXY 557, W9DND 453, W9IEM 259, WD9BCM 212, N9AUG 210, W9YCV 154, WB9YPY 154, W9DM 152, WD9DHF 148, K9FHI 118, W9UCL 104, N9AZI 98, W9MFG 98, WB9ESM 94, K9UU 90, W9UW 90, W9AYK 84, WD9ESZ 84, AD9X 84, WB9NRK 82, N9CP 71, W9SFL 60, K9LGU 53, AG9G 50, K9AKG 49, WB9ICH 49, K9JPS 38, W9BJSW 38, K9AQ 37, KB9CV 28, K9VSY 27, AF9T 26, WB9WHQ 26, K9HDF 25, WB9RRU 24, WD9AJA 21, K9UTQ 20, K9KSA 19, W9CJE 16, W9GKO 16, WB9LKC 16, KB9FM 15, W9NA 14, WA9WYS 14, WB9PAW 12, K9ANV 10, W9FDY 10, KB9CT 8, WB9YPZ 8, (Nov) W9CXY 148, W9AYK 79, WB9NRK 16, K9UTQ 8.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — STM: AFØO. SEC: WAØQIT.

Net	GDST	MHz	NM	QNI	QTC	Sess.
MSPN N	1805Z	3.945	WAØAIN	630	104	31
MSSN	2315Z	3.710	WBØZBJ	105	15	27
MSPN E	2345Z	3.929	KAØAIT	870	340	31
WX NET	0015Z	3.929	WBØUKI	485	330	31
MSN 1	0030Z	3.685	AFØO	295	216	31
MSN 2	0400Z	3.685	KØPIZ	166	135	31
RARESN	0130Z Su	146.22/82	KØTS	104	5	5
St C	0330Z	Su	KAØAIT	90	8	5

Upgrades this month were General to Advanced NØASQ; Novice to General KAØEDF WDØDZB; Novice to Tech KAØCSE KAØDNH. Welcome to all the new Novices: KAØGFE KAØGKW KAØGMD KAØGME KAØGMF KAØGMI KAØGMJ KAØGMK KAØGMN KAØGNL and KAØGNN.

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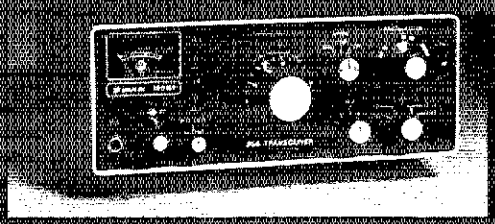
ASTRO 102 BX

100 MX



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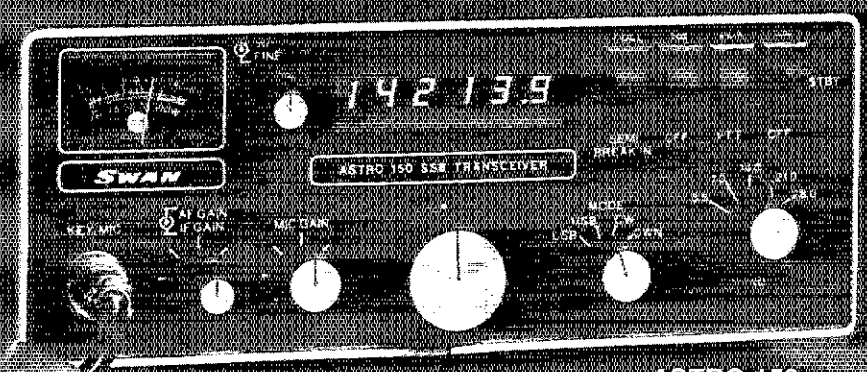

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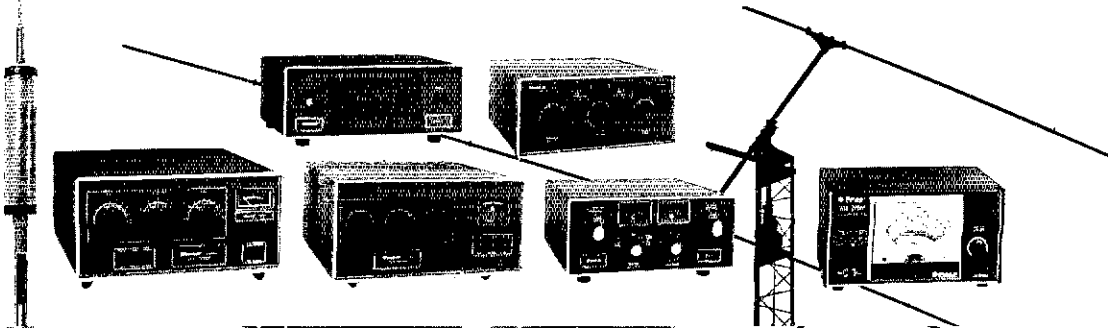

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I want you to know, Sir, how much I appreciate the continuing efforts of TEN-TEC to simplify ham operating for the growing numbers of blind hams. I have been blind just one year, October 1979, totally, and I would like to thank you and TEN-TEC for not putting THE "OUT OF SIGHT-OUT OF MIND."

Best 73,

Tiger & her TEN-TEC, WB5MRB

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The American Radio Relay League, Inc.

Hayfield, a town of 1100, doubled their ham population by adding two of the new Novices (KAØGMN & KAØGNL) to the previous total of 2 - WØAQO General & WDØGLS Tech. By the time this reaches you, KØRMX & WDØBXD will be settled in their new home in Manitoba and listening for their many friends. The address is PO Box 160 Arborg, Manitoba ROC 0AO. The Cougar Amateur Radio Club has been established at the University of Minnesota, Morris. Total membership is 10 - 5 students & 5 local hams. They have a 5 band transceiver and will soon have 2-meter capability. WAØAIN is Trustee. EC column missing this month because WAØQIT was under the weather - just wait until next month! He still needs ECs. Does you county have one? WDØECN found herself stranded one evening in Dec on her way home to Mankato after visiting her OM, WBØQN, in the hospital in Rochester. After going on the air for help, KØJCF and WBØRSJ responded. WBØHOX monitored the operation and assisted in locating the necessary parts so that the repairs on the car could be completed. It has been said that Amateur Radio is the "Ears of the World" and this was just one more case of some of those ears listening and being willing to help. Traffic: AEØM 173, WBØQEU 161, KAØAIT 116, WØHZU 114, WØDFX 112, WBØZBJ 110, WAØAIN 104, WBØSCN 96, WAØLVG 92, WBØUKI 92, WDØCGM 88, NØHY 82, WBØNZB 62, KAØBZP 50, KØCSE 47, WØDUW 36, KØFTB 28, KØRMX 26, KBPEJØ 25, NØJP 25, WDØGPX 19, WBØJUL 18, WDØCEX 18, WBØLRK 16, KØBDD 9, WØSZJ 7, KØJCF 6, KØTS 6, WØJYD 4, KØFLT 3.

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: WDØCLB. Dickison Club had a show and tell in their Mall. Bottineau has a repeater on 146.10/146.40. Congrats to those that upgraded, KAØDQX Novice to General and WDØECS to Extra and will change calls. Welcome to WBØAUM in Bismarck, working for Ma Bell. We express sympathy to WØRRH on loss of his brother. WØOSP enjoying new TSR 80, quite a challenge. Those on vacation for the holidays were WDØDFT to Miami and also attended Orlando Hamfest. KØRMT to Disneyland in CA, and arrived home for the first winter blizzard. WAØVGJ and WAØRWM visited WAØRWL in Ohio.

Net	kHz	CST/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990.0	0900 Su	5	63	2	WØCDO
DATA	3995.5	1830 Dy	26	346	35	WAØCRH
YL WX	3996.5	0730 Dy	31	530	571	WAØRWM

Traffic: WAØRWM 723, KBØIP 178, WAØCRH 113, WDØCLB 49, NØAFP 42, WØFNZ 39, KØGGI 35, WØCDO 27, KØBWZ 20, WDØGMD 17.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst SCM: WØDVB. SEC: WAØTNM. NMs: WØMZI WØWE WAØs TNM VRE WDØBMR. Congrats to KØHP for working rare DX Republic of Cape Verde. PSHR: WAØTNM 89, WDØBMR 61, and WDØBMS for #647 WAS 5-band award. ECs WAØCUL and WBØPZO report good activity in AREC. On 2-mtrs, WAØCUL uses a Kenwood 7625. With WARC completed, Amateur Radio maintained status quo, plus gaining 3 new bands at 10, 18, 24 MHz. Canada has agreed on automatic reciprocal operation with U.S. hams holding licenses above the Technicians Class. Net traffic totals: SDN 121; Wx 585; NJQ 45; SD Eve 87. ARRL members please note, SCM re-solicitations will be made in April and May issues QST. Traffic: WAØVRE 533, WAØTNM 418, WØDVB 328, KØFRE 210, WDØBMR 136, WØHOJ 130, KØAS 115, WAØUEN 112, WØMZI 47, WBØOMF 38, WØRWE 14, WØKJZ 10.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WD5IRB. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets, Freq, Time/Day, QNI, QTC, Mgr. ARN 3.995 0030/Dy 1365 114 AD5D. OZK 3.760 0100/Dy 192 41 W5MYZ. SCARC 28.765 0230/M-T WD5HJC. APN 3.937 1200/M-S 761 52 Act Mgr W5UAU. M-Bird 3.928 2230/M-F 736 44 WA5ZWZ. Cancel NM & OBS app't of AD5D who is moving out of state. Issue app't of NM & OBS for KC5E new mgr for ARN. New officers Hot Springs ARC: WD5PMI, pres.; WD5HIL, vice pres.; WD5CPL, secy/treas.; W5SRR WB5OMH W5JGN, trustees. During Xmas shopping period the following HSARC members worked the Salvation Army Kettle and let children talk to Santa via 2-mtr. W5QKR W5SRR K5EDI WA5UGN W5LQN WA5RRQ WD5CPL. We express the sympathy of AR hams to the families of W5STM & WA5SLR who became Silent Keys. New officers for CAREN: K5JEM, pres.; N5BPU, vice pres.; KB5HE, secy/treas. New officers Metropolitan ARC: WD5BIV, pres.; WB5GFA, secy/treas. SEC, WD5IRB, gave talk on ARES. OBS: K5DW 4, WB5WWA 4, W5UAU 2. PSHR to W5UAU. Traffic: K5AO 147, W5SYH 95, W5QFU 77, W5BLP 72, K5AJM 61, W5UAU 50, AD5D 33, K5BIL 27, K5DW 18, WB5WWA 10, WB5KUI 7, WD5CAA 2, WB5GQH 2.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM: K5DPG. SEC: WB5TPG. NMs: N5RB K5TL WB5LBR WB5TPG WB5USS. WD5GJB has applied for DXCC. DRN5 reps were K5BLV N5EK WB5JZP K5TTC WB5KIR W5YZL WA5JNL. Active on nite time cw RN5 were K5TL WB5LBR K5TTC W5GHP W5MI WA5CAV N5RB N5ES W5VMY WA5PRI. Thanks to the above liaison stations we get traffic in and out of our section. Congrats to W5GHP on his appointment to ECAC. Lafayette Hamfest is March 8-9, see you there. Nice to hear W5EXI active on LTN. New officers of LARC are: K5NFQ, pres.; WA5KNC, vice pres.; K5DPG, secy.; K5ARH, treas. Officers for Acadiana DX Assn are: WD5DBV, chmn.; WA5CGF, secy. Ruston Hamfest to be sometimes in February. Activity around the section is above average right now, especially with the LTN. QNI is running more than 600 with QTC just under that of the fast speed cw net. I am happy to report that during the month of Dec that the LTN finally moved more traffic than our Mother Net the LAN. Thanks to all who participate in both of these fine activities - keep the traffic coming. See you at the Lafayette Hamfest.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	376	194	N5RB
LTN	3910 kHz	6:30 P.M. Dy	698	204	K5TL
LSN	3703 kHz	7:30 P.M. M-F	93	24	WB5LBR
LRN	3587.5 kHz	6:30 P.M. Su	9	5	N5RB
LEN	3910 kHz	8:00 P.M. Su			WB5TPG
RACES	3910 kHz	8:45 P.M. Su			WB5USS

Traffic: K5TL 313, W5GHP 278, WD5LBR 160, N5RB 148, K5BLV 122, K5TTC 85, N5EK 79, W5YZL 64, W5MI 60, W5VMY 60, KB5AS 38, WD5CWK 29, N5BFV 24, WA5MUW 21, WB5LWP 17, WB5JZP 13, WD5GJB 11, WB5IKT 2.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. The new year is off to a fine start with good news from WARC. We all should be in fine spirits. 1979 Delta QSO Party reports good times with over 250 active

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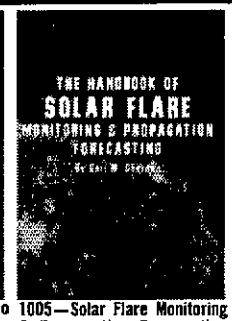
1120—OSCAR: The Ham Radio Satellites. A complete intro to ham communications via satellite! Includes all the details you need to start your own amateur earth station. You learn the ins and outs of every type of OSCAR satellite and its equipment, and you get full data on how to set up your own earth station, antennas, and tracking aids. 140 p., 91 il. only $4.95.



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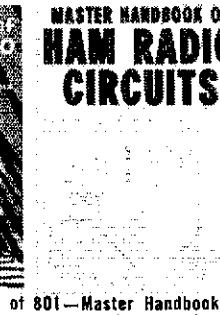

801—Master Handbook of Ham Radio Circuits. A rich collection of over 100 practical circuits. Contains some of the most ingenious ham radio circuits around—all have been built and tested by hams—some are brand new, some are oldies but goodies, and some are souped-up versions of the tried and true—but they're all useful. 400 p., 301 il. only $8.95.

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5600A-Wired	$199.95								
5612Kit	$199.95	50Hz-1.2 GHz	Proportional Oven .2 PPM 10° - 40°C	5-10mv	5-10mv	5-50mv	9	*115 VAC or 8.2-14.5 VDC	3¼" x 9⅛" x 9"
5612 Wired	$239.95								
5500 Wired	$109.95	50Hz-512MHz	TCXO 1 PPM 17° - 40°C	10-25mv	10-15mv	15-50mv	8	115 VAC or 8.2-14.5 VDC or NICAD PAK	1⅛" x 5" x 5⅛"
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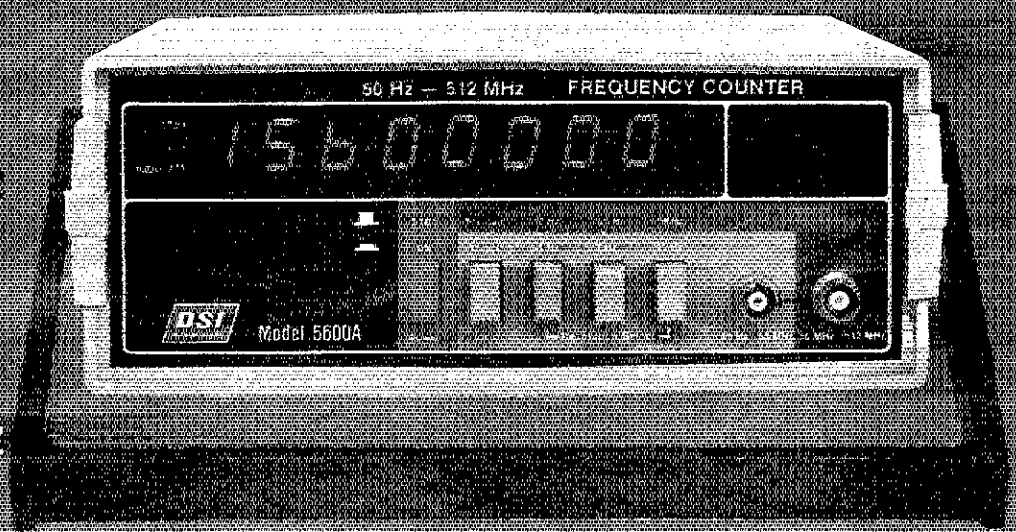

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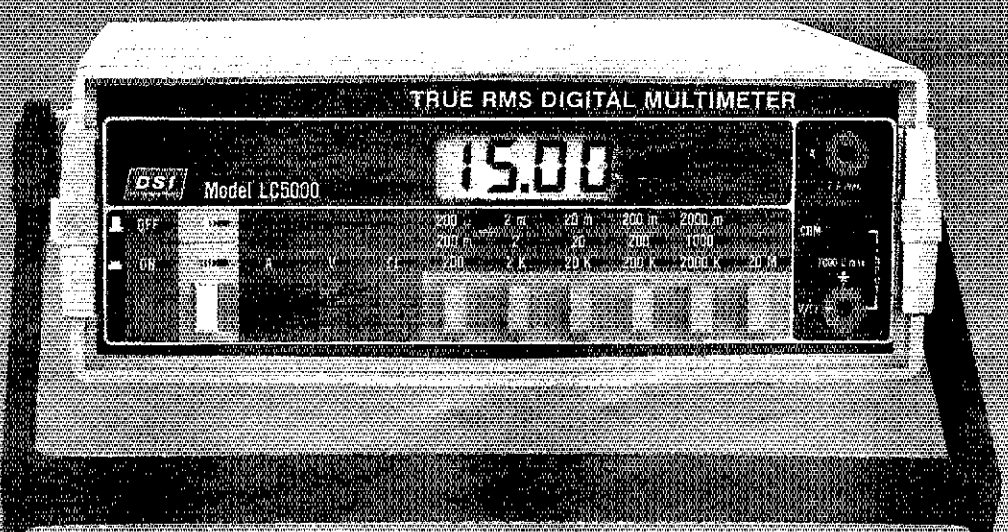

Delta Division stations. Tnx W5XX. New Net Mgr for CGCHN is AG5X. He will appreciate your support. Many tnx due outgoing mgr K5UPN. MSBN doing well, but other nets including MTN and MN especially need out support. And I need your reports! CAND(W5KLV) sessions 62, QTC 1445, with MS rep 100% by N5AMK, DRN5(W5KLV)MS rep 100% in 28 sessions with QTC 784 by WA5OPT K5DMD N5AMK W5EDT WD5EYM. RN5 (N4MD)MS rep 96% by KB5W K5OAF W5EDT WB5FHA W5WZ WB5TRZ. CGCHN (K5UPN) sessions 31, QNI 2706, QTC 326. MSBN(K5MK) sessions 31, QNI 2546, QTC 140. MTN(K5OAF) sessions 31, QNI 121, QTC 57. MN(WA5OP) sessions 31, QNI 612, QTC 14. RACES(N5AMK) sessions 5, QNI 209, QTC 5. Traffic: N5AMK 274, K5OAF 196, WB5FHA 177, W5EDT 82, WB5SNB 40, W5XT 23, WD5EYM 20, WA5OKI 19, KA5AFT 17, K5AMK 8, K5FI 7, WD5CSU 6, N5XA 1.

TENNESSEE: SCM, Earl Leonard, KB4G — My thanks and appreciation for all the support during the recent election. With continued support we will keep the Tennessee Section in fine shape. Thanks to W4NZW for accepting the job of SEC. I'm sure he will do a fine job. Many thanks to WB4DYJ for his contributions and a job well done. Don't expect drastic changes. Our section is doing well and only some minor changes may be made. I am sure you have noticed changes in the TSSBN. Our new NM, K4VM, is quite active. These changes are necessary to help speed the handling of traffic and increase the efficiency of the net and hopefully shorten a somewhat lengthy net. If you have comments or suggestions contact K4VM. Many thanks to W4HHU who has resigned as NCS on TSSBN. The Middle East Tennessee Emergency Net, part of a statewide endeavor, is active and meets Monday through Friday at 0200Z on 147.90/147.30. This repeater is newly installed by the Amateur Radio Club of Knoxville (RACK). KD4C is NM. Traffic: WA4CNY 696, W4ZJY 505, W4OGG 467, AF4T 178, WB4BKF 149, WB4PRF 85, K4VM 72, WB4FMR 66, KA4GSS 62, WD4SIG 52, WA4KSO 48, W4MRD 47, WB4ZSZ 45, WD4NJR 42, WA4CGK 34, K4XE 34, K4IVM 30, WB4HOQ 25, W4TYV 23, KD4C 22, WA4GZZ 20, WD4JIG 20, W4DPO 18, W4EBT 18, N4BVY 13, K4FSK 13, W4RUW 12, WA4EOE 11, WA4GLS 11, W4EWR 9, W4VJW 9, W4PSN 6, WA4WVW 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joe Miller, K4DZM — STM: K4HRF. SEC: WB4ZML. Section Nets reporting.

Net	Time/EST	kHz	QNI	QTC	Mgr.
KRN	6:30 A.M. M/F	3959	415	33	WA8EJ
MKPN	8:30 A.M. Dy	3959	1158	343	WA4JTE
KTN	6:45 P.M. Dy	3959	1340	333	WA4AVV
KNTN	7:00 P.M. Dy 9:00 A.M. S/S	3727	408	324	KB4OZ
KYN	8:00 P.M. Dy	3600	296	347	WA4WSM
KRTN	7:30 P.M. Dy	3630	130	61	K4YZU
KSN	10:00 P.M. Dy	3600	213	71	KS4V

Local and other nets reporting.

	QNI	QTC	Sess.		QNI	QTC	Sess.
KPON	87	21	5	AACN	84	9	5
SEKEN	29	3		TRI-ST 2-METER	275	35	
BARES	100	21	5	CARN	215	38	
PAWN	297	50		5-ARES	58	8	5
6-ARES	152	29	4	D-9RN	84%	593	92
D-CAN	100%	1445	62	25TN NEW FQ. 144.250			

K4SWL pres Henderson ARC, WA4KKV pres Bluegrass ARC, WD4FOS Tech, N4CAC & WA4NOG Advanced, Murray State ARC handled comm for Xmas parade, 6 stns participated. 6th District ARES handled communications for hospital move. PSHR: KB4OZ WD4RNI K4DZM, BPL: WD4FNI KB4OZ. Traffic: KB4OZ 570, WD4RNI 410, WA4SWF 262, KA4AZT 212, WA4AVV 194, K4YZU 170, K4JLX 160, WB4ILF 154, WB4ZDU 151, K4DZM 143, KS4V 142, WA4EBN 96, W4CDA 78, W4OJN 64, W4PKX 64, WA4JTE 62, WB4AUN 59, WD4COF 56, N4AOF 50, WB4APC 49, WA4AGH 47, K4HOE 47, WA4OMH 45, WB4BSC 39, KA4IKH 37, WD4LXX 35, K4HRF 34, K4MHL 32, KB4YH 30, KA4GFU 24, WA4YPQ 22, W4HKT 19, WA4NOG 15, WD4CJQ 14, K4AML 13, W4CID 11, K4AVX 8, WA4GAL 6, KA4ISJ 6, KA4ISZ 6, KS4W 6, KK4Y 3.

MICHIGAN: SCM, James R. Seeley, WB8MTD — Asst SCM: WA8DHB. SEC: WA8EFK. STM: WB8YRY. NMs: N8ABA WD8BHE WA8DHB K8LNE K8KMQ AF8V WB8YDZ.

Net	Freq.	UTC/Day	QNI	QTC	Sess.	Mgr.
QMN*	3663	2300/0300 Dy	1431	595	93	N8ABA
MITN*	3953	0000 Dy	747	428	31	KB8AI
GLETN	3932	0200 Dy	1340	404	31	WD8BSE
MACS*	3953	1600 Dy	859	292	31	K8LNE
UPN*	3922	2200 Dy	818	179	36	WA8DHB
MNN*	3722	2230 Dy	452	154	31	WD8BHE
WSSBN	3935	0000 Dy	822	66	31	WB8VAI
BR	3930	2230 M-S	459	24	25	W8HIN
MEN	3930	1400 Su	195	5	5	W8HIN
VHF Local Nets 12 Reports			445	21	36	WD8LSV

*NTS Section Nets. I've been asked by so many Michigan amateurs to say a public "Thank you" to retired SCM Stan Briggs, W8MPD, that I have to assume it is unanimous: Thanks, Stan, from the whole gang in Michigan. We'll miss you. Field appointments: NM for VHF activities AF8V. OTS: KB8MX WA8PIM. OO: WB8RUQ. Thanks to retired VHF-NM, WD8LSV, for a fine job. Upgrades: WD8PMD WD8RME to General; WD8CSA WA8VBZ to Extra. Callsign confusion: W8SOP to KB8Q, WA8VBZ to KB8W. New officers for Mid Michigan ARC of Farwell: WD8DVB, pres.; WA8DGH, vice pres.; K8YGH, secy/treas. OO reports from K8AIT K8JH W8QG. OBS report from W8GZF. With regret, I report the following Silent Keys: WD8AXC W8BG W8PYD. Sunday afternoons provide two opportunities for information and knowledge for anyone interested in public service communications. The Traffic Workshop at 4 P.M., 3953 kHz, conducted by STM WB8YRY; basics and fine points, Q & A format, no question too "dumb!" And the ARES net at 5:30 P.M. an information exchange net for MI ECs. Anyone interested in emergency communications is welcome. Traffic: WB8MTD 622, W8VPW 454, WB8ITT 419, WD8KZX 398, AF8V 337, K8DTG 331, K8KMQ 281, WD8LRT 254, KB8MX 243, WB8YDZ 228, N8BIK 214, K8RV 202, WB8YRY 189, WB8ZIY 177, KB8GC 153, WA8WZF 141, WB8QYU 134, N8ABA 126, WA8PIM 124, WA8DHB 107, WD8BHE 84, WD8BSE 82, WD8MJB 81, WD8NKA 75, WD8NKT 74, K8GXV 73, K8DYI 68, W8IHX 66, WD8IXZ 63, WD8EIB 62, K8LNE 61, WD8IEW 60, W8YIQ 56, KB8GT 55, W8HIN 53, WB8SVA 50, W8VIZ 48, WB8ZNS 48, WD8JQL 46, WBWOJ 43, AC8F 43, KA8CPS 42, WB8VAI 40, W8CUP 38, WD8EGQ 38, W3GQJ/8 38,

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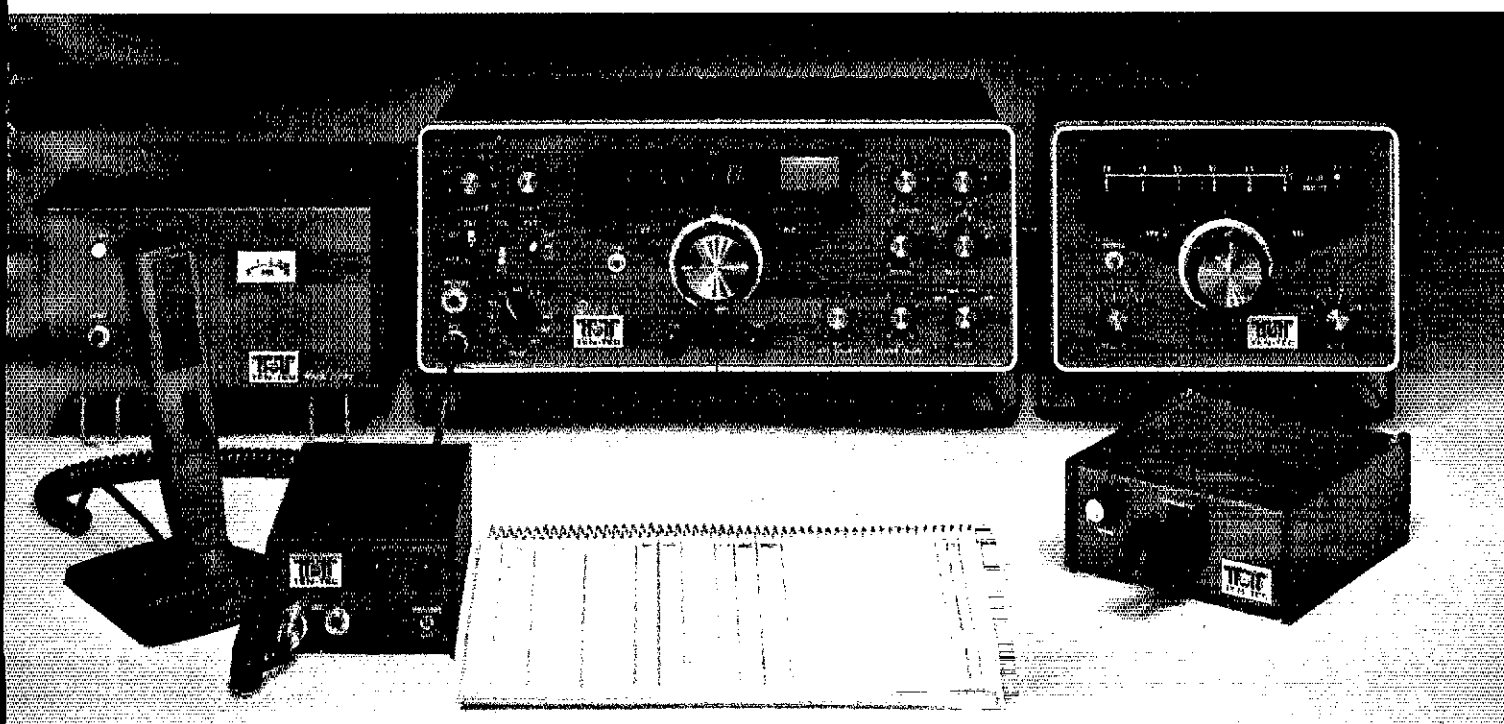

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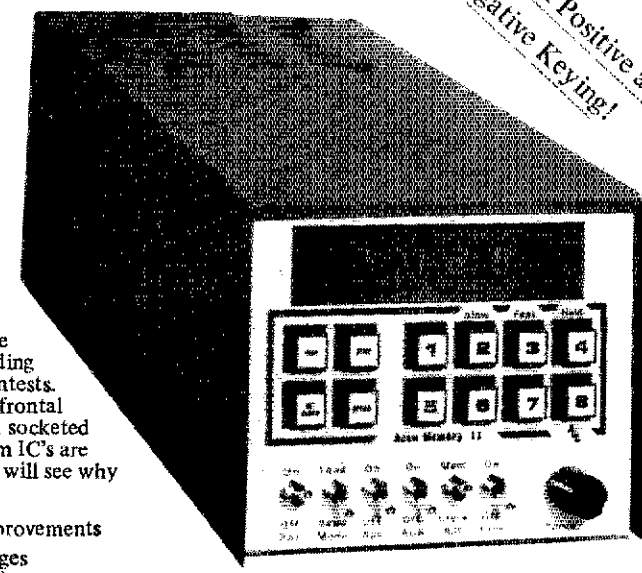

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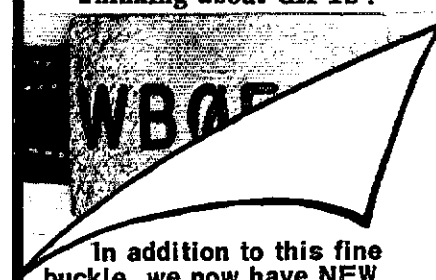

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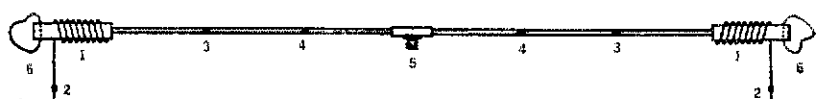

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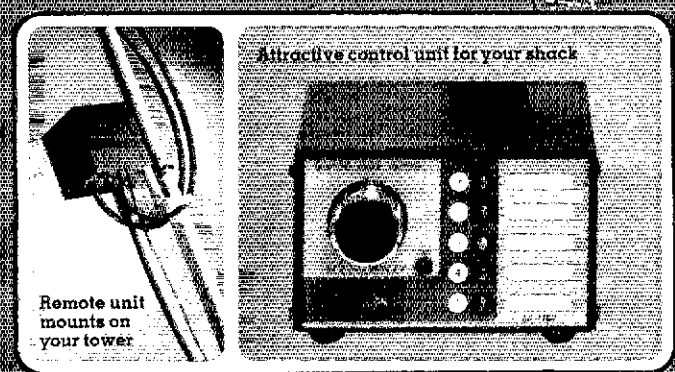

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OHIO: SCM, Harold C. Chapman, WB8JGW — Asst SCMs: AF8O W8TP. SEC: K8AN. NMs AF8A K8AAZ WD8KBW WB8KWD WB8OMQ WB8YGW. Net reports Dec

Net	QNI	QTC	Sess.	Time (Local)	Freq
BN	674	645	62	6:45/10 P.M.	3.577
BNR	119	45	31	6 P.M.	3.605
ONN	165	54	26	6:30 P.M.	3.708
OSN	302	249	31	6:10 P.M.	3.577
OSSBN				10:30 A.M./ 4:15 & 6:45 P.M.	3.9725
O6mN	390	90	31	9 P.M.	50.160

The EC is without a doubt one of the most important appointees in ARRL. He must be an organizer, a traffic handler, public relations expert and above all else a cool headed individual. He must have the ability to get opposing factions in his area of jurisdiction to lay aside their differences and work for the common cause under his leadership. Give the EC in your area all the support possible. Winter issue of QCD (ARRL appointees quarterly newsletter) brings up a couple of good points for discussion: Why didn't the Ohio Section have more participants in the October CD party? You say it has nothing to do with traffic? Sure it does, perhaps not directly, but contest operating can make a more effective traffic handler of you regardless of your favorite mode of operation merely because of the attention required and the accuracy of copy involved. You say it has nothing to do with being an Official Observer? Sure it does - where could you maintain contact with so many stations in such a short period as in a contest such as the CD party? You say it has nothing to do with being an Official Bulletin Station? Sure it does - where could you become more involved with something more repetitious (similar to repeating bulletins) than a contest? Perhaps OVS and OES are left out by the nature of their appointments but in many cases they hold dual appointments, so those dual appointees have no excuse. What was your excuse? Mine was that I just plain forgot it! Let's try to have more Buckeye participation in future CD parties. W8RC, the new Director of the Great Lakes Division, deserves your support. If you have a question, a problem, need his support at a hamfest or other local function, drop him a note at the address in the front of this copy of QST. Thanks to AF8A for his stint as ONN manager. Good luck to WD8PUH who volunteered to accept the vacancy. Appointments: EC WB8VZX Erie/Huron, NM WD8PUH, OTS WD8PUH.

Net	QNI	QTC	Sess.
BRTN	461	222	31
COARES	88	7	3
HCARC	46	4	4
TSRAC	305	37	17
VWCEN	63	3	5

Traffic: K8AAZ 877, WB8KWD 686, W8PMJ 679, WB8WTS 527, WB8IBR 464, N8CW 443, W8TH 387, K8FE 313, W8GGX 306, WA8HGH 276, K8OZ 253, WA8GMT 246, W8QZK 239, W8FU 237, WA8SSI 190, WD8KBW 185, WB8JGW 181, WB8SRC 177, K8SCH 168, K8ND 143, WB8SIQ 140, W8MOK 136, K8DL 122, WD8NJO 120, WB8QXN 120, WD8QZM 111, WB8TRK 111, WB8YTD 109, WB8YTQ 102, WB8OMQ 99, W8WEG 92, WD8DTG 91, AF8A 86, WD8KFN 81, WB8QHV 77, WD8LPP 73, WB8MEK 70, W8ZPF 68, WB8HMI 66, K8YUW 61, WB8NHV 60, WD8EMS 56, WD8PUH 53, WB8PIY 51, W8RG 51, W8HVA 50, WB8YGW 48, N8AKS 47, N8JR 42, WB8ICL 38, WB8CJU 36, WA8MAZ 36, W8TP 35, W8LZE 34, WB8MRL 33, WA8SED 33, WD8OYO 32, K8CKY 31, K3RC 31, K8DHJ 30 W9NJP/8 29, K8AN 28, WB8QHU 27, KB8KV 26, WB8TPX 25, WD8INK 24, WB8MZZ 24, WD8PID 24, K8BYR 23, KB8LQ 23, WD8OYK 22, W8BHL 21, W8IM 20, WD8MKC 20, WB8WNH 20, WB8AWM 19, WD8ILX 19, K8KWO 18, WB8PMW 17, K8IOW 16, W8EK 14, W8WAV 14, WA8RUO 13, WA8BOV 12, KA8DJZ 12, W8MGA 12, AB8P 12, WB8VZX 12, WD8QMP 11, WB8WEK 11, W8EMK 10, WD8QAC 9, WB8VLR 9, WA8TSX 7, K8BNL 5, W8XT 5, N8AJU 4, N8AUH 4, W8DYF 4, WD8JAM 4, WD8JTT 4, W8KN 4, K8JA 3, KA8EZB 2, WB8KKI 2, WB8NTR 2, WD8OTO 1, WB8YUS 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCM: WB2VUK WB2COY W2IT WB2KDC. NM: W2CS W2WSS KB2JG WB2QOH WB2ZCM WB2EAG. Nets: NYPON 5 P.M. 3913; ESS (slow) 6 P.M. 3990; NYPSTEN 6 P.M. 3925; NYS 7 & 10 P.M. 3677; CDN (Troy) 6:30 P.M. 34/94; HVN (Beacon) 7:30 P.M. M-F 37/97; SDN (White Plains) 9:30 P.M. S/T/T 66/06 M/W/F 615/015. ESS had QNI of 454 for Dec. Monthly ESS bulletin still the best. QNI ESS and get one. In it, WB2SFU wrote a piece about continuing usefulness of cw. Have you done any brass-pounding lately? Good for what ails you. QST interested in Prep. Duel. Think W2IT will write an article after Mar 16 duel. Are YOU ready? K1ZZ will speak (on WARC?) to SARA Mar. 3. Everyone invited. Congratulations in Order . . . WB2HDU new EC for Sullivan cty. New Advanced N2BAH, General WB2LHN WA2YUL KA2FLB. New AARA brass K2QF KB2CR WA2GYW KA2DDQ KB2FC. Looking back over 1979, let me thank all of those in ENY who gave rather than got, thought of others instead of themselves, who put in all those hours. You're a class bunch and it's a privilege to be associated with you. Traffic: (Dec) (p = PSHR, b = BPL) WA2SPL 1882pb, W2YJR 687pb, WB2EAG 516pb, N2YL 423p, WB2MCO 411pb, W2CS 407p, WA2STM 406, WA2EQW 172p, WB2HDU 155p, WB2ZCM 126p, K2TXP 114, KB2KW 62p, KA2AOQ 53, W2BIW 50, N2BDW 47p, AA2Y 44, N2EF 42, K2HNW 39, W2FFU 36, W2IQK 21, WB2SON 20, WA2YSM 20. (Nov) W2BIW 64, WA2CJY 10.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCMs: Steve Bloom WB2IDP Dwight Ernest KA2CNN.. STM: WB2BNY. NM: WB2HIQ KA2DBW. The following are ARES nets in our section. Please support your local group.

Area	Frequency	EC
Queens	145.620 am 146.88 fm	WA2ZHA
Brooklyn	146.88 fm	W2XY
Staten Island		
Manhattan		

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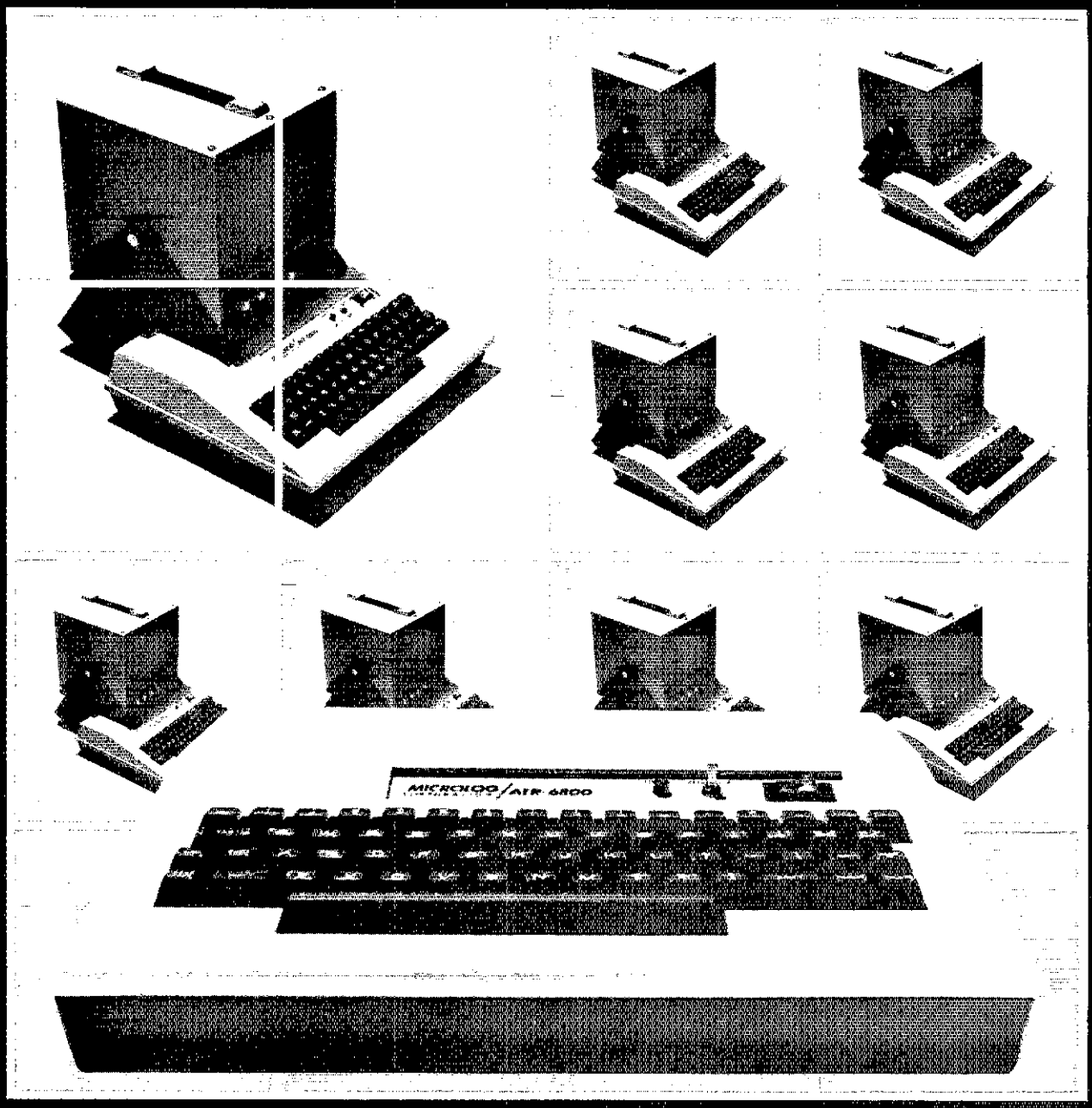

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Brookhaven	146.725 fm	WB2LOU
Southold		
Riverhead		W2LYH
Shelter Island		WA2LBJ
East Hampton		

Blanks indicate either no information or no activity. If you can help with one of the unfilled EC positions or have any additions or corrections to this list, please contact the SCM. I regret to report K2AIU as a Silent Key. She was a well known voice on 2-meters in the area and will be missed. Examinations will be held at Stony Brook in May. This will be the last chance to upgrade there because FCC will no longer be giving tests away from the home office. WB2FJX now teaching Novice course at PS 225Q. He would appreciate any donations. Please send them to PS 225Q, B110 St. Rockaway Park, NY, 11964, Attn. G. Skloot. Congrats to new Suffolk County Radio Club officers! WB2QIY, pres.; KA2T, vice pres.; AC2P, corres. secy.; WA2UMF, recording secy. Congrats to Citibank ARC who was awarded the Cashiers Award for the best non sports club. Lots of our traffic stations are heard on Army MARS nets these days. These stations include KA2CNN WB2BNY WB2IDP and WB2EUF. WB2LOJ just underwent heart bypass operation in TX. Best wishes for a speedy recovery. I regret to report old time traffic man W2BO as a Silent Key. Congrats to K2GCE on new granddaughter. The phone net welcomes new member WA2SEL. K2LIE and W2AHV providing much needed liaison between NLI and BAVTN with KA2CNN and N2BKK doing same between BAVTN and various phone nets. WB2IDP reports that because of being vy QRL with other activities, he has been inactive on the nets, but hopes to return soon. MAARC starting the new year off with over 260 members. WB2DCJ reports new TA 36 beam now up. Suffolk County RC readying new 2-meter solid state repeater. With warm weather coming, activity tends to slacken off, but this column still has to be written, so please continue to send in your activity reports. Traffic: WA2UWA 447, K2LIE 256, W2GKZ 177, KA2CNN 167, W2MLC 156, KA2DBW/T 121, WB2BNY 116, K2GCE 99, K2HD 80, N2BGR/T 55, WB2HIQ 47, K2UB 43, W2DBQ 31, WA2MEE/T 31, WB2RVA 21, WA2KXE/T 17, WB2DCJ 4, K2IZ 4, N2NT 1.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: K2VX W2PSU KB2HM WB2RMI W2TCA W2UEZ and WA2CUW.

Net	Mgr.	Freq.	Time Days	Sess.	QNI	QSP
NJN	W2UEZ	3695	7 P.M. Dy	31	523	402
NJN	W2UEZ	3695	10 P.M. Dy	31	286	341
NJPN	K2VX	3950	6 P.M. Dy	36	684	625
NJVN	W2TCA	49/49	10:30 P Dy	35	267	198
UCEN	WB2RMI	146.85/685	Dy	27	192	87
OBTTN	KB2HM	147.72/12	Dy	31	265	69
NJRTTY	W2PSU	147.51	Dy	31		
NJSN	WA2CUW	3735	6:30 P Dy	31		

Confab '79 held at Rutgers University. W2UEZ was awarded the W2SWE Memorial Award as the outstanding trafficker from all the nets. CGNS! Certificate of Merit awarded W2XD for outstanding work in VHF traffic. K2EZ is using Tiny Pascal on his Mod I TRS 80 Level II 16K computer and he is really into utilizing the above with his ham station. CLUB NEWS: Cranford Amateur Radio Society elected the following officers: N2EQ, pres.; K2MD, v.p.; KA2GQQ, secy.; W2CMK, treas.; WA2IXB, act. mgr. WA2IXB is presently a student at Lehigh. To General: KA2BBH and KA2GQQ. KA2GQQ has a new Azden on 2. TCRA News: W2IIN is the newest Life Member of TCRA. TCRA held their 45th anniversary party! Their first president in 1934, W2FJG is still a member. Novice classes begin February 14 at the Union County Technical Inst. and will run for thirteen weeks. For registration and details contact WA2RNJ. From the "Forty Niner" newsletter: W2MJA retiring editor has been transferred to NC. We'll miss you! The Ramapo Mountain ARC competed in the Nov. SS both cw and phone and will be in the January VHF Sweepstakes. Their annual Christmas party was a huge success. The club completed classes for Novice, Tech and General under the leadership of WA2HLE and WB2ARS. BARA is planning to undertake a new newsletter. Bayonne CD ARC is reorganizing and is currently completeing a licensing course and has a Spectrum Communications repeater 144.83/145.43 on order. WA2UDT qualified for USA-CA and has new transverters for 6 and 2 along with a crankup tower. W2TCA is working to establish a "state-wide" 2-meter net. Sure wish we could get some traffic generated out K2ZFI's way — he's almost a "lonesome George." N2NS is moving to Columbus, OH in July. Ohio SCM take note! KA2EKX is now N2BNB. NJ Radio Club Info Net had 51 stations check-in representing 18 clubs. Traffic: W2RQ 1322, W2UEZ 760, WB2TOM 725, W2SQ 527, N2CR 383, W2CQB 304, WA2OVE 263, AG2R 248, KB2HM 179, WB2RMI 171, AF2L 138, WA2MVQ 136, N2BC 127, W2TCA 110, W2XD 105, K2PH 87, WB2RMJ/T 68, K2WM 43, W2ZEP 43, W5DTR/2 42, KA2GTY/T 35, W2UH 32, WB2JVE 26, WB2AIU/T 20, WA2QWR 18, W2CC 11, WA7DPK/2 10, W2KB 10, N2SU 3, W2ODV 2, N2BNB 1.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. Des Moines RAA had 968 "Operation Santa Claus" calls which provided food, toys and clothing for over 3000. The WØIO Novice class had 7 pass code test. Cedar Falls repeater on 144.77/145.37. Coralville has WØFDA/R on 147.75/.15. Twelve new Novices at Des Moines. New gear dept: WBØNVL Tempo 2020. KØKQJ Amtech 2-m FM. AKØP 60 foot crankup. Marshalltown new VHF Eng. repeater. WDØEIF has DXCC/117 and WBØURA has DXCC/109. He made WAS on cw as a Novice. KØKQJ WØSXK NØAHJ WØDYS keeping 160 hot. Congrats to WBØRMT for 2nd place in IA Single Op. ARRL VHF Contest and to WBØZKG AKØP WDØEIF for 2nd place multi ops, and for 50 MHz leaders. Congrats to upgrades: KAØFRW and KAØEHI Tech; KAØAAI General. KAØAHY is NØBJL, KAØBIS is KBØJM, WDØGDL is KAØX, WBØZXU is KAØY. DMRAA has three advisors for and sponsors Explorer Post. WØSS WØYLS KAØX, AEØR WBØCPF WBØPYD AIØQ KØGP NØSM WØFO WØTIU gave 100% on NTS-TEN and WAØAUX WØNTK and WBØPYD gave IA 100% on DTRN. Don't forget 3900 Hamboree March 29th.

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KR-50 Keyer	89.95
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FT-7B Xcvr.	589
FT-127RA 220 Mhz Xcvr.	399
YC-221 Display	99
CPU2500R/K Xcvr.	419
SWAN	
600R Rcvr.	$399
350 Xcvr. w/117XC P.S./Spkr.	349
250 6 Meter Xcvr. w/117XC, P.S./Spkr.	289
TEMPO	
Tempo One Xcvr. w/AC One	399
TEN TEC	
Triton II Xcvr. w/252 P.S., CW Filter	475
Triton IV Xcvr. w/CW Filter	519
540 Xcvr. w/252G P.S.	569
244 Digital Display	139
YAESU	
FT-301SD Xcvr. w/CW Filter, Processor	499
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FT-901D Xcvr. "Demo" w/warr.	999
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T-4XB Xmtr.	369
T-4XC Xmtr.	429
AC-4	89
MS-4	19
TR-33C 2 meter port.	169
TR-22 2 meter port.	129
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ELECTRONIC RESEARCH CORP.	
SL-55 Tunable Audio Filter	49
HAMMARLUND	
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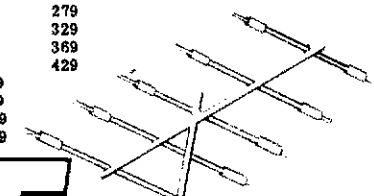
HALLICRAFTERS	
SX-101A Rcvr.	$179
SX-115 Rcvr.	259
FPM-300 Xcvr.	349
HENRY	
100 AL10 Amp. w/PS 1220B Supply & Cabinet	229
HEATHKIT	
SB-303 Rcvr.	259
HW-104 Xcvr. w/P.S., Spkr., CW Filter, N.B., Mike	549
SB-634 Console	169
ICOM	
IC-22S 2 Meter Xcvr.	189
IC-22S 2 Meter Xcvr. w/ 5/8 Wave Ant.	209
IC-215 w/BC-20	159
IC-3PA D.C. Supply	49
IC-245 2 Meter Xcvr.	299
JOHNSON	
275 Watt Matchbox w/SWR Meter	119
KENWOOD	
TS-600 6 Meter Xcvr.	529
R-820 Deluxe Rcvr.	759
TS-820S Xcvr.	799
QR-666 General Cov. Rcvr.	199
MILLEN	
92201 Transmatch w/SWR Meter	99
MIRAGE	
B108 2 Meter Amp. w/Rcvr. Preamp.	129
NATIONAL	
NCX-5 Xcvr. w/P.S. & Spkr.	359
REGENCY	
HR-6 6 Meter Xcvr.	109
HR-2 2 Meter Xcvr.	99



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Do not be fooled by the low prices, these brand new lab quality frequency counters have important advantages over instruments costing much more. The models 7010 and 8010 are not old counters repackaged but 100% new designs using the latest LSI state-of-the-art circuitry. With only 4 IC's, our new 7010 offers a host of features including 10 Hz to 600 MHz operation, 9 digit display, 3 gate times and more. This outperforms units using 10-15 IC's at several times the size and power consumption. The older designs using many more parts increase the possiblity of failure and complexity of troubleshooting. Look closely at our impressive specifications and note you can buy these lab quality counters for similar or less money than hobby quality units with TV xtal time bases and plastic cases!

Both the new 7010 and 8010 have new amplifier circuits with amazingly flat frequency response and improved dynamic range. Sensitivity is excellent and charted below for all frequencies covered by the instruments.

Both counters use a modern, no warm up, 10 MHz TCXO [temperature compensated xtal oscillator] time base with external clock capability - no economical 3.579545 MHz TV xtal.

Quality metal cases with machine screws and heavy guage black anodized aluminum provide RF shielding,light weight and are rugged and attractive - not economical plastic.

For improved resolution there are 3 gate times on the 7010 and 8 gate times on the 8010 with rapid display update. For example, the 10 second gate time on either model will update the continuous display every 10.2 seconds. Some competitive counters offering a 10 second gate time may require 20 seconds between display updates.

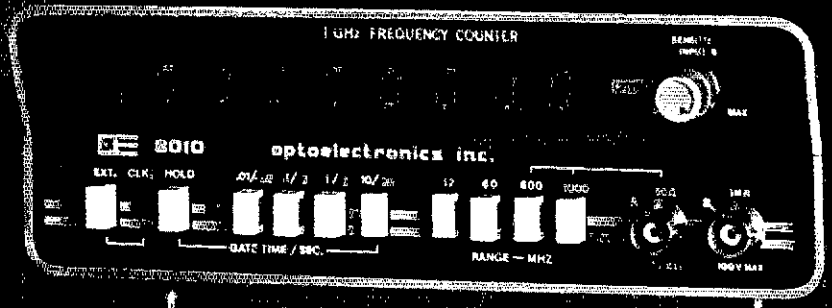
The 7010 and 8010 carry a 100% parts and labor guarantee for a full year. No "limited" guarantee here! Fast service when you need it too, 90% of all serviced instruments are on the way back to the user within two business days.

We have earned a reputation for state-of-the-art designs, quality products, fast service and honest advertising. All of our products are manufactured and shipped from our modern 13,000 square foot facility in Ft. Lauderdale, Florida.

When quality counts...count on Optoelectronics.

MODEL 8010 1 GHz

MODEL 7010 600 MHz



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- 0.1 PPM 10 MHz TCXO TIME BASE
- LAB/PORTABLE-AC ADAPTER INCLUDED
- 1 MEGOHM & 50 OHM INPUTS
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- COMPREHENSIVE USER MANUAL PROVIDED
- COMPACT SIZES—7010- 1-¾" Hx4-¼" Wx5-¼"D 8010- 3" Hx7-½" Wx6-½"D

MODEL	$ PRICE	RANGE 10Hz to	LED DIGITS	SENSITIVITY 50 OHM INPUT 25-250 MHz	250-450 MHz	450 MHz-1GHz	HI-Z INPUT 10Hz - 60 MHz	GATE TIMES	RESOLUTION 12 MHz	60 MHz	MAX. FREQ.	TCXO TIME BASE 20°-40°C	FREQ.	EXT. CLOCK INPUT	NI-CAD BATT PACK
7010 *7010.1	145.00 225.00	600 MHz	9	5-20 mV	10-30 mV	20-40 mV to 600 MHz	1-10 mV	(3) .1, 1, 10 SEC	.1Hz	1 Hz	10 Hz 600 MHz	1 PPM 0.1 PPM	10 MHz	YES OPTION $25.	YES OPTION $15.
8010 *8010.1	325.00 405.00	1 GHz	9	1-10 mV	5-20 mV	10-25 mV	.1-10 mV	(8).01-20 SEC	.1 Hz	1 Hz	10 Hz 1 GHz	1 PPM 0.1 PPM	10 MHz	YES STD	YES OPTION $39.

* Has precision 0.1 PPM TCXO time base.

MODEL 7010

#7010 600 MHz Counter - 1 PPM TCXO $145.00
#7010.1 600 MHz Counter - 0.1 PPM TCXO $225.00

OPTIONS

#Ni-Cad-701 Ni-Cad Battery Pack & charging circuitry Installs inside unit $ 15.00
#EC-70 External Clock input,10 MHz $ 25.00
#CC-70 Carry Case, Padded Black Vinyl $ 8.95

MODEL 8010

#8010 1 GHz Counter - 1 PPM TCXO $325.00
#8010.1 1 GHz Counter - 0.1 PPM TCXO $405.00
#8010.1-13 1.3 GHz Counter - 0.1 PPM TCXO $495.00

OPTIONS

#Ni-Cad-801 Ni-Cad Battery Pack & charging circuitry Installs inside unit $ 39.00
#CC-80 Carry Case, Padded Black Vinyl $ 9.95

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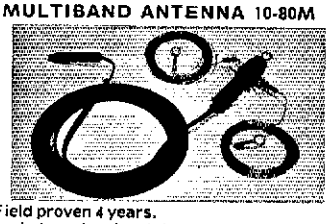
MODEL UT-2000A
ULTIMATE TRANSMATCH

Similar to the one in Lew McCoy's article July 1970 QST
- Use with any coax or end fed random wire antenna, ideal for apartment dwellers.
- 80-10 continuous, including MARS.
- Rotary inductor with turns counter for precise and rapid tuning.
- Full legal power, 4,000 volt capacitors.
- Use with any SWR/wattmeter.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $139.95 + shipping.

NEW — MODEL UT-2000B

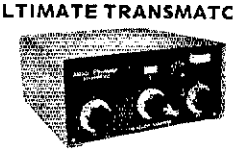
- Continuous coverage 160-10 meters.
- Rotary inductor with turns counter.
- Three core balun, 4,000 volt capacitors, full legal power.
- Built-in line sampler for precise tuning.
- No external meter required.
- Use with any antenna.
- Function switch — in, out, dummy load (not supplied), ground.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt. $218.50 + shipping.

MODEL 68A
MULTIBAND ANTENNA 10-80M



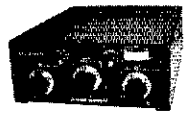
- Field proven 4 years.
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead.
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch.
- 2000W P.E.P. $44.50p.p.

NEW — MODEL UT2000A-LS
ULTIMATE TRANSMATCH



- With all the features of the popular UT-2000A.
- Plus built-in LINE SAMPLER for precise tuning.
- No external meter required.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $168.50 + shipping.

NEW — MODEL UT-160M & UT-160MB



- 160-10 meters.
- CERAMIC inductor tapped every turn each band, no burn out.
- Heavy duty switch.
- Built-in line sampler for precise tuning, no external meter required.
- Function switch — in, out, dummy load (not supplied), ground.
- Full legal power.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt.
  UT-160M (less balun) $164.50 + shipping
  UT-160MB (with balun) $179.50 + shipping

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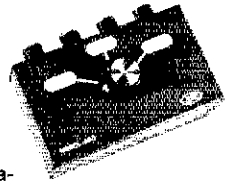
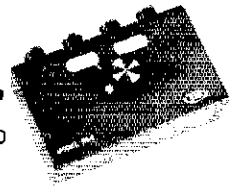


Model 593
- ***Single Pole*** 3 Position with grounding of all unused positions
- ***Crosstalk*** (measured at 30 MHz) is -45db between adjacent outlets and 60 db between alternate outlets



Model 594
- ***2 Pole 2 Position***
- ***Crosstalk*** 45db (measured at 30 MHz)

Specifications for both switches
- ***Power*** 1 KW-2 KW PEP
- ***Impedance*** 50-75 ohms
- ***VSWR*** 1.2:1 up to 150 MHz
- ***Dimensions*** 1¾" high, 5" wide, 3" deep
- ***Weight*** 1 lb.
- ***Mount*** Wall or desk

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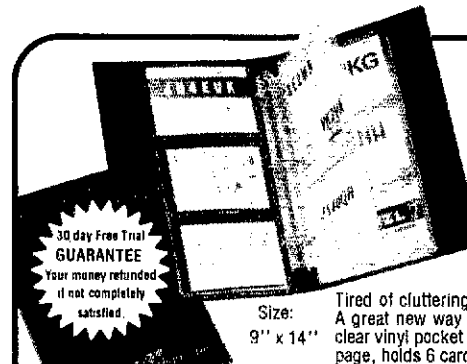

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Iowa 75M	3970	1830 M-S		1217	124	26
Iowa 75M	3970	2330 M-S		924	83	26

Traffic: WAØAUX 710, WØSS 322, WØYLS 231, KAØX 158, AEØR 147, WBØPYD 144, KØGP 116, WBØUPF 49, WBØAVW 40, WBØNSS 26, WØLFF 27, WBØMCX 12, WDØHND 8, KAØBYI 4, WBØNVL 4. (Nov) WØSS 156.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØOYH WØFT WDØESF WAØSZS. It is indeed another sad month when we have to report another addition to the list of Silent Keys - WBØKPE passed away Jan 6th. Our sympathy to his family. New officers for CVARA, SW KS are: WDØEUE, pres.; WBØYVK, vice pres.; WØFXN, secy/treas.; WDØEUF, act. chmn. WØKL reports ARES standing at 886 members. 15 ECs reporting for the month. Net activity for November as follows:

Net	QNI	QTC	Mgr.
QKS-SS	134	37	WDØESF
CSTN	1352	83	WAØOMB
QKS	356	134	WØFT
KWN	908	521	WAØLBB
KPN	260	18	WØOYH
KSBN	1107	131	WØOYH

Net Activity for December 1979 as follows: Net QNI/QTC. KSBN 1314/326; KPN 300/27; CSTN 344/137; KWN 1003/531; QKS-SS 184/68. Traffic: (Dec) WØAM 448, WØOYH 319, NØAOL 231, WDØFBP 223, KØEZ 208, WØHI 166, WDØACG 158, WØFT 124, WØFIR 94, WAØBB 74, KØBXF 60, NØABA 59, WØPB 47, WØCHJ 44, NØIN 44, WØKL 26, WØFDJ 17, WBØLKA 14, WØRBO 14, WØRT 14, WAØWJX 5, WAØWH 2. (Nov) WØHI 120.

MISSOURI: SCM, L. G. Wilson, KØRWL — Assistant SCM: Joe Flowers, WØOTF. SEC: WBØFKY. The PHD Amateur Radio Club has elected its officers for 1980 and they are: WAØSOK, pres.; WAØKUH, vice pres.; KØTLM, secy.; WBØOCW, treas. New officers for the Ozark Amateur Radio Society are: WBØNOW, pres.; WØOQ, vice pres.; WDØCHZ, treas. Officers for the Midwest YL Club for 1980 are: WØAYL, pres.; WAØWOF, vice pres.; KAØBKT, secy.; WDØDLX, treas.

Net	QNI	QTC	Net	QNI	QTC
MON	230	232	NEMOE	127	16
MON2	192	89	ACE	10	1
MEOW	512	103	TNT	20	0
HBN	369	82	MOSSBN	799	90

The Kansas City DX Club had its Christmas party at the home of ABØI again this year and a great time was had by all. WAØVLT is sporting a new TS-120S. Deepest sympathy to the family and friends of WØWIS who joined the ranks of Silent Keys. Congratulations to the following new licensees and upgrades: Novices: KAØGJR KAØGNA. Tech: KAØGHR. General: KAØAUV KAØAVG WAØTCF. Advanced: WDØBWY WDØBWZ WDØHTC. Extra: KØBRO WBØNQW WBØTNY. Traffic: WØBMA 700, KØONK 584, WDØBEV 205, KØSI 204, WØBV 148, WØOTF 122, WBØVHN 115, WØOUD 114, KØPL 61, KAØE 57, WØVTF 21, KØRWL 10, WAØKUH 6, WBØNIE 4.

NEBRASKA: SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. Omaha has opened its fabulous new Red Cross facility, complete with communications equipment and antennas to allow the Red Cross and amateurs to better serve the area. FB! Many section local radio clubs are underway with membership drives, you are invited to join and participate with local hams in your area. WDØFJY won the Jerry Cox Memorial Award from the Lincoln ARC for her dedicated hard work, congrats! The Central ARC is planning a possible clubhouse and a new tower for the repeater this year. Congrats to KAØASD for upgrade to General. KØTVD has 213 countries and climbing. Nets: Nebr Storm QNI 1270, QTC 44; Cornhusker QNI 1061, QTC 65; 160 Meter WX QNI 667; PM Net QNI 230, QTC 83; Mid Nebr 2-Mtr ARES QNI 105; Platte Valley 2-Mtr QNI 81, QTC 4; Western Nebr QNI 543, QTC 49; QCWA QNI 76. Traffic: WØEUT 155, KØAIE 81, WØVYX 76, WØHTA 12, KØODF 8, WØNIK 7, WAØOOX 7, KØTUH 7, KØSFA 5, WBØIGN 4, WØJUJ 4, KØHRL 2, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William J. Pace, W1ID — Asst. SCM: WA1LOU. SEC: W1SY. STM: WB1AIU. NMs: K1EIR K1EIC WB1CPF WA1ELA WA1LOU.

Net	Freq.	Time/Days	Sess.	QTC	QNI
CN	3640	1900/2200 Dy	60	492	393
CPN	3965	1800 M-S	31	303	383
		1000 Su			
NENN	3720	1815 Dy			
NUTMEG	28/88	2130 Dy	32	237	459
RASON	13/73	2100 MWFSu			
WESCON	78/18	2030 Dy	31	236	429

Hi QNI CN: W1WP WB2PJU KA1AWY WB1CEG K1EIR. CPN: WB1FZX K1AQE. Hi QTC: Nutmeg: W1EFW. Congrats to WB1CPF and WB1DGR who made BPL in December! Apartment dweller WB1CEG is a regular CN check-in using a new 60 foot dipole and transmatch. WB2PJU (with WB1FZX's assistance) has a full wave delta loop for 80 meters at his new QTH. KA1BUJ is building an amplifier. One way or another, there will be louder signals eminating from Connecticut in 1980. N1CC will be on the green keys shortly with his new Model 28 teleprinter. W1EFW will be a Model 28 owner very soon, too. CT expatriate WA1URA (now portable 4) is listening on 14,097.5 RTTY autostart . . . send him some news from 1-land. There's a bill coming up in the state legislature extending the use of callsign license plates to motorcycles, vans, private trucks, campers, motorhomes, etc., contact your state representative to speak out in favor of this bill (from Scarascope). Traffic: W1EFW 414, WB1CPF 372, WB1ACZ 350, WB1DGR 346, K1GF 290, WB2PJU 283, W1DFT 216, W1HMJ 199, K1XA 187, W1BDN 156, K1AQE 140, KA1AWY 137, W1WP 127, WB1FZX 119, WB1CEG 105, WA1WQG 100, WA1UUA 92, W1GVT 58, KA1BUJ 54, WB1DQP 54, WB1DQP 54, W1XX 54, WB1ESJ 43, K1EUW 41, W1KV 34, WA1LOU 34, WA1CMX 26, W1CUH 6, W1QV 4.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. STM: WA1TBY. EC reports from KA1BTV W1ALP. OBS Report K1BJZ K1UR K1YBS W1AQV. OO Reports W1NF W1HL W1BGW. OES RPT from AE1X. OVS report from W1GXT W1JR.

Net	Mgr.	Freq.	Time(Loc)/Dy	QNI	QTC
HHTN	K1BSO	04/64	2230/Dy	814	910
EMRI	WA1VAB	3.658	19/2200/Dy	512	468
RAIN	N1AMF	01/61	1800/Dy	225	275
EMRIPN	W1FJI	3.898	2230/Dy	403	394
MK FAR	WA1LAD	3.925	1300/Mon-Sa	230	162
EM2MN	WA1IFE	90/30	2000/MWF	89	39
EM2MN	WA1IFE	145.8	2000/TTh		
NEEPN	K1BZD	3.945	0830/Su	74	20

Traffic handling during Dec was very high with 13 stations making BPL. The high volume of traffic was due in part to the Wellesley and Whitman Clubs holding message fairs at shopping centers. Both are annual events which are a lot of work. Really put Amateur Radio

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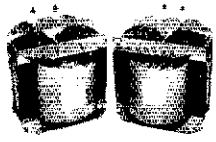

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BTI LK-2000 Plate	$135
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HENRY 3K-A Plate	$165
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PLATE XFMR:	4000/4600 VAC @1.5A ICAS 230 PRI-60LB	$195
PLATE XFMR:	6000 VCT @ 0.8A CCS 115/230 PRI-41 LB	$150
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FILMT XFMR:	7.5 VCT @21A 117 PRI-9.5LB	$ 30
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PRETUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 6 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

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COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6"- you just switch to band desired for excellent worldwide operation - transmitting and recieving! WT. LESS THAN 5 LBS.

1 ANTENNA WORKS LIKE 6 SEPARATE ANTENNAS! Can be used in attics, tops of buildings. Inverted or "sloper" Vs or V beams in minimum space. NO HAYWIRE HOUSE APPEARANCE - NOT A KIT! READY TO HANG OUT OF THE BOX! No center support needed - but can be if desired. NO TUNERS needed, unless you want to use them! SWR is 2-1 or less over all bands except low end of 80-160 meters (info included). THOUSANDS IN USE ALL OVER THE WORLD SINCE 1960! EASIEST INSTALLATION, BEST APPEARANCE & PERFORMANCE of any all band trap dipole made today.

160-80-40-20-15-10 bands 4 trap ---169 ft. with 90 ft. RG58U - connector - Model 1060BU . . . $99.95
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RG58U is OK for 500 watts CW - 1000 watts SSB - RG8U is $22.00 extra P.P. for any antenna. SEND FULL PRICE FOR POST PAID INSURED DEL. IN USA. (Canada is $5.00 extra for postage - clerical - customs - etc.) or order using VISA Bank Americard - MASTER CHARGE - AMER. EXPRESS. Give number and ex. date. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ALL PRICES WILL INCREASE . . . . SAVE - ORDER NOW! All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFO. AVAILABLE ONLY FROM.

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50' Guyed Tower: Includes top section, 4 regular sections, base plate, rotor plate, 50' guy wire, 2 guy assemblies with torque bars, 3 concrete guy anchors and other miscellaneous hardware.

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TECH 310 — $130

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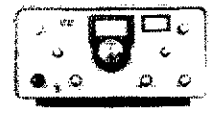
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FT207R: From YAESU — 2m FM XCVR. Handheld completely synthesized, digital readout, keyboard access, 2 watts, 4 memories and much more.

KLM PA2-25B Power Amplifier: 2 watts in, 25 watts out.

PACKAGE 1		PACKAGE 2	
Tempo S1 w/TTP	$339.00	FT207R Synthesized 2m handheld	$399.00
KLM PA2-25B Power Amplifier	92.95	KLM PA2-25B Power Amplifier	92.95
Total Regular Price	$431.95	Total Regular Price	$491.95
SALE PRICE	$396.95	SALE PRICE	$441.95
SAVE $35.00		*SAVE $50.00*	

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TS520SE: 160-10 meters, 200 watts P.E.P., speech processor, noise blanker, excellent sensitivity and minimum cross-mod.

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TS520SE	$629.95
Hustler 5BTV Vertical	139.95
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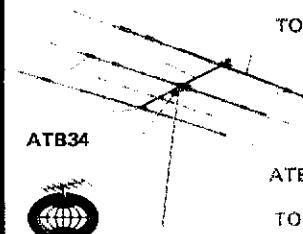
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cushcraft

TS520SE	$629.95
ATB34 Cushcraft TriBander	$289.95
TOTAL REGULAR PRICE	$919.90
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TL922A: 2kW P.E.P., 160-15 meters, 3-500Z tubes.

TL922A:	$1199.00
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Model 43


MBII TUNER: 3kW, 160-10 meters.

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- Nulls out interference

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MB II features:
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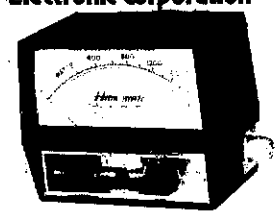
BIRD Electronic Corporation

$94 VHF model 4362 (140-180 MHz)
$94 HF model 4360 (18- 30 MHz)



The 4360, 4362 HAM-MATE Directional Wattmeters are insertion type instruments for measuring forward or reflected power in 50-ohm coaxial transmission lines. They are direct descendants of the model 43 THRULINE® Wattmeter – the professional standard of the industry—and will accurately measure RF power flow under any load condition. Each wattmeter is made up of a precisely machined section of 50-ohm line, a rotatable sensing element and meter calibrated in watts, all mounted in a high-impact plastic housing. It is this type of solid construction and the directional THRULINE coupling circuit, without toroids, that account for the superiority of the HAM-MATE Wattmeters.

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Power Range	Frequency Bands (MHz) 2-30	25-60	100-250	200-500	400-1000
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10 watts	—	10A	10C	10D	10E
25 watts	—	25A	25C	25D	25E
50 watts	50H	50A	50C	50D	50E
100 watts	100H	100A	100C	100D	100E
250 watts	250H	250A	250C	250D	250E
500 watts	500H	500A	500C	500D	500E
1000 watts	1000H	1000A	1000C	1000D	1000E
2500 watts	2500H				
5000 watts	5000H				

MODEL 43	$130.00
Elements (Table 1) 2-30 MHz	45.00
Elements (Table 1) 25-1000 MHz	38.00
Carrying case for Model 43 & 6 elements	27.50
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Power rated 2k WPEP, approx. 110 ft. span

Complete with: wire, traps, end insulators, 50 ft. RG-8/U, PL-259 connector, heavy-duty cast aluminum and steatite center connector.

Pre-assembled:
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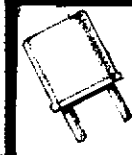

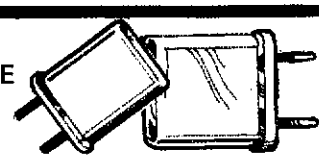

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The most portable high performance dipole ever...

The Model 18TD is unquestionably the most foolproof high performance portable doublet antenna system ever developed. It has proven invaluable in providing reliable communications in vital military and commercial applications throughout the world. Two stainless steel tapes calibrated in meters extend from either side of the main housing up to a total distance of 132 feet for 3.5 mc operation. 25 ft. lengths of polypropylene rope attached to each tape permits installation to poles, trees, buildings...whatever is available for forming a doublet antenna system. Integrated in the high impact housing is a frequency to length conversion chart calibrated to meter measurements on the tapes...makes installation foolproof. Feeds with 52 ohm coax. Delivers outstanding performance as a portable or permanent installation. Measures 10x5½x2 inches retracted. Wt., 4.1 lbs.

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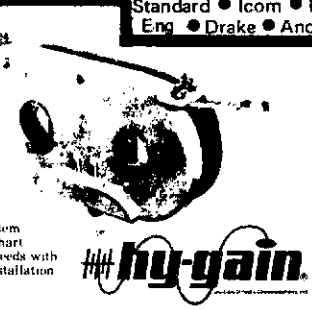

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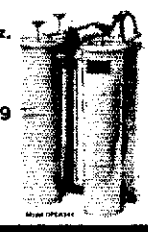
Also available for 54, 220, 450 MHz.



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in front of the public. Chelmsford Club had Xmas dinner. Mitre Bedford Club had a speaker on Sunspot Cycles and have a new TA33 in operation for the club. Sturdy Memorial Club planning on winning the ARRL 10 Meter Contest - go get em. Billerica Club had W1JR talk on EME, far out! Framingham Club received thanks from local civil preparedness office for help during Halloween. Quanapowitt Radio Club member WA1UZH placed first in EMASS in ARRL DX Phone Contest, W1GXT reports 6 mtrs open to KH6 on Dec 3, 4, 5, 6 and 22. Also a brief 2-mtr opening to FL on Dec 4. K1GN on OSCAR and maritime mobile. W1PL hosted numerous DX stations at his QTH. W1ALP elected a Life Member in QCWA. W1BGW received 50 year pin from OOTC and W1NF received 50 year golden certificate from OOTC. K1FB running WAS Net on 7250 at 1500Z Sat. WA9NEW now synthesized on 2-mtrs. W1JR worked OR on 2 for 42nd state and worked G3WDG, PA0SSB and more on 432 EME. WA1QAA alternate NCS on HHTN during busy month of Dec - hard way to break in. Hi! K1BJZ rebuilding cw rig. Police Amateur Radio Team (PART) of Westford planning to put a station on 52 direct from police headquarters and manned by hams to monitor for mobile emergency calls. Its been in the planning for 5 years — good luck. A group of Boston area hams called the Boston Area Amateur Radio Net has been set up to assist Boston Red Cross with communications personnel. KA1AQE will assist as EC for Area 1A. W1FJI, pres. of Southeastern Mass Amateur Radio Assn. Traffic: W1TKZ 1736, WA1TBY 937, WB1EZT 808, KA1CC 740, WA1VAB 659, K1BA 614, KA1BJY 592, W1PEX 555, K1BSO 524, WB1DXR 503, KH6JNQ 427, KA1CGP 335, WA1ZLQ 328, WB1ACA 294, N1AMF 264, KA1BDE 230, K1BZD 208, W1TR 195, WA1LAD 187, K1GN 131, WB1ANT 105, W1ATX 80, WA1QAA 57, WA1FNM 50, WA9NEW 49, K1UR 47. W1MJ 42, WB1GEX 38, W1FJI 31, K1LCQ 22, W1AQG 20, WA1IFW 17, WA3TMR 17, K1TW 15, W1PL 13, W1HL 10, K9HI 9, W1ALP 6, W1XA 6, KA1BTV 4, W1EGE 4, AF1Z 4, K1FB 2. (Nov) AF1Z 4. (Oct) N1AMF 136, W1MJ 3.

MAINE: SCM, Ed Bristow, WA1MUX — STM: W1RWG. NMs: PTN/W1RWG SGN/K1GUP MPSN WA4UJJ/1 CMEN/W1WCI SPSN/KA1BJE AEN/WA1YNZ. PTN/3596/Dy/7 P.M.; SGN/3940/Mon-Sat/5 P.M.; MPSN/3940/Sun/9 A.M. Consult NMs for local nets. YARC Hamfest 6/27-29, Oxford Fairgrounds. Details from K1YFY or other members. Sess/QNI/QTC: SGN 26/1116/556; SPSN 14/138/154; MPSN 5/74/25; AEN 4/44/0. PSHR: WB1BYR AF1L W1RWG. Traffic: (Dec) WB1BYR 387, WA1MUX 288, AF1L 285, W1ISO 247, WB1GRT 233, WA4UJJ/1 227, W1RWG 152, WA1JZP 133, K1TVT 122, W1HDC 118, N1RP 83, W1JYH 64, W1BMX 59, W1AHM 44, W1GKJ 43, KA1AYC 40, WA1YNZ 40, N5YX/1 40, WB7VKH/1 34, W1KX 31, W1IXC 29, W1OTO 25, KA1EO 24, K1GUP 24, WA1JHT 24, WA1ZJL 15, KA1DDJ 9. (Nov) W1HDC 112. (Oct) W1ISO 91.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: K1RSC. STM: W1TN. NMs: N1NH & WB1HFI.

Net	Time/Day	Freq.
NENN	1815 Dy	3720
NHN	1830 Dy	3622
GSPN	1900 M-F	3945
	0930 Su	3945
NHEPN	1900 Sa	3945
GSFM	2030 Dy	146.34/.94 & .655/.655

(Con & Mt Wash)

See on Hyways & Byways: WA1YXH K1MCP K1YLA & K1MFO. W1BYS sends greetings from sunny FL. W1UN now DXCC 305. WB1HFI now Advanced. WA1YIO, 3 years a ham, obtained 5BDXCC in 2 years. WB1HGQ now General. WA1VVX & WA1YIO are contesting for DXCC. Wandering gypsy WA1FSZ/AF1T backpacked to CA & back. W1GUX airs bulletins daily. New certificate holders GSFMN: N1ALM K1OSM N1AHN & WA1VVX. Net controls Dec. W1GUX K1BCX K1UQX WB1HGQ WB1HFI N1ALM WA1VVX & WA1SRU. Dec Granite Chips excellent job by WB1HGQ & WB1HFI. Your SCM has received many complaints re the new ARRL numbered radiograms. WB1HFI is looking for help as net controls on GSFM Net. Granite Chips feature, who's who in NH Amateur Radio, was N1ACB & K1BCS. Nashua Area RC new executive committee is: N1AHO K1LB WB1BRE W1HZN N1AIX. Traffic: W1TN 631, WA1YAZ 290, W1GUX 264, N1NH 126, K1YMH 119, W1MHX 86, WB1HFI 75, WB1HGQ 58, K1UQX 52, WA1SRU 49, N1ALM 49, N1HO 10, W1NH 9, WA1PEL 5, WA1HOB 4.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: K1DT. STM: N1RI. Fidelity ARC of Cranston observed their 20th anniversary in January, congrats. WA1WKK made General. We are very happy about that. KA1FE new OTS, welcome aboard. K1GOW had antenna trouble most of the month. K1DT needs more net control stations for the State ARES Net. Ditto the RIEM 2-mtr Tfc Net needs more NCSs. WA1CSO is working in Prov. & unable to serve. Also, there are plenty of appointments available for people interested in traffic. We are doing better, but we should have many more. Clubs are electing and wish they would send results to this office. The RIEM 2-mtr Traffic Net: sess 21, QNI 188, QTC 86. Submitted by WA1WKK. Traffic: N1RI 219, KA1BTU 158, W1EOF 68, KA1FE 65, AE1S 8, KA1BBY 4.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. Welcome back W1CBW from never never 2-mtr land! The struggling new 2-mtr. FM Net 1900 M - S on W1KOO/Rpt 146.94/.34 needs ops on a regular basis willing to handle tfc locally, to other repeaters, and to all VT HF nets. Can YOU help? WA1DKH recovering nicely in the DE Goesbriand Hosp. W1LTW is in Mary Fletcher Hosp. for a hip operation. Carrier 26/541/87; GMN 26/498/71; VSSB 31/482/194; RFD 5/96/30; VPN 5/88/8. AE1T was WA1TXI and WA2JSJ is the same op as WB1GQR. The GMN ops 3494 kHz 1730 M - S; this is for those who keep asking for the info. The FM Rpt Net would like contacts with other VT 2 MF rpts for traffic handling nitely tie-ins. Traffic: K1BQB 380, W1RNA 43, KA1DLN 2.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — STM: W1TM. SEC: W1JP. NMs: WA1MJE W1UD W1UPH. Credits to former SCM, W1TM, and 10-year SEC, WA1DNB for a healthy and active WMA. Glad to keep on board the two NMs, and W1TM in a less time consuming job, to permit more time with family and career; and welcome W1JP as SEC assisted by W1UPH, NM for Sun morning WMA LO and Repeaters roundup. Also happy to welcome "SCM emeritus" W1BVR to assist with admin duties and K1BE to share in promoting membership rapport. Kudos to AC1T, first US/Iceland 6m on cw; K1SF 6m WAS; KH6JNQ/1 helping get NE Teleprinter Net off and running MWF 3.620 at 1900 local; W1TM W1UD both BPL, and with K1SSH

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Of course the ***76A*** covers current amateur bands 160-15 meters (10 meters export versions only). It also has the BIG capacitors and flexibility to handle the new HF assignments - as they're made available by FCC - with little or no modification.

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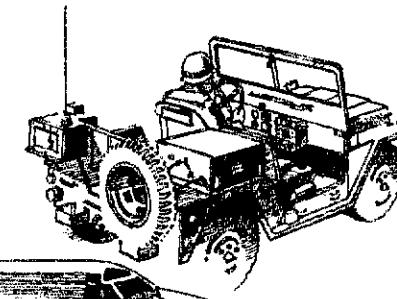
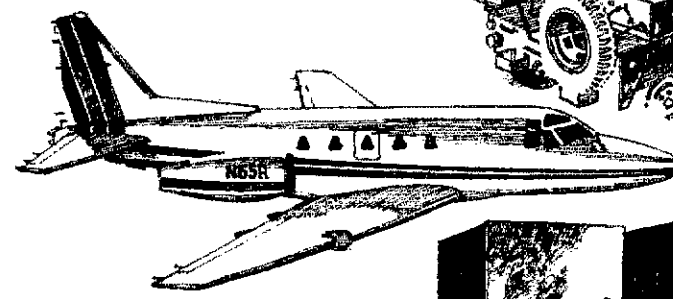
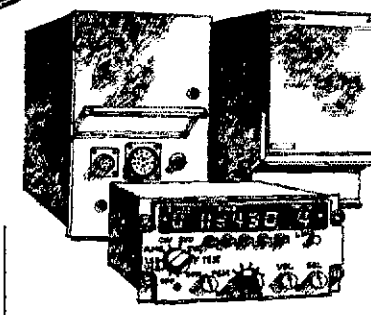






Since 1933, when a Collins HF radio was used to communicate with the United States from Antarctica, the Collins name has been synonymous with HF: Collins, first to perfect single-sideband technology and the mechanical filter. Collins, first to introduce "automatic tuning." Collins, first again with the application of microprocessor technology to HF, making equipment simpler, more reliable and more economical.

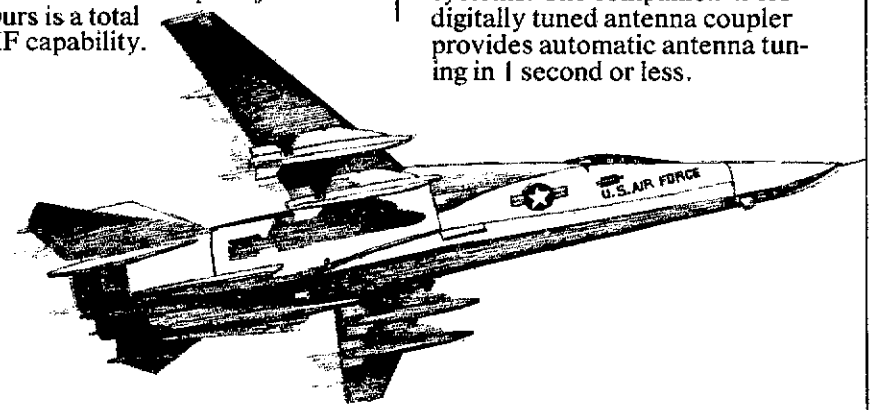
Today, the Collins Telecommunications Products Division is the world's leading supplier of HF equipment, much of it for individuals and organizations just like yours. This means we can bring a wealth of experience to bear on your HF communications problems. Tactical, strategic, secure, commercial — we can do the complete job. Ours is a total HF capability.

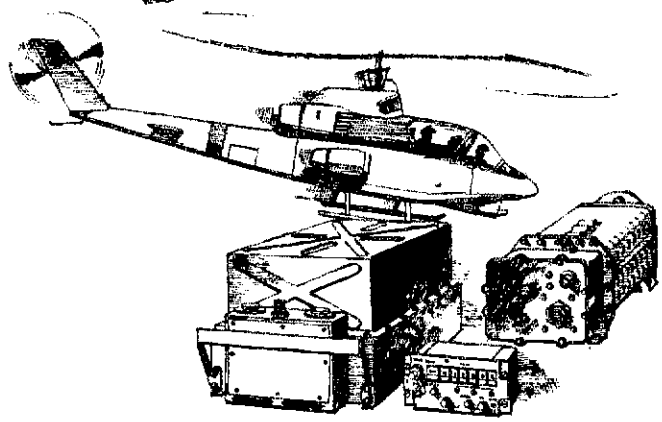
AN/ARC-190/728U Airborne Communications Systems

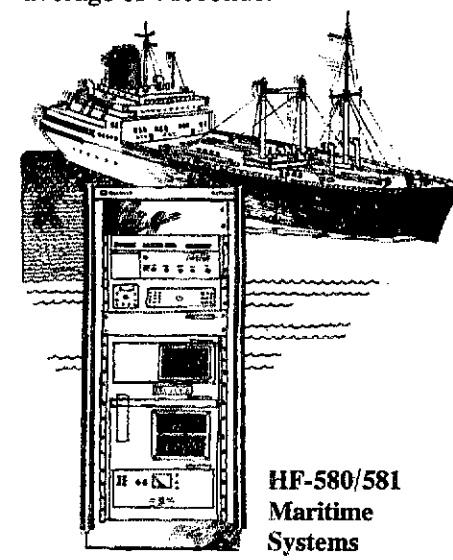
As the latest addition to the family of Collins airborne HF equipment, the all-solid-state AN/ARC-190/728U offers 400-watt peak and average output. Built-in microprocessor provides the control flexibility and speed needed to operate with scanning-selective call and remote frequency management systems. The companion 490A digitally tuned antenna coupler provides automatic antenna tuning in 1 second or less.

718U Communication Systems

A highly adaptive family featuring commonality of components and consisting of a convertible manpack/vehicular/base station system, a vehicular system, base station systems plus airborne systems. General characteristics include: Frequency range, 2 to 30 MHz in 100-Hz steps. Fully synthesized. Automatic tuning. Remotely controllable. Solid-state. Modular. 100 or 400 watts. All systems are easy to operate and can be tuned and ready to use in an average of 4 seconds.



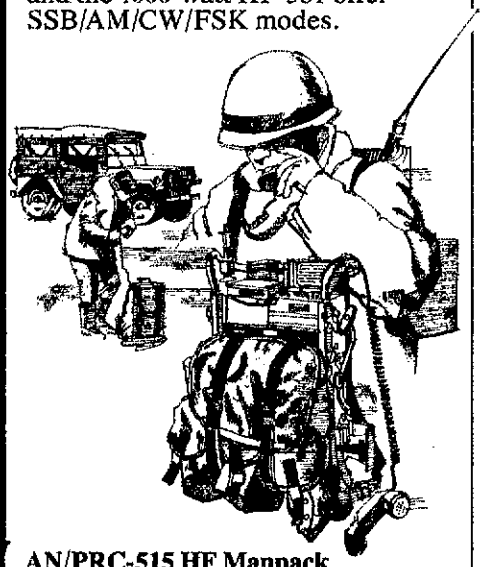




HF-580/581 Maritime Systems

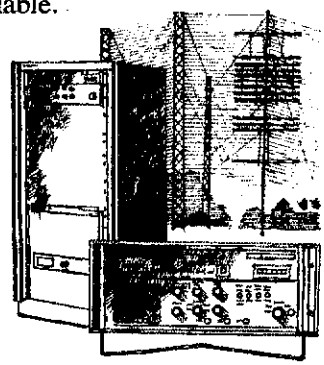
Fully synthesized, 1.6 to 30 MHz, 100-channel, front-panel programming with automatic tuning, ARQ and remote control make the new HF-580/581 Series

ideal for reliable maritime operations. Both the 150-watt HF-580 and the 1000-watt HF-581 offer SSB/AM/CW/FSK modes.



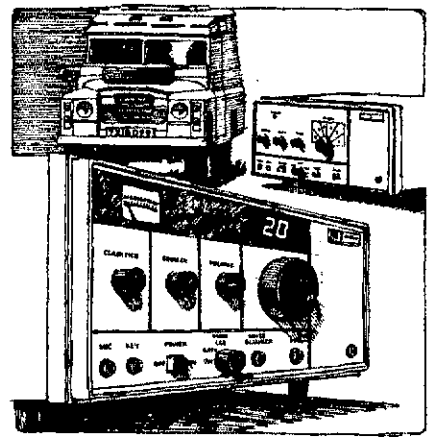
AN/PRC-515 HF Manpack Radio

A 20-watt packset that's small, lightweight and easy to operate, even while wearing gloves. Fully automatic antenna tuning. Low power consumption. Proven field performance. Arctic-desert-tropics use. 280,000 discrete channels. Large selection of options adapts it to field use, jeep and truck mounting, airborne and base station. 100- and 400-watt amplifiers available.



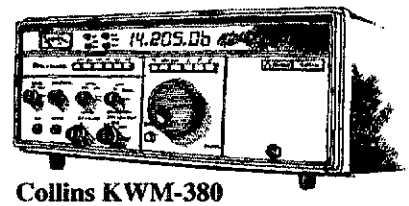
HF-80 Communication Systems

Anywhere communications setups are difficult, this family of systems gives you quality, performance and long-range HF radio capability in a range of products that can grow with your needs. It includes receivers, 1-, 3- and 10-kW transmitters, 1-, 3- and 10-kW transceivers — each capable of manual, FSK remote or computer remote control. Advantages include low-cost installation, low life cycle costs, high parts commonality and easy maintenance.



HF-280 Series Channelized Transceivers

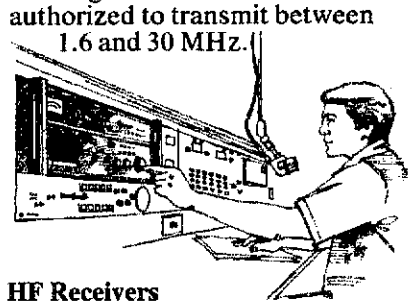
Professional, long-range and cost-effective, an HF-280 Series Transceiver is a complete HF station in one unit. For mobile or fixed applications, the transceivers offer 125 watts output and operate from either AC primary power at 110/220 volts or 12-volt DC. Choose either 6 or 20 channels. Both offer built-in speaker with microphone, a full 1.6- to 30-MHz frequency range and programmable preset channels. Ideal for commercial and civil government needs.



Collins KWM-380 and HF-380 Transceivers

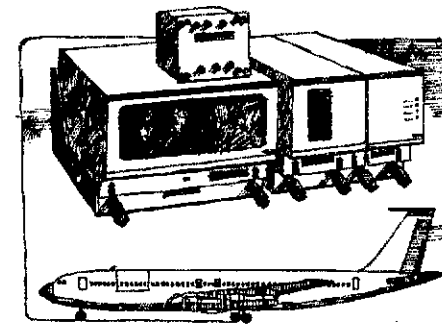
The new Collins KWM-380 transceiver continues the Collins heritage for quality amateur equipment. A fully self-contained station, the KWM-380 offers built-in AC/DC power supply, speaker and internal split frequency VFO function. Fully synthesized, with microprocessor controlled tuning gives frequency stability in four tuning rates down to 10 Hz with no bandswitch.

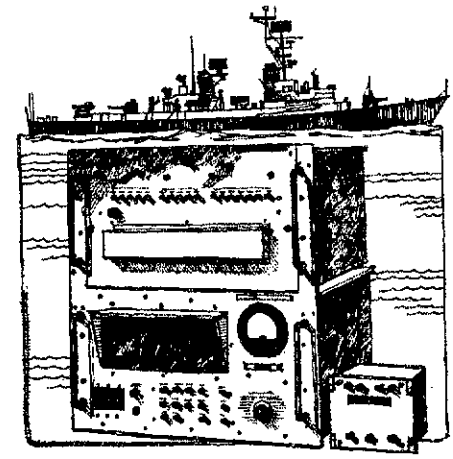
The new HF-380* general coverage transceiver is for users authorized to transmit between 1.6 and 30 MHz.



HF Receivers

A series of general purpose radio receivers for manual or remote controlled systems. The 851S-1, the newest member of the receiver family, can be configured to meet specified customer requirements by selecting optional plug-in kits.





HF-121/122 Transceivers

High-performance HF transceivers optimized for tactical data applications. Complementary radios fill both shipboard/transportable requirements (HF-122, AN/URC-97) and airborne (HF-121, AN/ARC-512) with high reliability and module commonality. Operating features include remote control, rugged PA and selective HF receiver front-end filtering for collocated operation. They cover the 2- to 30-MHz range in 100-Hz synthesized steps in all standard voice and data ISB and SSB modes.

For more information, contact a Collins representative or Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. 319/395-3553 or 2909. Telex: 464-435.

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HOW TO ORDER: Remit with order. We ship verticals prepaid no charge to you; beams and quads sent collect cheapest way, due to size of package.

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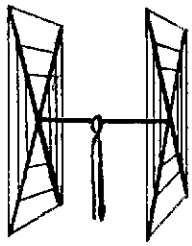
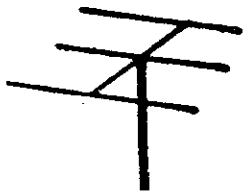


10/15/20 quad, absolutely complete, all machined ready for simple assembly, the choice of the champs for maximum performance!... **$79.95**

CHAMPIONSHIP BEAMS



Every beam is absolutely complete in every respect, fully machined and with hardware, ready for easy assembly.

4 El 6 M Beam	**$52.95**
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5 El 10 M Beam	**64.95**
3 El 15 M Beam	**59.95**
4 El 15 M Beam	**65.95**

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- 6 Pole Rcvr. Preselector
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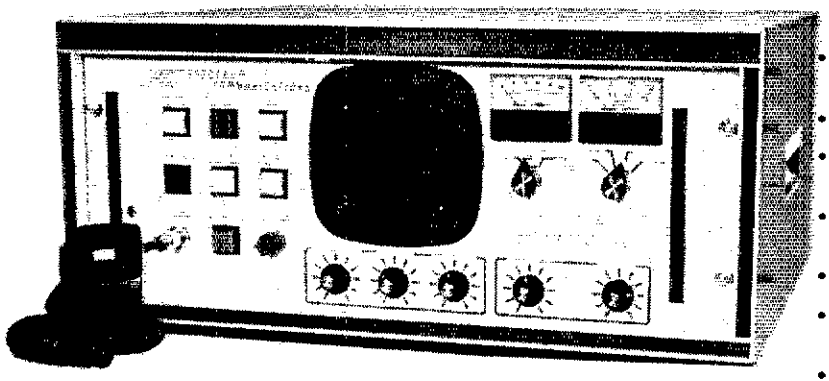

450MHz

- **Rcvr. Sens.:** 0.3 u V/12dB SINAD
- 8 Pole Xtal Filter
- **Front Panel Controls** for timers & AF levels
- **Built-in AC Supply,** w/ instant btry. switchover
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- **Supplied w/.0005% xtals** & a local mic
- **"True FM" Modulation**

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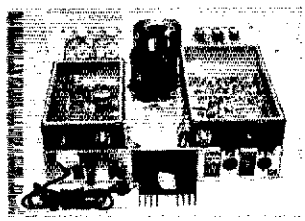
Whether you want to install a new Repeater System or upgrade your old one, don't you want the **finest** repeater available . . . at a reasonable price? And don't you want to buy it from a reputable firm with years of experience in Repeater Systems? A company that will stand behind the unit 100% if you should encounter a problem? Check around — check features, performance, availability of a full line of accessories and options . . . check prices, and **check into the company's reputation.**



If you do, you'll find that there isn't a repeater on the market that really compares to the SCR1000! There are low-power "barebones" units, and there are super-expensive repeaters (which don't even offer many of our features!) All things considered, we feel that the SCR1000 is simply the finest repeater available — produced by a very reliable company which specializes specifically in this field. So make your next repeater a Spec Comm. Years from now, you'll still be glad you did!

Sold Factory Direct only, or through Foreign Sales Reps. **Send for Data Sheets.** Contact Our Int'l Dept. for Export Sales.

Options available: Duplexers, 'PL' 10 Pole Rcvr. Fltr., Autopatch/Land Line Control, Hi/Lo Power, Multi-Freq., Racks, etc. — Inquire.

SPEC COMM REPEATER BOARDS
All Assembled & Tested

- ☐ **SCR100 Rcvr. Bd.** Used in SCR 1000. 0.3u V/20dB Qt. 8 or 10 Pole Xtal Fltr., S-meter output. Excellent Audio w/.0005% xtal.
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- ☐ **CTC100 COR/Timer/Control Bd.** — Complete COR w/Carrier 'Hang' and T.O. Timers, remote xmtr. control, etc.
- ☐ **ID250 CW IDer & Audio Mixer Bd.** — 4 chan., 250 Bit PROM memory. Adj. tone, speed, level & time, 4 input AF mixer & local mic amp.
- ☐ **Other Bds. Available** — Autopatch, T.T. Control, etc. Inquire.

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keeping WMA in the speedy high density NTS action. Traffic: W1UD 553, W1TM 521, K1SSH 498, W1KK 124, N1CW 117, K1NWE 91, K1JHC 82, WA1OPN 69, WA1MJE 52, W1DOY 47, W1BVR 42, W1EFC 31, W1ZPB 26, K1PUG 20, WB1HIH 13, K1BE 11, K1SF 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — This is my last report as SCM for this section. KL7HFM is the new SCM and will be sending reports in for the Alaska Section. The Alaska Snipers Net had 31 sessions, 1392 ckins. The Sesaw Net had 20 sessions with 268 ckins. The Alaska Bush Net had 31 sessions with 594 ckins. The AKPN had 19 sessions with 1187 ckins. As a matter of interest the Net Manager for the Alaska Snipers Net, KL7HOV, advises that since May 1, 1975 the net has had 51,743 ckins, 392 Official Bulletins read, 3,569 informal QTC and 1,190 phone patches. No formal written QTC record kept as each station kept their own. Traffic: KL7USA 390, AL7O 194, KL7BZ 186, KL7P 157, KL7JFT 94, KL7Q 89, KL7IYX 38, WB4HON 22.

IDAHO: SCM, Lem Allen, W7JMH — Pocatello Club's Xmas party had 67 in attendance and honors went to K7ALA in recognition of his achievements. Kootenai ARS started a new CD Net on 146.37/97 repeater Thurs at 7:30 P.M. Check in if you are in the area. Congrats to WB7VBM N7AMT and KA7DFS on upgraded licenses! The Trinity ARC at Mountain Home AFB is temporarily inactive, reports WB7URE, club pres. Eight members of the Lewiston club sent over 100 Xmas greeting messages for shut-ins from four of the area nursing homes. W7DMH has new ICOM 280 rig, can work 7 repeaters. N7APC has new KDK 2016A rig, is making Oscar 8 experiments.

Net	Freq.	Time	Sess.	QNI	QTC
CD	3990 ssb	8:10 A M-F	21	638	32
FARM	3935 ssb	7 P Dy	31	1549	65
IMN	3635 cw	8 P M-F	21	187	109
TV Emg	145.44 FM	9 P Su	5	237	—

Send a message to a faraway friend and join one of these fine nets. Traffic: W7GHT 846, WA7CTS 252, WB7URE 160, N7APC 122, AC7P 53, W7JMH 18.

MONTANA: SCM, Robert Leo, W7LR — W7LR W7TYN WA7PZO met in Butte to discuss several ARRL topics, such as a Montana ARRL net, a party, better traffic and emergency efforts, etc. One result, we will have the Montana Section Net on each Sun morning at 9:30 A.M. on 3910 or 7240 kHz. The first net was 6 Jan, but W7LR missed it due to blizzard near Billings. Good turnout, and 7240 worked better than 3910. KØPP active on 160 & other bands & did very well in recent contests. K7KUH new EC for Gt Falls area. N7AGP reports 52 at Gt Falls ARC Xmas dinner, where W7LR presented ARRL affiliated charter. The 13/73 repeater back on due to efforts by WB7ETT & WA7UWC. KA1EA reports lots of 6 meter activity by KA1EA W7HAH KA7DLC, plus OSCAR work by KA1EA KA7DLC WA7OBH, plus some 432 work. WB7BDD reports IMN QTC 109, QNI 188. W7IDK reports Have events: K7NM 10/70 repeater; FB Xmas party; new Novices; new emergency hospital station. WA7OBH reports: N7AXR new Hardin ham; his DX totals are 203 mixed, 42 cw. How about DX total for other Montana hams to be listed here? W7IXD had printer troubles, will be back on soon. Lots of FB newsletters received from around the state. Find MT hams in CA for winter on 3915 in morning, like W7DXQ. Lower Yellowstone ARC newsletter reports 36 million radios share the spectrum. QRM? IMN meets 0300Z M-F 3635 says W7GHT. Missoula club put on 2 night CPR training class - FB. Super report as usual from WB7UTJ: Their 7240 Net QTC 21; KA7AHC to General; WB7UTJ new TR7625 for Xmas; WB7UTJ very active in net, traffic, and EC work. Traffic: (Dec) W7NEG 53, W7DB 10, N7ANT 5, W7LR 5. (Nov) W7TGU 267, W7IXD 54

OREGON: SCM, Dale T. Justice, K7WWR — SEC K7OLN

Net	Time/Days	Freq.	QNI	QTC	Mgr.
OARES	0100Z Dy	3993.5	529	258	W7HLF
OARES	0300Z Dy	3993.5	88	8	W7HLF
BSN	0145Z Dy	3908	829	63	WB7PQU
OSN	0230Z Dy	3587	114	166	WB7OFI
PdxAARES	0330Z Dy	147.32	541	82	K7WWR
WCN	0300Z Dy	3702	285	137	K7ZIG
1676	0300Z Dy	146.76	733	190	W7LRB
JCARES	0315Z W-F	147.06	204	20	W7VSE
LBARES	0300Z Dy	147.39	344	8	WA7JCN

New appointments: K7OLN as SEC, WB7PKX and WB7OFI as ECs. Thanks to W7HLF for many years of service as SEC. Note the new time and freq. for OSN. OTVARC held a Christmas party at the home of new pres. WB7SIC. Dec meeting was a program on mobile antennas. Hoodview ARC Dec meeting was about ignition noise by K7VNS. 4Z4AI now N7BKU and awaits his Extra. WB7VAA now Gen and WB7VHD is Advanced. Traffic: (Dec) W7VSE 1508, WA7IHS 523, WB7OFI 400, W7HKE 385, K7NTS 254, K7QPW 112, K7SGU 62, W7HLF 51, W7LNE 43, K7WWR 41, WB7OIJ 29, W7LT 27, W7BNS 20, WD4OVR 5. (Nov) W7HKE 116.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX. SEC: WA7RWK. Nets reporting this month: NTN QNI 1686, QTC 182; WARTS QNI 3527, QTC 575; NWSSBN QNI 736, QTC 48; WSN QNI 597, QTC 361; MPRTN QNI 182, QTC 101. W7AXT W7GXI and WB7CXB have become Silent Keys. New officers of West Seattle ARC are: WB7YRC, pres.; W7HCH, vice pres.; WB7RMD, secty.; N7AIF, treas.; W7AIZ, steward; N7APR Al7L K7JBZ K7NC WB7SEV, trustees. Snohomish Cty ARES Net Mgr WB6QWC reports 16 checkins for the first 2 sessions on the new frequency and is looking for more stations with traffic. W7ERH checks out portable generator periodically to be ready for power outages. N7RV originated more than 20 messages in a 6 hour church activity. Olympia Amateur Radio Society (OARS) worked very closely with Thurston Cty Sheriff on river watch during recent floods. WA7YOM has been working the Novice bands and has been first contact for 21 Novices. Chehalis Valley Amateur Radio Society enjoyed organ playing from W7AXJ and wife at the CVARS Christmas party. Fort Vancouver Hamfair will be held May 10-11. SEA NARC '80 (Seattle Amateur Radio Convention) is July 25-27. For information the convention address is PO Box 68534, Seattle, WA. 98168. WWDX Club has over 500 members, that should make them the largest DX club in the world. The Mount Baker ARC now has 2 new batteries for the club truck, thanks to generous donations. OARS had a successful Santa Claus operation at the Olympia hospital, NW PRA W7CKZ played Santa, N7BAB and KA7EBK were his helpers. Inland Empire VHF Club is sponsoring a Swapfest April 26 at Spokane International Fairgrounds. W7LUP is new member of Evergreen Chapter QCWA. Officers of WWARA for 1980 are: W7FHZ, chmn.; K7OET, vice chmn.; K7CR, secy/treas.; W7NAN WA7FUS W7OUI K7KNZ, trustee. Members of BEARS, OARS and Radio Club of Tacoma

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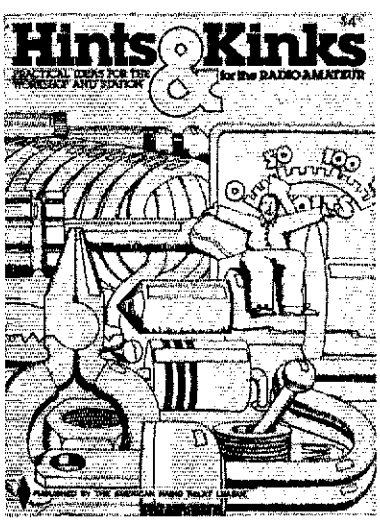

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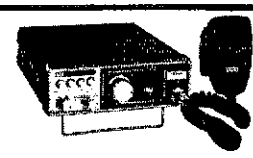

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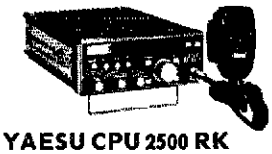

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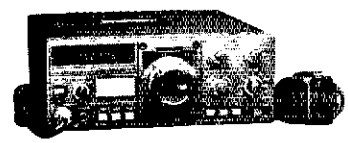

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provided communications for sports car rally in Capitol Forest near Olympia. Next Washington State QSO party, sponsored by BEARS, will be Sept 13-15, ending up Washington State Amateur Radio Week which will be Sept 7-14. Thanks to those who put in long hours and their skills to work to help the various public service agencies during the December floods. Traffic: KL7JEB 1554, W7DZX 1475, N7AFZ 932, WB7WOW 651, W7LUP 586, WB7TQF 502, K7GXZ 413, W7IEU 163, WA7BDD 159, W7GB 129, K7CTP 87, W7BUN 77, W7APS 45, WB7EBP 45, N7RV 41, WA7PHD 39, WA7EDQ 38, WA7RVA 34, N7AFY 33, W7EBU 33, WB7FDE 31, N7AJ 29, W7LG 23, WB7OAS 12, W7FJZ 11, WB7QWC 11, N7DH 3, K7MF 2, K7VNI 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: K6UWR W6ZF VE2AQV/W6. SEC: K6UWR. PSHR: W6OA W6JXK. BPL: W6OA W6JXK. MDARC mourns the loss of their pres. W6AMH. SBARA congratulates their Advanced upgrades: N6BFO KA6BGP WD6FMT WD5FLN. Livermore ARK has purchased a new set of call books for donation to the Livermore Library. Their members recently upgrading are KA6AIF to Advanced and WA6OHB to Tech. EBARC building a station at their Salvation Army HQ, the latest addition being a Johnson Ranger donated by member W6OLN. Alameda County RACES members provided communications for the first annual Oakland Marathon, in which over 2000 runners participated. The NCCC sponsored repeaters, WR6ADM vhf & uhf, carried all of the marathon traffic. W6WLW recently married. WB6AMB moved back into the section after a stay in Half Moon Bay. Napa Valley Emergency Net meets each Wed at 7:00 P.M. on W6LRR/R, 147.78/.18, WD6FJF is NCS. Newly NARC sanctioned Vallejo Repeater, WA6YXV/R, is on 144.71/145.31, 222.88/224.48, 446.375/441.375. Traffic: W6OA 659, W6JXK 519, K6UGS 86, WB6UZX 80, N6RO 8, N6NE 2.

NEVADA: SCM Ralph E. Covington, W7SK — ASCM: N7RH. SEC: WA7KCD. Correction in that N7AWP is EC for Northwest Nevada, with EC for Lake Tahoe being W7KJU. Needed are ECs for other areas; any volunteers? Other appointments: OTS: N7AKX W7IA N7XE N7YL; OES: W7HOP KB7JK; OVS: K7ICW W7TVF K7ZOK; OBS: AD7K; OO: WA7NIN; NM/STM: W7BS. LVRAC had a super meeting in January with film and auction. New officers LVRAC: WD9CKM, pres.; KA7DJT, vice pres.; KA7DDE, treas.; KA7AOP, secy.; K7LRV, treas. K7KJA home recovering from surgery. W7CKH teaching classes in Amateur Radio at Clark County Community College. KA7CUX now Advanced Class. N7BDV's new call is KB7JK. WB7SKL with new Drake Linear. Nevada Sagebrush Net meets nightly at 7:30 P.M. Pacific Time, 3898 kHz. Traffic: N7AKX 483.

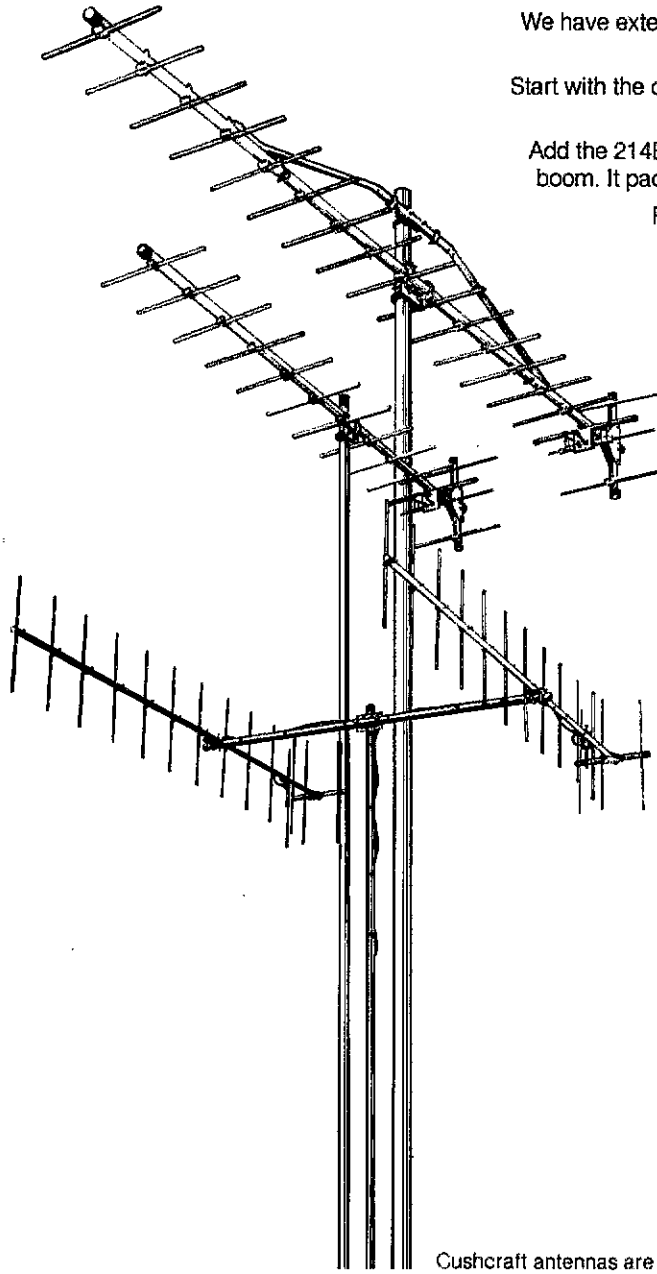
PACIFIC: SCM, Pat Corrigan, KH6DD — STM: W6KON. SEC: KH6CKJ. KH6HNF won the grand prize at the HonoARC Xmas banquet. Big Island Emerg Net (BIEN) meets each Wed 6:30 P.M. on 7125 kHz. It is a slow speed cw net. Check-ins welcome. Maui has a similar net that meets at 9:00 P.M. on 7120 kHz. Congrats to AH6K and KH6H for getting these nets on the air. Many antennas and towers lost in one of Hawaii's worst storms in early Jan. KH6WM, new prexy of Hono ARC, planning good programs this year with tours of local elec and telephone plants included. KH6IPQ soon to have her hf antenna up. 160m showed good winter conditions from mid-Pacific with more KH6's active. KH7HIJ visited Baltimore in Dec, taking time off from his busy sked on Pac. Tfc. Net. Traffic: KH6JJP 59, KH6HIJ 37, KH6H 16.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: W6NJU. New officers for the El Dorado Co ARC are: N6BIN, pres.; WD6PDM, vice pres.; WD6FEI, secy.; W6HBH, treas. Elected by the Sacramento ARC were: WB6LIK, pres.; WA6YZD, vice pres/secy.; K6FO, treas. Congratulations to new ticket holders WA6TCK (Adv) WB6YUQ (Gen) KA6HHF and KA6IFF (Novice). Butte College is offering an amateur radio course in the Winter Quarter. I regret that I must note that W6MR has become a Silent Key. AJ6M now KA6WW. W6RHC/Rpt has replaced WR6AJE. WD6ANX lost his tower over Xmas. Call the AR Newsline 916-484-7388 for the latest info. The Yuba/Sutter AR Emergency Service meets on the 2nd Sat of the month at 11 A.M. at the Red Cross Bldg in Yuba City. Traffic: W6SX 155, W6RSP 130, K6RPN 19, W6DEF 12.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. Congrats to W6BYS W6FAX W6GGC and W6URA on their admission to SFRC Hall of Fame. New

B=DX

BOOMER



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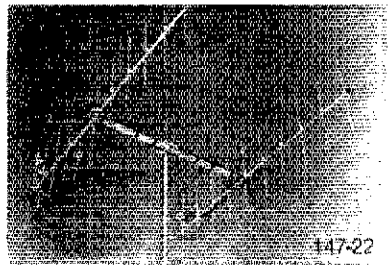

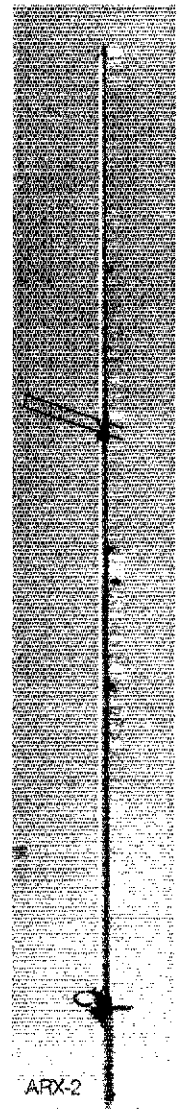

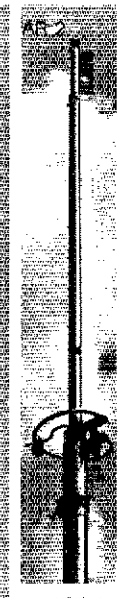

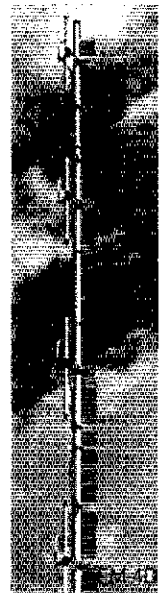

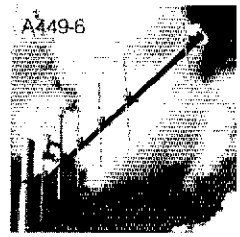

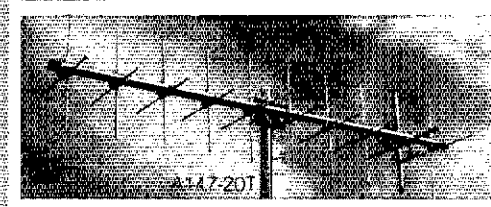

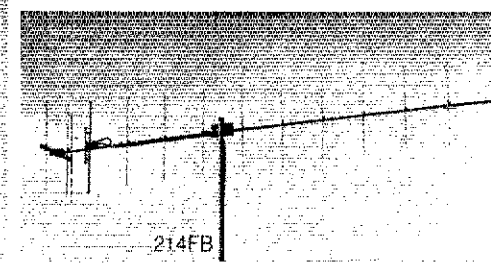

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pres.; K6UEY, WD6HEW, treas. WA6AQA KA6CWE KA6AOS KA6AOU WB6JSO, dir. Awards of Merit were presented to WB6SFC WA6HZO WA6OHT K6KZ WA6MZF KA6ERG KB6FB WA6NHD. Congrats. WVARA upgrades were: KA6ERG KA6EOT Advanced; N6BYX General; KA6ESC KA6IEX Technician. SPARK repeater WR6AIS now with battery back up power, and preparing for any emergency operation. Santa Cruz CARC has following new officers: WA6SVW, pres.; WA6HKP, vice pres.; K6TAM, secy.; N6BSU, treas.; WB6RWU WB6JON AI6D WD6FMC WB6PCC N6BIU, dir. Many Certificates of Participation and Awards of Commendation were given for service during 1979. FARS annual banquet was a huge success and they have most yearly activities in the planning stage. New members of FARS: KC6O WB6GYT N6ATO WD6CIO. Memorex ARC holding Novice and Tech/General theory classes each Mon. EC W6ASH reports on SPECS aid in communications for the Festival of Lights Parade in Los Altos, and the following participated: WB6AAJ WA6LJJ N6YO W6TPS K6SGW WA6VAQ WB6PZT KA6FYX WB6WBK. SPECS also recvd a commendation from the Electric Auto Rally, for their help in communications for the rally. A very active AREC group!! KB2ID, pres. of NPSARC, had a fine editorial on "An Amateur Radio Club exists to do the following." WB6OOL is designing and building a solid state 2-mtr repeater to replace tube machine at WR6ADM. NCCC going all out for ARRL DX test. W6TTU, of the Bay Area 220 Group, had an excellent article on Emergency Preparedness in that groups Dec bulletin. OO K6OQ says "appliances" on the most part sound cleaner than a lot of home brew rigs. At the helm of PAARA for '80 are: K6SEM, pres.; W6DU, vice pres.; WA6LNV, secy.; WB6RAF, treas.; K6SEM W6AIN KA6BEU K6TNY W6NIR N6RY N6YV, dir. N6XI busy with contests. W6MMG and WB6HBL chasing DX and contests. W6YBV led traffic totals each month for 1979. Congrats! Traffic: W6YBV 464, W6KZJ 80, W6AUC 47, W6RFF 33, W6OII 26, W6CF 2.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — Asst SCM: N4UE. STM: K4VHT. December traffic activities in the section reached an all time high as we passed the 9000 mark in the month. Thanks to all who participated in the nets and brought all messages into the system. Congrats to WD8NYN K4DHX K4GCN WD4CNO AB4V WB4VVL W4FMN WD4EPO WB4TOP W4DW for achieving BPL. This is the most BPLs awarded in any one month in many years - keep up the good work. WA4BFT reports the Triangle Radio Alert Net(2-mtrs) in Durham will be handling traffic on a routine basis from the VA Hospital. This will be a great service for the patients. Great losses from our ranks include W4CS(Greensboro) & WA4MJG(Durham) reported as Silent Keys. Rockingham Co ARES provided communications for bicycle race and Charlotte ARC for recent marathon - certainly good public relations. New Officers of Cape Fear ARS (Fayetteville): WB4FXM, pres.; WA4IJR, vice pres.; N4AGE, secy/treas.; KA4HOE, treas. CVRA new officers are: WA4ZQQ, pres.; WA4VCC, vice pres.; WA4JIY, secy.; N4AA, treas. CNCTN(13/73) meets at 9:30 P.M. rather than 10 P.M. Carolina Morning Net(CMN) now a section net of NC, no longer a combined net with SC, with NM WD8NYN. Besure to join them at 0800 local time daily at 3927 kHz. New appointees are WB6OTS WB4VVL WD4DIP (OTS), N4BGC(EC Bladen) & WA4OJU(NM Metrolina Two-Meter Emerg Net). Remember to join us in Charlotte on March 22-23 for the Roanoke Division Convention. See details in this issue of QST. Traffic: (Dec) WD8NYN 793, WD4CNO 559, K4DHX 554, K4GCN 536, AB4V 511, WB4MXG 442, WB4WII 364, W4FMN 338, WB4VVL 308, KB4IZ 302, W4EAT 294, AB4S 282, KF4R 240, WD4EPO 238, K4MC 227, W4PCN 219, N4BVZ 204, K4VHT 190, WD4LMM 119, WA4SRD 119, W4HKB 115, WB4TOP 108, W4DW 100, WD4OCO 95, W4OFO 92, WD4CFZ 87, K4NLK 84, N4UE 83, WB4CYN 82, WA4IHG 82, KQ4M 80, WA4IJYS 77, AA4R 72, N4BEX 67, K4FTB 66, KB4PD 64, N4ZH 58, WD4CNR 52, WA4UTC 45, WA4OBR 42, WD4AIE 40, WB6OTS/4 37, W4VTP 35, K4AI 32, W4ACY 29, WD4DIP 28, WA4OJU 28, WB4CES 27, WD4KPK 25, KK4M 22, WD4RDT 22, WD4NAO 20, W4RVE 19, WA4AKB 18, WD4FJM 18, N4BWO 12, N4AET 11, WB4VHE 10, W4EHF 8, KA4IUY 4, WD4PJU 2. (Nov) WD4CNR 46, KQ4M 6.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. SEC: WD4HBX. STM: W4ANK. N4JK WD4AEU WD4BUH have Icom 551 on 6 m, won't you join them? Congrats to new officers, Western Carolina ARS: KB4CK, pres.; WB4TRF, vice pres., K4VIA, treas.; WD4GAT, secy, K4RA, act chmn. Suggested freq. for SC QSO Party: ssb 50.150, 144.150, cw 50. 080 & 144.080. Congrats to W4GZO for being called upon to conduct a most comprehensive study at Harvard U. Congrats to new officers of Palmetto State Chapter OCWA: W4GZO, pres.; N4LS 1st vice pres.; K4AWY, 2nd vice pres.; K4FAF, secy/treas. Palmetto State Chapter OCWA spring meeting in Greenville 15th March at the Colonial Court Motel. Congrats to all known upgrades: KA4BFZ KA4BGB KA4BGA. Check-ins/traffic: SC SSBN 1571/295; Anderson 2-M Net 491/28; CNe 31 sess/361; Lancaster County 2-M Net 162/23; Western Carolina ARES Net 141/0; Blue Ridge 2-M Net 72/34; Newberry County ARES Net 52/7; Laurens County 2-M Net 44/0; Aiken County 2-M ARES Net 14/0. Traffic: (Dec) K4ZN 554, WD4AWN 457, W4ANK 447, W4FMZ 288, W4NTO 168, W4NOL 95, WD4PPM 88, W4DAW 85, W4OCX 63, WD4RMA 53, WB4UDK 49, W4MTK 48, WD4HBX 46, WB4MXW 38, N4BCD 29, WD4BUM 26, WB4FEU 24, KA4ASJ 22, WB8TGT/4 22, AF4E 21, W4FVV 16, WA4VYS 16, WD4EDM 15, K4VIA 15, N4EE 13, WB4JNE 13, WD4DOL 7 WA4SJS 7, WD4FJP 6, WA4ABZ 5, W4DRF 2, WD4BLW 1, WA4JWS 1. (Nov) WD4DOL 4.

VIRGINIA: Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. SEC: N4NK. ASEC: N4AZI. STM: W4SQQ. ASTM: WA4STO. Chief OO: W4HU. Chief OVS: WA4PGI.

Net	kHz	Time (PM)	Sess	QTC	QNI	Mgr.
VNTN	3907	noon	31	562	456	N4LE
VSBN-early	3947	6:00	31	682	671	W4JK
VSN	3680	6:30	30	237	306	WA4YIU
VN-early	3680	7:00	31	518	452	WB4FLT
VN-late	3680	10:00	31	240	254	WB4FLT
VSBN-late	3947	10:15	31	581	674	W4JK

WA4STO now W4SQQ's asst. Reports for W4SQQ can be sent to either W4SQQ or WA4STO, N4AZI now N4NK's asst. Reports for N4NK can be sent to either N4NK or N4AZI. Thanks and congrats to both. Dec was an "unreal" month for VA. Total traffic reported topped 17,000! This was due in large part to a number of traffic booths set up at local shopping malls. Perhaps the biggest was the month-long operation at Pembroke Mall in

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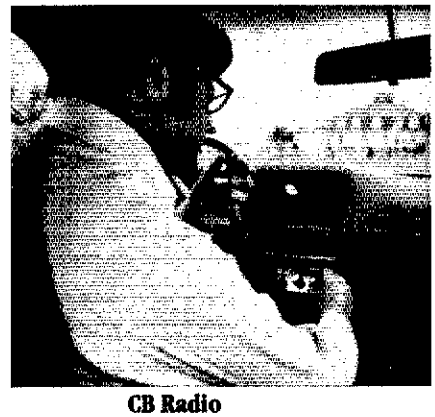

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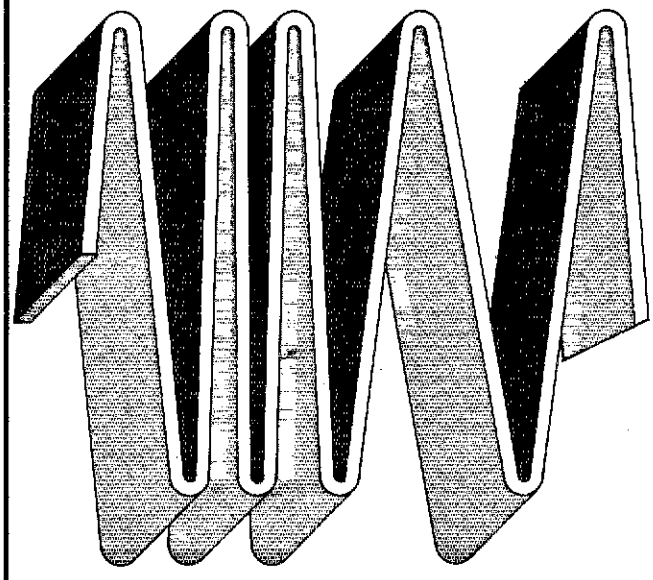

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Tidewater put together by Virginia Beach EC, WD4RDF. We had 13 BPLs: K4AF K4BKX WA4CCK N4IF W4JK K4KNP AK4L WA4LJI KB4N N4NK WB4PNY W4SQQ WA4STO. 13 made PSHR: N9ASX N4AZI K4BKX WA4CCK W4JK N4LE KB4N N4NK W4NWM KB4OG WD4POZ WA4STO WA4YIU. W4WWQ's ARES group spent New Year's day on a search and rescue mission. WA4NTP made DXCC. WB4UHC passed Extra. W4UVA a new TH6DXX on a new 50 ft tower. W4KX reports that the Fredericksburg area repeater is now on 147.72/12. KB4QD a new TS-120. WA4PBG vacationed in Florida. Many new calls heard in the nets; keep 'em coming gang. Virginia has a new net, the Virginia Specialized Communications Net (VSCN) which meets on Sat & Sun on 3617.5 kHz at 2200 UTC. RTTY and automatic Morse stations are encouraged to participate. It is a non-NTS net under the leadership of our SEC, N4NK. If all goes well, the schedule will be expanded. Traffic: AK4L 2396, WB4PNY 1305, KB4N 1054, W4JK 958, WA4CCK 831, W4SQQ 717, WA4STO 717, N4NK 715, K4KNP 630, WA4LJI 517, K4BKX 507, WB4FLT 452, WD4POZ 387, WA4YIU 344, N4IF 270, AA4CK 266, N9ASX 254, WA4NTP 249, K4AF 214, K8LGA 212, KB4OG 202, W3BBQ 197, K4AXF 195, W4UO 169, WB4DBK 166, N4LE 161, W3BBN 158, WD4NEI 145, K4GR 142, N4AZI 141, W4YVG 125, WD4RDF 110, K4JM 107, W4CEU 102, WD4FTK 91, N4RF 90, W4OKN 88, WB4NEE 86, WB4UHC 75, N4BJX 68, W4NWM 64, WD4MGF 59, KI4W 57, K4EJ 56, K4MU 54, WB4DQZ 43, N4BFI 42, WA4QWC 42, WB4ZTJ 42, WB4MAE 40, N4YO 38, KA4ETG 33, WB4KIT 30, N4ABM 29, WB4LAB 27, KA4HLI 25, KB4OB 24, KB4OF 23, K4HBE 21, WD4DUU 20, W4KXE 19, KA4GIO 18, WA4ISA 18, WB4ZWT 15, W4SUS 15, K4JRT 14, WA4YJF 14, KJ4J 13, WD4EUV 11, W4JUJ 10, WB4SHK 9, WA4JUO 8, WB4ZNB 8, N3RC 7, WA4FDV 5, W4KX 5, N4OT 5, WB4RWY 5, W4CFV 4, WB4ODZ 4, W4WWQ 4, W4YE 4, WK4FC 3, WD4KUK 3, W4LXB 3, WA4WQG 3, K4ITV 2, W4DM 1, WA4FGJ 1, K4MLC 1, KB4QD 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW NMs: K8MHR WD8JYM WB8AKQ. STM: WA8WPW. Christmas messages plus Red Cross traffic generated by Kanawha ARC pushed Dec traffic to record numbers both for nets and individuals. 54 messages were cleared on 12/19 via WVN. WV to join Carolina Virginia Repeater Assn. Contact K8LG for details. Reginald Atkins, Chief Interference Officer from NRAO was guest speaker for Huntington TARA. WV QSO party to be held in June; watch Contest Corral for details. WV traffic nets need your support; check time and freq below. Roanoke Division Convention to be held in Charlotte March 22 and 23.

Net	Freq.	Time(Z)	Ck-In	Tfc	Sess.
Hillbilly	14290	1700 Su	178	48	4
WV Phone	3990	2300 Dy	982	396	31
Phone-MD	3990	1700 Dy	348	96	30
CW	3567	0000 Dy	243	255	31
Novice	3730	2315 Dy	175	18	21
Bk. Diam.	25/85	0200 Tu	30	8	4

2 Mtr. Net

Traffic: WB8WPW 897, WB8AKQ 563, K8IXO 260, N8AJC 202, WB8TDA 149, WD8EAV 130, W8HZA 97, WD8MZW 93, WD8RNR 83, W8JWX 85, WD8POG 70, K8MHR 51, WD8LDY 47, W8CKX 38, WD8JYM 30, KA8ETV 27, K8KT 27, WB8BMX 22, N8BP 21, K8TW 18, W8LZE 16, WB8UDY 16, W8CAL 10.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJ — SEC: WØGOW. STM: WBØMCL. NM: ADØA WDØAIT KØCNV WØHE WBØZQG. Although well under way by the time you read this writing, a very happy 1980 to all! WBØYKH heading up a group of handicapped basketball players. All are confined to wheelchairs but are well skilled in the sport. Much controversy is surrounding the new numbered radiograms and precedences which went into effect at year's end. All stations active in traffic handling should consult QCD or send an s.a.s.e. to ARRL for form CD-3 for the update. WAØYNP forced to resign as manager of PAN(D) with WBØMTA now assuming the position. Newly appointed OVS, WØETT, reports several DX openings on six meters. Severe weather caused numerous problems during December. Perhaps it is a good idea to make certain those emergency generators are working and those batteries charged. Net tfc: Columbine: 31 sessions, QNI 1055, QTC 250, Intermals 197, QNF 1222; CWN: 31 sessions, QNI 289, QTC 205, QNF 1030; Hi-Noon: 30 sessions, QNI 1533, QTC 233, Intermals 285, QNF 1278. Traffic: (Dec) WØWYX 2581, WAØHJZ 1130, WBØZQY 490, ADØA 238, WØLAE 161, KØDJ 147, WØGO 135, WØRE 130, WBØYKH 95, WDØDEX 87, WAØYNP 78, WØHXB 60, WØNFW 54, W5HRS 31, WØGW 8, WØTX 5. (Nov.) WØHXB 447, WAØYNP 77, WØTX 12.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs WD5AHH and K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 2000 local time and handled 228 msgs with 176 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 231 msgs with 1151 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 99 msgs with 850 checkins. Yucca 2-Mtr Net handled 34 msgs with 382 checkins. SWOT 2-Mtr SSB net with 8 checkins meets Mon 0400Z on 144.200. Very sorry to report the passing of W5HQN who had been active in ABQ for about 30 years. Good to see the 2-Mtr SSB Net organized. Lots of SAR activity around the state. Traffic: W5UH 572, W5DAD 444, KL7HSF 369, W5ENI 289, N5NG 277, W5JOV 130, WA5MIY 89, W5BWV 27.

UTAH: SCM, Royce Henningson, K7QEQ — STM: W7OCX. SEC: WB7FCB. W7BE reports that the Utah VHF Society Weather and Road Net was reactived on Dec 10, '79. NCS W6BE alternates with W7GPN W7RO W7FSC WB7AMR. Check ins for Dec 718. The net will continue operations thru winter during commuter hours. WA7MEL, Net Manager on the UCN, would like to see more check ins from the areas outside the Salt Lake - Provo area. UCN meets on 3710 kHz at 0215Z. WB7FCB is doing a good job as SEC. He has started an EC Net at 2000Z on Sun on 7272 kHz and has about 18 EC checking in and exchanging ideas on their jobs. W7OCX received the Army Certificate of Achievement for 25 years as the Utah State Army MARS Director. Traffic: K7HLR 569, WA7MEL 149, NØAHA 135, WA7JRC 99, KB7DC 41, W7RO 36, W7OCX 23, W7UTM 15.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — WB7QID has received 5BWAS certificate number 611. WB7UFP, Laramie County EC, reports the ARES-RACES emergency communications plans for Laramie County and the state EOC station were completed in December. Participation in the ARES weekly net on 145.22/82 has been increasing. The Cedar Mountain ARC of Cody had

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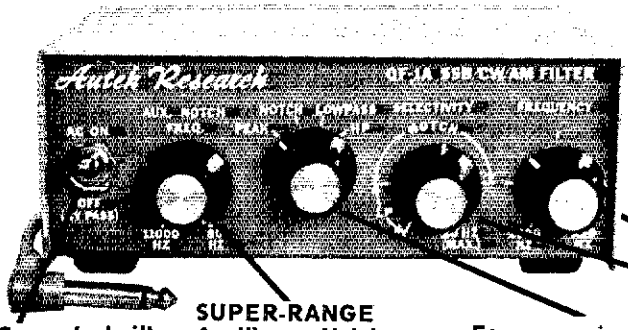

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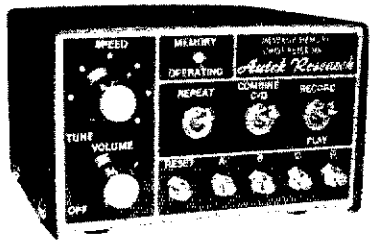
CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic MK-1 should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! MK-1 used to set new world's CW record. A single operator worked 3992 DXQSO's & 275 bandcountries in only 48 hours! Get the choice of champions — AUTEK.

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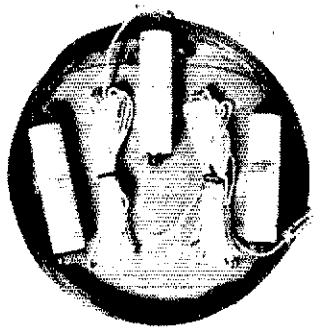
BASSETT HELIUM MOBILE ANTENNAS

The result of nearly two years of continuous development and nearly fifty years of amateur and commercial antenna design and manufacture Bassett helium filled antennas are for the amateur who demands the very best in American made automatic bandchange systems and mobile antennas that are compatible with all transceivers including the new "no tune"units. Trap systems are fundamental dipoles on each band and do not require antenna tuners.



- Helium filled traps impervious to all weather
- Maintains precise resonance and efficiency
- Systems easily handle legal amateur power
- Multiband amateur and MARS with one coax
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- Short enough to fit on a small 50'by 100' lot
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- Uses your RG-8 or RG-58 coax in any length
- Center"isolator" equipped to accept a PL-259
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- Helium filled for a lifetime of high efficiency
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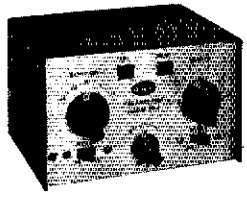

Model PT-2 is a continuous tuning 6-160 meter Pre-Amp and master power station control. It is specifically designed for use with a transceiver. The PT-2 contains new sophisticated control circuitry that permits it to be added to virtually any transceiver with NO modification. No serious ham can be without one. Other features include: *Improves sensitivity and signal-to-noise ratio. *Boosts signal up to 26 db. *For AM or SSB. *Bypasses itself automatically when the transceiver is transmitting. *FET amplifier gives superior cross modulation protection. *Advanced solid-state circuitry. *Simple to install. *Improves immunity to transceiver front-end overload by use of its built-in attenuator. *Provides master power control for station equipment.

Model PT-2 . . . 117 V. 60 Hz $79.95
Model PT-2E . . . 220-240 V., 50-60 Hz $84.95
Model PLF-2 is the same as above, except that it is for receiver use only and does not have a gain control.
Model PLF-2 . . . 117 V., 60 Hz $52.95
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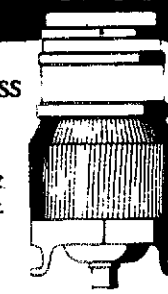

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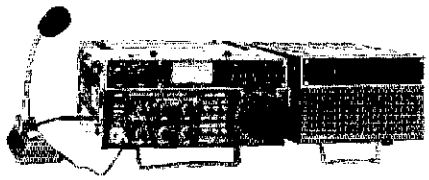

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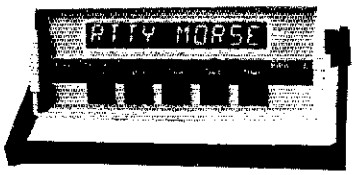

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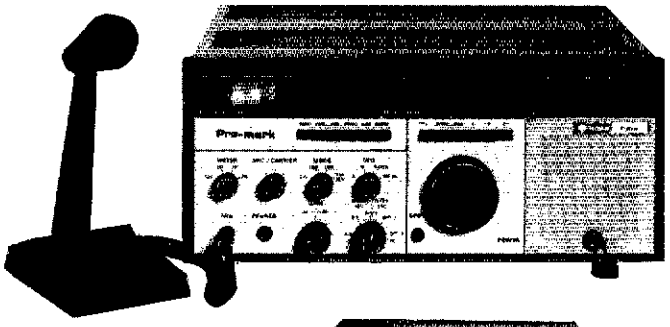

EIMAC
3-500Z,
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12BY7A &
4-400A

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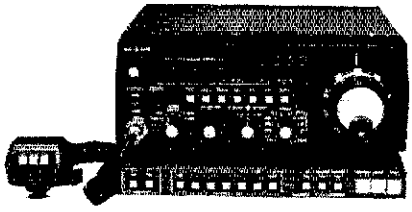
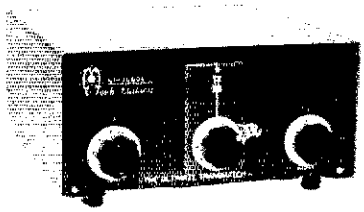
HY-GAIN



YAESU FT-707
FT-101ZD
FT-901DM,
FT-227RB, FT-7B
FRG 7000



Murch Model UT2000A,
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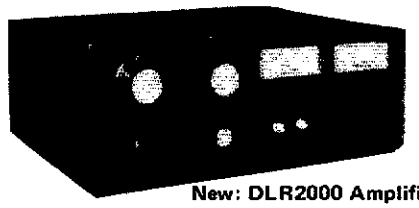

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DENTRON MLA-2500 Amplifier &
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DEALER INQUIRIES INVITED, PHONE IN YOUR ORDER & BE REIMBURSED.

three stations set up in different locations in Cody Dec 15th and generated quite a lot of holiday traffic though it was a cold and windy day. WA6PFJ reports Wyo. Jackalope net held 23 sess with 752 QNI, 9 QTC. WB7NHR reports the Wyo. Cowboy net held 21 sess with 682 QNI 89 QTC. Traffic: W7LYA 878, WA6GYQ 509, W7YWW 332, K7KSA 314, WA7SGG 202, W7SDA 141, W7PT 46, K7SLM 19, K7ISG 15, W7SQT 12.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. I want to thank all for electing me as your SCM. I will try to be worthy of your selection. I want to thank Bill Scates, WA4JYU, for a good job well done. W4IBU has been working on EC appointments. We are hoping to have as many EC as we have counties. WA4YEK reports Chattahooche Vally ARC new officers are: WA4VEK, pres.; WD4KAK, vice pres.; WA4CZY, secy/treas. Remember Mobile Hamfest in April, Birmingham in May. Watch Hamfest Calendar in QST. AENB CW Net looking for new and old members to check in. AENB QTC 112, QNS 231 in Dec. Check in on 3575 and get that cw practice with traffic. Traffic: WA4JDH: 2091, N4MD 795, N4CGT 646, W4CKS 151, K4AOZ 114, K4EWD 95, W4IBU 60, WA4FYO 50, KA4IVO/AT 41, KB4VI 38, W4UP 32, WA4ZPZ 31, KA4BU 20, WB4TVY 20, WA4JYU 12, K4UMD 12, WB4EKJ 6, K4JOE 5.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: K4VHC. SEC: K4SWJ. Asst SEC: WB4HXE. STM: WA3NAZ/4. NMs: WD4ADV (ARES) K4DMK (GCN) W4GH (GA TFC Nets) W4HON (VHF) K4VHC (RTTY) W4WXA (GSN) WB4ZOJ (GTN) WB4ZVX (GSSBN).

Net	Freq.	Time (EST)
GCN	3995	0700 M/S 0800 Su
GTN	3718	1815 Dy
GSN	3595	1900 & 2200 Dy
GSSBN	3975	1830 Dy
ARES	3975	1700 Su
GA TFC A*	7243	1200 Dy
GA TFC B*	3955	1830 Dy

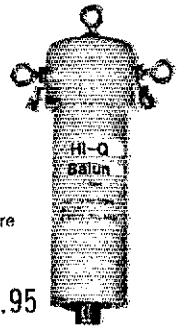
WB4EPS and W4PJD Silent Keys. They will be missed by all. 1980 Colquitt County officers: WD4KNA, pres.; KB4JZ, vice pres.; AA4P, secy/treas.; WB4MYJ, trustee; K4UPP, maint. N4UZ proud of new memory keyer. Again a superb job by K4VHC as Santa from the North Pole. With spring just around the corner it will be Hamfest time once again. Columbus kicks it off on March 8th & 9th. Please help conserve on gas by loading the gang up in the bus. Spring also brings us our violent weather so help the National WX Service by volunteering your clubs facilities. CGARC new officers: WB4BEO, pres.; WD4DVZ, vice pres.; WA4NRV, secy/treas.; N4BHB, program. ARES being reconstructed by SEC. Won't you give K4SWJ a call and give him some help. One day ARES will pay off tenfold. Winter conditions this year caused the time changes in nets. Traffic: (Dec) W4GH 294, W4WXA 255, WA3NAZ/4 249, K4AZM 244, WB4ZOJ 169, W4ELO 112, WD4ADV 81, W4CZN 68, K4JNL 64, K4EV 58, WB4ZVX 57, N4UZ 28, W4BIA 22, W4HON 21, AK4T 16, K4BAI 10, K4NM 8, K4PIK 6, N4BGN 4, K4HBI 2. (Nov) W4PIM 81, WB4ZVX 29.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA. NM: WD4HXS WD4LUG WD4PDK. KA4BRW apptd. EC for Sumter County. WB4NIP renewed OVS appt. Net certificates earned by N4AYH WD4KXI WA4PHL WA4RHH and WB4ZRS on Gulf Coast ARC Emergency Net. EC, WA2GIN/4, gave a talk on Escambia County emergency comm. at the Orlando Hamfest ARPSC meeting. QFN Bulletin will resume publication, with N4ET, editor and N4WA, printer/mailer. WB4NIP W4EQR WB4BSZ W4CSS WA4BMW and WD4ETU all worked Europe on 6 meters, listening on 10m. W4CS5 has a KWM-380 on order. WD4CFO did such a good job of restoring the Playground ARC's Golden Boob Award trophy, he got to keep it! KM4O is moving to Jacksonville, and had to resign as President of PCARC. The club has developed a new disaster plan, in coordination with civil defense. WD4PDK got a new toy for Christmas — a code reader. Tallahassee ARC had a program on construction of J-pole antennas. KC4N trying to revive the club's HF quad. The N. FL. DXA Bulletin has a "new image" tnx to N4KE. Congrats to N4PL on his first BPL in 40 years of traffic handling. Also making BPL this month were: WA4CRI WD4DNC WD4HIF WD4IIO. Orlando ARC and CFRA members approved a merger of the two groups. N4KF active in CD Party and RSGB 21 MHz contest. WB4FJY continues to be chief outlet for Central and S. America traffic. New officers of the Gulf Coast ARC: WD4KXI, pres.; WB4JZK, vice pres.; KA4IOL, secy.; WA2FGU, treas. Traffic: WD4IIO 940, WD4HIF 764, N4PL 762, WA4CRI 673, WD4DNC 513, AA4FG 477, WD4HXS 418, N4EC 330, WB4TZR 305, WD4NYY 228, WD4PDK 196, W4MGO 181, N4BZH 177, W4KIX 156, WA4EYU 153, N4WA 149, WB4FJY 147, KF4U 109, W4JL 102, WB4DTS 96, K4RNS 96, W4BKC 90, WD4LUG 77, WB4WOO 68, WB4ADL 56, N4BBY 49, W4MVG 45, W4RH 43, K8PXM/4 29, WA4GIN/4 26, KB4LD 20, WB4OBB 8, N4ARJ 6, WA4CLY 5. (Nov) KB4B 33.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. New appointments: KR4X EC Hillsborough County. Endorsement: W4ROA OO. Our family official appointees (with number in parentheses showing what it was a year ago) is: NM 7(5), EC 20(23), OTS 50(51), OES 24(26), OBS 11(12), OO 10(9), OVS 4(7). K4DYB reports 446.50 MHz simplex being used for coordination between ARES stations in Manatee and Sarasota Counties. N4KB now back on TCC after summer layoff. W4IYT reports Dade ARPSC very active in Orange Bowl parade and half time show. He expects to have 50 radio amateurs in 26 mile run Jan 12th. W4JM is now NCS on Central Florida Chapter of QCWA, 10 A.M. Sat, 7240 kHz. WB4DWA visited WB2FWS, Suffolk Cty, NY during Thanksgiving and give a talk to Model Plane Club on "Radiation Hazards from Handheld Transmitters." WD4SCD is new "Emergency Director" for Metropolitan Repeater Assn, Pinellas Park. We understand that "QFN Bulletin" is to resume publication with N4ET as editor and N4WA as printer. The new ARRL Numbered Radiograms went into effect January 1st. We've heard a number of complaints that traffic handlers don't like them. If you sincerely dislike them, get your gripes down to specific terms and let them be known to your STM and ARRL HQ. We've had complaints that liaison stations have been held on 4RN receiving traffic and missed late session of QFN. Liaison stations should be on their assigned net at starting time, even if it means leaving an earlier net before all the traffic is handled. We must accept the fact the NTS is a limited capacity system. When you run out of time, you quit. For PSHR purposes, you should not count yourself as a QNI on net sessions where you were

HI-Q BALUN

- For dipoles, yagis, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz
- Small, lightweight and weatherproof
- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector



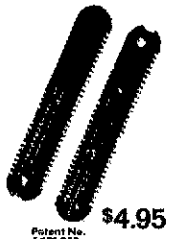
$10.95

HI-Q ANTENNA CENTER INSULATOR

Small, rugged, lightweight, weatherproof
Replaces center insulator
Handles full legal power and more

$5.95 With SO 239 connector

HI-Q ANTENNA END INSULATORS



Rugged, lightweight, injection molded of top quality material with high dielectric qualities, and excellent weatherability. End insulators are constructed in a spiral unending fashion to permit winding of loading coils or partial winding for tuned traps.

May be used for
- Guy wire strain insulators
- End or center insulators for antennas

$4.95
- Construction of antenna loading coils or multiband traps

Patent No. 4,991,350

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80/75	135'	$39.95	$24.95
D-40	40/15	66	25.95	21.95
D-20	20	33	24.95	20.95
D-15	15	22	23.95	19.95
D-10	10	16'	22.95	18.95
Shortened dipoles				
SD-80	80/75	90	31.95	27.95
SD-40	40	45	28.95	24.95
Parallel dipoles				
PD-8010	80,40,20,10/15	130	39.95	35.95
PD-4010	40,20,10/15	66	33.95	29.95
PD-8040	80,40/15	130'	35.95	31.95
PD-4020	40,20/15	66	29.95	25.95
Dipole shorteners - only, same as included in SD models				
S-80	80/75		$11.95/pr	
S-40	40		$10.95/pr	

All antennas are complete with a Hi-Q Balun or Hi-Q Antenna Center Insulator, No. 14 antenna wire, ceramic insulators, 100' nylon antenna support rope (SD models only 50') rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

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Nylon guy rope, 450# test, 100 feet	$3.49
Ceramic (Dogbone Type) antenna insulators	70/pr
SO-259 coax connectors	55

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5. With my own name on the door, I will personally back up any problem or question you may have.

—RON CONLEY K7LTV

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LIST PRICE $895.00
CALL FOR QUOTE

• KENWOOD TS-120S
H.F. TRANSCEIVER
LIST PRICE $699.95
CALL FOR QUOTE

KENWOOD EQUIPMENT CALL FOR OUR LOW QUOTE

MODEL	DESCRIPTION	LIST PRICE
TS-180S	W/DFC TRANSCEIVER	$1149.95
PS-30	POWER SUPPLY	139.00
TS-120S	TRANSCEIVER	629.95
TS-520S	TRANSCEIVER	849.00
TS-520SE	TRANSCEIVER	629.95
TS-820S	TRANSCEIVER	1299.00
TS-820	TRANSCEIVER	869.00
TL-922A	AMPLIFIER	1199.00
R-1000	RECEIVER	495.00
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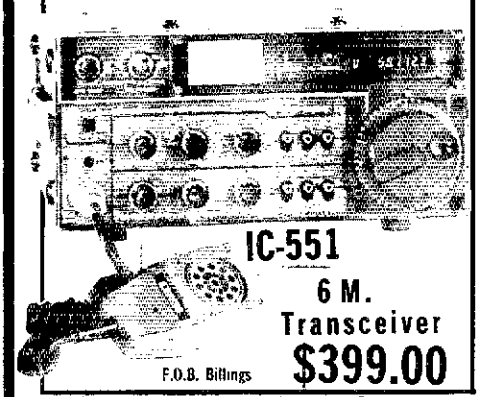

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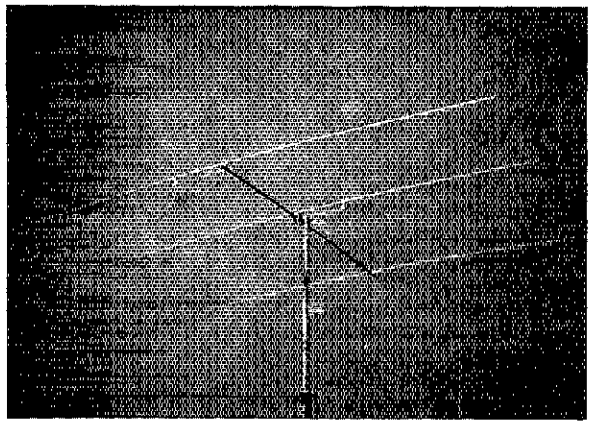

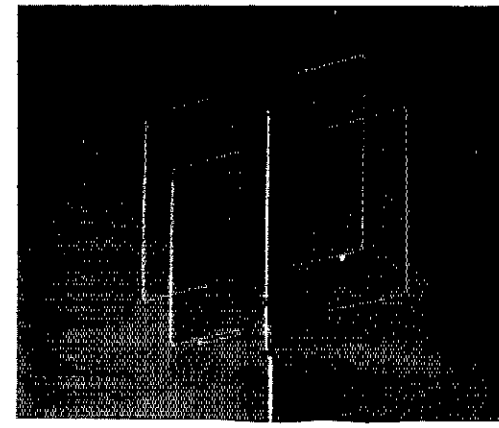

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Model	Band	Elements	VSWR	Pwr	Max EL	Boom L.	Wt. (lb.)	Price
HB20F4	14	4	1.5	2KW	35.48'	26.4'	43.0	147.95
HB20F3	14	3	1.5	2KW	35.48'	19.8'	34.6	114.95
HB20F2	14	2	1.5	2KW	35.48'	8.6'	20.5	79.95
HB15F5	21	5	1.5	2KW	23.76'	26.4'	38.1	117.95
HB15F4	21	4	1.5	2KW	23.56'	19.8'	26.2	84.95
HB15F3	21	3	1.5	2KW	23.56'	13.2'	17.0	59.95
HB10F4	28	4	1.5	2KW	17.49'	13.2'	13.7	63.95
HB10F3	28	3	1.5	2KW	17.49'	9.9'	9.7	45.95
HB40M3	7	3 Mini	1.5	2KW	38.61'	33.0'	52.2	226.95
HB40M2	7	2 Mini	1.5	2KW	38.61'	16.5'	33.2	135.95

SWISS QUAD

Model	Band	Elements	VSWR	Pwr	Max EL	Boom L.	Wt. (lb.)	Price
SQ20M	14	2	1.5	2KW	15.8 x 12.5'	13.2'	29.9	134.95
SQ15	21	2	1.5	2KW	14.5 x 11.2'	13.2'	14.5	52.95
SQ10	28	2	1.5	2KW	11.2 x 8.25'	9.9'	11.7	49.95
SQ61	50	2	1.5	2KW	5.9 x 4.9'	5.9'	5.5	36.95
SQ22	144	2x 2	1.5	2KW	1.88'	6.6'	4.1	45.95

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NCS. We don't like it, but this policy was published in QST and reaffirmed by letter from Headquarters. And you don't claim you were a liaison station unless you were legitimately assigned to that function. Just being there doesn't make you a liaison station. Traffic: W3CUL 3614, W4MEE 1362, WA4PFK 881, K4TH 815, W3VR 789, K4SCL 597, K4ZK 589, KM4G 573, WB4WYG 515, W4GPL 474, WB4FVV 414, WB4PIB 311, K4EUK 302, WA4EIC 301, WA4HXU 268, W4NFK 244, W4IRA 230, N4KB 218, KE4O 201, KA4FZI 193, WB4NJU 131, WB4AID 123, WB4SNX 86, WA4FKE 84, W4IYT 78, W4SMK 77, KA4BBA 75, WD4CHO 56, KB4OW 53, W4WYR 51, WA4HXU 44, N4APE 35, WD4HMC 16, W4TJM 16, WB4GSV 6, WA4HKP 4.

WEST INDIES: SCM, Julio Negroni, KP4CV — Novice classes at the Institute of Engineers recessed for the duration of the Christmas season. Classes to be resumed Jan 14. Instructors are KP4JL and KP4CV. Efforts are being made to complete the 450 MHz. link at El Gato Repeater. This link will permit communications between PR west coast and the San Juan metropolitan area. The project is under the direction of KP4EJN and KP4EEH. This is a project of the PRARC - at the same time, PRARC is studying the installation of a new repeater at Cerro Punta on 146.10/70. PRARC also announces its forthcoming convention which will be celebrated this year at Aguadilla Hotel, Montemar.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Willard L. Haskell, AC7D — SEC: N7EH. On Dec. 17, 1979, the AZ Tfc and Emerg Net (3992) 0200Z celebrated their 10th anniversary. Roll was called by Net Mgr WA7KQE using a roster dated Dec 1969. Many of the old timers were, and are still in there pitching. K6LL/7 is newly app't OO in Yuma. OPRC officers for 1980: AA7Q, pres.; AF7M, vice pres.; WB7VOM secy.; W7UV, treas.; WB7VGB, compt. Hughes ARC, Tucson, rpts W7HLG and K7RML are on ATV (fast scan 439, 25 video/audio). Further they have two rpts in operation on 147.39/99 and 448.25/443.25. All new ARES registration forms should be sent to N7EH. K7EMM rpts that Navy Mars Repeater is operational on 150.125/148.950. Net meets Wed 0300Z. Also has a simplex freq. of 49.690. WB7CGQ did another fine job this year with a group of hams from TRA in providing communications for the "La Fiesta de Los Vaqueros." This rodeo was a four day event starting with the longest non-mechanical parade in the state. ATTN ECs — review your reported ARES members and assure that numbers being reported are indeed correct. Tfc Nets: A-10, QNI 995, QTC 404; Cactus, QNI 1120, QTC 233; SWN, ANI 176, QTC 228. Traffic: W7EP 529, K7MC 333, K7NTG 156, W7LVB 152, WA7KQE 101, K7UXB 69, WB7NJY 60, K7JKM 56, K7NMQ 46, AC7D 44, W7LBW 25, WØOPX/7 18, WA7NXL 12, WA7JCK 10, WA7WEB 7, WØRIQ/7 7, W7YS 3, N7EH 2.

LOS ANGELES: SCM, Perry Masterson, KD6C — As this is being written, the Pasadena Rose Parade is over for another year. Again this year, several amateurs provided communications assistance. I don't know the exact number of participants, but the count could go over the 100 mark. In addition to communications, the amateurs now provide ATV coverage. Some of the hams reported to me were WA6PEA K6PGX W6ORG KA6AGE K6TOS W6PAJ. Now this doesn't add to over 100, but these were the calls that I received information on. Note for the San Fernando Valley ARES, net meeting new time starting February 1 9 P.M. Monday evenings on 147.48 MHz. Xmas is often good to hams, N6PZ reports that he received a new keyer. Just watch his traffic go now. W6WIS has put most of his spare time in support of Project Good Will. This is the program supported in a manner by the United Radio Amateur Club which brings credit to the Amateur Radio community as a whole. N6NQ is now mobile on 80-10 meters. He reports working 12 states on maiden voyage. W6INH provided me with a nice report for the month of December, however, I lost it during one of my trips out of town. Sorry. Our new SEC, WB6FAK, is doing a good job of reorganizing the ARES in the section. We will have a full report in next months report. Traffic: KB6OT 195, WB5EKU 162, N6PZ 147, WA6LVO 133, K6OWA 97, KB6FC 87, N6NQ 73, WA6OCM 49, K6CL 46.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Asst SEC: N6RD. ECs: WD6CSS WB6HFE W6INI W6JHG W6OGC. April 1, 1980 will see me entering my third two year term as SCM. I will continue to emphasize public service participation with emergency preparedness and ARES top priority. Voice traffic handlers are invited to refresh message handling procedures in the June 1979 QST, page 74. If you live within 100 miles of the San Andreas fault, you have the unique opportunity to take part in an earthquake prediction project. If interested, write KA6GVI, 8041 North Hamlin Ave, Skokie, IL 60076. Note Sept. '79 QST, page 20. Palomar ARC will provide a yearly scholarship to a worthy student in local community college. Traffic (Dec.): WB6PVH 1179, N6GW 334, W6HUJ 250, N6AT 174, WB6MLB 125, K6HAP 123, WA6SKU 111, N6AWC 98, WB6HMY 92, WB6FTY 48, WD6EML 44, WA6UFY 24, K2RTQ 22, WA6COE 9, WA6HGA 6. (Nov.) K2RTQ 10.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — WB6QEV/R moved to 145.11/144.51 in Lompoc and has great coverage of the section. N6TR made over 2500 contacts in the Ten Meter Contest. Others heard were WA6KTZ K6ELQ N6MA. WB6ILU now on SSTV. KA6HUR is Burl Ives from Santa Barbara. KG6K and N8AHQ have Extra. AA6BB and KA6V have both completed DXCC — from the same rig yet! WA6DJS and WB6CNS acquired 10 GHz gunplexers for contest work. WB6ODZ and KA6BQT have an Apple. (computer that is). W6HE and XYL visited New Zealand for their fiftieth anniversary. K6DZT is now on 160. Satellite ARC elected board members WB6SRK N5MB W2KVA N6ARB N6UE KA6AKC W6PRN. Conejo Valley ARC pres. is AD6T. He gave a talk to the club on PLL. Central Coast ARC officers are: WB6QMN, pres.; W6ENR, vice pres.; Ms Kemmeter, secy/treas.; W6LB, steward. WB6QKE and WD6EZY hosted the Simi Settlers Xmas Party. The Simi Club held an Operation Santa Clause at Simi Hospital with WB6JLG WA6TMS WD6EVT WD6BZN WB6QKF WD6EZY participating. K6MEP Club sponsoring a plaque in the ARRL DX Contest thanks to W6RGO. Santa Barbara ARC Interclub Contest winners are K6BPY Oceania Contest, WB6DNN CQ WW DX, and WA6VNN Sweepstakes. W6JEO and K6EDQ have earned certificates for Section Net participation. W6WBY has been checking in from Oxnard. Ventura County ARES helped Camarillo Christmas parade with comms by K6BGU W6s RIC TAE TSB WB6s RVA EDA EAN AEW VQL LPY WA6s LBS EUY ZAX N6s SR BPF AHI KA6s BPG BPH. PSHR:

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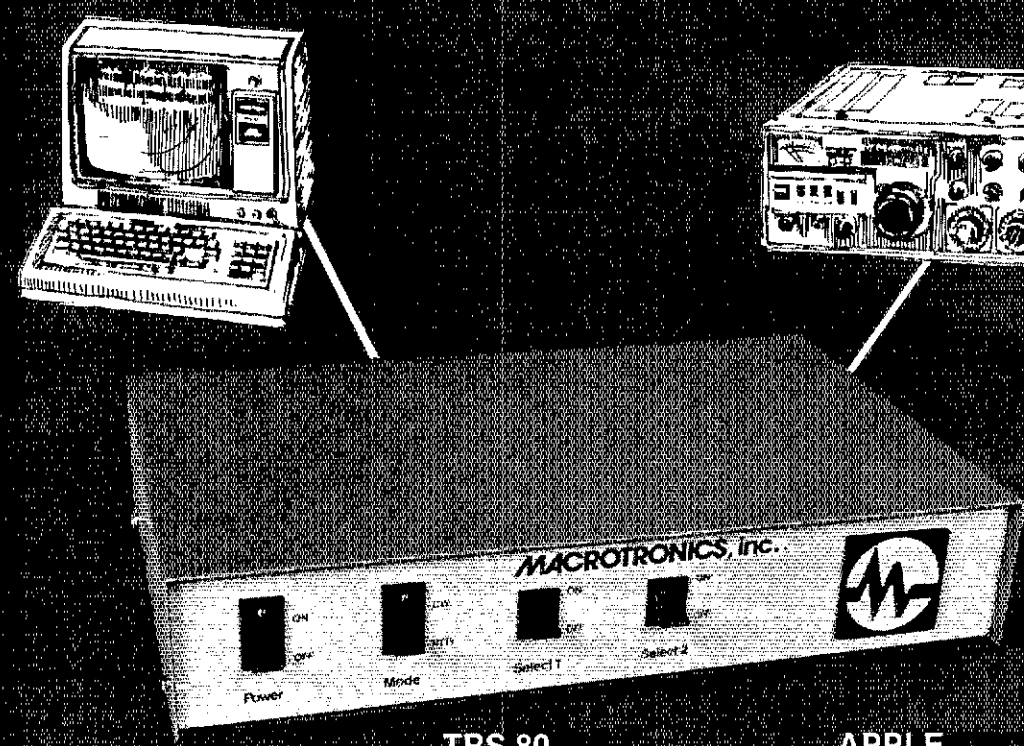

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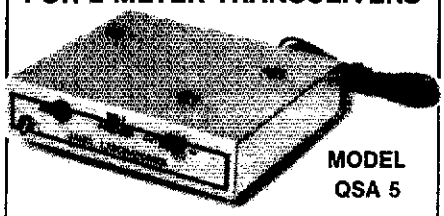

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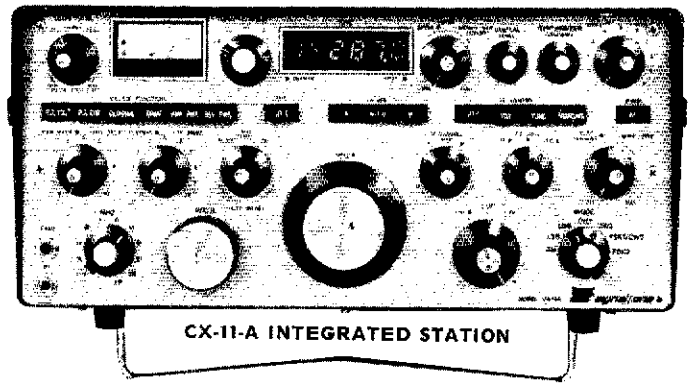

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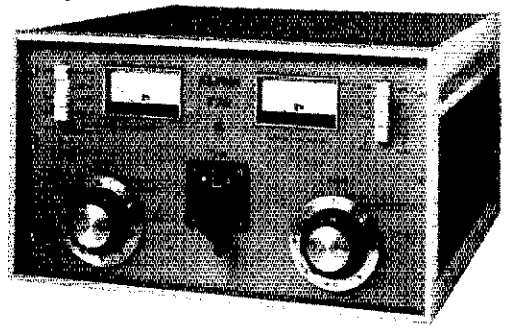

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N6YH 51, K6DZT 11, N6TR 4, N6MA 14. Sorry to report that WA6DNU is now a Silent Key. Traffic: N6YH 167, WB6TRP 137, K6DZT 22, N6MA 24, K6TR 14.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. SEC: N5WB. STM: W5VMP. NMs: AA5J AE5I. The new Texas Slow Net (TSN) is off to a good start, with good participation. This is a fine opportunity for learning cw net procedures, traffic handling techniques, and increasing your code speed, all at the same time! Join us nightly on 3745 kHz @2000L time. Several liaison slots open, contact AA5J, net mgr. The D/FW Metro Net had 462 check-ins, and passed 187 messages in Dec. New net mgr. for 1980 is N5AWG. Time to check out all your emergency and portable gear, lets hope we don't need it this season! Is your local AREA/RACES repeater emergency powered? If so, let me know, as we are compiling a list. Reminder: the emergency frequencies for our section are 7290 and 3961 kHz (ssb) and 3770 kHz (cw). PSHR for Dec: AA5J WD5JYI WD4SIH WD5IVD N5AWG WA5QFD W5HMR AJ5F WB5LAT AE5I WD5EUE W5VMP and WD6HHK. We have over 100 tfc handlers in our section, but only 20-30 stns report their tfc each month. Let's talk it up on the nets, and try to encourage those Stn Activity reports each mo. BPL for Dec W5TI WD5IVD. Traffic: W5TI 617, AA5J 396, WD5IVD 394, N5BT 301, N5CY 275, WD5EUE 270, WD5HHK 246, WA5INJ 177, AE5I 175, N5AWG 163, W5HMR 158, WB5LAT 140, W5VMP 101, AJ5F 87, WD5JYI 78, WA5QFD 74, W5AIR 42, WB5YYK 42, WA5KCZ 40, K5PC 37, K9MX 34, WD4SIH 29, W5YK 28, K5YKC 26, W8DCX 25, W5CTZ 22, WD5FYJ 20, KA5Q 16, WA5EZT 15, WD5JDA 11, WA5ZNZ 7.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Ray Miller, W5REG Ass't SCM. SEC: WA5MLT. NMs: K5CAY, WB5KKT WA5MLT WB5NKD WA5OUV W5RB. Excellent reports from most of the nets. BUT, All net mgrs report needing help in all aspects of net operation from NCS to liaison sta to just plain checking available for traffic. The 2 cw nets, in particular can use more help. We have a number of stations doing a fabulous job of liaison work with the NTS in the reports I receive. Many calls recur from month to month. A few of them are: W5RB N5AUP WB5ELG WA5OUV WB5MVR WB5NKC WB5NKD WA5AFO. WB5ULI new NAV-MARS coordinator. WB5TTU moved to new QTH. WA5VMS repeater now on micro-processor control. New ECs N5ABM WB5RXX WB5UUX. 3 BPLs in Dec traffic reports. Dec count not as large as I expected. The count reflects much of the relaying done by the relaying stations. We need more originations and deliveries reported. Operation Sky-Warn off to a good start with a large number of spotter training sessions under way. Monitor 3900 kHz and your local repeater. Traffic: WB5NKD 933, W5REC 840, WB5NKC 825, K5JGZ 368, W5RB 361, W5UYH 175, WA5FSN 73, WB5ELG 72, WA5OUV 70, K5OWK 55, W5SUG 45, W5VXU 38, W5VOR 33, W5DRZ 31, WD5DYI 27, KB5EK 27, WD5IFB 25, WD5ETB 23, WB5EAY 21, WA5AFO 20, WD5KFT 16, W5HGH 12, W5JJ 8, WB5AOH 5, WA5UTO 5, K5QNM 2.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — Assistant SCM/STM: N5TC. SEC: AK5N. OOs reporting WB5CIT. December was a good traffic month for STX; 30 stations reporting traffic and 11 making PSHR. OES/OVS WD5JJS graduated from Texas A&M with BS in EE. WB5RFQ upgraded to Advanced. New Brenham ARC officers are: WB5RFQ, pres.; WD5JJS, vice pres.; KA5EJM, secy.; KA5EEQ, treas. WB5UYV reports organization of Border Amateur Radio Society (BARS); includes ham from Eagle Pass, Bracketville, Del Rio, and Uvalde. Also, Mexican hams from Piedras Negras. They have received training in WX spotting from IWS. WB5CIT has set up for operating mobile cw. New officers for Central Gulf Coast Hurricane Net AG5X, NM; KC5M, Asst NM. Net meets daily 3.935 MHz, 0100 UTC. AC5R doing lots of traveling, but did have time to work 10 and 160 Mtr. Contests. New officers for Tidelands ARC are: WD5KBK, pres.; W5TCI, vice pres. WB5LFS, secy.; K5TP, tres. It sounds as if Tidelands ARC is having interesting programs: January, Scientific assesment of UFOs; February, Computers in Amateur Radio; March, Converting CBs to 10 mtrs. The UT Medical Branch repeater on 146.715/.115, WD5CTQ N5HF N5FN W5ASP NØACD WD5AAH DX-pedition to ZF2. Station Activity Report from CD-210 no longer available. Reports can be sent to me via NTS or mail. List QTC as Orig. . . . Rcvd. . . . Sent. . . . Del. . . List PSHR as 1. . . 2. . . 3. . . etc. Traffic: (Dec) W5KLV 1105, W5SBE 587, WB5YDD 529, W5SHN 478, K5DG 265, K5HZR 240, K5GM 223, N5TC 208, WA5RVT 175, KA5CDX 156, WB5CIT 126, WB5MMI 125, K5PE 105, K5QEW 101, AK5N 63, WB5UYV 60, WD5EYG 57, AK5M 46, WB5EEJ 44, K5RG 40, W5BGE 39, N5FN 29, W5SPD 28, W5KR 23, WD5JJS 23, KB5NX 20, WD5GKH 19, AC5R 14, KD5O 11, AG5X 11. (Nov) K5GM 75. (Oct) K5GM 130.

- ★ Technical Forums
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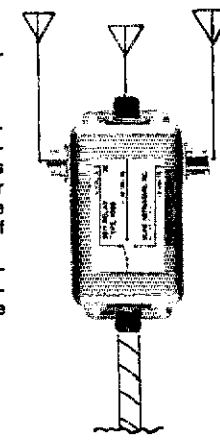

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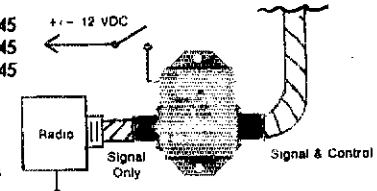

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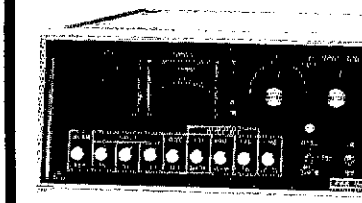

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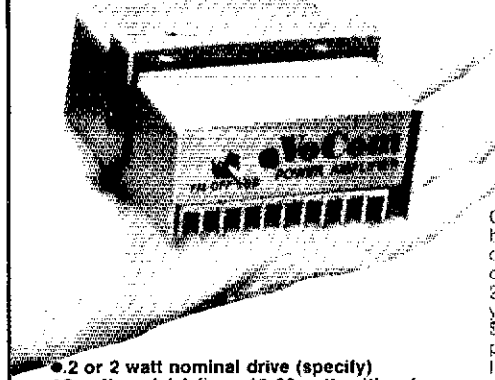

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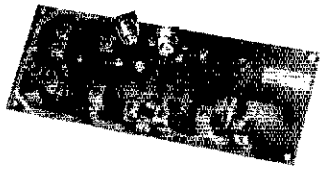

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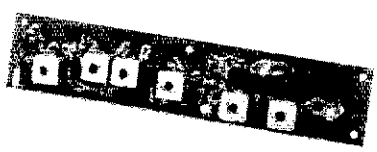

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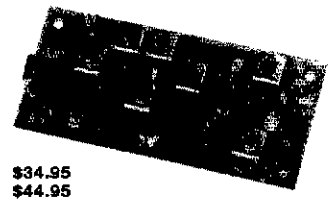

VHF KIT $34.95
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MODEL	RF RANGE	OUTPUT RANGE
CA28	28-32 MHz	144-148 MHz
CA50	50-52	28-30
CA50-2	50-54	144-148
CA144	144-146	28-30
CA145	145-147	28-30
or	144-144.4	27-27.4 (CB)
CA146	146-148	28-30
CA220	220-222	28-30
CA220-2	220-224	144-148
CA110 (less xtal)	Any 2MHz of Aircraft Band	26-28 or28-30

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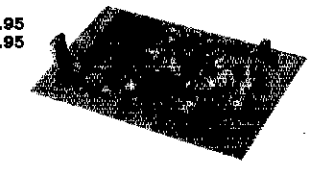

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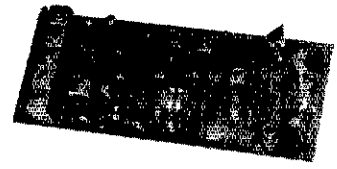

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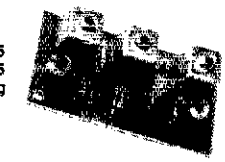

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- 2 stages
- Ideal for OSCAR
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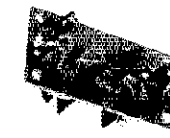

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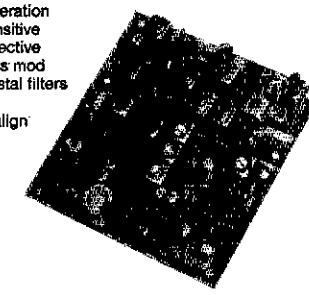

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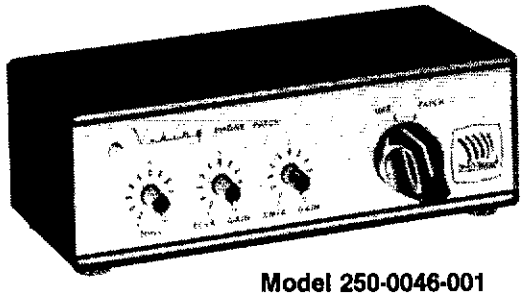

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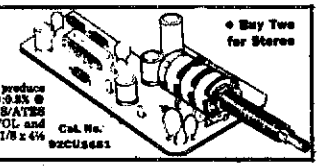

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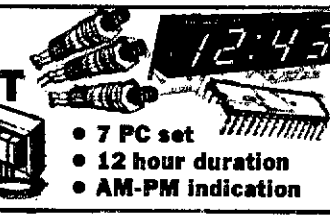

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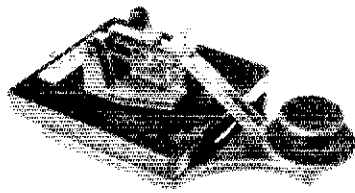

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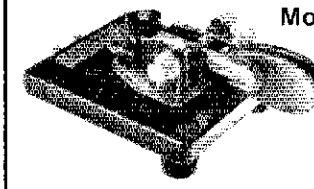

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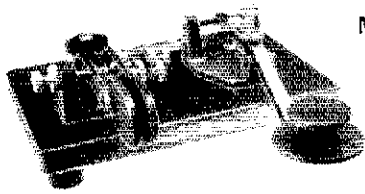

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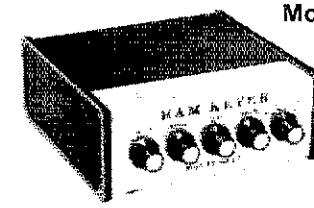

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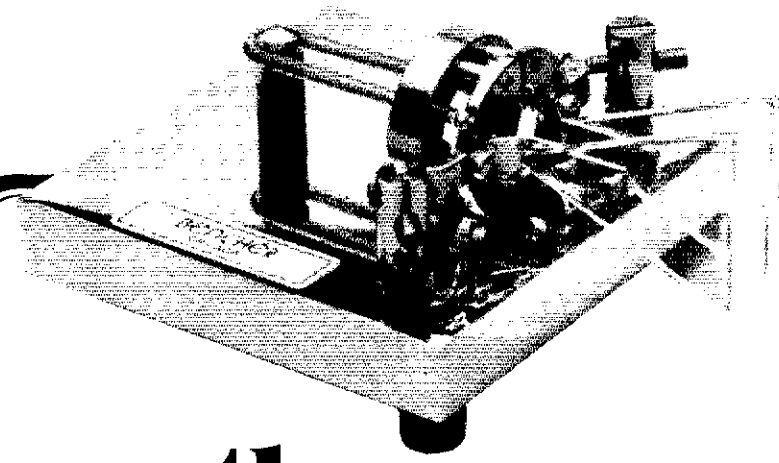

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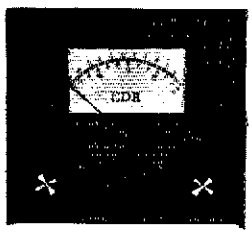

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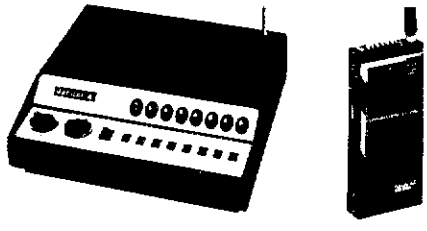

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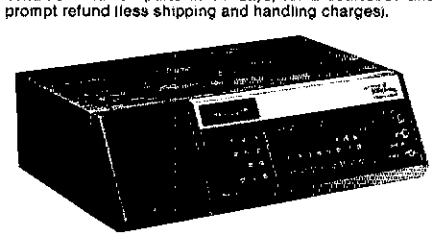

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NEW! Regency®‡ K500

CE price $269.00
40 Channel • Synthesized • Service Search Digital count • Weather with tone alert Search/Store • Priority Channel • AC/DC
Frequency range: 30-50, 144-174, 440-512 MHz.
The new *Regency* Touch K500 is an advanced synthesized scanner with many new features.

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The WORLD SCANNER ASSOCIATION is sponsored as a public service by **Communications Electronics.™** When you join, you'll receive a quarterly newsletter with scanner news and features. You'll also get a wallet I.D. card, an Official Personalized WSA Membership Certificate, and the latest FCC news affecting monitoring such as frequency allocations. FREE classified ads for members so you can contact other scanner owners when you want to sell or buy a scanner. FREE membership in the WSA Buyer's Co-op. Your Co-op membership will allow you to get special discounts on scanners and scanner related products. Since the WSA Buyer's Co-op gives you group purchasing power, you can easily pay for your membership dues the first time you make a Co-op purchase. WSA is your united voice to governmental and public service agencies as well as scanner manufacturers. You'll get inside information on the latest scanner products before the general public. Since WSA is *not* affiliated with any scanner manufacturer, you can rely on accurate product reports. You get all this for only $12.00 annual dues! And if you join before June 30, 1980, **CE** will pay $2.00 of the cost of your first year's dues as a "charter member". You can charge your "charter membership" on Visa or Master Charge so join now! Add $6.00 for foreign memberships.

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To ***get the fastest delivery from CE*** of any scanner, send or phone your order directly to our Scanner Distribution Center.™ Be sure to calculate your price using the CE prices in this ad. Michigan residents please add 4% sales tax. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 30 billing. All sales are subject to availability. All sales on accessories are final. Prices and specifications are subject to change without notice. Out of stock items will be placed on backorder automatically unless CE is instructed differently. International orders are invited with a $10.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Personal checks require three weeks bank clearance.

Mail orders to: **Communications Electronics,™** Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $5.00 per scanner for U.P.S. *ground* shipping, $9.00 for faster U.P.S. *air* shipping or $30.00 for *overnight delivery* to most major U.S. cities via Federal Express or Airborne Air Freight. If you have a Master Charge or Visa card, you may call anytime and place a credit card order. **Order toll free** 800-521-4414. If you are outside the U.S. or in Michigan, dial 313-994-4444. You may also order via TWX 810-223-2400. **Dealer inquiries invited.** All order lines at **Communications Electronics™** are staffed 24 hours.

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SERVICE by W9YKA. Professionnal grade lab, FCC 1st class license. Amateur and industrial ssb-fm equipment. Repairs, calibration, modifications, consultation. Reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 7 issues $2. Ham Trader Yellow Sheets, Wheaton, IL 60187.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1-8th St., Pelham NY 10803.

ARCOS — Amateur Radio Component Service. VHF/UHF high power amplifier kits, parts and accessories. High voltage power supplies. Proven performance in world-wide use. Dowkey, Eimac, Bird, KLM. Sase for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

RALPH Hicks, W5BCO, Dealer: Motorola, Atlas and Magnus ssb. P. O. Box 15633, Tulsa, OK 74112. 918-582-1333.

MANUALS for most ham-gear made 1937/1970. Send 25c coin for 16 page "Manual Catalog" postpaid. H. I. Inc., Box Q864, Council Bluffs, IA 51502.

COLLINS repair and alignment, $75. Former Collins engineer, First Radiotelephone. Extra, calibration laboratory, K1MAN 207-495-2215.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806.

MOTOROLA Wanted: I need Micors, Motracs, HT 220's, "MX's" or any Motorola equipment and parts. Radios must have serial plates. Len Rusnak, WA3TJO, 9605 Dubarry Avenue, Seabrook, MD 20801. 301-441-1221.

PREPARING for FCC exams? You need Posi-Check. Has been getting the job done for 15 years. Expertly devised, multiple choice questions and diagrams covering last study materials released by FCC. IBM sheets for self testing, keyed answers with explanations. Same day service. First class mailing U.S.A. Send check or money order with order. Novice, $4.95; General, $5.95; Advanced with addendum update, $6.75; Extra Class with addendum update, $6.95. Advanced or Extra Addendum alone, $1.25 each. Also Radiotelephone Third Class, Elements 1, 2 and 9, $7.95. Posi-Check, P. O. Box 3564, Urbandale Station, Des Moines, IA 50322.

WANTED: Hallicrafters receivers, transmitters, parts, accessories and manuals for private collection. C. Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

FREE-Fascinating Electronics Idea Book — hundreds of unusual parts & surplus items unavailable in stores or catalogs anywhere. Bargain prices on everything. Write today for latest issue. ETCO Electronics, Dept. 075, Box 752, Plattsburgh, NY 12901.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering. 930 Marine Dr., Port Angeles WA 98362.

STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. Now more than ever where you buy is as important as what you buy! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Collins, Wilson, Ten-Tec, ICOM, Dentron, MFJ, Tempo, Regency, Hy-Gain, Mosley, Alpha, CushCraft, Swan and many more. Write or call us today for our low quote and try our personal and friendly Hoosier service. Hoosier Electronics, P. O. Box 2001, Terre Haute, IN 47802. 812-238-1456.

HOSS-Trader Ed says "We refuse to be undersold: Big-Sale, the Hoss needs hay for his ponies. Shop around for the best price then telephone the Hoss last." Close-out on new Swan tube type transceivers: 350-B, $439.; Swan 350-D with digital, $469.; new Swan HF-700S, $475. New Rohn 50' toldover tower prepaid, $599. Mosley display TA-33 beam, $149. Used Ham-4 rotor, $119. New Kenwood transceiver; 120-S, regular $699, cash $599. New Alpha linear, $1195. Specials: New Dentron 2000 watt Clipperton-L linears, $499. New Drake TR-7 transceiver, $1139. New Dentron GLA-1000 watt linears; $245. Alliance HD-73 ham rotors, regular $165., cash $96. Used Collins S-line, $895. Moory Electronics Company, P. O. Box 506, DeWitt, AR 72042, Tel: 501-946-2820.

HAM Radio Repair, alignment. New location near Chattanooga for fast service by UPS, or visit our modern mountaintop lab. "Grid" Gridley, W4GJO, Route 2, Box 138-B, Rising Fawn, Georgia 30738. 404-657-7841.

VHF Amplifier kits, ssb-fm, 75 watt, complete kit, see Sept. QST, 1979, pages 11-16. $99.95 post paid. Communication Concepts, Inc. 2648 North Aragon Ave., Kettering, OH 45420.

UHF Amplifier Kits, FM-SSB-ATV, 420-450 MHz 100 watt, solid state, $94.60 post paid. Communication Concepts, Inc., 2648 North Aragon Ave., Kettering, OH 45420.

DRAKE R-4/T-4X Solid Tubes replace vacuum tubes to give better performance! Pre-mixer and mixers 6EJ7/6HS6/6BE6-C plus T-4X 12BA6 $17.50 each, ppd. R-4 B/C Improvement kits, $20.60, ppd. Sartori Associates, W5DA, Box 2085, Richardson, TX 75080. 214-494-3093.

STANDBY Power Alternators 1,300 watts to 7,000 watts — Engine and belt drive — club discounts. Write for lit. and price list. Outdoor Outfitters, Ken N9KS Box 411 Waukesha, WI. 53187, 414-542-7772.

PITTSBURGH hams; safety belt, ginpole rental. Towers antennas, rotators, cables. Tom, K3WT 412-653-3880.

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WANTED, Hammarlund, National, Hallicrafters and Collins receivers, accessories, manuals for private collection. Complete, not working o.k. 503-689-8208 — WB7PAM. 495 Highway 99No., Eugene, Oregon 97402.

CALL Toll-free (800-327-7798). Ask for Bob Hoffman, Jaro Electronics Corp. We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex, RCA, Western Electric, Raytheon, in Florida Call toll free: 800-432-8524. Address: 412 27th St., Orlando, FL 32802.

START your trade in plans now! The KWM380 will begin shipment Spring 1980. Write for quote on S-line, KWM2/2A, Drake lines. All Collins accessories available. Excellent service department also. Madison Electronics, 1508 McKinney, Houston, Texas 77002. 713-658-0268.

WANTED: Eimac 5CX1500A tube. Okubo, 529 Kevin Way, Placentia, CA 92670. 714-528-5652.

DX? You bet! Weekly newsletter of DX and related news. Send large sase for sample. The DX Bulletin, 306 Vernon Avenue, Vernon, CT 06066.

BIBLIOGRAPHIES: Your gear, special topics. Computer programs, code practice cassettes. Sase details: Savage, POB 351, New Castle, VA 24127.

QUAD builders — blizzard/hurricane proof your antenna. Fiberglass vaulting poles. Incredible strength. S.a.s.e. for info. K5WSE, Box 1032, Cedar Park, TX 78613. 512-259-2164.

KEYER kits $12.95 to $26.95. Several types. S.a.s.e. for information. MSC, 1304 Toney Drive, Huntsville, AL 35802.

HEATH SB101, HP23B acps, SB600 spkr. Excellent $300. W4UKU, Jerry, 803-827-1629.

QST-back issues-1915 to 1923, s.a.s.e. quote 1924 to 1929 $3., 1930 to 1939 $2., 1940 to 1955 $1. UPS paid. W3ZD, 520 Centennial Road, Warminster, PA, 18974 215-675-4539.

NEW edition "Owner Repair of Radio Equipment" $8.70 postpaid. 25 percent more pages. Service it yourself. K6RQ, 14910 LG Blvd., Los Gatos, CA, 95030. While they last — 1st edition $2.95.

WE have it, if you are looking for hf, vhf, or uhf gear we have it. VHF, KLM, Wilson, Kenwood Drake and many more. Send s.a.s.e. for are new catalog. L&D, P. O. Box 44425, Los Angeles, CA. 90044. KA6AIL

COLLINS 75A-4 Solid Tubes directly replace vacuum tubes to give better sensitivity, dynamic range, and reliability. 6BA7 mixers, $21.50 ppd. Sartori Associates, W5DA, Box 2085 Richardson, TX, 75080 214-494-3093.

FREE award information. S.a.s.e., WB8RTR P. O. Box 341, Hinckley, OH 44233.

FOR sale — Daiwa RF440 speech processor, $90.; Swan SWR 2-A SWR/power meter (0-150 MHz), $10.; RCA VCT-200 video cassette recorder (4 hour VHS system), $600; Drake RV-7 remote VFO, $150.; MFJ-900 econo tuner, $15; MFJ-752 ssb/cw filter, $50.; MFJ-16010 wire tuner, $10. WA2SRM, James Grandinetti, P. O. Box 106, Lakewood, NJ 08701.

WANTED: Collins 30S-1, 62S-1, Telrex antennas 4 el and larger, towers. QST magazine collection 50s to current. Equipment Mint condition only please! for sale: Henry 2K-2 converted to 2K-3 by Henry, Collins 30L-1, Collins KWM-2A. All in like-new condition. Best offer. Hugh Smith, KA7CPA, 3609 SW Juneau, Seattle Washington 98126. 1-206-937-7155.

ADIRONDACK Radio Supply, Inc. is proud to announce the availability of the Rockwell-Collins Pro-Mark KWM-380 transceiver - the ultimate in amateur radio solid state technology. for the discriminating amateur who appreciates excellence and quality in communications, the KWM-380 is truly the "Mark Of The Professional." Come in today for a demonstration. We will be happy to send you Collins' six page illustrated brochure covering the KWM-380. Send s.a.s.e. to Adirondack Radio Supply, Inc. 185 West Main Street, Amsterdam, NY, 12010 Phone 518-842-8350. Your Rockwell-Collins dealer for upstate New York and the Northeast.

ICOM-701; ac; SM-2 mic; EX-1 relay box, absolutely like new, not a scratch. Mint. $995. Jay Chesler, W1SEB, 5 Bosworth Rd., Framingham, MA 01701. 617-875-6361.

NOVICES: Owner Repair of Radio Equipment book bridges gap between license manuals and handbooks. $8.70 postpaid. K6RQ, 14910 LG Blvd., Los Gatos, CA 95030.

MOBILE HF antenna 3.2 - 30 MHz inclusive, 750 watts PEP, center loaded, tuned from the base, eliminating coil changing or removing from mount. Less than 1.5 to 1 VSWR thru entire coverage. $129.95 ea plus shipping. Contact your local dealer, if none in your area order direct. ANTECK, Inc., Route One, Hansen, ID 83334. 208-423-4100 Master Chg., and Visa accepted. Dealer and factory rep. inquiries invited.

WILSON handhelds at big discount. Bill Gerhardt, 3108 Glenview Avenue, Austin, TX 78703.

WANTED: 100-TH tubes with or without sockets-W1FDA Shelburne, VT, 05482.

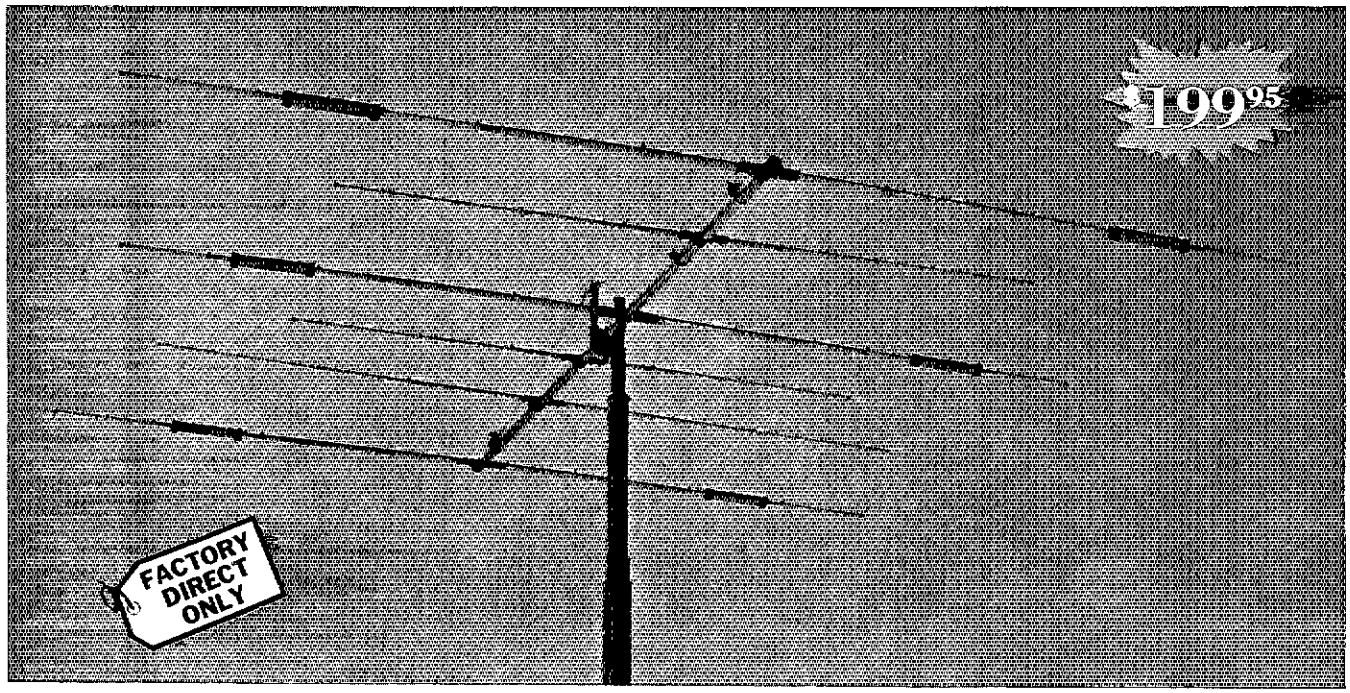
ICOM-701 International Users' Club. Details s.a.s.e. N8RT, Pohorence, 9600 Kickapoo Pass, Streetsboro, OH, 44240.

HELP, student needs GE Master (Pro, II, etc) 450, 2m equipment for senior project. WA6FSP.

COLLINS for sale — 75A4, $300, KWS-1 $600, pair $800. 51J4, $475. All mint. Jim, K1LLU, 617-887-8126.

SELL: Wilson 1402SM handitalkie; FRG-7; IC-22S; Bearcat 210; Micoder-I. Thurber, 631 North Overbrook Drive, Fort Walton Beach, Florida 32548.

WILSON SYSTEMS, INC. presents the SYSTEM 36

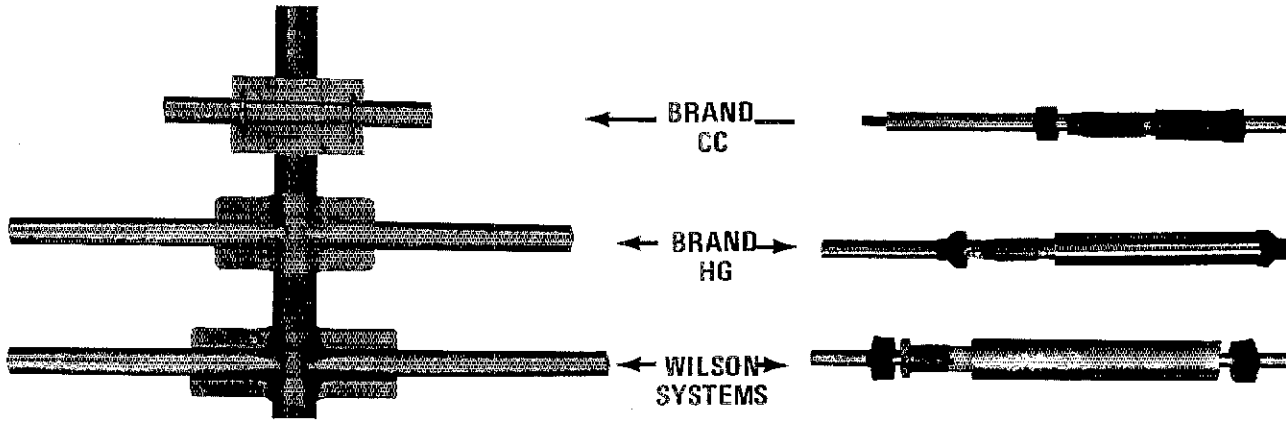


A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz 14-21-28	Boom (O.D. x Length) . . 2" x 24'2½"	Wind loading @ 80 mph . . 215 lbs.
Maximum power input . Legal limit	No. of elements. 6	Maximum wind survival . . 100 mph
Gain (dBd) . . . . . Call Factory	Longest element . . . . . 28'2½"	Feed method . . . . . Coaxial Balun
VSWR @ resonance . . . 1.3:1	Turning radius . . . . . 18'6"	Assembled weight (approx. 53 lbs.
Impedance . . . . . 50 Ω	Maximum mast diameter. 2"	Shipping weight (approx.). 62 lbs.
F/B ratio . . . . . Call Factory	Surface area . . . . . 8.6 sq. ft.	

Compare the SY-36 with others . . .



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

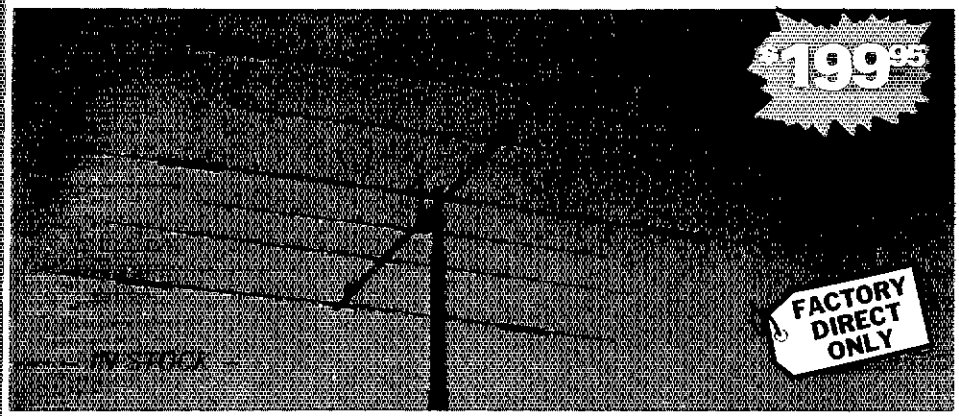
CALL FACTORY DIRECT 1-800-634-6898

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15 and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

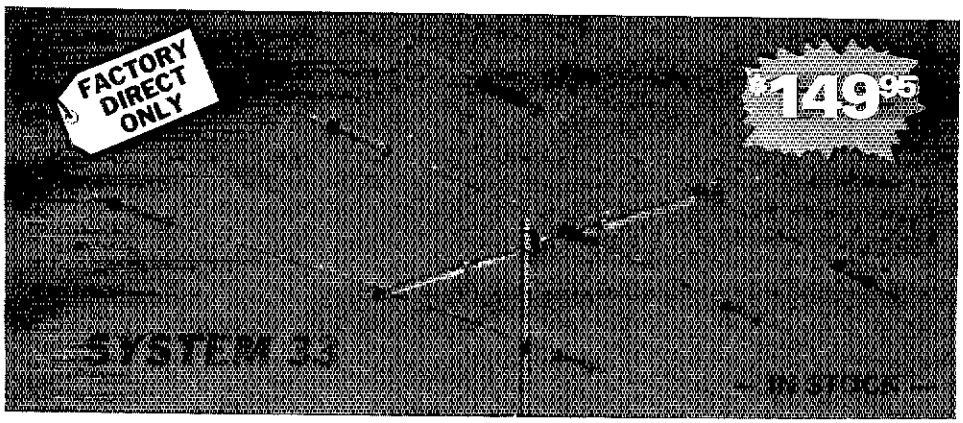
Band MHz 14-21-28	Boom (O.D. x Length) . . 2" x 24' 2½"	Wind Loading @ 80 mph . . . 215 lbs.
Maximum power input . Legal Limit	No. of Elements. 6	Maximum wind survival . . . 100 mph
Gain (dBd). . . . . Call Factory	Longest Element . . . . . 28' 2½"	Feed method . . . . . Coaxial Balun
VSWR @ resonance . . . 1.3:1	Turning Radius . . . . . 18'6"	Matching Method. . . . . Beta
Impedance . . . . . 50 ohm	Maximum mast diameter . 2"	Assembled weight (approx) . 53 lbs.
F/B Ratio . . . . . Call Factory	Surface area . . . . . 8.6 sq. ft.	Shipping weight (approx) . . 62 lbs.

NEW! ADD 40 METERS TO YOUR TRI-BAND WITH THE NEW 33-6 MK

$49.95

— IN STOCK —

Now you can have the capabilities of 40-meter operation on the System 36 and System 33. Using the same type high quality traps, the 40-meter addition will offer 200HKZ of bondwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36 or SY33, and using the same single feed line.



Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33". New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the "SYSTEM 33" quick and simple.

SPECIFICATIONS

Band MHz 14-21-28	Boom (O.D. x length) . . 2" x 14'4"	Wind loading at 80 mph . . . . 114 lbs.
Maximum power input . Legal Limit	No. of elements 3	Assembled weight (approx) . . 37 lbs.
Gain (dbd) . . . . . Call Factory	Longest element. . . . . 27'4"	Shipping weight (approx) . . . 42 lbs.
VSWR at resonance. . . 1.3:1	Turning radius. . . . . 15'9"	Direct 52 ohm feed — no balun required
Impedance . . . . . 50 ohms	Maximum mast diameter . 2" O.D.	Maximum wind survival . . . . 100 mph
F/B Ratio . . . . . Call Factory	Surface area . . . . . 5.7 sq. ft.	

WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

ORDER FACTORY DIRECT
1-800-634-6898

$49.95

WV-1A

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(See GR-1 below)

SPECIFICATIONS

- 19' total height
- Self supporting — no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

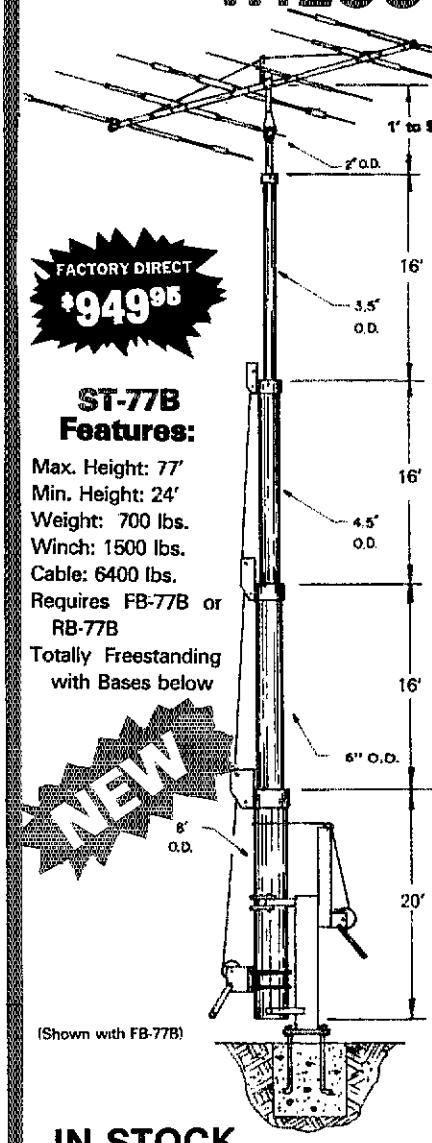
GR-1

$12.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded copper wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise.

WILSON SYSTEMS TOWERS

— IN STOCK —



FACTORY DIRECT $949.95

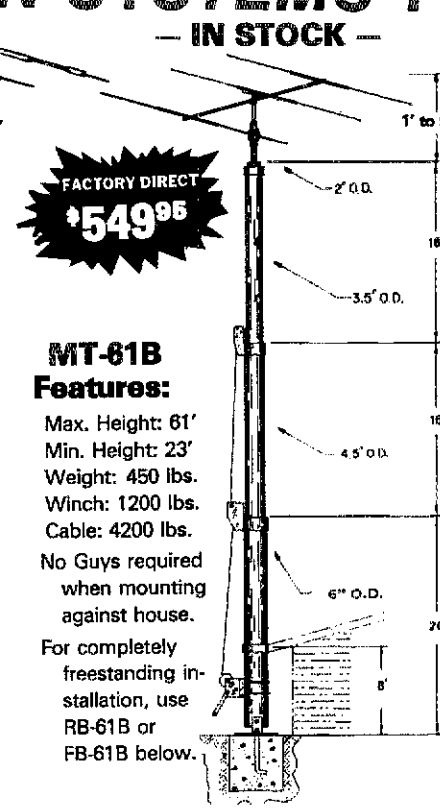
ST-77B Features:

Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires FB-77B or RB-77B
Totally Freestanding with Bases below

NEW

(Shown with FB-77B)

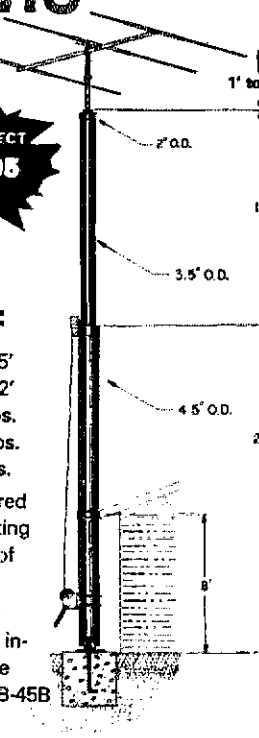
IN STOCK



FACTORY DIRECT $549.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



FACTORY DIRECT $314.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RG-45B or FB-45B below.

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	18	Square Footage Based on 50 MPH Wind
	77	12	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
ST-77B	See Below	Bases
FB-77B	3½' x 3½'	6'
RB-77B	3½' x 3½'	6'

Wilson Systems uses a new high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3½"-.095; 4½" & 6"-.125, 8" -.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

The ST-77B can not be mounted against the house and must be used with the tilt-over base FB-77B or RB-77B shown below.

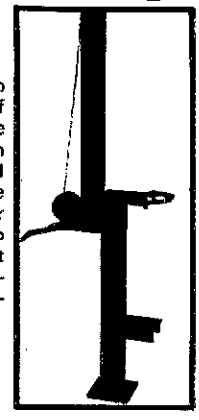
All three towers above are able to handle large arrays of up to 20 sq. ft. at 80 mph WHEN GUYED with one set of 4-point Guys at the top of the 3½" section. Guying Kits are available at the following prices: GK-45B—$59.95; GK-61B—$79.95; GK-77B—$99.95. When using the Guy System with RB Series Rotating Base, an additional thrust bearing at the top is required. The WTB-1 is available for $49.95.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

FB-45B... 112 lbs... $154.95
FB-61B... 169 lbs.... 214.95
FB-77B... 250 lbs.... 299.95



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The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B... 144 lbs... $219.95
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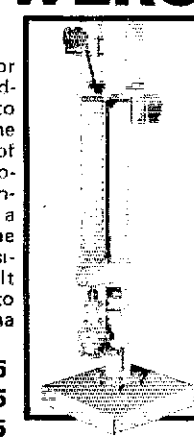

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SELL SB101 updated to '102, cw filter, ac power supply, HP13 mobile supply, SB640 remote VFO. Excellent condition $400. W2GRN — 516-354-5550.

SELL Swan 250C, 6 meter, perfect. Bob, WBØVGX, 612-364-5224.

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DRAKE TR-6 AC-4, TC-2, SC-2, SCC-1, CC-1, CPS-1, $450. 6-meter 2 kW Raytrack $550. or trade. 6 meter 100 watt amp: Henry Tempo $190. 2 freq. G.E. handy talkie with charger, $175. Tempo S-1 mobile & ac charger & TTP $320. SB-220 Heathkit $490. WB8VYF, 513-875-2992 after 5 EST.

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WANTED, Sound powered telephone handset with cord and plug. U.S. Instrument Corp. A555 or equal. W4ZWD.

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QSTs, CQs, radios, 1936-1955. Send s.a.s.e. for list. W8QZD, 2097 West Market, Lima, OH, 45805.

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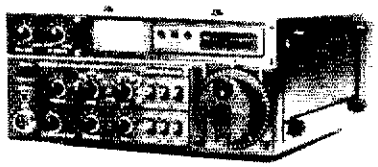

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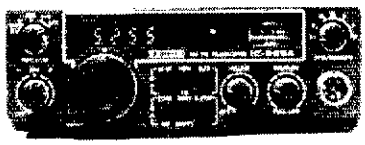

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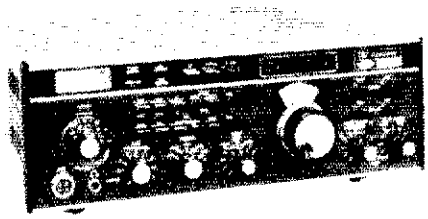

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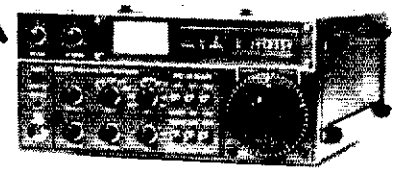

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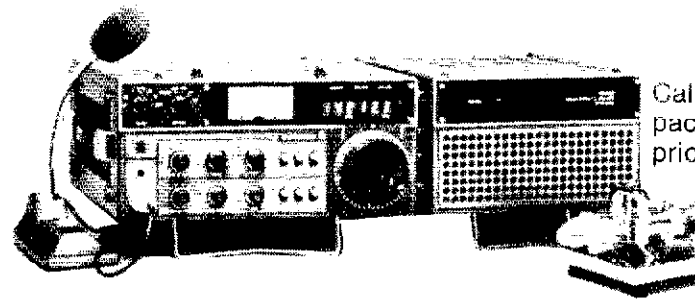

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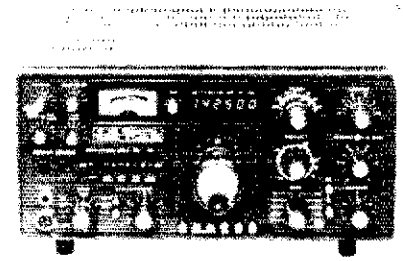

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Model 1528

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2 kW PEP, 1 kW cw, RTTY, SSTV operation—all modes, full rated input, continuous duty cycle.

160-10* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L-7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. Tubes are included.

Accurate built-in rf wattmeter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales.

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

Amplifier is comprised of two units—rf deck for desk top and separate power supply.

Operates from 120/240 V ac, 50/60 Hz primary line voltage.

DRAKE L-7 SPECIFICATIONS

Frequency Coverage*: Ham bands 160 through 15 meters. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit.

Plate Power Input: 2000 Watts PEP on SSB/AM and 1000 Watts DC on CW, RTTY, and SSTV.

Drive Power Requirements: 100 Watts PEP on SSB and 75 Watts on CW, AM, RTTY, and SSTV.

Input Impedance: 50 Ohms. (Bandpass tuned input)

Output Impedance: Adjustable pi-network matches 50 Ohm line with SWR not to exceed 2:1.

Intermodulation Distortion Products: In excess of −33 dB.

Wattmeter Accuracy: 300 Watts forward and reflected, ± (5% of reading + 3 Watts). 3000 Watts forward, ± (5% of reading + 30 Watts).

Power Requirements: 240 Volts 50-60 Hertz 15 Amperes, or 120 Volts 50-60 Hertz 30 Amperes.

Tube Complement: Two of 3-500Z or 8802/3-500Z or 8163 or 3-400Z.

Dimensions: Amplifier 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75"W x 7.88"H x 11"D (17 x 20 x 28 cm).

Weight: Amplifier 27 lbs (12.25 kg), **Power Supply** 42.5 lbs (19.3 kg).

*Export model includes coverage of the 10-meter Ham Band.

Robot introduces the Model 800
SUPER TERMINAL

Not just a keyboard, but the first integrated specialty mode terminal!

TTY, ASCII, MORSE, SSTV! The Robot Super Terminal has them . Everything you need for specialty mode operation is built-in standard equipment. All you add is a standard TV Monitor. mpare the Robot Model 800 terminal with most other termi-ls: Some have receive or send capability, but not both, some ve no RTTY, others have only single line display, most have no minal unit, and one even requires a full computer to function. Read the features below and compare for yourself. Dollar for llar you get more features, and much more capability with the bot 800, for just $845! □ In the Model 800 the terminal unit and the send/receive terminal are both in the same package. Our demodulator employs the latest state-of-the-art technology, and though built-in, is superior in quality and performance to any external unit, including stand alone units costing as much as the entire ROBOT 800. The key feature of the demodulator that makes this claim possible is its use of separate two-tone active filters. □ The basis for the Robot 800 Super Terminal's ability to provide such broad capabilities and varied functions in one package is the use of the powerful 8085 microprocessor.

Features

TY CAPABILITIES
24 line 72 character display.
On-screen status line indicates which ctivities are operating.
On-screen tuning indicator.
Has automatic carriage return and line feed.
Automatically prevents splitting of words t end of line.
Two programmable "here is" 64 character nessage memories.
Programmable narrow shift CW ID.
Programmable "who are you" and selcal eatures providing total automatic selective ommunications (automatic operation of our station even when you're not there).
255 character keyboard transmit buffer roviding full editing capability. Line word diting mode for total copy flow (never ransmit another typo again).
Built-in RY and Quick Brown Fox message enerators.
Receives and transmits not only Baudot but ASCII as well.

- Separate narrow and wide shift discriminator providing uncompromising performance.
- Copies 170, 425, 850 Hz shifts.
- Phase coherent, crystal controlled AFSK modulation, providing trouble free accurate generation of RTTY signals.
- Built-in current loop keyer for hard copy capability.
- Transceiver-transmit/receive control through keyboard (no need to touch your radio).

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- Automatic speed tracking (3 to 99 WPM).
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- Built-in side tone oscillator with volume control.
- All editing features and message memory of the RTTY mode.

SSTV CAPABILITIES
- Fast scan display of SSTV keyboard video featuring on-screen display of operating modes and Slow Scan cursor line.
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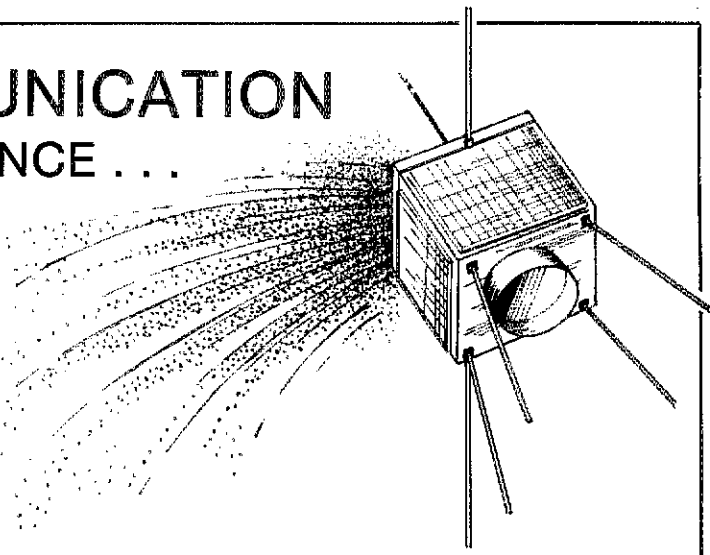

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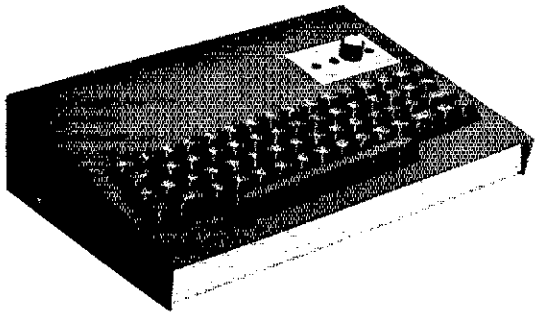

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MOST wanted: FT221 service manual. KE5C 817-774-8376, OK in Callbook.

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10 dB pushbutton-controlled broadband preamp can be activated on all ranges above 1.5 MHz. Low noise design.

Various optional selectivity filters for cw, RTTY and a-m are switch-selected from the front panel. Ssb filter standard.

Special new low distortion "synchro-phase" a-m detector provides superior international shortwave broadcast reception. This new technique permits 3 kHz a-m sideband response with the use of a 4 kHz filter for better interference rejection.

Tunable i-f notch filter effectively reduces heterodyne interference from nearby stations.

The famous Drake full electronic passband tuning system is employed, permitting the passband position to be adjusted for any selectivity filter. This is a grea aid in interference rejection.

Three agc time constants plus "Off" are switch-selected from the front panel.

Complete transceive/separate functions when use with the Drake TR-7 transceiver are included, along with separate R-7 R.I.T. control.

Special multi-function antenna selector/50 ohm splitter is switch-selected from the front panel, and provides simultaneous dual receive with the TR-7. This makes possible the reception of two different frequencies at the same time. Main and alternate antennas and vhf/uhf converters may also be selecte with this switching network.

The digital readout of the R-7 may be used as a 150 MHz counter, and is switched from the front panel. Access thru rear panel connector.

The built-in power supply operates from 100, 120, 2 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.

The R-7 includes a built-in speaker, or an external Drake MS-7 speaker may be used.

Built-in 25 kHz calibrator for calibration of analog c

Low level audio output for tape recorder.

Up to eight crystal controlled fixed channels can b selected. (With Drake Aux-7 installed.)

Optional Drake NB-7A Noise Blanker available. Pr vides true impulse type noise blanking performanc

DRAKE

R. L. DRAKE COMPA

Optional accessories available

Model 1531 Drake MS-7 Speaker
Model 7021 Drake SL-300 Cw Filter, 300 Hz
Model 7022 Drake SL-500 Cw Filter, 500 Hz
Model 7023 Drake SL-1800 Ssb/RTTY Filter, 1800 Hz
Model 7024 Drake SL-6000 A-m Filter, 6.0 kHz
Model 7026 Drake SL-4000 A-m Filter, 4.0 kHz
Model 1532 Drake NB-7A Noise Blanker
Model 1536 Drake Aux-7 Range Program/Fixed-Frequency Board

DRAKE R-7 SPECIFICATIONS

Frequency Coverage, continuous tuning (With Drake DR-7 Digital R/O, General Coverage Board)
0 to 30 MHz continuous (With or without Aux-7 board) (No gaps in frequency coverage)

Frequency Coverage, continuous tuning (Without DR-7 Board installed)

0.01 to 0.5 MHz 0.5 to 1.0 MHz 1.0 to 1.5 MHz 1.5 to 2.0 MHz 2.5 to 3.0 MHz 3.5 to 4.0 MHz	Without Aux-7 Board	5.0 to 5.5 MHz 7.0 to 7.5 MHz 14.0 to 14.5 MHz 21.0 to 21.5 MHz 28.5 to 29.0 MHz

Plus any eight additional 500 kHz segments between 0 and 30 MHz when programmed into Aux-7 Board.

Crystal Controlled Fixed Frequencies: Up to eight crystal-controlled fixed frequencies within the 0-30 MHz range with Aux-7 Accessory Board. Proper 500 kHz range for desired fixed frequency is also programmed into Aux-7.

Frequency Stability: Less than 100 Hz drift after temperature stabilization including ±10% line voltage variation.

Digital Readout Accuracy: (DR-7 installed) 15 PPM ± 100 Hz

Analog Dial Accuracy: Better than ±1 kHz when calibrated to nearest calibrator marker.

Modes of Operation: Ssb, cw, RTTY, SSTV, a-m.

Sensitivity (ssb): 1.8-30 MHz Less than .20μV for 10dB S+N/N with preamp on (typically .15μV) (Noise floor typically −134 dBm) Less than .50μV for 10 dB S+N/N without preamp (typically .30μV) (Noise floor typically −128 dBm). .01-1.5 MHz Less than 1.0μV for 10 dB S+N/N

Sensitivity (a-m): 1.8-30 MHz Less than 1.2μV for 10dB S+N/N @ 30% modulation, preamp on. Less than 2.0μV for 10 dB S+N/N @ 30% modulation, preamp off. .01-1.5 MHz Less than 4.0μV for 10 dB S+N/N @ 30% modulation.

Selectivity (2.3 kHz filter supplied): 2.3 kHz at −6 dB, 4.2 kHz at −60 dB (1.8:1) shape factor. Optional 300 Hz, 500 Hz, 1800 Hz and 4 kHz filters are available as follows:

Ultimate Selectivity: Greater than 100 dB

Accessory Crystal Filters

SL-300 cw filter: 300 Hz @ 6 dB, 700 Hz @ 60 dB
SL-500 cw, RTTY Filter: 500 Hz @ 6 dB, 1100 Hz @ 60 dB
SL-1800 ssb/RTTY Filter: 1800 Hz @ 6 dB, 3600 Hz @ 60 dB
SL-4000 a-m Filter: 4 kHz @ 6 dB, 8 kHz @ 60 dB
SL-6000 a-m Filter: 6 kHz @ 6 dB, 12 kHz @ 60 dB

Strong Signal Handling

Two-tone dynamic range: 99 dB *	1.8-30 MHz
Third order intercept point: +20 dBm	preamp off
Two-tone dynamic range: 95 dB *	1.8-30 MHz
Third order intercept point: +10 dBm	preamp on

Blocking: >145 dB above noise floor

** (at tone spacings of 100 kHz and greater)*

I-f and Image Rejection: Greater than 80 dB (48.05 MHz 1st i-f) (5.645 MHz 2nd i-f) (50 kHz 3rd i-f)

Agc Performance; Less than 4 dB audio output variation for 100 dB input signal change above agc threshold. Agc threshold is typical .8μV with preamp off and .25μV with preamp on.

Attack time: 1 millisecond. Three selectable release times: Slow—2 seconds; Med—400 m sec; Fast—75 m sec. Also, "Off" position is provided.

Antenna Input Impedance: Nominal 50 ohms

Audio Output: 2.5 watts with less than 10% T.H.D. into nominal 4 ohm load.

Power Requirements: 100/120/200/240 V-ac ±10%, 50/60 Hz, 60 watts or 11.0 to 16.0 V-dc (13.8 V-dc nominal), 3 amps

External Counter Mode (DR-7 installed): Readout: to 100 Hz. Accuracy: 15 PPM ±100 Hz. Maximum input frequency: 150 MHz. Input level range: 50 mV to 2 V rms.

Dimensions/Weight:

Depth— 13.0 in (33.0 cm) excluding knobs and connectors.
Width— 13.6 in (34.6 cm)
Height— 4.6 in (11.6 cm) excluding feet
Weight— 18.4 lbs (8.34 kg)

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$15; 6C21 $25; 450TH $45. Invader 200, needs work $100; Ranger I, same, $50. Telrex "xmas tree," rotor, 50-foot crank-up, h.d. $1550. All FOB. Want to buy: KW-1, OMNI-D, Eimac 1000T. K8CCV, 216-427-2303, 6-9 P.M. weeknights.

HEATH DX-60B, HR-10B, ant. relay, all mint $125. KA4-JDL, K. Straub, 310 East 14th Lumberton, NC, 28358.

MISC. equipment for sale, reasonable. S.a.s.e. WB6ZYD, 4068 Army, San Francisco, CA 94131.

SELL: Atlas 210X-NB with PS-200, automobile DC cord, $525; ICOM-245, 2M/FM (no ssb/cw) synthesized digital, extra Tuch-Com 1215 touch tone mic, brackets, $250; you pay parcel post (no UPS here); Vandegrift, 2308 Zinnia Court, Killeen, TX 76541, 817-634-1053.

YAESU FT-620B 6 meter transceiver. Excellent. $275. WB7VOO 602-298-4820.

FOR SALE: Mint condition power supply for Collins KWS1 transmitter. Phone Mack Jordan W4DAQ at 205-289-1225 or write drawer X, Demopolis, AL, 36732.

COLLECTING military walkie-talkies Especially want PRR-9/PRT-5 "Helmet Radio." Send me your lists please Dave Mann, 2048 Baywood Lane, Sierra Vista, AZ 85635.

SBE SB34 transceiver with cables and manual. Very good condition electrically and cosmetically $249. Dan Zdanowicz, K1YPB, 310 Tenth Ave., Haddon Heights, NJ, 08035 609-546-0962.

MICROWAVE Tower: Rohn factory modified model 80, 130', for 10' dish at top plus several vertical side-mounts. Complete and new. $3400. Also EXIDY computer, 16K, $700. WD9HCE, Norm, 812-988-4136.

SUPER buy. Hammarlund HQ-180-AC. general coverage receiver almost new $260. Fred Wiedenroth, Madison LaKE, MN 56063.

COLLINS 75A-4 840 3.1 filter, mint condx, $250. Hallicrafters SX-101, excellent $100. Maxine Greeson, WB9PBA, 414-332-6944.

SELL: Drake MN-2000 matching network $150. Bill Walker, WA3WJA 1407 Alpen Strasse, Latrobe, PA, 15650. Phone 412-537-6543, will ship.

YAESU FT-101ZD, with cw filter, $725., KA4HQI, 703-496-4835 after 5 P.M. EST.

220-MHZ HT wanted. 312-371-4196 weekday evenings. Dave Dykstra, KB9CA, 18628 William St., Lansing, IL, 60438.

WANTED: SX-146 WA8TMD, 313-642-5157.

H.P. 416B ratio mtr. $65. Hickok: Mutual Conductance Tube Tester model 533. $95. Servo — Microwve swept signal source Model 880 (2.0 to 4.0 GHz), make offer. Van guard rcv. conv. for 6 mtr, 2 mtr & 432 MHz model 4078408. 2 mtr EME system 8 EA 14 el KLM's, call or write for details. Pinon electronics — morse code to video — $160. 1/2" hard-line 50 Ω; odd length's 45c/ft, also have connectors. Heights: SOHB with stand, $235. Heights tower section 30" ST; 30" junction $125 ea. Bill Murphy W0RSS, RR no. 2, Dodge City, KS 67801 316-225-2794.

FERRIC chloride in double wrapped one pound packages. Dry, just add water, makes close to one gallon. Satisfaction guaranteed. $2.50 per pound, please include funds for shipping. Lou Carbaugh WA3OJF P. O. Box 398, New Cumberland, PA, 17070.

SB-220 linear with 10 meter capability. Operated less than 10 hours. Mint, $475. Pickup preferred. 1-617-678-4391.

ALPHA-77 new 8877 tube $2,500; Signal-one CX7B updated by Cunningham $1,800. First bank check will get these units Johnny Wertz, K4CRF, 803-536-2930.

FOR SALE: Collins S-Line, 75S3C, 32S1, 516F2. All excellent condition. $1100. Burt Cohen, W3GG. 17709 Lisa Drive, Derwood, MD, 20855. Phone 301-977-6464.

WANTED: Plug-ins for Micro-Power Model 221 Sweeper to cover the range of 8-40 GHz. Also the range of 100-1000 MHz. Plug-in oscillator for Elgar Model 101 Power Source such as Model 401V. Also need GR900 Adapters to SMA and Type 'N'. Need the following tech. manuals: HP 738AB meter calibrator, GR 1606A Bridge, Micro-Power 221. Prefer original manuals, but will accept copies. Phone collect 503-327-3827 evenings W7LDO, Cliff, or write, W7LDO. RTe. 1. Box 25, Jefferson, OR 97352.

DON and Mike deals: New Icom 251A-2m base $599; IC551-6M $399.; IC551D-100W 6 meter $599.; Yaesu FT202R $150.; Microwave Modules MMT 432-144S $389.; MMT432-28S $309.; MMT 50 out - 144 in $225.; Namebrand RG8 foam 19c/ft; Amphenol silverplate PL259 69c; Belden 8214 RG8 foam 26c/ft; 9405 H.D. rotor cable 32c/ft; 9251 RG8A/U 35c/ft; Telrex TB5EM $415.; Adel nibbling tool $8.45; Janel QSA5 $41.95; Sprague 100MFD/450VDC $2.; Bearcat 300 $399.; 250, 220 $299.; GE, Amperex, Raytheon 6146B $9.95 ea; Cetron or GE 572B $32. ea; Robot 400 $499. — limited. Prices FOB Houston, guaranteed, subject change without notice and prior sale. Madison Electronics, 1508 McKinney, Houston, TX 77002. 713-658-0268.

SALE: HW-101, cw filter, HP23C supply, speaker, HD-1410 keyer, Shure desk mike, Cantenna dummy, Drake low pass filter, SWR-power meter, trap dipole, all $350. 814-837-6558, AE3F, Kane, PA.

WANTED: Heathkit HW-2036A and SSTV viewing adapter (with or without oscilloscope) as described in the ARRL Radio Handbook, WB7SEZ.

QUAD kits from $18. to $33. Send s.a.s.e. for information. WAC, 404 Sanders Rd., S. W., Huntsville, AL 35802.

COLLINS. S-Line: 32S3, 75S3B, (both round emblem)

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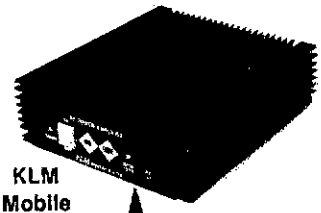

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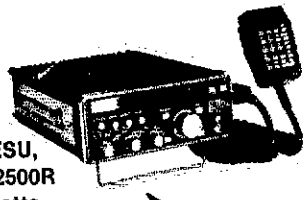

YAESU, CPU-2500R 25 watts.

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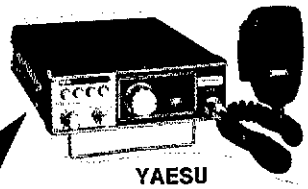

YAESU Memorizer FT-227R, Selectable power, 1-10 watts.

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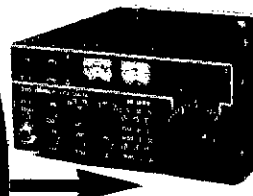

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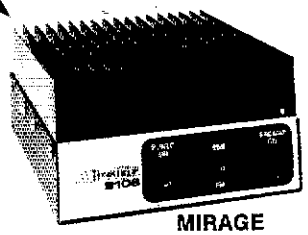

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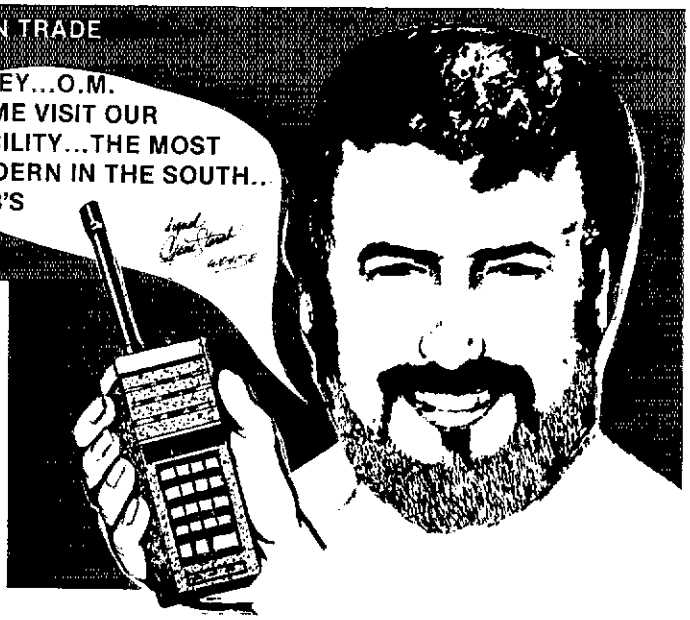

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SPECIFICATIONS

Freq. of Operation: 144-148 MHz
Power in: 3 watts
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Preamp: 2.5 dB N.F., 11 dB gain
Mode: FM
Amps @ 13.5 VDC: 5
Audio/PA amp: 5 watts
@ 8 ohms

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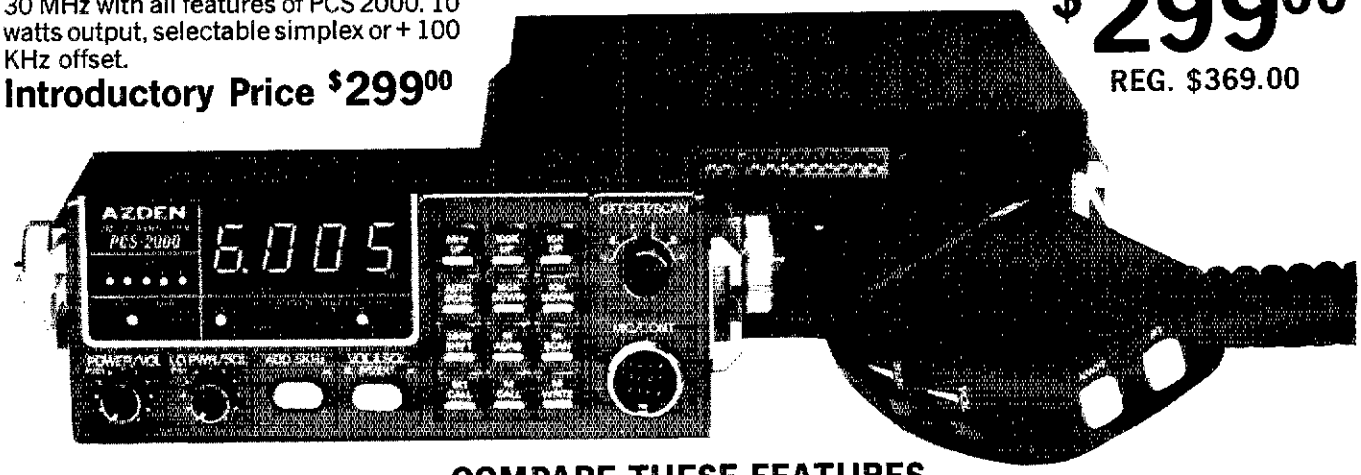

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- **SIX-CHANNEL MEMORY:** Each memory is re-programmable. Memory is retained even when the unit is turned off.
- **MEMORY SCAN:** The six channels may be scanned in either the "busy" or "vacant" modes for quick, easy location of an occupied or unoccupied frequency.
- **FULL-BAND SCAN:** All channels may be scanned in either "busy" or "vacant" mode. This is especially useful for locating repeater frequencies in an unfamiliar area.
- **INSTANT MEMORY-1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be recalled for immediate use.
- **MIC-CONTROLLED VOLUME AND SQUELCH:** Volume and squelch can be adjusted from the microphone for convenience in mobile operation.
- **ACCESSORY OFFSET:** Provides three additional offset values: +0.4 MHz, +1 MHz and +1.6 MHz. Other offsets may also be obtained.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-distance communication.
- **DIGITAL S/RF METER:** LEDS indicate signal strength and power output. No more mechanical meter movements to fall apart!
- **LARGE ½-INCH LED DISPLAY:** Easy-to-read frequency display minimizes "eyes-off-the-road" time.
- **PUSHBUTTON FREQUENCY CONTROL FROM MIC OR FRONT PANEL:** Any frequency may be selected by pressing a microphone or front-panel switch.
- **SUPERIOR RECEIVER SENSITIVITY:** 0.28 uV for 20-dB quieting. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed and built to exacting specifications, resulting in unsurpassed received-signal intelligibility.
- **TRUE FM, NOT PHASE MODULATION:** Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- **OTHER FEATURES:** Dynamic Microphone, built in speaker, mobile mounting bracket, external remote speaker jack (head **and** radio) and much, much more. All cords, plugs, fuses, microphone hanger, etc. included. Weight-6 lbs.
- **ACCESSORIES:** 15' REMOTE CABLE... $29.95, *MARS-CAP KIT... TBA. PCS-6R A/C POWER SUPPLY... $49.95. TOUCHTONE MIC. KIT... $39.95.

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516F2 (winged). Excellent cond. $1400. Steven W. Bockman, K2FW, 1415 Old Blackhorse Pk., Hilltop, NJ 08012.

WANTED Yaesu FV-101B VFO. Chris Brugman WA2KDC 1002 Louis Road, Schenectady, New York, 12303 518-355-3906 collect.

QSTs wanted. December, 1915; January thru July, 1916, with covers. Joseph Mullan, W3RLR, 217 Northway, Baltimore, MD., 21218. 301-467-3500.

WANTED: No. 19 Mark II or III transceiver. V. Grogan, WD8SEF. P. O. Box 382, West Salem, OH 44287.

RTTY — solid state CQer board with PROM programmed your call. Coming soon. Send name/address for future announcements. Nat Stinnette Electronics, Tavares, FL 32778.

HT-146A, TT, charger, Hybrid Mini-Quad, rotor. list. WB2WXX 24 Dalewood CT., New City, NY 10956.

ICOM 230 $195 plus shipping. WA2LYZ 609-627-5683.

SELLING used 80 ft. Rohn SSV tower, Corrigan, WA2GPB, Delmar, NY 12054.

I WILL assemble and test your Heathkit. Please write for details or quotations. Paul Preidecker, WA5WBF, 4123 Durness, Houston, TX 77025.

FOR SALE: two meter repeater, all transistor, consists of six cavities, 2 Midland 13-500 (swapable) for transmitter and receiver, repeater control board. Working excellet. $600, also spare repeater control board $35. Also material to make four cavities. WBØTCF, 816-761-2889 after 5:00 P.M. CST.

SALE: HW101 HP23B, speaker. 2 yrs old. $380. firm. N2BIJ, 315-526-6589 after 6 P.M.

HEATH SB-401 xmtr $220 Larry, WB8VYD, 313-852-1143.

FOR SALE: Heathkit SB104A with power supply/speaker, SB-230 linear, other accessories. Don Winter WA2IOP, 516-928-4152.

TEMPO 2020 mint, extra finals $650 WB2GHV. 201-697-3039.

HARDLINE: Wanted in approximately 300 foot piece, 1/2" or 7/8". Contact: G. Holmes, c/o G.F.W., Box 501, Sault Ste. Marie, Michigan 49783.

WANT clean SB-102, SB-600, HP-23B, SB640, manuals. Cash, or swap Cannon "T" with f0.95 lens KA6IQO, 714-762-5664, 25715 Country Club Ave., Boron, CA 93516.

ARGONAUT 509, c.w. filter $295. Wilson WE-800, nicads $255. ICOM 202 $155., Atronics 16 character code reader $245. DiLiberti, W3GHI, 1601 Chickasaw Rd., Arnold, MD, 301-757-3176.

ALDA 103A, ssb, cw, ss 250 watt mobile transceiver $400, Autek QF1-A filter $50., MFJ cw filter $15, NCX-3 transceiver w/p.s. $175. WB2KQA, 914-753-5223.

FT901DM, mint, $950 or offer. Tatar, 1625 North Park, Cleveland Heights, OH 44106.

KENWOOD TS520S, DG-5 digital display, MC-50 microphone new condition $725. Gary, 913-782-0567 evenings.

KENWOOD TS520S with cw filter and mike: Perfect at $600. KB8AZ, 216-372-2829, evenings.

FOR SALE: Heathkit HW-2036A full 4 MHz. operation. Mint condition, fully checked and aligned at factory, w/extra mounting bracket. 110v/12v power supply included. $300. Chuck Martin, P. O. Box 3370 Bowling Green, KY 42101.

FOR SALE: Radio Shack 16k-level I computer. Asking $650. Robert T. Holzapfel, 120 Meadowbrook Dr., Bowling Green, KY 42101.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept., 371, 230 Woods Lane, Somerdale, NJ 08083.

SELL: R4C, T4XC, AC4 $950. Tempo 2020 $450. HQ170AXC $100. SP600JX17 $200. 4KLM-432-16LB's with H-frame $125. 28KSR floor or table $200. Collins filters: F455J05 $80. F455N20 $25. Several 250 kHz Collins filters write Swan 250C $250. FT221R $400. R648-ARR41 rec. $60. WB5KCQ Clifton J. Turner, Box 323, Ball, LA, 71405.

HALLICRAFTERS SR-2000/P-2000, 2 kW ssb transceiver. New finals, excellent condition. $595. W9EBW, Minooka, IL, 815-467-5990.

FOR SALE: Microlog AVR-2 and AKB-1 — cw/RTTY units. Loads of options — scope tuning output — casette operation — automatic trans keyline — polarity switch — volume control, plus much more. $800 firm. WA1WYE, 448 Center Street, Groveland, MA 01834 — 617-373-3925.

NEEDED: Remote VFO for FTDX-560. N3JT, POB 19346, Washington, DC 20036.

TWO Motorola 2 meter 5 watt fm handi-talki's with "PL." $100 each. K7GFL, 1885 Parkside Dr., Hanford, CA 93230.

HEATH HR-1680 works great, $175. Johannessen, 19 Elliot St., Keene, NH, 03431.

SELL SB230 linear never used $350. 75A4 2285 $300. SB400 $175. All with manuals. W9VPE, 210 Le Jeune, Lockport, IL, 60441.

LINEAR: Dentron GL-1000 mint with 10 meter conversion, manual. Used 1 hour, $300. Ari, WB3KTF, 301-774-9247.

NEED 4CX250B, 4X150A, 866A tubes for my rig. Send postcard stating your price to N4BWD. Rte. 1, Box 93, Musella, GA 31066.

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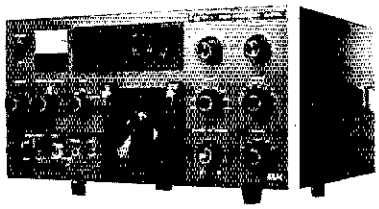

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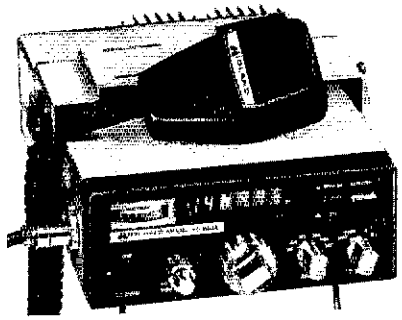

MIDLAND 13-510A 2m FM Xcvr. 12vdc, 25/1w, 143 - 149 MHz. PLL synth. for 600 freq. in 10 KHz steps + 5 Khz shift-up for 600 more 4 offsets, + or - 600 KHz and 2 opt. FET front w/ high-Q resonator filter and ceramic IF filters. LED readout. Polarity/ VSWR protected. Jacks for tone burst, discrim. meter & ext. speaker. S/RFO meter. Covers MARS & C.A.P. adjacent to the 2m band.

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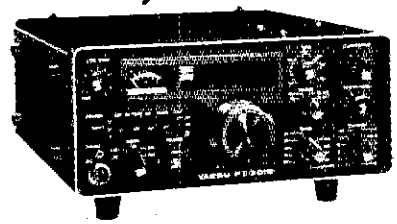

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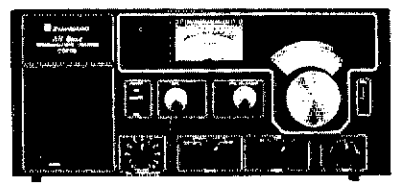

STANDARD C-6500 Solid-state, Synthesized General Coverage Receiver. 5 to 30 mHz. in 30 ranges. AM CW, USB and LSB. Sens: .3-1.0 uV. Sel: 5.5 kHz (AM); 3 kHz (SSB & CW). Readout within 5 kHz. 117vac, 12vdc with (8) D cells (not supplied) or ext. source. Whip or ext. antenna. Built-in speaker and large S meter.

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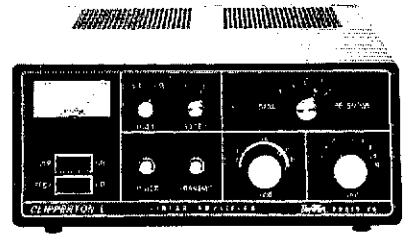

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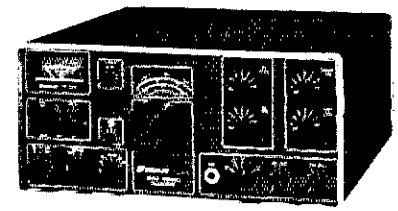

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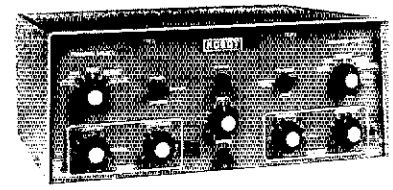

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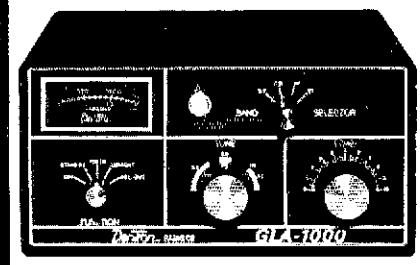

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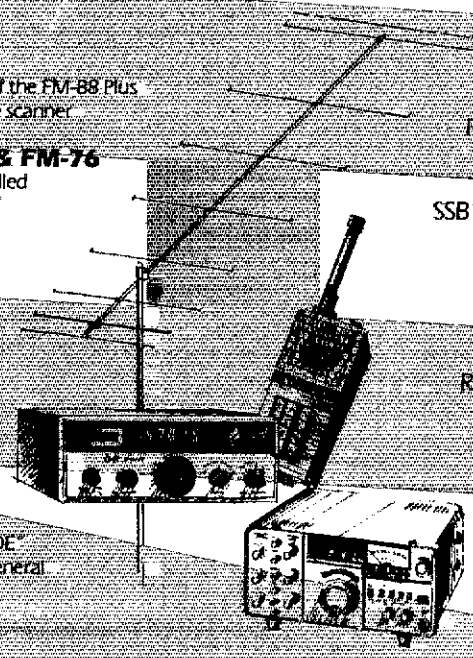

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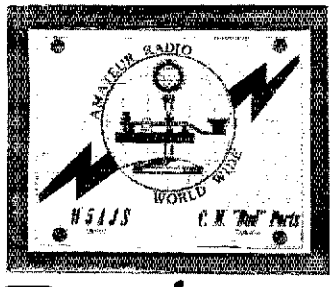

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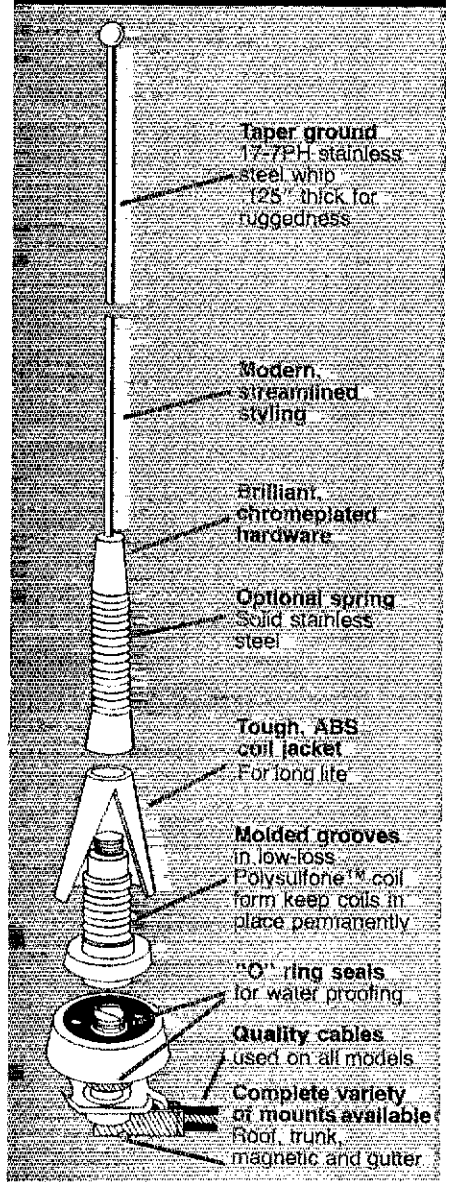

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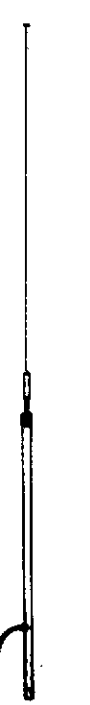

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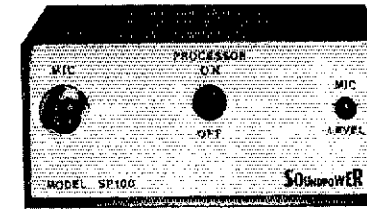

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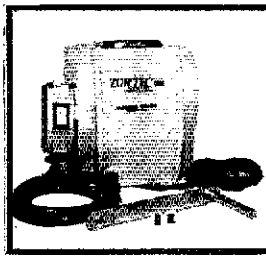

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CRYSTALS: Novice-General: Any frequency, FT-243, 7000 - 8700 Kilocycles $1.50, minimum five $1.25 each. 3500 - 4000 $2.95, five $2.50. 160M - $3.45, five $2.95. Sockets 40c. Airmail 20c per crystal. "Crystals since 1933" WØLPS. Stamp for 1700-60,000 Kilocycles listings-circuits. C-W Crytals, Marshfield, MO 65706.

HEATHKIT HR-1680 receiver. Excellent condition and workmanship. $170. WB5HFU, 8129 Shannon St. NE, Albuquerque, NM 87109. 505-821-1651.

WILSON Mark-II H-T with wall and mobile chargers, remote speaker/microphone, leather case $215 — George, WB1FXI, 413-739-8247 evenings.

SCR-284 (BC-654) WW-II 80-75 cw/phone transceiver with PE-103 dynamotor and hand-crank generator. All for $85. W1JEC, 109 Day St., Granby, CT, 06035.

FOR SALE: Collins 312B5 winged $390, PM2 Mobile Supply $90, 351D2 Mobile mount (new) $75. FT901DM 2 months old still under warrantee with SP901 speaker $1150. KLM 5 element 20 meter beam 42' boom $250. Quad: 3 elements 20, 4 elements 15, 5 elements 10 meters, 26' boom (W1FBY design) $250. New beams Hygain 205BA $200, 155BA $120 in original sealed cartons. Electronic keyer $25. Prefer local deal on quad, all items FOB. Paul 203-582-4885

SELL: Heath HW2036 w/"A" modification installed. 144-148 MHz in 5 kHz steps. Touchtone mic. Exc. cond. I ship. $225. WA1LZA. 617-275-1629.

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DRAKE: T4X-C, R4-C, AC-4, MS-4, 1.8 and .5 kHz filters, D-104 microphone, MFJ tuner with SWR, all less than one year old, and less than 200 hrs use, package $1000. Plus UPS. WB2TCR 607-797-2768.

ICOM IC215, 15 channel portable 2M FM xcvr, with Ni-Cad pack and charger and 9 sets of xtals. Excellent w/manual, $225. ICOM IC202, portable VFO-controlled 2M SSB xcvr, covers 144-144.4, 145-145.2 and Oscar bands, brand-new condx w/manual, $200. Johnson Vik-

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FT-301S	425
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IC-211	575
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MLA-2500B	999.00	839.00
Clipperton-L	699.50	581.00
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MT-3000A	349.00	295.00
MT-2000	199.00	172.00
AF-1	199.00	149.00
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SL-300	32.00	
SL-500	52.00	
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L-7	1099.00	
MN-7	165.00	
MN-2700	279.00	
WH-7	89.00	
DL-300	24.95	

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NB-7	90.00	
RV-7	195.00	
PS-7	249.00	
PS-3	89.95	
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SELL: 10 meter converted Pace 1000-M, Midland 13-893, $155. 35 amp regulated power supply, $150. Tempo One with powr supply, $435. WB2OEF, 158-20 80th Street, Howard Beach, New York 11414. 212-848-7961.

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FOR SALE: Heath SB-102 with crystal filter, SB-600, HP-23A excellent condition, $335. WA1PJY 203-792-5447.

KENWOOD TV506 transverter $225. Pair silver Johnson VHF/UHF 4CX250B sockets $32. Autek QF1A $45. All new. AF4K Carling, 5131 Raywood Lane, Nashville, TN, 37211 615-331-8461.

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WILSON Mark IV with TT pad, carry case, desk & mobile chargers, 2 batteries, 2 speaker-mikes. $225. Bob, WA2JGC, 201-223-0200.

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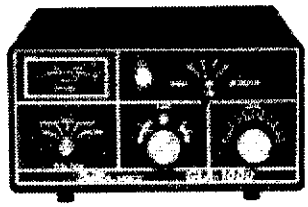

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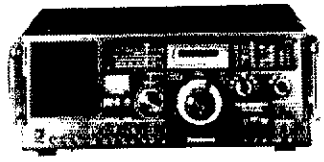

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DRAKE T4X, R4A, MS4 $315; RTTY Model 19, TU, parts. KØUP, Mike Reed, Rt 3, Box 356, Hannibal, MO 63401.

SALE: Heath DX-60B with HG-10B VFO - $100 Drake 2A Receiver with 2AQ Multiplier — $150 Tempo VHF-1 + with touchtone pad — $275 all manuals. Plus shipping. WB5RSQ, 713-695-9262 office 713-358-6816.

MONITOR scope for sale: 8 month old SM220 w/BS-5, manual, cables, $380. (Reason for selling: want lab type scope). Also Heath HD-1410 keyer, $45. AB7T; 788 S. Egan; Burns, Oregon; 97720.

COLLINS: 75S3 — $425, 32S1 — $350, 312B4 — $195, 516F2 $150, 312B5 — $495, PM2 — $95, SM1 $40, 312B3 — $35. Schaaf, Box 301, DePere, WI 54115 1-414-532-6643.

TUBES — want 811A's or 572B/T160L's. Trade for new 813 or cash. WA1OII, 14 Carina Road, North Haven, CT 06473 203-239-9927.

HEATHKIT SB401, SB303 excellent condition $399. WB4YTZ, 2255 Glen Dr. Safety Harbor, FL 33572, 813-726-8375.

SELL: VLF receiver, navy RAK-7, 15 to 600 kHz, spare tubes and manual. Good condition $100. Will not ship. Come and get it. F.G. Pearson N3BF, 215-642-5823.

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WANTED: Drake MN-2000 tuner, 1948 Callbook, 1947 Handbook, Sky Buddy. Bob, KE6E, 11456 Richardson, Loma Linda, CA 92354. 714-824-1133.

TRS-80 computers, used bought and sold call Roy Perkins 203-669-0726.

HQ170, matching speaker, $170; SB401, crystal pack, $250. All equipment perfect, original owner, manuals, rarely used. K7LJQ, 4220 Olympic Way SLC, UT 84117. 801-278-8550.

COLLINS 30L1 (winged) $525, 312B4 (round) $195. Both excellent. Swan 250 and TV-2 with 117XS, single switch select 6m or 2m, includes coax relay. Mint $350. 60' E-Z Way crankup/foldover tower (local sale only) $575. Certified check. Ship UPS collect. W4VCI, 509 Orange Lawn, Valrico, FL 33594. 813-689-6504.

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DEMO sale: IC701PS, EX-2, $990. Signal/One CX-11A $5595. Alpha 77DX $3195, all factory warranty. Signal/One CX7B, mint, warranty $1495. Payne Radio, K4ID, 615-384-2224.

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FOR SALE: 75S3-B 30,435 $750. KWM-2, acps $595. CX7-A $850. 312B-5 $500. 32S-1, acps, $350. 75A-4 4491 (0.5, 1.5, 3.1) $525. James Craig, Box 615, Portsmouth, NH 03801, 603-436-2884.

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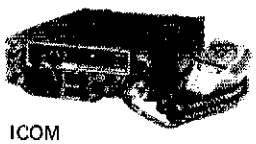
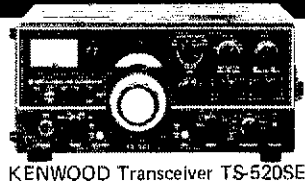
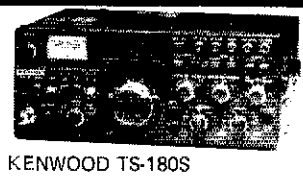


ICOM
IC-255A 2 Meter FM
List **$389.** *Dial for your discount!*

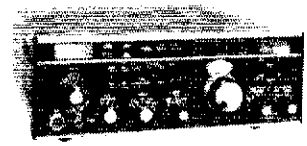


KENWOOD Transceiver TS-520SE
160 thru 10M
List $629.95 *PRICE TOO LOW TO PRINT*



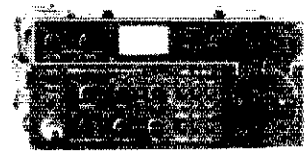
KENWOOD TS-180S
160 thru 10M
List $984.95 *DIAL FOR YOUR DISCOUNT*

DRAKE



DRAKE TR-7 / DR-7 **$1395.**
PS-7 **$249.** *Dial for your discount!*

ICOM



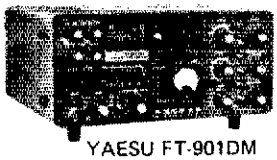
ICOM 551 6 Meter FM SSB
List **$449.** *Dial for your discount!*

YAESU

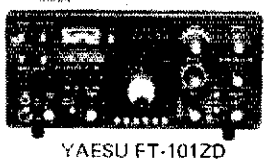
YAESU FT-227RB *Dial for your discount!*
2 Meter FM **$425.**

SPRING CLEAN-OUT SPECIAL

LIMITED SUPPLY

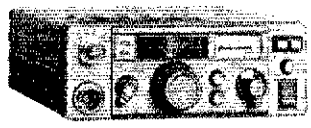


YAESU FT-901DM
160 thru 10M **$1459.**
Dial for your discount!



YAESU FT-101ZD
160 thru 10M $895.
Dial for your discount!

Total Tower lines available. Call for info.



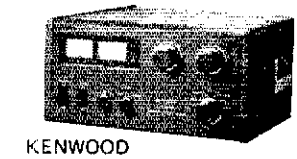
KENWOOD 2M FM
TR-7600 List $375.
Sale $284.95

TR-7625 List **$424.** Sale $319.95

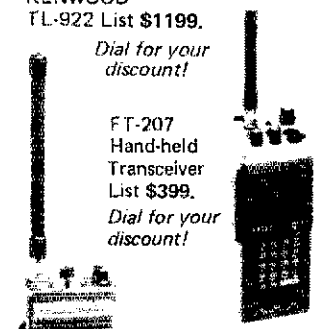
KENWOOD FM/SSB
TS-700SP List $799.
Sale $594.95

ICOM IC 211	DRAKE R4C $699
Sale $589.95	DRAKE T4XC 699
FT 202 List $199.	DRAKE AC4 150
Sale $134.95	$1548
	Sale $1100

FOR OTHER SALE ITEMS CALL TOLL FREE
ASK FOR FREE LITERATURE.



KENWOOD
TL-922 List **$1199.**
Dial for your discount!



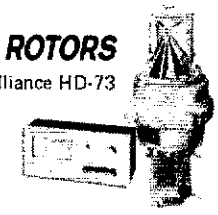
FT-207
Hand-held
Transceiver
List $399.
Dial for your discount!

KENWOOD
TR-2400
2-Meter Hand-held Transceiver with 10 memories plus many more features.
List **$395.**
Call for information sheet!

KENWOOD TS-120S
80 thru 10M
List **$699.** *DIAL FOR YOUR DISCOUNT*

KENWOOD R-1000
200 KC to 30 Mhz List **$499.95**
Dial for your discount!

ROTORS
Alliance HD-73



Prices and inventory subject to change without notice!

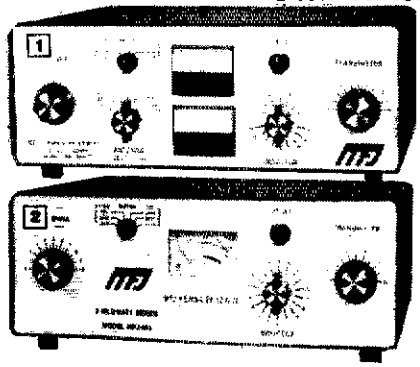
Webster radio, inc.

2602 E. Ashlan, Fresno, CA 93726 / Ph. (209)224-5111
HOURS: 9 a.m. to 5:30 p.m. – Mon. thru Fri. / 9:30 a.m. to 5:30 p.m. – Sat.

New MFJ 3 & 1.5 KW Versa Tuners

Run up to 3 KW or 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun.

3 KW VERSA TUNER IV's



1.5 KW VERSA TUNER III's

NEW MFJ KW VERSA TUNERS HAVE THESE FEATURES IN COMMON

These 6 new MFJ KW Versa Tuners let you run up to 3 KW or 1.5 KW PEP (depending on the model) and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire. Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

All metal, low profile cabinet gives RFI protection, rigid construction, sleek styling. Black. Rich anodized aluminum front panel. 5x14x14 inches. Flip down stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 250 pf, 6000 volt capacitors. 18 position dual inductor, 17 amp, 3000 V ceramic rotary switch (3 KW version). 12 position inductor, ceramic rotary switch (1.5 KW version). 2% meters. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. One year limited warranty. Made in U.S.A.

3 KW VERSA TUNER IV's

[1] MFJ-984 3 KW VERSA TUNER IV

$299.95 ***EXCLUSIVE RF AMMETER insures maximum power to antenna at minimum SWR. Built-in dummy load.***

This is MFJ's best 3 KW Versa Tuner IV. The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

An exclusive 10 amp RF ammeter insures maximum power to antenna at minimum SWR. A separate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

Versatile antenna switch lets you select 2 coax lines thru tuner and 1 thru or direct, or random wire, balanced line or dummy load.

A 200 watt 50 ohm dummy load lets you tune your exciter off air for peak performance. Efficient, encapsulated 4:1 ferrite balun.

[2] MFJ-981 3 KW VERSA TUNER IV

$199.95 ***Accurate meter gives SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. 4:1 ferrite balun.***

The MFJ-981 3 KW Versa Tuner IV is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

[3] MFJ-982 3 KW VERSA TUNER IV

$199.95 ***Antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.***

The MFJ-982 3 KW Versa Tuner IV gives you a versatile 7 position antenna switch that lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

If you already have a SWR/wattmeter, the MFJ-982 is for you.

[4] MFJ-980 3 KW VERSA TUNER IV

$169.95 ***Heavy duty encapsulated 4:1 ferrite balun for balanced lines.***

The MFJ-980 is MFJ's lowest priced 3 KW Versa Tuner IV but has the same matching capabilities as the other 3 KW Versa Tuner IV's.

Features an efficient, encapsulated 4:1 ferrite balun for balanced lines.

1.5 KW VERSA TUNER III's

[5] MFJ-962 1.5 KW VERSA TUNER III

$169.95 ***SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.***

The MFJ-962 1.5 KW Versa Tuner III is an exceptional value.

An accurate meter gives SWR, forward and reflected power in 2 ranges (2000 and 200 watts).

A versatile six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

Black front panel has reverse lettering.

[6] MFJ-961 1.5 KW Versa Tuner III

$149.95 ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

The MFJ-961 1.5 KW Versa Tuner III gives you a versatile six position antenna switch. It lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 ferrite balun.

If you already have a SWR/wattmeter, the MFJ-961 is for you.

Black front panel has reverse lettering.

FOR YOUR NEAREST DEALER OR FOR ORDERS

CALL TOLL-FREE 800-647-1800

Why not visit your dealer today? Compare these 3 KW and 1.5 KW Versa Tuners to other tuners. You'll be convinced that its value, quality and features make it a truly outstanding value. If no dealer is available, order direct from MFJ and try it. If not delighted, return it within 30 days for a prompt refund (less shipping). Charge VISA, MC. Or mail check, money order *plus $10 shipping/handling*.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA master charge

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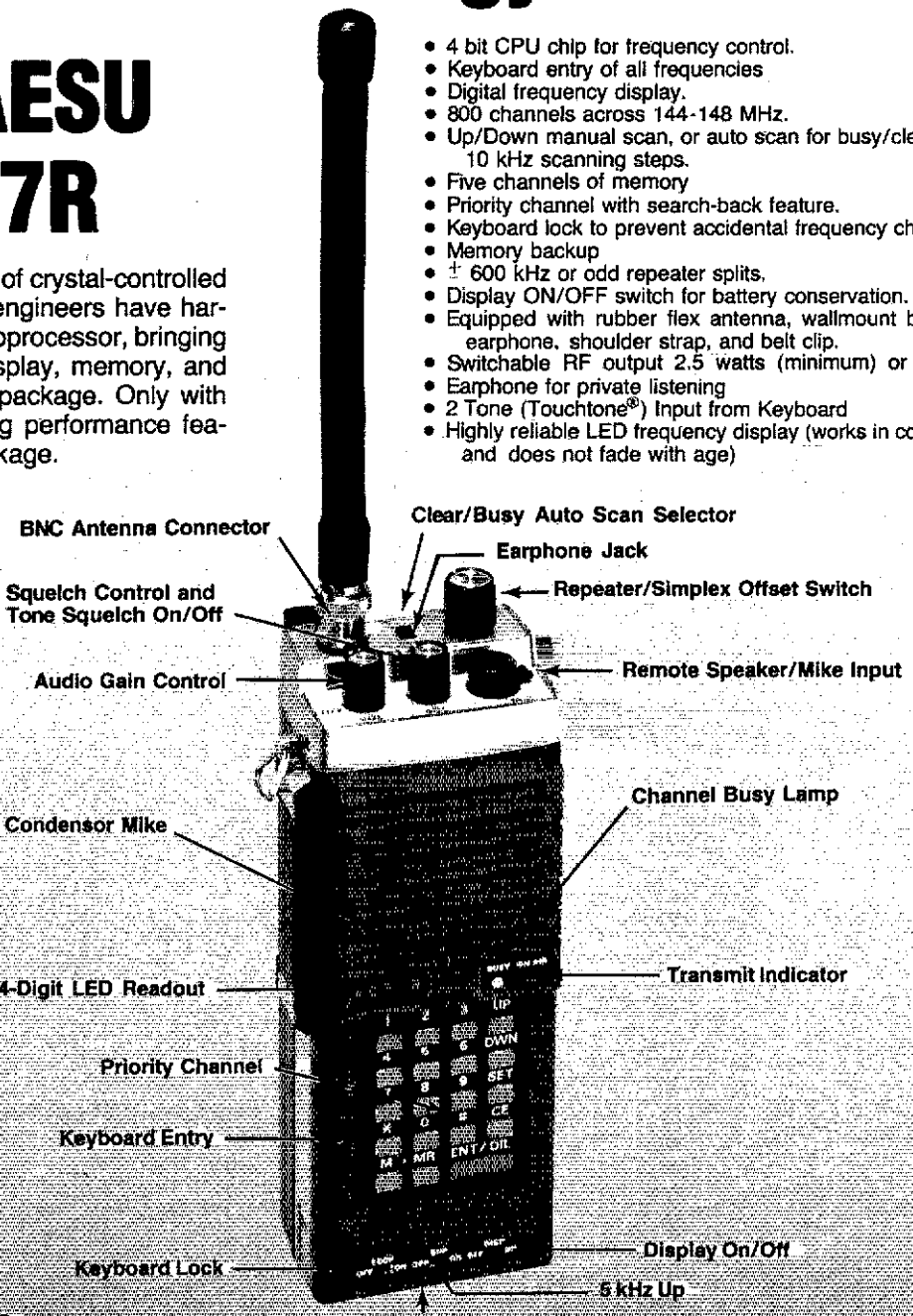
Tomorrow's Technology—Here Today!

THE YAESU FT-207R

The "horse-and-buggy" days of crystal-controlled handies are gone! Yaesu's engineers have harnessed the power of the microprocessor, bringing you 800 channels, digital display, memory, and scanning from a hand-held package. Only with Yaesu can you get these big performance features in such a compact package.

- 4 bit CPU chip for frequency control.
- Keyboard entry of all frequencies
- Digital frequency display.
- 800 channels across 144-148 MHz.
- Up/Down manual scan, or auto scan for busy/clear channels. 10 kHz scanning steps.
- Five channels of memory
- Priority channel with search-back feature.
- Keyboard lock to prevent accidental frequency change.
- Memory backup
- ± 600 kHz or odd repeater splits.
- Display ON/OFF switch for battery conservation.
- Equipped with rubber flex antenna, wallmount battery charger, earphone, shoulder strap, and belt clip.
- Switchable RF output 2.5 watts (minimum) or 200 mW
- Earphone for private listening
- 2 Tone (Touchtone®) Input from Keyboard
- Highly reliable LED frequency display (works in cold temperatures and does not fade with age)



SPECIFICATIONS:

GENERAL

Frequency coverage: 144-148 MHz
Number of channels: 800
Emission type: F3
Batteries: NiCd battery pack
Voltage requirement: 10.8 VDC ± 10%, maximum
Current consumption:
Receive: 35 mA squelched (150 mA unsquelched with maximum audio)
Transmit: 600 mA (full power)
Case dimensions: 58 × 161 × 34 mm (HWD)
Weight (with batteries): 580 grams

RECEIVER

Circuit type: Double conversion superheterodyne
Intermediate frequencies:
1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 uV for 20 dB quieting
Selectivity: ± 7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

TRANSMITTER

Power Output: 2.5 watts minimum /200mW
Deviation: ± 5 kHz
Spurious radiation: - 60 dB or better
Microphone: Condenser type (2000 ohms)

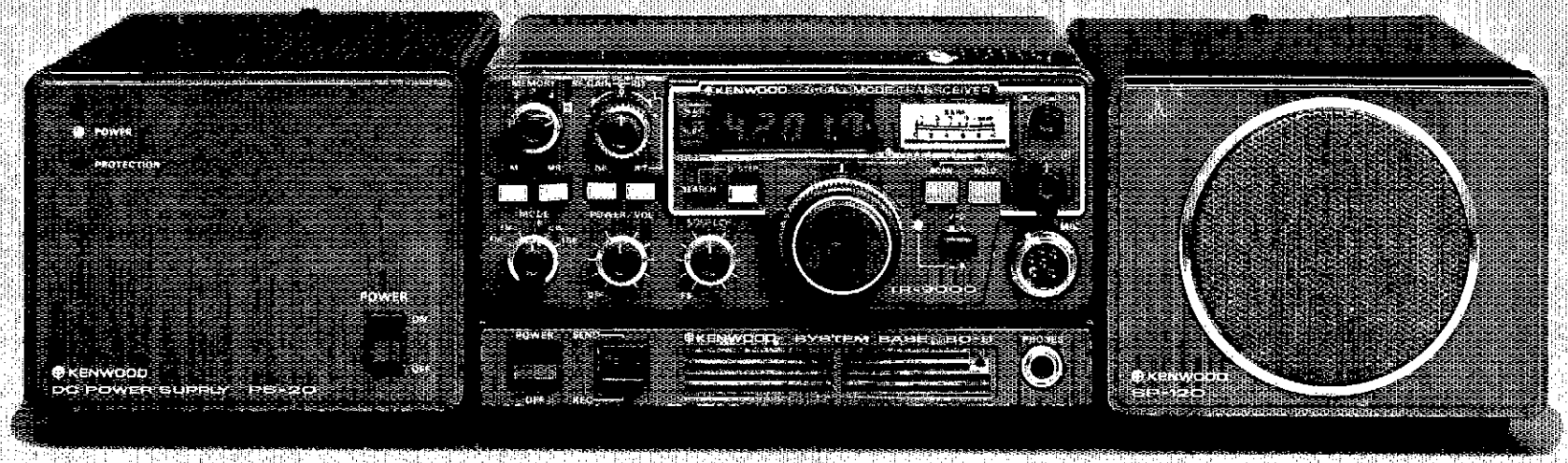
OPTIONS

LC-6X Leather Carrying Case
YM-24 Remote Speaker/Microphone
Tone Squelch Unit
NE-P8 Battery Pack
NC-2 Quick Charger

YAESU
The radio.

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007

New 2-meter direction.



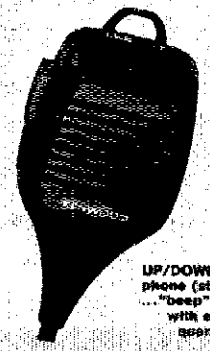
PS-20 TR-9000 BO-9 SP-120 Subject to FCC Approval

A compact transceiver with FM/SSB/CW plus...

TR-9000

Kenwood's done it again! Now, it's the exciting TR-9000 2-meter all-mode transceiver... complete with a host of new features. Combining the convenience of FM with long distance SSB and CW in a very compact, very affordable package, the TR-9000 is the answer for any serious Amateur Operator! Versatile? You bet! Because of its compactness, the TR-9000 is ideal for mobile installation. Add on its fixed station accessories and it becomes the obvious choice for your ham shack!

See your Authorized Kenwood Dealer now for details on the TR-9000...the new direction in 2-meter all-mode transceivers!



UP/DOWN microphone (standard) ..."beep" sounds with each frequency step.

KENWOOD
...pacesetter in amateur radio

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Note: Price, specifications subject to change without notice and obligation.