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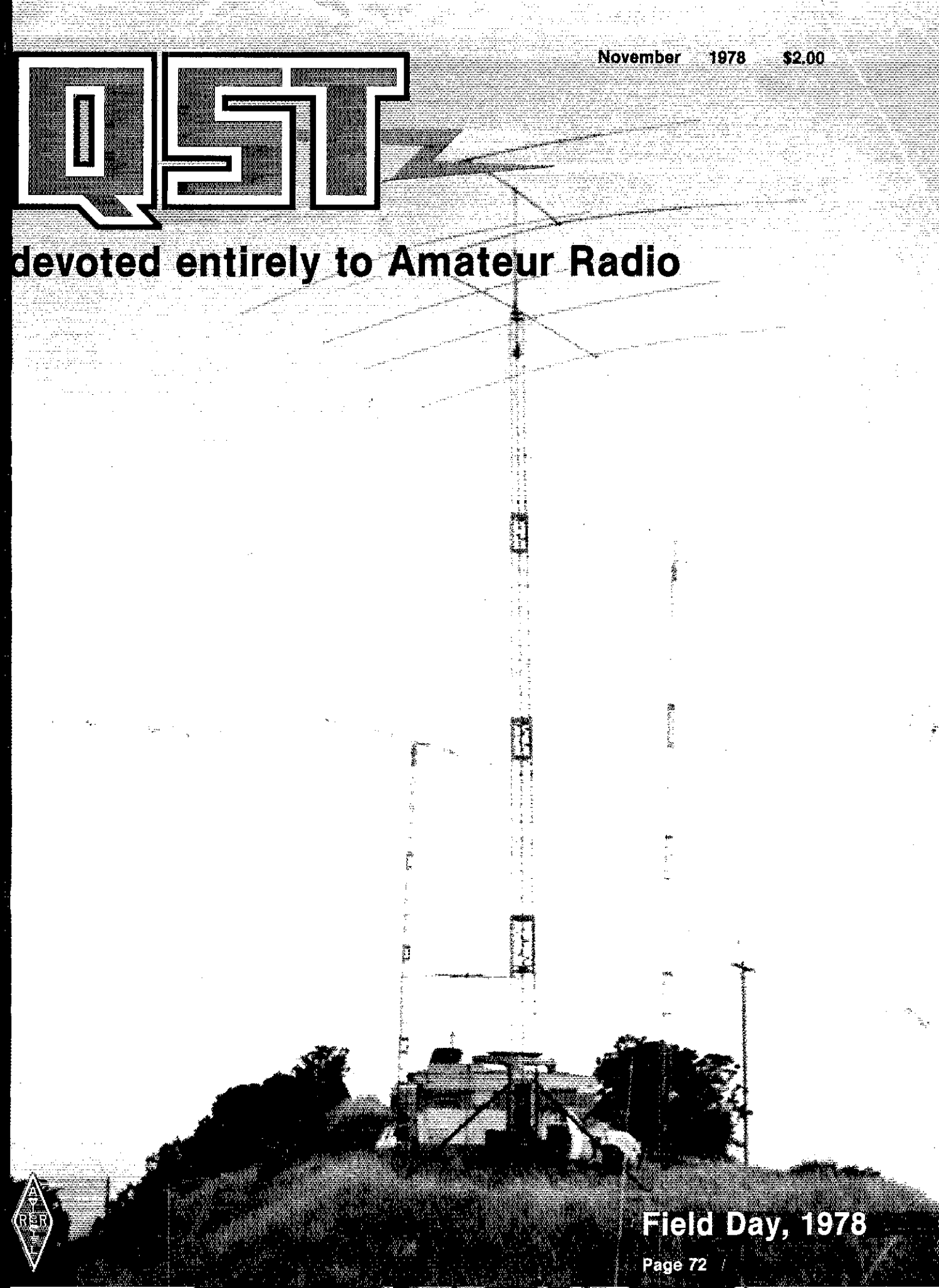

Field Day, 1978

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Shown with accessory touch tone pad

800 channels in the palm of your hand

Tempo presents the S1 SYNCOM...the world's first synthesized 800 channel hand held transceiver

This amazing pocket sized radio represents the year's biggest breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The SYNCOM'S price includes the battery pack, charger, and a telescoping antenna. But, far more important is the 800 channels offered by the S1. The optional touch tone pad shown in the illustration adds greatly to its convenience and we have available a 30 watt solid state power amplifier designed to give the SYNCOM S-1 the flexibility of operating as a mobile and base station as well.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Every 5 KHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 400 ma-transmit
Batteries:	Ni-cad battery pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES

Touch tone pad, tone burst generator, CTCSS chips, Rubber flex anter

Price . . . $349.00 (or with touch tone pad . . . $399.00)

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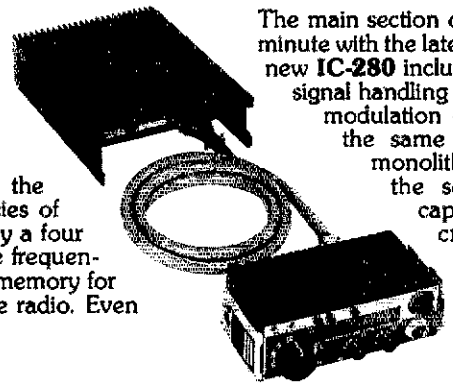
New, Remotable 2meter Mobile!

ICOM's New IC-280

ICOM introduces its new 2 meter mobile radio with the detachable microprocessor control head, the **IC-280**. Bright, easy to read LED's and a new style meter grace the brushed aluminum "new look" front panel of the detachable control head, which provides memory and frequency control for the remotely mountable main section.

The **IC-280** comes as one radio to be mounted in the normal manner: but, as an option, the entire front one third of the radio detaches and mounts by its optional bracket and the main body tucks neatly away out of sight. Now you can mount your 2 meter mobile radio in places that seemed really tight before.



With the microprocessor head the **IC-280** can store three frequencies of your choice, which are selected by a four position front panel switch. These frequencies are retained in the **IC-280's** memory for as long as power is applied to the radio. Even when power is turned off at the front panel switch, the **IC-280** retains its programmed memories; and when power is completely removed from the radio, the ±600 KHz splits are still maintained!

Frequency coverage of the **IC-280** is in excess of the 2 meter band; and the new band plan (144.5-145.5 MHz repeaters) can easily be accommodated, since it was included in the **IC-280's** initial planning by the ICOM design team.

The main section of the **IC-280** puts you up to the minute with the latest state of the art engineering. The new **IC-280** includes the latest innovations in large signal handling FET front ends for excellent intermodulation character and good sensitivity at the same time. The IF filters are crystal monolithics in the first IF and ceramic in the second, providing narrow band capacity for today and tomorrow's crowded operating conditions. Modular PA construction with broad band tuning provides full rated power across the full 2 meter band (plus a little).

All ICOM radios significantly exceed FCC specifications limiting spurious emissions.

Specifications subject to change without notice.

IC-280 Specifications: □ Frequency Coverage: 143.90—148.11 MHz □ Operating Conditions: Temperature: −10°C to 60°C (14°F to 140°F), Duty Factor: continuous □ Frequency Stability: ±1.5 KHz □ Modulation Type: FM (F3) □ Antenna Impedance: 50 ohms unbalanced □ Power Requirement: DC 13.8V ±15% (negative ground) □ Current Drain: Transmitting: 2.5A Hi (10W), 1.2A Lo (1W), Receiving: 0.630A at max audio output, 0.450 at SQL ON with no signal □ Size: 58mm(h) x 156mm(w) x 228mm(d) □ Weight: approx. 2.2 Kg □ Power Output: 10W Hi, 1W Lo □ Modulation System: Phase □ Max. Frequency Deviation: ±5 KHz □ Spurious Output: more than 60 dB below carrier □ Microphone Impedance: 600 ohms dynamic or electret condenser type, such as the SM-2 □ Receiving System: Double superheterdyne □ Intermediate Frequency: 1st: 10.695 MHz, 2nd: 455 KHz □ Sensitivity: 1 uv at S+N/N at 30 dB or better, Noise suppression sensitivity 20 dB, 0.6 uv or less □ Selectivity: less than ±7.5 KHz at −6 dB, less than ±15 KHz at −60 dB □ Audio Output: More than 1.5W □ Audio Output Impedance: 8 ohms

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THE COVER

The sun rises at the N6CW/6 site. For a look at how you fared, see page 72.

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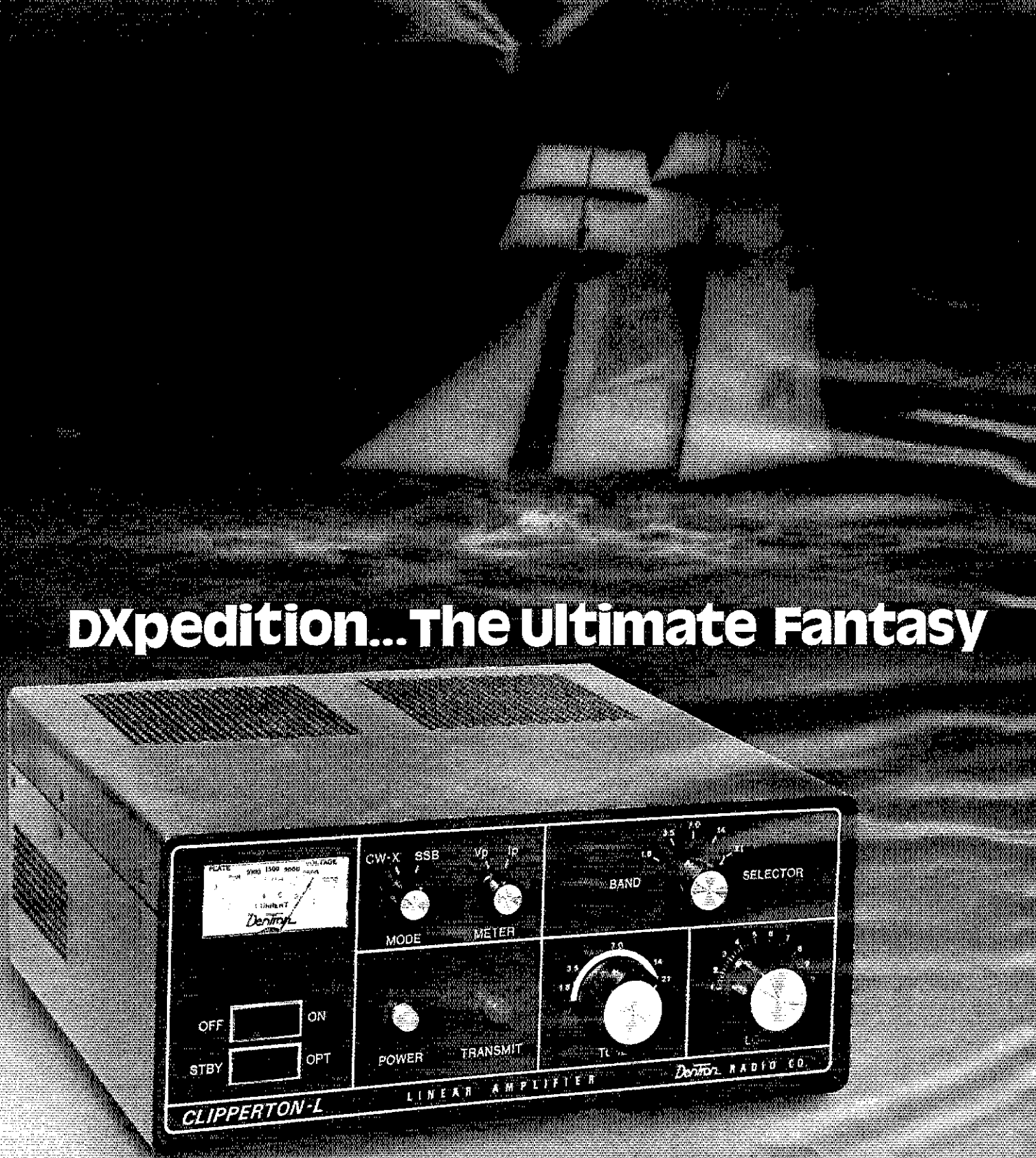
DXpedition...The Ultimate Fantasy



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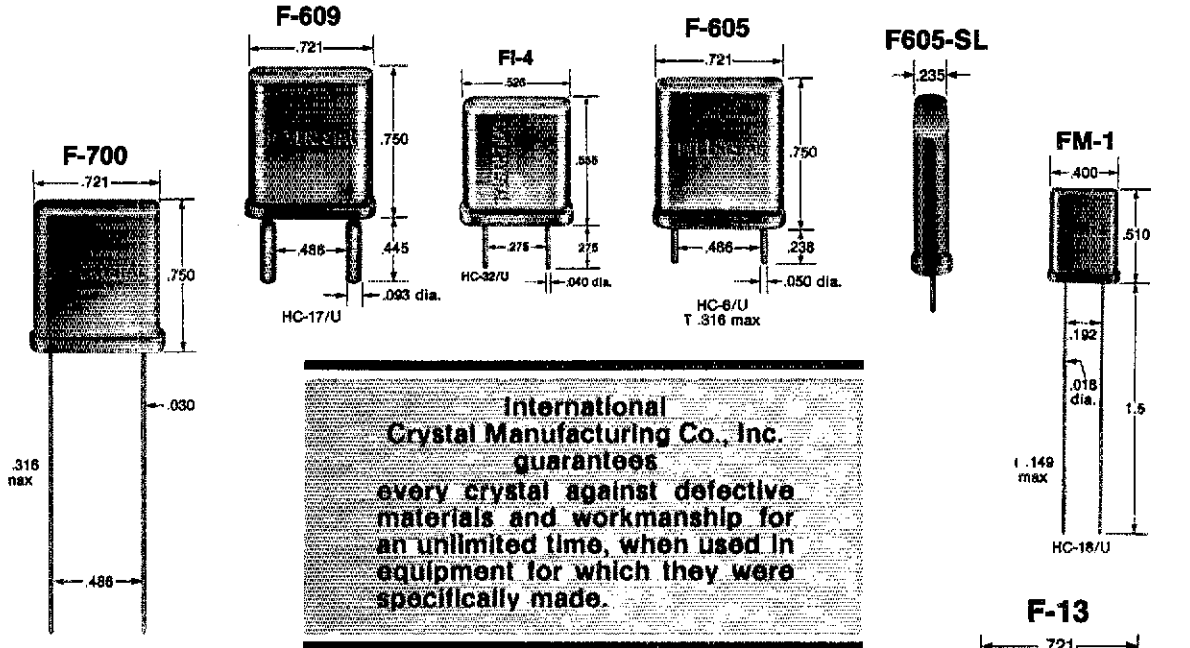

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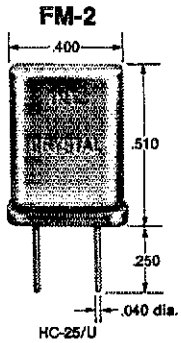

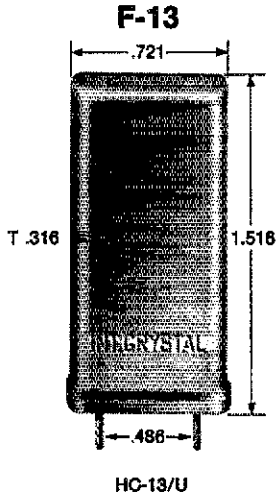

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"It Seems to Us..."

VHF Phone for Novices?

Once you get past the facetious photo caption, you will find a number of significant actions detailed in the September *QST* recap of the July Board Meeting. One that has stirred up some discussion is at Minute 51: "Moved, that the General Manager petition the FCC for Novice all-mode privileges on the amateur 220-MHz band." A quick review of recent and not-so-recent history may explain this move, and put it in perspective.

First, the idea of Novice phone privileges is nothing new. From its inception in 1951 as a one-year, one-time, nonrenewable "learner's permit" until the change to a two-year term in 1968, the Novice license conveyed phone and cw privileges at 145-147 MHz. Of course, this was prior to the explosion in fm and repeater activity, but there was enough a-m activity in metropolitan areas to give the new amateur a taste of phone operating. The problem was that those Novices who went on phone missed out on the code practice which was so important for upgrading to General. Until 1959 the Technician class license conveyed no 2-meter privileges, and at no time during this period did Technicians (except those newcomers who also held Novice licenses simultaneously, a possibility until 1970) have access to the high-frequency bands for code practice. Thus, Novice phone operating became a "dead end" for many who otherwise would have upgraded to General and beyond.

In 1972 the FCC "traded" Novice cw privileges at 145-147 MHz for 28.1-28.2 MHz; thus, when the Commission proposed its massive restructuring of the amateur licensing system in late 1974 (Docket 20282), the Novice license carried no vhf privileges at all. In Docket 20282, the Commission proposed a "dual-ladder" licensing structure, with separate tracks for hf and vhf operation. The entry grade of vhf license, dubbed the Communicator, carried privileges which most League members felt were excessive when compared to the examination requirements. The League conducted an in-depth survey of membership attitudes toward restructuring in the spring of 1975. The results of that survey, to which 56,000 members responded, were relied upon heavily in fashioning the League's counterproposals. In short, the membership rejected the dual-ladder structure, favoring a structure which integrated all license classes in a single, logical progression of increasing privileges.

In its counterproposals, the League proposed a "Basic Amateur" license with a written test similar in scope to the present Novice and with a Morse code recognition requirement. The Basic Amateur privileges would have included phone in a portion of the 2-meter band away from the repeater subband, and phone in the entire 220-MHz repeater subband. The license was to carry a five-year term, and was to be reobtainable upon reexamination. Because the written test would be identical, Novices would be given Basic Amateur privileges. These privileges were much more restricted than those proposed by the Commission for the Communicator.

In June 1976, the Commission released its First Report and Order in Docket 20282, adopting the single-ladder concept in preference to its own dual-ladder proposal. However, the Commission took no action on an entry-level vhf phone license, which had been one of the key issues in restructuring. In July 1976 in an effort to get things moving, the Board directed that the FCC be petitioned to add Basic Amateur privileges to those of the Novice license. This action was fully in keeping with the League position which had been developed, with full membership participation, the year before.

The July 1978 action of the Board is, in effect, a renewal of this position. Developments since 1976 have changed a couple of things: Repeaters are now permitted in the part of the 2-meter band which was originally envisioned as Basic Amateur territory, the Novice license is renewable for a five-year term, and more of the 220-MHz band is available for repeater operation. Activity on 220 has increased dramatically since 1975, despite the long-standing threat from Class E CB. Of course, it still lags behind 2-meter activity levels. None of these changes have diminished the desirability of an entry-level vhf phone license, or of stimulating more amateur activity on 220 MHz. To the contrary, the new 2-meter repeater subband has caused a slackening of interest in 220 MHz in some areas where the 146- to 148-MHz subband had been fully occupied, and where 220 was the best place to go with new repeaters.

Novice vhf phone operation has been a controversial issue since the inception of the license, and discussion of the issue is bound to continue. For critics of the League proposal, however, we have but one question: What do *you* propose as an alternative to stimulate 220-MHz activity?

— *K1ZZ*

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.

League Lines...

SPECIAL! LAST MINUTE NEWS: ON OCTOBER 12 FCC ORDERED A NOTICE OF INQUIRY FOR AN ADDED CB SERVICE AT 900 MHZ INSTEAD OF 220 MHZ. DETAILS NEXT MONTH.

Next year's World Administrative Radio Conference is being conducted by the International Telecommunication Union (ITU) in Geneva. The Secretary-General of that body had some mighty kind and encouraging words to say about Amateur Radio recently. Read page 59 and watch your own pride swell!

There will be a solar eclipse in Northwestern U.S. and Western Canada on February 26, 1979, and amateur communication is needed. See this month's "Happenings" for details.

Applications are sought for two Hq. positions -- assistant technical editor and lab technician. Need imaginative, energetic staffers requiring minimum supervision. Editor must have good command of English and firm technical background. Send resume or contact W1FB.

IMPORTANT NOTICE: Rates for Ham Ads, as well as all other advertising in QST, will be going up, effective with ads to be published in the January 1979 issue. The new rate for Ham Ads will be 70 cents per word. A special rate of 25 cents per word will apply for individuals seeking to dispose of or acquire personal equipment and for announcements of hamfests and conventions. All ads submitted for publication in January QST must be at the new rate. See Ham Ads, page 173, this issue, for full Ham Ad requirements.

Do you telephone ARRL Hq? Please help us by having your questions thought out in advance. It is a good idea to jot them down on a piece of paper before calling. This will enable our switchboard operator to make a faster determination of where to route your call and avoid keeping other callers on "hold."

A reminder: terms of some Advisory Committee members expire next month. League members may nominate other members for these appointments. See pp. 51-52 of September QST for details.

The 1978-79 ARRL Net Directory, with full information on over 600 public service nets, is now available. This attractive, newly revised pamphlet lists nets by name, area and frequency, explains how to check into a net, itemizes special Novice band nets, lists ARRL numbered radiograms and special Q signals for net operation, and much much more. For your free copy of this popular Communications Department membership service, send a self-addressed 9 x 12-inch envelope with 41 cents U.S. postage, to ARRL Net Directory, 225 Main Street, Newington, CT 06111.

Have we got a deal for you! Your club can get a complete set of ARRL publications at half price for donation to a local library. Three conditions: a) The purchaser must be an ARRL affiliated club; b) must send a letter from the library agreeing to display and circulate the manuals; and c) must send $45.00 with order. Sorry, we cannot bill.

Put your thinking caps on. We hope to announce in the December issue a contest for the establishment of an ARRL flag, in response to Minute 42 of the July meeting. Can you come up with a colorful and distinctive design?

Occasionally we at Headquarters receive a complaint from one of our members concerning a chain letter being circulated among radio amateurs. The Post Office has this to say about such activities: "Chain letters which request money, books, bonds, or other items of value, and promise a substantial return to the remitter, which is dependent upon the activities of those who follow in the chain, are regarded as nonmailable under the postal lottery and fraud laws, Title 18, U.S. Code, Sections 1302, 1341."

A Baseband Communications System

Part 1: Narrow-band voice modulation may be one of the biggest breakthroughs in Amateur Radio in three decades. This, the first of two parts, will enable you to understand how it works.

By Dr. Richard W. Harris,* and J. F. Cleveland,** WB6CZX

The December 1977 issue of *QST* heralded a unique method to conserve communications bandwidth and still allow high-quality voice transmissions.[1] This technique works at baseband (voice frequency range, in the case of speech), as opposed to an intermediate frequency or radio frequency. Thus it is applicable to virtually all types of analog and digital transmission systems. The system described in this article includes not only a newly developed frequency compandor,† but also the well-known but not extensively used amplitude compandor.‡ Use of both of these devices within the same baseband system offers significant improvements in adjacent-channel rejection and signal-to-noise ratio (SNR).

The transceiver baseband system operates just after the microphone on transmit and just prior to the speaker on receive. The frequency compandor filters the essential parts of speech and down-converts these electronically on transmission, thus providing a significant reduction in transmitted bandwidth. The narrower bandwidth creates less cochannel interference and allows the use of a

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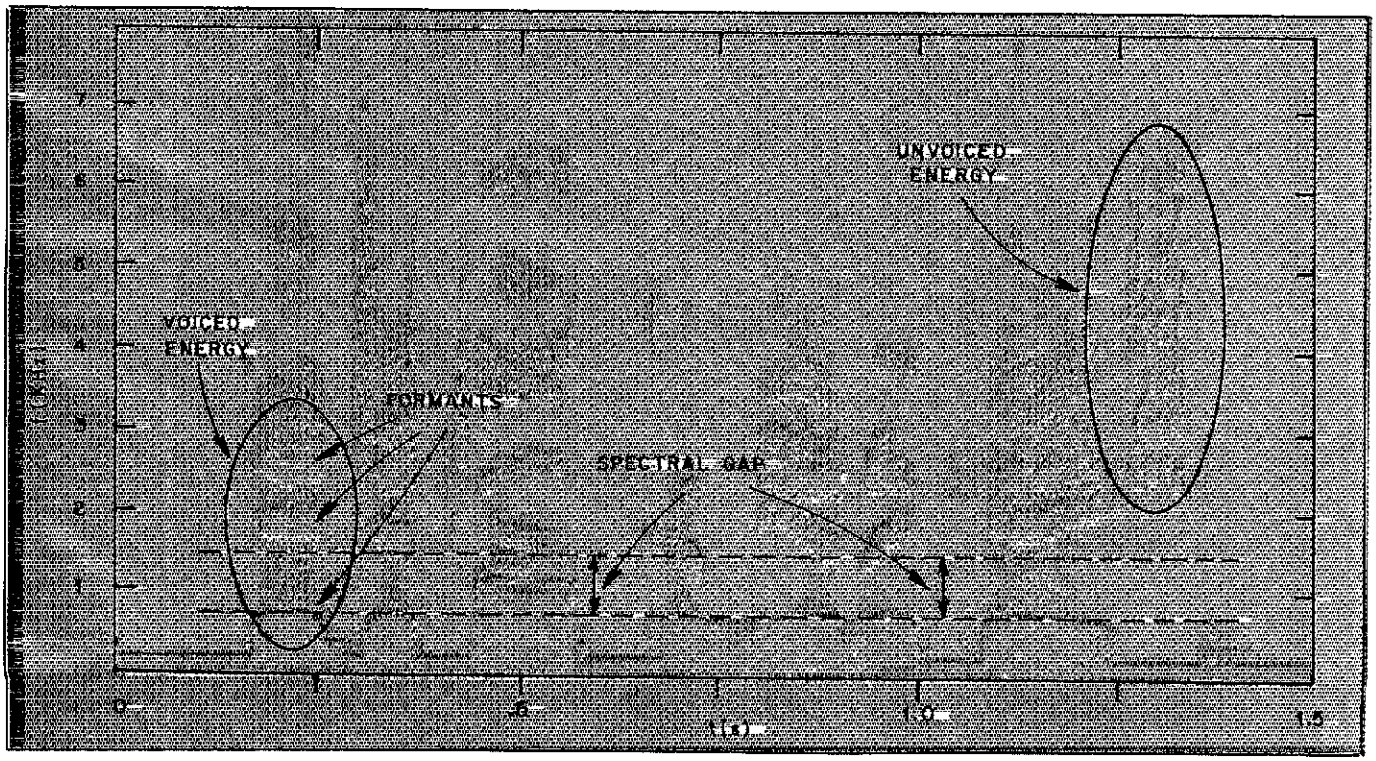
**305 Germaine Ave., Santa Cruz, CA 95065

[1]References appear on page 18.

†A frequency compandor compresses signal bandwidth on transmission and expands signal bandwidth on reception.

‡An amplitude compandor compresses signal amplitude on transmission and expands signal amplitude on reception.

Fig. 1 — A speech spectrogram of the utterance, "digital communication." The vertical axis represents frequency (80-8000 Hz), and the horizontal axis represents time (0-1.5 seconds).



narrower reception filter, which improves the system signal-to-noise ratio. Tests conducted for the FCC of the baseband system indicate that a signal 40 dB stronger and 2 kHz away from the operating frequency will not cause harmful interference.[3] A significant advantage of narrower reception bandwidth is that less noise power competes with the signal. Comparing the frequency-compandor noise bandwidth with that of a "typical" amateur receiver indicates that up to 3 dB can be achieved in signal-to-noise-ratio improvement.

The amplitude compandor, known since the 1930s but recently made practical and economical, provides significant advantages. It compresses the amplitude on transmission, and on reception expands the signal back to its original proportions. The FCC tests indicate that the SNR improvement is at least 13 dB, and as high as 15 dB in some cases. Adding the amplitude compandor allows higher voice quality over the usable communications range of currently designed ssb transceivers.

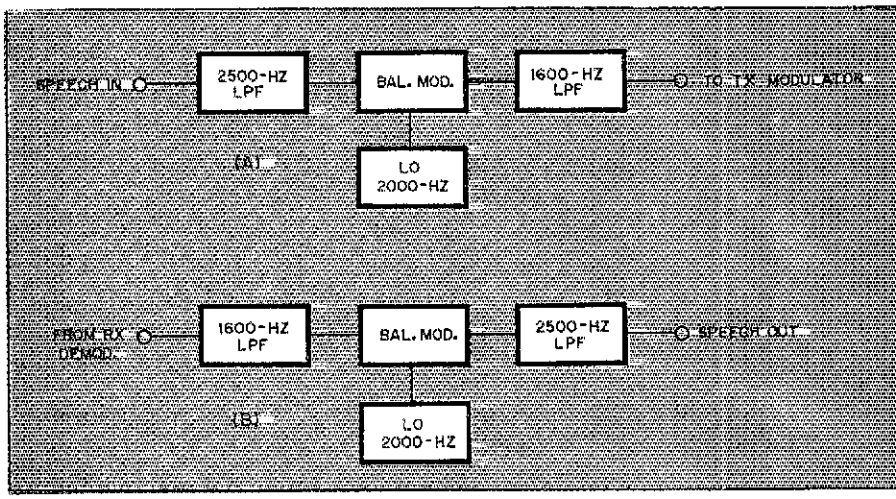


Fig. 2 — Block diagram of an early experimental version of the frequency compandor. LPF = low pass filter. At A is the transmitter frequency compressor and at B the receiver frequency expander.

What Is Speech?

A better understanding of how the frequency compandor works is achieved by considering the composition of speech itself. Acoustically, human speech consists of two types of sounds, voiced and unvoiced.

Voiced sounds originate by passing air from the speaker's lungs through the larynx (voice box), a passage in the human throat. The opening of the larynx is obstructed by vocal cords. As air is passed by these vocal cords they vibrate, causing puffs of air to escape into the aural cavity consisting of the throat, nasal cavity and mouth. Studies indicate that the acoustic waveform produced by the vocal cords contains many harmonics of the fundamental vibration. Because of the irregular shape of the aural cavity, the spectral amplitude distribution of the harmonics tends to show peaks at distinct points. As speech is produced, changes occur in the aural cavity shape, thus changing the spectral location of these peaks.

Fig. 1 shows a spectrogram or voice print of the utterance, "digital communication." The darkness of the bands indicates amplitude or voice strength. The fine structure of amplitude peaks very close together in the horizontal dimension is a measurement of vocal-cord vibration frequency or fundamental.

Notice the rather strong amplitude concentrations below 4000 Hz. These are the spectral peaks referred to above. They are called formants. The first three formants are shown in Fig. 1 at the beginning of the utterance. Properly processing these three formants is a major part of bandwidth conservation in speech.

Unvoiced sounds in speech occur when there is no vocal track excitation. They are caused by the speaker using his tongue, lips and teeth to cause clicks, hisses and popping sounds. These sounds, or evidence of their occurrence by formant extensions into or from an unvoiced sound, are very important in the intelligibility of speech. The spectral amplitude distribution of unvoiced sounds is generally above 1500 Hz and is "noise-like" in that very little periodic structure is present.

One other important aspect of speech is the pause between acoustic sounds. Juncture pauses carry meaning and cannot be eliminated without impairing intelligibility. Some long pauses can, however, be shortened and thereby reduce message length.

Briefly, then, speech is the continuous production of voiced and unvoiced sounds with appropriate pauses to add clarity and distinctness. Our measurements of voice from different speakers indicate that the first three formants lie predominantly below 2500 Hz. Speech consisting of these three formants is of good quality both from an intelligibility and listenability standpoint. Sufficient information as to the existence of some unvoiced sounds appears to lie in this range also. For example, to produce "s" sounds the frequency range must extend to about 4000 Hz, but this is not usually required for intelligibility since contextural clues provide sufficient evidence for the listener to "hear" an "s."

From a frequency point of view, evidence from theory and practice indicates a bandwidth of 300 to 2500 Hz is adequate for good-quality speech.

From an amplitude standpoint our tests, using single coherent tone interference, indicate a dynamic range of 40 dB is quite adequate for good-quality speech. Many communications channels only allow 10-30 dB of SNR, so equipment designed to preserve more than 40-dB dynamic range is not warranted.

To take advantage of the structure o speech for more efficient transmission w will first consider bandwidth conservatio and power. Bandwidth can be conserve basically at rf and baseband. Rf band width conservation involves the choice o modulation type, such as a-m, fm or ssb Amateur users have played a significan role in developing ssb, which is efficien with respect to bandwidth. Voice modulation methods more efficient tha ssb are not presently known. Thus, t conserve even greater bandwidth, it ap pears that audio bandwidth reductio prior to rf modulation and transmission i the only possibility.

Audio Bandwidth Reduction

The idea of conserving bandwidth a baseband is not new. Many technique have been used such as vocoder transform coding, waveform iteration time sampling, variable band vocodin and analytic signal rooting. Two of th more useful of these techniques emplo vocoders and time sampling.

Vocoders have been moderately suc cessful but typically reproduce voic which sounds mechanical, and they ar quite costly. There are many differen types of vocoders. Let us briefly describ the channel vocoder used in some militar communications.

Basically, speech can be thought of a being the sum of amplitude-modulate sinusoids. In a channel vocoder, 10 to 3 band-pass filters of 300- to 100-Hz band width are used to separate speech into in dividual sinusoidal components. Th amplitudes of the filter outputs ar measured and sent to a distant poin Knowledge of the transmitter-filter cente frequency allows the speech at the receive

to be reconstructed by modulating the measured amplitudes back onto a series of oscillators, the outputs of which can be summed to reconstruct the voice. Bandwidth is conserved because the component amplitudes vary only by a small amount. Vocoders can successfully communicate with only 600-Hz bandwidth, and higher quality systems with about 1200-Hz bandwidth. The poor quality in the past has discouraged widespread use of the vocoder.

The other more successful technique of those mentioned above has been time sampling. Because of the redundancy in speech (for example English is estimated to be 50-percent redundant), small segments of the time waveform (10 to 20 milliseconds) can be thrown away without serious degradation of speech intelligibility or acceptability.[3] Bandwidth is conserved by lengthening the time waveforms (compressing bandwidth) on transmission, and then shortening the time waveform (expanding bandwidth) on reception.[4,5]

Some commercial products using this technique are now available. Speech quality using this technique is good, but an inherent motorboating effect is heard which is caused by in-band sampling transients. This effect cannot be entirely removed.

Considerable effort has been expended to develop digital communications in recent years. The major motivation for this effort has been to provide secure voice, mostly for military users, by encrypting the voice when in digital form. However, digital communication is inherently broadband. The digital bit samples are not bandwidth conservative simply because their basic square waves have a much greater bandwidth than the basic sinusoidal analog waveforms of the speech they represent.

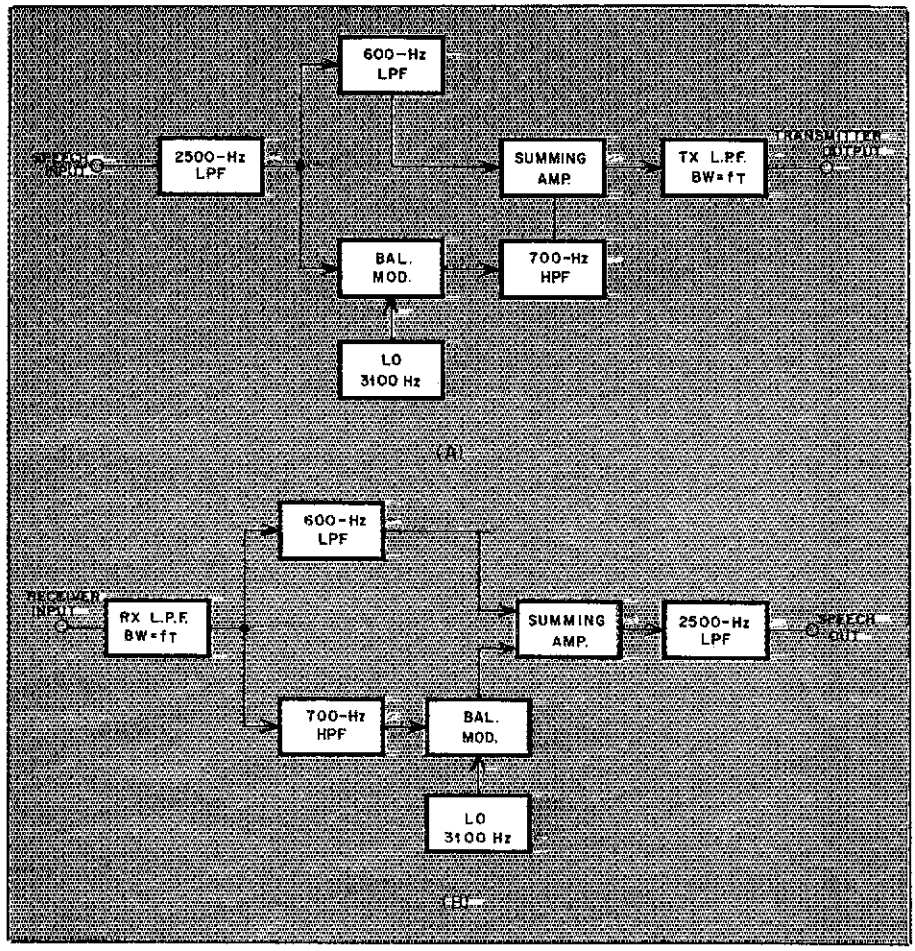


Fig. 3 — Block diagram of the final version of the frequency compandor. At A, the system for transmission, and at B, the system for reception. Audio frequencies in the range 1500 to 2500 Hz are inverted and transmitted as frequencies in the range 1600-600 Hz, for a total transmitted bandwidth of 1600 Hz. Intelligibility is excellent when processed through the receive circuitry. A system demonstration tape is available.* (System patents pending, VBC, Inc.)

The Frequency Compandor

Bandwidth-efficient techniques investigated by the authors have been only those which are of high quality from a communications standpoint, and can be produced in large quantities at reasonable cost with current technology. The system we devised allows flexibility in transmission and reception bandwidth so that reproduced audio quality can be tailored to an extent and still allow bandwidth conservation of up to a factor of two.

To explain the approach taken, again consider the spectrogram of Fig. 1. Notice that there are natural gaps between the first and second and between the second and third formants. There is little energy present in these gaps. An electrical system that could take full advantage of this fact would measure and track the first three formants and place narrow variable-bandwidth filters around each formant. Such a tracking system has been reported previously.[4] In this sytem the first formant filter was fixed and the second two formants were tracked with digitally implemented tracking band-pass filters. Although quality was reported to be good, the movement of the upper two band-pass filters produced a noticeable "swishy" noise in the background.

Observing the two major gaps between formants and also the fact that unvoiced and voiced sounds tend to be temporally independent led to the development of the system described here. It does not involve costly tracking filters which produce the objectionable swishing sound.

During system evolution it was first decided to conserve bandwidth by electrically reducing the gap between the second and third formants. The transmission and reception systems are shown in Fig. 2. The balanced modulator produced a spectral gap centered at 2000 Hz, which is close to the natural gap in speech (see Fig. 1). Although this system produced reasonable-quality speech, the distortion caused by high frequencies mixed to low and low frequencies mixed to high was objectionable. (However, much of this distortion can be eliminated by appropriate shaping of the 2500-Hz filter.) The biggest failing of this system is the fact that the second and third formants move over a fairly large excursion during speech. This is illustrated in Fig. 1 in which at some points the second and third formants essentially merge.

After extensive listening tests and consideration of various filtering and mixing combinations, it was found that the first formant is not as essential to intelligibility as the second and third formants. Furthermore, the gap between the first and second formants is wider than between the second and third formants, and it is more constant with time. As a result the system shown in Fig. 3 was developed.

To understand how the system works, note that two bands of speech are preserved, dc to 600 Hz and f_1 to 2500 Hz. The frequency f_1 is the low end of the second formant preserved and is variable depending on the transmission and reception low-pass filter cutoff frequency, f_T.

*To aid in the establishment of a data base as to the acceptability of the VBC, Inc. system, a demonstration cassette tape has been prepared. This tape presents male and female speakers in actual communications using ssb with and without baseband processing. Current plans are to make results of this acceptability evaluation available at a future date. To obtain a demonstration tape, send $5 to VBC Tape Request, P. O. Box 1289, San Mateo, CA 94401.

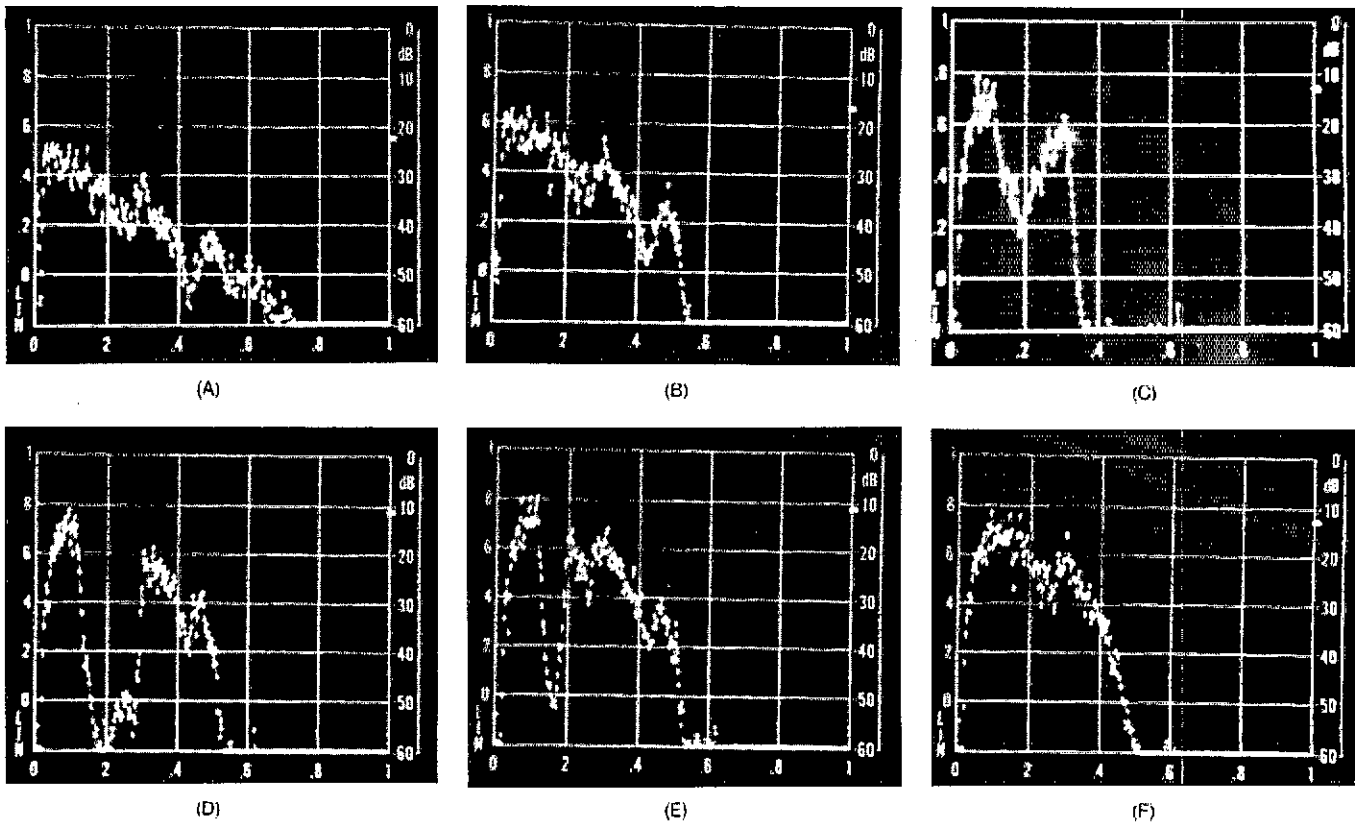


Fig. 4 — Long-time audio spectra for various points in the frequency-compandor system (see text). E and F show spectra for an expanded-range frequency-compandor system. The horizontal scale in each photo is 1000 Hz per division, and the vertical scale 10 dB per division.

In equation form

$$f_1 = 3100 - f_T$$

For example the two filter options developed by the authors provide either $f_T = 1600$ Hz or $f_T = 2100$ Hz. Both the transmission and reception filters have a 1.3 shape factor (3 to 30 dB). Thus the narrow system with a transmission bandwidth of 1600 Hz is designed to preserve speech from 350-600 Hz, which is the first formant approximation, and from 1500-2500 Hz, which is the band of contiguous second and third formants. The wider system with a 2100-Hz transmission bandwidth preserves speech from 350-600 Hz, as before in the narrower 1600-Hz system, but it also preserves the region from 1000-2500 Hz, which includes more of the lower end of the second formant.

Operationally, the first formant, 350-600 Hz, passes essentially straight through the system. The second and third formants are inverted and down-converted on transmission, then reinverted and up-converted on reception. Use of the 700-Hz high-pass filter aids in eliminating potential distortion products arising from high frequencies mixed to low on transmission and low frequencies mixed to high on reception.

Frequency Spectra in the Compandor

The various facets of baseband audio processing are more clearly understood by considering the following sequence of spectra in the system. Fig. 4A shows a long-time amplitude spectrum of input speech. The vertical amplitude scale is 10 dB per division and the horizontal frequency scale is 1000 Hz per division in all cases. In Fig. 4A note the presence of the first three formants and that speech components above 2500 Hz are 20 to 25 dB lower than those below 2500 Hz. The 2500-Hz low-pass filter at the input to the processor has an output spectrum as shown in Fig. 4B. The communications quality of this speech is very good. The baseband processor transmits this speech in a very narrow band and recovers it during reception.

The final transmitted spectrum using $f_T = 1600$ Hz is shown in Fig. 4C. Notice the extremely sharp roll-off above 1600 Hz. This signal has little chance of interfering with adjacent channels and allows an identical, very narrow 1600-Hz low-pass filter to be used at the receiver audio output. The receive 1600-Hz low-pass audio filter eliminates adjacent-channel interference.

The final compandor audio output for the 1600-Hz case is shown in Fig. 4D. Notice that the spectrum has been expanded and approximates the shape shown in Fig. 4B. While a gap does exist in the final output spectrum, the speech is of high intelligibility and recognizability.

If some additional speech features are desired, the transmission bandwidth can be widened by 500 Hz and the gap narrowed by using the 2100-Hz audio filter. This expanded output is shown in Fig. 4E. In comparing Fig. 4E with Fig. 4D, it is obvious that more speech is present in the second formant region. A common question is, "What would happen if we just used the final transmission low-pass filter only and listened to that speech?" A spectral output filtered by the 2100-Hz low-pass filter only is shown in Fig. 4F. Notice the absence of the third formant in comparison with Fig. 4E. This formant is essential for clear enunciation of words. It is preserved by the 2100-Hz compandor system. Loss of the third formant is, perhaps, the major reason why researchers in the past were not successful in merely cutting the spectrum down from the high end.

Comparing this bandwidth-compression scheme with the time-sampling method, it is interesting to note that small time gaps of *all* spectral components are lost in the time-sampling method. But in the frequency method presented here the loss of some energy in the frequency gap does not cause motorboating sound because the frequency errors tend to be spread over time.

A comparison of the roll-off characteristics of the 1600- and 2100-Hz final low-pass filters with respect to a typical amateur transceiver are shown in Fig. 5. Here it is obvious that both systems provide extremely sharp audio filtering capable of significantly attenuating adjacent-channel interference and nonlinearities not eliminated by the i-

filter. However, it may be pointed out that audio filtering has significant advantages over i-f filtering for eliminating nonlinearities.

Bandwidth conservation of the two systems can be estimated from Fig. 5 by computing the bandwidth reduction at several points along the roll-off characteristics and then finding the average savings. Performing this shows that for the 1600-Hz system a 50-percent bandwidth reduction is realized; the 2100-Hz system can yield a 33-percent bandwidth reduction. Converting the bandwidth savings to noise-power reduction and computing the increase in signal-to-noise ratio yields a 3-dB improvement for the 1600-Hz system, and 1.5-dB improvement for the 2100-Hz system. Laboratory measurements made for the FCC using actual speech did verify that a net SNR improvement is achieved. However, no extensive on-the-air testing has yet been performed.

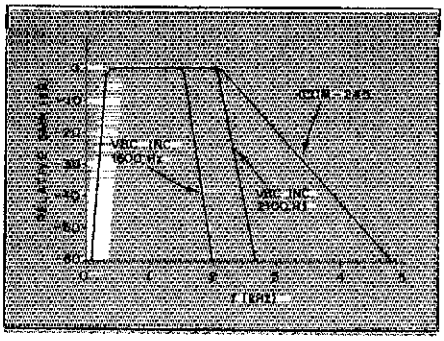


Fig. 5 — The audio amplitude response of two different options of the baseband communications system, compared to the frequency response of a commercially available amateur transceiver.

Efficient Power Usage — The Amplitude Compandor

Compressing the audio signal prior to modulation to achieve more efficient use of transmitter power has been widely used by amateurs. However, by compressing only the amplitude peaks, the background noise increases relative to the peaks. A significant advantage can be achieved by expanding the compressed audio at the receiver.

The positive effects of this expansion are illustrated in Fig. 6. A short segment of the speech time waveform is shown in Fig. 6A. When compressed and transmitted this waveform becomes noisy because of the compression and also because of the added circuit and radio-channel noise. This is shown in Fig. 6B. Notice the increased noise between the two passages of speech. After the waveform is processed by an amplitude expander (the receiving portion of an amplitude compandor) the waveform appears as shown in Fig. 6C. Now the noise during the quiet passage has been reduced relative to the high-level passages. The key point to improvement is that although the SNR during the loud passage is not as good as the input waveform, the SNR of the overall passage is much better than the passage would be if it had not been expanded. Noise during loud passages is not nearly as objectionable as noise between passages of speech.

Using a two-to-one amplitude compandor (Signetics NE571N),* our tests for the FCC indicated a measurable 12- to 15-dB improvement when using the full amplitude compandor (compression on transmission and expansion on reception) as compared to the case when it was not used. When only compression was used, significant SNR reduction resulted, even

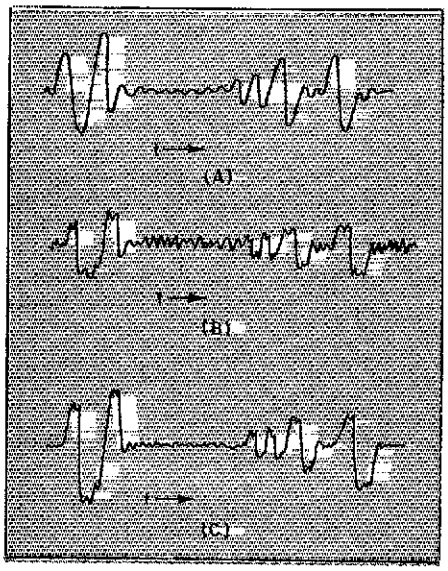


Fig. 6 — Speech waveforms for the amplitude compandor, showing amplitude (vertical axis) versus time, t. At A is the input waveform, at B the compressed waveform with additional circuit noise as might be received, and at C the expanded waveform. Note the improvement in signal-to-noise ratio upon expansion after reception.

though a higher average transmitter power was being used.

It is important to realize that the amplitude compandor will improve SNR, but only when it has sufficient signal to use as a reference. Thus it has a thresholding effect. As long as the received signal is a few dB above the noise, the expander can expand on the basis of the reference to make the communications channel have a cleaner signal over a wider dynamic range. But when the signal level drops into the noise the expander will not operate properly. Thus the SNR improvement has its limitations in providing significantly greater range, but it makes the signal much better over the range of usefulness than would be the case without compandor use.

If we consider that a certain SNR and corresponding voice quality were required, use of an amplitude compandor would allow the achievement of this goal with less transmitter power. In this respect, then, the amplitude compandor can achieve the same quality SNR with 12-15 dB less transmitter power. This is a significant power savings and can have a definite impact on the quality of communications per watt of transmitter power.

It is important to note that the frequency compandor, unlike the amplitude compandor, does extend communications into the noise because there is no thresholding effect inherent in the frequency compandor. Thus, use of both devices will save even more transmitter power and thereby provide more efficient communications.

Hardware System

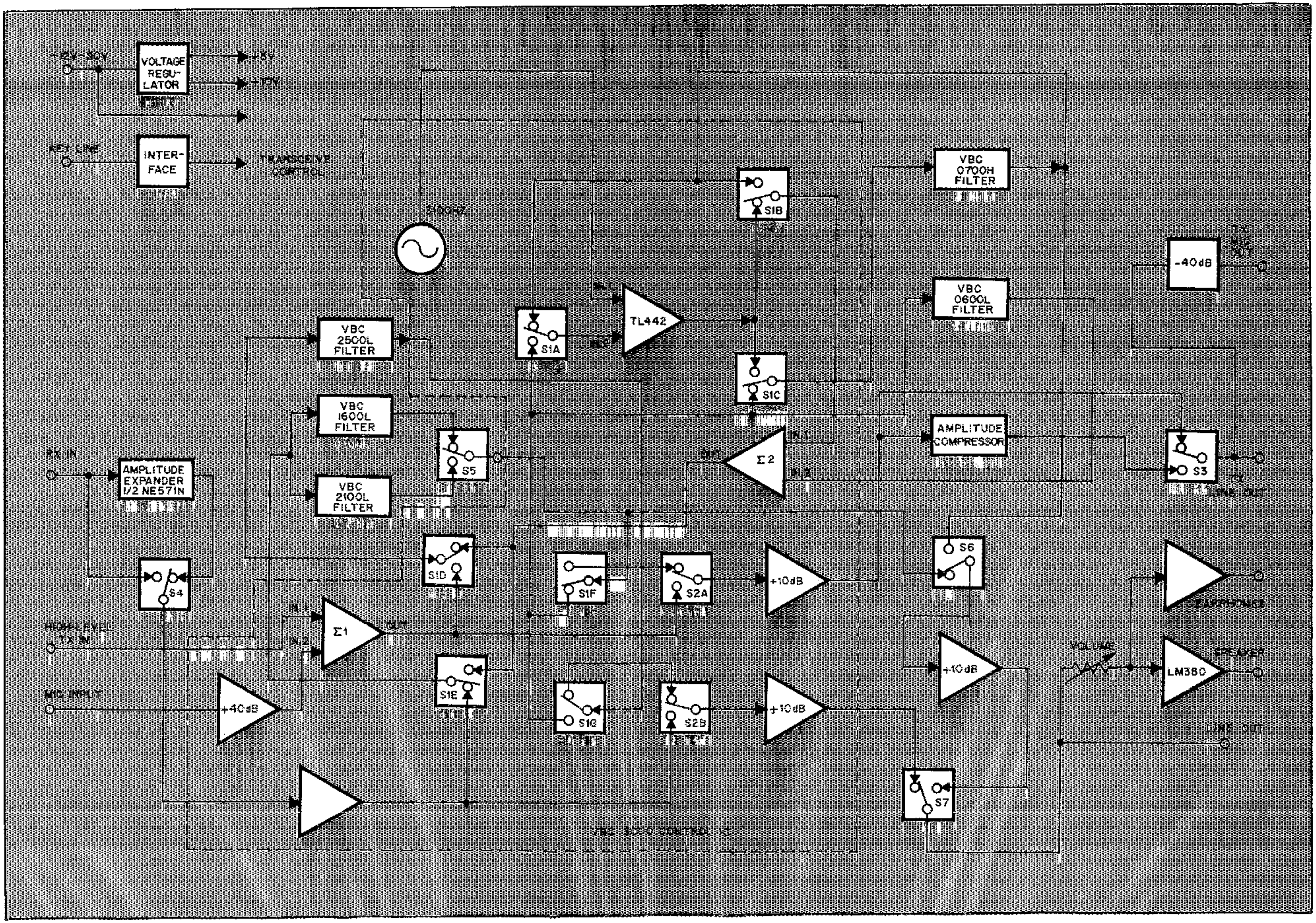
The frequency and amplitude compandor baseband system is designed as an add-on package. Because the system has not been extensively used in actual practice, considerable flexibility has been designed into it. For example, the user will be able to switch frequency-companding modes (2100-Hz and 1600-Hz bandwidths) and will be able to use the transmit and receive low-pass filters alone as audio filters. The amplitude compandor can be used independently from the frequency compandor, and it can also be used in the expansion-only or compression-only modes. Combination of the various filters also provides a band-pass filter for use in cw reception. The system is designed for use at baseband as an add-on unit for virtually all existing modulation formats for speech communications, such as a-m, ssb and fm.

The block diagram of a prototype voice processing accessory developed specifically for amateur use is shown in Fig. 7. Five custom hybrid integrated circuits make up the basic frequency compandor circuitry which includes provision for baseband transceive operation and system bypass (provided by sections of S1 and S2). A sixth hybrid IC plus an amplitude compandor and other peripheral circuitry has been added to increase the usefulness and flexibility of the overall device to the amateur. Since a considerable amount of audio signal switching takes place, CMOS analog switch elements are used wherever possible to minimize signal path lengths and therefore audio crosstalk. Dc control of the switch elements allows a much simpler logic-oriented selection of system functions and keeps control panel wiring to a minimum.

Refer again to the block diagram. The seven sections of S1 provide the transceive switching, shown in the receive mode. S2 allows receive and transmit audio to be connected directly through the system, thus bypassing the frequency compandor for standard voice operation.

In the transmit mode, S1 is in the

*A compandor with a compression of 1 dB out for every 2 dB in and an expander with 2 dB out for every 1 dB in.



VOLTAGE REGULATOR
+5V
+10V
KEY LINE
INTERFACE
TRANSCEIVE CONTROL
2100HZ
VBC 2500L FILTER
VBC 1600L FILTER
VBC 2100L FILTER
RX IN
AMPLITUDE EXPANDER 1/2 NE571N
S4
HIGH LEVEL TX IN
MIC INPUT
+40dB
Σ1
IN 1
IN 2
OUT
S5
S1A
S1B
S1C
S1D
S1E
S1F
S1G
S2A
S2B
TL442
Σ2
+10dB
VBC 0700H FILTER
VBC 0600L FILTER
AMPLITUDE COMPRESSOR
S6
S7
S3
-40dB
TX MIC OUT
TX LINE OUT
EARPHONES
VOLUME
LM380
SPEAKER
LINE OUT

position *opposite* to that shown in Fig. 7. Low-level audio from the station microphone is first fed to a 40-dB-gain preamp. The preamp output is summed with high-level audio energy, if present, and fed through S1D to the 2500L low-pass filter which limits the input bandwidth to 2500 Hz. The band-limited signal then passes through S1G to the input of the 0600L filter and also through S1A to the input of the TL442 balanced mixer. The 600-Hz low-pass filter passes the first speech formant to the summing circuit. The 3100-Hz oscillator at the other input to the TL442 mixer causes the output to contain a double-sideband audio signal with sidebands extending 2500 Hz either side of the suppressed 3100-Hz carrier. This signal passes through S1C to the 0700H filter which rolls off audio components below 700 Hz. The 0700H output passes through S1B to the other summing-circuit input. The output of the summing circuit then contains the original audio up to 600 Hz, plus the inverted audio from 700 to 3100 Hz, plus the opposite sideband above 3100 Hz. All that remains is to cut off this composite signal at the appropriate frequency to accomplish bandwidth narrowing. The summing-circuit output feeds through S1E to the 1600L and 2100L low-pass filters. The 1600L cuts off sharply above 1600 Hz and the 2100L does likewise above 2100 Hz. Thus if the 1600L filter is selected, the complete transmission signal includes the original components of the speech up to 600 Hz and the original components between 1500 and 2500 Hz, which are now inverted and transmitted between 600 and 1600 Hz. Use of the 2100L filter is the same except that original speech components between 1000 and 2500 Hz are inverted and transmitted between 600 and 2100 Hz. Some rolloff does begin on the upper (inverted) segment below 700 Hz due to the 0700H filter. This signal is fed through S1F and S2A to an output buffer amplifier. Neglecting the amplitude compressor momentarily, the signal is finally fed through S3 to a high-level line output and through a 40-dB pad to the low-level microphone output.

Comparison of the receive configuration diagram allows the reader to follow the reconstruction sequence of the narrow-bandwidth received audio from the receiver audio output. The process is essentially just the reverse of the transmission process. The recovered voice spectrum has a gap in energy between 600 and 1000 Hz or 600 and 1500 Hz depending on which transmission filter is used (1600L or 2100L). As explained previously, this spectral gap occurs in the region where less vital voice energy is present.

Table 1 lists the basic specifications of the frequency compandor portion of the baseband device operating as a standalone unit. Note that although the device responds to 50-Hz signals, moderate voice energy rolloff below 400 Hz performed by the transceiver is not only acceptable but highly desirable to obtain a pleasing tone balance in the recovered voice. Thus, the effective audio bandwidth at the input to the transmitter modulator is about 350 to 1600 Hz using the 1600 system. Linearity of subsequent rf stages in the transmitter affects the ultimate transmission bandwidth.

The basic operation of the Signetics NE570/571 amplitude compandor has been dealt with in a previous article,[7] except that major emphasis was not placed on the primary design purpose of the IC — amplitude compression and expansion. The NE571 has two identical halves, each of which can serve as an amplitude compressor or expander. The basic transfer function is 2:1. That is, in the compression mode, every 2-dB change in amplitude at the input is compressed to a 1-dB change in amplitude at the output. The expander performs the inverse function. The transfer curve is highly linear in nature except where purposely distorted as discussed below. This feature keeps harmonic distortion products to insignificant levels. The 0-dB gain point in the NE571 is set at 0.775 V rms input (0 dBm in 600-ohm systems) and its range extends plus 20 and minus 80 dB from that point. A 50-dB dynamic range is deemed adequate for voice communications and is also easily realized with the frequency-compandor circuitry. This is then reduced to about 25-dB range for transmission and is expanded back to 50 dB at the receiving station. Noise picked up via the transmission path is not compressed but, being lower in level than the desired signal, is expanded to an even lower level by the amplitude expander.

The excess dynamic range capability of the NE571 at very low amplitudes is not used in this system. Borrowing from telephone industry practices, the compressor is essentially turned off below a certain input level so that ambient acoustical noise at the microphone is not amplified to an annoying level by the compression process. Another interesting phenomenon occurs at the expander. If the full dynamic range is used and the signal input is quite low, the expander decreases this level to the point of inaudibility. In early telephone companding experiments the called party could hear nothing between voice passages and was inclined to prematurely hang up on the caller. So it appears that the expander should cease to expand signals below a certain input level so that a feeling of presence is maintained. This is accomplished by distorting the expander transfer curve so that little or no expansion occurs below a certain input level. The NE571 compandor allows this to be accomplished easily.

The compressor/expander continuously measures the level of the incoming voice signal. From this measurement a gain-control signal is developed to vary the "throughput" amplification (or attenuation) factor. The level measurement responds at a maximum 100-Hz rate, which corresponds to the shortest segment of typical speech at 10 ms duration. Faster response provides less compression advantage, and slower response distorts the time relationship of the speech passages. The process depends upon an amplitude

Table 1
Frequency Compandor Specifications

Parameter	Input		Output	
	Transmit	Receive	Transmit	Receive (Recovered Voice)
Cutoff Frequencies (Hz)				
1600 System	50-2500	50-1600	50-1600	50-600 and 1500-2500
2100 System	50-2500	50-2100	50-2100	50-600 and 1000-2500
Stopband Attenuation, min, (dB)				
1600 System		–90 @ 2000 Hz	–50 @ 2000 Hz	
2100 System		–50 @ 2000 Hz	–50 @ 2650 Hz	
Maximum Voice Levels, (dB) [0 dB = 0.775 V rms]	line, in, +10 mic, in, –30*	+10	line, out, +10 mic, out, –30	line, +10 dB earphone, +10 dB (2-kΩ load) speaker, 1.5 watts (8-Ω load)
Signal Port Impedances	line, 10 kΩ mic, 30 kΩ	10 kΩ	line, 1 kΩ mic, 600 Ω	line, 1 kΩ phone, 50 Ω
Suppression of 3100-Hz Carrier, min, (dB)			line, –35	line, –65

*Mic level set at maximum

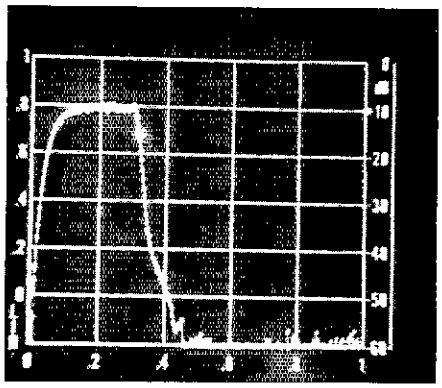


Fig. 8 — Spectrograph of the 350- to 1600-Hz receive filter.

Table 2.
Overall System Features.

Mode	Transceive	Transmit Only	Receive Only
Frequency Compandor			
1600 Hz	X		
2100 Hz	X		
Amplitude Compandor			
Compressor	X	X	
Expander	X		X
Receive Filters			
1600 Low Pass (Fig. 8)			X
2100 Low Pass (Fig. 9)			X
700-2100 Band Pass (Fig. 10)			X
700-1600 Band Pass (Fig. 11)			X
Straight Through	X		

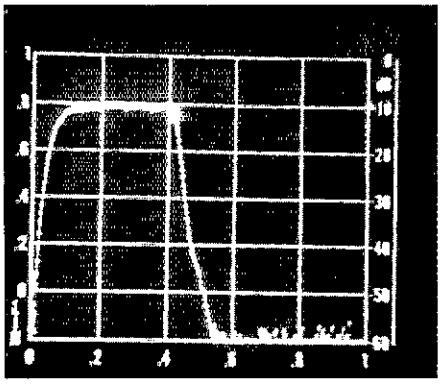


Fig. 9 — Spectrograph of the 350- to 2100-Hz receive filter.

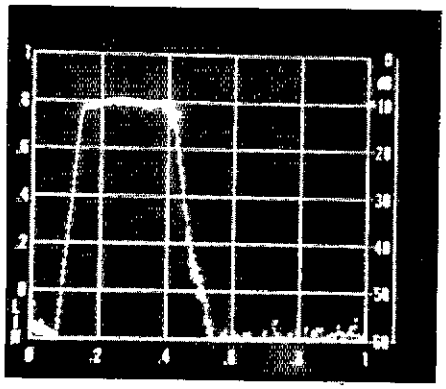


Fig. 10 — Spectrograph of the 700- to 2100-Hz band-pass filter.

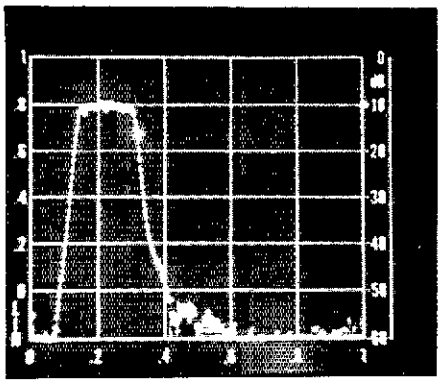


Fig. 11 — Spectrograph of the 700- to 1575-Hz band-pass filter.

modulation envelope to provide SNR improvement; therefore the amplitude compandor is "transparent" to constant-amplitude signals or signals which have modulation envelopes greater than 100 Hz. Fortunately, the typical on-off keyed cw modulation envelope falls within this range and the amplitude expander can provide an SNR advantage in this mode.

As shown on the block diagram, additional switching has been added to the prototype device to allow use of some of the active filters when the unit is not being used in the frequency-compandor mode. The additional switching is active only in the receive mode, the transmit signal being passed unmodified to the amplitude compressor or output. S7 puts the unit in the filters-only mode. S5 selects between the 1600- and 2100-Hz low-pass filters and S6 allows addition of the 700-Hz high-pass filter to provide a band-pass characteristic. Switch control lines (not shown) are fed to the front panel switches.

Also not shown on the block diagram is a voice feed-around switch operated by the keying circuit during frequency-compandor VOX operations. The frequency compandor is normally in the receive mode, and the microphone audio is fed directly to the transmit output. When the operator speaks, the radio transmitter VOX circuit energizes the transmitter, and the transmitter key line is fed back to the voice processor transceive control to put the unit into the transmit mode. In actual operation, this occurs so rapidly that the transition is not noticed.

The overall features of the amateur voice processing accessory are listed in Table 2. Note that the amplitude compressor, amplitude expander, and frequency compandor can all be selected to operate simultaneously or independently. Assuming reception of standard ssb transmissions, the receive filter options allow suppression of upper or lower adjacent-channel interference with voice degradation increasing with decreasing bandwidth. The 1600-Hz low-pass filter is not recommended for standard ssb reception but the 700- to 1600-Hz band-pass combination appears to be very useful in conjunction with the amplitude expander for cw reception. Bode plots of these receive filters, taken on a Spectral Dynamics model SD340 analyzer, are shown in Figs. 8, 9, 10 and 11. The plots include the typical low-end rolloff caused by the amateur transmitter.

The reader may question why the high-level inputs and outputs are provided by the system. The immediately obvious use for these inputs and outputs is for easy interface with a tape recorder for recording and playback of radio messages.

During development of this system, cost and quality have been considered at each stage. The desire is to provide technological solutions for the ever-increasing demand for greater communications volume with acceptable quality at a reasonable cost.

Part 2, to appear in a subsequent issue of *QST*, will present in detail schematic drawings of the system and information on how the amateur user can build or buy one of his own.

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Frequency-Measuring Tests Using a Product-Detector SSB Receiver

Costly frequency-measuring equipment preventing you from becoming an FMTer? Read how this author resolved the problem. Now he's really competing in the precision tests.

By Donald L. Upp,* WB8STQ

When I became acquainted with *QST* eight years ago, those reports on the quarterly frequency-measuring tests seemed rather dull and routine. The accomplishments appeared to be ones in a narrow field of interest. I wondered why anyone except those amateurs concerned with the official observing program would even become involved. After all, the FMT activities were established many years ago for the OOs and would-be observers. My attention to this section of *QST* was most casual. Little did I realize then that the future would bring about a surprising change of attitude.

What did not escape my attention was that two notable amateurs in my area consistently gained prominence on the FMT honor-roll listings. In time, as my general activity increased, I was most fortunate to meet both W8OK and W8CUJ. These two distinguished gentlemen readily impressed me as men of sincerity and character. Their warm friendship, interest and concern have shaped the course of my Amateur Radio life.

*52 East Sherry Dr., Trotwood, OH 45426

A Start in Frequency Measuring

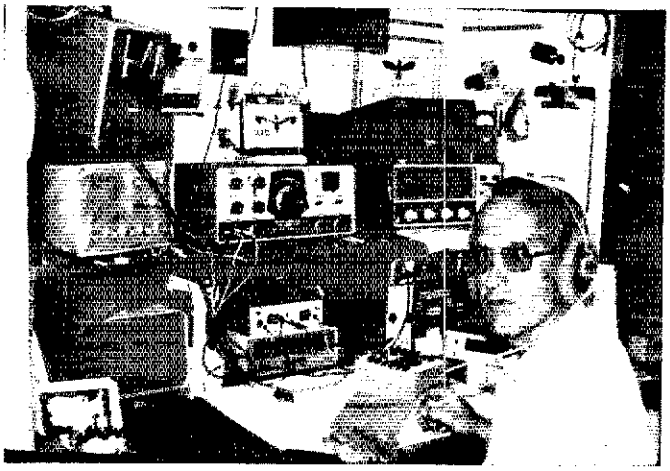
Conversations with W8OK and W8CUJ, as a natural course of events, aroused my curiosity about frequency measuring in general. I soon realized that I was giving more attention to the quarterly FMT reports. Other than these reports in *QST*, little additional written material seemed available on frequency-measuring activities. Perhaps the lack of information indicated that interest was not widespread. Nevertheless, W8OK and W8CUJ had motivated me to the point where I wanted to be part of the scene.

With a measure of impatience to get started, I launched my first attempts at frequency checking, limited by what little equipment I possessed. These efforts were crude and unreported. Yet they were the beginnings. While my station lacked the more refined equipment essential to precision measurements, inadequate reception clearly needed to be resolved. Could I really expect optimum performance from my HW-100 while depending on a ground-mounted vertical without radials? Those 80-meter signals, for instance, did little more than push the meter up to S3 at best. Performance on 40 meters was more decent, with S9 signals a common occurrence. But, on the negative side again, I was never able to bring in W1AW signals on 20 meters.

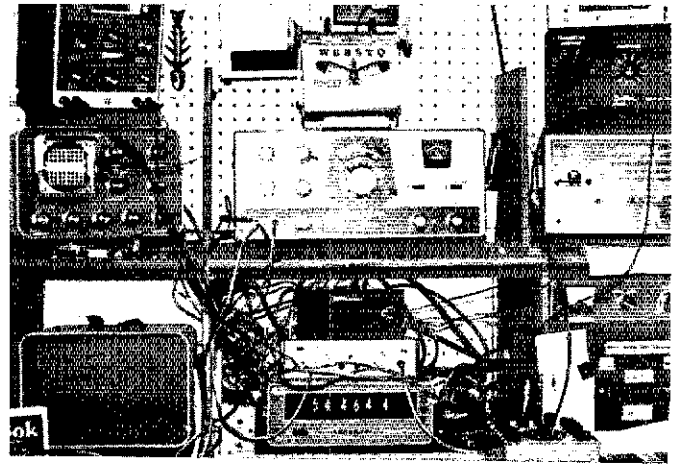
On Deck with the SB-650

Planned improvements for my installation included the acquisition of a Heath

WB8STQ during the November 1976 frequency-measuring tests.



The station setup at WB8STQ for FMT using divide-by-100 mode.



SB-650 frequency display. My reason for this particular choice is that it is compatible with the HW-100. This display operates with the Heath amateur receivers and five-band transceivers of the SB and HW series, covering the 3- to 30-MHz range. It calculates the received frequency to 1/10 kHz. The measured frequency is read out on six display devices.

Not long after the SB-650 went into service, I found that with a home-constructed, extremely narrow-band 750-Hz filter in the audio circuit, my equipment could measure the frequency of CHU (7,335,000 Hz) to within 25 Hz. But the final step in making the frequency check, admittedly, was done by ear and by "guesstimating" the relative length of the last-digit jitter. Satisfaction with this accomplishment was eventually overruled by a need to be honest with myself, admitting that 25 Hz was not good enough.

To make the honor roll in the FMT at the time I got started, 0.4 ppm was a requirement.* Results had to be better than 3 Hz (average) for all three frequencies used in the quarterly frequency-measuring tests.

While considering my intentions to achieve more accurate measurements, I did not fail to keep in mind the reception problem. Failure to hear even a whisper from W1AW on 20 meters was a significant loss, for the measurements on this band offered the greatest tolerance. Reception on 40 meters provided good signal strength but this was offset by heavy nighttime QRM that often makes activity on that band nearly a total loss. My frequency measuring seemed destined to be carried out on the 80-meter band where frequency checks had to be held within 1.8 Hz. Should the propagation produce a shift of 1/2 hertz and the umpire decided on the next higher (or lower) reading, all room for error would be lost — including any allowance for digital-display jiggle or line-voltage shifts. Tackling the reception problem, nevertheless, was not given top priority, all immediate effort being devoted to the electronic devices that perform the actual measurements.

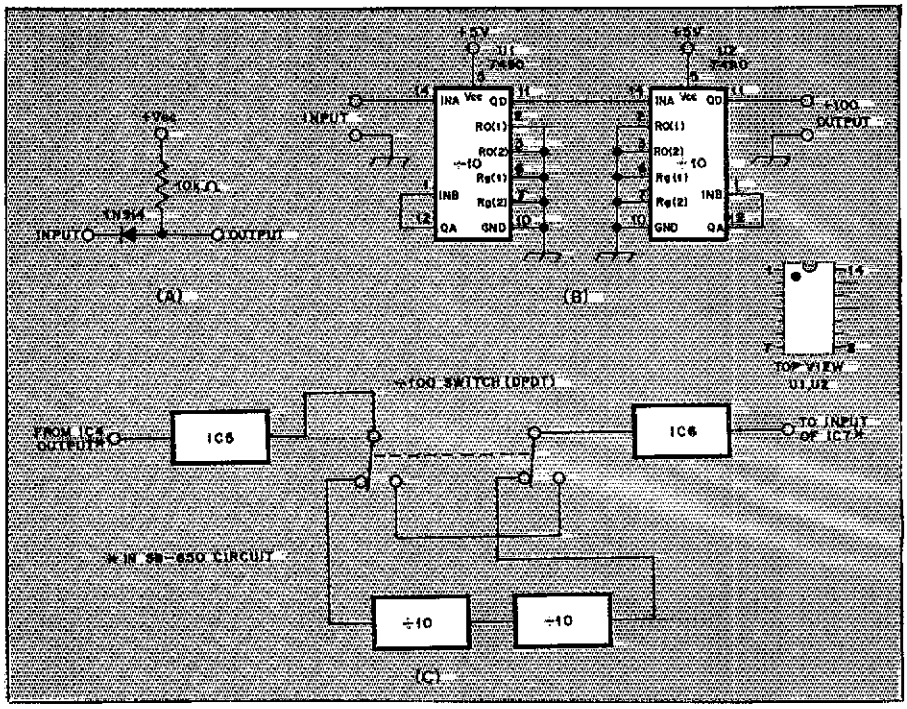
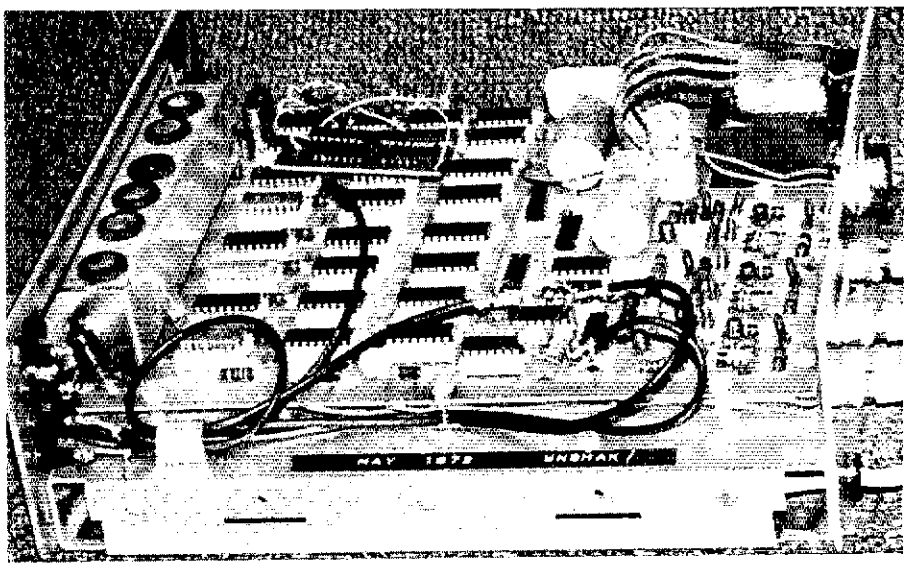


Fig. 1 — Circuits added in the modification of the Heath SB-650 frequency display. At A, a nonloading signal tap for TTL circuits using a high-speed switching diode. At B, details of the divide-by-100 circuit. Switching of the divide-by-100 system is illustrated at C. U1 and U2 are TTL decade-counter ICs. No connections are made to IC pins not shown in B.



The SB-650 with case removed. Pin jacks used in frequency reading are at the lower left. The divide-by-100 circuit board is at the upper left.

An Oscilloscope and a Frequency Counter

The Dayton Hamvention flea market furnished me with the next addition to my equipment inventory. After a $20 bill changed hands, I owned a second-hand oscilloscope which became a useful adjunct to an inexpensive but very stable Southwest Technical Products signal generator I'd recently constructed. Upon calibrating the generator against the 60-Hz power-line frequency, my equipment had the capability of measuring down to the 1.5- to 2.0-ppm range.

Progress is seldom achieved without some disappointment, and so it was with a frequency counter I built which did not increase the accuracy of my measurements. What the device did offer was an instantaneous readout of the frequency being checked. Work continued as I responded to an inner voice that kept saying, "Just have to get closer results!" The efforts produced a modest improvement with the range being lowered to the 0.8- to 1.5-ppm region.

Refer to the photograph of the SB-650 with the cover removed. The front-panel jacks, which you see from a side view, are for the buffered outputs of the HFO, BFO and VFO in addition to the 1-MHz crystal time base.

By going "down stream" one stage

*[Editor's Note: The procedure for the ARRL-sponsored FMT has been changed since Mr. Upp wrote his article. No longer is ppm used for measurement tolerances. Instead measurements are made now in terms of hertz. In order to qualify for Class 1 OO the new requirement stipulates that the frequency check must be within 100 Hz. In order to make the honor roll, the requirement is 5 Hz. Both tolerances, of course, must be within the umpire's readings. See page 76, May 1978 *QST*. At the time Mr. Upp made his frequency checks, the degree of precision under the 0.4-ppm requirement was 1.4 Hz at 3.5 MHz.]

from the inputs, a square-wave-conditioned signal can be taken off by means of a 10-kΩ resistor and a 1N914 switching diode (Fig. 1A). This arrangement allows the BFO and the HFO signal to be read with a frequency counter just prior to and just after the measurement run. Alternate readings of the audio beat frequency and the VFO frequency can then be taken rapidly.

This procedure is fine, provided that the line voltage does not change. A 1-volt displacement can induce a 2-Hz error. In my area, for instance, the line voltage may vary substantially during the late reading periods. Perhaps with a little practice I might have been able to obtain measurements within the 0.4-ppm limit, but I was convinced I'd find a better way.

Many of the dedicated FMTers might have volunteered the question, "Why not use a stable signal with 5- or 10-kHz points and just measure the beat note?" Surely that's a time-honored way, except that if one has a product-detector receiver in which the BFO cannot be turned off, there will be *two* beat notes. This simply means that by locking on one beat note, a product detector will provide two frequencies. Picking the right one could be troublesome, as in my case. Something up my sleeve resolved the difficulty: a number of SN7490Ns I had in stock. I jokingly tagged them "Destination SB-650," feeling quite certain that the search for a better way had ended.

Adding a Divide-by-100 Step

The digital modification of the Heath frequency display that followed paved the way to the real game of FMT. My plan involved the addition of a divide-by-100 step to the time chain with connections made at the output of IC4 (pin 11) and the input of IC5 (pin 14). See Fig. 1B. Going any further down the chain than the IC6 to IC7 stages would change the up-down-

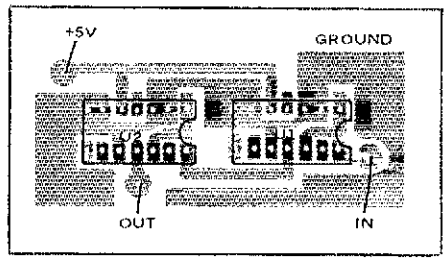


Fig. 2 — Parts placement guide for the WB8STQ divide-by-100 circuit. The shaded area represents an X-ray view of the copper pattern, the ICs being placed on the nonfoil side. The etching pattern for this board appears in the "Hints and Kinks" section of this issue.

down counter time relationships. The board layout is shown in Fig. 2, and you may see the board positioned in the upper left of the uncovered SB-650. The picture does not include the dpdt switch which I added later and appears in Fig. 1C.

Modification of the SB-650 was a rewarding effort. After a warm-up period of two hours, for stability, calibration against the frequency of CHU disclosed that at last my equipment had the capability of meeting those tight frequency-measuring requirements. With only 15 minutes of warming the error appeared better than 1 ppm. Following the more thorough warm-up the error remained constant and could be factored in any reading.

The Performance Report

My total score in the February 1977 FMT was 0.24 ppm. On the late 80-meter reading, I had five measurements that were exactly on the umpire's reported frequency. My other readings were plus or minus 1 Hz. A typical series in which the usb mode was used, so that all readings add, is as follows:

Band switch at 3.5 MHz.

SB-650 reading — 543561.

Audio to lock a single O on the oscilloscope — 882 Hz.

Calibration correction — add 3 Hz.

To apply the above information, add the numbers in this manner: 3.543561 MHz + 882 Hz + 3 Hz = 3544446 Hz.

By using the usb mode and adding the mathematical components, except possibly the correction factor, the chance for error at a sleepy-eyed 1 A.M. is minimized.

"Where did the variable error correction originate?" you might ask. The variation is mostly drift in the SB-650. The unit was not intended for this type of application, and thus has only a minimum of frequency stabilization. Furthermore, adjusting the time base to within 3-Hz error is nearly impossible, even on a short-time measurement using CHU as a standard. Because of the circuit delays and the timing/counting arrangement, the time base on mine must be set at 1000002.7 Hz to even be *that* close. But any error in ppm is virtually constant on the 80-, 40- and 20-meter bands. The short-time stability accounts for this feasibility. The poorest reading I obtained occurred in the early 80-meter run. My measurement was 0.57 ppm off that of the umpire, a difference of only 2 Hz. Therefore, you may appreciate what I mean about the need for close measurements.

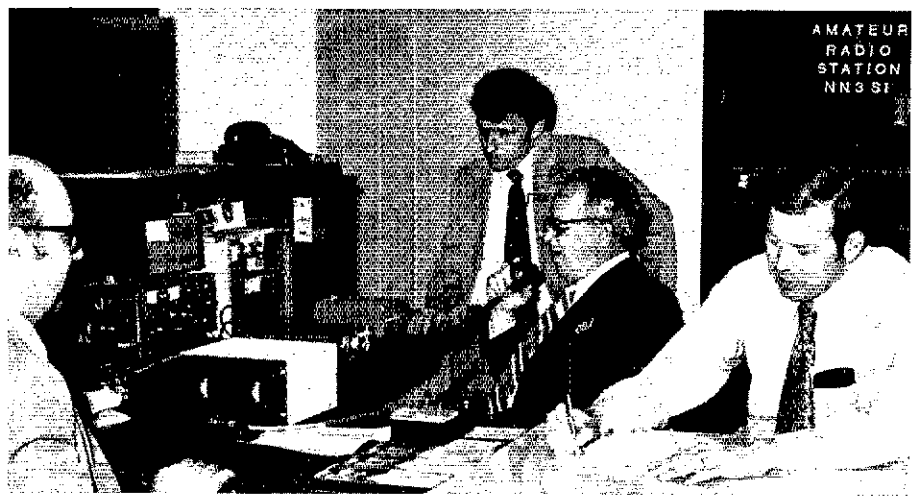
If the high price of equipment for frequency checking has discouraged you from participation in the FMT, I trust that these alternatives just outlined will renew your interest. I enjoy the challenge and also enjoy making equipment modifications to suit various needs, and I'm sure you will, too. As for modifying the antenna system, that too is in the works, with full anticipation of catching that elusive 20-meter signal from W1AW. So, in the months to come, you may see more of "STQ" in *QST*. QST

Strays

$5 FILTER SOLVES OSCAR MODE J DESENSE PROBLEM

If your 435-MHz receive system is sensitive enough to get desense from your 2-meter uplink, this filter should solve the problem. The filter, developed by ARRL's Club and Training Department, can be built from simple materials for less than $5.

To receive the description and drawing of this filter send a self-addressed, stamped envelope to ARRL C&TD Filter, 225 Main St., Newington, CT 06111. — *W9KDR*



More than 250 science educators from around the U.S. "met" OSCAR at the ARRL booth at the NSTA Annual Convention in Washington, DC. Jim Jipping, W8MRR, science teacher at Holland (MI) Christian HS, gave an excellent presentation on his classroom OSCAR work. At the Smithsonian's NN3SI, an OSCAR 7 demo was given by (l-r) K3RJA, AA4BE, WA4DMF and AA4SI.

The Two-Tone Tester

When used in conjunction with an oscilloscope, this simple device makes proper adjustment of ssb transmitters possible.

By Fred Brown,* W6HPH

Single-sideband transmitters require a perfectly linear input-output relationship in all stages between the sideband filter and the antenna. Any nonlinearity may cause splatter and "buckshot" extending many kHz either side of the ssb channel. A number of different techniques can be used to test transmitter linearity; three posible ways are shown in Fig. 1.

In Fig. 1A an audio-frequency sinewave generator is connected to the microphone input and relative transmitter output is indicated by an rf voltmeter. The audio voltage at the mic input is measured with an ac VTVM. These two meter readings make possible a plot of rf output vs. audio input, as shown in Fig. 2. If the plot is a perfectly straight line passing through the origin, it means the transmitter is probably linear. The reason this method is seldom used should be fairly obvious; it is tedious, time consuming, and every new adjustment requires plotting another curve.

*Box 2053, Rancho Santa Fe, CA 92067

With miniature components and careful layout it is possible to fit all parts into a 4 × 2 × 1-3/4-inch (102 × 51 × 44-mm) box. The 9-volt battery is mounted on the rear of the box for easy replacement. All components except the controls and R5 are mounted on a 1-3/4 × 3-inch (44 × 76-mm) perf board.

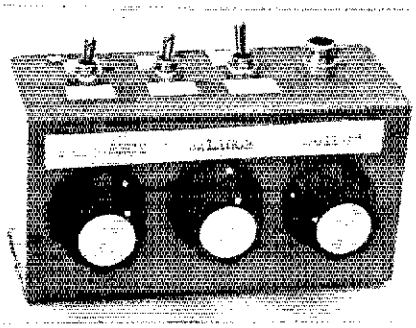
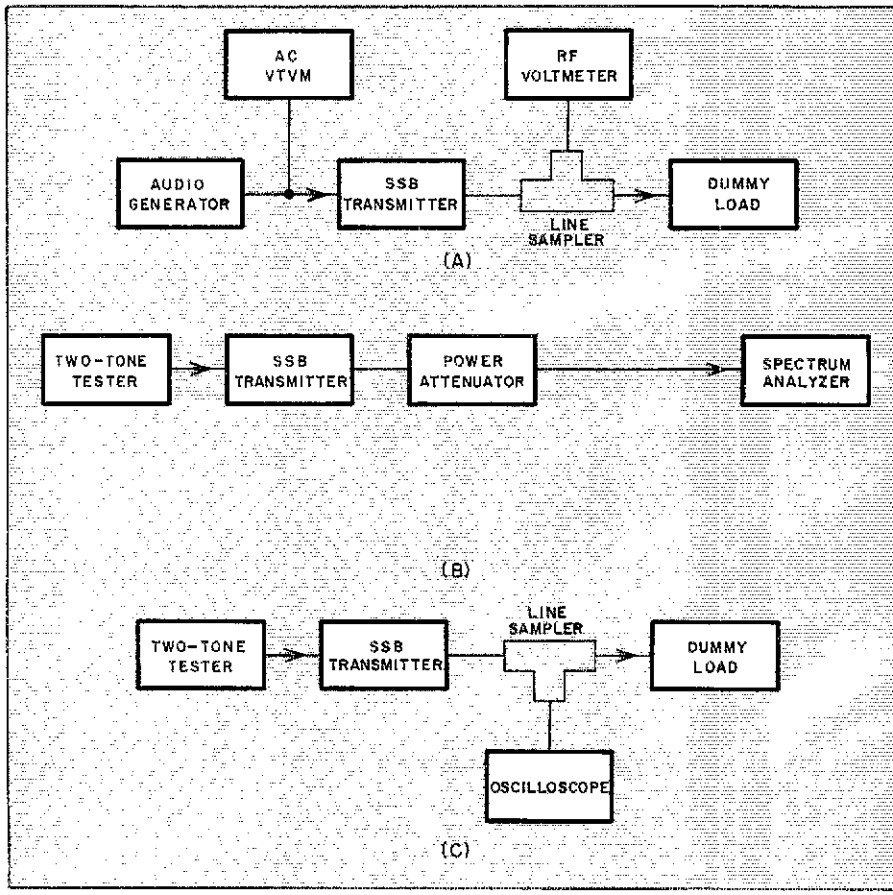


Fig. 1B shows another method of checking transmitter performance, one that is frequently used in the ARRL lab. Here, two audio tones are applied to the microphone input, and the transmitter output is observed on a spectrum analyzer. If the two audio tones are perfect sine waves, and if the spectrum analyzer has a calibrated amplitud response, it is possible to measure the ex act level of the distortion products relativ to full power output. This is the idea setup, and works beautifully, but i seldom adopted by the average ham sinc most of us do not have access to tha $10,000 spectrum analyzer.

Fig. 1 — Three ways in which transmitter linearity can be checked are shown below. The method at A requires laboriously plotting a curve of output vs. input. The method at B requires an expensive spectrum analyzer. The most popular method, at C, requires only a scope and two-tone tester.



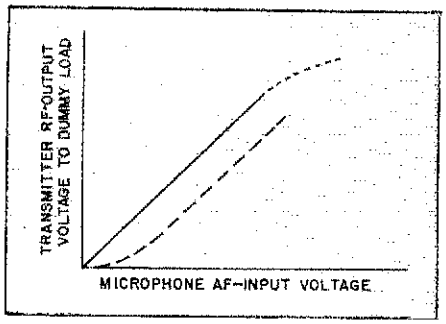


Fig. 2 — A properly functioning transmitter will result in a straight-line relationship between rf output voltage and microphone af input voltage, as shown by the solid line. The dashed line shows the type of nonlinearity caused by too much bias on the final amplifier or some intermediate amplifier stage. The dotted line shows the result of "flat-topping," or amplifier saturation.

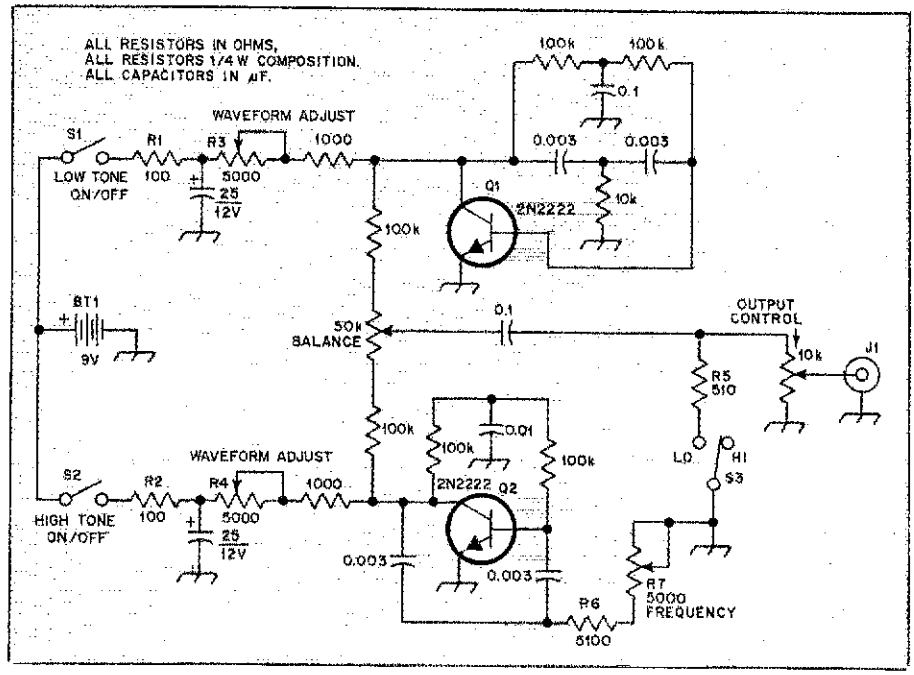


Fig. 3 — The two-tone tester utilizes a pair of twin-T oscillators. Transistors Q1 and Q2 can be 2N2222s, or similar npn silicon transistors. The waveform adjustment resistors, R3 and R4, are miniature trimmer pots, linear taper.

Fig. 1C shows the technique most widely used, and one that is discussed thoroughly in *The Radio Amateur's Handbook*. All that is required in this case is a two-tone input and a garden-variety oscilloscope. Any nonlinearity in the transmitter sufficient to generate distortion products higher in level than roughly 20-dB below the desired output will be visible as a distortion of the normal two-tone test pattern. Photographs of sample rf envelope patterns, along with their interpretation, are available in the *Handbook*. Some are reproduced here.

The two audio tones can be improvised with a pair of sine-wave audio generators, but this is a clumsy expedient, and also creates a procurement problem, as the average ham seldom owns even one audio generator. A compact two-tone tester in one package would be a very worthwhile addition to almost any station that uses single sideband.

Some desirable features of a good two-tone tester would be (1) pure sine-wave output with frequencies somewhere between about 600 and 2400 Hz, but not harmonically related to each other; (2) adjustable frequency of at least one tone so that the test pattern can be made stationary on the oscilloscope screen; and (3) adjustable amplitude of one sine wave so the two tones can be equalized in amplitude after passing through the sideband filter.

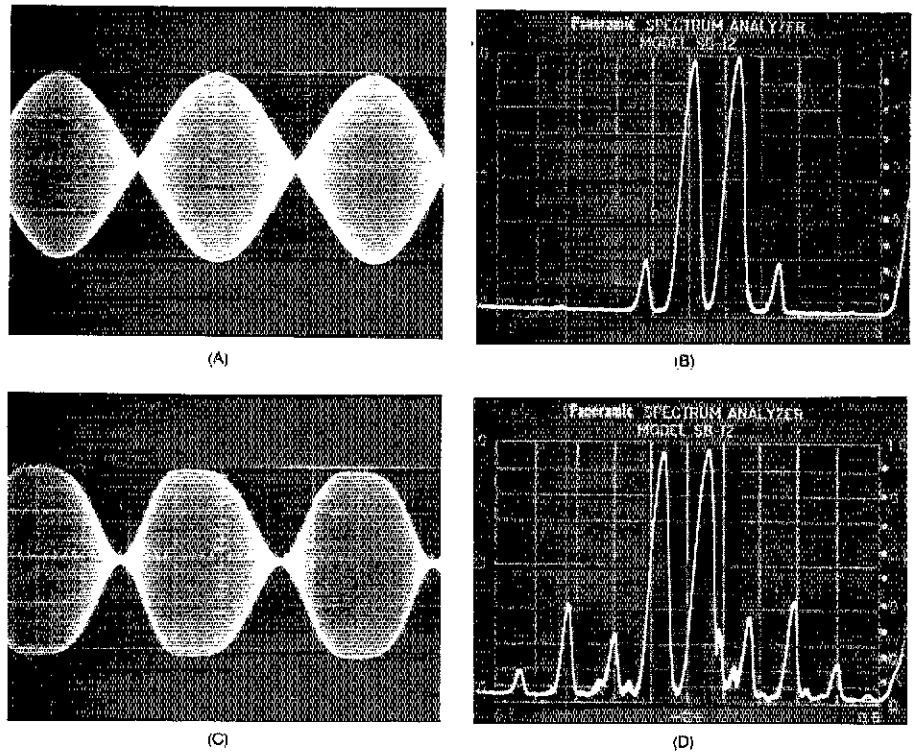


Fig. 4 — Scope patterns for a two-tone test signal and corresponding spectrum-analyzer displays. The pattern at A is for a properly adjusted transmitter; consequently the IMD products are relatively low, as can be seen on the analyzer display at B. At C, the drive level was increased until the flat-topping region was approached. This is the most serious distortion of all since the width of the IMD spectrum increases considerably, causing splatter, D.

The Circuit

A complete schematic of the two-tone tester is shown in Fig. 3. Twin-T oscillators were chosen because they are simple and, with proper adjustment, they can be made to produce quite pure sine waves. Q1 oscillates at a fixed frequency of about 1000 Hz, and the frequency of Q2 is adjustable between 1000 and 1300 Hz. The frequency difference of 0 to 300 Hz is about right for use with scopes having a horizontal sweep rate of 60 Hz, as it permits display of from one to five cycles of the rf envelope pattern.

The frequency range of Q2 can be made wider by substituting a 10-kΩ pot for R7, and then reducing R6 to about 3300 ohms, but it will be at the expense of less vernier in the frequency control. If this is done, it would be advisable to use a 10-turn pot for R7, to provide sufficient vernier action to easily stabilize the scope pattern. A 10-turn pot was not used in this unit because of space limitations.

Experimentally it was found that the twin-T oscillator is capable of producing a

quite pure sine wave if the collector resistance is carefully adjusted. It's not possible to specify values since the optimum resistance will depend on individual transistor parameters, and there is a wide variation from one transistor to the next. Accordingly, trimmer resistors are used for R3 and R4 in Fig. 3. These resistors are set for best waveform when the corresponding oscillator output is viewed on an oscilloscope. If you are a perfectionist, you can set the values with a distortion analyzer, but an ordinary scope will easily get you below 5 percent total harmonic distortion.

The two oscillators are independently switched by S1 and S2, which makes it possible to use one tone at a time for general lab work or for single-tone testing. Separate isolating resistors, R1 and R2, and decoupling capacitors, C1 and C2, are used in the supply leads to prevent any interaction or frequency-locking of the two oscillators.

The oscillator frequencies are determined primarily by the RC values used in the twin-T feedback networks. It's not important exactly what these frequencies are, so long as the frequency of Q2 comes close to that of Q1 with R7 set near one extremity of its range. The frequency of either oscillator can be fudged by shunting any of the resistors or capacitors in the twin-T networks.

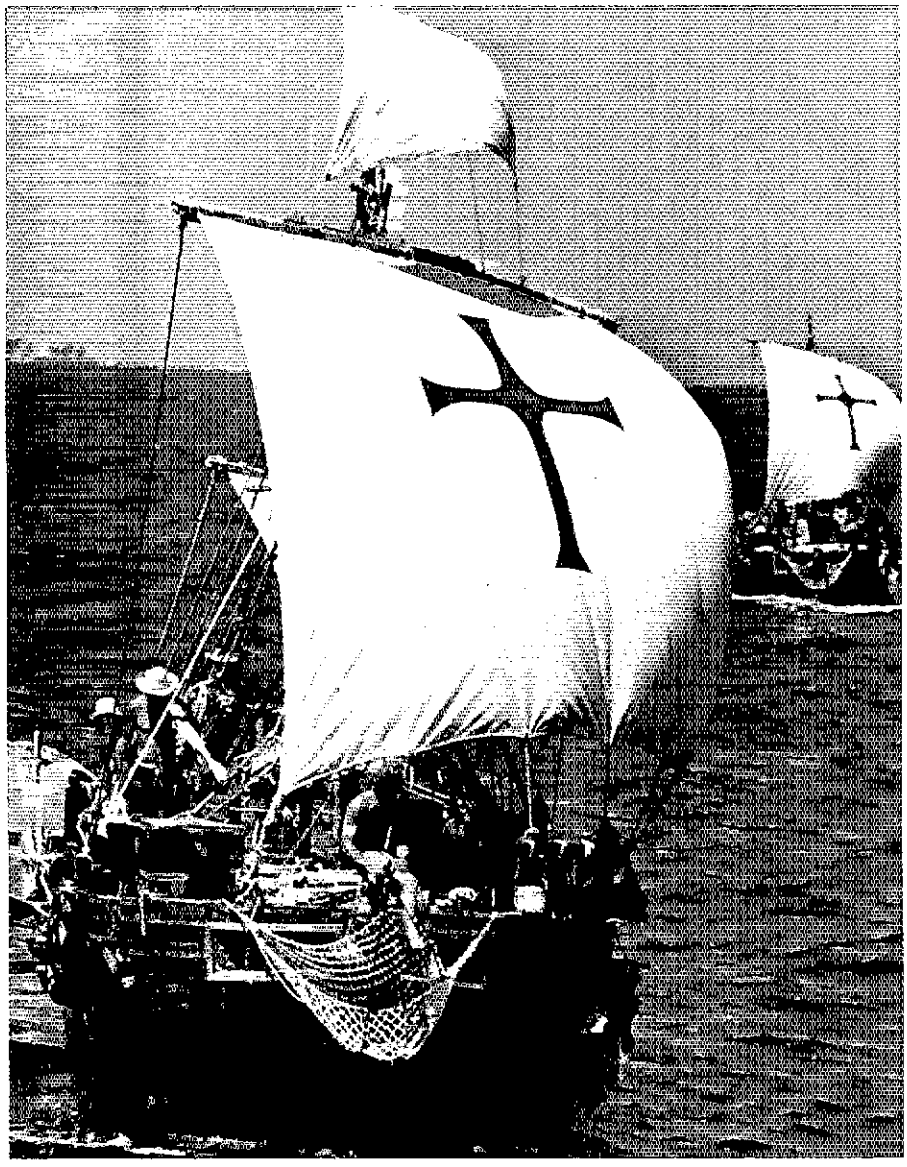
Single-tone output of the tester is about 120 mV, with S3 in the HI position. In the LO range, S3 connects R5 across the output control, and the maximum output is then about 10 mV, a convenient level for low-impedance microphone inputs.

One final word of caution: Remember that the two-tone tester will not produce meaningful scope patterns if applied to a transmitter that employs clipping or speech processing. QST

Strays

EL HOMBRE Y LA MAR EXPEDITION

☐ Aided only by 20th-century Amateur Radio for five adventure-filled months, Vital Alsar, XF1LM and his crew of 15 traversed the Atlantic in three primitive ships. Their voyage retraced a 16th-century gold and silver route. Having sailed on three 11-meter (35-ft) replicas of Spanish galleons 9000 km (5600 miles) from Tampico, Mexico, they were preparing to drop anchor in Santander, Spain.[1]



During the entire trip communications were maintained with radio amateurs via net operations on 14.135 and 14.280 MHz. Roberto Romero, XE1NF, ably handled the master of ceremonies chores at the Mexican end, while Manolo Estevez, EA1TI, was NCS in Spain.

In July, while sailing south of Florida, the flotilla developed equipment problems. Juan Granados, WD4LCD, who had been in contact with XF1LM since the voyage's start, suggested they lay over in Key Biscayne for assistance from the Radio Club Interamericano. For two days RCI hosted the voyagers while the hams repaired their two transceivers, rebuilt an auxiliary engine, and provided much-needed medicines and other supplies.

Once more the three galleons, *Anna de Ayola, Quitos-Amazonas* and *Cantabria*, set sail for Spain. Across the sea they braved the raging 100 mi/h winds and tempestuous 14-m (45-ft) waves of hurricane Ella. For a time the *Anna de Ayola* was blown away from the others, which created some anxious moments on both sides of the Atlantic until it was located.

The voyage actually began in an Ecuadorian jungle. On the bank of the Napo river, an Amazon tributary, Alsar and some fellow expeditionaries built the vessels. When completed, they sailed them down the Napo to the Amazon and on to the Atlantic port of Belem, Brazil.

Among the crew of 15 were 11 Mexicans, two Frenchmen, a Spaniard and an American. Most are city dwellers — a painter, three dentists, an engineer, an architect and an artist. They say they made the primitive voyage to prove man can overcome language barriers and rise above personality differences and the spoils of modern living. Certainly Amateur Radio on both sides of the Atlantic helped strengthen this view.

Many amateurs contributed to the success of this exciting adventure. Space limits prevent us from acknowledging all of them, but watch for a follow-up that will duly recognize the individuals who devoted countless hours to this team effort. — *WITKG and K1UJ*

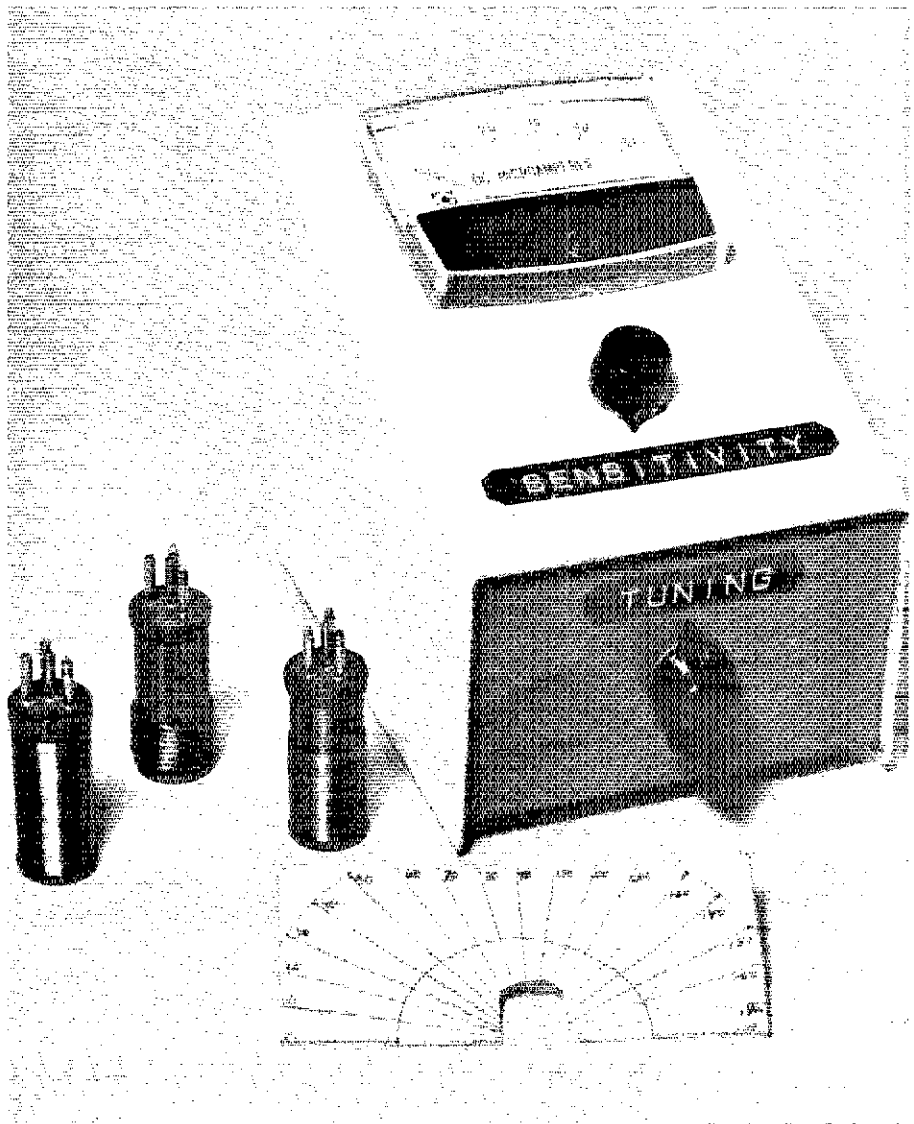
[1]At our deadline, they were within 160 km (100 miles) of their destination.

Calculating Component Values

Basic Amateur Radio: How do you find the value of an unmarked capacitor or inductor? With a dip meter and a general coverage receiver, you can make use of those "bargain-house" parts!

By Jim Bartlett,* K1TX

A lab-built prototype of the FET dip meter described in this article.



If you've ever built any electronic gadgets, you probably know what it's like to hunt for parts. Neighborhood electronic outlets are carrying fewer capacitors and inductors every day. Parts racks are being replaced with stereo displays, video games and the like. Many builders without large junk boxes are having to turn to the mail-order parts outlets for a large percentage of the items on their parts lists. Naturally the biggest savings on parts comes from buying bulk quantities of mixed values. Parts dealers buy many of these components from manufacturers who sweep them off production line floors. Unfortunately, many of these components are unmarked, or stamped with a manufacturer's part number at best. The newcomer may look at all those little blobs of wax with wires poking out the ends and decide not to buy any more "bargain bags." After all, you can't use them if you don't know what they are — right?

Most capacitors and inductors can be identified with the use of a *dip meter*, even if they contain no markings. If you've never used one of these gadgets, you don't know what you've been missing! Grid dip meters, and the newer FET dip meters are basically variable-frequency rf oscillators capable of indirectly monitoring the amount of rf energy absorbed from the instrument by a tuned circuit. When the resonant frequency of a tuned circuit is matched by the output of a dip meter, the tuned circuit begins to absorb some of the rf energy being radiated by the dip meter. As this happens, the grid or gate current

*Basic Radio Editor, *QST*

decreases. Therefore, by varying the oscillator frequency slowly and monitoring a meter that displays grid, gate or base current, you can determine the point at which the dip-meter frequency is equal to the resonant frequency of the tuned circuit.

Using this technique, you can determine the value of any unknown capacitor or inductor simply by matching up unknowns with known components of the opposite type (match unknown capacitor with known value of inductance, and vice versa). For example, let's say you had an unknown inductor, and you wanted to determine its value. In order to use the dip meter to find the inductance, you would first need to attach a capacitor of known value in parallel with the unknown component. This parallel combination would form a tuned circuit with a resonance at one frequency. The point of resonance is determined by the values for both the capacitor (which you know) and the inductor (the unknown), so therefore you can use this formula to determine the unknown value if you know the frequency and the value of the other component.

$$\text{Unk.} = \frac{\left(\frac{1000}{f \times 2\pi}\right)^2}{\text{known}}$$

where: f is frequency in MHz,
Unk. is either L or C,
Known is either L or C,
C is in pF, and L is in μH

This formula was derived from the one used to calculate the resonant frequency of a tuned circuit where both L and C values are known.

To find the value of our unknown inductor, we attach a known value of capacitance in parallel with it and then find the resonant frequency of the combination with the dip meter. After finding the resonant frequency, we apply this figure to the above equation, plug in the known value of C and solve for the unknown L. The equation is written so as to be easy to work with using common radio units of MHz, μH and pF, however, you can alter the formula if you wish to work with other units.

Let's look at some sample problems. In Fig. 1A we have an inductor of unknown value attached to a standard value of capacitance — in this case 100 pF. The resonant frequency of this combination is determined with a dip meter and found to be approximately 7.12 MHz. Using this figure along with the 100-pF value for our standard capacitor, we solve for the unknown in the equation above and determine our L to be about 5 μH. Next, we solve for an unknown value of capacitance. See Fig. 1B. Here we attach a 5-μH inductor in parallel with our unknown capacitor and use the dip meter to find resonance at approximately 13.7 MHz. Again, using the formula above, we solve for the unknown and find it to be about 27 pF. So you see, we can determine the value of practically any unknown capacitor or inductor simply by putting it in parallel with a standard value reactive component of the other type, and dipping to find the resonant frequency of the combination.

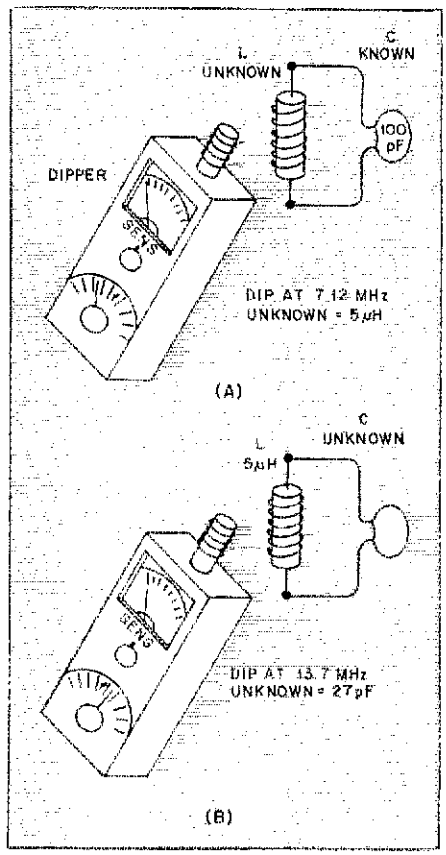


Fig. 1 — At A, a dip meter is used to determine the resonance of the unknown L and 100-pF standard-value capacitor to be 7.12 MHz. These figures plugged into the formula in the text yield a value of 5 μH for the unknown inductor. At B, the same process is used to find a value of 27 pF for an unknown capacitor.

Standard Values

In the above examples, we used components of known value, which we called "standard values." Actually, any value of inductance or capacitance can be used as a standard value, as long as you know exactly what the value is. Since you must enter this value into the equation every time you solve for an unknown, it is easier to use an even number — one that is easy to remember and which requires less keystrokes on the old calculator. The 100-pF and 5-μH values used in the examples are good enough for most calculations, and are also easy to find. One way to pick your standard value capacitor is to borrow or arrange to use a very accurate capacitance meter. Then obtain a batch of capacitors that are all marked 100 pF (or whatever value you wish to use). Preferably, these should be mica, and if they are 1-percent jobs that's even better. Measure each of the capacitors on the capacitance meter and determine which one is closest to the exact value you are seeking. If an accurate capacitance meter is not available and you have to use some other means to measure the components, select the capacitor that represents an average value of all components you test.

Once you have selected your standard value of capacitance, it is a simple matter to do the same for your standard value inductor. Again, if an accurate laboratory instrument is available for use in testing your value, use it. If you can't find one, don't worry. Simply use your standard value of C and your dip meter to obtain the values of prospective standard inductors.

Air-wound coils such as Miniductor, Polycoil and Air Dux make excellent standard values. They are easily cut to the proper size to yield the desired inductance value. In addition, they are less likely to exhibit self resonance than inductors wound on certain types of coil forms. Air-wound coils are also likely to have a higher Q than similar coils wound on forms. High Q is desirable in standard values of C and L because you can't control the Q of an unknown you wish to measure. In order to measure the unknown, you must be able to see the dip on the meter face. Sometimes this dip is very small or possibly appears as only a hesitation in the movement of the meter needle. To enhance the dip or make it more pronounced, a high Q is necessary in the tuned circuit under test. Therefore, since you don't know what the Q will be of any unknown you might happen to run across in the future, it's wise to keep the Q of your standard values as high as possible. Finally, make up your standard values as accurately as possible. Remember, the accuracy of all the measurements you make with your dip meter and standard values will be directly proportional to the precision of the standard values.

Using the Dip Meter

If you've ever used a dip meter before, you're probably aware that the dial calibration on most dippers is somewhat crude. To increase the accuracy of your measurements, use a general-coverage receiver or frequency counter to ascertain the exact frequency. If you use the receiver method, simply bring the dipper and LC combination within close proximity of the receiver. Then obtain the dip on the meter and note the frequency indicated on the dial. Tune the general-coverage set to the frequency shown on the dipper dial, and hunt for the audio beat note that should be produced in the receiver as it receives rf energy from the dipper. (See Fig. 2A.)

If you have a frequency counter and wish to use it to measure the operating frequency of the dip meter, you can couple the rf from one unit to the other through a

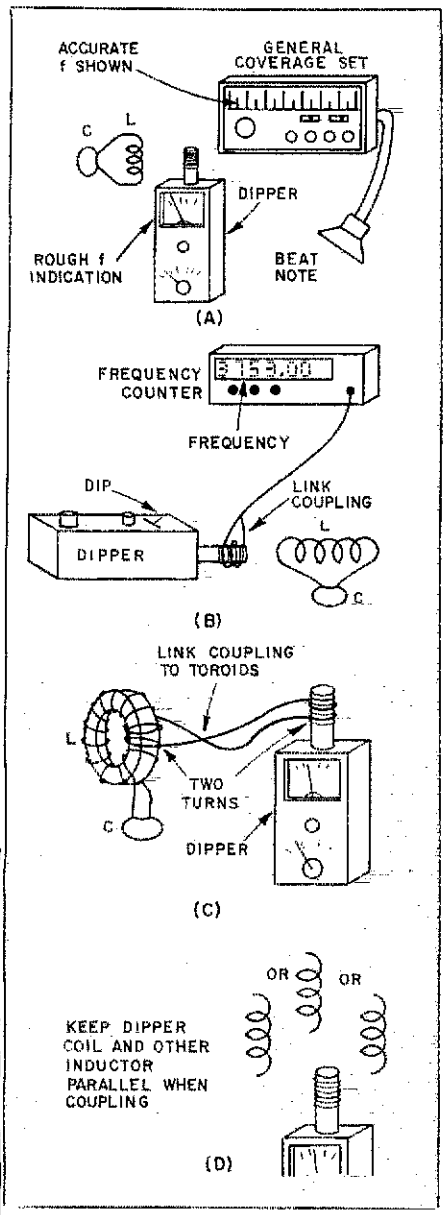


Fig. 2 — At A, the dipper is used in conjunction with a general-coverage receiver to achieve better accuracy in the measurement of frequency at the dip. At B, a frequency counter is used for the same purpose. Link coupling to a toroidal inductor is shown in C, and D illustrates the proper orientation between dipper coil and unknown inductor for coupling.

link wrapped around the dipper coil. See Fig. 2B. Alternatively, you may be able to couple enough energy from the dipper to the counter by simply hooking a short length of wire to the counter high-impedance input and bringing the dip meter close to the pick-up wire. This second method is less likely to cause the dipper reading to change since no extra turns are placed on the meter coil form.

Coupling to toroidal coils can't be done as easily as to conventional inductors because of the toroid's inherently superior shielding. To circumvent this, wrap a turn or two of insulated wire around the dip-meter coil and feed the end of the wire through the toroid core twice as shown in Fig. 2C. Connect the two ends of the wire together so that a complete loop exists between the dipper and toroidal inductor. Attach the parallel capacitor, and you're ready to hunt for the dip. Adjust the degree of coupling by sliding the turns which are wrapped around the dipper coil. Slide them up and down so they change in proximity to the coil windings themselves.

When you are using the dip meter, try to keep the coil away from any metal objects that could affect the tuning of the oscillator. Be especially wary of desk tops containing metal. If you must use a tabletop that you know or suspect contains metal, elevate the circuit under test and dipper a few inches using a stack of newspapers or magazines.

As you couple the dipper to the inductor of a tuned circuit, you will notice that the closer you get, the more pronounced the dip. A strong dip looks good, but try to resist the temptation to couple extra close on all measurements. If you *do* couple closely and obtain a sharply pronounced dip, you'll also probably notice that the dip is not symmetrical. That is to say that as you sweep the frequency-tuning knob through its range you will notice that although the meter dips slowly *down*, it doesn't return at the same rate on the other side of resonance. This occurs because overcoupling causes the oscillator to pull, keeping it from tracking properly with the tuning dial. This kind of dip is not only unstable, it is undesirable because it does not occur when the frequency dial is showing the actual resonant frequency, and therefore creates inaccurate measurements.

To avoid the overcoupling problem, dip your coils in this manner: Bring the meter slowly toward the inductor as you are repeatedly sweeping the dipper through the frequency range. When you notice a dip in the meter reading, pull the dipper away from the inductor. If the dip you observed was a true dip and not one due to a self-resonance inside the dipper or coil, it should disappear when the dipper and inductor are separated. When the dip is no longer evident, bring the dipper closer to the inductor under test again, watching closely for the dip to reappear. The point at which you can just detect the dip is the point of optimum coupling between the dipper and inductor, and the point at which the most accurate measurements can be made.

Building the FET Dipper

If you don't already own a dip meter, you might consider buying or building one. Commercial dip meters, both new and used, can be found at hamfest flea markets, and some kits are available. As an alternative, you may want to build a meter from scratch. Fig. 4 shows the schematic diagram for an FET dip meter that can be built inexpensively. Many parts are available from Radio Shack or

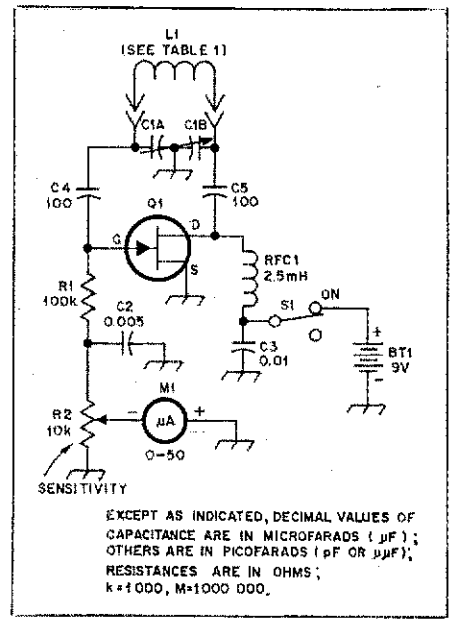
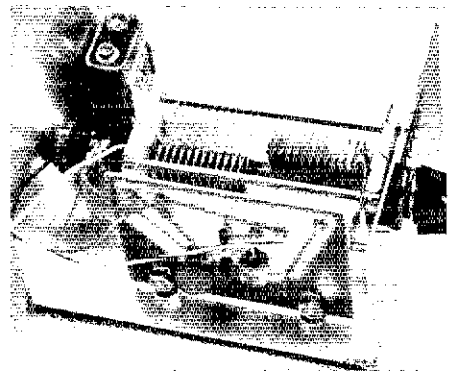


Fig. 3 — The schematic diagram for an FET dip meter using a single active device. Part numbers in parentheses are Radio Shack's unless stated otherwise.

BT1 — 9-V transistor radio type battery (23-464).
C1 — Air-variable capacitor, 2 sections, 100 pF per section (Johnson 167-53).
C2 — 0.005 μF disk ceramic (272-130).
C3 — 0.01 μF disk ceramic (272-131).
C4, C5 — 100 pF silver mica (Calectro A1-006).
L1 — See text and Table 1.
M1 — 0-50 μA meter movement (22-051).
Q1 — MPF102 FET transistor (276-2036).
R1 — 100-kΩ 1/4-watt composition (271-1300 or 271-000 series).
R2 — 10-kΩ potentiometer (271-1715) with spst switch for S1 optional (271-1740).
RFC1 — 2.5-mH choke (2.2 mH Miller 73F223AF).
S1 — Spst toggle switch (or switch ganged with R2).
Misc. — Cabinet, battery holder, battery clip connector, knobs, enameled and insulated wire, coil forms, coil socket, rubber feet, paint. (2-pin plugs and sockets suitable for use with pill vials to make plug-in coils are Radio Shack 274-342.)



The inside layout of the FET dipper. Note the short leads used between the pc board and the coil socket and C1. Although commercial forms and socket were used in the prototype, you can use an old tube socket and wind your coils on old pill vials or plastic 35-mm film containers fitted with pins salvaged from vacuum tubes. Alternatively, you can use pill vials with the 2-pin plugs and sockets indicated in the parts list of Fig. 3.

Table 1
Recommended Coil Values for L1

Inductance	*Coverage in MHz (approx.)*	*Construction†*
300 μH	1.2-2.4	76 t. no. 32 e.w.
82 μH	2.3-4.7	36 t. no. 30 e.w.
21 μH	4.6-9.2	18 t. no. 24 e.w.
6.5 μH	8.2-16.6	8 t. no. 24 e.w.
1.7 μH	16.2-32.6	5 t. no. 16 e.w.
0.9 μH	22.2-44.8	3 t. no. 16 e.w.
0.3 μH	38.4-77.6*	3 t. no. 12 on 1-inch OD form, spaced to give 2-inch total length
0.08 μH	74.5-150*	"Hairpin" no. 12, 2 inches long, 3/8-inch wide

t. = turns, e.w. = enam. wire

*Depending upon construction techniques, the dipper may not operate well above 50 MHz.
†First six coils all close wound on 20-dram pill vials (1-1/2-inch or 38-mm outside diameter).

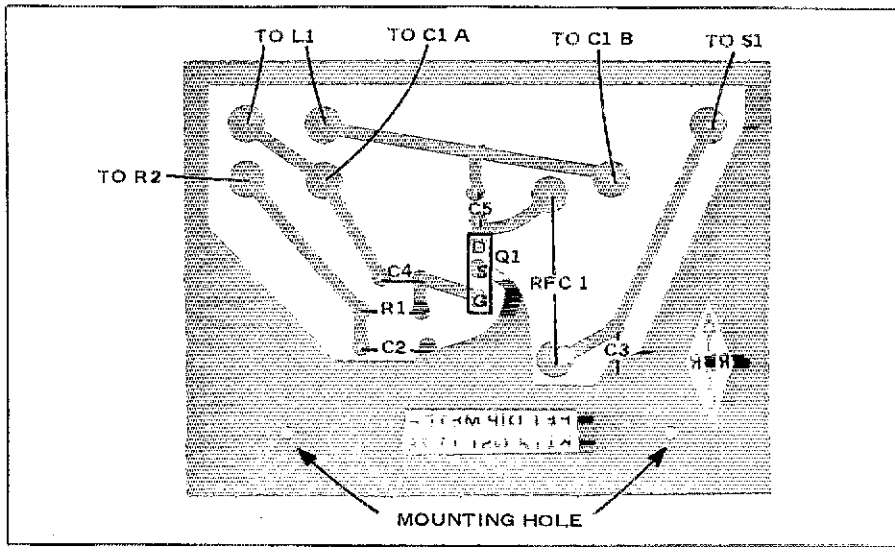


Fig. 4 — Parts-placement diagram showing where parts should be installed on the pc board. The etching pattern appears in the "Hints and Kinks" section of this issue. The above view is from the nontoil or component side of the board.

similar parts houses. A parts-placement diagram for the pc board is shown in Fig. 4. The prototype FET dipper was built in a homemade aluminum cabinet. Plug-in coils are used to cover the range from 1.2 to 150 MHz (see Table 1). The frequency dials were made by hand to match each coil by using a frequency counter to monitor the dipper operating frequency at various points along the tuning range. A general-coverage receiver could also be used to perform the calibration although its use would be more time-consuming, and probably lead to less accurate measurements.

As you can see in the photos, the circuit board was mounted on edge next to the tuning capacitor, while the on/off switch, sensitivity control and meter movement were mounted on the top cover. Interchangeable coils plug into a socket located on the rear panel of the unit. When coils are changed, a new dial face is slipped over the tuning knob on the front panel.

Construction of the instrument is straightforward. Lead lengths should be kept as short as possible, especially those going to L1 and C1 from the pc board. When you make up the coils for your meter, use air-core coils such as those discussed earlier for use at the higher frequencies (above approximately 30 MHz). Doing this keeps the coils from exhibiting self-resonance that would appear as false dips on the meter. For vhf coils, you may want to use a hair-pin loop for L1. Exact values for L1 and specific dial faces cannot be provided here because they will differ with each instrument according to lead lengths, specific values used and the rate of change of capacitance in C1. See Table 1 for suggested L1 values.

Good luck with your dip meter. There are many other uses for dippers, some pertaining to radio and some not. A number of articles have been written about the use of a dip meter as a treasure or metal detector (when used in conjunction with a receiver), weak-signal source, mutual-inductance or coupling-coefficient calculator, and so on, not to mention its use for tuning antennas, output pi net works and such, and for calculating unknown values of C and L. The uses for a good dip meter are almost endless, and no amateur should be without one. QST

Strays

Otto McVey, W8RZ (center), recently received both the National Certificate of Merit and the Elmer Award in addition to being named an ARRL official instructor. Larry Armstrong, K8ZIP (left), made the presentations, along with Bob Lawrence, K8PUM, who represented the many students "Mac" has helped over a span of 23 years.

YANKEE GETS LIVE DEMO

☐ Evan Wylie, who wrote the excellent articles in *Yankee* magazine on the sinking of the *USS Indianapolis* and the blizzard of '88 visited ARRL headquarters on August 18 to research a possible story on Amateur Radio.

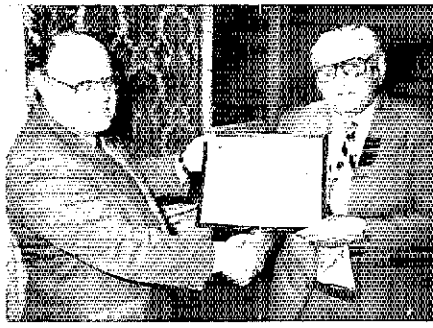
Near the end of his tour, at 1430 EDT we received a phone call from Tony Brunton, WA1QHS, of CBS Radio in New York. Could we help? There had been an earthquake in Guatemala, and commercial communications were interrupted.

At W1AW Jim LaPorta raised YN1AZ on 15 meters, who found TG8QV and TG9UL on 40 meters and relayed the information back to Jim. There had indeed been a 35-second quake. It registered 5 on the Richter scale, and was 50 km south of Guatemala City. Communications had been interrupted, but there was little structural damage and no reports of personal injuries.

At 1507 EDT this information was passed along to CBS, and the unexpected live demonstration for *Yankee* magazine was over — accidental, but first rate! — *W1UED*

QST congratulates . . .

☐ Mickey LeBoeuf, K5ML (ex-K5LVB), whose book, *Working Smart*, will be published by McGraw-Hill.



New England Division Director John Sullivan, W1HHR, presents a 50-year affiliation certificate to Norfolk County (MA) Radio Association President George Rummell, W1WTF.

Shoes, Size 220 AB or C

Going barefoot can be frustrating. Turn your meek 10-watt rig into a roaring, legal-limit machine!

By Wayne Overbeck,* K6YNB/N6NB

Interest in the 220-MHz band has been growing all over the United States and Canada lately. Among both fm and cw/ssb enthusiasts, there has been an awakening to the DX potential of 220. Only a few hardy souls are running high power on 220, an amazing fact when you consider that it's no more difficult to build a kilowatt amplifier for 220 than for 2 meters. This article presents such a final for 220, a simple and proven design using 4CX250B tubes in a push-pull configuration. Just 10 watts of drive will produce at least 600 watts output. And this final does it with components that are commonly available at low cost on the surplus market.

Circuit and Construction Details

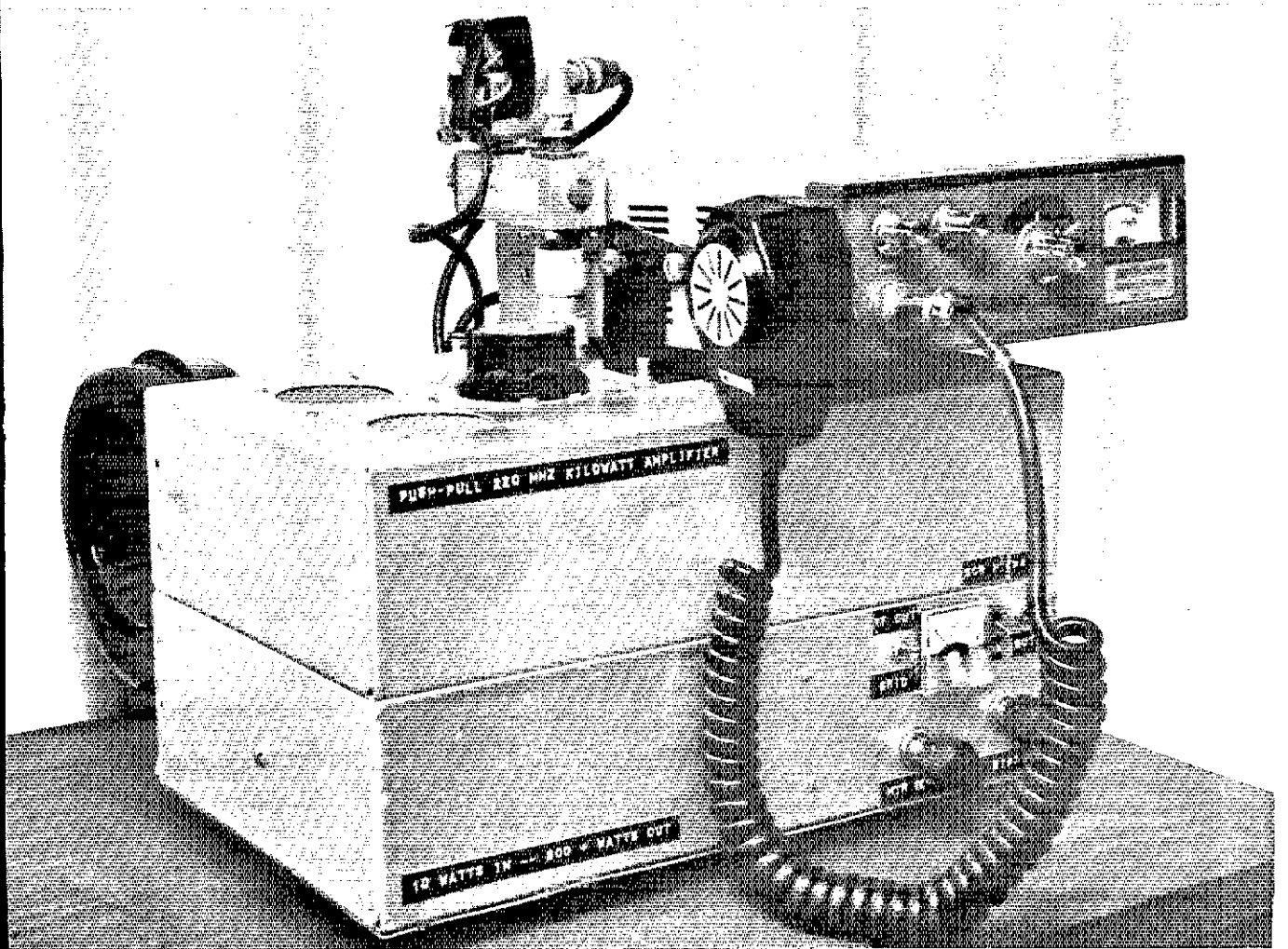
Fig. 1 shows the schematic of the 220 kilowatt. Any of the tubes in the 4CX250 family may be used in the amplifier, including the easy-to-find 4X150A. Its grid and plate circuits are half-wavelength tuned lines. Depending on the bias and screen-voltage levels, it may be operated in Class AB_1 or Class C. If only occasional fm use is intended, Class AB_1 will suffice for all operation. More efficient operation on fm or cw is possible with Class C, if desired.

The amplifier is constructed in a two-chassis arrangement that may remind some readers of the K2RIW amplifier for 432 MHz, although this particular unit existed before Knadle's now-classic design appeared in *QST*.[1] It employs an entirely different approach inside the boxes. Like

*Contributing Editor, *QST*

[1]References appear on page 32.

A California-style 220-MHz contest station: commercial fm transceiver and a homemade amplifier.



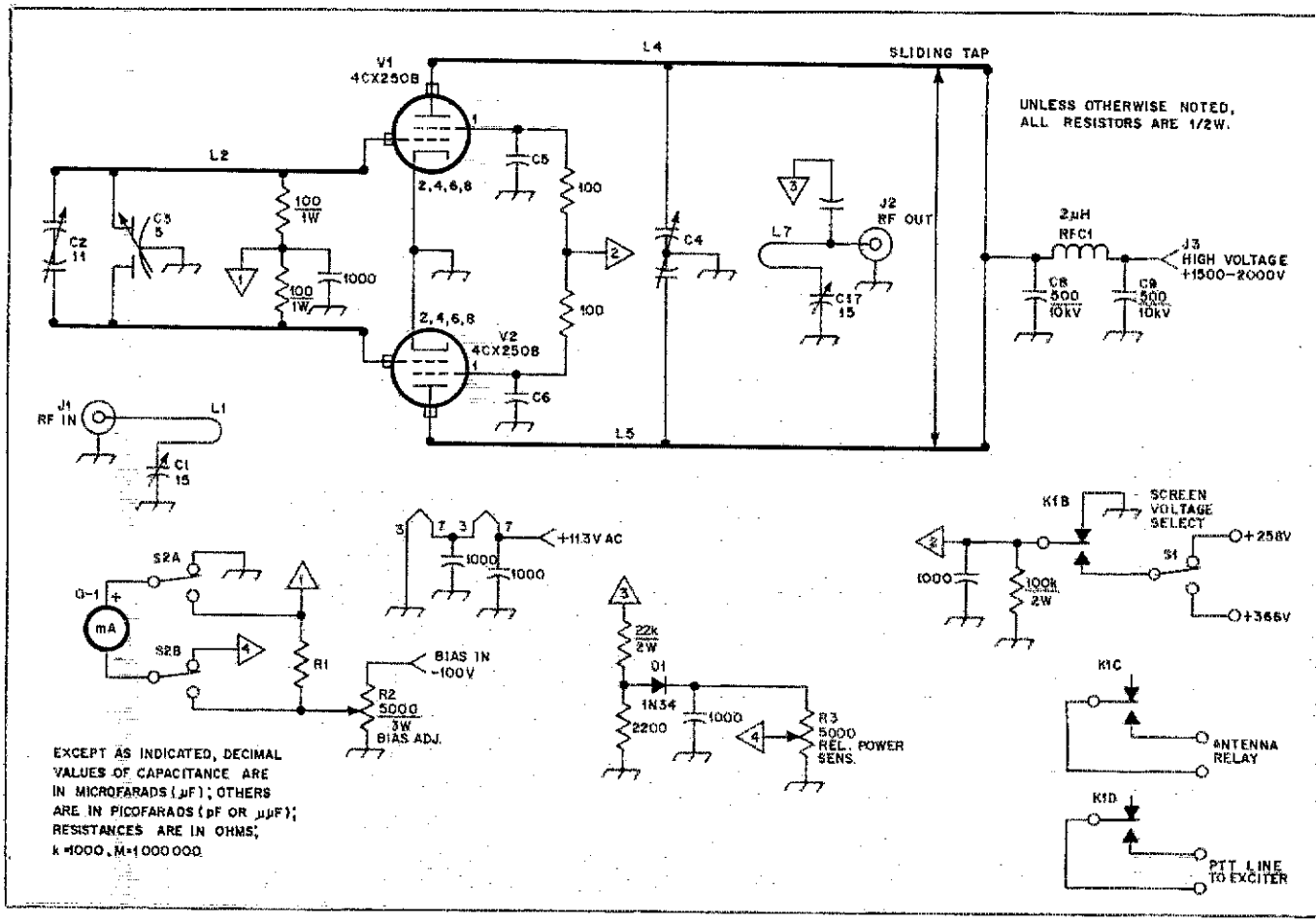


Fig. 1 — Schematic diagram of the 220-MHz amplifier. Although 4CX250B tubes are indicated, any of the tubes in this series may be used. Tube sockets should be EIMAC SK-620 or SK-630, or E. F. Johnson 124-115 for best performance. The amplifier should be cooled with a 60-ft³/min blower (Dayton 4C441 or equivalent). All 1000-pF capacitors should be low-inductance bypass or feedthrough types.

C1 — 2- to 15-pF miniature variable (Johnson 189-565-1).

C2 — 2- to 11-pF dual-section butterfly variable (Johnson 160-211-1).

C3 — 1- to 5-pF differential with all but two rotor plates and one stator plate removed from each side (Johnson 160-205-1).

C4 — Brass disk, 2.5 inches (64 mm) in diameter, soldered to a piece of 1/4-20 threaded brass rod. The rod passes through two 1/4-20 nuts mounted on the top chassis.

C5, C6 — Screen-bypass capacitor built into tube sockets.

C7 — 2- to 15-pF miniature variable (Johnson 160-107-1).

C8, C9 — 500-pF, 10-kV "doorknob" capacitor.

D1 — Germanium diode, 1N34 or equivalent.

J1, J2 — Type-N female coaxial connector.

K1 — 3pdt relay, 12-V dc coil (Potter and Brumfield R10-E6-X4-V185 or equivalent).

L1 — Input coupling loop; 4-inch (100-mm) piece no. 12 copper wire. Bend as shown in Fig. 2.

L2, L3 — Half-wavelength grid line, 6.5-inch (165-mm) length of 1/4-inch (6-mm) diameter copper tubing. Bend 4.5 inches (114 mm) from tube ends (see Fig. 2). Inductors are also bent 3/8-inch (10-mm) down at tube end to clear socket assembly.

L4, L5 — Half-wavelength plate line, 8-inch (203-mm) length of 1/2-inch (13-mm) copper tubing. A shorting bar, made from sheet copper, is used to resonate the lines. See Fig. 3 for details.

L6 — Output coupling loop, 4-inch (100-mm) piece no. 12 copper wire. Bend as shown in Fig. 4.

M1 — 0-1 milliammeter.

R1 — Meter shunt. Must be selected for meter movement used, to provide 50-mA full-scale deflection for grid current measurement.

R2 — 5000-ohm, 3-watt wirewound potentiometer (Clarostat 58C1 or equivalent).

S1 — Toggle switch, spdt.

S2 — Toggle switch, dpdt.

the K2RIW final, this one is housed in two standard 8 × 12 × 3-inch (203 × 305 × 76-mm) aluminum chassis. The lower chassis houses the grid lines and — behind a shield — the switching and metering circuits. The upper box encloses the plate lines and output circuit.

A 60-ft³/min blower mounted on the lower chassis forces air up through the two tubes and out through screening on top. The tube sockets are mounted about 2-3/4 inches (70 mm) apart and equidistant from the two sides of the chassis. As much as possible, the layout is kept symmetrical in relation to the chassis sides to avoid unbalancing the push-pull circuit. As with all vhf amplifiers using this type of tube, sockets with raised screen-grid rings and built-in screen-bypass capacitors are highly recommended. EIMAC SK-620, SK-630 or E. F. Johnson 124-115 sockets are ideal. With any of these sockets in use, no neutralization is needed to achieve stability under all normal operating conditions. Any instability encountered in this amplifier probably means there is a stray resonance or feedback path somewhere, one that neutralization will not likely cure.

The half-wave grid lines are tuned by means of C2, a small butterfly variable capacitor soldered between them at the end farthest from the tubes (see Fig. 2). Made of 1/4-inch (6.4-mm) copper tubing, the grid lines are supported at one end by the center terminals of the tube sockets and by C3, a small differential trimmer capacitor, near the other. C3 compensates for mismatched tubes and unbalance as a result of circuit layout, by adjusting the capacitance of each side of the grid line to ground. All wiring that must pass through the grid compartment is shielded and bypassed, except the input line of course. Low-inductance bypass capacitors, such as the feedthrough type, are used liberally.

Bias is applied to the grid lines at the point of minimum rf voltage, one-quarter wavelength from the ends. This is about 1/2 inch (13 mm) toward the tube sockets

from the bend in the lines. The two 100-ohm resistors through which bias is applied may be seen at right center in Fig. 2. If desired, the precise placement may be determined by applying a few watts of rf to the input circuit (with the tubes in place and the lines resonated) and tapping a pencil along the lines to find the point of minimum arcing.

The upper chassis is a model of simplicity. As may be seen in Fig. 3, it contains only the tubes, sockets, air-system chimneys, high-voltage circuitry and plate lines. EIMAC SK-606 or E. F. Johnson 124-111 chimneys may be used. The use of a shorting bar on the plate lines makes tuning the amplifier to resonance simple, even if the copper-tubing diameter varies from that specified. To resonate the plate lines, slide the short along to the approximate point of resonance and then do the final tweaking with the rotating disk, C7. A piece of threaded rod stock is used as the shaft of C7. A nut soldered to this shaft prevents the disk from contacting the plate line. Some builders may prefer to adapt a rotating vane arrangement to allow fine tuning the plate circuit. McMullen and Tilton's 144-MHz final offers an excellent example of this approach.[2] The top chassis also houses a small shielded compartment for the rf-output sensing circuitry. A 2.5-pF 4000-volt capacitor is soldered to the center conductor of the output connector and delivers a small rf sample to the detection circuit housed in the small black box at the top of Fig. 4. Actually, a gimmick or almost any other low-value capacitor is fine for rf sampling.

While only relative output and grid current are monitored internally in this amplifier, remember that screen and plate current must be monitored as well. If one supply powers more than one amplifier, it is usually more convenient to install these meters in the power supply cabinet.

If operation in both Class AB_1 and Class C is desired, two values of regulated screen voltage are required. A simple way to derive these voltages from a nominal 400-volt supply is shown in Fig. 5. T1 may be a TV-replacement transformer or similar type capable of supplying about 100 mA. Values of the other components are not critical. This transformer may also be used to supply the filament needs of the tubes, as shown in Fig. 5. Filament voltage should be somewhat less than 6 volts to obtain maximum tube life. This is because, at vhf, back bombardment of the cathode raises its temperature above normal and increases its emission. Operation at 6 volts would serve to heat the cathode even more, stripping off its oxide coating and eventually diminishing its emission. With the windings in series, a total voltage of 11.3 volts is obtained. If the tube filaments are placed in series, each tube will have a heater voltage of about 5.7 volts. Be sure that *both* filament windings of the transformer are capable of supplying 3 amperes. Grid bias may also be obtained from this supply, as shown in the schematic.

One other circuit detail worth noting is the T-R keying sequence. This is critical if you don't want to destroy antenna relays and receiver front ends! The amplifier relay should be keyed *first*, and contacts on that relay should key the exciter. This should allow the antenna relay to close firmly before drive is applied and the high-level rf starts flowing. The ideal arrangement is one in which drive is applied last when going to transmit and removed first when returning to receive. When the final is interfaced with the exciter, this requirement should be considered.

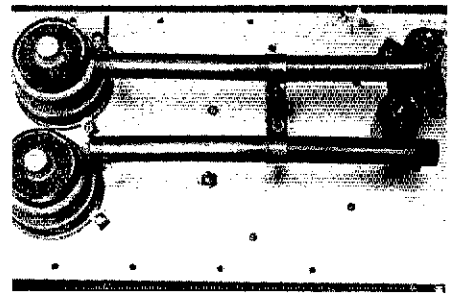


Fig. 3 — A view of the plate compartment with the top chassis removed. The plate lines are supported by the tube straps on one end, and by a TV-type doorknob capacitor on the other.

Tune-up and Applications

Tune-up is straightforward with this amplifier. First, use a dip meter to make sure both the grid and plate circuits resonate. Then activate K1 (with plate voltage applied but no drive), and adjust R2 so that idling plate current is at the

Fig. 2 — The interior of the amplifier grid compartment. The grid lines, L2 and L3, and the way they are installed on the sockets, may be seen. Note that all dc and filament wiring is done with coaxial cable and that all inputs to the compartment pass through low inductance bypass capacitors. In the author's station, a 6.3-volt transformer supplies the tube filaments. The coil of plastic-covered wire is a dropping resistor to lower the filament voltage to 5.8 volts. With the exception of the grid lines and related components, component placement in this portion of the amplifier is not critical.

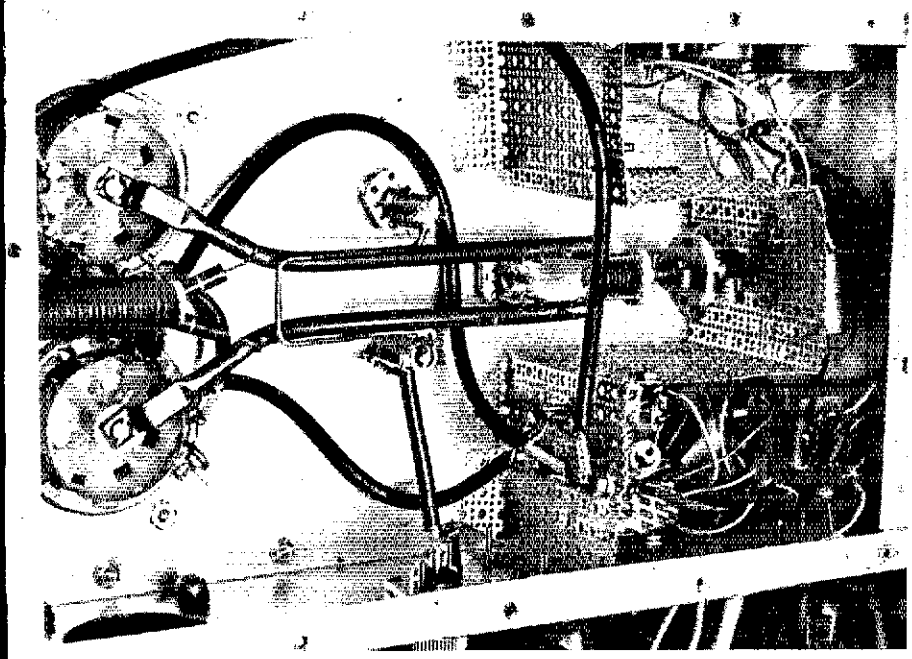
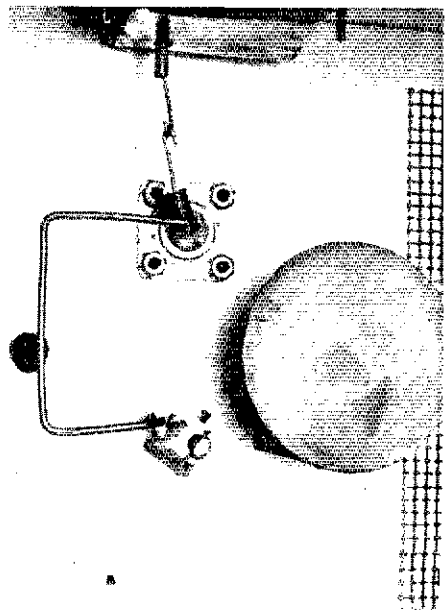


Fig. 4 — A view of the inside of the top chassis. L6, the output coupling loop, C7, the antenna loading control, and C4, the brass disk which serves as a plate-tuning capacitor may be seen. Just visible at the top of the photo is a small metal box containing the relative-power monitor components. Metal screening used to shield ventilating holes in the chassis may be seen at far right.



proper level. For Class AB_1, the higher screen voltage is recommended. Bias voltage should be adjusted to produce 160-200 mA of idling plate current. For Class C operation, use the lower screen voltage. Adjust R2 so that bias is slightly more negative than the value at which idling plate current becomes zero.

Finally, apply drive and peak the grid and plate circuits for maximum output. Positioning of the input and output coupling loops may have to be adjusted slightly for optimum energy transfer. Ultimately, 60-percent efficiency should be realized and full-output plate current should be 500-600 mA. Now there is one last adjustment, balancing the tubes. If the grid current of each tube can be individually monitored temporarily, C3 should be adjusted to equalize the currents. If that is not possible, C2 and C3 should be alternately adjusted for maximum amplifier output.

Conclusion

A kilowatt input is possible with as little as 1500 plate volts, and that voltage should not be greatly exceeded in fm service. For cw and ssb, plate voltages in excess of 2000 volts are permissible. Wearing "shoes" like this can make the difference between being limited to local ragchewing and long-haul DX capability on this very interesting band! QST

[Editor's Note: Part 97 of FCC Rules and Regulations states that any spurious emission from an amplifier operating below 235 MHz shall be at least 60 dB below the mean power of the fundamental. It was not possible to test this amplifier in the ARRL lab. We feel that an amplifier built and operated as described in this article will comply with FCC requirements. A stripline filter may be connected to the amplifier output if additional attenuation of spurious emissions is desired. One such filter is described in the *VHF Manual*, third edition, p. 335.]

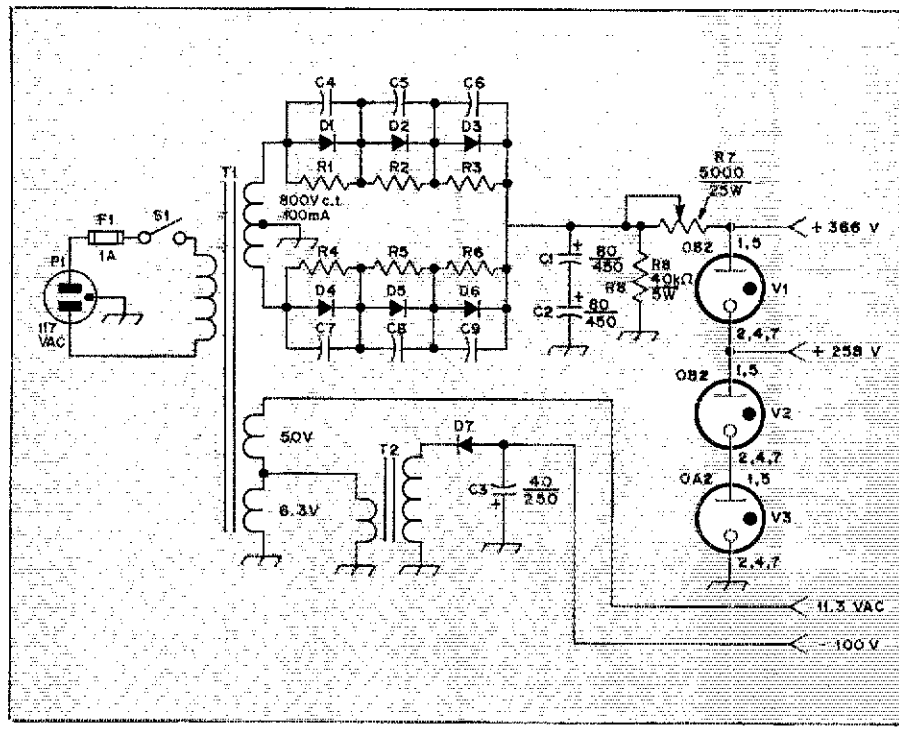


Fig. 5 — A power supply suitable for the filament, bias and screen-voltage requirements of the 220-MHz amplifier. T1 may be any transformer capable of providing the necessary voltages. A unit salvaged from an older TV set is ideal.
C1, C2 — Electrolytic capacitor, 80 μF, 450 volt (Mallory TC 80A or equivalent).
C3 — Electrolytic capacitor, 40 μF, 250 volts (Mallory TC48A or equivalent).
C4-C9, incl. — Disk-ceramic capacitor, 0.01 μF, 1000 volt.
D1-D7, incl. — 1000-volt PIV, one-ampere silicon rectifiers (HEP R0170 or equivalent).
F1 — 1-A fuse.
P1 — Three-wire line plug.
R1-R6, incl. — 470-kΩ, 1/2-watt resistor
R7 — 5000-Ω, 25-watt adjustable wirewound resistor (Ohmite 210-25-0382). Adjust for no-load regulator current of 30 mA.
R8 — 40-kΩ, 5-watt resistor.
S1 — Spst switch.
T1 — Power transformer, 800 volts center tapped, 100 mA; 6.3 volts, 3 A; 5 volts, 2 A (Stancor PC-8412 or equivalent).
V1, V2 — 0B2 gas-filled voltage regulator tube.
V3 — 0A2 gas-filled voltage regulator tube.

References

[1]Knadle, "A Strip-Line Kilowatt Amplifier for 432 MHz," *QST*, April, 1972.
[2]McMullen and Tilton, "New Ideas for the 2-Meter Kilowatt," *QST*, February, 1971.

Feedback

☐ *QST* binders ("What's So Rare as a *QST* from 1915?" August 1978 *QST*, and "Feedback," October) are $6 for the small size (through 1975) and $7 for the large size (1976 on).

☐ In "A 2-Meter Frequency Synthesizer" (August 1978 *QST*), author WB8ZBA suggests that the following corrections be made. In Fig. 4 the HI and LO labels on the MSD block should be reversed. In Fig. 5 the point labeled +12 V should be ignored. Power is brought into the circuit through the output cable. In this way power to the synthesizer is shut off when crystal control is used. In Fig. 7 the 220-ohm resistor connected to the base of Q13 should be changed to 68 kΩ. Also, in the TR-22 TX interface circuit, a 1-mH choke should be added in parallel with the 47-ohm resistor. D1 in the parts list should be an HEP R2502. And the inductance values for T1, T2 and T3 are 0.2-0.4 μH.

It should also be made clear that, because the TR-22 rig uses phase modulation, some sort of external modulator is required when using the modulator. The author feels that use of his circuit with rigs other than the TR-33C should not be attempted by beginners.

☐ When modifying the Heath HA-201 amplifier to accommodate a COR, as described in "Hints and Kinks" for July 1978, a jumper wire should be installed in place of D1 and D6, or D2 and D5. Either a 24- or 12-volt relay may be used in the modification. The latter is preferable.

Strays

QST congratulates . . .

☐ Hal Steinman, K1FHN, who finished 252nd (of 394 starters) in his very first 26-mile, 385-yard, marathon run in 90-degree heat through a group of islands in Lake Champlain in Vermont.

HOW SAFE IS *YOUR* HAMSHACK

☐ From now on, Bill Schuchman, W7YS, will heed those *QST* covers. While at the rig, he smelled smoke and tracked it down to his June 1978 issue of *QST* ("How Safe Is Your Ham Shack?"). He had been using a circuit magnifier to work on a May 1978 *QST* project, but Old Sol had other ideas for the magnifier and ignited the June issue with it. In addition, May's cover depicted an event similar to one that actually happened to Bill — during July 1977, lightning struck and vaporized his antenna and destroyed two transistors, two pilot lights, three power switches, two banana plugs and an antenna relay.

A Logic Circuit for Phasing the Telefax

The problem of phasing sending and receiving drums is unique to facsimile. This simple coincidence circuit provides a reliable method of synchronization.

By W. Conley Smith,* K6DYX

With the deregulation of the rules governing Amateur Radio in the United States, the transmission of drawings and photographs from a Western Union Telefax may eventually be permitted on the hf bands. Proposals contained in the Federal Communications Commission Docket 20777 indicate the possible authorization of this mode on the lower frequency amateur bands. Essentially the same practices and standards with regard to frequency and modulation that apply to SSTV seem likely to be adopted. Accordingly, audio tones fed into the phone-patch input of an ssb transmitter, with 2300 Hz for white copy and 1500 Hz for black copy, would become standard. The frequencies between these limits would produce intermediate shades of gray. Under special temporary authorizations (STA), a number of radio amateurs have been experimenting successfully with this mode.[1]

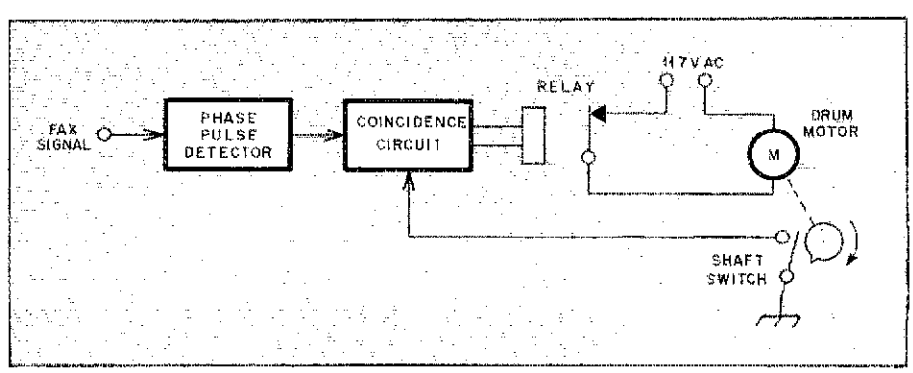
Many machines, purchased through the surplus market, generate a signal of approximately 2500 Hz by photoelectrically scanning a paper placed on a revolving drum. The signal is amplitude modulated, having a peak amplitude when the photocell sees white and a minimum amplitude when it sees black. This will produce a negative picture on a receiving machine where the blackness depends upon the strength or amplitude of the received signal. There are methods of inverting the modulation,[2] but remodulating or converting the 2500-Hz a-m signal to a frequency-modulated audio signal before transmission seems to be the better approach. At the receiving end a limiter and some form of a discriminator or audio filter can be used for slope detection. The superiority of this narrow-band f-m, when combating interference and fading, is indeed apparent.

The auxiliary circuits for accomplishing the remodulation and detection are relatively simple to construct. There are many examples of such circuits in SSTV literature. Unique to the facsimile mode, however, is the problem of phasing the receiving drum with the sending drum. Whereas in SSTV each frame and line is triggered by a synchronizing pulse, the Telefax drum turns at a constant speed of 3 rev./s. All that is necessary is to phase it so that the edge of the receiving paper moves under the recording stylus at the same time the edge of the copy being sent is scanned by the photoelectric system. Several methods of accomplishing this are in use.[3,4] The author is using a system based on the simple logic of a coincidence circuit which proves quite reliable and is simple to construct and install.

How It Operates

The general scheme is shown in Fig. 1. A dc pulse (logic 1) is produced by a phase pulse detector from the received signal. This pulse can be generated by the sending machine in several ways. By modifying the switch activated by the detent on the shaft, it can be used to short out the picture information and cause a momentary "black" 1500-Hz tone on each revolution. For the detector then, a toroid, tuned by a suitable capacitor, does the job. Needless to say, the picture information should be all "white" during the phasing interval, which is usually the first four or five seconds of a transmission.

Fig. 1 — The general scheme of phasing control for a Telefax machine by means of the logic of a coincidence circuit.



*67 Cuesta Vista Dr., Monterey, CA 93940

[1]Footnotes appear on page 34.

The same sort of phasing signal can be generated without the use of the detent switch by wrapping a narrow strip of white paper around the sending drum and securing it with a bit of black tape where the picture to be sent overlaps.

The received phasing pulse normally passes through the coincidence circuit and opens a relay which, with the contacts wired in series with the drum motor, causes the motor to repeatedly lose speed. On each revolution of the receiving machine shaft, the detent switch closes and introduces a logic 0 into the coincidence circuit. Eventually, as the receiving drum loses speed, a logic 0 will occur at the same time as does a logic 1 from the detector. This event causes the coincidence circuit to lock out and the relay remains closed. The receiving motor now runs continuously at a constant speed and in phase with the sending drum. Resetting the coincidence circuit for the next transmission is necessary since, once phasing is accomplished, the relay remains closed.

A minimum of rewiring of the Telefax machine is required. If you already have one, the chances are that you have modified it to eliminate most of the unnecessary items such as the relays and buzzer. The switch activated by the shaft detent is normally closed. It can be changed by inverting the leaves for normally open operation, enabling it to make the phasing pulse when sending besides providing the logic 0 pulses needed when receiving. This is not a necessary inversion if you can generate a phasing signal in another way because the coincidence circuit can be made to respond to the simultaneous occurrence of two logic 1s instead of a logic 1 and a logic 0. See Fig. 2.

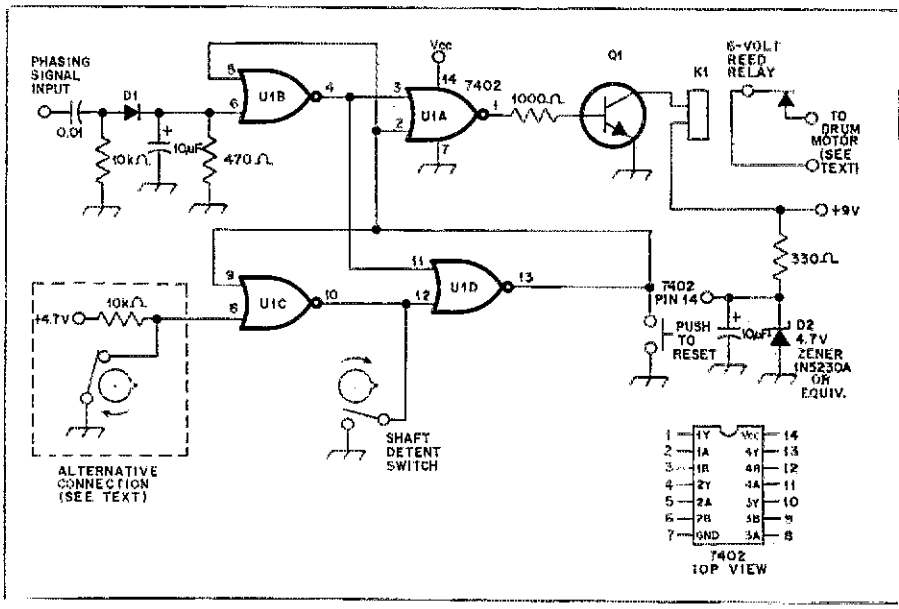


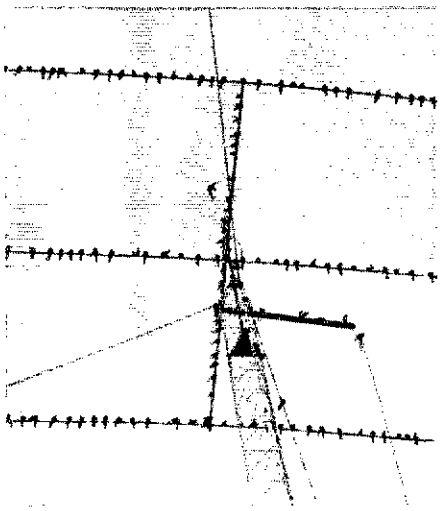
Fig. 2 — This coincidence circuit is built around a type 7402 quad, 2-input NOR gate. If the alternative connection enclosed in the dashed line is not used, pin 8 of the 7402 should be connected to ground at pin 7. Substitution is possible. Important is the logic. See Dahl, "New Symbology for Digital Logic Diagrams," August 1974 *QST*. Q1 is a general purpose type S0014 silicon transistor or equivalent.

If the contacts of the relay, used in Fig. 2, will handle the motor voltage and current, they can be connected across the points of the test switch on the machine. This switch should then be left open for the phasing circuit to work. The author uses a small reed relay at the output of the coincidence circuit to operate the unused LR relay of the machine, the contacts of which are used to carry the motor current.

Footnotes

[1] "High Frequency FAX," *QST*, December 1975, p. 67.
[2] King, "Conversion of Telefax Transceivers to Amateur Service," *QST*, May 1972.
[3] Righini and Eanibani, "Sync the Desktax," *QST*, October 1976, p. 20.

Strays



Is this antenna "for the birds," or is it a new way of linear "loading" of a Yagi beam? It is rumored the signal has "chirps and birdies." Ron Scherman, WBØOZT, who resides beneath this perch says he counted 153 birds, with one making its final approach.

I would like to get in touch with . . .

☐ airline hams interested in ragchewing about the commercial airline industry and Amateur Radio. The International Association of Airline Hams (IAAH) net meets Sunday at 1600 UTC on 14.280 MHz. Carl Crumley, N4VD, 512 N. Harrison Ave., Cary, NC 27511.

DIGITAL COMMUNICATIONS SEMINAR

☐ The University of Ottawa will present a three-day seminar on Digital Communications and Signal Processing, December 11-13, 1978. Dr. Kamilo Feher, one of the many international authorities giving the seminar, will introduce state-of-the-art material on digital modulation.

NO MORE AIR

☐ The Air Force MARS program recently retired the call sign AIR after more than 20 years service. The changeover to AFA, the Air Force command MARS station, marked their move to new, permanent facilities at Andrews AFB, VA.

Who says there are no hams in Monaco? From left: Louis, 3A2HB; Jean, 3A2BF; Henry, 3A2AH; Jean, 3A2EE, attempting a QSO amidst the clamor; and a visiting sightseer, Rudi, W6GVB. *(photo by W6AQ)*

GASOLINE AND HAMMING DON'T MIX

☐ Why tempt fate? Switch to safety and don't transmit while your car is being gassed up. There could be sparks . . . there could be fumes . . .!

Product Review

Yaesu FT-901DM Transceiver

A new model of an existing product does not denote improved performance. Rather, it usually means that a frill has been added here and there to entice new customers or stimulate the buying urges of old customers. That's why we feel it is important to point out early in this review that the FT-901DM is not a reworked version of the long-popular FT-101 Yaesu series. This is a new box with a completely different circuit design. There are numerous operational features which do not appear in the '101 transceiver series. There is little similarity in the design when comparing the FT-901 to the FT-301, the latter of which followed the '101 to the U.S. marketplace.

These are the highlights: frequency coverage from 1.8 to 29.9 MHz in nine band positions, plus WWV in the 10th position; operational modes are lsb, usb, cw, fsk, a-m and fm. Dc input power to the PA stage is 180 watts during cw and ssb. For the rest of the modes it is 80 watts.

Significant among the circuit features are digital *plus* analog frequency readout, PLL local oscillator, built-in Curtis keyer, memory frequency control, dual-filter variable i-f bandwidth tuning, and for cw, built-in RC active audio filter.

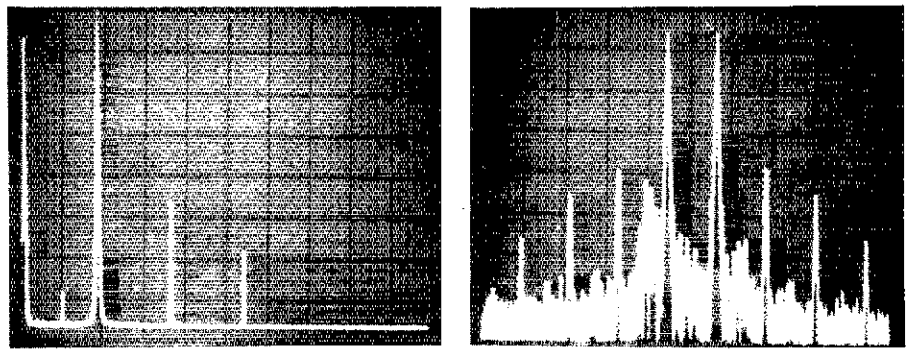
Some of the more common highlights are semi-break-in delay (not full QSK), sidetone, VOX, 25-kHz calibrator, noise blanker, rf speech processor, and time-delay tune-up position (prevents damage to the PA stage by limiting carrier-on time to short periods). There is also a 20-dB rf attenuator in the receiver front end (selectable) and two age choices (fast or slow).

Solid-state circuitry is used throughout the transceiver except for the driver and PA sections. Sweep tubes are not used in the final amplifier. Instead, a pair of 6146Bs is used to enhance tube longevity and improve transmitter IMD. Mobile operation is made possible by using the dc-to-dc converter which is built into the '901. Changing from ac to dc operation is achieved by simply attaching the appropriate external power cable. The only optional accessories for the FT-901DM are the a-m and cw i-f filters. Various other models of the '901 are available (901D, 901SD and 901DE) which have many of the features contained in the 901DM available as accessories. The FT-901SD is a QRP (10-watt) version of the other models.

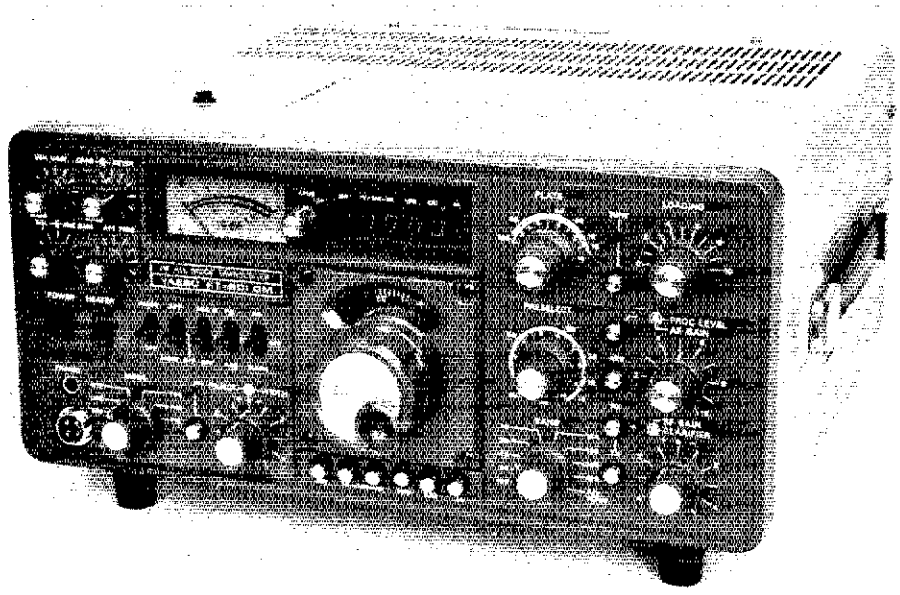
Audio output is greater than 3 watts at 10 percent total harmonic distortion. Although a built-in speaker is included, external speakers can be used. The output impedance is 4 to 16 ohms. The audio filter is variable for peaking between 400 and 900 Hz. Passband tuning is continuous from 2.4 kHz to 300 Hz. Ssb selectivity is 2.4 kHz, a-m is 6 kHz, fm is 12 kHz and cw is 600 Hz. All are specified at the −6-dB points on the filter response curve.

The memory feature should appeal to those who operate in split-band fashion. This circuit eliminates the need for an external VFO. When the M button (memory) is pushed a frequency can be stored. This will be the frequency which is displayed before the M button is activated. Once the frequency is stored, it can be recalled for use on transmit by pushing the TX button, or for receiving by punching the RX button. In effect, these are memory-recall buttons. However, when the MR button is activated, the stored frequency is used for the transceive mode. An EXT (external) button is available for transferring the frequency control to an outboard VFO, such as the FV-901, if that type of operation is desired. On our review unit there was evidence of a T8 cw note when the operating frequency was controlled by the built-in memory. This condition was not noted while using the straight VFO function. On-the-air checks with other FT-901DM owners showed their signals to be clean, suggesting that our unit may have had a local ground-loop problem or small internal anomaly.

The receiver dynamic range turned out to be substantially better than that of earlier Yaesu equipment. The MDS (noise floor) on 20 and



At left, the transmitter output of the FT-901 on 160 meters, as displayed on a spectrum analyzer. Vertical scale is 10 dB per division and horizontal divisions are each 1 MHz. The tall pip at the extreme left of the photo is generated in the analyzer and represents 0 MHz. This photo was taken while the FT-901 was operating at rated input power on cw. The most significant spurious emission is the second harmonic at 3.6 MHz, which is down 46 dB with respect to the fundamental, shown here at full scale. Other spurs are at least 57 dB down. The FT-901 meets or exceeds the FCC requirements for spectral purity. The right-hand photo shows the output of the FT-901 during a full-power, 7-MHz, two-tone test. Each vertical division is 10 dB and each horizontal division equals 1 kHz. Third-order products are approximately 38 dB down from the PEP level. Measurements were taken in the ARRL lab.



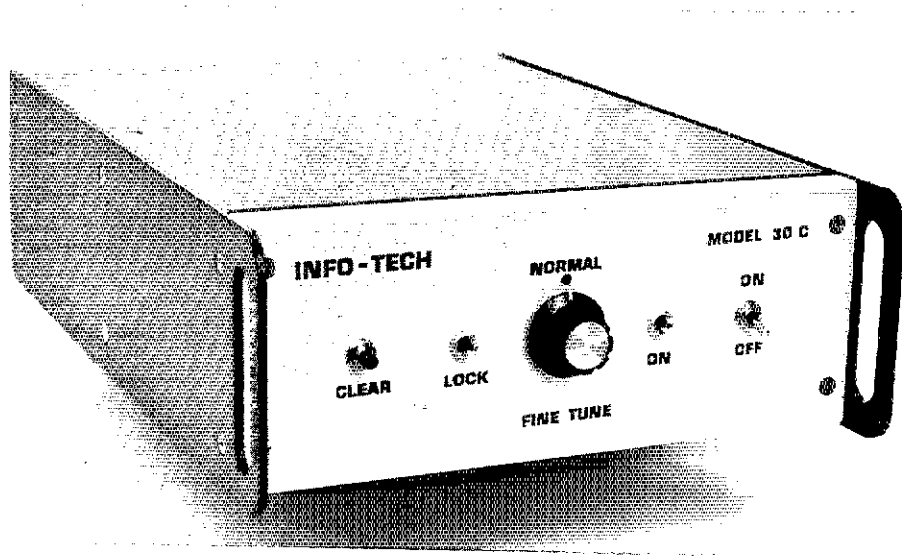
The FT-901 is top of the hf line at Yaesu, with several models available. Shown here is the '901DM which contains almost all possible features as standard. The only options on the "DM" are the a-m and cw i-f filters which go for $45 each.

80 meters is −137 dBm. Blocking above the noise floor is 118 dB (20 meters), 114 dB (80 meters) and IMD checks out at 90 and 85 dB respectively. These tests were done in accordance with the technique outlined by Hayward in July 1975 *QST*. Transmitter IMD characteristics are shown in the spectral display which accompanies this review.

Subjective Analysis

This reviewer has used all models of the Yaesu transceiver equipment which were available during the past 10 years, and it is felt that the FT-901DM is the finest of the lot for performance and features. The rig is easy to operate, just plain "sounds nice" with respect to the receiver, and apparently sounds good to those who have checked the quality of the ssb signal during on-the-air discussions of the unit.

Although the '901 is somewhat larger and heavier than the older 101s, it's the type of transceiver that a reviewer hates to send back to the U.S. distributor after running it through its paces at the home station. Going back to the older station transceiver may require biting the well-known bullet for awhile, at least! — *Doug DeMaw, W1FB*



The model 30 Info-Tech Morse code receiving unit, shown here in its handsome metal cabinet. All controls are located on the front panel; clear button, lock light, fine tuning knob, power-on indicator, and power switch. Four rubber feet are attached to the cabinet bottom.

Yaesu-Musen FT-901DM Transceiver

Frequency range: 1.8 to 29.9 MHz, plus WWV.
Modes: Cw, ssb, a-m, fm and fsk.
Power input: 180 watts cw and ssb, 80 watts for other modes.
Selectivity: See text.
Power requirements: 117 V ac — 70 W on receive, 320 W on transmit; 13.5 V dc — 5 A on receive, 21 A during full-power transmit.
Color: two-tone gray.
Dimensions (HWD): 6-1/8 × 13-1/2 × 12-3/4 inches (154 × 342 × 324 mm).
Weight: 39.6 lb (18 kg).
Price class: $1460.
U.S. Distributor: Yaesu Electronics Corp., 15954 Downey Ave., Paramount, CA 90723.

INFO-TECH MODEL 30C CW TO VIDEO CONVERTER

If you're in the market for an automatic cw-receiving device, you might want to consider the Info-Tech model 30. This device converts audio cw to video characters which can be displayed on a video monitor or modified TV.

Audio from your receiver is fed to the input jack on the rear apron of the cabinet. Inside the unit, the cw signal is detected, and the corresponding video characters are generated and sent to the video output jack. This composite video signal can then be applied to the input of a video monitor.

The source of audio must be capable of delivering at least 0.1 V peak to peak into a 500-ohm load. To operate the cw receiving device, you tune in a cw station and adjust the receiver tuning so that the audio note is approximately 1000 Hz. The "Morse Fine Tune" control on the front of the model 30 should be left in the center of its tuning range. As the signal is detected, the red LED "lock" light flashes in time with the received dots and dashes. The fine-tuning control can be used to adjust the input passband of the model 30 between 800 and 1200 Hz. This can be used to tune in a signal from a receiver that doesn't have a variable BFO.

The model 30 copies Morse code quite well, and even copies most punctuation marks as well as the standard alphabet and numerals. Some of the procedural signals are also known to the model 30, as it prints out a "<" for $\overline{AS}$, "=" for $\overline{BT}$, and "–" for $\overline{SK}$.

The video display generated by the model 30 is a standard 32-character by 16-line format. (A 72-character by 16-line format is available also.) Each of the characters is displayed on the video screen as a 5 × 7 dot matrix. When the unit is turned on and code is received, the first video line is generated so as to appear at the bottom of the screen. As new lines are started, the first line scrolls up and eventually goes off the top of the screen. The "clear" button on the front panel of the model 30 wipes the video display clean when pressed.

The model 30 was able to copy most cw signals on the bands, having trouble only with poorly sent Morse. There was no difficulty copying weak signals, and in fact the unit sometimes could copy signals that were practically inaudible. The passband of the audio input circuitry isn't as narrow as a few we've seen, but it caused no problems. There was never any need to retune the signal because of slight drifts, as copy was solid regardless. Of course, there will always be many signals too garbled, weak or otherwise deformed to be copied by anything other than the human ear. When the model 30 receives characters it can not recognize, it prints nothing on the video display.

Interconnections

Directions concerning the hook-up to a video monitor or converted television set are included with the model 30. An important warning states the dangers involved in using monitors that are not transformer-isolated from the power line. Although this is true with all types of equipment that are attached to video monitors or TV sets, it was reassuring to see Info-Tech make the dangers clear in its product literature.

Besides the video output and audio input jacks on the model 30 rear panel, another RCA-type jack labeled AUX is included. This connection can be used to feed a local cw signal to the model 30, such as the output from your keyer. To use the AUX jack, you use a relay so that the model 30 sees a series of opens and shorts at the input of the AUX line. This type of operation allows you to see both sides of the conversation displayed on the video monitor screen.

Appearance

The Info-Tech model 30 is packaged in an all-metal enclosure, as shown in the photo. All controls are located on the front panel, which is partially protected from damage by the two small decorative-type handles on each side. The handles are actually functional, being handy for carrying the model 30 when necessary. The real panel contains the three RCA-type jacks previously mentioned, a three-wire line cord, and the fuse holder. The cabinet appears to be well shielded, and the instrument operated flawlessly inside W1AW while the station was transmitting with full power on eight bands. If the unit were subject to RFI, it certainly would have been apparent under such operating conditions.

Inside

When the cover is removed, you can see the two glass-epoxy pc boards mounted one on top of the other in piggy-back fashion. A 12-pin connector ties the two boards together, and by removing four nuts you can remove the top board by lifting it upward. The connector separates, leaving only two wires attached to the upper board. The upper board is the video board, which generates the video characters for ASCII input. The lower board is a Morse-to-ASCII converter. All components are mounted on these two double-sided, plated-through boards except for the power supply transformer, two disk-ceramic capacitors and an LM309 5-volt regulator. These components are mounted on the rear panel of the model 30. This layout seems to be one that would be easy to work on, and it would seem also that an ASCII output could be easily added if desired for driving printers, computers, etc. Full schematic diagrams were supplied with the model 30. For more information contact Info-Tech, Inc., 2349 Weldon Parkway, St. Louis, MO 63141. — *Jim Bartlett, K1TX*

Info-Tech Model 30C Specifications

Price class: 32-character video, $325, 72-character video, $345.
Power requirements: 117 V ac, 50-60 Hz, 20 watts (220-V, 50-Hz model available for additional $10).
Dimensions (HWD): 3 × 9 × 12 inches (76 × 229 × 305 mm).
Weight: 7 lb (3.2 kg).
Input: Morse code audio from receiver (nominal 100 mV).
Output: Composite video, approximately 1.5 V peak to peak, negative sync, crystal controlled, 5 × 7 dot matrix. 32-character by 16-line or 72-character by 16-line formats. Displays 64-character ASCII set.
Materials: Glass-epoxy, double-sided, plated-through pc boards, ICs all socket-mounted.
Speeds: Will automatically copy Morse code from 5 to 60 words per minute.

GENAVE GTX-800 2-METER FM TRANSCEIVER

Early in the spring of 1978 the *QST* "Product Review" editor plopped a box on my desk and said, "Here is your chance to do a product review." Upon inspection, I found inside the box a new Genave GTX-800 2-meter fm rig. This is a nominal 25-watt output fm rig for 2 meters with 800-channel capability in 5-kHz steps from 144 through 148 MHz. Since the first part of a product review is a series of tests for compliance with FCC regulations, the transceiver was turned over to the ARRL laboratory for spectral-purity checks. After a unit is found to satisfy FCC requirements, the actual review begins. (The review unit did not initially meet FCC specifications, but *did* subsequently, after it had been realigned at the factory.)

Physical Characteristics

The GTX-800 is packaged in a high-impact ABS plastic case with a pleasant brown front and cream cabinet. The controls are all located on the front panel and consist of the following: a lighted S meter that doubles as a relative rf-output indicator during transmit; three frequency-selector lever switches for selection of 144, 145, 146, 147 and 148 MHz and 0.00 through 0.99 in 10-kHz steps; an LED indicator that lights if the synthesizer fails to lock or if the user tries to transmit below 144 or above 148 MHz, in either case resulting in no rf output; a row of switches (bottom) which includes, from left to right a +5-kHz offset switch that permits transceive operation on the 15-kHz standard channels, a fixed 600-kHz selector that chooses +600, simplex or −600 kHz of the transmit frequency, as displayed on the frequency-selector levers, a HI-LO power switch to select respective outputs of 25 and 1 watt, and an ON-OFF power switch mounted on the same shaft as the volume control; and the squelch threshold control. The remainder, about one half of the front panel, is devoted to a three-inch oval speaker. On the right front side of the control head is a three-conductor 1/4-inch microphone jack. A sturdy, metal U bracket is provided with plastic-handled bolts for mounting. Adjacent to the heat sink, on the rear of the transceiver, you will find an SO-239 rf output connector and a 15-pin combination power and accessory receptacle.

Electrical Details

The transceiver consists of two glass-epoxy boards on a main frame with a detachable control head connected by three 13-pin edge connectors. The synthesizer board is carefully divided into three compartments with extensive shielding, top and bottom, to prevent spurious rf responses. The main board contains the receiver, transmitter and rf-power amplifier. The main board is virtually identical to that used in the GTX-1212 (crystal version of this rig) and in Genave's line of marine vhf radios. The transmitter uses a TRW 2N6082 rf transistor to obtain the rated power output. Input power required is the standard 13.6-V dc automotive supply. Less than 7 A of current are required in high-power transmit. The manufacturer's specifications, as have been verified in the ARRL laboratory, are shown in the specifications table.

Installation and Operation

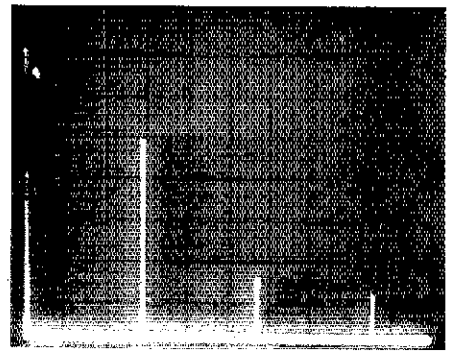
I first attempted to install the GTX-800 in my Peugeot, but this was not possible because of the size of the radio. My wife "loaned" her full-size Ford for the review period. The only place large enough to mount the '800 was in the passenger leg-well, making it somewhat inconvenient to operate while in the driver's seat. Some solutions to this problem were found subsequently, and will be explained later in this article.

Problems and Corrections

Several contacts were made using the GTX-800 while I switched between it and my personal vhf equipment. In all cases the audio sound of the Genave was termed by those contacted as being "constricted" both on simplex and through several different repeaters. The '800 was compared to my ICOM IC-215 and IC-245E. Nevertheless, the audio was considered to be of communications quality.

While using cruise control on the test vehicle, I discovered that the GTX-800 would shut down the fuel flow to the 1976 Ford LTD whenever I transmitted in the high-power position. Since this does not occur with the IC-245E driving a 140-watt Class C amplifier using the same antenna, I assumed the problem was not with the automotive system. Attempts to reroute the dc supply leads for the GTX-800 did not resolve the matter, and the final solution was to place the rig in the trunk with the mic cord passed through the back-seat recess. At this point the problem completely disappeared. It is assumed that the unshielded main board of the '800 presents a sufficient rf field to disrupt the electronic speed control, while the completely enclosed ICOM does not. (This problem occurred across the entire 144- to 148-MHz spectrum in simplex as well as both repeater modes.)

In resolving this problem, I discovered a very excellent feature of the GTX-800. Available for the marine version of this radio is a modification kit to extend the control head. Discussion with the Genave engineering staff revealed that you can make up a similar control cable for the '800 without regard to length (this assumes about 25 feet maximum length).



Output of the GTX-800 as displayed on a spectrum analyzer. Vertical scale is 10 dB per division. Horizontal divisions are each 50 MHz. The top reticle line in the photo represents full amplitude of the fundamental, which is partially notched out here to enhance the dynamic range of the analyzer. The most significant spurious emission is the second harmonic at 293 MHz, which is down 63 dB with respect to the fundamental. All other spurs are down at least 67 dB, meeting the FCC regulations concerning spectral purity. These measurements were taken in the ARRL lab.

The GTX-800 was large enough to create some mobile mounting problems. However, it seems to have capability for remote mounting of all but the control panel. The thumbwheel-control frequency switches aren't lighted and are difficult to read at night when operating mobile.

Unfortunately, the marine modification kit will not work on the GTX-800. The same engineer advised me that conversion data for MARS operation of the GTX-800 are available for an s.a.s.e. to Genave.

For nighttime operation, you might want to consider a small dash extension light, as the GTX-800 frequency-selector levers are not lighted. A recent "Hints and Kinks" article in *QST* offers a solution for a similarly switched rig (Heath HW-2036).

Overall

It is pleasing to find a moderately priced entry into the marketplace from a U.S. manufacturer. At first glance the size of the radio may seem to be disadvantageous. But when you consider the low-cost remote control capability, the ample space inside the housing to add peripheral modifications such as tone burst and room to do maintenance on the unit yourself, the large size might easily be rationalized. — *Jim La Porta, N1CC*

Genave GTX-800 Transceiver Specifications

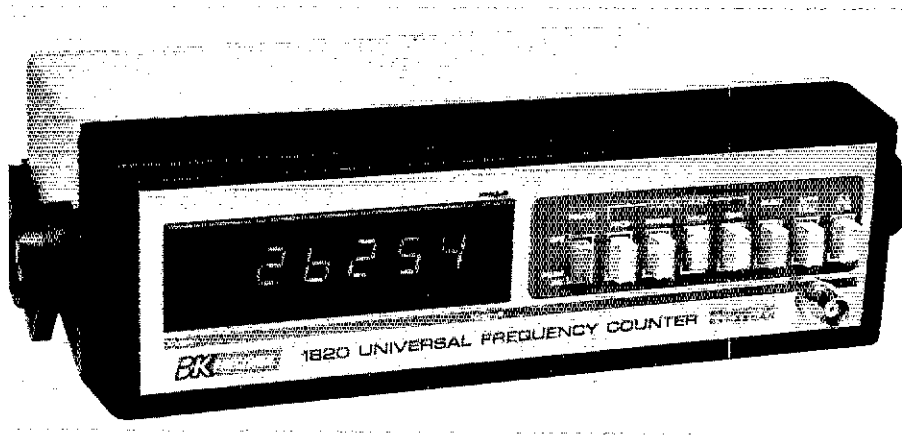
Power requirements: 13.6 V dc at 6.5 A maximum.
Receiver sensitivity: 0.35 μV for 12 dB sinad.
Rec. spurious response: −65 dB or better.*
Rec. selectivity: ±7.5 kHz.
Rec. frequency range: 144-148 MHz in 5-kHz steps, plus 143-144 and 148-149 at reduced sensitivity.
Transmitter power output: 25 watts (HI), 1 watt (LOW).*
Trans. spurious emissions: −63 dB (25 watts.)*
Trans. stability: ±0.001 percent.
Trans. frequency range: 144-148 MHz in 5-kHz steps.
Dimensions (HWD): 3-3/8 × 9-3/4 × 12 inches (86 × 248 × 305 mm).
Weight: 6 lb (2.7 kg).
Mfr.: General Aviation Electronics, 4141 Kingman Dr., Indianapolis, IN 46226.

*Measured in ARRL lab.

B AND K MODEL 1820 FREQUENCY COUNTER

This counter is designed for use up to 80 MHz. If you never operate above 6 meters, the range will suit your needs. Actually, the counter I tested in the ARRL lab made it up to 110 MHz before the display became erratic (it required every last microvolt I could squeeze out of our venerable model 80 signal generator to do it). At 80 MHz, sensitivity was about 8500 μV. The 1820 is installed in a lightweight plastic cabinet, which does nothing to shield the unit. No problems were encountered with interference to the counter, but the oscillator which multiplexes the display created havoc with any receiver nearby. By carefully routing power cords and other cables I was able to minimize this problem. Many new counters and most calculators use multiplexed displays to reduce power consumption and cost. Unless the user is careful, such devices can effectively disable receivers operating near them.[1]

Measuring 3 × 9.5 × 8 inches (76 × 240 × 200 mm), the counter is housed in an attractive tan and black case, provided with an adjustable stand. This allows the user to control the viewing angle. Provision is made via rear-panel connectors for external time-base and elapsed-time control. B and K instruments are available from Dynascan Corp., 6460 West Cortland Ave., Chicago, IL 60635, or through dealers. Price class of the model 1820 is $260. — *Jim Kearman, W1XZ*



The B and K Precision model 1820 frequency counter. Note the adjustable handle shown here in the fully back position.

DECIBEL PRODUCTS, INC. VAPOR-BLOC COAXIAL CABLE

Moisture and other external impurities have a pronounced effect on the life span of flexible coaxial cable. This is a significant problem in areas of heavy rainfall. It is especially pertinent to installations which require coaxial cable to be buried underground in the soil. Most ordinary RG-8/U cables, for example, are severely contaminated after a few years in the soil. When this happens the line becomes very lossy, and is relatively useless.

Decibel Products, Inc., has solved the moisture problem by developing what it calls the Vapor-Bloc line of coaxial cable (VB-8). With ordinary cables of the 50-ohm type, moisture and various impurities can enter the cable through cuts or scratches in the outer insulating jacket, or via improperly installed coaxial connectors. Even minute quantities of water vapor will condense to water, the latter of which will migrate through the shield braid to contaminate the entire length of cable eventually. If the water contains impurities (especially prevalent in high-pollution areas) it will ruin the copper in the braid. This will alter the attenuation and impedance characteristics of the cable, making it necessary to replace the line. Not only is the reliability of the antenna system questionable, the cost of replacement can be considerable.

Decibel Products has effected a significant improvement in moisture immunity for RG-8 and RG-11 types of cable. Not only is the outer jacket of their Vapor-Bloc cable especially formulated to resist sun, moisture and corrosion, but an inert semi-liquid compound fills all space between the polyethylene dielectric and the outer cable jacket, flooding the copper braid. This compound adheres strongly to the braid and the dielectric materials. It is not affected by temperature, moisture or time. Even though the outer jacket is cut, the compound keeps moisture and gases from migrating beyond the immediate area of the "wound."

Vapor-Bloc cable also features a solid inner conductor rather than the usual twisted-wire center. This ensures that unwanted moisture and impurities can't travel through the center of the cable to cause deterioration.

VB-8 cable is comparable in all electrical parameters to regular RG-8/U. Standard coaxial fittings can be used with it. Some of the characteristics are 50-ohm impedance; 30.8-pF capacitance per foot; 5-kV rating; velocity factor of 65.9 percent; 1.4-dB loss per 100 ft (30.5 m) at 50 MHz, 2.4 dB at 150 MHz and 4.4 dB at 450 MHz. The current price is 52 cents per foot.

Amateurs who operate marine mobile should find this information especially interesting. Those who reside near salt water and in polluted metropolitan areas may wish to replace existing coaxial transmission lines with VB-8. But on general principles, the longevity of any permanent amateur installation should be enhanced through the use of this type of cable. Vapor-Bloc cable is manufactured by Decibel Products, Inc., 3184 Quebec St., Dallas, TX 75247. — *Doug DeMaw, W1FB*

NEW BOOKS

Optoelectronics: Theory and Practice, by Texas Instruments, Inc., published by McGraw-Hill. Hardback edition 7 × 10 inches, 464 pages. Price: $21.50.

This new book, written under the auspices of Texas Instruments, with input from their engineers and scientists, provides thorough coverage of the design, use and methods in the field of optoelectronic devices. In addition to theoretical discussions, the book also contains practical usage information for engineering, consumer, commercial and technical applications. Hundreds of line drawings illustrate the physics of optoelectronics, including diode and transistor characteristic curves, and circuit diagrams.

Those amateurs interested in the more technical aspects of optoelectronic devices might find useful the volume's in-depth examination of such topics as infrared detection, opto-coupling, modulated radiation and data transmission, just to name a few. A number of sample circuits provided might be interesting for experimental use by amateurs. — *Jim Bartlett, K1TX*

[1]Editor's Note: Operation of a multiplexed or scanned display is discussed more fully in an earlier equipment review. See "The Heath GC-1005 Electronic Clock," December 1973 *QST*, p. 43.]

Hints and Kinks

MOUNTING A COAXIAL FITTING ON HARDLINE

Want a practical method of adapting and mounting a PL-259 connector on the end of that new 50-ohm hardline cable? Then try this. After removing the center pin and surrounding insulation from the inside of the PL-259 connector, prepare the hardline in the following manner.

Remove six inches (152 mm) of the outside jacket of the hardline, exposing the solid aluminum shield. Expose and trim enough of the foam dielectric material to permit the end of the cable to be inserted in the PL-259. The foam replaces the fiber insulation and the end of the hardline center conductor takes the place of the former center pin. The foam must be pared sufficiently to allow the 0.162-inch (4.1-mm) copper inner conductor to protrude from the PL-259 the same distance as the original center pin. (Refer to the related drawing.) The PL-259 is screwed onto the foam until it contacts the end of the aluminum shield.

Depicted in the illustration is the manner in which a short length of copper braid, removed from a piece of RG-8/U, is placed over the aluminum shield and soldered to the PL-259 connector. The two stainless-steel hose clamps, shown in the drawing, secure the braid to the aluminum shield. After installation, waterproofing of the entire connection may be accomplished by applying a liberal amount of Johns-Manville Dux Seal, a nonhardening putty-like substance, available at many hardware stores. The WRØAGP antenna transmission line is installed in this manner, showing essentially no SWR change over a period of months even though subjected to severe ice, snow and rain. — *Paul Grauer, WØFIR*

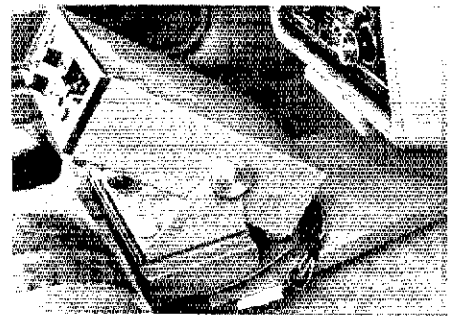
ANOTHER MOBILE-INSTALLATION CONCEPT

Every new car purchase poses a different set of mobile-rig installation problems even for the popular and compact 2-meter fm gear. Here is a concept that met all my installation criteria, including convenient location, easy removal, nice appearance, full access to the glove compartment or ash tray, no hole drilling, and low cost. One acceptable compromise is the necessity to remove the rig to accommodate the occasional third passenger in the front seat.

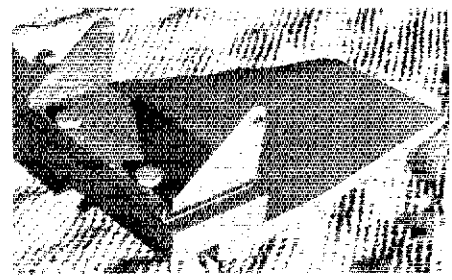
The photography illustrates the design of this mount better than words, particularly as each combination of automobile and transceiver will require variations of this arrangement. The basic materials are scraps of 1-and 1-1/4-inch clear white pine, two large common nails (about 40-penny spikes) and a few wood screws. The width and length of the baseboard, the height of the mounting block and the length of the nails are all a function of the size of the transceiver, the space between the transmission hump, front seat and dash, plus the amount of transceiver tilt desired. Adjustment is made to suit the need.

The nails, which serve as legs and nicely grip the carpet on the transmission hump, should be driven as a force fit through pilot holes to avoid splitting the baseboard. Once adjusted to the right length, the remaining "head-end" portion of the nail is sawed off flush with the baseboard. The nails will not back out because they are held in place by the mounting block, which is secured with wood screws from the bottom side of the baseboard. Note that in this installation (a 1978 Grand Prix) the rear of the baseboard is wedged under the ashtray housing, making the installation even more secure.

The coaxial cable and power leads disappear through an existing slit in the carpet under the driver's seat. A couple of coats of semi-gloss paint in an appropriate color completes the job. — *Al Robertson, K8BLL*

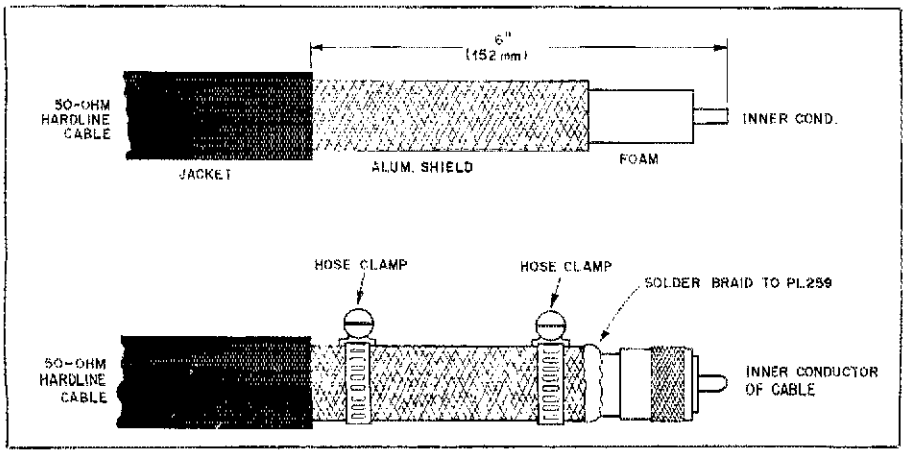


This neat and inexpensive arrangement for mounting a mobile rig, designed by K8BLL, provides easy removal, full access to the ash-tray or glove compartment, and no drilling is required.



The K8BLL mobile transceiver mount. Both the baseboard and mounting block are made of wood. Two spikes serve as legs.

These drawings illustrate a method of mounting a PL-259 connector on the end of a length of 50-ohm hardline coaxial cable. Six inches (152 mm) of the jacket are removed in order to expose the shield and foam. Remaining steps are given in text. The exposed area may be weatherproofed by applying Dux Seal from the jacket to the connector.

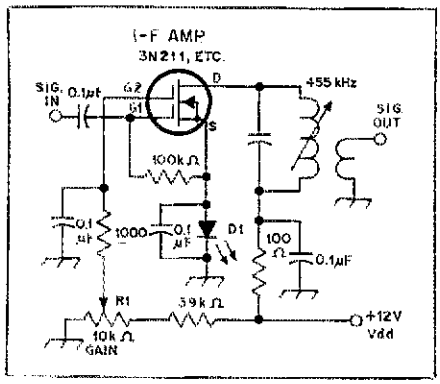


A 1.5-VOLT REFERENCE

When the need arises to use a low-voltage reference, it is common practice to employ silicon diodes singly or in series, depending upon the voltage needed. Typically, a silicon diode will act as a regulator or reference at approximately 0.6 to 0.7 volt. By using one or more in series the voltage level can be elevated.

Following a hint given to the writer by W7ZOI, an LED was used to provide a 1.5-volt reference as shown in the illustration. The diode will illuminate of course, which may give rise to a mild psychological trauma for those who view the pc board with a red, green or yellow glow beaming up from amid a group of passive and nonglowing components!

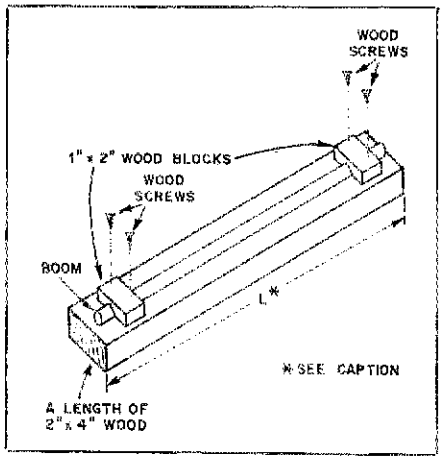
The diagram illustrates one use to which the writer has put an LED for the goal of obtaining a 1.5-volt reference. The requirement was to place gate 2 of the FET at −1.5 volts respective to gate 1 during minimum gain of the i-f amplifier. This was necessary in order to realize



A nifty circuit employing an LED providing a 1.5-V reference.

a wide range of manual gain control by means of R1. This method of bootstrapping the stage proved quite effective, even though the curves for the TI 3N211 indicate that −2 volts at gate 2 is the preferred reverse bias.

This concept for LEDs is entirely suitable for other applications which call for a 1.5-volt reference. In many instances the LED can serve double duty as a panel-mounted function indicator or on-off lamp. — *Doug DeMaw, W1FB*



A holding fixture for proper alignment of the elements of a 2-meter beam. Length L should be equal to or greater than the boom length of the antenna. The blocks, made from 1 × 2 wood, should be placed about every foot along the 2 × 4 but apart from the location of the beam elements.

FOR ALIGNING 2-METER BEAM ELEMENTS

While constructing a circularly polarized 2-meter beam, I came upon this idea to assure that all of the elements are in line with one another. Score the boom at the center spacing of the elements. Attach the boom to a straight length of a wooden 2 × 4 as shown in the diagram. Use small pieces of wood (1 × 2) with V notches cut out of them. Place these blocks over the boom and attach them to the 2 × 4 with wood screws. This holds the boom securely, allowing the boom to be drilled by means of a drill press and have all the elements end up in line. This method worked quite well for me. — *Anthony Campbell, WD5HJB*

TRANSCEIVER DIAL-LAMP REPLACEMENT

The Clegg FM-76 and similar transceivers frequently suffer burned-out dial and meter lamps. The Radio Shack lamp no. 272-1141, rated at 12 volts, 25 mA is a suitable substitute, but only if a small dropping resistor is installed in series to prevent future burn-outs. I chose a 1/4-watt, 100-ohm resistor from my junk box. It drops the voltage about two volts, dimming the light only slightly. I placed the resistor inside a piece of shrink tubing to prevent unintentional grounding. I find this solution quite satisfactory. — *Jerry Murphy, K8YUW*

USING A CB BEAM ANTENNA ON 10 METERS

My 10-meter beam antenna is a modified Radio Shack Archer Crossbow III three-element CB beam antenna, catalog no. 21-933. In order to obtain resonance at 28.6 MHz, I trimmed the elements to these lengths: reflector 17 ft, 6 inches (5.33 m), driven element 16 ft, 7 inches (5.05 m), and director 15 ft, 10 inches (4.83 m). The driven element is spaced 49 inches (1.24 m) from the director and the reflector 87 inches (2.21 m) from the driven element. Only a slight adjustment of the preset gamma match was required although this may vary according to the individual installation.

The elements must be cut an average of six inches (152 mm) from each end to conform to the dimensions given above. When cutting the elements an inexpensive pipe cutter does the work better than a hacksaw. At 28.6 MHz I find the SWR is 1.2:1, while over the entire band the readings are less than 2.0:1. — *Dan Kernan, WA2KOK*

PRV DIODE CHECKING

To check the PRV rating on unmarked diodes, the circuit I have shown can be used. The voltmeter is read in ac volts (rms × 1.414) when the oscilloscope shows reverse breakdown as the voltage is increased. Transformer T1 should be rated for a 117-V primary with a secondary in the expected range of the PRV. The circuit will also detect open or shorted diodes. — *Duane Meyer, K9PVY*

SB-220 MODIFICATIONS

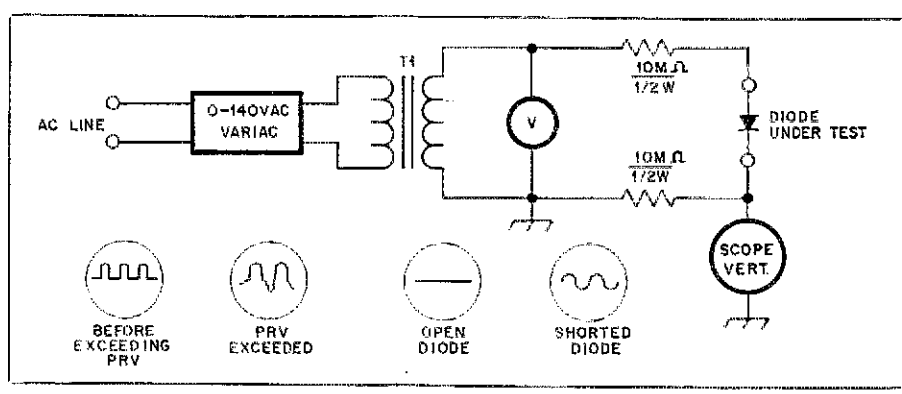
After burning up two main-tuning capacitors (C55-250 pF) on my Heathkit SB-220 linear amplifier from arcing (and the third one also going rapidly), I sought a solution to the problem. The answer was found in William I. Orr's 19th edition of the *Radio Handbook* starting with page 22.30, which refers to the 3-500Z 2-kW PEP linear amplifier for 10 through 80 meters. The designs of that amplifier and the SB-220 are similar. The parasitic chokes from the plates of the 3-500Z tubes are three 100-ohm, 2-watt resistors in parallel. Space wound about one resistor are 3-1/2 turns of no. 18 wire. I happened to have some no. 14 enameled antenna wire and used four turns on one resistor with the other two resistors in parallel. One set is used for each plate, replacing PC-1 and PC-2. I have not observed arcing in the main-tuning capacitor since. Some of the plates of the third capacitor had been previously damaged by arcing. I filed these plates and sanded them with smooth sandpaper.

I called the Heath factory for help in solving another problem with the SB-220; it delivered only 250 watts output on 10 meters. The SWR between the driver and the amplifier was 6:1. I was advised to add 5 pF of capacitance across the 10-meter coil (L1) in parallel with C33-C34 and then to tune the coil slug for minimum SWR between the driver and the linear with the latter feeding a 50-ohm dummy load. Having a 10-pF silver-mica capacitor on hand, I placed it across the coil and then backed the tuning slug 1/4 inch from the original setting to obtain a 1.8:1 SWR at the driver with 900 watts output from 28 to 29 MHz. The Heath engineer said that the SWR normally goes higher toward the high end of the 10-meter band past 29 MHz. *A strong word of caution for anyone making the slug adjustment. First disconnect the power, then ground the power supply with an insulated screwdriver after a two-minute wait. Take your time and work safely! It may take several adjustments to find the minimum SWR, but be sure to shut the power off again before each adjustment.*

My SB-220 is driven by an FT-101EE. A service representative at Yaesu suggested I use a 5000-ohm potentiometer across the SB-220 alc to avoid faulty alc operation, particularly on 15 meters. There have been times where the alc did not work and the signal could be completely clipped off on ssb. The movable contact is connected to the alc controlled output from the FT-101EE. — *Kenneth M. Wold, P.E., N6IH*

[Editor's Note: *Pay strict attention to the warning in the SB-220 manual with respect to high voltage.* Do take particular note of page 81 where SB-220 owners are warned also that the amplifier must not be turned on while the top cover is removed, as the high-voltage supply is short circuited under this circumstance.]

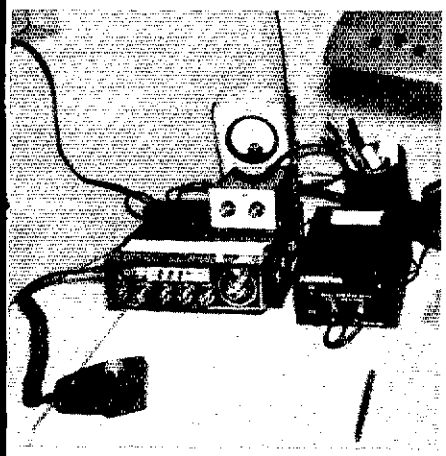
A circuit for checking the PRV ratings on unmarked diodes. Representative oscilloscope patterns are also shown.



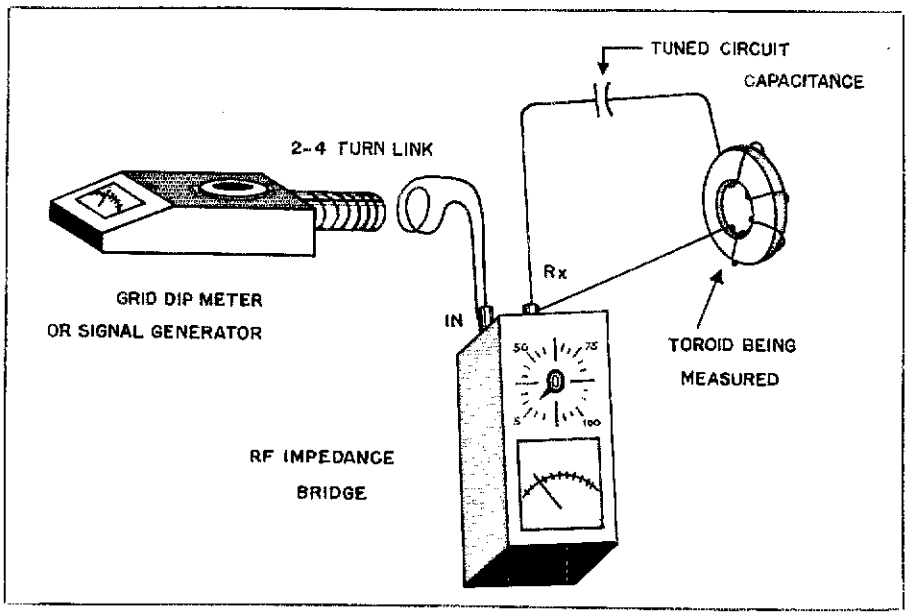
QRP ON 10 METERS

The bargain sales of CB sets enabled me to pick up a Midland 13-893 for under $100. I converted it to 10 meters by removing the four 11-MHz crystals with the following crystals being substituted: 12,638.5 kHz; 12,648.5 kHz; 12.658.5 kHz and 12,668.5 kHz. My tune-up equipment consisted of a signal generator on 10 meters, a dummy load, and a home-constructed SWR bridge. The use of Sams' Photofact diagrams and service information simplified setting the power output to maximum, turning off the alc, and adjusting the clarifier to provide 10-kHz range on each crystal channel. The unit now operates from 28.680 MHz to 28.880 MHz.

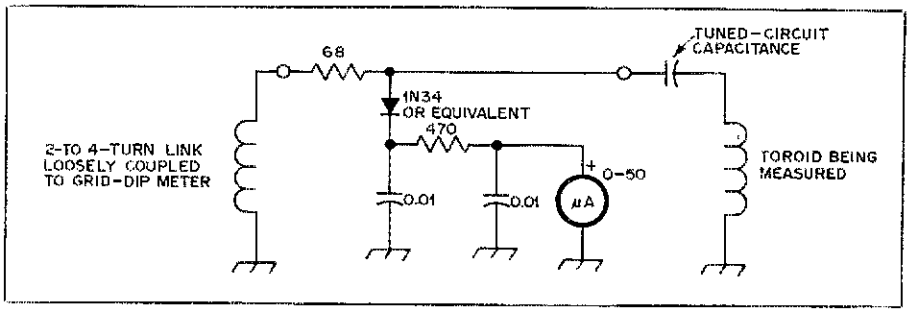
While operating this unit aboard the *SS Pennsylvania* on a run from Baton Rouge to Panama, the results were exciting. Stations were contacted in England, Germany, Belgium, South Africa, New Zealand, Canada and the USA. Signal reports ranged from S7 to 10 dB over S9. The antenna was a 300-foot (90-m) long wire. — *Andy Sallet, W1TG*



This Midland CB set, converted to the 10-meter band, provides W1TG with plenty of DX.



Test set-up for measuring resonance of toroids using an rf impedance bridge.



A circuit that may be used instead of an impedance bridge for indicating resonance. Resistance is in ohms, capacitance in microfarads.

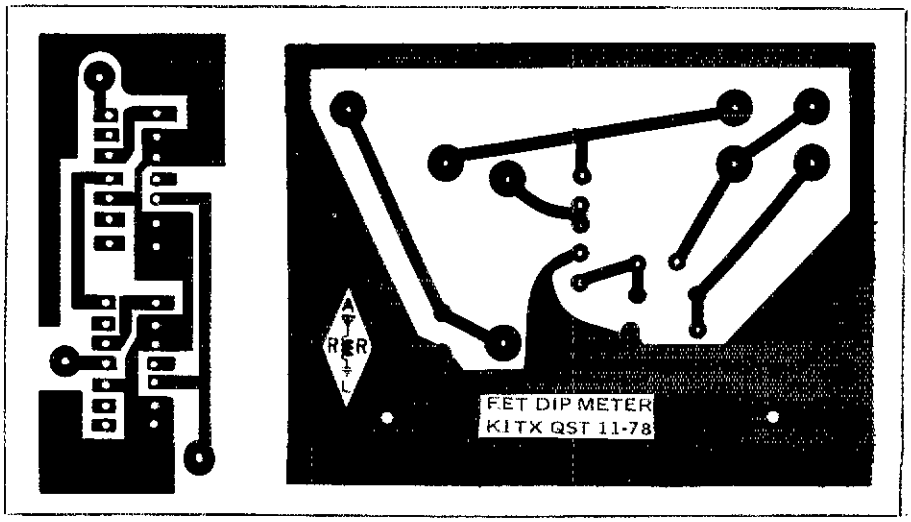
ANOTHER METHOD OF MEASURING TOROIDAL-WOUND INDUCTORS

Toroids can be grid-dipped as described by W1FB ("Hints and Kinks," April 1973 *QST*) but the link will cause some loading and detuning of the circuit. Usually the method is quite adequate, but here is an alternative that may be of interest.

The resonant frequency of a toroid and capacitor can be checked by connecting them in series to the R_X terminals of an antenna impedance bridge. The GDO or signal generator is then tuned for a null on the bridge. The bridge may be the one described in *The Radio Amateur's Handbook* or *The Radio Amateur's VHF Manual* (1st edition, page 286). The latter is easy to construct and also works well at low frequencies. It contains a potentiometer instead of the hard-to-find differential capacitor. The bridge is actually being used to measure the apparent series resistance of the LC circuit. This will usually be near the low-resistance end of the scale, but if it is on the scale the coil Q may be calculated using X_C/R (or X_L/R).

This method works well with any other type of coil. The bridge may also be used to determine the number of turns required for a link or tap point to present a given impedance. If an rf bridge is not available, the alternative circuit shown in the illustrations may be used for measuring the resonant frequency of toroids. When the vhf impedance bridge is set to 0 ohms it is essentially an rf voltmeter across the R_X terminals. If the Q of the coil is high (R_S <15 ohms) the meter will show a good null. A complete null is obtainable even with a lower Q circuit simply by alternately adjusting the R dial and the GDO frequency. — *Daniel H. Hopper, K9WEK*

Circuit-board etching patterns for construction projects contained in this issue of *QST*. The boards are single-sided, shown here at actual size from the foil side; black represents copper. At the left is the pattern for the divide-by-100 circuit addition to the Heath SB-650 frequency display (see Fig. 2, page 21). Right, the pattern for the FET dip meter (see Fig. 4, page 28).



The Aerial Performers of the Radio Circuits

Basic Amateur Radio. Part 1: Antennas are as different as the hams who use them. This two-part series will bring you a measure of expertise on this all-important subject.

By Margaret Koerner,* KØIQ (ex-WBØBEM)

The first thing to be said about antennas is that they are *different*. Not only are they different from all other types of equipment in Amateur Radio stations, but they also differ greatly among themselves. True, as far as genetic makeup is concerned, they all belong to the same family. They are all employed in the same line of work. However, they vary widely in appearance, and they differ in such individual characteristics as efficiency, attention to gains and losses, and ability to adjust to change.

The *lifestyle* of antennas is different from that of most other Amateur Radio components. Unlike receivers and transmitters, the vast majority of antennas do not live out their lives in the comfortable security of ham shacks but instead are subjected to all the perils of outdoor existence. They face struggles with burdens of snow and ice and can get corroded by salt and grime. Strong winds can make them fall flat on their baluns; squirrels can chew their support ropes to shreds. For all sorts of reasons, change is their lot. An antenna's life is not an easy one.

Antennas require installation, and here, too, is a difference. Other equipment can be bought or built, plugged in to a source of power, and be on its way. With antennas it's rarely that easy. Antennas must be installed by a process involving problems (expected and unexpected), decisions and work. This is particularly true of hf (high-frequency, 3-30 MHz) antennas, the kind we will primarily consider in this article.

In addition to *being different,* antennas *make a difference.* They can make the difference between a signal that really gets out and one that really doesn't; between a signal that lets you keep schedules, make radio friends, provide solid copy to a listening world — and one that, on the other hand, hides timidly below the noise level. As far as antenna work is concerned, each amateur is in competition with himself as well as with others, and the slogan of antenna-minded persons is forever the same as that of 4-H youth: "To Make the Best Better."

Prime Candidates for Discussion

Antennas are one of the leading subjects for amateur discussions on and off the air. One reason for the wide differences of opinion is that an antenna that works well for one amateur may not work equally well for another. Also, antennas cannot usually be adjusted or performance-tested on the bench. Other equipment can be checked, component by component, in the shack. Antennas must be tested *on the air.* They must be worked on *in place* ("place" being, perhaps, a precarious spot 50 feet or more above the ground), or they must be taken down, adjusted, and again be put up and tested on the air. They are repaired and improved by experimentation, by consultation, by guess and by gosh, or by something more explicit thrown in.

Much has been written about antennas. The latest edition of the *ARRL Antenna Book* contains 329 pages on the subject, and many other books and articles deal with antenna design, construction and experimentation.

What Antennas Are and What They Do

The study of antennas involves a mixture of fact and theory; a mixture of the tangible and the intangible. On the one hand, antennas are tangible, material objects with physical proportions which can be measured. They are made of metal, usually in the form of wire or tubing. Metal, in general, is a good conductor of electrical currents, and practically any metallic objects can be made to radiate a signal. How effectively they do this radiating, however, is something that varies tremendously. How any antenna manages to do it at all is another matter, one which takes us out of the world of material things and into the world of theory. This world of theory is inhabited by electromagnetic waves of various lengths (light, heat, X-ray, radio), all of them traveling through free space at the speed of approximately 300,000 kilometers (186,000 miles) per second. Among these waves we find our Amateur Radio signals — combinations of electrical and magnetic energy sent at radio frequencies from our transmitters to our antennas and from our antennas into the atmosphere and space.

As radio waves move into the atmosphere, their wavelength and frequency remain essentially the same as they were when they left the transmitting antenna, but their *field strength* (volts per meter) varies inversely with the distance from the antenna. This means that at twice the distance away from the antenna, the field

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strength of the wave is only half as much. At the same time, the *power* per unit area of the radiated wave falls off inversely as the *square of the distance* from the transmitting antenna, so that at twice the distance the power density (watts per square meter) is only *one-fourth* as much as it was originally. Remember that as the wave moves away from the transmitting antenna it becomes weaker the farther it goes.

Radio waves spread out from different types of antennas in characteristically different patterns. Excluding the effect of nearby objects, the shape of the pattern depends primarily on the kind of antenna and its height above ground. From most vertical antennas, radio waves leave more or less in the shape of a horizontal doughnut. No one has actually *seen* them leave in this shape, but we can accept this fact in theory because measurements taken of the radiated field show equal strength in all horizontal directions. Illustrations of radio-wave patterns and types of antennas producing them can be seen in the *ARRL Radio Amateur's Handbook*, the *ARRL Antenna Book*, and numerous other publications.

Before we go on to discuss types of antennas, let's consider a source of confusion that stems from our use of common names in referring to our radio bands. The common amateur band names (40 meters, 80 meters, etc.) are *approximations*, not precise wavelengths for the different bands. But the names have great practical value as far as ease of communication, time-saving and brain-saving are concerned.

The FCC has allocated — in accordance with International Telecommunication Union (ITU) regulations — certain groups or segments of the radio spectrum for amateur use. Each allocated group includes many individual frequencies and some groups include more frequencies than others. For example, the so-called 40-meter amateur band includes all frequencies from 7000 kHz to 7300 kHz. The 10-meter amateur band is much broader, including frequencies from 28.0 MHz to 29.7 MHz.

Antennas are constructed so that their physical length corresponds in some way to the theoretical wavelength of the bands for which they were designed, and so we designate them quarter-wave (1/4 λ), half-wave (1/2 λ), five-eighth-wave, (5/8 λ), full-wave, etc., antennas. (The Greek letter lambda, λ, is commonly used in scientific work to indicate wavelength.) These physical antenna lengths, however, do not correspond exactly to the theoretical wavelengths, which are based on the velocity of the waves in free space — 300,000,000 meters per second, as indicated by

$$\text{Wavelength in meters} = \frac{300{,}000{,}000}{\text{freq. in Hz}} \quad \text{or}$$

$$\frac{300}{\text{freq. in MHz}} \qquad \text{(Eq. 1)}$$

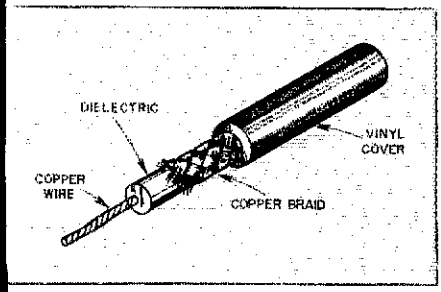
When a wave is traveling in a conductor such as an antenna, rather than in free space, it travels at a slightly slower speed and the antenna needs to be shorter than its free-space wavelength would indicate. These practical formulas

$$\text{length (ft)} = \frac{468}{\text{freq. (MHz)}}$$

$$\text{length (m)} = \frac{143}{\text{freq. (MHz)}} \qquad \text{(Eq. 2)}$$

automatically take care of this difference in length for the most-common horizontal antenna used by amateurs — the half-wave dipole. Don't confuse these two very important formulas: Eq. 1 is used for calculating wavelength (in meters). Eq. 2 is used for determining the physical length (in feet) of a half-wave wire dipole antenna.

Fig. 1 — Coaxial cable is the feed line used by most radio amateurs.



A Look at Transmission Lines

The transmission line is the life line linking the receiver and transmitter to the antenna. There are three kinds in general use in Amateur Radio: *coax, open wire* and *twin-lead*.

The purpose of any feed line is to transport as much energy as possible from the transmitter to the antenna or from the antenna to the receiver, but under certain conditions the line can "lose" much of the energy it is supposed to be transporting. A very small amount of energy is lost from even the best feed line — typically, about one or two percent per 100 feet of open-wire line at frequencies of 3-30 MHz — but we are talking here about more than that very small amount. If, for example, a coax line has been damaged or was made of inferior material to begin with, or if it is not properly matched electrically to the antenna, it can lose energy. A good grade of coax is a good investment. A poor-grade, "lossy" length of coax can drain away your hard-earned radio-frequency energy in a distance of just a few feet.

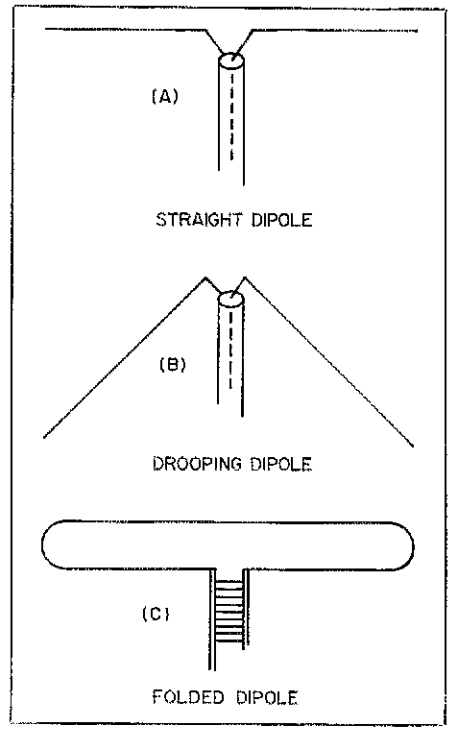


Fig. 2 — The dipole antenna is a favorite with beginners. Most antennas can be considered to be some form of dipole.

Kinds of Antennas

In this section we will describe, very briefly, five of the most common kinds of antennas used by amateurs. Any of these types can be *monoband* antennas, designed for operation on only one band, or *multiband*, designed for operation on several bands. Multibanders often make use of *traps* — not traps which catch and hold radio waves, as their name might imply, but rather traps which act as electrical gates, letting energy through on some bands and keeping energy out on other bands.

The Dipole

The dipole antenna is a favorite with beginners. It is a fundamental type of antenna and most antennas can be considered to be some form of dipole, even though their dipole ancestry may not be guessed from their appearance.

Dipole antennas are constructed of two equal-length pieces of metal, usually wire. For the half-wave dipole, the most common type, each of the two pieces is one-quarter wavelength long; the total length, therefore, is a half wavelength for the band being used. The less common full-wave and 1.28-wave dipoles yield a stronger signal for both sending and receiving, but they require more space than do shorter length ones. They may also require provision for "matching impedances," and are frequently fed with

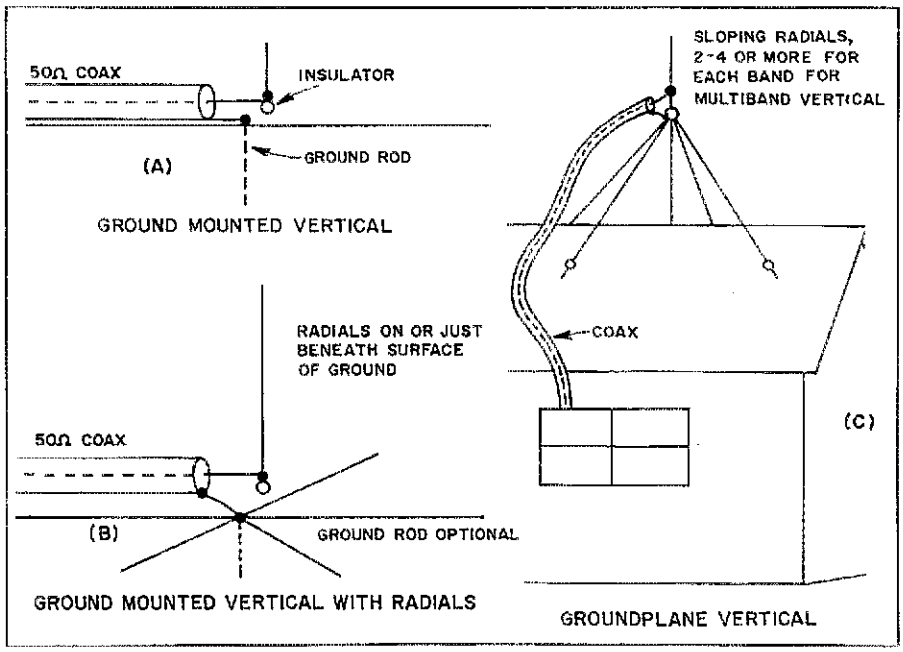


Fig. 3 — Three common methods for mounting quarter-wave vertical antennas.

open-wire feed line. (See the *ARRL Radio Amateur's Handbook* and *The ARRL Antenna Book*, for discussion of impedance matching.)

Several forms of the dipole antenna are in use. In addition to the *straight dipole* form (Fig. 2A), and the *drooping dipole* with wires drooping at an angle to form an inverted V (Fig. 2B), we occasionally see a *folded dipole* with the wire doubled back on itself, as in Figure 2C. The maximum radiation from a dipole is at right angles to the direction of the wires. Minimum radiation is off the ends of the wires.

The majority of dipoles are center fed, with energy from the transmitter entering at midpoint through a transmission line or feed line. [Note: Practical information on the construction and installation of a simple, coax-fed, half-wave dipole will be given in Part 2 of this series.]

The Vertical

Vertical antennas are commonly 1/4-, 1/2- or 5/8-λ long, with the 1/4-λ vertical being most often used by amateurs. Like the longer length dipoles, the taller verticals yield a stronger signal for both transmitting and receiving. But they, too, require more space, a fact that must be taken into consideration. Not that there is usually any shortage of space in the upward direction, but guy ropes are needed to keep taller verticals in position and prevent them, when hit by a strong wind, from suddenly finding themselves horizontal junk instead of vertical antennas.

There is an interesting electrical phenomenon and behavioral oddity common to all verticals — a *nonphysical mirror image* which appears, ghost-like, in the ground directly below the antenna whenever a signal is being transmitted or received. This mirror image forms the other half of the vertical and makes it into what is basically a "vertical dipole."

When we stand in front of a flat mirror and direct the beam from a flashlight toward it, the light in the mirror seems to come from a point as far back of the mirror's surface as we are standing in front of it, and the quality of the mirror determines, to a large extent, the quality and strength of the image we are seeing. An antenna's mirror image is an *electrical* one, with the ground acting as a mirror, and the conductive quality of the ground largely determining the strength of the mirror image. Excluding the effect of nearby surrounding objects, the mirror image and the height of the antenna, for the most part, determine the radiation pattern of the antenna's radiated wave.

The quarter-wave vertical is usually constructed and installed in one of three different ways:

1) As shown in Fig. 3A, the antenna is set on an insulator of some kind (a glass bottle, for example) placed on the ground. If it is coax fed, the copper wire in the center of the coax is connected directly to the quarter-wavelength-long aluminum tubing, or to some other radiating element such as a vertical wire or tower. The copper braid of the coax is connected to a metal ground rod pushed into the ground near the antenna base. This is the least efficient of the three methods we are discussing. (Efficiency is the amount of power radiated from the antenna compared to the amount of antenna input power.

2) The antenna is again mounted on the ground and fed by coax, but in addition has a group of copper wires called *radials* extending out from the base of the antenna as spokes of a wheel. These radials — the more the better — add *conductivity* to the ground. They can be laid out directly on the ground or placed underground at a very shallow depth, just deep enough to protect them from physical damage but not so deep as to put "lossy" ground between them and the vertical portion of the antenna (Fig. 3B). By tradition, each radial is 1/4 λ long. But if you can't fit 1/4-λ radials into the space you have available, a denser network of shorter ones or a mixture of shorter and longer ones may be the best way to go.

3) The most efficient of the three methods is to mount the antenna high above the ground, away from all energy absorbing objects, including the ground itself. In this installation, a circle of three to five radials, each 1/4-λ long, extend out from the base as in method 2, but because they are up high they form an artificial ground or *groundplane*. This antenna is referred to as a *groundplane vertical* (Fig. 3C).

Table 1 gives a comparison of the most common horizontal dipole and vertical antennas.

The Yagi

When we consider the Yagi antenna, we move into a group called *beam* antennas. Most beam antennas, including Yagis, are unidirectional, having the strength of their radiated energy primarily concentrated in one direction at the expense of other directions, somewhat similar to the beam from a flashlight.

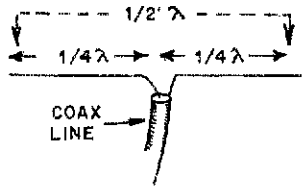
Yagis, the most popular of the beam antennas, are commonly horizontal dipoles with parasitic elements. The elements are called "parasitic" because they have no direct *electrical* connection to the transmitter or the receiver but instead are coupled (electromagnetically) to an element which *is* coupled directly (by a feed line) to the transmitter or receiver.

Normally, all of the Yagi elements are made of aluminum tubing. One element, a half-wave dipole called the *driven element*, is attached to the transmission line and receives energy from the transmitter. The parasitic elements are called *directors* and *reflectors*. All elements are placed on a horizontal support called a *boom* and are spaced at selected distances from each other — the reflector on one side of the driven element and the director on the other side. The reflector is about three to five percent longer than the driven element; the director is similarly shorter. The dimensions of these elements, as well as the spacing between them, must be carefully worked out if the antenna is to give its best performance.

The three-element Yagi is shown in Fig. 4. Yagis usually have only one reflector but can have as many directors as desired. Since the Yagi is normally rotatable, the beam can be pointed (with the director or directors in front) in a desired direction to

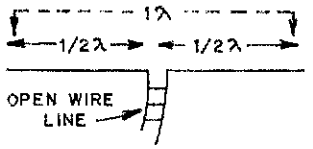
Table 1
Comparison of the Most Common Horizontal Dipole and Vertical Antennas.

Horizontal Dipoles



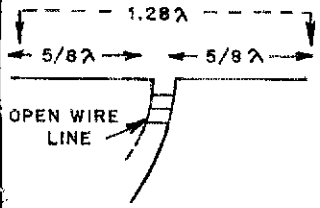
1/2-wave dipole.

Usually fed with coax transmission line.



Full-wave dipole commonly called double zepp or two half-waves in phase.

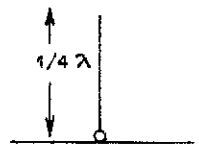
Usually fed with open-wire transmission line through antenna tuner at transmitter.
Has about 2 dB gain over 1/2-wave dipole.



1.28-wave dipole commonly called extended double zepp

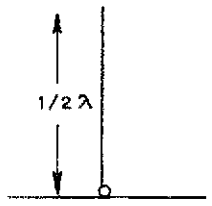
Usually fed with open-wire line through an antenna tuner at the transmitter.
Has about 3 dB gain over 1/2-wave dipole.

Verticals



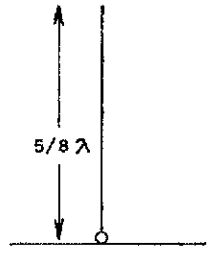
1/4-wave vertical

Usually fed with coax transmission line at base of antenna.



1/2-wave vertical

Usually fed with coax to a matching circuit at base of vertical.
Has about 2 dB gain over 1/4-wave vertical.



5/8-wave vertical

Usually fed with coax to matching circuit at base of vertical.
Has about 3 dB gain over 1/4-wave vertical.

Note: The terms "gain" and "dB" (decibels) will be discussed in part 2 of this article.

transmit or receive maximum signal strength. The antenna can be monoband or multiband, depending on its construction.

The Quad

Elements of the quad antenna are basically folded dipoles (see Fig. 2C) pulled out into a square shape. The quad is a rotatable beam antenna, usually consisting of at least two four-sided continuous loops — the antenna elements. These loops, spaced at selected distances from each other, are placed on a horizontal support, the boom. The driven element is directly coupled to the transmitter by a feed line, and a reflector is parasitically (electromagnetically) coupled to the driven element. In addition, many quads have one or more directors which are also parasitic, and you will hear amateurs say they have two-element, three-element, or four-element quads. These elements, each of which has four sides approximately a quarter-wavelength long (thus making up a complete wavelength for a desired band), can be placed on the boom as squares (Fig. 5A) or as "square diamonds" (Fig. 5B) in a plane perpendicular to the ground. Seen from even a short distance away, all the elements look alike, although the reflector is slightly larger than the driven element, and the directors are slightly smaller. *Spreaders*, usually made of bamboo or fiberglass, support the loops and hold them in place. The loops may be very large — an element for a 20-meter quad, for example, is about 17 feet on each of the four sides of the continuous wire loop.

Quads can be constructed as monoband (Fig. 5A) or multiband (Fig. 5B).

Fig. 4 — Three-element monoband Yagi consists of a driven element and two parasitic elements.

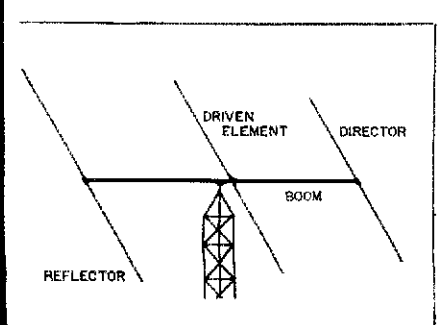
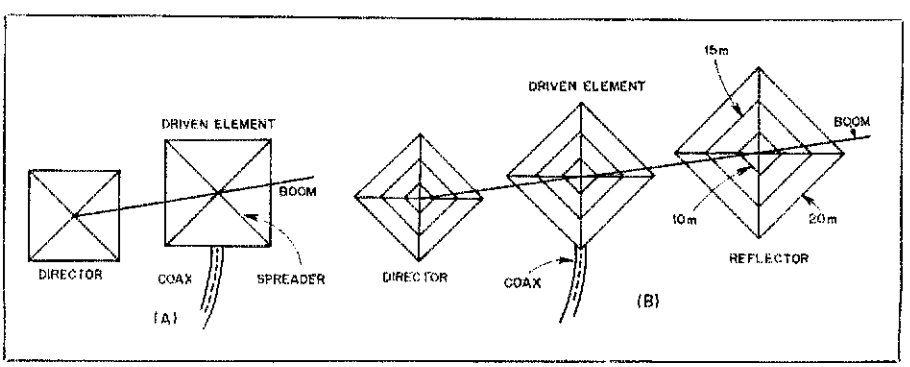


Fig. 5 — The quad antenna is basically a folded dipole pulled out into a square shape.



Multiband quads employ concentric loops for the various bands, with the band having the longest wavelength and therefore the largest loop on the outside and the others nested in the center (Fig. 5B).

Yagis and quads are the two most popular beam antennas, and amateurs can endlessly compare their relative merits. Yagis, according to those who prefer them, are (1) easier to construct and install, (2) less prone to receive damage from ice storms or strong winds, and (3) have a more attractive appearance. On the other hand, amateurs who prefer quads say they (1) are better for multiband operation, (2) possess greater "gain" for equal boom lengths, and (3) are easier to adjust since there is less interaction between elements, element spacing is less critical, and they are more broad-banded than Yagis.

The Longwire

The simplest antenna mechanically and electrically is just what its name implies, a long wire, with emphasis on the "long." Any piece of wire can be made to radiate or receive a signal, but an antenna does not deserve the name "longwire" unless it meets one important requirement: It must be more than one wavelength long for the band or bands being used and, if possible, should be several wavelengths long. A "random length" of wire can be called a longwire antenna, but the wavelength should still be taken into consideration. In general, the longer the wire, the stronger the radiation in certain directions. (Note: In most cases, longwire antennas require the use of an antenna matching unit, such as a Transmatch or "Match Box" to make possible the most efficient transfer of power from transmitter to antenna. See *The Radio Amateur's Handbook* for descriptions of these units.) Longwire antennas are usually at least one or more wavelengths long, using the lowest desired frequency band (which has the longest wavelength) to determine the length of the wire. They can be single wires (a type popular with beginners) or they can be constructed of wires combined in a number of ways, such as in the so-called V beam and the rhombic, which are more sophisticated longwire antennas.

There they are: five general types of antennas, each one with its subtypes — the straight, drooping and folded *dipoles;* the quarter-, half- and other-wave *verticals;* the *Yagis* and *quads*, each with varying numbers of elements and the *longwires* — simple and compound. Within each subtype, if we could but see them, are millions of individual antennas, all alike in some ways; all different in others. All of them are engaged, with varying degrees of success, in sending our radio signals out into all parts of the world. All of them leave us filled with amazement at their aerial performances, and always wondering — but never quite sure — just what their next act may be.

Update: Project Goodwill

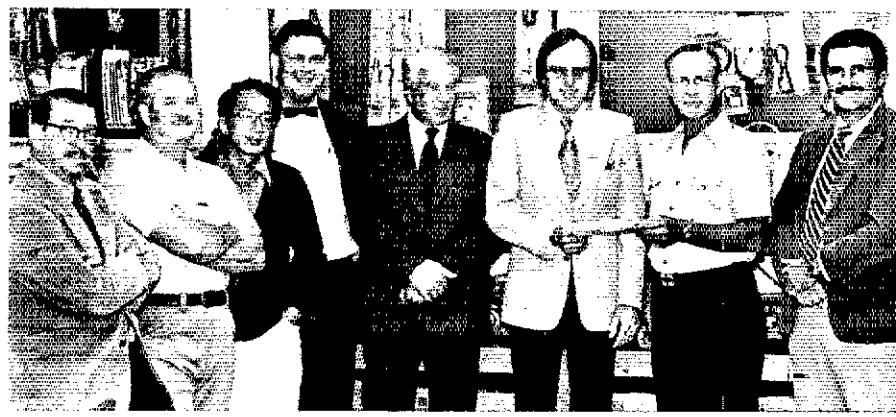
The fund that will help foster the growth of Amateur Radio in Developing Countries of Africa and Asia is off to a flying start! As of early October, more than $5000 has been received, and when the Northern California DX Foundation's matching fund ("League Lines," October *QST*) is added in, the total to date is almost $7000. If you have yet to make a contribution please do so now, as the NCDXF program ends December 31. For every contributed dollar up to $10,000, NCDXF is matching with 35 cents; on the second $10,000 they will provide 50 cents for each dollar. Contributions can be sent to ARRL WARC Fund, c/o International Services Officer, ARRL Hq., Newington, CT 06111.

Even before last month's announcement in "International News," Hq. speakers were spreading word of these stations. Thus, many individuals and groups have already taken the initiative of contributing to the special fund.

Those who have contributed so far are (in chronological order) Greater Bridgeport ARC, Stratford, CT; Sangamon Valley RC, Springfield, IL; Baker Springfield, W4HYY, Memphis, TN; Lockheed ARC, Burbank, CA; Jackson ARC, Jackson, MS; Daytona Beach (FL) ARA; Santa Clara County ARA, San Jose, CA; Sheboygan (WI) County ARC; Onalaska Area ARC, West Salem, WI; Enfield (CT) Radio Amateurs Group; San Fernando Valley RC, Van Nuys, CA; Louis J. Lyell, WA5YMK, Jackson, MS; Egyptian RC, Granite City IL; Nickolaus E. Leggett, N3NL Washington, DC; Radio Amateurs Clu of Knoxville (TN); Woodbridge Wireless Dale City, VA; Platinum Coast ARS Melbourne, FL; Allen B. Harbach WA4DRU, Melbourne, FL; Glenn F Mulligan, N6FZ, Brea, CA; Music Cit Repeater Association, Nashville, TN; Dr Norman L. Chalfin, K6PGX, Pasadena CA; Lloyd C. Sigmon, W6LQ, Sherma Oaks, CA; Hamfesters RC, Oak Lawn IL; Richard F. Barrett, W6CFK, Sa Jose, CA; Southern California Chapter Quarter Century Wireless Association, E Segundo, CA; Chickasaw Amateu Association, Hernando, MS; Johnso City (TN) RA; Paul E. Grauer, WØFIR Wilson, KS; Harold and Verna Cobb W6KDJ and W6JOJ, Pollock Pines, CA Peter N. Borsi, W4HII, Sterling, VA Jerry King, W4MLA, Miami, FL; Bruc Frahm, KØBJ, Colby, KS; Silver Dolla Chapter, 10-10 International Net an Southern Nevada DX Club, Las Vegas NV; Owensboro (KY) ARC; John C McGinty, K5HMI, Oklahoma City, OK Muskegon Area (MI) Area Amateu Radio Council; John B. Cree WB3GXW, Silver Spring, MD; Claude D Pressler, W5VVR, Houston, TX; Centra Illinois Radio Club of Bloomington, Nor mal, IL; K. A. Johnson, W6NKE Canoga Park, CA.

On behalf of the amateurs around th world who will benefit from you generosity, our heartfelt thanks. — *KIU*

The first installment of the Northern California DX Foundation matching fund for IARU receiver and transmitter kits is presented by Don Schliesser, K6RV, NCDXF president, to John Troster, W6ISQ/N6IQ, NCDXF trustee representing the ARRL. Foundation officers are (l-r) W6WB, K6DC, K6KQN, W6CF, WA6AUD, K6RV, W6ISQ/N6IQ, W6RJ. Not shown: K6AN, N6NB, O. G. Villard, Jr.



QRM and QRN: You've Heard It; Now You Can See It

Real-time 3-axis display captures interfering signals and noise on the ham bands. Here is a new look at an old enemy.

By W. R. Vincent,* W6PUX and R. S. Rich,** W6OPX

Modern technology has come up with a fascinating tool for observing frequency utilization. Most of us are familiar with the conventional 2-axis display of the spectrum analyzer. But, imagine adding a third dimension — time. Now we can literally take a picture of specific types of noise (QRN) and interfering signals (QRM). Visual identification of these spectrum signatures greatly simplifies the task of locating their sources by conventional direction finding techniques.

Such a real-time 3-axis display was used to obtain "mug shots" of the following undesirable signals in the amateur bands: net interference, a VFO dial twister, an old WW II jammer, "sweepers," power-line noise, TV receiver radiation, and auto ignition.

The 3-axis display in operation at the home QTH allowed us to view an ever-changing parade of signals and noise in the bands. Short noise bursts and natural static produced distinctive signatures which could be sorted out from the more persistent and more harmful man-made interference.

Equipment Description

A 30-foot long-wire antenna was connected to the input of a Hewlett-Packard 8552/8553 spectrum analyzer employed as a scanning receiver (Fig. 1). This was interfaced with an EMTEL 3-axis display to examine signals in the amateur bands. While the receiver was capable of operating over a total range of 3 kHz to 110 MHz, the scan was limited to relatively narrow frequency widths in the amateur bands. The sensitivity of the analyzer was adequate for spectrum measurement purposes without use of a preamplifier. An hf

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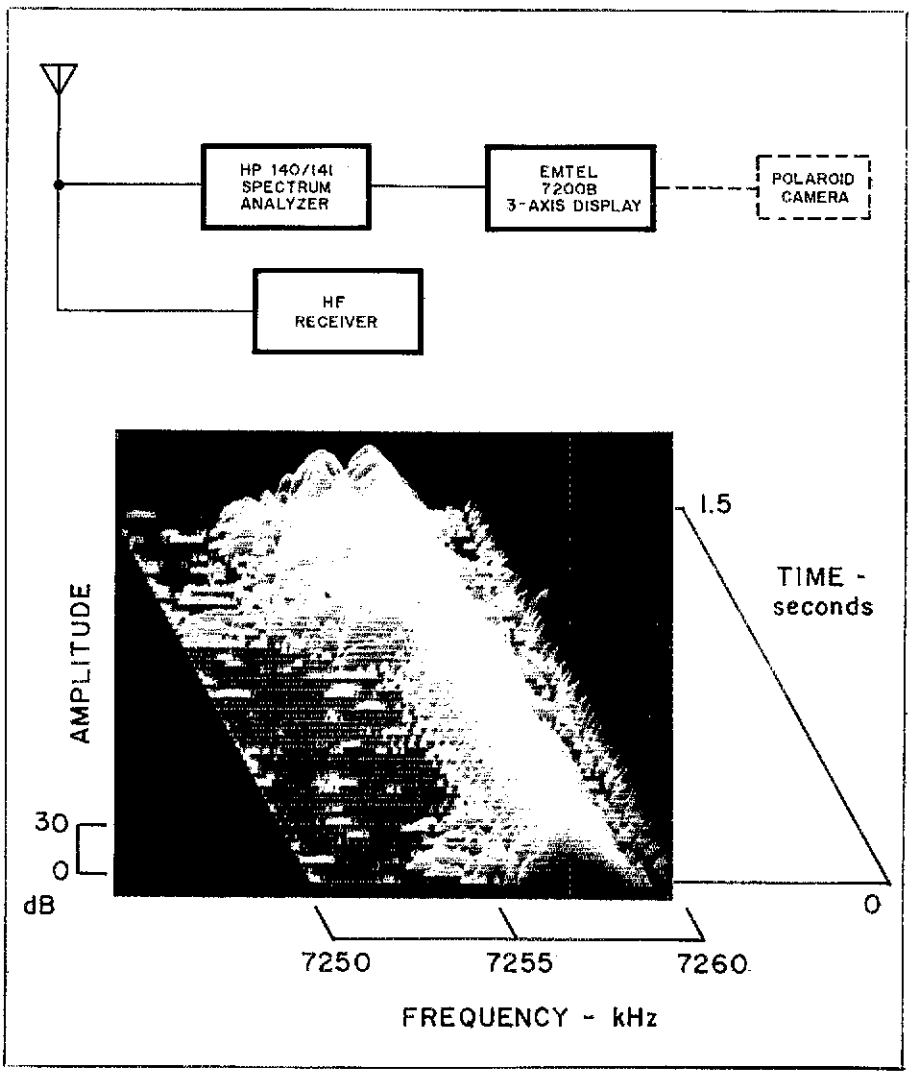


Fig. 1 (Top) — Block diagram of the system. The equipment for the measurement of QRN and QRM consisted of a spectrum analyzer, the display and a camera.

Fig. 2 (Bottom) — QRM. The 3-axis view shows all signals in a 20-kHz-wide portion of 40 meters for a 1.5-second period. While a longer time axis will show QSY change in the QRM, detail that can be seen in the 1.5-second period is lost. The view was taken at 1056 PST with a scan time of 20-ms/scan and an i-f bandwidth of 30 Hz.

receiver was used to supplement the visual view with conventional audio monitoring.

The conventional 2-axis display of the spectrum analyzer presents an excellent view of signal amplitude as a function of frequency for stable and slowly varying signals. This view is considerably enhanced by the addition of a third axis, time. The third axis allows the viewer to examine amplitude and frequency changes of time-varying signals in a simplified and easy-to-interpret format. The continuously moving 3-axis view was frozen at desired times to examine and photograph signals of interest. The 3-axis views were fully calibrated in frequency, amplitude and time by injecting a known signal from a Singer/Gertsch FM10 frequency synthesizer into the spectrum analyzer input.

Net Interference

A western states network operating on weekends has apparently been subjected to considerable interference from unmodulated carriers, signals from surplus jammers and other forms of intentional interference. An example of an unmodulated carrier interfering with the net is shown in the 3-axis view in Fig. 2. Ssb voice modulation from the net control station can be seen at 7256 kHz in the upper third of the time axis. The unmodulated carrier at 7258 kHz was equal in strength to the NCS signal at the measurement site. Over a period of several minutes this carrier moved above, below and directly on the signal. The long duration of the unmodulated signal, lack of evidence of any PA tuning, and the frequency change patterns all seem to indicate intentional interference.

VFO Knob Twisters

Two examples of signals varying in frequency from VFO operation at full transmitter output power can be seen in Fig. 3. This inconsiderate operator moved his carrier back and forth across a 150-kHz portion of the 40-meter band, causing intermittent interference to other amateurs using the band. Of special interest was the sequence in view A where the signal became fixed in frequency about three-quarters of the way down the time axis, was briefly turned off, turned back on and remained fixed in frequency while the operator identified himself. Most "twisters" fail to provide such convenient i-d.

CW Jamming

Occasionally an operator will use the VFO with a bit more care and finesse than the gross knob twister to disrupt a particular QSO or network. Fig. 4 shows an operator trying to place his carrier on top of the weak-signal network operating on 7257 kHz. At the top of the view the jamming signal was about 1 kHz below the intermittent voice signal. The cw signal moved slightly in frequency below the net

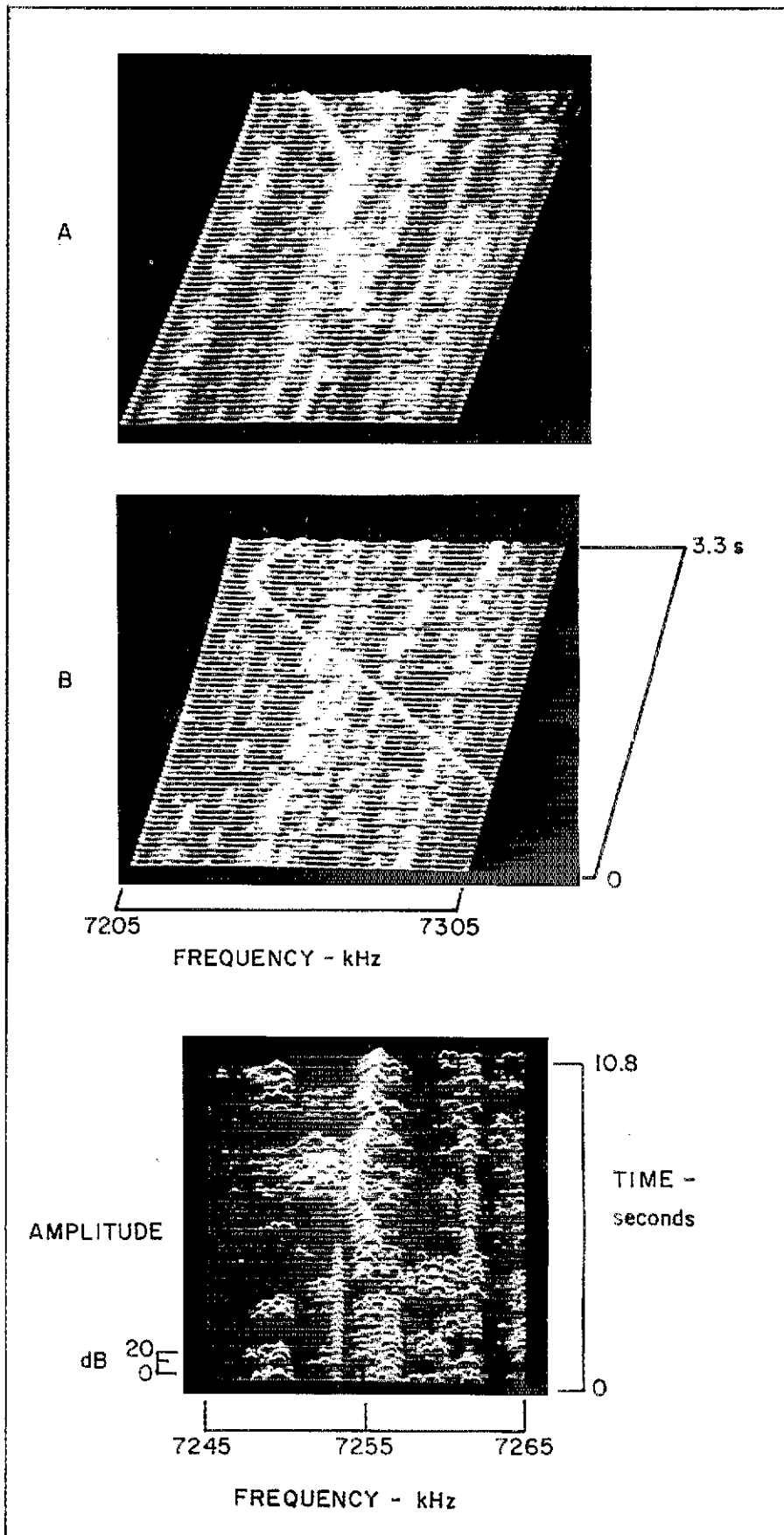


Fig. 3 (Top) — Signal from a VFO knob twister. The frequency-varying knob twister signals produced a distinctive easy-to-recognize trace across the CRT. The signal amplitude was heavily compressed in both views to emphasize frequency variations.

Fig. 4 (Bottom) — Cw jamming. The frequency variations of the signal on 7257 kHz are very noticeable in this view. Amplitude compression was used to emphasize small frequency changes.

until three-quarters down the time axis when it abruptly moved directly on top of the net signal. This operator's antics were observed for about 10 minutes at which time he left the air for some other form of entertainment! Propagation conditions were poor during the period of deliberate jamming so the effort was generally ineffective.

Old WW II Jammers

A few amateurs even employ surplus jamming gear to interrupt the radio signals of others. Fig. 5 shows two examples of jamming of a net by such equipment. In view A, seven bursts of narrow-band noise jamming were transmitted on 7255 kHz during an unexpected break in the net operation. The spacing between the noise bursts gradually increased to about one second and the burst duration increased to one-half second as shown in view B of Fig. 5. The one-half-second burst of noise covered up the low amplitude ssb voice signal with an unusually high signal strength, suggesting the use of high jammer power levels.

Sweepers

Swept frequency signals, commonly called "sweepers," can frequently be found in the hf amateur bands. These signals sweep rapidly across a portion of a band (typically 100 to 500 kHz wide) causing a noise impulse or rapid chirp in a receiver tuned to a frequency within the sweeper range as the sweeper passes across the receiver frequency. These noise impulses are somewhat similar to other noises heard with hf receivers. This feature makes it very difficult to identify sweepers with a conventional receiver.

The authors were in contact with Dick Silberstein, WØYBF, on 14,238.5 kHz when sweepers were observed on the frequency. Fig. 6 shows Dick's signal and a sweeper impulse. Ssb voice components from WØYBF's signal can be seen along the time axis at 14,238.5 kHz. A sweeper entered the left edge of the view at approximately 1.5 seconds on the time axis, swept upward in frequency to a maximum of 14,244 kHz and then decreased in frequency until it disappeared from the left edge of the 3-axis view at 0.8 second on the time axis. The sweeper impulse crossed WØYBF's signal during momentary speech pauses. Thus, Fig. 6 shows the sweeper across the 3-axis view, allowing continuous tracking.

Do sweepers originate from a VFO-happy operator or are they intruders of some kind? The authors have, with some difficulty and with many unusual experiences, traced numerous sweepers to specific sources. Each sweeper that has been traced to a source has originated from an ISM (industrial, scientific, medical) device operating outside

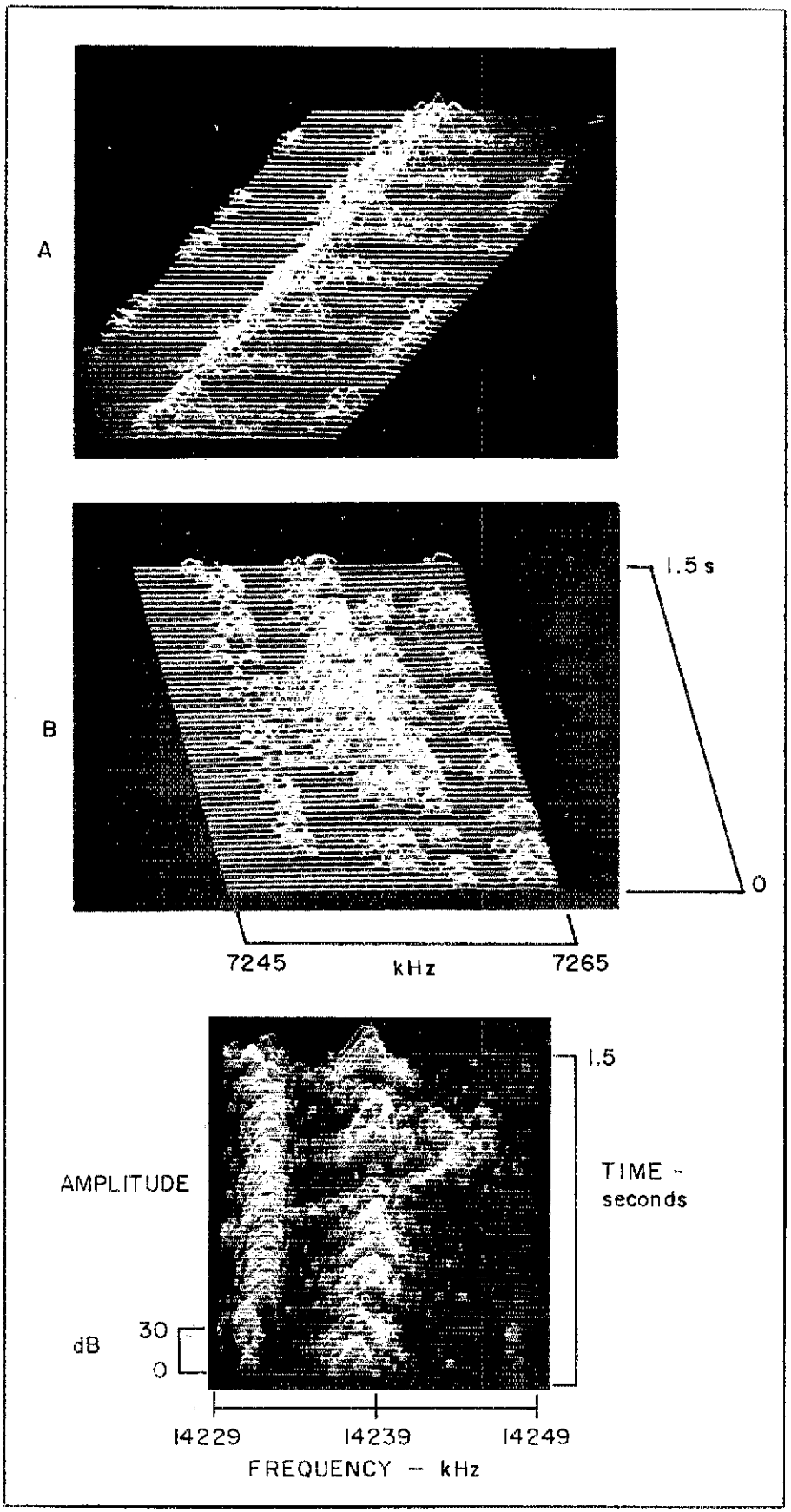


Fig. 5 (Top) — World War II surplus jammer signal. The two views were taken about 20 seconds apart as the illegal signal bursts changed in spacing and duration. View A shows brief bursts of noise closely spaced in time and view B shows a longer time interval of noise directly on the net.

Fig. 6 (Bottom) — Sweeper interference in the 20-meter band. The frequency-changing sweeper crossed WØYBF's signal, causing a noise burst in the receivers of both stations as it passed through the station receiver bandpass. The spectrum analyzer scan time was 20-ms/scan and the i-f bandwidth was 400 kHz.

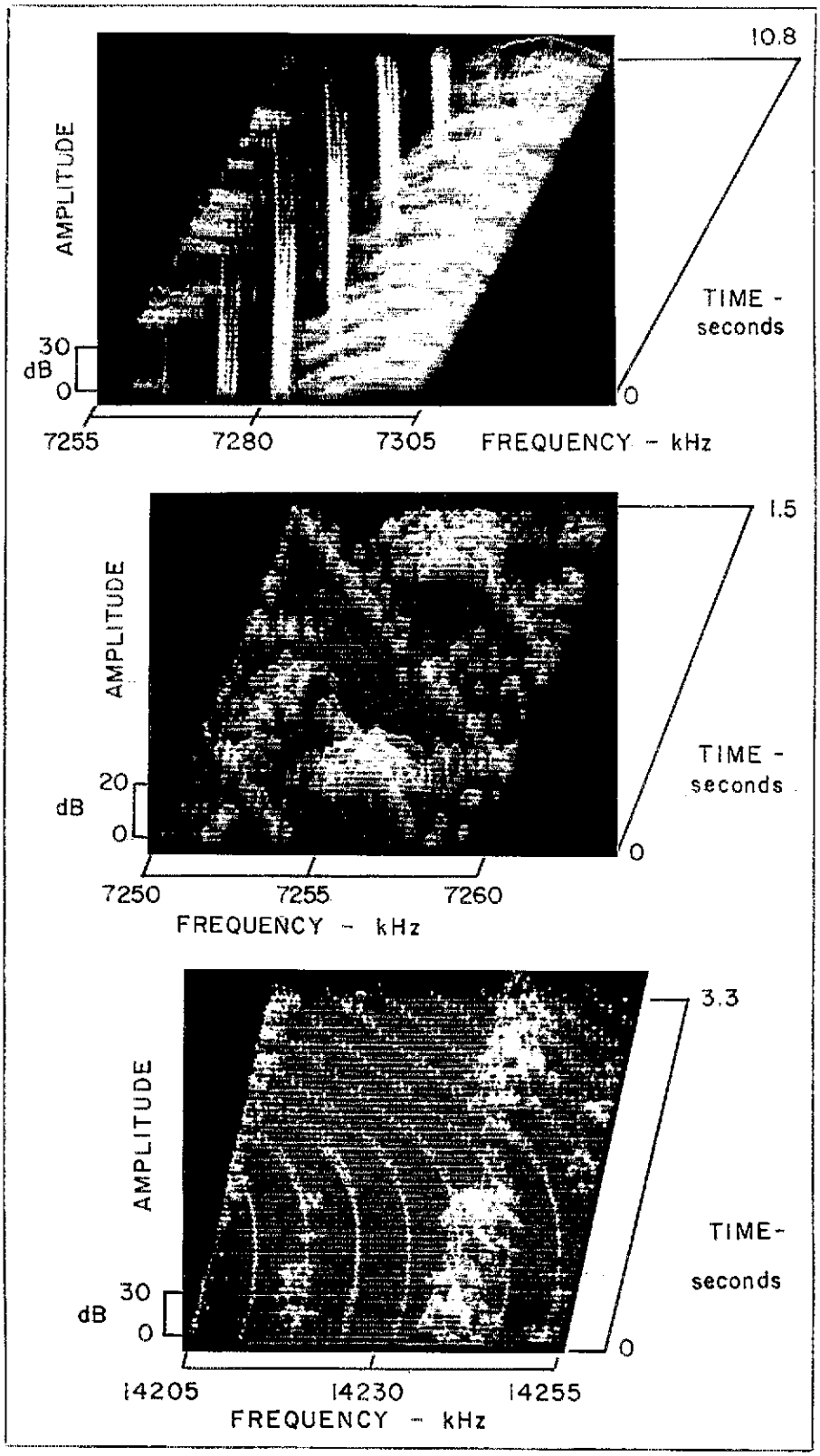


Fig. 7 (Top) — Color-TV radiation in the 40-meter band. The slanting lines show the distinctive signature of radiation from color TV sets. The radiation was confined to several narrow frequency bands 5 to 10 kHz wide in the 40-meter band and the noise adversely affected signal reception in these narrow bands. The view was taken at 2030 PST with a scan time of 100-ms/scan and an i-f bandwidth of 1 kHz.

Fig. 8 (Middle) — Power-line noise. The slanting lines show RFI which originated at a power-line fault. The slanting lines are synchronized to the 120-Hz peak voltage reoccurrence rate of a single-phase power line. The view was taken at 1620 PST with a scan time of 20-ms/scan and with an i-f bandwidth of 1 kHz.

Fig. 9 (Bottom) — Broadband impulsive noise. Impulsive noise with a smoothly changing rate causes the slanting line. The source was traced to a light-industrial park; however, specific source identification was not made. The view was taken at 1015 PST with a scan time of 50 ms and an i-f bandwidth of 3 kHz.

spectrum space allocated for ISM purposes.

TV-Receiver Radiation

One of the authors purchased a new color-TV receiver. Sweep-circuit radiation from the new TV immediately stopped 80-meter-band operation during family TV viewing hours even though the TV and 80-meter antennas were more than 100 feet apart. In addition to serious 80-meter RFI, weaker but still objectionable RFI was found in portions of the 40-meter band. An example of 40-meter RFI traced to the author's new TV set is shown in Fig. 7. The slanting lines in the center of the 50-kHz-wide band of frequencies shown in the 3-axis view form a distinctive pattern typical of color-TV-set radiation. Fortunately, the TV-set radiation was confined to a few narrow bands of frequencies in the 40-meter band so that some 40-meter operation was possible while the TV was on.

Power-Line Noise

Almost all amateurs complain of power-line noise at one time or another, and a presentation of undesirable signals in our bands would not be complete without an example. Many forms of radio noise originate from power lines and power-consuming devices which the authors treat as a general category of power-line associated noise. The 3-axis spectrum signatures of such noises can often aid in identifying their sources.

An example of power-line related noise observed at the QTH of one of the authors is shown in Fig. 8. The distinctive slanting lines across the view originated from a nearby 12-kV power line, and the noise was found only in a very narrow band of frequencies in the 40-meter band. A receiver tuned a few kHz above or below the 10-kHz band shown in Fig. 8 could not detect the noise shown in the view. Two segments of ssb voice can be seen at 7256 kHz, as well as general background noise throughout the view.

The slanting lines are produced by the interaction of the repetitive scanning process of the receiver and the 120-Hz components of the power-line related noise. These distinctive slanting lines are characteristic of most power-line related noise, and they allow the observer to sort out quickly such noise from other types.

Broadband Impulsive Noise

Broadband impulsive radio noise with a variable pulse repetition period was found in the 20-meter band and it severely affected signal reception in receivers without noise blanking circuits (see Fig. 9). The noise was observed for several hours on a weekday morning and its source was traced to a nearby light-industrial park. Since the total scan time of the receiver was 50 ms, the impulse period can be scaled from the view and it

is about 7.7 ms at the bottom of the view and about 6.1 ms at the top of the view. The period changed very smoothly as shown by the curved lines in the view.

This particular impulsive noise occurred at a high amplitude across the entire 20-meter band. To explore the spectral width of the signal, the spectrum analyzer scan width was increased to 10 MHz (see Fig. 10). The display elevation control was set at 0° to provide an integrated A-scan view of noise amplitude and the display threshold control was adjusted to eliminate weak signals. The noise was found throughout the entire 10-MHz block of frequencies with a distinct variation in amplitude vs. frequency of about 10 dB. This amplitude variation is probably caused by the frequency response of the noise-radiation mechanism and the receiving antenna.

Auto Ignition Noise

Most amateurs learn to identify auto ignition noise by listening to the changing impulse rate and the erratic amplitude of radiated impulses. The 3-axis views are equally distinctive and graphically show the same signal features (see Fig. 11). In the lower 3-axis view, amplitude changes from impulse to impulse are easily identified. In the upper view the azimuth control has been set at 0° and amplitude fully compressed to emphasize ignition pulse time variations caused by changing engine speeds. Auto ignition noise is very easy to identify in 3-axis views since engine speed is always varying sufficiently (even during idle) to produce the distinct visual patterns.

Concluding Remarks

Our goal was to identify and classify prominent kinds of QRN and QRM found in amateur bands at a typical suburban area. The 3-axis views show several types of erratic and intermittent signals that are representative of those heard in many station receivers. Some are the kinds of QRN and QRM that limit an amateur's ability to receive weak signals and make that elusive DX contact. The 3-axis views also provide technical documentation of cases of improper and illegal operation.

Our hf and vhf bands are crowded. The signal population in our bands is much higher than in nearby spectrum space allocated to other services. Although crowding creates occasionally unavoidable QRM, the use of reasonable operating practices, technical advances, plain old-fashioned common sense, and consideration for others can help. QST

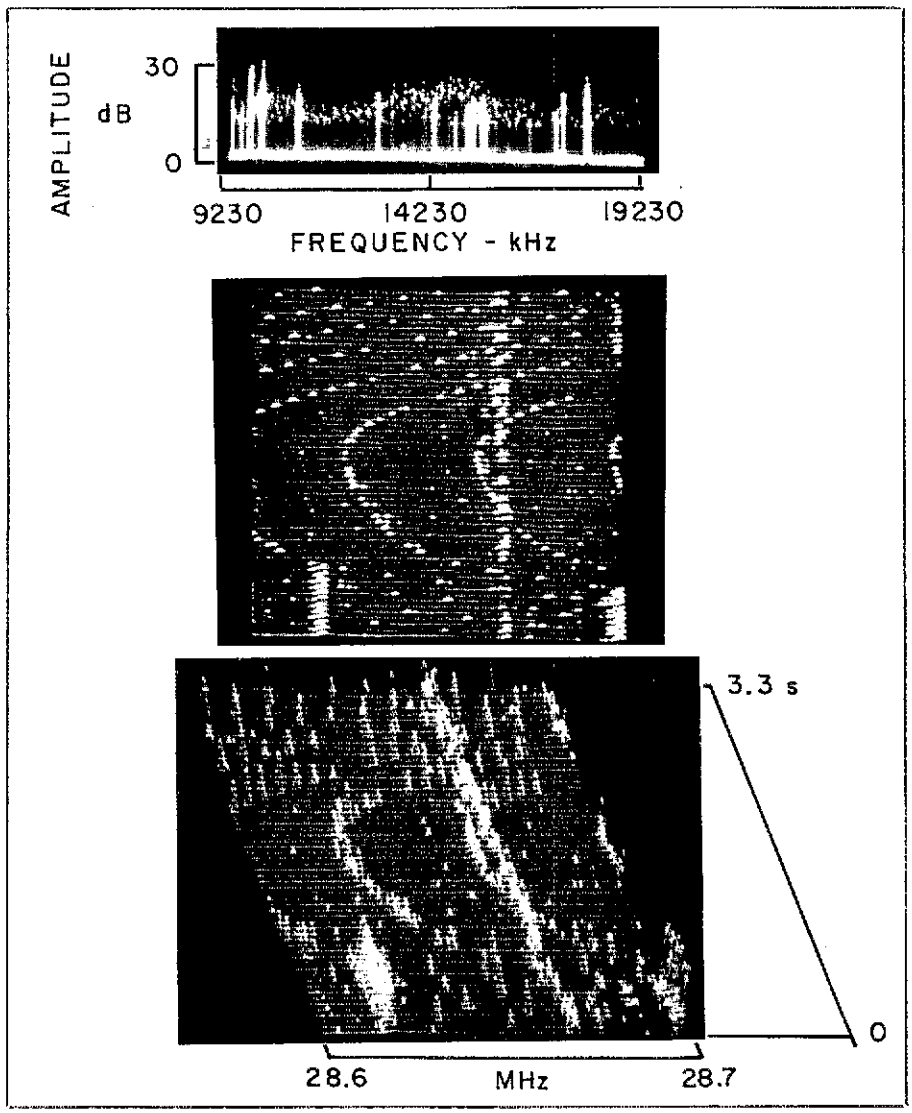


Fig. 10 (Top) — Spectral distribution of broadband impulsive noise. The noise shown in Fig. 11 affected most of the hf band. Amplitude variations over a 10-MHz block are shown to illustrate the wide frequency coverage of some QRN. Usually such wide spectral coverage indicates the source is nearby. The view was taken at 1025 PST. Scan time was 50 ms; i-f bandwidth was 30 kHz.
Fig. 11 (Bottom) — Automobile ignition noise. Ignition noise produces distinctive and easily recognizable patterns, as shown.

Strays

MORE ON THE W5OPC/ *DOUBLE EAGLE II*

☐ Here's a follow-up on the *Double Eagle II* story that appeared in last month's *QST*. ARRL has received a letter from Dr. R. L. Schwoebel, WB5OJO, technical director for *Double Eagle II*, which related an event that occurred when *Double Eagle II* neared the coast of Ireland.

"We had established a contact schedule with the balloon crew and, at the appointed time, W1HZ in Concord, MA, called the crew on the previously used 20-meter frequency. There was no answer. He repeated the call. Again to no avail. N8ACA from Michigan then gave a call to the crew. This was followed by radio amateurs in South America, England, Scotland, and from a ship in the Mediterranean. Each of these calls was in the clear and unencumbered by QRM. This represented to me the cooperative goodwill of not only this group of radio amateurs, but the obvious goodwill and superior operating practices of the many amateurs who did not interfere with these stations. Later, when contact was established through G4JY, we found that the crew had been in the midst of a substantial altitude change and had missed the appointed QSO for good reasons."

The contribution of Amateur Radio to the success of this mission is undisputed and the crew of *Double Eagle II* wants their appreciation conveyed to all hams. It was a proud achievement for Amateur Radio! — *WICUT*

UTC: The "Right-On" Time

There's one time all over the world, Universal Coordinated Time (UTC). Here's how it works to your advantage in logging and QSLing.

By Carl L. Bixby,* W1TKG

I didn't know what time it really was until I met UTC. If you haven't yet converted your timekeeping to Universal Coordinated Time, you're going to find that it's the only way to go. It greatly simplifies logging, scheduling and QSLing to know that 1745 UTC means the same thing to hams worldwide.

The time of day is a relative thing and as such can be very confusing. If you simply log 9:45 do you mean A.M. or P.M.? Is it 9:45 PST or PDST? Operating mobile, when do you shift from MST to PST? Or do you?

If you keep your log in 2400-hour time you can forget about the A.M. and P.M. confusion.[1] You don't even need a window in your shack to tell that night has fallen! Use UTC and you'll eliminate time-zone conversions and you can forget about whether you spring forward or fall back when juggling Daylight Savings Time. Operating mobile from California to Japan, you can even forget about stumbling over the International Date Line.

Erase Your Time Problems

Determine what UTC is,[2] set your clock and forget the time problem from now on. You might even drop a few hints to someone about coming up with a 24-hour clock for the next big gift-giving occasion.

When entering Universal Coordinated Time in your log or on a QSL card it is perfectly correct to use 1745 UTC or 1745Z (for "Zulu") — for all practical purposes, they both mean the same thing — the time at the reference (0°) meridian. UTC once was called Greenwich Mean Time (GMT) because the 0° meridian passes through the town of Greenwich, England.

If you want to know the local time in Bombay, Moscow or Las Vegas, remember that time changes one hour with each change of 15° in longitude. That means EST, CST, MST and PST are five, six, seven and eight hours "earlier" than the time at the 0° meridian. They correspond to the 75th, 90th, 105th and 120th meridians. There are a number of time-zone maps and handy slide-rule type gadgets available to help make the conversion to local time anyplace in the world.[3]

Table 1
UTC Time Signals

Station	Frequency (MHz)
WWV	2.5, 5, 10, 15
WWVH	2.5, 5, 10, 15
CHU	3.330, 7.335, 14.670

Careful! Don't Lose a Day

Yes, 2400 UTC and 0000 UTC are the same time. But 2400 is typically associated with the date of the day ending, and 0000 is associated with the date of the day just starting.

Speaking of dates, one aspect of UTC can be confusing — the change of date prior to midnight local time. Be sure the date you are using is consistent with UTC, do not confuse the UTC date with the local time date. For example, 0230Z November 5 is the same as 2130 EST November 4.

It is particularly important to watch out for this difference if you are a contester or a DXer. You don't want to miss the start of a competition by tuning up your rig on the wrong day! And many DX stations, in QSLing, look for call signs by date. If your card has the wrong day on it you may very well be overlooked.

Technically Speaking . . .

Universal Coordinated Time was adopted worldwide on January 1, 1972. UTC is based on the average of the time at 18 timing centers around the world, each center using atomic clocks. The atomic scale was chosen to agree in rate with the orbital motion of the earth about the sun in the year 1900. The present time difference amounts to approximately one second a year.[4]

In order to correct for cumulative differences, "leap seconds" are incorporated into the UTC time broadcasts. When such a correction is needed, the last minute of the month will contain 61 seconds. In the event that the earth increases its rotational speed, 59 seconds will be contained in the final minute of the month.

For those needing to know time more accurately than to the nearest second, double time ticks are broadcast by WWV, WWVH and CHU (Table 1) denoting the correction to be applied. With this correction, time can be determined to the nearest tenth second.[5] The number of such double ticks indicates how many tenths of seconds should be added (or subtracted) from the received time signal. If the group of double ticks begins on the first second of each minute, the correction is positive (add), and if it starts on the ninth second, the correction is negative (subtract). Absence of double time ticks denotes zero correction.

[1] *Tune in the World with Ham Radio*, ARRL, 2nd Edition, 1978, p. 69.
[2] Universal Coordinated Time is called UTC because it is an abbreviation of the French expression, *Universelle Tempe Coordinate*.
[3] Hultquist, "The Cardboard 'Clock' — a Simple Universal Time Converter," *QST*, November, 1977.
[4] NBS Special Publication 432.
[5] "Measurements and Test Equipment," *The ARRL Radio Amateur's Handbook*, 1978, page 540.

This do-it-yourself chart will help you get used to using UTC. After filling in your call and local time (CST for Central Standard Time, for example) at the top, enter the local times corresponding to UTC. 0100 UTC, for example, is the same as 2100 EDT/AST, 2000 CDT/EST, 1900 MDT/CST, 1800 PDT/MST and 1700 PST.

In 24-hour local time, 2000 refers to 8 P.M., since 0100 is 1 A.M. and 2300 is the same as 11 P.M. If you use 24-hour time and UTC consistently, it will soon become second nature, and no other way of keeping track of time will do.

Time Conversion Chart

Radio		Local Time	
UTC	LOCAL	UTC	LOCAL
0000		1300	
0100		1400	
0200		1500	
0300		1600	
0400		1700	
0500		1800	
0600		1900	
0700		2000	
0800		2100	
0900		2200	
1000		2300	
1100		2400	
1200			

*11 Birch Lane, Madison, CT 06443

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 371
September 16, 1978

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 0834 EDST on September 16, 1978, at the Headquarters offices of the League in Newington, Connecticut. Present: President Harry J. Dannals, W2HD, in the Chair; Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN, Richard A. Egbert, W8ETU and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were Assistant General Manager David G. Sumner, K1ZZ and Washington Coordinator Harold M. Steinman, K1FHN. General Counsel Robert M. Booth, Jr., W3PS, entered the meeting at 0855.

On motion of Mr. Thurston the Committee recognized the names of 387 individuals who had recently been elected to Life Membership, and instructed the General Manager to list their names in *QST*.

On motion of Mr. Clark, the Committee approved the affiliation with the League of the following Amateur Radio societies: AEA Amateur Radio Club, Los Angeles, CA; Bay Area Amateur Radio Club, Bay City, MI; Bismarck Amateur Radio Klub, Bismarck, ND; Central Carolina Amateur Radio Society, Sanford, NC; Foothills Amateur Radio Club, Marysville, CA; Fort Herkimer Amateur Radio Club, Herkimer, NY; Fulton County ARC, Rochester, IN; Grinnell College ARC, Grinnell, IA; LaSalle Amateur Radio Association, Trout, LA; Martin County Amateur Radio Association, Stuart, FL; Matanuska Amateur Radio Association, Palmer, AK; Metrovision, Inc., Falls Church, VA; Mountain Home ARA, Mountain Home AFB, ID; Point Radio Operating Society, Pittsburgh, PA; Powell River Amateur Radio Club, Powell River, BC, Canada; San Diego Teleprinter Society, San Diego, CA; Santa Clara Valley Repeater Society, Sunnyvale, CA; Sohio Alaska Radio Club, Anchorage, AK; South Shore Repeater Association, Weymouth, MA; Sub Sig Amateur Radio Club, Portsmouth, RI; Sullivan County Amateur Radio Club, White Sulphur Springs, NY; Talladega County Amateur Radio Society, Talladega, AL; 21 Repeater Group, Ligonier, IN.

On motion of Mr. Egbert, the following convention dates were approved: Great Lakes Division, April 6-7, 1979, Muskegon, MI; New York State, May 25-26, 1979, Rochester, NY; New England Division, September 28-30, 1979, Hartford, CT.

At 0901 Mr. Thurston left the meeting room.

The Committee next proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial radio connections. The Committee made findings and ordered actions as detailed below, all by unanimous action of those present:

Central Division

For Director: Edmond A. Metzger, W9PRN and Don C. Miller, W9NTP, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Edmond A. Metzger, W9PRN, was found lawfully nominated and eligible, but his nomination for Vice Director was declared void in accordance with the provisions of Bylaw 17. Kenneth A. Ebneter, K9EN and Gary L. Huber, AB9M, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Hudson Division

For Director: Stan Zak, K2SJO, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Hudson Division for the 1979-1980 term without membership balloting.

For Vice Director: George A. Diehl, W2IHA, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Hudson Division for the 1979-1980 term without membership balloting.

New England Division

For Director: Frank S. Darmofalski, W1FD and John C. Sullivan, W1HHR, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Fred E. Evans, W1JFF, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the New England Division for the 1979-1980 term without membership balloting.

Northwestern Division

For Director: The Committee was in receipt of nominations for Director for Mary Lewis, W7QGP and Robert B. Thurston, W7PGY. After extended discussion, it was voted unanimously to postpone the election for Director in the Northwestern Division until the litigation involving the League and Mrs. Lewis is resolved. In accordance with Bylaw 6, Mr. Thurston will continue as Director of the Northwestern Division until such time as the Executive Committee directs the election to proceed.

For Vice Director: Ronald D. Mayer, K7BT, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Northwestern Division for the 1979-1980 term without membership balloting.

Roanoke Division

For Director: L. Phil Wicker, W4ACY, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Roanoke Division for the 1979-1980 term without membership balloting.

For Vice Director: Clay E. Milius, Jr., W4UG, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Roanoke Division for the 1979-1980 term without membership balloting.

Rocky Mountain Division

For Director: Harlan D. Bercovici, WØMYN, Maurice O. Carpenter, KØHRZ and Barry S. Newberger, W5KH, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Lys J. Carey, KØPGM and Joe T. Knight, W5PDY, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

Southwestern Division

For Director: Jay A. Holladay, W6EJJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Director from the Southwestern Division for the 1979-1980 term without membership balloting.

For Vice Director: The Committee was in receipt of a nomination for Vice Director for Alan R. Ogden, W6SPK. Mr. Ogden, as the holder of a Technician class amateur license, did not meet the requirements of Bylaw 8, and he was thereupon declared ineligible. Peter F. Matthews, WB6UIA, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the Bylaws, to be duly elected as Vice Director from the Southwestern Division for the 1979-1980 term without membership balloting.

West Gulf Division

For Director: Jack D. Gant, W5GM and Carlos F. Montemayor, N5EN, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: O. E. Smith, AE5I, Raymond B. Wangler, W5EDZ and Amelia E. Wise, W5OVH, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

At this point, at 0936, Mr. Thurston returned to the meeting room.

By unanimous consent, the Committee appointed John Huntoon, Robert B. Thurston and Victor C. Clark as a Committee of Tellers to count the ballots in the current election.

Mr. Booth noted that the notice of appeal of the FCC action in Dockets 21116 and 21117 had been filed, as directed at Minute 91 of the July Board meeting, and that a final commitment to proceed with the appeal was not required at this time. After extended discussion, MOVED by Mr. Thurston and voted unanimously that the decision whether to proceed with the appeal is deferred until the next meeting of the Executive Committee, when additional information may be available on the likelihood of success.

(During the course of the above the Committee was in recess from 1015 to 1036 and again from 1155 to 1256.)

On motion of Mr. Clark, unanimously VOTED that the staff prepare a suitable response to the Further Notice of Proposed Rulemaking in Docket 20777.

On motion of Mr. Egbert, it was unanimously VOTED that the budgets of the following divisions be increased by the amounts shown: Pacific Division $650, Northwestern Division, $500.

In accordance with previously established Board policy, the General Manager reviewed the status of action taken on motions adopted at the July Board meeting. Action has been completed on Minutes 14 (80), 23, 26, 27, 43, 47, 55, 60. Action is in progress on Minutes 19, 20, 22, 30, 38, 40 (67), 45, 73, 74, 87, 96. No action has been initiated yet on Minutes 17, 21, 32, 41, 42, 51, 56, 59, 69, 71, 81.

The General Manager reported that a contribution of $1000 has been received from Peter Borsi, W4HII, earmarked for the IARU receiver/transmitter kit program (applause).

On motion of Mr. Arnold, voted unanimously that the Executive Committee confirms its mail vote authorizing the General Manager to borrow up to $250,000 from a local bank to solve cash-flow problems.

On motion of Mr. Egbert, voted unanimously that the Executive Committee confirms its mail approval of the National Convention program.

On motion of Mr. Egbert, voted unanimously to direct the General Manager to publish in *QST* and the next edition of the *Repeater Directory* the band plans presented to the July meeting of the Board by the VRAC/VUAC.

On motion of Mr. Arnold, the staff was directed to prepare in advance of the November meeting of the Executive Committee a draft of a response to the Notice of Inquiry concerning the examination of handicapped individuals.

On motion of Mr. Clark, the Committee granted the General Manager's request for approval to file in response to Public Notice 623 of the Department of State concerning "Participation of Public Sector Representatives on U.S. Delegations."

On motion of Mr. Arnold, the Committee granted the General Manager's request for approval to file in response to BC Docket 78-251, a Notice of Inquiry relative to public service announcements.

On motion of Mr. Thurston, voted unanimously to terminate ARRL membership in NASAR (the National Association for Search and Rescue).

The Committee was in recess from 1438 until 1451, during which time Mr. Egbert left the meeting.

On motion of Mr. Arnold, voted unanimously that the General Counsel would prepare a suitable paper for presentation at a September 22 Congressional subcommittee hearing in Washington concerning HR-13015, a rewrite of the Communications Act.

On motion of Mr. Clark, voted unanimously to authorize the General Counsel to file an *amicus* brief in the Gray legal case.

The General Manager announced that Harold Steinman, K1FHN, is now devoting all of his time to the coordination of our representation in Washington.

During the course of the meeting, the following topics were discussed without formal action: the request of Sam McCluney for an oral appearance concerning his expulsion from League membership, the status of various legal cases in which the assistance of the League has been requested, progress in the fundraising campaign, an upcoming meeting of the Personal Communications Foundation in San Diego, a radiation hazards bill introduced in New York City, the qualifications of Class I official observers, the lack of mention in the most recent *Repeater Directory* of the frequencies used by model aircraft, the matching funds being provided by the Northern California DX Foundation, and the membership status of amateurs whose licenses have been revoked by FCC.

The next meeting of the Executive Committee will be held at the Headquarters offices of the League in Newington on Sunday, November 19, 1978.

There being no further business, the meeting was adjourned at 1528.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

Happenings

Conducted By W. Dale Clift,* WA3NI

Communications Act Rewrite Taken to Chicago — Hams Make Impression

A call came into the Chicago FM Club (CFMC) repeater early in August, "Where can I find an officer or director of the club?" The caller turned out to be Chuck Krezwick, WB9JGG, a staff member of Rep. Marty Russo (D-IL). He was looking for someone representing Amateur Radio to testify at the August 22 subcommittee hearing in Chicago on the Communications Act of 1978. By the time the assignment finally ended up with Barry Bayer, K9CFV, an attorney and recently elected director of CFMC, less than a week remained to put together a presentation. Barry scrounged up a copy of Bill 13015 and proceeded to study it for its effects on ham radio.

Meanwhile, Ero Erickson, W9HPJ, president of the Chicago Area Chapter — QCWA, owner of a two-way radio shop, and active in several industry organizations, got wind of the hearings from other sources. It was too late for Ero to register as a witness. W9MOL was aware of both situations and got Barry and Ero together to collaborate. Phone calls to Dave Sumner, K1ZZ, at ARRL hq. and to Professor Eric Shalkhauser, W9CI, in Washington, IL, supplemented the input. On the Sunday before the Tuesday hearing, Barry realized he had all the material he was going to get.

By Monday, Barry had a statement typed and produced the required 50 copies. Included in the package was a copy of the CFMC repeater information package, containing information about vhf, uhf and repeater operation. They were delivered to the Federal Building on time, and Barry insured his place among the over 50 witnesses scheduled to testify. Ero put out a mailing to local QCWA members, asking them to support Barry by attending the hearing.

At the hearing on Tuesday, along with Barry, were Lee Knirko, W9MOL; Phil Haller, W9HPG; Bill Toner, W9MKL; and photographer John Bayalis, W9CSA. Barry was called to present his remarks at 11:40 A.M. The telephone, cable and broadcast interests were heavily represented; Barry was the only witness from Amateur Radio.

Barry gave an excellent presentation on Amateur Radio, stressing contributions to technology and public service. He suggested Bill 13015 be amended to:

a) Define Amateur Radio.

b) Give it an exemption from secrecy and nondisclosure provisions.

c) Give amateurs permission to furnish communication for not-for-profit organizations (such as March of Dimes) or government agencies even though in furtherance of the "business," so long as the amateurs are not paid or employed by the sponsoring organization.

d) Exempt radio amateurs from the new concept of spectrum use fees.

Rep. Russo asked Barry if he had a definition of Amateur Radio as a suggested addition to the bill. Barry responded that such a definition was not yet ready, but expected that ham would make one available to the subcommittee.

At a post-session gathering, those present felt that it would have been beneficial if letters could be submitted from various service agencies documenting help received from hams. We all agreed that we would be better prepared next time and be willing to discuss with amateurs in other parts of the country what we learned should they have the opportunity to testify at similar hearings. Barry indicated that these and other aspects of the pending legislation should be reviewed. — *Lee Knirko, W9MOL.*

ARRL CONSIDERS TAKING FCC TO COURT

ARRL has filed a petition for review of the FCC's action banning the commercial manufacture and marketing of external radio-frequency power amplifiers capable of operation between 24 and 35 MHz with the U.S. Court of Appeals for the District of Columbia circuit. This action puts the FCC on notice that it could face a lawsuit in this matter and gives the League time to do legal research to determine its chances of winning. The Executive Committee of the ARRL Board of Directors will take up the matter of whether or not to proceed with the lawsuit at its next meeting November 19, 1978.

The Appeals Court case number is *ARRL v. FCC, No. 78-1853.* For more information about the amplifier ban, see "Happenings," September 1978 *QST*, page 51 and May 1978 *QST*, page 46.

ARRL MEMBERS TO VOTE

"The affairs of the Corporation shall be governed by a Board consisting of sixteen Directors who shall be elected for terms of two years by the members eligible to vote."

The corporation to which the above quotation refers is called *The American Radio Relay League, Inc.*, and is taken from Article 4 of its *Articles of Association.* Full League members have the opportunity every two years to determine the persons to represent their ideas about League policy. ARRL Directors and Vice Directors are elected to represent specific geographic areas called divisions, and this year candidates were considered for the following divisions: Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf.

At its meeting on September 16, 1978, the Executive Committee of the ARRL Board of Directors declared the following candidates automatically elected by virtue of being the sole eligible nominee for the following divisions:

Hudson: Stan Zak, K2SJO, Director
George A. Diehl, W2IHA, Vice Director
New England: Fred E. Evans, W1JFF, Vice Director
Northwestern: Ronald D. Mayer, K7BT, Vice Director
Roanoke: L. Phil Wicker, W4ACY, Director
Gay E. Milius, Jr., W4UG, Vice Director
Southwestern: Jay A. Holladay, W6EJJ, Director

Chicago area radio amateurs attending the U.S. House Communications Subcommittee field hearing at the Dirksen Federal Building are (l-r) Phil Haller, W9HPG; Barry Bayer, K9CFV, who testified before the Subcommittee; Lee Knirko, W9MOL; and Bill Toner, W9MKL. *(photo by John Bayalis, W9CSA)*

*Asst. Manager, Membership Services, ARRL

Peter F. Matthews, WB6UIA, Vice Director

The Executive Committee also ordered that a ballot be sent to each person who was a full member of ARRL on September 10, 1978, in the following divisions which have more than one eligible candidate for an office:

Central: Edmond A. Metzger, W9PRN and Don C. Miller, W9NTP, candidates for Director; and Kenneth A. Ebneter, K9EN and Gary L. Huber, AB9M, candidates for Vice Director.

New England: Frank S. Darmofalski, W1FD and John C. Sullivan, W1HHR, candidates for Director.

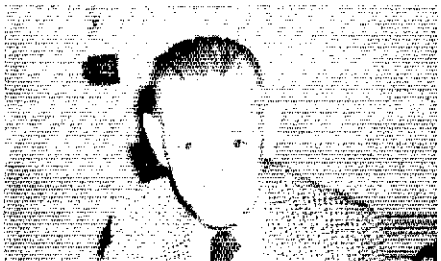
Rocky Mountain: Harlan D. Bercovici, WØMYN, Maurice O. Carpenter, KØHRZ and Barry S. Newberger, W5KH, candidates for Director; and Lys J. Carey, KØPGM and Joe T. Knight, W5PDY, candidates for Vice Director.

West Gulf: Jack D. Gant, W5GM and Carlos F. Montemayor, N5EN, candidates for Director; and Oscar E. Smith, AE5I, Raymond B. Wangler, W5EDZ and Amelia E. Wise, W5OVH, candidates for Vice Director.

The Executive Committee was in receipt of nominations for Director for Mary Lewis, W7QGP and Robert B. Thurston, W7PGY. After extended discussion, it was voted unanimously to postpone the election for Director in the Northwestern Division until the litigation involving the League and Mrs. Lewis is resolved. In accordance with the intent of Bylaw 6, Mr. Thurston will continue as Northwestern Division Director until such time as the Executive Committee directs the election to proceed.

NEW ARRL DIRECTOR FOR ROCKY MOUNTAIN DIVISION

Maurice O. Carpenter, KØHRZ, succeeded to the office of ARRL Director of the Rocky Mountain Division upon the death of Charles M. Cotterell, WØSIN. (See October 1978 *QST*, page 56.) Members of this division should note that Maurice will fill the unexpired term through December 1978. His address appears on page 8 of this issue.



Maurice O. Carpenter, KØHRZ, ARRL Director for the Rocky Mountain Division. *(W9PRN photo)*

MAYBE THE CASE WE'VE BEEN WAITING FOR . . .

A significant antenna victory won by George Oelkers, W6QOL, in federal court has prohibited the city of Placentia, CA, from limiting his tower to a predetermined height of 25 feet. This case is most significant because it is a *federal court* decision which directly contradicts another recent decision by the *state court* in nearby Cerritos which allows that city to limit towers to a specific height. These rulings set the stage for a U.S. Supreme Court decision because, with two contradictory decisions in the same area of law, it is likely the High Court will become involved to preserve equal justice.

The Cerritos case, fought by John Schroeder, W6UFJ, gained national attention last spring when the U.S. Supreme Court declined to rule on the lower case decision, thereby permitting the height limitation to stand. (See July 1978 *QST*, page 45.) However, attorneys for Oelkers, Schroeder and the Personal Communications Foundation (PCF) are confident that the Placentia case will result in a favorable decision from the U.S. Supreme Court establishing a precedent once and for all so hams can erect towers protected from the capriciousness of local zoning boards. Kenneth S. Widelitz, WA6PPZ, PCF president, also indicates a positive note in the clouded Cerritos (Schroeder) case. "Even though the Schroeder case has attracted so much publicity because of the Supreme Court, it is essential to understand that the case has *never* come to trial yet. All those lower court 'decisions' — even the Supreme Court's refusal to rule — are merely legal interpretations about points of law. When the case comes to trial, I think Schroeder has an excellent chance of proving his point and winning," Widelitz has said.

Fred Lawson, K6JAN, is the attorney in both the Cerritos and Placentia cases, and has donated hundreds of hours of his time in efforts to uphold the rights of radio amateurs. Hams throughout the country owe him an enormous debt of gratitude for his dedication.

The Personal Communications Foundation is a nonprofit organization of ham lawyers, judges and law professors formed to provide legal ammunition for amateurs and their attorneys in antenna zoning and TVI/RFI matters. For further information, contact PCF, 10960 Wilshire Blvd., Suite 1504, Los Angeles, CA 90024, 213-478-1749. — *Information courtesy of PCF*

CALIFORNIA HAMS TO PAY MORE

Effective January 1, 1979, the fees for special Amateur Radio license plates in California will increase. In addition to the regular fees for an original registration or renewal of registration, the following special fees must be paid: (1) $15 for the initial issuance of such special plate; and (2) $7 for the transfer of such special plate to another motor vehicle. Under the existing law, hams may apply for special license plates for an additional fee of $3. The additional fee for transferring such plates is also $3. — *Information courtesy of W6RHX*

BAD SIGNALS FROM UTAH

There are indications that fees for Amateur Radio call letter license plates will go up in Utah unless the hams in that state marshal their forces to head off a formal proposal.

The Governor's Blue Ribbon Tax Revision Study Committee voted recently to recommend to the Governor that call letter license plates be treated as personalized plates. A formal amendment to the Vehicle Code would mean that hams would be charged $35 in addition to the regular licensing fee. The current additional fee is $5. — *Information courtesy of WB7UYV*

ALASKA SAYS "THANKS" TO HAMS

The State of Alaska observed Amateur Radio Week August 21-27, 1978. Governor Jay Hammond noted the assistance radio amateurs had given the citizens of the state during the Alaskan earthquake and the Fairbanks flood, and he also mentioned hams help in providing daily and emergency communication links for isolated and rural locations. In an executive proclamation, the Governor urged all Alaskans to offer their support and thanks to radio amateurs for their services.

COMMUNICASTING

In recent action, the FCC addressed a petition for rulemaking that proposed a new TV community repeater concept developed by radio amateurs. Though the Commission dismissed RM-2846, it stated that the " . . . action should not be construed as a rejection of the 'communicasting concept.' " Rather, the FCC indicated that the idea needs considerable attention and will be included in its Notice of Inquiry (NOI) in BC Docket 78-253.

"Communicasting" is defined as an over-the-air community service which would involve the use of a television repeater capable of picking up very low power signals from remote terminals and rebroadcasting them to cover a community or small region. There would be a number of receiving/sending stations in a community, and program matter or information transmitted from one of these multiple access stations then could be received by the repeater and retransmitted instantaneously on an unused uhf television channel. Exact usage would vary from one community to another, but one use could be for televising lectures and enabling students to "talk back" to the instructor.

The petition was filed early last year by Dr. Lee Cohen, WA2RPC, of the Center for Advanced Education, City University of New York, and cosponsored by S. Edwin Piller, W2KPQ, president of a nonprofit group called Communicasting Association of America, Inc. (See "Happenings," May 1977 *QST*, page 65.)

For more information, write to Communicasting Association of America, 80 Birchwood Park Drive, Syosset, NY 11791.

RADIO AMATEURS EARN SCHOLARSHIPS

The *Foundation for Amateur Radio* announces the 1978 winners of the six scholarships which it administers. *The John W. Gore Memorial Scholarship* ($750) Alicia Ann Moore, WB9LAD; *The Richard G. Chichester Memorial Scholarship* ($750) Katherine Hevener, WB8TDA; *The QCWA Silent Key Memorial Scholarship* ($500) John P. Georges, WA2MYU; *The Young Ladies Radio League (YLRL) Scholarship* ($300) Elizabeth K. Riemer, N7IT; *The Radio Club of America, Inc. Scholarship* ($250) James S. Storey, WB9NIO; *The Edwin S. Van Deusen Memorial Scholarship* ($250) David A. Newmyer, WBØNLA.

These scholarships were open to all amateurs holding at least an FCC General class license or equivalent. This year applications were received from 24 states and Canada. The Foundation is a nonprofit organization representing 48 clubs in the Maryland, District of Columbia and Northern Virginia area. It is devoted exclusively to promoting the interest of Amateur

Honolulu Mayor Frank Fasi holds his proclamation in observance of Hawaii's Amateur Radio Week June 18-24, 1978. KH6ION, KH6DD, KH6IPQ, N7HR and KH6IEC look on. In last month's column, we ran a picture of Hawaii Governor George R. Ariyoshi signing his proclamation and incorrectly identified the Governor as Mayor Fasi. *(photo courtesy of N7HR)*

Radio and to the scientific, literary and eductional pursuits that advance the purposes of the Amateur Radio Service.

Information regarding the scholarships to be awarded next year will appear in the May 1979 issues of the major Amateur Radio publications. — *Foundation for Amateur Radio*

DOC CREATES NEW AMATEUR LICENSE CLASS

The Canadian DOC has taken final action to create a new class of amateur license. The new Amateur Digital Radio Operator's Certificate will require passing an examination equivalent to the Advanced Amateur, *plus* a new exam on digital techniques, packet radio, and microprocessors, *without* a Morse code requirement. Privileges are limited to 144 MHz and up, with pulse modulation reserved for holders of the new license. Present Advanced Amateurs can get their licenses endorsed by passing the new exam.

All Canadian amateurs will be permitted to use "packet radio" between 220.1-223.5, 433-434, and 24,000-24,010 MHz; however, 221-223 and 433-434 MHz will be set aside exclusively for packet radio in Canada. Narrow-band, low-power pulse modulation will be permitted at 145.5-145.8 and 434-434.5 MHz. The rules also have been changed to permit fm with up to 15 kHz deviation at 144.1-146 MHz in addition to 146-148 MHz, permitting Canadians to use the new U.S. repeaters in the 144.5- to 145.5-MHz segment.

While a dramatic departure from tradition, the new regulations are less startling and have much less impact on present operations than the original DOC proposals (May 1978 *QST*, page 59). More details will appear next month in "Canadian NewsFronts." — *David Sumner, K1ZZ*

SOLAR ECLIPSE NET BEING FORMED

On February 26, 1979, there will be a total eclipse of the sun that will be visible on a path roughly 150 miles wide running from the northern coast of Oregon, through Helena, MT, to Winnipeg, MB. This very rare occurrence (the next total eclipse visible in the continental U.S. will be in 2017) presents a public-service need for long-range communications, possibly from remote areas.

The Oregon State University Amateur Radio Club is organizing an eclipse net through the path of totality to: (1) provide observers with current weather conditions at possible sites; (2) give observers advance information on the eclipse (corona size, prominence, etc.); (3) provide hams and other researchers with information on unusual propagation conditions in and around the lunar shadow; and (4) transmit live SSTV pictures of the eclipse around the world (if operators with equipment volunteer).

For more information, interested hams should send an s.a.s.e. to the Oregon State University Amateur Radio Club, Corvallis, OR 97331. — *William Standing, AC7G, Station Manager, O.S.U. ARC, K7UYX*

MEANWHILE, IN WASHINGTON . . .

Just at deadline, ARRL went to Washington to testify before the House Subcommittee on Communications to present Amateur Radio's case concerning the proposed rewrite of the Communications Act of 1934. Appearing on behalf of League President Harry J. Dannals, W2HD, was Washington Area Coordinator Hal Steinman, K1FHN. Details of the testimony and how this rewrite could affect Amateur Radio will appear in next month's *QST*.

BEHIND THE DIAMOND

When Marge Tenney came to ARRL hq. as a Kelly Girl in 1964, she never dreamed she'd end up in an administrative position, in charge of one of the most demanding of Hq. programs. Marge started out addressing first day of issue covers for the U.S. postage stamp honoring the League's 50th anniversary. Today, she is the ARRL convention/travel coordinator in the Membership Services Department.

Actually, Marge made a couple of stops along the way to her present post. For a while she worked under Laird Campbell, W1CUT, the managing editor of *QST*. "One day Jo Huntoon (general manager at that time) ask me if he could borrow Marge for a while. haven't seen her since," Campbell said. S was the secretary for the general manager's o fice and for the Secretarial Department (n Membership Services) until three years ag

Every fall is ARRL election time. Each ye balloting for director and vice director ca didates is conducted in eight of the 16 di sions. Marge is in charge of coordinating t administration of these elections. Before voti can take place, all nominating petitions mu be acknowledged, a preliminary check made each candidate's qualifications and a briefi sheet prepared for presentation to the E ecutive Committee for final approval. The steps completed, she draws up a biographic sketch of each nominee, which appears on t printed ballot. Within days of ballot mailin the paper blizzard begins and she finds hers rounding up every able-bodied Hq. staffer s can find for the ballot-opening which tak place on November 20.

In addition, Marge handles distribution "convention kits" consisting of handouts a other materials to all ARRL-sanction hamfests and conventions, as well as t packages of ARRL publications which serve prizes. She also keeps track of the money c lected at all ARRL booths for membershi and supplies sold.

Marge received her Novice license November 1977 and sports the call si WB1FSN. Perry Williams, W1 *U*sually *Ea Di*nner, promptly dubbed her "*F*airly *Sha N*ovice," but no one thought of tho phonetics when she spent a bunch of lun hours in the ARRL lab building a 40-met direct-conversion receiver (slated to appear an upcoming *QST*).

In her spare time Marge and Her WB1ETL, kick up a little dust — the weekends are filled traveling from one squa dance to another, all over New England. S makes many of her costumes, too, some which require at least five yards of fabric! S also enjoys pedaling her bike around Plainvill CT, and is an avid sports fan — any sport. S has four children (Rick, the youngest boy, WB1ASG) and two grandchildren. A nati Nutmegger (citizen of Connecticut), Mar dispells the notion that New Englanders can unfriendly. You'll not find a nicer gal behi the Codfish Curtain. — *Michele Bartlet N1AGD*

Marge Tenney, WB1FSN

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

DOC Changes Amateur Examination Procedures

As announced at various Radio Amateur meetings in recent months, the radio examinations in the future shall only be scheduled at certain times during the year. In addition, the examination procedures and types of questions have been revised. For example, the examination will be in a booklet form enclosed in a sealed envelope to be opened only at the commencement of the examination. Upon completion of the exam the booklet will be handed in and returned to the department for grading. Questions asked for a given examination will be identical across Canada. Multiple-choice questions will only be used for the regulation portion of the examination. We understand that the theory questions will be problem types.

The first examination under these new procedures is tentatively scheduled for introduction in either October or November of this year. Examinations scheduled, or appointments made, and/or rewrites under the existing examination system may, at the regional director's discretion, be given up until the end of September, or as otherwise may be advised.

Other DOC "Happenings"

About a year ago, FCC and DOC agreed that it would be to their mutual advantage to eliminate the need for a special permit authorizing GRS and radio amateur operations in their respective countries by visiting operators. This matter had been actively promoted by both the ARRL and CRRL. We have now been advised that the necessary regulatory changes appear to be more complicated in the United States than in Canada and that therefore it may be several months before they are finalized to the place where it shall no longer be necessary to request specific authorization for operating privileges in Canada or the United States by a visiting ham. Current informal discussions which the DOC has had with the FCC indicate that when the regulations are amended that FCC Novice and Technician class operators will still not be able to operate in Canada because this country does not have the same type of license.

The CRRL has requested the department to initiate procedure to establish a reciprocal license agreement with Spain and Greece. We have been advised by the department that they have requested the Department of External Affairs to negotiate reciprocal privileges.

DOC has been requested to extend Canadian phone privileges on 40 meters by another Canadian organization. The extension requested is from 7050 to 7100 kHz. The CRRL is on record as being opposed to any such extension at this point in time for the very simple reason that if Canada permits this extension, we have reason to believe that U.S. amateurs will be granted the same phone privileges; therefore, no major advantage will be available to Canadian amateurs. We further are of the opinion that no such changes should be made until after WARC '79.

NARROW-BAND VOICE MODULATION

As you will have noted in the September *QST* editorial, a new frequency conservation phone mode has been invented by two U.S. amateurs and Canadian Tom Lott, VE2AGF. The CRRL now has a cassette demonstration tape that illustrates this new mode, even under poor and noisy conditions. It is available on loan from CRRL headquarters (P. O. Box 418, Sackville, NB E0A 3C0) by any interested club or association. It makes a very interesting presentation and we recommend it for your next club gathering.

QUEBEC HAMS FORM NEW ORGANIZATION

Quebec radio amateurs are now grouping into a federated administrative structure. La Federation des Radio Amateurs Quebecois has recently been formed in Montreal with the view of a province-wide inter-club relationship aimed as the common objective. In full cooperation with the REF (the French national society) and other groups the new federation is currently organizing for a 1979 social-cultural exchange program involving radio amateurs from Quebec and France. The federation elected Marcel Marchand, VE2JM, as president in addition to the following officers: Serge Peach, VE2EHS, Laval Duquet, VE2AAH and Real Gagnon, VE2BLW as vice presidents; and Guy Cadieux, VE2BTG as secretary-treasurer.

VE2FQJ has been assigned to the federation's network, which meets weekly on Wednesdays at 1700 on 14,115 kHz. Amateur radio clubs wishing to join the federation are requested to write the secretary-treasurer at the following address: P. O. Box 73, Laval Station, Laval, PQ H7R 5B7.

The federation has officially requested ARRL/CRRL affiliation.

POTPOURRI

☐ Frank Davis, VO1HP has been appointed VO1/VO2 ARRL QSL manager, replacing Bill Coffen, VO1KM, who has resigned after four years of dedicated and efficient bureau management. Bill has stated he has "enjoyed the many hours of 'card sorting' and hopes to be of service to the League again in the not too distant future." Thank you Bill and . . . welcome Frank!

☐ The ARRL DXCC desk advises that many VEs neglect to include enough postage for return of their QSL submissions via registered mail. Following are the correct *first class* mail rates for the return of your valuable cards: WAC — $1, 5BWAC — $1, WAS — 80 cents, 5BWAS — $3, 6 Meter 600 Club — $2.50, Satellite 1000 — $1, DXCC (new applications) — $3.20, DXCC (endorsements) — 50 cents, 5BDXCC — $5.20. *Registered* rates are: WAC — $3.30, 5BWAC — $4, WAS — $3.80, 5BWAS — $6, DXCC (new applications) — $6.20, DXCC (endorsements) — $3.50 and 5BDXCC — $8.20. *U.S. currency, please.*

☐ The Winnipeg Amateur Radio Club sponsored an Amateur Radio Display at Eatons in connection with the Eaton "Space Odyssey" program.

☐ A 23-year-old St. Catherines GRS operator recently received a fine of $300 or 60 days in jail after pleading guilty to using obscene language. He was also ordered to not use CB radio for a period of two years, *plus* a two-year probation for a second conviction of malicious interference to other CB radio conversations. Congratulations DOC!

☐ Kay Clark, VE3KAY, was recently presented with the Diamond Jubilee Award during the celebration of the C.N.I.B. 60th year of incorporation. This award was presented to Kay in recognition of her service by opening the world to the deaf *and* blind through Amateur Radio. There are only two other deaf-blind amateurs in North America (USA). Congratulations Kay. Tnx *TOT Topics.*

☐ Welcome to the following new ARRL/CRRL affiliates: the Winnipeg Repeater Society, Inc., the Metro Amateur Radio Club (Toronto), the Powell River Amateur Radio Club (BC).

☐ As Canadian amateurs may have noted elsewhere, the ARRL has established a "Hall of Fame." Nominations for Canadian hams are solicited now. You probably know of one or more Amateur Radio pioneers, living or deceased, who deserve the honor of being charter nominees. If you are personally familiar with the contributions one of them has made, don't wait for someone else to do it; begin the nominating process yourself! Nominations signed by five (5) League Full Members and fully and clearly documenting the qualifications of the nominee should be submitted to the secretary of the ARRL, or through CRRL headquarters, if you wish. A copy of the complete guidelines is available from either CRRL or ARRL.

☐ W. W. Scott, formerly director of operations of the DOC Regulatory Service, has assumed the duties of director of the newly created Regulation Development Branch. During any absence of the director general, Mr. Scott will be acting director general.

Please . . . some pictures of noteworthy Canadian events for this page. Our backlog is high and dry!

*Director, Canadian Division

Washington Mailbox

Conducted By Harold M. Steinman,* K1

Beacons

Q. What are beacons used for in the Amateur Radio Service?

A. A beacon station is simply a transmitter that alerts listeners to its presence. In the Radionavigation Service beacons are used to provide navigational guidance. In the Amateur Radio Service beacons are used primarily for the study of radio wave propagation — to allow amateurs to tell when a band is open to different parts of the country or world.

Q. Why is that important in the Amateur Radio Service?

A. Amateurs have always pioneered and engaged in studies of ionospheric propagation. Through amateurs the variations of the ionosphere (formerly called the Heaviside layer after its discoverer, Oliver Heaviside) and its effect on radio wave propagation were charted and explored. The first published explanation of the variations appeared in April 1925 *QST*.

Now, as then, amateurs are keenly interested in using frequencies which other services shy away from for long-distance communication — frequencies which other services have not found particularly useful or reliable. The propagation effects of the 10-meter band, for example, vary according to the time of the solar cycle, time of year, and indeed the time of day. For these very reasons this band represents a challenge to amateurs.

One of the best ways to know if the band is open to Australia or the West Coast of the United States, for example, is to have beacon stations operating from those locations on coordinated frequencies. If the signal from one of these beacons is coming in loud and clear, then you know the band is open to that area at that particular time.

Perhaps more important than just knowing if and when a particular band is open to a particular part of the world at a particular time is the conducting of long-term studies of ionospheric propagation. For example, monitoring a beacon or beacons once an hour for an extended period of time (days, weeks or months) could provide valuable information on long-term propagation trends. This type of activity may not seem as exciting as just using a beacon to determine band openings, but is an important part of Amateur Radio nevertheless.

Q. Aren't beacon transmisions one-way transmissions? I thought one-way transmissions were prohibited in the Amateur Radio Service.

A. In general, one-way transmissions are not allowed in the Amateur Radio Service. However, there are certain exceptions. Section 97.89(b) states that Amateur Radio stations may be used to transmit signals to receiving apparatus "for the measurement of emissions, temporary observation of transmission phenomena . . . and similar experimental purposes." Beacons which are used for studies of ionospheric propagation fall into this category.

Q. How do I put a beacon on the air?

A. First of all, it does little good to place a beacon on the air unless other amateurs know where to listen for it. Additionally, since the purpose of the beacon would be for studies of ionospheric propagation, you should be willing to devote the time to conduct such a study. Such a study might make an interesting research project for school, for example. Also, you do not want to put a beacon on the air in such a way that it will interfere with other amateur communications.

The International Amateur Radio Union Region 1 Division adopted a band plan at the 1975 Warsaw conference which provided for beacons in the 28.200- to 28.250-MHz band segment. In 1978, the Hungary conference extended the beacon band to 28.300 MHz. This part of the band was selected to minimize the possibility of interference to two-way amateur communication in the more heavily used parts of the band, and to occupy a part of the band that amateurs have not used enough, up to now. The coordinator of the 10-meter IARU Beacon Project is Alan Taylor, G3DME. You should check with him for a beacon frequency to be sure that your beacon does not conflict with the overall purpose of the worldwide beacon program.

Amateur beacons for propagation studies generally operate at a power level of approximately 50 watts, with omnidirectional antennas, and Morse telegraphy (A1 or F1) emission. They usually transmit continuously, sending their location and identification.

Q. Do I have to notify the FCC if I put a beacon on the air?

A. Not necessarily. Although you should coordinate your beacon with the IARU International Beacon Project, you do not have to notify the FCC if the beacon will be locally or remotely controlled. Note that this does not relieve you of the responsibility of assuring that your beacon fulfills the experimental purposes of §97.89(b) and that it will be used in studies of ionospheric propagation.

Of course, if the beacon is locally controlled, a control operator must be at the station location at all times the beacon is transmitting. If it is remotely controlled, a control operator must be on duty at the control point when the beacon is transmitting. All other provisions of §97.88 of the Commission's rules regarding remote control of amateur stations must also be followed.

Now, the problem is that in order to be useful for ionospheric propagation studies at all times of the day in all parts of the world, a beacon should be on the air 24 hours a day. It is difficult to have a control operator on duty at all times, so automatic control of a beacon (without the continuous monitoring by the control operator) is desirable. However, since rules for the automatic control of stations in the repeater mode only have been adopted, it is necessary to write the FCC for approval of automatic control of a beacon station.

Q. What does the FCC look for in a request approval of automatic control of a beacon

A. The FCC will look for answers in your quest to three questions:

1) Do you have a well-thought-out perimental plan for your beacon project? you demonstrate that you will be involved serious wave propagation studies? It is us to offer to provide the Commission a wri report on the progress of your project af say, one year.

2) Have you coordinated your beacon quency? Coordination with the IARU Inter tional Beacon Project shows the Commiss that your beacon will further the cause of in national propagation research, not conf with it, and that it does not duplicate the vices already provided by an existing beacon your area.

3) Have you taken measures to insure t your beacon will meet the Commission's quirements for automatic control of a stat (§97.85e)? For example, is the station cry controlled so it won't drift off frequency? H often will the station be checked for malfu tions? Are there amateurs nearby who authorized to enter your station and shut beacon off if the need arises?

What it comes down to is that the Comm sion recognizes the use of beacons in fulfill the amateur's purpose of the "continuat and extension of the amateur's proven abi to contribute to the advancement of the ra art." At the same time, the FCC does not w to see a proliferation of beacons which serve useful purpose or merely duplicate the funct of other beacons in the same area.

If you want to seriously engage and assis propagation studies, and feel that operatin beacon is the way to do it, go to it. I remember, it's a big responsibility, and it volves more work than glory.

Q. Where can I find a list of beacon stati presently on the air?

A. There is a list of 10-meter beacon stati on page 65 of June 1978 *QST*, and a list 6-meter beacon stations on page 69 of Octo 1978 *QST*.

SOME MORE ABOUT CALL SIGNS

Q. In March of this year the FCC complet revised the call-sign assignment system for Amateur Radio Service. Is it still possible me to be issued a call sign that I once held the past?

A. No. This is a point that is wid misunderstood, but the new rule is quite cle No requests for specific call signs (ev previously held call signs) will be honor although a licensee may transfer an existi secondary station call sign to the prima station anytime prior to expiration. To do so must attach a written request to his form 6

*Deputy Manager, Membership Services, ARRL

International News

Conducted By Bruce Alan Johnson,* WA6IDN

"Beyond Differences of Language, Nationality, Religion and Political Systems . . ."

It is very significant when the chief executive of the International Telecommunication Union (ITU) flies to Panama and delivers a stirring address of praise for Amateur Radio to the IARU Region 2 Triennial Conference. And that's what the Hon. Mohamed Mili did on 8 September 1978. The ITU, you'll recall, is the international body governing the world's telecommunications (including Amateur Radio), and it's the ITU which will host next year's World Administrative Radio Conference (WARC-79), at which 154 member-countries are going to decide who gets what frequencies for the rest of the century.

A separate article will appear soon in *QST* covering this important conference, but we would like here and now to share with you some of Mr. Mili's kind and enthusiastic remarks.

"Mr. Chairman of the Executive Committee of Region 2, Ladies and Gentlemen:

"You can now look back on more than 50 years of intense activity which, through disinterested research and sound scientific studies embracing the entire radio frequency spectrum, has made an appreciable contribution to the progress of radio communication.

This half-century of international cooperation has forged a chain of human brotherhood . . .

"This half-century of international cooperation has forged a chain of human brotherhood between all those who, by inclination or through dedication, have devoted or are devoting the greater part of their leisure time to seeking human contact over continents and seas, and beyond differences of language, nationality, religion and political systems.

. . . The International Amateur Radio Union is one of the most useful and dymanic organizations . . .

"The millions of chance contacts which have occurred during this period have been instrumental in saving many lives, thus making the International Amateur Radio Union one of the most useful and dynamic organizations when it comes to helping to save individual lives or the lives of many in natural disasters and catastrophes. . .

"It is hardly necessary to remind you that the Amateur Service is one of the oldest radio services, for there have been radio amateurs since the very beginnings of radio. . .

"Your Amateur Service is defined in the International Radio Regulations as 'a service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.'

"This service is, hence, recognized as having two lofty missions:

"— *First, to instruct,* that is to say, to take part in the training of those who in any capacity bear responsibility for the operation of radio services.

"— *Second, to engage in disinterested research,* in order to deepen our knowledge of such matters as the mechanism of wave propagation.

"It is therefore with the greatest satisfaction that we acknowledge the fact — and a most important fact — that radio amateurs have followed very closely the various developments brought about by the use of ever higher frequencies or by new techniques, such as space communications. Several thousand Amateur Radio enthusiasts have already made use of satellites (in particular, OSCAR 6 and OSCAR 7), and their observations will undoubtedly help to enhance our knowledge of the phenomena involved. . . .

"But the role of amateurs in technical training [as contrasted with that played in emergency communications] seems to be little known for all its great importance. As you may be aware, the ITU is engaged in a vast program of technical cooperation to aid developing countries to expand their telecommunications. In this program, training plays a predominant role. There is no doubt that the development of Amateur Radio . . . in the countries concerned makes a substantial contribution to the execution of this immense task and a contribution, moreover, that costs governments so little.

"All this certainly explains the importance of the Amateur Service in the life of our ITU which, as I imagine you all know, has its own Amateur Radio station in the headquarters building: 4U1ITU . . .

"I have noted with pleasure, when looking through the technical reviews of Amateur Radio societies, that they already embarked upon active preparations for the World Administrative Radio Conference to be held in 1979. We cannot, in my view, begin too early to give serious thought to the problems concerning the Amateur Service, and indeed all the other radio services, which will be raised at that conference.

We cannot, in my view, begin too early to give serious thought to the problems concerning the Amateur Service . . .

"This administrative conference will be a particularly important one, since it will be the first since 1959 to deal with the radio frequency spectrum as a whole. All the administrative radio conferences since that date have had a limited agenda relating specifically either to space radio communications, the Aeronautical Mobile Service, the Maritime Mobile Service, or Broadcasting.

. . . It is impossible for me to forecast as to the way this conference will go.

"You will readily understand that it is impossible for me to forecast as to the way this conference will go. One thing is pretty sure, however; namely, that the problems it has to face will be highly complex. It would therefore not be amiss for me to emphasize the care you should take to present to your national administrations any wishes or requirements you have to formulate in the most convincing manner possible. Nobody can tell what will come of it; the very most I can say is that more often than not when people describe radio regulations or a table of frequency allocations as 'good' they mean that the degree of disatisfaction is roughly the same for the users of all the different services. But I am convinced that the half-century that has gone by has amply demonstrated the importance of the part played by radio amateurs, and that once again you will have the sympathy of the conference on your side.

"Ladies and Gentlemen, convinced as I am that your work will further the progress of radio techniques and strengthen international cooperation with a view to improving telecommunications and human relations, allow me to conclude these few words by wishing you every success in your labors."

ITU Secretary-General Mili is greeted in Panama by Col. Rodrigo Garcia Ramirez, HP1RGR, commandant, 2nd Battalion, Panamanian National Guard. *(K1ZZ photo)*

*International Services Officer, ARRL

YL News and Views

Conducted By Louise Moreau,* W3W

YLs Are There to Help

Several years ago at the YLISSB annual convention an announcement was made that one of the handicapped members was having some trouble checking into the system because of a very poor antenna. By the end of the concluding ceremonies the problem had been solved through financial aid plus members who volunteered to make sure the new antenna was up and working properly.

Sister Lauren, WAØKRJ, works regularly with handicapped people to help them with the theory and the code that for many is not easy. For quadriplegics, learning to send with a mouth key is necessary in order to learn the code, and they must also master writing by holding the pencil in their teeth for code practice — a long slow method but they do get their license.

Clara Reger, W2RUF, who gave us our very distinctive YL signature, spent a great deal of time helping an aspirant, who was unable to use his hands, to learn to copy and to send with a special foot-operated keying device so that he could qualify.

Members of the Handicapped Net bring Amateur Radio to disabled people through a number of ingenious ways: creating special types of open face meters, tuning the transmitter by sound to help the blind, and a special memorization of theory process for others who are unable to type, write or even hold a pencil for the examination in theory.

The YLRL long ago created a permanent tivity of taping *YL Harmonics* as well as Q "YL News and Views" and made these ta available to all sightless YLs whether they members of the club or not. A similar projec sponsored by Canada's national YL cl CLARA.

The Ontario Trilliums' activity of assista to blind amateurs has been well known many years. They provide transportation to Amateur Radio events, and have recently panded their project to include classes, as as help in veterans' hospitals.

Individually YLs are doing more to, as Handi-Hams say it, "help create a window the world."

HOUSTON AREA YL ACTIVITIES

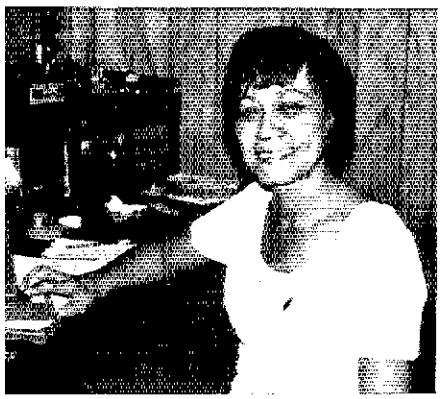
A net started to promote 2-meter work from all licensed YL Amateur Radio operators in the Houston area has been set on 147.93/33 at 9 P.M. CST. The Houston YLs have a second aim of offering encouragement to all interested women through announcements and the check-ins on this Tuesday net. At present they are also planning code tapes to be aired each weeknight on 147.93/33. These tapes will be code practice for the beginner, then graduated code speeds will follow the beginner session.

YLRL SCHOLARSHIP FUND

A $300 scholarship has been contributed in the name of the Young Ladies Radio League, Inc., for the academic year 1978-79. It is hoped that this will be the first of a regular scholarship program to assist licensed YLs to continue their education in the study of communications and electronics or related arts and sciences. This fund will be administered through the Foundation for Amateur Radio of Washington, DC.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036

Marylise Craan, HH2YL, is the first and only Haitian YL operator. Marylise is assistant secretary of the Radio Club d'Haiti. She may be found on 20-meter ssb where she is quite active. The OM is HH2MC. *(photo courtesy Vic Clark, W4KFC)*



Carol Julien, J3AM, is the first Grenadian YL be licensed. Carol works mostly 40-meter phone and is a member of the executive com mittee of the Grenada Amateur Radio Club. *(photo courtesy W4KFC)*

50 Years Ago

November, 1928

❑ Ross Hull, heading the ARRL's technical development program to help amateurs get ready for the more restrictive 1929 regulations, presents a symposium of receiver designs with major emphasis on selectivity. Because of the mechanical difficulty of gang tuning systems, he discards the r.f. approach and recommends sharply peaked audio circuits! Nonharmonic top band edges also present a new problem, solved by plug-in fixed tuning condensers.

❑ 8BQ, preaching "pure d.c." techniques at the Atlantic Division Convention, was almost hooted off the stage by a group who opposed expensive and unnecessary filters in power supplies.

❑ That mysterious sj5BX on "Pablo Island" was really in Peru, says W6HM, the "j" deriving from an ancient country name "Juinan."

❑ W6CHZ describes the excellent communications job done by Los Angeles amateurs for the 1928 National Air Races.

❑ A magnetostriction oscillator won't be much use on high frequencies but Harold Westman explains how well it works on long waves.

❑ A beautiful 10-meter crystal-controlled pair of 852s rig at M.I.T. is described by Howard Chinn.

❑ G. F. Lampkin has a collection of hints and kinks, from circle cutters to wire telegraph instrument keying relays.

❑ W5NW correctly points out that the initial letter of a call on QSL cards should be capitalized and not a small "w" as some are doing.

❑ The Hq. staff, with President Maxim in charge, hosted a dinner for visiting Dr. Curt Lamm, EK4CL, of the German society (active today as 3A2CL).

25 Years Ago

November, 1953

❑ New color television standards specify 3580 kc. as an internal control for "color burst," and the League is much concerned that another major TVI hassle may develop. But at ARRL request, the industry set up an *ad hoc* committee to study the problem, including extensive tests at Hq., with the result that precautions will be taken to protect the receiver circuitry from h signals insofar as possible.

❑ If you can't beat 'em, join 'em, says W3NDE describing a basic system for amateur television co munication, using the "iconoscope" tube.

❑ W1IEQ uses multiband tuning techniques i mobile unit covering both 50 and 144 Mc. with plug-in coils.

❑ A heterodyne exciter for stability is nothing ne but W6FPV finds the surplus BC-459 an ideal comp nent of such a hookup because of its rock-solid co struction.

❑ Even the mentor of our Novices, W1ICP descri a simple 40- and 80-meter one-tube rig in which elimination has been given major consideration.

❑ You won't need much yard space if you duplic W9YVZ's self-supporting 10-meter coaxial antenna which produces excellent results.

❑ The first ARRL Merit Award, created by action the Board of Directors, has been made to Phil Ra W1DBM, for his outstanding work in elimination television interference.

❑ In an effort to cut expenses, FCC is proposing discontinue giving Novice and Technician exams field offices and to conduct them henceforth by m through volunteer examiners.

❑ W1HDQ's second installment on 220 Mc. g features the transmitter. — *W1RH*

Coming Conventions

November 11-12
Hudson Division, McAfee, NJ
November 25-26*
South Florida Section, Clearwater, FL

***Date Change**

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA
July 25-27, 1980
Seattle, WA
March 13-15, 1981
Orlando, FL

SOUTH FLORIDA SECTION CONVENTION

November 25-26, 1978, Clearwater, FL

The Florida Gulf Coast Amateur Radio Council convention at the Sheraton Sand Key on the Gulf of Mexico, November 25-26, Thanksgiving weekend, will be a *Happy Ham Holiday* to remember.

Commercial equipment displays, forums, ARRL talk session, contests, radio club meetings, and prizes galore. FCC exams will be given all day. Swap tables will be available at $10 for both days, sold only in advance. The QCWA Gator Chapter hosts a hospitality room and Saturday luncheon (all hams and guests welcome). Gala Saturday night banquet.

Ladies' luncheon and style show on Sunday, as well as many other activities. Trips to local attractions — Disney World, Busch Gardens — can be arranged directly with the Sheraton. Plenty of off-hotel parking, courtesy buses and security provided. Work our *Ham Holiday Station* 21,150 and 7140 and 21,400 and 7250 kHz for special QSL, pick up or send s.a.s.e.

Make reservations early: 1-800-325-3535 for special rates. Four days and three nights, $75 double, extra person $4, kids under 18 with family, free.

Hamfest donation $3 single, $5 family. Advance registration gets two extra prize tickets. Talk-in on 37/97, 16/76, 3940, 223.34/224.94. Call CQ Ham Holiday (CQ HH de WB4BZF). Want more info? P. O. Box 157, Clearwater, FL 33417 or Charlotte, WB4PEL, 1-813-461-HAMS.

Hamfest Calendar

***Indiana:** The sixth annual Ft. Wayne hamfest, sponsored by the Allen County Amateur Radio Technical Society, is November 19, from 8 to 4:30, in a new location, the Allen County Memorial Coliseum, Parnel and U.S. 30 bypass north. All indoors for exhibitors and flea market. Reserved tables $3 until October 31. Admission $2.50, under 12 free. Talk-in on 52 and 28/88. Write ACARTS, P. O. Box 342, Ft. Wayne, IN 46801.

Massachusetts: The Framingham Radio Club flea market is November 11 at the Framingham Police drill shed, rear of 81 Union Ave. Entry fee $1. Reserved tables $5 full and $3 half, or $7.50 and $5 at door. Setup at 9, open at 10. Talk-in 52, 75/15 and CB 12. Contact FRC, P. O. Box 3005, Framingham, MA 01701, or call Jon Weiner, 617-877-7166; Lew Nyman, 879-7456; or Jim Boates, 653-6398.

Michigan: The ninth annual Oak Park High School swap 'n shop is November 26 at the Oak Park High School, 13701 Oak Park Blvd. Refreshments and prizes. Donation $1.50, tables $1 and $2. Write to Oak Park HSEC, Oak Park, MI 48237.

Michigan: The 13th annual Hazel Park ARC swap and shop is December 3 from 9 to 3 at Hazel Park High School, 23400 Hughes St. From I-75 take 9 Mile Rd. exit and go east. Admission $1. Reserved tables 75 cents per foot; limited free space for self-provided tables. Prizes. W8JXU talk-in on 52. Details from Rob Numerick, WB8ZPN, 23737 Couzens, Hazel Park, MI 48030.

Pennsylvania: The RF Hill ARC winter indoor hamfest II is November 12 from 9 to 5 at the Sellersville National Guard Armory, Rte. 152 (Park Ave.), Sellersville. All indoors, heated. Donation $2, XYLs free. Dealers $5, bring own tables. Prizes and refreshments. Talk-in on 52 and 28/88. Info from Sam Cox, WA3IUH, P. O. Box 29, Colmar, PA 18915.

*ARRL Hamfest

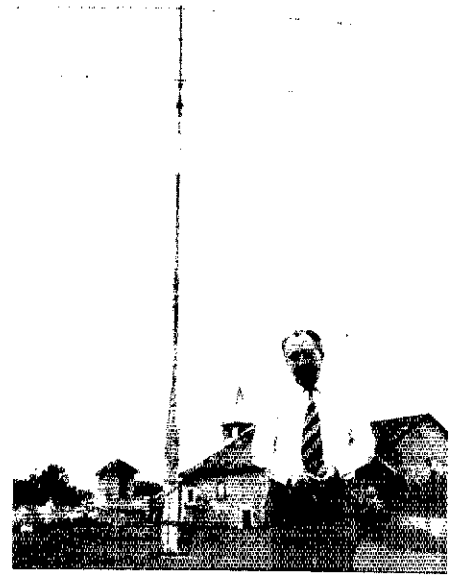
Club Notes

Looking for a new club activity that all members can become involved with? The Handi-Ham System wants you! The Courage Handi-Ham System is looking for local Amateur Radio clubs, regional/national Amateur Radio groups and other interested organizations to help them do the work everywhere that they do in Minnesota. In return for filling out an application and an annual report, your club receives materials to assist handicapped people in becoming quality licensed amateurs. Besides educational materials, Handi-Hams provides counseling, assistance in procuring equipment, encouragement and support.

A quote from the Handi-Ham workbook follows: "You are not a 'branch' or 'department' or any other local arm of this organization. You are, instead, a volunteer doing charitable work for a nonprofit health agency. In recognition of the work done by the individuals and clubs providing Handi-Ham services, there exists an affiliation between the System and the provider (your club)."

Write Bruce Humphrys, KØHR, director of the Courage Handi-Ham System, for more information, at 3915 Golden Valley Road, Golden Valley, MN 55422. — *WA1STO*

Strays



Ted Robinson, F8RU, past president of the International Amateur Radio Club, 4U1ITU, in Geneva. His tribander and 40-foot homemade tilt-over mast are in the front yard of his modern home, sharp contrast to the 300-year-old church in the background. *(photo by W6AQ)*

W1AW NOTES

Each time the W1AW schedule is rewritten, we think we have simplified it as much as possible. But some questions keep popping up. Ever since the ARRL Board in 1960 decided that the schedule should be maintained in GMT, there has been confusion — we know what time it is, but we're not sure what day! Remember that the date changes at 0000 GMT (or UTC as it is now called), which is at 7 P.M. EST or 4 P.M. PST. Thus a transmission at, say, 0200 UTC on Wednesday is really at 9 P.M. EST or 6 P.M. PST Tuesday evening.

Code practices and cw bulletin transmissions are on the same set of frequencies: 1.835 3.580 7.080 14.080 21.080 28.080 50.080 and 147.555 MHz. Slow-speed code practice begins with 16 minutes each at 10, 13 and 15 wpm. All the texts for code practices are from recent issues of *QST*, and the source of each practice is given at the beginning of the text and again at the start of the 10, 15 and 25 wpm portions. For example, "Text is from June 1978 *QST*, pages 13 and 73" shows that the main text is from page 13 and the mixed number-letter groups are from contest results on page 73.

Cw bulletins are sent at 18 wpm, RTTY bulletins are at 60 wpm, 170-Hz shift. Voice bulletins are read at a slower-than-normal speaking speed. — *W1WPR*

Thomas L. Cox, WB9OQU, of Madison, WI, first worked Ernest, 4S7EA (Sri Lanka), last December. Since then, Tom has become Ernest's QSL manager, and he recently shipped a quad at his own expense to his friend abroad. After only five weeks on the air, Ernest has worked 35 states and has had 260 QSOs — thanks largely to his American friend.

Correspondence

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

EXAMINATIONS OF EXAMINATIONS

☐ I wish to comment on the editorial "Those FCC Exams" (August *QST*, page 9). I never have experienced any difficulty with the FCC exams. I passed the Amateur Extra on the first attempt and the only material I used for study was the *Radio Amateur's License Manual*. The important thing was that I thoroughly *understood* all the material. I also reviewed all the study questions from the Novice through Advanced sections. Rote memorization of such material is useless except for the FCC regulations, formulas and schematics. Granted, there are people who do in fact understand the material but who continue to fail the exam. Some people generally get "uptight" over any kind of examination and fail for that reason. More often than not the failure is due to carelessness and not reading the question. My advice is — don't rush. Read the question thoroughly and then ask yourself, "What precisely are they asking for?" Furthermore, don't read anything into the question that is not asked for. I've taken a lot of examinations like the FCC gives, and I admit that reading comprehension is the all-important factor if you understand the material. — *Philip Nordmark, N7BR, Yakima, WA*

☐ A little over a year ago I determined that I would try to become active in helping young people enter ham radio despite a number of years of inactivity. I consider myself a reasonably intelligent person with some ability and proclivity for the mechanical and electronic fields, and have in the past designed and built my own equipment. I was shocked at the amount of time and effort the preparation took, not to mention the type of questions in your manual and on the examination. *Sans* a current electronic or electronically related job, the average professional or businessman would have to devote such an enormous amount of time to preparation that it would be in derogation of his business or practice, and his family. When I took the exam I was appalled by many of the questions. It was very possible to answer incorrectly because of the manner in which the question was worded. The League should press for the type of questions which are straightforward. The League should carefully reexamine its position in respect to the quality and quantity of information required for each class of license. Consider the amount of time necessary to acquire the necessary information and knowledge. Many hams are not retired, not students, nor in a position to spend literally enormous amounts of time in preparing for examination. — *Leonard Gilberg, K4DDM, Albany, GA*

☐ I've no doubt that a lot of guys and gals are frustrated when taking the FCC exams, but let's not put all the blame on the FCC. In some cases I've heard people say, "It's not fair." No, I'm afraid they're just not prepared. I wasn't the first two times. I went back to the books and the third time I got my General. All this took two years. If I as an auto mechanic, age 39, a high school dropout who has a family of five, can make the General with hard work and determination, they can too. Prove it to yourself. It can be done! — *Robert Stuff, WB4IBT, Rossville, GA*

☐ This column brought back some unhappy memories. I am an old railroad telegrapher and train dispatcher. I received my Novice, set up a respectable station and worked almost all states. I spent a year and a half studying with well-qualified people. I bought quite a library of books which were studied diligently and I could answer all the sample test questions through the Extra. I started the General test and couldn't even read it with understanding. This was probably the most discouraging and frustrating time of my life. I came home and dismantled the station. My license has expired and I have been off the air for two years. I miss it, so I set up again to listen. Maybe I'll get another Novice license and become a perennial Novice. I certainly won't subject myself to my previous experience again. — *Earl Howard, ex-WB9RNQ, Speedway, IN*

☐ I just came back from Detroit for the fourth time and failed to upgrade to General. There were three of us who went and not one of us passed. We have been to schools, private instructors, and tried just about everything possible. In my opinion, the questions and selections of answers were very bad. I believe the *QST* article was well written and I was impressed with your views. — *Robert Phinney, WD8IDE, Broad Park, OH*

WAS/WHATEVER

☐ I read your article on WAS endorsements (September *QST*, page 73). Since there are clubs and/or organizations that sponsor such things as WAS/mobile, I would say, leave it to them. You should only issue WAS and leave it at that. As the amateur ranks grow also do expenses grow. Issuing just WAS would allow you to have the same staff working on this award without penalizing any other awards and without entertaining the horrible thought of charging for it. At times I agree with you people at ARRL and other times I disagree, but where would we be without you? — *Frank McJanner, K7LQI, Seattle, WA*

☐ Any time you relax a rule or a requirement someone will be right there to take advantage of it. All awards should be authenticated before being issued. If you start to issue awards on the honor system I won't bother trying to get the last W1 QSLs I need for my WAS. It soon wouldn't be worth the paper it's printed on. — *Raymond Gascon, W7SJS, Salem, OR*

☐ As for the honor system I say "No!" I am of the opinion that anyone wanting WAS endorsements given to him, stating on the endorsement that he made contact with all 50 states using QRP, all home brew, or whatever, should be willing and intelligent enough to make sure that all cards sent to Hq. state on them that contact took place under those special conditions. It seems to me that would be a very small price to pay. — *Dennis Pharr, WD5JWY, Oklahoma City, OK*

☐ The only reasonable solution is to accept the word of the applicant. Special endorsements are of value only to the applicant and then only from a personal satisfaction standpoint; so if some people cheat, who cares? — *Lawrence Reece, WB9LUG, Southport, IN*

SPEEDOMETER FOR ORGAN GRINDERS

☐ Reference July 1978 *QST*, page 11. The Digital Speed Readout is like a speedometer for the organ grinders. Next project, a digital strain gauge to regulate finger pressure on the paddle. After that, a pulse counter to keep the high-grade code people from passing out due to hypertension caused by that rare DX not coming back quickly. — *Samuel Margolis, W2ERU, Southhampton, NY*

ILLUMINARIES OF HAM RADIO

☐ I would like to express my continuing appreciation for a top-notch job you are doing at Headquarters. The ARRL is the international bulwark of Amateur Radio. I especially like the tone and format of *QST*. Why not devote one page each month to the luminaries of ham radio? Your recent biograph sketch of Dick Spenceley was excellent. Don Wall for example is the folk hero of the neophyte DX I'm sure an update on him would be enjoyed. *William Anglea, Jr., WA4NQG, Nashville, TN*

RIDDLE

☐ What new licensee will almost certainly have symbol for a rectifier on a QSL card? AC2DC. — *Ward, W2IT, Yorktown Heights, NY*

SHOPPING BY MAIL

☐ The correspondence from WB4VKT (Septem *QST*, page 54) regarding long shipping delays struc nerve. I would like to recommend that anyone buy or selling by mail read the pamphlet "Shopping Mail? You're Protected!" The pamphlet was prepa by the Federal Trade Commission and the U.S. Po Service and is free. My copy came from the Fed Trade Commission, Room 1339, Federal Office Bl Cleveland, OH 44199. The consumer's rights are cl ly stated along with the necessary addresses to con for assistance. — *James Sullivan, KB8DE, Cincinn OH*

VIEWS THROUGH NOVICE EYES

☐ One thing that we can do to increase our numbe to do away with the Novice name tag we hang on hams, making them feel like unwanted stepchildre can remember when I was a Novice I heard an vanced say that he could always tell a "bunch Novices" when they were together practicing c Let's stop treating the less experienced like touchables. Let them join the club. They paid t dues! After the many hours of study and work pended in order to receive a license, no one preciates being called a Novice. I know of m potential hams who have said that they were not g to put in all that time and effort to have a No name tag hung on them. By the way, not all Nov are beginners. I know some who have been hams years and handle a key like a musician. This is another reason to drop the designation. So you "What do we call them?" Well, we can call t Amateur fourth class, Technician second class or other dignified name we so desire. Why not run a *test in QST* for a new name and award some sor goodie to the ham with the best imagination? Not would it be a fun thing, but it would be a great ste the right direction. It would be up to the ARRL make this proposal to the FCC and follow it up. *D. C. Gluck, WD4IOX, Morristown, TN*

☐ This rebuttal is for hams such as those who c cized some so-called "poor" cw operators (Au *QST*, page 44). I thought ham radio was supposed be a fraternity in which we stick together and each other. Let's face it, ham radio isn't Utopia. S it's human nature to want the best, but criticism never bring it. Criticism only makes people an Why not offer help such as that given by W5SQ ("Correspondence," August *QST*) I am only Novice, a beginner. When I get on the air I want vice not complaints. I don't want to be labele "lid." I want other people to say, "Oh yeah, heard KA4CVL. He's the 17-year-old with the c fist." — *Chuck Ogburn, KA4CVL, Kenbridge,*

☐ When will higher class hams realize that the No band is for beginners. It is a segment of an ama band to give Novices and Techs a proving groun build up their fists. Some have mastered the key some haven't so give us some time to improve. Th what the band is all about. Who knows, that — may make a member of the Brass Pounders Leagu A-1 Operator someday. — *Edward Middlebro WD5BCI, West, TX*

☐ A group of Extra, General and Novice class h would like to see the Novices automatically g General after being on the air for three years. *K2TB, WB2MUA, WB2DVX, K2ITT and Ha Alpaugh, WA2DZQ, Lebanon, NJ*

How's DX?

Conducted By Bill Lowry,* W1VV

Odds and Ends — and Farewell

This will be my last column as conductor of "How's DX?" When I started earlier this year, I expected to continue for a long time, but after this month I will no longer be able to devote the time that the column requires.

One of the pleasures of the job that I shall miss is receiving correspondence from DXers from all parts of the world. Much of the mail covered QSL information and news about DXpeditions and other DX operations. But much to my surprise, I found that many hams are interested in becoming QSL managers, and want to know how to become one, and what the job involves. Elsewhere in this column, every month we do list the calls of those potential QSL managers. Unfortunately I lack firsthand knowledge of the details of the QSL manager's job, and my written inquiries to various managers have yet to yield any information. A detailed article on the subject is badly needed. Will an active QSL manager take this hint and write one for *QST*?

Still More on QSLing!

Of all the columns I wrote, the two on QSLing drew the most comments. For example, while a QSL is valid without the precise time of the QSO on the card, Hank, WA6FPB, wants to emphasize that it is still highly useful information, especially to those making out QSL cards for an extensive DXpedition. In any case, a QSL should contain as much useful information as practical, unless it is obviously not going to be read. Among others, Gene, W7TE, believes that your call, plus the date and time of the QSO should appear on the back flap of your s.a.s.e. That simplifies filing, retrieval and completion of QSL cards in situations where many cards are involved.

Gene also comments that all the vital information should be on one side of the card: That is not essential, but for obvious reasons QSL managers and many operators prefer it that way. They also like all the information in a row of blocks across the face of the card. For example, a good card might have blocks labeled *QSO with, date, UTC, frequency, RST* and *mode*. Your call (prominently printed), name and QTH would appear on the same side.

Another source of QSL information will be available in a few months when Rod, W7OM, publishes his directory of QSL managers. Containing over 200 pages, it will cover more than 7000 DX stations and their managers going back to 1969 when the 5B-DXCC started.

IRCs still present problems. Lloyd, 6Y5LA, reports that some post offices will not accept them if they have not been stamped in the lower left-hand corner by the issuing office.

Operating Practices

Some of my mail concerned that broad subject. Because of their frequency limitations, Novice licensees have unique problems in working DX. Many have written pleading for DXpeditions and other DX stations to spend some time listening or operating in the Novice segments. Paul, WB3GVS, says many of them are upgrading as fast as they can, but in the meantime, the Novices have lost out on some rare stations that may not be on the air again for a long time.

What can be done about pirate operators? Don, NØRF (ex-WBØNOU), believes the problem can be alleviated slightly if pirates receive the minimum of on-the-air and printed publicity. He realizes they must be identified, but believes anything beyond that merely encourages them.

Others objected to the operating practice of taking lists for DX stations. In a recent letter, Henry, W3PN, recommends that DXCC credit not be given for any country worked as the result of a list. While the list may possibly simplify things for the DX station, it does remove some of the sport from DXing. (Some remains, as it can be very difficult to get on the list!) Abuses do creep in, however, as when the list manager gives preference to his friends. A list may even waste time, especially if it was taken several days before the DX station was scheduled to appear. I have listened to such situations where many on the list did not appear, and valuable time was wasted repeating their calls. Many operators believe it is better for the DX station to work stations by call areas rather than by lists. If you feel strongly about list operations, you can write to the DX Advisory Committee member from your district.

Bad Behavior Continues

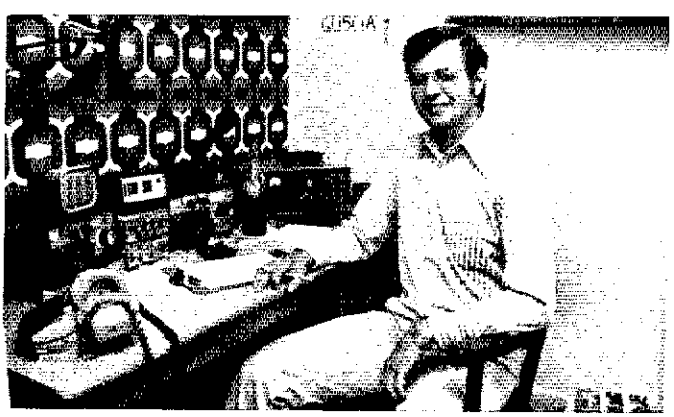
Many worry about the general problem of bad operating practices. It's no secret that the biggest obstacle to working DX is usually the competition or interference from other stations. Unfortunately, when many U.S. stations are chasing the same DX, the situation all too often gets out of control. It happens so often that there is no need to describe the details here. This sorry state of affairs, however, does not improve our position at WARC-79. Nations wanting our amateur frequencies point to the chaos they observe as evidence that we do not deserve those frequencies.

The ARRL is starting to work on this problem. At the July meeting of the Board of Directors, the following motion was passed unanimously: ". . . that the Board express its continuing concern over harmful operating tactics and procedures and improper language being heard with disturbing frequency on the amateur bands, particularly during rare DXpeditions, and directs the General Manager to undertake suitable educational programs through channels available to the League so that the international image of Amateur Radio is not tarnished and so that our stature at international radio conferences will be enhanced." Regardless of what the League does, each of us has the responsibility to avoid those practices that we deplore in others.

In any case, many a DX operator — unwilling to "take it" — has left the scene of a bad pileup. Others stop working U.S. stations altogether, or at the very least alter their operating tactics to minimize interference from U.S. hams. For example, John, TG9ML, who concentrates on cw, reports in a recent letter that he will not work U.S. stations in any segment between the low edge of the band to 25 kHz above it. His reason? "On more than one

* c/o ARRL, 225 Main St., Newington, CT 06111

On the left, famous QSL manager Joe Arcure, W3HNK, smiles at the thought of answering all those cards! And on the right is another cheerful ham, Dale Jones, GU5CIA, active on 20 cw from Guernsey.



occasion I have tried to work a DX station, and had a W or K or N preempt him, to work me. This has happened to me . . . on a number of occasions . . . in the Extra Class subband."

Perhaps many aspects of DXing would be improved if we had an organization devoted to it. While this thought has occurred in the past, Ed, K8ZM, has recently done some detailed thinking about the possibilities. Write to him if you are interested in the subject.

Final Words!

Based on the correspondence received, I believe many readers are apparently unaware of the fact that the DX editorship historically has not been a full-time position at ARRL. As in my case, the editor typically has a regular occupation elsewhere, and all the correspondence, writing and work associated with the column are done during his spare time. As a result, the news and QSL information aspects of the column depend heavily on contributions from readers. Thus I am extremely grateful to all who have helped me this year by supplying information and sending me friendly letters of encouragement and support. Until our next QSO, 73.

THE DX SCENE

4P2AR writes that only contacts made with that call in July 1969 and before are legitimate. ARI indicates that many QSLs have been received for QSOs made after July 1969; however, the call appears NOT to have been reissued.

FB8WW. Logs prior to 1967 are now in W2AIW's hands for anyone still needing this one. (W4PZV)

GU, Guernsey, is the source of lots of cw action these days with brothers GU4s CHY and EON, GU3YIZ, GU5CIA and club station GU3HFN all active. GU3HFN should be heard in both CQ WW tests this year.

HKØ, San Andreas. The operation reported in September *QST* will be by the Frankford Radio Club, *not* PVRC. Tnx to N3RD.

HL/HM, Korea, should become much more active. HL9WI says that 700 natives passed the new amateur examinations! Jim, HL9WG and Butch, HL9VY, transplanted Americans sporting new Korean calls, are often found on ssb. QSLs for Butch's Okinawa stint (KA6JA) from 5/72 to 9/74 can also be received through his QSL manager, WB7DXM.

KA1HW, Ogasawara. Glen shows on 14220 kHz daily from 1100Z, opening a one-year stay. QSL to K8DYZ. (LIDXA)

KP1, Navassa Is. Call signs for the operation from November 25 to December 2 are NØTG/KP1 (ssb), WØRTU/KP1 (cw) and WØZH/KP1 (OSCAR, Mode B). QSL via NØTG.

S9, Sao Thome. D4CBS plans a 2- to 3-month stay beginning in late September. QSLs for Angelo's operation go to K1VSK.

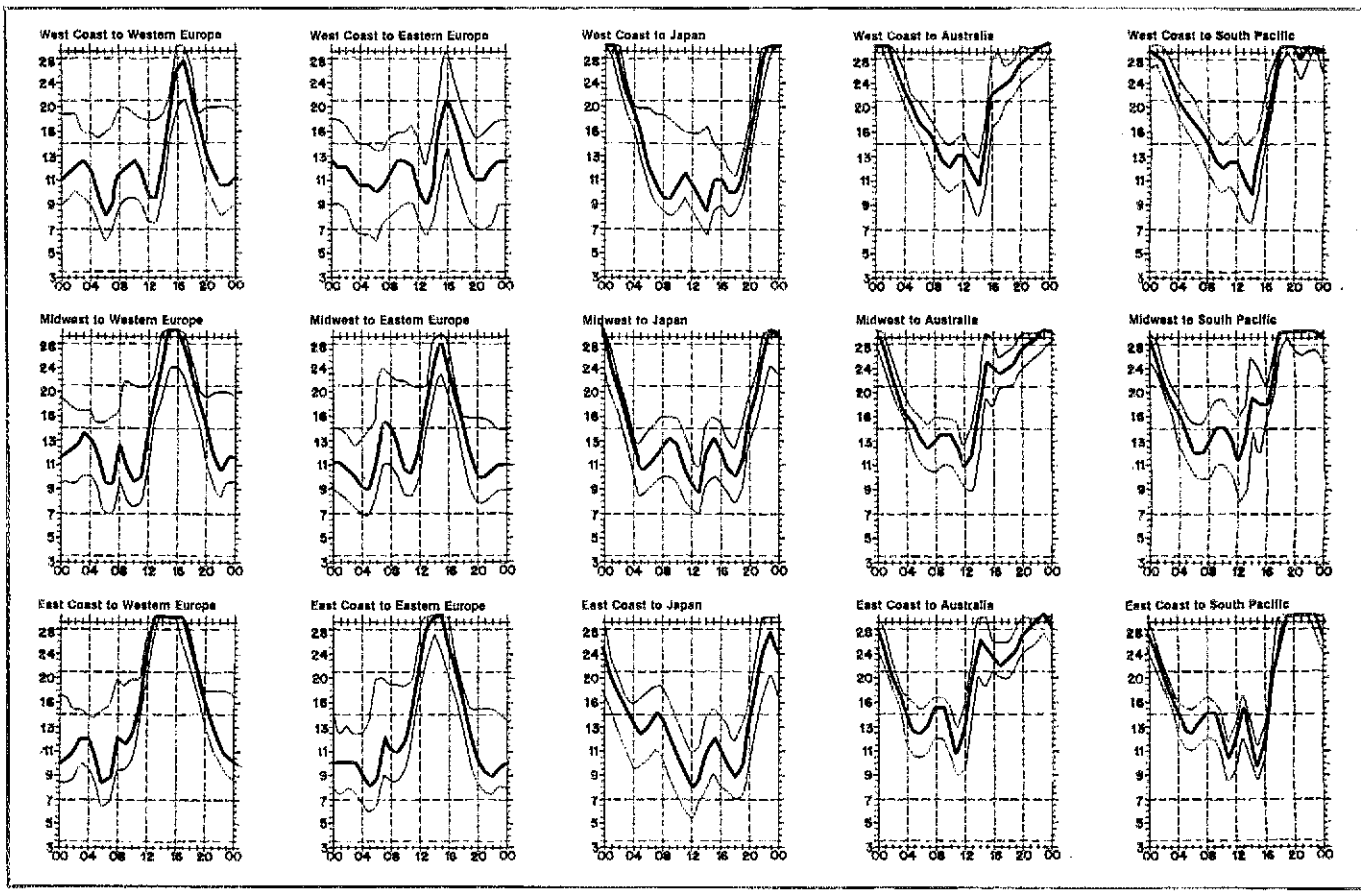
VP2E, Anguilla, will be activated on all bands from October 25 until November 1 by N5CG, W5TO, K5SZN and KH6HBZ, with each member of the group signing his own call. (K5SZN)

VP8, So. Shetlands. HFØPOL, the Polish base station, is presently active on the low edge of all cw bands and has been heard using upper sideband at 3705 kHz. QSL via SP2BBD.

XF4, Revilla Gigedo. A DXpedition is being planned by XE1J for the third weekend in either November or December. (LIDXA)

ZL/C, Chatham, will be activated on all bands (including 1.8 MHz) and modes (including SSTV) from October 27 through November 6 by ZL1s ADI, AJF, AMO, BKL, ZL2AH, ZL4NF and WA6YOW. Only one call (ZL3HI/C) will be used and lots of Novice band operation is also planned. QSL via N2CW.

Mack King, 8P6FV, finds it easier to cut through the QRM by operating from a barber's chair



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

4D will be an optional prefix for DU amateurs until the end of 1978.

4U1UN shows daily during lunch periods (1700Z) on 14-MHz ssb. Cards for this new DXCC counter will be accepted for credit beginning November 1 for operations back to February. A TH6DXX donated by the NCDXF should improve high-band signals.

5W1BN is being heard from 0800-1330Z on 21 MHz on both cw and ssb. His home call is KH6LW. QSL to KH6JEB. 5W1AX also is often heard on 21-MHz ssb from 1130-1400Z.

9X5NH may regularly be found at 0330Z on 14265 kHz, often with lists being taken by his QSL manager, DL8OA. He needs the Dakotas to complete his WAS.

QSL INFORMATION WANTED

If you know the QSL routing information for any of the following, please contact directly the person needing the help. SVØWT ('71) by WB6DXU; 7P8BG by W2HKM; VP2VD by WA2FJI; T72AB (11/70), ZS2FM (10/76) by W2DUN; 5A1TK (3/69), 4U1ITU (12/70), 7Q7RM (11/72), SV1FT (10/72) by K1HDO; KS1U/C6A by K1MC; 3Y1CA (9/70), KR6CB (1/70) by WA3IMG; FT3FY, FT3GB, KW6EJ (all 10/66), KH6EH/KW6 (11/66) by W5IL; JX4GN (73) by WB4TPU; VP8MS (10/76) by WA3SXH; ZD4AB (2/51), FG3FP (8/46), VO6P (9/46), VO4J (12/46), FF8AP (4/57) by W4PZV; 9L1VW (2/72), SVØWOO (7/72) by K2AIO; XW8BJ (12/67) by K5WF; KW6EJ (4/69), FT3JH (10/72), FT3USA (7/70), FR7ZS/T (10/69), MP4BEU (4/71) by K6UD.

Also, WBØNOU needs help with F9UC (8/65), FT8RA (5/66), HL9US (3/67), 3C3FIZ SU (3/67), UL7KAR (5/65), VK4TE (Willis — 5/65), 7Q7LC (1/66); and NØAT (as ex-WAØKQU) needs TL8VE.

QSL MANAGER VOLUNTEERS

The following amateurs offer their services to any overburdened DX station: I2MQP, N2OL, WB3C7K, WB3IRU, K4CIA, N4WQ, N6ACF, WA6ABD, WD6AOF and WD8DMX.

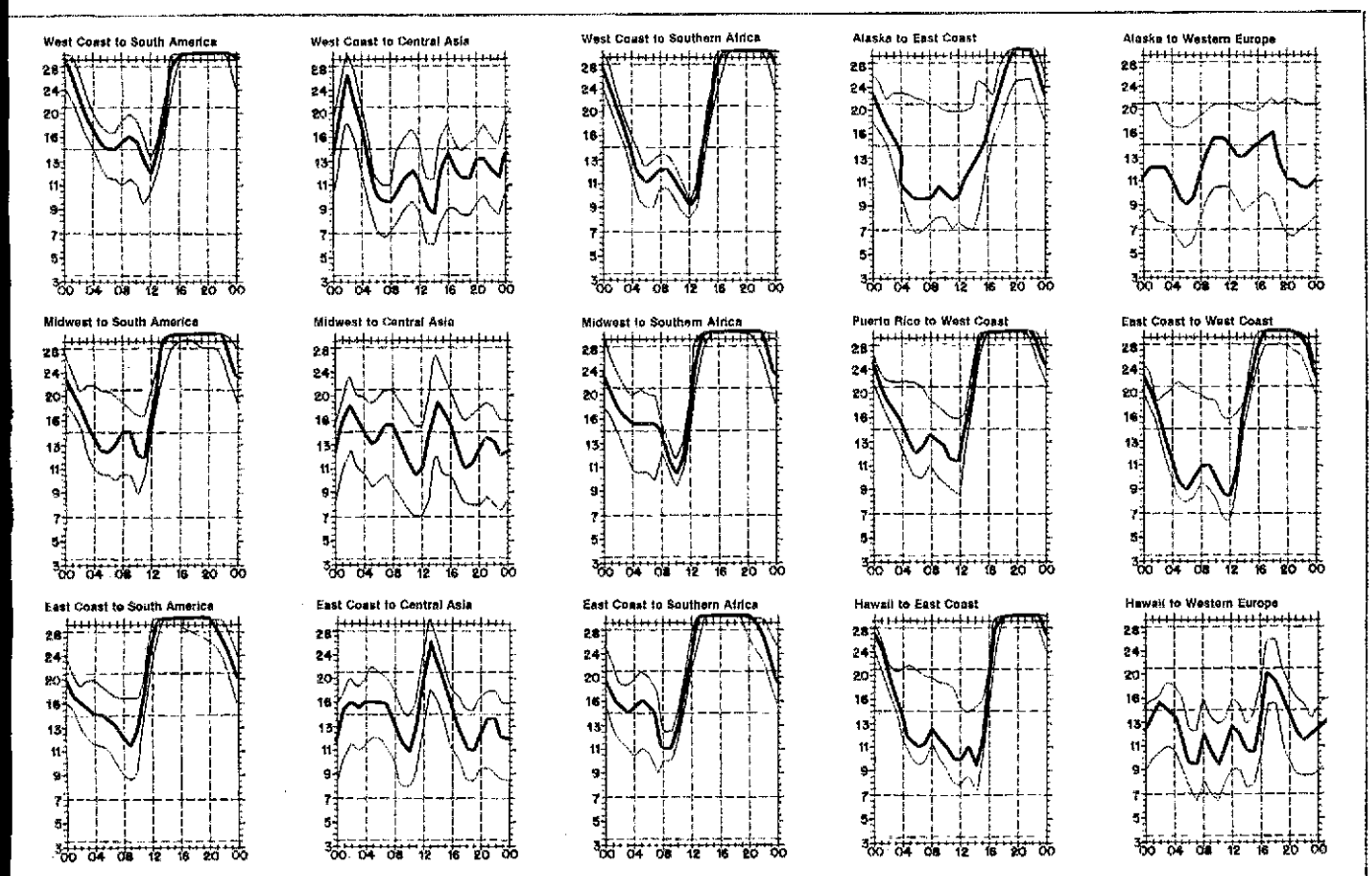
Cliff Saccalis, SV1JG, shown traveling to Cos Island, Dodecanese, on a recent DXpedition.

QSL Corner

Administered By R. L. White, W1CW

Back in '76 when the skull session was underway about an "outgoing" QSL service, someone with insight opined that there was going to be confusion as to who does what to whom with regard to the "incoming" and "outgoing" bureaus. While it was generally agreed that there probably would be some confusion, maybe if the two functions could be disassociated in some way (like in the name) it might help. So, rather than naming them "incoming" and "outgoing" QSL bureaus, and since the ARRL DX QSL System had been in operation for some 35 to 40 years with an established name, what was left was the name of the (then) new function. Make the name say something different and there would be less of a tendency to associate the two functions, e.g., the name was made "ARRL Membership Overseas QSL Service." Whether the philosophy of the two dissimilar names works might be debatable as the fact is we get people sending envelopes (that should have been sent directly to the call area QSL bureaus) to Headquarters and the call area QSL bureaus have people sending them cards that should have been sent directly to Headquarters. Actually it is only a small percentage that can't seem to get it right, but that small percentage causes a very disproportionate waste of time, effort and money.

So what is all the harangue about? Actually the harangue is a lead into discussing an apparent problem concerned with the ARRL DX QSL System (the incoming QSL bureaus). The ARRL DX QSL System operates on a self-sustaining basis (almost). Theoretically the expenses of the bureau are met by the users (you) paying the postage and envelope cost (the big expense) and the ARRL picking up the bill for any other administrative expense, such as the expense for a P. O. box rental and rubber stamps, paper clips, etc. For a good many years the system worked out on an acceptable, if not perfect, basis or at least one that



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for November 15 to December 15, 1978, assume a sunspot number of 111, which corresponds to a 2800-MHz solar flux of 155.

wasn't causing a problem. However, with an ever-increasing amateur population and a subsequent larger use of the bureaus we are now facing a problem that, hopefully, can be reduced to at least an acceptable point. What is that problem? That problem is the amount of incidental postage that is being used by the QSL bureaus that shouldn't really be necessary. Incidental in this case being postage that isn't supplied by the users but should be: Things such as notification that a person has cards on file at the bureau but no envelopes. Even if the notification is made by postcard (which it generally is) that postcard uses 10 cents in postage. The bureaus ask that the 10 cents be refunded to the bureau but too often it isn't. Another thing is the matter of postage due. The bureaus can't pick and choose what mail to accept or return to sender and when. For example, if an envelope containing someone's s.a.s.e.s being sent to the bureau doesn't have sufficient postage put on the envelope by the sender, the bureau has to pay the postage due. Another example of postage being used by the bureaus when it shouldn't have been necessary was mentioned before, i.e., people sending cards to the district QSL bureaus that should have been sent to Headquarters. These are just a few of the things that are happening which are causing a problem. A problem that could get out of hand. With a little thought there isn't any reason it can't be kept under control. End of harangue and on to some hopefully helpful hints from the good folks who like to share. Keep in mind the hints are as supplied and, therefore, cannot be absolutely certain.

CE9AT, Via CE2DIO, Antarctic Dept. Naval Post Office, Valparaiso, Chile
DA1GR/OHØ, Box 395, APO NY, NY 09611
EP2YK, Box 94, Esfahan, Iran
HL9WG, WO1 James Madsen, 186-40-1658, 833 Ord. Co., APO SF, 96231
I28AA, Box 215, Djibouti
K9PNT/DU/4D2, P. Hunsberger, PSC No. 1 Box 1864, APO SF 96286
SV1JG, Box 564, Athens, 902, Greece
9K2FP, Computer Dept. Box 177, Kuwait

A4XGZ (WB4NND)	PYØRO (W1DA)
C31MJ (EA3NE)	SVØWTT (W6GBG)
C31MK (EA3WZ)	TF3CW (K1RH)
C31MS (EA3MS)	VE6BGU/SU (VE6BGU)
C31NM (PAØGIN)	VO1LX/SU (VE3IWI)
C31QR (PEØMQT)	VP5CNL (W8CNL)
C6ABA (G3AMR)	VR1X (G3IQM)
EA7FL (July 30, Aug. 1-3, '78, WA6QDR)	VP2SZ (WB8OBA)
	YBØPQ (WA2DWE)
	WB1EZI/KP2 (VE2UN)
EA9EY (Aug. 17-19, '78, WA6QDR)	W9RBD/VP9 (W9VNG)
	WØRJU/KP1 (NØTG)
EL2AE (WB3CQM)	WØZH/KP1 (NØTG)
EP2PQ (PAØWGS)	ZB2EE (WA6QDR)
FØEPT (K8MR)	ZF2BR (WB4ROY)
FB8WW (before '67, W2AIW)	ZF2BZ (WA4ORG)
	ZL3HI/C (N2CW)
FOØAKV (KV4CF)	ZL4JO (W4LZT)
FPØMG (W9GBC)	ZM7AT (WB6DXL)
FR7BE (W4LZZ)	ZP2BX (VE2UN)
GD5BTU (W3LPL)	3AØGJ (K1IXG)
H44KM (WA6AHF)	3D6BP (K1AGB)
HH2MC (WA4AKU)	4X4CJ/4X3OCJ (K4YSF)
HL9VV (WB7DXM)	
ISØLYN (WB6TZQ)	5Z4RH (WA4WTG)
NØTG/KP1 (NØTG)	8P6IB (WA4WTG)
PJ8USA (W1CDC)	9G1MB (WA4OOM)
PWØPP (W1DA)	9V1TE (WAØTKJ)

Put the following on your good guy list for supplying the tips this month: HL9WG, K1IXG, K2BK, K2TV, K4WSB, K4YSF, N2CW, SV1JG, VE6BGU, WB1EZI, WB3CQM, WB3CZK, W4PZV, WB4FNH, WA6QDR, W8IBX, W9MXC, WD9DCL, and WBØOUH.

9Y4VU, a recent visitor to ARRL hq. *(W1YL photo)*

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation 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 August 1 through August 31, 1978. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

WB4YHV/234	N4HB/118	G4DRD/106	WB4LIB/104	KL7IWE/101	WB1CRG/100
4Z4DX/234	WD8BOH/117	WB9EJE/106	WA5DYH/104	WD4CXV/101	W2PU/100
N4QF/227	JA3VPA/114	EI9CD/105	WA5KTE/104	W7HR/101	WA2IKO/100
K8ZE/153	K9MK/111	K8IPT/105	WB2WCE/103	WB8DUC/101	WA3ZMY/100
HA5FA/148	VE6ATT/111	KP4EOF/105	WØJIE/103	W9BB/101	W4NGT/100
WØQAC/130	WØUZ/111	WA7IJB/105	K5OUK/102	FKØKG/100	N6PZ/100
WA2CBU/125	WA6YQW/110	DJ5EJ/104	N4FO/102	N1NA/100	WD8BPH/100
ISØLYN/123	G4OMI/109	HB9RE/104	WA3TKP/102	N5RQ/100	WD8EGQ/100
F6DCE/122	WA4DWN/109	K7CU/104	K9WG/101	VE3FAC/100	WDBIXV/100
SP1ADM/122	W3TEF/107	N4PF/104	KH6CZ/101	VE3GCE/100	W9ET/100
WB9OCU/121	W6SUJ/107	N7RC/104			

Radiotelephone

W4DJJ/229	CT4IB/140	I8XIW/110	WA3UZT/108	CN8AK/104	WA4OIB/102
N4QF/225	OZ3YI/125	KP4CI/110	IØWKS/107	K3LRI/103	W6TJY/102
TU2BD/207	K6OYE/124	OE6HCG/110	K8BTH/107	K6CBL/103	I5EFO/101
N1YL/177	WD8BYF/123	W4MID/110	WD5GIF/106	SP9PDF/103	K4VAA/101
DL3ML/167	F3SG/119	JA4GXS/109	WB9SLV/106	W6CN/103	WA3ROX/101
I6NOA/146	WB7PTZ/119	N4HB/109	JA3XRC/105	K9UAA/102	W6VZZ/101
KØLUZ/144	WA4OEJ/116	PAØRNO/109	KL7IPU/105	VE6ATT/102	HI8XHJ/100
VE3IKN/144	WA6GUR/116	WD8MKL/109	OZ2TH/105	WA2YOB/102	WB4RLV/100
HI8XBH/142	WA4ABC/111	I1XXM/108			

CW

W9SFR/224	DK7XX/113	K4JYS/108	JA1KQX/104	K6WD/103	WØUZ/101
DK3ES/145	W4DGJ/111	N9ER/106	DF2KU/103	PAØUGB/103	K2PF/100
N1RI/122	DK6AS/110	N5RR/105	DJØGD/103	W5UR/102	OE1TKW/100
KØLST/120	EA8NU/109				

5BDXCC

K2HYM	JA4FHE	VE3BMV	DK3KD	JA8DNV	AA4A
K8DR					

Endorsements

Mixed

W9JUV/354	WA5REU/322	WA1CJR/292	KH6CF/250	SM3DMP/201	WA9BGK/161
KH6CD/350	G5RP/321	N5XR/291	W2HAZ/250	VE1MF/201	YU3FKJ/161
W4EEE/349	OE1UZ/321	F2NB/285	W5CPI/250	WØPFG/201	AA9M/160
W1PM/347	K9GM/320	W6DN/283	W8GTR/249	K2BXG/200	K4NV/160
ZS6LW/346	N5DX/320	K2ZRO/280	W2HL/246	N9KV/200	W1YNE/160
W6HYG/344	OH3SR/320	K3ND/280	WB4OSN/244	K7AOZ/200	W6EGX/160
VE3HD/342	OK1MP/320	K6NM/280	W6JD/244	WA2FIJ/200	WD8AHS/160
OH2QQ/341	VE6LU/320	W9MCR/280	W8LZV/243	K9FD/199	WB5ZDO/159
WØTJ/339	W1FJ/320	WB4EDD/280	OE3EVA/242	W4BTZ/199	EP2LI/154
ON4PA/338	W1OT/320	N4GG/279	W4LF/241	W8BQE/198	W7ZR/153
HB9DX/337	WB2YQH/320	W6VD/279	K7LAY/240	4Z4GH/198	N4MA/150
N4XO/337	PY1DH/319	WA9TVM/279	N4HU/240	VE3MV/195	K1PMJ/149
OH2BH/337	DJ4AX/318	K8IA/278	WA1EOT/240	W1PKW/193	KØLST/145
W9KXK/335	K2AGZ/318	WA2AUB/277	W9TY/240	WA3DSD/192	WB9ZBE/143
W9QLD/333	K2QOU/316	W2CC/275	WB9CGL/240	K2FJ/191	WA2VCZ/141
JA4ZA/332	N5RR/316	K1UO/272	W8GE/238	WØPT/187	WB1AMQ/141
W5UR/332	W8FAW/4/315	EA3NA/271	K4JS/233	W3HAO/185	K2ON/140
W8YGR/332	W8LBM/315	W2BBK/271	K9QXY/229	W4DGJ/184	K5MK/140
WA4WIP/331	W4JD/313	K2PP/270	WB2QAX/227	W8UVZ/183	WAØJYJ/140
W2MZV/330	W9JA/313	N4RR/270	W6AYQ/226	WB9SLV/183	K2LX/139
DJ5LA/327	OH3NY/311	W7PFZ/270	AA4PP/225	I5BOL/182	W4CEB/139
OZ3PO/327	W8KCJ/311	W4HG/270	G2AFO/224	I5AFP/180	WA4DPU/139
KV4FZ/326	K3NL/310	WA4JTI/270	LU1SE/224	K1TO/180	W1XX/132
W7AO/326	K1BW/309	WB4RUA/270	WA4WYN/221	K5DUT/180	WA6TOO/132
W7CSW/326	K1KNQ/309	W6OMR/270	K4KBL/220	KH6DJ/180	WB1CCH/129
K2CL/325	K6HTM/306	IØZG/264	W3KH/220	N6OZ/180	DK7XX/127
W1GX/325	LA8LF/306	K3RT/261	K5RW/216	WB4OPG/180	VE3GEF/127
W9DH/325	W1NG/305	W3IRE/261	KØLUZ/214	WB4RFZ/180	JA4GXS/125
W9HLY/325	W9GDI/304	N4WX/260	WA4PYF/213	W7HX/180	K9QVB/125
K1RM/324	W5TMN/301	N8BM/260	JA7JWF/207	K5IF/179	WA4SKE/124
PY3CB/324	AA4VZ/300	W4YDD/260	K9QVB/204	K1KNM/172	WB4PRU/123
W2LL/324	K4XL/300	VE3BZ/257	WA2WSX/203	DJ2OW/164	KØBX/122
N4TB/323	W2MP/300	W2QXA/255	K1WJ/201	JA1KQX/163	N4EY/122
W8CNL/323	K8LJG/299	K1TZQ/254	K8MN/201	OK1DKR/163	WA2ECA/120
ZS6IW/323	K9VQK/296	VE3BHZ/251	OE1BFW/201	N5CB/161	WAØYMK/120
K3AV/322	W1ESN/293				

Radiotelephone

W4EEE/349	CT1UE/320	LA8LF/292	W8FAW/260	DL3FC/210	W6ILH/174
ZS6LW/345	DJ5LA/320	WA1CJR/292	W9XM/260	OH2XA/210	WA6DTG/172
W5ACE/343	N4TB/320	W6GTL/290	K1RAW/258	W6OMR/210	K1KNM/170
K8CFU/335	WB2NYM/318	K8LJG/289	CT2BB/254	DK9KD/202	N9BA/169
W6HYG/334	K5OVC/315	JA8BAR/282	W1NG/253	K2YIY/202	W9GYL/169
W3EVW/333	WØTJ/315	WA4CXZ/280	P29JS/251	WB4ASV/201	YB2CR/166
W9JT/333	K2QOU/312	W9GU/280	WA2AUB/250	A9XBD/200	ZP5CD/166
F3DJ/332	W5UR/311	VE6LU/276	W1ESN/248	AC4B/200	W7ZR/162
W3FWD/331	W8CNL/311	N5DX/277	WA4JTI/240	W2MPI/200	OZ4RP/161
WA4WIP/331	W4ELB/305	WB4JLO/276	W7DSZ/230	ZP5PX/200	W1KSZ/160
W7KH/330	W9OH/304	W1FJ/275	G2AFO/222	I5KKW/199	K6AXC/159
W9HPS/330	W3ICO/302	W2CC/274	K7LAY/222	ZP5EF/199	EP2LI/154
G3UML/328	DL9DYJ/301	K1UO/272	W1RL/220	I5SJ/198	K1WJ/154
JA4ZA/328	K6HTM/301	W8YGR/272	WB2EZU/220	K8MN/197	HK3DDD/155
W9QLD/327	W5TMN/301	W9KXK/270	WBØCGJ/220	VE3MV/195	W6TPR/150
I2AT/325	K4LSP/300	F6BDS/265	LU1SF/216	W3KV/184	W4TJC/144
K6AWR/325	WA6REU/300	N5XR/264	WB4TIN/216	K1CPJ/180	YV4ACY/142
W8JTD/324	W7EKM/300	OH3NY/264	WA4PYF/213	W7IDG/180	N6QS/140
W4QAW/323	F6AOI/299	W2MP/264	IØGFP/212	W9TEI/180	WØPEL/132
PY3CB/322	W8LBM/295	IØZG/262	AA4PP/210	K5IF/179	WA7GQI/125
KV4FZ/321					

CW

JA1JRK/243	W9GW/200	W6JD/181	VE7CNE/159	VE3DCI/136	K1TO/122
W1JR/220	W9TY/193	WB9SLV/162	NØRF/140	WØAP/133	W4WXZ/120
W1NG/214	W2MD/183	K4FJ/160	W2RS/140	OH3NY/131	W4NGT/119
K5RW/200	W6BS/183	K4NV/160	K2LX/139	WBUVZ/126	

Corrections

September Honor Roll listing Mixed: KØIXG should read K1IXG 312/338. Phone: JA1ADN 309/328. New Members Mixed: WA4PRU should read WB4PRU/102. 5BDXCC: K8KI should read W8KI.

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

Self-Policing and Autopatch

Recent FCC actions in services other than amateur bodes ill for the amateurs unless we continue to keep our own house clean. And this brings up the subject of self-policing and what we can do about it.

Recently, on one of the local machines, an amateur came on and made an autopatch call to his office and told his secretary that he would be late for work and not to expect him until a certain time. Another amateur (who was an officer of the club) called him and told him that the call was a business one and was forbidden under club and FCC rules. Naturally an argument ensued. The amateur who had made the call insisted he had paid his dues and had every right to use the autopatch as he saw fit. The club officer responded by stating firmly that both FCC and club rules were quite clear and that the repeater would be shut off if the member attempted such violations. The amateur then came back and said that he was going to write the FCC and get a ruling, etc.

We certainly don't want to do any more preaching than necessary but it seems to us that self-policing is the only answer and should be the course we continue to follow — and in fact, emphasize! One amateur, yes, a *single* amateur can upset all that we have worked so hard for.

*c/o ARRL hq.

EMERGENCIES AND AUTOPATCH

There isn't a great deal of doubt that the one, single major step in emergency communications was the advent of the amateur 2-meter repeater. Amateurs could always step in and provide communications to any part of the world in the event of an emergency. However, it was always a problem getting enough amateurs together to handle local problems. Sure, if someone got bit by a snake or needed rare medication we could always get a ham to contact the ends of the earth for help; but local problems, such as a lost child — no way!!

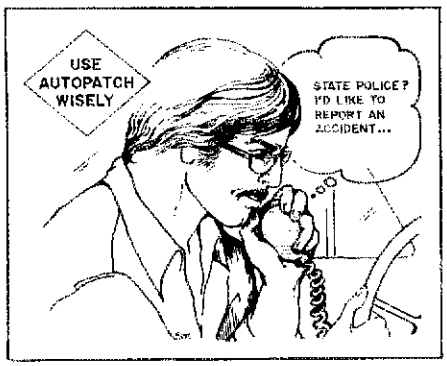
However, with repeaters and autopatch, Amateur Radio truly came into its own as the number one communications service for emergencies. Police, fire, CB or any other service — you name it — cannot even come close when it comes to operating in the public interest. And, repeaters with autopatch have made this possible! There are now over 1000 autopatch repeaters in the USA.

Amateurs have created this wonderful system and, most important, irresponsible amateurs can *destroy* the system. What can you do? For one thing, don't abuse autopatch privileges. Self-policing is important. Nobody wants to be a bad guy but remember, you are not a bad guy if you tell an amateur he is violating the rules and endangering the hobby.

10-METER BAND PLAN CHANGE

In the original 10-meter plan, which we might add was made in haste, it was a case of going with a plan as soon as possible after FCC announced the availability of a repeater band at 29.500 to 29.700 kHz. At that time the decision was for 15-kHz channel separation, which as it turned out, was not adequate for fm. This brings up another point — while the VRAC supported the change to 20-kHz separation by a vote of 7 to 4, there was much discussion that we should give serious consideration and encouragement to ssb and other narrow-band techniques — let's face it, there *are* better ways. The new band consists of four channels, in low, out high, first channel at 29.52, output 100 kHz higher at 29.62. The other three are 29.54/64, 29.56/66, 29.58/68; 29.600 is reserved for simplex or direct

We do not recommend surplus equipment for these channels simply because the intermod products on most do not reach 40-dB attenuation (which incidentally does not meet amateur FCC specs). Such equipment causes interference to the satellite users (OSCAR, which incidentally is also a repeater). So if you use surplus gear, do some filtering work to get the spurs down well below 40 dB.



Silent Keys

It is with deep regret that we record the passing of these amateurs:

N1AO, Andrew G. Osterberg, W. Yarmouth, MA
W1BVG, Charles H. Harris, East Hampton, MA
W1DIU, Sebastian Gahm, Hull, MA
W1DVM, John A. Robertson, Chichester, NH
W1EPZ, James W. Cook, Waltham, MA
W1KEA, Irving J. Sheffield, Augusta, ME
W1KKM, John Grzegorowicz, Hartland, VT
k1VPS, Lorenzo Charland, Pittsfield, MA
W2BCL, Archie S. Waterbury, Rochester, NY
k2BSU, Robert D. Wengenroth, Liverpool, NY
W2BXX, Raymond D. Noren, Babylon, NY
WB2FXW, John G. Schappi, Ithaca, NY
W2IAY, Robert V. Mrozek, Keyport, NJ
W2IIT, George Siegel, Huntington Station, NY
W2IRP, Lowrie W. Burdette, Jr., Utica, NY
W2MKN, Frank M. Adrian, Livingston, NJ
WB2MTH, Anthony M. Tarantino, Ridgefield NJ
WB2NIH, Francis W. O'Leary, River Edge, NJ
W2OLP, Edward W. McFeely, Little Silver, NJ
W2OQO, Joseph Calvanico, Bronx, NY
W2OXR, Reuben E. Gross, Staten Island, NY
W2QK, Frank D. Pizzuti, Yonkers, NY
W2TFX, Orville F. Bauer, Rochester, NY
WA2THA, Ronald C. Klingerman, Yorktown Hgts., NY
K3DNU, Leonard J. Muskin, Pikesville, MD
WB3DPH, Lester A. Sipe, Harrisburg, PA
W3JID/Ex-W9OEG, Edward J. Mohr, Washington, DC
W3OAY, George W. Demmitt, Hagerstown, MD
k3YOC, Charles H. McCormick, Connellsville, PA
WB4EEE, Vilmar W. Roney, Pinellas Park, FL
k4ETH, Clyde W. Watkins, Phenix City, AL
k4HG, Harry F. Washburn, Clearwater, FL
k4IPX, Theodore B. Thompson, Stuart, FL
k4KKF, Henry E. Campbell, Greenwood, SC
W4KQM, Gordon O. Stone, Memphis, TN
K4LM, Lawrence T. Hardin, Cape Coral, FL
Ex-W4NWJ, William T. Smith, Robersonville, NC
N4RN, Raymond G. Newman, Babson Park, FL
K5DIN, John W. Brandau, Cleveland, MS
W5HIP, George W. Smith, Jr., Dallas, TX
Ex-5MB, Benjamin F. Painter, Chattanooga, TN
W5MVE, Bobby Smith, Longview, TX
W5VII/W5FBO, Arthur C. Ellzey, Jr., Amite, LA
WB5WXM, Mark R. Dyer, San Antonio, TX
WB5YBU, Arnold C. Ash, Afton, OK
WA6AMR, Coert D. B. Vande Carr, San Diego, CA
W6BXD, Edgar T. McKee, San Diego, CA
W6DEO, Walter F. Pittman, Huntington Park, CA
K6DQF, Walter J. Gallegos, San Bruno, CA
W6FNE, John A. "Pete" McKowen, Torrance, CA
K6HEZ, Roger H. Strait, Armona, CA
KH6HOF, Raymond B. Swigert, Honolulu, HI
W6HUS, Dr. Victor H. Vogel, Ben Lomond, CA
K6IKG, Edward M. Egan, Santa Barbara, CA
WA6MLU, Louis Shapiro, Los Angeles, CA
WA6MOQ, Glenn R. Morris, Santee, CA
W6QCN, Frank T. Viles, San Diego, CA
WB6QVE, Frank D. Ross, Long Beach, CA
K6SA, William W. Briare, Los Gatos, CA
W6UPZ, Lyle H. Scrivener, El Cajon, CA
W7BK, John G. Girard, Glendale, AZ
W7H, Sumner W. Ostrom, Milwaukie, OR
WA7BSY, Willard Dunsford, Mesa, AZ
W7JTC, John F. Draper, Apache Junction, AZ
WA7NYL, Marie Sue Nail, Las Vegas, NV
W7OGP, David S. Holdren, Tacoma, WA
K8ACD, Sylvester G. Glancy, New Carlisle, OH
WB8CVI, Robert D. Funkbeiner, Midland, MI
WB8DHN, John R. Bender, Chester, OH
W8EFF, Donald R. Stevenson, Davison, MI
WD8IJK, Marlene L. Backus, Oberlin, OH
W8JP, James W. Harris, Jr., Cleveland, OH
W8UTL, William E. Arnold, Richfield, OH
WN8NQT, Joseph J. Baucher, Sawyer, MI
W8NV, George H. Lister, Cleveland, OH
WA8OJP, Fred L. Barrett, Avon Lake, OH
W8OUS, John L. Sullivan, Glouster Village, OH
W8TRM, Frank J. Maskus, Crystal Falls, MI
WB8UTH, Wallace D. Underwood, Winn, MI
W8UUN, John N. Baumler, Ann Arbor, MI
WA8VNV, Eunice E. Ring, Niles, OH
W9FKA, Edwin H. Kriz, Racine, WI
WD9FUH, Carl Nelson, Chicago, IL
W9HEO, John E. Miller, Villa Park, IL
WA9NZC, Joseph A. Bochning, Springfield, IL
WØAGH, Roy N. Meier, Wayne, NH
WØBGU, Robert H. Manlove, Mt. Pleasant, IA
WØDNC, Paul M. Palmer, Cedar Rapids, IA
Ex-WØFBQ, John A. Scorpil, Cedar Rapids, IA
WØJHP, Edgar Waggoner, Bolivar, MO
WØMPP, Elwood W. Abbott, Aurora, CO
WØOKG, Zeno W. Jones, Davey, NE
WØPOG, Dewey Donato, Pueblo, CO
*WØSIN, Charles M. Cotterell, Lakewood, CO
WAØTLT, James D. Moffat, Clayton, MO
WBØTQO, Albert T. Holden, Council Bluff, IA
KØWRN, Hamer H. Hicks, Pueblo, CO
WBØYEQ, Kathryn M. Tucker, Salina, KS
VE1ARN, Claude R. Moreau, Edmunston, NB
VE1BLP, J. H. Petrie, Dominion, NS
VE7AP, David Van Ness, Vancouver, BC
VE7BLO, Walter W. Walsh, Victoria, BC
VE7DQ, Norman S. Greig, North Vancouver, BC
VK5NO, L. H. Vale, Gawler, Australia
GW3KSQ, C. T. Jay, W. Glam, Wales
9M2DQ, James C. Pershouse, Penang, Malaysia
ZE8JJ, Wells A. Buxton, Salisbury, Rhodesia

*Life Member

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

Some Dos and Don'ts for Harmony on 2

Operation on 2 meters is quite different now than it was only a few short months ago. With 2-meter ssb now probably the fastest growing facet of Amateur Radio and FCC's May 15 order allowing Technician class licensees full use of the band, things just don't sound the same as they used to. Even fm operation has changed, mostly as a result of the availability of synthesized rigs covering the entire 144- to 148-MHz range. Generally speaking these changes have been for the better, but some conflicts have arisen. It is these conflicts and what can be done to resolve them that will be addressed in the following paragraphs.

Just as the supplanting of the horse by the automobile brought greatly increased capability, so did it bring a new set of rules. Some were imposed by governments and some were just plain common sense and therefore generally accepted without need of official sanction. Designation of a specific side of the road to drive on is probably the best example of a rule which the coming of the horseless carriage made mandatory. Similarly, the appearance of equipment capable of operating on a number of modes and covering the entire 2-meter band, brings with it certain responsibilities on the part of the owners if chaos is not to result. We hope that few government-imposed rules will be needed to allow the various interest groups on the band to "do their things" without interfering with each other.

The only FCC rules which exist specifically for 2 meters (versus those applicable to any band — maximum power, suppression of spurious emissions, etc.), are the reservation of 144.0-144.1 for A1/F1 and the limiting of repeaters to 144.5-145.5 and above 146 MHz. The 2 meter band plan proposed in the June issue was an attempt to suggest a set of "gentlemen's agreements" which would allow us amateurs to keep our own house in order without having to ask FCC to impose specific, arbitrary — not to mention shackling — rules. Some have been under the mistaken impression that the band plan, once accepted, would be presented to FCC with a request that it be made mandatory. This is not the intent. On the other hand, if operation on the 2-meter band does become a shambles, there are certain to be those who will seek government protection for their particular sphere of interest. Such a course will not add to Amateur Radio's popularity with the Commission and is certain to lead to conditions under which other interest groups on 2 meters will suffer. We can all do our bit to see to it that this does not happen by the way we operate our 2-meter stations. For example, here are a few suggested guidelines:

1) Do not operate fm below 144.5 unless one is calling into a net which specifically welcomes all modes.

2) Do not operate ssb, a-m or cw on fm frequencies, especially those used by repeaters. Note that in this context I am not addressing the frequencies which have been proposed for linear translators (144.5-144.6 input and 145.1-145.2 output).

3) Do not engage in any nonsatellite-directed communications on frequencies which might be picked up by one of the OSCARs. The best rule to follow for those who are not familiar with the satellite schedules is don't transmit in the OSCAR bands at all. Frequently, in recent months, stations using fm just below 146 have been heard through the satellites as well as direct on the OSCAR 7 Mode B downlink. Such operation causes considerable QRM to those using the satellites.

4) Don't interfere with those trying to work long haul. Many have complained to me of their meteor-scatter schedules being disrupted by stations calling them and insisting on long QSOs. It's a pretty good bet that if you hear someone calling a station hundreds of miles away on a 15-second-on, 15-second-off cycle, he is trying to work via meteor trails. Don't assume that the band is "open" and call him to find out why you're not hearing the DX. It just may be that the very time that he departs from the sequence to converse with you might be the time when a burst may come along which would have enabled him to complete his contact. The best thing to do is to turn your antenna in the direction of the station being called and listen for bursts yourself. If you have heard the other station and once you are absolutely certain that two acknowledgements have taken place, start calling the station yourself, using the same sequence. You may get lucky and make a good DX contact. Then, you too may get the m.s. bug.

5) Do follow the recommendations of the band plan with respect to portions of the band for ragchewing and long-haul work. The area between 144.1 and 144.2 was suggested for long-haul short QSO work, with the portion above the calling frequency (144.2) used for ragchewing and nets. Many individuals and groups have gone along with this guideline, including the SWOT organization which now suggests 144.250 for its nets. Many individuals, however, use 144.110 and nearby frequencies for general calling and working. Most of the time they don't bother anyone, but it's principally a matter of custom. If that part of the band becomes generally used for local ragchewing it won't be available for long-haul weak-signal work when conditions permit. Naturally there are times when this guideline must be bent, such as during contests and wide-scale band openings, but there is no reason that all of us should not observe it the rest of the time. This goes for us "old-timers," too. It cannot be used as a means of keeping the new people out of our "private preserve."

6) Do use the calling frequency for calling, then move up when you receive a reply, leaving the calling frequency open for someone else. Conversely, when puttering around the shack, monitor the calling frequency. 144.200 has pretty much been universally accepted as the 2-meter ssb calling frequency. If it is to be worthwhile and not become just a mass of QRM that no one will listen to, it must be used as a calling channel only.

At the risk of being labeled a dictator, I have listed a few suggested 2-meter operating ground rules. These were not originated by this conductor. Rather, they are generally accepted by a large number of active inhabitants of 2 meters, ranging from weak-signal DX people to satellite users and fm repeater operators. It appears to this conductor that those are working principles to base our 2-meter operation on. I would very much like to hear of any significant shortcomings and will certainly air such comments. In the meantime, let's all try to abide by these concepts and see if life on our most popular vhf band is not the better for it.

1978 CENTRAL STATES VHF CONFERENCE

This year's Central States VHF Conference was held at Rochester, MN. As these conferences normally are, this one was a bang-up affair. Ed Fitch, WØOHU, current Society president, and his able crew arranged a fine program in a great facility ideally suited for this group. This year's conference was especially fortunate in having both ARRL President Harry Dannals, W2HD and Ed Tilton, W1HDQ, the originator and long-time conductor of this column, as featured speakers. Other speakers included Dick Knadle, K2RIW, who lent some of his knowledge on the subject of optimizing Yagis for maximum gain. Dick, along with George Johnson, WØMD, also discussed the not-so-pleasant, but vital subject of biological hazards from rf. Both Saturday and Sunday mornings dawned bright and sunny, making for ideal conditions to observe the face of the sun through Ed Tilton's solar telescope set up just outside the motel. Other outside activities included a fiercely competitive antenna gain contest and an operating 70-cm EME station assembled by WØYZS and KØTLM. Status and design features of the forthcoming Phase III amateur satellite were the subjects of a talk by Jan King, W3GEY. Much of the discussion at the operations forum involved m.s. operating procedure and what constitutes a valid contact. A synopsis of this, along with some new ideas developed, will be covered in next month's column. Evening hours were enlivened by a well-run noise figure competition, listening to tapes, and just plain good old-fashioned face-to-face ragchewing.

A new award, the President's Award, was established this year. First recipient was Ted Mathewson, W4FJ, for his long and able service to the society. The annual John Chambers Award went to Wayne Overbeck, N6NB, for development of the quagi and his many DXpeditions to rare and hard-to-get-to places which have helped others increase state totals.

The results of the election of officers for the coming year were announced at the superb Saturday evening

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

banquet: president is to be WB5LUA, vice president WØRRY, secretary still the faithful and reliable W4FJ, and treasurer WA5HNK. The prize committee consisting of WB5LUA and W3TMZ amassed a table piled so high that there were more prizes than people despite the fact that a new attendance record was set with some 175 present. It was announced that next year's conference will be held in the Dallas area in August, as usual, right after the Perseids. You won't be able to keep this conductor away.

ON THE BANDS

6 Meters — By the time this appears, the following may seem "old hat," but as this is being written in mid-September it represents the first hopeful signs of a coming period of DX excitement. At 2220 UTC September 2, WD4IIS, Commerce, GA, snagged LU3EX. The fact that Tim had, just prior to that, worked VP9WB indicates that the contact may have been an Es-TE linkup. Just a half hour before, K8WHA, Youngstown, OH, reports hearing the LU about 539 on cw. Then on September 8 between 0145 and 0230 UTC, K5ZMS reports that LU3EX and LU9MA were both putting signals into San Antonio. K5KS is known to have worked LU3EX on that occasion. WA5IYX says that Central American TV and fm stations were in at the time, suggesting another Es-TE link. It is also reported by K5ZMS that W8PSD/VP2S, St. Vincent, worked PY1RO, CE4CP and LUs 3EX, 6DH, 9HJW, 9MA, 4OHY, 9HDW as well as 4HBI the same day. Bob also hooked up with LU9HDW the following day.

Another Caribbean station capitalizing on the conditions September 8 was KV4KV who also netted a string of South Americans. WA5IYX notes that the solar flux jumped from below 100 to 180 in less than a week prior to all the September 8 doings. A word to the wise should be sufficient. Watch those propagation broadcasts on WWV at 18 minutes past each hour. They are one of the best indications we have of current conditions.

In what now seems to be a consistent occurrence, we have still more cases of openings to KL7 during auroras. In one instance WB2TFH reports that he and WB2MAJ, both of the New York City area, worked KL7DJ, Fairbanks, at 0248 UTC September 8 with 58A to 55A signals exchanged. About an hour later, at 0343, KØGJX near Minneapolis reports that he as well as Twin City stations WBØs PVM, BFM and SYL also hooked up with KL7DJ. At 0547 they worked KL7ACV, KL7AZJ and KL7AG, College, AK. In a late August buzz session, KL7DJ informs me that he contacted WAØCSK/WAØCSL, ND, WB8VYF, OH, WA9CHD, IL and WA9PKL, IN between 0545 and 0635 UTC August 28.

In another DX note, this one strange indeed, WB4CHZ, Memphis, reports that on August 17 at 0140 UTC he heard an S8 cw station on 50.110 which George copied as VK9??. The signal faded quickly and after a few calls from WB4CHZ he thought the station was signing VK9IU but he could not be sure. In addition to himself, WA4HFN and K4VPK heard the VK9 but they too were unable to come up with a positive identification of the suffix. WB4CHZ further notes that soon after the VK9 was heard, weak signals from CA appeared. Then, at 0212, K4VPK heard weak ssb signals on 52.62. Can anyone shed any light on this? W5KHT does note that VK9NI, Norfolk Island, is on 52.05 but has filed application for operation on 50 MHz. He is presently off the island, but will be back by December 12. W5KHT also passes along the information that ZS5IB is on 6 ssb. Bob comments that ZS5IB is a good DX man and should be a reliable 50-MHz contact if conditions are right to South Africa.

As conditions improve, 6 meters is becoming a part of more and more DXpeditions. One such operation will be from Navassa Island, 140 miles south of Jamaica, between November 25 and December 2. This group will be on hf and 6 meters under the call NØTG/KP1 and OSCAR 7 Mode B as WØZH/KP1. W2ORA tells me that the 6-meter gear will consist of a SMRK IC-502, plus an amplifier.

2 Meters — Now there are seven who have accomplished the "impossible" — WAS on 144 MHz. WA4MVI has informed me that he completed a QSO on EME with WBØQMN/7, MT, for number 50! And K5JL landed his final state via the moonbounce route with WA1JXN, VT. Congratulations to both Jim and Jay!

How does one even begin to report the fantastic tropo which blanketed the eastern half of the country beginning Sunday evening August 20 and not completely dissipating until the night of Thursday the 24th? The story of K1HTV's accomplishments, inserted into last month's column at the last moment, provided only a meager indication of the extent of the opening and the level of activity which prevailed. W2AZL, whose vhf experience spans well over three decades, called it the longest-lived, if not the best, tropo session that he has ever witnessed. If it wasn't the best, it had to be very close to it as indicated by the huge stack of reports received.

Here are a few samples: On Sunday evening, KØCJ Minneapolis contacted W4WZH, WA4YJX, K4UQ and WA4JUW, KY; WA4YRK, WA4ALJ and K4EJQ, TN; WA4CFK, AL; WD4LFY, VA; W8SDJ, OH, as well as N9SS, IL, who was running only 10 watts. WD4IIS's activity from his QTH in Commerce, GA, was the next night, Monday the 21st. Tim worked WØXF, IA; K9IMX, IL (over S9 for 2 hours) and VE3DJE. Then the band shifted farther east about 0430 UTC (August 22) and the following stations went into the log: K3ARN, WB3AZH and WB3JHP, MD; WD4MUO and WB4EYP, VA; N3MG, PA; WA2DPU, K2MLB, WB2BUR, W2DWJ and WB2MMX, NJ; K2LIO, WA2PVV and WA2SLY, NY, as well as K1FO, CT and K1WHS, ME. Quite a haul, including six new states! WB2RBG/3, north of Philadelphia, lists 43 stations worked in VA, NC, KY, OH, MI, IN, IL, MO, IA and GA. Howard went to bed too early (1 A.M. Tuesday morning) and missed W5ITJ, MS, for a new state. The next evening he heard many of the same stations again and worked NØIS, MO. The following night WA4LYS, FL; K4KAE and W4USW, SC, were worked along with WA4JUW, KY, K4EJQ, TN, and WA4CQG, AL. WA2PMW, College Point, NY, was in on the action also. Louis got a new state out of it in the form of WØRWH and WBØOGK, MO, and went on to hook up with WA4UJI, WA4GBE and WA3BPZ/4, NC, as well as K4EJQ, TN. WA3USC, Baltimore, added three to his state total as a result of contacts with TN, AR and NE on the evening of the 20th. N4AJO did his DXing from a pickup truck with 10 watts and a homebrew three-element beam. On Sunday evening Ferrell picked up five new states plus VE3, his best DX being WBØZXU, IA. But his most unusual contact was a mobile to mobile hook-up with WB2EMG who was stuck in a traffic jam in Buffalo, NY!

Hardly had the gang recuperated from the rigors of the big week of tropo when aurora hit. KØWLU, who is now operational on 2 meters and 70 cm from Sioux Falls, SD, describes the session that took place the evening of August 27 as "Terrific." Running just 8 watts output, Bill snagged stations in CO, IN, IL, MO, WI, NE and OH. He notes that WBØQMN, Denver was in from 0600 until 1400 UTC. Since June of this year KØWLU has worked 15 states with the low-power feeding stacked 11-element Cushcrafts. Another making a success on 2 with low power is WB9TPV, Washington, IL. With a setup very similar to KØWLU's, Jon has run up a state total of 28 using tropo, Es and m.s.

Another good tropo session took place along the East Coast Saturday evening September 2. VE1UT near Yarmouth, NS, worked 58 stations in ME, NH, VT, MA, CT, RI, NY, NJ, PA, MD and VA as well as other VE1s in NS and NB. Bernie points out that records of an upper air station located about 50 miles southeast of Yarmouth indicated at 2000 local Saturday a 4.7° F (2.6° C) rise at 600 feet (183 m). By 0800 the next morning they showed a 6.7° F (3.4° C) rise at 1000 feet (305 m).

1-1/4 Meters — The massive tropo opening the week of August 20, reported in the 2-meter section, was good news for that hardy group of souls who inhabit 220 MHz. K4LHB in the VA suburbs of Washington is one of them. Thom made good use of the conditions to land three new states, bringing his total to 11. Worked were WA8PKB, OH; K9EA and K9HMB, IL and W9UD, IN.

After long months of trying K5FF, NM, finally completed a 1-1/4-meter EME contact on August 23 with WB2BYP, NY. Lee adds that the next night OM Fred, W5FF, pulled it off with Judd, K2CBA. The FFs expect to have an 8877 on the band soon which should help their moonbounce results. So far, Lee says that 220 seems more difficult than 2 meters, which is somewhat strange since their 32-foot (9.8-m) dish should perform better on the higher frequency.

70 Cm — Of course that tremendous tropo opening discussed in the previous sections made itself felt on 70 cm as well as the lower bands. K2UYH, Trenton, NJ, didn't discover that anything unusual was occurring until about 0230 UTC August 22. At that time Al exchanged S9 signal reports with WA4IPI, Louisville, KY, and then went on to work more than 30 8s, 9s and Øs. The next morning and the following evening the band was still open all the way to the Øs. All sorts of new states were added to numerous totals. K3WHC, York, PA, added three: NØIS, MO; K9EA, IN and KØDAS, IA. Then Steve added one more, W1FC, NH, during the contest to bring his total to 23. To take advantage of another good tropo opening September 5, NØBS, Eden Prairie, MN, put up a temporary antenna consisting of a hastily assembled eight-element quagi at 20 feet and worked seven states including WA4IPI, KY. The next day he hooked up with an OH station for eight states in two days with 10 watts. Tom says that he never dreamed there were so many stations on 432! Now he has four quagis up and is looking for skeds. Interested parties can call him at 612-944-3658. On the same two nights WA4IPI bagged 37 9s and Øs plus VE4MA 992 miles away. Steve is looking for 1s. Give him a call at 502-969-4348.

WA1JXN writes that he is interested in investigating the effect of antenna elevation on 70-cm aurora but Jerry complains that not enough stations operate the band during such propagation, apparently preferring to have fun on 2 meters instead. Those interested in pursuing this may call him at 603-635-3890 or write 4 Garland Dr., Pelham, NH 03076. Jerry is also looking for schedules with anyone needing NH. But he is particularly interested in skedding DE and WV. He is now on moonbounce and doing well with that mode. Another rare New England state planning 70 EME operation is VT. K1LPS has decided that his state is already well represented on 2-meter EME by WA1JXN and K1BKK, so he promises to be on 70-cm soon. Another state long dormant on 70 cm EME is MN. According to the K2UYH *432 EME Newsletter*, the portable operation by WØYZS/KØILM at the CSVHF Conference was instrumental in inspiring both WØDML and WBØCOR into getting on. WØMDL has eight KLM Yagis up, while WBØCOR is using eight of the new 19-element RIW antennas.

70-Cm Standings

Figures are states, U.S. call areas and best DX in miles.

W1JR	27	11	10110	K5JL	33	11	6400
W1WHS	21	9	7820	WB5LUA	32	10	9046
K1PXE	19	8	2600	W5FF	21	11	6454
K1FO	18	6	820	W5RCI	19	6	880
WA1TZV	17	7	2000	W5HN	15	5	1467
K1HTV	17	5	610	K5LLL	10	5	1612
W1AJR	16	5	680	WA5HNK	9	5	1625
W1SL	15	7	2600	W5SWV	9	3	915
WA1MUG*	15	5	740	W5GVE	7	3	963
K3EAV/1	14	6	700	W5LPV	7	2	950
K1BFA	13	5	710	W5UKQ	6	2	590
K1JIX	13	5	620	WB5QQG	5	3	700
WA1JTK	11	4	715	K5UGM	5	2	956
W1HDQ	11	4	380	W5SXD	5	2	850
K2UYH	45	12	10000	W5HPT	4	3	645
K2ACQ	24	8	925	K5MWH	4	2	289
K2LGJ	22	8	2300	W6ABN	16	9	—
W2AZL	21	7	1000	WA6HXW	6	4	7500
K2RIW	20	10	2600	W6DQJ	4	2	360
K2CBA	20	8	2670	K7ICW	4	2	225
W2BLV	20	6	812	W7JF	3	2	420
W2CLL	20	6	790				
W2OMS	19	6	725	K8WW	35	10	9600
K2VDK	18	6	750	K8DEO	24	8	775
WA2EMB	18	6	720	W8IDU	22	7	735
WA2FGK	17	6	745	W8YIO	22	7	650
K2ARO	17	6	740	W8HVX	19	7	660
W2DWJ	16	4	570	W8GVQ	13	7	625
K2YCO	15	6	675	W8MNT	13	7	600
K2OVS	15	5	734	K8BR	10	6	625
W2CNS	14	6	525	W8RQI	10	6	425
K2BF	12	4	325	W8QOB	8	5	500
WA2EUS	11	4	380	W8FWF	8	5	450
W3RUE	24	7	900	W9WCD	22	9	1725
K3WHC	23	8	2450	K9HMB	21	8	836
W3TMZ	23	8	2410	W9JIY	21	7	1025
K3QCO	23	7	766	WA9HUV	19	7	780
W3IP	19	7	722	K9IIF	16	7	695
W3HMU	19	6	2450	W9AAG	15	5	800
K3IUV	18	5	650	W9YF	13	6	500
WA3JUF	14	5	250	K9XY	13	5	650
W3XO	12	5	325	K9AAJ	12	5	425
W3OMY	11	7	850	WØYZS	47	10	8840
K3SWZ	10	6	2422	KØTLM	36	11	8800
W3CJK	10	5	450	WØDRL	24	9	1425
W3UJG	9	4	400	KØDAS	21	7	950
WA4IPI	26	8	1985	WØLER	18	6	1000
W4FJ	25	8	2430	KØCJ	16	5	814
K4QIF	23	7	1065	WØPW	15	5	1700
W4NUS	22	8	2400	WBØZXU	14	7	928
K4EJQ	21	8	900	KØALL	11	3	825
WA4CQG	15	5	800	WØOHU	11	3	514
W4HJZ	15	5	560	KØWLU	10	3	760
K4SUM	15	5	462	WBØWAO	6	3	630
W4VHH	15	4	750	KH6IHP	7	7	6300
W4ISS	14	4	697				
WA4GPM	14	4	—	VE2HW	6	3	750
K4GL	12	5	720	VE3DKW	19	7	940
WA4SBC	12	5	539	VE3EVW	12	6	520
K1FJM/4	11	4	560	VE3ONT*	11	7	390
K4PKV	10	4	—	VE3AIB	9	5	600
K4NTD	9	2	963	VE3EZC	7	5	510
WA4MVI	7	1	—	VE7BBG	12	—	—
K4QF	5	4	2000				
K4IXC	5	2	800	VK2AMW	9	8	10535
W4AWS	4	2	750	F9FT	8	7	10445
				I5MSH	6	5	10500

*Club station

Public Service

Conducted By Robert J. Halprin,* K1XA

"I Wish Someone Would Come Along"

It had been a long, long week in Little Rock, one of those weeks that seem to have nine days in them, but at last I had a couple of days off. My parents had just moved to Jackson, MS, from Columbus, MS, and this was to be my first trip to their new home. My wife had gone ahead earlier in the week, to help them get the place in order.

Finally, I was on my way. I had put the 2-meter handheld and charger in the car, since I knew Jackson had a couple of 2-meter frequencies, although I didn't know them. I had six channels in the rig; maybe I'd be lucky.

Several times before I had driven through this area and I knew I could save 25 miles or so by taking shortcuts and going on a few state roads. The Mississippi Delta is flat, sparsely populated farm land. It is pretty by daylight, but dark and lonely by night. My route went right through the heart of the Delta. I didn't really know the highway numbers, nor the names of all the little towns, but that didn't matter because I knew where to turn.

By 10:15 P.M., I'd been driving for a couple of hours and was about 10 miles from Hollandale, MS, on a very dark road. Suddenly, through the gloom I saw what looked like lights shining up at an odd angle. When I got closer, I saw it.

A pick-up truck was upside-down in a ditch! I pulled off the road, hit the four-way flashers and scrambled down to see if there was anyone inside. The engine was off and no fuel was leaking, so hopefully there would be no fire. But the driver was trapped inside. I needed help and needed it fast. But from where?

The last town was too small to have a hospital. Hollandale was 10 miles down the road and there were no houses or cars in sight. The driver was about to go into shock — I couldn't leave him.

My HT! Good old ham radio! I ran to the car and grabbed the HT. What frequency should I try? Try 'em all! On the fourth pair, using 2 watts, I hit a machine. After a few frantic calls, a W5 came on. I told him what was happening. He was having trouble hearing me. My batteries were weak and I remembered neglecting to charge them before leaving.

"Give me your QTH," he said, "I've got the highway patrol on the landline."

Then it hit me. I didn't know where I was. I knew the route but not the highway number. Ten miles from Hollandale, but north, northwest, west? My batteries were rapidly failing. I was, for all intents and purposes, lost. "Man, I wish someone would come along . . ."

What you have been reading is fiction. But the situation could have easily happened. Think about it. Could it have been you?

Most amateurs are not often involved in serious emergency communications. It is safe to assume that most any ham would have helped in such a case if he could, but emergency work is not most amateur's main interest. But with the vhf and uhf FM repeaters, and abundance of mobile and portable rigs, many more amateurs have the capability to assist in crises than ever before.

What may be needed is not more planning by amateurs who already prepare for emergency work, but rather some thought and a little planning by those of us who don't think much about it. A few basic ideas and plans can work for a car accident, a tornado or most emergency situations. The principles are the same. Getting active with the local Amateur Radio Emergency Service group is a fine way to become acquainted with these principles.

Let's see what Joe Average Ham can do. Let's start by considering where you might be when you need to perform a lifesaving communications link. You could be just mobiling around town, in a private airplane, fishing or camping. Almost all of us do some of these things.

Let's say you're driving your car. Most driving is probably done within 25 miles of home, with occasional visits to Grandma's, the beach, or the mountains. If you have a small vhf rig, take it with you. If it's a handheld, make sure it's charged before you embark on the journey. A 5/8-wave magnetic base antenna or a flip-flop antenna and cigarette lighter power plug can give you greater range and plenty of power over a "rubber duck" antenna and penlight batteries.

A copy of the *ARRL Repeater Directory* and a few road maps of the area should be in the glove compartment. Take a few minutes before you go to look over the map, get the road numbers in mind, check the repeaters that serve the area and maybe note their frequencies. This information on a 3- × 5-inch file card can save you time later. Do you have autopatch capability? If so, a list of emergency telephone numbers on a card inside the radio carrying case or over the sun visor [CD-209 is convenient for this purpose — Ed.] can also save time. If you don't have autopatch gear, you still can conserve precious minutes by giving the number to the other station. That's the thing about emergencies; you usually needed help five minutes ago!

When you drive, be aware of the last town you passed, the highway you're on, the last exit number or the road mileage markers, especially in bad weather. In other words, be able to tell someone approximately where you are, if you should have to.

Give some thought to your radio procedure before an emergency occurs. Do you know how to properly report an emergency? Can you determine if it is indeed a bona-fide emergency? How to properly break a QSO? You should review these procedures.

Remember to speak clearly and slowly in a normal voice (this sometimes takes deliberate thought and effort), keep calm, give your i-d, location and nature of the problem. If you make a request, be specific. If possible, keep a list of who you are talking to for future reference. After your request, don't leave the air, because you may have to clarify or give additional information to the station assisting you.

Got the idea? We have done some planning and taken a few steps toward emergency preparedness right here. You can go on and on — first-aid kits, flares, etc. How much you do is up to you, but think how much amateurs could help with just a little preparation. The key is prior planning and that costs only a little time and effort. Public Service — that's the name of the game.

Besides, you may be the one who needs help!
— *Bob Patterson, K5ZDE*

PUBLIC SERVICE DIARY

☐ Sacramento, CA — June 25. A small grass fire was discovered near the Field Day site of the River City Amateur Radio Communications Society and while the authorities were being notified via 2 meters, KA6ADR and WB6HYQ rushed to the fire and extinguished it. (WA6ZDZ)

☐ Collinsville, IL — August 6. Members of the Egyptian Radio Club Emergency Corps helped man a communications van at the site of a train derailment and propane gas explosion. (K9EOC)

☐ Blue Bell, PA — August 17. In the aftermath of an explosion at a nearby chemical plant, W3GJC cleared repeater WR3AHC for emergency and phone patch traffic until relieved by the local c.d. (WB3CPW)

☐ Owensboro, KY — August 19. The Owensboro ARES provided communications for the Coast Guard and a rescue team as an unoccupied car was found, secured and removed from the Ohio River where it had been a hazard to navigation. (W4OYI)

☐ *Repeater Log.* According to reports received to date, repeaters and fm simplex frequencies were used in conjunction with 150 vehicular emergencies, six crime reports, six fires, five medical emergencies, three searches and rescues, one tornado watch and four

*Asst. Communications Mgr., ARRL

The ARRL Ham Radio Newsline: 203-667-0138

Our Public Information Office's 24-hour Newsline should be used to report items of interest to the general public, so that this information can be passed on to the news media. News dies a quick death, usually within hours, so please call before, during or immediately after the newsworthy event.

We suggest that you write down the essential details of the event before calling and when you do call, please follow the directions on the recorded message. Don't forget to supply your name, call, address and telephone number(s) where you can be reached. Names and phone numbers of other contacts in your area would also be appreciated. Remember, your story is for the public at large, which for the most part, is unfamiliar with Amateur Radio. So, for publicity purposes, names are more important than call signs.

Please note: In order to have *emergency communications reports* duly covered in the Public Service Diary or elsewhere in *QST*, follow up your phone call with a *complete written report*, directed to the Communications Department. — *K1XA*

miscellaneous incidents. Repeaters involved were WR1AAC, WR2s ADM AEA AHJ AIX, WR4AAE, WR5s ABA ABE ABY ADP APK, WR6ACJ, WR7s ACE AEL ALH, WR8AJY, WR9s ADA ADU AGJ, VE1CBC.

AMATEUR RADIO EMERGENCY SERVICE REPORTS

[ ] Flint, MI — July 23-30. The Genesee County ARES manned first aid stations and provided medical communications via repeater WR8AGR during the five-day Flint Festival and Parade. (AC8T, Asst. EC Flint)

[ ] Sonoma County, CA — August 9. The Sonoma County RACES was activated and provided on-the-spot communications during a wildfire that eventually blackened 12,000 acres of the county. (W6CYM, EC Sonoma Co. and WB6IZF, SEC SCV)

[ ] Santa Barbara, CA — August 13. Local ARES groups were immediately activated after an earthquake measuring 5.1 on the Richter scale struck the area. The Red Cross was assisted and health-and-welfare traffic was handled. (WA6TUO, EC Santa Barbara South Co.)

[ ] San Bernardino Mountains, CA — August 19-20. The Riverside Mountain Rescue Unit provided communications support during the two-day search for a lost hiker in the rugged mountain terrain. (W6LKN, EC Western Riverside Co.)

[ ] Memphis, TN — August 29. The Shelby County Public Service Net was activated after a tornado touched down in the southern part of the city. The net handled messages for the Red Cross, the National Weather Service and the fire department through the emergency. (WA4EAV, EC Shelby Co.)

[ ] SEC Reports. For August, 39 SEC reports were received denoting a total ARES membership of 16,131. Compared to August 1977, this represents a 22-percent increase in reports received (32 last year) and a 39-percent increase in ARES membership (11,578). Sections reporting were Ariz, Ark, Colo, Conn, Del, EBay, ENY, EMass, EPa, Ind, Iowa, Kans, Man/Nfld, MDC, Mich, Miss, Mo, Mont, NH, NC, NNJ, NFla, NTex, Ohio, Okla, Ont, Org, SDgo, SF, SJV, SCV, Sask, SFla, SNJ, Va, Wash, WVa, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

This year's Bill Shaw, WB2VEJ, memorial award went to Clara, W2RUF, for outstanding service to the second region nets. WA3THT officially became manager of 3RN-D in August. WB2KDC is now assistant manager, 2RN-D. A booth at the University of Alaska Arts Fair generated much traffic for RN7.

August Reports

Area Nets

(evening sessions)
(daytime sessions)

1	2	3	4	5	6	7
EAN	31	1578	50.9	1.229	97.8	
EAN	60	1175	19.6	.582	92.6	
CAN	31	1060	34.2	.830	99.5	
CAN	62	621	10.0	.316	99.5	
PAN	31	1197	38.6	1.023	99.5	
PAN	27	517	19.1	.366	86.0	

Region Nets

1RN	89	630	7.1	.414	93.9	87.1
2RN	121	715	5.9	.399	87.1	96.8
3RN	93	437	4.7	.439	99.3	95.7
4RN	124	1205	9.7	.377	72.9	97.8
RN5*	62	658	10.6	.423	87.3	100.0
RN6	93	938	10.1	.367	97.5	94.6
RN7	124	747	6.0	.378	99.1	95.7
8RN*	59	496	8.4	.403	91.9	93.5
9RN	124	710	5.7	.320	94.0	100.0
TEN	90	621	6.9	.311	57.1	98.4
ECN	57	177	3.1	.301	74.2	100.0
TWN	87	613	7.0	.264	79.8	94.6

TCC

TCC Eastern	168	967	
TCC Central	206	926	
TCC Pacific	114	742	
Sections	4925	21747	4.4
Summary	6290	39017	6.2
Record	5920	36613	16.4

*Incomplete report
TCC functions not counted as net sessions.
Section and local nets reporting (145): ASN (AK), AENB AEND AENJ AENS (AL), ATEN HARC (AZ), NCN SCN SDNN (CA), CN CWN (CO/WY), CN CPN NVTN WESCON (CT), FAST FMTN FPON FPTN NFPN PBTN PEN QFN SPARC TPTN (FL), CGVHFN CVEN GCN GSN GSSBN GTN MAEN NGSN WGN (GA), TCN (IA), IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN QKS (KS), KNTN KSN KTN KYN SEKEN (KY), LAN LRN LSN LTN (LA), HHTN RIEM WMPN (MA/RI), MEPN MSTN MTN (MB), MDCTN MDD (MDC), AEN CMEN PTN SGN (ME), MACS MITN MNN QMN (MI), MSN MSSN PAW (MN), NEMOE (MO), APN (MR/NFD), MN MSBN MTN (MS), CN CNCTN NCSSBN SCSSBN THEN (NC/SC), WNN (NE), CRN NHN (NH), MCN NJN NJPN (NJ), RRN SWN (NM), NLI NLIPN NYS WDN (NY), BNR 06mN ONN OSN OSSBN (OH), OAN OLZ OPEN OTWN (OK), CMN GBN GBSSN LN ODN OLN OPN OSN (ON), ARES BSN OARES PdxAARES (OR), EPA EPAEPTN PTTN WPA (PA), WQV/UHF (PO), SATN (SK), HCN TEX TTN (TX), UCN (UT), SVSN VFN VN VNTN VSBN VSN (VA), NWSSBN WSN (WA), BEN BWN WIN WNN WSBN (WI), WVN WVNN WVPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

K6MAT issued TCC-Pacific certificates to the following (the number in parentheses indicates years of service): W6EOT (23!), W7DZX (18), W6VZT (15), N6GW (12), W7GHT (7), W7EP (6), VE7ZK (4), W6OA (3), W5KH (3), K7IWD (3) KØDJ (3), KØBN (3), N6WP (1), WØKON (1). K1XA received a second annual TCC-E-E certificate.

	1	2	3	4	5
Eastern	189	88.9	2513	967	
Central	217	94.9	1782	926	
Pacific	124	91.9	1504	742	
Summary	530	91.9	5799	2635	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (August): Eastern Area (VE3SB/N2YL, Directors) — W1s KX NJM OD, WA1s UNC UWF ZAZ, WB1AIU, K1s BA EIR GN PAD SSH X4, W2s CS COB FR GKZ MTA RQ, WA2s ERT/1 ICB SPL, K2NY, N2YL, W3s FAF PQ YQ, K3s KW NGN, N3HR, W4s MEE SQQ UO, WA4CCK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, K8KMQ, VE3s GOL SB, Central Area (W5GHP/W9NXG, Directors) — AA4KB; W4ZJY, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP NKC, SDD, WD5GNR, K5s GM MC, N5s TC TS YL, W9s CXY DND FC JIJ JUJ NXG, N9TN, WØs AM HI, WAØTNM WBØZAL NØSN, Pacific Area (K5MAT, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA VZT, K6OE, N7AM, W7s DZX EP GHT VSE, K7s HLR IWD, WØKON, KØs CI DJ, WBØTAQ, VE7ZK.

Independent Nets (August)

	1	2	3	4
Amateur Radio Telegraph Society	31	983	272	
Central Gulf Coast Hurricane	31	384	2185	
Clearing House	31	363	657	
Empire Slow Speed	31	105	349	
Hit & Bounce Traffic	62	909	437	
IMRA	27	446	780	
North American SSB	26	334	226	
Southwest Traffic	31	177	1243	
20 Meter ISSB	27	487	600	
75 Meter ISSB	31	725	1051	
7290 Traffic	45	730	3015	

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll August 1978

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 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. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points

87	56	WB6UZX	WD4IOF
AE5I	VE3GT	WA7MEL	K4JGW
78	VE4PG	K7GXZ	WD4LUG
WB5RPU	W1TN	WA8WPW	WA4PFK
70	N3HR	WØOTF	WA4VLT
WB5SDD	K4BKX	WAØTNM	W4ZJY
69	N4NK	48	WB5EMU
W7VSE	WB4QBB	N8ABA	WB5LBR
68	N4WA	47	WA7JRC
WA5RKU	W5GHP	WB3JGP	W9NXG
W5VMP	K5TL	WA4CCK	43
66	W6OA	WB4FAS	VE4GJ
WB5LAT	W6RNL	WD5AAT	W1BJ
65	W7GHT	WD5AHH	WA1TBY
WA1ZXB	55	WD8NKA	K3JL
63	WD4COL	KØDJ	W6JXK
W5KLV	K5SOR	46	N6NE
WA6UAZ	N5TG	K2GCE	WD8JYM
62	54	W2XD	42
N5ES	WB4ZOJ	WB4OXT	VE3IFP
61	52	K5OWK	N2SU
WA1ZAZ	W1RWG	W8YIQ	K2VX
AA2H	W2RQ	45	K5PC
WN4KKN	W4MEE	W2CS	WA6LBO
W5JOV	N8CW	W3YQ	N7AM
WB8MTD	51	WD4ISN	41
W8SOP	N5RB	WA5JWD	WB1EMU
WB8YDZ	KØPVI	W8VPW	WB2EUL
WBØZAL	50	WB9KPX	WB2JAY/4
60	WB1GEX	WBØMTA	K4VWK
W4OGG	WA1MJE	44	40
59	WD8JYN/N	VE4IZ	K3ORW
WA2SPL	WD8NYN	VE4QU	W4HON
WA4CNY	49	VE5HG	WB5IYH
WA4JDH	VE1WF	WB1DXR	WA5RVT
W5AC	VE3DPO	WA1HYN	WD8DDJ
WB5NKC	VE3GOL	K1OQG	WB8PAV/3
58	VE5AAE	WA1OFX	25
WB2MSO	W1TM	N1RI	WA4QGV/T
WB4PNY	WA1VAB	N2CR	24
WB5NKD	WA3NAZ/4	WB2RMI	WA1SMY/T
57	W4FMN	W2SQ	22
WB8WTS	W4SUS	N2YL	WD4BAJ/T
	AF4T	W3PQ	WA4VKD/N
	WD5ETD	K4EJ	
	WB6PVH	K4EV	

Brass Pounders League August 1978

BPL Medallions (see December 1973 *QST*, page 59) have been awarded to the following amateurs since last month's listing: WAØHJZ, WBØZAL.

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.

1	2	3	4	5	6
K3NSN	1200	1400	1200	200	4000
W3CUL	545	1249	1516	81	3391
WØWYX	58	1339	577	762	2736
WA4JDH	2	807	800	9	1618
WB5SDD	54	481	512	118	1165
W3VR	354	221	406	12	993
KØYFK		480		480	960
WB4PNY	2	502	431	4	938
K5OWK	420	28	442	14	904
W9ZGQ		644	253		897
W9JIJ	33	422	412	16	877
WA3ZRY	37	364	367	27	797
WA2SPL	1	368	399	23	791
WAØAUX	2	310	446	2	760
W5KLV	9	392	314	29	744
W4MEE	3	352	326	21	702
WA3WQP	83	263	345	10	701
W4JK	1	315	368	5	689
W7DZX	21	308	318	5	652
WD4COL	91	249	342	67	649
WA3ATQ	318	130	173	2	623
W7VSE	5	293	296	27	621
W9JUJ	10	310	283	7	610
K1BCS	85	174	314	14	587
WA4CCK	2	255	291	15	563
WA4CNY	15	305	157	59	536
WB5NKC	7	138	353	6	504
WB8OFR	12	230	250	10	502
KØYFK (July)		600		600	1200
WA2SPL (July)	1	403	410	32	846

Multioperator stations:

K8DDG	490	36	505	4	1035

BPL for 100 or more originations-plus-deliveries:

K7NTS	166	WDØAIT	117
W7TZK	135	WBØMTA	117
W7SQT	127	AE5I	115
WD8NYN	125	WA3THT	112
WD4NSG	120	WB4OBK	106
WBØQEU	120	WØBMA	104
WA5PPF	119	WA1UNC (July)	154
WA1ZXB	118	WØFIR (July)	154

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Results, Field Day 1978

Enjoy Field Day — 22,000 people can't be wrong!

By Bill Jennings, K1WJ* and Tom Frenaye, K1KI**

In every travelogue you've ever seen on TV, one of the primary subjects covered was probably the seemingly odd and diverse customs or tribal rites of the indigenous population of that area of the world under study. We sit in air-conditioned comfort and wonder, probably more than just a little curious, why such customs that often cause pain and anxiety to the practitioners are able to propagate from generation to generation.

After all how can we, surrounded by our creature comforts and electronic marvels, hope to understand why a native of a South Pacific Island would plunge into shark-infested waters to try to slay one of the beasts, using only a hand spear or knife, in an ancient tribal rite of manhood. Watching a snake-cultist from the Far East fondle a highly venomous serpent in an ages-old ceremony does little to further our understanding of different customs.

Consider for a moment, if you will, how our tribal rites might be viewed by the populous of some lesser developed country in the world.

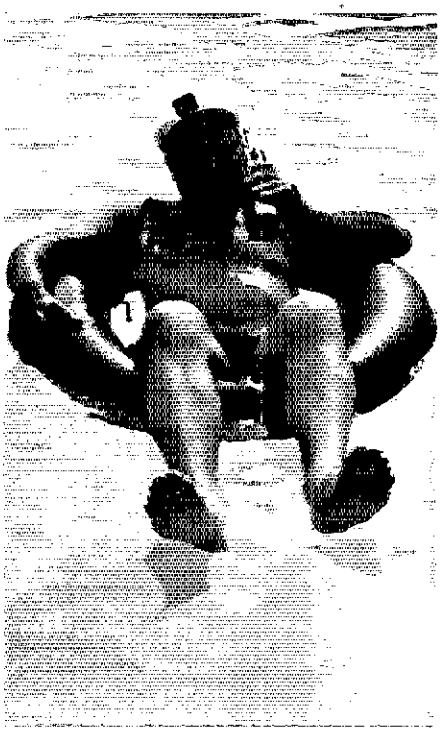
In the country of Sandland, Joe Citizen comes home exhausted from a hard day of tribal warfare and foraging in the jungle for a living. He plops down in the comfort of his grass shack and turns on the TV.

The picture fades up from black to reveal a group of several casually dressed men and women, gathered about tables, set up in the middle of an open meadow. The people are talking into little strange boxes, that have "glowing eyes" and many round protrusions on the front. Other people in the vicinity of those talking into the boxes are writing very quickly. Joe hears the word "logging" but sees no trees falling. Others in the group are spraying chemicals into the air and onto their bodies, in an obvious attempt, Joe thinks, to appease the swarms of insects that abound. Yet another group of people are seen lying about in various positions and in varying states of consciousness, obviously recovering from near fatal combat with some undisclosed enemy. Joe is able to deduce this last piece of information from the bruises, rashes, lacerations, burned expanses of skin, and the pained expressions on the weary faces of those in the scene.

The camera pans to the right and Joe sees something with which he can readily identify. One individual in the film is demonstrating a tribal dance. He is leaping up and down in the waist-high grass, swinging a wooden club (which is inscribed with the religious incantation "Louisville Slugger"), yelling over and over "I got him. I got him." The pulsating rhythm for the strange dance is being supplied by a contraption called a "generator."

The camera zooms out to a wide-angle shot and the announcer's voice comes up. "Once each year on the last full weekend in the month of June, quite near the summer solstice in the Northern Hemisphere, the 'ham tribe' of the United States and Canada celebrates the 'rites of summer' with a holiday called Field Day."

The narrator's voice drones on, but Joe has seen enough. He is thinking of what he will wear to the snake-cult meeting later in the evening. One last look at the TV screen and Joe shakes his head in wonderment at the interesting tableau that



K1DII, alias Capt. Toenail, takes a shot at a little maritime mobile operation on FD. The Capt. thinks solid-state devices are OK, but nothing will ever replace *tubes. (K1DII, 3A-Batt)*

Class-A Call-Area Leaders

1A	*2A*	*3A*	*4A*	*5A*	*6A*	*7A*
N1MM/1	W1RM/1	K1JNQ/1	W1TR/1	K1MUJ/1	W1BLM/1	K1WEW/1
W2ZJ/2	K2DB	N2OO/2	W2DMM/2	N2EF/2	K2YNT/2	K2AZ/2
K2WI/3	N3IC/3	K3LR/3*	N3AD/3*	W3CSL/3	K3SSC/3	W3SK/3*
N4ND/4*	AA4AA/4	W4UC/4	W4ABZ/4	W4CUE/4	K4BFT/4*	K4IY/4
K5PR/5	K5LG/5	K5RWK/5	K5DX/5	W5TI/5	W5ANR/5	K5FFO/5
W6JC/6	N6CW/6*	K6YT/6	K6YA/6	K6QEZ/6	W6CN/6	W6TRW/6
K7WK/7	N2EX/7	N7AZ/7	K7AUO/7	W7YN/7	WB7QIW/7	K7LED/7
W8AU/8	W8GK	W8GI/8	K8KRG/8	K8DAC/8	W8LC/8	K8AN/8
K9BGL/9	AA9A/9	N9RX/9	W9TE/9	K9RO/9*	K9UT/9	W9IC/9
NØNO/Ø	KØNA/Ø	KØWA/Ø	WØMXW/Ø	WØMG	WBØBBN/Ø	WBØMWE/Ø
VE5UA/5	VE1FO/1	VE7SAR/7	VE3RC/3	VE2BLW/2	VE3VM/3	
8A	*9A*	*10A*	*11A*	*12A*	*14A*	*16A*
W2MMD	K2AA/2*	K1KA/1	N1AV/1	K5GT	VE3WE/3*	VE3NAR/3*
W4HAW/4	W7DK/7	N2CG/2	W3SGJ/3	W9JZ/9*		
W5SC/5	W9KW/9	W3AI*	VE3DC/3*			*23A*
W6PW/6*	VE3FW/3	K6IS/6				K2KX/2*
W7VW/7		W7FR/7				
W8QLY/8		K8SF/8				
WBØKRA/Ø		W9ZK/9				

*Denotes overall class leaders

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

Number of Entries per Transmitter Class

Class	Number of Entries Year 1977	Year 1978
1A	205	197
2A	307	327
3A	365	318
4A	160	159
5A	179	118
6A	49	56
7A	28	32
8A	12	17
9A	11	7
10A	3	9
11A	3	4
12A	1	2
14A	—	1
15A	1	—
16A	3	2
23A	1	1
1B	126	131
2B	38	29
1C	46	34
2C	1	2
3C	1	—
6C	—	1
1D	101	82
2D	7	6
3D	—	5
4D	2	1
1E	20	18
2E	1	2
3E	2	—
4E	—	2
5E	2	—
Check logs	17	15
Class indeterminate	—	24
TOTAL	1592	1602

Class-B Call-Area Leaders

1B	2B
W1ECH/1	N1OM/1
K2NJ/2	N2AE/2
N3ND/3	WB3BNZ/3
K2JT/4*	N4FD/4
W5VFO/5	WD5CGC/5
W7CB/6	AA6R
KØPP/7	W7LTL/7
N8SR/8	WB8JBM/8*
K9EI/9	WB9JDL/9
NØTU/Ø	WBØINJ/Ø
VE1TL/VE1	—

*Denotes overall class leaders

he has seen. "Strange people, those hams." Strange, indeed.

The tribal rites of summer (aka Field Day, 1978) were celebrated in grand fashion by the largest turnout ever. The 1602 stations reporting FD activity, manned by 22,319 operators utilizing 4391 transmitters, are just a shade over the total from the 1977 Field Day.

The chart to the left compares the number of entries, class by class, from 1977 to 1978. It will suffice to say that there occurred a predictable shift in the most popular entry class from 3A in 1977 to 2A in 1978, as the 2A stations could add the "free" Novice station for the first time this year.

The bonus most often claimed by those FD stations eligible to receive bonus points is the emergency power bonus. The next in line most-claimed bonus is the publicity bonus with 91 percent of those stations eligible receiving this bonus. What with the many acceptable forms that the publicity bonus can take, accessibility of the FD site to the public, newspaper stories, broadcast media coverage, etc., it's surprising that the number of recipients of the publicity bonus doesn't approach 100 percent of those FD stations eligible for same. Maybe a little advance planning and a few friendly calls to your local newspaper will net those oh-so-easy 50 bonus points for your group in Field Day 1979.

Once again in processing the Field Day entries, we were faced with the problem of trying to return incomplete entries for corrections, in order to be able to include them in this report. Aside from the superlate submissions (those postmarked more than a month past the mailing deadline), we returned 123 entries in order that they might be completed to be considered valid FD entries. *Most* of the 123 were received back here in time to make the listings, but some were not. It takes only a small amount of time (at least compared to the effort expended in the actual operation of FD) to *carefully* check the FD entry to be sure it carries *all* the required information. Obviously, official FD forms, completely and correctly filled out, are best, but reasonable facsimilies which provide all the needed info are OK, too. We feel that having to return entries, in lieu of a little care taken on the part of the entrant before submitting the entry, is an unnecessary step which will probably be discontinued in the future.

So, planning well in advance, having a good time in the actual operation of Field Day, and checking the entry before submission seem to be the three main ingredients of a successful Field Day.

What follows are six brief descriptions of both typical and atypical Field Day operations. These reports represent a good cross-section of all of the reports received.

Southern Illinois Code Operators (AA9D/9)

S.I.C.O. was formed to represent southern Illinois in the annual Field Day madness to prove that cw operators aren't dead. We chose as our location the highest spot in southern Illinois, Bald Knob Mtn. We failed to consider that because this location is high, the total wilderness makes for much more work and logistics problems. We killed one rattlesnake while clearing weeds two days before Field Day and discovered later that we had also set up one of the operation tents (mine) on top of a baby rattler. Mosquitoes were no problem as they couldn't find a place to bite through our many ($\times 10^4$) chiggers. Our rewards for our effort were many. How can I ever describe the beauty of a natural sunrise coming up over the peak of the mountain (when we were too tired to open our eyes), the fresh air in our lungs (at 95 degrees, 98 percent humidity, and no shade), or the great fellowship of my fellow amateurs (a bunch of slave-driving nuts). I just hope that all of the FD groups in the country had as much fun (and chiggers) as we did. — *WB9ZHK*

River City ARCS (K6CII)

The first Field Day for the River City

Operating the vhf station are Jerry, W3FB (front), and George, WB3IGR. Jerry has been licensed for 50 years and has yet to miss a single Field Day outing. (*K3SSC/3, 6A*)

A bit of public relations as Mid-Michigan ARC President, WD8MQR (on the right), explains the FD operation to an interested observer. (*WB8PPG, 3A*)

Frank (foreground), WB8OFR and Dan, WD8AAU, with the Farout ARC, doing a little 40 ssb early on Sunday morning. (*WB8SMC/8, 3A*)

AR Communications Society was a rousing success. The members actively participating have been Amateur Radio operators for no more than 1-1/2 years. What they lacked in experience, they made up for in enthusiasm. The only YL operators made the most contacts of any team. The highlight of the activities was a small grass fire that could have caused great destruction. A careless motorist wasn't concerned about the dry conditions. The Citrus Heights Fire Department was alerted at 4:20 A.M. and the Field Day group was awakened. The group rushed to the fire and, using shovels and feet, quickly doused the fire. The owner of the 7000-acre ranch was very grateful for the quick action taken and has offered the use of his ranch again next year for Field Day activities. — *WA6ZDZ*

WB9JDL/9 2-B

"Those Ole Air Corps Men," brass-pounders "MR" (WB9JDL) and "RS" (W9EI) for the good old Army Air Corps back in the 1940s, got together for Field Day again this year. This year they chickened out and ran medium power. Last year MR operated with a hand key for the full 24-hour period; this year he slapped it out on his old bug. The results: This year their total was 608 cw and (all respectable cw men cover your eyes) 49 phone QSOs. They agreed never to reveal which of them had used the microphone. Al said, "I hereby do solemnly swear that I will not reveal to any other person which of us worked phone." Russ said, "Al, old buddy, I also solemnly swear that I will never reveal that you were the one who made those phone contacts." Thus MR and RS retain their image of purity — as pure as old Air Corps men, particularly the brass-pounding variety, ever were. — *WB9JDL*

Prince Edward Island ARA

FD 1978 was a super event on PEI. We had the exclusive use of a large field at the beautiful Brudenell Provincial Park on a site overlooking warm sandy beaches. A main event was the world's championship tower-climbing contest. The contest required climbing a 30-foot tower, attaching a 2-m antenna to the mast, attaching coax to the antenna, and descending. Contestants had to touch all rungs on the tower on the way up and down. The world's champion is now VE1AIC. Ron's record of 25.6 seconds, timed by two judges before a large crowd was nothing short of fantastic. We issue a friendly challenge to any club at next year's FD to break our record. Ron received a beautiful trophy and is the reigning king of tower power. Our tower next year will be 40 feet. Another event combined a road rally with a transmitter hunt. The rally had several different courses but all ended at the junction of five roads. From this point the hidden transmitter could be heard. With five roads to choose from, the reflective power of salt water, and the transmitter hidden just above sea level on a beautiful secluded beach, a real challenge was assured. The super sleuth who won this event was VE1ABU with his eagle-eyed teammate VE1EJ. The second team only found the transmitter when their DF loop actually touched the transmitter. Very special thanks to the four lovely girls in bathing suits who concealed the checkpoint ham from view in the nicest and most unusual way. — *VE1BCN*

WA6FBC/M 1-C

The first day, Randy (WD6EIM) and I operated mobile from Mt. Pinos about 75 miles north of Los Angeles. The scenery and weather were spectacular. The next morning I decided to try again and went to the visitor's parking lot at Castaic Lake. There were probably 3000-5000 people there on Sunday, swimming, fishing, boating, sailing and sightseeing. About 9:45 A.M., I looked up over the hood of my car and saw a bit of smoke down near the lake. After 30 seconds of debating with myself whether or not someone had turned in a report, I jumped out of the car, ran into the visitor's center

Club Aggregate Mobile Scores

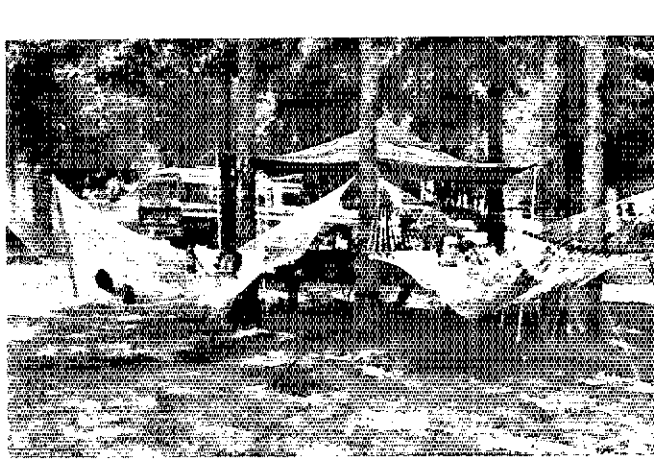
Radio Amateur Mobile Society, Inc. (11 entries)	3095
Northern California Contest Club (4 entries)	2260
Granite State ARA (3 entries)	656

and reported the smoke. James Cron, the ranger on duty, took one look and called the district ranger. Within 20 minutes the fire fighters were on the line, trucks were arriving, borate bombers were making their drops, and the fire seemed destined to jump the one fire break since it was fanned by strong winds. However, the wind died down for about 10 minutes, and they stopped the blaze about 200 feet from the fire break after it had spread for about 3/8 mile. They were preparing to evacuate all the people in the area, including me, but when the wind died down they relaxed and the fire was out in one more hour. I received a nice memo concerning the reporting of the fire. Quite a few people stopped by to observe the operation of my Atlas 210X and look at the log to see who had been contacted. Most commented that it was nice that a pretend emergency could serve a real emergency. Field Day was great even if I operated only 10 hours. — *WA6FBC*

K9EEA/MM 1-C

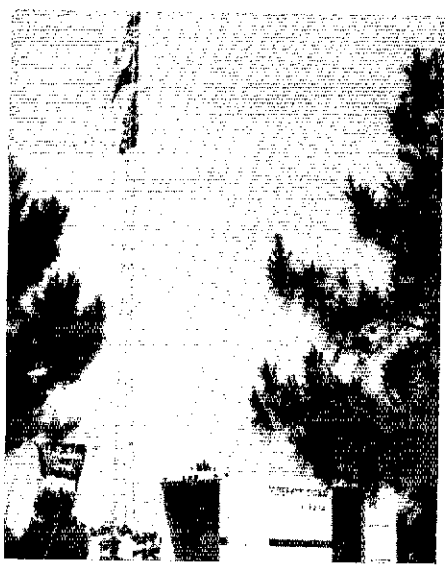
Another great Field Day. More attended this year, to take our annual ham radio voyage on Lake Michigan. And, of course, Murphy didn't miss the boat. He got us first by letting Bruce's (K9EEA) 46-foot yacht run aground just north of Chicago. Our erstwhile operator on duty at the time (Dave, K9SW) kept at the key throughout, except to poke his head out now and then and ask nervously, "Are we abandoning ship?" Then — with no less than four Extra Class operators aboard — we flipped a switch wrong and went four hours with no receive antenna. We even had a horizontal sailor. Lee, N9BT, spent

Don, WA1SDY, *limb*-ers up his operating technique on the site of the Mt. Tom Repeater Association FD effort. (*W1JP/1*)



Walt, WA4BOA and Hap, WA4UMU, are "horizontally polarized" in the relaxed atsmosphere of the Lake Wateree ARC FD Site. (*N4GS/4, 2A*)

The Champlain Lookout FD Group seems to have branched out in a new direction in an attempt to add a new dimension to their FD activites. *(VE2CV/VE2, 3A)*



The Confederate Signal Corps shows their colors, "The Stars and Stripes and the Stars and Bars." *(W4VTA, 4A)*

almost the entire voyage on his back suffering from acute seasickness, and the thunderstorm we ran through didn't help at all. And finally, the blind writer of this letter lost his glasses to Murphy when a fickle antenna cable flicked them off into Lake Michigan as we were raising a new antenna. But we've got our act together for next year. We're going to rendezvous at a secret harbor so Murphy can't find us, and. . . . — *K9MX*

Well, that about wraps it up for Field Day 1978, except to thank Contest Aide Arlene and her tired typing fingers for a job well done, and to say that if you didn't participate in the latest running of Field Day, make plans to celebrate the "Rites of Summer" in 1979. Support the custom, it's not only fun, it's your Ham Heritage.

Soapbox

All in all, an excellent Field Day. QTH was Bald Mountain Summit just east of Mt. Rainier. The weather was bad; a 40-mph wind blew continuously and we had some light snow showers. Despite the weather, all the antennas stayed up, the generators kept generating and the coffee (with rum) was very popular. When the weather broke on Sunday we had breathtaking views in all directions. Our spirits remained high. We saw no UFOs in the vicinity of Mt. Rainier nor did a Sasquash (Bigfoot) request a 20-meter cw shift. (W7SX/7) We even had one 11-meter man, who lives just down over the hill from our site, stop up on Saturday just to see what was going on. He ended up staying the entire weekend, logging, gassing up the generators, making coffee, etc. He was really enjoying himself and I think that he is really hooked. He wants in on our next Novice licensing class. (N3AY) Each Field Day seems to have its own particular brand of activity under Murphy's Law, but this year Murphy outdid himself — we lost the truck and trailer combination that had our ac power plant on it. Can you believe that a military trailer, carrying a 10-kW ac generating plant, 50-gallon drum of gasoline, electric panel boards, and being pulled by a large military truck with "CD" emblazoned all over it could completely disappear and no one could find it? Well it did! (W2LI/W2IHA) The last station that I worked for K8DM/8 was W2DUN/2 and since *DUN* is the same as *done*, I thought I was really *done*, but then I went home and believe it or not, I worked W2DUN/2 from my home site also. I guess I wasn't really DUN until I DUN gone and worked W2DUN again! Well that DUN it. (K4CQA/8) Murphy struck immediately after we hooked the coax to the antenna for our first test QSO. A teenaged gardener on a riding mower, mowed the lawn and our coax several times before we could stop the carnage. RG-58/U in two-foot sections can produce strong emotions. (W3AA/3/K3DG) Our site was somewhat unique. We were looking down on Camp David, the Presidential retreat. No special visitors arrived at our site; either they were not interested or we were not bothering their boob tubes. (K3ERU/WA3AMH) At 8:30 A.M. on Sunday morning, a gentleman in a tuxedo walked into the shelter house where we kept our food (we operated from a state park) and announced that our tent, FD operators, generator, in fact, everything had to go as there was to be a wedding there. Fortunately, we reached a compromise, which merely meant operating on batteries for 15 minutes. For them it was a most unusual wedding and for us it was a most unusual Field Day. (W8LT) Some of you may be wondering what happened to that club with the long name. Too many members couldn't make it to Field Day. When you're in class 2B and your operating partner begins to get a little drowsy, a quick jab with a freshly sharpened pencil does the trick. I know, I used it more than once. It worked. (WB8DQP/WB8JBM) Last year we went the high-power route and had no end of troubles. This year we left the amplifiers

"Hitch your wagon to an . . . operator?" Portable power for the Johnson City RA. *(K4SE/4, 3A)*

Working DX, even on FD, is a real gas for (l to r) WD5BOC, WB5WYX, WB5AZI, WD5CVG, WD5FRN and WD5CQF. *(W5AC/ M, 2C)*

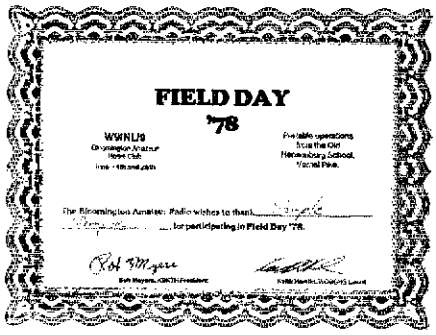
at home, entered the low-power category, while cutting your troubles in half and *doubling* our total score. (K8SF/8/WB8TVD) Antelope Island is slightly north and east of Salt Lake City, UT. It is about eight miles from the mainland. A causeway links it with civilization. The island itself is in the middle of the Great Salt Lake . . . Murphy struck early Friday night. Our original plan was to put our verticals right in the lake. The salt water makes a good ground. But we soon found out that the sand would not support the weight of my truck. After the wrecker pulled me out, we began to set up. The Salt Lake is known for its large number of brine flies and brine shrimp. When a strong wind comes up it churns up the smell of the shrimp. Hence our name, "Great Salt Lake Rotting Brine Shrimp Inhaling Association." (N2EX/7) We blew the public relations bonus! A club member at a TV station was to bring the minicam crew over and plumb forgot it. No soul at all. P.S. We worked two stations with call signs having the suffix SEX and worked one station with the suffix GAY! Guess that just about gets 'em all! (W9AIU/K9EOC) My strawberry malt literally lept into my Heath HW-101 transceiver. (N6MI/6) There out to be something in the FD regulations that would require portable stations to sign "portable" *every* time they sign their call signs. Much time was wasted in verifying the status of most of the stations that we worked. (W7LTL/7/WA7LHZ) FD in 107-degree temperatures was really rough so we turned on the air conditioning . . . thus no credit for emergency power. (W5UMK) You might be interested in our method of hanging a skyhook. We had tall trees nearby, but needed a way to get the end of the wire over them. Walt suggested a two-string kite. In my day, kites had only one string and went strictly downwind. With a two-string version, the orientation can be changed over a wide range. We were on the shore and there was a strong offshore breeze. It was easy to swing the kite over the tree and have it nose-dive to the ground on the other side of the trees, leaving the string beautifully draped over the top. Worked like a charm. We used a surplus wire from a "Gibson Girl" lifeboat transmitter. The wire is phosphor bronze, very flexible with good conductivity. (W1WP/WB1DWY) The JPL ARC operated from Table Mountain near Wrightwood, CA. A major feature of the JPL activity was a solar-powered hf position. The transceiver used was a Triton IV, to a 3-element triband beam antenna. The power was derived from a storage battery, floated across a solar panel array, which supplied 12 volts at a charging current of 2-1/2-3 amps. During the night-time hours of the operating period, the ri operated directly from the battery. Whe the station was shut down at the end o Field Day, it was found that the batter was still "topped-off." This should giv considerable encouragement to those in terested in using solar-powered transmi ting and receiving apparatus, but we concerned about the effectiveness an reliability of such a power source (K6PGX) There are about six amateurs i this county, most of whom have receive their tickets within the last two years. I in herited the office of emergency coor dinator this year and set about enrollin the fellows in the Emergency Corps. W decided to have a Field Day. With litt funds and less brains, we got the grea

Although not a Field Day "contestant," K6ROC, Los Angeles Police Dept., activated "Mobile 1" t show support for Amateur Radio and Field Day. Mobile 1 sports no less than 10 antennas, covering amateur, CB and most of the frequencies used by the local emergency agencies. A 25-kW generator supplies the power. Shown in the photo going up the stairs are (l to r) Officer Art Haute one of the builders of Mobile 1; Investigator E. T. Hocking, AB6N and Officer Archie Bates, WB6DZF.

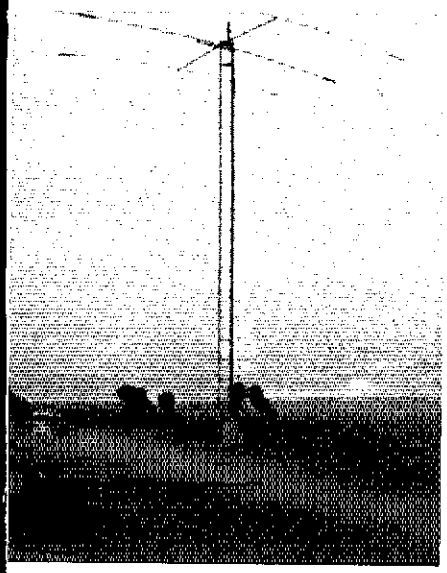
Left to right: W1KK, WB1CAD, WB1CAC and KA1APR all of the Hampden County ARA. (*W1NY/1, 4A*)

The N.A.R.C.O. FD group "family" portrait (l to r, top row then bottom row): K1LL, WB2ERJ, K2NN, WA1VMI, WB1ABV, N2FB, WA2PCB, N3B and N1YY. (*K2NN/2, 3A*)

idea of using a lawn-mower engine, an automobile (1964 Ford) generator, and a retired battery for our power plant. On the morning before FD, WD4FXR fastened the components of our generator to a plank and hooked up the wiring. It would not produce a single microamp. After numerous curses and incantations, WA4LMC kicked it at just the right spot and polarized the fields and it worked.



This is a sample of the certificate that the Bloomington ARC awards to all who participate in their Field Day activities. A pretty nice memento of the good times to be had on FD. *(W9INL/9, 2A)*



Sunset on the Meriden ARC FD Site. *(N1AN/1, 2A)*

W7GV/7, 3A

(WA4LLR) We know the kind of pictures that you like (dog with headphones, etc.) and we had a giant radish trained to send high-speed code on a keyboard. But, before the picture was taken, somebody got hungry for a salad and there went our *QST*-type picture. We tried to train a baboon to operate with a microphone, but with only a few hours of Field Day left, we could only get him to say "10-4, Good Buddy." (W8TK/W9DY) [Tom, we really don't like the "dog with the headphones" pix, but we use the best quality photos that we get. — Ed.]

Feedback

Please make the following corrections and additions to the Field Day report for 1977 (December 1977 *QST*): In the 2-B Battery category at 2670 points the call sign of the station should be K5DI/5 *not* W5DI/5. In 6A, add Penn Wireless Assn. W3SK/3 (and WB3DIV) 2699-B-40-8722. W2OYH (2-A) should be Morris RC. VE2CV/2 in the 3-A category was the no. 1 Canadian. Finally in 2A, add the Buffalo Area DX Club W2RR/2 3386-B-12-9088.

Scores

Class A stations are clubs or groups operating portable, with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation at each station. The scores list club or group name, total number of contacts, letter indicating power classification (determined by the dc input power where A is 10 watts or less, B is greater than 10 watts but less than or equal to 200 watts, and C is greater than 200-watts input), number of participants (if known), and total score. Listed in descending order from highest to lowest score.

Class B stations are those portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power (same as class A), and final score.

Class C are mobile stations. These are listed by call (number of operators), number of contacts, power (same as class A) and final score.

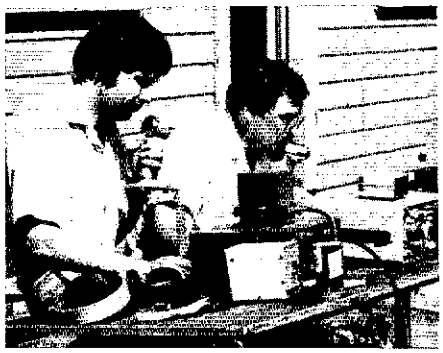
Class D are home stations using commercial power sources. These are listed by call, number of contacts, power and final score.

Class E stations are home stations utilizing emergency power sources. The listings include call, number of contacts, power and final score.

Asterisks (*) denote stations, which did not begin set-up operations prior to 1800 UTC on Saturday.

Joan (front), WA3UNI, and Ben, K3JQH, doing duty on 75 phone for Penn Wireless, used the phonetics Whiskey 3 Sweet Kisses which they say, really cut through the QRM. *(W3SK, 7A)*

The Surrey ARC, VE7SAR/VE7, 3A



W2KB (l) and WA2WVY of the Bayonne Civil Defense ARC. *(W2ODV, 3A)*

The Gobble Group (l to r): VE5DX, VE5RG and VE5UA. *(VE5UA/VE5, 1A-Batt)*

Left to right: WB9UKK, WD9FNW, K9ZO, WD9INV and W9LMJ of the Central Illinois RC.

1A - Battery

Central Virginia Contest Club N4ND/4	794	A- 8-7300
The Gobble Group VE5UA/5*	790	A- 3-6745
Murphy's Marauders N1MM/1	703	A-19-6490
M.J.Field Day Party W1MJ/1*	615	A- 7-5160
Massillon CEE Dubs W8AU/8*	564	A- 4-5740
Hamburg Helpers K8IF/8*	489	A- 3-5090
Non-Club Group WB8KVM/8*	378	A-15-3930
The Rated-X Contest Conspiracy AA4RX/4	563	A- 3-3775
Colorado Traffikers W0GO/0 *	350	A- 3-3600
Beacon Radio Amateurs W3AA/3	345	A-11-3395
Non-Club Group W6JC/6	319	A- 6-3340
Non-Club Group N5RL*	352	A- 3-3055
Non-Club Group K8SYH/4*	409	A- 7-2880
Low Gainers W0SH/0*	377	A-16-2715
RCA - ARC N9RJ/9	255	A-13-2685
Frozen Buns ARC K7ED/7	493	A- -2615
Limestone ARC K4KJD/4	511	B- -2104
Mich. QRP Club W8LCU/8	190	A- 3-1905
Hopkins ARC WA3EPT/3	566	B- 3-1732
FD Coalition W6SZN/6	406	B- 4-1724
Huron ARC,Inc. W0NOZ/0	576	B-15-1407
Non-Club Group W7DAZ/7	110	A- 4-1200
VE3JRT/VE3	89	A- 6-1040
LABOH,EQG & Friends K8ZZU/8	128	A 4-1000
Non-Club Group N1KE/1*	89	A- 5- 990
WorldRadio Staff ARC N6WR/6*	249	B- 4- 734
Phillips Acad. RC W1SW/1	86	A- 3- 669
Non-Club Group WB9RAB/9	11	A- - 210

1A

Iberia ARC K5PR/5*	1336	B- 9-9544
Miami Valley AR Contest Society W8OK/8*	1680	B- 7-5354
Hollywood ARC N4BP/4*	1294	B-13-4642
Delta DX Assn. W5RU/5*	1447	B-20-4506
Spark Gap Wonder Boys N0NO/0*	1286	B- 6-4486
Official North Texas Contest Club N5AU/5	1794	B- 9-4472
Thibodaux ARC W5YL/5*	1468	B-30-4114
Belleville A R Foundation K9BGL/9*	1338	B- 3-3843
S.A.N.A.N.A. K2N/3	1265	B- 4-3726
Altair Computer Center ARS K7WK/7*	1366	B- 8-3680
Lafayette ARC W5DDL/5*	1332	B-15-3654
Rhombic Raiders K0WX/0	895	B- 4-3582
Utah DX Assn. K7UA/7*	1442	B- 5-3472
N9GB & K9s KM,RS K9RS/9*	981	B- 3-3442
Idaho Falls Mavericks W7RH/7*	1326	B- 9-3368
Norwood ARC KIJMR/1	868	B- -3260
Bozo And The Lids W9TG/9*	810	B- 3-3212
Glen Gates Gang W9MO/9*	941	B-14-3192
Duluth Guns Castoffs K0SV/0	959	B- 5-3176
South Eastern Michigan Contest Crew W8WD/8	1480	B- 3-3124
N3DF Field Day Team N3DF/8	1530	B- 3-3110
WA5YTX,W4HIR,K2UFT K2UFT/8	864	B- 3-3066
Candlewood Contest Club W1QK/0	716	B-14-3064
Duluth Guns RC K0II/0	786	B- 4-2950
Ozark Contesters W5TNT/5*	694	B- 8-2868
Tri-County Radio Telegraphy Soc. N8VV/8	686	B- 7-2844
Caledon Side Hill Gougers VE3FOX/VE3*	827	B- 5-2798
Suey Creek Boys N6UE/6	1153	B- 4-2788
Tallahassee ARC AA4US/4	1313	B-15-2766
Glenn,Glenn & Ken K9SO/9	975	B- 3-2666
Lebanon A.R. Klub K0DEW/0	665	B-14-2642
Non-Club Group W9DEP/0*	607	B- 5-2620
Radio Free Pinckney K8CC/8	834	B- 6-2616
Beaches ARS W4DU*	922	B-15-2612
Crawford ARS K3IC/3*	666	B-15-2596
Orangeburg ARC K4QO/4	697	B- 4-2594
Aurora Repeater Assn. W9LJF/0*	1073	B-18-2506
Union Parish Contesters K5MC/5*	561	B- -2444
Ogden ARC, Inc. W7GPN/7	1071	B-20-2394
Carbide ARC W5UDR/5	725	B- 7-2390
Gulf Coast ARC AA4FG/4	1022	B-18-2359
Argonaut Conspirators KH6NO/KH6	776	B- 3-2304
Rockwell International ARC WB1FZ/8	714	B- 9-2264
Canton Top Dogs W8TD/8	536	B- 8-2244
Morris & Minnis WB6ITM/6	697	B- 6-2242
Marianas ARC KG6JCN/KH2	996	B-15-2232
Chigger Mountain Scratchers N4WH/4	830	B-15-2226
Bell AR Contest Club N5HD/5	744	B- 5-2216
Society Radio Ops. W9EJ/9	620	B- 7-2198
Western Nebraska Tech ARC W0AFG/0*	945	B-11-2158
Recal Milgo ARC W4MLA/4	509	B- 8-2078
Eastern Mich. ARC K8DD/8	656	B- 7-2072
Opelousus Area ARC, Inc. W5TKV/5*	858	B-10-2052
Naples DX Assn. K4FA/4	917	B- 7-2028
Non-Club Group W0UY/0	468	B- 7-1972
Utah ARC W7SPY/7*	555	B-35-1964
Dirty Birds K3MT/3*	529	B- 3-1954
Murphy's Law-Yers N6JF/6	856	B- 6-1942
Ramsey Co. ARC WD0FFQ	837	B-15-1924
Lake Shore ARA W3ALD/3	882	B- 6-1864
Non-Club Group K6ZH/6	525	B- 3-1828
Baltimore ARC W3FT/3	634	B-18-1826
Principia ARC K9BO/9*	566	B-17-1820
Cedar Valley ARC, Inc. W0SS/0	414	B- -1806
Marty's Marauders K3MK/3	806	B- 8-1762
Butte ARC W7EO/7*	1533	C-20-1745
South Florida Hamsters WD4AAA/4*	796	B- 7-1742
Union Metropolitaine Des Sans Filistes De Montreal VE2UMS/2	375	B-16-1700
Dyer County ARC AA4HF/4*	427	B- 9-1680
Non-Club Group AA4WA/4	689	B- -1668
Strasburg DX Group/0 W0BRT/0*	775	B- 6-1660
Winnipeg DX Club VE4AAA/VE4*	1174	C-13-1645
Club De Radio Sorel/Tracy VE2CBS/VE2	414	B-15-1632
First State ARC K3QBD/3	571	B-13-1614
Gumnison Valley ARC WA0ZOZ/0*	508	B- 9-1608
Non-Club Group W0QU/0	441	B- 6-1608
Texins ARC K5OJI/5	651	B-12-1608
Mojo Marauders AA4HH/4*	440	B- 5-1592
Jackson ARC W4TM*	573	B-15-1582
Chippewa Valley AR Group K9FIF/9	689	B-15-1528
Franklin ARC K4JA/4	592	B-10-1510
Chateauquay ARC VE2CAR/2	407	B-10-1502
Indiana County ARC W3BMD/3*	317	B-12-1498
Anaconda ARC W7VNE/7*	646	B- 7-1488
Lima Area ARC W8EQ/8*	418	B-24-1484
Dakota Feedback ARC WA0UNA*	549	B- 6-1482
Green Hills Field Dayers W3MN/3	358	B- 4-1480
Patrick Henry ARA WA4TLR/4*	554	B-10-1468
Elmira ARA W2ZJ/2*	489	B-10-1450
Montreal ARC VE2BG/VE2*	426	B- 8-1448
Hebron Allstar Wireless Bunch W1PE/1	448	B- 4-1424
Duluth Guns RC 3 K0BR/0	344	B- 3-1378
Great Plains ARC N5OO/5*	602	B-20-1354
A.I.L. ARC AA2J	319	B- 4-1328
Non-Club Group W9PC/9*	332	B- 8-1328
Hot Springs ARC WA5BRF/5	512	B-14-1316
Indian Hill ARC,Inc. WA9WSL/9	429	B-20-1294
Stanly County ARC K4OGB/4	561	B-14-1284
Montgomery ARC W4AP/4	364	B-10-1280
Red River Valley ARC WB5RDD/5	420	B-13-1278
International Harvester ARC WB4HPC/4*	538	B-14-1276
Humboldt ARC N4EH/4*	918	C-25-1266
Oswego County ARA W2PGS/2*	483	B-10-1264
Where's Paul? N2NT/2	343	B- 4-1260
Washington Apple Radio Klub W7WA/7	470	B- 5-1244
Teegap ARC N5EY/5*	368	B- 4-1218
SWT ARC W5DG/5	540	B- 9-1202
Pictou County ARC VE1JV/VE1	477	B-10-1196
Cedar Valley ARC, Inc. W0GG/0	440	B-33-1190
Milwaukee Area Contest Group WB9TSL/9	330	B- 6-1190
Non-Club Group WA8VFA/8	356	B- 3-1190
Theodore Roosevelt ARC W9ZTL/0*	431	B-10-1188
Williamson County ARC N5TT/5	492	B-11-1148
Greensboro RC W4GG/4	378	B- 4-1124
Oak Park ARC WB8MB/8	372	B-10-1106
South Platte ARS W0KK*	468	B-15-1092
Humboldt ARK K0GP/0*	349	B-20-1064
Hopkins County ARC WB4JRO/4	337	B- 7-1058
Sullivan County ARC K2RP/2	280	B- 8-1056
Callaway ARL N0NT/0	415	B-18-1056
250th Sig. Bn. NJARNG RC WB2JIU/2	394	B- 5-1044
Non-Club Group WB4MKK/8*	931	C- 4-1031
Holdrege Area ARC WB0RWR/0*	363	B-12-1014
Hastings ARC W0WWV/0*	396	B-15-1012
Frodo's Freaks WA4NNG/4	434	B- 3- 968
Teche ARC WB5ACG/5*	298	B-12- 948
4 - Drenched K0KCY	383	B- 4- 934
Oregon State Univ. ARC WA7SSO/7	345	B- 8- 908
Milwaukee RAC K9RH	307	B-11- 898
Hiawatha ARC K0NL/0	396	B- 8- 890
Willie & The Luckenbach ARC Good Ol Boys WA8RDF/8	395	B- 5- 890
Harris Satellite Comm. ARC WA5YNE/5	384	B- 3- 868
Non-Club Group WB5YIF/5*	267	B- 5- 864
QIT Graduates WA0QIT/0	329	B- 3- 858
Eastshore ARA K6RNP/6	356	B-10- 812
Berkshire Brasspounders WA1WMG	323	B- 4- 798
Marc,Jeff & Dorns Last Stand WB4NMJ/4	272	B- 3- 796
Sutton AS WA0JRB/0*	250	B- 7- 784
No Name Club WA7GVT/7*	281	B-12- 770
Emerald ARC WA7FQD/7	213	B-20- 762
Tex Southmost ARC K5DG/5	227	B-14- 708
CARC Alumni & MDC Navy Mars WA3HKF/3*	363	B- 9- 688
3M ARC W0MR/0	227	B-18- 676
Gallatin Ham RC W3YB/3	282	B- 9- 672
Salmon ARM VE7AED/VE7	244	B- 4- 638
Trojan ARC W6WOB/6*	164	B- 9- 627
An Age Group W8FH/8	262	B- 6- 624
Montreal ARC VE2ARC/VE2*	236	B- 8- 600
Explorer Post 599 WB7EXA/7*	248	B- 6- 596
John Marshall H.S. Alumni RC WB8PIY	243	B- - 586
Belle Glade Repeater Assn WA4DLR*	352	C- 9- 554
H.A.M.s. Club W7IEU/7*	87	B- - 548
Mason County RC K8DXF/8	339	C-10- 489
Knickerbocker ARC WA2CEG/2*	154	B- 5- 474
Non-Club Group VE7APW	147	B- 3- 474
Non-Club Group WD5HKP/5	187	B- 3- 474
Central Florida Repeater Assn. W4PMX/4	103	B-10- 356
Confederate Signal Corps K5ZC/5	88	B- 3- 354
MTA ARC W5CFX/5	95	B- 4- 340
Fulton ARC W2CXV/2*	125	B-14- 300
Barrington ARC WB9GWK/9	56	C- 4- 206

1A - Commercial

Muhlenberg ARS WD4EOK/4	488	B-10-2002
Touisset Contest Club Comm. W1OH/1	394	B- 3-1226
Lompoc ARC K6WJ	413	C- 3- 478
CHARRO W5KR/5*	202	B- 4- 416
Magic Valley R A Club N5AG/5	82	B- 6- 262
Chesterfield ARES N4NK	61	C- 8- 161
Queen Co. ARC VE1QW*	136	C- - 136
Samurai Optometrist ARC Comm. WB2PJH/2*	40	B- 3- 82

2A - Battery

Southern Calif. Contest Club N6CW/6*(+WB6STR)	1835	A- 7-13,520
Conn. Wireless Assn. W1RM/1*	985	A-17-10,170
Walton R A W2LZ/2*	460	A- 8-4660
Renfrew County ARC VE3UE/VE3	854	A-10-4530
Pinestate AR Corp. N1SW/1(+WB1DKQ)	1164	B-25-4362
Great River ARC K9YH/0(+WD9HDX)	652	A-24-3695
Capital Leftover ARA W2CRS/2*	405	A- 5-3680
Glastonbury ARC W1FYM/1	442	A- 8-3660
Buzzard's Bait WB4FBM/4	337	A- 5-2420
Seidl-Heard A R Keying Society W3IA/3*	204	A- 5-2300
Lockport ARA W2RUI/2	238	A-15-1840
U.S. Army Mars KH6USA/KH6	242	A-20-1700
Non-Club Group WB8FPN/8 K4ABOE/8)	152	A- 6-1580
Field Day's Finest N9DD/8*	102	A- 6- 805
Mountain Home AFB ARC WB7URE/7*	36	A- 6- 515
Non-Club Group WB2RLC/2*(+WA2RZG)	96	B- 4- 484

2A

Prince Rupert RC AA9A/9	3566	B- 5-8674
Arapahoe RC K0NA/0(+WD0AIT	2534	B-16-7664
Flyweight DX Group AA4AA/4*	2564	B-21-7614
Meriden RC N1AN/1(+WB1GEN)	1830	B-23-6785
Indian River ARC W4QM/4(+WD4LRF)	1901	B-23-6145
Halifax ARC VE1FO/1*	1743	B-20-5860
Buffalo Radio Amateur Group K2DB	1495	B- 7-5598

The Brightleaf ARC, W4AMC/4, 4A

The 1B-Batt station of W5VFO/5. Second op is W5VBO.

WA2PHA mans the Novice station for the Broome County International Allstars. *(N2HR/2, 4A)*

Kanawha ARC		
W8GKI+WD8OZT)	1875	B-36-5568
Univ. of Buffalo ARC		
K2ZJ/2(+WD2AJS)	1859	B-55-5530
Mecklenburg ARS		
W4BF B(+WD4JIH)*	2021	B-23-5488
West Valley ARA		
W6PIY/6(+WD6DUR)	1797	B-25-5442
ARC of Ohio State Univ.		
W8LT/8*	1401	B- 8-5260
Bay's Mtn. and Kingsport ARC		
W4TRC/4*(+WA4MOS)	1575	B-30-5090
No. Ark. ARS		
K5LG/5	1627	B- 8-5026
Raleigh ARS		
K4PU/4*	1203	B-10-5012
Ten-Four Good Buddies		
WB4AIN/4	1674	B- 8-5000
Non-Club Group		
K9KQ/9	1710	B- 6-4964
Logan County ARC		
N8RR/8*	1967	B-15-4885
Non Cheating Contest Conspiracy		
W2RR/2	1526	B-10-4792
Hampton Roads R A		
N4HF/4(+WB4AXY)	1477	B-12-4728
U. of Illinois - Symton ARC		
W9YH/9(+WD9HJD)	1553	B-12-4718
Ames ARC		
N9AN/9	1491	B-11-4680
East Bay Amateur Wireless Assn.		
N1RI/1(+WB1DEZ)	1409	B-12-4542
Richmond ARC		
W6IFZ	1490	B- 6-4516
Grand Rapids ARA		
W8DC/8(+KA8ANE)	1512	B-37-4423
Irvington ARC		
K2GU/2*	1630	B-22-4386
Hormel ARC		
K2UR/2(+WA2LEA)	1400	B-14-4226
Tupelo ARC		
K5IG/5	1551	B-18-4198
Bicentennial ARC		
N9OK/9(+KA9AFB)	1144	B-25-4176
Heart of America RC		
W0RR/0(+WD0DCW)	1292	B-15-4170
RA Megacycle Soc.		
W9UY/9	1022	B-13-4109
Wisconsin Valley R A		
W9SM/9	1347	B-30-4106
Ski Country ARC		
W9FG/9	1392	B-14-4040
Wallingford ARS		
W1SY/1	1318	B-11-4030
Randallstown ARC		
N3IC/3	1348	B- 6-4012
Boiled Owls of N.Y.		
W2AO/2	1296	B-12-4008
Douglas County ARC No. 1		
N0SD/0	1378	B-15-4006
Los Alamos ARC		
W5PDO/5*	1452	B-22-3972
Texas Chigger and Grasshopper Growers Assoc. with the Armadillo Contest Oprs.		
K5MW/5(+WD5HEP)	1384	B-10-3964
Black-Jack Mountain Gang		
K8AA/8*	1162	B- 7-3914
Lynchburg ARC		
K4HEX/4	1211	B-47-3906
Assoc. R A of Southern New England		
W1AQ/1	1332	B-20-3900
Tri-City ARC		
W1BML/1(+WB1GCX)	1083	B-25-3874
Medina 2 Meter Group, Inc.		
K8TV	1439	B-24-3858
Overlook Mtn. ARC		
K2HA/2	1169	B-17-3856
Great Salt Lake Rotting Brine Shrimp Inhaling Assoc.		
N2LX/7*	1215	B- 9-3834
Manhattan Area/KSU ARC		
W0QQQ/0*	1122	B-16-3828
Charlotte ARC		
W4CQ/4	1170	B- 8-3820
Farmington ARC		
W8RC/8(+WD8DUG)	1327	B-25-3808
Nanaimo ARA		
VE7NA/VE7	1253	B-15-3752
Broward ARC		
W4AB/4(+KA4AAT)	1702	B-25-3750
Radio Amateur Transmitting Soc.		
W4HQP/4	1204	B-50-3742
Fittstown Repeater Team		
N3WW/3*(+WB3HII)	1124	B-15-3732
Signal Propagators ARC		
K4EJJ/4	1109	B-15-3686
Aalea Coast ARC		
K4UWH/4*(+WD4NKP)	1259	B-22-3680
Sam Houston A R Klub		
AA5E/5(+WB5LVL)	1294	B-20-3673
Southern Illinois Code Ops.		
AA9D/9	1011	B- 6-3650
Andersen AFB Mars Support Club		
KG6FAE/KG6	1279	B-18-3643

T - T Boys		
K4OU/4	901	B- 4-3596
Pinicon Ridge-Runners		
W0IZ/0*	1112	B- 7-3588
South Kansas DX Assn'		
W0WU/0	1084	B- 8-3544
Central Wis. Radio Amateurs Ltd.		
W9NN/9(+KA9ACC)	1013	B-23-3538
Edison RA Assn.		
W8ICN/8(+WB8ZAF)	1034	B-13-3462
BRARC		
W5MI(+WD5CML)	962	B-30-3460
DEC FD Club		
W1IS/1*	940	B- 9-3390
Ozark Mountain ARC		
K0AW/0	1013	B-20-3386
Raleigh ARS		
W4DW/4(+WD4RDT)	1133	B-30-3350
Radio Renigades		
K0VM/0	1056	B- 7-3324
Hoosier Lakes RC		
K9RD/9	1203	B-13-3320
Jackson County ARC		
W5WA/5	1242	B-25-3320
Fauquier ARA		
AB4N/4(+WD4ACF)	911	B-12-3284
Enterprise ARS		
WD4AR0/4	1470	B-35-3276
Hart House ARC Univ. of Toronto		
VE3UOT/VE3	997	B-14-3272
Beaumont A R		
W5RIN/5(+WA5JMZ)	834	B-50-3248
Tampa ARC		
W4DUG/4	981	B-15-3242
Land of Lakes ARC		
K8RDJ/8(+WD8AEJ)	1000	B-12-3200
Rideau ARC		
VE3BPC/3	949	B-15-3190
Foothill ARC		
WB6RXH/6	1044	B-12-3176
Santa Fe Trail VHF Club		
K0KS/0	1050	B-10-3156
Escondido ARS		
N6WB/6	1075	B-25-3128
Non-Club Group		
WB5CLE/5(+WA4OUT)	1213	B-14-3126
Club of Radio Amateurs in Mahopne		
K2AV/2(+WB2JAT)	1022	B- 5-3116
South Lyon Area ARC		
WB8QXB/8*(+WD8MEF)	940	B-17-3116
Burlington ARC - The Green Mountain Boys		
W1KOO/1*	1236	B- 6-3114
Shenandoah Valley ARC		
W4HKC/4	937	B-11-3108
Middlesex ARC		
W1HEB/1	1173	B-15-3086
Westpark Radiops, Inc.		
W8VM/8	980	B-22-3080
Kemper ARS		
W9VA/9	996	B-16-3070
Barker's Bandits		
WB9S/8	868	B- 3030
North Augusta - Belvedere RC, Inc.		
K4FR/4	997	B-20-3028
Greater Fairfield ARA		
WB1CQO/1	1355	B-25-3022
Carmine A - 1 Group		
K5DL/5(+KA5ALE)	673	B- 5-2942
North Kitsap ARC		
W7COD/7(+KA7ARK)	932	B-13-2924
Ozarks ARS		
K0FA/0(+WD0HCT)	936	B-20-2918
WECOMO ARC		
K0IO(+WD0CST)	910	B-28-2908
Holland ARC		
K8DAA/8	1373	B- 9-2896
Non-Club Group		
K3ONW/3	844	B- 5-2894
Greater Bridgeport ARC		
W1VW/1(+KA1AJQ)	932	B-20-2878
Three Rivers ARC		
W8BRN/8	1191	B-18-2858
Ottumwa ARC		
N0SM/0(+WD0CQU)	1053	B-20-2848
Winona ARC		
W0NE/0	948	B-20-2782
Univ. of Miss. ARC		
W5YE/5	922	B-18-2770
Honolulu ARC		
KH6W/KH6	815	B-30-2762
Fossil Creek Wireless		
K5GD/5	996	B-10-2730
Milacron Ham RC		
W8RSN(+WD8OME)	860	B-14-2730
Victoria Short Wave Club		
VE7EZ/7	795	B-25-2720
Morton ARC		
W9AO/9*	898	B-14-2714
Green Bay Mike & Key Club		
K9EAM/9(+WB9VJV)	959	B-25-2712
Unlucky 7		
N9IA/9*	800	B- 7-2712
Carroll County ARC		
N3SB/3	995	B-16-2704
Non-Club Group		
N1ED/1*(+WB1FQI)	964	B- 4-2699
S.P.A.R.K.(Ford Aerospace)		
WA6NKK/6	906	B-10-2698
Lampasas ARC		
W5GFR(+WD5HEZ)	793	B-12-2690
CIRC & GTE Group		
K9ZO/9*	867	B- 2688

Grand Island ARS		
W0CUO/0	831	B-24-2686
Chipola ARC		
W4IRO/4(+WA4ARI)	756	B- 8-2682
Valley ARC		
N0NA/0(+WD0EHX)	807	B- 9-2670
Southwest Mo. ARC		
W0EBE/0*	770	B-50-2636
York North ARC		
VE3YNA/3	791	B-10-2604
Piedmont Tec ARC		
WA4PRW/4(+WD4LQD)	867	B-19-2596
Racine Megacycle Club		
W9UDU/9	833	B-25-2576
Brandon ARS		
WB4BIM/4(+WD4ASP)	903	B-11-2556
Tuscaloosa ARC		
W4KCQ/4	966	B-20-2552
Southwestern Manitoba ARC		
VE4DT/VE4*	828	B- 2550
Mo. Western State College ARC		
WB0OKX/0	718	B-10-2538
W/K ARC of Greater Milw.		
N9AW/9	800	B-10-2526
Non-Club Group		
K2LSA/2	730	B-13-2470
Southern Counties ARA		
K2SR/2	718	B-35-2458
Mid-Willamette Valley ARC		
W7SO/7*	918	B-50-2454
Ottawa Valley Mobile RC		
VE3RAM/VE3	746	B-18-2454
Bloomington ARC		
W9INL/9*(+WD9EVM)	645	B-26-2451
Indiana Univ. ARC		
K9IU/9(+WA2ECZ)	850	B-15-2433
Parsons Area ARC		
W0RT/0	786	B-12-2404
Larkfield ARC		
WA2PNU/2	709	B-52-2383
Non-Club Group		
W5RBO/5(+KA5APR)	898	B-11-2370
UCLA ARC		
W6YRA/6(+KA6ARM)	991	B- 7-2370
Explorer Post 296		
WB5FIL/5	733	B-15-2364
North Central W. Va. FD Assn.		
WB8BMV/8*	670	B- 7-2350
Adirondack ARC		
K2KO/2(+WB2YUW)	758	B-10-2342
McDonnell Douglas Astronautics West ARC		
W6VLD/6	832	B-10-2340
Starke County ARC		
W9MZA	650	B-10-2316
Air Capital Field Day Assoc.		
N0IE/0(+WB0VJK)	859	B- 6-2314
Lubbock ARC		
K5LIB/5*(+WD5JDJ)	899	B-25-2272
Arrowsmith ARC		
VE7EMO/VE7	713	B-20-2262
Missouri Valley ARC		
W0NH/0	871	B-24-2226
Northeast Missouri ARC		
W0CBL/0	666	B-20-2222
Non-Club Group		
W3GH/3	911	B- 8-2212
Rowan ARS		
W4EXU/4(+WD4KJZ)	863	B-17-2190
Northern Ill. A R Contest Oprs.		
K9SA/9(+KA9AJT)	768	B-12-2172
Grande Ronde RAs		
W7KVV*(WB7FFC)	601	B-14-2156
Derry ARC		
WA1UBC/1*(+WA1YNX)	795	B-10-2140
Signal Hill ARC		
K0HP/0	776	B-15-2134
Bridge City ARC		
N5AL/5(+WD5HMF)	610	B-12-2132
Friendship ARC		
W3GRJ/3	630	B-14-2132
Huron County ARC		
N8VT/8(+KA8ANM)	643	B- 2132
Quad-County ARC		
W3FF/3	648	B- 2132
Washington Co. ARES		
K9SK/9(+WD9IUX)	656	B-15-2116
Rappahannock Valley RC		
K4TS/4*(+WB4TYS)	569	B-14-2106
Vancouver ARC		
VE7ARV/7	479	B-20-2105
Explorer Post 373		
W9CUS	796	B-24-2080
Lake Wateree ARC		
N4GS/4	843	B- 3-2068
Blossomland ARA		
W8MA1/8	538	B-28-2066
Explorer Post 73 ARC		
K0NB/0*	537	B- 4-2044
Orlando RC		
W4PL6/4	604	B-40-2030
Oxford County ARC		
VE3OHP/VE3	557	B-16-1984
Central Washington ARC		
W7GB/7	600	A-14-1966
Freysville Wireless		
WB3BLM/3	641	B- 4-1964
Huntingdon County ARC		
W3VI/3	551	B- 9 1956
Kachina ARC		
W7YE/7(+KA7ARZ)	801	B-20-1948
Rutgers ARC		
WA2NPP/2	589	B- 8-1946
Midland ARC		
N5GL/5	750	B-15-1942

Explorer Post 73		
W8TTF/8	632	B-15-1940
Black River ARC		
N8TR/8	748	B-22-1930
Mancorad ARC		
W9DK/9*(+WD9HLD)	663	B-10-1906
Prairie Dog ARC		
W0OJY/0(+WD0FWJ)	622	B-22-1904
The "Never Again" FD Group		
W5WO/5	555	B-14-1902
Big Bear ARC		
W6AT/6	640	B-14-1898
Calhoun County ARA		
W4ZS/4*	714	B-30-1890
Chemung County AREC		
WB2VPY/2*(+WB2LND)	617	B-35-1880
Iowa City ARC		
W0JV/0	784	B-22-1876
Maple Ridge AR		
VE7CMR/7	740	B-11-1872
Non-Club Group		
WB0MAH/0*	755	B- 6-1872
Bell ARC		
W0RG/0	656	B-12-1868
Aerojet R A Club		
K6CLZ*(+WD6FXS)	694	B-20-1816
Suburban RC		
W0DCJ*	730	B-22-1804
Bruce ARC		
VE3HJR/VE3	605	B-11-1804
Lera ARC		
WA6GFY/6	696	B-16-1799
Non-Club Group		
WB0DZA/0*	539	B- 6-1756
The RAC Bishop CA.		
K7BDS	652	B-14-1756
Robbinsdale ARC		
K0LTC/0*	488	B- 6-1744
Non-Club Group		
W4RLQ/4*(+WD8BLC)	466	B-15-1706
Fort Pierce RC		
K4KPH/4*(WB4NOZ)	490	B-16-1706
Muscle Shoals ARC		
W4JNB/4	773	B-18-1705
Americus ARC		
WA4RWS/4	666	B-28-1707
Hazel Park ARC		
W8JXU/8	614	B- 2-1688
Gore Range ARC		
W0KEA/0	642	B- 6-1684
Flambeau ARC		
N9CE/9*(+KA9AVX)	667	B-14-1682
Goz's Gang		
K2VCZ/2*	401	B- 6-1680
Jr. Radio Oprs. of Virginia		
WD4JMW/4	638	B-12-1674
Morris/Passaic Counties ARES		
W2UH/2	617	B-16-1666
Douglas County ARC No. 2		
W0UK/0	543	B-15-1652
IBM ARC of Boca Raton		
WB4QNX/4	567	B-12-1650
Georgian Bay ARC		
VE3AEO/VE3	469	B-24-1650
Huntington County ARC		
W9NJD/9	435	B-10-1650
Gaston County ARS		
K4TP/4	552	B-15-1644
Douglas County RC		
K4PI/4	542	B-10-1642
Newaygo County AR Men		
WA8UAN/8	435	B-16-1626
Cullman ARC		
AC4C/4	701	B-12-1620
Kansas-Nebraska ARC		
WB0YYG/0*	596	B-20-1614
Non-Club Group		
N3AM/3	433	B- 3-1604
Regina ARA		
VE5NN/VE5*	498	B-12-1592
Joliet ARS		
W9OF R/9	568	B-12-1550
Non-Club Group		
VE3GCB/3	543	B-26-1538
Midway ARC		
K0WN/0	592	B- 1534
Carrollton, Tx. ARC		
K5LLA/5*	638	B-14-1526
Olympia ARS		
W7USA/7	431	B-17-1514
Club Amateur Maskoutain		
VE2CAM/VE2	394	B-12-1500
Air Force MARS of Virginia		
WA4JQX/4	583	B-14-1480
WR6ABW Group		
N6ZH/6	563	B- 6-1456
Pender ARC		
K0CWW/0	587	B- 6-1424
Grazespot ARC		
N5FN/5(+WD5IPM)	646	B-16-1423
Non-Club Group		
WB5TGL/5	580	B- 5-1410
Arlington RC		
K5SLD/5(+WD5DOB)	671	B-25-1404
Thompson ARS		
VE4YY/4	326	B- 7-1396
Northern Colorado ARC		
W0UPS/0	520	B- 1394
Murray State Univ. ARC		
WB4NTB/4*(+WD4IEC)	578	B-12-1376
Univ. of Hawaii ARC		
KH6TM/KH6*	442	B-15-1372
North Country RC		
W2LCA/2*	446	B- 5-1366

General Mills Chemicals ARC NØBE/Ø(+WDØGCH) 377 B- 8-1348
Goose River ARC WØPU/Ø* 429 B- 7-1334
KY Mountains ARC K4VHF/4(+WD4FDS) 407 B- 8-1330
Morongo Basin ARC W6JOR/6* 415 B-10-1324
Umpqua Valley ARC W7LNE/7* 389 B-17-1324
Springfield ARC W8HG/8 417 B-24-1314
Collier County ARC WB4ZEI/4 497 B-10-1294
Free State ARC K3IVO/3* 465 B-16-1292
LERC ARC W6LS/6* 273 B-19-1292
Central Oregon RA WA7TPD/7(+WB7SOZ) 377 B- 8-1274
Clarke County ARC WB4THU/4(+WD4RWG) 498 B-15-1260
Lakes Area ARC WD5FDG/5 461 B- -1258
Totem ARC VE7ES/7 340 B-11-1250
Daytona Beach ARA K4BV/4(+WD4KEQ) 382 B-20-1226
Non-Club Group WB6SFJ/6 339 B- 3-1226
Southington ARC W1ECV/1* 391 B-10-1204
Lancaster Radio Trans. Society W3AD/3 355 B-17-1200
Pocono Amateur League K1UJ/3 334 B- 8-1196
Wilderness Ham Radio Ops. KØSG/Ø* 321 B-17-1184
Walker County ARC K4QMH 374 B-12-1156
Flint Hills AR WØHT/Ø* 327 B-10-1150
Chirps Off the Ole Block W1YE/1 244 B- 4-1127
Electron Club of Denver WØMT/Ø* 437 B-17-1124
Fidelity ARC K1NQG/1 319 B-10-1104
Albert Lea Spiderweb ARA WØFIT/Ø 318 B-15-1102
Non-Club Group K8CW/8 530 C- 5-1085
NVARC Renegades KØZQ/Ø(+WDØBSJ) 348 B- 7-1079
Chattahoochee Valley ARC K4DXZ/4 533 B-14-1066
Mavericks WBØVDE/Ø 246 B- 4-1028
Missabi Wireless Club KØMK/Ø* 358 B-15-1024
DESC RC W8TIV/8 250 B- 7-1010
Pocono AR Klub W3PM/3* 364 B- 8-1008
Pioneer ARC KØSW/Ø(+WDØHWR) 262 B-15- 992
Heartland ARC WBØTTZ/Ø* 330 B-20- 975
Salem County RC K2IYO/2 284 B- 8- 970
Walla Walla Valley RAC, Inc. W7OP/7 281 B- 8- 954
River City ARCS K6CJT/6*(+WD6CQH) 365 B-19- 940
North Platte ARC WØCXH/Ø 212 B- 4- 928
Rock River RC W9TCH/9*(+KA9BAB) 245 B-10- 919
McDowell ARC N8ACQ/8* 280 B- 9- 874
Iowa Missouri ARC KØGFV/Ø* 401 B- 6- 852
Chehalis Valley ARS K7BNN/7* 225 B-25- 844
Hiawatha AR Group WB8QXG/8 211 B-10- 830
Eugene Contesters K7GDN/7* 306 B- 7- 828
Milwaukee School of Engineering W9HHX 274 B- - 818
C T ARC W5ZDN 302 B-20- 810
Pinley Park ARC K3GP/3 277 B- 4- 794
Desert Waves ARC K6OLT/7(+WD6CPF) 163 B- 4- 784
Non-Club Group W5ND/5* 198 B-10- 782
Valley ARA WA1ZMM/1 569 C- 5- 769
Talawanda High School ARC WB8PTN/8* 216 B-10- 766
Penn Mar RC W3MUM/3 335 B-15- 764
Non-Club Group WAØHOU/Ø 254 B-14- 758
Harmonic Hill Radio League W2AAD/2 229 B- 9- 746
The Linley's W8PEQ 272 B- 3- 744
Non-Club Group WB9VFS/9 234 B- 3- 740
Skyline ARC W1RP/2* 224 B-14- 718
Polytechnic Inst. of N.Y. ARC WA2MIT/2 138 B-10- 714
Forx ARC NØND/Ø 191 B- 8- 694
Wilderness Trail ARC K4BJZ* 222 B- 8- 694
Eagle Rock RC WH7SYR/7(+WB7SEZ) 206 B-11- 644
Door County Contest Club WB9OWI/9 291 B- 7- 634
Morad(Western Electric) WA9DNZ/9* 206 B- 4- 622
Logan Coalers WD8IGN/8* 474 B- 3- 618
Peace Country ABC VE6ARC/VE6* 134 B-10- 606
Trico ARA K5DR/5 168 B- 7- 594
Yukon ARA VY1YAR* 349 C-15- 571
Phil's Follies N9AX/9* 357 C- 6- 547
Johns Nelson,Davidson,Larry Burchett, Dave Ross KØAJ/Ø 163 B- 4- 526
Lincoln County ARC WBØMLL/Ø* 176 C- 6- 488
Wheat Straw ARC WA5IPE/5* 84 B- 6- 473
Lake Region ARC KØQIK/Ø* 79 B-13- 432
Crete ARC KØJOQ/Ø* 170 B- 4- 420
Bluewater RC VE3EAR/VE3 99 B- 3- 398
Non-Club Group WD9AAO/9 53 B- 3- 362
The 55 Directors K2ME/2* 97 B- 4- 294

2A - Commercial

Hillbilly ARC K4EJQ/4 1061 B- 7-3322
Frog Pond Five K2HVR/2* 963 B- 5-2408
Wilsonville Wireless Wizards N4YZ/4(+WD4MRI) 225 B- 5- 550
Mt. Prospect ARC N9ACQ* 226 B-12- 452
Shore Point ARC WA2ESD/2 171 B-10- 384
Hill Country Mtn Toppers K5PA 104 B- - 208
Windsor-Hights RC N2EC/2 26 B- 6- 193

3A - Battery

Magnificent Seven W6WIA/6* 567 A- 7-5970
Fungo Hill RC N6RZ/6 698 A- 7-5235
SMARS W8DF/8 721 A-35-4595
JPL ARC W6VIO/6 942 B-11-2946
Burnt Out CW Operators N2GC/2* 146 A- 3-1760
Chippen Hill Assn. K1DII 70 A- 6- 925

3A

Shenango Valley AR FD Group K3LR/3(+WB3EUB) 3780 B-16-11,508
Richardson Wireless Klub K5RWK/5(+WD5JBA) 3650 B-48-10,572
Old Barney ARC N2OO/2*(+K2MOH) 2962 B-21-8656
Central Arizona Contest Assn. N7AZ/7(+WB7ERC) 2804 B- 7-8582
Central Kansas ARC KØWA/Ø(+KAØANT) 2787 B-31-8436
Poughkeepsie ARC W2YV/2(+WA2QEH) 2653 B-55-8432
Smokey Valley ARC WØCR/Ø*(+KAØARS) 3254 B-24-8296
Willamette Valley DX Club W7AC/7 2894 B-11-7766
N.A.R.C.O. K2NN/2 2631 B- 9-7486
Palo Alto ARA K6YT/6(+WA6IJP) 2352 B-43-7316
RA Technical Soc.(Ill.) N9RX/9(+WB9SIO) 2359 B-25-7278
Columbia RA K3EF/3(+WB3GDA) 2220 B-35-6982
Cherryland ARC of Traverse, Mi. W8GI/8*(+KA8AFX) 1880 B-28-6726
Sharon ARA K1JNQ/1(+WB1CPW) 2115 B- -6264
Tippecanoe ARA N9MM/9(+W9REG) 1985 B-27-6240
ARA of Tonawandas, Inc. W2SEX/2(+WA2JHW) 1846 B-30-6202
Hattiesburg & Laurel ARC W5NA/5*(+WB5IST) 2195 B-40-6172
Surrey ARC VE7SAR/VE7* 2202 B-17-6128
Satellite ARC, Inc. W6AB/6(+WA6NMI) 1751 B-50-5846
Plano A R Klub N5WB/5(+WD5GRW) 1936 B-25-5750
Five Flags ARA W4UC/4(+WB4PKW) 1923 B-25-5710
Amateur Radio Transmitting Society, Inc. W4CN/4 1710 B- -5702
Old Natchez ARC K5OCM/5(+WD5EMO) 2507 B-19-5682
Kent County ARC K3BY/3 1886 B-18-5582
Libertyville and Mundelein ARS K9IW/9(+WB9GPY) 1612 B-45-5474
The Lake County ARC W9LJ/9 1585 B-60-5430
Wis. Rapids ARC W9DQA/9 1863 B-35-5410
Marcom K3CZ/3 1011 B- 9-5404
Club R.A. De La Vallee Du Richelieu VE2CVR/VE2 1356 B-12-5288
Redwood School ARC K6FB/6 1989 B-10-5286
Milford ARC N8AS/8(+WD8EGD) 1812 B-36-5246
Motor City RC W8MRM/8(+WD8QDH) 1676 B-23-5232
Shiawassee ARA, Inc. W8QQQ/8*(+WD8JJM) 1633 B-10-5174
N.E. Ga. ARC N4SF/4 1732 B-20-5148
AR Mavericks K8KL/8(+WD8NPC) 1864 B-25-5046
HESEA ARC W6QL/6(+N6ACL) 1444 B-25-4916
Gadsden ARC K4JMC/4 1615 B-50-4876
Adams and Brown County ARES W8ON/8(+WB8TWA) 1570 B-26-4860
Redwood Country Contest Club AA6DX/6 1639 B- 7-4779
St. Charles ARC KØBM/Ø 1530 B-25-4768
PennARC WA3RCA/3*(+WA3WSS) 1634 B-22-4743
Aroostook ARA K1JK/1(+WB1DED) 1581 B-15-4740
New Providence ARC W2SE/2(+WB2WDW) 1268 B-20-4718
Hamfesters RC W9AA/9*(+WD9IIX) 1386 B-20-4702
Alvin Comm. Col. ARC K5IW/5(+WB5OGZ) 1652 B-39-4682
South Eastern Michigan ARA K8FC/8(+WD8NKC) 1447 B-31-4662
ARINC ARC W3ZH/3(+WB3IQW) 1507 B-15-4642
Univ. of Tennessee ARC N4VI/4* 1418 B-14-4608
Non-Club Group K5OB/5(+KA5AXY) 1349 B-30-4574
Motorola ARC of Arizona W7ER/7 1567 B-12-4558
Green County Chapter 10-10 Int'l W5NNL/5 2084 B-14-4518
Heart O' Texas ARC, INC. WD5IAF/5(+KA5ADK) 1547 B-51-4476
Non-Club Group N8CC/8 1502 B- -4464
Bellflower ARA WA6SFM/6 1370 B- 9-4462
Findlay RC W8FT/8* 1307 B-25-4442
Champlain Lookout FD Group VE2CV/VE2* 1391 B-18-4434
Vicksburg ARC W5XX/5(+WB5OJT) 1497 B-25-4430
TASBAR & RA of Frackville W3VA/3 1347 B-16-4392
Johnson County RA Club WØERH/Ø*(+WDØDZE) 1407 B-40-4350
Trident ARC N4EE/4(+WD4ESP) 1558 B-30-4308
Johnson City RA K4SE/4(+WD4IEX) 1373 B-19-4249
Santa Barbara ARC K6TZ/6(+WD6EGI) 1422 B-25-4224
COMSAT/IBM/SBS Radio Clubs W3NN/3(+KA3AKV) 1286 B-20-4222
Hazelton ARC W3SJ1 1598 B-28-4200
Mobile ARC W4IAX/4(+WD4AGS) 1145 B-50-4170
Billerica ARS N1RR/1(+KA1AIE) 1285 B-24-4168
Southern Peninsula AR Klub N4DJ/4(+WD4FTK) 1470 B-38-4148
Gopher Creek Group VE4PG/VE4* 1150 B-20-4122
Williamsburg Area ARC K4RC/4 1272 B-24-4118
Central Michigan Contesters W8HW/8(+WD8RBP) 1304 B-15-4080
Denton County ARC W5NGU/5(+WD5IKX) 1404 B-30-4074
Anne Arundel RC W3VPR/3(+WB3KIW) 1154 B-25-4054
Mitre Bedford ARC W1JR/1(+W1ZFI) 1306 B-17-4016
Warminster ARC K3KT/3(+KA3AIK) 1359 B-25-4012
Mississippi Coast ARA W5BW/5 1586 B- -4002
Arizona ARC W7IO/7(+WB7UMV) 1614 B-45-3984
Carbon ARCS N3IK/3(+WB3JZA) 978 B-20-3932
Boulder ARC WØDK/Ø 1224 B-40-3930
Band Dit-Dahs K2MP/2 1245 B-14-3930
Western Illinois ARC W9AWE/9 1457 B-30-3907
Comm. Club of New Rochelle W2XV/2 1385 B-30-3882
Radio Club De Quebec VE2CQ/2 1071 B-14-3878
West Allis RAC W9FK/9 1228 B-16-3856
Utica ARC K2IQ/2 1494 B-25-3746
Redwood Coast ARC W6OS/6* 1156 B- 8-3708
Syosset High School AR and TV Club WA2JAS/2 1450 B- 6-3690
Non-Club Group W9LTU/9 1007 B-27-3684
Orange Park ARC K4SP/4(+WA4MST) 1137 B- -3684
Estero ARC W6KW/6 1225 B-16-3674
Acton ARC W1EKO/1(+WB1GZK) 984 B-15-3606
Lower Columbia ARA W7DG/7*(+WB7QFJ) 901 B- 3596
Lakeview ARA W9SE/9* 1523 B-11-3584
St. Louis ARC KØLIR/Ø 1085 B-21-3534
Stockton ARC W6SF/6 1205 B-35-3512
Phd ARA, Inc. WAØUGI 1018 B-37-3500
Ole Virginia Hams ARC N4RA/4(+KA4BPJ) 1114 B-25-3460
Saline County RC W9ZX/9(+WB9QAN) 1399 B-20-3476
Otter Creek Rebellion W5KI/5 1039 B-10-3370
Culpeper ARA N4JR/4 891 B-16-3364
Penn State ARC K3CR 1057 B- 9-3348
American Red Cross Emergency RC WB2QBP/2* 1102 B-25-3286
Smokey Mountain ARC W4OLB/4(+WA4CNW) 1010 B-15-3258
West Seattle ARC W7AW/7 904 B-18-3244
Autonetics RC N6AF/6 1095 B-12-3210
Mid Missouri ARC KØETY(+WDØECO) 865 B-20-3210
William Penn RC W3FPC/3 771 B- 6-3148
Southcentral Conn. ARA W1GB/1 1087 B-25-3144
Carson ARC W6UNE/6*(+WA6ROR) 1072 B-29-3100
Humboldt ARC WA6ICB 1314 B-45-3094
Copper Country ARA W8CDZ/8(+WD8IVI) 866 B-22-3074
GE Evendale ARS K8LUC/8 749 B-20-3060
South Georgia ARC WD4LRD/4* 1232 B-14-3052
North Hills ARC of Pittsburgh, Pa. N3FM/3* 841 B-20-3050
Lake Area Radio Klub KØOTZ/Ø*(+WDØELT) 1193 B-12-3048
Port City ARC W1WQM 826 B-14-3020
Great Bay R A WB1CAG/1(+WA1UIU) 1015 B-15-3010
Forsyth ARC W4HG/4*(+WD4EQK) 1011 B-35-2992
Boston ARS K1YHM/1(+WB1HBZ) 1000 B- 7-2988
Independent ARC NØII/Ø 989 B-15-2984
Bunker Ramo Westlake Village ARC WB6OBQ/6 1222 B-12-2958
West Georgia ARS W4FWD/4* 1136 B-18-2953
Foothills ARC W3IBW 1325 B-15-2950
Old Pueblo RC W7GV/7(+WB7RSF) 1067 B-30-2942
East Kootenay ARC VE7IP/VE7 754 B-13-2941
Suffolk County RC W2DQ/2 982 B-13-2922
Hub City RC WRØTUJ/Ø(+WDØFET) 1119 B-28-2898
Virginia Beach ARC WA4TGF 808 B-10-2896
CRA De Valley-Field VE2CEV/2* 649 B-12-2896
The Denver RC WØTX/Ø* 1227 B-16-2876
Ellsworth AWA K1BZ/1(+K1WJY) 897 B-22-2802
Great South Bay ARC K2IZ(+WA2HQB) 850 B-47-2800
Albany ARES/Races WC2ACJ/2 676 B-10-2758
S.E. Washington VHF Society W7SX/7 961 B- 9-2692
Titusville ARC K4BZJ/4(+WA4CUO) 1128 B-16-2666
Nutley ARS W2GLQ/2*(+WA2TNN) 813 B-25-2651
Electronic Museum ARC WB6WSL/6* 768 B-20-2642
Robert Moses Junior H.S. ARC WB2RCJ/2* 405 B-12-2640
Wellesley ARS W1TKZ/1 732 B-24-2636
London ARC VE3LON/3 1246 B-22-2628
Bellow Bellers KH6DL/KH6* 1089 B-18-2618
Coconino County ARC W7YS/7(+WB7OWW) 656 B-18-2604
Pasadena RC W6KA/6 1012 B-20-2586
Wescon II W1ID/1 897 B-18-2526
Rip Van Winkle ARS W2FSL/2(+WA2WRW) 813 B-40-2522
Manatee ARC K4GG/4(+WD4CRS) 1050 B-30-2516
The Farout ARC WB8SMC/8 894 B-20-2512
Jones County Rag Chewers WØGN/Ø* 742 B-12-2510
Kamloops ARC VE7UT/7 810 B-12-2502
Wabash Co.(Ind) ARC, Inc. W9JOO/9* 771 B- 6-2482
McDonnell Douglas - St. Louis ARC WAØCGV/Ø(+WDØHHU) 792 B-25-247
Mesquite Horned Toads K5JM/5 909 B- 7-247
Murphy's Radio Class W6MK/6(+KA6ALK) 896 B-106-246
Radio Amateur Mobile Society W6HIR/6 421 A-11-245
Elkhart Red Cross ARC W9XD/9 847 B-15-2450
Ten-3,Independence FM,ARCS and Society for the Preservation of AR WHØKCD/Ø 702 B-15-243
Springhill AC N5II/5* 1034 B-16-241
Santa Clarita ARC W6JW/6 781 B-24-239
Austen ARs., Inc. W5KA/5(+WD5GAU) 666 B-30-239
Livingston AR Klub K8PJ/8(+WD8RVI) 695 B-20-238
Falmouth ARA W1HQH 660 B-15-237
McHenry County Wireless Assn. W9KTB/9(+KA9ATS) 677 B-25-237
Berry's Mtn. ARC W3TS/3(+WB3HHA) 542 B- 8-237
Lancaster FD Oprs. Club N3AY/3 685 B-20-236
Mid-Atlantic ARC WB3JOE/3 771 B-32-236
Detroit Metropolitan RC W8UMI/8 760 B- 8-228
Egyptian RC,Inc. W9AIU/9* 798 B-27-226
Marin ARC W6SG/6 637 B-20-225
Princeton ARS N4IL 681 B- -225
Neenah-Menasha ARC W9ZL/9(+WD9HAT) 604 B-25-225
Welland County ARC VE3WCA/VE3* 678 B-12-225
Valley ARA W4XD/4(+WD4JEK) 597 B-25-225
Albany ARA K2CT/2(+WB2YBM) 632 B-20-221
Milford ARC W8YDK/8 697 B-20-218
Mt. Baker ARC K7SKW/7(+WB7POW) 1616 C-47-218
Nat'l Inst. of Health RAC K3YGG 805 B-13-218
York RC W9PCS 612 B-18-217
Queen City Emergency Net W8VVL/8 664 B-35-214
Hellgate ARC W7PX/7 513 B-10-214
Non-Club Group W7VJD* 773 B-10-212
Rogers County ARC N5TM/5* 677 B- -211
Murdocksville Modulators WA3IDX/3 867 B-16-210
Thief River Falls ARC WØMBC/Ø 729 B- 6-208
Thornhill RAC VE3RAT/3 760 B-14-206
Ft. Dodge ARC, Inc. WØUL/Ø 708 B-20-206
Chesapeake Bay RA WA3SFJ/3 721 B-11-205
Hernando County ARA K4ZC/4 591 B-10-205
Catalpa ARS W8CQ/8* 686 B-20-204
Sand Hills ARC WØMI/Ø(+WDØGAS) 774 B-38-203
Delta Co. ARS K8ZAS/8 530 B-10-202
Non-Club Group WØZR/Ø*(WBØZUV) 469 B- 8-201
Aero ARC W3PGA/3* 664 B-16-196
Lawton-Fort Sill ARC W5KS/5 609 B-21-193
The Wood Tic-Key Clicks VE5RF/5 648 B- 5-192
Wenoca RC WB4KIF/4 620 B- 8-191
Stamford ARA WA1RSD*(+WB1GGP) 536 B-17-189
Cape Fear ARS WB4YZF/4*(+KA4CAF) 614 B-22-188

Bedford County ARS
W3ZW/3 599 B-12-1852
Southeast ARC
K8EMY/8(+WD8ILB) 594 B-23-1800
Fargo Moorhead Amateurs
WD@CCL/@ 666 B-12-1794
Telco ARC
W@MPH/6*(+WB6IAE) 682 B- 8-1794
Very Fine Operators
N6KG/6* 419 B- 7-1792
Alamo DX Amigos
K5DB/5 764 B-10-1754
Morgantown ARC
K4VLY/4 654 B-11-1742
Non-Club Group
W@QEY/@ 584 B- 5-1732
Skyview RS
K3MJW/3* 541 B-27-1710
Lake Success RC
W2YKQ/2 651 B-16-1704
Foothills ARC
WA8EEC/6* 546 B-23-1698
Wheaton Community RA
W9CCU(+WB9TTE) 1262 C-42-1693
Cass County ARC
W9YMW/9 482 B-20-1688
Porter County ARC
N9RD/9 523 B-78-1686
Tompkins County ARC
AA2T/2 600 B-12-1686
Non-Club Group
VE4RB/4 537 B-18-1684
Menominee Falls ARC
K9HH/9 518 B-18-1676
Lumberton ARC
W4JZA/4 512 B- 7-1658
Bellbrook ARC
WD8DPX/8 555 B-48-1646
Vero Beach ARC
W4OT/4 775 B- 9-1624
El Paso ARC
W5ES/5 529 B-35-1620
Ham Radio Club
K1RCI/1 510 B-40-1618
Ogdensburg ARC
N2MD/2(+KA2AVZ) 510 B-19-1614
Eagle Pass ARC
WA5MJW/5 498 B- 4-1610
Vineyard Amateur Modulating, Practically Independent Radio Exciters Society
K1UR/1 483 B- 7-1604
San Juan County ARC
N7JN 513 B-11-1600
Mike & Key RAC
N6SR/6 586 B-11-1553
Lake Country RC
K5XO/5 566 B-15-1542
Navarro Amateur Radio Club, Inc.
WD5JOT/5(+KA5BAK) 549 B-17-1540
Viking ARS
WA@CJU/@* 336 B- 6-1528
Fullerton RC, Inc.
W6ULL/6(+WD6HNJ) 433 B-22-1520
Saunders County ARC
WH@ICY/@ 453 B-12-1514
West Bank Breakfast Group
N5GJ/5 579 B- 8-1508
Mich-A-Con ARC
N8LT/8 494 B-12-1500
Enfield RA's Group
W1AX/1(+WB1GWL) 467 B-12-1498
Central Iowa ARC
W@SJ/@ 553 B-16-1492
Longmont ARC, Inc.
WB@VFN/@ 525 B-12-1490
Bay County ARC & Naked Hams
W5HYZ/5 361 B-10-1488
Mid-Michigan ARC
W8SHP@* 565 B-28-1460
Over The Hill Gang
W7EVI/7 459 B- 7-1462
Delaware - Lehigh ARC
W3OK/3 487 B- 9-1450
Clatskanie ARC
W7CJV/7(+WB7UPC) 422 B- 9-1448
Solano County ARS
WB6GDX/6 574 B- 9-1448
Mid-Range ARC
W0EL/@ 443 B-12-1414
Cedar Hill ARC
WB@TJT/@ 480 B- 5-1396
Charleston AFB Mars Group
WR4KLR/4 504 B- 6-1372
ARC of Savannah, Inc.
W4HBB/4* 490 B-17-1362
Straits Area RC
W8GQN/8 330 B- 9-1354
Club VE2CMH
VE2CHM/VE2 399 B- 9-1346
Austin ARC
WA@ACH/@* 457 B-30-1328
Hualapai ARC
WA7LAZ/7 408 B-18-1320
Non-Club Group
WB6JRT/6 414 B- 3-1320
McKean County ARC
W3VV3(+WB3CXC) 430 B-10-1316
Rock Point ARC
VE5TT/VE5 346 B- 1300
Naval Research Lab ARC
W3NKF/4 748 C-15-1295
North Peninsula Elec. Club
W6PMK/6*(+WD6FYS) 439 B-11-1294
Omik Electronic Comm. Assn.
Cincinnati Chapter
W8DWJ* 434 B- 1294
CAREN
W5SEI/5 390 B-15-1292
Jackson Co. ARC
K8NCJ/8* 388 B-14-1290
Southeast Louisiana ARC
W5SET/5* 353 B-12-1282
North Suburban Wireless Assn. and North Star Hibanders
K@WH/@ 451 B-10-1280
Dekalb County Amateur Club
W4JVZ/4 426 B- 1260
Eastern Airlines Club
WB4PQG/4 327 B- 6-1244
Emporia ARS
WH@DUN/@ 385 B- 9-1224
Runstone RC
WA@UVM/@* 344 B- 8-1224
Metro State College ARC
WB@PEH/@ 293 B- 5-1174
South Canadian ARS
W5OUJ/5 772 C- 8-1172
Leeward Oahu ARC
KH6MOP/KH6 350 B- 1170
Worthington ARC
WB@NFX/@* 513 B-12-1166
Glasgowsite ARC
K3NI/3 214 B- 8-1140
Allendale ARC
WD@PNG/8*(+WD8JKU) 271 B- 7-1136
Anchorage ARC
KL7AA 356 B-12-1132
Briarpatch ARC
N4VL/4 325 B-12-1126
KPAA Radio Comm. Club
N2AL/2 374 B-20-1124
Minot ARA
K@AJW/@(+KA@AGP) 275 B-25-1106
Miami County ARC
K9ZEV/9*(+KA9BAL) 326 B-12-1098
Valley of the Moon ARC
WB6DWY/6 283 B- 7-1098
Wa-Wa-Tay-Se Water Wonderland Way-word Wizards
N8WC* 389 B- 1078
Florence ARC
W4UIL/4* 386 B-13-1072
Island School ARC
KH6IFY/KH6* 341 B- 6-1064
Detroit Diesel Allison RC
K9AOM/9 435 B-15-1060
Bayonne Civil Defense ARC
W2ODV/2 312 B-14-1058
Moosehorn ARC
KL7IEJ/KL7* 322 B-18-1050
Winslow ARS
W9CZH/9* 222 B- 9-1008
Bluff ARC
WD@AXV/@* 298 B- 8-1006
Shelter Island ARC
WA2LQS/2 272 B- 3- 969
Western Arizona RC
K7UJ/7* 283 B- 9- 964
Rockbridge ARC
WA4LJI/4 235 B- 7- 958
Non-Club Group
K7VED/7 299 B- 4- 920
McMurdo's Moo Meadow Monsters
W7XI/7* 215 B- 5- 912
Elmwood Park ARC, Inc.
K9YHB/9* 230 B-15- 882
Tri State ARS
W9OG/9* 181 B-12- 880
Cresenta Valley ARC
W6HS/6* 374 B-27- 864
Upper Valley
N8ED/8 514 C-12- 847
Marblehead Wireless Assn.
W1WA/1* 183 B- 5- 836
Matanuska ARA
KL7JFU(+WL7AAX) 200 B-12- 806
Playground ARC
W4ZBB/4 218 B- 7- 804
Carleton ARC
VE1CAC/VE1 213 B- 7- 778
Keowee - Toxaway ARC
WD4AAD/4 234 B- 8- 768
Coastal Area Repeater Society
AB4B/4 168 B-15- 756
ARC of Central Wisc.
K9FYM/9(+WB9SJN) 148 B-10- 710
Southern Ore. ARC
K7LIX/7(+WB7TSX) 131 B-10- 700
Columbia ARS
K4IOD/4*(+WD4KFH) 149 B-13- 652
Dept. of Health ARC
WB6NFY/6(+WD6FIW) 212 C- 5- 616
Henry County ARC
K8TII/8 197 C-12- 564
Emmett ARS
WB7FDM/7(+WB7WQL) 54 B- 7- 468
Society for Preservation of AR in Kodiak
AL7AB/KL7 51 C- 6- 406

3A - Commercial

Jersey Keg Partyers
N2CI/2(+K2ZQ) 1211 B-14-3702
Rockingham Co. ARC
WD4FVP/4 667 B-28-1838
Little Mexico Radio Oprs.
WA3ZKL/3 327 B- 5-1334
Loudon County ARC
WA8WVJ/4 409 B- 7-1178
Newton ARC
W@BZN/@* 431 B- 8-1176
Stuyvesant High School RC
W2CIF/2 382 B- 5- 772
The Finns
K8TUF/9 342 B- 4- 684
Virginia ARA
W4FEG/4 559 C-11- 569

4A - Battery

Ringgold ARC
W4ABZ/4 1402 A-25-9930
Tektronic Employees RAC
K7AUO/7(+WB7VGQ) 1211 A-15-9705

4A

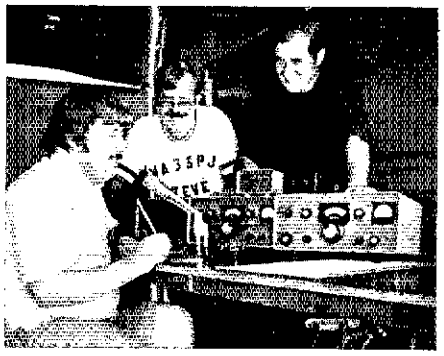
Barf
N3AD/3(+WB3LHK) 3756 B-22-11,554
Texas DX Society
K5DX/5 3539 B-25-10,438
Fort Wayne RC
W9TE/9(+WD9DGA) 3143 B-75-9985
Foothills ARS
K6YA/6(+WD6CKD) 3172 B-20-9176
United R A Club
K6AA/6(+KA6AAA) 3130 B-60-8810
Alamance ARC
K4EG/4(+WD4JFG) 2857 B-25-8160
Albuquerque Dxers & Kirtland ARC
N5RR/5(+WD5IWP) 2337 B-11-7278
Natchaug ARA
W1IKI(+WB1CCL) 2346 B-18-7082
Ozaukee County ARC
W9LO/@(+WD9ISS) 2465 B-29-7050
Inter County ARC
W2DMM/2* 2484 B-15-6732
Central Florida DX Assn.
W4SJ/4 2108 B-12-6516
Oak Ridge ARC
K4PJ/4* 1900 B-25-6234
Columbus ARC, Inc.
K4KS/4*(+WD4IRQ) 1878 B-23-6098
Ottawa ARC
VE3RCA/VE3 1894 B-60-5964
North Shore ARC
VE3NSR/3 1756 B-33-5746
Two Rivers ARC
W3OC/3 1583 B- 5558
Kettle Moraine RAs
W9HE/9(WB9WFC) 1823 B-43-5548
Reading RC
W3BN/3*(+WB3HYQ) 1718 B-25-5382
Northern Ohio ARS
K8KRG/8(+WD8JUQ) 1665 B-90-5352
Scientific-Atlanta ARC
N4HI/4 1356 B-18-5326
Rochester ARC
W@MXW/@*(+WB@ONE) 2378 B-27-5306
Elgin Amature RS
W9IKN/9(+KA9ATG) 1694 B-30-5048
Monroe County Radio Comm. Assn.
WA8MTX/8* 1533 B-20-4810
Wichita ARS
WA5CTD/5 1600 B-30-4660
Saratoga County R.A.C.E.S.
N2FGS/2 1434 B-16-4580
Cary ARC
N4NC(+WA4NRR) 1228 B-36-4428
Fort George ARC
VE7FG/VE7 1419 B-23-4192
Brightleaf ARC
W4AMC/4(+WD4JFR) 1211 B-35-4122
Auburn ARA
K2ET/2* 1177 B-40-3988
Huron Valley ARA
W8KGG/8* 1127 B-13-3962
Tri-Town RAC
W9VT/9(+WD9GGY) 1269 B-42-3958
South Bay ARS
K6QHQ/6(+WD6ETM) 1333 B-23-3940
Salem ARC
N7ES/7*(+WB7WTZ) 1055 B-50-3918
West Jersey Radio Amateurs
W2JUG(+KA2BAO) 1128 B-23-3879
Petaluma OX and Experimenter Soc.
N6OJ/6(+WD6GJH) 1376 B-15-3852
Peel ARC
VE3CGE/3 1096 B-26-3848
Saline County ARC
K5NE/5 1247 B-22-3778
Quinnasquewitt R A
W1EKT/1 1042 B-40-3651
Arlington ARC
W4GA/4(+WD4RCA) 1478 B-28-3622
Chelmsford ARA
W1XH/1(+WB1CDD) 972 B-12-3605
Cowichan Valley ARC
VE7CVA/VE7* 1054 B-31-3582
Confederate Signal Corps
W4VTA 1313 B-15-3570
York FD Assn.
W3HZU/3(+WB3GRA) 1103 B-27-3562
Nashua Area RC
W1YR/1(+KA1ARM) 1154 B-20-3478
Kentucky Colonel RS
WA4IGS/4(+WD4OJC) 1089 B-40-3472
The Algoma ARC
VE3SOO/3* 1206 B- 3446
Van Wert ARC
W8FY/8(+WD8ASG) 1131 B-34-3440
Iowa-Illinois ARC
W@GA/@*(+WD@EDH) 1132 B-30-3422
Chattanooga ARC
W4AM/4 1346 B-31-3410
Lincoln ARC,Inc.
K@KKV/@(KA@AZA) 1070 B-45-3373
Ak-Sar-Ben ARC
W@EQU/@(+WD@HPK) 1169 B-65-3357
Marshall RC
W@BMJ/@(+WD@HRP) 1272 B-34-3316
Middlesex ARS
W1EDH/1 998 B-30-3246
Lehigh Valley ARC
W3OI/3 954 B-14-3184
Danville ARS
W4XQ/4 1048 B-17-3170
Crystal RC
K2SW/2 988 B-14-3147
Portland Amateur Wireless Assn.
K1SA/1(+KA1AVE) 2280 C-25-3116
Orchard Contesters
K8LK/8 729 B- 5-3112
Central Georgia ARC
AA4TT 1132 B-21-3090
Wiregrass ARC
W4AZPI/4(+KA4BUI) 1114 B-25-3086
New River Valley ARC
N4QA/4(+KA4BVQ) 882 B-14-3082
Kalamazoo ARC
W8VY-8(+KA8AOG) 800 B-25-3062
Blue Ridge ARS
W4WK/4 802 B-25-3052
Twin Base ARC
W4MF/4 886 B-24-2988
Bristol ARC
W4VS/4 781 B-20-2966
Andrews AFB Mars Team
K3AF/4 1221 B-43-2916
Clallam County ARC
W7FEL/7 816 B-17-2890
Martin County ARA
K4ZK/4 992 B-20-2874
Broome County International All Stars
N2HR/2*(+WA2PHA) 946 B-25-2862
Dallas ARC
W5FC/5(+WB5OWD) 897 B-44-2844
Panoramaland ARC
K7YB/7 835 B-10-2772
Framingham RC
W1FY/1 800 B-17-2771
Whitman ARC
WA1NPO/1(+W1CAS) 769 B-19-2762
Chickasaw ARA
K5FC/5 869 B-10-2732
Greensboro-Guilford County ARES
K4DG/4 809 B-22-2730
Miami ARC
K5JOA/5 833 B-17-2706
Davenport RAC
W@BXR(+KA9ALC) 774 B-25-2660
Lincoln Trail ARC
W4BEJ/4(+WD4KWZ) 899 B-20-2642
Cabarrus ARS
W4KJV/4 871 B-31-2624
Niltany ARC
W3VA/3*(+WB3GDX) 661 B-20-2607
Granite State ARA
W1TF/1(+WB1BSQ) 912 B-15-2600
Dade RC
W4NJU/4 735 B-15-2570
New Bern ARC
WD4JMS/4(+WD4PDZ) 958 B-25-2534
Lexington ARC
K1CE/1*(+WA1YML) 774 B-20-2516
Tulsa Repeater Organization
W5OK/5 757 B- 2504
Algonquin ARC
N1CW/1 951 B-15-2494
Ware RC
WA1ESQ/1 754 B- 5-2470
Assoc. R A of Long Beach
W6EI/6* 769 B-13-2454
St. Paul RC
K@AGF/@* 771 B-17-2454
Paso Robles ARC
W6LKF/6 678 B-13-2378
Griffiss ARC
W2TPB/2 674 B-15-2352
Newark ARA
K8LJ/8*(+WD8RIF) 578 B-20-2304
Augusta Emergency AR Unit
W1TLC/1* 742 B-10-2272
Santa Cruz County ARC
K6BJ/6 822 B- 9-2258
Schuylkill Amateur Rptr. Assn.
W3EEK/3* 1445 C- 8-2158
Windsor ARC
VE3OW/3 509 B-18-2136
Mercer County ARC
N8XR/3(+WB3IIA) 625 B-22-2132
Kings County RC
W2RAK/2* 715 B-16-2120
Kings County and N.A.S. Lemoore ARCs
WA6SOM/6 832 B-18-2114
Central Carolina ARS
K4JUO/4 756 B-12-2072
Big Island ARC
AH6B/6(+KH6JRM) 606 B-15-2050
HFEA ARC
K6QEH/6 631 B-18-1996
Tri-Lakes ARC
K@EI@/@(+WB@ZVQ) 572 B-15-1966
Cosi Radio Students
WB8YOU/8(+WD8NAQ) 524 B-20-1962
Sydney ARC
CG1CK/1* 622 B-18-1959
Clark County ARC
W9WW1/9(+WB9WDW) 559 B-30-1942
Lebanon Valley Soc. of RA
W3RE/3 656 B-11-1904
Old Post ARS
W9EOC/9* 1266 C-21-1862
Tri-City RAC
W@VQN/@(+WD@BQG) 597 B-12-1820
Wallaceburg DX Assn.
VE3BSM/3 453 B- 6-1815
Highland & Clinton County ARA
W8WMQ/8 534 B-18-1760
Spokane RAs
W7NBR/7(+K/ANH) 484 B- 9-1724
Piqua RC
W8SWS/8(+WD8BFN) 465 B-24-1688
Rogue Valley ARC
W@OEK/7 466 B- 7-1667
Hampden County RA
W1NY/1 446 B-20-1663
Coastside ARC
WA6TOW/6* 542 B- 8-1654
Gratiot ARA
W8AWF/8 544 B- 7-1647
Cape Cod RC
K1ES/1 554 B- 5-1646
Orillia ARC
VE3ORC/3 446 B-10-1646
Boeing Employees ARS
K7NWS/7 541 B-48-1640
Casper ARC
W7VNJ/7* 481 B-18-1624
North Shores ARC
K6HAI/6 543 B-12-1586
Stu Rockafellow ARS
W8NJH*/(+WD8LAP) 498 B-23-1586
Cape Ann ARA, Inc.
W1RK/1 413 B- 5-1584
Non-Club Group
K8DMR 577 B-17-1582
Eldorado ARC
N6YT/6(+WB6ZJS) 425 B-30-1542
Club De RA Outaouais, Inc.
VE2CPO/VE2 550 B-15-1528
Garden State ARA
W2ISA 429 B-13-1518
Shasta Cascade ARS
W6VVO/6*(+WD6FEH) 490 B-12-1506
Fond Du Lac ARC
W9LUQ/9*(+WB9TRN) 423 B-10-1472
Bowie ARC
K3PI/3 821 C-12-1460
Van Zandt Co. RA
W5AJ 377 B- 7-1448
East Aurora DX Club
K2ZUW/2*(+WB2VZT) 345 B- 8-1392
Golden Empire ARC
W6RHC/6*(+WB6AZK) 463 B-10-1382
Argonne ARC
W9QVE/9 350 B-12-1342
Allegany Highlands ARC
W2SAM/2(+WA2JHD) 303 B-12-1310
Dillon C I W ARC
WD4EDM/4 309 B-15-1298
Non-Club Group
W1DHT 365 B-17-1298
St. Clair ARC
K9GXU/9 629 C- 9-1245
White Mountain ARC
WA1VIP/1 355 B-10-1218
Trouble Makers Net
W4ERL/4 422 B-13-1216
Fresno ARC
W6TO/6 309 B-50-1149
Mt. Vernon A.C.
K8EEN 295 B- 9-1136
Sabine Parish ARC
K5ABA/5 258 B-25-1128
Kishwaukee ARC
WA9CJN/9 314 B-24-1120
Jefferson Barracks ARC
K@ZFK/@(+WD@HWQ) 253 B-17-1102
Fayette ARA
WD8BNG/8 300 B-12-1074
Cascade RC
W7EK/7 283 B- 5-1016
American Radio Party
W6PNT/6 278 B- 4- 980
Ramona R C, Inc.
K6SIR/6 257 B- 6- 914
Southside ARC
W8@UAV/@ 205 B- 6- 860
San Fernand Valley RC
W6SD/6 245 C-12- 695
FAMC & BRA RA
W8@HZL/@ 234 B-12- 645
Chautauqua County Amateur FM
K2EY/2 82 B-15- 574

4A - Commercial

Telephone ARC of Manhattan
W2FWG/2 580 B-19-1868
State Line ARC
WB5YUJ*(+WD5IXE) 623 B-30-1514

5A - Battery

WR6AKU Repeater Group
N6WF/6* 1103 A- 8-6650
NE Iowa Radio Amateur Assn.
W@MG*(+WB@ZIZ) 593 A-20-5695



The Reading RC with a *cast* of thousands . . . well, at least one. (*W3BN/3, 4A*)

WD9ESM of the Door County Contest Club handles the 75-meter phone chores. (*WB9OWI/9, 2A*)

FD 1978 for the McDonnell Douglas Astronautics West ARC. (*W6VLD/6, 2A*)

Fusion ARC
W2FJ/2(+WB9YEF) 556 A-14-4860
East Side H.S. ARC
WD4EOL 559 A-27-4155
Non-Club Group
W8EV/8 177 A- 5-1020

5A

Motorola Engineers - Schaumburg
K9RO/9(+KA9AZZ)2202 B-20-10,110
Birmingham ARC
W4CUE/4(+WD4JUI) 3385 B-75-9112
Northwest ARC
W9LM/9* 2837 B-43-8982
Westchester Emergency Comm. Assn.
N2EF/2 2468 B-55-8054
Portsmouth ARC
W4POX(+WA4WUK) 2626 B-20-7912
Nevada ARA
W7YN/7(+KA7AVL) 2472 B-45-7708
Ampex Employees ARC
K6GE/6 2173 B-15-7180
Orange County ARC
W6ZE/6(+WD6GSK) 2599 B-65-6524
Schaumburg ARC
WB9TXO/9(+WD9HRL) 2141 B-35-6470
Polk ARC
W4TJM/4 2234 B-35-6466
Schenectady ARA
K2AE/2(+WB2TZC) 1905 B-21-6262
Kilocycle Club of Fort Worth
W5TI/5(+WD5IFG) 1902 B-100-5998
Grumman ARC
WA2LQO/2(+WA2NCG) 1688 B-48-5794
Eastern CT. ARA
K1MUJ/1(+WB1EAT) 1639 B-23-5712
Ashheim ARA
K6SYU/6* 1776 B-50-5686
Club R A Dunord-Quest De Quebec
VE2BLW/2 1751 B-15-5542
Fair Lawn ARC
WH2RLQ/2 2039 B-26-5474
Litton Data Systems ARC
K6HD/6(+K6BUT) 2137 B-26-5290
Saginaw Valley ARA
K8DAC/8(+WD8RIN) 1527 B- -5052
W. Car. ARS
N4AA/4(+WD4HQP) 1561 B-22-5026
Garland ARC
K5QHD/5(+WD5IHY) 2036 B-50-4960
Carthage ARS
N0ES/0*(WD0GKC) 1326 B-34-4588
RAS of Norwich
W1LW/1(+WB1DJL) 1543 B-33-4479
Citrus Belt ARC
W6IRT/6 1250 B-15-4442
Monessen ARC
W3CSL/3 1427 B-38-4340
Kingston ARC
VE3KAR/3 1220 B-23-4218
N. Bay ARA
K6GL/6(+WA6BTR) 1170 B-20-4178
East Whittier RC
W6NI/6 1545 B-15-4170
Champion Valley ARC
W2UXC/2 1397 B-18-4040
Rio Hondo ARC
W6GNS/6 1653 B-26-4022
Capeway RC
W1AN/1 1178 B-20-3856
Irving ARC
WA0CKF/5(+KA5ARQ) 1533 B-50-3814
Delaware ARA
W9DUK/9(+WD9HUX) 1107 B-32-3780
Lapeer Co. ARA
N8NE/8(+WD8PCV) 1187 B- -3752
Clinton ARC
W0CS/0* 1018 B- 8-3722
Genesee County RC
W8ACW/8 1245 B-15-3686
Middle Country ARC
K2VL/2 1043 B-12-3640
Manchester RC Inc.
W1KK5/1*(+WB1GIF) 1020 B-30-3636
Radio Central ARC
WA2UEC/2 1267 B-20-3632
Abington ARC
K3GSG/3 1218 B-23-3614
North Bay ARC
VE3NBC/VE3 1043 B-25-3613
Scottsdale ARC
K7TR 1271 B-19-3602
PFAR East
W8NF/8 990 B-16-3592
Harrisburg RAC
W3UU 998 B-25-3582
Macon ARC
W4BKM 1347 B- -3548
Kennehoochee ARC
W4BTI/4 1112 B-42-3546
Onslow ARC
N4EN/4 1402 B-22-3484
South Pickering ARC
VE4SPC/3 1161 B-20-3336
Non-Club Group
K6CA/5(+WD5DQN) 909 B-28-3318
Sioux Falls ARC
W9ZWY/9(+WD9ETF) 949 B-35-3308
East Texas VHF-FM Society
WA5LDL/5 1223 B-30-3264
Dupage ARC
W9DUP/9(+WD9FXC)
Stonewall Jackson ARA 1124 B-35-3242
KB4YL/8(+WD8MZU) 919 B-20-3222
Las Vegas RAC
K7UGE/7 999 B-25-3216
Bismarck ARC
W0ZRT/0 1056 B-18-3208
Roanoke Valley ARC
W4CA/4 1018 B-30-3206
Orange County ARC
N2CCF/2(+WB2LQI) 1142 B-20-3118
Massasoit ARA
W1MV/1 817 B-15-3080
Vienna Wireless Society
K4HTA/4* 989 B-25-3036
Thomaston Area ARC
W4OHH/4 1198 B-20-3030
Oakville ARC, Inc.
VE3HB/VE3 1101 B-22-2983
Spokane Dial Twisters
K7LRO/7 908 B-30-2954
Bellevue ARC
W0WYV/0 892 B-29-2902
Jackson ARC
W5PEC/5 956 B-30-2878
Wayne A R Tech. Society
WD8LLD/8 920 B-16-2838
Brantford ARC
VE3BA/VE3 1113 B-30-2828
Henry County ARC
W9OB/9*(+WD9RCE) 764 B-20-2684
Hurst ARC
K5YM/5 967 B-16-2664
Muskegon Area AR Council
WB7HO/8(+WD8EJQ) 907 B- -2645
Staten Island ARA
W2CWW/2 852 B-20-2645
Fremont Peak FD Group
K6EEK/6 954 B- 7-2636
Sunset Empire ARC
W7BU/7 839 B-10-2618
Okaw Valley ARC
WB9NEY/9 1005 B-13-2608
Rockford ARA
W9ADX/9(+WD9IUG) 616 B-55-2530
East New Orleans ARC
WD5HRZ 963 B-11-2526
Concord Brass Pounders
W1OC/1(KA1AUK) 799 B- 9-2440
Kitchner-Waterloo ARC, Inc.
VE3IC* 942 B-25-2434
Burnaby ARC
VE7BAR/VE7* 617 B-30-2376
Southern Chester County ARC
W3QT/3(+WB3LOG) 747 B-30-2270
Bill Gremillion RC
K4SEX/4 857 B-14-2264
South Waterloo ARC
VE3SWA/VE3 601 B-17-2262
Clark County ARC, Inc.
W7AIA/7*(WB7NDO) 540 B-25-2238
Fredericton ARC
VE1NDI/1 761 B-22-2238
Illini Repeater System
K9KC/9 743 B-17-2220
Rancocas Valley ARA
K2BG/2 655 H-11-2214
Delco Firebird Club
K9CK/9(+WD9HWO) 638 B-20-2210
Toledo Mobile RA
W8HHF/8* 807 B-30-2208
Newport County RC
W1SYE/1*(+WB1FMB) 819 B-26-2150
Non-Club Group-Scarborough, Ont.
VE3IBM/VE3 800 B- -2100
Riverside County ARA
W6TJ* 631 B-11-2082
Eaton Co. ARC
K8PTZ 948 B-13-2058
Northern Chautauqua ARC
W2SB/2 743 B-15-2056
Naval Post Graduate School ARC
K6LY/6* 1142 C-12-2013
Explorer Post 96, CGW RC
W2GJ/2*(+WA2HXU) 374 B-10-1996
Silvercreek ARA
WD8PNF/8 606 B-35-1938
Starved Rock RC
W9MKS/9 1066 C- 8-1801
Sierra ARC
N6KE/6* 618 B- 8-1794
Nassau County ARC
WB2WWP 535 B-20-1756
Mountain ARC
WA4VZY/4 463 B-10-1688
Tryon ARC
WA2ZJF/2 503 B-10-1624
RARA
K2JD/2 478 B- 8-1596
Dublin ARC
WA4HZX/4* 372 B-15-1414
Fort Myers ARC
W4LX/4(+WA4RLK) 666 C-14-1383
Teays ARC
W8KST/8 678 C-20-1306
Hams of Western Labrador
VO2WL/VO2 169 B- 9- 992
West Branch ARC
W3AVK/3 457 B-15- 872
Metropolitan ARC
K8NOW/8 286 B- 8- 668

5A -Commercial

D.A.R.D.S.
K9IJ/8 939 B-11-2154
Johnston ARS
W4MIK/4 911 B-10-1822
Fort Gordon ARC
K4WAR/4* 883 B- 7-1790
Stateline ARC
W5STH/5(+WD5GAB) 498 B- 9-1174
AVCO ARC
WB1FUN 699 B- 7-1082
Preston ARC
WD8MIK/8 211 B- 9- 516

6A - Battery

Durango ARC
N0AO/0*(WD0GZZ) 702 B-14-2696

6A

Huntsville ARC
K4BFT/4(+WA4VKD) 4360 B-31-12,992
Delmont ARC
K3SSC/3*(+WB3KGW) 3733 B-30-10,828
L'Anse Creuse ARC
W8LC/8(+WD8ITM) 3121 B-43-9806
North Florida ARS
W4IZ/4(+WD4KHI) 3315 B-51-9512
The Hogtown Hammers
W4WJ/4(+WD4IFF) 2661 B-18-7742
Metuchen YMCA RC
K2YNT/2(+WB2MSV) 2197 B-49-7158
Northrop RC
W6CN/6*(+WD6CE1) 2403 B-40-7106
Whitewater Valley ARC
K9UT/9*(+WB9ZIG) 2176 B-40-6602
Hoodview ARC
WB7QIW/7 2311 B-37-6006
Niagara Peninsula ARC
VE3VM/3 2047 B-25-5940
Non-Club Group
W3PTQ/3 1872 B-40-5676
Peoria Area ARC
W9UVI/9 2169 B-30-5600
Sterling Park ARC
K4UW/4 1901 B-20-5544
Kootenai ARS
K7MM/7(+KA7AGR) 1796 B-24-5290
Indian Hills RC
W8ICS/8(+WD8SCV) 1447 B-27-4738
DVRA/Troop 44 BSA
W2ZO/2 1555 B-35-4720
Livermore AR Klub
W6OA/6 1560 B-20-4564
Mid-South VHF Assn. - Raleigh Club
N4EQ/9 1840 B-119-4510
Ft. Smith Area ARC
W5ANR/5 1437 B-20-4274
South Orange ARA
N6RW/6* 1499 B-34-4262
Southwest Dallas County ARC
K5HJ/5(+WD5JYP) 1412 B-39-4138
Poway ARS
K6CD/6* 1200 B-30-3892
Tri-City ARC
W1BLM/1(+WB1GCX) 1083 B-25-3874
Montgomery ARC
WA3EWJ/3 1258 B-42-3614
Metropolitan Repeater Assn.
W4MUV(+WD4MIO) 975 B-15-3414
Chicago ARC, Inc.
W9CA/9 1088 B-25-3404
Seneca RC
W8ID/8 1278 B-13-3372
Mankato Area RC
W9WCL/9*(+WD9ECN) 943 B-31-3254
Monsanto ARA
WB9BBN/9 1033 B-34-3160
Salmon Valley RC, Inc.
W9DUA/9 900 B-14-3050
Island County ARC
W7PN/7* 935 B-17-2996
The Foxboro Company ARC
W1XA(+K1EXM) 793 B-20-2965
Academy ARC
W7WR/7 1095 B-14-2948
Sonra
VO1AA/VO1 800 B- 8-2920
Middle Tenn. ARS
W4UOT/4 772 B-15-2788
Northern Lakes ARC
K9EL/9 1081 B-18-2762
Quinte ARC
VE3BSQ/VE3 750 B-16-2762
Everglades ARC
W4SV1* 606 B-15-2640
C.W.E. Group
W9WJ/9 733 B-12-2542
Radio Amateurs of Greater Syracuse
W2AE/2 798 B-15-247
Champaign-Logan ARC
W9ERG/8* 766 B-20-238
Iroquois Ford ARS
WB9TAH/9 634 B-25-237
Anderson RC
N4JK* 510 B-12-233
Fox River Radio League
W9CEQ/9(+KA9ADP) 730 B-31-2214
Brainerd Area ARC
WD0GXK/0* 478 B- 8-2212
Kansas City ARC
K9OKI/0* 480 B-30-2102
Monterey Park ARC
K6GIP/6 684 B-17-2064
Rivertront Wireless Assn.
WB2DGJ 483 B-11-2052
Shore County ARC
W9YLV/9(+WD9HPO) 456 B-11-1792
Chelsea Comm. Club
WD8IEL/8* 501 B-10-1727
Cedar Mountain ARC
W7PT(+WB7WUL) 502 B-14-1676
Gould RC West
K6OR/6*(+WB6HFF) 444 B-12-1598
Rock Creek ARA
W3RCN 469 B-60-1564
High Plains ARC
K7YPT 542 B- 6-1484
East Bay ARC
W6CUS* 323 B-17-1430
Marion ARC
W8VB/8(+WD8JHH) 213 B-40-1250

7A

Penn Wireless Assn.
W3SK/3(+WB3LNZ) 3820 B-45-11,60
DRW ARC
W6TRW/6(+KA6AVE) 3324 B-42-10,35
Mike & Key ARC
K7LED/7(+KA7AYE) 3595 B-50-10,14
Morris RC
K2AZ/2*(+KA2ANO) 3765 B-30-9102
Chicago Suburban R A
W9IC/9*(KA9AE K) 2714 B-50-7590
Mt. Diablo ARC
W6CX/6(+WA6ZGB) 2800 B-35-7262
Woodbridge Wireless, Inc.
K4IY/4* 2357 B-43-7215
Southern Calif. Amature Transmitting So
WB6LRU/6(+WD6DMV) 2877 B-41-7048
Delaware ARC
W3SL/3(+WB3EOD) 1944 B-24-6207
Submarine Signal Division ARC
K1WEW/1 1841 B-19-6186
Cherryville Repeater Assn.
K2NT/2 1681 B-28-5190
Triple States RAC
K8AN/8(+WD8JIO) 1358 B-35-5182
Cuttelo Valley ARC
W6HE/6*(WD6CWJ) 1532 B-18-5104
The Cuyahoga Falls ARC
W8VPV/8(+KA8BCZ) 1577 B-30-4866
Siouxland ARC
WB9MWL/9 1374 B-30-4622
Lake Monroe ARS
W4MHJ/4(+WD4ILF) 1332 B-40-4540
Bergen ARA
K2TM/2(+WB2PKY) 1331 B-40-4280
Lancaster County ARC
W4PAX/4 941 B-32-3305
Frederick ARC
K3ERM/3 1351 B- -3248
Tioga ARC
WB3IPW/3(+WB3GZY 989 B-30-3246
Sierra Foothills ARC
K6CBP/6 863 B-14-2908
Greater Toledo ARA
K8ALB/8 928 B-37-2785
Iredell County ARS
N4QQ/4(+KA4ANI) 782 B-15-2768
South Texas ARS
K5FFO/5 791 B-18-2662
San Angelo ARC
WB5QX/5 717 B-11-2252
Beloit ARC, Inc.
W9DL(+WD9FWR) 640 B-24-2078
Non-Club Group
N8TM/8 640 B-13-2038
Mobile Sixers RC, Inc.
W3AWA/3 508 B-12-1828
Willmar Emergency ARC
W9SW 528 B-14-1806
Clinton Co. VHF RAC
WB9WWB/9 319 B-20-1802
Shortline ARC
W1BCG/1 352 B- 7-1520
Northeast Michigan ARS
WD8OOM/8 271 B-11-1390

8A

San Francisco RC
W6PW/6* 3105 B-35-8762
Gloucester County ARC
W2MMD(+WB2VOH) 2634 B-65-8254

West Palm Beach ARC
W4HAW/4(+WD4GBG) 3684 B-103-6762

San Antonio RC
W5SC/5 2064 B-83-5908

Mahoning Valley ARA
W8QLY/8(+KA8AVA) 1335 B-45-5300

Tri County R A
W2LI/2 1590 B-33-4578

Klamath Basin ARA
W7VW/7(+WB7SIN) 1280 B-13-4368

Cascades ARS
WB8CSQ/8(+WD8IGK) 1044 B-16-4204

Sonoma County ARC
W6LFJ/6(+WD6DOY) 1357 B-16-3836

Long Island Mobile ARC
W2VL/2 2365 B-35-3638

Radio Club De Puerto Rico
KP4ID/KP4* 918 B- 8-3446

Silverado ARS
W6CO/6 826 B-15-3340

ARC of El Cajon
WA6BGS/6(+WD8CNN) 1001 B-40-3188

Midland ARC
W8KEA/8(+WD8JZW) 1059 B-27-2986

Oh-Ky-In VHF ARS
K8SCH/8(+WD8PKE) 1923 C-32-2972

Tahoe ARA
K6QWT/6 981 B-20-2966

Faribault Area ARC
WB0KHA/0(+WD0HOK) 496 B-17-1896

9A

South Jersey RA
K2AA/2(+WA2NBL) 4215 B-46-13,046

The RC of Tacoma
W7DK/7 2601 B-75-6912

Tioga A.R. Clubs
N2NW/2 1545 B-17-5676

Twin City ARC
W9KG/9* 1391 B-45-4672

Fairmont ARS/ARES
N2NS/2 1371 B-70-4622

Lakehead ARC
VE3FW/3 854 B-20-4416

Moncton Area ARC
VE1EV/1 986 B-15-3766

10A

R F Hill ARC
W0AI* 4391 B-50-12,866

Western Washington DC Club
W7FR/7(+WB7CBU) 2621 B-52-8786

R.A.D.I.O. Club of Northern New Jersey
N2CG/2 2206 B-25-6594

Morgan ARC
K3YTL/3 2011 B-45-6158

North Hills RC
K6IS(+WB6YUQ) 1904 B-90-5608

Big Rapids Area ARC
K8SF/8(+WD8CQZ) 1268 B-16-4690

Turlock ARC
W6HXN/6* 1230 B-20-4616

Barnstormer ARC
K1KA/1 1140 B-21-3996

Rantoul ARA
W9ZK/9* 397 B-35-1862

11A

Hamilton ARC
VE3DG/VE3 3115 B-39-9176

Provin Mtn. Amateur Repeater Assn.
N1AV/1 1922 B-25-6142

Skywide ARC
VE3DRT/3 1703 B-46-5800

Beaver Valley ARA
W3SG/3(+WB3NWB) 1422 B-28-5484

12A

Four Lakes ARC
W9IZ/9(+WD9CLH) 1926 B-37-7072

Corpus Christi ARC
K5GT* 1885 B-28-6400

14A

Scarborough ARC, Inc.
VE3WE/VE3 2860 B-65-9699

16A

Northern ARC
VE4NAR/VE3 3272 B-55-11,082

Metro ARC
VE3MRC/VE3 2337 B-42-8744

23A

Englewood ARA
K2KX/2*(+WA2FYI) 2666 B-40-9380

1B - Battery

K2JT/4(+K1RW) 479 A- .4610
WA4IAR/4(+WA4GQJ) 442 A- .4520
N8TU/8(+N8BF) 442 A- .4520
W4OOJ/4(+WB4OUH) 466 A- .4450
K4VFY/4(+WB4YKV) 414 A- .4240
WØAA/Ø(KØTO + WØBF) 417 A- .4210
W1ECH/1 400 A- .3550
W5VFO/5(+W5VBO) 417 A- .3540
K9EI/9(+WD9EDT) 253 A- .3460
K2NJ/2(+K4LDR) 361 A- .3405
N4NZ/4*(+N4YL) 316 A- .3260
KØBP/Ø 307 A- .3170
K7SS/7(+K7RA) 344 A- .3000
KØTK/Ø*(WAØTGM,WDØGPF,oprs) 282 A- .2920
WA6EUZ/6(+WB6OYV) 264 A- .2790
N6DN/6(+K6XC) 230 A- .2400
AA1K/1(+KA1AD) 305 A- .2275
WB2EZG/2* 165 A- .1750
WB2ARH/2(+WB2QJQ) 409 B- .1736
WAØNSY/Ø*(+WAØZPT 160 A- .1700
K6TG/6 198 A- .1625
WA2DF1/7 152 A- .1620
VE3TL/VE1(+VE1AZW) 160 A- .1520
AC4X/4(+WD4EVW) 231 A- .1505
AA8S/8 133 A- .1480
WA8REN/8*(WA8RQU) 123 A- .1430
K4ISW/4(+WB4EKY) 143 A- .1430
WB2MAN/1(+WA2SID) 235 A- .1285
WD4FAB/4(+WA4JRD) 163 A- .1250
W6PQZ/6(+W6SKQ) 215 A- .1175
VE2AKI/VE2*(+VE2AYL) 101 A- .1110
K3GQ/3* 180 A- .1105
WB7QWA/7(+WB7QWP) 373 B- .1094
WA7NTU/7*(+WB7FFI) 190 A- .1075
K2ZT/2* 94 A- .1040
AA7M/7(+WB7AIP) 279 B- .1030
WA4RDP/3 230 B- .990
N6YP/6(+W6HB) 286 B- .956
WD6EGT(+WD6DFO) 264 B- .678
W8TN/8*(+WD8CPN) 172 B- .624
W1PWK/1 92 A- .620
WØWT/Ø(+WDØEMX) 119 B- .576
WD4CZM/5 155 B- .540
K7QPC/7 53 A- .530
VE3JHE/VE2*(+VE3JHD) 38 A- .530
WD9ENH/9 41 A- .510
WA4NAR/4(2 oprs) 151 B- .502
WA1NSZ/1*(+WA1NTA) 50 A- .500
K1DS/1(+K1PAM) 177 B- .460
WBØNLA/Ø* 35 A- .350
W1UXK/1(+WB1GTO) 29 A- .440
W7KPL/7 82 B- .428
WD5BCK/5 32 A- .420
VE7DSH/VE7(+VE7DTI) 141 B- .382
WA7NNH*(+K7UYP) 139 B- .378
WBØUKU/Ø 100 B- .378
K7BFL/7* 26 A- .380
N4VK/4(+WD4AII) 25 A- .350
K8NMG/3* 25 A- .350
WB6BYU/KL7 19 A- .235
WB5REJ/4 25 A- .225
WB6FTW/6* 62 B- .224
WA2HNG/2 16 A- .190
WBØYMO 15 A- .175
WA2PLR/2* 6 A- .160

1B

W9OBF/9*(+K9RK) 1400 B- .3282
W7CB/6* 999 B- .3214
K4QIY/4(+K4OAQ) 739 B- .3056
W8IZ/8*(+K8HHZ) 693 B- .2580
WB2ABD/2(+WB2PAY) 733 B- .2526
AA7D 724 B- .2408
N6MI/6(+WA6CDT) 571 B- .2050
K5HL/5(+WB5WDS) 916 B- .1932
WA5RSC/5*(+WB5KBA) 821 B- .1918
WB8UCW/8*(+WD8MKC) 533 B- .1866
K2OID/2(+K2LYV) 530 B- .1758
K5ER/7 410 B- .1740
K8ZRL/8(+WA8YTB) 767 B- .1708
KJDQ/7(+W7TS) 421 B- .1682
N5EK/5*(+WB5YMD) 372 B- .1682
N3NO/3(+WB3FUO) 464 B- .1658
W6ACP/6(+W6MVV) 743 B- .1586
WB9NFQ*(+WA9YUH) 427 B- .1438
WB8SCD/8*(+WD8JJQ) 526 B- .1388
VE3AUI/VE3(+VE3GAM) 426 B- .1376
K7YCH(+WA7YOK) 478 B- .1346
WB1DXR/1(+WA1ZAU) 161 A- .1305
WB2UKT/2*(+WA2TDE) 301 B- .1304
VE1AFL/VE1(+VE1ASN) 476 B- .1298
WBØZAL/Ø(+WD9CQC) 469 B- .1264
WB5EGQ/5(+KØBPC) 527 B- .1204
K1VUT/1* 307 B- .1180
W8CBR/8(+WD8CQO) 525 B- .1150
WA2EYA/2* 247 B- .1088
WA4LDC/4 518 C- .976
WB2MDZ/2(WA2IGK,opr) 201 B- .904
W1WP/1(+WB1DWY) 276 B- .866
K6MRK/6(+N6ND) 308 B- .784
WD8LEN/8(+WB8JOZ) 293 B- .784
WD8NSD/N 162 B- .748
WB4ICQ(+WA4IBX) 256 B- .700
K8DDV/8 294 B- .688
KØZFL/Ø 151 B- .646
WBØUBL/Ø 116 B- .610
N6DM/6(+W6CF) 198 B- .598
WB9ZED 103 B- .582
WA4GNI/4(+WA4GEL) 126 B- .572
WB9QVQ/9*(+WB9YDR) 126 B- .568
WAØAGM/Ø 112 B- .538
WAØFBQ/Ø 109 B- .536
W7FKF/7(+W7FKB) 209 B- .528
VE2XL/VE2*(+VE2XS) 213 B- .526
N2GU/2(+W2GTS) 150 B- .516
W7JBN/7*(+W7FOS) 109 B- .494
K1TH/9*(+WA1TZT) 102 B- .492
N2MA/1*(+W2XS) 123 B- .492
WB5HJC/5*(+N5ABG) 195 B- .490
WA6RFS/6(+WD6AIN) 143 B- .436
W7QD/7 98 B- .403
WA7WDJ 147 B- .394
W7KRM/7*(+WB7QCZ) 99 B- .320
WB5HPG(2 oprs) 103 B- .306
W9TA/9* 81 B- .262
W1BB/1 13 B- .252
WA1PLK/1* 35 B- .228
WA2ANU 20 B- .190

1B - Commercial

N8SR/8(+N8NAI 1294 B- .3702
K2OPJ/2 527 B- .1694
K9NE/9(+WD9DNF) 292 B- .584
W5UMK/5(+WD5JLJ) 223 B- .294
WA4RTG/4 337 C- .337
WA3VIL/3 75 B- .152

2B - Battery

WA2VUN/2(+WA2IMS) 243 A- .1485
W2TV/5(+WB2ETW) 288 B- .1186
WB3BNZ/3*(+WB2EGG) 94 A- .730
WA4PVI/4(+WD4BUN) 178 B- .472
K9LCR/9*(+WB9VDF) 28 A- .345
WA6JUR/6*(+WB6BUY) 16 B- .134

2B

WB8JBM/8(WB8s DQP LSN,oprs) 2000 B- .6526
N4FD/4(+WB4YHF) 1075 B- .3404
N4NT/4(+WA4BTK) 1401 B- .3292
WB9JDL/9(+WB9EI) 657 B- .2830
N2AE/2(+N2PA) 750 B- .2502
WB8GDO/8*(+WB8GDP) 781 B- .1662
WA4RXB/2(+WA2FOK) 347 B- .1562
N1OM/1(+W1FMF) 486 B- .1396
WA8YJE/8(+WD8MKG) 436 B- .1146
K9IL/9(+K9LAE) 260 B- .1040
K9VAL/9(+WB9IOU) 328 B- .956
W7LTL/7*(+WA7LHZ) 279 B- .758
WD5CGC/5(+WB5ZRD) 234 B- .734
WD8NBV/8*(+WD8EOE) 230 B- .724
W1DU/1(+WA1RTC) 186 B- .716
WA7PQL/7*(WB7DZH) 237 B- .674
K1TF/1*(+K1TE) 254 B- .660
AA6R/6(+WD6CKF) 221 B- .642
WB1AKU/1(+K1GHJ) 132 B- .516
WB2ZIH/2*(+WA2BHB) 114 B- .428
KL7CQ/KL7(+KL7ED) 71 C- .321

2B - Commercial

WBØINJ/Ø(+WØPZ5) 199 B- .398
WD4HUT/4(+WD4KSR) 136 B- .272

1C

K3ZMI/M5 558 B- .2328
W6MXO/M 147 A- .1870
N7MH/6(2 oprs) 227 A- .1525
K9EEA/MM(6 oprs) 357 B- .1446
AA2U/M(2 oprs) 129 A- .1035
N5TV/M(7 oprs) 234 B- .568
K3FY/M 200 B- .500
WA6EBC/M(2 oprs) 191 B- .482
WA6KHD/M 72 A- .460
W6GGW/M 161 B- .442
W1HMP/M 170 B- .440
WA4IGS/M(1 opr) 59 A- .395
WB6KZN/M 50 A- .350
WA6PHF/M 44 A- .320
WA4VEB/M(2 oprs) 54 B- .316
WØXJ/M6 100 B- .300
WA6IKG/M 40 A- .300
W9JZE 96 B- .292
N6SF/M 38 A- .290
W3LDD/M 144 B- .288
WA7STA 89 B- .278
N6IG/M 32 A- .260
WB6VJX/M 29 A- .245
WA6PGV/M 27 A- .235
KØLJZ/M(2 oprs) 58 B- .216
W6RGG/M 17 A- .185
W6FRE/M 16 A- .180
WD6DQB/M 29 B- .158
WØWUU/M 47 C- .147
K6PWH 20 B- .142
WA6KVI/M 5 A- .125
WA9NP5/M 10 B- .122
WA1TFO/M 4 B- .108
W1TFS/M 4 B- .108

2C

W5AC/M(7 oprs) 132 B- .466
K4STR/M2 175 B- .450

6C

VO1AA/M(8 oprs) 3 A- .715

1D

N3KK 1050 B- .3064
WØSI(2 oprs) 772 B- .2278
WA5ZOP 1776 - .1776
KØMM 1393 C- .1722
W7TC 429 B- .1716
WB9LZA/9(3 oprs) 445 B- .1334
KØVUW 642 B- .1284
K5AKS 623 B- .1245
N6GL 287 B- .1148
WA4RDI 340 B- .1044
WA3UXA 288 B- .936
W8TWA 221 B- .884
WB2FGZ 220 B- .880
VE3CVV 423 B- .846
K9GDF 178 B- .716
WB3EML 168 B- .672
K2SX 319 C- .633
WB9PIR 157 B- .628
WB3FGF(3 oprs) 168 B- .626
K8NG 306 B- .612
WB6VVI/9 302 B- .604
N5BO 281 B- .562
WB6VVI/9(2 oprs) 302 B- .604
N5BO 281 B- .562
K4VUD/9 514 C- .514
WD5AIW 245 B- .490
WBØSYV 123 B- .474
WB6BWZ 128 B- .444
WA1CIC 134 B- .444
WA8QAF(2 oprs) 130 B- .436
WD9DMV 97 B- .388
WB4YEX 96 B- .384
VE3HOU(3 oprs) 191 B- .382
AA4U 332 C- .332
K1FD 84 B- .322
W7NE 154 B- .308
NØWB 128 B- .306
W3IW/4 73 B- .292
WAØSHA/5 139 B- .278
W5MHY(2 oprs) 68 B- .272
W2II 65 B- .260
WB9IFE 129 B- .258
W3PIE(6 oprs) 125 B- .250
WB3AGL(3 oprs) 108 B- .224
WA6KMS 111 B- .222
N8AAU(2 oprs) 55 B- .220
WB3UBK 59 B- .218
W6BYH 155 C- .211
WB1ANT 186 C- .205
W5NR 102 C- .204
WØRTB 100 A- .200
WA7NWL 50 A- .200
WB6BJB 95 B- .190
WA4INI 47 B- .188
WA4UIH 45 B- .180
WB5TRZ 69 B- .152
W7ZMD 76 B- .152
WDØCXE 38 B- .152
WBTO(2 oprs) 114 C- .147
K5HIM 72 B- .144
WA5MUF 33 B- .132
WA5IYK 128 C- .128
WA9CYG/9 32 B- .128
W1OPJ 31 B- .124
WB2PJM 28 B- .112
K2JZT 102 C- .102
VE1BNN 94 C- .94
K4CQA/8 45 B- .90
WD5BTU 22 B- .88
WD5IOI 22 B- .88
WD9DMJ 21 B- .84
WA9AHZ 41 B- .82
KH6GMP 79 C- .79
KA2AKG 19 B- .76
WA6YZD 30 B- .60
WB6PFE 29 B- .58
K9VHF 55 C- .55
AA6EE 13 B- .52
W3FQE 24 B- .52
WD6BJK 18 B- .42
WB6DFA 20 B- .40
WD8PGA 19 B- .40
WD5HPK 9 B- .36
WB3KJD 13 B- .26

2D

K2FW(5 oprs) 2831 B- .7586
VE3ECP(2 oprs) 1593 C- .1593
WB8ITW/8(5 oprs) 466 B- .1554
WB7RTG 475 B- .1412
WB5OFB(2 oprs) 269 B- .722
W9CGI 50 B- .102

3D

K1AR/1(6 oprs) 3825 B- .8928
WB2JQR(11 oprs) 1259 B- .3844
WAØMFI(6 oprs) 561 B- .1278
W3GV/3(7 oprs) 363 B- .1266
W5SSV(7 oprs) 435 B- .1250

4D

W5EJK/5(22 oprs) 1186 C- .1193

1E - Battery

N2US 276 A- .2760
WB4SYC 242 A- .2285
WB1HLD 155 A- .1650
W2FTY 404 B- .1616
W4OOV 92 A- .915
K5DI 102 A- .780
WØAP 192 B- .768
WA2NSM 258 B- .522
N8TM 26 A- .260
W8YD 22 A- .220
W6TGL 22 A- .220
WD4KDZ 16 A- .160
WA4GJQ 28 A- .140
WB2DLA 6 A- .60

1E

K3RA(4 oprs) 1337 B- .2038
W1WEF 602 B- .2178
WB5TPK(6 oprs) 847 C- .847
VE5LM/VE5(10 oprs) 228 B- .694
WA2MLJ 69 B- .212
WB2DLA 6 A- .60

2E

K9CDB(3 oprs) 961 B- .1922
WA2HCL(2 oprs) 259 B- .518

4E

W3KWH(33 oprs) 1657 B- .4026
WD5CYX/5(16 oprs) 381 B- .1248

Unable to determine entry classification, other than A or B of following FD operations

A

BC Contest Club
VE7CC/7 2118 B-12-6192

K.A.Club
K1XR/1(+WB1EUU) 1547 B- .4092

Palomar ARC
W6NWG/6 1011 B-14-2902

Doctor Loomis Memorial Jr. Mechanic League
N4FM/4* 959 B- 8-2738

Kennedy's Knisaders
K8TK/8 1310 B- .2620

Central Louisiana ARC
K5TS/5 706 B- 8-2202

Branch County ARC
WD8KAF/8* 848 B-23-2174

Mt. Tom Repeater Assn'
W1JPI(+WB1FIC) 778 B-13-2104

Just A Bunch of XYL's and OM
WB8GKW 859 B-27-1878

Dial RC
W8BLV/8(+WD8PZL) 644 B-25-1866

Central Ky AR Club
WA4UXJ/4 803 B-15-1857

SPARCS
WØSU/Ø 719 B-10-1850

Adrian ARC
W8TQE/8 649 B-25-1502

Yardley Wireless Assn.
WB2ENJ/3 274 A- 7-1470

NE Miss. ARC
K5DGL* 542 B- .1427

Warrensburg Area ARC
WDØAYC 587 B-24-1214

Non-Club Group
N4LA/4* 405 B-12- 960

R A Mobile Society
W6SOT/6 380 B-11- 878

Kansas City Assn. for the Blind
KØTCB/Ø 516 C- .720

Hopkins County A R
K5WUE/5 148 B-15- 428

Johnson Co. ARC
WA4DFS* 64 B- 3- 349

B

WB9RRU/9*(+WB9RRT) 211 B- .731
K2QDY*(+WB2MOU) 174 B- .606

Check Logs

N1NN,VE2CK/W1,W2KP/2,W3ARK, N3BO,W4RAL,K4ZRH,K5FI,WR5(LOZ, WB5ZMK,W6IPM,W8MAA/8,WØEEE/Ø, KØRKV,VE3DCQ

Results, June VHF QSO Party

Is the termination of a good tropo opening on a moonlit night, during the June VHF QSO Party, considered a brilliant de-duct-ion?

By Bill Jennings,* K1WJ and William O. Reichert,** N9HH

Depending upon the location from which one participated in the latest running (June 10-11, 1978) of the June VHF QSO Party, band conditions for the annual bash might be described as "superb" or "dismal" (see the disparity in the Soapbox comments later on), "best condx in years" or "worst ever."

Then taking into account that the number of entries received at 464 was 23 fewer than the number of entries received in 1977, and that 11 new all-time division records (compared to 16 in 1977) were set, one might be led to think that the most recent June outing was only a fair-to-middlin' exercise, at best.

Don't you believe it.

Not one, but two operators were able to best the all-time single-operator high score and three, count 'em — uno, dos, tres — multioperator stations came on to blow away the four-year-old existing multiop mark by healthy margins; ranging from 4k to 20k points.

Single-Operator Accomplishments

The single-operator assault was led by K1MNS. Larry, the number two single op in the 1977 June Party, put it all together with a 75k point score to break the N6NB national solo operator record by over six thousand points. Also surpassing the old record and a scant 2000 points behind 'MNS, was K1FO, who placed number two in the 1978 and the all-time top ten single-operator listings. These two scores are indicative of how things went, single-op wise, as the 1978 "Top Tenners" had a score that averaged, at 44,207, 10,953 points higher than their counterparts in 1977.

Four divisions all have shiny new all-time single-operator records as a result of the June contest. WA2DPU added 6k points to the 1968 K3IPM record in the Atlantic Division. The New England Division record is, of course, owned by K1MNS, who outscored his own one-year-old best effort in that division. WA4GPM upped his own 1977 record score by 20k points to retain the top spot in the Roanoke Division. And VE2DFO holds the new Canadian single-op high, as the VE2YU score from 1977 was a multiop effort, which was erroneously reported as a single-operator entry.

Multioperator Happenings

Not to be outdone by the high-scoring single operators, the multioperator stations took careful aim at some of the existing records and came away with three scores, which were better than the previous all-time best score, and seven new all-time division/DX records.

W2SZ/1, operating from their favorite haunt on Mt. Greylock in western Massachusetts, came away with a score 20,000 points higher than the previous best ever recorded for the June VHF QSO Party. The previous holder of the all-time multiop record was the 1974 WA1MUC group, who have essentially evolved into the W2SZ operation of 1978. Not too far behind and in second place in the all-time multiop standings, by a mere 7000 points, is the W3CCX/3 operation, which was the number one multiop in the 1977 June contest. In third place in the multiop standings at 181k points are the operators of station W3BBS.

The 1978 top ten multiop list shows seven "repeaters" from the 1977 list, with K8III, W2YX and W1XM the newcomers. The average top ten multiop score, at 111,581, is 16,660 points higher than the 1977 average.

The new all-time multiop division records include W3CCX/3 bettering their own Atlantic Division record of 1977. The

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Division Leaders

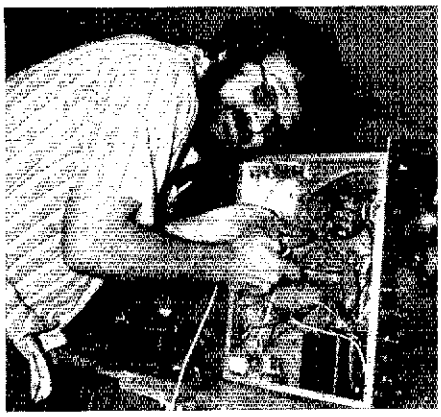
Single Op	*Division*	*Multiop*
WA2DPU	Atlantic	W3CCX/3
K9KFR	Central	W9NWE
KØVXM	Dakota	WØVB
K4CHE/5	Delta	W4BFB/4
WB8IGY	Great Lakes	K8III
WA2PVV	Hudson	W2YX
WØSI	Midwest	WØYZS
K1MNS	New England	W2SZ/1
WA7RTA/7	Northwestern	K7AUO/7
N6NB	Pacific	W6AMT
WA4GPM	Roanoke	K4CAW
K5EFW	Rocky Mountain	WØPUF/7
N4QH	Southeastern	W4VO
WB6FTW/6	Southwestern	W6XJ
WA5HNK	West Gulf	N5KK
VE2DFO	Canadian	WB2SIH/VE1
WB2RLK/VP9	DX	XE2BC

All-Time Division Leaders

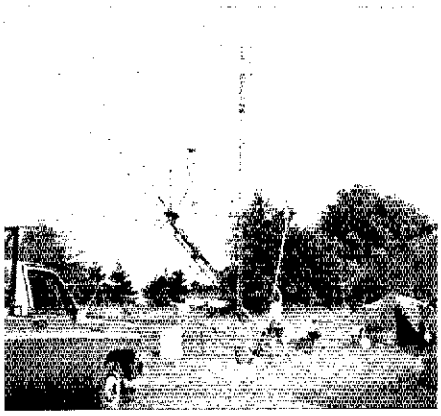
Single Operator				*Multioperator*		
Call	*Score*	*Year*	*Division*	*Call*	*Score*	*Year*
WA2DPU	43,351	78	Atlantic	W3CCX/3	190,464	78
K9HDE	33,572	77	Central	W9NWE	48,195	78
WAØCSL	21,808	77	Dakota	WØOHU/Ø	60,164	77
WA5RMS	16,740	70	Delta	W4BFB/4	74,404	78
K8LEE	37,114	74	Great Lakes	K8III	90,522	78
K2RTH	37,875	74	Hudson	WB2WIK/2	106,399	76
WAØMRH	20,435	77	Midwest	WØOHU/Ø	33,120	74
K1MNS	75,537	78	New England	W2SZ/1	197,516	78
K7GWE	20,515	74	Northwestern	W7LYE/7	35,776	77
N6NB	69,184	77	Pacific	WA6JUD/6	81,213	76
WA4GPM	41,760	78	Roanoke	K3LNZ/8	56,742	77
WAØTVZ	22,935	77	Rocky Mountain	WB5AXC/5	23,424	76
W4GJO	32,292	62	Southeastern	W4VO	28,450	78
K6YNB/6	60,342	76	Southwestern	W6AMT	105,080	76
WA5HNK	34,151	77	West Gulf	K5CM	56,028	77
VE2DFO	24,012	78	Canadian	VE3ONT	82,188	74
W2BN/C6A	18,700	77	DX	XE2BC	23,961	78

Top Ten

Single Operator		*Multioperator*	
K1MNS	75,537	W2SZ/1	197,516
K1FO	73,395	W3CCX/3	190,464
W1JR	43,516	W3BBS	181,676
WA2DPU	43,351	W1DC/1	135,252
WA1OUB	43,239	W2CNS/1	101,360
WA4GPM	41,760	K3LZ	96,900
K9KFR	32,000	K8III	90,522
WA1FSZ	31,680	W2YX	88,100
WB8IGY	30,384	WA2SNA	78,585
GW3NJY/W9	27,216	W1XM	77,168

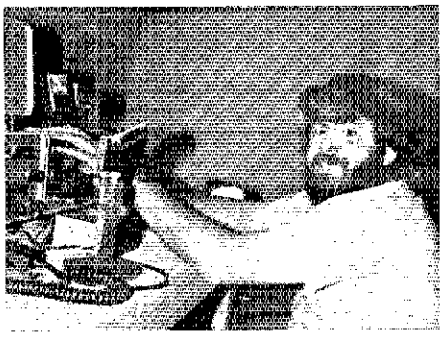


K3BPP



1296, 2304 dishes going up

W3HMU



WA3JUF

W3CCX — Eastern Pennsylvania — Multiop

W9NWE effort tumbled the K9HMB Central Division record of 1975. The Delta Division powerhouse, W4BFB/4, added 26k points to the record that they set last year. The K8III group grabbed the top spot in the Great Lakes Division in posting a score 29k points higher than the old record which was set by WA8BCA in 1975. W2SZ/1, in turning in the highest multiop score ever, also, incidentally, holds the New England Division record. The gang at W4VO added 5k to the 1977 K4CKS score to lead the Southeastern Division. And XE2BC now owns the multiop DX score to beat.

All in all, not a bad showing for a contest that might at first glance, have appeared a study in mediocrity.

N9HH provides an interesting narrative on his group's efforts to try to break the Central Division multiop record. Take it away, Bill.

"The June 1978 VHF QSO Party is now history, and from our point of view it was an enjoyable, albeit somewhat unusual, event. Our multioperator group did better than ever before, but that isn't what we consider unusual, since we have been able to make the same claim each time that we've entered the June Party. Rather, the strange sensation comes from the condition of the bands.

"Six meters was poor, at least based on past June showings. We had nothing resembling an opening until Sunday morning and then it was a good one, but all to the northeast. That evening the band opened again, but again to the northeast. We are glad that there are lots of 1s, 2s and 3s on 6, because we were at least able to rack up a fairly good contact total. As the band was folding for the last time during the party, we caught a little Es to the southeast and picked up three of four multipliers for a total of 40.

"Before the contest started, the group had developed a plan for breaking the existing Central Division multioperator record. We thought 600 contact points in 70 sections would do the trick. We were expecting somewhere between 52 and 55 sections on 6, so with a total of 40, it didn't look too promising especially after the 59 sections we had in June 1977. We didn't even hear any of the DX that was supposed to be on, but we were battling our usual noise level, so maybe the DX was there and we just didn't hear it.

"Two meters was as good as 6 was mediocre. Excellent tropo conditions began at about 0430Z on the 11th. Worked a couple of new states and got 23 multipliers, 10 better than in 1977, almost making up for the slack for 6 meters. Contact totals were up on 2 also, statistically almost directly attributable to being able to use 146.52 MHz, at least in a limited way. Our only serious equipment trouble occurred on 2, and we got hit with a double whammy. Around 0200 on the 11th, two capacitors shorted in the ssb/cw amplifier, leaving us with about 85 watts output for the remainder of the contest. Then about 1400, as I turned on the equipment after catching a little shuteye, a surge from the big 12-volt power supply got the Tempo VHF-1 and we were off 2 fm until late on Sunday afternoon.

"Things took an upswing on 220 this year also. We had more contacts on 220 fm than ever before and for the first time, we worked a station outside the local area. This gave us three multipliers instead of the planned and virtually assured two. With conditions as they were on 2 and 432, it is certain that more could have been done on 220 given some DX mode capability. We've been running fm since there didn't appear to be much to work locally on cw or ssb.

"Conditions on 432, as intimated earlier, were fine. We had a total of 12 sections, four better than we've ever done on the band, and eight ahead of our total in June 1977. So here again, we picked up a little of what we didn't do on 6. Had two small problems on 432. First, the antenna-mounted preamp we'd thrown up before the contest without testing, oscillated. Secondly, we were rock-bound and the rock wouldn't quite come up to 432.1, the new activity center, so we might have missed a few. In fact, we didn't work many of the normal "locals," so the contact total is up only slightly. Was interesting to hear some of the Eastern stations ask us to QSY to 1296, a capability we don't have. Here again, if there was some local activity, I'd probably give it a try.

"Think that all the ops basically like the way the contest is now run. Being able to use 146.52 is a boon to us here in what is a low vhf activity area. My personal opinion is either allow use of .52 any time, all the way, or eliminate 146 to 148 MHz from the contest. But if you keep the limited use rule, we'd like to suggest that the period be slightly longer, say six hours, so one could set up a particular portion of each hour for .52 and have enough to go the whole contest. In our case, we try to monitor .52 the first 10 minutes of each hour, if the frequency is clear and an operator is available.

"The other suggestion I'd like to make

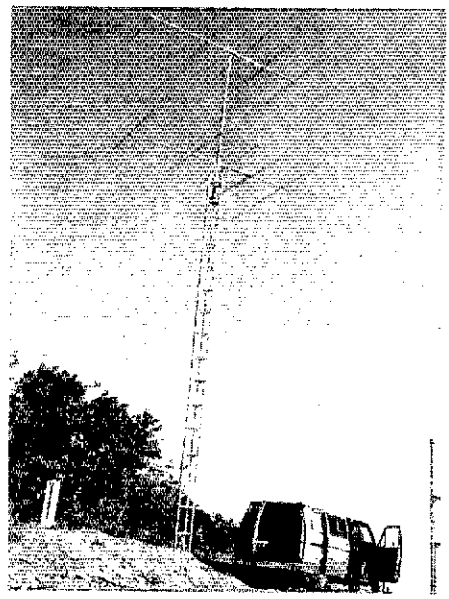
is that multiops be allowed to use the whole contest period. One of the advantages of the multiop (although it doesn't seem to work in this particular operation) is the greater availability of fresher operators for a longer period of time. The required 'off time' seems to negate this.

"All in all, a fine-business affair. We seem to have met our goal of bettering the old multiop record by about 10 percent, I believe. Of course, the way that we did it didn't resemble our plan, but what the heck. Guess that just shows that it is pretty hard to plan a contest."

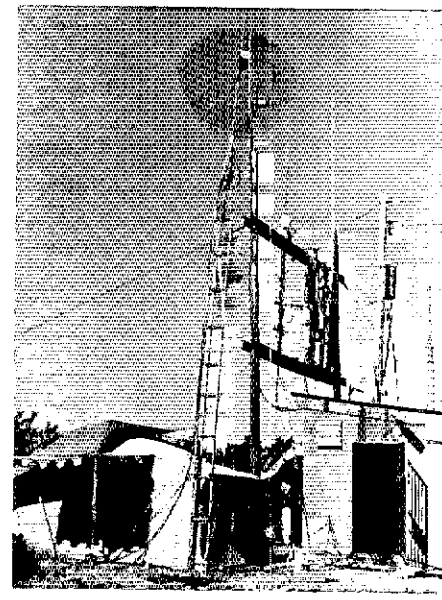
Guess that just about wraps it up for this time, except to acknowledge the able assistance of Tom, K1KI and Arlene in the preparation of this report.

Soapbox

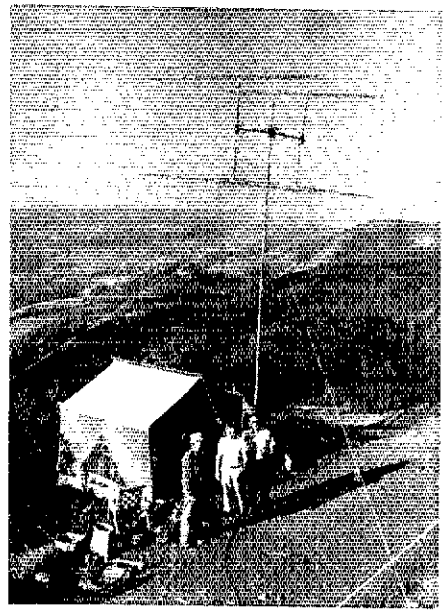
There is only one conservative comment for the June 1978 VHF QSO Party: WOW! The pileup of stations trying to work NC on 2 meters was as bad as if I were low-band DX. (K1FJM/4) I tried my best with 1 watt on 2 meters. (WA2YEI) Both 6 and 2 seemed better than normal from here, although the Es on 6 seemed to favor the W1s and the boys out west and south . . . I would like to compliment K2UOP/4, K4MSG and K4LHB (all within one mile of each other) for their signal quality and operating courtesy. All of us were able to operate 6 meters within 30 kHz or so without any real trouble. (W3IY/4) Just a token effort this year, since we were all tied up with the K2UYH EME DXpedition. (WAØCSL) We had very heavy winds (80 plus mph) on Peavine Mt., Nevada. Six meters didn't do too much for us, but on 1296, we worked K6UQH (a distance of 214 miles) for a first QSO between California and Nevada. (W6YKM) I suggest that each of the Maritime Provinces be counted as individual sections and large provinces, such as Ontario and Quebec be divided into several sections such as eastern and western Quebec, and eastern, central and western Ontario to promote vhf activity. At present, there is no incentive to work stations in western Ontario after having worked a station in eastern Ontario and yet the province stretches from W2 to WØ land. (VE2DFO) Worst weekend in years. Heard XE2BC, but too weak to attempt QSO. Heard one burst from W7KFS/VY1 (VE7ASM) Had a great time in my first contest. Was fun using solar power, but I had to wait for direct strong sunlight before I could transmit. (WA6OYS) Doubled my score, seems the quagi really works. Hope for four stacked next year and a little more power. (VE3GLD) Six meters didn't open up nearly as much as it had the past several years. It opened to California at the beginning of the contest, then again on Saturday evening to Nevada, Oregon and Idaho as well as to the Midwest at the same time. Sunday the band was mostly dead, but did produce a double-hop opening to VE1 and New England around mid-afternoon. Nothing else was heard at this time until W1/VE1 signals disappeared and the band opened to southern CA and Mexico. The band was dead for the rest of the contest. (WA5QCP) The closest local was 180 miles north of me. Didn't even work my own state for a multiplier. (W7KNT) I sure wish that there were more stations on 223.5 fm simplex — Please! (WA2ANZ) Two meters provided extended openings into the Midwest with 20 over ssb signals for several hours . . . sure glad to hear all that 2-meter activity. (AA4R) The Sunday (11 June) Es opening was chaos! QRM was so bad that 6-meter ssb operations were forced up as high as 50.250 MHz. Yup, almost 4 percent of the 6-meter band was in use! (WA1UXQ) On Saturday, a news crew, including a cameraman, from WBRE-TV in Wilkes-Barre, PA, arrived on the scene and did its thing. On the 6:00 news the following Monday there was a three-minute news item of our effort . . . In order to provide for operator comfort and safety, it was necessary to shoot one member of the native wildlife population — namely a rattlesnake. (W3BBS) We have all waited for one like this and this year we really got one . . . a contest that had a real good tropo opening. This contest clearly will be the time that many of the old all-time section and division records will come tumbling down. We were able to better the all-time record score, set while we were still WA1MUG, and by a good bunch too. I have heard



6-meter station

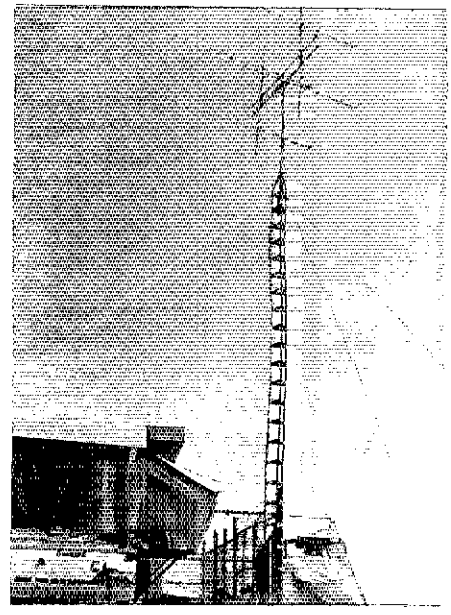


1296 station



(l to r) Rich, W3GPY and N3AAX — 220 MHz

W3BBS — Eastern Pennsylvania — Multiop



432 station

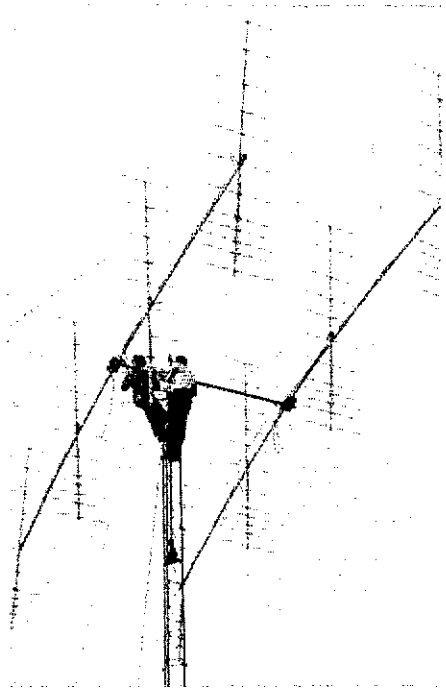
Multipliers Per Band

Min. Sections / MHz	40 / 50	20 / 144	5 / 220	6 / 432	3 / 1296
K1FO	46	24	11	18	6
K1EM	42	17			
K1ZZ	32	23		2	
W1FV	44				
W1WHL	43				
K1TX		17	2	8	
WB1ALW		20		3	
W1FAJ		13	10		
WB1CJT		13		9	
WA1LUJ*	49	15	9	12	
W1JR	38	22	9	19	3
WA1PMB	45	14			
K1CM		21			
K1GVM		19		7	
W1XM*	45	23	10	18	8
K1TR/1	39	18	5	5	
K1TOL	49				
K1MNS	49	26	5	15	4
WA1OUB	48	23			
WA1FSZ	42	15		12	3
W1EJ	33	16	8	3	2
W1FMF	34	14	4	8	
W1DC/1*	49	24	11	20	10
WA1PBR	58	18	7		
W1UHE	23			12	
W2CNS/1*	50	25	12	16	8
K1LPS/1	36	14		8	
K1GYT	41	7			
W1TKZ/1*	14	16		10	2
W2SZ/1*	49	32	16	24	13
WA2PVV	44	16		7	
WA2TEO	19	21	9		
W2TX*	51	27	11	10	
WB2FKJ*	44	21	9	16	3
K2OVS	38	21			
WA2HBZ		23			
K2RIW				20	
WB2JAY			6		
WA2FUZ*	46	14		18	
WA2SLY*		23			
WB2CAM	44	11			
WB2CUT		21			
WA2SNA*	45	20	9	17	2
K2GE*		25			
WA2DPU	44	22	3	8	
W2EIF	23	21	10	14	4
WA2KOK	41	17	3	10	
WB4NXY/2	45	19			
K2BWR*	46	20	10	15	
WB2CUD*	41	15	4	9	
K2NV	33	26		2	
K2YCO	24	17	6	7	4
WA2BPE	42				
K2GK	1	23			
K2QR		23			
K2EVJ	24				3
K2OEQ*	44	27		5	
WA2ZJF*	42	18	1	6	
WB2UEE	37	13	2	7	
WA2ZHR/2*	30	24			
K3SXA	16	14	1	11	
WB2RBG/3	44	26			
WA3VJU	40	12		3	
WB3CXE	43				
K3IUV	12	9	3	15	4
W3JMY	44				
W3ARW		16	7		
W3CCX/3*	49	29	16	21	9
W3BBS*	46	30	16	22	11
K3LZ*	46	30	10	16	
W3AD*	47	29	5	16	
W3XO	44	16		8	
K3HCE	42	19		6	
WA3USC		24			
W3IP				18	
W3PGA/3*	22	13	4	9	
W3EAX*	14	25	3	5	
WA3TIH	41				
W3GNR/3*	40	30		6	
W3QZF/3*	30	27	2		
K3WHC/3*	23	23		4	
N4QH	47	5			
WA8CLN/4	41	9			
K1FJM/4		22		11	
K4CAW*	39	19	5	5	
W4BFB/4*	41	22	4	9	
WA4GPM	40	34		16	
WA4SBC	35	25		15	
WD4GXN		28		19	
K4QIF		23		17	8
K4LHB	34	13		7	
WA4BUE		18		12	
W4FJ	25	7		8	
WØOHU/5*	53	28	2	10	
K4CHE/5	40	4	1	1	
N5KK*	61	18			
N5KW*	57	20		6	
WA5HNK	55	6		3	
K5LZO*	57	7	1	3	
WB6JQY		7		7	
W6CN		7	6		
W6NXB			6		
K6ZMW					6
W6GGV*	22	13		7	
K6BPC*	17	8	7		
WD6DNV	17	7		6	
K6MEP*	29	10	5	4	
K6HXW*	25	12	5	8	
WB6IMM/6*	19	9	6	8	5
K6TZ*	24	5	6	7	
K6KLY	21	11	5	8	2
N6TX*	9	8	4	6	3
WB6FTW/6	24	5	6		
WA6AWM	29	6	5		
WA6OIL	24	7	5	6	
W6XJ*	35	11	5	6	1
N6NR*	28	11	6		
W6AMT*	18	10	4	6	
N6NB	27	11	9	7	3
K6JKQ	7	4	6	6	1
W6YKM/7*	21	9	6	5	1
WB8BKC	32	22	2	6	
N8HT/8*	31	20			
WB8IGY	40	30		2	
WA8TTS	40	17			
WA8OGS	44				
WA8TJL	23	28			
K8DIO		23		3	
W8GOH		25			
K8III*	49	36	1	8	
W8VP*	36	26	4		
W8AEC	29	15		11	
K3LNZ/8*	36	30	5	7	2
W8GK*	25	31		7	
N8II*	42	21		6	
GW3NJY/W9	35	21			
K9RO	42	20			
K8IE/9		26		16	
WB9SNR		15		7	
WB9QBU		20			
W9NWE*	47	29	1	4	
N9HH*	40	23	3	12	
K9HDE*	39	21	2	3	
K9KFR	39	21		4	
W9CSF/9	23	22			
WA9JFM		21			
WBØZXU	23	25		2	
KØDAS		19		8	
WBØSBG		15		10	
WBØUFQ		24			
WØRWH		22			
WØYZS*	32	16		11	
KØALL*	42	4			
WØSD*	41	12			
WB2SIH/VE1*	34	21		11	
VE2DFO	45	24			
VE2YU		18	1	12	
VE3BQN	28	14	2	7	2
VE3FGU		20			
VE3FN		23			
VE3FHK*	43	7		3	
XE2BC*	24	11	6	5	3

*Multioperator station

rumors that the W3CCX group did about as well as we did, and it will be verrry interesting to see who came out on top. No matter who is the winner, the vhf bands have benefited from this last bash. For a change, weather conditions cooperated with us very nicely. Wonder of wonders, no one got wet on the mountain this time. The bountiful supply of sunshine and light winds permitted us to go all out and erect our antennas in their largest versions rather than in limited size, fall-back versions that we use when the weather is bad. This time, we were really loaded for bear on 2 meters with a total of eight (that's right 8!) 12-element KLM style antennas. This array is huge — 36 feet by 15 feet. All of the 96 elements really worked too! The 220 antenna was up in its large version — 88 elements. The activity on this band really needs help on the low end though. When 2 is open and 432 is open, but nothing is on 220, that's really bad news, guys!! (W2SZ/1) This contest was almost a duplicate of one about five years ago, where nothing was worked on 6 meters east of the Mississippi River. The highlight of the contest was working XE2BC on 2 meters, a first to XE-land for me, but not for Nevada to Mexico. The first Nevada-Mexico QSO on 2 meters was made by WB7EME on fm several years ago. Meteor scatter was unusually excellent on Sunday morning to provide a host of new sections here on 6 meters. Unfortunately, 6-meter and 2-meter activity peaked at the same time so we missed opportunities for 2-meter sections. (K7ICW) Probably would have worked more stations on 432, but for antenna alignment problems. Many ops just don't know where we are, and with highly directive arrays that usually spells *no contact*. (W1AIM) Six meters was poor most of the contest, very short E openings, had to work hard to get our 58 sections. The 2 meter and 3/4 part was super. Had the tropo to the northeast giving us 20 sections on 2 meters and six sections on 3/4 meters. We had lots of guys confusing us with N5KK, some thinking we were the same station and tuning past us. (N5KW) [The N5KK-N5KW clash in the OK section is a rather interesting rivalry (you would really need a scorecard to tell the players apart). N5KK came out on top this time, but look out next time cuz the

N5KW bunch now has Melissa to throw into the fray. Congrats to Sam, K5SW and Pam, N5KW, on the new harmonic. — Ed.] If anyone complained about conditions in this contest, they should be sent to a shrink. (K1FO) Had a very good time, operating from the side of an active volcano (Mauna Loa Volcano) at the 8200-foot level. Had very good weather, the night was cold (40° F) and the days were warm (60° F). Most of the time we were calling CQ on ssb on 50.1, 144.1, 144.2, 145.1, 432 and 432.1 MHz, with the antennas pointing toward the mainland (CA). Only two 1-minute openings on 50.1 to Arizona at 2334 and 2341 UTC on June 11. We will try to stir up some more interest in the VHF QSO Party for September here in Hawaii. 432 MHz was always by far the very best for the 200-mile-plus distance to the island of Oahu. Worked KH6IJ on 432 ssb, 10 watts, 5-9 plus. Hoping to work the mainland on 432 MHz, using a 64 element "extended both ways, W6GD collinear antenna" at the home QTH. (KH6HME) A very good contest. Thanks to W2CNS/1 and WA2SNA for two new states on 432. Some cw operators should learn to copy things other than "RST/Section." With some stations, requests for skeds on 432 met only with a "QRZ Contest" reply! (VE2YU) 144 MHz opened up on Saturday evening to S. TX, AL, MS, GA, the Carolinas, VA, WV and PA, although not to all areas at the same time. The ducts seemed to form and dissipate several times in an hour to various places. (KØDAS)



WB2BXP — K1DH — 2 meters

WB2QCJ — 2 meters

K1DH — 6-meter station

W2SZ/1 — Western Massachusetts — Multiop

Feedback

Please note the following corrections to the June 1977 VHF QSO Party report: K8DIO should have been listed in the Multipliers Per Band Box, as Lloyd had four sections on 432. VE1ASJ's score should have been listed a 23,258-401-58-AB. This would have mad Andy (as VE2YU, shown in the scor listings as a single-operator effort wa really a multiop station) the number on Canadian single-operator station, and th All-Time Canadian Division record holde for 1977.

Scores are listed in order, single-operator stations first within each section. From left to right: call, score, number of QSOs, number of multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-420 MHz, E-1215 MHz, F-2304 MHz, G-330 MHz, H-5 GHz, I-10 GHz).

U.S.A.

1

Connecticut

K1FO 73,396-618-105-ABCDE
K1EM 18,644-316- 59-AB
K1ZZ 15,447-269- 57-ABD
W1FV 9372-213- 44-A
K1KI 8272-188- 44-AB
W1WHL 7052-164- 43-A
WA1ZNT 4686-142- 33-AB
K1TX 4536-143- 27-BCD
WB1CWZ 4042- 87- 43-ABD
WB1ALW 3151-134- 23-BD
W1FAJ 1840- 64- 23-BC
WA1LOU 1717-101- 17-B
WB1CJT 1650- 62- 22-BD
W1HNF 1650- 50- 33-AB
WB1CWG 812- 58- 14-B
K1VMI 756- 63- 12-B
WA1IHZ 741- 54- 13-BC
N1CC 600- 50- 12-B
W1XZ 539- 49- 11-B
W1JA 462- 42- 11-B
K3KH/1 440- 40- 11-B
K1TN 224- 28- 8-B
WA1LUJ(K1s VSC ZKR WA1s HYN RLV,oprs) 57,120-642- 85-ABCD
WA1GTP(+K1VYU) 3000- 75- 40-AB

Eastern Massachusetts

W1JR 43,516-399- 92-ABCDEF
WA1PMB 21,594-366- 59-AB
N1HR 17,316-333- 52-AB
WA1NQV 9633-131- 43-AB
WA1UXQ 4719-143- 33-A
K1CM 3759-179- 21-B
K1GVM 3198-123- 26-BD
W1CRL 3185- 88- 35-ABD
WB1FKF 935- 85- 11-B
WB1FQD 275- 25- 11-AB
W1LMU 34- 18- 2-AB
W1XM(K1s JH MK,N1RC,W1XG, WB1CQR,WA4TTG,NØAL ND, oprs) 77,168-644-104-ABCDE
K1TR/1(+K1EA,WA1s ONB PBU QWF VFJ) 40,664-573- 68-ABCDI

Maine

K1TOL 23,373-477- 49-A
WA9FCG/1(+K1s CZ DK IMZ) 8120-232- 35-AB

New Hampshire

K1MNS 75,537-685- 99-ABCDE
WA1OUB 43,239-609- 71-AB
WA1FSZ 31,680-409- 72-ABDE
W1EJ 19,220-279- 62-ABCDE
W1FMF 17,640-269- 60-ABCD
WA1NPZ 6450-150- 43-AB
K1LL 3348-124- 27-ABC
W1JSM 780- 52- 15-B
W1DCJ/1(K1s BA BT KEC MUC TWF YAN,N1KO,W1s GUI GXT LI R OOP QXX,WA1s GVH HON JIR KPS MZC NPN NVC TFH TZV YAM, NØKV,oprs) 135,252-977-117-ABCDEFI

Rhode Island

WA1PBR 17,388-265- 63-ABC
W1UHE 4060- 82- 35-AD
N1RI 1264- 79- 16-B
N1DM 225- 25- 9-B
W2CNS/1(+W1R IN,K2s LDU LZF OS W2s AV IOG,WA2s VCM ZKD ZQN, WB2KAO) 101,360-799-112-ABCDEI
K1COW/1(+WB1ORW) 3683-127 29-AB

Vermont

K1LPS/1 10,904-172- 68-ABD
W1AIM 10,143-202- 49-ABD
K1GYT 7344-153- 48-AB
WA1JXN 2304-128- 18-B
WA1IYK 2146- 74- 29-A
K1LJL 407- 34- 11-BD
WB1BZR 301- 43- 7-B
W1TKZ/1(K1s OGF TK UR WA1s PQV YOJ,WB1s BUN ECJ,WB2BYP, oprs) 8694-184- 42-ABDE

Western Massachusetts

K1WGN 8742-186- 47-AB
WA1UOL 6973-166- 42-AB
N1PF 2380- 68- 35-AB
W1JP 1428-102- 14-B
WB1ABF 1428-102- 14-B
K1JG 20- 5- 4-B
W2SZ/1(K1s DH IO KR,WA1s UNH UGE UWN,WB1s OBH FUR,W2GN, K2s IR UF,N2FU,WA2s FKS GFP, WB2s BXP DCH CFP PKO QCJ, WB4ZGB,WA8USA,oprs) 197,516-1303-134-ABCDE
WA1WRK(+WA1WRM,WB1AKT) 3861- 99- 39-AB

2

Eastern New York

WA2PVV 24,589-359- 67-ABD
WA2TEO 8820-167- 49-ABC
WA2ANZ 36- 6- 4-BC
W2YX(+K1RT,K2OV,N2s CB NT, W2YV,WB2JSJ,K3UA) 88,100-840-100-ABCDI
WB2FKJ(K2s DNR SHB UKE,W2s AWX HCQ KBH,WA2s ENM HAQ, WB2s DVV GXF HDS NKN,oprs) 67,704-661- 93-ABCDE
WA2FPF(+KA2s AKS APN,N2FQ, WA2s FPG OGN OUS YGE,WB2s FAC FPL) 7426-158- 47-AB

New York City - Long Island

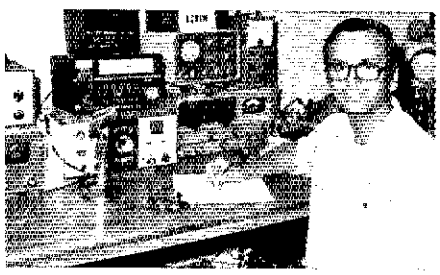
K2OVS 10,915-185- 59-AB
WB2GVD 6336-144- 44-AB
WA2HBZ 3243-141- 23-B
K2RIW 2420- 84- 20-D
W2LEJ 900- 60- 10-A
WB2JAY 216- 18- 6-C
K2SX 102- 17- 6-B
WA2WZW 60- 15- 4-B
WA2YEI 55- 11- 5-B
WA2FUZ(+WA2YJF) 31,434-364- 78-ABD
WA2SLY(+WB2IDP) 4002-174- 23-B

Northern New Jersey

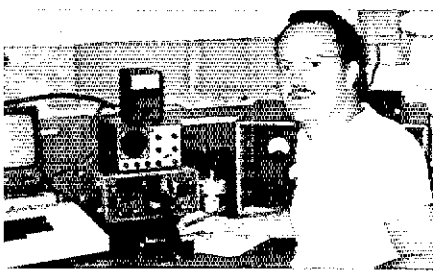
WB2CAM 17,050-310- 55-AB

WA1JXN — Vermont

K2RIW — Eastern New York



6 meters at K3LNZ/8. WA4LJQ does it best.



WB2WIH 5304-136- 39-AB
WB2CUT 4578-218- 21-B
WA2FZW 3010- 86- 35-AB
K4BNC/2 1170- 45- 26-AB
WA2AQT 1054- 62- 17-B
W2CVW 714- 38- 17-ABC
WB2NCF 639- 71- 9-B
WB2CHE 50- 10- 5-B
WA2SNA(K2BJG,N2AAZ,W2IHM, WA2s ANQ DTJ JSW UPK WLK, WB2s ARS JCP LBP LHG QEA QOQ V2W,WD2s AAL ADH,oprs) 78,585-741- 93-ABCDE
WB2EWV(K2DLJ,N2GA,W2EKU, WA2s HMU MIS OCN RJM,WB2TKU, oprs) 12,200-244- 50-AB
K2GE(K2s KFE KZ MS,WA2s NXK OJO ONA,WB2s SNN UYX,oprs) 8800-352- 25-B

Southern New Jersey
WA2DPU 43,351-532- 77-ABCD
W2EIF 23,616-287- 72-ABCDE
WA2KOK 22,649-293- 71-ABCD
WB4NXY/2 19,264-301- 64-AB
WB2YEH 14,355-235- 55-ABC
N2CQ 2900-100- 29-AB
WB2IMU 2768-173- 16-B
WA2MMA 2378- 82- 29-AB
WA2FZB 670- 67- 10-AB
WB2RRJ 498- 83- 6-AB
W2HXF 494- 34- 13-BD
WB2SPW 30- 10- 3-B
K2BWR(+K2ZRJ) 38,948-385- 91-ABCD
WB2CUD(+WA2ONK,WB2HWF) 25,254-333- 69-ABCD
WB2OSQ(+WA2OMY) 9408-196- 48-AB

Western New York
K2NV 23,058-372- 61-ABD
K2YCO 11,020-164- 58-ABCDE
WA2VAM 8010-178- 45-AB
WA2BPE 6552-156- 42-A
WA2SHN 5022-162- 31-AB
WA2IKO 3471- 85- 39-ABC
K2GK 2760-115- 24-AB
WB2ELB 2349- 83- 27-ABD
K2QIR 1771- 77- 23-B
K2EVI 1755- 59- 27-AE
K2JIQ 880- 55- 16-B
K2HC 720- 48- 15-A
WA2KJE 615- 41- 15-A
W2WGL 612- 36- 17-B
K2SSB 72- 36- 2-B
K2OEQ(+WA2KGM,WB2s IEY KIW JLR KGL RJL) 33,744-432- 76-ABD
WA2ZJF(K2RKW,WA2s MYU PGW RQC,WB2s FBP MMA MYY MYZ NFB PGL SHC,oprs) 27,001-394- 67-ABCD
WB2UEE(WA2s CJT GQF,WB2s BGI KLD +YF,oprs) 13,865-217- 59-ABCD
WA2ZHR/2(+WB2s RVH TBT) 13,500-225- 60-AB
N2JY(+WB2s HWO LRY) 2842- 97- 29-ABD
WA2CBU(+WA2CBT,WB2WCE) 2688-192- 14-B

3

Delaware
K3SXA 8022-157- 42-ABCD
WB2DNE/3 3120-130- 24-A
W3BDP 286- 20- 13-BD

Eastern Pennsylvania
WB2RBG/3 22,400-320- 70-AB
WA3VJU 17,105-305- 55-ABD
K3IWK 11,556-213- 54-ABD
WB3CXE 7611-177- 43-A
K3IUV 7525-113- 43-ABCDE
W3JMY 6908-157- 44-A
K3OX 5733-147- 39-A
W3CLQ 1980-110- 18-B
W3ARW 1081- 39- 23-BC
K3YL 966- 46- 21-A
WA3YSU/3 175- 25- 7-B
WA3HIT 60- 20- 3-AB
W3CCX/3(WA1YHO,K2EVW,W2NM, WB2s OYU SZK,K3s ACR BPP JUV MWV QQ,W3s ELX HMU HQT IIT VQ,WA3s AXV JUF NFV NUF WAS YUE,WB3s ATA CDE,oprs) 190,464-1257-128-ABCDEFGHI
W3BBS(WB2ZMR,W3s AMC AXX CGY GPY OWP RW,WA3s BRW UGP VVG VYI,WB3s ACG ADS AMY EFH EFI ESS EUP FHJ FVJ FVK HTK KXQ,K3s AI ARR MF HAT II JJ PFX PGE RLM RYL TT N3s AAX ET IK) 181,678-1137-133-ABCDEFGHI
K3LZ(+K3UU,WA3s KPP LBI PUL UL VUN WAK ZFD) 96,900-872-102-ABCD
W3AD(K2NE,N3MG,WA3s PHL RKM,oprs) 73,623-705- 97-ABCD
W3LP(W3s GEN JUZ,oprs) 1344- 56- 24-AB
WB2ENJ/3(+WA2AUH) 36- 12- 3-B

Maryland - D.C.
W3XO 25,772-359- 68-ABD
K3HCE 22,244-311- 67-ABD
WA3DMF 10,878-212- 49-ABCD
K3AKR 8234-169- 46-ABD
WB3LSY 4862-143- 34-AB
WB3AZH 4796-136- 36-AB
W3JPT 4500-125- 36-AB
WA3NVW/3 3103-106- 29-ABC
WA3USC 2880-120- 24-B
W3IP 1904- 54- 18-D
W3OTC 1449- 61- 29-AB
WA3YKI 1152- 72- 16-AB
W1TFA 741- 49- 13-ABCD
W3MSN 154- 21- 7-ABC
W3PGA/3(K3s CWZ FRX PHH ROJ,N3IT,W3s JDF VRD WA3s HV HZJ LAW OTZ QKB,WB3s ACE BGS BIT,oprs) 12,336-234- 48-ABCD
W3EAX(N1QG,WA3s UHY WHE PT,WB3IEJ,oprs) 10,105-196- 47-ABCD

Western Pennsylvania
WA3TIH 6519-159- 41-A
W3CSA 1534- 59- 26-AB
W3GNR/3(+K3TFL ZDR,W3s DQF GNR IJT,WA3s BUX FFC UFN, WB3s DCZ DDA) 37,164-482- 76-ABD
W3QZF/3(+K3s LYK OIH,W3s BTX BZN,WB3s EFQ JQD,oprs) 22,007-373- 59-ABC
K3WHC/3(+K3DJC,WB3s AWJ BNB) 12,850-243- 50-ABD

4

Alabama
WA4NPL 11,644-282- 42-AB
WA4CQG 6468-170- 38-AB
WA8KLH/4 4266-158- 27-AB
AA4F 238- 30- 7-BD
WA4FHY 14- 7- 2-B

Georgia
N4QH 21,200-400- 53-AB
WB4RUA 2117- 73- 29-AB
WA4SJI 1950- 78- 25-A
WA4ODB 1872- 78- 24-AB
W4ISS 306- 24- 9-BD
W4VO(K4s AEK CKS,WA4s IBI KPU,WB4s AEG YWK,oprs) 28,450-558- 50-ABCD
WB4NMA(+WD4IIS) 17,200-335- 50-ABD
N4SJ(+WA4s MCQ MZN,WB4NNW, WN4OAQ,WD4s DWU DXD JLH JLI) 536- 67- 8-B

Kentucky
W4SMU 1649- 94- 17-BD
WD8NMY/4 20- 10- 2-B
WA4QYK(+K4EJQ,WA4CBX,WD4s AGO EKA) 9936-216- 46-AB
WB4VLH(+WB9JFT) 6176-193- 32-A

North Carolina
WA8CLN/4 16,650-333- 50-AB
K4GMP 10,824-246- 44-AB
WA4GBE 9348-221- 41-ABD
K1FJM/4 6732-177- 33-BD
WB4HFL 5882-168- 34-ABC
K4ROM 3172-122- 26-AB
K4SAN 1020- 55- 17-BD
W4ZZ 280- 40- 7-B
K4CAW(+K4s HJE MOB,N4XO, W4GFJ,WA4s DYY JIY MSS WB4s DBB EEM GGF) 50,456-680- 68-ABCD
WA4WZQ/4(+WA4WZP,WB4UDS, WD4s GQU HBU,oprs) 18,424-352- 47-ABCD
W4CQ/4(G8NF,KA4AVL,WA4s JLW TIJ UNZ,WD4s BEL CFX, oprs) 16,687-404- 37-ABCD
W4ATC(AA4OO,WA4LQS,WD4MBK, oprs) 7476-160- 42-ABCD
N4YN(+N4SM,WD4AQH) 6724-150- 41-ABCD
W4PAR/4(W4s IPP LYV OTI UIJ, UKZ WAU,K4s FMC HGK SWN, WA4s ASK EPV HAZ JVD PLT NSD,WHE,WB4s EMG PTV HCP VMC,WD4s KUN LYG NTE NTI OLF,KA4BGP,WA4KFF,W4EPV, K4HSK,oprs) 6562-179- 34-ABCD

Northern Florida
W4NVV 6634-214- 31-AB
WB4BSZ 4060-145- 28-AB
W4EQR 2464- 72- 32-ABD
WB5MAC/4 1416- 59- 24-AB
W4CSS 1344- 56- 24-ABD

South Carolina
N4DT 7560-171- 42-ABCD
WD4ACT 4991-161- 31-AB
K4KAE 2940- 82- 35-ABD
K4GMJ 2604- 93- 28-AB
WA4LDU 2184- 84- 26-AB
WB4NBK 1403- 61- 23-AB
W4IQQ/4(K4PXE,N4OB,W4LZW, WA4s AZQ OMN MWC,WB4s HKZ PGG,oprs) 13,040-305- 40-ABCD
N4JK(+W4FVV,WA4JWC,WB4s JWR WJQ,WD4s BUC BUH,oprs) 3243-141- 23-AB

Southern Florida
WD4MGB 10,545-285- 37-AB
WB4BND 2407- 83- 29-A
K4GFG 102- 34- 3-B
WA4BUS(+WB4ORM) 8960-279- 32-ABD
WB4WXE(+WA4YMZ,WB4YLR) 6045-195- 31-AB

Tennessee
WA4WCN 204- 18- 12-B
WA4DFS 180- 20- 9-B
W4BFB/4(AA4s R SC ZZ,K4s BF CEB LVV MQG RVW SE SLC,N4s ZC,W4FKT,WA4s ICM OBO VCC, WB4s AMU BQC FDU PCS QCS TLX YFD,WD4ABZ,oprs) 74,404-932- 76-ABCD
W4SGI(+K4WS,WA4s AFI PPR ZXB' WA4IRG,oprs) 12,742-277- 46-ABCDE

Virginia
WA4GPM 41,760-429- 90-ABD
WA4SBC 19,650-232- 75-ABD
K2UOP/4 15,989-254- 59-ABCD
WD4GXN 11,609-247- 47-BD
K4QIF 10,704-165- 48-BDE
WB4FQR 10,192-207- 49-ABC
W3IY/4 9776-207- 47-ABD
K4LHB 7668-132- 54-ABC
K4FJW 7245-207- 35-AB
W4NFR 4560- 90- 24-BD
WA4BUE 4200-113- 30-BD
W4MHQ 4064-117- 32-ABD
W4FJ 3720- 73- 40-ABD
WB4EYP 2790-155- 18-B
K4MSG 2100- 84- 25-AB
WA4EPI 820- 41- 20-A
K4JSI 528- 44- 12-A
N5BA/4 481- 37- 13-B
N4MM 60- 15- 4-B

5

Arkansas
WB5JAR 4026-122- 33-AB
WA2QVI/5 2160- 72- 30-AB
WØOHU/5(+K9AKS,W9UD, WA9CWY,WB9QPI) 65,658-706- 93-ABCD
K5ETU(+WA5FDF) 3312- 92- 36-AB

Louisiana
K4CHE/5 9248-195- 46-ABCD
WA5UUD 7178-194- 37-AB
WB5CZV 4030-130- 31-AB
WA5UFH 1518- 66- 23-A

Mississippi
WB5QCB 867- 51- 17-A
W5UCY 248- 30- 7-BD

New Mexico
K5EFW 2340- 90- 26-AB
W5IXR 702- 54- 13-AB

Northern Texas
WB5KTC(+W5QYT) 6732-175- 36-ABDI

Oklahoma
N5KK(+N5CG,WB5s SVV THA, WD5s CSQ CSR GIF) 48,585-615- 79-AB
N5KW(+K5s CM SW,WB5HLR) 47,808-557- 83-ABD

Southern Texas
WA5HNK 24,768-368- 64-ABD
WA5IYX 3696-112- 33-A
WA5QCP 2064- 86- 24-A
K5EI 2050- 82- 25-AB
K5ZD 840- 70- 12-AB
K5LZO(K5s MA NA RC,KB5AW, WB5WJT) 37,264-521- 68-ABCD

6

East Bay
N6IG/6 1176-140- 8-BD
WB6YJC(+WB6s BJO ZGY,WD6s EIZ FGA) 6328-226- 28-AB

Los Angeles
WB6JQY 2072-122- 14-BD
W6CN 873- 52- 9-BC
W6NXB 456- 38- 6-C
K6KH 224- 28- 4-C
K6ZMW 198- 11- 6-E
N6YB 120- 12- 5-B
WA6DCT 64- 8- 4-C
W6GGV(+WB6PKA) 18,270-418- 42-ABD
K6BPC(WA6HXD,WB6s AXE YVP,oprs) 7520-206- 32-ABC

Orange
WD6DNV 4740-141- 30-ABD
WB6MFW 2465- 85- 29-AB

Santa Barbara
WA6OYS 1520-111- 10-BC
K6MEP(K6VMN,N6MA,WA6s IJZ UEO WB6FPX,oprs) 20,629-372- 49-ABCDI
K6HXW(+WA6WTH,WB6HJW) 16,100-287- 50-ABCD
WB6IMM/6(+W6OAL,WA6EJO) 15,312-241- 48-ABCDEI
K6TZ(WA3YYG,W6EMS,WA6s ATE KTZ MBZ OUZ ZYG,WB6s CBV HOZ,WD6FZV,WB9KMO,oprs) 15,047-268- 41-ABCD

Santa Clara Valley
K6KLY 23,829-426- 47-ABCDE
WA6GYD 7805-190- 35-ABDE
K6QAX 2900-116- 25-AB
WA6BYA 1040- 65- 16-A
N6TX(+W6URA,WA6UHN,WB6JNN) 10,920-297- 30-ABCDEI
N6RZ(+K6TCN,WA6OCV) 6425-257- 25-AB
K6BJ(K6BDK,W6LC,WA6SVW,oprs) 2772-126- 22-AB

San Diego
WB6FTW/6 12,355-260- 35-ABC
WA6AWM 12,040-260- 40-ABC
WA6OIL 6846-143- 42-ABCD
WA6MHZ 3696-112- 33-AB
N6PC 462- 21- 11-A
WB6YNQ 33- 11- 3-B
W6XJ(+WB5CTS,K6JYO,WA6IGY, WB6IMV) 35,148-541- 58-ABCDE
N6NR(+K6DYD,WA6s POI RLV) 14,445-299- 45-ABC

San Francisco
N6HZ 2640-114- 22-ABD
W6SFH 174- 29- 6-B
W6AMT(WB6s ASR FER RAL RHP VZY,oprs) 18,603-435- 39-ABCDJ

San Joaquin Valley
N6NB 23,997-362- 57-ABCDE
K6YK 3645-135- 27-AB
K6JKQ 1872- 54- 24-ABCDE
W6DPD 1224- 51- 24-AB
WD6CPO(+WA6ALA,WD6DIO) 48- 16- 3-B

Sacramento Valley
K6RNQ 4800-160- 30-AB
WDØDYP/6 864- 48- 18-AB

Pacific
KH6IHP 19- 18- 1-BD
KH6HME(+KH6IAA) 92- 20- 4-ABD

7

Arizona
K7NN 5319-197- 27-AB
W7EDO 3358-146- 23-A
WA7LHZ 1504- 94- 16-A
W7LUX 96- 21- 4-BD
WA7JTM(+WA7s JTL LYI) 5300-212- 25-AB

Idaho
WA7FSI/7 588- 49- 12-AB
WA7NNH 245- 35- 7-AB
K7MM/7(+WA5ZKQ,WA7s YCP ZAH,WB7s AVD UBM) 1995-102- 19-ABD

Montana
W7KNT 287- 41- 7-A
WA7PDC 200- 20- 10-AB
WB7CLS/7 9- 9- 1-B

Nevada
K7ICW 5436-149- 36-ABD
N6CA/7(+N6ZC,WB6s JVD OKK) 12,936-268- 42-ABCDE
W6YKM/7(+K6LXO,WA6EZM, WB6KBZ) 11,382-250- 42-ABCDE

Oregon
WA7RTA/7 5740-175- 28-ABCDE
K7HSJ 1311- 63- 19-ABCD
W7TYR 936- 70- 12-ABCDE
W6LLP/7 24- 8- 3-B
K7AUO/7(K7WW,N7OB,W7s ADV UDM,WA7GFP,WB7s FHF PMP,oprs) 19,795-453- 37-ABCDEFGH

Washington
W7YOZ 4752-183- 22-ABCD
WB7SDA/7 544- 68- 8-AB
WA7PVE 378- 63- 6-AB
W7IDZ 115- 23- 5-AB
W7ERH 31- 31- 1-B
N7NW/7(+K7s KOT NO WTG, WA7NAN) 11,718-366- 27-ABCD
W7EK(K5WTA,WB5TWK,W7UGK, WA7s JEG LZE OJI,WB7s AIV BFM, oprs) 2453-194- 11-ABC

Wyoming
WA7KYM 688- 43- 16-AB
WØPUF/7(+KØUDZ,KAØAZX, WBØFPK) 1206- 67- 18-AB

Alaska
KL7IFP 68- 17- 4-AB
W2BN/KL7 52- 13- 4-AB

8

Michigan
WB8BKC 20,460-307- 62-ABCD
WA8EUU 4059-110- 33-ABCD
WB8AAX 1224- 72- 17-B
K8BGZ 49- 7- 7-B
W8MRM(WA8HGX,WB8s RNY SBI, oprs) 14,536-303- 46-ABD
WA8ULG(+WA8s MGO QBG,WB8s PGH WVD WXS,oprs) 11,088-232- 44-ABCD
WA8FTA(+WB8ZYC) 10,988-268- 41-AB
N8HT/8(+W8HW,WB8FEZ,WD8s CQN QQE) 10,659-209- 51-AB
WD8CQN(+N8HT) 54- 27- 2-B

Ohio
WB8IGY 30,384-420- 72-ABD
WA8TTS 15,732-276- 57-AB
WA8OGS 12,936-294- 44-A
WA8TJL 9486-186- 51-AB
K8NXI 8448-192- 44-AB
WD8MSF 7084-154- 46-AB
WB8PAT 4588-108- 37-ABD
K8DW 4235-107- 35-ABD
K8DIO 3094-110- 26-BD
W8GOH 3050-122- 25-B
WA8SVV 2106- 78- 27-AB
WD8INN 295- 59- 5-B
WD8PRJ 161- 23- 7-AB
K3ZAP/8 150- 25- 6-AB
W8JRN 150- 25- 6-AB
WB8VSU 48- 24- 2-B
K8III(+K8WW,WA8s PKB RCN) 90,522-937- 94-ABCD
W8VP(K8AL,KA8AMF,W8s LBB MZP,WA8AHD,WB8s DQE ERB ONY TRK TSI,WD8s AHV AKI LKJ QBJ,oprs) 35,508-499- 66-ABC
WB8WJT(+WB8KQP,WA8ZNC, WB8BOS,WD8s DDJ DIP) 1920- 70- 24-ABCD

West Virginia
W8AEC 7315-113- 55-ABD
K3LNZ/8(K3AAF,WA3s EOQ NZL OYW,W4PSJ,WA4LJQ,oprs) 36,480-426- 80-ABCDE
W8GK(K8s BS CG MBH WMX,W8s AH NR,WA8OKG,WB8s GDY ILK LPF UVM,WD8NPW,oprs) 33,920-517- 64-ABDI
N8II(+WB8s EGW EKG HOG QPU VAZ) 29,463-411- 69-ABD

9

Illinois
GW3NJY/W9 27,216-486- 56-AB
K9RO 20,336-328- 62-AB
WA9AHZ 11,544-213- 52-ABD
K8IE/9 10,332-204- 42-BD
W9IVI 3325- 95- 35-AB
WB9MEK 2375- 95- 25-AB
WB9SNR 2244- 88- 22-BD
WB9QBU 2160-108- 20-B
W9IFA 1800- 74- 24-ABD
WB9RXE 128- 32- 4-B
K9BDJ 90- 18- 5-A
W9ABA 64- 16- 4-B
W9NWE(+N9SS,WB9YUN) 48,195-582- 81-ABCD
N9HH(+WA9TZL,WB9s CLN RHW, NØIS,WAØIYY) 44,538-522- 78-ABCD
K9HDE(+K9KD,WB9IWN) 33,215-495- 65-ABCD

Indiana
K9KFR 32,000-492- 64-ABD
WB9PXW 12,312-228- 54-AB
WB9NTL 10,668-254- 42-AB
W9NFE 8541-219- 39-A
W9CGI 5733-147- 39-AB
WA9MEM 2675-107- 25-A
WA9PKL 690- 46- 15-A
W9ERW 375- 25- 15-AB
W9CSF/9(K9DZE,WA9MSW,WD9s BDR BLP,oprs) 7785-173- 45-AB

Wisconsin
WA9LZM 5600-128- 40-ABEFI
WB9ROE 4144-112- 37-AB
WA9SUJ 3245- 55- 55-ABCD
K9XY 3150- 85- 35-ABC
WA9JFM 1953- 93- 21-B
WD9ACY 1053- 81- 13-B
WA9TFG 80- 16- 5-AB
WA9CUH(+WB9OAR) 4788-120- 38-ABD

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Colorado
WAØTVZ 1968-123- 16-AB
WBØVGC 1245- 83- 15-AB
WDØGBI 341- 31- 11-A

Iowa
WØSI 11,438-301- 38-A
WBØZXU 9100-179- 50-ABD
KØDAS 2727- 82- 27-BD
WBØSBG 2175- 67- 25-BD
WØRAP 798- 35- 19-BD

Kansas
WBØQDK 2730- 91- 30-AB
NØLL 2248- 96- 23-AB
WØQOA 480- 40- 12-B
WØRT(+KØOBY) 1008- 52- 18-BD

Minnesota
WBØPVM 2132- 82- 26-A
WØVB(+KØs IN SE TS,WØRGU, WAØs QWY ULE,WBØMBD RSW UIP,WDØFCX) 16,940-304- 56-ABD

Missouri
WBØPKN 8840-170- 52-AB
WØIRP 3920-112- 31-AB
WBØUFQ 3480-145- 24-B
WBØVTA 2240- 70- 22-AB
WØRWH 1430- 65- 22-B
WØKC 1232- 56- 22-AB
WBØWGG 646- 34- 19-AB
WBØOGK 209- 16- 11-BD
WDØBBN 2- 2- 1-A
WØYZS(+KØTLM,WBØCE,WAØs EEU WPJ) 15,812-248- 59-ABD

Nebraska
WAØMRH 7880-197- 40-AB
WØOHP 1092- 52- 21-AB

North Dakota
WAØCSL 1600- 62- 25-ABD
KØALL(+WAØs HBN KSB ZOK) 5382-117- 46-AB
WØRIB/Ø(+WØCZR,WAØEWW, WBØGPW) 544- 34- 16-AB

South Dakota
KØVXM 3424- 97- 32-ABD
WBØULX 180- 14- 12-ABD
WØSD(WB2VEY,KØs QC WM,WAØs NRE QLP UFS,WBØs AFY ZLK, oprs) 15,529-293- 53-AB

VE

Maritime - Newfoundland
VE1BNN 8880-296- 30-A
VO2AG 5954-229- 26-A
WB2SIH/VE1(+WA2OMT,WB2DST) 25,080-349- 66-ABD

Quebec
VE2DFO 24,012-348- 69-AB
VE2SH 14,076-263- 51-ABD
VE2YU 7192-206- 31-BCD
VE2KW 1836- 68- 27-AB

Ontario
VE3BQN 18,073-318- 53-ABCDE
VE3FGU 4100-205- 20-B
VE3DSS 3570-119- 30-AB
VE3CKU 2178- 81- 27-A
VE3FN 2139- 93- 23-B
VE3OJ 225- 25- 9-AB
VE3GLD 100- 20- 5-B
VE3AQG 96- 32- 3-B
VE3FHK(+VE3FHU,opr) 20,670-384- 53-ABD
VE3ECP(+VE3BXY) 3672-153- 24-AB
VE3AEA/3(VE3s AAY FDP IQM IQZ,oprs) 1776-111- 16-AB

Saskatchewan
VE5LY 1- 1- 1-A

British Columbia
VE7ASM/7(+VE7s AFB AOU ASC AUK AVW BBB BLG BN BSM CKW CLO CXD,oprs) 910- 87- 10-ABI

DX

Japan
JA1RJU 6- 2- 3-A
JA2DDN 4- 1- 4-A

Turks + Caicos
WB2CHO/VP5 0- 0- 1-A

Bermuda
WB2RLK/VP9 8370-279- 30-A

Mexico
XE2BC(+WB6NMT) 23,961-388- 49-ABCDE
XE2II(+K5HVC,W5XW,..A5NAD, WB5MIC) 3016-104- 29-A

Disqualifications
W8CCI (W8DJY, W8ULC, WA8WQC, WA8WXT, WB8YGU, WD8KVR, operators) WB8HUC/9 (WB8GEU, WB8GEW, WB8GEX, WB8GEY, WB8GFA, operators).

Rules, ARRL 160-Meter Contest

Don't forget the ninth running of the ARRL 160-meter contest this year. Activity (and propagation) on 160 may surprise you!

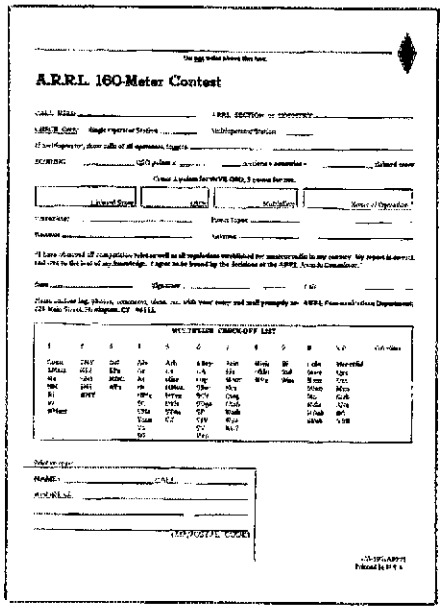
Most activity will be concentrated in the 1800-1825 kHz slot, though 1830-1850 should be used to spread things out. Listen for DX stations in the 1825-1830 segment. They'll tell you what frequency they're listening on (not 1825-1830 in most cases).

Rules

1) This contest will start at 2200 UTC Friday, December 1, and end at 1600 UTC Sunday, December 3, 1978. This is a 42-hour period with no limitation on operating time. Cw only.

2) The contest is open to all amateurs. A QSO with an amateur in an ARRL section (see page 8, *QST*) is worth 2 points. QSOs with amateurs not in an ARRL section are worth 5 points. DX-to-DX QSOs will not count.

3) Multipliers are the 74 ARRL sections, VE8/VY1 and each foreign country worked.


A.R.R.L. 160-Meter Contest

4) The exchange will be the report, plus ARRL section, for those in an ARRL section. Those participants outside of an ARRL section will send a report and the name of their country.

5) Competition is within the section and non-W/VE country for certificate awards. Division high scorers will have their section award endorsed with an appropriate seal. Multioperator work is permitted with scores to be shown after single-operator listings (no certificates).

6) Contest work may be reported either on the forms available from Hq. or on a reasonable facsimile. The log must show date/time, call, RST, section/country for all QSOs. An entry consists of the log and summary sheet. Check sheets are not mandatory.

7) Entries become the property of ARRL; none can be returned. Awards Committee decisions are final. Send an addressed stamped no. 10 envelope for appropriate entry forms. All entries must be postmarked no later than December 29, 1978, to be eligible.

8) Standard disqualification criteria apply; see February 1978 *QST*, page 83 and September 1978 *QST*, page 48 (item 26).

Strays

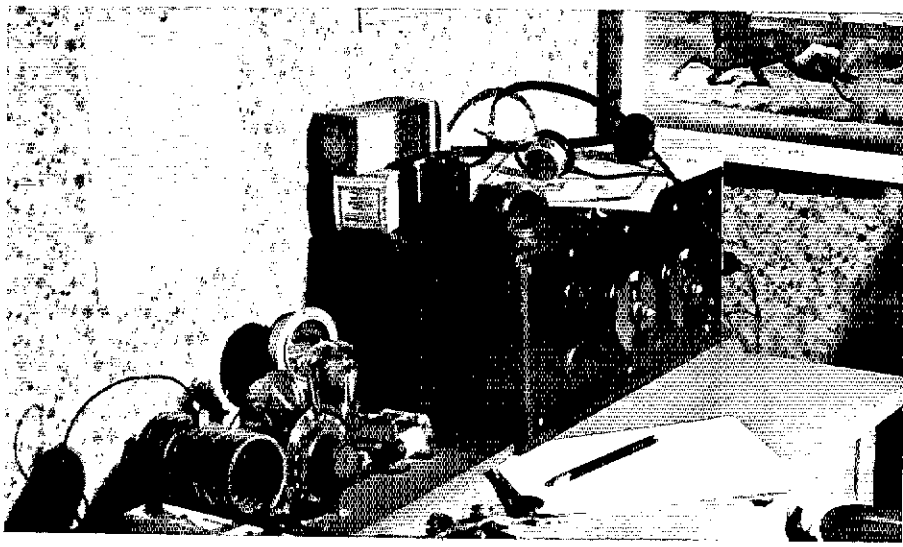
WINNERS, FIRST ANNUAL ARRL PHOTO CONTEST

☐ The First Annual ARRL Photo Contest brought some surprises (only one entry by a professional photographer) and some unusual subjects (birds of various types seem to make FB operators!). To the 75 entrants who sent in about 170 photos (one enthusiastic entrant sent us 16 photos but, sadly, failed to win a prize), our thanks. And to the winners, our heartiest congratulations.

This year's entries made it clear that it will be easier to win a *Handbook* or other prize next year if you enter photos depicting overseas amateur activity, a public service event or photos in just about any category besides Equipment/Antennas. Some excellent equipment photos failed to qualify for a prize because of the heavy competition in that category.

One First Place winner is shown on this page. We will try to use as many of the winners (and those that didn't win) as possible in *QST* and our other publications, as a need for their specific subjects arises.

Your efforts could be among those published next year. Watch for the announcement of the 1979 ARRL Photo Contest early next year! — *WA1ZUY*


Joe Halpin's photo of W1ELB's complete 1932 station garnered first prize for K1ERO in the Equipment/Antennas category. Note the original Department of Commerce license on the wall.

Winners, 1978 ARRL Photo Contest

Alfred Gavenas, WA6IQD
First Place, Operating Event
Walter Livingston, WA4YCM
Second and Third
Drew Pliszka, WB8YDP
First Place, Portrait
G. W. Legel, N6TO, Second;
Chuck Rafferty, WA7ZOO, Third
J. D. Halpin, Jr., K1ERO
First Place, Equipment/Antennas
G. W. Legel, N6TO, Second;
Charles Hall, WA8MYV/WB5TGK, Third
Stanley Briggs, W8MPD
First Place, Public Service
Gregory Black, WA2EPK, Second and Third
Overseas Amateur Activity — No Entries
Bernard L. Wehage, WB3AXP
First Place, Unusual Modes of Operating (Amateur photographer) (only entry)
Ron Pollack, K2RP
First Place, Unusual Modes (Professional)

Rules, ARRL 10-Meter Contest

Last year's 10-Meter Contest proved to be the biggest ever. This year's should be even better, with sunspots appearing in ever-increasing numbers.

Beginning in 1978, upon recommendation of the ARRL Contest Advisory Committee, the contest period will be 48 hours, with a maximum of 36 hours of operating time permitted for *all* stations.

Suggested frequencies are cw: 28,000-28,050; Novice/Technician, 28,100-28,150. Ssb: 28,500-28,600; a-m, 28,800-28,900. Novice and Technician operators should sign /N or /T.

Remember to send an s.a.s.e. to Hq. for a summary sheet, log sheet and dupe sheet. Please ask for only one of each unless you can't make copies locally.

At press time OSCAR 7 was scheduled to be in Mode B and OSCAR 8 in Mode J during the contest period. *If* the schedule changes, don't forget that OSCAR contacts do count (on Mode A only).

Rules

1) *Eligibility:* This contest is open to all amateurs worldwide.

2) *Object:* To exchange QSO information with as many amateur stations in any and all parts of the world as possible on 10 meters.

3) *Contest Period:* The contest shall run from 0000 UTC December 9, to 2359 UTC December 10, 1978. This is a 48-hour period with only 36 hours of operating time permitted for *all* stations.

4) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

5) *Entry Classification:* Entries will be classified as single- or multiple-operator stations. Single-operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multiple-operator stations are those obtaining any assistance, such as from spotting or relief operators, or keeping the station log or records. Multiple-transmitter stations are prohibited. The use of electronic or mechanical devices and/or any other method of simultaneous operation of two or more transmitters is prohibited.

6) *Exchange:* Amateurs in the 50 United States and Canada will transmit signal report and state or province. Others (including KP4, KZ5, KC6, etc.) will transmit signal report and consecutive serial number starting with 001. Stations not land-based transmit signal report and ITU region.

7) *Valid Contacts:* A station may be worked once on cw and once on phone. All contacts must be either cw to cw or phone to phone. Crossmode contacts do not count for contest credit. OSCAR contacts may be counted. All cw QSOs must take place between 28.0-28.5 MHz except those made through OSCAR.

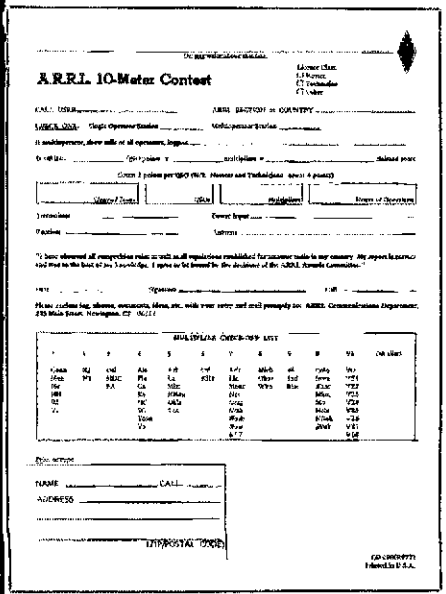
8) *Scoring:* Two points are earned for each completed two-way exchange. Four points are earned for a completed two-way exchange with a W or K Novice or Technician. Incomplete QSOs will not count. Multipliers: The multiplier will consist of the number of different states, Canadian call areas (VE1-VE8, VY1, VO), ITU regions (as sent by non-land-based stations) and countries as determined by the ARRL Countries List. A state or province cannot be counted again as a country. Final score = QSO points × the multiplier.

9) *Reporting:* Contest work may be reported on the forms available from Hq. or on a reasonable facsimile. The log must show date/time, call, RST, section/country for all QSOs. All entries must be postmarked no later than January 5, 1979, in order to be eligible for *QST* listing and awards. Check sheets must be submitted if you make more than 200 QSOs (total). If you are a Novice or Technician, make sure you indicate it on your entry.

10) *Awards:* Awards will be issued on a section or country basis. A certificate will be awarded to the highest-scoring single-operator station in each section, Canadian call area and foreign country. Multiple-operator, Novice and Technician stations will receive an award if three or more such entries in a section are received or if the entry displays exceptional effort. Regional awards for non-land-based stations will be issued if participation warrants.

11) *Judges:* All entries become the property of ARRL and none can be returned. All entries will be passed upon by the ARRL Awards Committee whose decisions will be final.

12) Standard disqualification criteria apply; see February 1978 *QST*, page 83 and September 1978 *QST*, page 48. QST


ARRL 10-Meter Contest

NAME _____ CALL _____

ADDRESS _____

160/10 Meter Contest

CALL USED _____ STATE or COUNTRY _____

50 QSOs per side
Number each new multiplier as worked

FREQ.	MODE	DATE/TIME GMT	STATION WORKED	COMPLETE EXCHANGE SENT	COMPLETE EXCHANGE RCVD	LIST NEW MULTIPLIERS	POINTS

Operating News

Conducted By George Hart,* W1NJM

Having a Purpose

It has always been a basic tenet of all amateur operating activities, especially those sponsored by your League, that a basic purpose or objective be served. Sometimes this objective is obvious, sometimes it is obscure, and just once in a while it appears that there is none — or at least not a worthy one.

A "worthy" one? Now, just how do you define a "worthy" objective, and who determines this? Brother Webster goes only so far; he says that "worth" is "the value of something measured by its qualities or by the esteem in which it is held." So if we are to determine what it means to us, we have to apply it to our activities. Do all our activities have qualitative and beneficial values? You could get a good argument started on this.

Let's look at some of our specific activities, starting with the "big three" contests — Field Day, November SS and DX Competition. The original purpose of Field Day was to "test portables," which had an emergency communications connotation that soon became stated as this activity's *primary* (but not sole) objective. Certainly a worthy objective, eh? Yet there are those who feel that FD has degenerated into just another cutthroat contest and that the great majority of participants are in no way interested in emergency preparedness, only in winning, or in beating a rival. Should FD be given back to the emergency planners? Maybe — but it'll never happen.

The November SS contest had a basic objective, once — to acquaint all amateurs with ARRL message-handling procedure. Did you know that the first SS (1930) lasted a full two weeks and that the exchange was a *complete* message? Today's SS is a far cry from this, with only two week*ends* involved and a perfunctory exchange having little if any meaning or significance. The only apparent objective left is operator training, the business of digging out contacts at high speed, which seems to be an objective of all contests.

The basic objective of the DX Competition is to foster international goodwill between amateurs in our own field organization and those in foreign countries and by extension among all peoples of the world. A worthy objective indeed, no question! But there are those who look askance at the way this contest is being conducted as to whether it is really accomplishing this objective.

Then there are the "lesser" contests and other operating activities, some of them approaching "bigness" in the same category as the Big Three. Vhf contests, for example, are getting mighty big. Objective? To enhance vhf operating and techniques, we guess, or to increase occupancy. 160- and 10-meter contests? To provide occupancy. The new UHF Contest has the same objective. The Novice Roundup is to encourage more contact between beginner licensees and the older, more senior amateurs. The IARU Radiosport competition has the same basic purpose as the DX Contest, but a slightly different format. What else? There are more and more contests every year, and more complaints that they are getting away from us, serving only to clutter the bands, especially on weekends and serving no useful purpose.

How about this for a purpose: having fun? After all, Amateur Radio is a hobby, isn't it? Why can't we do the things we do just for the fun of it? Why do we have to seek to justify everything we do by trying to ascribe to it some high and mighty purpose and objective? Let's face it, better than 90 percent of all amateurs do what they do because it's fun; and when or if it stops being fun, they'll stop doing it, never mind its overall importance or our overall responsibility.

We think this is true, but it has problems as a stated philosophy. Try, for example, telling the delegates at WARC that we need all this spectrum space so we can have fun playing on-the-air games. Nothing wrong with playing games but each game must have some purpose, some objective that is beneficial not just to the growth of Amateur Radio and occupancy of our bands, but to the general weal to justify our existence.

Looking back, from the twilight zone, over a 52-year Amateur Radio career (40 of them with ARRL hq.) it is possible to discern some trends. We have certainly grown and progressed during that time. Our operating techniques and activities have changed immeasurably, mostly for the better. We view the improvements with satisfaction and pleasure, take pride in them as having been, to some small extent, a contributor. Both the growth and improvement have been phenomenal; but as in all phenomena there are or can be undesirable side effects. It is these which we must guard against. One of them is losing sight

*Communications Manager, ARRL

W1AW Operating Schedule (October 29, 1978-April 29, 1979)

PST	CST	EST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1400	Slow'	Fast'	Slow'	Fast'	Slow'		
7	9	10	1500	←		Cw Bulletins'		→		
8	10	11	1600	←		RTTY Bulletins*		→		
1 P.M.	3 P.M.	4 P.M.	2100	Fast'	Slow'	Fast'	Slow'	Fast'	Slow'	Slow'
7	4	5	2200	←		Cw Bulletins'				→
8	5	6	2300	←		RTTY Bulletins*				→
4	6	7	0000	Slow'	Fast'	Slow'	Fast'	Slow'	Fast'	Fast'
5	7	8	0100	←		Cw Bulletins'				→
6	8	9	0200	←		RTTY Bulletins*				→
6:30	8:30	9:30	0230	←		Phone Bulletins'				→
7	9	10	0300	Fast'	Slow'	Fast'	Slow'	Fast'	Slow'	Slow'
8	10	11	0400	←		Cw Bulletins'				→
9	11	12	0500	←		RTTY Bulletins*				→
9:30 P.M.	11:30 P.M.	12:30 A.M.	0530	←		Phone Bulletins'				→

Slow code practice on cw bulletin frequencies, 8 minutes each session: 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
Fast code practice on cw bulletin frequencies, 8 minutes each session: 35, 30, 25, 20, 15, 13, 10 wpm.
Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.
Please note that all footnoted frequencies are approximate.

Normal W1AW visiting hours are 3:30 P.M. to 1 A.M. seven days a week (local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about seven miles south of Hartford). Note: ARRL office-visiting hours are 8 A.M. to 5 P.M. Monday through Friday. Maps with local street detail are available upon request. If you wish to operate when visiting, you must have your original operator's license with you. The best time for visitors to operate is on weekdays between 1 and 4 P.M. local time. (Schedules can also be arranged to work W1AW.) The station will be closed November 23 and December 25. *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Bruce Brightman, WA1PAL.

In a communications emergency monitor W1AW for special bulletins as follows: *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0300 practice from the issue of *QST* two calendar months past: November 1, It Seems to Us; November 7, World Above; November 13, League Lines; November 18, Public Service; November 22, Happenings; November 27, Operating News.

of our overall responsibilities as a communications service in our zeal to do the things we like to do, of lapsing into a self-serving rather than a public-serving frame of mind. We need to have fun doing what we do, otherwise we will not get participation. But this cannot be the objective. The objective must be something beneficial to the public in general. Our advisory committees and our administrators must always bear this most importantly in mind.

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning October 1, 1978:

Balloting results: In the Connecticut Section, William J. Pace, W1ID/W1ILV, defeated John J. McNassor, W1GVT, 433-417.

In the North Carolina Section, William C. Parris, K4GHR/AA4R, defeated Carl E. Smith, N4AA/W4NQA, 609-378.

In the Southern Florida Section, Woodrow Huddleston, K4SCL, defeated Robert B. Conaughty, K4OQ, 922-471.

Appointments: In the Canal Zone Section, Alvin Sholk, KZ5AS, was appointed to complete the term (until June 30, 1979) of Paul Ebdon, KZ5TJ (resigned).

SCM ELECTION NOTICE

To all ARRL members in the Montana, Mississippi, Iowa, Arizona, Ontario, Orange, Northern Texas, Arkansas, Kentucky and Wyoming sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, December 8, 1978.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on January 2, 1979, returns counted February 20, 1979, and SCMs elected as a result of the above procedures will take office April 1, 1979.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning April 1, 1979.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April 1979 *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

George Hart, W1NJM
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the North Dakota section as a result of notices in April and May 1978 *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate. QST

OSCAR 7				OSCAR 8			
Ref. Orbit	*Date (UTC)*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Date (UTC)*	*Time (UTC)*	*Long. W.*
18120B	1 Nov.	0145	86.1	3352X	1 Nov.	0026	47.9
18132A	2 Nov.	0044	71.0	3366A	2 Nov.	0031	49.2
18145B	3 Nov.	0138	84.6	3380A	3 Nov.	0036	50.6
18157B	4 Nov.	0038	69.4	3394J	4 Nov.	0041	51.9
18170A	5 Nov.	0132	83.0	3408J	5 Nov.	0047	53.2
18182B	6 Nov.	0031	67.9	3422A	6 Nov.	0052	54.5
18195B	7 Nov.	0126	81.4	3436A	7 Nov.	0057	55.8
18207A	8 Nov.	0025	66.3	3450X	8 Nov.	0102	57.2
18220B	9 Nov.	0119	79.9	3464A	9 Nov.	0107	58.5
18232B	10 Nov.	0019	64.7	3478A	10 Nov.	0113	59.8
18245A	11 Nov.	0113	78.3	3492J	11 Nov.	0118	61.1
18257B	12 Nov.	0012	63.2	3506J	12 Nov.	0123	62.5
18270B	13 Nov.	0107	76.8	3520A	13 Nov.	0128	63.8
18282A	14 Nov.	0006	61.6	3534A	14 Nov.	0133	65.1
18295B	15 Nov.	0100	75.2	3548X	15 Nov.	0139	66.4
18308B	16 Nov.	0154	88.8	3561A	16 Nov.	0001	41.9
18320A	17 Nov.	0054	73.6	3575A	17 Nov.	0006	43.2
18333B	18 Nov.	0148	87.2	3589J	18 Nov.	0011	44.6
18345B	19 Nov.	0047	72.1	3603J	19 Nov.	0016	45.9
18358A	20 Nov.	0142	85.7	3617A	20 Nov.	0022	47.2
18370B	21 Nov.	0041	70.5	3631A	21 Nov.	0027	48.5
18383B	22 Nov.	0135	84.1	3645X	22 Nov.	0032	49.8
18395A	23 Nov.	0035	69.0	3659A	23 Nov.	0037	51.2
18408B	24 Nov.	0129	82.6	3673A	24 Nov.	0042	52.5
18420B	25 Nov.	0028	67.4	3687J	25 Nov.	0048	53.8
18433A	26 Nov.	0123	81.0	3701J	26 Nov.	0053	55.1
18445B	27 Nov.	0022	65.8	3715A	27 Nov.	0058	56.5
18458B	28 Nov.	0116	79.4	3729A	28 Nov.	0103	57.8
18470A	29 Nov.	0016	64.3	3743X	29 Nov.	0109	59.1
18483B	30 Nov.	0110	77.9	3757A	30 Nov.	0114	60.4
18495B	1 Dec.	0009	62.7	3771A	1 Dec.	0119	61.7
18508A	2 Dec.	0104	76.3	3785J	2 Dec.	0124	63.1
18520B	3 Dec.	0003	61.2	3799J	3 Dec.	0129	64.4
18533B	4 Dec.	0057	74.8	3813A	4 Dec.	0135	65.7
18546A	5 Dec.	0151	88.3	3827A	5 Dec.	0140	67.0
18558B	6 Dec.	0051	73.2	3840X	6 Dec.	0002	42.5
18571B	7 Dec.	0145	86.8	3854A	7 Dec.	0007	43.8

Have you listened to OSCAR 8 yet? This newest of amateur satellites is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during O 7 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).

Notes

1) All time and date references are in UTC.
2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
3) O 7 will operate Mode A only on days of the *year* fully divisible by three (November 2 is day number 306, for example), and the other two days in between will be Mode B.
4) *All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL.*
5) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
6) O 7 progresses an average of 28.737617 degrees west per orbit in a period of 114.945247 minutes. O 8 progresses 25.807892 west in a period of 103.227752 minutes.
7) O 8 modes of operation are Monday, Tuesday, Thursday and Friday — Mode A. Saturday and Sunday — 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

This schedule of orbits for OSCAR 7 and OSCAR 8 is a regular feature of *QST*. Tune in W1AW bulletins for updated reference orbit data. Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. Also, the popular and informative series of *QST* articles for the beginner has been reprinted in book form. *Getting to Know OSCAR — from the Ground Up* covers OSCAR 6, OSCAR 7, the newest satellite, OSCAR 8, launched in early March, and the exciting Phase III program scheduled for late 1979. It includes the OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for $3 postpaid ($3.50 outside the U.S.), from the ARRL.

Operating Events

NOVEMBER

1-2: YL Anniversary Party phone, September, page 75 (11-12 listing).

3-4: Trilliums QSO Party, October, page 93.

4: Frequency Measuring Test, October, page 93.

4-5: Sweepstakes cw, October, page 73. **RSGB 7 MHz** cw, September, page 75 (14-15 listing).

8: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. (Universal Coordinated Time, abbreviated UTC with Z shown as a time designator). The run will take place at 9 P.M. PST local clock time the night of November 7. 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 include your full name, call (if any) and complete mailing address. A large, stamped, self-addressed envelope will help to expedite your award/endorsements.

11-12: WAE RTTY Contest, Delaware QSO Party, Missouri QSO Party, IPA Contest, October, page 93.

12: OK DX Contest, October, page 93.

16: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST local clock time the night of November 15. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL per the instructions under the November 8 listing.

18-19: Sweepstakes, phone, October, page 73. **WARS QSO Party,** October, page 93.

20: W1AW Qualifying Run, 10-35 wpm at 2100Z. This is 4 P.M. EST on November 20. All other details per the November 16 listing.

23-26: CQ Ham Holiday, from 0001Z November 23 through 2359Z on November 26, sponsored by the Florida Gulf Coast Amateur Radio Council, Inc. Work any member of a club belonging to the FGCARC for a special commemorative QSL. Exchange RS(T), time, frequency and mode in your log report. Frequencies 7.140 and 21.150 MHz on cw and 3.940, 7.25 and 21.4 MHz on voice. Logs to P. O. Box 157, Clearwater, FL 33517.

25-26: CQ WW cw, October, page 93 (28-29 listing).

DECEMBER

2-3: 160-Meter Contest, details this issue. **EA Contest** phone, from 2000Z Saturday through 2000Z Sunday (cw Dec. 9-10). Non-EA stations will try to contact the most EA stations in every zone and with as many EA districts as possible. Only single-operator category: 80-10 meters. Transmit RS(T) plus QSO number, starting with 001. N.A. to EA QSOs are worth 2 points. Only one QSO with each station per band valid. A minimum of 100 points for score consideration. Multipliers are each EA district, per band. Call CQ EA. Log QSOs, date/time(Z), bands/stations, control numbers, QSO points and note new multipliers. Usual summary with call, name, address and declaration. Postmark no later than Feb. 15 and send to the URE International Contest, Box 220, Madrid, Spain. **Telephone Pioneers QSO Party,** from 1900Z December 2 through 0500 December 4. This 14th annual event is sponsored by the John D. Burlie Chapter No. 89 of the Telephone Pioneers of America for members of the TPA. On phone, call "CQ Telephone Pioneers" and on cw, call "CQ TP." Frequencies: 3.965 7.275 14.295 21.365 28.675 50.1 and 144.275 MHz on voice and 3.565 7.065 14.065 and 21.065 on cw. Exchange RS(T), QSO number, ITPA chapter name and number. Scoring one point for each pioneer and one point for each chapter worked. Send log showing date, time, station worked, chapter name and number and QSO number postmarked not later than January 10, 1979, to Ted Phelps, W8TP, 6200 East Broad St., Columbus, OH 43214. **Connecticut QSO Party** sponsored by the Candlewood Amateur Radio Club, CARA. The time will be from 2000Z Dec. 2 to 0200Z Dec. 4 with a rest period from 0500Z to 1200Z Dec. 3. Phone and cw are considered to be the same contest. Send QSO number, RS(T), ARRL section for out-of-state stations or CT county for CT stations. Stations may be worked once on each band and on each mode. To score, out-of-state stations multiply total QSOs by the number of CT counties worked (maximum of eight), CT stations multiply total QSOs by the sum of ARRL sections and provinces. Additional DX contacts count for QSO points but only one DX multiplier overall is allowed. W1QI, the club station, will be operating cw on the odd hours and ssb on the even hours and counts as 5 points (each band, each mode). Novice contacts count 2 points each and OSCAR contacts count 3 points each. Suggested frequencies are cw, 40 kHz up from the bottom of each band; ssb, 3927, 7250 14295 21370 28540; Novice, 3725 7125 21125 28125. Out-of-state portables and mobiles operating in CT are requested to identify themselves as such, as are CT mobiles operating in other counties. Awards (minimum of 5 QSO points). A Worked All Connecticut Counties Certificate will be awarded to each station working all CT counties. Logs must show category, date/time (Z), stations, numbers, bands, QSO points and claimed scores. Enclose a large s.a.s.e. for results. Logs must be postmarked by Jan. 3 and sent to CARA, c/o Fred Porter, W1VH, 169 Carmen Hill Rd., No. 2, New Milford, CT 06776. **International Island DX Contest,** from 0001Z December 2 through 2359Z December 3. Sponsored by the Radio Amateurs on Whidbey Island. Non-island stations send RS(T) and ARRL country; island stations send name of IDX island, i.e., 59 Whidbey Island, 599 Tasmania, etc. Single, multioperator, single transmitters only. Frequencies 1.805 3.555 3.715 7.055 7.115 14.055 14.155 21.055 21.155 28.055 and 28.155 on cw and 1.825 3.815 3.895 7.215 7.285 14.215 14.285 21.315 21.385 28.515 and 28.585 on phone. Scoring 10 points for each island contact outside your own DXCC country and 1 point for DX not on the IDX list. Work each station once regardless of band/mode, multiply by each IDX island. Power multiplier 500-1000 watts × 1, 300-499 watts × 1.5, 101-299 watts × 2 and 100 watts or less × 4. QSO points × IDX × power multiplier gives final score. Send log sheet showing date, time, band, station worked, RS(T) DXCC country or IDX with IDX check sheet and dupe sheet. Awards. Send to WB7BFK, 2665 North 1250 East, Oak Harbor, Whidbey Island, WA 98277 with s.a.s.e. by 4 January 1979. **Flatland Farmer 10-X QSO Party,** from 1200Z to 2359Z on December 3 sponsored by the Flatland Farmer Chapter of 10-X International Net, Inc. Open to all using frequencies 28.7 to 28.8 MHz. QSO with non 10-X members counts one point, two points for 10-X associate or local members of Flatland Farmers and three points for Flatland Farmers. Awards. Logs showing date, call sign, name, address, 10-X number and Flatland Farmer number if any mailed by January 15 to Mike Reik, WB9YJF, 304 McKinley Street, Westville, IL 61883. **Garden City Contest** from 1200Z December 2 through 1159Z on December 3 sponsored by the Bangalore Amateur Radio Club (India). Cw only contest open to all amateurs on 40 and 20 meters only. Single operator only. Work each station once per band. VU work all, all others work only VU stations. Exchange RST plus serial number (599001, 599002, etc.). Score one point per QSO multiplied by 1 for Asia, 2 for Europe, Africa and Australia and 3 for North and South America. Logs postmarked by December 31 to Bangalore Amateur Radio Club, VU2ARC, P. O. Box 5053, Bangalore 560 001 India. Awards.

7: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run will take place at 9 P.M. PST local clock time the night of December 6. Other details under the November 8 listing.

9-10: 10-Meter Contest, this issue. **EA Contest** cw details per the December 2-3 listing. **HA-DX Contest,** sponsored by the Hungarian Radioamateur Society, from 1600Z Saturday to 1600Z Sunday. Classifications: single op, single band; single op, multiband; multioperator, multiband (club stations classify for this category). All bands 80 through 10 meters, cw only. Call TEST HA (HAs will call TEST WW). Exchange RST and serial starting with 001. After their signal report HA stations will transmit a two-letter code corresponding to their location (county) as follows: BA BP BE BN BO CS FE GY HA HE KO NO PE SA SO SZ TO VA VE ZA. Each HA contact counts a point. The same station may be worked just once on the same band. Each different HA county worked counts as a multiplier on each band. Usual logs/summary plus declaration. Awards. Repor promptly to the Radio Amateur League of Budapest H-1553 Budapest, Box 2, Hungary.

15: W1AW Qualifying Run, 10-40 wpm at 0300Z. Thi is 10 P.M. EST local clock time on December 14. A other details per the November 16 listing.

16-17: 10-X Winter CW QSO Party, from 0001Z o December 16 through 2359Z on December 17 spon sored by the 10-X International Net, Inc. Open to a amateurs. All contacts must be below 28.5 MHz. Ex change name, QTH, 10-X number (if you have one) Scoring per contact one point plus one point if statio has a 10-X number plus one point if Novice/Techni cian (max. points per QSO 3). Specify date and time o contact on logs sent to Daniel Rubin, WA1ZXB, 1 Princeton Street, Danvers, MA 01923, postmarked b January 20. **SOWP Christmas CW QSO Party,** spon sored by the Society of Wireless Pioneers (SOWP) from 0000Z Dec. 16 to 2359Z Dec. 17. There are n formal requirements for exchange and logs are not re quired. The purpose of the affair is to give members chance to meet on the air and to exchange season' greetings. The call will be CQ SOWP. Suggested fre quencies are 55 kHz up from the low end of each amateur band. Additional information may be ob tained from the Party Coordinator, Bill Willmot K4TF, 1630 Venus Street, Merritt Island, FL 32952.

24: HA-WW Contest, full 24-hour period UTC, singl operator, multioperator, SWL sections, al bands/modes. Call WW Test de . . ., exchange repor plus ITU zone number (see page 75, May *QST*). Con tacts within one's own continent count 1 point, be tween continents 3 points, with HA/HG5 stations points, with HA5 stations 5 points. Final score equal the sum of QSO points times the sum of different ITU zones. Usual logs, declaration, mailed by January 1 to BRAL Contest Committee, Box 2, Budapest 134 Hungary.

27: W1AW Qualifying Run, 10-35 wpm at 1400Z. This is 9 A.M. EST local clock time on December 27. Al other details per the November 16 listing.

JANUARY

1: Straight-Key Night, details next month.

3: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate) 10-35 wpm at 0500Z. The run will take place at 9 P.M. PST local clock time the night of January 2. Other details under the November 8 listing.

6-7: CD Party, phone

9: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST local clock time on January 8. All other details per the November 16 listing.

13-14: VHF SS, CD Party cw, YU DX Contest

26: W1AW Qualifying Run

27-28: Simulated Emergency Test, French Contest cw, **CQ 160-Meter Contest**

FEBRUARY

3-11: Novice Roundup
11: Frequency Measuring Test

MARCH

3-4: DX Competition, phone
17-18: DX Competition, cw

APRIL

21-22: Earth-Moon-Earth Competition (Part 1)

MAY

19-20: Earth-Moon-Earth Competition (Part 2)

JUNE

9-10: VHF QSO Party
23-24: Field Day

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤ CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Manager: VE6AFO. VE6AC and XYL have taken up permanent residence in Calgary after many years of wandering south for the winter. VE6AFO was an Edmonton visitor while on holidays. Congratulations to all those who participated in the communications effort for the Commonwealth Games in Edmonton. A job well done. VE6YD and XYL have returned to Canada after a three-year stay in ZL-Land and have taken up residence near Olds and VE6GK. Traffic: (Aug.) VE6HO 59, VE6AAT 20, VE6AFO 2, VE6AVZ 2 (July) VE6XD 20, (June) VE6HO 45.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — The biggest news here is that we have respectfully buried our ORSs and others and now have OTSs. The SCM has been away for two months in the great Northwest. STM VE7CDF has moved to Vernon, and BCEN Net Manager VE7GY has been busy with forest fires. Worst fires for years in BC. So reports are scarce. Again we are asking the Clubs to write the SCM. Traffic: VE7ZK 302, VE7COA 228, VE7DFY 183, VE7FB 23, VE7BLS.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR. NMs: VE4s NM GJ VJ TE ADS. A slight increase on all nets. Many OPSs on holidays and other odd jobs keeping activity to a trickle. VE4NM now new Net Mgr. for the Manitoba Evening Phone Net and replaces VE4JP who is now Asst. SCM. MEPN 31 sess., QNI 818, QTC 33. MMN 29 sess., QNI 307, QTC 30. WRIN 4 sess., QNI 70, QTC 6. MTN 17 sess., QNI 120, QTC 30. MSTN 14 sess., QNI 38, QTC 6. Traffic: VE4PG 116, VE4TE 16, VE4AED 14, VE4QJ 14, VE4AFO 12, VE4JA 10, VE4OU 10, VE4CR 9, VE4HR 8, VE4LB 8, VE4IX 7, VE4JP 6, VE4VJ 6, VE4AAD 4, VE4AAU 4, VE4LU 4, VE4NE 4, VE4DS 3, VE4OD 3, VE4GB 2, VE4AAF 1.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — Silent Keys: VE1AYN & VE1BBQ. Hosp. — VE1AVA. 22 NS/NB amateurs provided comm. for Highlands Rally; Am. Rad. Skeet Shoot; Dart. L. L. Baseball. Congrats. VE1KG has worked total DX 321 countries. HARC VE1 Callbook now available. VE1MTA act. Sable Island. NSARA held annual meet, picnic at Shubenacadie. NSARA: VE1UT, pres.; VE1s ALP, AKO, vice-pres.; VE1HQ, secy-treas. SARC: VE1ZB, pres. VE1TB, vice-pres.; VE1AVX, secy., VE1ABM, treas. VE1s LG ZB AAB YO BLO org. comm. for Skeet Shoot. VE1BJF re. publicity in Kentville Advertiser news. VO1HL, VE2DYS sailed Eire using call VEØMAC/EIØ. VOQ. VO1FG acting NCS Nfld. Net plus helpers. VO1GP presented Queen Elizabeth for work with paraplegics. APN sess. 31, QNI 79, QTC 39/38. Traffic: (Aug.) VE1WF 119, VE1ZB 62, VE1YO 50, VE1RO/LCR 37, VE1ASW 32, VE1AMR 25, VE1HJ 11, VE1LJ 7, VE1AMB 5, VE1ADG 4, VO1HL 3, VE1KH 2 (July) VE1LJ 15, VE1KR 5, VO1HL 2.

ONTARIO: SCM, Larry Thiverge, VE3GT — Asst. SCM, Noreen Nimmons, VE3GOL. The annual VE3STP corn roast, held at Cobden, was a success with 52 amateurs attending. VE3CXC bound for Cambridge Bay for two years where he will operate under the call VE8GC on 80 and 160 meter cw. New two letter calls are VE3NG, ex-VE3GUJ and VE3RU, ex-VE3CPA. VE3ILN and YL enjoyed holidaying in Eastern Ontario. A successful demonstration of "Packet Radio" took place at a recent meeting of the Ottawa ARC. Nipissing FM Assn. provided communications for the Ont. Canoe Regatta held in North Bay. Taking part were VE3s JHY JHZ CMZ DPI CZA DOF and FLX. I would like to extend my thanks to VE3DV for his generous donation of an HW-12 and dc power supply to the Ontario ARES. It will be put to good use. thanks Shep. New members of the CARTG are VE3s CGE and KVG. The number of logs received for the 1978 BARTG RTTY Contest was the highest total ever and would also appear to be the highest in a major RTTY contest held during the year. Almost 50 percent of the first 20 places are occupied by VE and W stations. Algoma ARC discontinuing "The Borderline Friendship" and "Twin Cities" certificate awards. Newly formed "Open Line Net" performing successfully under the sponsorship of the TFMCS and the Toronto area ARES. First OTS appointments issued to VE3JIR and VE3JGX. Traffic: (Aug.) VE3GOL/3 332, VE3SB 321, VE3KK 163, VE3HGJ 160, VE3DPO 152, VE3JIR 145, VE3GFN 104, VE3GT 104, VE3ISW 98, VE3JGX 59, VE3GYD 52, VE3FZG 47, VE3GNW 47, VE3DVE 43, VE3IFP 37, VE3FRG 31, VE3EWD 21, VE3FHZ 17, VE3JRT 15, VE3EBC 14, VE3FHQ 6. (July) VE3GFN 106, VE3GOL/3 100, VE3FHQ 12, VE3ILP 12.

QUEBEC: SCM, Ed Sieb, VE2BAQ — Welcome to new amateurs VE2s FSO FKZ FRK FRX. VE2AED has a new FT-7, reports he worked 25 new countries from his mobile. Now is the time when Code and Theory classes are starting, please help budding hams; tell them about your local ham radio classes in your area. VE2BFH active on 50, 144, 220 and 440 MHz. VE2FEL also active on 440. VE2CLT club installed a repeater between La Tuque and Trois Rivieres. VE2LO was chosen as Region No. 4 coordinator for the Quebec Civil Protection. Many Quebec amateurs participated in recent Moto-Cross rally, serving as main communications system. Traffic: (Aug.) VE2DXU 60, VE2BP 52, VE2EC 27, VE2UN 16, VE2BAQ 3. (July) VE2EC 20, VE2APT 8, VE2UN 6.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — VE5TA a Saskatoon amateur did some fine research work and has produced a paper on "The Sun's Effect on Shortwave Radio Communications in the 3 to 30 Megahertz Region." If you are interested in a copy please send a self-addressed envelope with a 20 cent stamp and mail it to me. I would like to mention that the Regina Amateur Radio Club put on an excellent ARRL hamfest in Aug. Traffic: VE5AAE 56, VE5WM 26, VE5ABK 22, VE5QY 20, VE5HG 17, VE5RP 16.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STMs: W3WD W3QQ. Aug. PSHR: W3PQ 44, K3JL 43. Congratulations to K3JL and helpers for an excellent Delmarva Hamfest. Field Day awards. Special SCM Trophy to the BANANA group K2WI/3. K2WI with WA3YXO, WA2ZZX and N2UT/AA5B set a new single xmitter record for the Atlantic Div. with total points/bonus of 3726. Delaware Clubs: Multi Xmitter — Del. ARC with 5607 pts. just 225 ahead of Kent Co. ARC. Single Xmitter 1st State ARC. VHF DARC. Hamfest prizes 1 & 3 went to WA2TSZ and W3GL, other main items going to non-hams. W3PQ now Net Mgr. of MDD. DTN QNI 330, Tfc. 113. DEPN QNI 54, Tfc. 1. Traffic: W3PQ 149, WB3KPX 56, N3ND 46, W3DKX 43, WB3DUG 29, WA3WIY 26, W3OQ 25, W3WD 23, K3JL 19, WB3FUP 15.

EASTERN PENNSYLVANIA: SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3KW K3NGN W3VA W3IAZ. Net repts: EPAEPTN QNI 320, QTC 82; PFN QNI 338, QTC 792; PTTN QNI 271, QTC 54; EPA 552, QTC 232; AREC (2) QNI 11. OVS reports W3GOA W3CL K3YD WA3BJO. OBS reports W3ID K3EBZ WA3YJZ K3NSN W3VA W3TI W3CL W3AVJ. OO reports W3KEK WA3TMP K3NSN. PSHR: W3BI WB3JGP W3DP WA3YJZ N3HR. BPL: K3NSN W3CUL W3VR WA3ZRY WA3WQP WA3ATQ WA3THT. Medical nets keeping K3NSN busy. W3CUL says band condx gotta get better they can't get any worse! WA3WQP going to try to get school work and skeds done at same time! WA3ATQ away on a cruise with no radio unless she can retune the ship gear! Nets report slowest tfc in long time. WB3JGP's fist has improved with a new vibroplex. W3VA lost his fist — got a keyer! WA3YJZ now big A and already has 48 countries and 49 states. WB3GZV's tfc total is 29 regularly he should play it. W3TI reports the coal crackers are keeping busy. WA3YDC back in swing after a vacation. WA3YOE active in AREC activity. W3ID has been working on a plumbers delight but it is not an antenna! W3WRE still speechless! W3GMK is getting deep in VHF. W3EU better watch out for the ecology guys, he keeps smoke testing gear. I hope you got all the antenna repair or installation done. The Pack Rats sponsored a nifty VHF conference and another wopper of a Hamarama. The club papers are getting better all the time. I guess you all know to be good for Santa will be coming soon! Egad how time does fly! Traffic: (Aug.) K3NSN 4000, W3CUL 3391, W3VR 993, WA3ZRY 797, WA3WQP 701, WA3ATQ 623, WA3THT 312, K3KW 308, W3BI 191, W3FAF 162, K3NGN 155, WB3JGP 136, W3IPX 84, W3VA 48, W3DP 46, WA3JYZ 40, WB3GZV 29, AA3B 22, N3GP 22, WA3ADE 20, W3TI 20, K3NB 19, N3CD 15, WA3CKA 10, WA3YDC 9, K3EBZ 8, W3CL 7, WA3YOE 7, W3AVJ 6, W3ID 4, WA3TMP 4, WA3BJO 2, W3HK 2, K3YD 2, W3EU 1, W3GMK 1, W3GOA 1, WB3HPV 1, W3KEK 1, W3WRE 1. (Apr.) N3HR 165. (Mar.) N3HR 398.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Congrats to W3JHJ our new SEC as of Aug. 1 and to W3PQ who becomes MDD net manager Sept. 1. Tnx to N3II and to W3OQ for jobs well done. K3RJ reports Georgetown Univ. ARC WQ3FXJ will be active. WB3FTB is prexy and WA7MWO is veep. WB3JXK upgraded to Advanced, congrats. Time and energy needed for antenna work sez W3ZNW. N3RC liked his boat so much he stayed on it all summer. N3RL summer doldrums! W3MSN is eyeing the gentoo! WA3RSK and K3IU are all prepped for the contests. W3CDQ tripping to San Diego ARRL and to the QCWA too. W3WBY is working 10/15 with his new Yaesu Xcvr. W3EOV has the 4BTV in full service. WB3FTN vacationed from everything this summer. W3HJH is battling a temp compensation problem with so-so results. WA3HEM is impatient with the time it takes to change QTH's. QO reports from W3MR WA3RSK and W4MLR. K3ORW made PSHR with AA3s and N3CL just missing it. N3QA is fast or slow as circumstances dictate. WA3EHK has the Columbia ARA local net Tue. at 2030 local time on 147.735/135 covering the Balto-WDC corridor. N3IT is a trafficking YL. WB3CES is getting the amplifier tamed to his liking. W3FZV has his eye on the upcoming season. K1BCS radios that WA3ZIV was a visitor. With the nets: Net/Manager Sessions/Tfc./QNI avg. MEPN/AA3S 22/72/22.5. 100% W3HJH others W3HWZ K3RIJ AA3S and WA3ZRY. WR PON/W3DFW 17/32/13.2. MDCTN/K3ORW 18/73/16.7. Top Honors to WA3ZRY K3ORW and W3DKX. MDC PON/W3OYY 5/19/19.2. The boys are talking it up to make 3920 the place to find Maryland-DC. Acknowledgements to FAR, Ham Arundel News and the CVRA Repeater Journal. Traffic: N3CL 177, W3FA 114, W3FZV 75, N3QA 50, K3IU 34, K3ORW 28, WA3EHK 34, AA3S 24, W3EOV 24, N3IT 17, W3HJH 11, N3RC 6, W3ZNW 5, W3WBY 4, WB3CES 3.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — W2HOB reports 6 ECs out of 9 reporting. FB. K2TJ has 158 countries. K2KI puts up four-element beam. WB2EVL appointed JSARS NM. WB2UBQ rig hit by lightning. SCARA K2BR service the Miss America Contest. WB2LAQ reports lightning stops sked. N2GL moves to PA. SJRA's homebrew nite proves hams can built their own. Old Barneys ARC's W2IFI running new Novice class. RCA Astro Electronics ARC reports latest class receive their calls. Congrats to KA2s BXD BVT BYY BVU BWO BVS BBR BWI BVV BXE BWK. K2QIN a Silent Key, Burlington Co. RC's N2VW sez club plans Xmas dinner Dec. 8. W2JI working on new tower. Gloucester Co. ARC reports 97 at last meeting and WB2LNR Crosstalk editor is transferred. N2AHT now Advanced Class. KA2ABU KA2BBW new Techs. WB2GHA married to KA2BAM. W2BN explains ant. gain to WJRA. WA2ONW inquires about EC job. SPARC's WB2IOI helps new hams get started on the air. FB after Novice classes. AA2H reports 14 hams signed up for participation in National Weather Service's Sky Warn. K2IB was on hand at 2.30 A.M. when floods hit New Egypt, NJ and 30 families were evacuated. K2QUJ K2IB WB2HUV worked thru Toms River, Robbinsville, and Burlco Repeaters. Traffic: AA2H 110, WB2EVL 63, W2JI 45, WB2UBQ 34, N2HF 32, WB2LCC 27, WB2VFT 14, N2FC 8.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — SEC: W3VUP, Asst. SEC: WA3LJW. NMs: W3YQ K3LL W3NEM W3KUN and W3MML.

Net	kHz	Time/Day
WPA CW Tfc	3585.0	7:00 PM Dy
WPA Phone & Traffic	3983.0	6:30 PM Dy
PA Traffic & Training	3610.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Dy

The Western Pennsylvania AMSAT Coordinator is W3KH, please send him any reports on your AMSAT activities. He is especially interested in Mode J (145 up/432/dn. We have two Silent Keys this month, W3LFQ and W3GRX both fine longtime amateurs, we will miss them. We extend our sympathies to their families in their bereavement. WA3ZXG is operating from So. New England. KA3AAR is a new licensee. N3DQ has been conducting CPR classes at Steel City ARC and I am told they are very successful. Allegheny County Public Ser. Net at 9:00/PM Wed. on 146.28/88. The Butler ARES Net 90/30 WR3AGY Wed. 8 PM. Join your local ARES or RACES groups, your services may be needed and practice is the key to good operating practices. I misplaced the WPA CW Net Report and will give it next month. The WPAP&TN had 31 sess., QNI 376, QTC 91. The WPA 2MTN had 31 sess., QNI 530, QTC 118. PSHR credits, W3YQ 45, WB8PAV/3 40, WB3EML 32, K3LL 27, AB3X 22, WB3DKT 23, WB2HGL 4. Good antennas, portable equipment, good emergency power sources are the need for emergencies. Traffic: WB3HGL 304, W3EGJ 269, W3YQ 105, N3FM 92, WB8PAV/3 57, WB3DKT 52, K3LL 44, W3KUN 37, W3SMV 37, AC3N 36, K3SMB 35, WA3UNX 35, N3EE 24, WA3QNT 24, W3EXC 15, W3SN 13, W3DXQ 12, K3HCT 11, W3RUL 11, W3ATQ 11, WB3EML 8, AB3X 6, WB3GZR 5, N4DR/3 3, K3UA 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst SCM: Harry Studer, W9RYU. SEC: W9AES. NMs: WA9KFK WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Day	Tfc.	Sess.
ILN	3690	2330/0300 Dy	344	62
Ill Phone	3915	2245 Dy	220	31
NCPN	3915	1200/1700	440	52
IEN	3940	1400 Su	no report	

The Central Division Convention will be held in Milwaukee, Wisconsin on June 15 and 16, 1979 and not the date reported in an earlier column of QST. WA9IVU visited K1BCS. The W9VEY Memorial Net had a traffic count of 7. WN9JAT is now an Extra Class. The Egyptian Radio Club was helpful in a propane spillage in the Collinsville area on Aug. 6. Hamfesters Radio Club (Chicago) had their largest attendance at the annual hamfest in Aug. New call heard in the Streamwood area is KA9BZY. The Central Ill. DX Club is one year old and interested persons can contact K9CT. Congratulations to newly wed WB9PHM and his XYL. K9BX received his mixed DXCC certificate. K9WA is moving to Colona, Ill. Henry County (for County Hunters). The Starved Rock Radio Club assisted with communications with the parade in Princeton, Ill. W9PRN received a 15 year service pin from the Sangamon Valley Chapter of the American Red Cross. New appointment this month includes WB9DJT as EC of Coles County. The 9RND in 62 sess. passed 124 messages in 691 minutes with Ill. stations W9JIJ W9HOT W9NXG and W9YZR participating daily 100%. WB9IFR has upgraded to General. WD9CTF now AB9H. The CAND report by W9JIJ had a traffic total of 621 messages in 62 sess. and that the 9RN with Ill. participation of 100% with WD9CTC W9RXO W9HOT W9NXG and W9JIJ checking in. WD9GBZ and XYL WD9GCA's new QTH will be Roanoke, VA. Upgrades include KA9BJL who is now General Class. W9JIJ is the only BPL recipient for Aug. Traffic: W9JIJ 877, W9NXG 471, K9PNG 197, WB9JSR 142, W9OK/5 115, N9TN 99, W9KR 95, WB9ZED 89, K9BVE 75, W9OBS 70, WD9DMV 70, W9HOT 60, N9DR 56, K9EEA 52, W9OYL 46, W9LNQ 31, W9HBI 15, W9PRN 14, W9HPG 6, K9WA 2.

INDIANA: SCM, J. M. Kell, W7LTU — SEC: W9UMH. Net Managers: K9CGS (ITN), W9JUJ (QIN), WB9YXN (ICN), W9PMT (VHF). Net times in UTC and freq. in kHz.

Net	Freq.	Time/Day	QNI	QTC	Sess.
ITN	3910	1330/2130/ 2300 Dy	3469	350	93
IPON	3910	1300 Su	131	2	4
QIN	3656	0100/0400 Dy	942	445	93
ICN	3737	0015 Dy	139	23	29

Please note the one hour later times on QIN and ICN. Nov. begins the Holiday traffic season. Be sure to QNI and help the traffic nets. ECs its time to begin planning for the annual SET held in the last weekend in Jan. W9UMH is planning another Blizzard. INCERT was operating during the Labor Day weekend. A lot of cooperation between CB and Amateur groups made the activity a huge succes. More to come I'm sure. In case you missed the last hamfest, good news. Ft. Wayne will have an indoor hamfest in the colliseum Nov. 19th. K9FG can be heard on the other side of subdivision now that his tower is up. K9TKE reports a new Civil Defense

PEERLESS PACKAGES
and in-demand "exclusives"

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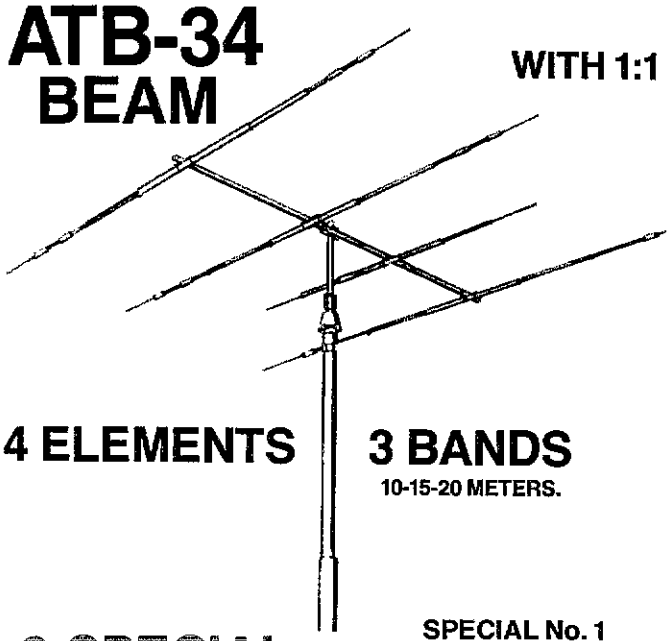
ATB-34 BEAM



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(Regular $319 value)
SPECIAL No. 2 $239

ATB-34 PLUS
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2) 100' RG-8 SUPER-FLEX FOAM COAX
3) 100' 8 COND. ROTOR CABLE
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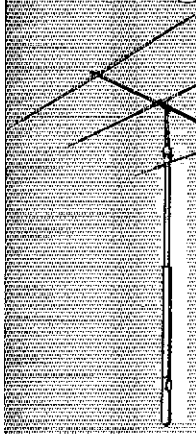

a) TRI-EX SM-40, 40' TUBULAR CRANK-UP MAST w/WALL BRACKET.
b) TH3MK3 HY-GAIN TRI BANDER.
c) BN-86 HY-GAIN BALUN.
d) HD-73 ALLIANCE HEAVY-DUTY ROTOR.
e) 100' RG-8 SUPERFLEX COAX.
f) 100' ROTOR CABLE.

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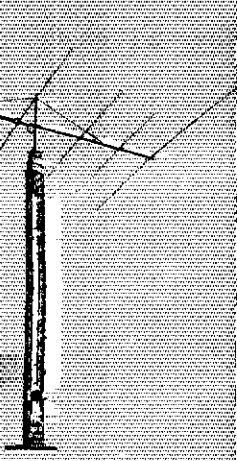
c) HY-GAIN BN-86 BALUN.
d) CDE HAM III ROTOR.
e) 100' RG-8 SUPERFLEX COAX.
f) 100' ROTOR CABLE.

REGULAR $1400 VALUE **$1079**



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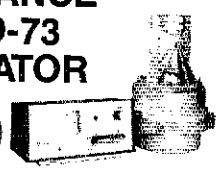
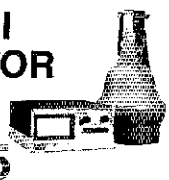


HAM X ROTATOR
Reg. $349.95
$249

ALLIANCE U-100 ROTATOR
$39.95
(Regular $59.95)

HAM III ROTATOR
$129.95



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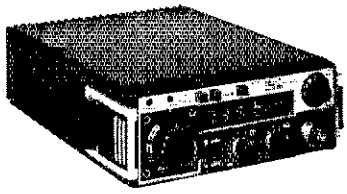

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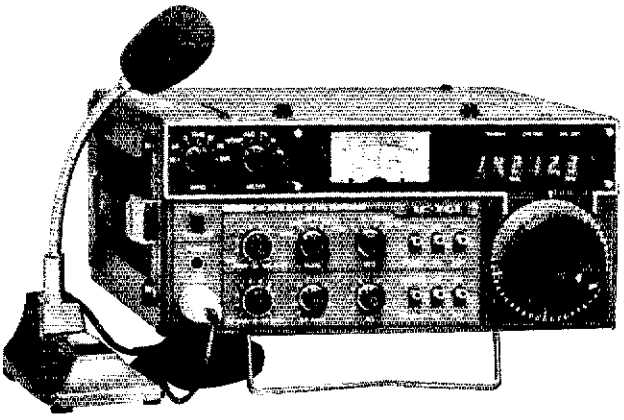

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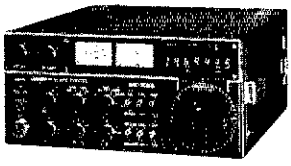

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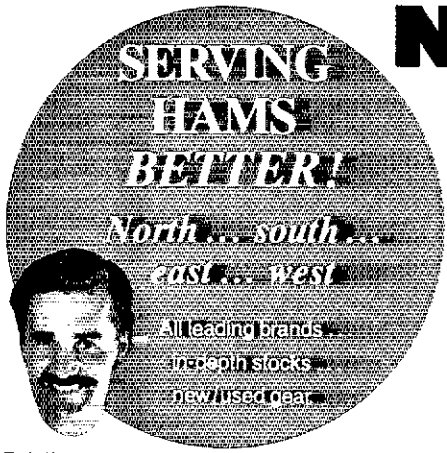
Prices/specs subject to change without notice. Calif. residents add sales tax.



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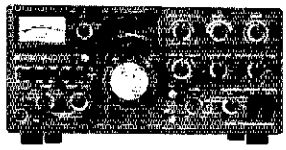

New price, 9-15-78, $1249 while stocks last,

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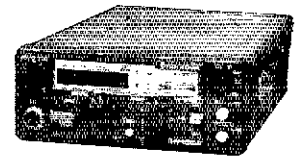

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repeater on in Boonville. Seems there is one going up in every other town whether needed or not. Congrats to Peggy for making BPL for second month in row. It seems to come as a shock to some people to find out that an SCM cannot allocate a clear net frequency to anyone. A published net time and frequency does not give anyone the right to start a net on top of someone's QSO. Let us pause and reflect on all the great and wonderful things we have in this country and be thankful. Traffic: (Aug.) W9JUJ 610, W9FC 252, W9EI 125, WB9UYU 113, W9XD 93, W9QLW 88, WA9TJS 63, W9WWI 56, AA9S 44, W9ZW 42, W9DLF 31, WD9GXW 25, K9FZX 19, WB9IHH 17, W9UEM 17, W9HUF 16, K9RPZ 16, WA9OHX 14, WA9GTZ 10, W9RTH 10, N9TS 9, K9FG 8, K9TKE 4, W9BDP 3, W9CMT 3, W9DZC 3. (July) W9TG 76, AA9S 24, N9AEI 21, W9PMT 16, W9CMT 16, WA9OHX 15, WA9CYG 6, WB8VNV/9 4.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FCZ. NMs: W9AYK K9UTQ W9IEN WB9ICH K9KSA WB9KPX K9LGU K9EN. Nets, freq., time, ONI, QTC, Mgr. BWN, 3985, 1145Z M-S, 708, 671, W9AYK; BEN, 3985, 1700Z Dy, 666, 128, W9IEM; WSBN, 3985, 2230Z Dy, 959, 267, K9UTQ; WNN, 3725, 2215Z Dy, 24, 0, WB9ICH; WSSN, 3662, 2330Z M-W-F, Summer Vac., K9KSA; WIN-E, 3662, 0000Z Dy, 41, 172, WB9KPX; WIN-L, 3662, 0300Z Dy, 253, 95, K9LGU; WRN, 3662, 0030Z S, K9EN; WI Ex PO, 3925, 1701Z M-F, 648, 46, WA9NIX. WSBN certificate to WD9BFY. New Novices in Madison area KA9BDZ KA9BKS KA9BEA KA9BIP KA9BDX KA9DDH KA9BDI KA9BDW KA9BDY KA9BIH. EAA was a big success again this year, thanks to the guys who brought and took traffic on the Wisconsin nets. WD9HOA now General Class. WB9BJO now N9EZ. WB9WBX now W9WH. Mark your calendar for ARRL Central Division Convention next year June 15-16 at Milwaukee, also be sure to attend. Congratulations to WD9EAQ for being NCS on WIN. BPL to W9ZGQ. WB9YSD took a blue ribbon on 4-H book he wrote on "Ham Radio." WB9ULC passed Extra. News items for FLARC, INTERCOM, KETTLE DRUMS. Traffic: (Aug.) W9ZGQ 897, W9IEM 253, W9CXY 239, W9DND 212, W9SFL 180, K9FHI 120, WB9KPX 94, WB9YPZ 84, K9LGU 74, W9AYK 62, W9DM 62, WD9EAQ 61, WB9YPY 59, WB9ULC 58, WD9DHF 55, W9YCV 52, WB7TPY/9 50, W9FDY 48, K9AKG 45, WD9AJA 43, WB9ZRE 43, K9UTQ 43, W9IHW 42, K9ANV 34, WB9ICH 29, N9JW 29, WB9RRU 29, K9JPS 28, WB9MPF 26, WD9CQC 22, WA9ZTY 20, K9UU 18, W9UW 16, WA9WYI 2. (July) WD9DHF 60, W9YCV 47, K9KSA 23, W9VBQ 18, WB9FTC 8, K9ASC 2. (June) K9JPS 34.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WØSA. Minn. Nets.

Net	Freq.	Time	QNI	QTC	Mgr.
MSN 1	3685	6:30 P	248	125	NØHY
MSN2	3685	10:00 P	106	37	KØPIZ
MSPN N	3945	12:05 P			WBØJYT
MSPN E	3929	5:45 P	631	144	WØDUW
PAW	3925	9-12/1-5 P	3319	234	WAØYVT
MSSN	3710	5:15 P	214	32	WBØZAL
MXW*	3929	6:15			WBØUXI

*Started Sept. 1. WAØEPX is the new PAW afternoon captain, and WAØYWA is the PAW morning captain, good luck to both. The DXCC certificate proudly displayed by NØHY was worked on CW. Congratulations! NØJP states that his DXing took care of his vacation, and his love of flying radio controlled model airplanes takes all of his spare time. WDØEPS is now NØAHA; WBØYNW is now KBØBK; WDØABD is now KBØBI. WBØZAJ upgraded from Tech. to General. WBØRSW KØTZ and yours truly had our equipment tower and antennas struck by lightning. WBØRSW and KØTS are back on the air and I hope to be back soon. We only had 26 SAR and 1 PSHR this month, let's talk it up so we will do better in the months to come. Anyone who would like to be considered for EC in their county please ARL7 WØSA-SEC of MN. There are many counties that SHOOULD but DO not have an EC. Let's remedy this situation. Traffic: WBØZAL 372, WBØOEU 291, WAØTFC 186, KØBK 129, KBØBQ 128, WAØYVT 125, WBØONK 110, KØPIZ 79, WØRQJ 70, WAØOIT 55, WDØFGA 54, WBØSYT 34, WBØNZB 28, KØZBI 20, WBØUKI 16, WAØCCA 14, WAØRKV 13, WØDUW 11, WDØFSL 9, NØJP 8, WBØZBJ 8, KØFLT 4.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB. SEC: WAØTNM. Net Mgrs.: WØHOJ WØMZI WAØTNM KØTVJ WAØVRE WAØUEN. New operators interested in nets should contact any one of the managers or me. WBØOMF endorsed EC for Charles Mix Co. WAØARZ put up a 27-ft. Hornet Triband beam, using a TS520 and TV 520 SSB. New SFARC members KØTUH WDØGXF KAØAQY. WAØECK credits 250 students to his fourteen years teaching code classes. WBØWJH, his 14 year old son is one of them. Please note, Stolen WAØPBL's 2 mtr. TR-7200A, touch tone pad and antenna. Gear serial number 450563 with nine sets of crystals. SFARC set up an amateur radio demo and traffic booth at the Sioux Empire Fair for the FMCA. To get your 1978/79 ARRL Net Directory, send a self-addressed nine by twelve inch envelope, with forty-one cents postage to ARRL Headquarters. Nets: SDN CW, QTC 37, QNS 68, sess. 30. NJQ, QTC 40, QNS 730, sess. 26. Evening, QTC 31, QNS 1116, sess. 26. Morning QTC 59, QNS 589, sess. 26. Traffic: WAØVRE 137, WØDVB 77, WAØTNM 66, KØAIE 57, WØHOJ 55, KØFRE 51, WBØZEB 37, WØKJZ 28, WBØEVQ 12, WØIG 10. (Aug.) KØAIE 56, WBØZEB 43.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. NMs: K5MEA W5MYZ W5POH WA5ZNZ. Nets, kHz, Time/Day, QNI, QTC, Mgr.: OZK, 3760, 0000 Dy, 128, 20, W5MYZ. APN, 3937, 1100/M-S, 901, 54, W5POH. M-Bird, 3928, 2130/M-F, 641, 21, WA5ZNZ. ARN, 3995, 2330/Dy, 901, 94, K5MEA. NEAEWN, 146.28/88, 0130/M-F, 255, 27, WB5WJH. Following ORS appts. cancelled W5ASD W5RIT WA5RTG WB5NBC WD5CND. N5NA OPS appt. cancelled. New OTS cert. issued to W5ASD W5RIT WA5RTG WB5NBC WD5CND. WA5HNN now AE5L. WD5GTJ and WD5OYH now General. N5NA now LAØCA

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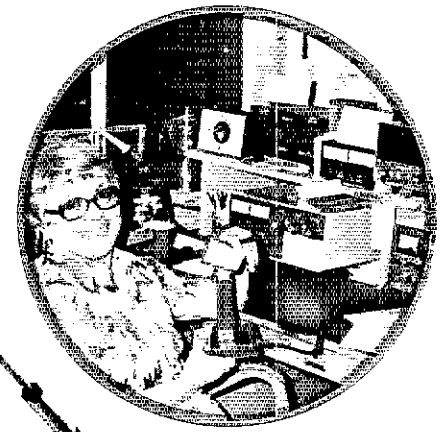
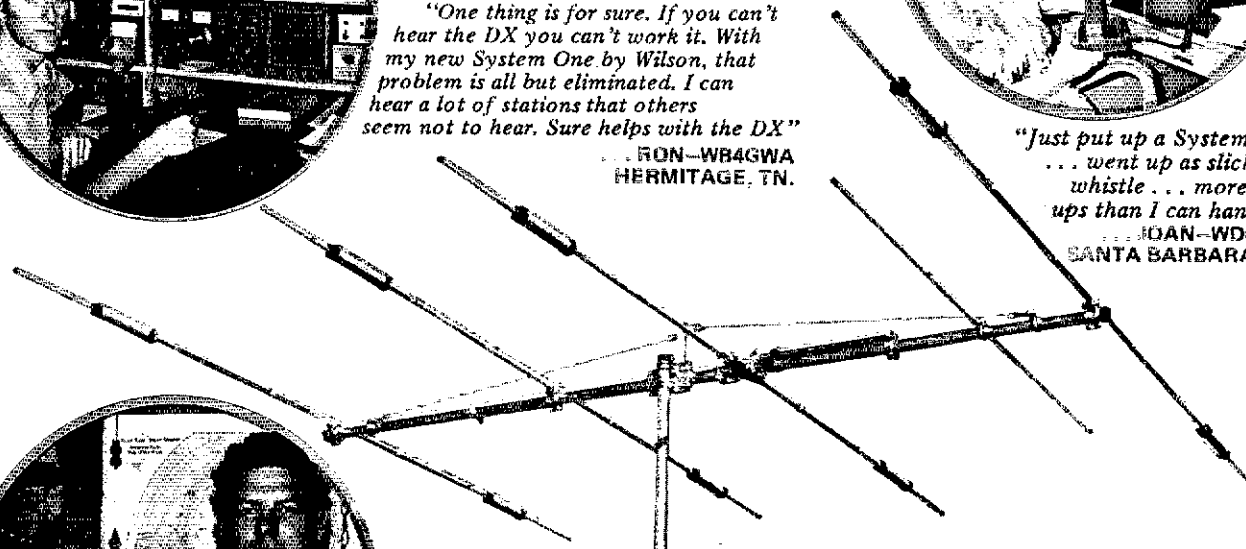
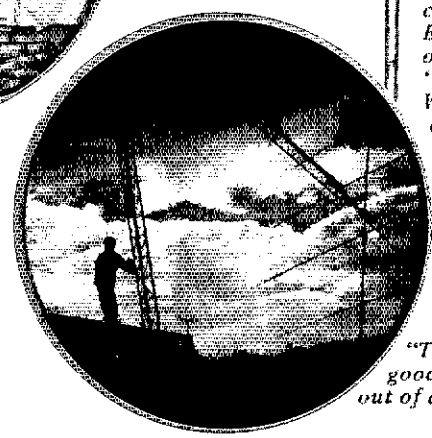
. . . RON—WB4GWA
HERMITAGE, TN.



"Just put up a System One . . . went up as slick as a whistle . . . more pile-ups than I can handle".
. . . JOAN—WD6BNH
SANTA BARBARA, CA.



. . . *"As far as performance, the operation of the new System One is expressed by my increased success among the ruthless 20 meter pile-ups"*
. . . RICK—WB9ZAH
FT. WAYNE, IN.



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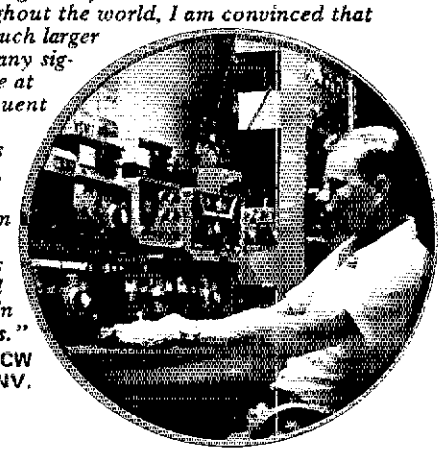
. . . AL—K7ICW
LAS VEGAS, NV.



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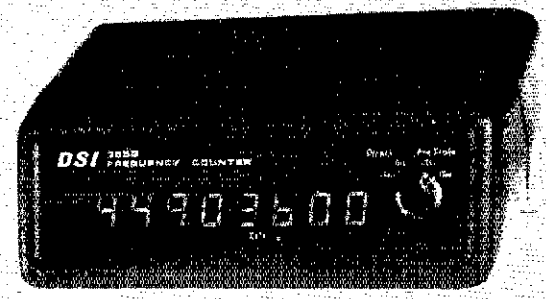

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Model	Frequency Range	Accuracy Over Temperature	@150MHZ	@250MHZ	@500MHZ	Number Of Readouts	Size Of Readouts	Power Requirements	Size
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3550W	50HZ-550MHZ	TCXO 1PPM 65° to 85°F	25MV	25MV	75MV	8	.5 inch	115VAC or 8.2-14.5VDC	2⅞"H x 8"W x 5"D
3240HH	2MHZ-250MHZ	3PPM 65° to 85°F	100MV	100MV	NA	7	.4 inch	4AA Batt.	5"H x 3"W x 2"D

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whose stateside QSL mgr. is K5WA. N5NA any reports rec'd were used but the rpts. must be received first. Still looking for reports from club secretaries from Southern part of State. PSHR: W5POH 39, AE5L 35. OBs by K5MEA 12, WB5WWA 3, W5UAU 3. Traffic: K5MEA 47, W5POH 29, W5UAU 27, WB5WJH 24, WB5GWU 16, K5DW 14, AE5L 7, WB5WWA 6, WB5GQH 1.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM: K5DPG. SEC: WB5IYH. Net Mgrs. N5TS N5ES N5RB N5IB WB5IYH. Congrats to KB5AS on being the section CD Communciations Officer. WB5IYH the new State RACES RO. Members interested in participating in either of these worthy activities contact Gary or Milton. See below. K5BLV reports 200 confirmed DX contact, all on low power. N5YL active on CAND. K5BLV WB5CDX WB5LBR K5DPG K5TTC active on DRN5. WB5USS asst. net mgr. of LTN and WB5EMU same for LAN. WB5COO turning hamshack into dark room. Visited Alexandria hamfest in Aug. N5TS soon to be back on air at new home. Shreveport Hamfest 1979 to be first weekend in May. K5PR new OO appointment. Novices and Techs are urged to participate in La. Slow Speed Net, 10 wpm, to gain skill in CW traffic handling. Section Emergency Net had two sess. because of Tropical Storm Debra with over 50 QNI.

Net	Freq.	Time/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 PM Dy	410	210	N5TS
LTN	3910	6:30 PM Dy	576	97	N5ES
LSN	3703	7:30 PM M-F	109	11	N5IB
LRN	3587.5	6:30 PM Su&W	6	7	N5RB
RACES	3993.5	8:00 AM Su			KB5AS
LEN	3910	9:00 AM Su			WB5IYH

Traffic: (Aug.) W5GHP 254, N5YL 130, N5ES 122, WA5IOU 120, W5MI 113, N5RB 56, WB5LBR 55, K5TL 45, K5BLV 36, WB5EMU 32, WB5IYH 21, N5IB 20, WB5USS 20, N5EK 17, W5YN 12, WD5GJB 8, N5DP 5, WB5IKT 4. (July) N5TS 89, N5RB 31.

MISSISSIPPI: SCM, E. Ed Robinson, III, W5XT — SEC: WB5FXA. Had FB meeting with South Ms. Amateur Klub (SMAK), Gulfport, this month. Boliver Co. ARC is relocating 146.25/85 repeater for better activity. OBSs W5EPW WD5DCK WD5CSU doing good job — tnx. MSN certificates to WB5TRZ and WB4NXM. Vicksburg ARC active with downtown AR demo of ham radio. (WD5HHT). WA5GIT now N5AMK. WD5BEX received WAS. Congrats. MSN NCSs WD5DCK WA5IDF WD5GDA W5YRX doing fine job — keep it up. CAND — W5KOV — 62 sess., QTC 621 with Miss. DRNS Hep. 100% by WD5GNR. DRNS — WB4CDX — 31 sess., QTC 328 with Miss. Hep 77% by W5EDT K5DMD K5AKM. CGCHN — WD5BDC — 31 sess., QNI 2733, QTC 384. MSBN — K5ONE — 31 sess., QNI 2295, QTC 93. MTN — K5OAF — 31 sess., QNI 130, QTC 34. MSN — WA5IDF, 13 sess., QNI 65, QTC 5. MN — WD5CSU, 27 sess., QNI 286, QTC 6. Capital AEN — K5ONE — 6 sess. (with 1 emergency), QNI 118. Traffic: W5EDT 131, K5OAF 72, K5AKM 36, WA5JWD 22, WB5SNB 20, W5WZ 17, WA5OKI 14, W5XT 14, WB5VFS 11, W5XX 9, K5MK 8, WB5NGF 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM, WB4PRF. SEC: WB4DYJ. Net reports Mar.-Aug.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC
Manager					
TPN	3.980	1140 M-F	491	24184	1428
WA4EWW					
W4PFP		1245 M-F			
WB4YPO		0030 M-S-Su			
		1400 S-Su-H			
TN	3.635	0100 Dy	143	1256	467
AF4T					
N4UC		0400 Dy	8	40	31
TNN	3.710	0000 MTTh	83	602	
WA4CNY					
ETVHFN	50.4	0200 MWF	77	660	224
WA4WZJ					
ETVHFN	145.2	0200 TTh	50	224	0
WB4DZG					
MTTMN	28.6	0200 TF	50	324	0
W4EAY					
ETTMN	28.7	0200 WF	17	168	4
WB4NFI					
WTVHFN	146.37	0030 Dy	96	2811	1457
WA4VVX	146.97				
TCDWN	146.31	0200 W	25	1084	1
WA4BOC	146.91				
WMARCN	146.07	0200 MWF	84	1568	1
W4TZG	146.67				
MTTXN	28.75	0300 TF	17	202	3
WB4PPY					
MAPSN	146.34	0300 Th	13	394	24
WB4RHQ	146.94				
QCVHFN	145.1	0200 F	26	209	4
N4AEO					
MCRN	147.72	0130 Dy			
WB4VXW	147.12				
KARCN	146.37				
N4AEO	147.97	0100 Th			
TSFMAN	146.19				
WD4ARY	146.79	0200 M			

All net mgrs. report net activities promptly and regularly. Please correct cal sign W4EBZ in July QST to W4EDZ. WA4AWT awarded Section Net Cert. W4OGG's PSHR for July was 62. WA4NIF & WA4FMR appointed OTS. WB4GBI appointed OES. Certificate of Merit given WB4RHQ WA4WHQ W4BOY WB4EBX W4WSP WA4IQL WA4OVO WB4QVD W4YLE WA4REJ WA4EAI W5RJJ WB4IUM WA4IMO K4CXY WB4BWN WD4EGB WA4YHP K4FMV K4UUV. Traffic: WA5CNY 536, WB4PRF 221, WA4NIF 211, K4CNY 138, W4ZJY 111, AA4KB 103, W4OGG 102, AF4T 94, WB4BKF 89, N4UC 84, K4XE 64, K4JGW 46, WB4ZSZ 44, K4QG 43, K4FSK 32, WA4GLS 30, WA4DKC 29, WB4GZF 23, K4VM 18, WB4YPO 18, W4PFP 16, W4VJW 12, K4WOP 10, W4TYV 7, WA4WVW 6, W4EWR 5, W4QD 5, W4PSN 4, W4RUW 4, W4SGI 4.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WB4ZML. Aug. Nets.

Net	QNI	QTC	Net	QNI	QTC
KRN	283	34	KYN	106	66
MKPN	919	140	KSN	106	44

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Input Power-CW	160W (DC)	80W (DC)
RX Sensitivity	.25uV for 10dB S/N	.25uV for S/N 10dB
IF Shift	Yes	Yes
Rejection Tuning	No	Yes
MDS	?	-137dB
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All Mode	No (No FM)	Yes
Memory	No	Yes
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Modular Construction	No	Yes
Clarifier	Yes	Yes
DC Capability	Option	Yes Built-in
Automatic Mic Gain	No	Yes
Audio Frequency Peaking	No	Yes

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KTN	1047	171	SEKEN	20	2
KPON	54	2	CARN	241	6
5DARES	38	1	6DARES	64	4

Congrats to the BGARC for an FB Lexington Hamfest! The Club rates their 775 attendance as very good, the BG Club also held a Ham Radio Demo at one of the large shopping malls. AA4KY has his 5BWAS. N4DOI KA4DEN and KA4BJT are new calls in Leitchfield, WA4MOM has his Extra. W4YID gets roses from 9RN for 48% KY representation. Many tnx to WD4LXX for helping me with much of the SCM traffic. Traffic: K4DZM 168, WA4AVV 142, WD4ITJ 71, WA4JTE 65, WA4JAV 59, KB4SF 52, W4CID 52, W4HKT 43, WB4NPD 42, WD4CQF 40, WB4ABE 26, K4AVX 23, WD4LXX 18, K4AML 17, K4UMN 16, AI4T 13, WA4YPQ 12, WA4FAF 10, WA4AGH 9, K4NOE 7, WD4IEH 6.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: KB8AI K8KMQ K8LNE K8RV WA8WVV WB8YDZ WB8ZNS.

Net	Freq.	Time/Days*	QNI	QTC	Sess.
MiTN	3953	2230 Dy	761	396	31
MACS	3953	1500 Dy	973	301	31
QMN	3663	2200/0200 Dy	738	232	62
GLEN	3932	0130 Dy	1025	135	31
WSSBN	3935	2300 Dy	780	82	31
MNN	3722	2230 Dy	296	68	31
UPEN	3922	2100 Dy	792	63	35
BR	3930	2130 M-S	551	29	27
MEN	3930	1300 Su	151	8	4
SEMTN	146.69	0215 Dy	38	5	11
ARES	3932	2130 Su	76	1	4
Mi6M	50.7	2300 Dy	28	0	4
VHF Local Nets, 8 reporting			604	29	38

*UTC Summer Schedule. Mich Emergency calling Frequency 3932 kHz. The Thumb Area amateurs did an outstanding job providing communications for the Lamont Air Show near Carsonville. W8LUR took charge of the operation. WD8ORQ relayed emergency communications resulting in the successful rescue of an injured rider of a tour wheel drive vehicle in the Arizona desert. Appointments: K8AXL EC for Mason County. WD8PAF EC for Alger County. WB8YIG EC for K.I. Sawyer AFB. W8GZF WD8IXV WD8LSV OBSs. W8GZF OO-II. OTSs: N8ABA KB8AI WA8AWU KB8BS KBCTY WA8EFK WA8GTG WB8HPZ WD8OKU WA8MDK W8QFQ WB8TTA WB8UUJ WA8VBF WB8WBJ. OO report from K8HG. OVS report from WB8RNY W8WN. OBS reports: N8AG KB8AI WD8IXV K8NKB W8SOP. I am sorry to report the following Silent Keys: K8BJC WA8TAN WA8TCD N8TR W8ZKT. New Club officers: Huron Valley ARA: WD8BNA, pres.; KB8BZ, treas.; W8PS, secy.; W8TC, trustee of W8KGG. The Michigan Novice Net (MNN) is a great place to get started in CW traffic work. Give it a try. Upgrades: Extra: WD8DIB to AC8Y, WB8MQJ to AD8F. Advanced: WB8HYD to KB8CK, K8GXV, WB8VVY. Traffic: (Aug.) WD8NYN 422, WB8YDZ 327, WB8MTD 256, K8KMQ 222, K8KC 165, WD8NKA 155, K8RV 137, W8MPD 121, W8SOP 99, WA8DHB 97, WD8LSV 94, W8VPW 86, K8DTG 63, WA8WZF 63, KB8BZ 62, N8ABA 58, K8DD 57, KB8AI 56, W3GQJ/8 53, WD8JES 48, WD8MCN 47, WB8TTA 47, W8NOH 46, WD8DMX 44, WD8CSA 42, K8CN 40, WA8CKZ 39, K8DYI 39, WD8IEW 34, AC8Y 31, WA8QAF 31, W8YIQ 30, K8ZJU 30, WB8UZM 29, WD8JEP 28, AA8N 26, W8HIN 25, W8IHX 24, WA8FXR 22, WB8OYU 22, K8UPE 21, KB8CK 20, W8DSE 20, W8JUP 19, WB8WYO 19, W8CUP 17, W8VIZ 17, WB8YIG 15, K8AIT 14, WD8KZX 14, W8DCN 13, WB8BNN 12, WB8NCD 12, WA8VBF 12, K8AXL 11, K8GXV 10, W8JVP 10, WD8ROK 10, N8ACL 9, WB8DJS 9, WD8IXV 9, W8LDS 9, KB8BS 8, K8JED 8, WA8MDK 8, K8VA 8, *WA8AXF 7, AC8F 7, WB8ITT 7*, K8MJK 7, WN8NII 7, K8QBZ 7, WB8SYA 7, K8TIY 7, WA8WVV 7, N8AG 6, W8BEZ 6, WA8EFK 6, W8SDB 5, WB8NDB 4, W8KJ 3, WA8MAM 3, WB8UUJ 3, W8WVL 2. (July) WB8YRY 47, WN8NII 22, K8MJK 6, W8VOM 3.

OHIO: SCM Hank Greeb W8CHT/N8XX — Asst. SCMs: WA8MCR N4VY W8TP W8FU. SEC: K8AN. STM: WB8JGW. NMs: N8CW W8DIL WB8KWD K8OZ WA8SSI WB8WTS. Net reports (Aug.)

Net	Sess.	QNI	QTC	Times	Freq.
ONN	29	104	29	2330	3.708
8N	59	558	280	2345/0300	3.577
OSSBN	92	2669	1560	1530/2100/2345	3.9725
OSN	31	197	70	2310	3.577
O6mN	31	402	37	0200	50.160
BNR	31	117	71	2300	3.605

Traffic was up during Aug. because of Ohio State Fair and several county fairs. Central Ohio ARES organized the booth at the state fair again, and utilized 50 different operators. Several upgrades this month, including EC K8CKY, General; NM WA8SSI, General-Advanced; and WA8VWY, Advanced. This last report of the outgoing SCM is written with best wishes to the section. It has been a pleasure serving for 4 years. Though hectic at times, the job has been challenging and rewarding. Some things were accomplished, like building public service and network activities under the capable leadership of the SEC, ECs, and net managers. Ohio amateurs responded well during the various emergencies that occurred. Aug. QST could not do justice to the fantastic work during the 1978 Blizzard relief efforts performed by Ohio hams, and the job of compiling a comprehensive report to the section proved too time-consuming. Thanks again to all who helped out in this endeavor. Keep supporting your section with your activities, and reporting thereof, to Chappie, WB8JGW, your new SCM! Traffic: (Aug.) K8DDG 1035, WB8OFR 502. W8PMJ 492, K8KRG 387, K8BYR 361, WA8HGH 304, K8OZ 248, WD8LIU 217, K8AAZ 182, WD8CGR 182, WB8KWD 174, W8DIL 164, WB8WTS 168, WB8OMQ 159, W8QZK 150, WB8CJU 131, N8CW 109, K8DL 106, WB8QHV 105, W8ENI 104, WB8JGW 101, WB8UBR 96, WA8GMT 89, AB8P 84, W8TP 82, WB8SIQ 75, W8TH 60, W8CXM 56, WA8MCR 49, WD8DIP 48, WA8VWH 48, WA8SSI 44, N4VY 42, WD8MGP 38, WA8ODY 37, K8KWO 31, WB8MRL 31, WD8DDJ 30, WB8SRC 30, K8AN 28, N8TM 27, WB8WNH 26, WB8TPZ 25, W8WEG 25, WB8TRK 24,

K8IKD 22, W8LZE 21, WD8JTT 20, WD8MTV 20, WB8PIY 20, W8RG 20, WD8DTG 19, W8MGA 19, WD8LPP 16, W8OUU 15, WA8TSX 15, WD8QMD 14, WB8TCZ 14, N8XX 13, W8ARW 12, K8IOW 12, WB8VLR 12, W8GRT 11, WD8MKC 11, WB8VZX 121, W8UQY 9, WB8BGX 8, WD8DRT 8, K8CKY 5, WD8DOS 6, WB8HMI 6, WB8LWY 5, W8QCU 5, W8ZM 5, K8CYX 4, WD8EKI 2, K8ONA 2, W8IM 2. (July) WA8MCR 210.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — ASCM/SEC: WB2VUK. ASEC: K2AYQ. STM: WA2SPL. NMs: W2CS W2WSS. Nets: NYPON 5 PM 3913; ESS (slow) 6 PM 3590; NYSPTEN 6 PM 3590; NYS 7/10 PM 3677. This is the month for kicking off Preparedness Duels. One county passes messages from mobiles at picked spots via ARES nets via HF liaison to distant county. Traffic also in reverse direction. Scores participation, accuracy and time to clear. All counties go against one another for annual award for best accumulated score. If you are interested in getting in on the first round of duels, please see me, your EC, etc. Congrats to large summer batch of upgrades, new licenses. Extra: K2QF AC2S. Advanced: KB2CT KB2CR N2AIF WA2HFT WA2GYS WB2SHB WA2SHH WB2DOI KB2AQ KB2BB WA2EBV WB2TYI KA2AQ. General: N2AKR WA2GYT WA2WSY N2ABL WA2GYT. Tech: KA2ATW. Novice: KA2AEG KA2BLC KA2AUQ KA2AXM KA2ATS KA2ATT KA2ATU KA2AEH KA2BLB KA2ATV. Congrats to Doc, WA2RAU, now on top of SSB CQ DXCC Honor Roll. Uncle Dave Marks, W2APF, honored (or ???) at a 75th birthday riot thrown Sept. 20 by AARA. New CD appointments: OTS W2IT & WB2EAG. Aug. PSHR: WA2SPL N2YL W2CS. Traffic: WA2SPL 791, N2YL 212, W2CS 170, W2YJR 140, WA2OTC 110, W2IT 108, W2ACQ 52, K2AV 46, N2EF 26, W2EFU 7, K2RRR 7.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: K2HTX. NMs: WB2EUF WA2UWA. The following are major AREC/RACES Nets in this section: please join one. Bronx: 28.64 MHz, 50.35 MHz, 146.88 fm. Kings: 28.64 MHz, 50.35 MHz, 146.88 fm. Richmond: 146.88 fm. New York: 29.5 MHz, 146.88 fm. Queens: 29.5 MHz, 50.52 MHz, 145.62 am/fm. Nassau: 28.72 MHz, 145.68 am, Suffolk (West) Hunt.: 28.73 MHz, 145.59 am. Smith: 28.65 MHz, 147.21 fm. Babylon: 21,340 MHz, 146.085/685, fm. Islip: 28.65 MHz. Suffolk (East): 146.82 fm. Brookhaven: 146.115/715 fm. Riverhead: 3730 kHz cw. Note: Net times between 2000 and 2100 local on Mon. Hopefully you will be reading this column in the very early part of Nov., there is still time to plan to attend the Hudson Division Convention, dates Nov. 10-12, at the Playboy Resort and Country Club at Great Gorge, NJ. WA2HAZ spent a nice vacation in ME. Congratulations to WA2YEI who passed his Extra and is now working for WPIX-TV as a Broadcast Engineer. W2DBQ getting ready to go on 160 m with a long wire. K2UB was hospitalized in Wash. DC following a traffic accident. I am sure that everyone will join me in wishing Moshe a speedy recovery. Congratulations to WB2MIY; Bob raised a tower and got married, all in one week! W2ZUC now residing in his new QTH in Ft. Myers, FL. W2BIE now has new NY state license plate "CQ-DX." The Great South Bay ARC had a course in CPR (Cardio Pulmonary Resuscitation). The clubs annual picnic was a success; one of the highlights was a visit by WA2OHD in his Suffolk County police car and gave a run down on the Police Radio System to the members. WA2FGB is home from the hospital. Congrats to WB2OHD on upgrading to Advanced. Babylon AREC looking for new members, see K2TV for further info. W2MFW and XYL WA2FIW now back on the air with a 901 DM Yaesu and the Yaesu Memorizor. WA2ISY now N2AGY, she is XYL of W2QL. There is a 2-meter am net that meets at 1900 local on 145.050 MHz. The NCS is W2AVI with W2AUF as alternate. There is a new club in Woodhaven, The Forset Park ARC, with the call WB2RBD. Contact W2OEQ for further info at 212-441-8275. Traffic: (Aug.) K2GCE 98, W2MLC 31, W2DBQ 24, N2LI 13, K2JFE 4. (July) K2JFE 16.

NORTHERN NEW JERSEY: SCM, Bob Neukomm, WA2MVQ — SEC: WB2VUF. NMs: W2XD WB2LCC WA2OPY (VHF). NM RTTY W2PSU. NM NJSN N2MW. NM NJNYN WA2LHV.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	W2XD	3695	7:00 P Dy	31	453	158
NJN	W2XD	3695	10:00 P Dy	31	314	96
NJSN	N2MW	3730	8:15P Dy			
NJPN	WB2LCC	3950	6:00 P Dy	31	534	160
NJPN	WB2LCC	3950	9:00A Su	4	47	6
RTTY	W2PSU	147.51	7:00P Dy			
NJ2MTR Tfc	WA2OPY	145.51	8:30P Dy			
NJNYN	WA2LHV	3735	8:00P Dy			

New Extras WB2RMI. WB2MSO now AF2L. WA2AJI new Advanced. WA2LWU new General. KA2AXZ new Novice in Springfield and looking for a club offering an upgrading class. How about the Cranford Club coming to his help? W3WKL recently moved to Morristown. WA2ASC, WB2BMB, WB2KFW all vacationed in Maine. WA2MVQ was in Germany and Switzerland. K2ZFI has been on a long trip the past 9 weeks. WB2RMI has a new antenna up with a good signal along with an IC-211 and IC701, a nw MLA2500 and awaiting putting up an ATB-34. K2OP taught amateur radio and ran a lot of traffic for the Scouts at Horseshoe Scout Reservation in Chester, PA. K2OIJ is back on the air after a long lapse and has become EC for Hudson County and has recently organized the North Hudson Amateur Radio Association. This activity will fill a void in Hudson County so all you fellow hams in Hudson get in touch. AF2L Asst. EC for Monmouth County. Ramapo Valley Emergency Network (RAVEN) meets the second Mon. of each month at Wayne EOC Municipal Building Health Center on Valley Road with talk-in on 146.55. The NJ Army Mars Technical Net under W2TJZ gave an interesting talk and "hands-on" discussion of the VOM at the BARA meeting. Seven BARA members joined Army MARS that evening. K2ETN and WA2MVQ are teaching Novice and General courses respectively at the Ridgewood Adult School. K2UDZ has a new HW101 on the air. New Extra W2INL. Traffic: (Aug.) WB2MSO 202, WB2RMI 195, W2CQB 185, WA2PIP 142, W2RQ 139, K2VX 78, N2CR 87, W2XD 65, K2BHL 64, WB2DMB/3 57, WA2MVQ 42,

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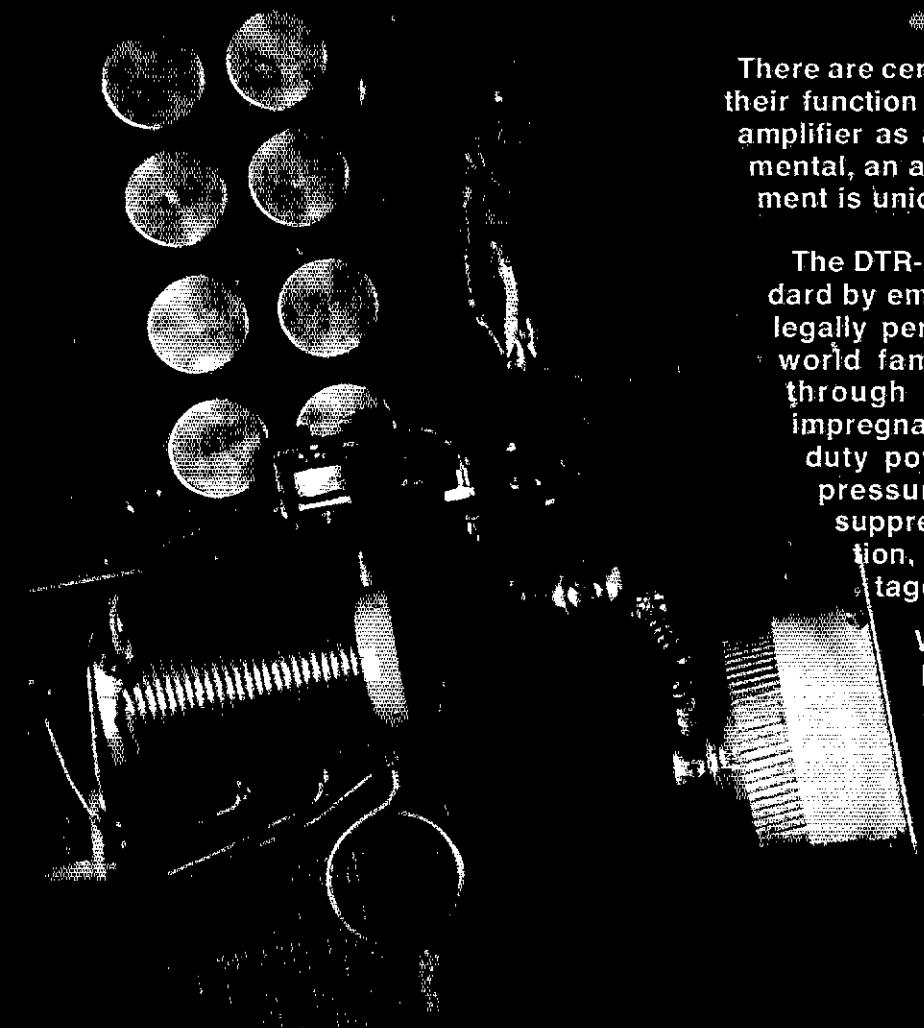

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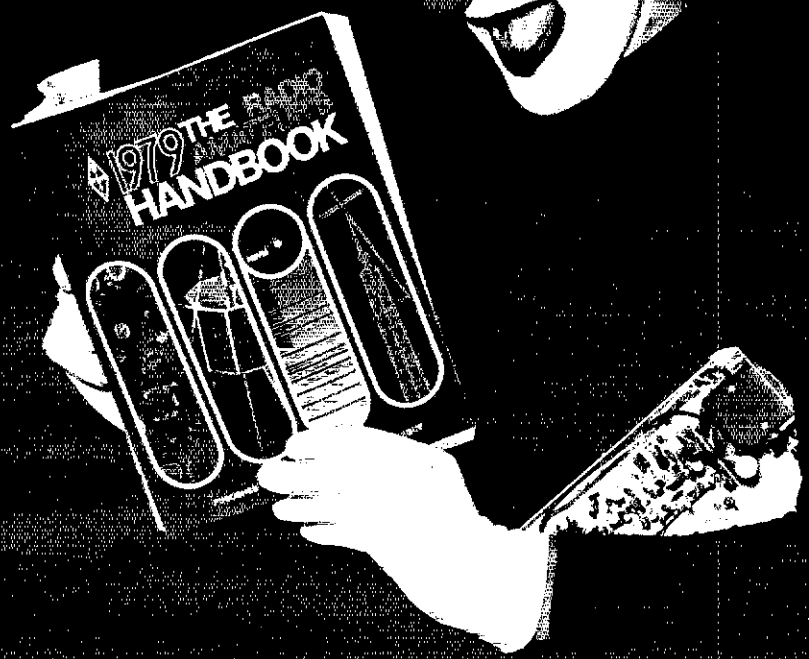

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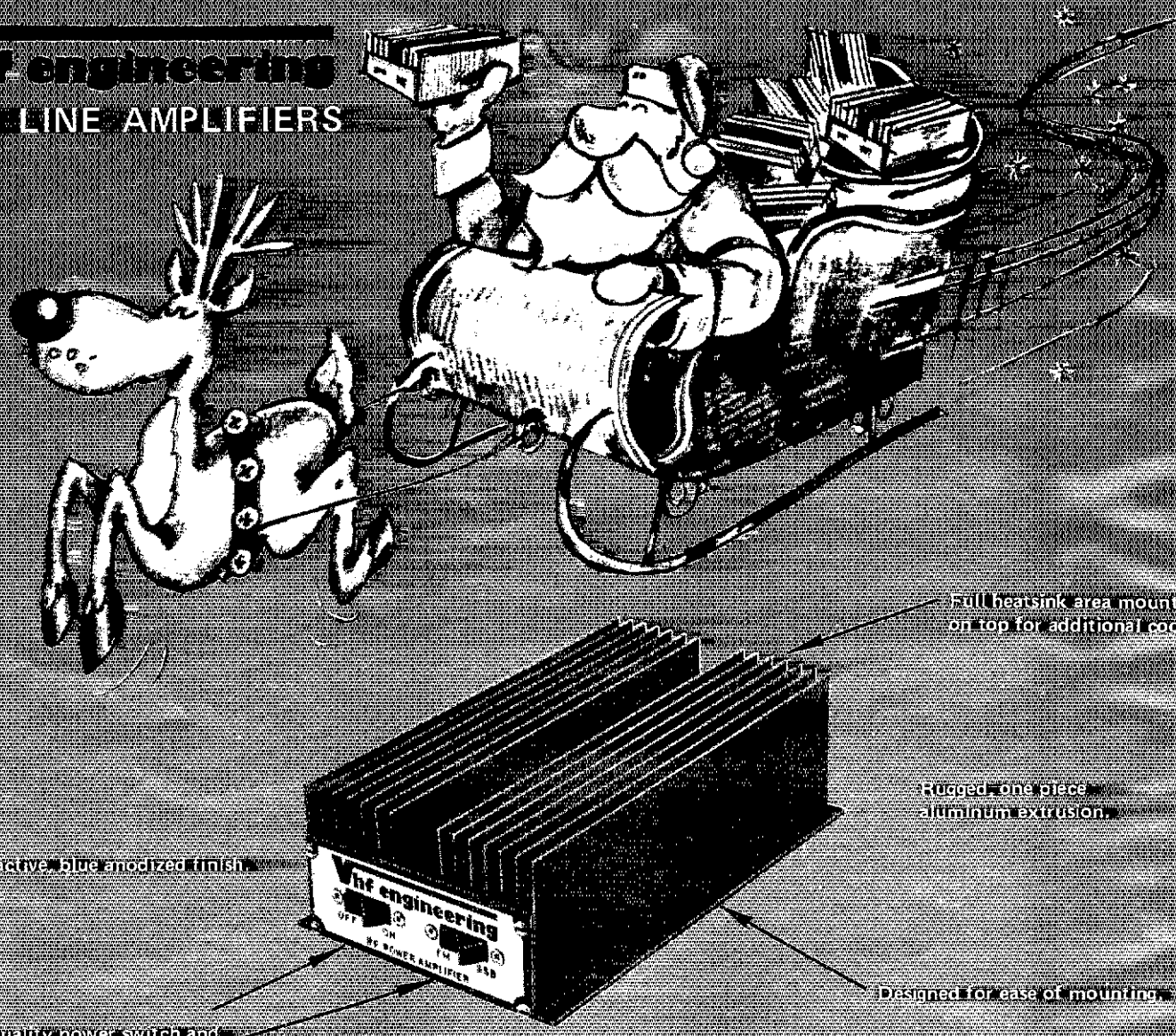

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BLC 30/150	144 MHz	CW-FM-SSB/AM	30W	150W	239.95
BLD 2/60	220 MHz	CW-FM-SSB/AM	2W	60W	164.95
BLD 10/60	220 MHz	CW-FM-SSB/AM	10W	60W	159.95
BLD 10/120	220 MHz	CW-FM-SSB/AM	10W	120W	259.95
BLE 10/40	420 MHz	CW-FM-SSB/AM	10W	40W	159.95
BLE 2/40	420 MHz	CW-FM-SSB/AM	2W	40W	179.95
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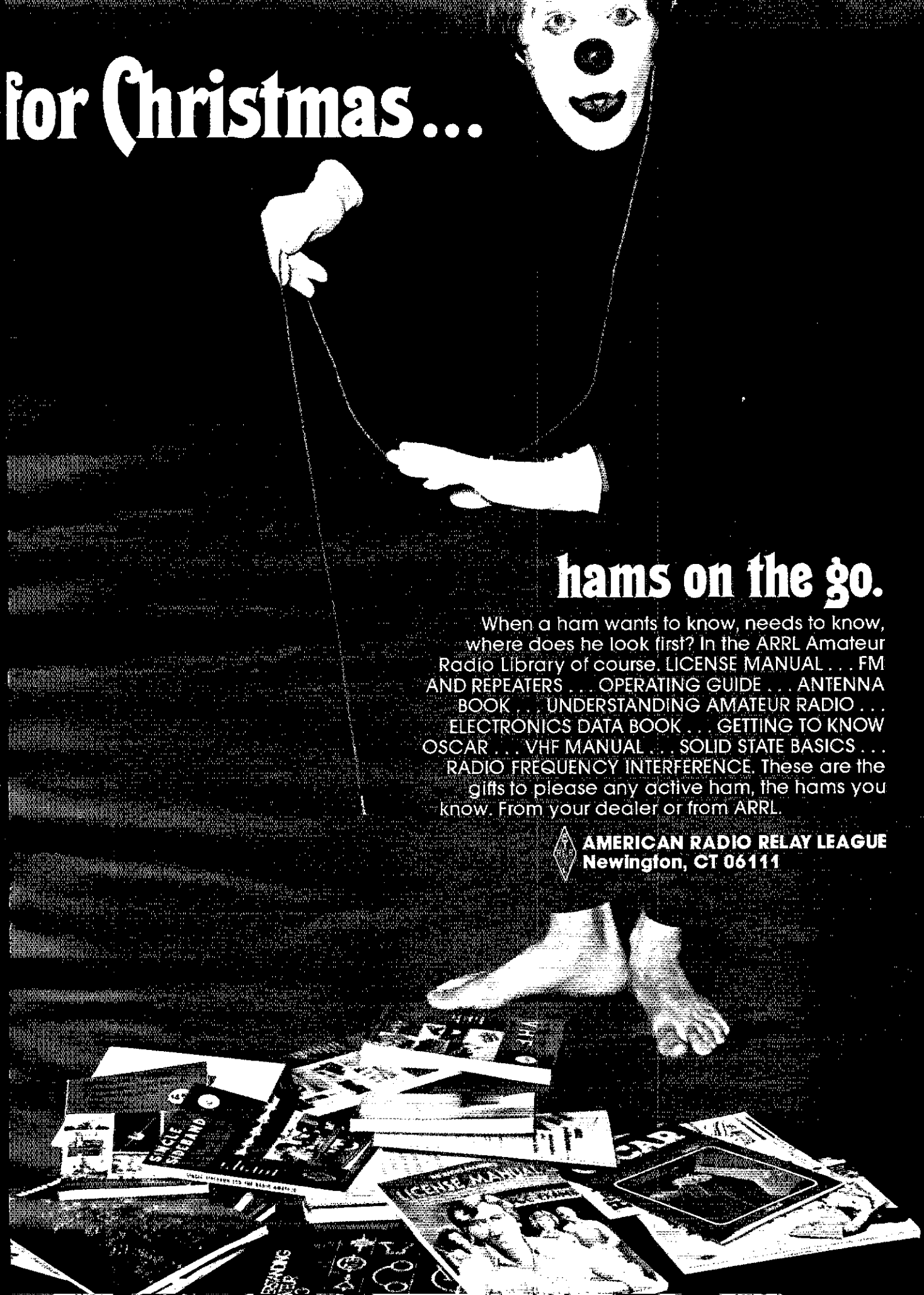

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WA2EPK 42, W2SQ 41, N2SU 40 WA2LHV 33, W2LTP 31 N2GJ 29, K2SE 26, WA2COJ 24, W2ZEP 22, N2NS 15 WB2KAK 10, W2QNL 10, WA2WXM 10, WB2KLF 6 WA2KLS 6, W2CC 3, WA2IXB 1. (July) W2RQ 125, (June) W2RQ 135

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — Nice to meet old and new friends at Des Moines Ham & Computertes and at Iowa 75M picnic. At picnic WBØJFF honored with "Certificate of Appreciation" and WAØMIT received "Baloney Award." KØJXN now ABØZ, WBØTJC is ACØZ WBØSEL is trustee of WØCS and has 170 confirmed countries. WBØCHP working OSCAR on A. 220 machine in Cedar Rapids 3.34/4.94 working well. Congrats to KØPNZ and WDØFCI for Extra and to WDØFZZ for Gen Denison 6.28/88 has 4 Bay J-poles at 24U and 140 feet New officers at Denison Rpt. Assn.: KØEFQ, pres. KØCNM, veep.; WAØGUD, secy-treas. Congrats to WBØVFE for quick thinking and saving a life. The team of WBØVRN WBØVRQ and WDØGSS found the tox in six teen minutes. WDØADP ow NØAHJ and has new SY-2 on a 50-ft. tower. WBØSUU moved to Colo. and N5YX/Ø moved to Maine. New equipment: WBØURA ATB-34 ant. WDØEIF 144-11 on 2M SSB. WBØRAT 40-ft. plus homebrew 15M beam. WBØRMT got a JA6 first call with homebrew 10-15 Quad. Humeston on 6.31/91 and Humbolt on 7.78/18. Ia. Code Net (ICN) invites slow-speed check-ins on 3713 kHz 7 P.M. M-W-F. Nets: Iowa 75M 3970, 0000Z M-S, QNI 797, QTC 125, sess. 27, Mgr WØYLS. 1830Z, QNI 1474, QTC 82, sess. 27, Mgr WAØVZH. TLCN, 3560, 0030/0400 Dy, QNI 438, QTC 159 sess. 62, Mgr. WØYLS. Traffic: WAØAUX 760, WØSS 286 WØYLS 189, N5YX/Ø 110, WBØKHO 43, WBØNSS 39 WDØFCI 38, WØJPJ 36, WØLFF 34, WDØGDL 27 WBØAVW 9.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC WØKL. Net Mgrs.: WØFT WØOYH WBØSZS. We, the amateurs of KS offer our prayers as WØOBH mourns the death of his XYL. We are also sorry to report that WBØKWL formerly of Topeka, and WØNSB of Lawrence are now Silent Keys. Several clubs reporting activities in public service type events. Among those reporting this month are the KVARC and the JARS. The Wichita ARC and the ACARA have joined forces when it comes to club bulletins. Congrats to WØPB as he celebrates his 50th year as a ham. Also we are glad to hear that WØFT was not hurt any worse then he was in recent auto accident. Net reports for Aug. CSTN QNI 1084, QTC 92 KWN QNI 788, QTC 387, KSBN QNI 1011, QTC 203. KPN QN 223, QTC 28. QKS 449, QNI 174. MMM QNI 108, QTC 10 serving 10 mobiles in the 5 sess. reported. ARES now 858 members strong in KS — ARE you a member yet? See your EC!! Are you a Novice? Are you interested in a Tfc. Net, if so monitor 3735 daily at 8 PM. Traffic WBØOBH 203, WØOYH 168, WØAM 113, NØSN 107, WØH 101, WØCHJ 98, WØFT 56, WØIX 50, WDØFBP 28, KØBXF 27, WBØKDE 22, KØFPC 21, WØZUX 20, WØPB 17, WBØTI 16, WØBLI 13, KØYTA 13, WØERO 11, WAØOWH 7, WØKL 3, WØNYG 3. WAØWJX 3, NØIN 2.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM, Joe Flowers, WØOTF. SEC: WBØFKY. WBØVXV has a new Ten-Tec Century 21. WDØGPV and WDØGPU have a new Tempo 2020 and IC-22S. WDØZSS and WDØARX are sporting a new Yaesu FT-101E and WDØDBM has a new TH6DXX up 50 feet. Larger metropolitan areas of the state will soon have more than one EC per county. WBØMUU KØMAT and WDØHTC recently presented a demonstration in ham radio for Kansas City's Veterans's Administration Hospital.

Net	QNI	QTC	Net	QNI	QTC
MON	195	170	MOSSBN	1016	175
MON 2	143	56	HBN	334	25
NEMOE	95	1	MEOW	233	131

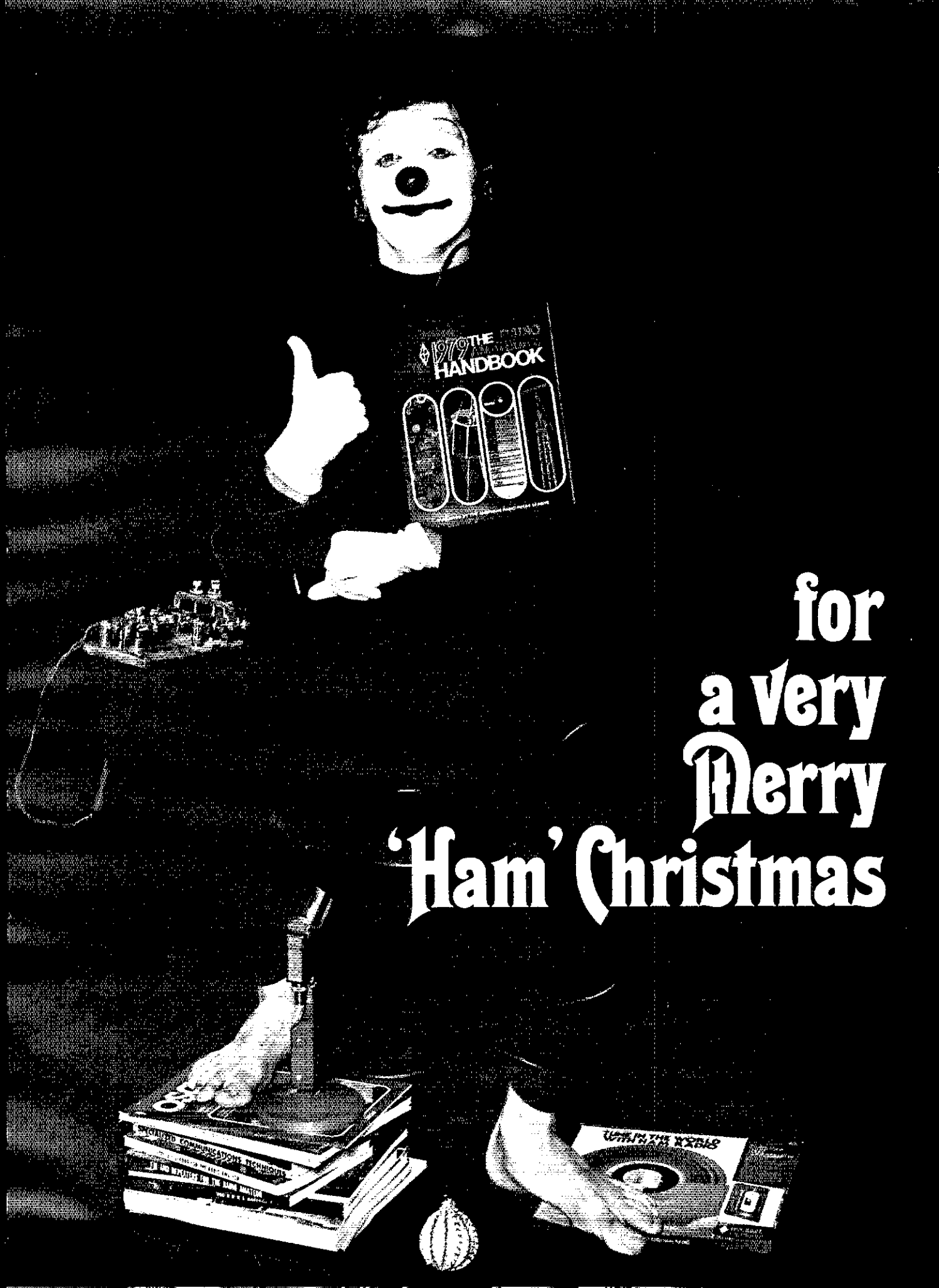
Congratulations to WØDHN who recently retired from Missouri Public Service with 41 years service. Here's wishing WØCW a speedy recovery from recent major surgery. Congratulations to the following new licensees: Novice KAØs BDD BDQ BDP BDR BEC BEF BEG BEL BET BEU BFB BFC BFN BFO BFU BFX BGC BGE BGF BGG BGK BGM BGN BHK NHM BHW BIO BIP BIQ BIZ BJA BJJ BJK BJN BJR BKJ BKL BKR BKS BKY BKZ BLF BLJ BLK BLM BLU BLV BLY BLZ BMA BMB BMF BMI BMJ BMM BMN BMR BNB BNH BNJ BNK BNN BNQ BNS BOM BOY BPB BPC BPN BPV BPW BPY BPZ BQE BRF BRG BSE BSI. BST BSZ BTI BTO BTP BTR and BTZ. Tech: NØs ACA ADC AFN; KAØs AUU AUV AUY and AVV. General: NØs ACZ ADA AFA and KAØAUD. Traffic: KØONK 484, WØBMA 353, WØHH 313, KØSI 128, K3IGA/Ø 111, WØBV 87, WBØVHN 57, WØOTF 56, WØOUD 53, WØQAU 46, KØSSN 44, KØRWL 12, WØBVL 11, WAØMOF 6.

NEBRASKA: SCM, Ed O'Donnell, WBØGWR — Silent Keys (Aug.) who will be missed are KØHNT KØIWQ and WBØTLC. WAØAUX says that the PM Net now meets at 3:30 PM CDT on the same previous frequency. KØGND and a Lincoln group have been operating an emegency Red Cross Medical nets during the Nebr. home football games on 146.94 and 146.52 simplex frequencies. Net reports: Neb. Cornhusker Net, QNI 1319, QTC 128; Mid-Neb. ARES 2Mtr Net, QNI 195, QTC 5; Neb. Morning Phone Net, QNI 1349, QTC 44; Neb. ARES 75Mtr Net, QNI 165, QTC 5; Neb. Storm Net, QNI 980, QTC 38; Pawnee ARC 2Mtr FM Net, QNI 143, QTC 2; Platte Valley 2Mtr Net, QNI 39, QTC 0; QCWA Net, QNI 51, QTC 0; Western Neb. Net, QNI 395, QTC 27. Traffic: WØFQB 124, WØVEA 82, WAØCBJ 59, KØJFN 31, WØHOP 30, KØBRS 27, WBØNFG 22, WØHTA 12, WAØPCC 8, WAØQEX 7, WDØBOZ 6, WØNIK 6, WØVYX 6, WBØGMQ 4, WØATU 3, WØIXB 3, WAØOQX 3, WBØIGN 2, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1XX. NM: K1EIR. NM: K1EIC. VHF NM: WA1ELA.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	62	266	191
CPN	3965	1800 M-S 1000 Su	31	410	145
VHF-2	28/88	2130 Dy	31	268	187
WESCON	78/18	2030 Dy	31	571	117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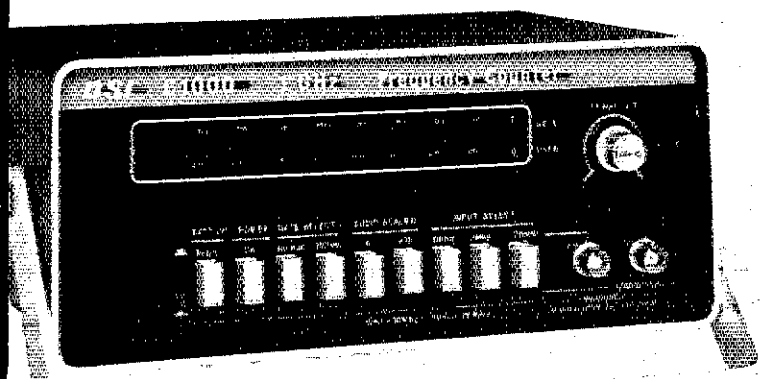

MODEL C1000 10Hz to 1GHz

$399.95

- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**

Accuracy . . . that's the operational key to this rugged advanced design Model C1000 1GHz frequency counter . . . a significant achievement from DSI. That's because you get . . . **.1 PPM** 0° to 40°C proportional oven time base . . . Built in 25DB preamplifier with a 60DB adjustable attenuator . . . x10 & x100 audio scaler which yields .01 Hz resolution from 10Hz to 10KHz equivalent to 10 sec. & 100 sec.Gate Time . . . Selectable .1 & 1 sec. time base and 50 ohms or 1 meg ohm input impedance . . . Built-in battery charging circuit with a Rapid or Trickle Charge Selector . . . Color keyed high quality push button operation . . . All combined in a rugged black anodized (.125" thick) aluminum cabinet. The model C-1000 reflects DSI's on going dedication to excellence in instrumentation for the professional service technician, engineer, or the communication industry.

MODEL C700 50Hz to 700MHz

$299.95

- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**

ALL NEW! All UNPARALLELED DSI QUALITY! The model C 700 700 MHz frequency counter features . . . **.2 PPM** 0° to 40° C proportional oven time base . . . 25db preamplifier with a 60db adjustable attenuator. Built in battery charger with a rapid or trickle charge selector . . . Combined in a rugged (.125" thick) aluminum cabinet makes the C700 ideal for the communication industry and professional service technician.

3600A OWNERS: Up date your 3600A frequency counter to a C 700 includes, new back board, **.2PPM** proportional oven, 25db preamplifier, rugged .125" thick aluminum cabinet, order 3600A-700. Unit must be returned to DSI factory for modification.

DSI — GUARANTEED SPECIFICATIONS — FACTORY ASSEMBLED — MADE IN USA

Model	Frequency Range	Proportional Oven Accuracy Over Temperature	50Hz To 75MHz	75MHz To 500MHz	500MHz To 1GHz	Number Of Digits	Size Of Digits	Power Requirements	Size
C700	50Hz to 700MHz	.2PPM 0° to 40°C	50MV	10MV	NA	8	.5 Inch	115 VAC-BATT 8 to 15VDC	3"H x 8"W x 6"D
C1000	10Hz to 1GHz	.1PPM 0° to 40°C	20MV	1MV	>50MV	9	.5 Inch	115VAC-BATT 8 to 15VDC	4"H x 10"W x 7½"D

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OMNI

OMNI—THE *ALL-INCLUSIVE*. Because OMNI has it *all*. Designed to give you every advantage, every capability, whatever your operating specialty. Designed to give you new conveniences and new levels of performance. Designed to give you the world of Amateur Radio with a world of difference—the OMNI world of unique features. An unusual combination not found in any other.

FUNCTIONAL STYLING. The "look" you requested. "Clamshell" aluminum case clad in textured black vinyl. Complementary nonreflective warm dark metal front panel. Extruded satin aluminum trim bezel and tilt tail. Convenient controls. Fully shielded. And everything in a larger, easier-to-use size: 5¾"h × 14¼"w × 14"d.

TOTALLY SOLID-STATE. Sharing the TEN-TEC heritage of solid-state design leadership with its companion transceivers, the highly successful 540/544, OMNI has all the advantages of proven solid-state technology—reliability, long life, cool performance, better stability.

8-BANDS. The world now and in the future. OMNI covers 160, 80, 40, 20, 15, and 10 meters now (crystals included for all present Amateur bands, 1.8-30 MHz). And it has convertible 10 MHz and "AUX" band positions for the future.

BROADBAND DESIGN. Permits changing bands without tune-up, without danger of out-of-resonance damage to the final stage.

ANALOG OR DIGITAL READOUTS. OMNI-A features an analog dial with 1 kHz dial markings. OMNI-D has 0.43" LED readouts with the 5 most significant in red and the 6th in green to show 100 Hz increments.

BUILT-IN VOX AND PTT. Smooth VOX action with 3 easy-to-adjust front panel controls. PTT control is available at both front and rear panel jacks; an external microphone switch may be used.

BUILT-IN SQUELCH. Unusual in an hf rig, but handy for tuning or monitoring for a net or sked.

BUILT-IN 4-POSITION CW/SSB FILTER. 150 Hz bandwidth with 3 selectable skirt contours for optimum CW reception.

8-POLE CRYSTAL FILTER. 2.4 kHz bandwidth, 1.8 shape factor.

SEPARATE MODE SWITCH. Permits using *all* filters in *any* mode.

2-SPEED BREAK-IN. Switch to "fast" or "slow" receiver muting to accomodate any band condition or mobile operating.

2-RANGE OFFSET TUNING. Switch-select the ±5 kHz range for off-frequency DX work or the ±0.5 kHz range for fine tuning.

OPTIMIZED RECEIVER SENSITIVITY. Ranges from 2 uV on 160 m to 0.3 uV on 10 m (10 dB S+N/N) to achieve ideal balance between dynamic range and sensitivity.

GREATER DYNAMIC RANGE. Typically exceeds 90 dB to reduce possible overload from nearby stations. Also includes switchable 18 dB PIN diode attenuator for additional overload prevention.

WWV RECEPTION. On the 10 MHz band switch position.

FRONT PANEL CONTROL OF LINEAR/ANTENNA BAND-SWITCHING. Auxiliary bandswitch terminals on back panel for simultaneous control of external relays or circuits with the OMNI bandswitch.

BUILT-IN PHONE PATCH JACKS. Provide interface to speaker and microphone audio signals for phone patch connection.

BUILT-IN "TIMED" CRYSTAL CALIBRATOR. In the OMNI-A a pulsed 25 kHz calibrator desensitizes the receiver and provides an automatic 5 to 10 second "on" time for easy two-hand dial skirt adjustment.

BUILT-IN ZERO BEAT SWITCH. Permits placing your transmitted signal exactly on the listening frequencies of CW stations.

BUILT-IN SWR BRIDGE. The "S" meter electronically switches to read SWR every time you transmit to provide a continuous antenna check.

FRONT PANEL MICROPHONE AND PHONE JACKS.

ADJUSTABLE AUTOMATIC LEVEL CONTROL. For setting output power level from low power to full output, for retaining low distortion at desired drive power to linear amplifier.

SEPARATE RECEIVING ANTENNA CAPABILITY. Rear panel switch and jack connect receiving section to common antenna or separate receiving antenna. Also acts as receiving antenna by-pass when used with instant break-in linear amplifiers.

BUILT-IN ADJUSTABLE SIDETONE. Variable pitch and volume.

DUAL COMPRESSION-LOADED SPEAKERS. Larger sound output, lower distortion, no external speaker needed.

POWER INPUT. 200 watts when used with 50 ohm load. Proven, conservatively-rated, solid-state final amplifier design with full warranty for first year and pro-rata warranty for 5 additional years.

100% DUTY CYCLE. Ideal for RTTY, SSTV, or sustained hard usage.

PLUG-IN CIRCUIT BOARDS. For fast, easy field service.

POWER. Basic 12 VDC operation for convenient mobile use; external supply required for 117 VAC operation.

OPTIONAL ACCESSORIES. As all-inclusive as OMNI is, there are a few options: Model 645 Keyer, 243 Remote VFO, 248 Noise Blanker, 252M Power Supply.

Model 545 OMNI-A $899 **Model 546 OMNI-D $1069**

Experience the world of difference of OMNI, see your TEN-TEC dealer or write for details.

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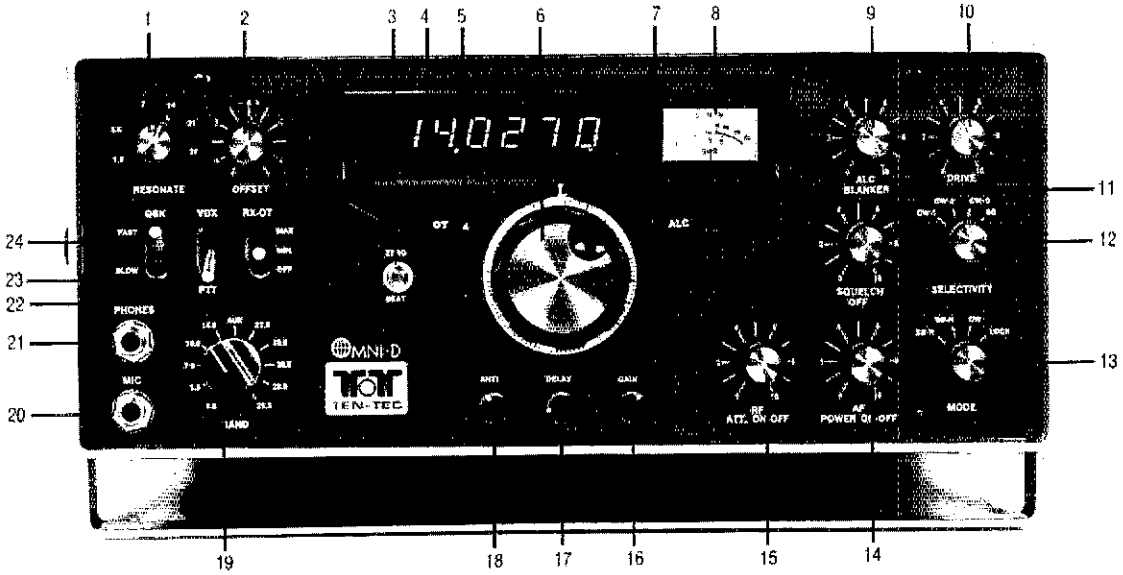

1 Receiver RESONATE control for peak sensitivity.
2 Receiver Dual Range OFFSET TUNING control for off-frequency work.
3 ZERO BEAT switch, spring-loaded, momentary contact.
4 6-Digit LED FREQUENCY READOUT for 100 Hz accuracy.
5 OFFSET TUNING LED indicates OT switch is "on".
6 MAIN TUNING KNOB; big, easy-to-grip with integral spinner.
7 AUTOMATIC LEVEL CONTROL LED indicates ALC-region operation.
8 Combination "S" and SWR METER; switches automatically.
9 Combination ALC control and NOISE BLANKER on/off switch.
10 DRIVE control for final stage.
11 SQUELCH combination on/off switch and control.
12 4-Position SELECTIVITY switch for SSB and CW.
13 4-Position MODE switch, automatic SSB Normal, Reverse, CW, andd Lock (key down).
14 Combination push-pull POWER switch and AUDIO LEVEL control.
15 Combination RF ATTENUATOR on/off switch and control.
16 VOX GAIN control.
17 VOX DELAY control.
18 VOX ANTI-TRIP control.
19 11-Position BAND SWITCH.
20 MICROPHONE jack; hi-z input.
21 HEADPHONES jack.
22 RECEIVER OFF-SET TUNING SWITCH; 3-position: Max-Min-Off.
23 VOX-PTT SWITCH.
24 QSK (full break-in) SWITCH; 2-position: Fast-Slow.

High QNI: CN — W1KV K1GF K1EIR AA1G. CPN — K1BSB W1NQO W1HMJ. VHF-2 High QTC: W1EFW, SE W1XX suggests clubs promote EC work and impress a with need for preparedness. Director W1HHR ap preciates your attendance at the NE Convention in Bos horn, MA. Traffic nets need traffic — service is excellen and free — your help is needed! VHF Repeater station can continue only with your financial support — pleas join Repeater Club of your choice. Congratulations to W1NJM retiring from ARRL after over 40 years; Bill Pace W1ID, our new SCM — send him all reports at 15 Upland Road, Middlebury, Conn. 06762 and please extend you wholehearted support — tnx. I am completing my term as SCM and offer my thanks and appreciation for you help. All credit for progress in Conn. Section goes direc ly to: SEC. W1XX; RM, K1EIR; PAM, K1EIC and VH PAM, WA1ELA and their associates! Their help mad the position of SCM easy — your friendship made it fun Continued cooperation with our new SCM will make it a worthwhile! Sincere thanks to all!!! Traffic: (Aug.) K1GI 252, WB1AIU 197, WB1CPF 147, K1OQG 113, W1EFV 103, AA1G 61, WA1RLV 61, W1BDN 48, W1GVT 3F WB1HTZ 36, W1KV 32, K1XA 30, WA1HYN 22, WA1LOI 19, W1JA 17, W1JTD 17, W1QV 12, W1BDI 9, WA1JGS 8 W1GUH 2. WA1OGR 1. (July) K1GF 166, W1EFW 73.

EASTERN MASSACHUSETTS: SCM, Frank Baker W1ALP — Asst. SCM: WA1OWQ. SEC: W1AOG. K1PNE W1IYD W1BK W1III W1ZMO WA1BLG WA1HPS W1BHD K1NFW as ECs sent reports to W1AOG. W1EPZ W1DIU W1BV are Silent Keys. WB1GWF now AC1U. EMRIPN had 217 QNI, 179 QTC. NENN 178 QNI, 67 QTC. HHTN 218 QNI, 34 QTC. NEEPN 58 QNI, QTC 9. WA6CQF & family visited W1ALP. FMRI had 428 QNI, 420 QTC W1OLP in hospital. W1TUP now N1DS. W1YLB-JY9VK is in Amman, Jordan. W1HZU now AC1O. W1HCR & WA1TEL now in E. Falmouth. WB1ASD had heart attack. So. Eastern Mass. ARA, W1AEC working on their 50th anniversary, two years from now. K1IBR handling the Novice Class. I have appointed WA1ZAZ as our Section Traffic Manager as of Oct. 1st. WA1ZXB made BPL. W1LE overhauling his station. W1NF's 1902 Coherer RX on display, Essex Museum, Salem, MA. K1BCS making a trip around N. E. W1GXT worked Iowa, Ill & Mo. on 2. W1VRK on 2. WB1FYSA new op at WCC. Chatham repeater back on air. WB1CLK has 50 ft. tower, three element beam. WB1DMP has FT-7. WA1YWK has SB101. WB1HAH has 10 wpm. K1PAD Swan power supply blew up. K1GN was Maritime Mobile during Sept. WB1GEX playing chess on radio. WB1DXR copied 35 wpm W1AW. WA1ZET on our traffic nets. WB1EMU has new Century 21 & Accu Keyer. WB1GUK has Kenwood 520 and ICOM 215. W1AYI in the hospital. WB1EYE wrkd Japan, 20 watts. WA1UWF went to NOBARC Hamfest. WB1DQC has new SB220. K1OTA move to FL. K1URX mobile on 10. WB1AJY on RTTY. WA1HHS has new tower. W1MX new beam. WB1CPW has FT7, wrk DX. WB1DMP/M has FT7, QRV at Logan airport. W1AOG has a Kenwood TR-7400A. WB1GEX new OTS. W1ALP spoke at the Foxboro Co. ARC. EM2MN had 156 QNI, 34 QTC. To many that knew "Doc" W1CLS in this Section, sorry to report he is in a nursing home in NH. W1UQ new EC for Brookline, who will be working with K1UN, EC for Needham and may be cross-linking repeaters for emergency purposes in our respective towns. WA1ONB is on from the Univ. of Virginia as W4UVA. W1LMU has TR-4. W1CS has new ant up at Dennis QTH, works his son-in-law in VA. K1EMU going to W6- and W7-Land on vacation. W1CFU traveling. W1HI busy with tennis at Longwood. W1UH has sked with FL every morning. W1DYS going to FL for winter with a good ant. WA1JYQ in NH for summer. W1KSA very active on Quincy repeater. W1LMU on 75. W1ECK made a trip to Lithuania, Finland, Russia and gave talk at Massoit ARA. Capeway RC met at WA1VFO's QTH. Whitman ARA had a Flea Market, WA1DUZ in charge. KA1AAP has his Tech. W1DL had serious spinal surgery. K1VVC has a new son, Quanapowitt RA held a "special CB night." W1PVF now K1SC. Traffic: (Aug.) WA1EYY 347, WA1VAB 344, WA1ZXB 237, W1PEX 229, WA1TBY 164, K1PAD 148, WA1ZAZ 116, K1CE 112, K1GN 106, WB1GEX 106, W1DMS 86, W1FJI 81, WB1DXR 73, K1ES 65, WA1LAD 65, W1CZB 57, WB1EMU 46, W1DMH 44, K1BZD 19, K1CE 12, W1AOG 10, K1PNB 8, WA1YMD 7, WB1EYE 5, W1AIX 3, WA1ZET 3, K1TR 3, WA1QMZ 2, W1SR 2. (July) WA1ZAZ 220, WA1UNC 154, WA1UWF 114, K1GN 81, K1ES 80, WB1CUA 6, WA1QMZ 3, W1SR 2, K1FTB 2, WA1UMG 2, WB1CWN 2.

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. NMs: W1RWG (PTN), K1GUP (SGN), WA1SMY (CMEN), WB1AOD (MSN). Winter Harbor, Aug. 12 — Acadia Naval Radio Amateurs (K1NAN) operated at Lobster Festival with portable, mobile and emerg. pwr. facilities. Cent. Maine Emerg. Net very active with liaisons to PTN and SGN. CMEN meets Mon-Wed-Fri at 2030 local on 146.10/70 (Litchfield rptr.). Aroostook ARA lists 37 members and held car wash, summer outing and swapfest/pot luck supper. New Yankee ARC officers: K1VFG, pres., W1WYX, vice-pres.; N1RP, secy.; WB1FAK, treas. Remember friends and relatives at Thanksgiving by sending radiograms and help Maine nets at same time. Aug. rpts.: Sess./QTC/QNI. PTN 31/176/210. SGN 27/120/1189. BYN 27/18/886. Traffic: W1RWG 102, W1KX 96, WA1QFX 85, N1RP 55, W1AHM 48, W1HDC 44, K1TZH 23, W1JTH 20, N8AFN/1 20, WA1SMY 19, K1TVT 14, W1WCI 8, WA1MUX 7, WB3HYD/1 4, WA1FCM 1.

NEW HAMPSHIRE: SCM: Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. The GSPN had 37 check-ins & 169 traffic vs. NHVTN totals of 104 & 148. The Tri State Emergency Net meets on Wed. at 7:30 PM on 147.975/375 (Keene Machine). Seen on the highways & byways: W1NGS WA1NZJ K1LGQ WA1ZNZ K1MFQ & W1MCP. Recent visitors to NH were WA4MYY WA4MYX K1YXS K1EEG & WB1BSI. XYL W1WS and the WRONES will meet at Pier II in Portsmouth in Nov. N1AAI is building the 20-meter rig from Apr. QST. W1BYS has new 10 watt amp & antenna for the TR22. WA1RGP worked 125 JAs with 10 watts. WA1FSZ is building seventeen-element Yagi for 220. WB1EHV K1BH W1WS WA1NXS W1CEW K1BCS WA1TOL & W1ZPG dined at Pier II.

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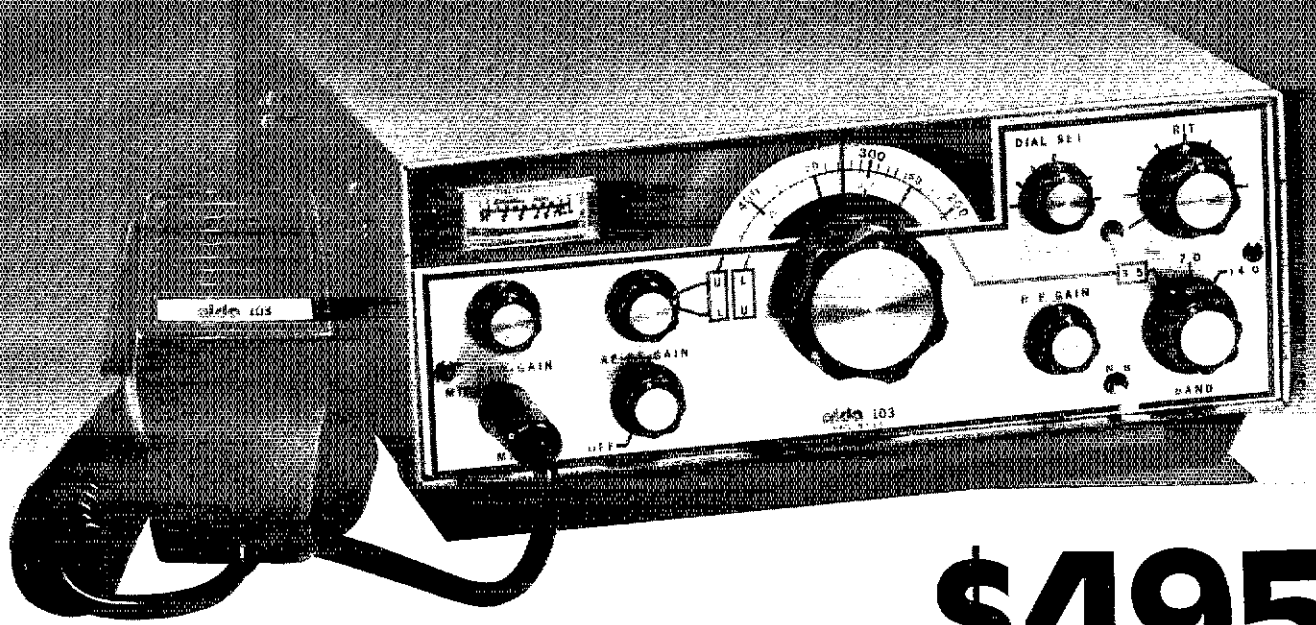
ALDA 103, the trim little powerhouse with incredible performance for the price! ALDA 103 provides a full 250 watts PEP input for SSB operation, and 250 watts DC input for CW. And when it comes to performance, ALDA 103 is the hottest little transceiver going — all solid state, totally broadbanded and super-stable VFO.

Ideal first transceiver for brand new novices! You'll want a full-capability CW/USB/LSB unit with all the power and performance you can use. ALDA 103 gives you 250 watts DC input for CW, the maximum allowable power for your novice license. When you upgrade to technician, you've got 2 bands for CW operation. And with your general license, just plug in your mic and use the ALDA 103's full 250 watts PEP on SSB!

Perfect second or mobile unit for seasoned hams! If you're looking for a super-sharp, compact unit to use in your car or boat, ALDA 103 will live up to your expectations. Absolute worst case sensitivity 0.5 uV for 10 dB S+N/N — a must for mobile operation. Receiver audio output of 3 watts minimum — another must. Also, very low receiver power drain of only 5.5 watts — that's 0.4 amps at nominal 13.8 VDC including power for dial and meter lamps!



$495

GENERAL SPECIFICATIONS

Semiconductors:	39 diodes, 23 transistors; 11 integrated circuits
Power Requirements:	Nominal 13.8 VDC input at 15 amps, negative ground only
Power Consumption:	Receive — 5.5 watts (includes dial and meter lamps), Transmit — 260 watts
Dimensions:	3-1/4" high x 9" wide x 12-1/2" deep (82.55 mm x 228.6 mm x 317.5 mm)
Weight:	8-1/4 lbs. (3.66 kg)

PERFORMANCE SPECIFICATIONS

Frequency Range:	80 meter band — 3.5 to 4.0 MHz 40 meter band — 7.0 to 7.5 MHz 20 meter band — 14.0 to 14.5 MHz
Modes:	CW; USB; LSB
RF Input Power:	SSB — 250 watts PEP nominal CW — 250 watts DC maximum (adjustable)
Transmitter:	
Antenna Impedance:	50 ohm, unbalanced
Carrier Suppression:	Better than −45 dB
Side-Band Suppression:	Better than −55 dB at 1000 Hz
Distortion Products:	Better than −26 dB
AF Response:	500 to 2500 Hz
Spurious Radiation:	Harmonics better than −45 dB below 30 MHz; better than −60 dB above 30 MHz
Frequency Stability:	Less than 100 Hz drift per hour (from a cold start at room temperature)
Microphone:	High impedance 3000 ohm
Receiver:	
Sensitivity:	Better than 0.5 watts audio output for 0.5 μV input
Signal-to-Noise Ratio:	Better than 10 dB S+N/N for 0.5 μV input
Image Ratio:	Better than −60 dB (typical with respect to 0.5 μV input: 80 meters — −130 dB; 40 meters — −100 dB; 20 meters — −75 dB).
IF Rejection:	Better than −70 dB (typical with respect to 0.5 μV input: 80 meters — 110 dB; 40 meters — 80 dB; 20 meters — 75 dB).
Intermodulation Intercept Point:	Better than 10 dBM
Selectivity:	2.5 kHz — 6 dB; 5.0 kHz — 60 dB
Audio Output Power:	More than 3 watts
Audio Distortion:	Less than 5% at 3 watts

OPTIONS & ACCESSORIES

Microphone **$14.95**

Mobile Mount **$3.95**

Noise Blanker — Model No. PC 701 ..... **$39.95**

100 kHz and 25 kHz Dual Crystal Calibrator — Model No. PC 801 ..... **$19.95**

Portable Power Supply — Model No. ALDA PS 115: average duty 15 amp unregulated; input — 115/230 VAC, 50/60 Hz; output — 13.8 V nominal at 15 amps... **$84.95**

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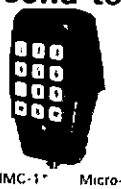
$439.00

Regulated AC/PS
Model FMPS-4R . . . $39.95



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- New! Auto key up
- Snap-Action Keyboard
- Adj. level and tone balance
- Use with any transceiver
- Only 3¾" x 2"

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- **FREQUENCY RANGE:** Receive and Transmit: 144.00 to 148.995 MHz, 5Khz steps (1000 channels) INCLUDING NEW BAND 144.5-145.5MHz + MARS-CAP and MULTIPLE OFFSET.*
- **LED DIGITAL READOUT.**
- **4 CHANNEL RAM SCANNER WITH IC MEMORY:** Program any 4 frequencies and reprogram at any time using the front panel controls—search for occupied (closed) channel or vacant (open) channels. Internal Ni-Cad included to retain memory (no diode matrix to wire or change).
- **MULTIPLE FREQUENCY OFFSETS:** Three positions A,B,C, provided for installation of optional crystals: EXAMPLE - 1 MHz offset. Duplex Frequency Offset Built in - 600 Khz PLUS or MINUS 5 KHz steps, plus simplex, any frequency.
- **INTERNAL MULTIPURPOSE TONE OSCILLATOR BUILT IN:** 1750Hz tone burst for "whistle on operation" and sub-audible tone operation possible by simply adding a capacitor across the terminals provided. Internal 2 position switch for automatic and manual operation, tone burst or sub audible tone PL - adjustable 60-203Hz (100 Hz provided).
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED's while driving and provides the sightless amateur with full Frequency Selection as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END AND TRANSMITTER CIRCUITS:** DC output of PLL fed to varactor diodes in all front end RF tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. APC (AUTO POWER CONTROL) - Keeps RF output constant from band edge to band edge. NO OTHER AMATEUR UNIT AT ANY PRICE has these features which are found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation - for superb emphasized hi-fi audio quality second to none.
- **RIT CONTROL:** Used to improve clarity when contacting stations with off frequency carrier.
- **MONITOR LAMPS:** 2 LED's on front panel indicate (1) incoming signal-channel busy, and (2) Transmit.
- **FULLY REGULATED INTEGRAL POWER SUPPLY:** Operating voltage for all 9v circuits independently regulated. Massive Commercial Hash Filter.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 Unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch tone, phone patch, and other accessories. Internal switch connects receiver output to internal speaker when connector is not in use.
- **MULTI-PURPOSE METER:** Triple Function Meter Provides Discriminator Meter, "S" Reading on receive and Power Out on Transmit.
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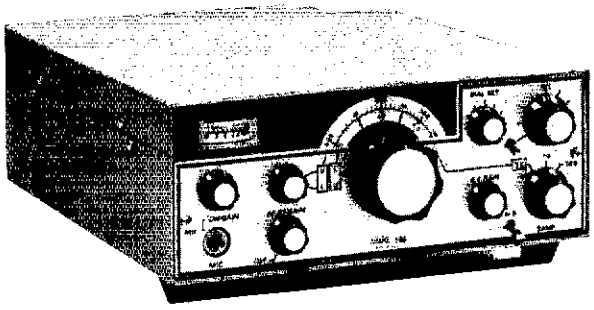

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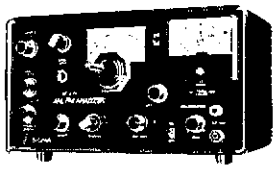

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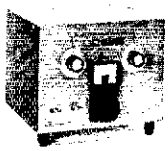

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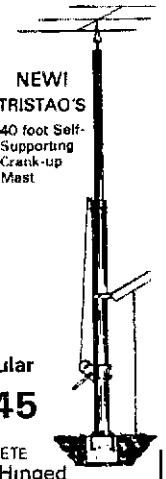

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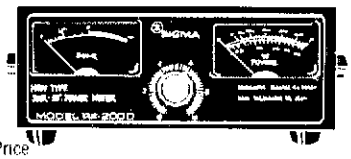

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W1TN has new eleven-element 2-meter beam. W1TI reports the GSARA did well in FD. The 34/94 Net had 27 check-ins & 140 traffic. The Keene Machine new exciter output power boost and corrected desense problem makes for fine communications. It is sad to repor WA1ZFI a Silent Key. Traffic: K1BCS 587, W1TN 269 W1GUX 110, WB1ELP 85, WA1PEL 43, N1AAI 18, W1SW 4, W1BYS 2, W1UN 1.

RHODE ISLAND: SCM, John Titterington, W1EOF — RIEM 2-Mtr Tfc net still going strong. QNI 165, Tfc 34 WA1SCO could use some help and more traffic. W1CEV and W1ZPG are vacationing in New Hampshire. Bill Ed wards, ex-W1EZW, and well-known to all is now Silen Key. WB1CFT became Advanced and KA1BI now is Ex tra and awaiting new call. NCRC helped win the Battle o Rhode Island again. Lately, the monthly reports hav been conspicuous by their absence. Let's get with i gang, the doldrums is now officially over! When yo read this, I will have met many of you at the NE conven tion. Let's make the coming winter season a real big on in Little Rhody. I want to wish you and your loved ones very Happy Thanksgiving, best wishes for a good holi day! Traffic: N1RI 53, W1EOF 17.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA The Border Amateur Radio Club is a new club in the Northeast Kingdom. WA1HSG, pres., W1SVT, vice-pres. K1WML, secy-treas. Bob Bean, Box 85, Derby, VT 05829 who would like to hear from those desiring to become mbrs. The club has a 2 mtr repeater on Jay Peak, 146.145 in & 146.745 out waiting for xtals which are expected about Oct. first. OP about 5 watts with 9 dB gain ant K1BQB reports Old Home Day Bellows Falls (8/4&5) had amateur radio booth set-up & was big success. WR1AEA holds an emergency net 1100 hours each Sun. We hope the VT repeater groups get together and form an emergency tie-up for handling of such tfc throughou VT. Contact our SEC. Carrier 472/55; GMN 447/48; VTSS 642/120; VFN 56/8, & VTRFD 82/36. Traffic: K1BQB 211 AA1E 60, W1RNA 8.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB. STM: W1KK. Net control stations in NTS for WMN: K1IJV W1DOY W1ZPB WB1AUV W1KH W1BVR W1TM. For WMFN: W1UKR W1KUE K1RGC WA1ZXB WA1MJE. For WMEN: K1BF W1UPH. These stations also perform liaison work with other nets. Tfc from K1BGS reports K1RPZ vacationing in Maine. Also in Maine and QNI to WMEN, WB1EHS. W1BKG W1BS and W1WF now active on 2 mtr. fm. W1ZPB taking ad vantage of school vacation to rebuild antenna system WA1MJE host to K1EIC K1EIR K1PQE W1HAD W1OD W1TM and XYL. W1EFW and XYL visited W1BVR. Traf tic: (Aug.) WA1MJE 218, W1TM 113, W1ZPB 87. W1KK 75 W1DOY 33, W1BVR 21, WA1OPN 15, K1PUG 7. (July K1IJV 31.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — This was a red let ter month in this section with the ARRL Alaska 197 Convention, which took place in Anchorage. Those no attending missed a very good time especially First Vice Pres. Vic Clark's presentation. We also enjoyed having Director Thurston join us. The Governor of Alaska declared the week of Aug. 21-27 as Amateur Radio Week. All of those working on the convention deserve considerable thanks. The new calls showing up these days make hard to tell who is who. There were two ARES assists to the Alaska Rescue Council, see Public Ser vice section for details. ARES in this section now has 6 full members and 5 limited. Remember the ARES ne every Thur. at 8:00 PM on 146.52 MHz. Traffic: KL7JDI 75 KL7JFJ 59, KL7JDH 22, KL7AF 8.

IDAHO: SCM, Lem H. Allen, Jr., W7JMH — SEC WA7UHW. Asst. SEC: W7IBT. W7BDL with family and friends vacationed at Stanley for 12 days, kept schedules twice daily with the Pocatello Gentol Gang WIMU Hamfest a huge success. 478 people registered with some 600 present. W7DWE was presented a plaque for being Breakfast Chairman for 19 years. W7GGV and family have been making coffee for the breakfast for 19 years also. W7LLM now AC7P. WB7OUO now N7PB. The Boise Club held a successful picnic and flea-market auction at the W7SC ranch. K@EJ, ex-WA@URW from Winona, Minn. is with the AEC on temp duty in Idaho Falls for 6 months — welcome to ID. W7HZL has taken some interesting and beautiful trips on his motorcycle now has the goal of working all counties on CW. Net activity:

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935	8 PM	29	901	20
IMN	3635	9 PM	23	217	86
CD	3990	8:10 AM	30	495	8

Traffic: W7GHT 264, W7JMH 59, W7ASA 38, AC7P 21 KN7WLF 16, K7FR 7, W7KDB 7, N7PB 2.

MONTANA: SCM, Robert Leo, W7LR — WA7IJN sells some gear & waits for WARC '79 results before getting new gear. Will use QRP homebrew CW gear meantime K7ABV & W7LR QSO ST@YY. Many MT hams busy with vacation, hamfests, summer visitors, planning fall radio classes. W7DB continues ARRL bulletin transmission W7IXD has RTTY auto-start and so handles lots of traffic even if busy with work. IMN: QNI 217, QTC 86. MTN QN 988, QTC 155. Many new MT calls: KA7, KB7, AB7, N7 etc. Nice report from W7TGU: DX 152 countries, 2-meter beam, 4 different traffic nets. W7PAF QSO OSCAR. Con tinued from last month, other Montana ARRL appoint ments: OOs: K7ABV, WA7IJN WA7KKN W7LBK K7LTV W7LYR WA7OBH. ORSs: K7CHY K7CTI W7LBK. OPSs WA7VTD. OTS: WB7PCZ. OVSs: W7DB W7OIO W7TYN OBS: K7SIK. Any corrections? Traffic: W7IXD 52 W7NEG 15, W7DB 6, W7LBK 6, W7HAH 3, W7LR 3 W7LYR 2.

OREGON: SCM, Dale T. Justice, K7WW — New SEC W7HLF. New Beaver State Net manager is WB7PQU WA7GFE is now assistant. Other appointments: W7HLF as SEC and OBS; WB7OIJ as OTS. Traffic: W7VSE 621 K7NTS 467, W7HLF 72, WA7GFE 53, K7WW 17, W7LT 13 W7GUH 2.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC WA7RWK. STM: W7DZX. NTN 3970, 11:30 AM, QNI 1166, QTC 81; ESN 3920, 5 PM, QNI 438, QTC 43; WARTS 3970,

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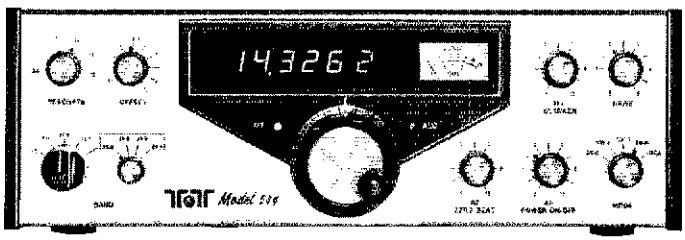

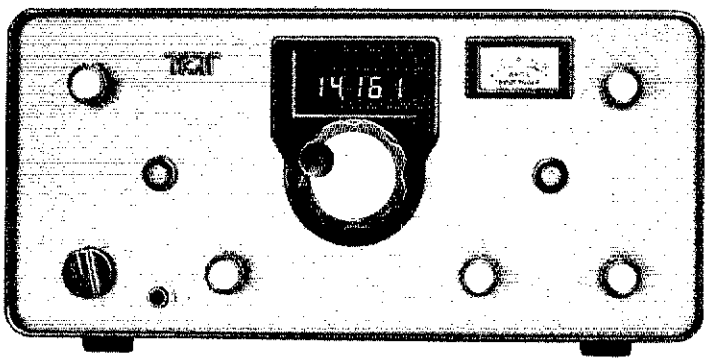

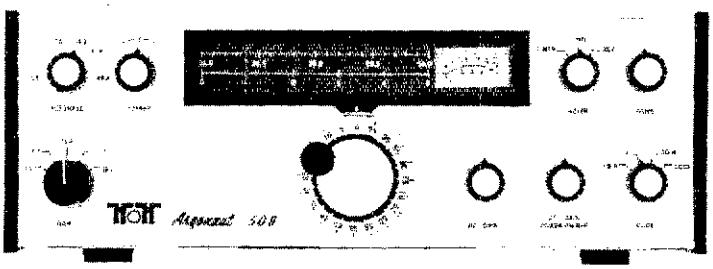

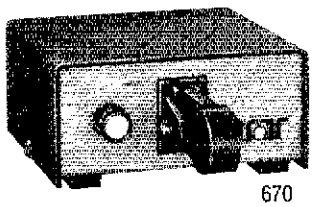

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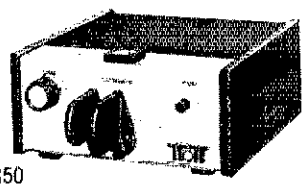

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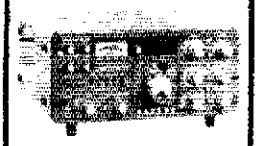

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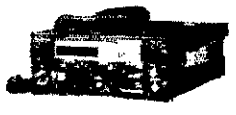

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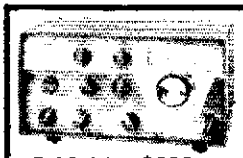

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6 PM, QNI 2677, QTC 100; NWSSBN 3945, 6:30 PM, QNI 867, QTC 46; WSN 3590, 6:45 PM, QNI 323, QTC 162. CBN 3960, 7 PM. Note that with winter condx all nets are subject to a time change. EC WB7FDE expecting an increase in ARES members from her recent mailing, a very informative letter, Donna. K7VSZ reports the Island County ARES handled 94 msgs from their booth at the Island Cty fair. King Cty ARES, Mike and Key, and others very active during Seafair week using 25 stns to cover 4 parades. 6 Wash stns took part in the first 7-Land QSO party with 15 yr. old WB7QEL taking first place. WB7QWC is new PR and WB7EBP new Activity Chairman for HAMS Club. W7WPR now W7LZ operating primarily on 40 cw. BEARS hope to have their rptr running by the first of the year on 144.73/145.33. RC of Tacoma had 1082 registered, hosted 245 for dinner and fed 116 at their loggers breakfast for a successful Ham-fair. KA7BOD is new Novice in Vcvr, KA7BKZ and KA7BHZ are new Novices in Spokane. WA7NTU is new Rptr. Chmn. for Clark Cty ARC. WB7BND worked RI for his WAS. North Seattle ARC reports a successful FD operation. K7WF WB7UUP and WB7PEI have had 100 percent attendance at Lower Columbia ARA meetings. I'm looking for OOs, especially Class III, from what I hear on 2 FM we sure could use your help. WB7RIF teaching fall Novice Class for Clallam Cty ARC. WA7OJI off to the UW for Fall classes. N7AM sez it's getting to be a race between him and winter on the antenna farm. N7IT is off to Germany. W7ERH has TR-33 and put it to good use in the Redmond Bikeathon. N7RV once again airing OBs on 146.58 and Baw Faw Rptr. RASC did such a fine job of communicating for the Algier Trail Riderss they have been asked to help again next year. WB7BJB had nice visit from OH8UT and his wife. Traffic: W7DZX 652, K7GXZ 181, N7AM 149, N7AJ 116, WA7BDD 85, WA7YCM 64, W7BUN 49, W7APS 46, N7IT 37, WA7LQV 35, W7EBU 33, W7IEU 31, W7LG 29, WA7PHD 17, WB7FDE 15, W7BCS 12, WB7EBP 12, WA7OJI 9, W7ZEV 6, N7RV 4.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — SEC: K6UWR. Asst SCMs: K6UWR W6ZF VE2AQV/W6 PSHR for Aug. W6OA WB6UZX W6JXK N6NE; July: WB6UZX, WA6CCM/RPT, 222.58 in/224.18 out, was put on the air by WA6CCM and WA6JVZ as an open repeater Sept. 1. They plan an open 450 MHz repeater for the same site. WA6NTI Asst. Mgr. NCN/VHF. W6ZF spoke on WARC '79 at SFRC Napa Co. EC N6XN, conducted a very successful emergency exercise. WB6KQU is organizing emergency communications in the Fremont, Newark, Union City area. Sonoma Co. RACES responded to the Cazadero fire emergency. WR6AES WR6AFY and WR6AXV were used to provide fire communications which could not be handled on the overloaded Public Safety channels; a job well done. LCARS plans a picnic with the Ukiah RC on Sept. 10 at the Willits Ranger Station. FARS won the CCRC annual Field Day trophy. W6WC has a new mobile auto-tuner in his Honda. WB6GFH moving to Ark. K6USW has SCARS repeater on from his home. W6HUW has a new Heath hand-held for two meters. WA6BJW and W6TTG, and the husband/wife team of WA6VPA and WD6AYC active on NVEN. W6IRT going mobile to Canada. K6UX recovered from circulation problems. W6GIP studying for Extra. Traffic: (Aug.) K6OE 292, W6OA 146, N6MR 86, W6JXK 78, WB6UZX 53, WD6BMX 12, WA6DOO 8, WB6VEW 4, N6NE 3. (July) WB6UZX 41.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. W7ILX reports the LVRAC has a Radio and Theory class started for Novices at Western High School. N7XE reports a Code and Theory Murphys' Class for Novice and General with around fifty students, under the guidance of WA7KVV N7OK WB7PHL WB7TJT N7SD and N7XE. Forty-two received a Radio Amateur License from their July Murphy Radio Class. WB7UPF now N7AKB, W9EOB/7, ex-K7RBM has new QTH in Las Vegas. K7AKE moving back to W8-Land and is closing the R. L. Drake Co. plant in Las Vegas. W6LET, ex-K7RKH new QTH in TN, W4-Land. The Reno Pacific Division Convention was reported to be the best division convention in many years, congratultions to all. Nevada Silver Dollar Certificates are going fast. QSO on 28.777 MHz for Nevada stations. Traffic: W7ILX 194.

PACIFIC: SCM, George Morton, N7HR/KH6 — Your SCM making visits throughout Micronesia. Talks to the U.S.N. for whom token official biz is being conducted where no conflict with League biz. Seriously it's a great chance to visit with hams in the Pacific basin, and I plan to see as many as possible. Repeater directories received from Hq. and will be sent to clubs. Those wanting direct copy, use S.A.S.E. (60¢) large envelope. Aloha!

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Asst. SCM: W6NJU. K6XB is the new EC for Modoc County. His family constitutes about half the hams in the Co. The Nevada Co. ARC participated in their Co. Fair with a booth from where they orig. 150 messages thru NTS. The El Dorado Co. ARC had a booth at their counties fair at which WD6FEI won a blue ribbon with a homebrew xmtr and rcvr. Congratulations to W6KDJ K6LAD and WB6NJW who passes their Extra Class exams; WA6ZDZ with her Advanced; WD0DYP/6 with General and WD6CQH and KA6AWG who made Tech. N6DM has a new 2-meter rig and has built an eight-element quagi for it. WB6HBI has a new triband Quad. WB6FNG sorrowfully became a Silent Key. WB6GFJ has been QRI while operating as an FO0 in Tahiti. Traffic: W6RSP 360, K6RPN 167, W6DFF 55, WB6VWF (N4KS) 16.

SAN FRANCISCO: SCM, Mark Nelson, AA6DX — Glad to see so many of you at Reno! W6VV can't cook? TTY machine WR6ACR on 93/33 has voice call-up Sun. at 10:20 A.M. WA6ICB planning new VHF arrays, and WA6GSR putting up an HF beam. WB6AMP now reporting in from SF. W6ZM planning South Bay Convention for '79. W6GGR's KIM now sending random 5 character code groups. AA6DX operated All Asia CW from Ore. NCCC meets at 3815 kHz Tue. 19:30 local. The '78 CQP promised to be best yet! WA6DNM has 250 countries timed with dipoles and verticals. Sonoma hams used WR6AES, AFY, AXV for dependable repeater service during Cazadero fire. W6MEO reports the job

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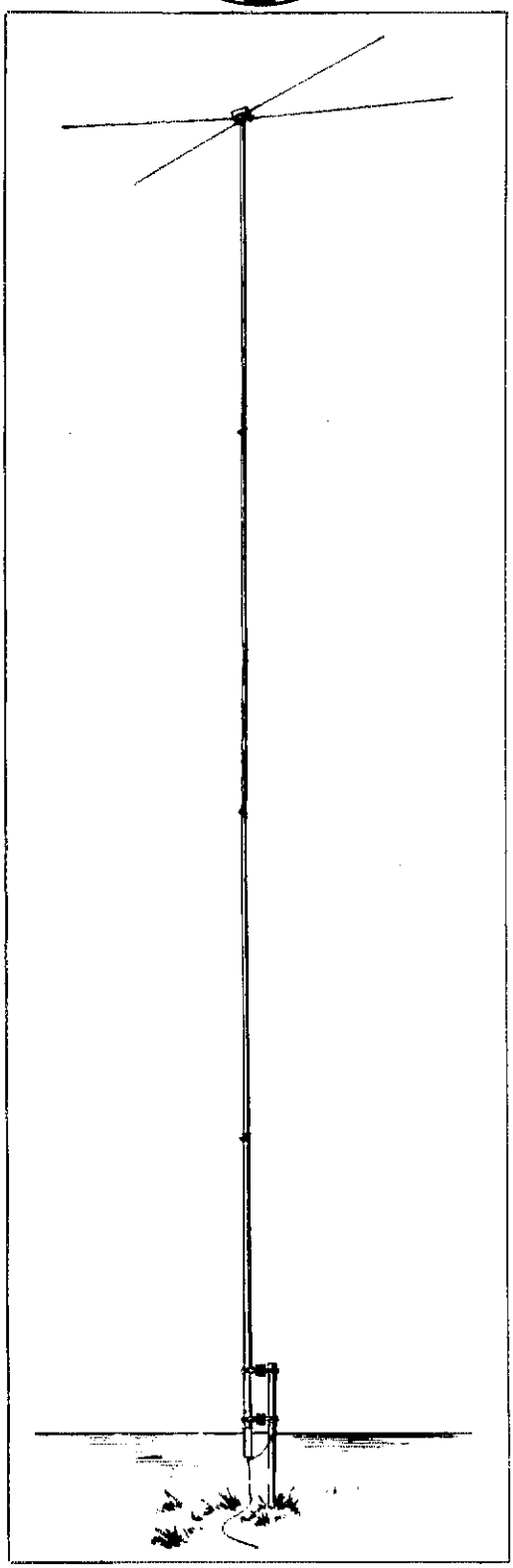

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well done. Traffic: (Aug.) W6IPL 292, W6RNL 182, K6PB 163, WB6AMP 162, K6TP 141, WB6RTE 36. (July) W6NL 267, W6IPL 194, K6PD 173, W6RNL 159, K6TP 85, WB6RTE 12, AA6DX 4, W6GGR 2, WA6GSR 2.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. W6SF qualified for DXCC thanks to K6YK and N6OZ. Renewals: OTs WA6KMW, EC WB6TTP. Officers of Madera Co. ARC are K6KLV, pres., W6GR, vice-pres.; WA6PJN, secy-treas. The club meets the 1st Tues. at the Madera Library. W6ZM, Pacific Division Dir., spoke at a joint meeting of radio clubs from Kern, Tulare and Kings Counties in Visalia. Contrats to NARA on a very successful Pacific Division Convention. WB6KUO WA6PIC K6XJ N6ZU WB6MGK WA6OAP KH6EKQ K6JKO WA6MXH, XYLs of WA6YAB and W6IRV were prize winners. WB6VJW has a Tempo VHF-1. WA6QND a KDK 2015. WB6MGK a TR 7400A. W6XP a new tower. W6LOC a TS 820 and Dentron Amp. Congrats to WA6YLB on Advanced license. WA6CPP received IOTA-CC-100 Award. WA6YMO now AD6W, WA6QND now AF6Y. WB6JDM is KB6DI. WB6MRL is KB6DJ. Fresno ARC progressing on its emergency communications Van. W6MRT also outfitting a van. Remember Sweepstakes coming in Nov. Let's have big scores from the SJV this year. Traffic: W6BWM 46, W6DPD 34, WA6YAB 10, WA6JDB 4, N6UR 2.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. NM: W6RFF. I would appreciate a copy of all club bulletins for SCV. Address on page 8 QST. IZF heading for Syria for 2-3 months and will take a rig if possible. K6GJ reminisced the olden times of home brew at a PAARA meeting. KA6BFU working 40 meters with good results. WA6ZZU looking for help to put up a 40-mtr beam on his tower. WB6SRC became a General Class. Congrats. WA6NCX moving to W1-Land. W6RFF visited Lockheed ARC and spoke on traffic and National traffic system. CCRC reports 13 new hams in SCV. FARS, for the 3rd year in a row, won CCRC Field Day Trophy and PAARA was second. WA6ROM and Perham Foundation takes over Foothill Electronic Museum and publication of CCRC Circle. W6PDD reworking antennas and preparing for Pioneer QSO Party. W6AUC busy with several phone nets, but found time to help a Novice on the air. N6AU came out of the woodwork and hopes to be active again. He enjoyed a visit to ARRL Hq in Aug. W6KZJ back in full swing on NCN after a stay in the hospital. The following made the NCN honor roll: KA6BZO WA6JXK N6YE W6YBV K6YKG. KA6BZO is ex-WB9ZLV. N6YR active on NCN. The 2nd annual "Smoked Hamfest" was held at the San Antonio Mission near King City. N6YBV pushed his traffic total up over the three hundred mark. Lee puts in a lot of time on Public Service besides his traffic activity. A Station Activity Report would be appreciated from those who hold ARRL appointments — or from anyone for that matter. Traffic: W6YBV 325, W6RFF 85, W6AUC 49, W6KZJ 38, WA6HAD 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4H — SEC: K4CJZ. STM: N4UE. Effective Oct. 1, Chuck Bino, K4CJZ, Greensboro, is the NC SEC replacing W4FHF who served 3 good years. Thanks Bill for all the hard work. W4EHF remains active as an Asst. SEC. A big welcome is also extended to the JFK Net, now a Section Net & member of the NTS. The JFK meets @ 1830 local on 3923 with WA4CUD as NM, WD4CNQ Asst. NM & WB4KHZ as SEC. Thanks to WB4MJH outgoing NM of JFK who led the move to affiliate with NTS. Get on and join us. Many clubs now active with Fair exhibit stations including the clubs in Rowan, Stanly, & Cabarrus Counties. K4EG, Alamance ARS, active this month with Mall exhibit taking traffic. New officers of the Stanly Co. ARS include K4ODX, pres.; WA4LBT, vice-pres.; W4EAT, secy/treas.; K4CLY, act. mgr.; W4WLE, trustee of K4OGB. WA4SRD is vacationing in Germany & working DX from the other side. WB4OXT reports getting ready for 160 M season. WD4CNQ really involved in traffic as Asst. NM of JFK & a NCS on Tar Heel. WA4ACP reports the Rockingham Co. ARC set up exhibit stations at 3 county locations demonstrating Ham Radio and getting persons to enroll in upcoming Novice Classes. Three new OTS appointees this month W4RVE, N4AGP & WD4CNQ. Mecklenburg ARS, W4BFB, reports good results during the Sept. VHF Contest. Be getting your plans organized for the SET — not far off. Traffic: WA4YSK 206, K4MC 184, W4HMN 124, W4OFO 115, K4FTB 111, N4ZH 104, N4UE 86, K4VHT 81, N4AGP 80, WB4MXG 72, W4EAT 66, AA4R 59, WD4DKF 38, AA4RW 36, WB4GYN 33, WD4FJM 30, K4EG 22, WB4VHE 21, WA4SRD 20, WD4EMK 20, W4ACY 19, W4PNY 17, WB4OXT 16, WD4CNQ 12, W4EHF 10, WA4WFY 8, WA4ULA 8, WA4UTC 6, W4DW 5, WD4KSI 4, W4OCZ 4, K4AI 4, WD4TOP 3.

SOUTH CAROLINA: SCM, Tom Lufkin, WA4DAX — Asst. SCM: WA4MDP. NMs: W4MTK WB4CAK. WB4PNY 4RND Net Mgr. reports Freq. will be 7243 kHz at 4 P.M. EST. She is looking for EAN liaison stations. New ECs: WA4JYR, Horry Co., WD4LLC, Hampton Co. and WB4QJT, Charleston Co. If you live in these counties please contact them and give them your support. Several people have inquired why no news of their local club appears in this column. I need someone to report that news monthly. Have your club appoint someone to send a monthly report to the SCM which he must have by the 10th of each month. Everyone is encouraged to send a monthly activities report. WB4JWR now Extra and WD4s BUK and KEB Generals. OO W4NTO reports illegal activity 14360-14355 MHz is increasing. Net reports SCSSBN, QNI 1192, QTC 145; Anderson 2Mtr QNI 613, QTC 33; PX QNI 54, QTC 0 (9 sess. not reported). Traffic: WA4KXZ 243, WB4UDK 87, W4NTO 78, W4FVV 48, K4FRX 43, W4MTK 26, WA4KXZ 18, W4FMZ 18, WB8TCT 13, WD4EDM 9.

VIRGINIA: SCM, Rick Genter, K4BKX — Asst. SCM: W4YE. SEC: WB4ZNB. STM: N4NK. Many thanks to W4SUS on his term as the first VNTN Mgr. WA4CCK took over Sept. 1st. New ECs: K4ITV/Washington Co. & K4LMP/Scott Co. WD4IQF now KB4N & WD4SDR is N4ATT. WB4DBK now Extra Class but will keep same

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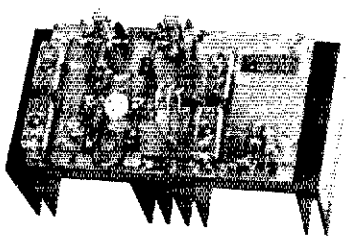

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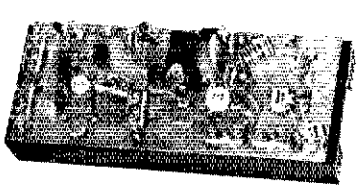

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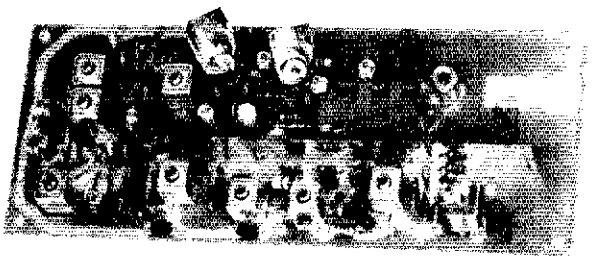

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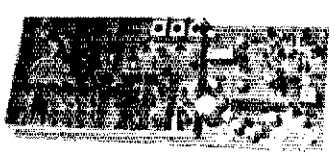

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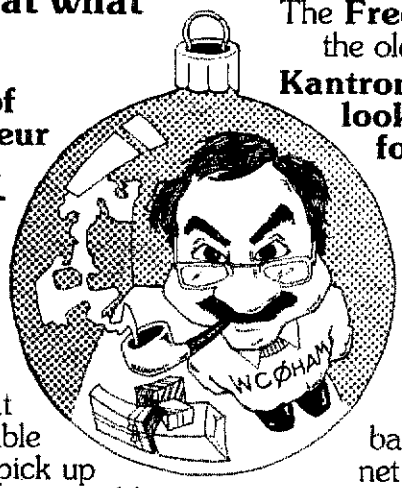

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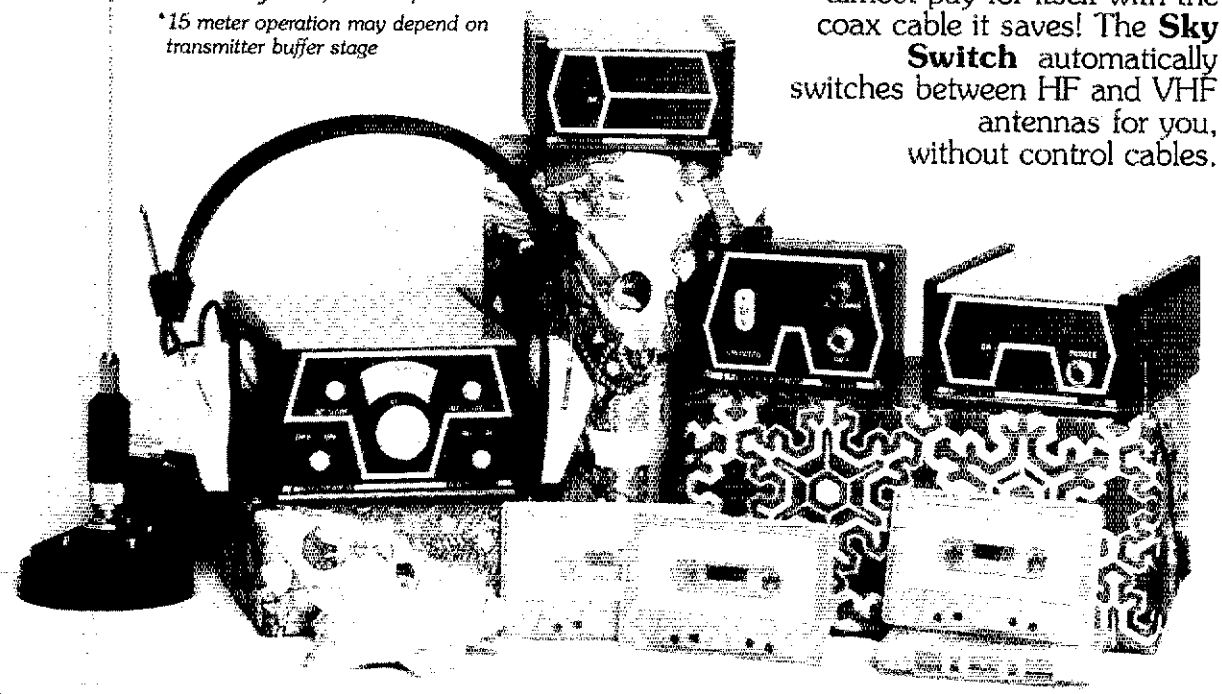

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call. K4GR enjoying flying newly acquired Aero Commander. WA4NYZ also spending much time flying. N4FP active on OSCAR with Ameco TX-62. K4BKX and WA4FDV have new beams up for 10, 15 & 2 meters. K4LEF hopes to have TH6DXX up in time for fall contests. WB4FNW has Swan 350 back on the air. W4NWM looking forward to winter DXing. WA4OUF is to talk DX at the Hampton Roads RA meeting. W4FJ reports that the VEs will put up a satellite which will give N. America 24 hr. coverage. WB4ZNB reports the Franklin 147.90/30 is progressing well. Your SCM attended the Bristol and Winchester Hamfests. Our VP, W4KFC, also attended Winchester and the Alaska State in Anchorage as well. WD4OVR is enjoying VSV-VN liaison and WA4STO with new 2 meter rig will give W4JK a hand with SVSN liaison. N4NK busy getting set up with OEES to handle traffic at the State Fair. The Richmond ARC, under W4THV, will provide comm. for the Tobacco Festival. The Lynchburg ARC has a superb info pamphlet on Ham Radio and their club; a great idea for all clubs. Contact WA4VAJ for details. WD4PKQ visiting with K1BCS in NH. We are all wishing W4ZM a speedy recovery from recent surgery. School is keeping W4YE, K9EFJ/4 and many others busy. WA4LJI conducted 4 ARES drills during the month. WA4RXY working on emergency pwr. for his station. W4JUJ needs 8 & AA4FF needs 35 for Worked All 3K + Counties. W4KAO working with 2-meter Quagi. BPI · WA4CCK WB4DBK W4JK & WB4PNY. Thanks to all of you for making Virginia Section the best! Traffic (Aug.) WB4PNY 938, W4JK 689, WA4CCK 563, N4NK 463, WB4DBK 304, K4KNP 268, W4SQU 221, WD4IQF 204, WB4FLT 186, WA4STO 124, K4GR 120, N4RF 107, K4JM 104, WB4DQZ 101, K4KDJ 101, WA4LJI 100, K4BKX 99, WA4YIU 85, AA4CK 84, K4EJ 78, WA4FDV 78, W4SUS 78, WB4ZNB 71, W4YVG 65, WB4ZWT 55, WA4HBR 52, W4UQ 42, WA4RXY 41, W4SHJ 41, WB2JAY/4 37, WD4OVR 35, K9EFJ/4 34, WB4KIT 33, W4YE 32, W4LXE 30, WB4FNW 28, K4VWK 28, N4FI 26, W4NWM 25, WB4ODZ 25, W4OKN 25, WA4QQI 19, W4OOL 18, N4FP 16, W4KFC 14, WA4NTP 12, WA4QWC 12, WB2VYK/4 12, N4AOP 11, N4UY 11, WA4WQG 10, N4RC/4 8, WA4WTZ 8, K4ITV 7, N4LE 6, K4ISW 5, W4ZM 4, W4JUJ 2, K4LEF 2, WB4KSG 1. (July) W4SHJ 50, W4YVG 16, N4DW 4, WA4NTP 4, WD4KUK 2, W4KX 2.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Asst. SCM: K8KT. SEC: WA8NDY. Net Mgrs: W8YP WA8WPW, WD8JYM. State Radio Council Club call W8WVA has been renewed by the FCC. WA8WPW upgraded to Extra Class. K8KT with wB8SAW as operator won the West VA QSO Party Contest. K8QEW installed Amateur station and promoted Amateur Radio at the Hancock Co. Fair. State Radio Council held successful fall meeting at Jackson's Mill, planning the 1979 State ARRL Convention.

Net	Freq.	Time(Z)	Ck-In	Tfc.	Sess.
Hillbilly	14290	1:00 Su	141	52	4
Novice	3730	5:15 Dy	124	62	30
CW	3567	7:00 Dy	213	80	30
Phone	3990	Noon Dy	124	52	30
Phone	3990	6:00 Dy	877	284	30

Traffic: WA8WPW 230, W8YP 70, WB8TDA 49, WB8VAZ 49, W8HZA 48, WD8JYM 37, WD8JYN 29, WD8LDY 23, N8JC 14, W8CKX 13, N8AJC 10, K8JQ 9, KRZDY 8, W8FG 7, W8LYV 6, WD8AIQ 6, WD8DHC 6, K8MS 5, WB8SAW 5, K8KT 5, W8JWX 4, K8QEW 3, WB8LAI 3, WA8LZE 3, WB8WRQ 3, WD8AXN 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde P. Penney, WAØHLQ — SEC: KØFLQ. NMs: KØTER KØCNV WBØ7QG. CWN now meets at 0130Z, 3715 kHz. KØCI now home from hospital and recovering nicely from recent auto accident. Newly appt'd. EC for Eagle Cnty. is NØACW, formerly WDØBNL. Deepest sympathies to W5HRS & family who lost their son in a tragic blasting accident. Welcome to ADØA, ex-W5SGZ/5, who just moved to Colo. Section from Torrance, CA. WDØDNM received Advanced Class license. WØDYK reports loss of his 10-160 dipoles to recent high winds. KØZK has new QTH at Buena Vista, and plans to erect phased vertical for 160, plus other antennas. NØQV is enjoying mountain climbing in New Hampshire. Newly formed Morningside Net meets daily at 8:00 AM Denver Time, 14256 kHz, and welcomes check-ins from anyone. Net Tfc. for Aug.: Columbine, QNI 907, QTC 111, QNF 1300, sess. 30; Hi-Noon, QNI 1049, QTC 34, informal 126, QNF 1253, sess. 30; SSN, QNI 58, QTC 41, QNF 498. Traffic: WØWYX 2736, KØYFK 960, WAØHJZ 725, WBØMTA 406, KØDJ 288, WDØAIT 252, WBØZOG 164, KØCI 103, WØMDT 78, NØACW 72, WØRE 68, KØPVI 52, W5HRS 42, WBØYKH 28, WØGO 21, ADØA 19, WDØDNM 14, WØLQ 4. WØGW 1. (July) KØYFK 1200, WBØMTA 226, KØCI 198, WAØYNP 128, WAØCNA 118, KØZL /0, NØACW 39, WØLQ 26 (June) WBØMTA 177, WDØBYU 5.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NM: W5JOV. K5KPS. Southwest Net (SWN) meets daily on 3585 kHz at 20:00 local time and handled 240 msgs with 199 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 133 msgs with 1007 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 137 msgs with 69 check-ins. West Gulf Division Convention well attended by NM hams. All enjoyed hearing and chatting with W2HD and N1CC from Hq. W5ALR NM SEC was to speak on Emergency Communications, however he had an emergency of his own. He was passenger on an aircraft enroute to the convention which encountered weather and Rick now has a broken back and other serious injuries. Good luck Rick on your recovery. WB5SHG had extensive surgery but doing good now. Traffic: W5UH 380, N5NG 324, W5JOV 315, W5DAD 266, WD5AHH 141, K5KPS 126, WA5MIY 15.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — On Aug. 8, and 10 WØYZS visited WA7ADK, equipped with a full compliment of 432 MHz Moonbounce gear. During that time successful contacts were made with W1JR W5FI K2UYH KØTLM K5JL WB5LUA VE7BBG WA1UHA W1XI and K3PGP. On Aug. 11, 12 and 13 WA7ADK contacted K9MB K7ND and K7KOT via 2-meter meteor scatter. W7OGX enjoying a vacation in Europe. Ex-WB7DMI now AC7K, and is putting up with all the varying remark-

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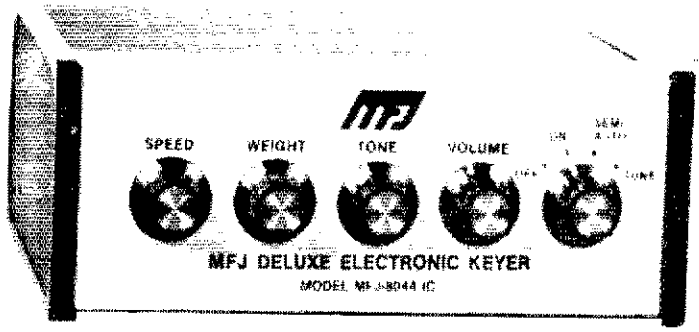
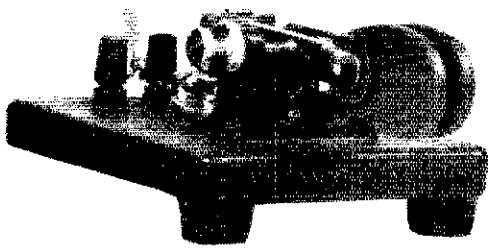
NOW WITH NEW CURTIS 8044 IC. DOT AND DASH MEMORIES AT NO INCREASE IN PRICE.





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Totally RF proof. No problems, whatever.

Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, −300V max., 10 ma. max.; cathode and solid state transmitters +300V max., 100 ma. max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot dash space ratio; makes your signal distinctive to penetrate thru heavy QRM for solid DX contacts.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys xmtr for tuning.

Completely portable. Take it anywhere. Operates up to a year on 4 C-cells. Miniature phone jack for external power (3 to 12 VDC).

Beautiful Ten Tec enclosure. Eggshell white, walnut sides. Compact 6x2x6 inches.

Three conductor quarter-inch phone jack for key, phono jacks for keying outputs.

Optional squeeze key. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling. Optional AC adapter $7.95.

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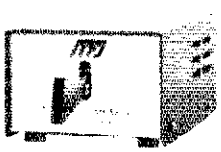

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BRAND NEW

Small enough to slip in your hip pocket!

Only MFJ offers you a keyer this size with this much versatility at this price.

Paddle has adjustable contact travel.

Rear Panel: Speed control (8 to 50 WPM), 4 position switch for TUNE, OFF, ON, SIDETONE OFF. Phono jacks for external key and keying outputs.

Weight control gives distinctive signal for QRM penetration. Internal tone and volume controls.

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Iambic operation with external squeeze key.

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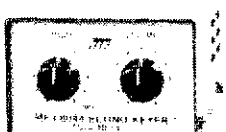

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Has sidetone, speaker, weight, tone, volume, speed controls. Tune switch.

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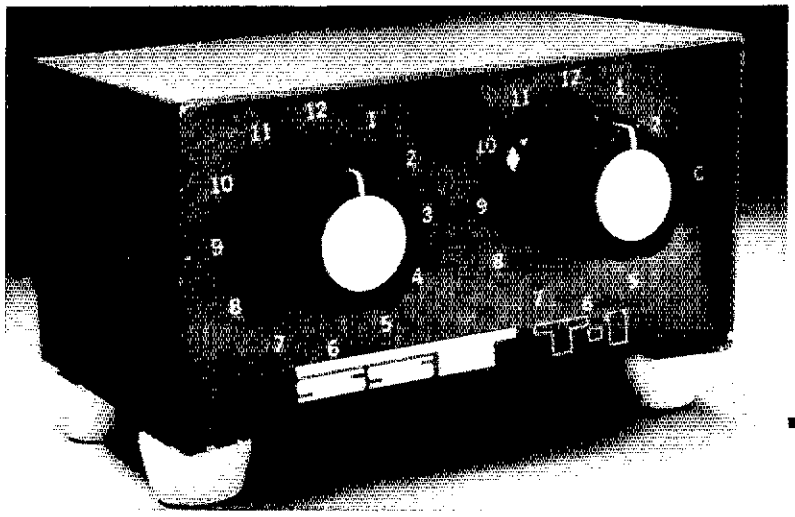
SST T-1 RANDOM WIRE ANTENNA TUNER



All band operation (160-10 meters) with any random length of wire. 200 watt output power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for apartments and hotel rooms—simply run a wire inside, out a window, or anyplace available. Efficient toroid inductor for small size: 4-1/4" x 2-3/8" x 3", and negligible loss. Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

only $29.95

THE ORIGINAL Random Wire Antenna Tuner. . . in use by amateurs for 6 years.

SST T-2 ULTRA TUNER

Tunes out SWR on any coax fed antenna as well as random wires. Works great on all bands (80-10 meters) with any transceiver running up to 200 watts power output.

Increases usable bandwidth of any antenna. Tunes out SWR on mobile whips from inside your car.

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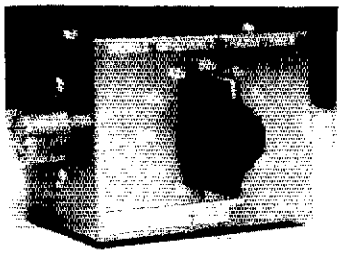

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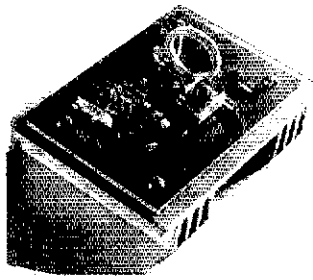

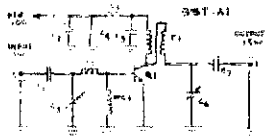

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Kit includes:

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☐ 5352	STK-025	20	14.95
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*Stereo

1N4000 EPOXY RECTIFIERS

Cat. No.	Type	PIV	Sale
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☐ 2378	1N4002	100	10 for .59
☐ 2379	1N4003	200	10 for .69
☐ 2380	1N4004	400	10 for .89
☐ 2381	1N4005	600	10 for 1.09
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For cooling, flushing, heating and ventilating! Quiet & dependable. Lightweight, flame retardant. 3 blades or better (sorry, no choosing). Removed from new equipment. Ship wt. 1½ lbs. Cat. No. 92CU3108

• Famous USA Makers! • 4-7/16" sq. 1¼" deep.

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1% precision resistors, D'Arsonval movement with burnout protection. Measures DC volts 0-15-150-1000; AC Volts 0-15-150-1000; DC Current 0-150mA; Resistance X1000 ohms. Sensitivity 1000 ohms per volt AC/DC. Uses AA penlite cell, not included. Size 2-3/8" x 3¼" x 1-3/8". Wt. 6 oz. Cat. No. 3921

• 1000 ohms per volt!

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Fits inside our Frequency Counter Cabinet. Requires +5VDC, 100mA. With instructions.

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PIV	2 AMP (#2346)	6 AMP (#2456)	10 AMP (#2447)	25 AMP (#2273)
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☐ 100	.69	.99	1.49	1.79
☐ 200	.79	1.25	1.69	2.25
☐ 400	.89	1.50	1.99	2.49
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- ☐ VOLTAGE REGULATORS, hobby LM320, TO-5 (# 3330) ..... 10 for 2.00
- ☐ PANEL SWITCHES, slides, rotaries, mod, etc (# 3268) ..... 30 for 2.00
- ☐ RESISTOR SPECIAL, ¼ to 1W, carbon, metal (# 3054) ..... 200 for 2.00
- ☐ HALF WATTERS, resistors, carbon, metal (# 3048) ..... 200 for 2.00
- ☐ NATIONAL IC BONANZA, linears, 7400s ROMS (# 2860) ..... 100 for 2.00
- ☐ LM340T VOLTAGE REGULATORS, 5 to 24V, TO-220 (# 2635) ..... 15 for 2.00
- ☐ HOT STYRENE CAPS, asst'd values, voltage, hi-Q (# 2729) ..... 100 for 2.00
- ☐ BRIDGES, untested, 2, 4, or 6 amps (# 4032) ..... 10 for 2.00
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- ☐ QUARTER WATTERS, resistors, metal film, marked (# 3613) ..... 150 for 2.00
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- ☐ PREFORMED RESISTORS, ¼, ½, 1W, marked, asst'd (# 2609) ..... 200 for 2.00
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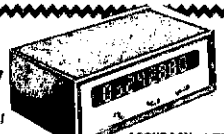

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RESOLUTION: 1 Hz @ 1 sec, 10 Hz @ 10 sec.
GATE TIMES: 1 and 0.1 sec.
INTERNAL FREQUENCY STANDARD: 5.24288 MHz
INPUT IMPEDANCE: 1 megohm
ACCURACY: 1 PPM @ 4 MHz
LEAD ZERO BLANKING
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Cat. No. 4049 COUNTER KIT. . . $77
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☐ SN7401	.12	☐ SN7454	.19	☐ SN7483	.45	☐ SN74161	.49
☐ SN7402	.14	☐ SN7455	.12	☐ SN7484	.49	☐ SN74163	.69
☐ SN7403	.12	☐ SN7460	.19	☐ SN7485	.39	☐ SN74164	.39
☐ SN7404	.14	☐ SN7464	.12	☐ SN7486	.12	☐ SN74165	.69
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☐ SN7423	.12	☐ SN7482	.12	☐ SN74132	.65	☐ SN74191	.99
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☐ LM340K-12V	.99
☐ LM340K-15V	.99
☐ LM340K-18V	.99
☐ LM340K-24V	.99
☐ LM340T-5V	.99
☐ LM340T-6V	.99
☐ LM340T-12V	.99
☐ LM340T-15V	.99
☐ LM340T-18V	.99
☐ LM340T-24V	.99
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☐ NE531H	1.49
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☐ NE567V	1.20
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☐ LM704H	.19
☐ LM709H	.19
☐ LM710N	.29
☐ LM711N	.29
☐ LM723N	.49
☐ LM733N	.59
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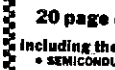

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about such a unique call letter. The OARC had their annual steak fry with good attendance and weather. 2-meter repeater activity very low this month except for out of state visitors. It is hoped that the visitors were not too badly ignored. WR7AKO suffered severe damage due to lightning. Traffic: K7HLR 318, WA7MEL 52, WA7JRC 47, WB7ECL 27, W7OCX 12, W7UTM 5, W7BE 4, W7FYR 4.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — Wyoming Weather Net, M-S 3923 kHz, 6:45 AM MDT. Jackalope Net, M-S 7260 & 3923 kHz, 12:15 & 12:30 PM. Wyo. Cowboy Net, M-F, 3923 kHz, 6:45 PM MDT. Please check in and support your nets. Check in your area for local two-meter nets. The Sheridan ARC has moved their repeater a little higher in elevation to improve coverage into northeastern Wyo. WB7EIN has agreed to accept appointment as SEC for this section. Please give him your support. W7KHH has been transferred from Cody to Glendive, Mt. WB7NHR reports Wyo. Cowboy net held 23 sess. 623 QNI, 17 QTC. Traffic: W7SQT 353, W7TZK 317, K7VWA 131, WA7SGG 44.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Frank S. Brown, W4LNN — SEC: K4WYT. NMs: N4MD WA4RNN. EC Endorsement: WA4VEK Chambers Co. Net reports: AENB QNI 239, QTC 130, AEND QNI 229, QTC 189. Good luck to WA4RND who has resigned as NM for AEND (Novice) after five years putting together a great net. WA4VKD has assumed her duties as AEND NM. New NM for the AENJ is WA4JPK, N4AIJ joins CAP Cadet program. WN4KKN turns 15 and working on new Accu-Keyer. WA4VKD recieves 25 wpm Certificate. K4UMD reports 15 intrs good for Europe DX. Tuscaloosa ARC election results: WA4CHV, pres.; WD4MLD, vice-pres.; WD4DAT, secy-treas. WA4YGM EC for Autauga Co. and KA4BRD are the new editors for the Twin-Base ARC bulletin. They report TBARC pres. WA8KLH has been reassigned to Rickenbacker AFB, Columbus, Ohio and a slow speed cw practice net now operating on 21.160 MHz. WB4TVY takes a break and goes to the Smokies. WD4CIQ has been appointed Hamfest Chmn. for the 1979 Birmminghamfest. Aug. vacations took it's toll on reports. Com' on gang let's hear from you. ANEV is now operating on 01/61 through the Bald Rock Mountain repeater with WA4UJK as net mgr. Meets Wed. at 8:30 PM. Check-ins are requested. Thanks to WA4JDH, WN4KKN and WA4RAJ for covering DRN5 100% during the month of Aug. Traffic: (Aug.) WA4JDH 1618, N4MD 271, WN4KKN 230, WA4RND 129, WA4VKD 113, K4AOZ 48, K4UMD 28, WB4RCF 18, W4NN 14, N4AIJ 2, WB4TVY 2. (July) W4EF 8.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — The CZARA held a dinner meeting on Sept. 7, 1978 in honor of the visiting IARU members. Among the guests were Harry Dannals (W2HD), Vic Clark (W4KFC), David Sumner (K1ZZ), Ron Hesler (VE1SH), Carl Smith (WØBWJ), Charles Tweedie (W1DPL/6Y5) and others. Panama Canal Chapter of the Ten-Ten Network is being organized. The certificate has been designed, the charter member numbers have been issued and the details such as on air nets are being worked out. More next month. The annual fall Novice Classes have begun and we are pleased to see 40 students attending. We do miss KZ5VV, but KZ5JA assisted by KZ5CE KZ5BB and KZ5AS will try to carry on. OZ9OU visited the Zone and was able to talk to his friends in Denmark on 10 meters from the QTH of KZ5AS.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ. NMs: K4NJL WA3NAZ. Congrats to WB4ZOJ WA3NAZ WB4FAS K4EV and W4HON making PSHR. Congrats to WA4CFI and K4VBH making Advanced and to KA4AFK WD4IBZ WD4ICH and WD4KHM making Technician. GSN QNI 497, QTC 242, GTN QNI 122, QTC 70. WGN fm QNI 85, QTC 11; cw QNI 12, QTC 12. GVEN No. 1 QNI 52, QTC 1. GVEN No. 2 QNI 1175, QTC 99. NGSN QNI 17. Cntrl GA VHF QNI 103, QTC 10. Please note WA4NAZ/4 is new NM. Try GSN at 0200 and 2300Z daily on 3.595; GTN at 2215Z daily on 3.718; GSBN at 2330Z daily on 3.975; GCN at 1100Z daily on 3.995; GA ARES at 2200Z Sun. on 3.975; WGN cw at 2100Z Sat. on 3.725; GVEN No. 2 at 0130Z daily on 146.94. WB4FAS using cw a lot since getting wisdom teeth pulled — hi! Welcome back K4EV. Emergency test on the 20th was a surprise but great participation — keep alert, the next one may be for real. W4PIM has new Ten-Tec 544. W4JM says new job should allow more hamming. WB4HXE has 146 to 220 rptr work ing. Albany ARC fun day was a grand success. WA4KXL has given Albany ARC a rptr. WD4NAE had ham exhibit at Pelham Gold Leaf Festival. W. GA ARS, W4FWD, gave public demo at mall in Carrollton. N4NX OSL mgr for ZL4LR/A on Campbell Island. SEDX club has over 200 members and growing. Traffic: W4FOE 289, WB4FAS 242, WB4ZOJ 212, WA3NAZ 152, W4WXA 142, W4GH 137, W4PIM 96, N4UZ 72, WD4ADV 45, K4WC 43, K4NM 41, K4EV 40, AA4GA 28, W4HON 11, WA4VMV 7, W4JM 6, K4BAI 5.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA. NMs: WD4LUG WB4PGB. New appts: N4WA as Section Traffic Mgr.; WB4ROK as EC, Putnam Co. SNC's earned by WB4CDR and WA4WVY on NFPN; by W4BKC WD4MOJ K4TTO and WA4ZLM on FPTN; by W4BKC on FMTN; and by WD4LUG on AENB. SEC AA4FG prepared an updated Section Emergency Plan; each EC should have one. A new FL RTTY net meets Sat. 1300Z on 7088 kHz with K4ZS as NCS. New calls: W4UHC now W4GI; WA4BZC now N4ARP. Upgrading this month: K4KHV WA4LTP K4PPQ & WA4SIB to Extra; WD4FHD WD4HWE & WD4ODD to Advanced; KA4BFF & WD4FNX to General. NFPN/QFN liaison being done by N4ARP WN4IIV WD4LUG and W4WNY. Pensacola Hamfest held in new larger quarters this year. W4BKD suffered heart attack but on mend now. WA4PDK picked up NCS slot on NFPN Jackson Co. AREC Net meets 1st Mon. each month at 7:0 PM on 07/67 rptr. WN4IIV and KA4DCA at home in Tallahassee after their recent marriage. W4MNW gave talk on 2m operation in Europe at TARC meeting. Live Oak area has half dozen new hams on the air. WB4RIS went back to "bug" for cw, and has a new antenna for 75m. Beaches ARS new officers are:

SOME DRY INFORMATION ABOUT OUR ALL WEATHER ANTENNAS

Sooner or later almost all ordinary ham antennas are going to become victims of bad weather.

But Shakespeare's brand new line of two meter and HF antennas is anything but ordinary.

We're new to the ham market, but we've been making marine and military antennas for 26 years.

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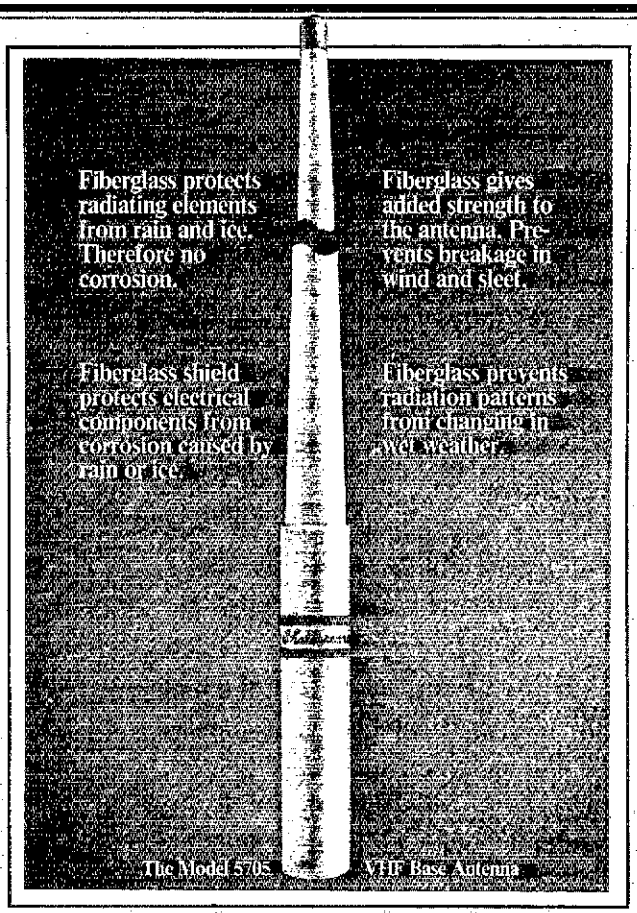

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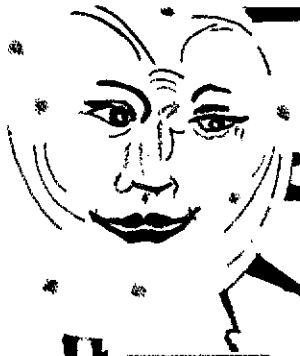

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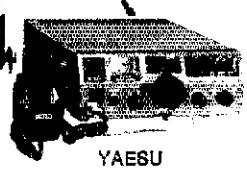

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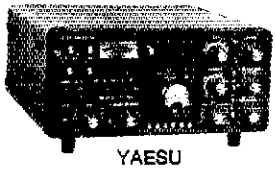

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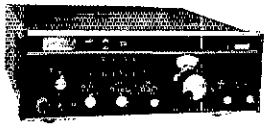

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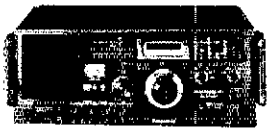
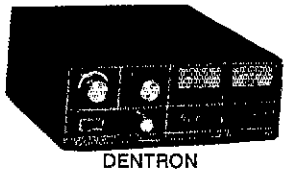
TEN TEC
544



PANASONIC RECEIVER
RF 4800

KENWOOD
TS-700SP

KDK
2015R



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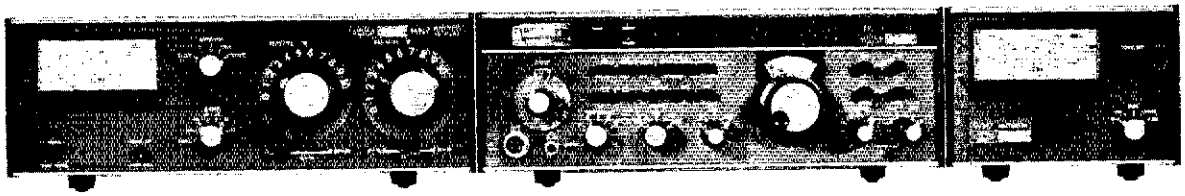
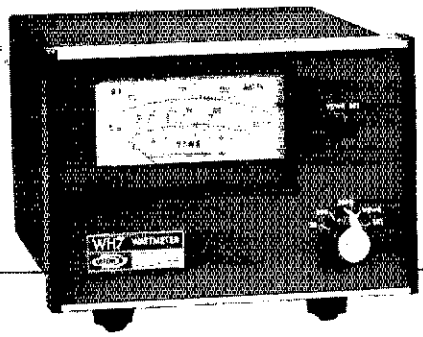


Drake offers 7-line accessories for maximum performance of your TR-7 station

DRAKE WH-7 Directional Rf Wattmeter



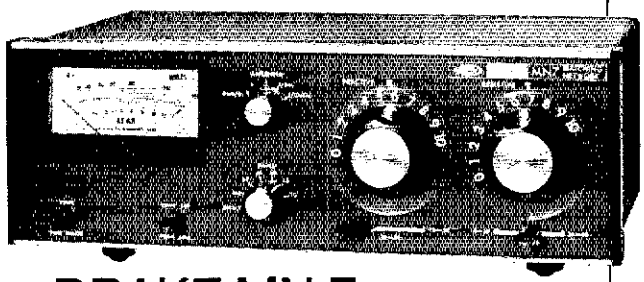
- **Remote coupler**
- **New 0-20 watt scale for low power enthusiasts in addition to 200-2000 watt scales**
- **New direct-reading VSWR scale**

The Drake WH-7 is designed for user convenience and high accuracy. This instrument includes three calibrated scales for rf power to satisfy applications from QRP to high power (0-20, 0-200 and 0-2000 watts full scale). A fourth calibrated scale provides direct reading VSWR information, and is switch selected from front panel. This wattmeter makes possible quick, accurate adjustments of antenna resonance and impedance match, when placed between transmitter and matching network. The WH-7 is styled to match the 7-line.

WH-7 SPECIFICATIONS

• **Frequency Coverage**— 1.8-30 MHz • **Line Impedance**— 50 ohm resistive • **Power Capability**— 2000 watts continuous • **Jacks, Removable Coupler**—Two SO239 input and output connectors • **Semiconductors**—Two 1N295 power meter rectifiers • **Accuracy**— ± (5% of reading + 1% of scale) • **VSWR Insertion** — Insertion of wattmeter in line changes VSWR no more than 1.05:1 • **Dimensions**— 4.6"H x 6.9"W x 7.5"D (11.6 x 17.5 x 19 cm) • **Shipping Weight**— 3 lbs. (1.4 kg) **$89.00**

DRAKE MN-7 Antenna Matching Network



- **160-10 meters, 250 watts continuous rf output**
- **Unique "low-pass filter" design of MN-7 provides significant harmonic reduction to help fight TVI**
- **Built-in rf antenna switch allows unit to be by-passed regardless of antenna in use. No need to disconnect feedlines. Switch also permits front panel selection of various antennas.**
- **Built-in rf wattmeter/VSWR bridge**

MN-7 SPECIFICATIONS

• **Frequency Coverage** — All amateur bands 160-10 meters with generous out-of-band coverage for future expansions • **Power Capability**— 250 watts continuous • **Input Impedance**— 50 ohms (resistive) • **Load Impedance**— 50 ohm coax with VSWR of 5:1 or less (3:1 on 10 meters)— 75 ohm coax at lower VSWR can be used—Long wire at low impedance; high impedance may be matched with optional Drake B-1000 Balun (switch selected)—Balanced feeders with optional Drake B-1000 Balun may be accommodated (switch selected)—MN-7 may be switch by-passed regardless of feedline in use • **Meter**—Reads rf watts or VSWR (switch selected)—High accuracy • **Dimension**— 4.6"H x 13.6"W x 8.5"D (11.6 x 34.6 x 21.6 cm) • **Shipping Wt.**— 10 lbs. (4.55 kg) . . . **$165.00**

(optional B-1000 Balun) *24.95*

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WA8OFU/4 WB4MMH WB4NIG and W4SME. WB4VMP made good score on FMT. Sorry to lose K4YX to S. FL Section. W4MGO's rig another victim of lightning. WB4HKP N4PL and WA4ONZ instructors for Hambone College new session. K4RNS gopt a new 2m rig. WB4GHU moving to Deland. WA4QQQ and WA4WGL got the DBRA 75/15 repeater going again. W4ILE reports Cloverleaf Farms ham population up to seven. Traffic: (Aug.) N4PL 254, WD4HIF 200, W4FZX 186, N4WA 167, WB4OBB 160, W4LDM 151, WB4RIS 141, WD4LUG 135, WA4FKE 111, W4JL 68, WA4EYU 67, WD4IIO 56, WB4FJY 47, W4RH 43, WD4NYY 42, WB4TZR 36, WB4HKP 32, W4DFU 31, WB4DTS 29, WB4VAP 26, WA4VLT 18, WA4CRI 10, W4MGO 9, WB4VMP 9, W4MVG 7, K4RNS 5, N4ARP 3. (July) WB4RIS 172, W4LDM 73, WA4OEM 48, WB4FJY 41, W4DFU 21.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCMs: WB4AID W4KGJ. SEC: AA4WJ. Our thanks to all the members who voted for me and reelected me for another term as SCM. Last month we listed ECs and OBS appointees. Here we list the Official Traffic Station appointees: WB4AID WA4ATF W4BK K4BLM WA4BPE N4BU WD4COL W4DVO W4ESH N4ET WB4FVV WA4GBC W4GDK K4GFW N8GG/4 WA4GNI W4GOG W4GPL K4GRM WA4HDH W4IYT WA4JPV N4KB K4KE W4KGJ WA4KKE W4KMN WD4PKG WA4LGT W4LK W4MEE W4MML WA4NBE WB4NJU W4NTE W4OGX WA4PFK WA4QGV W4OM WA4RLV WA4SCK K4SCL K4SJA N4TW WA4UOQ AA4WJ WB4WYG W4WYR N4XR W4ZJ. That's an even 50 or about 1 out of every 100 members in the Section. However, there is no limit to the number we can appoint if they can qualify under the rules laid down in "Operating an Amateur Radio Station." Request an application if you are interested. Section Net Certificates earned by WB4CWV WB4FVV W4IOV W4MFA W4NBY K4WXS and W4YHN for FPON. WB4ALH for QFN. WD4COL for PEN. AA4WJ is operating a borrowed rig while his IC-701 gets factory-type repair. N4XR is back on after factory repair. WD4EOT reports West Coast Area Repeater Club (Fort Myers) active in MDA Telethon, handling 64 messages. WB4AID is having a hernia operation. Summer static on the HF nets is murder! Yearning for some nice quiet winter evenings. Traffic: (Aug.) W4MEE 702, WD4COL 649, WD4KPG 473, WB4NJU 354, K4SCL 328, WA4PFK 282, WB4WYG 246, WD4NSG 244, WA4JPV 197, WB4FVV 192, W4YCL 171, WA4NBE 120, WB4AID 116, K4EUK 114, WA4RLV 90, WA4GYH 70, WB4PIR 62, W4DVO 55, WA4SCK 51, W4KMN 48, W4NTE 48, W4GPL 47, WU4HYJ 44, W4ESH 39, W4IRA 38, W4WYR 38, W4IYT 35, W4OM 33, WB4GSV 26, W4MPV 25, WA4MNX 21, WA4OGV 21, AA4WJ 20, W4KGJ 17, W4SMK 14, WD4BAJ 8, W4MML 7, WB4KYE 6, WA4MJT 3, WB4SNX 3, WB4DWU 1. (July) W4DVO 55, W4MML 6, WB4DWU 1.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — NM, WA7KOE W7UOQ W7EP, WB7DGP, pres. of the Old Pueblo RC, reports that with classes for Novice, General, Advanced and Extra, the Club has the most complete free ham courses in the area. W7ME, ex-W7FKK and former SCM, reports he's still active chasing DX and approaching 300. W7YW and WA7NXL operated in rare Santa Cruz County during the CW county hunter contest. WB7OWW, Flagstaff Jr. HS ARC, operated at the Coconino County Fair. The Superstition ARC is preparing to add auto-patch to the club repeater, if funds are available. New ECs are WB7CDO, Coconino County; W7KAX, Mohave County, and W7KXT, Gila County. With regret, reported as Silent Keys are W7EXA (wife of W7EXI) and W7QFI. WB7CNY received the Aug. achievement award from the Ariz. Rptr. Assn. The Squelch Tail, published by the ARA, has changed from monthly to bi-monthly publication. Nets (Aug.): ATEN 121, SWN 240. Traffic (Aug.) K7NTG 172, K7MC 142, W7EP 121, WA7KOE 35, K7OXB 33, K7NMO 9, WA7VLA 8, W7ME 8, N7EH 5, W7QDS 4, W7YS 2. (June) WB7TPY 21.

LOS ANGELES: SCM, Perry Masterson, W6RHS — The month of Aug. was another vacation month here in the Los Angeles Section. Not much news reported. K5DY/6 has been appointed Asst. Mgr. of SCN beginning Sept. 1, '78. Tom is getting the traffic but in a big way. Nice reports from the sections OOs again this month. Had a nice report from WB6YID. Ron reports a recent trip to South America where he worked DX from a DX station. Ron worked over 3000 QSOs. 15 and 20 meters seemed to be open for his trip. K6KA has been very active with his OO appointment. His reports are always interesting to read. I hope the amateurs he advises appreciate the effort he puts forth in their behalf. This goes for all in the section. There are quite a number of appointees in this section not heard from for quite sometime. The rule of monthly reports to the SCM is still in effect. Those who cannot find the time for a report every month or so, will have their appointments withdrawn. As we move into the fall season, school has started. So far, we don't seem to have the number of adult education amateur licensing classes this year. This presents a good opportunity for some of the clubs to get into the training end again. Let's all have a nice fall season and make amateur radio everything you want it to be. Let me know of your successes. Traffic: W6INH 187, AD6M 176, K5DY/6 112, N6PZ 106, W6OEO 83, W6BRO 32, K6CL 23, W6YID 12.

SAN DIEGO: SCM, Arthur H. Smith, W6INI — SEC: W6INI. It's time to improve your emergency preparedness for the annual SET in early 1979. Most needed are stations with full portable capability for 75, 10, 6 and 2 meters. Also, mobile for 75 and 10 meters. Manual phone patch for 2-meter FM is desirable. For ARES membership info contact one of the following Emergency Coordinators: S. D. County WB6HFE (Northern), WA6UAZ (Southern), WA6UFY (Eastern), W6INI (Central), Imperial County WA6LAW. The following clubs have pledged support of ARES and have been designated ARES-Affiliated clubs: S. D. Teleprinter Society, 220 Club, No. Shores ARC, S. D. Repeater Assn., ARC of El Cajon, Poway ARS, Palmoar ARC, and Escondido ARS. The Palomar ARC flea mart has been shifted to the first Sun. of each month starting Nov 5, 1978.

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B & W	
361 Codax keyer	$ 29
BRIMSTONE	
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CIR	
Astro 200 Xcvr	$695
CLEGG/SQUIRES-SANDERS	
22'er 2m AM Xcvr	$ 59
66'er 6m AM Xcvr	69
Thor 6 6m Xmtr (RF)	39
417 AC supply/mod	39
418 DC supply/mod	35
Interceptor VHF Rcvr	129
SS Booster	39
22'er FM 2m FM Xcvr	149
FM-27B 2m FM Xcvr	179
031 AC supply	49
HT-146/charger	199
COLLINS	
75A-3 Ham Rcvr	$249
75A-4 Rcvr 4424	475
75S-3 Ham Rcvr	485
75S-3B Ham Rcvr	750
75S-3B Rcvr (round)	895
75S-3C Ham Rcvr	795
75S-3C Rcvr (round)	995
32S-3 Transmitter	750
32S-3 Xmtr (round)	895
30L-1 Linear	495
312B-4 Console	199
KWM-2 Xcvr	595
KWM-2A Xcvr	795
KWM-2A Xcvr (round)	1295
312B-5 PTO console	349
136B-2 Blanker	100
516F-2 AC supply	149
516E-1 KWM-1 DC PS	75
MP-1 DC supply	119
PM-2 Port AC PS	95
CC-2 Carrying case	49
51S-1 Rcvr (round)	1595
COMCRAFT	
CPS-6 AC supply	$ 49
DENTRON	
160-10AT Tuner	$ 89
160-10AT 3kw Tuner	159
DRAKE	
2AQ Spkr/Q-mult	$ 29
2C Ham Rcvr	189
2CS Speaker	15
2AC Calibrator	12
R-4 Ham Rcvr	269
R-4A Ham Rcvr	289
R-4C Ham Rcvr	449
4NB Blanker	49
FL-1500 Filter	35
FL-6000 Filter	35
MS-4 Speaker	19
SSR-1 SW Rcvr	249
SPR-4 SW Rcvr	349
5NB Blanker	49
SCC-4 Xtal cal.	19
DSR-1 SW Rcvr	1195
TR-4 Xcvr	389
TR-4/NB w/blanker	459
TR-4C Xcvr	449
TR-6/NB 6m Xcvr	589
T-4X Transmitter	339
T-4XB Transmitter	375
T-4XC Transmitter	449
AC-4 AC supply	85
DC-3 DC supply	65
DC-4 DC supply	85
L-4B Linear	695
MN-4C Matcher	119
WV-4 VHF wattmeter	59
ML-2 2m FM Xcvr	119
TR-22 2m FM Xcvr	129
AC-10 AC supply	39
AA-22 2m amp/preamp	99
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BC-101 Scanner	$199
MK-101 DC ps	15
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PSA-300C AC supply	$ 39
Galaxy V Xcvr	$189
GT-550 Xcvr	279
GT-550A Xcvr	299
AC-35 AC supply	65
DC-35 DC supply	65
SC-35 Speaker	15
SC-550A Speaker	19
F-3 CW filter	24
GENAVE	
GTX-10 2m FM Xcvr	$119
GTX-200 2m FM Xcvr	149
GONSET	
GC-105 2m AM Xcvr	$ 69
901A AC supply	39
HALLICRAFTERS	
SX-100 SW Rcvr	$139
SX-111 Ham Rcvr	139
HT-32A Transmitter	199
SR-160 80-20m Xcvr	169
MR-150 Rack mt	15
SR-400 Cyclone	399
SR-400 Cyclone II	450
SR-400 Cyclone III	599
P-500AC AC ps	75
HA-20 Remote VFO	125
SR-42A 2m AM Xcvr	49
HA-26 6-2m VFO	39
HAMMARLUND	
HQ-110A Ham Rcvr	$149
HQ-110A/VHF	199
HQ-180A SW Rcvr	349
S-200 Speaker	19
HEATHKIT	
SB-303 Ham Rcvr	$269
HX-10 Transmitter	189
HW-16 Xcvr	109
HW-100 Xcvr	249
SB-102 Xcvr	369
HP-23 AC supply	45
HP-23B AC supply	54
HP-13 DC supply	45
SB-104 Xcvr	575
HP-1144 AC/spkr	89
HM-102 SWR/watt	29
HWA-17-1 DC supply	9
HW-202 2m FM Xcvr	99
HW-2036 2m FM Xcvr	249
HWA-2036 AC supply	24
HA-201 2m amp	24
ICOM	
IC-502 6m SSB Xcvr	$189
IC-202 2m SSB Xcvr	199
IC-22 2m FM Xcvr	139
IC-22A 2m FM Xcvr	159
IC-230 2m synth Xcvr	229
TTH-230 TT handset	69
IC-245 2m synth Xcvr	349
IC-21 2m FM Xcvr	149
IC-21A 2m FM Xcvr	175
IC-215 2m FM Xcvr	159
JOHNSON	
Valiant I Xmtr	$189
Kw matchbox/SWR	199
Phone patch	24
KLM	
Multi-11 2m FM Xcvr	$179
PA15-160BL 2m amp	199
KENWOOD	
R-599 Ham Rcvr	$249
R-599D Ham Rcvr	375
S-599 Speaker	15
T-599 Transmitter	249
TS-700A 2m Xcvr	450
TR-7400A 2m FM Xcvr	289
TR-7500 2m FM Xcvr	199
TR-8300 450 FM Xcvr	229
MIDLAND	
13-500 2m FM Xcvr	$129
13-505 2m FM Xcvr	159
13-513 220 FM Xcvr	299
13-520 2m HT/chgr	129
MOSLEY	
CM-1 Ham Rcvr	$ 99
NATIONAL	
NCX-5 Xcvr	$279
NCXA AC supply	69
NYE	
250-30 Kw tuner/SWR	$199
PEARCE SIMPSON	
Gladding 25 2m Xcvr	$ 69
RAYTRACK	
Horizon 6L 6m amp	$595
REALISTIC	
DX-150 SW Rcvr	$ 89
REGENCY	
HR-2 2m FM Xcvr	$ 99
HR-2A 2m FM Xcvr	109
HR-2B 2m FM Xcvr	129
HR-212 2m FM Xcvr	119
HR-312 2m FM Xcvr	149
HR-2S 2m FM Xcvr, ac	149
HR-2MS 2m FM Xcvr	149
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70 Monitor	$239
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SBE	
SB-34 Xcvr	$239
SB-450TRC 450 Xvtr	149
SPECTRONICS	
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DFD/K Dig (Kenwood)	119
SC-250 Counter	149
STANDARD	
14U 2m FM Xcvr	$199
146A 2m FM HT	179
826M 2m FM Xcvr	99
SWAN	
SW-240 Xcvr	$159
117B AC supply	69
P-1215 AC supply	49
PS-20 AC supply	95
260 Cygnet Xcvr	289
270B Cygnet Xcvr	299
300B Cygnet Xcvr	369
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700CX Xcvr	459
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117XC AC supply/spkr	95
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Tempo One Xcvr	$289
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FT-101EX Xcvr	529
SP-101PB Sp/patch	49
FR-101S SW Rcvr	359
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SP-400 Speaker	19
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FT-221R 2m Xcvr	429
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200R mobile mt	19
FT-2 Auto 2m Xcvr	199
FT-2FB 2m FM Xcvr	149
FT-227R 2m FM Xcvr	279

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Bankamericard (Visa); no trades.

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210X/NB Xcvr	$810	699
220CS AC supply	155	139
BIRD	reg.	NOW
4352 VHF Ham-Mate	$ 94	59
CDE	reg.	NOW
CD-44 Rotor	$134	79
HAM-II Rotor	164	119
HAM-III Rotor	169	129
T-X Tailtwister rotor	299	239
CIR	reg.	NOW
Astro 200 Xcvr	$995	895
DENTRON	reg.	NOW
MLA-2500 Linear (with 10m)	$899	799
MLA-1200 Amp/ps (w/10m)	558	499
4V 40-10m vertical	84	69
MT-3000A Ant tuner	349	299
160-10M Monitor tuner	299	249
DRAKE	reg.	NOW
TR-4CW Xcvr w/RIT	$799	599
34PNB Blanker - TR-4CW	100	95
RV-4C Remote VFO/spkr	170	149
MMK-3 Mt for TR-4CW	10	9
R-4C Receiver	699	549
T-4XC Transmitter	699	549
AC-4 AC supply	150	119
MS-4 Speaker	33	27
2CQ Speaker/Q-mult	49	45
7075 Desk microphone	39	35
7072 Hand microphone	19	17
DSR-2 Receiver DEMO	3200	2495
TR-22 2m FM Xcvr	229	199
TR-33C 2m FM DEMO	229	199
MMK-33 Mt for TR-33C	12	9
AC-10 12vdc supply	49	45
AN-5 Shortwave ant	8	5
EDGECOMM	reg.	NOW
System 3000A 2m FM Xcvr	$549	499
FMS-25 2m FM Xcvr	439	399
ELECTRA	reg.	NOW
BC-210 Synthesized scanner	$349	249
ELECTROLERT	reg.	NOW
Fuzzbuster II Radar detector	$129	99
HY-GAIN	reg.	NOW
TH6DXX 6 el beam (truck)	$296	237
TH3Mk3 3 el beam (truck)	219	175
ICOM	reg.	NOW
IC-21 VFO Receive VFO	$119	69
IC-21A 2m FM Xcvr	399	269
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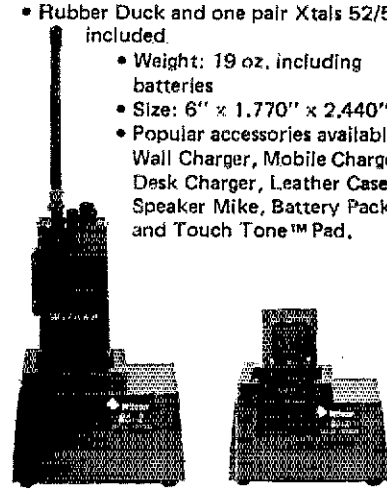

Illustrated is Wilson's BC-2 Desk Top Battery Charger shown charging the Mark Series Unit or the BC-4 Battery Pack only.

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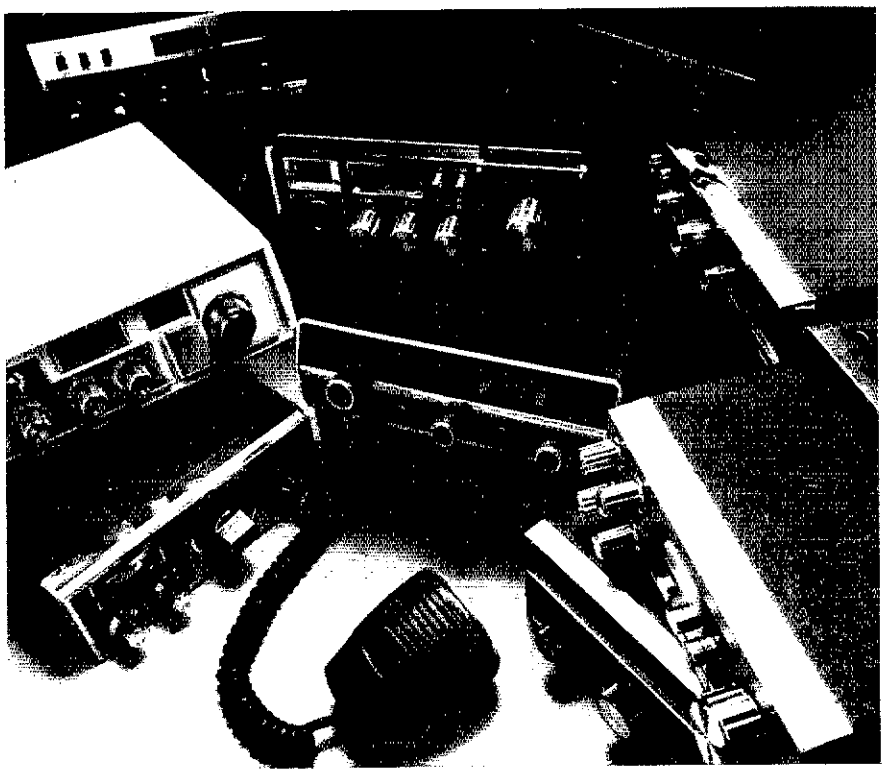

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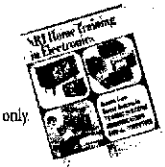

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SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — WB6OBZ spoke at Mike and Key Club in Camarillo on CPR. The Santa Barbara Tuckers Grove Swapfest was successful with over 400 attending. W6SUN spoke at the Thousand Oaks Conejo Valley ARC on the art of DXing. WA6SYY double talked his way thru the auctioneering chores at their annual auction. W6ZH was guest speaker at the Santa Barbara club installation dinner and showed slides from his recent tour of New Zealand. AC6I is the new Vice Chmn. for the Sulphur Mountain Repeater Assn. W6KPS spoke at the Vandenberg Satellite ARC on the workings of the Cactus Remote system. K6VK is in charge of Novice classes sponsored by SMRA for the fall. WA6GRD and K6JTE are editing and W6TSV publishing "The Repeater" for SMRA. WA6OOO has turned out an excellent Directory of Santa Barabara area hams. Southern Cal Net (CW) had 403 check-ins and 372 messages in Aug. reports N6YH the new record keeper. Section ARES net meets on 3935 Sun. at noon and Wed. at 1930. WA6MBZ headed our traffic list this month with 334. N6WP was a close second at 256. WØKON made two quick trips to Nebr. W6ZRR sent 71 bulletins on 2M fm and RTTY. WB6MXM enjoying DX with his new CL-36 beam. WB6YGH, W6YCF K6IKG and WA6ZRA are Silent Keys. WA6IGH now AB6O. WA6LBF is AE6B. WD6FEZ is N6AJA. New Techs: WA6NSD WB6WHS. Novices: kA6s BAG BRN CDT APB. K6IA received his MS from USC. PSHR: WA6LBO 42, N6WP 36, K6YD 22. Traffic: WA6MBZ 334, N6WP 256, WØKON 155, N6YH 45, K6YD 44, WA6LBO 43, WB6MXM 37, N6MA 22.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Helthecker, W5EJ — Asst. SCM/SEC: K5PC. NMs: W5GN AE5I EC/WB5LSI now AE5U. The following is a list of "Dos and Don'ts" during emergencies that proved themselves out during the Aug. flooding. No. 1 — If the emergency lies within your jurisdictional area, take immediate action; get moving! Don't wait for an invitation — it may never come; communications may already be out and means of access to the disaster area may be closing. No. 2 — Make sure that at least one local repeater is emergency powered and tested regularly. No. 3 — Take along an adequate supply of fuel and water — food is more accessable than drinking water in a disaster area; Don't be a burden to the folks you are trying to assist. 4 — Try to be self-sufficient — you may be the only means of communications for many hours. A "back-up" rig is good insurance against "Murphy's Law!" 5 — Organize your troops upon arrival at the scene; find out who needs you the most & what they need. 6 — Establish contact with stations outside the immediate area; let them organize the nets and coordinate and expedite the traffic. 7 — Try to estimate the duration of the emergency, and if needed, arrange well in advance for relief crews. Keep your SEC and neighboring ECs informed of your situation and needs. 8 — Use standard ARRL form on all msg. ltr. Emergency and priority msgs should be written out and signed by a responsible official if possible. 9 — Select the right band to suit the need — the better the signal, the better the service. Don'ts: 1 — Never usurp the local ECs authority; he usually is better qualified for the job and knows the area and its people. Take orders and assignments from him or his designee. 2 — Don't get caught short on equipment — you are usually trying to replace an entire radio or telephone system; usually via 2 mtrs locally, with H.F. for the "long distance" calls by your served agencies. 3 — Don't initiate emergency traffic yourself unless absolutely necesary. We are a communications service; the served agencies should supply the content and signature for each msg. 4 — Don't spread rumors; all transmissions should be authenticated as to their source, and repeated word for word. With everyone's nerves already on edge, who needs false info?! 5 — Don't transmit on an emergency net unless you can make a positive contribution to the current situation. If check-ins are not invited; there is probably good reason. When in doubt — don't key up! 6 — Don't wait around for an invitation to a local disaster! One of our greatest assets is that amateurs are usually "first in and last out", getting the job done with what's available. For a public safety official to call upon a volunteer service to "bail him out" is an admission of inadequacy; but very few amateurs are ever turned away from a disaster scene after having reported on their own! 7 — Don't put off another day getting your "disaster kit" prepared and ready to go. Each emergency operation is unique in itself, but preparation in advance and a general plan of action is amateur radio's "ace-in-the-hole!" Remember, IT CAN HAPPEN IN YOUR COUNTY! Hats off to the Amarillo area troops for a fine hamfest. This month again has proved that when the chips are down, amateur radio can do the job; thanks to you, it works! Traffic: (Aug.) WB5SDD 1165, WA5PPF 258, W5TI 257, AE5I 244, AA5J 168, WB5LAT 141, WB5BKM 132, W5VMP 118, WA5INJ 117, WD5BDC 94, WB5RPU 88, K5PC 87, WD5AAT 81, K5SOR 74, K5MC 69, WD5DRK 15, W5GTZ 11, N5BT 10, N5OX 4, AE5U 4, WB4DUQ 4, WD5JLF 2. (July) WB5RPU 53.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — WB5KKT new NM for OFON. WB5OSN back in Okla. W5JJ teaching Electronics at an area Vo-Tech School. Man Code and Theory classes all ready underway. Sorry we had to miss "Ham Holiday" but Dr. said no. W5RB and WD5ETD report a fine increase in cw traffic and participation in the cw nets. What better way to help your code speed? All net operations are good training for emergencies. We, in OK have the capabilities of reaching almost every town via Amateur Radio. We need regular daily liaison stations to work between the HF nets and the various repeaters to help get better distribution of the listed traffic. Too many times traffic

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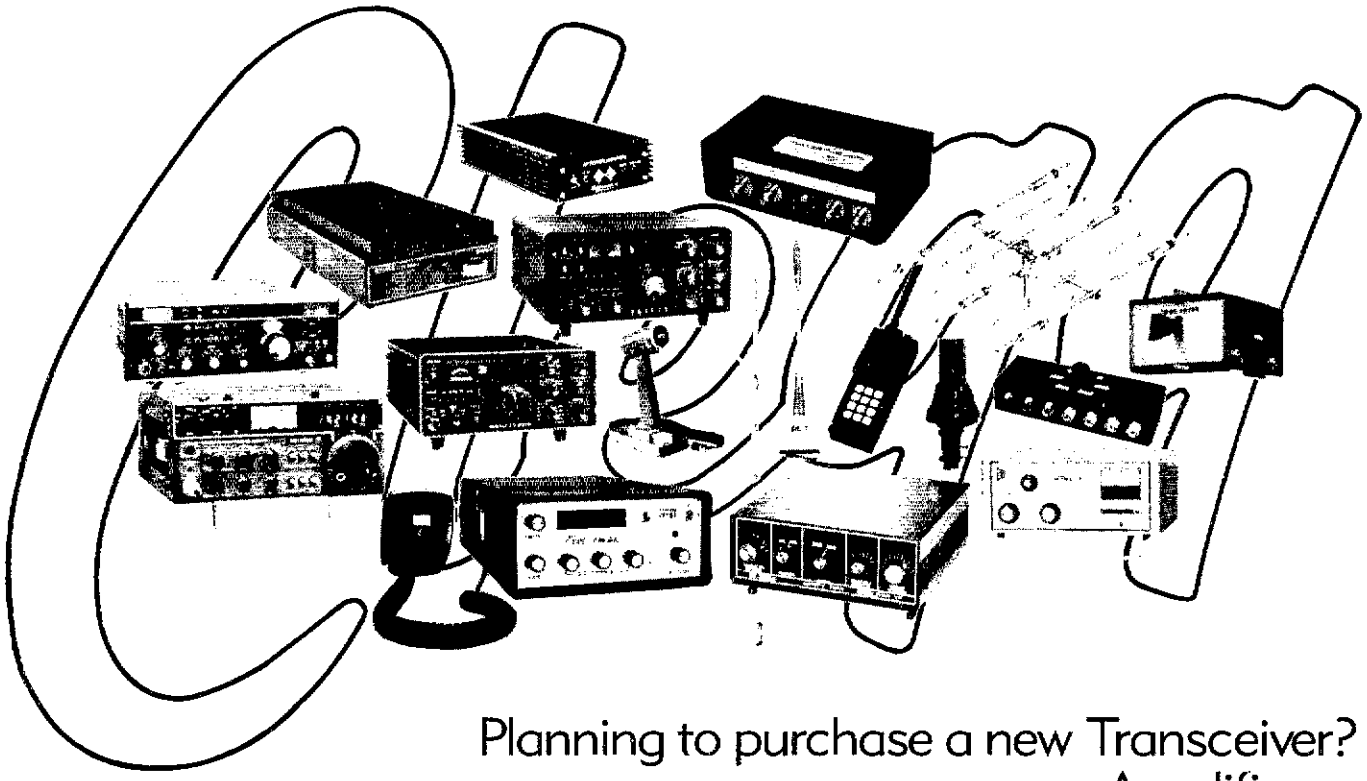

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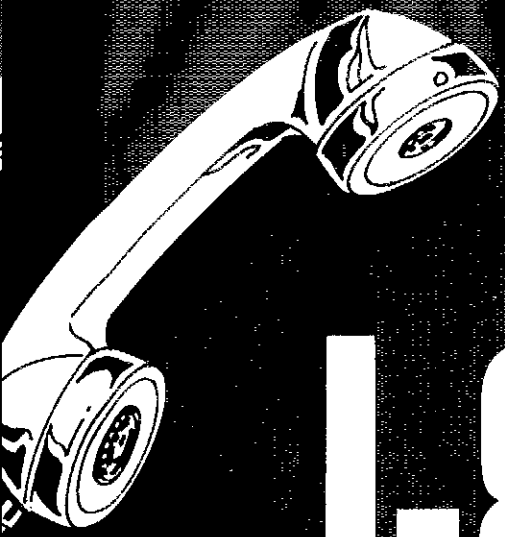

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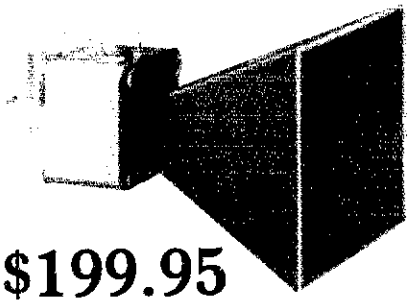

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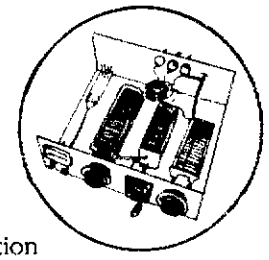

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is either cancelled or delayed because some areas ar hard to get into. The Night Owl Net in (07-67) is helping lot. ATV is getting off to a good start in the Tulsa area Some excellent reports from our OVSs on VHF open ings. Too bad more from this Section could not atten the West Gulf Convention at El Paso. A very FB get-to gether in a beautiful setting. Traffic: K5OWK 904 WB5NKC 504, W5REC 345, K5TEY 186, W5RB 138 WB5NKD 101, W5BYC 70, WD5ETD 70, WA5OUV 61 WB5ELG 57, W5SUG 43, W5FKL 30, K5CAY 29, W5VO 28, WA5FSN 27, W5JJ 22, WD5ETR 20, WB5OYU 3 WB5UCM 2.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — Asst SCM: N5TC. SEC: WB5LHK. Net Mgrs. at large: N5I WA5RKU. OO reporting this month: K5DL. OVSs repo ting this month: N5AJQ WA5OCP. New appointments K5CA, EC for Galveston County; WA5IFX, EC for Jeffe son County; K5ZD, OO; WB5UYV, OTS; W5SPD, OES WB5OLV enjoyed visiting New Hampshire. WB5YO operated from W5AC; ran up nice traffic count whil subbing for N5TC. EC WA5HVT says Brazosport AR had SKYWARN training program; WB5AHN an WB5SPE won the transmitter hunt Aug. 5; N5FN WB5AHN and SB5SPE won Tidelands ARC transmitte hunt Aug. 20; Alvin Community College ARC had grea picnic at home of WB5MZY. OTs WB5UYV says 34/9 repeater operational in Sept. with call WA5MJW/RPT From W5ES Bulletin: WD5CUL upgraded and has new call — KB5CC. OVS N5AJQ reports new Rockdal repeater, WB5JDE/RPT, on 147.87/27; also reports KA5ASE upgraded to Technician. CHARRO has regula Sat. kattee klatch at Gourmet Corner in Brownsville from 10:00 AM on. Traffic: (Aug.) W5KLV 744, K5HZR 272 WA5RKU 240, N5TC 139, W5AC 107, K5PE 72, K5RG 57 WB5MMI 47, W5BHO 26, WA5RVT 16, AE5X 10, W5KR 8 WB5UYV 7, K4RVF 3. (July) WA5RVT 22, K5QEW 18

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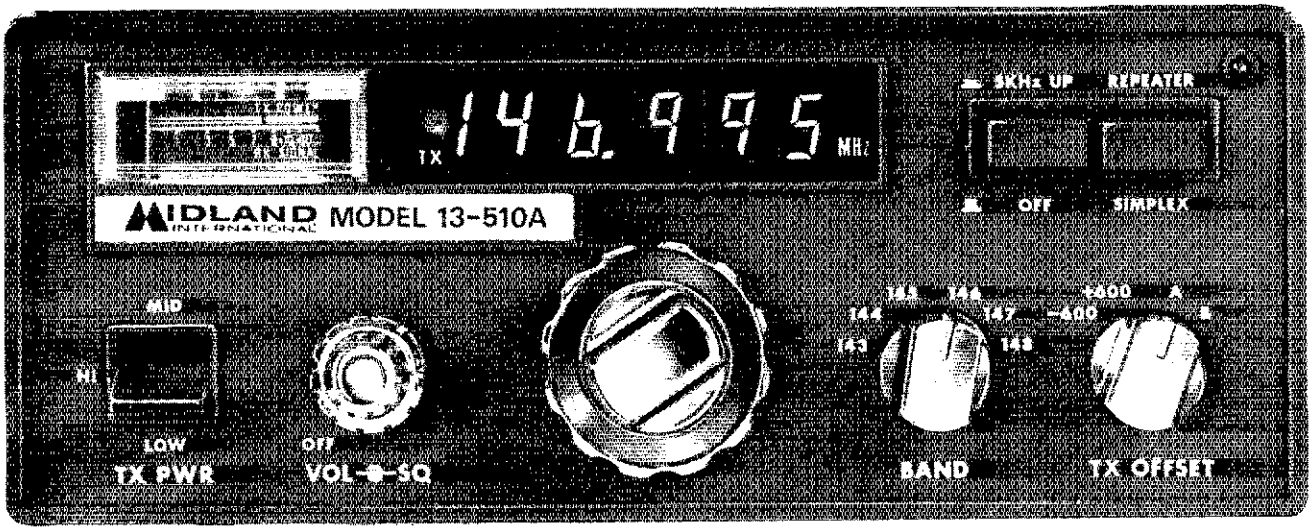

NEW! The 13-510A P.L.L. synthesizer delivers 1,200 frequencies between 143.00 and 149.00 MHz . . . the full 2-meter band, plus MARS.

NEW! The 13-510A will operate with up to a 6 MHz split between TX and RX frequencies.

NEW! The 13-510A microphone connector is pre-wired for your Touch-Tone® encoding microphone.

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NEW! The 13-510A is compatible with available popular CTCSS continuous tone-coded squelch system accessories.

NEW! The 13-510A has 3 transmitter outputs: 1, 10 and 25 watts.

Midland's 13-510, with its commercial-type modular construction, earned its reputation as one tough 2-meter FM mobile. Now Midland has made the 13-510A an even more versatile performer!

The 13-510A P.L.L. synthesizer splits the 6 MHz spread between 143.00 and 149.00 into 600 discrete frequencies, and a 5 KHz up-shift delivers 600 more for a total of 1,200 . . . shown directly on the digital display. In addition, there's access to 4 available offsets for repeater operation on ± 600 Hz with crystals supplied or up to 6 MHz spread with your crystals installed.

Inside the 13-510A, there's a highly sensitive (0.3 uV), highly selective (-70 dB at ± 15 KHz) dual conversion receiver with dual gate MOSFET RF and mixer stages, crystal filter in the 1st IF, ceramic filter in the 2nd IF, and helical resonators in the RF amplifier.

The transmitter is conservatively rated for 25 watts output, switchable to 1 or 10 watts for repeaters, and uses direct FM modulation to deliver natural sounding audio.

Other features making Midland's 13-510A the one to look at include automatic protection circuit for the output transistor, internal DC filtering and polarity protection, a deep-finned heat sink for the power transistors, and electronic switching that needs no mechanical maintenance. Mobile mounting bracket, base stand and push-to-talk microphone are included.

CHECK OUR SPECS:

RECEIVER. Type: dual conversion superheterodyne. 1st IF frequency: 16.9 MHz. 2nd IF frequency: 455 KHz. Sensitivity: Less than 0.5 uV for 20 dB quieting (0.3 uV for 12 dB SINAD). Spurious response: -60 dB. Squelch threshold: Less than 0.3 uV. Modulation Acceptance: ± 7.5 KHz. Selectivity: -70 dB at ± 15 KHz. Audio output power: 1.5 watts at 8 ohms.

TRANSMITTER. Outputs: 1, 10, 25 watts. Frequency deviation: Adjustable 3 - 16 KHz (normal 5 KHz). Audio input: 600 ohms. Modulation system: Direct FM. Spurious Radiation: Less than -60 dB below carrier.

GENERAL. Power: 13.8 volts DC, negative ground. Current drain: Transmit, 2 - 7 amps.; receive, 0.8 amps. average. Antenna impedance: 50 ohms. Unit size: 2-5/8" x 6-13/16" x 9-5/8". Unit weight: 6.6 lbs.

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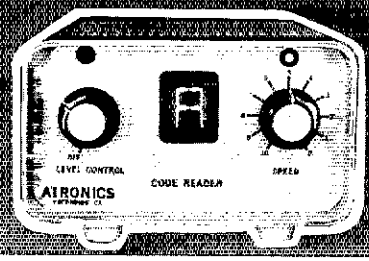

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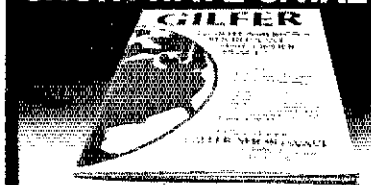

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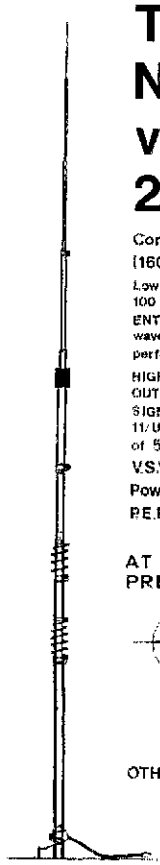

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V.S.W.R. at resonance: 1.5:1 or less; all bands.

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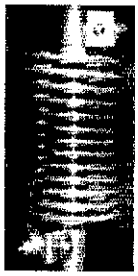
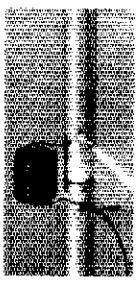

80m coil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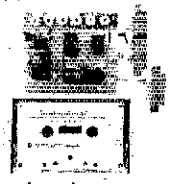

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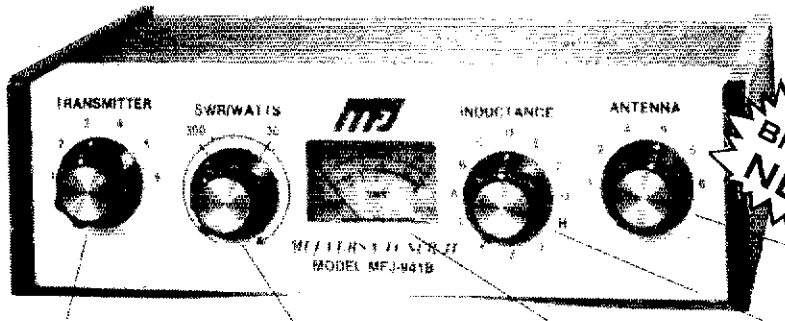
has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



BRAND NEW

NEW, IMPROVED MFJ-941B HAS . . .
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Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

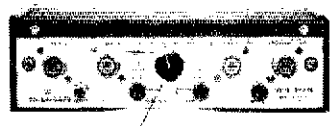
A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line; and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.



ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

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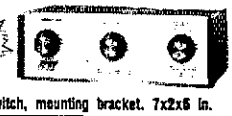

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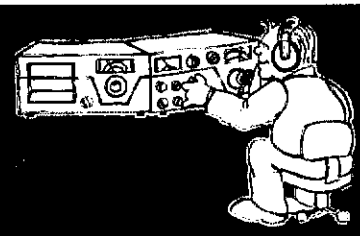

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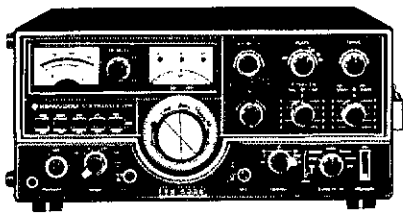

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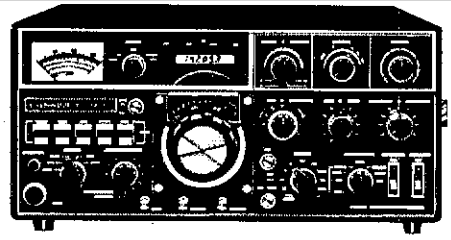

KENWOOD TS-820S transceiver

The TS-820S features a factory installed digital frequency readout. • 160 thru 10 meter coverage • Integral IF shift • RF speech processor • VOX • Noise blanker • PLL • Built-in 25 KHz calibrator • CW side tone & semi-break-in • IF OUT, RTTY, & XVTR • Phone patch IN and OUT terminals.

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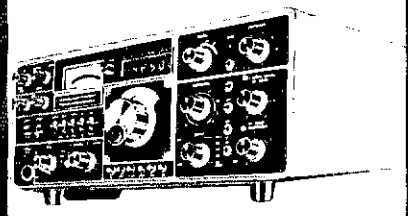

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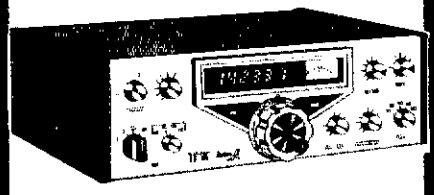

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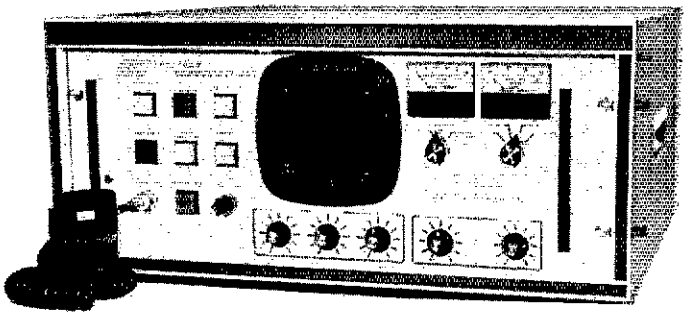

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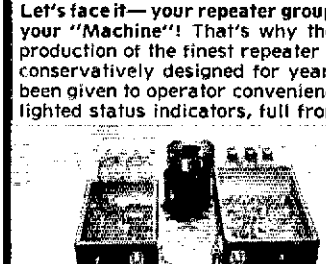

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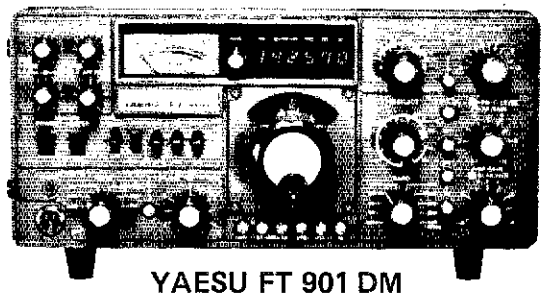

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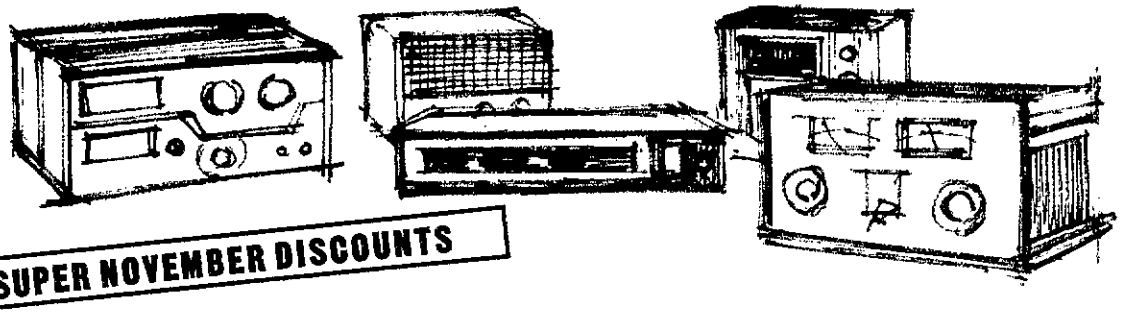

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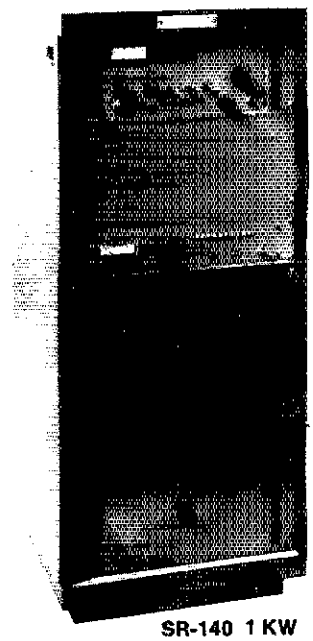

SR-140 1 KW

Operating frequencies are programmed to the front panel switch by entering the desired frequency into a solid state memory using the internal keyboard and display. The channel frequencies can be changed in the field by entering the new frequencies into the memory from the keyboard. Operation on all frequencies is inherent within the SR-240. Changing frequencies does not require any crystal, other component, or test equipment.

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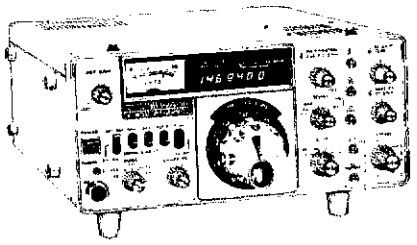

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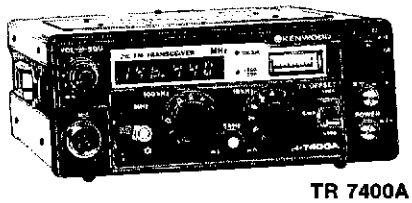

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HX-50 Transmitter 169

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QR-666 259
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The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell accessories and power supplies with matching transceivers and transmitters. Please allow up to 10 working days to ship your order so that we may check and service the gear you purchase.

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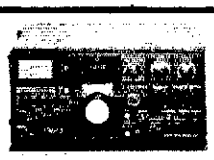

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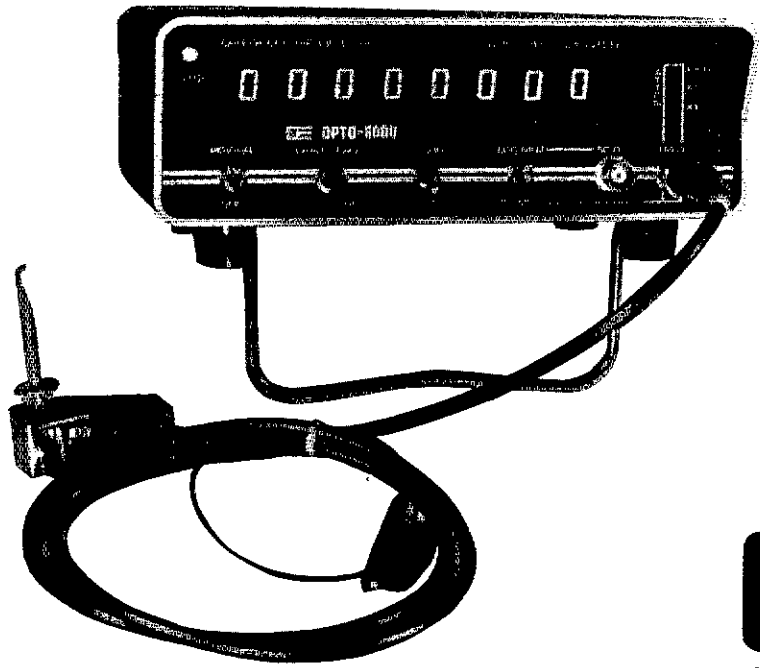

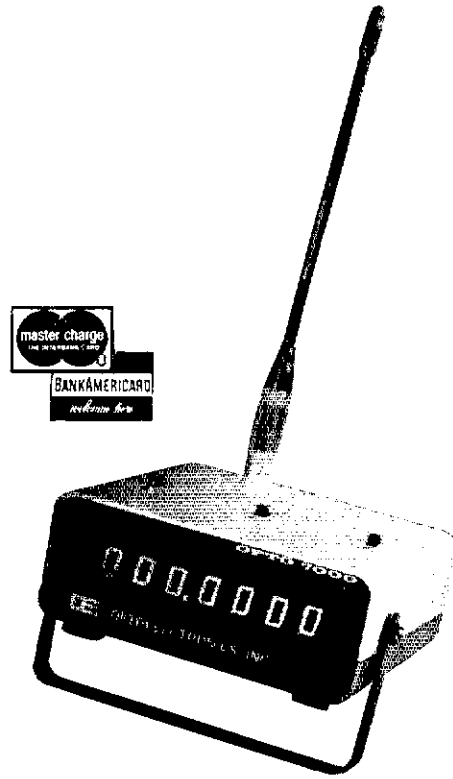

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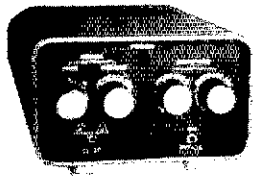

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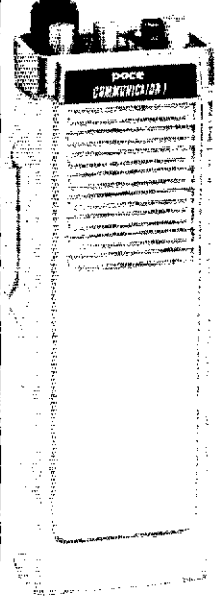

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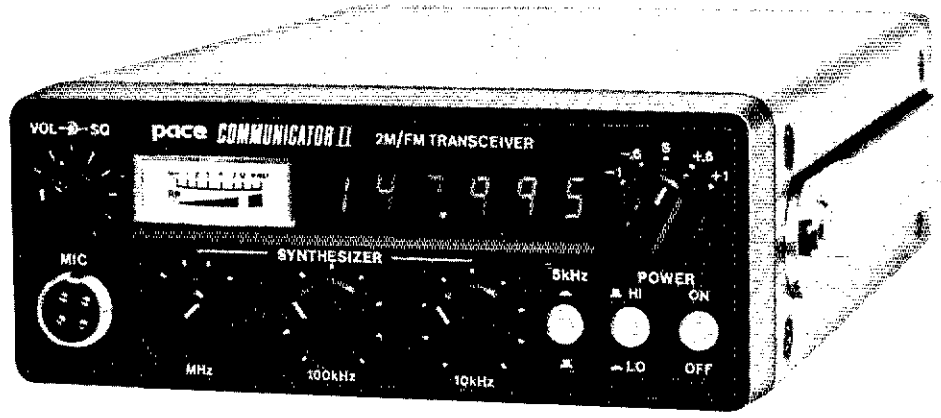

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* Communicator I will be available in the fall, Communicator II is in stock for immediate shipment.

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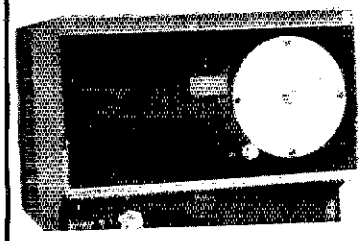
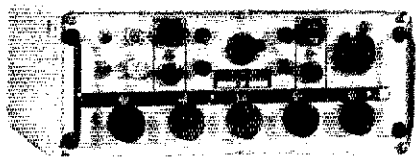
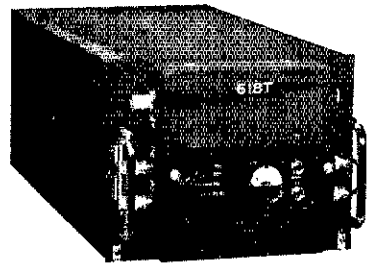




R1051 or T827



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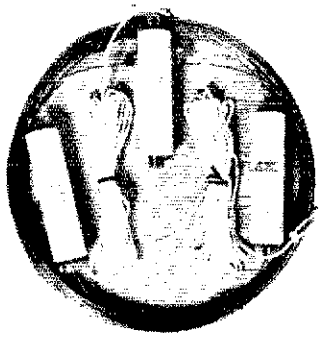

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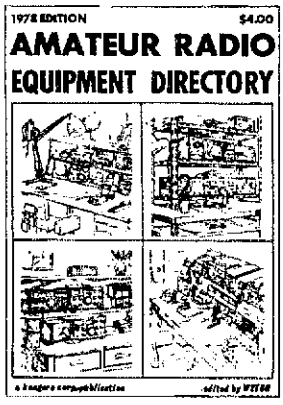

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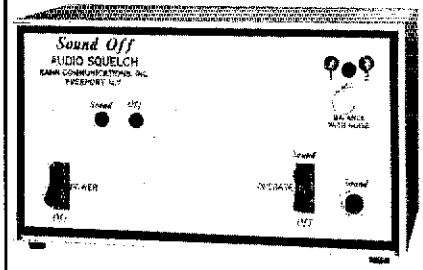

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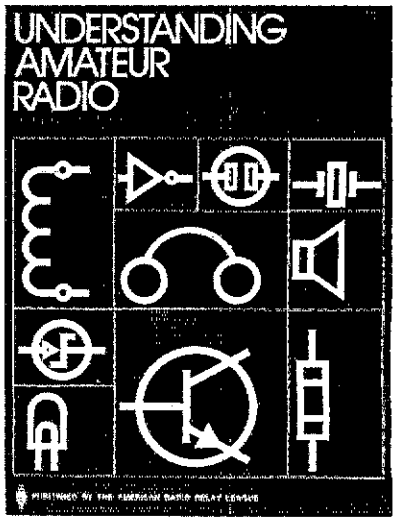

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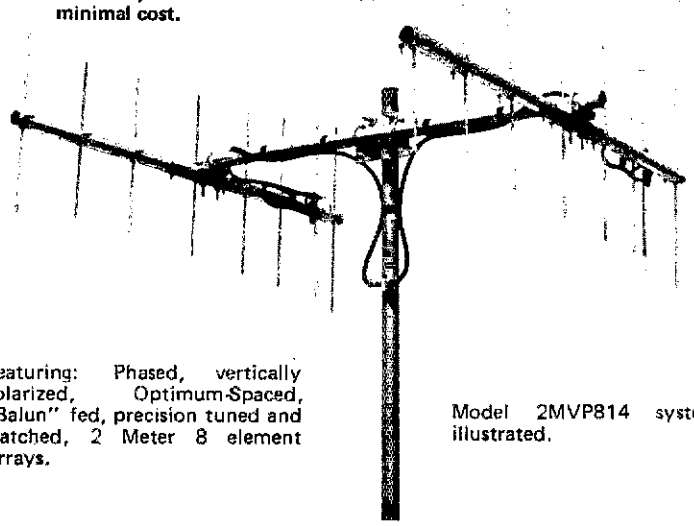

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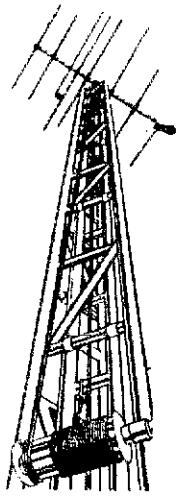

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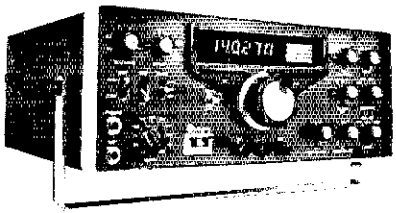

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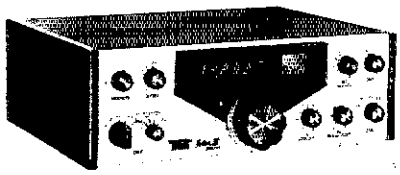

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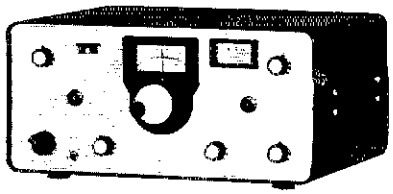
1102	Snap-up legs, pair	1.00
1140	Circuit Breaker	8.75



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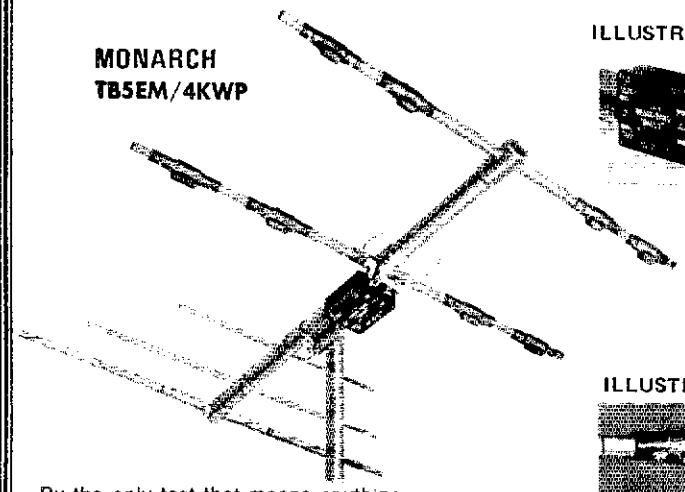

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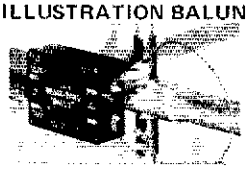

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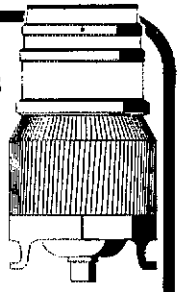

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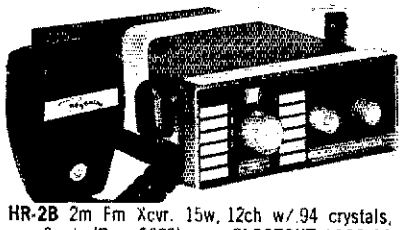

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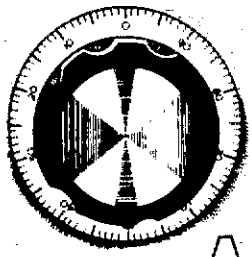

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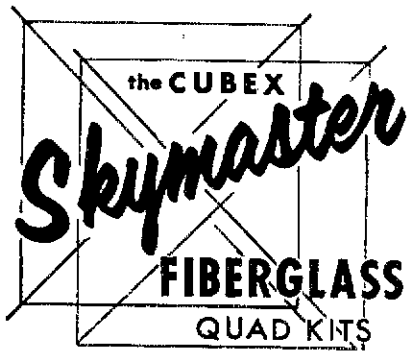

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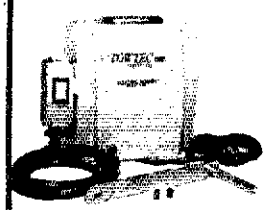

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GUY WIRE, galvanized aircraft control cable 12c/ft. Clamps, turnbuckles, more. Send quarter for list to STANGE; Box 145 Lithonia, GA 30058.

RUBBER Stamps. All wood, four lines, $2. two for $3. NJ residents add tax. M. Zappia,, 18 Spencer Ave., Colonia, NJ 07067.

SELL: SB-100 with power supply, speaker and manuals $200. NC-300 receiver with manual $100. Classic 33 tri-band beam with manual $100. Will deliver all three up to 500 miles. Paulsen W5FTK, RFD 1, Franklin, LA 70538.

COLLINS KWM2. Waters REJ-TNG $650. 312B-5 $450 Both mint. Ralph, W1SDN. 203-397-1555.

WANTED — Grid meters for Johnson's Pacemaker – Thunderbolt. W2DSG 1026 Balcom Ave., Bronx, N 10465.

MINT Ten-Tec Triton IV digital, remote VFO, nois blanker, cw filter, 216 P microphone and stand, com plete 10 meter crystals, accessory ammete VOX/110-220 Vac power supply. Must sell, going back t sea. $985. Ed Giambastiani N4OC 803-795-2423.

BINDERS: For January, 1976 QST and later; $7. Fo December, 1975 and before; $6. ARRL, 225 Main Street Newington, CT 06111.

NAMETAGS 1" x 3" $3.25. Engraved with name, call le ters, QTH. Limit 20 letters per line. Red, blue, yellow black, walnut with white letters. Other colors available Nielsen Communications Inman, Nebraska 68742.

TR-7, IC-701, Ten-Tec 544, IC-211, Midland 510, Mark-I KDK, We-800, MLA-2500, VHF-1+, IC-280, . . . and or and on. Shopping price? Better drop a card or call for ou low, low cash quote. Comm Center Inc., Laurel Plaza Rte. 198, Laurel, MD 20810. 301-792-0600.

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ATV Equipment, older, with manuals; cameras monitors, lenses, cable, etc. Send large s.a.s.e. for list Equipment Sale, Broadcasting Div., Mail code no. 3 Univ. Concinnati, Cincinnati, OH 45221.

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WILSON System Ones now $189.95. Wilson Systen Twos now $149.95. WE-800 with nicads and charge $449.95. Mark Two — write or call. Tetra tower, 11' 4 sections, now $45.95 each. Call or write Abilene Digita Communications P. O. Box 627, Abilene, TX 79604 915-677-0390 after 5 P.M. CST.

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TEST Equipment Catalog listing used Tektronix, HP and GR equipments at bargain prices. PTI, Box 8699, White Bear Lake, MN 55110. Price $1 refundable with firs order.

COLLINS KWS-1 wanted. Please give details on condi tion, mods, serial, price in reply. W1QM, 87 Bloomfield St., Lexington, MA 02173. 617-862-0215.

MICROWAVE Specialists — we buy and sell microwave test instruments, waveguide components. Send in quiries. Lectronic Research 1423 Ferry, Camden, N 08104.

WANTED: SB-101 or SB-102 in working or non-working condition, with or without power supply. Send complete description and asking price. Dick Schellens, WA1BDA Coffin's Farm, South Stratford, VT 05070.

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COLLINS: 75S3C (winged), $925; 3253 (round), $795 516F2 (round), $125; 312B4 (round) $175 all absolutely mint. HW-101, $225; HP-23, $35. Miller, 3685 Sycamore Marion, Indiana 46952.

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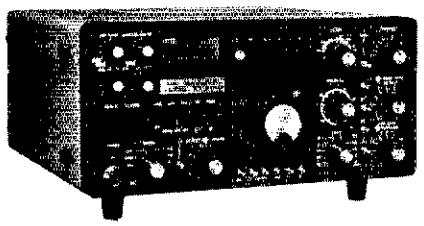

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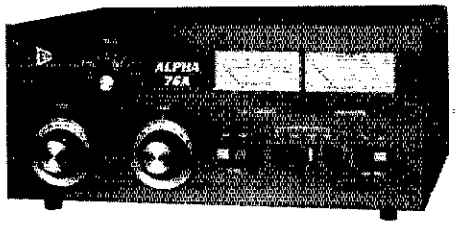

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SELL Drake R4A, T4X, AC4, MS4 in excellent condition $700. Also Regency HR-2A 2-M with xtals for six channels, mic., Kulrod 2-M mobile antenna with magnetic base $150. Greg, W2HRX, 212-580-9964.

SELL: Yaesu FRG-7 Mark I SWL rcvr. 10 hours use. $200 firm postpaid. Wanted: Cheap transceiver. Doug Kowalski, 7319 Donna Dr., Middleton, WI 53562 608-831-2267.

DRAKE 2B-2BQ, good condition, $180. W8EL (517-773-7120).

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KIT Builders. I have Heathkits with cartons never opened. Do not have time to build. HW-2021 2 meter handheld with Touch-Tone pad and 3 crystals, $195. HD-1410 electronic keyer, $45. GD-1157 car alarm, $20. WA5RSC, Bill Morris, 4419-77th St., Lubbock, TX 79424.

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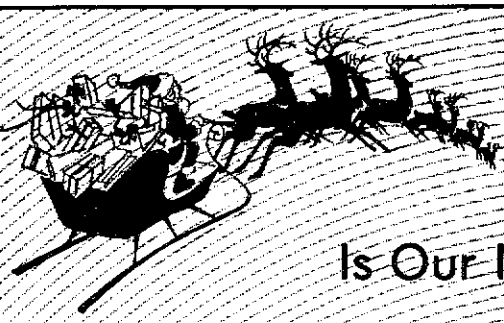

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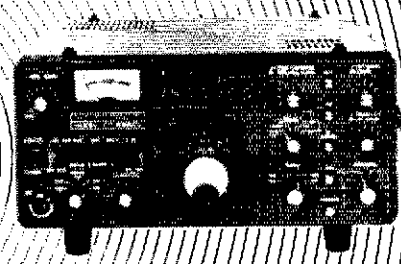

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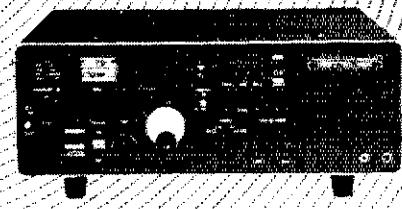

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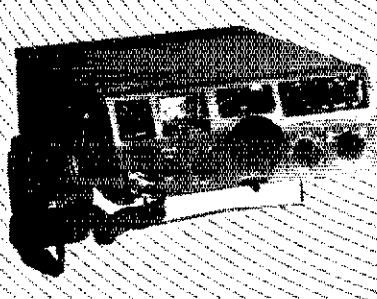

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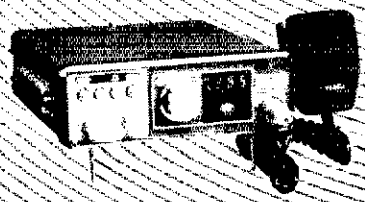

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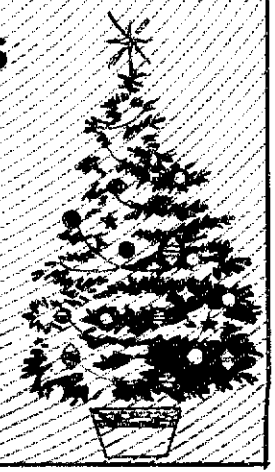

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HEATHKIT DX-60B mint. Logged less than 20 hours. $60. U ship. WB5YRT 9054 Southwood Drive, Shreveport, LA 71118. 318-686-5780.

TEN-TEC 544 digital, 262G, VOX, power, 242 VFO, 245 cw, 249 blanker. Mint, $900. K8CV 313-549-2353.

WANTED: Heathkit HG-10B VFO. Virgil Arns, RFD #4 Waverly, IA 50677.

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SELL — Drake SSR-1, 5-30 MHz general coverage receiver, mint condition $175; Heath DX-60B, $60; MFJ cw filter, $10. Doug Jones, WB7NVO, RFD 1, Box 308, Delta, UT 84624.

SELL Heathkit SB-102, $300; cw filter, SB-600 spkr and HP-23B pwr supply $60; IM-18 VTVM $25; HD-10 keyer $35; all for $400. College. Mark Cronemeyer, WA2FTZ, 211 Barnes St., Ossining, NY 10562.

ASTRO 200 digital transceiver, 200 watts; brand new in factory sealed carton with power supply $850. Yaesu FT-7 used $395. Bob Seydler, Rt. 2, Box 586, Boerne, TX 78006.

COLLINS S/Line wanted. Sell HQ-170VHF, Viking 500 and Collins R-388, all operating condition, pick up only. Make offer. K1NLW, 47 Old Wagon Rd., Ridgefield, CT 06877.

FOR SALE: Drake SPR-4 rcvr with SCC-4 cal, 5-NB noise blanker, AL-4 loop ant, xtals for SWL, ham & some marine freq, MS-4 spkr, TA-4 xcvr adapter $450 (firm) T-4B reciter xcv's with SPR-4/R4 series $250 (firm); new HP-23C pwr supply $60. Tom Howey, WB1FPA, Box 302 RFD 2, Stacy Lane, Goffstown, NH 03045 603-497-3539.

WANTED — Atlas 210X or 215X & mobile ant. and accessories. Send resume and price. KA4BGA, Dan Mobley, Box 103, Latta, SC 29565.

FOR SALE — One HW-12A 80 meter transceiver and p.s., good. $105. K1WO, P. O. Box 7, Somerset MA 02726. Tel. 617-678-4391.

COLLINS station, 32S3 s/n10201, 75S3B s/n30127, 30L1 s/n40781, 312B4 s/n70212, 516F2 s/n60168, all round emblem, excellent condition, no modifications, make offer. Also, Hy-Gain TH6 beam, Ham-M rotor, Rohn #25 tower (55 ft), make offer. Nick Quackenbush, 6203 Rainier Rd., Plano, TX 75023, 214-424-6619.

COLLINS KWM-2 $475; 75S3B $525, N6HR 408-867-3257.

WANTED: One copy of Radiotelegraph Operator's Q&A Manual by Milton Kaufman, publisher Hayden Book Company. Contact Alex Gish, Route 1, Box 46, Belfast, ME 04915.

COMPLETE station, new Kenwood TS-820, Yaesu 2-kW linear, D-104 mike, all manuals and cables, $1100; will sell items separately; call 804-973-7257, WB4JZV.

SERVICE on Kenwood ham equipment by experienced technicians. Quick turn around time. Dealer for most lines, competitive prices. Universal Amateur Radio, Inc., 1280 Aida Dr., Reynoldsburg, OH 43068. 614-866-4267.

HW-101 (Owners). Send for your copy of thirteen modifications that can improve your transceiver's overall performance, on both transmit and receive. Send $2 to Ham-Mods, 6817 Gettysburg Dr., Hudsonville, MI 49426.

MOTOROLA 2-meter receiver type TA140B, 144-174 MHz $85. Matching transmitter, TA192 $85; ac power supply, control head and mic. $85. Complete unit $200. W6BKY, Box 1457, Campbell, CA 95008.

TEN-TEC PM3A transceiver — break in keying, $45. 305-878-5912. W. Corl, 3 Florencia Lane, Port St. Lucie, FL 33452.

SELL: Heath SB-104, HP-1144, SB-604, SBA-104-1, SB-230 — $900. Hy-Gain 18-AVT $75. Wilson 1402-SM w/tone pad, TPL 302 Amp) $300. Or trade for Apple II. Don Smith, K5CAF, 4438 Lymbar, Houston, TX 77096.

RTTY Hal ST-6 with AK-1 and 3 shifts $300; RVD 1005

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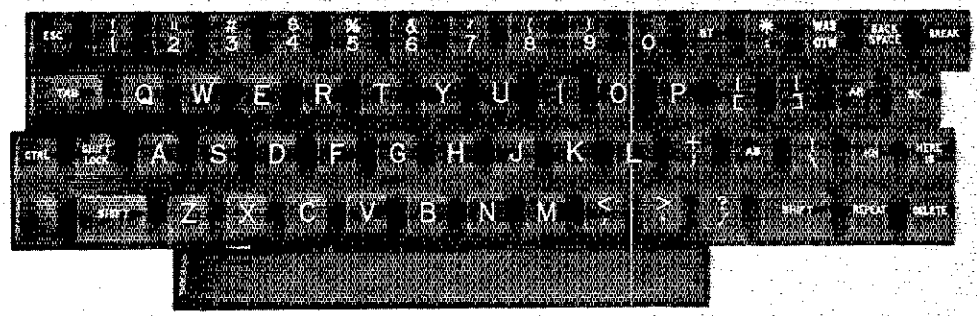

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MOTOROLA Wanted: I need Micors, Motracs, HT 220's, "MX's" or any Motorola equipment and parts. Radios must have serial plates. Len Rusnak, WA3TJO, 9605 Dubarry Avenue, Seabrook, MD 20801. 301-441-1221.

FOR SALE: Hammarlund gen. rcvr. Hallicrafters HT-37 xmtr. Gonsett linear. Ham II rotor — new. Fone patch, 5 way antenna switch, mike, etc., coax, wire (approx. 60ft. each). Excellent condition. $485. K1RJS 203-745-0683.

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WANTED: Heath VF-1 VFO, manual for DX-35. Selling Heath shortwave receiver, FB cond. $45. WB2MJQ, Box 490, Chester, NY 10918.

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Hallicrafters SR-42A two meter transceiver, mint, mobile gutter whip, ac/dc, manual, $75 offer. WB6TJQ, 1992 Kinneloa Canyon Road, Pasadena, CA 91107. Telephone — 213-798-1772.

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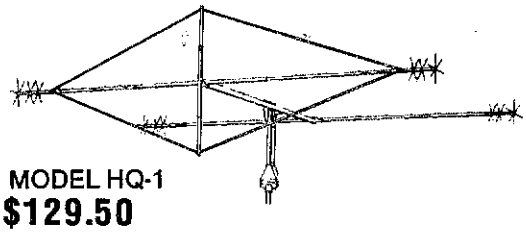

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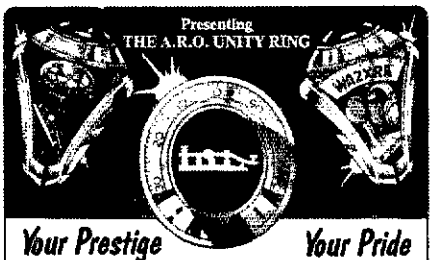

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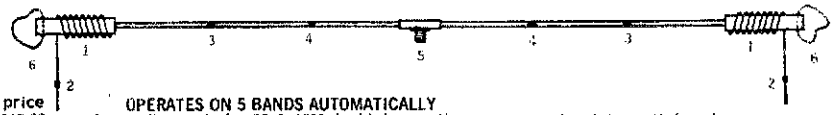

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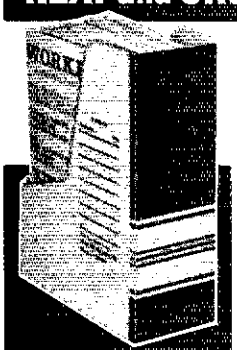

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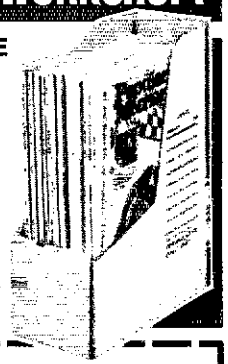

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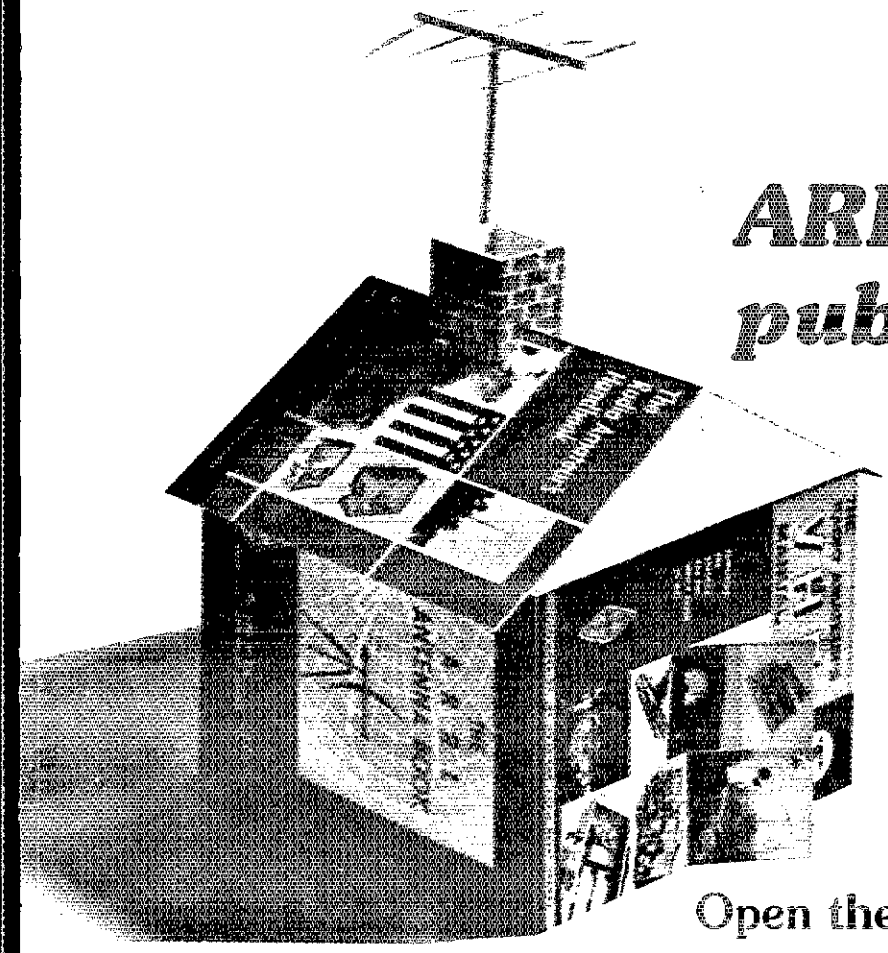

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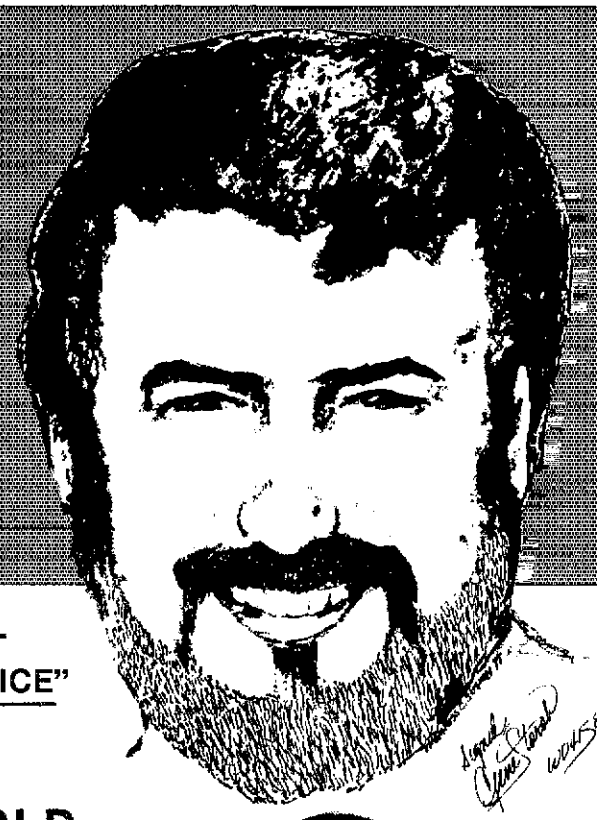

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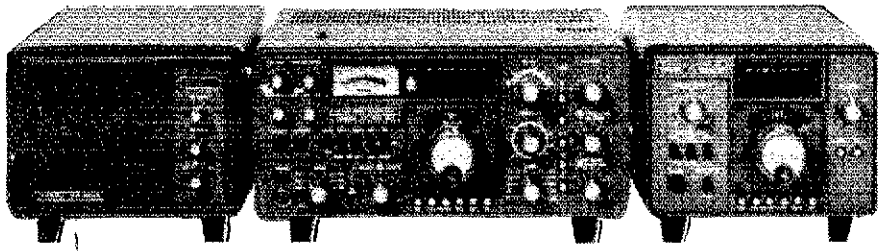

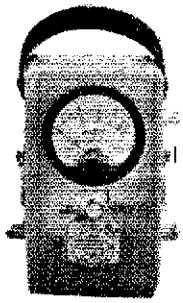

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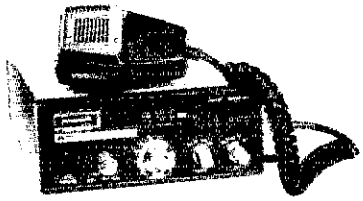

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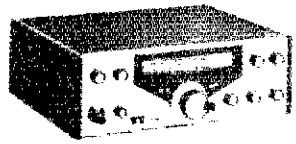

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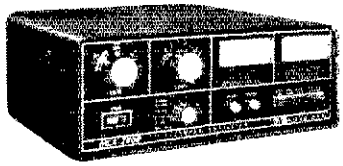

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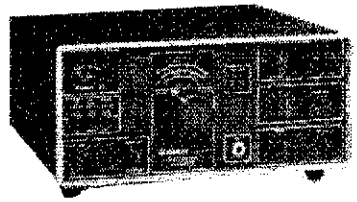

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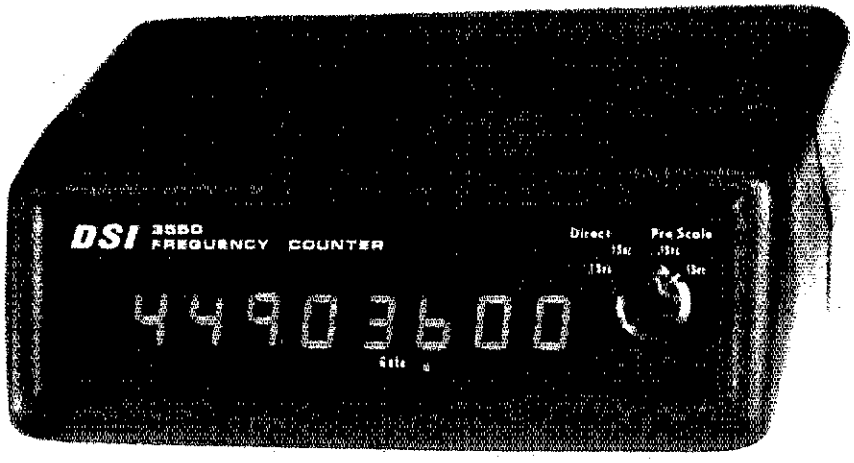

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WANTED — Service manual or complete schematics or copies for Motorola model P-33 high band Handi-Talkie. WB4YWV, Bob Greep, Rte. 1, Box 3, Louisa, VA 23093.

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SELL: Hallicrafters FPM300 Mark II ac/dc transceiver, extra tubes, fan, mic., $325. Clegg mark 3 fm transceiver, 12 channels, 15 watts, mic., antenna. Vista V1-R supply, $175. Morgain new dipole 40/20 meters, length 36 feet, $40. Shipping prepaid, offers considered. George Konnick, Apt. C5, 1750 West Main Street, Riverhead, NY 11901.

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DRAKE C-Line purchased 3/78 $1000. W2YA. 201-795-2812.

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FOR SALE: Triton IV transceiver, VOX power supply, digital readout, cw filter, noise blanker, microphone 12 months old asking $850. Yaesu FT-620B 6-mtr transceiver 6 months old, used 4 hours, asking $325. Paul, K1YOU, after 5 P.M. 413-538-7978.

FOR SALE: Heath SB-614 station monitor w/manual $150. Heath HM-102 wattmeter/SWR bridge w/manual $30. Excellent condition and I will ship. WB4MNW, 1555 Galveston St., Memphis TN 38114. 901-743-0951.

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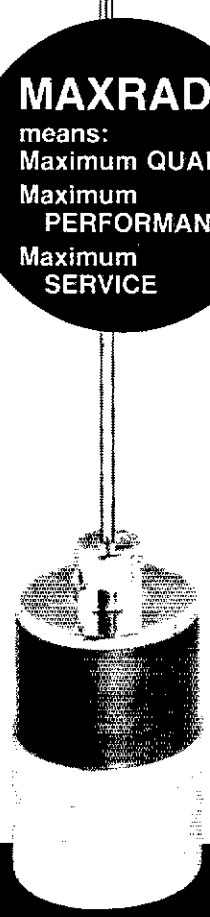

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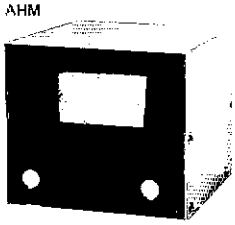

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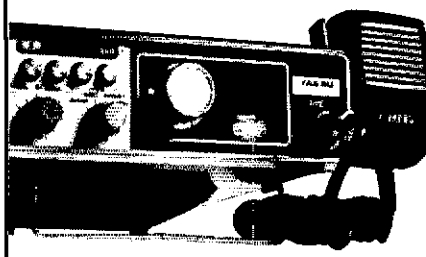

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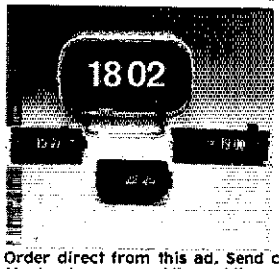

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SB-610 monitor scope with manual for sale; wired for 3 MHz i-f, chassis bent but works well, $65, shipping paid. Jim McGloin, WB9QNC, 520 Main St., #6, Lemont, IL 60439.

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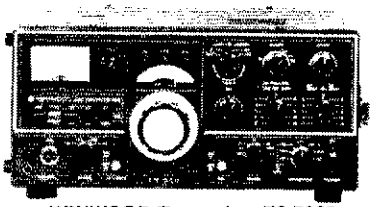

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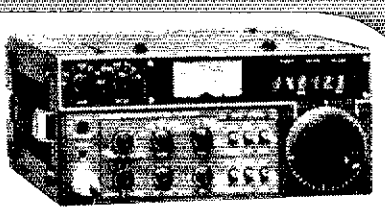

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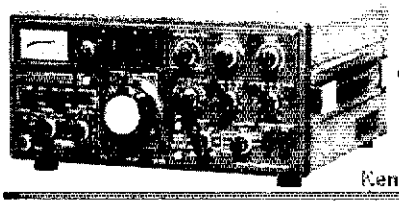

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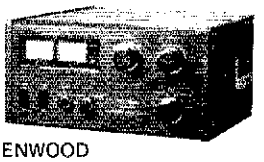

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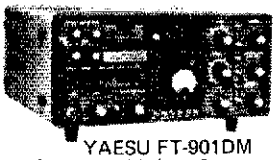

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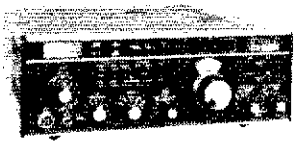

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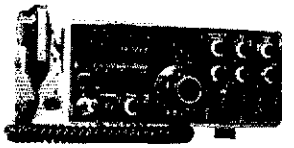

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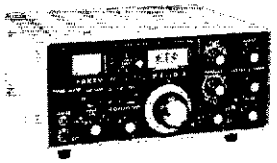

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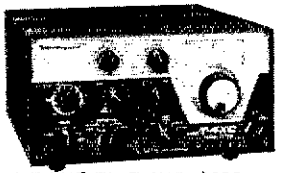

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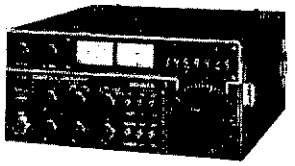

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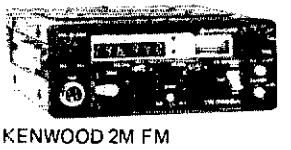

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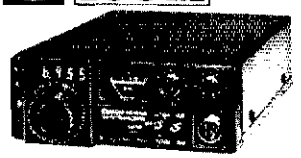

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A vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

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A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versitility. A switch on the rear panel determines the signal path . . . the receiver in the TS-820 or any external receiver.

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The CW-520 500-Hz filter can be easilly installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has three positions (OFF, FAST, SLOW) for optimum operation on CW.

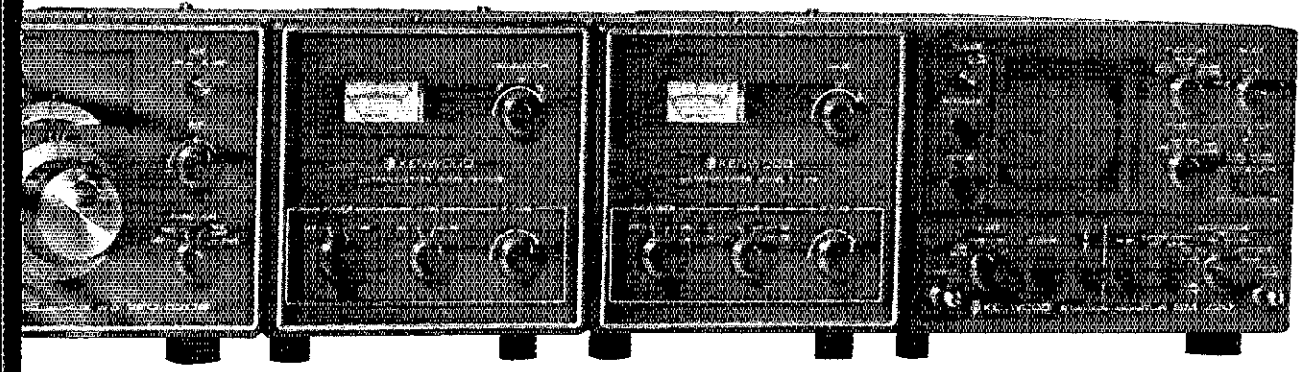
AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (optional) allows for mobile operation of the TS-520S.

EASY PHONE PATCH CONNECTIO

The TS-520S has two convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 kHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in cooling fan • Provisions for four fixed frequency channels • Heater switch.



VFO-520S TV-502S TV-506 SM-220

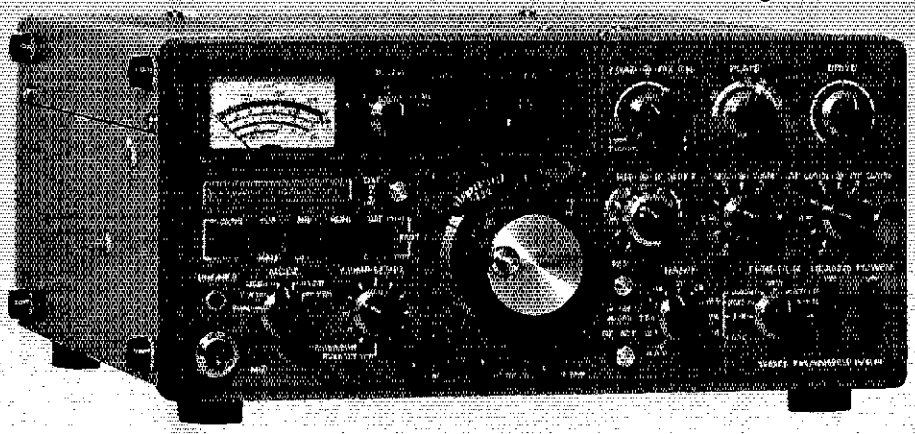
ting on the 2-meter band.
The **TV-506** is an equally practical way of getting on the 6-meter band, providing 10 watts on SSB and CW.
The **SM-220** is an extremely useful and unique station monitor. It allows you to monitor your transmissions, monitor incoming signals and monitor the amount and strength of band activity* and performs as a general purpose 10 MHz oscilloscope, as well.

*With BS-5 or BS-8 pan display option.

KENWOOD

. . . pacesetter in amateur radio

The TS-820S . . . known worldwide as the Pacesetter. Amateur Radio Operators universally respect its superb quality, proven through thousands of hours of operating time under all environmental conditions. The TS-820S has every feature any Amateur could desire for operating enjoyment, on any band from 160 through all of 10 meters.

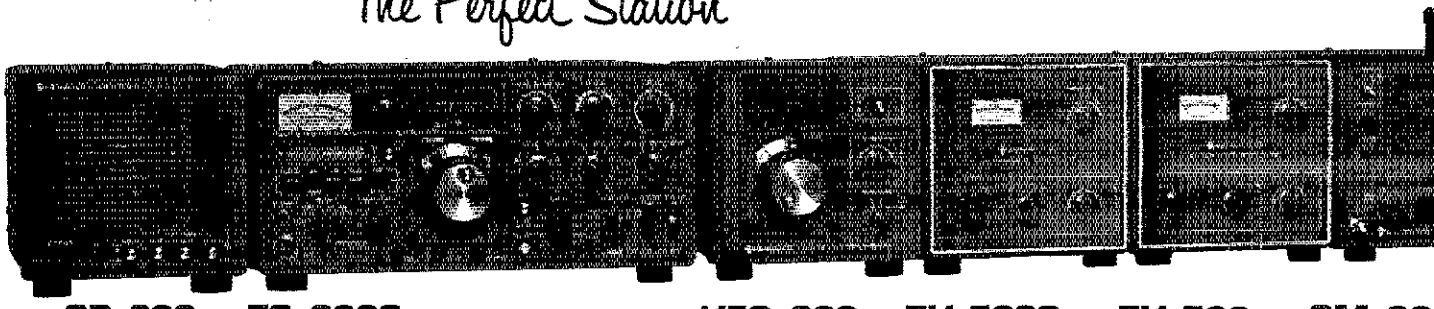


TS-820S

You can always tell who's running a TS-820S. Its superb quality stands out from all the other rigs on the band . . . and when the QRM gets heavy, the TS-820S's adjustable RF speech processor, utilizing a 455-kHz circuit to provide quick-time-constant compression, will get the message through. RF negative feedback is applied from the final to the driver to improve linearity, and third-order products are at least —35 dB. Harmonic spurious emissions are less than —40 dB and other spurs are less than —60 dB. RF input power is 200 W PEP on SSB, 160 W DC on CW, and 100 W DC on FSK. Receiver sensitivity is better than 0.25 μV for 10 dB S/N. The TS-820S is known for its superb receiver selectivity, and its famous IF shift easily eliminates heavy QRM. That's why the TS-820S is the DXer's choice.

See your local Authorized Kenwood Dealer today.

The Perfect Station



SP-820 TS-820S VFO-820 TV-502S TV-506 SM-22

T-599D

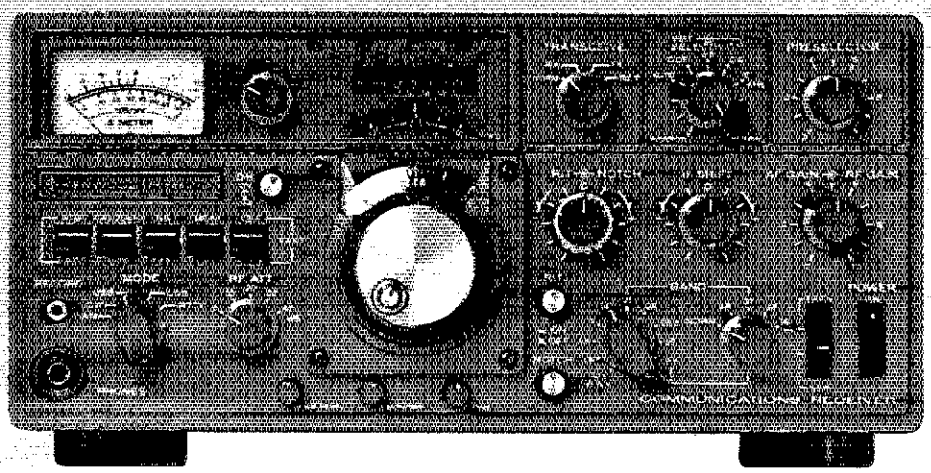
Kenwood's matched pair...

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating Amateur

The T-599D transceiver is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full Amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

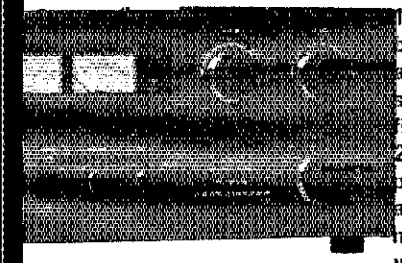
Your station isn't complete if it doesn't include the R-820



R-820

Introducing the ultimate in receiver design . . . the Kenwood R-820.
With more features than ever before available in a ham-band receiver. This triple-conversion (8.33 MHz, 455 kHz, and 50 kHz IFs) receiver, covering all Amateur bands from 160 through 10 meters, as well as several shortwave broadcast bands, features digital as well as analog frequency readouts, notch filter, IF shift, variable bandwidth tuning, sharp IF filters, noise blanker, stepped RF attenuator, 25 kHz calibrator, and many other features, providing more operating conveniences than any other ham-band receiver. The R-820 may be used in conjunction with the Kenwood TS-820 series transceiver, providing full transceive frequency control.

Additional features include: A monitor switch which allows the user to hear his own voice when using associated transmitter. Either VFO control or crystal control on four selectable frequencies. Digital hold . . . locks counter and display while VFO is tuned to another frequency . . . facilitates return to "hold" frequency. RIT/notch control . . . RIT allows receiver to be tuned off frequency, while not affecting transmit frequency when in transceive mode with TS-820S. Notch control tunes notch within IF passband for eliminating interference. Interfering signal remains notched even when IF shift is utilized. Built-in crystal calibrator, settable to WWV, provides signal every 25 kHz. Noise blanker/level control . . . for maximum reduction of noise interference. A transceive/separate switch enables receive VFO to control the receiver and TS-820 (or TS-820S) frequency (or the TS-820 VFO to control both), or, of course, both can function independently.

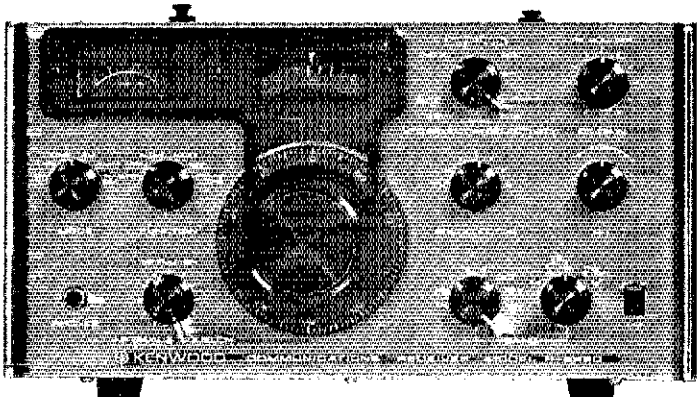


TL-922A

for the most discriminating Amateur

If you have never considered the advantages of operating a receiver/transmitter combination . . . maybe you should. Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid-state (and includes four filters). Your choice will obviously be the Kenwood.

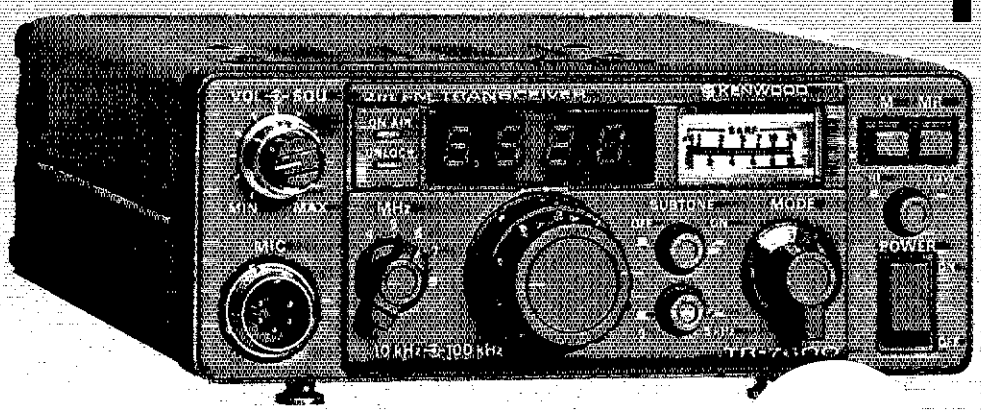


R-599D

KENWOOD

...pacesetter in amateur radio

10 WATT ...KENWOOD OFFERS A CHOICE



TR-7600

...THE RADIO THAT REMEMBERS

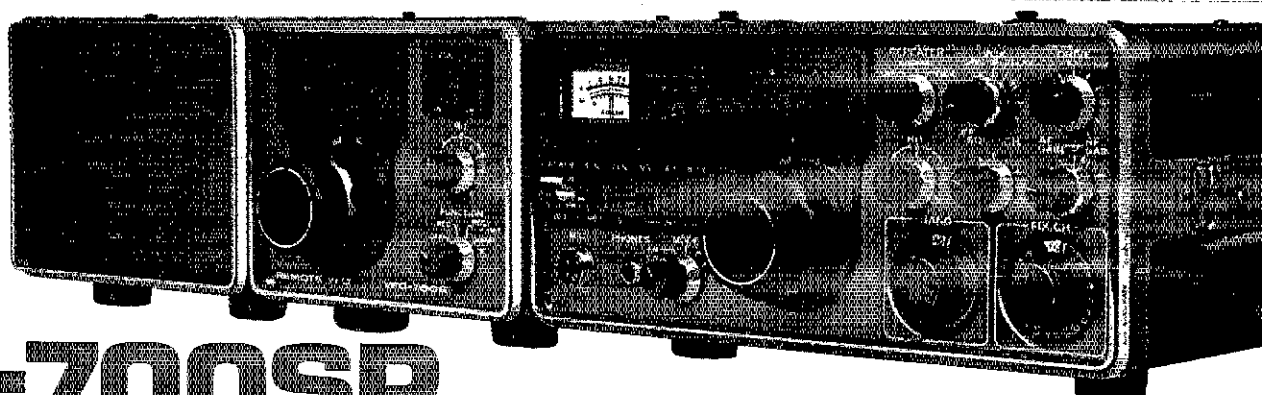
Every feature you could possibly want in a 2-meter FM rig is available now in the Kenwood TR-7600...the RADIO THAT REMEMBERS!

Even without its optional "Remote Controller," the TR-7600 gives you...
• Full 4-MHz coverage (144.000-147.995 MHz) on 2 meters • 800 channels • Dual concentric knobs for fast frequency change (100-kHz and 10-kHz steps) • 5-kHz offset switch • MHz selector switch...for desired band (144, 145, 146, or 147 MHz) • Mode switch for operating simplex or for switching the transmit frequency up or down 600 kHz for repeater operation...or for switching the transmitter to the frequency you have stored in the TR-7600's memory (while the receiver remains on the frequency you have selected with the dual knobs) • Memory channel...with simplex or repeater (plus or minus 600 kHz transmitter offset) operation. • Digital frequency display (large, bright, orange LEDs) • UNLOCK indicator...an LED that indicates transceiver protection when the frequency selector switches are improperly positioned, or the PLL has malfunctioned • 10 watts RF output (switchable to 5 watts low power) • Noise-cancelling microphone • Compact size (only 6-7/16 inches wide, 2-7/16 inches high, and 9-3/16 inches deep)

The optional Remote Controller, with a built-in microprocessor, provides more operating features to the TR-7600 2-meter FM tranceiver than found in any other rig! With the Remote Controller attached to your TR-7600, you can...
• Select any 2-meter frequency • Store frequencies in six memories • Scan all memory channels • Automatically scan up all frequencies in 5-kHz steps • Manually scan up or down in 5-kHz steps • Set lower and upper scan frequency limits • Reset scan to 144 MHz • Stop scan (with HOLD button) • Cancel scan (for transmitting) • Automatically stop scan on first busy **or** open channel • Operate on MARS (143.95 MHz) • Select repeater mode (simplex, plus transmit frequency offset, minus offset, or any of six memory transmit offsets) • Select transmit offset (1 MHz/600 kHz)

The Remote Controller's display indicates frequency (even while scanning) and functions (such as autoscan, lower scan frequency limit, upper scan limit, error, and call channel).

Subject to FCC approval.



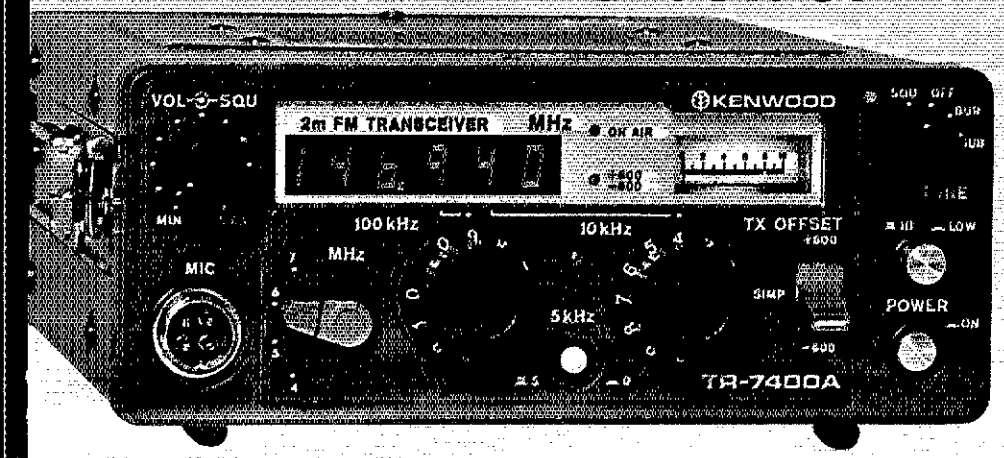
TS-700SP

SP-70 VFO-700S

Still the same fine, time proven rig. But now with the simple addition of a plug-in crystal, the TS-700SP will be able to utilize the new repeater sub-band (144.5 to 145.5 MHz). Still features all of the fine attributes of the TS-700S: A digital frequency display, receiver pre-amp, VOX, semi-break in, and CW sidetone. Of course, it's all mode, 144-148 MHz, VFO controlled... and Kenwood quality throughout.

Features: 4 MHz band coverage (144 to 148 MHz) • Automatic repeater offset capability on all FCC authorized repeater subbands including 144.5-145.5 MHz • Simply dial receive frequency and radio does the rest...simplex, repeater, or reverse. Same features on any of 11 crystal positions • Transmit/Receive capability on 44 channels with 11 crystals • Operates all modes: SSB (upper and lower), FM, AM and CW • Digital readout with "Kenwood Blue" digits • Receiver pre-amp • Built-in VOX • Semi break-in on CW • CW sidetone • All solid-state • AC and DC capability • 10 watts RF output on SSB, FM, CW • 3 watts on AM • 1 watt FM low-power switch • 0.25 μV for 10 dB (S+N)/N SSB/CW sensitivity • 0.4 μV for 20 dB quieting FM sensitivity.

OR 25 WATT OUTPUT

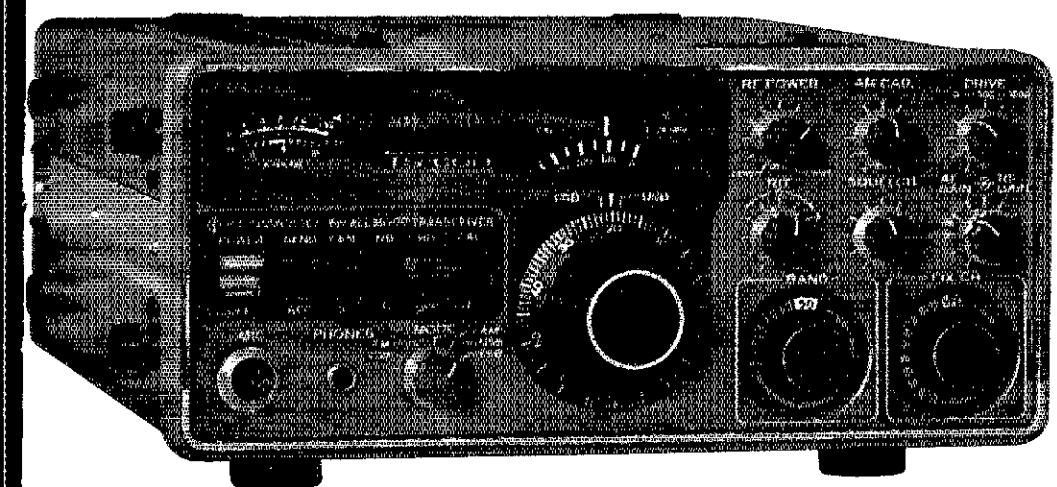


TR-7400A

The fully-synthesized TR-7400A 2-meter FM transceiver operates on 800 channels and features repeater offset over the entire 144-148-MHz range, dual frequency readout, six-digit display, and subaudible tone encoder and decoder. RF output is at least 25 watts!

The TR-7400A 2-meter FM transceiver provides fully synthesized operation, including 600-kHz repeater offsets, over the entire 144-148-MHz range. It can operate on any of 800 channels, spaced 5 kHz apart. RF output is at least 25 W, and typically 30 W. A low power position produces 5-15 W (adjustable). Included is a dual frequency readout with large six-digit LED display plus a dial readout. The subaudible CTCSS signaling feature may be used on transmit and receive, or transmit only. Optional tone-burst modules are available. Receiver sensitivity is better than 0.4 μV for 20 dB quieting. Large, high Q, helical resonators minimize interference from outside the band. A two-pole 10.7-MHz monolithic crystal filter provides excellent selectivity.

Intermodulation distortion is down more than 66 dB, spurious rejection is better than −60 dB, and image rejection is better than −70 dB. See your local Authorized Kenwood Dealer today, for a demonstration of the fantastic TR-7400A.

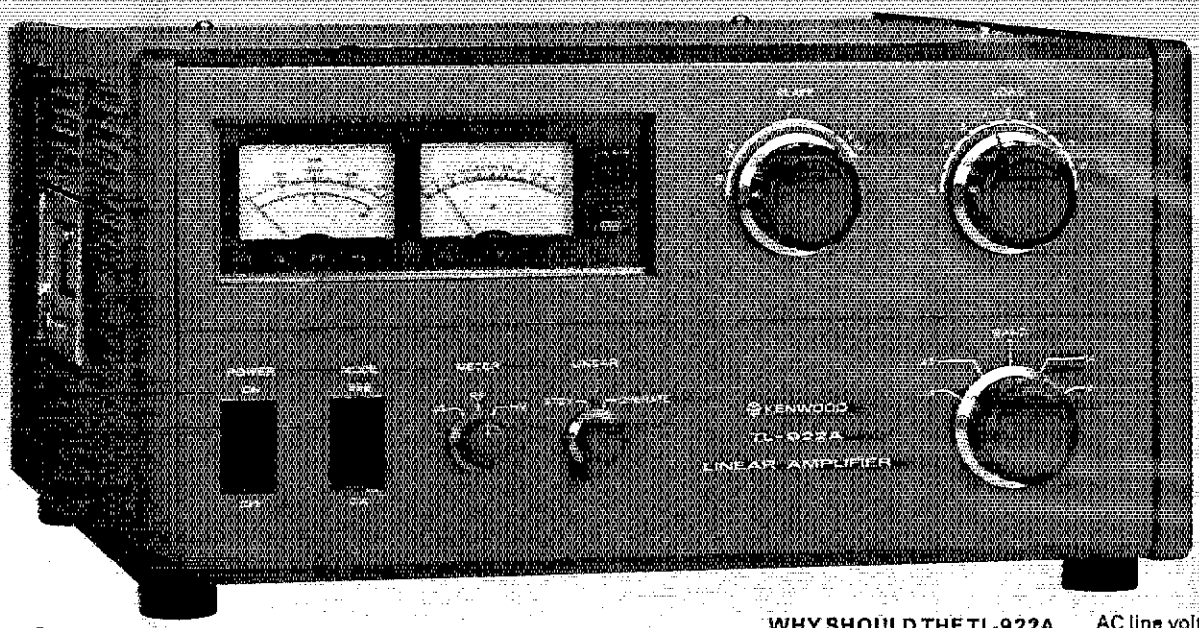


TS-600

Experience the excitement of 6 meters. The TS-600 all mode transceiver lets you experience the fun of 6 meter band openings. This 10 watt, solid state rig covers 50.0-54.0 MHz. The VFO tunes the band in 1 MHz segments. It also has provisions for fixed frequency operation on NETS or to listen for beacons. State of the art features such as an effective noise blanker and the RIT (Receiver Incremental Tuning) circuit make the TS-600 another Kenwood "Pacesetter".

KENWOOD

...pacesetter in amateur radio



Give your signal extra muscle

TL-922A

The Kenwood name has grown to represent the finest Amateur Radio equipment available. The TL-922A linear amplifier carries on that tradition. As a linear it gets your signal through today's crowded bands and provides the power to reach those far away places with ease. And because it's Kenwood you can count on its dependability. The TL-922A is FCC type accepted. It runs the full legal limit on all ham bands from 160-15 meters and is compatible with most amateur exciters. Contact your nearest Authorized Kenwood Dealer for complete specifications and the best deal.

WHY SHOULD THE TL-922A BE PART OF YOUR STATION? COMPARE THESE FEATURES AND SPECS... THE ANSWER WILL BE OBVIOUS.

Instant heating filaments — The 3-500Z tubes require no warm up period. Just turn it on and go!

Time delay fan circuit — Even after you turn the TL-922A off, the super quiet fan continues to work for approximately 2 minutes to greatly extend tube life.

Adjustable ALC output voltage — Lets you tailor the ALC voltage to your exciter.

Standby position — Provides amplifier bypassing without having to turn the AC power off.

Two independent safety interlocks — One disconnects AC line voltage and the second shorts B+ to ground when tripped.

Vernier plate control — For smooth, easy tune-up.

Diecast side panels—Includes functional carrying handles for easy transportation.

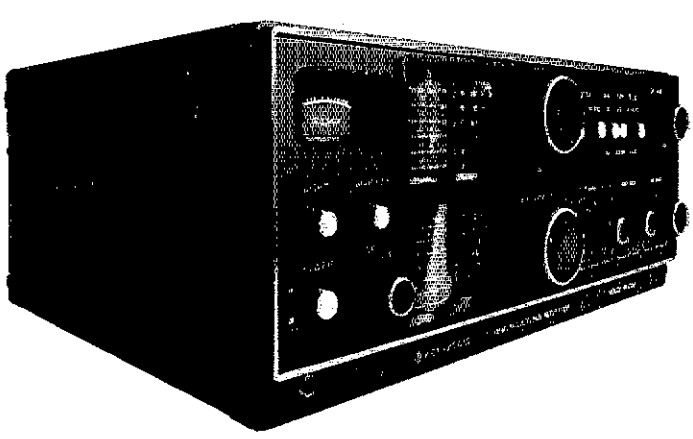
Thermal protection of power transformer — Amplifier automatically switches to standby if power transformer temperature exceeds 145°F.

Tuned Input Circuit — Means improved spurious characteristics.

Line voltage selector — Easily switched between 120 and 240 VAC.

Multimeter — Reads high voltage, relative output or grid current (selectable).

Plate Current Meter — Separate meter allows continuous monitoring of plate current.

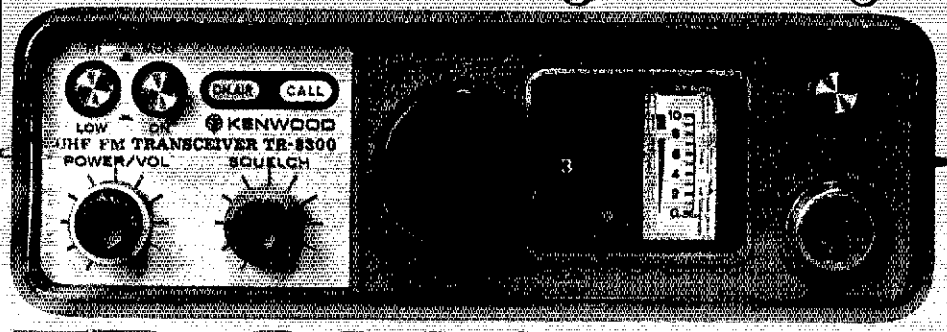


For the best in world listening

R-300

Dependable operation, superior specifications and excellen features make the R-300 an unexcelled value for the short wave listener. It offers full band coverage with a frequency range of 170 kHz to 30.0 MHz • Receives AM, SSB and CW • Features large, easy to read drum dials with fast smooth dial action • Band spread is calibrated for the 10 foreign broadcast bands, easily tuned with the use of a built-in 500 kHz calibrator • Automatic noise limiter • 3-way power supply system (AC/Batteries/External DC)... take it anyplace Automatically switches to battery power in the event of AC power failure.

Escape the rat race... try 440 MHz FM!



TR-8300

How would you like to work an uncrowded frequency . . . hear signals with less noise . . . or use a sophisticated repeater or remote base with better coverage? 440 MHz is the answer. It will surprise you. It will penetrate buildings where 2 meters won't, and often you can even work out from underground garages . . . where 2 meters is dead.
Best of all, it's easy to get on 440 MHz (70 cm) . . . with a Kenwood TR-8300 transceiver. High quality is critically important on VHF bands, and the TR-8300 is just what you need to meet all technical requirements.

- 10 watts RF output (switchable to 1 watt)
- 23 crystal-controlled channels (3 supplied)
- 445.0-450.0 MHz transmit range
- 442.0-447.0 MHz receive range
- Transmitter and receiver adjustable over any 5-MHz segment from 440 to 450 MHz
- 5-section helical resonator and 2-pole crystal filter in IF to reject intermod
- SWR protection in final amplifier
- Excessive-voltage and reverse-polarity protection circuits
- 0.5 μV for 20 dB quieting sensitivity
- Better than −60 dB spurious radiation
- 20 kHz (−6 dB), 40 kHz (−70 dB) selectivity
- Monitor switch that lets you check modulation and frequency "netting"
- Call CH switch that activates optional CTCSS (subaudible tone) function
- Large S meter

Move up to 440 MHz today . . . with a Kenwood TR-8300 . . . for more reliable communications!

Fine equipment that belongs in every well equipped station

HF LINES

820 Series
TS-820S . . . TS-820 with Digital Installed
TS-820 . . . . 160-10 m Deluxe Transceiver
YG-88A . . . 6-kHz AM filter for R-280
YG-455C . . 500-Hz CW filter for R-820
YG-455CN . 250-Hz CW filter for R-820
DG-1 . . . . . Digital Frequency Display for TS-820
VFO-820 . . Deluxe Remote VFO for TS-820/820S
SP-820 . . . . External speaker with audio filters
CW-820 . . . 500 Hz CW Filter for TS-820/820S

520 Series
TS-520S . . . 160-10 m Transceiver
DG-5 . . . . . Digital Frequency Display for TS-520 Series
VFO-520 . . . Remote VFO for TS-520 and TS-520S
SP-520 . . . . External Speaker for 520/820 Series
CW-520 . . . 500 Hz CW Filter for TS-520/520S
DK-520 . . . Digital Adaptor Kit for TS-520

599D Series
R-599D . . . 160-10 m Solid State Receiver
T-599D . . . 80-10 m Matching Transmitter
S-599 . . . . . External Speaker for 599D Series
CC-29A . . . 2-meter Converter for R-599D
CC-69A . . . 6-meter Converter for R-599D
FM-599A . . FM Filter for R-599D

HF ACCESSORIES

TL-922A . . . 160-15 m kilowatt linear amplifier
SM-220 . . . Station monitor, 10-MHz scope
BS-8 . . . . . SM-220 pan display for TS-820 Series
BS-5 . . . . . SM-220 pan display for TS-520 Series
AT-200 . . . . 200-W antenna tuner, SWR/power meter, switch
DS-1A . . . . . DC-DC Converter for 520/820 Series

SHORT WAVE LISTENING

R-300 General Coverage SWL Reveiver

VHF LINES

TS-600 . . . . 6 m All Mode Transceiver
TS-700SP . 2 m All Mode Digital Transceiver
VFO-700S . Remote VFO for TS-700S
SP-70 . . . . . Matching Speaker for TS-600/700 Series
VOX-3 . . . . VOX for TS-600/700A
TR-7400A . 2 m Synthesized Deluxe FM Transceiver
TR-7600 . . . 2 m FM transceiver with 800 channels and memory
RM-76 . . . . Remote Controller for TR-7600 with six memories, scanning
TR-8300 . . . 70 CM FM Transceiver (450 MHz)
TV-506 . . . . 6-m Transverter for 520/820/599 Series
TV-502S . . . 2-m Transverter for 520/820/599 Series

POPULAR STATION ACCESSORIES

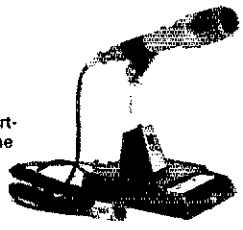
HS-4 . . . . . Headphone Set
MC-30S . . . low-impedance mobile noise-cancelling microphone
MC-35S . . . high-impedance mobile noise-cancelling microphone
MC-50 . . . . Desk Microphone
PS-5 . . . . . Power Supply for TR-8300
PS-8 . . . . . Power Supply for TR-7400A

Trio-Kenwood stocks a complete line of replacement parts, accessories, and manuals for all Kenwood models.

MORE ACCESSORIES:

Description	Model #	For use with
Repeater Subband Kit	RSK-7	TS-700A/S
Rubber Helical Antenna	RA-1	TR-2200A
Telescoping Whip Antenna	T90-0082-05	TR-2200A
Ni-Cad Battery Pack (set)	PB-15	TR-2200A
4 Pin Mic. Connector	E07-0403-05	All Models
Active Filter Elements	See Service Manual	TR-7400A
Tone Burst Modules	See Service Manual	TS-700A; TR-7400A
AC Cables	Specify Model	All Models
DC Cables	Specify Model	All Models

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).



The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

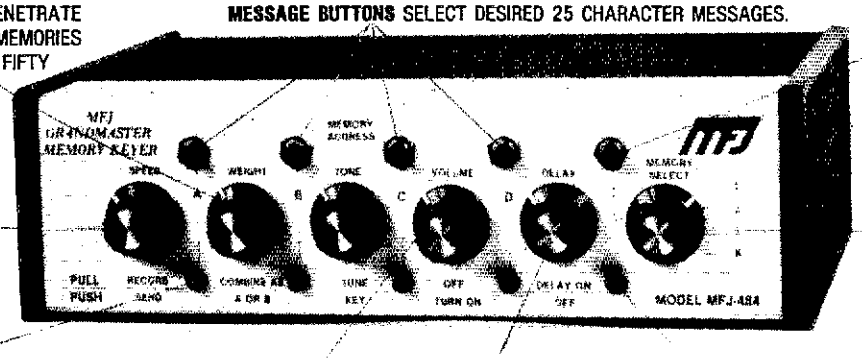
NEW! MFJ INTRODUCES THE *GRANDMASTER* MEMORY KEYERS

At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.



RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

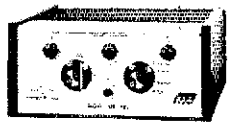
$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95



Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

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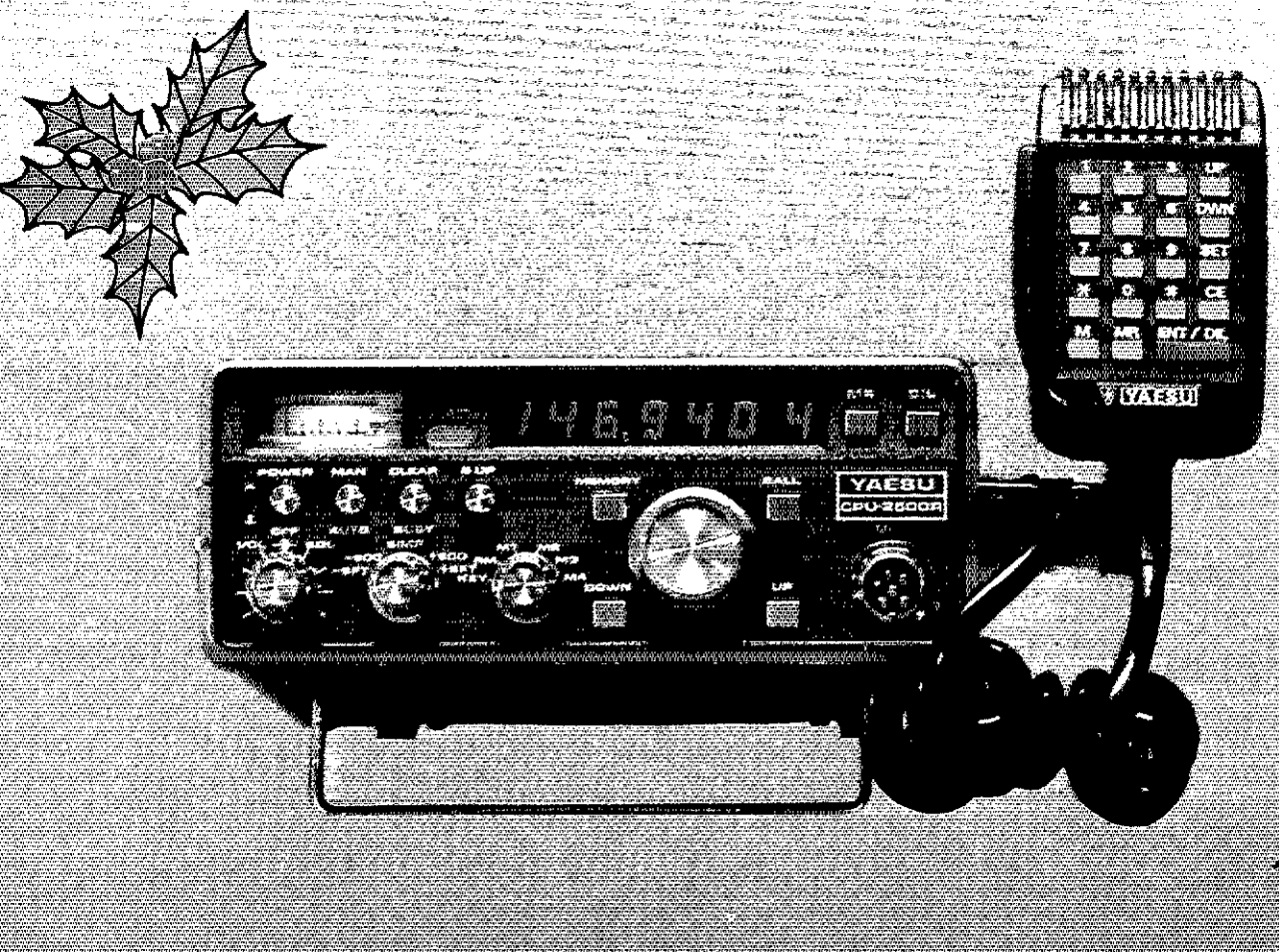
THE CHRISTMAS GIFT OF A LIFETIME!

YAESU ANNOUNCES THEIR SENSATIONAL COMPUTER AGE CPU-2500R/K 2-METER 25 WATT TRANSCEIVER



Again, Yaesu THE RADIO takes a giant step forward with their computer age 4-bit Central Processor Unit controlling the Phase Locked Loop. It allows selection of 800 PLL channels with touch button station selection built into the optional keyboard mike ..... *PLUS* automatic scan, up or down across the entire 2 meter band ..... *PLUS* four memory channels ..... *PLUS* optional tone squelch encoding ..... *PLUS* tone burst ..... *PLUS* high SWR and reverse voltage polarity protection ..... *PLUS* 3/25 watts of power ..... *PLUS* fixed ±600 KHz offsets ..... *PLUS* programmable offsets ..... *PLUS* tone pad microphone option ..... *PLUS* bright 3/8" LED six digit frequency display and another LED for memory display ..... and much more.

The CPU-2500R/K is a space age radio for discriminating amateurs utilizing the latest solid state techniques and it's on your dealer's shelf today!

Price And Specifications Subject To Change Without Notice or Obligation

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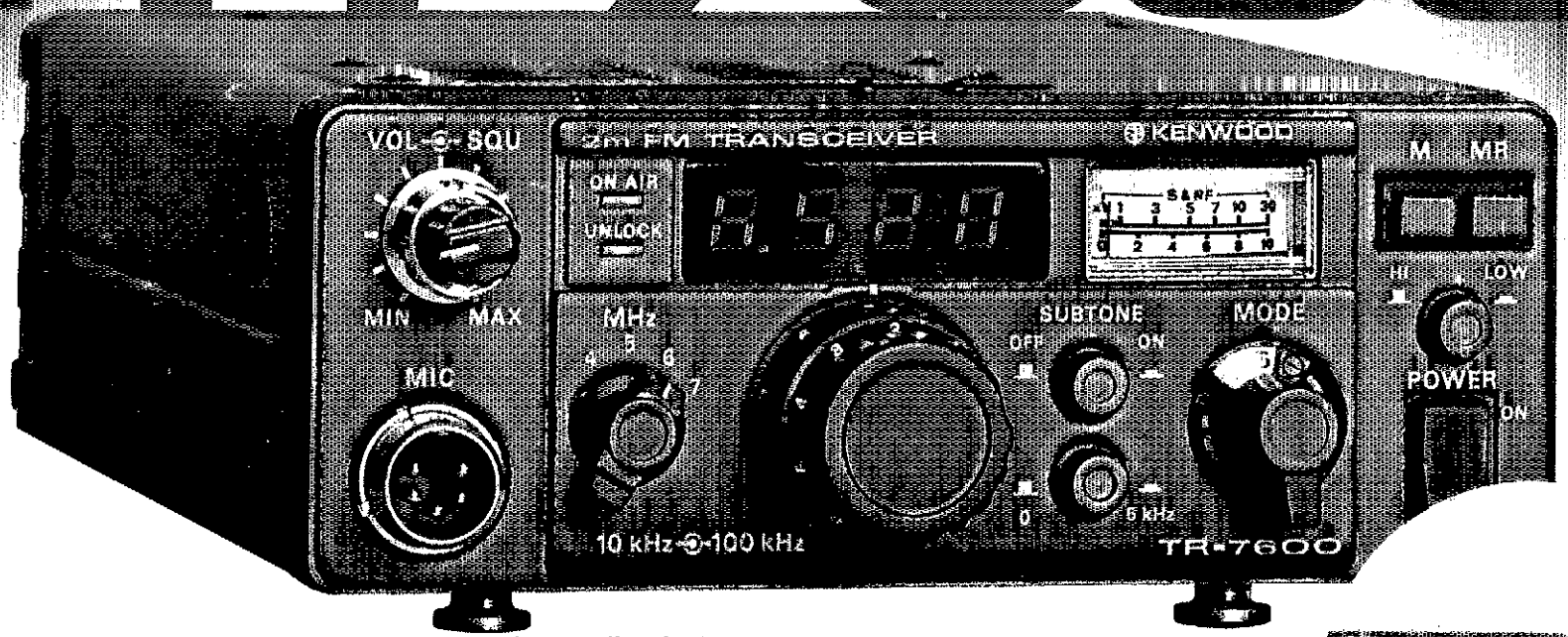
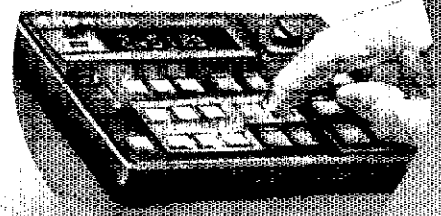
TR-7600



Actual Size



Remote Controller

EVERY FEATURE YOU COULD POSSIBLY WANT IN A 2-METER FM RIG IS AVAILABLE NOW IN THE KENWOOD TR-7600

...THE RADIO THAT REMEMBERS

Even without its optional "Remote Controller," the TR-7600 gives you...

• Full 4-MHz coverage (144.000-147.995 MHz) on 2 meters • 800 channels • Dual concentric knobs for fast frequency change (100-kHz and 10-kHz steps) • 5-kHz offset switch • MHz selector switch...for desired band (144, 145, 146, or 147 MHz) • Mode switch for operating simplex or for switching the transmit frequency up or down 600 kHz for repeater operation... or for switching the transmitter to the frequency you have stored in the TR-7600's memory (while the receiver remains on the frequency you have selected with the dual knobs) • Memory channel...with simplex or repeater (plus or minus 600 kHz transmitter offset) operation.

The optional Remote Controller, with a built-in microprocessor, provides more operating features to the TR-7600 2-meter FM transceiver than found in any other rig! With the Remote Controller attached to your TR-7600, you can...

• Select any 2-meter frequency • Store frequencies in six memories • Scan all memory channels • Automatically scan up all frequencies in 5-kHz steps • Manually scan up or down in 5-kHz steps • Set lower and upper scan frequency limits • Reset scan to 144 MHz • Stop scan (with HOLD button) • Cancel scan (for transmitting) • Automatically stop scan on first busy or open channel • Operate on MARS (143.95 MHz)

Subject to FCC approval

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