

December 1968

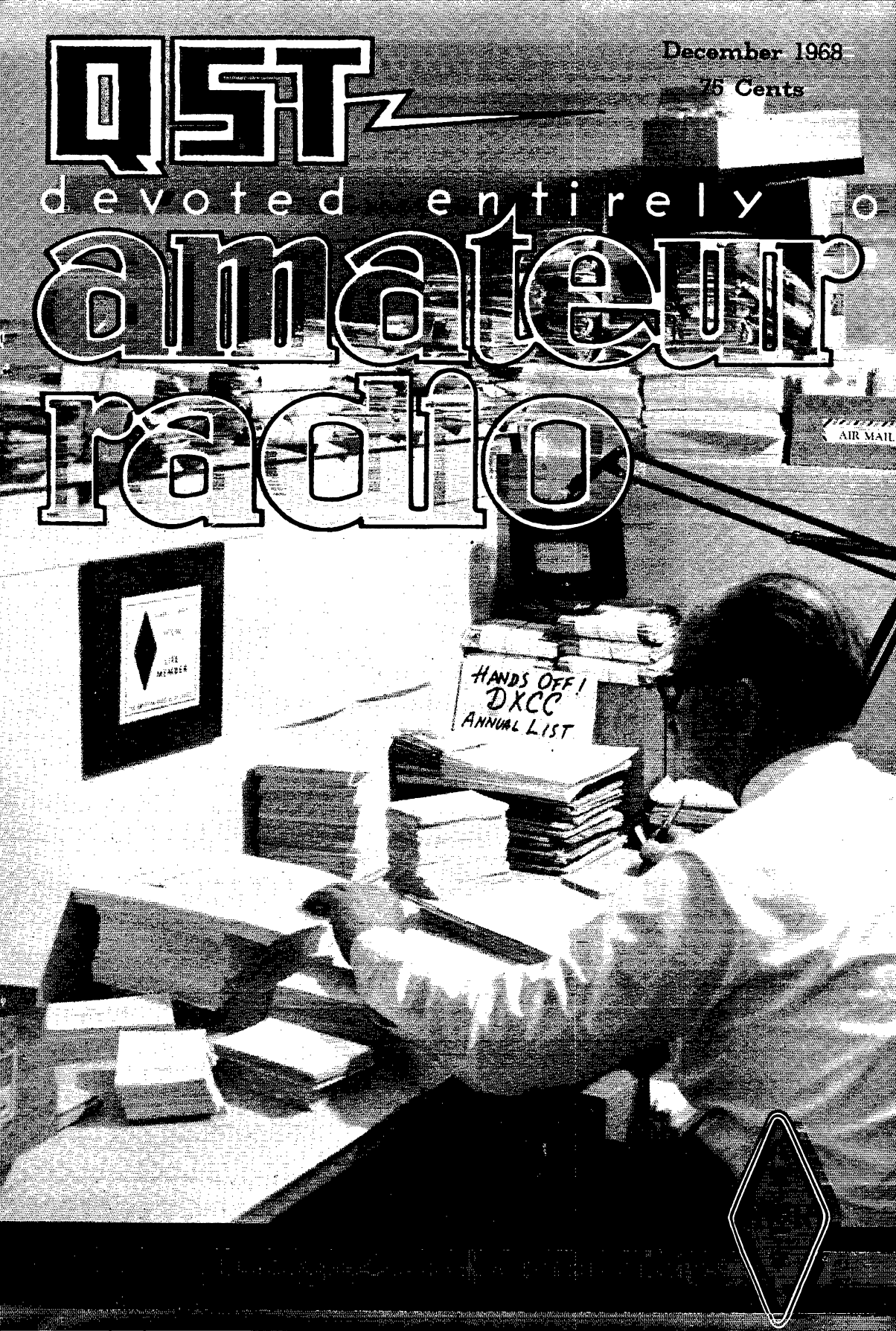
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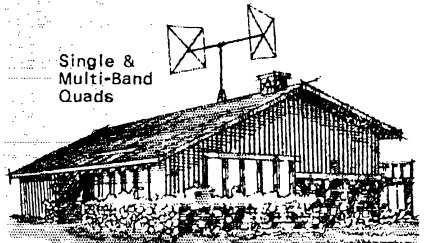
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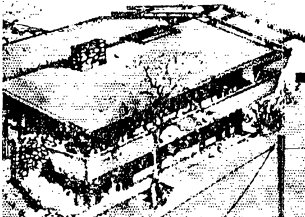
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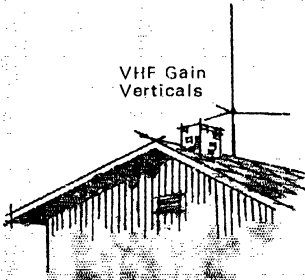
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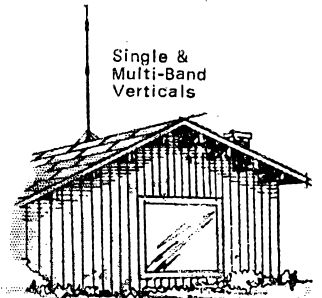
Single & Multi-Band Beams



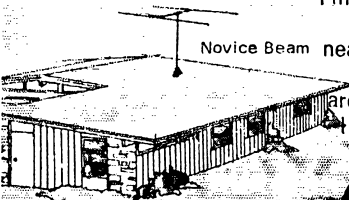
VHF Gain Verticals



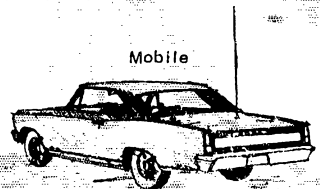
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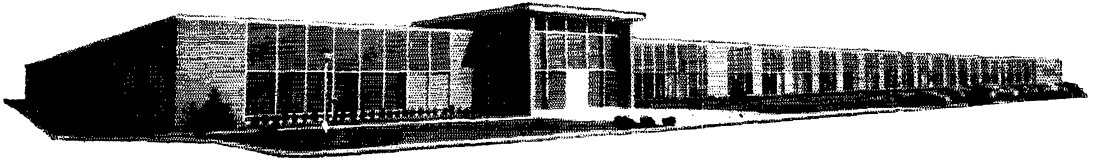
Novice Beam



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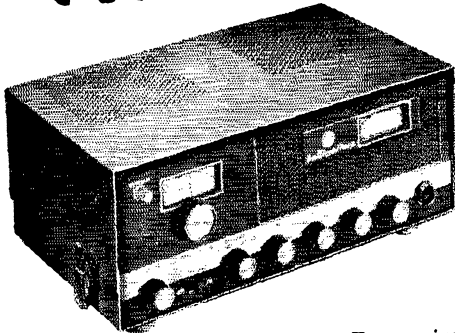


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OUR COVER
Here's W1CW compiling that annual DXCC listing, which starts on page 106. As of Sept. 30 a total of 14,413 DXCC certificates have been issued.

QST

DECEMBER 1968

VOLUME LII NUMBER 12

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— CONTENTS —

TECHNICAL —

What is RTTY?.....Gerald L. Hall, K1PLP 11
The Chirp Magnifier
 W. Valentine, W4LDW, WB2KVK/1 16
Gimmicks and Gadgets:
 A Converter for V.H.F. F.M.
 Cliff Buttschardt, W6HDO 18
A Solid State Product Detector For The HRO-60
 David Palmer, W6PHF 20
An Impedance-Matching Method Robert Leo, K7KOK 24
Synchronous Weak Signal Detection with Real Time Averaging (QST Extra) W. R. Adey, M.D., WB6DEX and R. T. Kado, B.S. 31
A Solid State Audio Filter
 Louis N. Anciaux, WB6NMT 35
Further Improvements in the 32S-3
 David P. Shafer, W4AX 38
A Two-Stage Transistor Preamplifier for 1296 Mc.
 Dolph Vilardi, WA2VTR 40
A 40-Foot Self-Supporting Tilt-Over Mast for Less Than \$50.....Albert H. Robitaille, Jr., W1YUT 43
Combine V.H.F. Bandpass Filters
 Reed E. Fisher, W2CQH 44
Technical Correspondence..... 48
Recent Equipment: Hammarlund HQ-215 Receiver..... 50

BEGINNER AND NOVICE —

Is A Balun Required?.....Lewis G. McCoy, W1ICP 28

OPERATING

22nd V.H.F. Sweepstakes Announcement..... 63
35th ARRL International DX Competition Announcement..... 64
September V.H.F. QSO Party Results..... 66
The Case For Belonging..... 72
The Annual DXCC Listing..... 106

GENERAL —

The Real Life of W2SKE.....Bill Leonard, W2SKE 58
A Christmas QSO.....John Troster, W6ISQ 58
A Simple Book Binding Method
 Stanley R. Nelson, WA0KQD 60
Amateur Radio and Citizens Band..... 61
Return To Wonderland.....A. A. Zimmerman, K4HPF 62
Study Questions Added by FCC..... 76
The ARRL Museum of Amateur Radio..... 84

Annual Index of QST Articles.. 179
ARRL QSL Bureau..... 82
ARPS..... 72
Coming Conventions..... 82
Correspondence From Members 86
DX QSL Bureau..... 88
Feedback..... 27, 49, 57, 90
Happenings of the Month..... 78
Hints & Kinks..... 46
How's DX?..... 91
IARU News..... 88
Index to Advertisers..... 176
"It Seems to Us . . ."..... 9
League Lines..... 10
New Apparatus..... 27, 37
New Books..... 42, 59
Operating News..... 102
Silent Keys..... 150
Station Activities..... 111
Statement of Ownership, Management and Circulation..... 156
World Above 50 Mc..... 98
YL News & Views..... 96
25 Years Ago in QST..... 82

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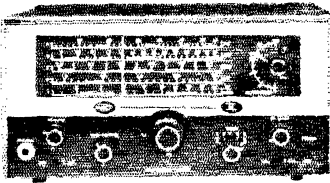


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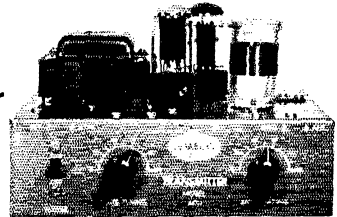
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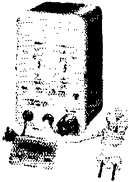
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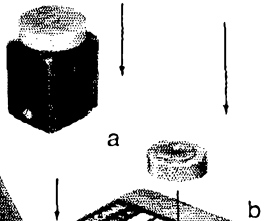
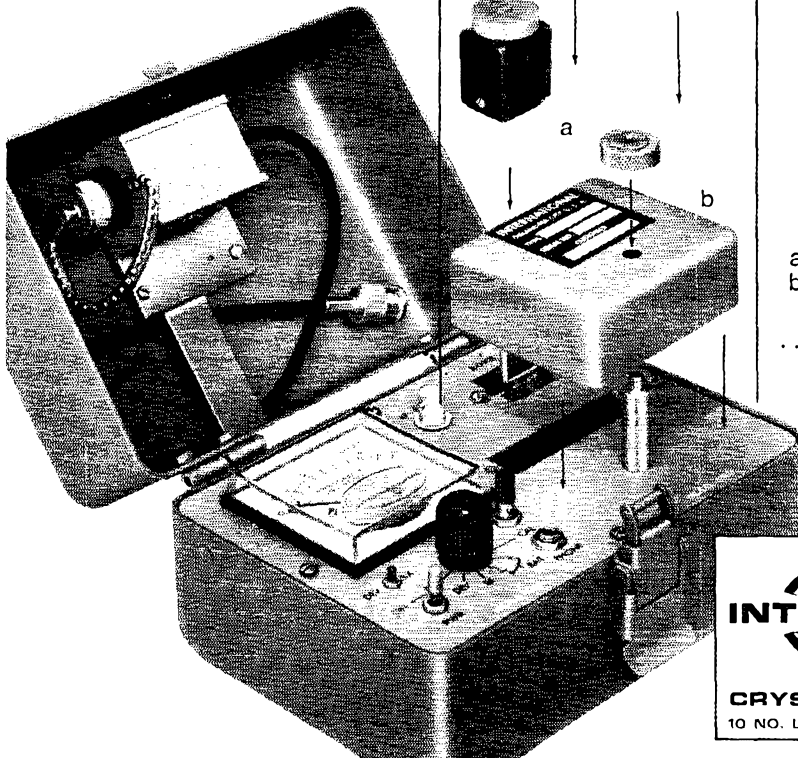


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"It Seems to Us..."



PHONE PATCHES

FOR YEARS, tariffs filed by AT&T and other telephone companies with the Federal Communications Commission — and with state regulatory agencies as well — have prohibited interconnection of the telephone system with "foreign attachments." This term included most anything not furnished or approved by the phone company; thus, strictly speaking, an amateur phone patch was a violation of tariffs.

So, officially, patches didn't exist; they were technically illegal. In practice, there were (and are) hundreds, perhaps thousands, in use by amateurs (and others). The service hams provide to isolated areas — Antarctica, GIs overseas, hospital ships, e.g. — is of inestimable morale value, openly praised by civilian and military brass alike. It was taking little or no revenue from commercial circuits; domestic patching was minimal. Hams were skilled enough to build patches which didn't upset line balance; or at least smart enough to buy commercial products (freely advertised in other mags while old-fashioned, stuffy *QST* felt obliged to turn down such revenue). Phone companies looked the other way, and preferred not to be asked questions. FCC pretended not to notice. In most respects, everything was rosy. Hams didn't have to pay a nickel for a facility which, if "legalized," would probably cost us a buck or so a month. Some appeals were made to the League — by members because their consciences hurt; by manufacturers because their pocketbooks hurt — to get official recognition of amateur phone patching. The response was, in essence, sure we'd like to have the revenue, and it indeed is somewhat an anomaly to praise patchwork on the one hand but term it illegal on the other; but all around it's better to leave things alone.

All this changed when the Carter Electronics Corporation of Dallas, Texas, tangled with its local phone company — and, later, AT&T — over a commercial patch installation it sold to business users, interconnecting between landline and radio despatching systems. The telephone company said the unit violated tariffs; Carter said the tariff is illegal because it's too restrictive, and made an issue of it in Texas court. The judge said the case needed expert analysis, and so referred it to FCC.

Just what is being decided is, at least in

detail, somewhat obscure at the moment. The fur is still flying. But it is reasonably certain that FCC's order to the phone companies to drop broad restrictions will stand the test of time, and that new tariffs (a couple have already been filed, rejected, withdrawn, and what have you) will eventually be approved and straighten out the entire question.

What is in doubt at the moment, at least so far as our amateur interest is concerned, is a ruling on the proposed requirement for an "interface" device furnished only by the phone company. You'd connect your patch to it, rather than directly to the line. AT&T says that indiscriminate and uncontrolled access to the lines would degrade telephone service; since the U.S. undoubtedly has the best in the world, that is a point meriting much consideration. But the manufacturers argue they can build equipment meeting phone company standards, and shouldn't be denied the privilege. So the fur still flies.

What is more than likely, however, is that the interconnection privilege will now require a monthly fee for use, and probably an installation charge for a new unit. A number of proposed tariffs have already been filed with state regulatory commissions; a sample installation charge is \$20, with 50 cents a month the continuing fee.

There is one point, though, which is not in doubt. It's that domestic phone patching can easily be — and often is — overdone. Like the guy in Philadelphia on 20 meters who calls "CQ Miami phone patch" — or maybe it's Dallas or Denver. Except in emergency or other dire need, there's no real excuse for domestic patching to occupy space in our crowded h.f. bands. So whenever we hear a request to run a patch to Buffalo, St. Louis or what have you, we hope someone suggests using the landline — or better yet, the alternate form of a record message through normal traffic nets. That way we have an extra dividend of training in a skill valuable in time of emergency.

We expect that by copy time for the next issue, things will have settled down sufficiently to provide a clearer picture of what is in store. At the moment of writing phone patches are still just as "illegal" — and as much in use — as ever.

QST

League Lines . . .

At least two of those three Kentucky hams indicted for obscene language (July LLines), and who pleaded nolo, were sentenced to three months in jail (suspended, but two years probation) and fined various amounts up to \$600. Bouquets to FCC and the Department of Justice for straightening out a messy situation. Now maybe some of these other smart-alecks on the ham bands will sit up and take notice.

Watch your language in print, too. "Prizes" is a taboo word in mailing pieces if the award is to be based on chance or lottery; okay if it's for achievement, such as winning a code-speed contest. At least one ham club magazine has had an issue bounced by the Post Office for this reason.

FCC is periodically revamping exam questions for the various classes of amateur license -- a procedure we heartily applaud even if it does make revision of the "License Manual" a bit hectic at times. The latest changes, released by FCC toward the end of October, affect General, Advanced and Extra -- and are covered in the 61st edition of the LM, available about the time you read this. See page 76 for a summary of the new material.

LM can also mean Life Membership, and there are now more than 600 on the roster or in process through the instalment plan. Each month a couple dozen more applications arrive. Join 'em? See the rules on page 81.

". . Magazine arrives very late. . . situation bound to become worse . . . avoid if possible barraging us with complaints of non-delivery. . ." Sound familiar? It's not ARRL or QST this time, but the Radio Society of Great Britain and member problems with the post office in late receipt of the journal.

A survey by the Schenectady Amateur Radio Association confirms on a local basis, once again, what we've found nationally: half of amateur licensees are "deadwood" -- incapable of going on the air because of no equipment (or else it's disconnected and stored in the attic). Like ARRL nationally, SARA's paid-up membership is a disappointing percentage of the total number of licensees in the area -- but a substantial portion of the active group.

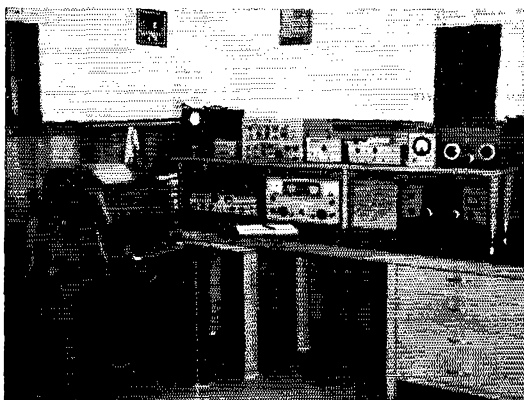
Organizing a club -- or reorganizing an older one? Our Communications Department has a new compilation of helps, including tried-and-true practices and procedures, sample constitution, "keeping up interest," etc. Free on request.

Hey, all you new Extra Classers -- remember you are entitled to a large certificate in addition to the endorsement on your card license. Write to the office which administered your exam after the regular ticket has been issued from Washington.

Among several hundred volunteers enrolled in ARRL projects, none work harder than QSL Bureau personnel -- spending what could be hours and hours of pleasant operating time in the drudgery of sorting and mailing DX pasteboards to you. But they can mail only when they have your stamped, self-addressed envelope. See page 82 for the address of the bureau handling your call area.

What Is RTTY?

BY GERALD L. HALL,* KIPLP



EVERYDAY, more and more amateurs are becoming interested in RTTY, or radioteletypewriter operation. Used teleprinter equipment is now available in a price range comparable to that of an economical transmitter, so that cost is no longer a serious obstacle to the use of RTTY. For an amateur just entering the field of the "green keys" (as RTTY is often called because of the green keytops on a Teletype¹ keyboard), a sequence of four events usually takes place. First, he must acquire some teleprinter equipment. Next he will probably check it out locally without connecting it to the amateur station equipment. Following this, he will borrow, buy, or build a demodulator for operation of the printing equipment from received signals and, finally, make the necessary preparations at the station in order to transmit RTTY signals. Not until all four of these steps have been taken can the newcomer sit back and fully enjoy this mode of operation. Fig. 1 shows a simplified block diagram of an amateur station which is fully equipped for RTTY operation.

Transmitting Modes

RTTY operation can be conducted using any of three basic modes of transmission. One mode

* 15 Endleigh Avenue, Pinehurst, Mass. 01866.

¹ Registered trade name for the Teletype Corporation, Skokie, Illinois.

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■ *An amateur interested in acquiring RTTY capability is often baffled by the profusion of literature that has appeared on the subject. The block diagram of an RTTY system looks simple enough. Why must there be so many pros and cons? This article supplies the answers. It should be an invaluable aid in selecting a system to fit the individual circumstance and pocketbook.*

.....

The equipment in the author's station illustrates one of an almost unlimited number of equipment combinations. A Model 19 composite Teletype Corp. unit is at the left. The demodulator is a home-built unit, to the left of the receiver. The transmitter has been modified to permit frequency-shift keying of the v.f.o.

is on-off keying, or make-and-break (m.a.b.) operation. Years ago, this was the only legal mode for amateur operation in the high frequency bands. An on-off keyed RTTY signal sounds similar to c.w. keying at high speeds, although the code used for RTTY does not in any way resemble the Morse code used for c.w. This mode is seldom, if ever, used on the amateur bands these days because noise or interference during the key-off period can easily cause errors in the printing of received signals.

A second mode for operating radioteletypewriter equipment is through the use of audio-frequency-shift keying, or a.f.s.k. Two separate and distinct audio tones are used to modulate the steady-running carrier, alternating between one and the other tone during the transmission of RTTY signals. Amplitude modulation of the carrier (A2 emission) is most commonly used, although frequency modulation (F2 emission) is also employed. Instead of using carrier "on" and "off" conditions to transmit the information of the teleprinter code, two separate audio tones are used. The presence of one tone corresponds to the "on" condition, or "mark" and the presence of the other tone corresponds to the "off", or "space" condition. By this technique, the possibility of printing errors caused by noise or interference is eliminated under conditions of good signal-to-noise ratio. Audio frequencies which have become standard for amateur use are 2125 Hz. for the teleprinter marking or idling condition, and 2975 Hz. for the spacing condition. A.f.s.k. is authorized for amateur use only on frequencies above 50 MHz., and therefore can be used only in the v.h.f. and u.h.f. bands.

The third mode for transmitting RTTY signals is through the use of carrier frequency-shift keying, or f.s.k. The presence of one carrier frequency corresponds to the teleprinter mark condition, and the presence of the other carrier frequency corresponds to the space condition. With f.s.k., two separate and distinct radio frequencies are used, alternating between one and the other during RTTY transmissions. The maximum shift allowed under present amateur regulations is 900 Hz. Carrier shifting of 850 Hz. has become the standard for amateur wide-shift operation. Narrow frequency shifting of 170 Hz. is becoming common on amateur h.f. bands for a number of reasons, but primarily because of the reduced bandwidth requirements. The higher of the two carrier frequencies is normally used for the teleprinter mark condition, the lower of the two frequencies being used for the space condition.

Frequency-shift keying, or F1 emission, may be used throughout portions of all of the h.f. amateur bands, 80 through 10 meters. F1 emission has sometimes been used in the v.h.f. bands, although equipment stability becomes a limiting factor at these frequencies. Because F1 emission is not authorized in the 160-meter band, RTTY operation is rarely conducted there, even though on-off keying is permitted.

Demodulators

A demodulator is the unit which converts signals from the station receiver into the d.c. impulses required to operate the teleprinter, and is often called a terminal unit (t.u.) or a converter. The term "demodulator" more adequately describes its function. There are many types of demodulators in existence, ranging from the very simple to the quite complex. Under good signal conditions, all perform nearly equally

well. Under less than optimum signal conditions, differences in the various units become apparent. The conclusion reached by most amateurs who have done extensive experimenting with various types of demodulators is that there is no one best type of demodulator for all of the possible receiving conditions that may be encountered at one time or another. Some perform best under certain conditions; others excel under different conditions. The final choice of a particular amateur depends on his individual requirements and operating habits — bauds, times, etc. —, and to some extent upon his pocketbook. Some amateurs own more than one type of demodulator.

For use on the v.h.f. bands with audio frequency-shift keying, the demodulator *must* operate from the receiver's audio output. With carrier-shift keying, the demodulator may operate either from the receiver's intermediate frequency as a conventional f.m. discriminator, or from the receiver's audio output. If an i.f.-type unit is used, most amateur receivers must be modified to provide the i.f. output signal. An audio demodulator is much easier to build and align than the i.f. type, does not require modification of the receiver, and is more versatile. It may be used with receivers having different intermediate frequencies, and it may be used on both h.f. and v.h.f. bands. For these reasons, audio designs are more popular for amateur use.

Audio demodulators may be divided into two general classes, those which contain channel filters, and those which do not. Units containing channel filters rely on circuitry which is either resonated at audio frequencies, or designed to act as a bandpass filter for a limited audio-frequency range. The two audio tones, one for mark and one for space, are "channeled" into different sections of the demodulator circuitry for detection. In effect, this is a double-tuned audio discriminator. This type of a demodulator is generally characterized by the use of TV "width" coils, or toroidal coils, to obtain the necessary circuit inductances. Several designs of this type of demodulator are popular among amateur enthusiasts. The W2PAT circuit has appeared in the A.R.R.L. *Handbook* for the past several years. (The same circuit appears also in a past issue of *QST*.²) The Twin City Terminal Unit,³ named after the twin cities of Minneapolis and St. Paul, is another circuit frequently used by RTTY newcomers. These circuits are rather simple, and can therefore be assembled in a short time. Such units are designed primarily for use on the v.h.f. bands with a.f.s.k. The W2JAV⁴ unit is also quite popular, being basically the same as the W2PAT circuit, with additional stages incorporated for improved performance where f.s.k. is used on the h.f. bands. More recently, the revolutionary TT/L demodu-

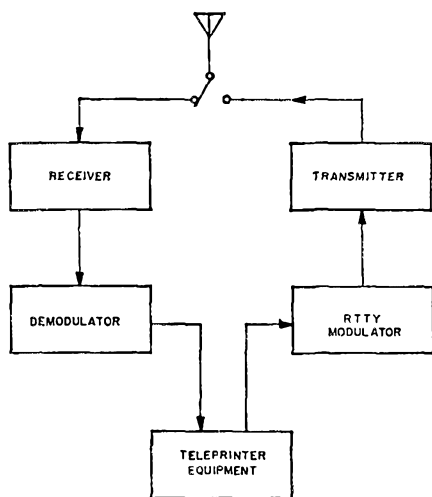


Fig. 1—Block diagram showing the basic equipment required for amateur RTTY operation.

² Blakeslee, "RTTY Reception for Beginners," *QST*, March, 1965.

³ Kretzman, *The New RTTY Handbook*, 1962, p. 92, Cowan Publishing Corp., 300 W. 43rd St., New York, N. Y.

⁴ Kretzman, *The New RTTY Handbook*, p. 97.

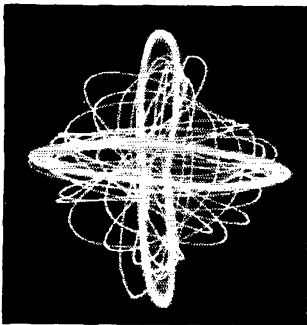


Fig. 2—In this oscillogram of a frequency-shift keyed RTTY signal, the mark frequency is displayed on the horizontal axis and the space frequency on the vertical axis. Although only one frequency is present at a given instant, the persistence of the scope screen permits simultaneous observation of both frequencies. The signals are of equal amplitude, and appear as ellipses because filters of moderately broad response were used in deriving the display. The smaller-amplitude traces faintly visible outside the ellipses appear because it is not possible (nor is it desirable) to shift instantly from one carrier frequency to the other. The fainter traces represent the transitional frequency sweep.

lator, described by K8DKC^{5,6}, has gained rapid popularity. This unit is comparatively complex and costly, and thus is in use primarily by only the most avid RTTY enthusiasts. The complexity of the TT/L stems from its many features which are not offered in other units, rather than from the use of involved circuitry.

As previously mentioned, audio tones of 2125 and 2975 Hz. are used for RTTY transmissions with a.f.s.k. If the demodulator in use is of the audio-discriminator type, the tuned circuits of the unit must be designed to cover these specific frequencies for proper operation on v.h.f. The same unit may be used on h.f. bands with the proper tuning technique. The receiver b.f.o. must be energized, and the signal must then be tuned for the proper audio pitch to match the demodulator discriminator circuits, much like the tuning procedure for a lower-sideband s.s.b. signal. As the carrier is frequency shifted, the audio pitch will change, resulting in either of two tones at the receiver's output. A carrier shift of 850 Hz. will result in tones of 2125 and 2975 Hz. when the signal is properly tuned. It becomes apparent that unless one has a perfect sense of musical pitch, some form of tuning aid is required to know when the signal is properly tuned. The aid may be as simple as a specific note on a harmonica or a musician's pitch pipe, or as elaborate as complex oscilloscope circuitry.

For h.f. use with f.s.k. of 850 Hz. it is not necessary that the discriminator circuits of the demodulator be tuned to cover precisely 2125 and 2975 Hz. *Any arbitrary pair* of audio frequencies which are 850 Hz. apart, are within the

capability of the receiver, and which are not harmonically related, may be used in the design. This is because of the tuning technique used—the pitch of the audio tones is established by the offset of the receiver b.f.o. during tuning of the signal. Many amateurs employing mechanical filter receivers, or receivers which have "shaped" audio response with low output amplitude at frequencies near 3 kHz., have found it advantageous to use lower-than-standard frequencies in their discriminators. The majority of these amateurs are using 1275 and 2125 Hz. for use on h.f. bands. (The use of plug-in circuitry permits an easy change to the standard audio frequencies, if desired for v.h.f. operation.) Technical advantages for either pair of frequencies may be stated.

Because of their use of tuned audio circuits, the discriminator-type units have a limited input-frequency range for proper operation. This requires that the transmitting amateur operate pretty nearly at the standard audio tones on a.f.s.k. and that frequencies and shifts be set with care for h.f. net or roundtable activity, if the receiving amateur is to get reliable copy with his discriminator type unit without continual retuning. The useful frequency range of the unit can be extended somewhat by using broad-response or low-*Q* tuned circuits. Toroidal coils will have a much higher *Q* than TV width coils.

There are a variety of techniques in use that permit copying narrow-shift signals with discriminator-type units. One method requiring no circuit alterations from that used for wide shift is to "straddle-tune" the signal. This method is quite satisfactory if the equipment is stable and if the discriminator output is linear with frequency change, but it is not optimum. Other techniques involve the use of switches or plug-in units to alter the tuned circuitry, or the heterodyning of signals to meet a fixed filter frequency.

The audio demodulators without channel filters are generally of more simple design. Perhaps the limit in simplicity is a one-tube unit of the type for detecting single tones in on-off fashion, described recently by W1K1K.² This unit detects the presence of a single tone and operates the teleprinter selector mechanism through the "gating" of a vacuum-tube keyer. With this unit, it is necessary to zero-beat one of the two frequencies of a frequency-shifted carrier, so there will be no audio input to the demodulator for that carrier frequency. This type of unit will not function properly with a.f.s.k., because it cannot recognize the difference between two frequencies.

A unit of unique principle for amateur operation is a filterless demodulator described in past issues of *QST*.^{7,8} This unit is popular for use with a.f.s.k. and for f.s.k. RTTY net activity because it will tolerate a very wide range of

⁵ Hoff, "The Mainline TT/L F.S.K. Demodulator," *QST*, August, 1965.

⁶ Hoff, "High-Performance RTTY Filters," *QST*, August, September, 1966.

⁷ Kaufman, "A Filterless Terminal Unit for F.S.K.," *QST*, July, 1958.

⁸ Davis, "More on the Filterless Terminal Unit for F.S.K.," *QST*, February, 1964.

audio frequencies and frequency shifts. This unit also works well at h.f. with a receiver that may leave something to be desired in regard to frequency stability. The unit distinguishes one frequency from another by using pulse-counting detector circuitry. This is the same type of circuit used in an audio-frequency meter, where meter deflection is calibrated in frequency. The changing d.c. voltage resulting from shifting audio tones at the input of this unit is shaped into keying pulses for the printing equipment. Because this unit tolerates such a broad frequency range, a tuning aid is not required. A control is also provided to optimize operation for the various shifts which may be encountered.

These latter types of units, having no frequency selectivity, are more subject to making wrong mark or space decisions when influenced by off-frequency signals. This, of course, will cause garbled printing. For that reason, the discriminator type units are by far the more popular for f.s.k. use in crowded bands.

The preceding paragraphs should acquaint the reader with the more popular types of RTTY demodulators which may be constructed by the amateur. Commercial units for the amateur market are generally of the audio discriminator type. Surplus military units for either audio or i.f. input frequencies are sometimes used, but these units generally are not designed to operate under weak-signal or crowded-band conditions.

Selective Fading

Simple circuitry is quite adequate when a.f.s.k. is employed at v.h.f. A given signal is usually of almost unchanging amplitude, and the two audio tones at the receiver output are essentially of equal strength at all times. Simple circuitry will also provide quite satisfactory operation in the h.f. bands under good-signal conditions. However, operation under interference and fading conditions on these bands demands more than simple circuitry, if reliable copy is to be made.

When f.s.k. is used in the high-frequency bands and sky-wave signals are received, the effect we call selective fading takes place. As Figs. 2 and 3 indicate, radio frequencies only 850 Hz. apart will fade quite differently from one another

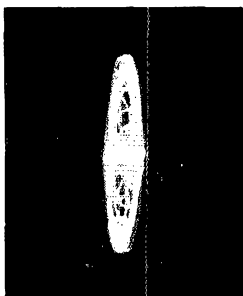


Fig. 3—Oscilloscope presentation of a received f.s.k. signal during selective fading. The mark signal is barely visible above the noise level, while the space signal is many times stronger, having faded only slightly.

under some conditions. As alternate carrier frequencies are transmitted, the temporary loss of one audio tone at the demodulator input often results when one frequency momentarily fades nearly into the background noise level, while the other of the two frequencies remains quite strong. The fade period for a single frequency may last for from a few milliseconds to several seconds, depending on band conditions, and may occur at quite frequent intervals, several times a minute. Simple demodulators requiring the alternate presence of both tones for proper operation will not provide reliable operation during such fading. If such fading occurs often, so much copy may be lost that one might not even be certain what the transmitting station is discussing.

With properly designed circuitry, normal operation of the demodulator will continue during such a fade. Such circuitry permits the demodulator to operate automatically from either audio tone alone, as if the tone were on-off keyed, and combines the operation from both tones when no fading occurs. Of those previously mentioned, the W2JAV and TT/L units include such circuitry. Modification information to incorporate such circuitry in the Twin City unit has also been published.^{9, 10} The satisfactory use of these units, of course, is not limited to the h.f. bands and f.s.k. operation.

Markhold and Autostart

The normal behavior of the teleprinter, when left connected through a demodulator to an open receiver channel, is to print random letters and figures, ring bells, spew out paper, and perform other gyrations in a noisy sequence. This occurs because channel noise, and perhaps unwanted signals, actuate the demodulator circuitry in random fashion. Many amateurs control this behavior simply by turning the printer motor off. Others use a switch to disable some portion of the demodulator, or to shift the printer selector mechanism into another circuit. As an operator convenience, a few demodulator circuits include additional stages to control such behavior. A variety of circuits exist to simulate a marking or idling signal at the demodulator output when there is no RTTY signal present at the input. Such a circuit is sometimes called a *markhold* circuit. As a simple analogy, a markhold circuit does for RTTY what a squelch circuit does for audio, which is to disable the output under the condition of no-signal input.

The TT/L unit contains a markhold circuit, described in that unit as the autostart circuitry. The TT/L circuit goes one step further in providing an optional motor-control circuit. Such features as these permit unattended operation of the teleprinter equipment. With no signals being received, the machine motor may be deenergized. When a valid RTTY signal comes

⁹ Hall, "The Super Twin City Terminal Unit" *RTTY*, March, 1965.

¹⁰ Hall, "Additional Notes on the Super Twin City Terminal Unit," *RTTY*, November, 1965.

on for a period of time, the motor will be energized and normal operation will ensue. When the RTTY signal goes off, the machine motor will again be deenergized. Several "autostart frequencies" are in use by various groups of amateurs. Prearranged frequencies are used for transmission and reception of information. The amateurs leave their receivers tuned to the prearranged frequency, and anyone wishing to pass information to one or more of the group may do so merely by accurately spotting the frequency with his transmitter and, after a sufficient time interval of transmitting RTTY signals, transmit the information. After signing, as long as his receiver is accurately tuned to the prearranged frequency, his teleprinter equipment can be energized by an incoming signal for a reply, without the necessity for his presence.

Modulating Techniques

Perhaps the simplest method of transmitting RTTY signals is through the use of a.f.s.k. A frequency-shift-keyed audio-oscillator signal may be fed directly into the microphone jack of an a.m. (or f.m.) phone transmitter. So long as the audio note is relatively pure sine wave and the modulation level is held below 100%, everything is fine. A2 (or F2) emission will result. This technique may be used on v.h.f. and u.h.f. bands.

For operation at h.f. where f.s.k. is used, it would appear that the same technique could be used with a single-sideband transmitter, feeding a shifted-tone signal into the microphone jack. Because one audio tone produces a pure carrier from an s.s.b. transmitter, one might reason, a shifting audio tone would therefore produce a shifting carrier. While this is true in theory, a pure f.s.k. signal is difficult to realize in practice because of incomplete carrier and unwanted-sideband suppression. Audio distortion is also a factor to contend with. Although several amateurs are using this method, the F.C.C. has cautioned amateurs who are considering the use of this technique against any spurious radiation that may result.¹¹

One method of obtaining true f.s.k. is through the use of a frequency-shifting-circuit addition to the transmitter v.f.o. The modification is normally simple and inexpensive, requiring only the addition of five or six small components. Some form of diode-and-capacitor arrangement is often used to alter the capacitance of the v.f.o. tuned circuit with external keying. Operation of such a circuit is based on the fact that the junction capacitance of even an ordinary diode will vary with changing current through the diode. The external keying changes the diode current. With this type circuit, a potentiometer, or a variable capacitor, is used to adjust the effective capacitance for one of the two conditions, and therefore adjusts the shift width. Such a modification can be applied to a heterodyning v.f.o. or a multiplying-type v.f.o. There

are disadvantages in the use of this type of a circuit. It may be necessary to readjust the shift width for large frequency excursions in the same frequency range, because the ratio of keyed capacitance change to the overall v.f.o. tuned-circuit capacitance is not constant. If the v.f.o. is the heterodyning type, the shift may come out inverted on some bands. If a frequency multiplier follows the v.f.o., as it does in most c.w./a.m. transmitters, it will also be necessary to readjust the shift from band to band. (K8DKC has devised a simple and effective solution to this problem.¹²) Unless preset shift-width adjustments are made for various portions of various bands, it is necessary to have an accurate means of checking the shift width to obtain proper adjustment during operation. V.f.o. stability may also be a critical factor with this method of obtaining f.s.k. However, in spite of these disadvantages, the simplicity of the circuitry makes it attractive to a large number of RTTY amateurs, and this type of operation is quite common on the h.f. bands.

F.s.k. may also be accomplished in a manner similar to the filter method of s.s.b. transmission. The f.s.k. signal is generated at some fixed intermediate frequency, and is then heterodyned up to the operating frequency by mixing the i.f. output signal with the signal from a variable-frequency oscillator. By this method, the v.f.o. itself is not frequency-shifted. Here again, however, the shift may come out inverted on some bands. But with this method the shift width, when once properly set, will be correct for any portion of any band. Many amateurs employ two such intermediate-frequency f.s.k. generators (usually crystal-controlled oscillators), and select one for 850- and the other for 170-Hz. shift.

Yet another method of obtaining f.s.k. is by using frequency-shifted crystal-oscillator circuits. Most amateurs concentrate their RTTY operation within a very small portion of each of a few bands, often only one, and several have found that being "rockbound" is not a severe handicap, especially with a small selection of crystals. In fact, crystal-controlled transmissions are advantageous for MARS and autostart operation, eliminating the need for painstakingly spotting the desired frequency each time it is used. Information on frequency-shifted crystal oscillator circuits appears in the A.R.R.L. Handbook and in a previous issue of *QST*.¹²

The preceding paragraphs present in general terms some basic information about radioteletypewriter operation and equipment, to provide the reader with an overall idea about this fascinating mode. With the recent increased popularity of RTTY operation, many articles devoted to various aspects of this mode have been published. The Hoff series of articles in 1965 issues of *QST* is an authoritative source of more detailed information on nearly all phases of RTTY, and is highly recommended reading for those who are further interested. QST

¹¹ FCC Docket 15267, "Happenings of the Month," *QST*, September 1964.

¹² Hoff "Transmitting Radio Teletype," *QST*, May, 1965.

The Chirp Magnifier

A Simple Listening Aid For Improving Your C.W. Note

BY W. VALENTINE,* W4LDW, WB2KVK/1

It is not always easy to eliminate chirp in your v.f.o., but the problem is compounded if you cannot hear the chirp well enough to know whether the last circuit alteration made it better or worse. A simple solution is to listen to a high-order harmonic, since as the frequency is multiplied the degree of chirp is multiplied too. By listening on 10 meters while the v.f.o. is running on 80, you can easily spot slight improvements in the signal.

However, what do you do if your rig is a transceiver or if your receiver will not tune to a harmonic of the v.f.o.? The "Chirp Magnifier" may be the answer: it and any receiver (even your pocket transistor set) will permit the chirp to be detected easily.

As shown in Fig. 1, the device consists of a filter for keeping harmonics from being radiated from the input, a frequency multiplier for multiplying the chirp, a mixer stage for converting the new frequency down to a convenient output frequency, and an output attenuator. Only one tube and a few other inexpensive components are needed to build the gadget. However, because the Chirp Magnifier is a very efficient TVI generator, a shielded box and shielded cable must be used. My own unit was built entirely from junk-box parts in about an hour.



Fig. 1—Block diagram of the Chirp Magnifier. The unit should be built in a Minibox or other shielded enclosure to prevent direct radiation.

Circuit Details

Referring to Fig. 3, filter C_1L_1 is an ordinary tank circuit, with the input tapped down on the coil to reduce loading and to maintain high Q . L_1 and all other coils were wound on old slug-tuned coil forms that were found in a piece of surplus gear. There is nothing special about the forms and the slugs allow the unit to be retuned without the necessity for opening the box to reach the trimmers. Link L_2 , which was wound on the cold end of L_1 , couples the v.f.o. signal to a diode multiplier. Although a voltage-doubler

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In order to make a c.w. note as clean as it can be, you must be able to listen to the signal while making adjustments. But what do you do, if all you own is a transceiver? W4LDW has an answer.

circuit is shown, the only reason the combination is used is because it already had been built up from a previous experiment. A single diode (CR_2) would probably work equally well in this application, in which case C_2 would not be needed.

A capacitive voltage divider, C_3C_4 , is used to reduce the loading of the second tank by the diode network. $L_3C_3C_4$ should be chosen to tune to the fourth or higher harmonic of the v.f.o. Of course, the higher the harmonic, the greater will be the chirp multiplication. The tap on L_3 is not necessary, in all probability; however, it was there so I used it. If the output of the v.f.o. is great enough to drive the grid of the 6BE6 converter into conduction, the tap will reduce the loading effect of the driven grid on the tank. The tap will also reduce the signal voltage reach-

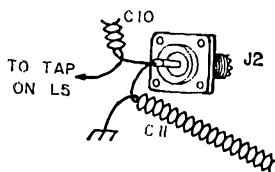


Fig. 2—Twisted pairs of hookup wire make up the Chirp Magnifier's output attenuator, $C_{10}C_{11}$. The output of the unit is adjusted to the proper level by cutting off part of one or the other of these gimmick capacitors.

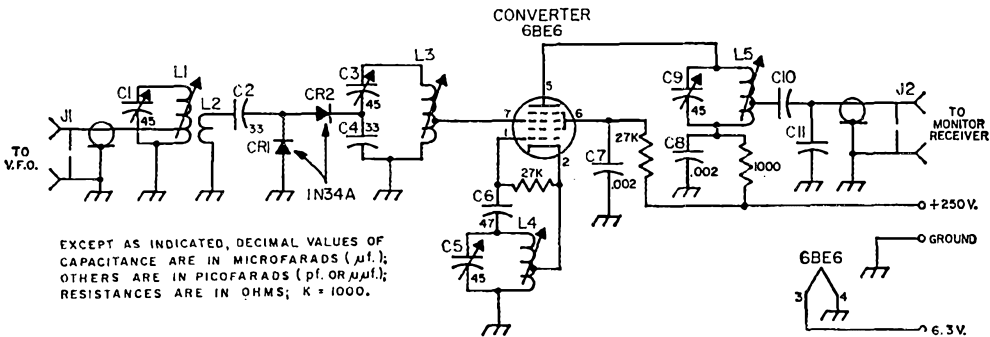


Fig. 3—Schematic diagram of the Chirp Magnifier. Resistors are 1/2-watt composition.

- C₁, C₃, C₆, C₉—7-45-pf. ceramic trimmer or suitable capacitor to tune, respectively, L₁, L₃, L₄ and L₅ to the desired frequencies.
- C₂, C₄—33-pf. ceramic or mica.
- C₅—47-pf. ceramic or mica.
- C₇, C₈—0.002- μ f. disc ceramic.
- C₁₀—Two insulated hookup wires twisted together, about 1 inch long; see text.
- C₁₁—Two insulated hookup wires twisted together, about 2 1/2 inches long; see text.
- CR₁, CR₂—Germanium diodes, 1N34A or equivalent.
- J₁, J₂—SO-239 coaxial fitting.
- L₁—Slug-tuned coil, tapped about one-tenth away from

- grounded end, resonant with C₁ at v.f.o. frequency; use about 40 μ h. at 3.5 Mc. and about 10 μ h. at 7 Mc.
- L₂—2 turns of hookup wire at ground end of L₁.
- L₃—Slug-tuned coil, tapped about one-third way from grounded end, resonant with C₃ and C₄ at fourth or higher harmonic of v.f.o. frequency; use about 5 μ h. at 14 Mc. and about 1 μ h. at 28 Mc.
- L₄—Slug-tuned coil, tapped about one-third way from grounded end, resonant with C₅ to sum of L₃:C₃:C₄ frequency and desired output frequency.
- L₅—Slug-tuned coil, tapped about one-eighth away from cold end, resonant with C₉ at desired output frequency (within tuning range of monitor receiver)

ing the grid, making the overdriven condition a less likely possibility to begin with.

The 6BE6 converts the multiplied v.f.o. frequency down to the desired receiver frequency. Choice of frequency is unimportant in this application. If a low frequency is chosen — say below 2 Mc. — C₉ may have to be padded to maintain a reasonable L/C ratio. The converter circuit shown was lifted from an old mobile converter, and any mixer-oscillator circuit should serve equally well.

The converter plate coil, L₅, is tapped to reduce loading. C₁₀:C₁₁, a capacitive voltage divider at the tap, provides the means whereby the output of the Chirp Magnifier can be adjusted to prevent overloading the monitor receiver. I used pairs of twisted hookup wire for the capacitors, as shown in Fig. 2, and adjusted the output by clipping bits from these gimmicks.

Operation

The device is used by coupling J₁ to the v.f.o. with either a capacitive probe or a one-turn link, tuning the various tank circuits to the proper frequencies, and adjusting the output of the gadget to the desired level. All tank circuit adjustments were done with a grid-dipper, and the entire unit was buttoned up before power was applied. An external voltmeter was connected across the a.g.c. line of the monitor receiver, and C₁₀ and C₁₁ were trimmed until the output of the Chirp Magnifier caused the same amount of a.g.c. voltage to be developed as would a moderately strong signal at the

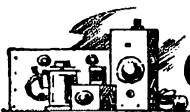
receiver antenna. Of course, an S meter could have been used, but my receiver didn't have one.

It is wise to repeak C₉ after clipping the twisted pairs of wire, since C₁₀ and C₁₁ are in parallel with part of L₅, and the resonant frequency of the output circuit changes slightly as these gimmick capacitors are trimmed. For the output level adjustment, the entire lash-up of twisted wires was permitted to poke out the hole in the box in which the output connector was afterward installed. After the clipping was done, the gimmick capacitors were taped and poked in the hole, the connector screwed in place, and that was it.

If the rig being modified is a transceiver, no receiver may be handy for use as a chirp detector. In this case the output of the gadget may be set near a broadcast frequency, and a household BC set used to detect the chirp. If a strong BC station is tuned in, and the output of the Chirp Magnifier is tuned to a frequency that is about 1 kilocycle away, no b.f.o. is needed in the receiver. As an alternative, an i.f. amplifier in the receiver may be made to oscillate and serve as a b.f.o. This can be easily done by soldering a twisted-wire gimmick capacitor to the grid and plate leads of an i.f. stage. The gimmick should be trimmed until the heterodyne is strong, steady and clear when the receiver is tuned to a local station. Too much capacitance will cause overloading, and the note will be rough and squeaky.

Regardless of the type of receiver used to look for chirp, care must be taken not to overload the monitor; otherwise, the chirp may be generated in the receiver itself.

QST



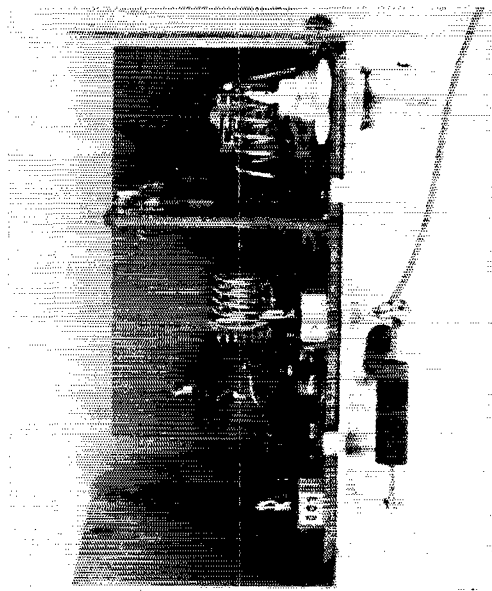
A Converter for V.H.F. F.M.

BY CLIFF BUTTSCHARDT,* W6HDO

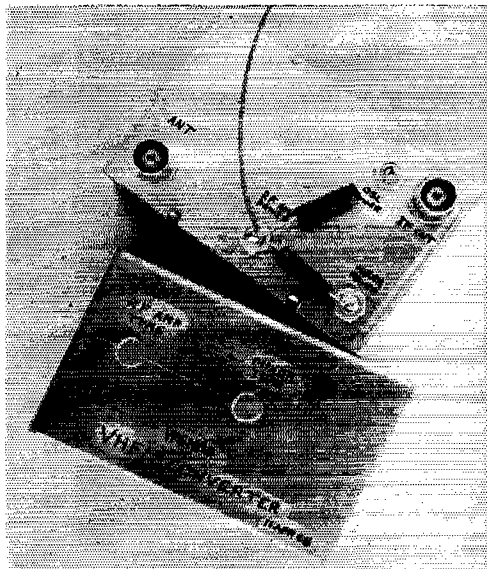
WITH the simple converter shown in the photographs and a standard f.m. receiver, you can monitor f.m. signals in any chosen 20-MHz. section of the v.h.f. band. The converter has been especially useful for listening to two-meter f.m. repeaters, as well as numerous commercial and other services.

As shown in Fig. 1, the r.f. amplifier, Q_1 , and the mixer, Q_2 , are P'ETs, which under the proper operating conditions will tolerate strong adjacent-channel signals without cross-modulation.¹

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¹If cross-modulation is a problem, apply some source bias to Q_1 . As a starter, insert in the source lead a 270-ohm resistor shunted by a 0.001- μ f. disk ceramic capacitor.—*Editor.*



Side view of the converter. The mixer is at the bottom, and the r.f. amplifier is at the top. The BNC connector is J_1 .



The v.h.f. converter with the bottom half of the interlocking chassis removed to show the location of the holes through which C_1 and C_2 can be adjusted.

(Of course, the f.m. receiver itself must also be good in this regard.) The crystal oscillator, Q_3 , uses a 40-MHz. third-overtone crystal in a Colpitts configuration. The frequency of 40 MHz. was chosen because none of the harmonics of this frequency fall within the resulting 128- to 148-MHz. tuning range, and because it is easy to mentally add 40 to the f.m. receiver dial reading. Other crystals can be used provided their harmonics fall outside the tuning range or in an unused part of it.

As shown in the photographs, the unit was built on a printed-circuit board that has copper foil on only one side. A $3\frac{1}{4} \times 2\frac{1}{8} \times 1\frac{5}{8}$ -inch interlocking chassis (LMB 000) serves as the enclosure, and a dividing shield that runs almost the length of the chassis separates the oscillator from Q_1 and Q_2 . A smaller shield separates the input circuit of Q_1 from the stage's output circuit. No interaction was experienced after the properly-sized neutralizing coil, L_2 , was found. Because of the compact construction, toroids² were used for the oscillator coil and in the i.f. output circuit:

² At press time it was learned that the toroid forms used by the author are no longer available. T-37-10 forms, available from Amidon Associates, 12033 Otsego Street, North Hollywood, California 91607, for 45 cents each (minimum order: \$1.00 plus 25 cents for packing and shipping) should make suitable substitutes. Because the Amidon forms are not exactly the same size as the original ones, a different number of turns than specified in Fig. 1 may be required; however, a little bit of experimenting will easily determine the exact number.—*Editor.*

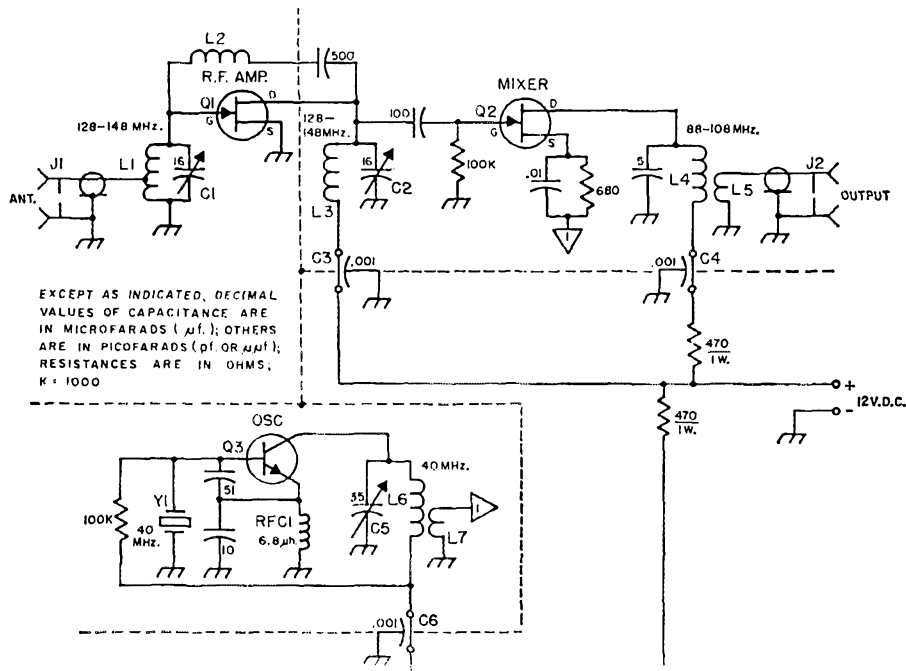


Fig. 1—Schematic diagram of the 128- to 148-MHz. converter. Fixed capacitors are disk ceramic except as mentioned below. Resistors are 1/2-watt composition unless specified otherwise.

C₁, C₂—1.8-16.7-pf. subminiature variable (Johnson 189-506-4).

C₃, C₄, C₆—0.001- μ f. feedthrough.

C₅—8-35-pf. ceramic trimmer.

J₁, J₂—Coaxial connector, BNC type.

L₁—6 turns No. 22, 1/4-inch i.d., 5/8 inch long. Tap 3/4 turn from ground end.

L₂—0.82- μ h. neutralizing coil [18 turns No. 34 enameled on a 1-megohm 1/2-watt composition resistor].

L₃—5 turns No. 22, 1/4-inch i.d., 5/16 inch long.

L₄—10 turns No. 22 enameled on 3/16-inch o.d. toroid (see Footnote 2).

L₅—2 turns No. 22 enameled at B-plus end of L₄.

L₆—9 turns No. 22 enameled on 3/16-inch o.d. toroid (see Footnote 2).

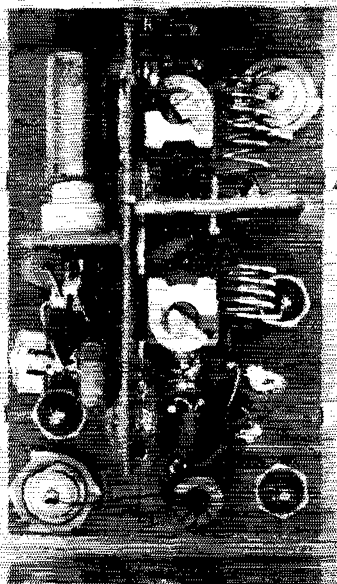
L₇—2 turns No. 22 enameled at B-plus end of L₆.

Q₁, Q₂—2N5179 used; MPF 102 suitable.

Q₃—2N5179 used; 2N706, 2N3564, 2N3663 suitable.

RFC₁—6.8- μ h. r.f. choke.

Y₁—40-MHz. third-overtone crystal.



Underside view of the converter. The oscillator is on the left side of the photograph, the mixer circuit is in the lower right corner, and the r.f. amplifier is in the upper right corner

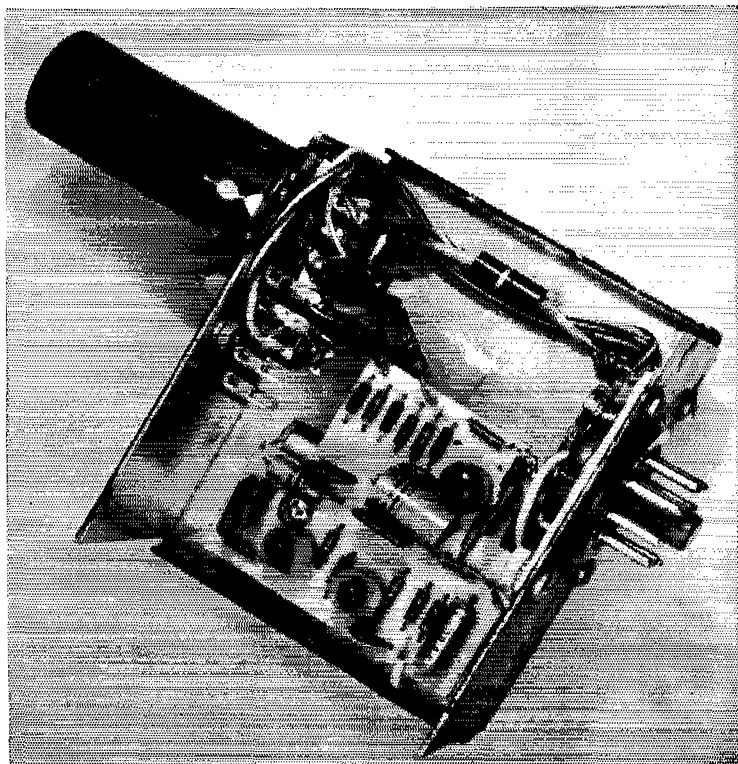
Some concern was felt that the narrow deviation used by amateur and communication services would result in too low audio output from an entertainment-type f.m. receiver. The output is reduced, but not so far that it is not useful. Sensitivity and the cross-modulation performance have been quite good. In fact, the converter has been used to work full duplex through a repeater whose input and output frequencies are only 600 kHz. apart. Overload and direct feedthrough of f.m. broadcast stations have been slightly troublesome, but have been reduced to a satisfactory degree by a 20-db. pad between the converter output and the f.m. set input.

Q57

A Solid State Product Detector

For The HRO-60

The adapter plugs into the n.b.f.m. socket in the receiver, using an octal plug (Amphenol 86-CP8) mounted on one edge of the chassis. The 6BA6 i.f. stage and its i.f. transformer (hidden by the tube shield) are on the opposite edge.



BY DAVID PALMER,* W6PHF

A silicon-diode ring product detector and i.f. stage in a module improve the c.w. and s.s.b. operation of an old standard receiver.

SEVERAL features of the design of the HRO-60, characteristic of the era in which it was built, suggested that a modernization project was justified: an excellent backlash-free dial mechanism, essential for the precise tuning of s.s.b. and c.w., and a large chassis with octal sockets in the most desirable locations for module installation, would produce a receiver that would compare very favorably with more modern receivers.

In the late 1940s, when the HRO-60 was designed, narrow-band frequency modulation was considered a potentially popular mode of amateur communication, and in order to increase the versatility of the receiver, National pro-
*638 Benvenue Ave., Los Altos, Calif. 94022. Letters to the author should be accompanied by a self-addressed, stamped envelope if reply is desired.

vided an octal socket in the power-supply compartment for an n.b.f.m. adapter. With the exception of connections to the b.f.o. and a positive 20-volt power source, all of the necessary circuits are accessible at socket X-1, greatly simplifying the installation of the product detector. Use of a module provides a very convenient method of servicing the product detector if it should become necessary.

Desirable characteristics of the product detector are very low intermodulation distortion, no output without the presence of both signals, and very low noise and susceptibility to magnetic and electrostatic fields. Eight different vacuum-tube product-detector circuits were tried with varying degrees of success, none completely satisfactory from a performance standpoint.

Circuits originally intended as balanced modulators were investigated as they must of necessity possess all the characteristics desired in a product detector. The first circuit studied was the ring, originally intended as a modulator for multiplexed land lines. As perfect balance was not required in order to eliminate the

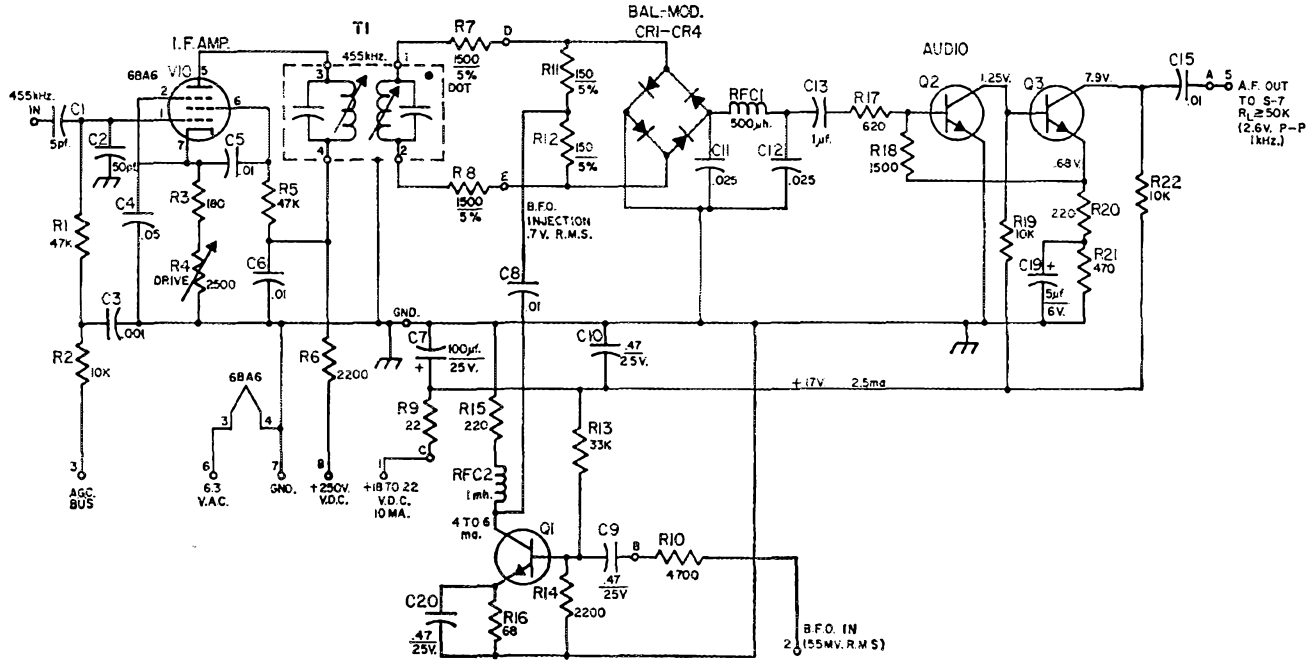


Fig. 1—Circuit diagram of the product-detector adapter. Except as listed below, component designations are for text and layout reference. Capacitors with polarity indicated are electrolytic; others are ceramic except as listed below. Fixed resistors are composition; those not specified below are 1/4 watt.

- | | | |
|---|--|---|
| C ₁ , C ₂ —Dipped mica. | Q ₂ , Q ₃ —2N3565 or equivalent. | RFC ₁ —500 µh. (Delevan 2500-14). |
| C ₉ , C ₁₁ , C ₁₃ —Ceramic (Sprague 31C8). | Q ₁ , Q ₃ —2N3565 or equivalent. | RFC ₂ —1 mh. (Delevan 2500-28). |
| CR ₁ -CR ₄ , inc.—Fairchild type FDH-600. | R ₁ -R ₁₀ , inc.—1/2 watt. | T ₁ —455-kHz. miniature i.f. transformer (Miller 14-C2). |
| | R ₁₁ -R ₁₂ , inc.—1/2 watt. | |
| | R ₄ —2500-ohm control, linear taper. | |

carrier, several compromises were made in the original circuit, and it was decided that the b.f.o. input and the recovered audio could be unbalanced, thereby eliminating one transformer (Fig. 1). Isolation from the preceding driver was considered necessary, however, and accordingly a 10:1 resistive pad was included between the i.f. transformer, T_1 , and the b.f.o. drive point, which is the junction of two 150-ohm resistors, R_{11} and R_{12} .

A ring of four silicon diodes appeared to possess most of the desired characteristics, including no output without sufficient drive from a carrier generator to self-bias the diodes into conduction. The diodes function as switches that are opened in succession as the phase of the injected b.f.o. signal rotates through 360 degrees. The output consists of various sum and difference frequencies of the b.f.o. and i.f., with the desired audio-frequency components separated from the others by means of the following low-pass pi filter. Fairchild FDH-600 silicon diodes were used because of their characteristics of relatively low capacitance and high perrvance, resulting in sufficiently short switching time for this application.

Optimum drive to the ring is 700 millivolts r.m.s., slightly beyond the point where the diodes are biased on by rectification of the b.f.o. signal. This is approximately 10 times the i.f. signal input to the ring (about 65 mv. r.m.s.) required to produce 2.5 volts r.m.s. audio output from Q_3 . Excessive drive will degrade the signal-to-noise ratio and linearity of the detector, consequently, overdrive should be avoided.

Q_1 is a Fairchild SE5025 silicon transistor functioning as a buffer amplifier for the b.f.o. signal, while Q_2 and Q_3 are 2N3565 transistors in a direct-coupled audio-frequency amplifier. As the ring is a low-level device, it is necessary to amplify the 40-mv. r.m.s. output to a level adequate to drive the following a.f. power stages. Several demands must be met by the audio amplifier in order for it to function well with a ring product detector. Low distortion and a quite good signal-to-noise ratio are required so that the excellent characteristics of the ring are not degraded. The large amount of negative

current feedback within the amplifier reduces both noise and distortion to where both are difficult to measure, and creates an extremely low input impedance so that a 620-ohm resistor

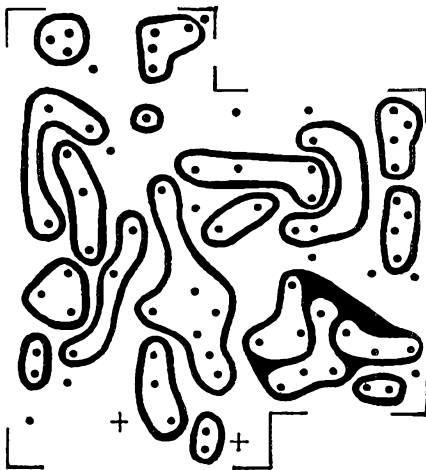


Fig. 2—Full-scale layout of the etched circuit board, component side. This can be traced on transparent stiff paper and the tracing used as a negative for photo-sensitive board. See text.

(R_{17}) is used to match the 600-ohm output impedance of the ring. An additional consequence of the d.c. feedback is insensitivity to fluctuations of supply voltage; variations as great as 25 per cent will not have a noticeable effect upon the performance of the amplifier when used at normal listening levels.

To simplify the problem of mounting a number of small components, an etched board was designed. The art work, Fig. 2, is a negative for use with photosensitive board, and a transparent master can be made by tracing the dark areas on a sheet of vellum or other stiff, transparent paper then making the dark areas opaque with black drawing ink. Complete kits for making etch boards at home are available for between \$3 and \$4 and are well worth the effort involved.

When the board has been etched and cleaned,

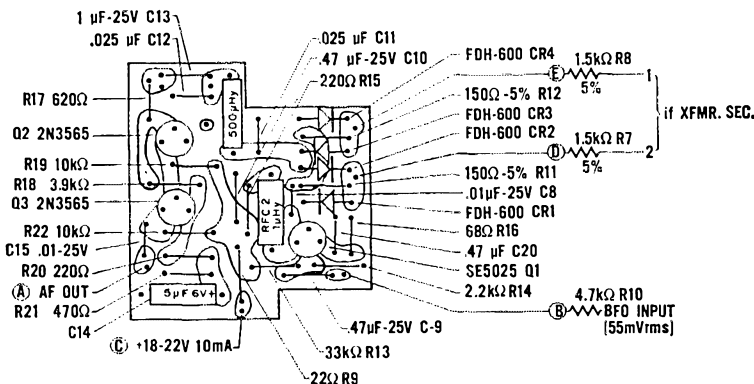


Fig. 3—Placement of components on the circuit board.

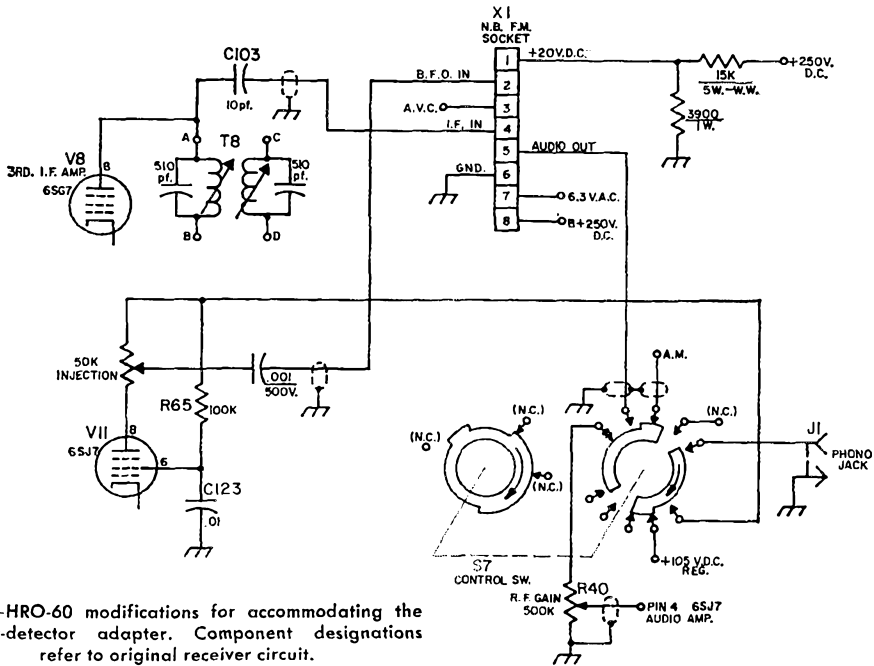


Fig. 4—HRO-60 modifications for accommodating the product-detector adapter. Component designations refer to original receiver circuit.

it should be cut to size with a hack saw and the edges smoothed with a file, after which the holes for the component leads should be drilled with a No. 57 drill. Soldering the components is made easier if the photo resist is removed with a solvent and the copper side of the board is pretinned.

Receiver Modifications

In order to use the product detector in the HRO-60 several existing circuits must be modified. Fig. 4 should be coordinated with the schematic diagram of the receiver for better understanding of what is required.

Socket X-1 in the power-supply compartment, originally intended for an n.b.f.m. adapter, is rewired as in the follows:

Pin 1—Remove lead to +105-volt regulated supply and wire it to a +20-volt source.

Pin 2—Remove ground lead and replace with shielded lead from c.w. oscillator.

Wiring to the remaining pins is unchanged.

Modification of the beat-frequency oscillator is required to permit a means of varying the output level and to improve the waveshape of the signal, as the ring must be driven by as clean a sine wave as possible. A practical method of mounting the 50K injection lead is by means of heavy bus wire soldered between its lugs and the terminals to which it is connected. Rewiring of the function switch so that the b.f.o. is supplied with regulated 105 volts during c.w. and s.s.b. reception and disabled while receiving a.m. is also recommended.

Automatic gain control on c.w. and s.s.b. is possible and even desirable with the existing a.g.c. detector, but modification of the a.g.c.

decay time constant is necessary. The HRO-50 a.g.c. detector described in May 1964 *QST* by W4JDR should be referred to by those interested in building the product-detector module.

Module Construction

Assembly of the components is on a 2½ by 3 x 3¼ inch box chassis, and is easily accomplished. As with other low-level r.f. and a.f. circuits, all leads should be as short and direct as possible; and those carrying the input from the i.f. and a.g.c. buses should be shielded to prevent coupling to other circuits. A terminal strip can be used to mount components associated with the 6BA6 driver stage for ease of assembly.

Operation and Adjustment

After construction of the module and modification of the receiver, it would be wise to check the wiring for errors and to make certain that all voltages are within five per cent of those given. Alignment of the driver transformer is conventional, and in the absence of a signal the primary and secondary should be adjusted for maximum noise. B.f.o. injection is optimum when slightly more drive is used than is necessary to produce output from the ring.

The ring product detector has been used for over a year under widely varying conditions; from 20 db. over 9 signals to ones barely readable in QRM and QRN, and during DX contests on both c.w. and s.s.b. Under all circumstances the very low noise and distortion considerably reduce listening fatigue and allow separation of c.w. signals differing by but a few cycles that would, with a nonlinear detector, be either difficult or impossible to copy.

QST

An Impedance-Matching Method

Combining the Balun and L Network

BY ROBERT LEO*, K7KOK

Use of open-wire feeders offers a convenient way of using a single-wire or doublet antenna which does not need to be a half-wave long, and which may be used for many different radio frequencies, not necessarily harmonically related. It offers the possibility of using shorter antennas than usually possible. As for radiating power, the length of a doublet is not critical if there is a means of getting the r.f. power to it. For example, the maximum directive gain of a half-wave dipole is only 0.39 db. greater than for a very short dipole¹. Performance should not suffer if high v.s.w.r.'s result, since then open-wire line losses are still not excessive.

The impedance at the shack end of the open-wire feed line will depend upon frequency, length of antenna, length of feed line, physical arrangement, and upon the proximity of nearby objects. Whatever this impedance may be, we usually want to transform it by some matching and tuning network so that it will look like 50 ohms to the coaxial cable coming from our transmitter and receiver.

For this situation the usual coupler uses either series or parallel tuning, plus the use of taps or links². While one can make estimates of whether to use series or parallel tuning, there is still some uncertainty as to what element values to use and where the taps should be. This is even more true when "short" antennas are being considered.

The tuning system to be described here is quite different from the conventional series-parallel type. Its elements are shown in block diagram form in Fig. 1. The matching elements are the r.f. transformer, to convert the open-wire balanced impedance to an unbalanced im-

pedance, and the L network, to convert that unbalanced impedance to a 50-ohm load for the coaxial-cable transmission line.

The design of this tuning system is straightforward, and uses a scientific approach based upon measurements of the unbalanced impedance which any ham can easily make, and using design procedures that are simple and easy. A feature of this system is that the unbalanced impedance measurements take into account all actual physical conditions, such as transformer performance, line and antenna length, balance, and so on. From a practical standpoint, the L network is probably easier to construct and operate than the series-parallel type. The use

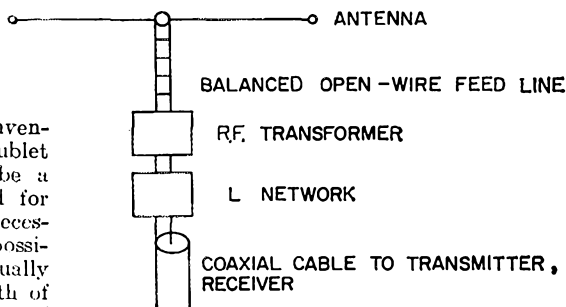


Fig. 1—Block diagram of the matching system.

of a transformer to convert from balanced to unbalanced is similar to the audio case of going from push-pull plates to a single-ended speaker load.

I have used coil baluns³ as the r.f. transformer in many applications with complete success, including both end- and center-fed antennas used for many different radio frequencies where it was not practical to erect more than one antenna. Usually a balun is thought of only as a 4:1 impedance-conversion device, from a balanced to an unbalanced load. For example, the usual coil balun is a pair of coils with the wires having 150-ohm transmission line spacing, and converts from 300 to 75 ohms when connected in series on the balanced end, and in parallel on the unbalanced end. Such a balun used in this application may not act

³ *The Radio Amateur's Handbook*, p. 338, 1968 edition.

*Director, Electronics Research Laboratory, Montana State University, Bozeman, Montana, 59715

¹ Jordan, *Electromagnetic Waves and Radiating Systems*, p. 415: Prentice-Hall.

² *The Radio Amateur's Handbook*, ARRL, p. 343, 1968 edition.

A balun at the input end of a balanced transmission line provides an unbalanced load that can be measured to sufficient accuracy with simple equipment. An L network for matching this load to coax gives the transmitter the resistive load it likes to see

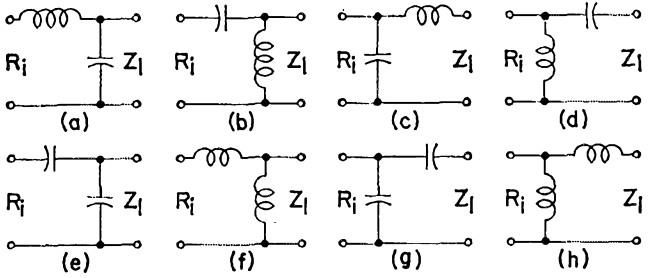


Fig. 2—L-type impedance-matching circuits for transforming a complex load, Z_L , into a pure resistance, R_i .

in the "4:1" sense, but apparently does a good job of converting from balanced to unbalanced, which is all that is necessary. The L-network does the rest of the job. If available, probably a ferrite-core r.f. transformer⁴ could also be used instead of the coil balun, but this has not been tried.

Impedance measurements on open-wire lines are not readily made, since balanced types of r.f. bridges are not available nor practical. The transformer converts the balanced open-wire impedance to an unbalanced impedance, which can easily be measured with normal unbalanced types of r.f. bridges.⁵ Once this impedance has been measured an L network may be designed to provide a match to 50 ohms.

Probably the best design information on L by Phillip H. Smith,⁶ (I will furnish a copy of the article to anyone wanting it, since it is too long to include here). In his article, Smith (of later circular Smith-chart fame) proposed a set of eight L networks as shown in Fig. 2.

The complex load, $Z_L = R_L \pm jX_L$ will be that measured at the unbalanced side of the r.f. transformer, while the pure resistance, R_i , will be the same value as the characteristic impedance of the coaxial transmission line chosen. Network analysis shows that for each impedance transformation situation certain of these networks will work, while certain other

configurations will not. Which networks will work for a given combination of load and line impedances may be quickly determined by plotting these on one of Smith's rectangular design charts, which show workable and "forbidden" regions. If any of several networks might do, then choose the one having the most-reasonable element values, or the one which acts most like a low-pass filter, for greatest harmonic attenuation.

The use of such L networks has several advantages. Antenna matching and tuning is easily accomplished by varying the L-network elements to achieve a minimum v.s.w.r. as indicated by a v.s.w.r. meter in the coaxial transmission line. L networks are physically convenient and easy to make, since often they may be wired as shown in Fig. 3, creating configurations (a) and (c) of Fig. 2. Other switchable combinations are of course possible, and this will depend upon the set of impedance combinations involved.

Use of such tuned networks offers an excellent way to reduce harmonics, as suggested by the shape of the tuning curves given in Fig. 4. The curves show that a roller coil would offer more precise control in achieving a low v.s.w.r. than the tapped coil used to generate the data for this figure.

Use of an L network opens the way for automatic tuning of the antenna matching network, by use of discriminators, servo amplifiers, and motors to tune the network LC elements for minimum v.s.w.r.

Another important application for this type of L network is to match the base of a vertical antenna to a 50- or 75-ohm coaxial line. One

⁴ *The Radio Amateur's Handbook*, p. 339, 1968 edition.
⁵ Strandlund, "Amateur Measurement of $R+jX$," *QST*, June, 1965. Of the manufactured bridges available, the General Radio type GR-1606A is representative. (See also Cherubini, "An Admittance Bridge for R.F. Measurements," *QST*, September, 1967—*Editor*.)
⁶ Smith, "L-Type Impedance Transforming Circuits", *Electronics*, March, 1942.

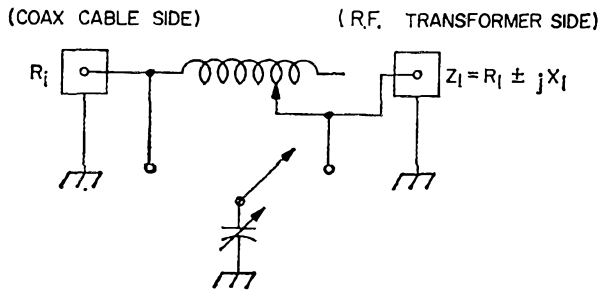


Fig. 3—Commonly-used L-network configuration. The capacitor can be switched between the input and output sides as required for matching.

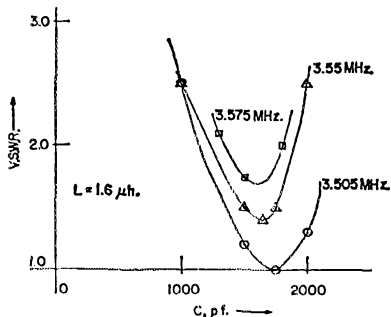


Fig. 4—Voltage standing-wave ratio versus capacitance for the network shown in Fig. 3, for a fixed value of inductance, in a representative antenna system.

vertical antenna with a tunable L network at its base will allow one antenna to serve for many different, and random, frequencies. (The open-wire-line horizontal antenna system has the advantage, however, that the L network can be located in the shack for convenience in tuning.) Bridge measurements of the base impedance of the vertical provide the same kind of data as is obtained from the r.f. transformer measurements, and allow the same kind of L network design. Use of such measurement data and L networks has been completely successful in many such vertical antenna installations.

Typical L networks are shown in the photograph, Fig. 5. The smaller one is for the 15-meter band, while the larger has independently switched L and C to cover the 40- and 80-meter bands. The data for Fig. 4 came from tests of that unit.

The system has not been tried on extremely short antennas, but I see no reason why this would not be possible. In such a case the high currents which would result would need to be allowed for in selection of components, just as in any other short-antenna situation.

An Example

As an example, consider the L network used here for the 15-meter band. Measurements made on the unbalanced side of the balun with a GR r.f. bridge were:

<i>f</i> , MHz.	<i>R_i</i> , ohms	<i>X_i</i> , ohms
21.0	9.0	-j10
21.1	8.7	-j10
21.45	8.0	-j15

The Smith charts use normalized units, which means that for matching to 50 ohms, divide the values of *R_i* and *X_i* by 50 to make 1 chart unit equivalent to 50 ohms. Thus for the 15-meter

network use $R_i = \frac{9}{50} = 0.18$ and

$$jX_i = -j \frac{10}{50} = -j0.2.$$

Next, select the type of L network which will allow a match between $Z_i = R_i \pm jX_i = (0.18 - j0.2)$ here, to $R_i = 1.0$. Study of the charts associated with each of the network configurations of Fig. 2 shows that (c) is suitable, and desirable since it acts most like a low-pass filter. The Smith chart representing the L network of Fig. 2 (c) is shown in Fig. 6.

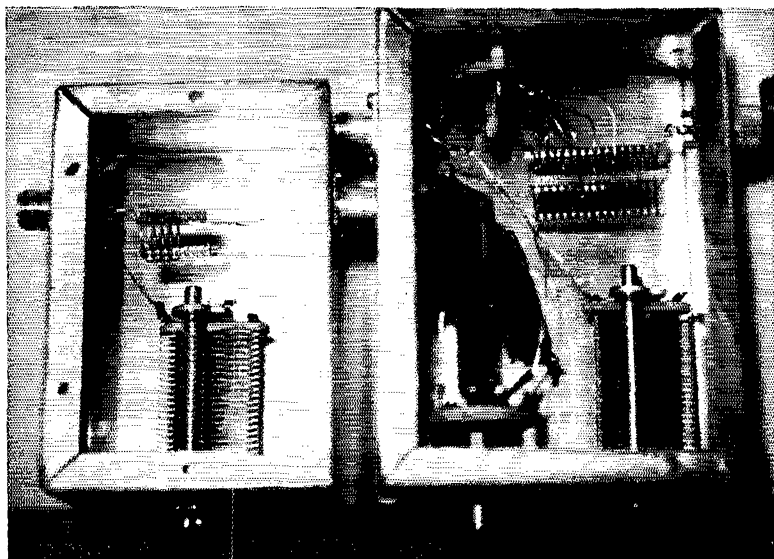


Fig. 5—Typical L-network construction. The network at the left is for 15 meters and the one at the right is for 40 and 80 meters.

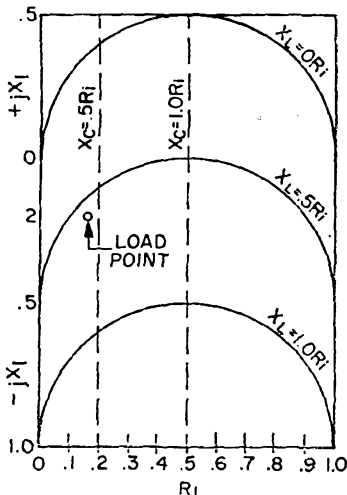


Fig. 6—Chart for the L network of Fig. 2(c). The load point, $Z_L = 0.18 - j0.2$, used in the example in the text is plotted on the chart. From its position the network element values, $X_L = 0.56R_L$ and $X_C = 0.47R_L$, can be determined.

Plotting of normalized load values on this chart gives direct answers as to the required normalized network element values, X_L and X_C , needed to build the network. In this case, the load point, $Z_L = 0.18 - j0.2$, gives $X_L = 0.56 R_L$ and $X_C = 0.47 R_L$. Since $R_L = 50$ ohms, $X_L = 28$ ohms and $X_C = 24$ ohms. Use of a reactance slide rule for these values of X_L and X_C at 21.0 MHz. gives $L = 0.21 \mu\text{h.}$ and $C = 310 \text{ pf.}$

I built the L network in a metal box as shown in Fig. 5, with the coil leads connecting to coax connectors, one on each side of the box. Tuning is done with the variable capacitor, and for this band is not critical enough to require changing the coil. For 80 meters, or where the antenna is "short", both L and C should be tuned, as suggested in Fig. 4. Other designs can be easily carried out using the charts given in the *Electronics* article. The design may be easily checked by measuring the coax side of the L network, when connected to the balun and antenna, with the r.f. bridge. When the L and C have been correctly set, the impedance should read $50 + j0$, which will result in a v.s.w.r. of 1.0. QST

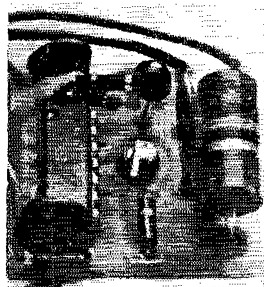
• New Apparatus

25-kHz. Adapter for 100-kHz. Markers

The 100-ke. crystal-oscillator marker now an almost customary part of current ham-band receivers is obviously useful, but doesn't supply close-enough frequency intervals to define the edges of amateur subbands as now constituted. Nowadays it takes intervals no greater than 25 kHz. to do the job for all bands. The gadget shown in the accompanying photo, the Paxitronix IC-3 Divider, is a digital circuit which will divide the output of your 100-ke. oscillator by 4, thus generating the needed markers.

The circuit is basically the one suggested by W0KPZ in "Technical Correspondence" on page 55 of February, 1968 *QST*, with the addition of a transistor amplifier between the receiver's 100-ke. oscillator circuit and the first flip-flop. The amplifier, dual flip-flop, and power-supply voltage divider are all included on the $1\frac{1}{4}$ by $1\frac{1}{4}$ inch etched circuit board. The IC-3 d.c. power can be taken from any point in the receiver B supply that will furnish 100 to 180 volts. Current taken is 5 to 10 ma., depending on the source voltage.

The divider comes with descriptive material, installation and operating instructions, and mounting hardware. A trial in a receiver where a d.c. voltage of 125 happened to be conveniently available showed it to give strong harmonics at 25 kc. intervals throughout the entire range (10 through 80 meters) covered by the receiver. The IC-3 is made and distributed by Paxitronix, Inc., P.O. Box 1038, Boulder, Colorado 80302. Price class is \$6. — W1DF



Strays

Feedback

The HEW official shown with WA7AEL on page 77 of October *QST* is Jas. G. Terrill, Jr., Director of the National Center for Radiological Health, HEW.

The figure in the last line of the first column of W6IT's 7-MHz. antenna table in Technical Correspondence, October *QST*, should have been $\frac{1}{4}$ instead of $\frac{1}{2}$. The vertical and horizontal portions add up to $\frac{1}{2}$ wavelength.

● *Beginner and Novice*

Is A Balun Required?

Information on a Popular Antenna Question

BY LEWIS G. McCOY,* W1ICP

I am using coax to feed my antenna, and other hams tell me I must use a balun or my antenna won't work properly. I seem to be getting out OK, so should I put in a balun or shouldn't I?"

This question, or a variation of it, keeps popping up whenever antennas are discussed. This article will attempt to answer the question in simple language.

The Balun — A Definition

The word balun (not balum!) is a contraction of **BALANCED** and **UNBALANCED**. Its application is to transform an unbalanced condition (one side at ground potential) into a balanced one, or vice versa.

There are two types of baluns that are commonly used by hams. They are 1-to-1 and the 4-to-1 devices. A 1-to-1 balun is a circuit that has the same impedance at its input side as at the output side. In other words, if you attach a 50-ohm load to one side, the 50-ohm impedance will appear at the other side. The 4-to-1 type can be used either as a step-up or step-down transformer. For example, if you wanted to match a 300-ohm folded dipole to a 70-ohm coaxial line, the 4-to-1 balun would be ideal to match the antenna to the line.

This brings up an interesting point. Many amateurs mistakenly believe that a balun is a matching device. It *can* be a matching device but in most applications with antennas, it is not. The 4-to-1 balun would be considered a matching device in that it transforms the impedances by a ratio of 4 to 1. However, the more commonly used 1-to-1 balun does not transform impedances, so it shouldn't be considered a matching circuit. What the 1-to-1 balun does is enable the user to go from an unbalanced feed line to a balanced feed point.

Feed Lines, Balanced and Unbalanced

There are two common types of feed lines used by amateurs. The most popular is coaxial line. The other is parallel-conductor line, which can be either open-wire or Twin-Lead type. Any transmission line that has two conductors of the same size and shape can be considered to be a *balanced* line. Open-wire and Twin-lead transmission lines fall in this category.

Coaxial transmission line consists of two *different-sized* conductors. The outer conductor is in the form of a tube and the other conductor

*Novice Editor.

is centered inside it. In the type of coax used by most amateurs the tube is a flexible copper braid while the inner conductor consists of either stranded wires or a single wire, insulated from the tube by a plastic dielectric. This type of line is unbalanced.

Where many beginners get confused in their thinking is in understanding how r.f. currents travel in coaxial lines. This probably arises from the fact that the outside shield is usually grounded at the transmitter end of the line (as it should be). R.f. currents travel on the inner conductor and on the *inside* of the outer tube or braid. If r.f. does flow on the outside of the line as well as the inside, the coax is no longer a simple transmission line but will act as an antenna as well, with the current on the outside causing radiation just as it would with any single conductor.

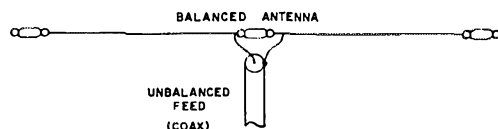


Fig. 1—This shows a popular antenna system. The text discusses the problems involved with feeder radiation.

Feed-Line Radiation

The function of a transmission line is to offer a path for r.f. power to travel from the transmitter to the antenna. The feed line should make this transfer of r.f. as efficiently as possible (with a minimum of loss) and do the job without *radiating*. When a transmission line radiates any r.f. it no longer is just a feed line; it becomes an antenna, or part of the antenna.

Whether or not a radiating feed line is important as far as your signal is concerned depends on several factors. If, for example, you are a Novice with a dipole or multiband dipole, feed-line radiation probably won't be harmful at all. In fact, such radiation would probably be helpful, because it might put out a signal in a direction where none would normally exist. A Novice operating on 80 or 40 meters would probably want to work in the most directions possible.

On the other hand, if you are using a beam antenna, the only radiation you would want would be from the antenna itself. Otherwise, you could seriously degrade the front-to-back or front-to-side ratio of the beam. If you have a

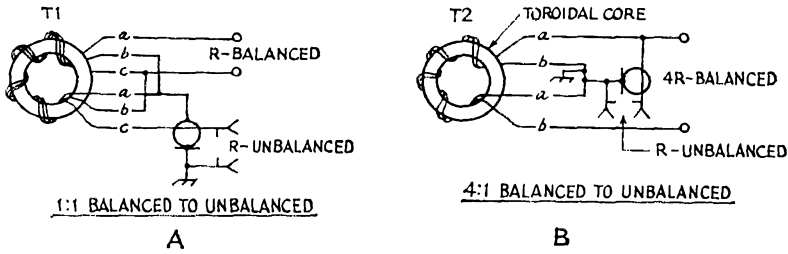


Fig. 2—A—Pictorial of a balun for a 1-to-1 ratio. B—The 4-to-1 unit. For a 1-to-1 balun for the 3.5- to 28-Mc. range, 10 trifilar turns are required. The turns should be equally spaced around the core. 10 bifilar turns are required on the 4-to-1 unit for the same frequency coverage.

beam antenna that has poor front-to-back ratio, a radiating feed line could be the cause.

If a feed line isn't supposed to radiate, the question is how such a condition comes about. A feed line usually radiates because power from the antenna is coupled from the antenna back to the feed line. A beginner, not knowing about transmission-line theory, would be perfectly justified in asking why the r.f. traveling on a transmission line from the rig to the antenna doesn't radiate from the line. Without going into a lot of detail, it can be stated briefly that radiation from one line conductor tends to cancel the radiation from the other conductor because the phases of the fields set up by the two are such that radiation is very difficult or impossible. However, if r.f. energy is coupled back from the antenna to the feed line the phases of the r.f. currents that flow on the line conductors no longer are such that the fields cancel one another, so radiation takes place. These "back" currents often are called *parallel currents* or "parallel standing waves."

Our problem boils down to the undesired coupling between the antenna and the feed line, particularly when using coaxial feeders. Fig. 1 shows a typical dipole, a balanced antenna, fed with coaxial cable, an unbalanced line. The inner conductor of the coax is connected to one side of the antenna while the outer shield is connected to the other side. By connecting the outer braid to one half of the dipole we are connecting both the *inside* and *outside* of the braid to one side of the dipole. Under these conditions, it is difficult to prevent antenna currents from flowing on the outside of the braid.

Checking for Line Radiation

It is almost impossible to actually *measure* any current flowing on the outside of the braid. However, there are several methods of determining *if* currents are flowing on the outside. If you have an s.w.r. bridge in the coaxial line, check the s.w.r. and then change the location of the bridge in the line and check again. If the s.w.r. changes, more than likely the reason is because of parallel currents on the outside of the line. The s.w.r. in a feed line is established by the impedance of the antenna in relation to the characteristic impedance of the line. If, for example, the impedance of the antenna is 100

ohms and you are using 50-ohm line, the s.w.r. will be 2 to 1, and it should be 2 to 1 no matter where the bridge is placed in the line! If the apparent s.w.r. is different at different points along the line, then the s.w.r. readings are being upset by the parallel currents.

Another way to check is to put the s.w.r. bridge in the "forward-power" position, set the meter for about half-scale reading, and then run your hand along the outside of the coax. If the meter reading varies, you have parallel currents on the feeder.

Still another indication is r.f. around the shack. If you get any "bites" from r.f. on equipment in the shack, such as the microphone, the receiver, or the transmitter cabinet, this can be an indication of antenna currents on the outside of the line.

Is a Balun Worth It?

Before discussing the "how" of removing r.f. from the outside of the line, the question you should ask yourself is, "Should I remove the r.f.?" Assuming you are using an 80- or 40-meter coax-fed dipole, more than likely any feed-line radiation is of no consequence, so it probably wouldn't be worth the cost and effort to eliminate the feeder radiation. The average amateur 80- or 40-meter antenna is installed 30 to 40 feet above the ground. While many owners of such antennas may assume that they are getting the figure-8 pattern from the antenna, in all probability the radiation is omnidirectional. In order for a dipole to have any appreciable directivity on 80 or 40 meters the antenna must be considerably higher than 30 or 40 feet above the ground.

There is one other consideration that should be taken into account, TVI. One of the common problems with TVI is fundamental overloading of the TV set from a strong nearby amateur station. Feed-line radiation is more likely to be vertical radiation rather than horizontal. As such, the vertical radiation could possibly dump more fundamental signal into the nearby TV antenna system. Normally, less fundamental signal pick-up could be expected with horizontal polarization.

As stated earlier, one would not want feeder radiation with a beam antenna because such radiation could degrade the beam pattern.

In addition to feeder radiation, it is possible to run into another problem at v.h.f. when using coax to feed a balanced antenna. Instead of the pattern from a v.h.f. antenna being symmetrical, as would be expected from a balanced circuit, it is possible to get "skewing" of the pattern. For this reason, a balancing device of some type should be used with coaxial feed. Complete details for such devices can be found in *The Radio Amateur's V.H.F. Manual*.

The Toroidal Balun

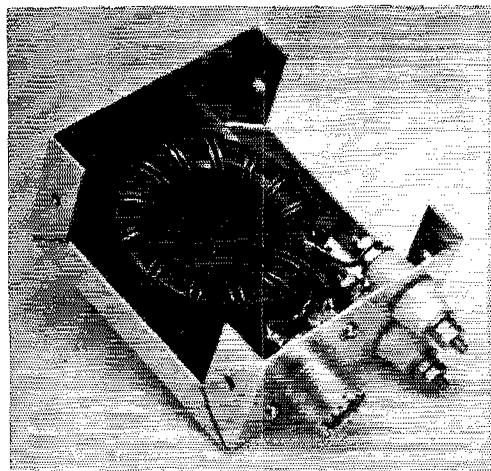
A study of *The Radio Amateur's Handbook* will show that several different types of baluns are available for different applications. The most popular type in use at frequencies below 28-Mc. is the broad-band toroidal type shown in the photographs. The balun shown in Fig. 2 can be used as a 4-to-1 or 1-to-1 device, depending on how it is made, and will maintain these ratios from 80 through 10 meters with reasonable tolerances. For example, the 1-to-1 unit was tested with a 50-ohm load and the poorest match within that frequency range was 1:2 to 1.

If you look through the advertising pages of *QST* you find several firms that make toroidal baluns, or you can build your own and save money. The kit¹ shown in one of the photographs includes the toroidal core and wire to make up a balun that will handle the legal amateur power limit.

Resonant Outer Braid Problems

One fact that should be pointed out is that a balun may not eliminate feeder radiation. You

¹ The kit shown is available from Amidon Associates, 12033 Otsego St., North Hollywood, Calif. 91607.



Here is one method of mounting the balun. This particular unit is a 4-to-1 device. A small piece of phenolic insulation is used between the transformer and the Minibox wall to prevent shorting of the wires. Epoxy cement can be used to cement the core to the phenolic board. For outdoor use, the seams of the Minibox should be sealed with epoxy cement.



This is a kit that can be used to make up either a 4-to-1 or 1-to-1 toroidal balun. The core measures 2 inches in diameter and is 1/2 inch thick.

can still have power coupled from the antenna to the line if the line isn't brought away from the antenna at right angles for a distance of at least a quarter wavelength. Also, if the length of the outside of the braid and its path to earth ground, (including the part of the antenna to which the braid is connected (if you aren't using a balun) happens to work out to be a resonant length, energy from the antenna would more than likely be coupled back to the outside of the coax. This would cause parallel currents on the line, with radiation a result.

Bear in mind that the overall *outside* length of the coax braid must take into consideration the *total* path length from the end at the antenna to where an earth ground actually exists. Because we have no way of knowing where the exact ground point is, there is no way of knowing how long to make the coax feeder beforehand.

One way to check if the overall path length happens to be a resonant length is with a grid-dip meter. Make sure that all the regularly-used connections, such as the ground lead, a.c. plug in the wall, key or mike leads, and so forth, are in place, because all this metal goes into making up the length we are concerned about. Just keep in mind that we are not concerned about the electrical length of the *inside* of the coax but rather the *total* length of the *outside*: the total electrical length is varied by the factors mentioned above.

Couple your grid-dip meter to the outside braid of the coax and carefully tune the grid-dip meter through the bands you are concerned about. If you get a dip in the band or bands, the outside length is resonant and it would be easy to couple power back from the antenna to the feeder. One simple way of correcting the condition is to change the length of the ground wire so that any grid-meter dip is well outside the ham band or bands. You could prune the coax but this is slightly more expensive than changing a wire length! If you can move any resonances at least a few hundred kilocycles outside a ham band it should help to prevent coupling of undesired feeder currents.

As you can see, whether or not you want to install a balun depends on several considerations. For many purposes, it would be to a ham's advantage to use one, but in other instances it would be a waste of money and time. What you must do is carefully look over your needs and act accordingly.

QST

Synchronous

Weak

Signal

Detection with

Real Time Averaging

COHERENT POST-DETECTION SYSTEM

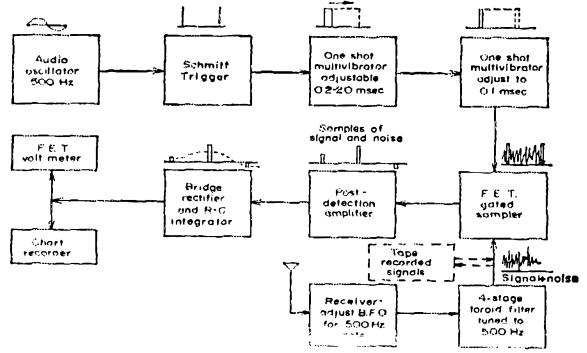


Fig. 1. Synchronous detection system, with received signal sampled by an FET, gated at the rate of the audio beat note of the receiver.

BY W. R. ADEY*, M.D., WB6DEX AND R. T. KADO*, B.S.

THE technique of weak signal reception described here was first developed for use in brain research,^{1,2} and has been successfully applied in the past year to the detection of weak moon-bounce signals on 144 MHz. Our impedance measurements in brain tissue were made at 1000 Hz., and have required the reliable detection of shifts in the measuring signal of the order of 0.1 to 0.01 microvolt, in the face of an amplifier input noise of 0.2 to 0.5 microvolt in the same bandpass.

Obviously, such a system has considerable potential in the detection of weak, coherent radio signals substantially buried in noise of much greater amplitude. Its application to brain research has allowed detection of changed tissue states associated with learning and epilepsy, which would have been totally obscured with larger measuring currents. Its particular capability to detect coherent signals in noise immediately suggested its possible use in detection of weak echoes in e.m.e. studies at 144 MHz. A recent *QST* article³ has emphasized the potential of synchronous detectors in slowly integrating very weak signals buried in noise. The price paid by all such devices is

a reduction in bandwidth proportional to the integration time. The system described here offers the advantages of a fast sampling rate and more rapid integration. It also offers the possibility that its utilization by groups of experimenters in the m.e.w. transmission mode may provide truly phase-locked transmission and reception loops at audio frequencies at different locations.

Design Of Signal Sampling System

The initial laboratory system was designed around an exceedingly stable tuning-fork oscillator. The system was truly coherent, and retained phase information about the impedance signal current on a cycle by cycle basis. The question was whether the system would retain its useful characteristics with a less elaborate oscillator. Also, could it be used to detect signals by manual tuning to the desired audio frequency? To be fully effective, the receiver beat note or tone modulation should remain stable within 1.0 Hz. On the other hand, as will be explained, the system will integrate, though more slowly, wave trains at frequencies adjacent to the master oscillator frequency, and at the same time will integrate noise components to zero. Our expectations have been proven correct, and the method does indeed detect signals in 10-20 db. of noise.

The system configuration is shown in Fig. 1. A 500-Hz. sine-wave oscillator drives a Schmitt trigger which produces brief pulses at the same rate as the audio oscillator. These pulses drive a multivibrator that fires once for each pulse of the Schmitt trigger. The duration of the

*School of Medicine, University of California, Los Angeles, California 90024.

¹Adey, W.R., Kado, R.T. and Didio, J. "Impedance measurements in brain tissue of animals using microvolt signals." *Experimental Neurology*, 1962, 5:47-66.

²Kado, R.T. and Adey, W.R. "Method for measurement of impedance changes in brain tissue," *Proc. 6th Internat. Conf. Medical Electronics and Biol. Engineering, Tokyo*, 1965, p. 551.

³Parrish, A. "Detecting VHF signals too weak to be heard." *QST*, January, 1968, p. 44.

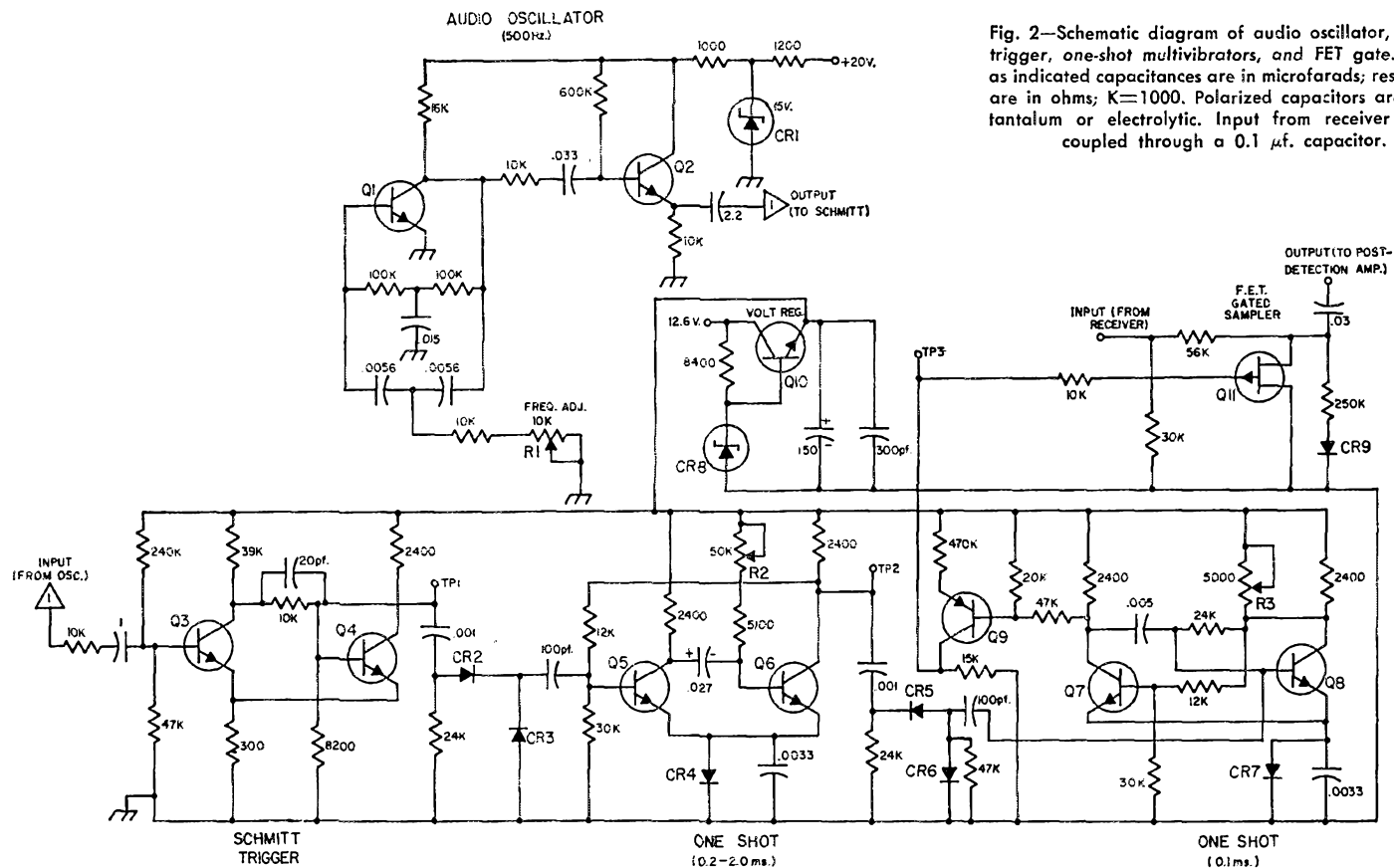


Fig. 2—Schematic diagram of audio oscillator, Schmitt trigger, one-shot multivibrators, and FET gate. Except as indicated capacitances are in microfarads; resistances are in ohms; K=1000. Polarized capacitors are either tantalum or electrolytic. Input from receiver is a.c. coupled through a 0.1 μ f. capacitor.

CR₁—15-volt zener.
 CR₂—CR₇, inc.—1N4009 or equivalent
 CR₈—7.5-volt zener, 1N4737 or equivalent.
 CR₉—1N270 or equivalent.

Q₁, Q₂—2N1304 or equivalent.
 Q₃—Q₄, inc.—2N914 or equivalent.
 Q₅—2N508 or equivalent.
 Q₁₀—2N914 or equivalent.

Q₁₁—2N3382 or equivalent.
 R₁—10K, ½-watt, linear control.
 R₂—50K, ½-watt, 10-turn, linear control.
 R₈—5000-ohm, linear control.

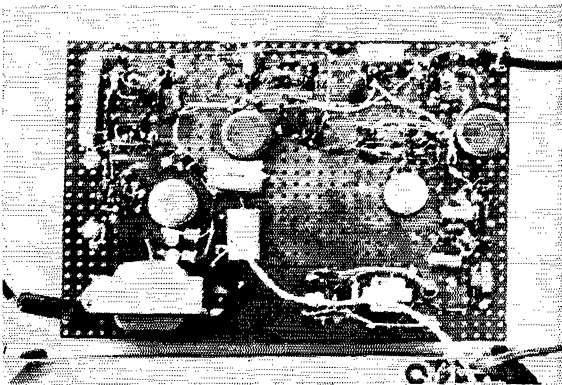


Fig. 3. Interior view of synchronous detector.

square wave produced by this multivibrator can be adjusted from 0.2 to 2.0 milliseconds. The first one-shot multivibrator triggers a second one-shot multivibrator on the falling phase of its square wave. The second one-shot multivibrator produces a much shorter pulse of 0.1 ms. The variable duration of the square wave from the first multivibrator allows the positioning of the brief 0.1 ms. pulse at any position in time relative to the original sine-wave signal. In the initial adjustment of the detector, the pulse is placed at the base line crossing of the sine wave, which is the point at which the sine-wave voltage is changing at the fastest rate. As will be explained, it will thus charge the following *RC* integrator most quickly at this position.

The 0.1 ms. pulse is used to open an FET gate, which remains short circuited until the pulse is applied. The receiver output is applied to this gate. The signal is mixed with noise. The momentary opening of the gate allows a brief sample of the receiver output to pass to the postdetection amplifier and *RC* integrator. The signal is sampled 500 times per second, and the components that have a constant phase relation to the sampling pulse will integrate to a measurable output, whereas the noise components will integrate to zero. In its application here, the integrator time constant is 1.0 to 2.0 sec., but in the detection of very weak signals this can be extended to 10 sec. or more.

What happens if the receiver is not tuned to a beat note exactly the same as the audio oscillator frequency? In a practical world receivers and transmitters drift, and even short term stability better than 10 Hz. at 144 MHz. is not easy to secure without phase-locked r.f. oscillators. Under these conditions, the beat note will have a "phase velocity" relative to the sampling pulse train. The beat note will drift in and out of phase at a rate determined by the frequency difference. At frequencies within 1 or 2 Hz. of the sampling pulse frequency, the output of the integrator rises and

falls at the rate of the frequency difference. Phase locking is indicated by a sudden sharp rise in integrator output, four or five times larger than at closely adjacent frequencies. To minimize responses to beat frequencies more than a few cycles away from the sampling frequency, the receiver selectivity should be as sharp as possible. Filters in a 75A-4 receiver reduce the bandwidth to less than 150 Hz., and this is further reduced to 40 Hz. in a toroidal filter. At shifts up to 10 Hz. from the center frequency, smaller but useful integrator outputs will occur. Integrator output can be read visually on a high-impedance voltmeter or chart recorder. It can also be used to generate a synthetic audio signal.

Circuit Of Signal Sampler

The version of this system used in moon bounce work replaced the original tuning fork oscillator with a simple parallel twin-T oscillator followed by an emitter follower to drive the Schmitt trigger (Fig. 2). The latter needs about 5 volts drive, and can be driven by any external audio oscillator. Adjustment of the two multivibrators will require an oscilloscope, but once the potentiometer settings have positioned the sampling pulse from the second multivibrator as described above, no resetting is needed. The detector was constructed on copper clad perforated board and mounted behind an aluminum chassis that also houses an FET voltmeter. It is well to locate the audio oscillator at one end of the board and the FET gate at the other to minimize chances of coupling between them. The audio oscillator is located at the left end of the board (Fig. 3) and the Schmitt trigger and multivibrators lie along the upper edge. At the right top is the FET gated detector, with the post-detection amplifier at the lower right. This amplifier is transformer coupled to the bridge rectifier and *RC*-integrating network on the lower part of the board.

Application To MoonBounce Reception

This system has been successfully tested on numerous occasions in searching for signals from other stations, and in the detection of our own echoes. The transmitter runs 1.0 kw. to a pair of 4CX250Bs, with an output of 600 watts. The antenna is a stacked array of 9 bays of cross-polarized Yagis, totaling 180 elements. The approximate gain of a single set of 90 elements is better than 21 db., using the sun as a noise source and calculating gain from both maximum noise increment and by measurement to half power points in *E* and *H* planes of the antenna.

The results shown in Fig. 4 are representative of average echo levels with 90 elements in a 90-second period. The receiver output was recorded on tape, and later played back through the detector on a chart recorder. In each case, the upper trace is the synchronous

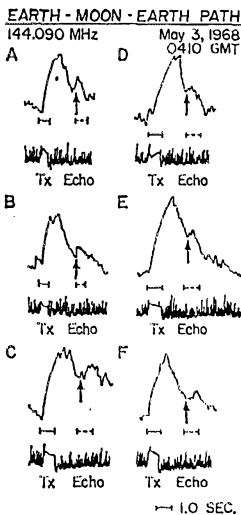


Fig. 4. Echoes returned from moon under average conditions. Top trace in each pair is from synchronous detector, and lower from receiver output.

detector output and the lower trace is the raw receiver output. At best, the echoes were weakly audible to a "trained" ear, but in most instances were inaudible. (The question of the trained ear is a topic in itself, since it can be shown to detect tone signals in more than 30 db. of noise.)⁴ Hand-sent pulses 0.5 to 1.0 sec. in duration caused a rapid rise in the integrator output. The height and slope of the rise varied with the proximity of the beat note to the sampling pulse frequency. At the time shown, the moon was almost due south in azimuth at this location, so that doppler shift was small, and the transmitted and received

⁴Swets, J.A. "Indices of Signal Detectability Obtained With Various Psychophysical Procedures," *J. Acoust. Soc. Amer.* 1959, 32(4): 511-514.

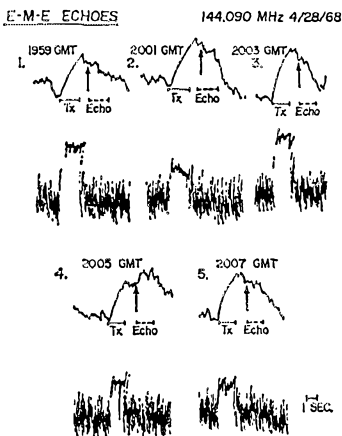


Fig. 5. Weak returns with moon and sun close together. Antenna was fixed and moon passed in transit across antenna. Echoes peaked at 2005 GMT.

signals were close together. Echo returns begin about two and one half-seconds after the start of the transmitted pulse, and appear on the discharge phase of the integrator time constant. The amplitude of these echoes is about one fifth of the deflection from the receiver background noise, and thus the detector is able to retrieve signals in 10 to 15 db. of noise.

Echoes are usually weaker when the sun and moon are close together. A test was made when they were about 10 degrees apart, with the antenna fixed 4 degrees ahead of the moon's transit (Fig. 5). Echoes at 1959 GMT were weak and variable, peaking at 2005 GMT and declining thereafter. A half hour later they were barely visible, even with higher detector gain (Fig. 6).

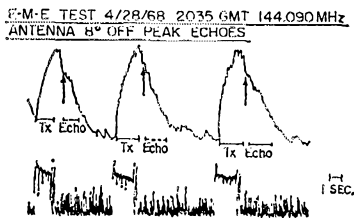


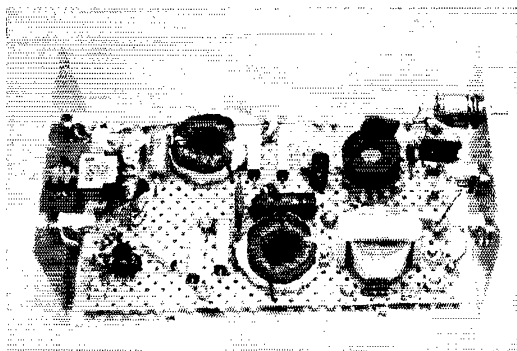
Fig. 6. Minimal echoes half hour after those in Fig. 5, with moon now substantially off main lobe of antenna.

Application To Transmission With M.C.W.

Obviously, it would be desirable to obviate the problems of drift associated with stringent tuning requirements in conventional receivers. A further development of the system is now under test. The 500-Hz. audio oscillator has been used to generate a second 1000-Hz. signal by frequency doubling in a toroidal filter. The two signals were mixed and applied to an s.s.b. generator to produce a signal that was amplitude modulated at 500 Hz. Currently echo tests are under way with the receiver in the a.m. mode. Since the transmitted signal is now locked to the synchronous detector at audio frequencies, it should be possible to take full advantage of a coherent system. However, it appears that the decreased sideband power associated with the m.c.w. mode, and the additional problems of accurate receiver tuning in the a.m. mode need evaluation.

Nevertheless, such a method would afford stations at different locations the opportunity to develop coherent systems that would utilize a common tone source. For example, world-wide coverage by WWV would permit use of its tone transmissions as reference signals for the pulse sampling train used here, and as a tone source for m.c.w. Moonbounce circuits are much closer now for amateur work than any of us ever realized, but their utilization will always bring us face to face with the problem of weak signals, and often with signals actually buried in noise. QST

A Solid-State Audio Filter



The completed filter mounted in a small Minibox.

BY LOUIS N. ANCIAUX, LT., U.S.N.,* WB6NMK

THE 2.5-kHz. filter found in most transceivers provides just about the maximum selectivity that can be tolerated in s.s.b. reception without impairing intelligibility. It does not, however, provide the degree of selectivity permissible and desirable for c.w. reception. I.f. filters with nominal bandwidths of 400 or 500 Hz. are available for some receivers, but they are expensive, and still do not provide the degree of selectivity that could be used for c.w. reception.

Maximum permissible selectivity for the mode under consideration is desirable not only as an aid in eliminating interference from signals on closely adjacent frequencies, but also to reduce noise. The effective increase in signal-to-noise ratio that results with increased selectivity is approximately proportional to the log of the bandwidth ratio. As an example, the improve-

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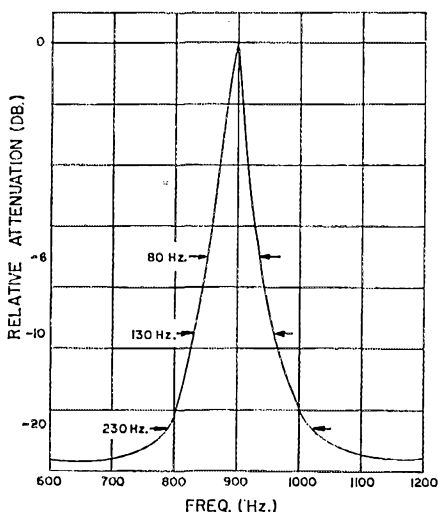


Fig. 1—Response curve of the selective audio filter shown in the photographs.

ment in signal-to-noise ratio in decreasing the bandwidth from 2.5 kHz. to 80 Hz. is $10 \log 2.5/0.08 = 10 \log 31 = 10 \times 1.49 =$ approximately 15 db. This is equivalent to an increase in signal strength of about three S points, assuming 5 db. per S point.

Several factors place a limit on the maximum selectivity that can be used in practice. Easily-recognized factors are those associated with the receiver tuning rate, and the frequency stability of the signal being received. Unless the receiver tuning rate is adequately slow, there will be difficulty in adjusting the receiver to set the signal in a narrow pass band. Similarly, it will be difficult to keep an unstable signal centered in the pass band. Signals whose frequency variations are too rapid to be followed by retuning the receiver (chirpy, wobbly, or rapidly drifting signals) cannot be copied.

A factor that may be less familiar to some is that rectangular pulse signals, a class into which c.w. signals fall, require a certain minimum bandwidth.¹ This bandwidth in Hz. is approximately three times the c.w. transmitting speed in words per minute. Thus a code speed of 25 w.p.m. requires a bandwidth of about 75 Hz. (Where extreme selectivity is used to reduce noise, such as in moonbounce work, the code speed must be reduced accordingly.)

Selective Audio Filter

A high order of selectivity can be obtained with an audio filter. One advantage of this type of filter is that it can simply be plugged into the headphone jack of any receiver. No alteration of the original receiver circuitry is necessary. Selectivity in an audio filter can be obtained by the use of high-Q tuned circuits, just as selectivity is obtained at r.f. The sharpness of the nose of the selectivity curve and the steepness of the skirts depend on the number of such circuits used. In the author's first attempt at a filter, three circuits were used. This arrangement provided a bandwidth of approximately 30 cycles at

¹Grammer, "Why Key Clicks?" QST, October, 1966.

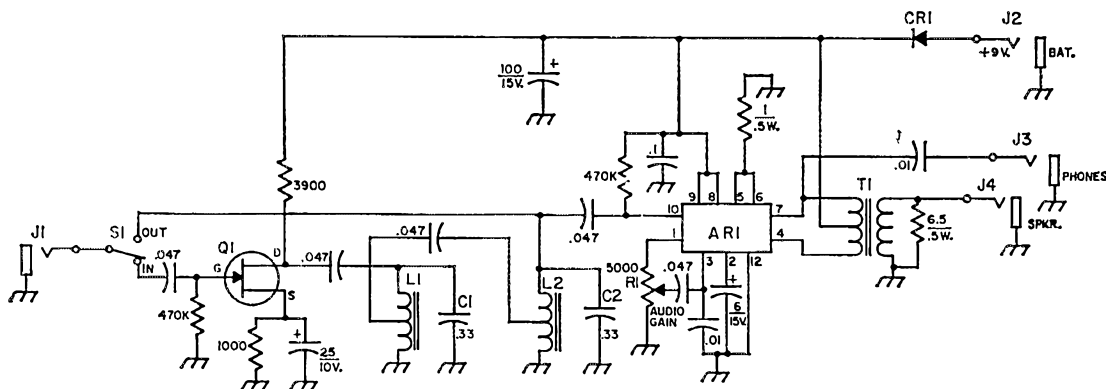


Fig. 2—Circuit diagram of the selective audio filter for c.w. reception. Capacitances are in microfarads; resistances are in ohms ($K = 1000$). Polarized capacitors are electrolytic; others are mylar. Unless otherwise indicated, fixed resistors are $\frac{1}{4}$ -watt.

AR1—Integrated-circuit audio amplifier (RCA CA3020).
 C₁, C₂—See text.
 CR1—1N547 (or any other silicon diode).
 J₁, J₂, J₃, J₄—Miniature open-circuit headphone jack (Calrad, Switchcraft).
 L₁, L₂—88-mh. telephone toroid (see text).

Q₁—2N3819 N-channel FET transistor.
 R₁—5000-ohm control, audio taper.
 S₁—Miniature toggle (Calrad, or similar).
 T₁—Transistor audio output transformer, 125 ohms, c.t. to 3.2 ohms (Argonne AR-174).

10 db. down, but this selectivity was too great to be of practical use. Two circuits provide just about the maximum selectivity that is practical for the frequency stability of a large percentage of the DX signals normally to be found on the air. The response curve of this filter is shown in Fig. 1.

The circuit of the filter is shown in Fig. 2. It is simple and straightforward, and is not critical as to component layout. The FET amplifier provides high-impedance input, and its gain of approximately 12 db. is enough to overcome losses in the filter. The selective circuits are inserted between the FET amplifier and an RCA CA3020 IC amplifier. The latter is a high-gain two-stage amplifier with $\frac{1}{2}$ -watt push-pull output.

R₁ is the audio gain control. S₁ permits cutting the filter out of the circuit when it is not wanted. Headphone output may be taken from J₃, and speaker output from J₄. The diode, CR₁, is merely a safety device to protect the transistors in case the battery polarity is inadvertently reversed. The 6.5 ohm resistance (two 13-ohm, $\frac{1}{4}$ -watt resistors in parallel) is necessary to provide a proper load for the IC amplifier when high-impedance headphones are used.

The inductors, L₁ and L₂, used in the tuned circuits are the well-known 88-mh. telephone toroids, but any high-Q inductors of this approximate value may be used. The parallel capacitors, C₁ and C₂ must have values that will tune, with the inductance of the coils, to the desired audio frequency. The author prefers a frequency of about 900 Hz. for copying c.w. The frequency may be lowered by using more capacitance, or raised by using less capacitance. Both circuits should be tuned as exactly as possible to the same frequency, whatever the chosen frequency may be.

The photographs show the general layout of components in the author's filter, which was assembled on a $2\frac{3}{4} \times 5$ -inch piece of perforated board. This board fits nicely into a $3 \times 5\frac{1}{4} \times 2\frac{1}{4}$ -inch Minibox. The layout need not be followed closely.

Using the Filter

Some patience is required in learning to tune the receiver with the filter in use. The less bandwidth the receiver has, the more difficult tuning becomes. A common tuning rate for amateur-band receivers is about 25 kHz. (25,000 Hz.) per revolution of the tuning knob. This gives a rough idea of the care that has to be used in adjusting a signal to the center of an 80-Hz. pass band. But it can be done with practice. Start out by tuning in some signals that are reasonably strong, and free from QRM. These signals will have sufficient strength when down on the skirts of the response curve to give a warning as you approach them. After some experience with signals of this type, you can start digging down for the weaker ones that have to be fairly well centered on the pass band to be heard.

Noise

While high selectivity deals quite well with random noise with a more or less smooth envelope form, unfortunately this is not true of noise spikes of high amplitude and short duration, such as ignition noise. Shock excitation of a high-Q circuit by such a spike can cause the circuit to oscillate at its resonant frequency, much like a gong continues to vibrate after being struck with a sharp blow. The result is a "ringing" sound that masks a weak signal. Aside from moving to a location remote from highways, the only remedy

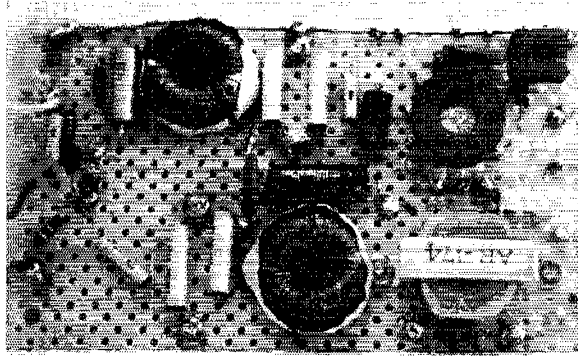
Components of the selective audio filter are assembled on a small perforated board. The FET transistor, fitted with a small heat sink, is to the right, above the output transformer. The IC audio amplifier is at the center, immediately above one of the toroid coils. Component connecting leads are on the under side of the board.

is the use of i.f. limiting, or an i.f. noise silencer or blander.²

In conclusion, I would like to express my appreciation to W. J. Fay, L. E. Hoff, M. E. Moore, W. J. Freye of Naval Electronics Laboratory Center, and to Virginia M. Kerth for typing the manuscript and K6DSM for his assistance and invaluable guidance.

QST

² ARRL Handbook, 43rd-45th editions.

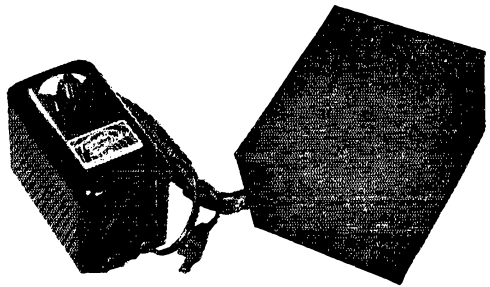


• New Apparatus

Remotely-Operated Antenna Switch

ALTHOUGH single-feeder simultaneous operation of several beam antennas on the same tower is undoubtedly convenient, it generally represents an electrical compromise which many like to avoid. There are two alternatives — separate feed lines, or a selector switch with one feed line. The Model TS-4 "Tenna Switch" shown in the photograph has been designed for the latter system. It will handle up to four antennas, switching both sides of the line for maximum isolation of the ones not in use.

The box at the right, the remote unit, contains the stepping switch, a two-section ceramic-wafer type, and the necessary means for making connections to the coax lines as well as to the control cable. It also has provision for weatherproofing the cable entrances and exits, since this unit is mounted close to the antennas. The control unit, at the left, has the antenna-selector switch and a step-down transformer for actuating the ratchet in the remote unit. The transformer operates from the regular 115-volt line and takes power only during the actual switching time. The control cable, not furnished, can be



lightweight (No. 22 conductors); 4-wire cable is needed for switching three antennas, or 5-wire cable for switching four. The Tenna Switch is rated to carry the maximum legal amateur power on s.s.b., a.m., or c.w.

The TS-4 is manufactured and distributed by Cubex Co., P.O. Box 732, Altadena, California 91001. Price class is \$18.00. — W1DF

Strays



1500-Mile Eyeball QSO

On a bright morning in August, the Port Arthur (Texas) ARC was off on another of its week-end excursions, which for years have been a topic of conversation among area hams. All previous outings have been train trips but this year the trip was by air. After considerable discussion, Albuquerque, N. M. was selected. Upon arrival at Albuquerque, the group was met by representatives of the Chamber of Commerce, the airlines, and a fine delegation of Albuquerque hams headed by Virginia Sims, K5GJL. The local group really rolled out the red carpet (see photo), volunteering their cars, services as guides and chauffeurs. For those fortunate enough to make the trip it was a real thrill . . . especially for Spike Parnell, K5ZCU, a very active ham in spite of his 70 years. This was his first airplane ride! Shown in the photograph are representatives of the Albuquerque Chamber of Commerce presenting the "Red Carpet" to WA5JTZ, President of the Port Arthur club, K5ZCU, the guest of honor, is at the right.—WA5JTZ.

Further Improvements in the 32S-3

By DAVID P. SHAFER,* W4AX
Ex 3AC, K2GU

In this article the author describes a simple method of reducing spurious heterodyne products that have been observed in the output of the 32S-3 transmitter. Included is further information on keying this unit for break-in operation, which he discussed in an earlier article.

IN an earlier issue of *QST*,¹ the author described slight modifications in the wiring of the Collins 32S-3 transmitter to provide instantaneous break-in, without backwave or hash, in c.w. operation. Two further improvements can be made. The first eliminates an out-of-band spurious frequency generated when the 32S-3 is used on frequencies near the low end of the 80-meter band. The other adds grid-block bias to the driver tube in addition to that applied to the first mixer stage, as recommended in the article referred to above. These improvements are the result of frequent discussions and on-the-air trials by WA1EO, W2CA, K3JH, W3RKF and the writer. Most of us have applied them, along with the ones already mentioned, and find operation of the 32S-3 to be more satisfactory.

Generation of Spurious Frequencies

Two spurious frequencies of concern are generated by the presence of a second harmonic in the beat-frequency oscillator, and a second harmonic in the operating frequency. The stronger (out-of-band) spurious emission, f_{s1} , is produced by the mixing of the v.f.o. frequency, f_v , with the second harmonic of the b.f.o. frequency, f_b . Thus, $f_{s1} = f_v + 2f_b$.

The other (in-band) spurious frequency, f_{s2} , is caused by the mixing of f_{s1} with the second harmonic of the operating frequency, f_o . That is, $f_{s2} = 2f_o - f_{s1}$.

As may be seen in Table I and Fig. 1, f_{s1} and f_{s2} are separated from the operating frequency by only a few kHz., especially near the

lower band edge. In fact, f_{s1} and f_{s2} coincide with f_o at 3.505 MHz. In this range, the stronger spurious frequency, f_{s1} , (down approximately 70 db. from f_o), sometimes can be heard for several hundred miles!² Since it falls outside the 80-meter band for operation above 3.510 MHz., the risk of FCC citation is obvious. The weaker spurious frequency, f_{s2} (down approximately 80 db. from f_o), lies generally within the amateur spectrum, but is not considered troublesome.

Changing the 80-Meter Crystal

Both f_{s1} and f_{s2} can be effectively suppressed and relocated in the frequency spectrum by providing greater separation between f_v and f_o . This is easily accomplished by replacing the 6.555-MHz. crystal (Y_1) with a 6.655-MHz. crystal. Since $f_o = f_x - (f_v + f_b)$ the 100-kHz. shift in f_o , which would otherwise occur, is offset by raising f_v by an equal amount; in other words, by operating the v.f.o. 100 divisions lower on the kilocycles scale. Specifically, after the crystal change has been made, the low edge of

*The relative spurious frequency levels given above were obtained from S-meter readings taken on a spare receiver (Hulliercrafts SX-101A) located far enough from the transmitter to avoid response to direct in-station radiation. A very short (few inches) pickup "antenna" was used to avoid front-end overloading, and selectivity was set at maximum (0.5 kHz.).

Attenuation figures are the difference between the level of the operating frequency and that of the spurious frequency being measured. For example, if f_o is 55 db. over 89 and f_{s1} reads 85, the difference is 55+6(9-5), or about 80 db., using the familiar relation that one S-point is equivalent to slightly more than 6 db. The figures are approximate also because the spurious-frequency level changes with the separation between it and the operating frequency; the greater the separation, the greater the attenuation of the spurious frequency.

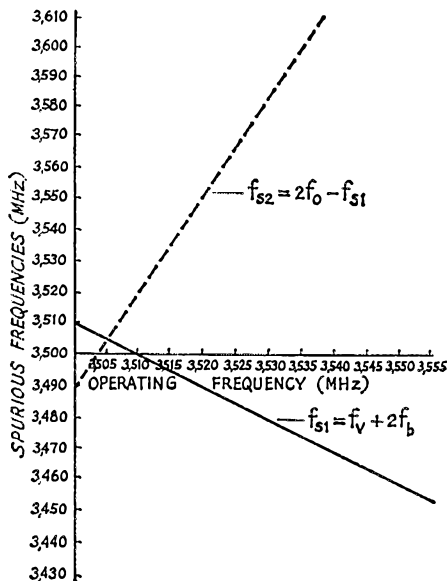


Fig. 1—Relation of spurious frequencies to the operating frequency when the crystal frequency, $f_x = 6.555$ MHz.

¹RFD 4 Box 71, Glen Allen, Va. 23060.

²Shafer, "Cleaner Break-In with the 32S-3," *QST*, Nov. 1964.

TABLE I
Relation (in MHz.) of Spurious Frequencies to the Operating Frequency

f_o	f_r	f_B	f_{s1}	f_{s2}
3.500	2.600	0.455	3.510	3.490
3.505	2.595	0.455	3.505	3.505
3.510	2.590	0.455	3.500	3.520
3.515	2.585	0.455	3.495	3.535
3.520	2.580	0.455	3.490	3.550
3.525	2.575	0.455	3.485	3.565
3.530	2.570	0.455	3.480	3.580
3.535	2.565	0.455	3.475	3.595
3.540	2.560	0.455	3.470	3.610
3.545	2.555	0.455	3.465	3.625
3.550	2.550	0.455	3.460	3.610

f_x (crystal frequency) = 6.555 MHz.

the 80-meter band will fall at zero on the v.f.o. dial.

Zero positioning of the v.f.o. dial for the low edge of the 80-meter band (with the band selector switch on 3.4) now becomes consistent with zero setting for 3.600 MHz. with the switch on 3.6, 3.800 MHz. with the switch on 3.8, and so on for the 40-, 20-, 15- and 10-meter bands. This also permits optimizing adjustment of the tuning slugs and capacitors for the same relative positions of the band segments selected by the switch.

Following the crystal change, f_{s1} is attenuated to approximately 90 db. below f_o and, as may be seen from Table II and Fig. 2, falls well within the 80-meter band. While the possibility remains that nearby amateurs may hear this weak emission on occasion, it should not be cause for citation by the FCC.

Spurious f_{s2} will lie outside the amateur band for only the lower 37 kHz. of operation, but it is extremely weak (down more than 90 db. from the signal at the operating frequency.) From a practical viewpoint, this spurious frequency is effectively suppressed and normally would be under the noise level.

Adding Grid-Block Bias to the Driver Stage

As covered in the previous article by the author, backwave is eliminated by applying grid-block bias to the first mixer stage. It is considered advantageous to also apply grid-block bias to the driver stage when making that modification.

The additional procedure is simple, as follows:

1) Snip the connection from R_{40} to ground. (R_{40} grounds the grid of V_7 , the driver tube, through 10,000 ohms, and is located inside the third shield can from the front panel on the band switch. This shield is easily removed by first withdrawing the band-switch shaft through the hole provided for that purpose at the rear of the chassis.)

2) Connect the free end of R_{40} to the common

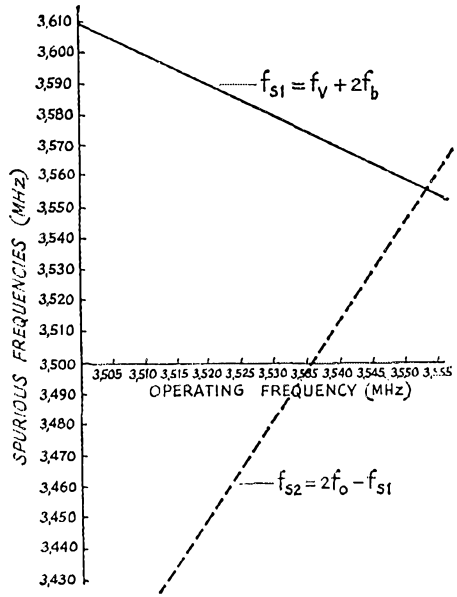


Fig. 2--Relation of spurious frequencies to the operating frequency when the crystal frequency, f_x , = 6.555 MHz.

connection R_{33} - R_{37} (grid-block bias circuit.)

Wave shape, signal timing, feedback neutralization and driver neutralization are unaffected.

TABLE II
Relation (in MHz.) of Spurious Frequencies to the Operating Frequency

f_o	f_r	f_B	f_{s1}	f_{s2}
3.500	2.700	0.455	3.610	3.390
3.505	2.695	0.455	3.605	3.405
3.510	2.690	0.455	3.600	3.420
3.515	2.685	0.455	3.595	3.435
3.520	2.680	0.455	3.590	3.450
3.525	2.675	0.455	3.585	3.465
3.530	2.670	0.455	3.580	3.480
3.535	2.665	0.455	3.575	3.495
3.540	2.660	0.455	3.570	3.510
3.545	2.655	0.455	3.565	3.525
3.550	2.650	0.455	3.560	3.540

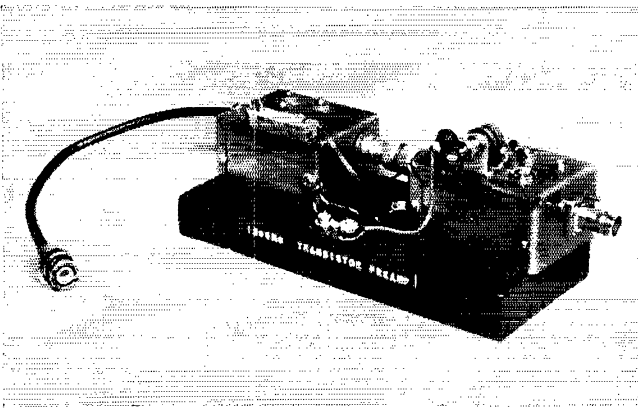
f_x (crystal frequency) = 6.555 MHz.

The crystal change and the modification described above are independent of each other.

Replacing the V_1 crystal to eliminate the troublesome out-of-band spurious emission involves no modification of the transmitter. The secondary (relocated) spurious frequency is of negligibly low level.

Addition of grid-block keying to the driver stage should be of interest to those who plan to modify their 32S-3 transmitters to eliminate backwave in c.w. operation, as covered in the previous article.

QST



The two-stage preamplifier for 1296 Mc. is built in separate units. The first stage is at the right. A jack for plugging in a small 9-volt transistor radio battery is shown in the foreground.

A Two-Stage Transistor Preamplifier for 1296 Mc.

BY DOLPH VILARDI,* WA2VTR

TRANSISTOR preamplifiers like that described last year by K2UYH¹ have been instrumental in extending the reliable coverage of several 1296-Mc. stations in New York and New Jersey. A single r.f. stage will work very well with a crystal-mixer converter for this frequency range, if the mixer and its following i.f. amplifier stage are already fairly low-noise devices. If they are not close to optimum in design, more r.f. gain than one transistor stage is capable of delivering may be needed to effectively mask the mixer and i.f. amplifier noise.

This and the availability of improved u.h.f. transistors led us to try a two-stage amplifier. The amplifiers shown here are not unlike Al's earlier model, but the gain with two stages is around 19 db., which is adequate to override the noise of all but the worst of mixers. With this much gain, and the low noise figure of the new transistors, the mixer and i.f. amplifier are no longer critical factors in the overall performance of the 1296-Mc. receiving system.

The two stages are built in separate units, though they could be combined in one, if desired. Separation has the advantage of permitting the builder to start with one stage, and then progress to two if the additional gain is needed. The transistors may be either the 5200 or 5500 series. The latter has more gain, and is probably better for the second stage.

* 14 Oakwood Terrace, Spring Valley, N. Y. 10977.

¹ Katz, "A 1296-Mc. Preamplifier — That Works!" *QST*, Nov., 1967, page 32.

Construction

Transistors used in early work with 1296-Mc. amplifiers had wire leads. The KMC K5200 and K5500² used here have flat ribbon leads, making possible a mounting having substantially no lead inductance. The "accordion-pleated" shield plate shown in Fig. 1 suspends the transistor on its emitter leads, with the base lead on one side and the collector lead on the other. These two leads are soldered to their respective strip lines, L_1 and L_2 , with the minimum possible length.

² The KMC transistors used in these stages are expensive if obtained through the usual channels. Units entirely satisfactory for amateur service may be obtained at reduced prices from Samuel G. Nelson, W2M11K, Reaville Associates, RFD 1, Box 200, Flemington, N. J. 08822.

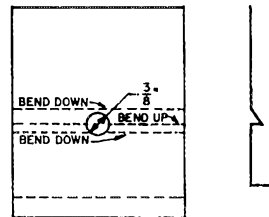


Fig. 1—Details of the thin brass shield plate used to support the transistor in the first r.f. amplifier stage. Dimensions will depend on the case size and height of the tuning capacitors used. The emitter leads are soldered to the horizontal "shelf" made by bending the plate as seen in the end view.

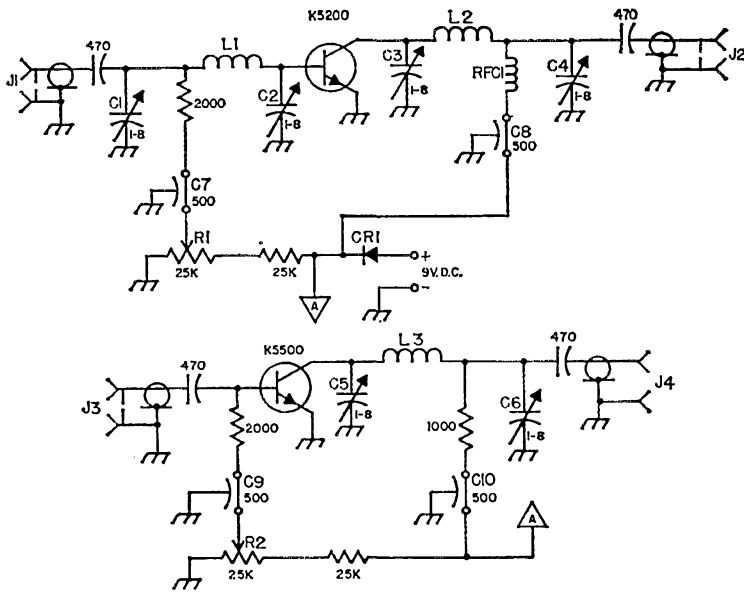


Fig. 2—Circuit diagram and parts information for the preamplifier stages. The upper portion should be used for a single stage. Capacitor values are given in picofarads.

- C₁–C₆, incl.—1 to 8 pf. high-quality short piston or coaxial trimmer. (Johanson used here.)
 C₇–C₁₀, incl.—500-pf. feed-through, button mica or ceramic.
 CR₁—Protective diode, 10 ma. or more.

- J₁–J₄, incl.—BNC receptacle, UG-290/U.
 L₁—Brass or copper strip, 5/8 by 3/4 inch.
 L₂, L₃—Brass or copper, 1/4 by 3/4 and 3/8 by 3/4 inch, resp.
 R₁, R₂—25,000-ohm miniature control.

The input and output coupling capacitors are no-lead disks, though conventional disk ceramics may be used if the minimum possible lead length is assured. Their value is not particularly critical. The tuning capacitors, C₁ through C₆, should be high-quality short piston or coaxial capacitors, 3/4 inch center to center, except C₂ and C₃, which should be positioned for minimum leads to the transistor.

In the first photograph the first stage is shown at the right side. The boxes are handmade of thin sheet brass. Standard aluminum Mini-boxes could be used, though brass or copper facilitates soldering direct to the case. The shield in the first stage should extend nearly the full width and height of the box. This is not so important in the second stage, which has a tuned circuit only on the output side. The bent brass mounting plate in the second stage is primarily to insure minimum emitter lead inductance.

The interior views show the input sides at the left. It will be seen that the strip for the input circuit, L₁, lower left, is wider than that for the output L₂. The transistor has higher input than output capacitance, requiring less inductance in the input circuit. All strip inductors are brass, 3/4 inch long. They are soldered directly to the tops of the tuning capacitors. As in the K2UYH single-stage model, these are pi-networks.

Adjustment

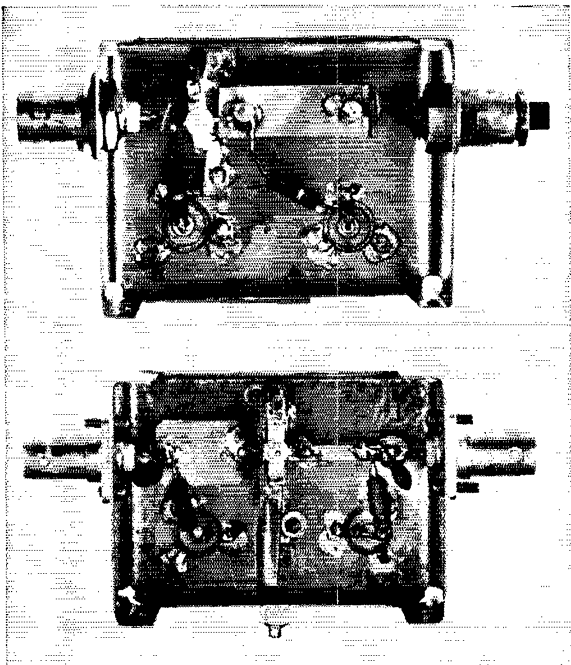
A signal source is necessary in tuning up the

preamplifier. Most small two-meter transmitters put out enough energy on the 9th harmonic to be plainly audible at 1296 Mc. Transistorized "beacons" commonly used by amateur u.h.f. experimenters are fine. Anything strong enough to be heard on the converter, without the preamplifier, will serve. Just be sure that, if you are listening to a harmonic, it is the *right* one.

Initial peaking can be done with no voltage on the preamp. If a 50-ohm antenna is used the tuned circuits will be close to optimum adjustment if peaked first in this way. The same is true if one is fortunate enough to have a 1296-Mc. signal generator with 50-ohm termination.

Now apply about 5 to 6 volts, and check the current on each transistor. Adjust the bias controls, R₁ and R₂, for 1 to 2 ma. on the 5200 and 1 to 14 ma. on the 5500. Now reduce the strength of the signal and adjust the tuned circuits for maximum response. Readjust the bias, for minimum noise on the first stage and maximum gain on the second.

The preamplifier as shown has a socket for plugging in a small 9-volt transistor radio battery. This may now be used, and a final peaking and bias adjustment made for best results. Bear in mind that optimum signal-to-noise ratio is the objective. This can be achieved by careful adjustment of the first stage, and it is not likely to be the same as for maximum signal level. The second stage can be used as a gain control, to some extent, though this is best done in the first



i.f. amplifier. The gain of the two stages is about 19 db., when the system is adjusted for best noise figure. Not many amateurs will be able to measure noise figure accurately at this frequency, but it should be under 5 db. A system noise figure of 3 db. is possible with these transistors at 1000 Mc., but at 1296 Mc. it may be slightly higher.

QST

[EDITOR'S NOTE: The author brought the two-stage preamplifier to ARRL Headquarters for a demonstration. It was operated ahead of a crystal-mixer converter of average quality. Probably the principal deficiency of the test converter is that its injection is not as pure as it could be, with more selectivity in the multiplier stages. Consequently the noise figure of the mixer is relatively high, so it made a good "trial horse" for the preamp. With this converter the gain of the amplifier was about 19 db. There was only about a 3-db. increase in noise output with the preamplifier activated, so the net improvement in weak-signal reception was very marked.

Using the first stage alone showed a 10-db. improvement, so the two-stage amplifier was a definite advantage with this particular receiving setup. It is likely that the same would apply with other crystal-mixer converters, unless extreme care was used in the design and adjustment of the mixer, the injection stages and the first i.f. amplifier.]

Interior views of the two preamplifier stages, with the first stage at the bottom. The input ends are toward the left of the picture.

NEW BOOKS

World At Their Fingertips, Published by Radio Society of Great Britain, 28 Little Russell St., London, W.C.1. $5\frac{1}{2} \times 8\frac{1}{2}$ inches, 307 pages, including index. Paper cover, price \$2.50, deluxe hard back edition \$6.50, from "Ham Radio," Greenville, N.H. 03048.

With characteristic British thoroughness, John Clarricoats, G6CL, has developed in an interesting and unique fashion, the history of amateur radio in Great Britain from its crude beginnings in the waning years of the 19th century to its present sophistication. G6CL is peculiarly well qualified to write on this subject, an active radio amateur of many years standing and, for 36 years, secretary of the Radio Society of Great Britain. The book relates many revealing facts about our hobby and should appeal to old timers and neophytes alike. For example, most American amateurs will be surprised to learn that, contrary to popular belief, apparently Amateur Number One was probably a Britisher, a statement which G6CL says has never been challenged.

Most of us in the USA are doubtless quite unaware that, with much smaller numbers and more restrictive rules, British amateurs were quietly developing their skills in the art which we are too often inclined to believe was strictly an American invention. Surely, as Clarricoats so graphically describes, the abilities of the British amateur both in those years prior to and immediately following WWI were contemporary with the US amateur, for witness the speed with which they quickly demonstrated their awareness and knowledge of the art of short wave wireless. The treatment of this phase of international amateur radio will bring back many nostalgic memories to those of us who were active in the early and middle 20's. The accomplishments of such as G2KF, G2OD, G2NM and G5BV, to mention but a few, are exceptionally well narrated.

While admittedly dealing through the eyes and ears of

G6CL, this history has not failed to give credit to all of us, large and small, who have contributed to amateur radio's progress. The book is well illustrated with many pictures apropos its theme. In this reviewer's opinion, for any amateur who is proud of our heritage, the book is a very worthwhile addition to his library; for the amateur radio historian the book is a must.

— F. B. Redington, W4ZM

Strays



Bob Anderson, WA1BCL, of Newport, R.I. didn't let grass grow under his ham-radio feet. Bob got his Novice ticket at age 13, General at age 14, Advanced at age 17, and last March he received his Extra!

A 40-Foot Self-Supporting

Tilt-Over Mast

for Less Than \$50

BY ALBERT H. ROBITAILLE, JR.,* W1YUT

THIS article was written especially for the amateur radio operator with little money and a great desire for a rotary-antenna support; one which will provide both sufficient height to achieve adequate antenna efficiency, and ease in raising and lowering the antenna when necessary.

The author has recently designed and constructed the 40-foot self-supporting tilt-over mast shown in Fig. 1. It is capable of being operated by one man, and the total cost was less

than \$50.00. The main support consists of a 35-foot utility pole, which was bought from and installed by a local dealer. If the Yellow Pages section of your local telephone directory does not list a dealer, information may be obtained from your local telephone or power-and-lighting company.

The tilt-over section consists of four 18-foot 2 by 4s (well saturated with a wood preservative such as creosote) assembled as shown in Fig. 2. A hole is drilled through the utility pole 20 feet above ground level, and another through the center (pivot point) of the tilt-over section. A bolt 1 inch or greater in diameter, and of sufficient length to pass through the utility pole and tilt-over section, is then installed and fastened. The bolt serves as the pivot when raising and lowering the antenna. Another hole is drilled through the utility pole and tilt-over section at the base of the structure and a bolt similar to that used for the pivot is installed to secure the tilt-over section once the antenna is raised. Suitable bolts can be obtained from the utility-pole dealer.

Fig. 1 indicates the method used to operate the tilt-over mast. By fastening a strong line (such as nylon reinforced clothes line) to the base of the tilt-over section, the antenna may be raised or lowered from the ground by one man. The pivot-bolt location provides counterbalance for the tilt-over section and thereby cancels its weight during the raising and lowering operation. It may be desired to place a counterweight at the base of the tilt-over section to compensate for antenna and rotator weight, thus affording finger-pressure operation.

This mast has been supporting a fiberglass triband cubical quad for over 1½ years, and has been raised and lowered over a dozen times without encountering any difficulty. Lowering or raising the antenna can be accomplished in about 3 minutes without the need to climb a pole or tower, or to organize an antenna-raising party.

The structure is sufficiently strong for the support of small Yagi-type antennas (10, 6, 2

(Continued on page 150)

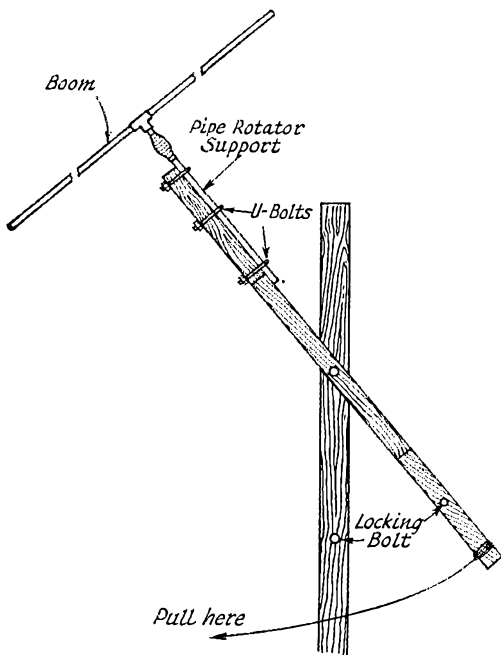
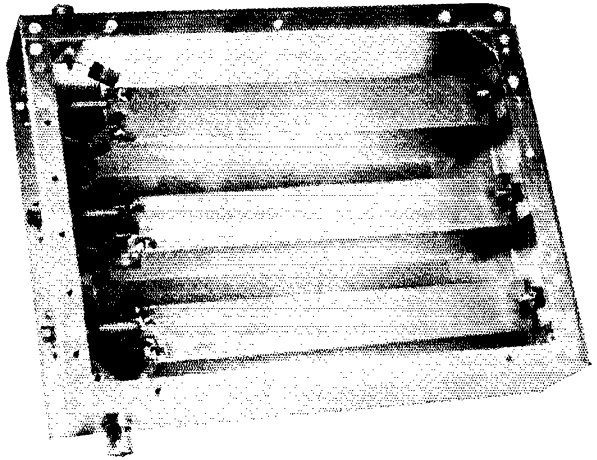


Fig. 1—A simple tilt-over arrangement for a telephone-pole antenna support. Unguyed, it will support a triband quad or small arrays of other types. Larger antennas may be used if the top is guyed.

* 561 Benefit St., Pawtucket, Rhode Island 02860.

Comblines V.H.F. Bandpass Filters



BY REED E. FISHER,* W2CQH

Interior of the 50-MHz. combline filter.

In a previous article¹ it was shown how low-loss multiple-section interdigital bandpass filters could be constructed for 432 and 1296 MHz. These filters are very practical at u.h.f., but when scaled up in size to work on 50 or 144 MHz. they become unwieldy. Interdigital filter theory requires that all the resonators must remain physically a quarter-wave long. Therefore, to reduce the size of v.h.f. filters it is desirable to shorten the resonator lengths by capacitive loading. Cristal² has recently shown how this is accomplished in a straightforward manner that yields a combline structure which is exceedingly simple to build, using stripline techniques. The shortened filter is called "comblines" because, in contrast to the interdigital structure, all resonators are grounded at the same end of the cavity, simulating teeth of a comb. Although Tilton³ has already written an excellent article describing the construction and use of stripline and coaxial filters, they are single-section types that do not yield the passband flatness and out-of-band rejection obtainable with multiple-section structures.

Construction details of three-section combline filters centered near 52, 146 and 222 MHz.

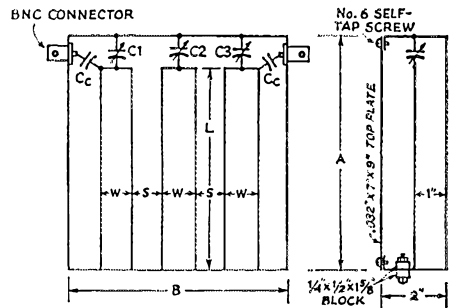
* Forum Court, Morris Plains, N. J. 07950.

¹ R. E. Fisher, "Interdigital Bandpass Filters for Amateur V.H.F./U.H.F. Applications," March, 1968, *QST*, p. 32.

² E. G. Cristal, "Capacity Coupling Shortens Comblines Filters," *Microwaves*, Dec. 1967, p. 44.

³ E. P. Tilton, "Coaxial-Tank V.H.F. Filters," *QST*, Oct. 1964, p. 11.

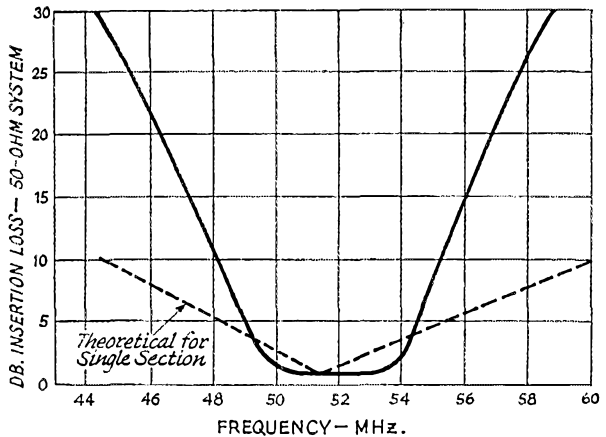
are given in Fig. 1. Each filter is built in a



DIMENSION	52 MHz.	146 MHz.	222 MHz.
A	9"	7"	7"
B	7"	9"	9"
L	7 ³ / ₈ "	6"	6"
S	1"	1 ¹ / ₁₆ "	1 ³ / ₈ "
W	1"	1 ⁵ / ₈ "	1 ⁵ / ₈ "
CAPACITANCE (pf)			
C1	110	22	12
C2	135	30	15
C3	110	22	12
C _c	35	6.5	2.8

Fig. 1—Schematic diagram and principal structural details for combline v.h.f. filters.

Fig. 2—Bandpass characteristics of the 50-MHz. combline filter, compared with those of a single-section filter.



standard 7 x 9 x 2-inch aluminum chassis (Bud AC-406). The three resonators are made of 0.032-inch flashing copper and spaced one inch from the chassis bottom. Each resonator is firmly clamped to a chassis sidewall by two $\frac{1}{4}$ x $\frac{1}{2}$ x $1\frac{1}{4}$ -inch brass blocks. Alternate clamping methods may be tried, but the joints must be secure since large r.f. currents flow in this region, and the best possible electrical connection is mandatory. The tuning capacitors C_1 , C_2 , and C_3 are APC air trimmers, paralleled, when necessary, with mica capacitors. The coupling capacitors, C_c , are fixed micas or ceramic trimmers. Note that there are no coupling capacitors between resonators; the necessary coupling is obtained by the electromagnetic fields within the cavity. If the filters are to pass more than about ten watts the mica capacitors should be replaced by equivalent air units having adequate plate spacing.

An aluminum cover, 7 x 9 by 0.032 inches in size, which serves as the top groundplane, is fastened over the chassis opening with No. 6 sheet metal screws. At least six screws should be used in the groundplane edges that face the resonator ends.

The filter can be aligned roughly by individually grid-dipping each resonator with the top cover removed, and with 50-ohm loads attached to each BNC connector. A temporary partial top groundplane, at least double the resonator width, must be clamped over the resonator being dipped, since the cover affects the resonant frequency. Alignment is completed by installing the filter in the system and adjusting all tuning capacitors until maximum signal transmission is obtained at the desired center frequency.

The measured characteristics of the 50-MHz. filter in a 50-ohm system are given in Fig. 2. The filter has a "maximally-flat" response. The 3-dB bandwidth is about 5 MHz., and the midband (52 MHz.) insertion loss is 0.6 dB. The dotted curve is the theoretical response of a single-section coaxial or stripline filter having the same 3-dB bandwidth. It is evident that the three-section filter gives steeper out-of-band rejection, yet does not have to be re-tuned when the frequency is moved across the band.

The two-meter filter's measured characteristics are shown in Fig. 3. The 3-dB bandwidth was again about 5 MHz., and the midband (146 MHz.) insertion loss was 0.7 dB. The 220-MHz. filter was not constructed but should give a 6-MHz. 3-dB bandwidth and low midband loss.

If the filters are to be used in a 75-ohm system, the coupling capacitor value should be multiplied by $\sqrt{50/75}=0.82$. For example, the new value of coupling capacitors in the six-meter filter would be $0.082 \times 36 \text{ pf.} = 30 \text{ pf.}$ All other capacitors and dimensions should remain unchanged.

Hopefully these structures should solve the most knotty v.h.f. filtering problem. QST

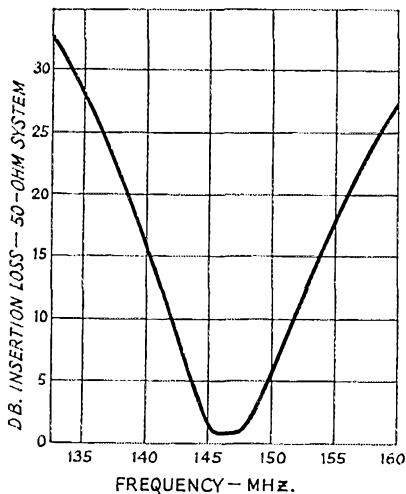


Fig. 3—Characteristics of the 144-MHz. filter.



Hints and Kinks

For the Experimenters



SEMI-AUTOMATIC C.W. BREAK-IN WITH THE SWAN 350

HERE is a modification that permits semiautomatic break-in c.w. with the Swan 350 transceiver. Little added circuitry is needed and the internal changes are minor. All normal functions of the transceiver are retained.

Fig. 1 shows the external circuit required. The key or bug at J_1 operates relay K_3 . One set of contacts on K_3 keys the transceiver through P_2 , and the second set of contacts grounds the VOX lead in the transceiver. A time delay circuit consisting of C_1 , CR_1 , Q_1 , R_1 and R_2 permits the transceiver to stay in the transmit mode between characters.

Normally C_1 is uncharged. However, when K_3 grounds the VOX lead, C_1 charges rapidly to 12 volts through CR_1 . When the relay contacts open between elements and characters, the charge on C_1 leaks off through R_1 and R_2 . During the time a sufficient charge is present, Q_1 is forward biased, causing current to flow from collector to emitter. This holds in the transceiver relays, K_1 and K_2 , for a length of time that depends on the setting of R_2 .

The external circuit can be built in any convenient-sized aluminum box, and a cable and octal plug can be employed to connect it to the external octal socket normally used to connect the VOX adapter to the transceiver. Of course, P_2 must be plugged in the transceiver's key jack.

Only two internal wiring changes to the Swan are required in the modification. Prior to the changes, the transceiver function switch grounds (turns on) the internal relays, K_1 and K_2 , in the TUNE-CW position, regardless of the setting of the PTT-VOX switch. After the modification, K_1 and K_2 are grounded in the TUNE-CW position of the function switch only if the PTT-VOX switch is in the PTT position.

Place the transceiver on its top and remove the bottom plate. On some models you must remove the four nuts and washers holding the cover over the v.f.o. transistor. From the function switch disconnect the two gray wires that ground one side of K_1 and K_2 through one arm of the switch. The correct switch tab is located between the tab that goes to ground and the tab that has a 50-pf. capacitor connected between it and Pin 6 of V_{14} . Solder the ends of the two wires together, and tape the connection to prevent a possible short. Connect one end of a jumper to the function switch tab from which the two wires were removed, and pass the other end of the jumper through the grommet near the A.F. GAIN control and connect it to the PTT tab of the PTT-VOX switch. The PTT tab is the one farthest from the main tuning knob.

After the changes have been made, put the

PTT-VOX switch in the PTT position for push-to-talk s.s.b. and for tune-up. Hold the key or bug closed for tune-up if P_2 is plugged in the keying jack. For break-in c.w., place the PTT-VOX switch in the VOX position and the function switch in the TUNE-CW position. Closing the key will then change the transceiver from receive to transmit. Adjust the delay control, R_2 , for the desired amount of hold-in time. Each occasion the hold-in time is exceeded while the key is open, the transceiver will automatically switch from transmit to receive.

With this semiautomatic break-in modification the frequency of the carrier oscillator is not shifted between transmit and receive functions. Therefore, a station exactly on the transmitted frequency is zero beat when received. This problem can be solved by slightly shifting the v.f.o. dial between transmit and receive. However, a better solution is to use Pin 3 of internal relay K_1 to ground the carrier shift capacitor, C_{1401} , in the receive mode. With this change the transmitted carrier is offset by approximately 500 Hz.

A sidetone monitoring oscillator can be added to the external circuit and turned on by the key, and the tone signal can be connected to the audio output stage of the transceiver through Pin 3 of the octal plug. (A capacitor must be used to make this connection as there is +275 volts on the pin.) However, although Swan advertises a sidetone modification kit, I find that the change in audio hum level when keying can be satisfactorily monitored if earphones with good low-frequency response are used. — D. G. "Doc" Willard, W1-UXS/KIATG

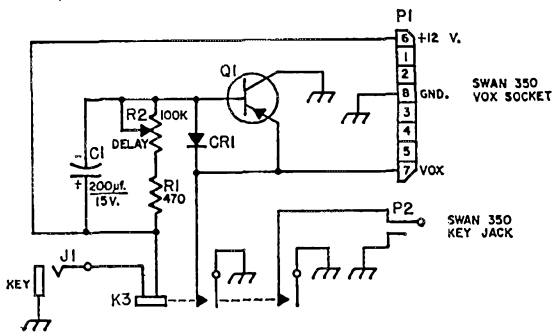


Fig. 1—External circuit for semiautomatic c.w. break-in of the Swan 350. Resistance is in ohms, K = 1000.

- C_1 —Electrolytic.
- CR_1 —1N91.
- J_1 —Open circuit phone jack.
- K_3 —D.p.s.t. keying relay, 12-volt coil, 300 ohm or more.
- P_1 —Octal plug.
- Q_1 —2N174.
- R_1 — $\frac{1}{2}$ -watt composition.
- R_2 —100,000 ohms, linear taper.

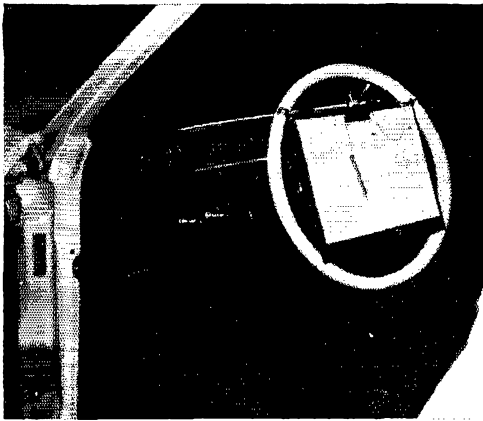


Fig. 2—WN2FLO's Mobile Desk simplifies contest logging.

CONTEST LOGGING WHILE MOBILE

DURING mobile contest operation, nothing is more difficult than logging stations. At one or two contacts a minute, it can become tiring to search for the logbook and grope for a pencil. However, there is a solution to the problem: the Mobile Desk shown in Fig. 2.

The Mobile Desk snaps onto the front of the steering wheel and eliminates the need for finding a place to write on. It was built from a 10- by 12-inch piece of one-eighth inch thick Masonite. The board is held to the wheel by two Sears type 34 K 6123 cable clamps, and an ordinary spring clip is used to secure the logbook to the board. For added convenience a hole was drilled in the board, and a beaded chain like those used on key chains was passed through it. A pencil was then taped to the free end of the chain. To prevent marring the steering wheel, masking tape should be wrapped around that part of the wheel over which the clamps are to be snapped. — Ron Dagavarian, WN2FLO

ETCH-RESISTANT CIRCLES

COMMERCIALLY available kits containing etchant and tape resists seem most useful for amateurs who make their own printed circuits. However, the cost of the small etch-resistant circles is high, considering that only a hundred go for about 75 cents, and a small job easily consumes that many.

A visit to a well-stocked stationery store will yield single hole paper punches for about 60 cents each. Although punches are available for $\frac{1}{8}$ -, $\frac{3}{16}$ - and $\frac{1}{4}$ -inch diameter holes, I find the first two sizes to be the most useful. An hour's worth of punching a strip of electrical tape will produce a load of circles for printed circuit use. The most difficult part of the task is retrieving the punched-out dots. For the least amount of trouble, position the sticky side of the tape away from the cutter of the punch.

This procedure isn't quite as joyful as cutting out paper dolls, but it does save money for buying transistors and has a certain therapeutic value. — Donn V. Campbell, W2UJD

MODIFIED TRANSMATCH FOR EASE IN MATCHING VERY LOW IMPEDANCE LOADS

THE general *Handbook* circuit for matching an open-wire line to the 50-ohm output circuit of a transmitter is shown in Fig. 3A. As pictured, the line is normally tapped across coil L_1 to effect a match. However, I found that I had to put taps practically on the pins of the plug-in coils to get a 1:1 v.s.w.r. on 15 and 20 meters, where my line presented a very low impedance to the matching network (transmatch). As shown in Fig. 3B, this situation was alleviated by disconnecting L_{1A} from L_{1B} and inserting C_2 between the two coils. C_2 raises slightly above ground the r.f. potential at the inside ends of L_{1A} and L_{1B} .

To adjust the modified transmatch, start with C_2 at maximum capacitance and tune C_1 to resonance. With a v.s.w.r. bridge in the coaxial input line from the transmitter, gradually decrease the capacitance of C_2 while retuning C_1 each time for resonance until the reflected power is reduced to zero. At frequencies where the transmission line presents a medium to high impedance to the transmatch, set C_2 at maximum capacitance, thus effectively grounding the inside ends of L_{1A} and L_{1B} . Then proceed in the normal manner described in the *Handbook*, experimentally connecting the line to different taps on the coil until the correct ones are found to get a 1:1 v.s.w.r.

This circuit has been used successfully for several years with a 66-foot multiband dipole on 10 through 80 meters. — D. C. Mead, W2LT

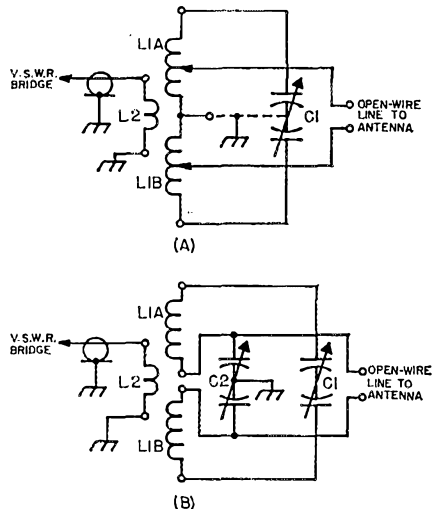


Fig. 3—A general *Handbook* circuit for matching the coaxial output of a transmitter to open-wire line. (B) Modified coupling circuit to provide ease in matching when the open-wire line presents a very low impedance to the transmatch. Typical values for C_1 , L_1 and L_2 can be found by referring to the *Handbook* and the *Antenna Manual*. C_2 is a dual 365-pf. broadcast variable.

Technical Correspondence

SLOW-SCAN WITH REGULAR VIDICONS

Technical Editor, *QST*:

The slow-scan vidicon camera described by Macdonald (*QST*, June, July, and August 1965) has proven to be a versatile and reliable slow-scan picture source. Unfortunately, the 7290 slow-scan vidicon which was required for this camera is no longer readily available, a fact which has discouraged a number of amateurs from attempting to construct the camera. I was faced with the same problem and decided to build the camera with a conventional "fast-scan" vidicon instead of the special slow-scan tube. The project was completely successful, and it appears to be perfectly feasible to use commonly-available pickup tubes (6326, 7038, 7735, etc.) in the circuit with only minor modifications. As an added bonus, the vidicon is much more sensitive in the slow-scan mode than it is when used in a conventional camera, and allows the use of inexpensive 16-mm. movie-camera lenses of moderate aperture. The only drawback is that the shutter mechanism is not incorporated, which requires that the scenes televised must be stationary. This has not proved to be a significant limitation in the operation of the camera. The following paragraph outlines the modifications incorporated in my camera.

The phase setter (V_5) and shutter stages (V_3) and their associated circuitry were omitted. Pins 3 and 6 of the vidicon socket should be tied together. This last step allows proper electrical focus to be achieved if a 6326 vidicon is used, and in no way affects the operation with other pickup tubes. Slow-scan focus and deflection coils from ATV Research (see *QST* ads) were used in place of the coils specified, at a considerable saving in cost. The only other deviation from the Macdonald article consisted of a revised procedure for adjusting the black frequency. Rather than shorting out the primary of T_2 as specified, the following procedure was used:

- 1) Cap the lens.
- 2) Adjust the black frequency control (R_4) to the low end of its frequency range.

3) Increase the contrast (R_3) until the subcarrier output is 1500 Hz. Leave the contrast control at this setting.

4) Recheck the sync and white frequencies as specified in the article — readjust if required.

I will be very glad to correspond with anyone interested in constructing the camera in the hope that my experience with the circuit may be of some value to them. — *Ralph E. Taggart, WA2EMC/8, 1109K University Village, East Lansing, Michigan 48823.*

RTTY AUTOSTART

Technical Editor, *QST*:

There has existed for some time a need for a simple and reliable autostart circuit for unattended RTTY operation on v.h.f. particularly. Most solid-state circuits suffer from various degrees of temperature instability, prestage loading, unequal start and release times and/or grossly disproportionate component values.

Shown in Fig. 1 is a very inexpensive and reliable circuit which avoids the above difficulties and has the dividend of allowing an adjustable threshold voltage greater than the FET pinch-off to be obtained (a noise-immunity feature). The timing does not change with reasonable temperature changes or with various amounts of input signal. The input signal can be any complex signal from pure sine waves to positive-going pulses normally found in the T.U. Attention has been given to adjusting the time constants so that machine-speed keying can be accommodated without dropout.

For varying amounts of noise immunity, differing ratios of R_1 to R_2 are used, keeping the total of the two at 2 megohms. Larger negative values of voltage on the FET gate require larger input signals before commencement of the time cycle. The 150-ohm resistor in the emitter of Q_2 can be changed to a lower value if necessary to satisfy higher relay-current requirements, but should be kept as high as possible for best stability. The relay is one of the radiosonde types, with 100 to 300 ohms resistance. Closure normally occurs at 10 to 30 ma.

Those who may want to incorporate such a device in units where no negative power supply exists should note that a dry battery will have shelf-life capability in this circuit. — *Clifford Buttschardt, WGHDO, 275 Chiquita Ave., Mountain View, Calif. 94040.*

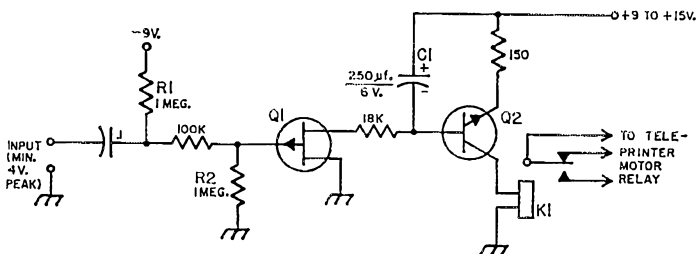


Fig. 1—Simple autostart circuit for RTTY, using field-effect transistor. The input terminals normally are connected to the mark circuit in the RTTY converter.

C_1 —Aluminum electrolytic satisfactory.

K_1 —Radiosonde relay, Sigma 41F200S/SIL, or Potter & Brumfield RS-5D, 6 volts d.c.

Q_1 —MPF-102 or TID-34.

Q_2 —2N644, 2N4037, or equivalent.

R_1, R_2 —See text.

Note: Changing the value of C_1 changes the total delay time, with constant on-off ratio.

LINEAR-AMPLIFIER TRICKS

Technical Editor, *QST*:

In the course of building a new linear recently, I used a couple of variations that are not commonly applied, but which have worked so well I thought they might be of interest to other amateurs. These comments apply specifically to a cathode-driven linear using four 811As with low-Q pi networks for the input circuit and a high-Q output pi network of conventional design. With some discretion, they will apply equally well to other configurations.

The first item is the bias system which may be required in the case where the no-signal current is higher than desired. A common system used to provide cutoff bias in the standby condition is a large resistor in the filament d.c. ground return. This resistor is shorted out by a relay in the operate condition. A power Zener diode can be inserted in this circuit at the ground end, as in Fig. 2, to provide the desired bias at nominal cost. The relay is still used to short the resistor *only*, and the bias remains at the Zener voltage regardless of the instantaneous plate current (within very narrow limits). To avoid diode noise from the Zener in the standby condition we must shunt the diode with a low-value resistor so

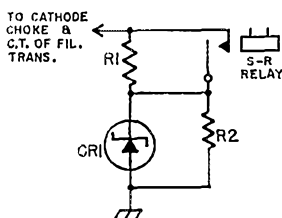


Fig. 2—Using a Zener diode in the d.c. cathode return to obtain fixed operating bias. The Zener power rating should be of the order of one-half the product of the Zener voltage and the maximum intermittent cathode current.

that the diode threshold is not reached in the standby condition. About 1000 ohms is satisfactory, since the standby cathode current is probably less than 1 ma. In the operate condition the diode resistance is far below 1000 ohms and the diode controls the bias. There is no need for concern about r.f. currents through this diode since they will have been bypassed to ground in the usual manner between the filament choke and the filament transformer. This method of biasing permits strapping the grids direct to ground and metering grid current by circuits shown in the *Handbook*.

The second item concerns the subject of neutralization. The necessity for neutralization with the cathode-driven amplifier depends in large measure on the physical layout and care employed in shielding the input circuits from the output circuits. Since the necessity for complete neutralization has been repeatedly stressed by many writers, there is no need to repeat. In checking for signs of feedback by conventional methods, none was found that could be detected by plate or grid current change, but it was apparent in the receiver when the input circuit of the *undriven* amplifier was tuned through resonance with the amplifier's output circuit. For cathode-driven amplifiers, two systems of neutralization have been rather widely advocated. One is a bucking coil, capacitively coupled from the plate circuit to the cathode lead. Another is the use of a split-stator capacitor in the cathode tuned circuit, using one side of the capacitively center-tapped coil to introduce

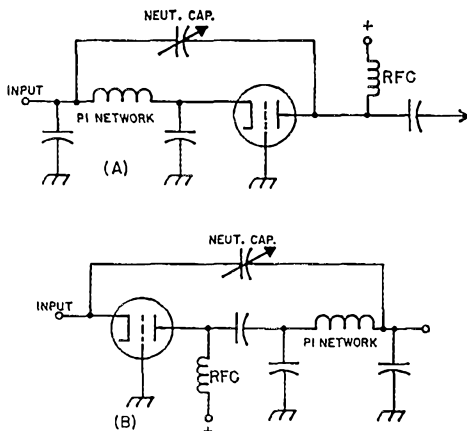


Fig. 3—Neutralizing circuits for cathode-driven linear amplifiers.

the neutralizing voltage. Actually, there are two additional means of getting the required neutralizing feedback with the amplifier described above. One, which I use successfully, is to feed back from the amplifier plate to the input of the cathode pi network. Similarly, feedback from the output end of the output network could be fed back to the cathode. These methods are shown in Fig. 3.

Now, with four instead of two methods, it is much easier to find one that is mechanically or physically more suitable than the others. In my case, complete neutralization was obtained for the 20-, 15-, and 10-meter bands with about 2-pf. capacitance. This had a minute effect on the tuning of either input or output circuits of the amplifier. Theoretically, this is not a rigorous approach to the problem of neutralization, but practically it is extremely simple and satisfactory.¹—*J. H. Ellison, W6AO1, 1720 Holly Ave., Menlo Park, Calif. 94025.*

¹The voltages at the two ends of a pi network are not 180 degrees out of phase, although the out-of-phase condition can be approached if the output reactance is very small compared with the load resistance. In cases where the inherent feedback is small (frequently stated as "no neutralizing required") stabilization can be achieved even though the phasing is not exact. — *Editor.*

Strays

Feedback

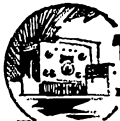
A couple of bloopers in the DX Contest scores (October *QST*):

1) W7FCD was shown in the Arizona Section phone listings as W7CFD.

2) The entire line showing the c.w. score of East Bay multioperator station W6RGG was omitted; it should have read: 466,620-220-710-C-80.

A sentence on page 56 read, "The Southern California DX Club again was third, and again was chased hard by that enemy to the north, the Northern California DX Club." While the prose may have been impeccable, the facts were not: NCDXC finished *ahead* of SCDXC in '67. Our apologies to both clubs.

— . . . —
"Silent Keys" for September 1968 listed the call for Kirk C. Foucher incorrectly. It should read K1MRI.

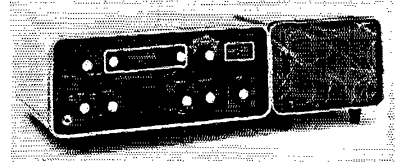


Recent Equipment



To acquaint you with the technical features of current amateur gear.

Hammarlund HQ-215 Receiver

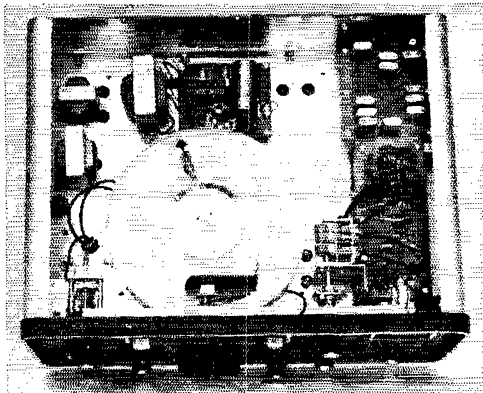


THE Hammarlund HQ-215 is an all-semiconductor receiver that is *not* miniaturized, and *not* lightweight. It's a full-size, full-poundage job, big enough for you to get your fists on the knobs, and heavy enough to stay put when you do. This is a fixed-station receiver, not the type to be packed in an odd corner of your kit bag when you go on a trip.

Like most receivers currently aimed at the amateur market, the HQ-215 has double conversion, with a bandspread tunable first-intermediate frequency and crystal-oscillator first frequency conversion. The tunable i.f., centered around 3055 kHz., covers a tuning range of 200 kHz.; thus at least two first-conversion crystals are needed for complete coverage of the narrowest of the amateur bands between 3.4 and 30 MHz., and more are required for the wider ones. As many as 24 crystals can be accommodated by the band switch, so up to twenty-four 200-kHz. tuning ranges can be made available without swapping crystals inside the cabinet. These

ranges can be placed anywhere you like in the 3.4-30-MHz. spectrum. Standard equipment includes all the necessary crystals for the 80-, 40-, 20- and 15-meter bands, plus one (to cover 28.5-28.7 MHz.) for 10 meters.

The overall plan of the receiver, minus some details, is shown in Fig. 1, a block diagram. The single r.f. amplifier stage is followed by the first mixer, the output of which is between 2955 and 3155 kHz., depending on the signal frequency. The crystal-controlled h.f. oscillator drives both the mixer and a separate emitter-follower buffer, the output of which is available at a phono connector on the rear of the chassis. The first-i.f. output from the mixer goes through a 200-kHz. bandpass coupler to the second mixer, where it is combined with the variable-frequency oscillator output to convert the signal to 455 kHz. The v.f.o., which covers approximately 2.5 to 2.7 MHz., is coupled to the mixer through a buffer, and also to a second buffer whose output, like that of the h.f. oscillator, is brought out to a phono jack on the rear panel. A slot filter for notching out heterodyne interference is connected to the output side of the mixer; this is tunable over a range of plus-or-minus 6 kHz. centered on 455 kHz.



The 7-inch diameter drum dial, occupying most of the central region of the above-chassis space in the HQ-215, has an effective scale length of 21 inches. With 200-kHz. coverage, this gives a spread of $\frac{1}{3}$ inch or better per kHz. The v.f.o. is directly under the dial. The capacitor on the panel at the left is the c.w. pitch control. Audio stages are at the rear left. The three-gang capacitor alongside the dial drum is the preselector tuning control. The circuit boards containing the r.f., first mixer, and crystal-controlled h.f. oscillator stages run along the right-hand edge of the chassis.

In the 455-kHz. i.f. system there is provision, following the second mixer, for selecting one of three mechanical filters. Only one, having a bandwidth of 2.1 kHz., is furnished, but additional ones having 6.0- and 0.5-kHz. bandwidths can be purchased separately. The filter is followed by three transformer-coupled i.f. amplifier stages, the last of which feeds the a.g.c. detector and either an a.m. detector or a balanced demodulator for s.s.b. and c.w. The beat-frequency oscillator for the balanced demodulator has separate crystal frequencies for upper- and lower-sideband reception, and there is also a tunable b.f.o. for c.w. The a.m. detector is followed by an audio preamplifier stage which is not used with the balanced demodulator.

Finally, there is an audio amplifier consisting of three stages, the second of which is a driver for the push-pull final stage. The last stage is transformer-coupled, with 3.2-ohm output for a speaker and 500-ohm output for a line or for operating an anti-vox circuit in a transmitter.

A brief run-down such as this gives little or no inkling of the actual circuit. As might be

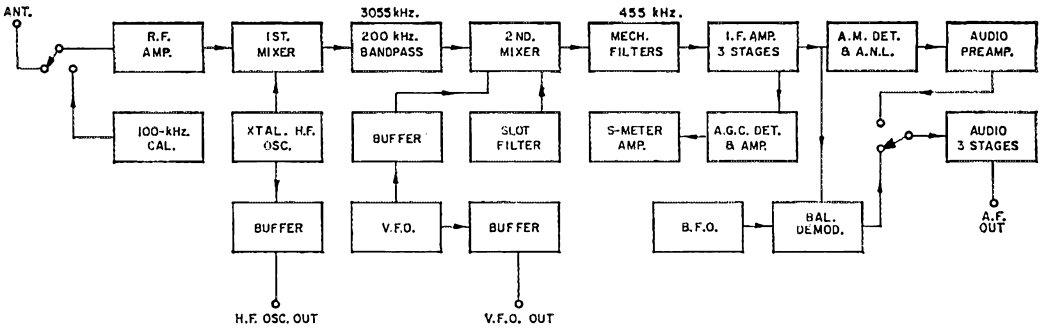


Fig. 1—Simplified block diagram of the HQ-215. Provision is made for three 455-kc. filters, but only one (2.1-kHz. bandwidth) is supplied as standard equipment.

expected at this stage of solid-state amateur receiver development, there are many features that will be of interest to those who build their own. We can't cover all of them in the space at our disposal, but have picked out a few that seemed to hold special interest.

R. F. Amplifier

In this day when field-effect transistors are all the rage it may seem odd that an "old-fashioned" bipolar transistor is used in the r.f. stage. Actually, from such listening checks and tests as we have been able to make, the receiver seems to compare favorably with tube front ends in respect to overloading and intermodulation. It could be that the triple-tuned arrangement shown in Fig. 2 is at least partially responsible. The added selectivity from individual tuned circuits, top coupled (L_{2A} and L_{3A}), no doubt helps protect the first mixer from strong signals a little off the wanted frequency. Another contributing factor may well be the selection of coupling taps.

The circuit itself is interesting in that one set of coils is used for the entire 3.4-30 MHz. spectrum, which is covered in four ranges switched with the h.f. crystal in use. The first range (the first three points on the 24-point switch) shunts relatively large values of fixed capacitance,

240 pf. shunted by a 200-pf. padder, across the 3-gang tuning-capacitor sections. The second uses just a 200-pf. padder, and the third adds nothing. The fourth shunts inductors (L_{1B} , L_{2B} , L_{3B}) across the regular coils to raise the frequency. This scheme, although not original with this receiver, is a simple one and saves a number of coils compared with separate inductances for each range.

The purpose of the low-pass filter shown in Fig. 2 is not mentioned in the instruction book. From the specifications given it appears to have a cutoff frequency somewhere between 30 MHz. and Channel 2. It is probably there to prevent spurious responses generated by strong television signals, which can be the curse of transistor receivers. If so, it works; we haven't heard any such responses on the set.

Slot Filter

The slot filter, Fig. 3, resembles the Selectoject in principle. That is, it is a Q multiplier followed by a phase inverter to give a sharp null instead of a peak. The circuit formed by L_1 and the capacitances in parallel with it is tuned to 455 kHz. with C_1 at its midposition, and varying C_1 tunes the circuit between about 449 and 461 kHz. Slot depth is set by the control of regeneration (Q multiplication) afforded by R_1 . The col-

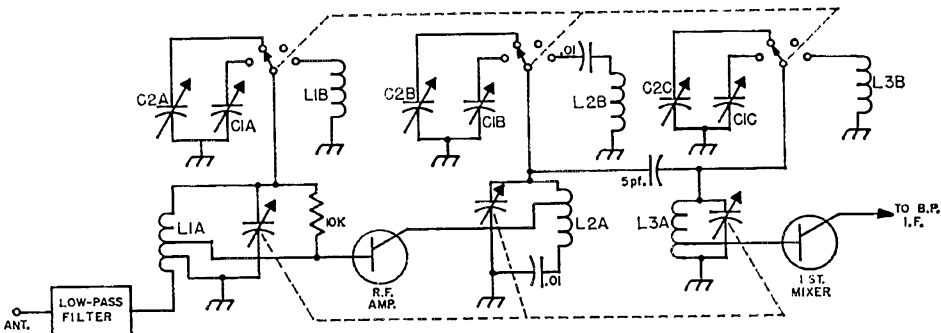


Fig. 2—Stripped-down signal-frequency tuning setup. Biasing and other details of similar nature have been omitted in order to emphasize the features essential to tuning. The four-point selector switch shown here is actually a 24-position switch divided into four sections in each of which the contacts are connected in parallel: points 1-3 connect to C_{1A} , C_{1B} , etc.; 4-6 to C_{2A} , etc.; 7-11, no connection; 12-24 to L_{1B} , etc.

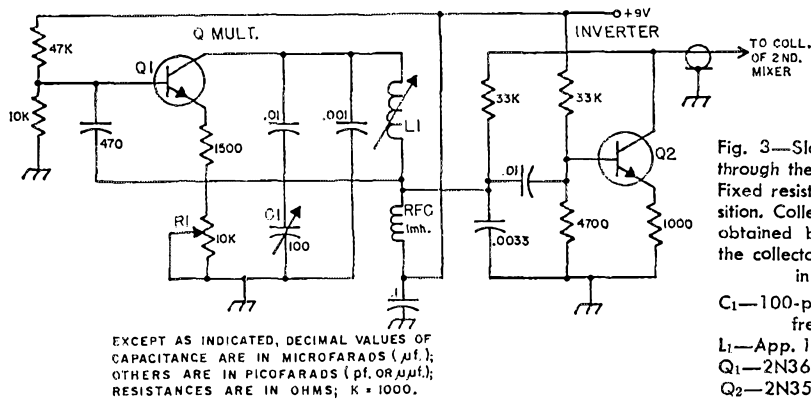


Fig. 3—Slot-filter circuit, tunable through the 455-kc. i.f. passband. Fixed resistors are $\frac{1}{2}$ -watt composition. Collector voltage for Q_2 is obtained by direct connection to the collector of the second mixer in the i.f. system.

C_1 —100-pf. midget variable (slot frequency control).

L_1 —App. 150 $\mu\text{h.}$, adjustable.

Q_1 —2N3693.

Q_2 —2N3564.

lector of Q_2 is connected directly to the collector of the second mixer stage.

Slot depth is rated at 40 db., but we were able to get close to 50 db. by careful adjustment of the slot-depth control. For maximum suppression of a heterodyne the adjustment is critical. In actual use, the slot filter is quite effective, and does not take out too much of a chunk of the passband. Phone signals remain intelligible with the filter in use.

Gain Control and S Meter

The automatic gain control/S-meter system used in the receiver is shown in Fig. 4. The i.f. input to the a.g.c. rectifier, Q_1 , is taken from a capacitive divider across the collector winding of the last i.f. transformer. Rectification takes place in the base of Q_1 after the signal overcomes the delay introduced by the voltage drop across the diode CR_1 . This delay is adjustable by means of R_1 . The collector output of Q_1 is a d.c. voltage proportional to the signal level, the i.f. component being filtered out by the 0.1- $\mu\text{f.}$ capacitor from collector to ground. This d.c. voltage, amplified by Q_2 (note that this is a p-n-p transistor) is the a.g.c. voltage. Two a.g.c. "speeds" are provided, the slow one being the result of the relatively long time constant of C_1 and R_2 . Fast a.g.c. release is obtained by switching R_3 in parallel with R_2 , lowering the time constant. Attack time is very fast in either case, because C_1 can discharge rapidly through the collector-emitter resistance of Q_2 when the base is driven negative by the output of Q_1 .

In the complete gain-control system, not shown here, the a.g.c. voltage from Q_2 is applied to the base of the first 455-kHz. i.f. stage. A.g.c. for the second 455-kHz. i.f. amplifier is taken from a tap on the emitter bias resistor for the first stage. From this same tap, the gain-controlling bias goes through a variable resistor (the manual gain control) to the r.f. stage and the first and second mixers.

The d.c. collector voltage of Q_2 also is applied to the base of Q_3 , the S-meter amplifier. The emitter output—a d.c. voltage varying with signal strength—of this transistor is used to unbalance a bridge circuit having the S meter

between its arms. R_5 is adjusted for balance at zero reading with no signal input, and R_4 controls the meter sensitivity. CR_2 , since it will conduct only in one direction, prevents the pointer from "going negative" at any time.

Detectors

The a.m. detector is a simple diode rectifier. The audio preamplifier that follows it makes up for the higher gain of the s.s.b.-c.w. detector so that the input to the main audio amplifier is approximately the same with either method of detection.

The balanced detector for s.s.b.-c.w. uses a two-diode circuit that will be familiar to those who have been around long enough to remember "Single Sideband Junior".¹ The signal input from the secondary of the last i.f. transformer is balanced to ground, and the b.f.o. voltage is applied in parallel to the two diodes through a center-tap on a resistor shunting the input. The audio output is single-ended.

Two crystals, one above and one below the 455-kHz. passband, are used for shifting sidebands in the s.s.b. b.f.o. circuit. In addition, there is an adjustable-frequency b.f.o. for c.w. reception, cut in by a separate position on the mode switch; when this oscillator is in use its output goes through the crystal-controlled-b.f.o. transistor, now used as a buffer amplifier. On all three modes requiring the use of a b.f.o. the mode switch shifts the range of the variable-frequency oscillator (main tuning) so that the receiver calibration remains the same whether reception is on upper or lower sideband, or on c.w. This is why we said earlier that the tuning range of this v.f.o. is "approximately" 2.5 to 2.7 MHz. The actual range is altered a few kHz. by the switching for each mode in order to make retuning unnecessary.

Calibrator

The 100-kHz. crystal calibrator in the HQ-215 is not just a handy accessory but is an essential part of the setup procedure for each band, if the

¹The circuit was originally a balanced modulator in a simple transmitter described in G.E. *Ham News* for November-December, 1950; also, *Ham News Sideband Handbook*.

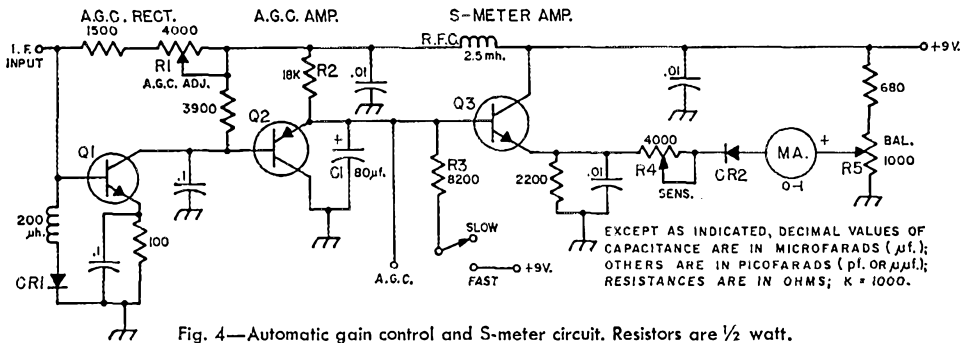


Fig. 4—Automatic gain control and S-meter circuit. Resistors are ½ watt.

C₁—80-μf. electrolytic.
CR₁, CR₂—1N541 (silicon).
Q₁—2N3693.

Q₂—2N3638 (p-n-p).
Q₃—2N3567.
R₁, R₂, R₅—Linear controls.

frequency readout of which the receiver is capable is to be realized. In changing tuning ranges, the first recommended step after setting the band switch is to put the function switch in the "calibrate" position, tune in the 100-kHz. harmonic at the low end of the range, and set the dial indicator to correspond. When the calibrator is turned on the antenna is disconnected from the r.f. input circuit so the 100-kHz. harmonic will stand out.

Setting the dial properly on each band is purely a mechanical adjustment. The fiducial can be moved back and forth by a knob on the panel to make its position coincide with the calibrated points on the dial.

Power Supply

The receiver has an internal supply operating from the domestic power line. Either 120-volt or 240-volt supply, 50-60 Hz., can be used; the receiver comes wired for 120 volts and can be adapted to the higher voltage by a simple change in the power plug. The supply uses a step-down transformer and bridge rectifier to develop approximately 14 volts d.c. through a simple Zener-stabilized series regulator², the output of which goes through the circuit shown in Fig. 5. Alternatively, the input to Fig. 5 can be a 12-volt storage battery (negative ground is required) by using a different wiring arrangement in the power plug.

² The regulator system is similar to that shown on page 33, March 1967 *QST*.

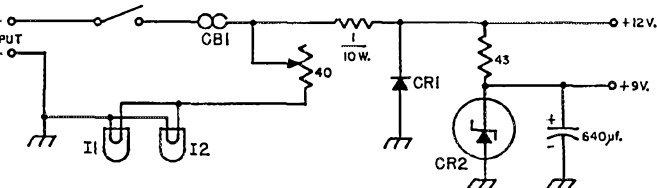


Fig. 5—Protective circuit in power supply prevents damage in case of breakdown causing short circuit in equipment, or in case battery polarity is wrong. CB₁ is a 2-ampere thermal circuit breaker, I₁ and I₂ are 12-volt pilot lamps, and CR₁ is a 3-amp., 50 p.v. silicon diode. CR₂, a Zener, regulates the 9-volt supply.

The circuit of Fig. 5 affords protection against an internal short-circuit in the receiver and against improper battery polarity when a battery supply is used. The entire d.c. load goes through a 2-amp. thermal circuit breaker, CB₁, which will open if the current exceeds the safe value. CR₁, across the d.c. line, is back-biased and does not conduct when the polarity is correct, but amounts to a short-circuit when the polarity is wrong. In the latter case, CB₁ opens and closes intermittently, causing the panel lamps, I₁ and I₂, to flash on and off and give a visual warning that something is wrong.

Although the 12-volt line is regulated, additional regulation for the 9-volt line is provided by the Zener regulator, CR₂. With the exception of the audio driver, audio output stages and the pilot lamps, which run off 12 volts, the entire receiver is operated from the 9-volt line.

Mechanical

Probably the outstanding constructional feature of the receiver is its drum dial. Calibrated in 1-kHz. steps, it is easily read to a fraction of a kilohertz, and just as easily tuned for "on-the-nose" reception. The driving knob has a flywheel for smooth action, and the reduction is such that one rotation of the knob averages 10 kHz. on the drum. The frequency calibration is very close to linear, so the tuning rate is practically the same everywhere along the scale.

The chassis, which is made of heavier-than-ordinary material, serves as the foundation for the entire cabinet. Front and rear panels are fastened to it, and joining the four corners of the panels are heavy grooved bars into which side, top and bottom panels can be slid from the rear. These are fastened in place by machine screws at the back, and one or more can be removed for access to the chassis without disturbing the others. It is a very convenient scheme for getting at any part of the interior. The only objection to it is that the sliding panels have a tendency to rattle if there is any vibration.

The circuit is divided into eight sections, five of which are on separate etched circuit boards. Each of these can be removed for servicing, if necessary.

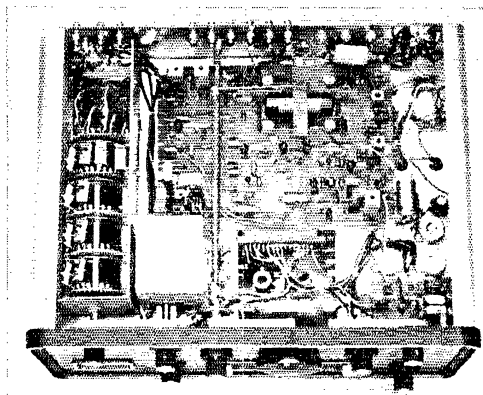
The rear panel is used as a heat sink for the power-supply regulator transistor and the two transistors in the audio output stage. There is a plastic baffle plate over them to prevent finger contact — for heat, not voltage.

The front cabinet feet are taller than the two in the rear so the receiver has a slight upward tilt, making it easier to read the dial and panel markings when the set is installed on the work surface of a desk or operating table.

The instruction book, besides the usual installation and operating instructions, has detailed service data (a little discouraging in spots, for the ham, since the recommended test equipment includes such exotic items as Tektronix scopes, Hewlett-Packard frequency counters, and Ferris signal generators!). A nice feature of the book is a set of "X-ray views" of the circuit boards, showing the etched pattern shaded and the parts placement in solid outline. Larger than life, these are easy to follow.

Miscellany

In the receiver we tested the v.f.o. calibration was practically on the button throughout the range, well within the rated accuracy of 500 Hz. between 100-kHz. calibration points. A couple of drift checks on the v.f.o. confirmed that after about an hour's warmup it easily met the specified less-than-100-Hz.-per-hour (total drift in one continuous run of over 12 hours, from a cold start, was almost exactly 1 kHz). The receiver is practically impervious to line-voltage variations, the v.f.o. frequency change being un-



The band switch and h.f. oscillator crystal sockets are along the left edge of the chassis in this bottom view. Next to it, on the panel, is the variable capacitor for tuning the rejection notch; the circuit board for the notch filter is immediately behind it. The large board occupying the rear center area contains the i.f. system and associated circuits; the long extension shaft operates the filter-selector switch through a panel control concentric with the function switch on the panel. The small board at the right front has the crystal-controlled b.f.o. circuits,

Hammarlund HQ-215 Receiver

Height: 7½ inches above supporting surface.
Width: 16 inches.
Depth: 14 inches.
Weight: 21 lb.
Power Requirements: 115/230 volts, 50/60 Hz., or 12-15 volts d.c.; 19 watts.
Price Class: \$530.

measurable when the voltage is swung from 110 to 130.

The v.f.o. output for external use showed an amplitude drop of about 4 to 1 going from r.f. probe only to a 50-ohm load. The same change in loading caused the frequency to change approximately 500-Hz. at 2700 kHz.

We did not have the sharp (500-Hz.) filter for c.w. reception, and with the 2.1-kHz. s.s.b. filter the special tunable b.f.o. for c.w. proved to be of no great benefit. No doubt it would be advantageous with the sharp filter.

The a.g.c. cannot be switched off in the HQ-215, and the often-used technique of running the audio gain up and the r.f. gain down for optimum c.w. reception in interference (it's good on side-band, too, although few use it) doesn't work unless signals are quite strong. Normal-strength signals disappear in the noise when it is tried, so for a good signal-to-noise ratio the manual r.f. gain must be at maximum. This means that the a.g.c. must be full on, with the result that you may lose a weak signal when a strong one comes inside the passband and takes control of the gain. (Again, a sharp filter should help a great deal.) Also, as a minor annoyance accompanying fast-attack a.g.c., local noise "pops" such as light-switch transients depress the gain until the a.g.c. recovers. These things are inherent in a.g.c. as such, not peculiar to the HQ-215 — except that in the 215 the a.g.c. can't be defeated.

Like all multiple-conversion receivers, the 215 has some birdies. There is at least one on each of the eleven 200-kHz. amateur-band tuning ranges for which crystals are supplied. Their strength, in terms of equivalent antenna-signal input, ranges from 3 to 0.25 microvolts, most of them being in the lower part of this range. As they are harmonic responses of one type or another, they are easily recognizable by their rapid tuning rate.

Image rejection is rated to be better than 40 db. As the h.f. crystal oscillator is above the desired-signal frequency, the image will fall approximately 6 MHz. above the signal. Our checks showed image rejection of at least 60 db. on all amateur bands.

Using an average-responding a.c. voltmeter connected to the 500-ohm audio output, spot measurements at various frequencies showed that the 10-d.b. c.w./s.s.b. signal-plus-noise-to-noise ratio was well within the 0.5-microvolt specification. — *WIDP*

The Real Life of W2SKE

Bill Tells It the Way It Really Was

BY BILL LEONARD,* W2SKE

Bill Leonard is CBS News Vice President and Director of News Programming. As the banquet speaker during the Hudson Division Convention in Tarrytown, N. Y., in October, W2SKE recited a personal ham history which, despite its light touch, hit home to many in the audience as descriptive of their own dedication to amateur radio.

WE'RE all so much a part of ham radio, we're so involved with ham radio, that I am afraid a lot of the time we won't face up to the facts of ham radio. We live in a dream world. We pretend it is one kind of a world when it is really something else.

Now, I propose for a few minutes tonight to talk to you about the world a ham *really* lives in, and the only way I can think of doing this is to share with you something about my life. When you have heard this full confession of how it has been with me, maybe you will feel that flash of recognition. Maybe you will say to yourself, "Yes, that's the way it is!"

Now, I am going to have to be very frank, and personal, and go back a long time. I suggest you all know what adolescence means. Adolescence is the time when a man is finally old enough to pay attention to the opposite sex. That is, for the first time he walks by a radio store and sees in the window not a collection of wires and aluminum and glass — no, he sees curves, romance. He is stirred for the first time by the lovely lines of a vacuum tube; his heart beats a little faster at the sight of a coil of wire. He sees himself no longer as a boy with dirty knees, but as a man looking deep into the eyes of something very precious and very rare and very desirable — like a radio receiver.

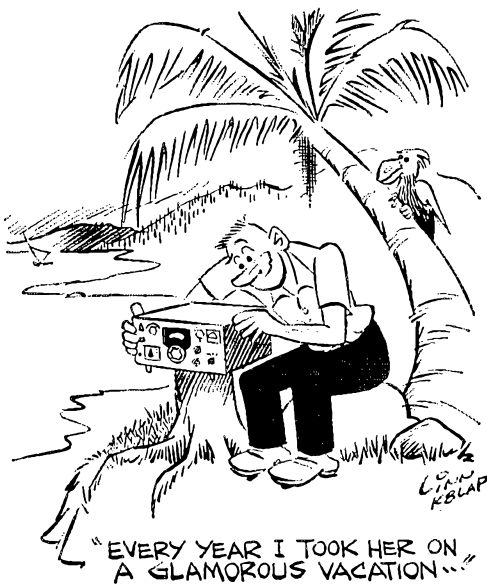
Well, not to put too fine a point on it, I was a normal red-blooded young man, and then about the year 1928, I fell in love for the first time. Her name was Freed Eiseman. In those days, fashions were different and she wore three enormous dials: one of which tuned her first r.f. stage, one of which tuned her second r.f. stage, and one of which tuned her detector.

She was all dressed in black Bakelite; and when you tickled her, she squealed. It took a real hand at the knobs to get her to react at all but

when you got to know her secret likes and dislikes, she played the sweetest music this side of heaven. You could sit and listen to her for hours, and that's more than you can say about most girls! First loves never leave you. I can see her now, with her huge coils and oversize condensers and silver wire.

But life moves on, and man is fickle and I went on to sow all the wild oats of my generation . . . a couple of dates with a National SW3, and later an FB7; a wild orgy with an early HRO; a passionate love affair with a Hartley oscillator and a long, lusty adventure with a pair of 210s in push-pull.

Many of you are too young to remember the swinging girls of those days just as I was too young to understand what the oldtimers of my youth meant when they talked about sparking, and the good old spark days. Anyway, I am a normal sort of guy and soon the time came for me to settle down and get married. What kind of a girl would it be? How would she want to live? Well, I believe in love at first sight and — sure enough — one day at a cocktail party in the basement of Harrison Radio, I looked across a crowded stockroom and there she was. This was a girl who had everything. She could transmit, she could receive, she was ruggedly built and yet delicate in every move. You could look at her and



*524 W. 57th St., New York, N. Y.

know exactly where she was on the band. One sideband was more beautiful than the other. Boy was she built!

First thing you know, we were deep in conversation and of course, I said, "What's your name?" She said, "My name is Kay."

I said, "Oh really, that's a nice name . . . what's the rest of it?"

"Well," she said, "My middle initial is W and my last name is M2."

"Well," I said. "Well, I'm sure pleased to meet you Miss M2," and she said, "Why don't you just call me Kay?"

"Tell me your dreams," I said.

"Well," she said, "I want to marry a contest man with his heart set on DXCC . . . the kind of fellow who dreams of DXpeditions."

"Gee," I said, "you're looking at a guy who has worked 11 countries, including Canada! I just love DX. Tell me more."

"Well," said Kay, "I want to live in a little dream shack, with good a.c. regulation, on a hill near the salt water with a clear shot into Asia."

"Just like a girl," I murmured.

"That's not all," said Kay, "I want a great big back yard with plenty of room for a beam."

I said, "you're my kind of girl . . . but aren't you interested in things like washing machines, stoves, oil burners . . . that kind of thing?"

"Yes," she said, "they are okay if they are properly by passed to ground, well filtered so they won't cause any interference. I am the kind of girl who is very sensitive to interference."

Well, it wasn't long before we both knew we were meant for each other. We had a spectacular wedding on a revolving charge account, and we settled down to what I can honestly describe as a great deal of activity on all bands. Kay was all woman. Every last resistor. I gave her everything. I dressed her up with a final amplifier that was the envy of every rig in our neighborhood. Very p.e.p. So lovely and powerful that it was even admired to the extent of a special visit by an inspector of the FCC. I offered her a mink coat but she said mink was a lousy insulator. Every year I took her on a glamorous vacation to places like Navassa, Bhutan or the Rochelle rocks.

We had a wide circle of friends, all of whom admired Kay. "You have one of the prettiest signals on the air," the fellows would say. "How long have you kids been married?"

Naturally, after a few years, we began to think about a family and one day Kay came to me and said, "Honey, I think I am going to have a harmonic . . . what do you want — a receiver or a transmitter?"

"Dear," I said, "I want something that looks exactly like you . . . I want a little transceiver. I don't care whether you give birth to a Swan, a Drake, or a Hallicrafters . . . just as long as it makes you happy."

"Well," she said, "that's wonderful. I'm going to see the doctor tomorrow."

"What doctor are you going to see?" I asked her.

"Well," she said, "I think we only ought to



have the best. I thought I would go to see the most famous doctor in all the world."

"Oh," I said, "Who would that be . . . Dr. DeBakey, Dr. Christian Barnard?"

"Oh no," she said, "Dr. Don Miller."

"Well," I said, "I would like to have Don. He is a crack operator all right, but I am not sure the League would sign the birth certificate, and you wouldn't want our little harmonic thinking he wasn't legitimate, would you?"

Now I'm getting to the point of this long, personal story. A few years later my whole life changed. I developed a hobby. At first, my beloved Kay encouraged me.

"I think every man should have a hobby," she said. "You spend entirely too much time with me. All you think about is domestic things . . . coax cable, transistors, angles of radiation . . . there must be something more to life than this."

I said to myself, "There is."

As a hobby, I had gradually developed an interest, in what is known as . . . girls . . . just as something to do after work, just as something to do when I wasn't sitting around with Kay on the high end of 20. I started an interest in young ladies. One day I brought one of them home. She was about 36-22-36.

"What's that?" said Kay.

"It's a girl," I said.

"How does it work?" she said. "It looks kind of funny to me."

I tried to explain this . . . I tried to get her interested so we could share my hobby together.

Kay was tolerant but uninterested. "I listen to you talk with those girls you bring home and you talk about absolutely nothing. It bores me to death . . . but it's your hobby."

After a year or so, I began to realize that my hobby was taking more and more of my time. I had found a very nice piece of equipment named Norma, and brought her home to stay.

"It's alright with me," said Kay, "as long as she sleeps in the bedroom and not in the shack."

I found myself more and more absorbed in my hobby. One day, I said to Kay, "Norma and I would like to put some drapes in the living room."

"Well," said Kay, "Don't you dare let them interfere with the feed line that goes out into the 40-meter beam."

"Don't worry," I said, "You'll never know they're there."

Things went along fairly well until Norma and I decided to build a garden. If girls are your hobby, gardening is a kind of advanced stage. Unfortunately, when I was digging in the garden, I happened to stick a spade through the main coax line leading out through the tower.

For the first time in our married life Kay really blew her stack. Actually, she does not have a stack, but she blew both fuses in her power supply and both her final tubes. She never amounted to much after that.

She jumped right out of the band yelling at me that I would have to make a choice, either it was my hobby or it was her. Which was it going to be? She was not going to sit alone on 3999 night after night while I was down in the cellar wiring up some blonde. She was not going to see her precious shack desecrated by works of art, rugs on the floor and all that sort of junk. I had to understand that if I wanted to make my hobby my life she would have no part of it.

Well, I was in a fix. Naturally I loved Kay very much. She had been a good piece of equipment. She had held her market value very well, and except for an occasional side-long glance at some of the newer, flashy Japanese gear, I stayed right on the straight and narrow all those years. But on the other hand, there was something about my hobby that I couldn't get out of my blood. There seemed to be something about women, one woman in particular, that no mere piece of electronic gear could satisfy. I tried to figure out what it was. Girls are certainly not as beautiful as a nice transceiver. The smell of perfume could certainly not replace the smell of hot melting solder. You can't turn them on and off the way you can a rig. Still, every man needs a hobby, something to take his mind off the important things of life and I was darned if I was going to give up girls.

Finally, I had an inspiration. Finally, I found a solution and I commend it to all of you or any of you who may have found themselves, or who do find themselves, in a similar position.

"Why can't I just reverse the whole thing?" I said to myself. I finally said to Kay, "why wouldn't it be better my dear if *you* were the hobby . . . if you got all the attention, if *you* were what I relaxed with?"

"Oh," said Kay, "I think that would be wonderful. If you did that you'd make me the happiest transceiver in all the world."

Then she thought for a moment.

"What would happen to poor Norma?"

"Well," I said, "I have been thinking of that. I guess there is nothing to do but marry her."

"She won't like it."

"That's true," I said, "she won't be a hobby any more but I love you so much Kay, I think this is the solution."

And that's the way it's worked out at our place. The KVM2 is a hobby, and I am married to my wife. And all three of us are better off that way.

QST

Strays

A newspaper clipping sent to us by K0CTK relates another tragic story involving electrical safety. "Four persons were electrocuted yesterday when a 60-foot radio tower they were erecting fell across a high power line." (The victims were a man, his two daughters, aged 18 and 15, and a friend). "The four were putting up the tower for CB use when it fell on the electric line." **Switch to safety.**

The public announcement of the engagement of Barbara Ann Eisenhower to Fernando Echevarria-Uribe of Colombia was not news to K11VB; he had handled traffic through HK4CL of Medellin for the two youngsters (Miss E. in Pennsylvania) making many arrangements for the wedding as well as the engagement announcement.

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, 06111.

Feedback

The section award for Northern New Jersey in the June V.H.F. QSO Party goes to K2LNS, operator of WA2FGK.

Our compilation of Field Day scores in the November issue was struck full-force by Murphy & Co.

- 1) The Class C and Class D headings were transposed.

- 2) All the rest of the Class B scores after WN8ANW/8, beginning with K9QKA/9 and ending with WB6VKK/6, wound up being listed under the Class D heading immediately following WB6KZN/6.

IMPORTANT NOTICE

Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying please give old as well as new address and your zip code. Your promptness will help you, the postal service and us. Thanks.

A Christmas QSO

BY Ibenezzer SQrooge*

"IBENEZER SQrooge . . . Ibenezzer SQrooge

"Who calls . . . QRZed?"

"Ibenezzer SQrooge . . . this is the ghost of Old Times Past. We're going to take a little eyeball through the Good Old Days."

"QRX one, Old Timer. I don't want to eyeball nothing today."

"Come Ibenezzer SQrooge. We go back . . . back . . . through the years. Look . . . look there . . ."

"Why that's my old home with my old zepp on the roof. And that's me up in the attic. And there's my old 3-tube receiver . . . and 10-watt breadboard rig . . . and look at them QSL cards on the wall."

"And what are you doing, I. SQrooge?"

"It's evening . . . oh, I remember. I'm on a traffic sked handling Christmas messages. But it was hard! Some nut threw a carrier on the net every night. Took us hours and hours to pass that traffic."

"And now what do you see, I. SQrooge?"

"Oh, this is later. I'm real excited. Must be working a new state . . . or new country. And there, I'm filling out a QSL card . . . and begging the other fella to please send me his card. And look, there I'm building a new rig. And all them other fellas around the shack . . . we were always helping each other, ya know, and . . ."

"And now . . . now where are you, Ibenezzer SQrooge?"

"Lessee . . . why, that's on a hill. Ohhhhh, it's Field Day. I'm putting up the tents . . . climbing trees . . . trying to start that blasted generator. Great fun. I even did the cooking that year . . . and everybody got sick. But our club did pretty well . . ."

"And now, I. SQrooge, where are you?"

"Why that's the old radio club meeting. Fine times we had . . . then. Swapping parts . . . and lies about good DX. Oh, there I am taking notes. I was secretary . . . and I edited the club paper, too, and . . . yeah . . . I did everything in them days."

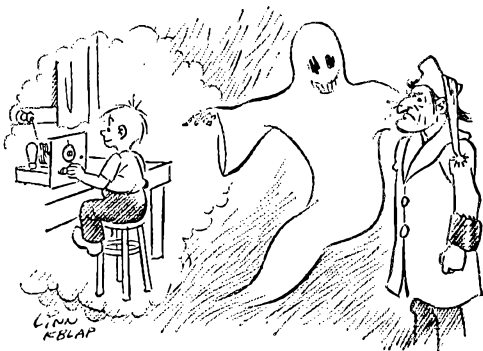
"Yes, Ibenezzer SQrooge. You did your part . . . then. But what about now? What about this year? Let's look . . . let's eyeball this year."

"Naw, Old Timer, let's QRT for now. It's not good for my old eyes to look too close. Besides there's a good show on TV and . . ."

"Ibenezzer SQrooge . . ."

"Please Old Timer, not . . . not this year . . . maybe some other year. Spare me this year . . . ohhhh . . . where are you taking me???? . . . oh me . . . I see . . . oh . . . That was last night when I was tuning my rig."

* John Troster, W6ISQ, 45 Laurel Ave., Atherton, Cal, 94025.



"Correct. And on what frequency were you tuning your 10 kw.?"

"I . . . I don't remem . . . ahhh . . . I forget."

"You were zero beat with a net frequency. And you tuned your rig for about two hours, didn't you? That net was passing Christmas traffic. Why did you do that, I. SQrooge?"

"Ohhhh . . . well . . . well . . . that net was operating on *my* frequency . . ."

"*Your* frequency, Ibenezzer SQrooge?"

"Well . . . ahh . . . yes. I monitor that frequency all the time. But when they come on with all their messages, I can't monitor my frequency. So, I have to protect my rights to my own channel . . . ahhhh . . . I mean . . . well, . . . suppose somebody wanted to call me???"

"Who would want to call *you*, I. SQrooge? That Christmas traffic was from a long way off . . . and it would be very comforting to all concerned if the messages were delivered. Don't you remember, I. SQrooge??? . . . when you used to handle . . ."

"Oh please, Old Timer . . . no more. I won't . . . really I won't do it again. They can use my frequency for their traffic in the evenings."

"*Your* frequency?"

"OK, Old Timer . . . I'll tune the whole band."

"And now, I. SQrooge . . . do you see all those people?"

"Who are they? Where are they? Ohhhh, that's Field Day someplace. Guess I don't know any of them fellas . . . Oh, maybe that gray haired fella yonder. But I wasn't there. Field Day's for young fellas."

"So instead you stayed home and had your own Field Day. Your score was how many QSOs you could disrupt."

"Yeah, but how is anybody gonna QSO anybody with them fellas all messing up the band

with a contest? I have to defend my rights to a QSO, ya know."

"Remember waaaaaay back, I. SQrooge? Who sat up all night in the contests?"

"Well, that was different then, and . . ."

"Now, Ibenezzer SQrooge . . . look at this room full of people. Know any of them?"

"Ahhhh . . . well, one or two, I guess. But they got a lot fatter since I last saw 'em. Yeah, that must be the club meeting."

"Where were you, I. SQrooge?"

"Ahhhh, I had real important business."

"You were home flat on your back watching TV."

"No more Old Timer . . . QRT . . . QRT, I say. I've had enough. I used to do all them good things. Build all my own gear . . . rag chew all day . . . handle traffic in the evenings, then sit up all night working DX . . . QSLs for everybody . . . and Field Days . . . and contests . . . and club meetings. I *used* to do all them things, Old Timer."

"And do you think your net . . . or your friends . . . or your club is any less deserving of your services and participation now than they used to be?"

"Well no . . . it's not that. I just been too busy. And besides . . . well, things is different . . ."

"The only difference is *you*, Ibenezzer SQrooge. You always volunteered for all occasions. How many projects do you suppose have *not* been done because *you* did not offer your help?"

"Oh, I'll volunteer next time, Old Timer, really I will . . . I will . . . I will . . . I will . . . I . . . ahhhhh . . . ohhh . . . whatsamater? That you Marge? Watcha looking at me like that for?"

"Last time you hollered 'I will' with that much enthusiasm, we were standing in front of a preacher."

"Yeah, oooooo . . . I must have had a real bad dream."

"You really were dreaming! Calling me Old Timer . . . calling a club meeting to order . . . volunteering to climb a tree! You????? At your age??? Maybe you got a little problem! You feel OK?"

"Marge, never felt better. And I got no problems . . . at least not no more. But I can't tell ya all about it now . . . too much to do. What time is it? Ah, just in time for the net . . . haven't checked in for years. Might help out for a while. Lesseeeee . . . what's Charlie's number? I'll volunteer to work in the club booth at the County Fair next summer . . . and I'll help with the club paper . . . and I'll help next Field Day too . . . and Marge, I'll volunteer *you* to do the cooking. And I'll take them QSL cards out of the waste basket and answer 'em . . . and I'll clean up my TVI all over the neighborhood . . . and then I'll help them kids with their code practice. Then I'll give that new fella in town a hand with his antenna . . . I'll climb that tree for him so's to get in shape for Field Day . . . haw!"

"Maybe you better lie down again. Haven't seen you so stirred up in years."

"I'll explain later, Old Timer . . . errrr Old Marge . . . ahhhh . . . Marge, Old Girl. Too busy makin' up . . . I'm late for net check in. All I got time for right now is to say . . . Merrrrrry Christmas! And I promise to make it a real Happy New Year . . . next year . . . for everybody." QST

NEW BOOKS

Fundamentals of Integrated Circuits (Motorola series), by Lothar Stern. Published by Hayden Book Company, Inc., 116 W. 14th St., New York, N. Y. 10011. 176 pages, well illustrated, cloth cover, 7 by 10 inches. Price, \$8.95. Cat. No. 5695.

This informative book is written in a style that can be understood by those who do not have a formal education in electronics. Yet, it is presented with the technician and engineer in mind and is capable of imparting the basic integrated-circuit knowledge needed by electronics people at all levels of industry. Radio amateurs and experimenters should find this book as useful as do those who are at higher technical plateaus. It is refreshing to note the absence of the mathematical gymnastics which so often are a major factor in unraveling the sometimes-mysterious substance of modern-day technical books and engineering papers. One does not need to have a slide rule, Mathematics, or computer at hand to comprehend the data given by the author.

A generous sprinkling of schematic diagrams and artist's sketches illustrate the highlights of the text in all chapters of the book. This publication should not only serve as a primer in basic integrated-circuit techniques, but can be used as a refresher course by those who are already versed in this field.

The first four chapters furnish the reader a practical

foundation for the material in the remaining chapters. Chapter 1 outlines the basic physical concepts of ICs and introduces most of common terms of the integrated-circuit language. Chapters 2, 3, and 4 deal with basic semiconductor theory — junctions, holes, resistivity, capacitance, transistor types, electrical functions, and other important considerations.

Chapters 5 through 8 cover the actual mechanics involved in the design and fabrication of various types of ICs — thin-film circuits, resistive and capacitive elements of ICs, multi-chip designs, reliability considerations, and the many packaging methods used when building integrated circuits. Chapter 9 treats many of the popular circuit applications for ICs and includes schematic diagrams of the circuits discussed. Several curves are included to show the transfer characteristics of the integrated circuits. Among the circuits discussed are differential and operational amplifiers, r.f. and i.f. amplifiers, audio and video amplifiers, and others. Stabilization is also a topic in this section of the book.

The balance of the book covers practical design techniques — initial design considerations, what can be integrated, packaging, breadboarding and testing, design examples, and other useful data. In giving an overall appraisal of this book, it appears to be one of the most complete texts on basic integrated circuits and their applications that has been published. It should make a valuable addition to any electronics man's technical library. It tells a plain-language story about ICs, from the ground up — WICER.

A Simple Book Binding Method

BY STANLEY R. NELSON,* WA6KDO

THERE is no substitute for bound *QST*s. The usefulness of the magazines is increased, as the annual index is always available; a selected article can be referred to quickly, as bound issues are less likely to be hidden beneath an incomplete homebrew project or lost to a well-meaning ham friend. *QST* binders (available through ARRL) are neat and effectively store 12 issues in one volume. For the ham interested in a homebrew project where glue replaces solder, binding one's own *QST*s is a useful, satisfying project.

Most bookbinding methods require considerable time and practice to produce a neat, firm book. A fast, simple method, used by binders for binding single sheets and old books, is the Sawkerf method which is included in a book, "Creative Bookbinding."¹ This is an excellent reference for those interested in pursuing the subject further. The method described is well suited for amateur use since only a few basic items are needed, although more elaborate presses, glues and covering materials can be added as the need arises.

Six issues are bound per volume. The issues are placed in order by month and it is a good idea to double check the year for each month as it is easy to introduce an issue of the wrong year if issues over several years are being bound. Two boards 1" x 2" x 12" are placed even with the spines (bound edges) of the magazines and a 5-inch "C" clamp is placed centrally on the boards and tightened. The backs of the issues should be as even as possible and time spent getting all edges even will pay dividends in the finished product. A layer of Elmer's glue is spread over the backs and allowed to dry. A light bulb near the glued surface reduces the drying time. When dry, the "C" clamp is loosened and the boards

¹ "Creative Bookbinding," by Pauline Johnson. The University of Washington Press, Seattle, Washington.
* 12203 W. 70th, Terrace, Shawnee, Kansas 66216.

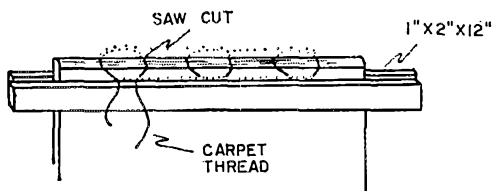


Fig. 1—Saw-kerf binding. Angular cuts $\frac{3}{16}$ -inch deep are made $\frac{1}{4}$ inches from the ends and about the same distance apart. Elmer's glue is worked into the cuts and heavy thread or cord is wrapped several times around each of the 3 segments with converging cuts.

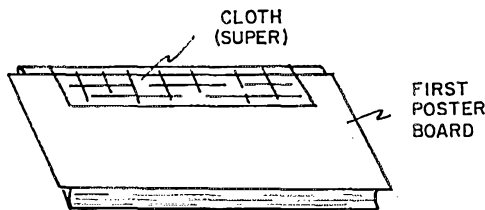


Fig. 2—The book cover is made of 4 pieces of poster board of equal size—2 in front and 2 in back. The first board is placed beneath the cloth super, $\frac{1}{4}$ inch from the spine edge and over-lapping the book $\frac{1}{4}$ inch on the remaining 3 sides. The cloth is glued in place and the second board glued on top of super and first board.

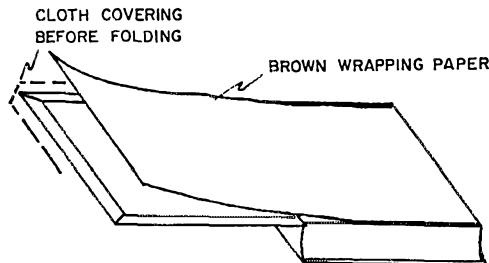


Fig. 3—Cloth is cut an inch larger than the cover on all sides and glued to the front and back covers and spine. The cloth corners are cut diagonally and the edges glued to the inside of the cover. Brown wrapping paper is glued to the inside of the covers and onto the first and last pages of the book.

are lowered about 1 inch from the glued edge and the "C" clamp firmly re-applied (Fig. 1). Six cuts are made at an angle with a hacksaw into the glued backs of the magazines (the spine) to a depth of $\frac{3}{16}$ " or about to the level of the staples (Fig. 1). Elmer's glue is applied along the cuts and worked into the opening with a finger. Heavy thread is wrapped several times around the pairs of converging cuts and tied (Fig. 1). Glue is placed over the spine surface and a piece of cloth $\frac{1}{2}$ -inch shorter than the book at both ends and 2 inches wider on each side is pressed onto the wet glue and allowed to dry over night. The book is then removed from the "C" clamp and boards and placed in a cover.

The cover can be made from 4 pieces of poster board. With the poster board placed $\frac{1}{4}$ " from the spine edge the board should be $\frac{1}{4}$ " larger than the book on the remaining three sides (Fig. 2). The 2-inch cloth extension (super) is glued over a piece of poster board in front and back, and a second piece is glued on the first with the

cloth super between the two (Fig. 2). Cloth an inch larger than the cover on all sides is glued to the covers, spine and along the inside edge of the covers after folding (Fig. 2). Excess cloth at the top and bottom of the spine can be trimmed and folded over and glued in place so that the folded edge is even with the covers. Brown wrapping paper is used to cover the inside of the covers and the first and last pages of the book (Fig. 3). Wax paper inserted beneath the book

covers keeps book pages from wrinkling while paste is drying. A label printed with a tape-writer can be attached to the spine giving information such as "QST Jan-June 1968."

Modifications can be made throughout the procedure to suit the binder. Single pieces of Formica make sturdy front and back covers. Contact paper can be used to cover most of the board covers with cloth used only over the spine and a few inches onto the covers. QST

Amateur Radio and Citizens Bands

These paragraphs were adapted from an editorial appearing recently in the Florida DX Club Bulletin, and now appearing here with the approval of author editor W4BRB. If we go about it in the right fashion, W4BRB is saying, there are a number of CB licensees who could and should be recruited into the ranks of amateur radio.

WE recently renewed a CB license issued to our business and used for dispatching of company vehicles. One almost-immediate result was a plethora of "trashmail" and catalogues from mid-western CB houses directed to the company title and call letters. Obviously, the vital statistics were "lifted" from FCC's public records and each new CB licensee (renewals too) must receive a similar shot in the arm.

A prior editorial deplored the prevalence of inferential and suggestive advertising aimed at the CB element, a group largely comprised of legally and technically ignorant individuals who are, as a result of ignorance, highly vulnerable to such approachment. That they are devoid of technical "smart" is apparent in reading these catalogues wherein fantastic claims are made for the goodies. Here we learn that there is a difference in watts depending on who manufactures them; that signal-boost is better than range-boost but that neither quite compares with boost-boost; and that two-element quads start with 10 db! (No mention of the standard of comparison which must, necessarily, be a wet sponge.) Continuing into this electronic Oz reveals a "Match-Maker" to get the most out of your CB system, as it "gets rid of s.w.r. losses without antenna tuning." (What say now, you backward types who lean to resonant elements and matched impedances! Where have you been dozing?) A "base-boost" (autoformer) between the rig and power socket will "put new life in old units." Simply plug it in and watch the tubes bl—, er, glow, that is. Finally, for a "real punch" whilst "letting them know you are there," we are told that nothing beats the linear amplifier, and a gaggle of such are offered over questionable specs which prove them ideal for your CB set together with coy admissions that such are "illegal on Citizens Band as they boost the power far in excess of the limit."

A reading of those catalogues underlines the fact that even a little knowledge would alert the potential victim against improbable claims. But, dwelling as CBs do in their information vacuum, illuminated solely by the inspired spiels of counter salesmen,

fellow sufferers and those didactic catalogues, there is no room for knowledge—only for numbo-jumbo.

Bill Orr, W6SAI, writing in *Amateur Radio Facts!*, suggests that many CBs are, at heart, "communicators" and would rightfully be hams had they not stumbled into the temporarily-attractive 11-meter trap; that by the time the shortcomings of CB had blunted their initial enthusiasm and driven them off they had also been driven beyond any probability of attaining amateur status and, consequently, were lost to us and we to them. This is an all-too-true fact—few manage the successful transition, for the Citizens Band is, in its way, a spoiler and it offers a debilitating palliative which defeats all but the most determined of its captives. CBs with whom we have discussed this phenomena invariably retreat behind a Maginot Line of resentment against examination—especially the code requirement. But for that nasty old code exam, all CBs would be hams.

God forbid! That code hurdle and, in fact, all of the exam, is our ante. If in poker, for example, there were no antes, everyone could draw and there simply would not be enough cards to go around. If, in our game, there were no initial qualifications, it might not be a case of all CBs becoming hams—rather, we might descend to their unhappy status. In any event, fearsome though it may be, the exam is the ante and it must be paid—all of it—if the game is to be played.

In prior writings we examined the negative aspects of citizen banders. Total condemnation of this group is a popular pastime, but an objective evaluation of the overall picture suggests that it may not be completely bad. While it is true that a hard-nosed, outlaw minority group exists in the CB structure, it is also true that huddled within this same structure are many of those "communicators" who could, would, and should be hams. These are potential radio amateurs that we need even as they want amateur radio, but they are also the ones whose blunted enthusiasm will lose them if they are not helped in time.

The problem, then, is one of reaching the desirable CB element. It is no small job for, desire notwithstanding, human apathy does not welcome change and, particularly, change wherein human effort is a requisite. But "ham-activities" exposure is an attractive stimulant and one which, if seasoned with a splash of "how" and "why" and served with cordiality, must distill into a powerful purgative. We hams have the tools at hand—it remains only for us to use them.

For the recent Field Day effort, W4EPO and the writer selected four CBs to complete our task force. Of the untried lot, two proved to be excellent antenna riggers, working hard and well; one did yeo-

man duty throughout the long night as a logger; and the fourth turned in a truly fantastic job of contest voice operation. Three of this group are ham-inclined, and for these CB can never be the same again. But there are countless more like these who will pass and be lost if they are not helped, and this encouragement *must* come from within amateur radio. We are in competition with a cheap and dirty attraction, but we have an incomparably better product and we are, in the final analysis, its finest salesmen — let us go forth and sell!

Therefore, let amateur radio, through its individuals and its many organized groups, mount an immediate, intensive campaign designed to recruit this ham-inclined CB element; to aid it and to guide it toward ham licensing and into the paths of satisfaction and usefulness. Our organized clubs are in an ideal position to expand their already extant training programs to include desirable CB defectors as are smaller groups and even individuals. Let us make sure that few of those drop-outs will be amateur radio's fault or amateur radio's loss. **QST**

Return To Wonderland

BY A. A. ZIMMERMAN,* K4HPF

THE article by WN6BRE¹ in June QST was read with considerable interest and amusement. But why disguise the name of the company which will do favor for the ham fraternity?

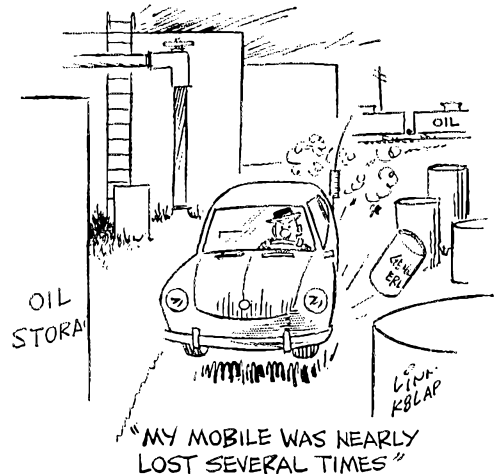
I had a parallel experience with the Heathkit Cantenna. Calling on some experience in industry, I know that the bigger the corporation, the more accommodating they are . . . if you get to the right people!

I casually strolled into the impressive administration building of the Standard Oil Company Refinery at El Segundo, California, the second oldest refinery in the U.S., and asked their receptionist to direct me to the Marketing Department. She gave me a choice of Marketing Specialists in lubricating oil M.S., lubricating oil SO., asphaltic coatings, detergent additives, jet fuel, high octane fuel, automotive grade fuel and special applications. I selected special applications . . . she gave me a stick-on visitor's badge and directed me to refinery gate 3, about ½ mile down the street.

At a small building inside gate 3, a pleasant fellow named Chuck was waiting (he never did give me his last name), and Chuck didn't act at all surprised when I told him I needed one gallon of uninhibited insulation oil. In fact, he apologized for not having a drum immediately at hand for the guys at the lab., who needed small quantities for experimental purposes.

We went inside to his desk and Chuck set the huge Standard Oil Company product locator system in operation. Within a few minutes he had the storage location identified, but there was one additional problem. Sales in this area are controlled by the Marketing Division at Long Beach, California. While I was envisioning the 80-mile round trip drive to Long Beach, Chuck picked up a tieline phone, talked to a Marketing Manager for a few minutes, and before I could finish my cup of coffee, had a Sales Release order filled out for one gallon of insulation oil, GRATIS.

I went out of gate 3, up the street, in gate 2, through Security Control and then drove for about ¼ mile through the most amazing con-



glomeration of plumbing (not r.f. plumbing) that I had ever seen. My mobile was nearly lost several times in the traffic of huge tankers, railroad spurs full of tank cars, 55 gallon drum racks, etc.

Although I am not noted for my modesty and have never been accused of being timid, by the time I arrived at the warehouse I was feeling somewhat reluctant. Here were six semi-trailers being loaded by forklifts, two more trucks waiting for space at the dock, two automated driverless tractors running around the pallets blowing their horns and flashing their warning lights, so . . . I walked into the dispatcher and presented him with my Sales Release for one gallon of oil. He confirmed my belief that dispatchers as a group cannot be shaken by anything. Without a change of expression, he dispatched a forklift to pick up one gallon, neatly packaged in its cardboard container. He carefully wiped off the box and offered the use of a hand dolly to transport the 1½-pound load to my car!

Moral of the story: The bigger they are, the more accommodating they are. Incidentally, I have no financial interest in Standard Oil and am not employed by the Corporation. **QST**

* 8722 Pershing Dr., Playa del Rey, California 90291.

¹ Pollock, "Novice in Wonderland," QST, June 1968, p. 70.

22nd V.H.F. Sweepstakes - January 4-5

January 4 is when the v.h.f. New Year begins (with either a bang or a whimper, depending upon how the propagational ball bounces), because that's the date of our annual V.H.F. Sweepstakes for 1969. In a 34-hour period from 2 p.m. Saturday to midnight Sunday (your local time) you work as many other World Abovers as you can scare up, exchanging preamble information as shown in the box below; to calculate your score, take the sum of your QSO points (at 2 points per complete two-way exchange) and multiply by total ARRL sections worked *plus ten*. Assemble your log, comments and pictures, and mail the whole works to us **no later than January 31, 1969**. Send now for log forms; each sheet has space for 80 contacts plus a section checkoff list and a summary. (Let us know how many you want.)

ARRL-affiliated clubs, and clubs awaiting approval of affiliation, are eligible to compete for an engraved gavel (see Rule #7). Club secretaries note: your entry letter must be *received* here at Hq. by **February 28**.

We've got lots of section-award certificates ready to fill out and mail in early spring. Will yours be among them, maybe?

Rules

1) **Eligibility:** Amateur operators in any ARRL section (see page 6) operating at home, or mobile or portable *under one call*, on or above 50 MHz., are invited to take part. Yukon-N.W.T. (VE8) counts as a separate multiplier.

2) **Object:** Participants will attempt to contact as many other stations in as many ARRL sections as possible.

3) **Contest Periods:** The contest starts at 2:00 p.m. your local time, Saturday, Jan. 4, 1969, and ends at midnight, Sunday, Jan. 5, 1969. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the zones concerned.

4) **Exchanges:** Contest exchanges, including all data shown in the sample, must be transmitted and received for as a basis for each scored point.

5) **Scoring:** (a) Contacts count *one point* when the required exchange information has been received and acknowledged, a *second point* when exchange has been completed in both directions. A section counts only once for multiplier credit, regardless of band.

(b) Foreign entries: All contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together as one, and a section multiplier of *no more than one* may be claimed for contacts with all foreign stations contacted. Foreign stations may only work stations in ARRL sections for contest credit.

Foreign stations will give their country name in the exchange.

(c) Final score is obtained by multiplying total contact points by the sum of different ARRL sections worked (the number in each of which at least one SS point has been credited) plus 10.

6) **Conditions for Valid Contact Credit:** (a) Repeat contacts on other bands confirmed by completed exchanges of up to *two points per band* may be counted for each *different station* worked. (Example: K3IPM works WA2FGK on 50 and 144 Mc. for complete exchanges of 2 points on each band; 2×2 gives 4 points but only *one* section multiplier.)

(b) Cross-band work may not be counted.

(c) Portable or mobile station operation under one call, from one location only, is permitted.

(d) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest (with the exception of family stations, where more than one call is assigned to one location by FCC/DOT).

(e) Contacts with aircraft mobiles cannot be counted for section multipliers.

(f) Contacts made by retransmitting either or both stations do not count for contest purposes.

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e., able to communicate over at least a mile).

7) **Awards:** Entries will be classified as single- or multi-operator, a single-operator station being defined as one manned by an amateur who neither receives nor gives assistance to any person during the contest period. Certificates will be awarded in each ARRL section to the top-scoring amateur in the single-operator classification. In addition, a certificate will be awarded to the top Novice in each ARRL section where at least three such licenses submit valid contest logs. Multioperator work will be grouped separately in the official report of results in *QST*.

When three or more individual affiliated club members compete and submit logs naming the club with which they are identified, an ARRL certificate will be issued to the leading club member. A letter must be received from the club's secretary itemizing participating members and approximate claimed scores. When fewer than three individual logs are received, there will be no club award or club mention.

A gavel with an engraved band will be offered the affiliated club whose secretary submits the greatest aggregate score, provided such scores are confirmed by receipt at ARRL Hq. of the *individual contest logs* from such members. Only the score of a bona fide club member, operating a station in local club territory, may be included in club entries. Claims from federations, radio club councils, or other combinations of radio clubs, will not be accepted, nor can special memberships granted for contest purposes be recognized.

8) **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 Award Committee.

9) **Reporting:** Reports must be postmarked no later than January 31, 1969, to be considered for awards. QST

EXPLANATION OF V.H.F. SS CONTEST EXCHANGES

Send Like a Standard Msg. Preamble, the.....NR		Call	CK	Place	Time	Date
Exchanges	Contest numbers 1, 2, 3, etc., a new NR for each station worked	Send your own call	CK (Readability and strength or RST of station worked)	Your ARRL section	Send GMT time of transmitting this NR	Send date of QSO
Sample	NR 1	WAIHQJ	59	CONN	1905	JAN 6

Announcing . . .

. . . The 35th ARRL

International DX Competition

If all the participants in our annual DX Competition were laid end to end, it would probably be because they were recuperating from another exhilarating session of new countries, massive pileups, and just plain great fun. You too can be one of the horizontal bodies; here's how: W/K and VE/VO stations send signal report and state province to DX; DX stations send signal report plus a 3-digit number indicating power input. (E.g.: KH6BZF DE WA7ISP OE HR 579 ARIZ BK. WA7ISP R 569500 DE KH6BZF K.) Compute your score (see rules following) and send your entry to Hq. **no later than April 12, 1969.** We have brand-new log sheets, summary sheets, and DX checkoff sheets (see cuts) — send for yours *now*, and let us know the approximate quantity of your requirements. Attach comments and photos, and send the works to ARRL Communications Dept., 225 Main St., Newington, Conn. 06111, U.S.A. — and remember, checkoff sheets **MUST** be attached. CU in the pileups!

Rules

- 1) **Eligibility:** Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
- 2) **Object:** Amateurs in the 48 continental United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.
- 3) **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.
- 4) **Entry Classifications:** Entry may be made in either or both the phone or c.w. sections: c.w. scores are independent of phone scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating, log-

DX Restrictions

U. S. amateurs licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference. Cambodia, Indonesia (including West Irian), Thailand and Viet Nam forbid radio communication between their amateur stations and those of other countries. U. S. amateurs should not work HS XU XV YB 3W8 or 8F. Canadian amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan. Prefixes to be avoided are HS JY XU XV YB XW8 3W8 and 8F.

CONTEST PERIODS

Phone		C.W.	
Starts	Ends	Starts	Ends
Feb. 1, 0001 GMT	Feb. 2, 2359 GMT	Feb. 1, 0001 GMT	Mar. 2, 2359 GMT
Mar. 15, 0001 GMT	Feb. 16, 2359 GMT	Mar. 15, 0001 GMT	Mar. 16, 2359 GMT

ging and spotting functions. Multiple-operator stations are those obtaining assistance, such as from spotting or relief operators, or in keeping the station log and records. The use of spotting nets places an entry in the multioperator category.

5) **Contest Periods:** There are four weekends, each 48 hours long; two for phone work and two for c.w.

6) **Valid Contacts:** In the phone section, all claimed credits must be made voice-to-voice. In the telegraphy section, only c.w.-c.w. contacts count. Crossband contacts may not be counted.

7) **Exchanges:**

a) **Amateurs in the 48 continental U.S. and Canada.** C.w. participants will transmit a three-figure number, representing the RST report, plus their state or province. (The latter may consist of an appropriate abbreviation.) Phone participants will transmit a two-figure number consisting of the readability-strength report plus the state or province. *Example:* W6LDD might transmit "579CAL" on c.w., "57 California" on phone.

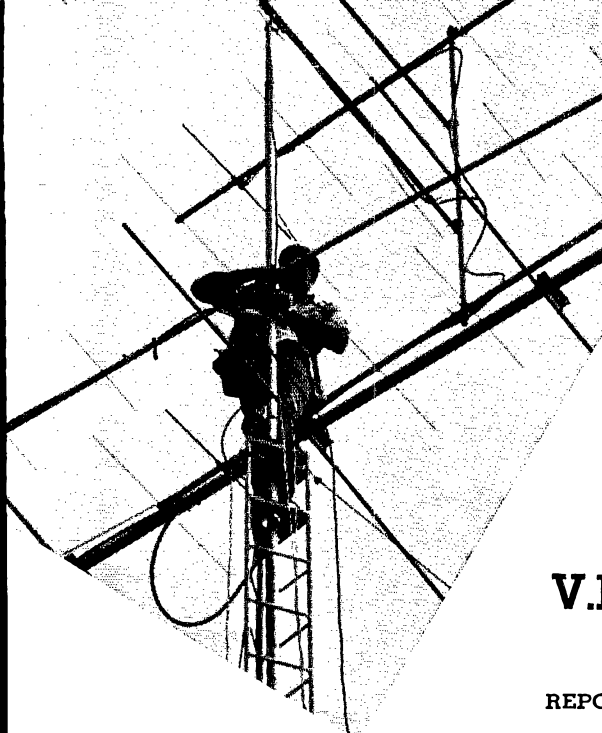
b) **Amateurs outside the 48 continental United States and Canada** will transmit six-figure numbers, each consisting of the RST report plus three "power" numbers; the power indicator will represent the approximate transmitter-power input. Phone contestants will transmit five-figure numbers, each consisting of a readability-strength report and the three "power" numbers. *Example:* KH6IJ, with 150 watts input, might transmit "569150" on c.w., "56150" on phone. If the input power varies considerably on different bands, the "power" number should be changed accordingly. (Note,

ARRL International DX Competition
 Form Sheet 2 of 7
 C.W. PHONE
 CALL PREFIX WAARR..... Separate logs and summary sheets required for each mode.

MODE	STATION	RST	CLASS	TIME	By multioperator band			
					1	2	3	4
W	WAARR	579	CA	10:00				
W	WAARR	579	CA	10:05				
W	WAARR	579	CA	10:10				
W	WAARR	579	CA	10:15				
W	WAARR	579	CA	10:20				
W	WAARR	579	CA	10:25				
W	WAARR	579	CA	10:30				
W	WAARR	579	CA	10:35				
W	WAARR	579	CA	10:40				
W	WAARR	579	CA	10:45				
W	WAARR	579	CA	10:50				
W	WAARR	579	CA	10:55				
W	WAARR	579	CA	11:00				
W	WAARR	579	CA	11:05				
W	WAARR	579	CA	11:10				
W	WAARR	579	CA	11:15				
W	WAARR	579	CA	11:20				
W	WAARR	579	CA	11:25				
W	WAARR	579	CA	11:30				
W	WAARR	579	CA	11:35				
W	WAARR	579	CA	11:40				
W	WAARR	579	CA	11:45				
W	WAARR	579	CA	11:50				
W	WAARR	579	CA	11:55				
W	WAARR	579	CA	12:00				
W	WAARR	579	CA	12:05				
W	WAARR	579	CA	12:10				
W	WAARR	579	CA	12:15				
W	WAARR	579	CA	12:20				
W	WAARR	579	CA	12:25				
W	WAARR	579	CA	12:30				
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W	WAARR	579	CA	13:05				
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W	WAARR	579	CA	14:00				
W	WAARR	579	CA	14:05				
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W	WAARR	579	CA	14:30				
W	WAARR	579	CA	14:35				
W	WAARR	579	CA	14:40				
W	WAARR	579	CA	14:45				
W	WAARR	579	CA	14:50				
W	WAARR	579	CA	14:55				
W	WAARR	579	CA	15:00				

CP-39 (Rev. 68) Each side contains space for 30 QSOs. Printed in U.S.A.

Sample log sheet



As a parting gesture before donning military garb, **K1WHS** came up with a superb 20-grand effort and showed his heels to the whole single-op pack. Dave's station, now dismantled, featured homebrew transmitters of 400 and 1000 watts for 6 meters, 500/1000 watts on 2 meters, and 35 watts on 220 MHz. Antennas: 9L at 72' for 6, a 32L quad at 92' for 2, and 11L at 80' for 220. Well done!

Results, September V.H.F. QSO Party

REPORTED BY BOB HILL,* WIARR

AURORA! It sneaked in on little cat feet Saturday evening (Sept. 7) about 2300 GMT and was still pussyfooting around at 0900, ten hours later. From Oregon to Virginia, QSO Party enthusiasts rubbed their mikes and keys in glee as section totals mounted at a dizzying pace. Two-meter c.w. was the place to be if you really wanted to take advantage of the fine condx: "CQ AU" filled the 144-MHz. airwaves from coast to coast, and 2-meter multiplier totals rivaled, and in some cases exceeded, those on 6.

In the Northeast, multiop **W3KWH** piled up 38 sections on 6 and a phenomenal 34 on 2, including such tidbits as **W5HFV** (Okla.), **W0DRL** (Kans.), **W0LCN** (Minn.), and **W0LFE** (Mo.) via the auroral route. Highest aggregate multiop scores were submitted by **W2JKI** (whose multiplier of 73 was also tops), **W1DC/1** (with the most QSOs — and from *Maine*, yet!), and the aforementioned **W3KWH**. The blistering 20,242 points of **K1WHS** paced the whole contest in the single-op category. Three thousand miles to the west, **W7EGN** worked three KL7s in a row on aurora: **K7VNU** and **VE6OH** got two of 'em and **W7FN** one. **K6YNB/6** doggedly kept at it, with no unusual propagation to help, and wound up just short of 200 QSOs to lead his part of the country; **W6YEP/6**, aided by **K6GSS** and **WB6HIL**, led the multiops. In Canada, **VE2SH** held dominion over all singletons; **VE3SAU** was boss multi.

In the central areas, it seemed to be a matter of lots of sections but a dearth of people to work. Some nice multiplier totals were turned in on 50 MHz. by **K9HMB** (33), **WA8SAJ** (31) and

WA8LRE (30); 144 MHz. Midwesterners were able to compile hefty figures, too: **W8IDU** had 29 sections, **VE3BQN** 26, **W8WEN** 25. As for the rest of the country — hang in there, fellas, your turn is coming!

With all those Northern Lights, the higher bands were left in relative darkness. But **K1PXE/1** got 13 mults on 220, **K1JIX**, **K2ACQ** and **W2JKI** had 11 on 420, and **W2OJ/2** made it to 3 on 1215-and-up. Let's not forget these micro bands: there's multiplier gold there just for a little digging.

In brief, we received 335 logs from 30 sections, with 60 single-operator and 9 multioperator awards to be mailed December 15.

Here's how the participants themselves tell it:

Soapbox

"Very few stations knew how to slope-tune f.m. in." — **K3NYG**. "From my first experiences in a V.H.F. QSO Party a few things have emerged as necessities for contest operation: a v.f.o. (at least on 6), some means of keying the rig (could have worked several sections that I missed during the aurora by that method), higher power, and a better antenna." — **K3RBU**. "Wish the fellows up in W1 would swing their beams down this way — there *are* hams on the v.h.f. bands in Delaware." — **WN3KFF**. "Activity was lower this contest because of the S.N.J. Hamfest, but the conditions were great. The auroral opening really knocked off the sections and the tropo into W1 was also well above par. A good number of sections were worked on c.w." — **WA3ASL**. "Good auroral opening on 6 Saturday night where we worked several VEs, W1s and W8s on c.w. At times there was a lot of DX on c.w. when nothing could be heard on phone." — **WA3ADN**. "Competition was high and stations were many." — **WA3JWL**. "W2JKI has a fantastic signal in Phila." — **WA3FCZ**. "Worked through Friday night to get 432 going, all for one lousy contact (not even our own section)." — **K3YQS/3**. "Why place a time limit on operations? Most of the mountaintoppers are back home shortly after dark, and what is there left to work? Unless *E's* or *F2* propagation exists on 8, the long hours are superfluous. Why not cut it back to 30 hours and

* Assistant Communications Manager, ARRL

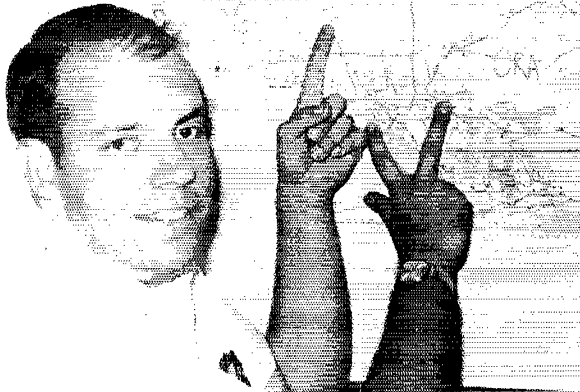
work-all-you-want." — W3LUL. "Contest was well timed; aurora Saturday, tropo Sunday; what more can one ask?" — K3OPB. "Activity on 230 was pathetic; only heard one other station. Usually hear at least 5 sections." — WA3EOP/3. "Terrific aurora — best heard in years. Am not a c.w. operator but jumped in with both feet on key to snag extra sections; enjoyed it and plan to put it to good use in Jan." — W2EIF. "Really a ball on c.w." — W2WGL. "I like the 28-hour time limit." — W3BWU. "Best contest ever! Worked 27 states in 8 call-areas on 144 MHz, 30 states in 8 call-areas on 50 MHz., mostly on aurora. Had about a two-minute-burst m.s. QSO with W5HFV, Okla., on 144 at 1230Z Sunday. This time 2M section totals will closely rival 6M totals. Almost all 6-meter QSOs on a.s.b.; perhaps 1% w.b.f.m. or c.w. Two meters was probably 90% c.w., 10% s.s.b. or w.b.f.m." — W3KWH. "Could have used some s.s.b. gear for strong aurora opening on 6 meters. Managed to work 3 c.w. stations on aurora scatter by keying the mike button on my SR46A!" — K9GHR. "A good chance to get a lot of QSLs." — WN9ZGF. "What's the good of holding the contest before the football season if no one shows up on Sunday anyway?" — WA9WIL. "The aurora Saturday night saved this contest from being as bad a fiasco as last year's. We went like mad for the first six hours, then sat around all day Sunday." — W9YT. "Although activity was quite low in our area, we still had a nice time." — K4QPJ/4. "Too bad the contest conflicted with the Findley, Ohio, Hamfest; otherwise I would have operated in it fully." — K8WKZ. "That aurora certainly saved the day, as the next day was plain nil. Add to that a couple of locals who decided this was a prime time to test out their RATT gear and covered the entire band with birdies!" — W8NOH. "I think that because of the 'wild' aurora on 6 and 2 everyone seemed to stay away from 432 to get those easy multipliers." — WA8VHG. "Except for the aurora, conditions were terrible." — W8IDT. "Next fall we'll beat WA8PIE or bust!" — WA8JXE. "Very good aurora. Wish I could have operated more than 9 hours, but had to go to a hamfest." — WA8LRE. "Conditions on 6 were very good on aurora, and also on Sunday there was a very short Es opening to the southwest." — WA8SAJ. "Good aurora! but days for fixed-frequency operation have already been numbered." — W8WEN. "The aurora was just made for c.w. contacts." — WA8KPN. "My first v.h.f. contest; I had been on the air for a little over a week." — WA8YHN. "Many phone stations were so eager to work sections that they went below 50.1 in doing so." — WA8MTS. "Interesting and fast-moving." — WA8UZP. "A lot of fun." — W8LKY. "Tried to transmit simultaneously on 144 and 220, but my own TV set looked at both incoming signals and mixed them down to Channels 4 and 5." — K2DNR. "Very interesting contest. Looking at the comments about the June contest: those who grumble are very low scorers and snicker at people who put a lot of time and effort and know-how into a contest. That's the name of the game." — W2JKI. "Three weeks after the contest I still had a buzz



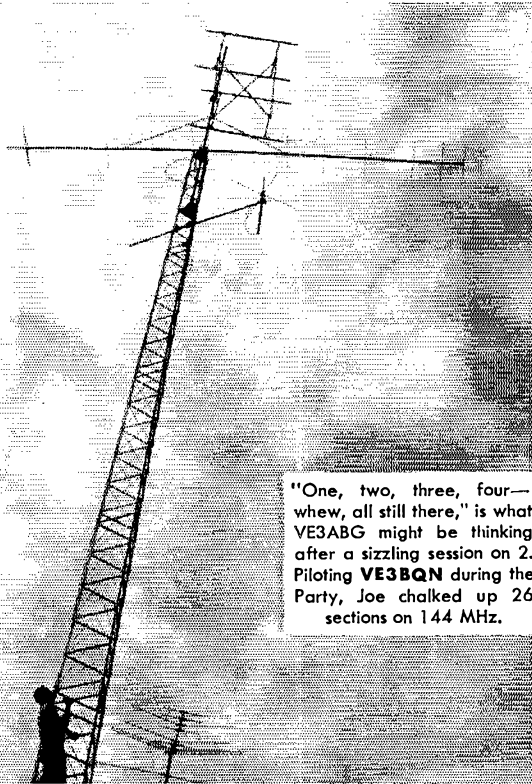
A fine 50-MHz. effort from W7FN turned out to be the top single-band score in the West. Don (formerly W6PUZ) is making a determined effort to stimulate more v.h.f. activity in Washington.

in my ear: could it have been aurora? Highest section total ever on 2." — K2RTH. "Worked all my 2100 points on 2-meter a.m." — WB2ESD. "If only we would use a bit more of the bands, like from 144 to 145." — W2KXG. "In my last hour of operation, heard many 3s, 1s and some 4s, but could not work them because they had finished the contest and were engaged in local ragchews." — WB2GWU. "I do not like the new 28-hour rule, as it leaves the bands pretty dead on Sunday night." — WB2YYV. "Choice of dates showed great foresight — thank you!" — WA2EBT. "Heard reports that we were being heard in W1 area on 1296 but couldn't hear anyone there." — W2OJ/2. "Combination of magnificent location and high power helped us amass our score. Unfortunately, we were not able to spend all our time operating; over 5000 people came up to our tower to see what was going on!" — WB2GKE/2. "Operated 432 for the first time — found it very profitable." — K2DEL/2. "Heard 35 sections during aurora, including NTex, Okla., NMex and La. Wish we could have worked them all!" — W8EKB. "Was on vacation and got home late Saturday night at the very end of the aurora opening." — W9ECV/6. "Aurora produced strong signals here from Montana to New York." — W8UJK. "Made my first Kansas contact but couldn't find anyone in Iowa or further east. You guys should point your beams thisaway." — WA6TTW. "Section totals on all bands were fantastic. This will be the last contest for a while, as we have dismantled the station and stored it away for later use when my brother and I get our military obligations out of the way." — K1WHS. "A lot of stations were operating portable during this Party. They deserve a lot of credit for all the effort and for all the multipliers they provided. Again it was c.w. that brought home the bacon." — W1DZA. "The aurora was fine, but 30 watts a.m. just couldn't make it." — W1DYJ/1. "This 28-hour consecutive operating period is for the birds! It gives an advantage to the multiop stations and gives the single op no chance to sleep. If you had two 14-hour segments, the single op could operate when conditions are good." — WN1IQJ. "Many stations still refuse to believe I'm running only 300 milliwatts carrier output." — W1ENZ. "Da zdravstvuet u.k.v.!" — KL7ELA/W1. "Couldn't ask for better weather. A good time was had by all." — K1PXE/1. "Had a great time despite Murphy. Nice to hear and work W1AW on both 6 and 2." — K1AGB. "Was amazed to hear at least 30 sections on six." — W1QXX. "Hampered by no c.w. on 2." — WA1FCD. "Great to be back on v.h.f.! Worked some d.c. bands while in W8, but can't compare with 6, 2, 220, etc. All 2-meter QSOs were on c.w. — the only way to fly!" — K1OYB. "I think anyone who wants to work the whole contest should be allowed to." — K1FTG. "Seems as though we nearly always have some kind of propagation during those things. Boy, it's hard to keep the 'balanced' part of the Amateur's Code

Solo-banding on 6 with a pair of 4-400s and stacked 5L beams at 60 feet, WA8LRE socked away 30 sections and eased into the top W8 position with plenty to spare — and in just nine hours, too!



Wayne, **K6YNB/6**, ran 175 watts p.e.p. on 6, only 20 watts on 2, had average antennas at average heights—and still managed 198 QSOs, 12 multipliers, and by far the biggest tally from the Wild West. Here he points to three portable locations in three different sections from which he's operated in recent contests. (How 'bout trying Mexico next, Wayne?)



"One, two, three, four—whew, all still there," is what **VE3ABG** might be thinking after a sizzling session on 2. Piloting **VE3BQN** during the Party, Joe chalked up 26 sections on 144 MHz.

Running 5 watts to a Heath HW-30 and a ground-plane, Colorado's **WNJTML** was the one and only Novice entrant west of the Mississippi. C'mon, WNs, there's much fun to be had on 2-meter c.w. during one of these affairs. (Read Soapbox and see.)

during the heat of battle."—**K1ABR**. "Would like to suggest investigation into the possibility of a 2-hour addition to the 2N-hour period for those single-ops who attend church."—**WA1GFG**. "Best contact on aurora: **VE4MA**."—**K1GYT**. "It was a big thrill to give many stations their first Vermont QSO, and we only regret we weren't able to work everyone who called us."—**K4GGI/1**. "Aurora Sat. night really made everything worth while. We sweated Ontario, only to work Hoeks of them during a brief tropo opening over Lake Ontario Sunday afternoon."—**WA2PTS/1**. "The 220- and 432-MHz. bands alone were busy enough to occupy almost the full contest period enjoyably."—**K1JIX**. "There was at least one portable on every sizeable bump in New England and New York State, from the sound of 6 and 2 from my favorite portable site: Mt. Everett, in the s.w. corner of Massachusetts."—**WIHDO/1**. "The three Alaskans appeared to be undistorted trans-aurora."—**W7EGN**. "Most exciting event was hearing **W7FN** signing with **KL7FNL** and not being able to hear the **KL7!**"—**W7JRG**. "In spite of a low score we thoroughly enjoyed working the contest from 9500-foot Steen's Mt. in s.e. Oregon (an 800-mile round-trip). Wx was great and signals good, but there just weren't very many people on."—**K7AUO/7**. "Boy, what a difference lack of *E*s makes. Contacts are pretty scarce from this part of the country. The aurora session of Saturday evening was quite a thrill for this displaced California. Called **CQ** on c.w. and raised **KL7FNL** at 0714Z. Doing my best to generate more enthusiasm in the gang around this area."—**W7FN**. "Aurora first observed 072312 GMT; first contact **VE6OH**; my log entries give the rest of the details."—**K7VNU**. "Noticed increased activity on 220 and 432."—**WA7-EHE/7**. "Just to show **KH6BZF** that a v.h.f. contest in Hawaii can be won having worked more than one station!"—**KH6EQF**. "Due to temp. inversion, signals from **NJ** were well over the usual contest reports of 'S9 OMI.' Sent log sheets to **WATGXM** in Carson City, much to the delight of the Pacific Division boys as Hal had 6 sections from the Nevada side of the Sierra."—**W6DOR**. "About the normal amount of activity except for the scarcity of hill-toppers. Some good mountains went begging this year."—**W6TEE**. "We didn't get an opening on 50 MHz., and this was a little disappointing; we could have had a much better score, as we had an excellent location."—**W6KDJ/6**. "Such lousy conditions! The aurora did not extend this far south."—**K4GL**. "Surprised to hear so many brass-pounders on."—**WA4ZSF/4**. "No skip equalled no multipliers equalled very few points."—**WA0PIZ/6**. "Lots of scatter and noise—few locals—hardly worth the time."—**K4WHW**. "My thanks to the *E*'s OMs for their patience with a newcomer."—**WB4KUN**. "We almost had Cuba in a c.w. QSO on 2 meters but couldn't make it two ways. Darn, we could have used the multiplier with so few stations on locally and the band closed."—**WB4HML/4**. "Except for a heated race among local Novices there was very little contest activity here. As a result, about three-quarters of my QSOs consisted of raising a non-participating station, asking him his QTH, and then telling him what ARRL section he lived in!"—**K6YNB/6**. "Slim pickings."—**WA6FJJ**. "Two-meter conditions consistently good."—**WB6TFC**. "Recommend that the high-band multipliers apply both to contact and section."—**K6OKC**. "Made contacts via m.s., iono-scatter, aurora, tropo and ground-wave. I noted no *E*s."—**W5WAX**. "Condx poor, but happy to work Ark. on ground-wave for first time with my 15 watts s.s.b."—**K5CYK**. "Imagined the utter frustration of having a 90%-completed 2-meter kw and not being able to get out on aurora with 20 watts."—**VE2DFO**. "432 very inactive in this area, possibly due to the aurora on 144."—**VE3EVW**. "The c.w. notes were from coarse aurora tone to bursts of T9. The **KL7**s were worked s.s.b. with as clear transmissions as off *E* except for the last few minutes. Absolutely no stations from the east of me came through."—**VE6OH**. "Activity better than expected. Working **K7AUO/7** in the s.e. corner of Oregon (550 mi.) made the contest for me."—**VE7BQH**.

SCORES

In the following tabulation, scores are listed by ARRL divisions and sections. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multiplier scorer receives a certificate award. A single asterisk indicates Novice award winner; two asterisks indicate Hq. staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and hands used. A represents 50 MHz; B, 144 MHz.; C, 220 MHz.; D, 420 MHz.; E, 1215 MHz. and above.

ATLANTIC DIVISION

Delaware
 W3CGV 2128-6R-28-ABCD
 WA3HWC 320-32-10-B
 K3NYY 230-25-10-AB
 K3RBU 110-22-5-A
 WN3KFF 4-3-1-B

Eastern Pennsylvania
 W3ARW 4598-9R-3R-BCD
 WA3ASL 2948-134-22-AB
 WA3AEO 2740-137-20-AB
 WA3ADN

1872-116-17-AB
 W3ETB 1328-84-16-AB
 WA3IOB 1275-75-17-AB
 WA3HIT 1035-115-9-AB
 WA3DEQ 800-80-10-A
 WA3JWE 780-65-12-AB
 WA3FCZ 160-40-4-A
 K3MTK/3 (6 oprs.)

18,524-421-44-AB
 K3CSG/3 (8 oprs.)
 5874-167-33-ABC
 W3SK/3 (5 oprs.)
 4524-74-26-AB
 K3YQS/3 (4 oprs.)
 3116-163-19-ABD
 W3LP (W3s GFN JUZ,
 WA3FB)

2730-130-21-AB

Maryland-D.C.

W3LUL 2781-103-27-AB
 K3OPB 1558-82-19-B
 WA3EEN 968-88-11-B
 W3MNE 714-51-14-AB
 W3GN 658-47-14-B
 WNJJHE/3
 462-66-7-B
 W3PGA/3 (7 oprs.)
 12,742-267-46-ABD
 WA3JGI (K3s NXU VIR,
 WA3JGI)
 4082-156-26-ABD

WA3EOP/3 (WA3s EOP
 FCN) 2054-158-13-AB
 K3ARN (4 oprs.)

1364-62-22-B
 WN2HBL/3 (WN2s EWP
 HBL) 124-31-4-B

Southern New Jersey

W2EIF 11,330-181-55-ABCD
 K2BWR 3360-96-35-AB
 WB2WVC 468-52-9-B
 WB2YEF 240-30-8-A
 W2ZQ (WB2LGL, K3CPF)
 1770-285-18-AB

WB2UIM (WB2s PWI UIM)
 10-5-2-AB

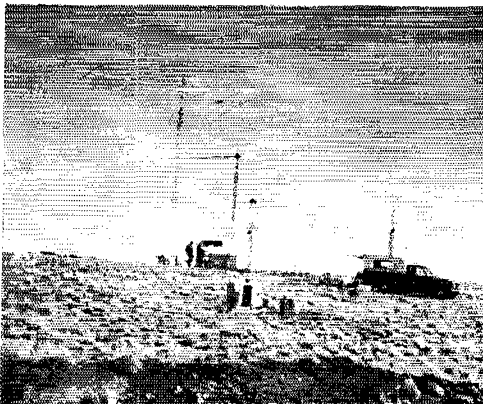
Western New York

W2CNS 12,780-198-60-ABCD
 WA2TEY 1620-97-18-AB
 K2SJB 990-54-18-ABC
 W2WGL 969-51-19-B
 WB2KYQ 912-57-18-B
 K2ACQ 616-28-11-D
 K2PKK 450-37-15-AB
 WA2KND 360-40-9-AB
 WA2UJM/2 (K2ODL, WA2s
 CJK UJM)
 15,517-256-59-ABC

W2OW (15 oprs.)
 8668-190-44-ABC
 WB2LZD/2 (WB2s BBS
 LZD) 1059-88-12-A
 WB2LXS/2 (WB2s MXS
 MXT) 200-40-5-A

Western Pennsylvania

W3BWJ 2208-96-23-AB
 K3QMJ 1702-74-23-B
 W3DJM 140-44-10-A
 WA3HTD 240-48-5-AB
 WN3KQA 132-44-3-B
 WA3KYC 129-43-3-B
 W3KWH (5 oprs.)
 34,920-485-72-AB



The splendid isolation of 9500-foot Steen's Mt., Oregon, provided this setting for the **K7AUO/7** gang: K7s BEU IUN TTK TPO WKT, W7s ADV HUY RPT SMV VOK and VRM.

K3HKK/3 (7 oprs.)
 18,144-277-63-ABCD
 K3JRO/3 (6 oprs.)
 3816-159-24-AB

Indiana

WA9QXZ 400-40-10-A
 WA9UUE 186-31-6-A

Wisconsin

WA9WIL 1710-95-18-A
 WA9MCC 407-37-11-B
 WA9EJU 72-12-6-A
 W9KIH 6-3-2-AB
 W9YT (6 oprs.)
 7872-180-41-ABE

CENTRAL DIVISION

Illinois

K9HMB 6930-210-33-A
 WA9YR (G3PAC, opr.)
 1170-117-10-AB

K9CHR 908-151-6-AB
 W9GWT 406-58-7-AB
 WA9FXH 360-72-5-B
 WN9YXZ 312-78-4-B
 WA9RLJ 300-75-4-AB
 WA9ZHF 201-67-3-B
 W9DIZ 192-48-4-A
 K9VKP 88-44-2-B
 K9DTB 44-22-2-AB
 K9DNW 32-32-1-A
 WN9ZGF 28-28-1-B
 WA9GUK 11-11-1-A
 K9YHB (K9RHY, WA9s
 EJJ QH)
 1722-123-14-AB
 WA9QAD (WA9QAD,
 WN9YTX)
 153-51-3-B

DAKOTA DIVISION

Minnesota

W0QIN 658-41-16-A
 WA9MCC 344-31-11-A
 W0LCN 240-20-12-BD
 W0LER 220-19-11-BD

DELTA DIVISION

Louisiana

W5MCC 161-32-5-ABD
 W5JFB 24-8-3-B

Mississippi

W5AO 136-17-8-B

Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections					
20 15 4 3 2						20 15 4 3 2						20 15 4 3 2						20 15 4 3 2					
Band (MHz.)						Band (MHz.)						Band (MHz.)						Band (MHz.)					
K1ABR	18	20				WA2PTS/1*		21				W2WGL		19				W8AEC			23		
K1AGB	21	22	10			K4GGI/1*	10	12	8	7		WA2WZP	25	14				WA8BCA/8*	26	15		4	
W1ALE	2	3	7	5		K2ACQ					11	K3ARN*	25	22				W8CCI*	29	10			
W1AW	17	20				W2AQT		22				W3ARW	22	9	7			W8IDT			23		
W1AZK		21	6			K2ARO		15				W3BWU	21	5				W8IDU			29		
K1BUB/1*	21	15	11			K2BWR	22	13				W3CGV	18	5	1	4		WA8LRE	30				
W1DC/1*	26	18	9	10	2	W2CNS	27	24	4	5		K3CSG/3*	12	13	8			K8LZF			16		
W1EUF	21	17		6		K2DEL/2*	22	17		4		K3HKK/3*	30	25	4	4		WA8PIE			22		
K1GYT	28	7				K2DNR	9	19	12			K3JRO/3*	20	4				WA8SAJ	31				
W1HPM*	14	11	7			WA2EBT		22				W3KWH*	38	34				W8WEN			25		
K1HTV		24				W2EIF	22	19	8	6		W3LUL	7	20				K8WKZ	29	6			
WA1IED*	13	19				WB2KJ/2*	18	20				K3MTE/3*	25	19				K9HMB	33				
WA1HOX*	23	22	4		1	WB2FXB		20				K3OPB	25	19				VE2RM*			22		
K1JX	8	9	11			WB2GKE/2*	24	22	2	7		W3PGA/3*	25	17	4			VE2SH			25	19	6
W1JO	9	15	7			W2JKI*	23	22	12	11		K3QMX/3		23				W8WBR	20	18			6
WA1JTK	17		6			WB2KYQ	16					WA4CGA	14		3			VE3BQN			26		3
W1LMZ	17					W2OJ/2*	20	19	8	5	3	K4QI*		6		6		VE3CUA	25	4			
K1PXE/1*	16	22	13			W2OW*	22	17	5			K4SUM	9	15		6		VE3DSQ			18		
W1QVF		4		10		K2RTH	25	24	11			W4VZR	15					VE3EVW			16		2
W1QXX	16	9	6			WB2SIH	10	17				W4ZJA/4*	10	7		3		VE3SAU*	26	9			
K1WHS	25	24	9			W2TND	16	20		1		WA4ZSF/4*	27	2									
K1YLU/1*	22	13	9	8		WA2UJM/2*	28	27	4			WB6KAP	9	6	1	3							
K1YON			11	5		K2VMR*	32	20				K6OKC		7		4							
W1YTW	5	15	6			WA2VTR				3	2												

*Multiplier Station

Tennessee

WA4CGA 2080-80-26-ABD
 WB4HLH 16-8-2-A
 WA4YCL/4 WA4s HCQ
 PWO YCL)
 1695-113-15-AB
 WA4ZTH (WA4s ZTH ZWA
 ZZL) 308-14-7-AB
 W4ODR (WB4DFE
 WA5ERP, WA5FLK)
 259-37-7-AB

**GREAT LAKES
 DIVISION**

Kentucky
 WA4CQG 650-50-13-A
 WA8TYF/4 459-27-17-AB
 K4QPJ/4 (K4s QPJ WYN)
 2162-94-23-AB
 W4VQA (4 oprs.)
 1710-90-19-AB

Michigan
 K8WKZ 4165-119-35-AB
 W8LDU 2429-101-29-B
 WA8PTE 2552-116-22-B
 W8NOH 2100-100-21-AB
 W3TBF/8 1634-86-19-A

WA8REM 1488-93-16-AB
 WA8VHG 1440-71-20-ABD
 W8IDT 1288-56-23-B
 K8HLEG 980-70-14-B
 K8LZF 512-32-16-B
 K8CBN 363-30-11-A
 WA8STV 144-36-4-AB
 W8NYVW 42-14-3-B
 WA8JXE (WA8s JQA JXE,
 WB8BYJ) 312-52-6-B

Ohio

WA8LRE 6270-209-30-A
 WA88AJ 4371-141-31-A
 W8WEN 2475-99-25-B
 WA8KPN 1320-88-15-A
 WA8STX 672-86-7-AB
 WA8TTS 623-89-7-AB
 WA8LKN 248-31-8-AB
 WA8YHN 117-39-3-A
 WA8MTE 110-22-5-A
 WA8YOR 80-40-2-A
 W8NYXU 52-26-2-B
 WA8UZP 10-10-1-A
 W8NAFP 8-10-10-1-B
 WA8BCA/8 (5 oprs.)
 15,120-33-45-ABD
 W8CCJ (5 oprs.)
 12,714-326-39-AB
 WA8VVP (K8HIF, WA8VVP)
 380-76-5-A
 W8LKY (5 oprs.)
 360-30-12-AB

DIVISION LEADERS

Single Operator

W2CNS
 K9HMB
 W6QIN
 WA4CGA
 WA8LRE
 WA2WZP
 W0PFP
 K1WHS
 W7FN
 WB6KAP
 K4SUM
 K1WYS/0
 K4WHW
 K6YNB/6
 W5WAX
 VE2SH

Atlantic
Central
Dakota
Delta
Great Lakes
Hudson
Midwest
New England
Northwestern
Pacific
Rocknoke
Rocky Mountain
Southeastern
Southwestern
West Gulf
Canadian

Multioperator

W3KWH
 W9YT

 WA4YCL/4
 WA8BCA/8
 W2JKI
 W0EKB
 W1DC/1
 WA7EHE/7
 W6YEF/6
 WA4ZSF/4
 WA0PHZ/0
 WB4HML/4
 W6IAK/6

 VE3SAU

HUDSON DIVISION

Eastern New York

K2DNR 6680-143-40-ABC
 WB2SHH 3024-112-27-AB
 K2ARO 1590-106-15-B
 WB2FXB 1440-72-20-B
 WA2KUL 580-29-20-AB
 WA2VTR 180-15-5-DE
 WB2WVY 6-2-1-E
 W2JKI (4 oprs.)
 43,362-555-73-ABCD
 WB2FKJ,2 (5 oprs.)
 11,172-294-38-AB

New York City-Long Island

K2RTH 13,320-205-60-ABC
 WB2YVZ 3486-166-21-AB
 W2ESDZ 2100-150-14-B
 WA2EPX 1292-76-17-AR
 WA2EUB 784-47-14-ABCD
 K2RLW 739-81-9-AB
 W2KXG 621-69-9-B
 WB2UZU 459-51-9-B
 WB2GWU 405-45-9-AB
 W2TUK 371-53-7-B
 WA2DSL 325-65-5-B
 WA2DTP 250-50-5-B
 WB2DJJ 180-20-9-A
 WB2YV 180-45-4-B
 W2NDQK 42-21-2-B
 K2VMR (9 oprs.)
 20,696-398-52-AB
 W2VA/2 (WB2s DBA DIN
 MZE) 8190-270-30-ABC

Northern New Jersey

WA2WZP 13,689-351-39-AB
 W2TND 7437-201-37-ABD
 WA2EBT 3454-157-22-B
 W2AQT 2596-118-22-B
 WA2BLB 1022-73-14-AB
 WB2LDE 416-52-8-B
 W2CVW 220-11-AB
 WA2CUE 92-23-4-B
 W2NEBW 54-18-3-B
 W2OJ/2 (7 oprs.)
 31,240-510-55-ABCDE
 WB2GKE/2 (11 oprs.)
 29,755-512-55-BCD
 K2DET/2 (9 oprs.)
 19,006-435-43-ABD
 WB2WVW (4 oprs.)
 4084-178-23-AB
 WB2MFD/2 (9 oprs.)
 3066-146-21-AB
 WB2DME/2 (WB2DME,
 WN2s GHO GLT)
 441-49-9-AB

MIDWEST DIVISION

Iowa

W0PFP 306-26-15-A
 W0EKB (K0MBC, W0EKB,
 WA9ROM) 810-54-15-A

Kansas

W9ECV/0 264-22-12-A

Nebraska

W0UJK 187-17-11-A
 WA0TTW 40-20-2-B

**NEW ENGLAND
 DIVISION**

Connecticut

K1WHS 20,242-338-58-ABC
 W1AW (K1ZND, opr.)**
 8325-226-37-AB
 K1HTV 3408-142-24-B
 W1DZA 2760-138-20-AB
 W1AHUE 1702-74-23-AB
 W1DYJ/1 1494-83-18-AB
 W1HSD 979-89-11-B
 K1YON 396-28-16-CD
 K1EKK 804-67-12-AB
 W1QVF 700-50-14-BD
 W1LIQJ 450-50-9-B
 W1ENZ 423-47-9-B
 W1IJP 26-13-2-B
 K1PXE/1 (9 oprs.)
 24,735-445-51-ABC
 W1IIOX (8 oprs.)
 14,900-290-50-ABCD
 W1HED (4 oprs.)
 4544-142-32-AB
 K1AIU/1 (K1AIU,
 W1HXY) 3310-150-22-AB

K1TKJ (K1s PUG TKJ)
 2375-125-19-A
 WA1GTP (WA1s EDJ GTP)
 253-20-11-ABC
 WN1JYU/1 (4 oprs.)
 166-31-6-B
 WA1HOL (WA1s HOL JCK)
 56-14-4-AB

Eastern Massachusetts

K1AGB 10,750-182-53-ABC
 W1EJW 5140-174-44-ABD
 W1QXN 2945-95-31-ABD
 W1ADFP 2185-115-19-AB
 WA1FCD 1577-83-19-AB
 W1DOM 1095-73-15-AB
 W1LMTZ 193-29-17-B
 WA1ETC 370-37-10-AB
 WA1HKK 231-33-7-B
 WA1GRD 180-30-5-A
 W1MX (WA2LOY, opr.)
 154-22-7-BC
 W1CTR/1 130-26-5-B

Maine

W1YTW 2603-100-26-ABC
 K1OYB 555-29-18-ABC
 W1GKJ 350-25-14-A
 W1DC/1 (13 oprs.)
 41,730-586-65-ABCDE

New Hampshire

W1JJO 6231-183-31-ABC
 WA1JTK 2300-89-23-AD
 W1AZK 1916-27-7-BC
 W1ALE 765-25-17-ABCD
 W1MAS 630-42-15-AB
 K1FTG 128-16-8-AB
 WA1DC 100-20-5-A
 W1HFM (6 oprs.)
 8128-241-32-ABC

Rhode Island

K1ABR 5282-139-28-AB
 WA1GFG 4136-188-22-AB
 K1TPK 3586-163-22-AB
 K1JSG 611-47-13-AB
 W1REK 315-35-9-AB
 W1CPC 210-30-7-A

Vermont

K1GYT 6346-167-38-AB
 K4GGV (K4GGH,
 WA5IO) 13,120-121-37-ABCD
 WA2PTS,1 (WA2s KZV
 PTS) 3906-186-21-B

Western Massachusetts

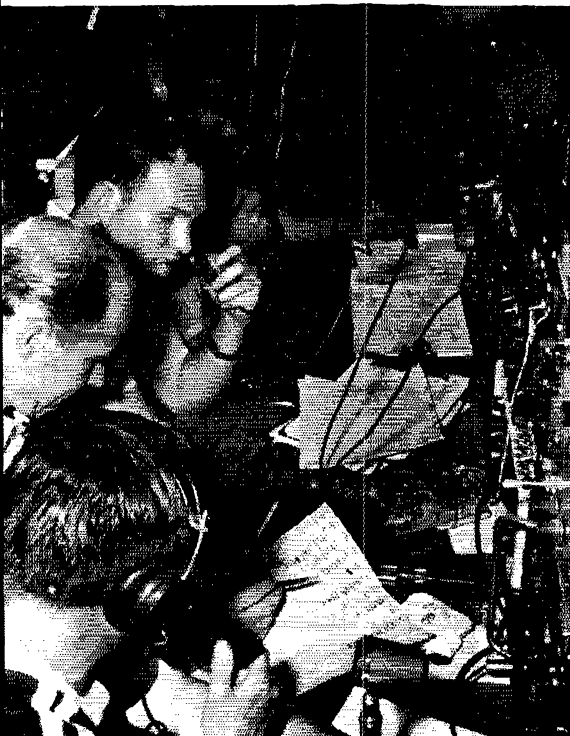
WA1HHN 3640-130-28-AB
 K1JIX 3052-62-28-BCD
 K1ULZ 1078-77-14-AB
 W1UWX/1 297-27-11-A
 W1HDQ,1** 225-25-9-AB
 W1UCB 200-20-10-AB
 W2NG/1 06-12-8-A
 W1TTL 35-7-5-A
 K1YLU/1 (10 oprs.)
 22,672-400-52-ABCD
 K1UBJ/1 (6 oprs.)
 11,139-211-47-ABC
 WA1JVS/1 (K1JVS,
 W1NBT, WA1JVS)
 1378-199-22-AB

**NORTHWESTERN
 DIVISION**

Montana

W7EGN 150-25-6-A
 W7JRG 56-8-7-AB

Oregon
 K7GWE/7 670-67-10-ABC
 K7JZL/7 552-69-8-AB
 W7TYR 205-39-5-ABC
 WA7AWJ 96-24-4-AB
 K7AUO/7 (1 oprs.)
 270-27-10-AB



W2JKI & Co. ground out the number-one score (43,362) and the biggest overall multiplier (73) in the Party. (Front to rear) WA2DND, WB2VLR, WA2JWO and W2JKI are observed methodically adding points to the score; other ops were K2AXX, W2DEG, WA2s SPL VGA VRN and VRG.

QST for

These guys aren't really as ferocious as they look, but their signals are. Hardly a v.h.f. contest goes by without big scores from some or all of this sextet: (left to right) K2RTH, K2HLA, W1VTU, W1MEH, W1JSM and K1ABR. Manning the camera was host K1HTV, who's been known to work a few himself.



Washington
 W7FN 923-71-13-A
 WA7BTG 320-40-8-AB
 K7VNI 252-36-7-A
 K7YMW/7 22-11-2-A
 WA7EHE/7 (K7A IEY MQF,
 WA7EHE)
 464-58-8-AB

PACIFIC DIVISION

East Bay
 WA6BGG/6
 190-38-5-B

Hawaii
 KH6EQF (K7DTH, opr.)
 56-28-2-AB

Nevada
 WA7GXM 90-15-6-A

Sacramento Valley
 WB6NTL 384-45-8-AC
 W6DOR 216-36-6-A
 WA6CXB 135-27-5-B
 W6TEE 92-23-4-ABD
 W6KDJ/6 (K6TMIW,
 W6KDJ, WA6RUQ)
 726-64-11-ABC

San Joaquin Valley
 WB6UYG 468-36-13-AB
 W6YKS 50-10-5-AB
 WB6UHK 2-2-1-A
 W6YEP/6 (K6GSS, W6YEP,
 WB6HIL)
 2091-123-17-AB

Santa Clara Valley
 WB6KAL 1254-61-19-ABCD
 WB6CKT 890-89-10-AB
 WB6WLE/6 (4 oprs.)
 215-43-5-B

ROANOKE DIVISION

North Carolina
 K4YYJ 324-27-12-B
 K4DFI 51-17-3-B
 K4GHR 51-17-3-B
 K4PXU 36-12-3-B
 W4BNU 34-12-2-B
 W4PAR/4 (4 oprs.)
 2046-93-22-AB
 K4GHR/4 (K4S DFI GHR)
 75-15-5-B

South Carolina
 K4GL 252-18-14-AB

Virginia
 K4SUM 4588-129-31-ABDE
 K4QIF 1160-58-20-B
 W4VZR 825-55-15-B
 W4FJ 324-17-12-BD
 WA4ZSF/4 (WA4S LPR ZRP
 ZSF)
 4872-168-29-AB
 W4ZJA/4 (8 oprs.)
 2280-108-20-ABD

West Virginia
 W8AEC 1748-76-23-B
 K8WVP 403-31-13-AB
 W8SP/8 (12 oprs.)
 360-45-8-AB

ROCKY MOUNTAIN DIVISION

Colorado
 K1WYS/6 200-50-4-AB
 WN0TMI (8 oprs.)
 WA0PHZ/6 (WA0RFA,
 WN0S VFO VGH)
 80-40-2-AB

Regarding the contest operating period, which do you prefer:

- 1) The present 28-consecutive-hours method, or
 - 2) Two segments of 14 consecutive hours, or
 - 3) Another way?
- PLEASE LET US KNOW! VOTE TODAY!**

New Mexico
 W5IXR/5 22-11-2-AB
 Utah
 K6DLY/7 3-3-1-B

SOUTHEASTERN DIVISION

Alabama
 K4WHW 87-29-3-A

Eastern Florida
 WA4VYP 34-34-1-A
 W4OJU 32-32-1-A
 WB4KUN 22-22-1-A
 WB4HIP** 21-21-1-A
 WB4HMI/4 (WB4S FTE
 HMI JIM)
 102-51-2-AB

Georgia
 W4ISS 12-4-3-AB
 K4YZE 10-10-1-B

SOUTHWESTERN DIVISION

Arizona
 WA7JSB 14-14-1-A

Los Angeles
 K6YNE/6
 2376-198-12-AB
 WB6PKA 1610-115-14-AB
 WA6FJJ 136-34-4-B

Santa Barbara
 K6OKC 948-86-11-BD
 WB6YTI 200-50-4-B
 WILXE/6 72-12-6-A

WEST GULF DIVISION

Northern Texas
 K6IVB 180-36-5-A
 W5BWV 38-18-2-A
 W5WJ 9-9-1-A

Oklahoma
 W5WAX 450-30-15-AB
 WA5OUU 105-35-3-AB
 WA5TVY 58-29-2-AB
 W5LOW 34-17-2-AB
 K6CYK 4-2-2-A

Southern Texas
 WA5TXI 186-31-6-A

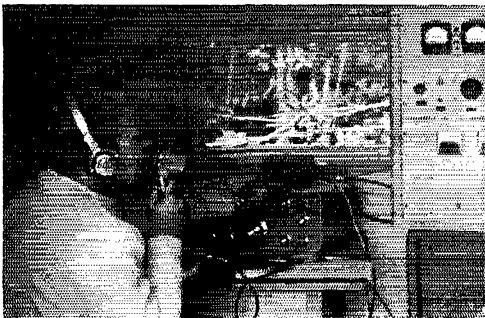
CANADIAN DIVISION

Quebec
 VE2SH 10,100-194-50-ABD
 VE2DFO 216-18-12-A
 VE2BAM 9-9-1-A
 VE2RM (4 oprs.)
 3982-181-22-B

Ontario
 VE3CUA 4756-164-29-AB
 VE3BPR 4576-93-44-ABD
 VE3BQN (VE3ABC, opr.)
 4147-134-29-BD
 VE3DSQ 1764-98-16-B
 VE3GAF 630-42-15-A
 VE3EVW 540-30-18-BD
 VE3DNR 408-68-6-B
 VE3CWN 160-40-4-B
 VE3AQJ 36-18-2-B
 VE3ACT 38-15-2-B
 VE3SAU (7 oprs.)
 5005-143-35-AB

Alberta
 VE6OH 144-24-6-A

British Columbia
 VE7XF 128-32-4-A
 VE7BQH 84-21-4-B1
 VE7BNO (VE78 BDJ BNO)
 72-18-4-RD



From the shack atop Rigaud Mt., VE2RM (multiopped by VE2s ALE BU DEA and ZA) cut a 22-section swath on 144 MHz. VE2BU is depicted tuning the SB-401 driving a pair of 4CX250Bs to a 50'-high Long John.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

The Case For Belonging

THE above is the title of a leaflet issued by the League for distribution among non-members, purpose: to point out the advantages of belonging to the League and the local amateur radio club. But there is also a strong case to be made for belonging to some amateur radio organization specifically set up for public service in the interest of both public benefit and the preservation of amateur radio as a service and as a hobby.

Statistics compiled in past years have indicated that about 50,000 amateurs participate in public service *operating* aspects of amateur radio. Most of these participate only in a "token" way—that is, enough to be able to say they take part, but not enough to do any more than add a unit to a statistic. This 50,000 represents approximately 20% of the amateur population. If we can assume that half of the amateur population is inactive, and therefore not really to be considered, then 50,000 would represent 40% of *active* amateurs. Only about 10% of these are really interested in active participation in public service activities, and only about 10% of this 10% is interested in assuming leadership roles. Boiling this down to finite numbers, this means that 5,000 amateurs are now doing the bulk of amateur radio public service work and being led by 500. These data are very rough estimates, but they hit close enough to the mark for illustrative purposes.

Illustrative of what? Just the point we are trying to make: that *not nearly enough* amateurs belong to amateur radio activity groups that even remotely perform a public service. Not enough, that is, to make an appreciable dent in the one phase of amateur radio which is mentioned *first* in the "Basis and Purpose" section of the regs. This first paragraph in the regs encompasses our ARPSC (including AREC, RACES and NTS) and the many and various "Independent" amateur groups who handle traffic and prepare for emergency operation as amateurs on the amateur bands. We want to talk more about this in a moment.

But first, let's take a look at the other four paragraphs of the "Basis and Purpose" section of the regs. Paragraph (b) refers to "continuation and extension" of amateurs' "advancement of the radio art." Paragraph (c) points to much the same thing in terms of "encouragement and improvement" through the FCC rules. Paragraph (d) refers to the existing reservoir of

*Communications Manager, ARRL.



K9EFY, seated, and WA9PYG were on hand at Flora, Ind., to help with communications for the Powder Puff Derby, September 2. Also active were K9KTB at another pylon for the ladies airplane race, and W9EHE who was in charge of communications for the race.

experts in both operating and technical fields. Paragraph (e) points up the value of DX operation.

All seem slightly vague, except that first point, which is *very* specific in defining "the value of the amateur service" as "a voluntary noncommercial communication service" and especially mentions emergency communications.

What, you may ask, has all this to do with "belonging"? Well, simply this: *Do* you belong to that part of the amateur fraternity that renders these communications services to the public? And if so, do you belong to that group in which you are best qualified to render service? If not, what do you want of amateur radio, what are you doing with your license, what is your "basis and purpose" for being an amateur? All of us have a reason for doing what we do. What's yours? Do you really rate a space on the band for what you are doing?

In an Emergency and Traffic Bulletin written in 1953, an attempt was made to evaluate and analyze some of these factors, on the basis of "amateur radio fun versus duty and responsibility as an incentive for the things we do with our hobby."

"Again and again," so goes this thinking, "we are told that we are going about our emergency and traffic organizing the wrong way because we put too much emphasis on organization, system and our obligation to perform a service,

and not enough on having fun and *making it fun.*"

We can think of several networks that are heavily populated by amateurs for just this reason, and this reason alone — having fun. To all outward appearances, these networks are doing their job for amateur radio and their participants are thoroughly enjoying it at the same time. The public doesn't appreciate the difference, so why should we go all out to emphasize efficiency, discipline and proper procedure at the sacrifice of camaraderie and fun?

The values inherent in performing a service are so many and so varied that it is difficult to meet this question squarely. We think the answer resolves mainly around the *actual service performed*. The net which emphasizes efficiency and sticks strictly to business inevitably is capable of performing the greater service and attracts as participants mainly those operators who derive their greatest satisfaction (fun) out of using their operating skill, out of knowing they are doing something useful (service) and out of association with other operators (fraternality) with like incentives. There is no fraternity so close-knit as one whose members not only enjoy each other's company but are proud of themselves, each other and their organization in a service performed.

The case for belonging revolves about your particular emotional needs. There is room for and need for both types of operators and nets — the fun-seekers and the dedicated zealots. It is far better for an operator to be associated with a net partly devoted to service, for social or other reasons, than not to be associated with the service aspect of amateur radio at all. Just between us amateurs, however, no one is kidding anyone as to who is performing the greater service.

Got an hour a week to spare? Join a net, do your part. Don't let anybody say that you are a parasite enjoying your amateur radio because someone *else* is doing what we have to do to keep it. — *W1N1M*.

Diary of the AREC and RACES

On June 13, Tracy, Minn., was stricken by a tornado whose high winds caused heavy damage in business and residential areas. Less than an hour after the tornado first touched down, amateurs were being organized to furnish communications for the stricken city. *WA0PGC* set up the control center at the local hospital, from which contact to the outside was made. *WA0NTM* coordinated the work of amateurs and *CBers* in the communications emergency. — *WA0NTM*.

NE1DAN called, August 5, on the monitored frequency of the West Coast Amateur Radio Service, requesting aid in obtaining medical advice for an ill person located in a remote part of Baja California. Eventually arrangements were made for the ill party and a doctor to get together. — *WB61ZF*.

VE2ALE reports several instances in which amateurs in Quebec aided communications at



The Chesapeake ARC manned an amateur radio exhibit at the Maryland State Fair August 26 through September 4. *W3JGN* (1.) Public Relations Chairman for the Club discusses a minor problem with *WA3IPB*.

automobile mishaps.

On September 2, *VE2BOQ* was mobiling on the TransCanada Highway when he came upon a serious accident ten miles west of Montreal. Using the *VE2MT* repeater, he called *VE2s DEA* and *OHII*. The Quebec Provincial Police were called and a cruiser was dispatched to the scene of the accident.

VE3CAU/m, en route from Montreal to his home in Chrysler, Ontario, came across an accident on highway 401 on September 3. Using the *VE2RM* and *VE2MT* repeater nets, a call was phoned to *VE3GLJ*, who took all the details and relayed the information to the police, who sent a car to the accident.

On September 5, *VE2ALE* came across a truck parked so as to obstruct traffic in the high-speed passing lane of the TransCanada Highway. *VE2BOP* was called via *VE2RM* and the police were notified. — *VE2ALE, SEC Quebec*.



The funnel cloud that struck Tracy, Minn. June 13. See "Diary" for details. How would you like to see this coming at you?



Members of the Richland (Wash.) ARC installing antennas prior to the running of the Atomic Cup Boat Races. K7VNV took the photo.

An error was made in the caption of the October *QST* cut showing WA7AEL receiving an award from the Department of Health, Education and Welfare. Presenting the award was James G. Terrill, Jr., Director, National Center for Radiological Health.

On July 21, members of the Richland (Wash.) Amateur Radio Club provided communications for the third running of the Atomic Cup Hydroplane Races. Six-meter f.m., with a repeater on 450 Mc., was used, mainly because of the lessened effects of severe ignition noise on the f.m. equipment. A total of more than twenty amateurs participated in the event, using twelve mobile or portable units. — *W7OEB*.



WA6PCY at the San Diego "Bring 'Em Back Alive" headquarters. This operation was representative of several which took place over the Labor Day holidays.

On July 30, the Nebraska Storm Net was activated to track a tornado that passed $\frac{3}{4}$ -mile north of Stromsburg, Nebr., at 2315 GMT. A six-meter net was also started after power had been restored. The Red Cross was contacted, but no actual emergency developed. — *K0ODF, SEC Nebr.*

For about three hours on August 11, amateurs furnished communications for the annual Three Rivers Fair Canoe Races. VE2AJD and VE2ACO acted as control stations near the judges' stand. Four other stations were located along the path of the races, with a fifth mobile unit acting as backup for any of the other units. The units were used to report the positions of the entrants to the judges. — *VE2ALB, SEC Quebec.*

On August 18, twenty-eight amateurs in Nebraska participated in a storm alert. However, commercial telephone cables were underground, and when the storm hit, no communications emergency developed. — *K0ODF.*

There are several reports this month of amateurs participating in the "Bring 'em Back Alive" campaign of the AAA, over the Labor Day weekend, August 30 to September 2. The first comes from Western Pa., where a number of amateurs from the Erie area served nine counties of the northwest part of the state. Fifty-four messages were handled from W3GV portable at AAA Headquarters. — *W3KPJ, SEC WPa.*

Twenty-six members of the Penn Wireless Association also participated in the BEBA activity around Harrisburg, Pa. Sixty-four pieces of traffic were handled from W3SK in 54 hours of operation. Several other counties were represented on the 75-meter network with W3UU acting as state NCS. — *W3ICC, EC Bucks County, Pa.*

California amateurs also participated in BEBA. WA6PCY, a California Highway Patrolman, operated portable from AAA Headquarters in Los Angeles. However, interference problems eventually forced a move to San Diego early August 31. Reports were gathered from all over the west coast area from mobiling amateurs, then were relayed to BEBA headquarters where they were transformed into bulletins to be broadcast by 73 commercial stations over the entire area of Southern California. — *WA6PCY.*

Eight amateurs, including Saskatoon, Sask., EC VE5RJ, participated in a drill to provide communications for a Walk-a-Thon held Sept. 21 to raise money for a new YMCA. About 4500 persons hiked while five mobiles leap-frogged along the 22-mile route in order to cover twelve check points. Traffic handled included requests for supplies, first aid gear, and the location of one participant who was urgently needed at his home. — *VE5RJ, EC Saskatoon, Sask.*

On Sept. 28, during the attempted recording of a star gaze of the moon, nine Regina, Sask., amateurs used two-meter f.m. to provide communications for astronomers. Of importance to NASA for future moon landings, the recording was less than a complete success when, just before the predicted event, there was an increase of cloud cover. Although no concrete results were obtained, both

astronomers and amateurs expressed their thanks and pleasure in participating and looked forward to future projects of mutual interest. — *VE5KM*.

On October 7, WA8NDY was notified by K8YNG, local CAP communications officer, that communications were needed in a search for a missing plane in mountainous Gilmer County, W. Va. W8WVM went to the area in his mobile with a CAP official and relayed information to WA8WCK on 75 meters. After two and a half hours, the small plane was found with the pilot dead. — *WA8NDY, EC Upstair Co., W. Va.*

Forty-three SEC reports were received for the month of August, representing 15,595 members of AREC. This is two fewer reports and 357 fewer members than last year at the same time. The following sections sent reports during the month: Ala., Alta., Ark., B.C., Colo., Conn., Del., E. Fla., E. Mass., Ga., Ind., Kans., Ky., La., Mar., Mich., Mo., Mont., Nebr., Nev., N. Mex., N.L.I., N.C., N.N.J., Ohio, Okla., Org., Que., S. Dgo., S.F., S.C.V., Sask., S. Dak., S.N.J., S. Tex., Tenn., Utah, Va., Wash., W. Va., W. Fla., W.N.Y., W. Pa.

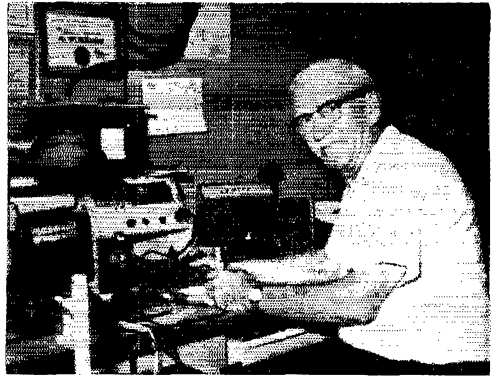
National Traffic System

Elsewhere in this issue you will probably find the announcement of the annual Simulated Emergency Test. If not in this issue, it will appear in January *QST*. In any case, the dates were announced in the Operating Events box in Nov. *QST* (p. 100) and have been known generally to be the last weekend in January.

NTS participation is expected to be along somewhat the same lines as previous years, with some small differences. In general, the NTS emergency plan will be invoked. NTS nets at all echelons will conduct extra or continuous sessions, utilizing for this particular weekend all the one-night-per-week operators who normally keep the system's lines in operation. So if you are a NTS participant at any level, let your net manager know whether or not you will be available, how often and for what.

Some of you may remember that a question regarding the desirability of a "surprise" SET was included in a recent poll survey of ARRL appointees, and came out heavily in the affirmative. Further study of the question revealed two salient features of such an activity which were perhaps not carefully enough considered by those who voted affirmatively. First is the practical fact that a "surprise" SET would suffer greatly in participation. It's all very well to theorize that emergencies don't usually allow time for specific preparation, and therefore we shouldn't make specific preparation for the SET either; but the SET isn't a real emergency. The average amateur who plans ahead for a personal weekend with the family or other non-amateur activity would gladly give it up at a moment's notice if his services were needed to save lives, but he's not so likely to be willing to do so for a make-believe exercise. Would you?

Second is the manner in which the question was posed — that is, right after a question regarding the desirability of an unannounced Field Day. The average reader of the CD Bulletin probably felt that an unannounced FD would certainly enhance its emergency preparedness value but was very hesitant to buy the idea because it might mean he couldn't go out. June is a favorite time for weddings, graduations and many outdoor activities, y'know. No doubt there was much head-scratching about this — until he came across the question relative to



TCC Central Director, WØLCX. Red is also active in TEN and CAN.

an unannounced SET, and there was the answer. Of course! This was an emergency exercise exclusively, so *this* is the place for a surprise test, not the FD.

If the FD question had been asked without the SET, the affirmative vote would have been heavier, maybe a majority. If the SET question had been asked without the FD, the negative vote would have been stronger. The two questions in the same poll affected each other, just as terrain and height affect the "free space" radiation pattern of an antenna.

So, as far as NTS is concerned, the SET will take place on January 26-27. Better reserve the weekend on your calendar *now*, so you'll be available. Net managers and TCC directors, better start getting your people signed up, or at least *lined up* for extracurricular duty that weekend. The SET Bulletin, detailing how the system will operate, should be in your hands about or shortly after you read this. Let's get with it. — *W1VJFM*.

September reports:

Net	Ses- sions	Traffic	Rate	Aver- age	Represen- tation (%)
EAN	30	1690	1,309	56.3	96.7
CAN	30	1138	.954	37.9	100.0
PAN	30	1303	.947	43.3	100.0
LRN	60	530	.399	8.8	91.1
2RN	60	580	.649	9.7	97.0
3RN	60	564	.436	9.4	93.2
4RN	49	402	.364	8.2	75.5
RN5	60	655	.344	10.9	87.0
RN6	60	1170	.836	19.6	98.3
RN7	56	365	.300	6.5	39.8
8RN	60	492	.358	8.2	95.0
9RN	60	603	.541	10.0	96.3
TEN	60	593	.636	9.8	69.4
ECN	52	122	.183	2.3	68.3
TWN	50	263	.214	5.3	53.7
Sections ¹	1900	11,572		6.1	
TCC Eastern	120 ²	786			
TCC Central	90 ²	636			
TCC Pacific	120 ²	1039			
Summary	2677	24,503	EAN	9.2	—
Record	2866	27,764	1,266	15.4	—

¹ Sections Nets Reporting (67): ILN (Ill.); FCATN, KTN, KYN, KRN, MKPN (Ky.); PVTEN, NJN, NJEPTN (N.J.); CPN, CN (Conn.); M6MTN, QMN (Mich.); BUN (Utah); NYS (N.Y.); PTTN, EPA, EPaEPTN, PFN (Pa.); GSN (Ga.); OSN OSSB, FRANKLIN COUNTY AREC, BN (Ohio); VEN, FMTN, WFPN (Fla.); RISPEN (R.I.); HNN (Colo.); MDDS, MDCTN,

(Continued on page 152)

Study Questions Added by FCC

General, Advanced and Extra Class Are Affected

THE Federal Communications Commission continues its modernization and upgrading of amateur examinations with the release of new and modified study questions. The subjects below relating to Extra and Advanced Classes are in addition to the questions at pages 83 to 86, *QST* for November, 1967 — which remain substantially as shown there. The new questions, and of course appropriate answers, are in the 61st edition of the *License Manual*, just now coming off the presses — though, after 17 years at the 50-cent price, printing and editorial costs finally forced a rise to \$1.

Amateur Extra Class

1. What must the value of an inductor be to cancel a capacitive reactance of 12.6 kilohms at an operating frequency of 2 Mc/s?

2. What is meant by "end effects" in an antenna? How can they be compensated for in half-wave antennas?

3. What are the bandwidths normally used for A1, A3 (single and double sideband), and F3 (narrow-band) type emissions?

4. Describe briefly how an a.c. power supply produces a d. c. output voltage. Discuss the merits of using choke-input versus capacitor-input filters in power supplies. How does the leakage resistance of the capacitors affect the output voltage? Also, what is voltage regulation as related to power supplies?

5. Compare silicon and vacuum tube diodes. What is meant by the "forward voltage drop" of a conducting silicon diode?

6. What is push-pull amplifier operation?

7. What is a Q-multiplier and how is it used in amateur equipment?

8. How can the final amplifier of a transmitter be tested for self-oscillation?

9. How does a frequency converter operate?

10. What visual observation within an operating vacuum tube's envelope would indicate that the tube is gaseous?

Advanced Class

1. On what frequencies do s.s.b. transmissions become more difficult?

2. List some of the advantages s.s.b. provides over double sideband operation.

3. Which class of amplifier operation is most favorable to the generation of harmonics?

4. What effect would a reactive load have on an oscillator's output frequency? What can the value of the d. c. voltage across an oscillator's grid-leak resistor reveal about the oscillator's performance?

5. Compare the center impedance characteristics of the inverted V, the half-wave dipole, and the folded dipole antennas.

6. How are the shape factor and the selectivity of a crystal lattice bandpass filter related?

7. Where should noise limiters be positioned in a receiver to be most effective?

8. During the application of the single-tone test to a linear amplifier, how does the average power input to the amplifier relate to the p.e.p. produced?

9. What parameters affect the directional pattern of a beam antenna?

10. What are some precautionary measures that should be taken before replacing faulty circuit elements?

11. Compare the operating characteristics of wirewound and carbon type resistors.

12. List ways of protecting amateur equipment from damage induced by electrical storms.

13. Define single and double conversion. What is an intermediate frequency (i.f.)? In a receiver, how does the image frequency relate to the desired signal frequency?

14. Explain why the grid wiring in an r.f. transmitter should be as far removed as possible from the plate circuitry.

15. What is a dummy antenna? How can it be of use to amateur operators?

16. What is meant by percentage of modulation? What determines if a carrier wave is under- or over-modulated?

17. What affect would a self-oscillating buffer stage have on a transmitter's output frequency?

18. What is meant by the "effective value" of a voltage? "Peak to peak value"?

19. What is a wave-trap? Draw some common wave-trap configurations.

20. What circuit condition is indicated by a high direct current reading in the grid meter in the final Class C amplifier stage of a transmitter?

21. Briefly discuss the advantages and disadvantages of using paper, mica, air, and ceramic type capacitors. What happens to a circuit when a capacitor develops a leakage resistance?

22. Discuss the characteristics of a series resonant circuit; a parallel resonant circuit.

General Class

Here there are revisions as well as additions; thus we reproduce the whole set of questions applicable to General, Conditional and Technician Class:

1. Questions based on Part 97 of the Commission's rules.

2. Of what use is a bleeder resistor in amateur equipment?

3. Define skin effect. How can this phenomena be minimized?

4. List some operating procedures which can be employed to minimize interference and congestion of the amateur bands.

5. Describe the operation and usage of a cathode follower.

6. How does frequency tolerance affect band edge operation?

7. What is impedance matching and why is it important?

8. How is the plate circuit efficiency of a vacuum tube determined?

9. What is amplitude modulation (a.m.)? How is the intelligence conveyed in an a.m. signal?

10. What is meant by the ripple frequency of an a.c. power supply voltage?

11. What is a third party agreement?

12. How does a zener diode operate and of what use is it in amateur equipment?

13. Define standing wave ratio (s.w.r.). How can the s.w.r. of a line be determined? How are the s.w.r. of a line and its characteristic impedance related? Name some factors that affect the characteristic impedance of an air-insulated parallel-conductor transmission line.

14. What is meant by the maximum plate dissipation of a vacuum tube?

15. What is a decibel?

16. What is a harmonic? List ways of minimizing harmonic generation in frequency doublers, vacuum tube amplifiers, transmission lines, and antennas?

17. What is a crystal resonator?

18. How do electrolytic capacitors operate and why are they widely used in power supply circuitry?

19. What symbols does the Commission use to designate how the main carrier of a signal is modulated?

20. What are some possible causes of excessive plate current in a Class C power amplifier?

21. List several characteristics of a vertical quarter-wavelength antenna.

22. What is TVI? How can it be remedied if the amateur station is at fault? If the TV receiver is at fault?

23. How can transistors be used in electronic equipment? What is the beta of a transistor? Compare the elements of a transistor to a vacuum tube's.

24. What is meant by percentage of modulation? What is the maximum legal limit to which an amateur transmitter can be modulated?

25. Describe briefly how oscillators operate. What are the most common types of oscillators and how do they differ from each other?

26. Why is a center-tap return connection employed on the secondary of a transmitting tube's filament transformer?

27. Define Ohm's law. How does it relate to resistive and reactive impedance?

28. Describe ways of equalizing the reverse voltage drops across series connected silicon diodes.

29. What is the maximum legal d.c. power that can be delivered to the final amplifier of an amateur transmitter? How is this power determined?

30. Define instantaneous power, average power, sideband power, audio power, and peak envelope power. How is each related to the voltage and current that produced it? How is each related to the unmodulated carrier power?

31. What is meant by the bandwidth of a signal? Compare the maximum necessary bandwidth occupied by a c.w. signal, an s.s.b. signal, a double sideband signal, and an ordinary voice signal.

32. What is neutralization and how does it contribute to proper amplifier operation? What procedure should be followed to properly neutralize an r.f. amplifier?

33. What are the distinguishing features between series tuned and parallel tuned resonant circuits? How is the resonant frequency determined? Define the Q of a resonant circuit?

34. How does an a.c. power supply produce a d.c. voltage? Distinguish between a choke-input and a capacitor-input filter and compare their operating characteristics. What is dynamic regulation and how can it be improved? How do the output voltages of a full-wave center-tapped and a full-wave bridge rectifier compare?

35. How do resistors combine in parallel and in series to give total resistance? Capacitors? Inductors?

36. How does voltage division occur across series connected resistors? Capacitors? Inductors?

37. What does it mean to connect circuit elements in series? In parallel?

38. What is inductive reactance? Capacitive reactance? How is their value determined? How do like reactances combine in series? In parallel?

39. Describe the transmissions characteristics of the amateur bands below 30 Mc/s. List several propagation factors that influence signal transmission and reception in these bands.

40. List the basic stages of a conventional super-heterodyne receiver and tell what function each stage performs.

41. How is the approximate length of a half-wave dipole related to its resonant frequency? Compare the operating characteristics of a half-wave dipole and a grounded antenna.

42. What do high- and low-pass constant- k filter circuits using balanced and unbalanced pi- and T-sections look like?

43. How can amateur equipment be protected from lightning discharge?

44. What are the basic stages of a single sideband (s.s.b.) receiver and transmitter and what purpose does each serve?

45. List the three main classes of amplifier operation and explain the use for which each class is best suited.

46. What are "images" in a receiver?

47. What is meant by "flat-topping" of a single sideband signal and what are some possible causes of it?

48. What does grid current flow in a Class A amplifier indicate?

49. Briefly discuss how a multiband "trap" antenna operates.

50. How can the power input to the final amplifier of an s.s.b. transmitter be determined?

51. Compare the operating features of the grounded-grid and grounded-cathode amplifiers.

52. How is the bandwidth of an f.m. signal related to the bandwidth of the modulating audio signal?

QST

Strays



The annual New England DXCC dinner meeting (chaired by WIWQC) took place in Waltham, Mass., last October 5. A highlight of the evening was the presentation of several ARRL 1968 International DX Competition plaques. Left to right: **KH6IJ** (high scorer both modes, Oceania), **W1YWM** ARRL Deputy Communications Mgr., **KA7AB** (high scorer both modes, Asia).

Happenings of the Month

VE TARIFF TRY FAILS

In 1965 the Canadian Tariff Board announced a hearing on Tariff Reference No. 134, relative to tax-free importation of scientific equipment for non-profit groups, (e.g., hospitals). The League's Canadian Division took advantage of the call for comment by submitting a brief asking for cancellation of the duty and federal sales tax on amateur-band-only equipment into Canada.

The Board has turned down our request, primarily because it was not closely-related enough to the subject under consideration. Quoting from the report:

"Finally, among the user interests are two proposals the adoption of which the Board is not recommending.

"The first is that of the American Radio Relay League, Inc. for free entry of certain amateur band radio equipment. At the hearing, stress was laid upon the self-education of the amateur, his scientific investigation, his useful role in moments of emergency or disaster and upon the League's technical publications. The Board does not, for one moment, contest the laudable nature of the purposes and activities of the League's members; it does, however, find difficulty in assimilating to the subject matter of this reference an amateur activity with a personal aim arising out of a personal interest in the subject matter; for this reason it is not making any recommendation in this field beyond those made some three years ago in its Report on Reference 123 — Radio, Television and Related Products."

The quoted recommendations were a reduction from 20% to 15% in the duty on all transmitters and receivers; it has never been implemented

by the government, but is scheduled for reduction by 1% per year to the 15% level as part of the "Kennedy Round" tariff negotiations.

The League received strong support at the hearings from Radio Amateur du Quebec, Inc., and by mail from a number of radio clubs and from Heathkit. A mild verbal objection was entered by the Electronics Industries Association, and one Canadian firm (Delta) objected in writing.

Further action is being discussed by Canadian ARRL personnel and legal counsel.

VE3NR REPLACES CATON

W. J. Wilson, VE3NR, has replaced W. A. Caton as chief of the Radio Regulations Branch of the Telecommunications Bureau. Bill is an active amateur on both h.f. and v.h.f. bands, particularly six meters.

As Canadian Director Noel B. Eaton VE3CJ put it in a recent bulletin, "We are most fortunate in having an active and sympathetic amateur in charge of our affairs, a fact which will make our relations much easier and more pleasant."

LICENSE FEES IN CANADA

Because of the protests of VE/VO licensees at the abrupt raise in annual fee from \$2.50 to \$10 last spring, The Telecommunications Bureau held a meeting in Ottawa on October 7. Representing the Bureau were F. G. Nixon, W. J. Wilson and A. G. E. Argue; for ARRL, VE3CJ and VE3RX; for Canadian Amateur Radio Federation VE3BSG and VE3AHU; for Radio Amateur du Quebec, Inc., VE3AP; for Saskatchewan Amateur Radio League, VE5BU and for Nova Scotia Amateur Radio Association, VE1FQ. ARRL carried the proxy of New Brunswick Amateur Radio Association, and the British Columbia Amateur Radio Association's delegate was unable to attend because of business reasons.

The Bureau explained its views to the amateur representatives, and furnished figures on request, except an estimate of the cost of administering the amateur service. No specific proposals were presented by the Bureau; however, a number of ideas were discussed at length. A two-level fee structure: a realistic examination fee; scheduled exams (instead of the "drop-in" system now in use); long-term licenses; fees for amendments (e.g., second location, permission for TV, change of callsign) were among the topics touched on.

The Telecommunications Bureau will now have to make its final decisions, clear them with Treasury officials and make their recommendations to the Cabinet through the Postmaster.

Incidentally, it developed that 75% of Canadian amateurs hold the Advanced Amateur certificate. Also, the cancellation rate this year is four times normal, probably due to non-



ARRL President Robert W. Denniston, W0DX, left, and Barry Goldwater, K7UGA "meet the press" in the person of newspaper columnist-radio personality Ray E. Meyers, W6MLZ at the ARRL Southwestern Division Convention in Phoenix, Arizona.

renewals by inactive amateurs unwilling to pay \$10. There are about 11,000 licenses in force, virtually no change from a year ago.

Charles A. Service, W4JC

We regret to report the death of Charles A. Service, Jr., originally 3QZ and 3ZA of Bala, Pennsylvania and more recently W4IE of Sarasota, Florida. Charlie was a director of the League from 1919 to 1924; vice president from 1920 to 1922; assistant secretary from 1922 to 1925 and 1942 to 1945; and acting communications manager 1945.

In the days after World War I he was one of the leading traffic handlers, and was ARRL Atlantic division manager before the days of the SCMs.

Charlie continued to be an active amateur until his death in September.

SIX METER FOOTNOTE

Last month we reported that ARRL had filed a "Petition for Reconsideration" which asked FCC to set aside its planned restrictions on six meters. The petition has now been assigned an RM number of its own, RM-1352.



Two Pittsburgh attorneys who are amateurs have long been furnishing exceptional legal assistance to amateurs in their area. The South Hills Brass Pounders and Modulators, Inc., presented awards to Irwin Bud Tryon, W3WFR and John Elder W3RSB, in appreciation of their efforts; ARRL Director Gilbert Crossley, W3YA, of the Atlantic Division officiated during the October meeting of the club.

Behind the Diamond



The diamond-studded spotlight moves southerly this month to shine upon a tall, lean gentleman with enough gray in his hair to be distinguished and enough Southern accent in his voice to be charming — P. Lanier Anderson, Jr., W4MWH. (Psst, don't let him know we told you, but the P stands for Paschal.)

Both unusual handles aside, our man of the month is usually known as Andy. He served from 1953 through 1966 as director from the Roanoke Division, and was elected as a vice president by the Board in May of 1968.

Andy's home in Danville, Virginia, is presided over by his captivating wife, Marie. He is the owner of P. L. Anderson

No. 10 of a Series

& Son, building contractors. W4MWH is a snappy traffic handler by phone or c.w., on the latter mode serving many times as net control station of the Eastern Area Net in the National Traffic System. Other marks of distinction: the Extra Class license, 35 w.p.m. sticker in ARRL's code proficiency program and membership in the A-1 Operator Club. He's also an Official Relay Station, a member of DXCC and of the Amateur Radio Emergency Corps.

With his experience in construction, he was a "natural" for service on the Board's Housing Committee from 1957 to 1964, overseeing the layout, specifications and erection of our present headquarters. He served a term on the Executive Committee and several terms on the Planning Committee, the Merit & Awards Committee and especially, seven years on the Finance Committee; he also served at least once as chairman of the last three.

Through all this service, Andy has acquired a reputation as one who can sit through an hour of wandering debate, and then sum up its central truths in a sentence or two, all the while keeping his good humor and avoiding offense to anyone.

His summary during one debate: "Sometimes we have to be politicians, sometimes we have to be statesmen: this is one time we must be statesmen!"



The June QST article, "An Automatic Band-Scanner/Transmitter Monitor," has won for its author, R. F. Latter, W2YFM, the Cover Plaque Award. Hudson Division Director Harry J. Dannals W2TUK made the presentation at a meeting of the New Providence Amateur Radio Club in September.

OPERATION RETREAD FILING

This department reported briefly last month that ARRL would file support for Docket 18266, "Operation Retread," to allow ex-amateurs to obtain Novice Class licenses after a year off the air. Here is the actual text filed with FCC.

Before the
FEDERAL COMMUNICATIONS COMMISSION
 Washington, D. C. 20554

In the Matter of

Amendment of Part 97 of the
 Commission's Rules Concerning
 the Novice Class Amateur
 Radio License

} Docket No. 18266
 (RM-1288)

COMMENTS IN RESPONSE TO NOTICE OF PROPOSED RULE MAKING

The American Radio Relay League, Incorporated,
 a non-profit membership association of amateur

radio operators, respectfully submits the following comments in response to the Notice of Proposed Rule Making released July 26, 1968.

This rule making proceeding was initiated by a petition of the Electronic Industries Association (EIA), filed March 25, 1968, proposing the following changes in the rules and regulations concerning the Novice Class license: that the code speed be reduced from the present five words per minute; that the license term be extended to five years from the present two years; that the radiotelephony privileges in the 145-147 MHz band, deleted by the final order in the "incentive licensing" rule making proceeding, Docket No. 15928, be restored; that operating privileges on frequencies between 29.4 and 29.6 MHz be authorized; and that the restriction prohibiting the issuance of the Novice license to previous licensees of any class be removed.

The Notice of Proposed Rule Making, to which these comments are directed, denied those portions of the EIA petition which proposed a reduction of code speed requirements, extension of the license term, restoration of radio telephony privileges and operating privileges between 29.4 and 29.6 MHz, citing the Commission's order in Docket No. 15928. With respect to the proposal to permit relicensing, the Commission invited comments upon a possible amendment of Section 97.9(f) of its rules to permit any eligible person to obtain a Novice Class license provided that he has not held a Commission-issued license within the 12 months prior to his application, and to prohibit any person from holding Novice and Technician Class licenses concurrently.

As was developed during the "incentive licensing" proceeding in Docket No. 15928, the League was and is opposed to any reduction in examination requirements because any such action would tend to downgrade the level of skills in the amateur service. Thus, the League fully supports the Commission's action in denying substantial portions of the EIA proposal.

The requirements for various classes and grades of licenses have been continually under study by the League in light of the purposes and objectives of the Amateur Radio Service. At its annual meeting in May, 1968, the League's Board of Directors voted to request amendment of the Commission's rules to permit the issuance of Novice Class licenses to former licensees, and to affirmatively permit the concurrent holding of Technician and Novice Class licenses. Thus, the League supports the proposed amendment of Section 97.9(f) to the extent that relicensing will be authorized.

WHO THE DEVIL IS WHO?

Eighth in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	Was	Now	Was	Now	Was	Now	Was
W1FO	W1KZN	W2UI	W2QDY	K4FV	W4LRL	W7CG	W7GXA
W1HS	W1DNQ	W2VM	W2AKU	K4FX	W4AZNI	W7LK	W7DTY
W1JY	K1WKP	W2YI	W2HNH	K4HZ	K4SRR	W7MB	W7GBM
W1KB	W1ALS	W2YC	W2CEI	K4IX	W4KYD	W7MD	W7DDP
W2HN	WA2UTJ	W3ER	WA3ESL	K4JA	W4EFX	W7ME	W7FKK
W2NM	W2RQA	W3MX	W3DUY	K4JB	W3WYO	W8CO	W8RUV
W2QJ	W21WM	W3RU	K3FFK	W5JJ	W5EHC	W8HJ	W8BRW
W2QM	W2SHC	W3SB	W3GHW	K6KB	W6BOL	W9EB	W9EHW
W2QT	K2ZFA	W3TP	W2GUR	W6PH	WA6PEK		

With respect to the proposal to prohibit the concurrent holding of Novice and Technician Class licenses, the League must respectfully oppose the proposal. Technician Class licensees must confine their operations to amateur frequencies above 50 MHz where voice and other modes of emission are far more prevalent than c.w. telegraphy, while Novice Class licensees are restricted to c.w. telegraphy and may conduct such operations in portions of the 3.5, 7.0 and 21.0 MHz amateur bands which are not open to Technician Class licensees. The end result is that the Technician has little opportunity to gain the code experience and skill he needs to progress to a General or higher class of license. Indeed, the Commission made a similar point in Docket No. 15928 when it deleted the previous voice privileges for Novices in the 145-147 MHz band. Thus, to prohibit the concurrent holding of Novice and Technician Class licenses would be incompatible with the basic self improvement and advancement objectives for which various classes of licenses were established.

Information available to the League indicates that many Technician Class licensees went directly to that class of license, either as a matter of personal pride or through ignorance of the fact that Novice and Technician Class licenses could be held at the same time if (and only if) the Novice Class license was acquired first.

Though the Technician Class licensee is a very useful citizen of the amateur bands, experimenting and communicating on the v.h.f. and higher frequency bands, he most certainly will be a far more versatile amateur if he acquires proficiency in the Morse Code and experience under the skip conditions of the high frequency bands. It logically follows, therefore, that any steps which will encourage amateurs to try for higher grades of license, without at the same time lowering standards required for those grades, will be in the long-term good of the Amateur Radio Service.

For the foregoing reasons, the League most strongly recommends and requests that Section 97.9(f) be amended as follows in lieu of the amendment proposed in the Notice of Proposed Rule Making (italics indicate additions to the Commission proposal):



First amateur radio week for 1969 is in Nevada, January 5-12. Governor Paul Laxalt holds the proclamation while Nevada SCM Len Norman, W7PBV (center) and SEC Mike Blain, WA7BEU look on. The date coincides with the Sahara Amateur Radio Operators Convention in Las Vegas Jan. 8-12.

RULES FOR LIFE MEMBERSHIP

1. The Board of Directors has established a provision for Life Membership in The American Radio Relay League, Inc., effective August 1, 1967.
2. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
3. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
4. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
5. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
6. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$1, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
7. Application forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.

(f) Novice Class. (1) Any citizen or national of the United States, except a person who holds, or who has held within the 12 month period prior to the date of receipt of his application, a Commission issued Amateur Radio License; and, in addition, (2) any Technician Class licensee of the Commission who has not held a Novice Class license during the 12-month period prior to the date of receipt of his application.

The amendment proposed herein may be adopted without a further rule making proceeding in as much as interested parties have been afforded an opportunity to submit reply comments.

Respectfully submitted,

THE AMERICAN RADIO RELAY LEAGUE,
INCORPORATED

225 Main Street
Newington, Connecticut 06111

1150 Connecticut Avenue
Washington, D. C. 20036
October 15, 1968

By ROBERT M. BOOTH, JR.

Its General Counsel



December 1943

... Judging from the mail received at Headquarters, hams abroad in military service enjoy getting mail from fellow hams — next, of course, to the folks at home. So, why not, pleads K. B. Warner, sit down and write to a few whose APO or FPO you know? In this connection, local editors would welcome a little background on hams mentioned in the news. Contact your local City Editor or re-write man.

... The front cover shows a radiosonde balloon about to be launched by a YL team of technicians at Ft. Monmouth. "Deke" French, W1JLK, continues his story on aeroanalysis and v.h.f. techniques. Much is being learned about the lower atmosphere with these transmitters which transmit information on temperature, pressure and humidity. Construction and use of radiosonde equipment is described by the author.

... Loyal S. Fox, ex-W2AHR, discusses super-regeneration theory and gives some pertinent advice on how to achieve best results. There are some interesting charts, but no mathematics. Easy reading, and you might learn something.

ARRL QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9¼ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand-corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below:

- W1, K1, WA1, WN1 — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.
- W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4 — H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4 — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.
- W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.
- W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.P. Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 — Paul R. Hubbard, W8CXY, 921 Market St., Zanesville, Ohio 43701.
- W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.
- W0, K0, WA0, WN0 — Alva Smith, W0DMA, 238 East Main St., Caledonia, Minnesota 55921.
- VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
- VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.

... The activities of the Civil Air Patrol along the coast are well described by Tech. Sgt. Karl H. Stello, CAP, W3IVZ, who has been flying missions for some time. Starting with practically nothing in the way of equipment except their own planes and ham gear, these dedicated fellows have accomplished a very great deal in spotting enemy submarines and directing the Coast Guard and Navy to the area. Stations are licensed by FCC and are under direct supervisions and control of the U.S. Army Air Force. Some 20 millions of miles over water have so far been flown.

... Philip Bliss, W1DXT, comes up with a stable oscillator-monitor for the 112-Mc. band. This fills a long-felt want in the service in that both transmitters and receivers are readily calibrated by its use. And it's portable, uses a type 9002 tube, and embodies its own power supply.

... Now, want to tangle with a little mathematics? Harry E. Stewart, W3JXY, tells how to measure antenna and transmission line impedance. All you have to do is measure the standing-wave ratio and apply it to a couple of not-too-difficult formulas. He also discusses stubs and antenna lengths.

... F. Cheney Beekley, W1GS, our advertising manager, has invented a new microphone of the differential type which embodies a noise-cancelling feature. It goes on the upper lip. It provides a very significant improvement in voice-to-external-noise ratio and is in quantity production for use in tanks, etc. — *W1ANA, Curator.*

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.

KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹These bureaus prefer 5×8 inch or #50 manila envelopes.

COMING ARRL CONVENTIONS

January 18-19, 1969 — Southeastern Division, Miami, Florida.

May 9-10, 1969 — Michigan State, Grand Rapids.

May 24-25, 1969 — New England Division, Swampscott, Mass.

June 20-22, 1969 — NATIONAL, Des Moines, Iowa.

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.



Strays



The Third Annual Illinois Amateur of the Year Award went to Donald Demik, WA9BYF of Oak Lawn, Illinois, for service to the public, including work during the tornados last year, preparing for other emergencies, and lecturing on fallout. The award was presented by ARRL Central Division Director Philip E. Haller, W9HPG, (right) on behalf of the Hamfesters Radio Club, Inc., sponsors of the award.

1969 QCWA QSO PARTY

Starts: 2200 GMT Friday February 7, 1969.

Ends: 2200 GMT Sunday, February 9, 1969. This year's party is being sponsored by the Joliet Chapter of QCWA. Only members are eligible for the QCWA certificate and plaque donated by the National Headquarters, and only contacts with other members will count toward this award.

This is primarily a party to renew old acquaintances and see how many members you can contact. Overseas members can be contacted. This year, as last year to add interest, a simple point scoring system will be incorporated. Count one point for each QCWA member worked. (Repeats on other hands of modes do not count, nor do non-members.) Multiply the points by the sum of the states, Canadian provinces and countries other than the U. S. and Canada in which a member was worked, for the final score.

Your log should show in this order: Date/Time in GMT, Station worked, contact number sent and received, RST/RS reports, baud, QTH, name, and QCWA number.

Activity will be found near the following frequencies: *cw:* 3530, 7030, 14030, 21030, 28030 kHz. *Phone:* (a.m. and s.s.b.) 3855 7230 14240 28530 kHz. *RTTY:* 7105, 21140 kHz.

Mail your log by Mar. 8, 1969 to R. H. Woolsey, W9AQP, 1511 Burry Street, Joliet, Illinois 60435.

— . . . —

An amateur exhibit at the National Electronics Conference in Chicago December 9-11 will include extensive operation of W9TEM, the Chicago Area Radio Club Council's show station. Look for them around 14,330 kHz.

A.R.R.L. AFFILIATED CLUB HONOR ROLL

Each year, from the data given in or supplementing the annual affiliated club questionnaire (CD-18), we send out special certificates and make a special listing of those clubs all of whose members are members of ARRL. The first such listing appeared in June *QST* (p. 95). We are happy herewith to present the second listing of clubs who qualify as "100% ARRL Clubs."

Next February we plan again to forward to every affiliated club on the "active" list a questionnaire form for filing new data. How about putting *your* club on this honor-shrouded 100% list?

- Arkansas DX Association, Little Rock, Ark.
- Binghamton ARA, Binghamton, N. Y.
- Blue Ridge Radio Society, Inc., Greenville, S. C.
- Bristol Amateur Radio Club, Inc., Bristol, Tenn.
- Columbia Amateur Radio Club, Columbia, Miss.
- Enid Amateur Radio Club, Inc., Enid, Okla.
- Hoot Owl Club of Southwest Louisiana, Starks, La.
- Inglewood Amateur Radio Club, Inc., Inglewood, Calif.
- Lake Success Radio Club, Great Neck, N. Y.
- Limestone Amateur Radio Club, Athens, Ala.
- Maydale Amateur Radio Club, Silver Spring, Md.
- Mike and Key Radio Amateur Club, Camarillo, Calif.
- Moose Jaw Amateur Radio, Moose Jaw, Sask., Canada
- North Alabama DX Club, Huntsville, Ala.
- Oak Ridge Radio Operators Club, Inc., Oak Ridge, Tenn.
- Pawnee County Amateur Radio Club, Pawnee, Okla.
- Radio Ops. Association of New Bedford, New Bedford, Mass.
- St. Louis Amateur Radio Club, Inc., St. Louis, Mo.
- Saint Mary's ARA, Lexington Park, Md.
- Sarasota Amateur Radio Association, Inc., Sarasota, Fla.
- Scarboro Amateur Radio Club, Toronto, Ont., Canada
- Sheridan Radio Amateur League, Sheridan, Wyo.
- Society of Amateur Ops., Inc., San Francisco, Calif.
- South St. Louis Radio Club, St. Louis, Mo.
- Southern California VHF Radio Club, Inc., Norwalk, Calif.
- Southern Nevada ARC, Inc., Boulder City, Nev.
- Union Carbide Caribe ARC, Ponce, Puerto Rico



The Rocky Mountain Division's award for operation in the public interest, convenience or necessity (PICON) for 1967 was presented to Robert B. Foster, Jr., K5CQH of Tijeras, N.M., by Director Carl L. Smith, W0BWJ. W0WYX was the Colorado winner, and K7RAJ, the Utah awardee.

The ARRL Museum of Amateur Radio



THIS month, we continue with some remarks concerning the Museum, and we start with the first cabinet, as one enters the building. I wish Hiram P. Maxim could see some of his very earliest equipment, here displayed. There is the twin French ignition coil with which he and his son Hamilton worked across town, a homemade Leyden jar covered with tattered tinfoil and various other goodies. Those who aspired to higher power than readily-obtainable spark coils could buy the "One Hundred Mile Wireless Coil" with its attendant Electrolytic Interrupter. This outfit blew 30-ampere fuses with annoying regularity. Many amateurs scrounged their dry cells from garages, testing them by shorting two of them in series and judging their goodness by the ensuing spark.

. . . The next shelf down contains a small part of the collection of the late Robert S. Gowen, 2XX, who was Chief Engineer for DeForest. Of special note is the 1904 electrolytic receiver which became the first piece of radio gear used by the Harvard Wireless Club. Gowen's 1901 spark coil still perks. The most beautifully made twin crystal detector stand, with marble top and a small drawer for spare crystals, actually is somewhat difficult to adjust mechanically. The two prototypes of the famous honey-

coil mount have not been refinished. Thought I'd leave the split hunk of wood and hand-made switches alone. There is a very early British Marconi filings coherer in a faded velvet-lined box. Some of the very early DeForest tubes show that heat had been applied in an effort to improve them. Caved in walls etc. Remember?

. . . Then, underneath is a shelf with many crystal and electrolytic detectors and quite an assortment of fixed spark gaps. Maxim's fixed gap used zinc from an old bi-chromate wet battery, I think. Getting into somewhat heavier old gear, on the bottom shelf are a couple of rotary spark gaps, a husky Amrad spark coil and a beautiful 4-inch coil made in the classical manner with heavy vibrator, platinum points and immaculate brass work. The spark frequency is about 20-per-second. It will jump four inches and then starts to spark somewhere down inside. Buried in the base, as part of the packing is a very remarkable issue of the *Canadian Electrician*. In it is an interview with Thomas A. Edison, on the occasion of the dedication of the Niagara Falls hydro-electric plant. In it Edison is said to have labeled the whole idea impractical, and that the only way to convey power from one city to another is to charge storage

batteries, transport them by rail to destination and then discharge them!

. . . In the center bay are several coherers, Braun, Marconi, etc. A magnetic detector that works, but not too well; needs stronger permanent magnets. This writer used one on the ill-fated "Vestris" in 1912. I'm thinking that this type detector was probably the original a.v.c. system. NAH was no stronger at ten miles than at 1000! Like relics? We have a brick from WCC powerhouse, a piece of one of the anchors and a fragment of one of the towers.

. . . Just underneath are a flock of headsets, Baldies, Murdock, etc. Also WIZE's 6800-ohm Trimm headset. We do not have the E.I.Co. resistance wire wound set. I believe they *did* measure 3000 ohms! There are quite a few keys worth looking over. Ever see a vertical Vibroplex? We have one. How about a Mecograph and Melehan Valiant? Variable condensers, as we used to call them? All the way from home-made ones to General Radio Precision jobs. Someone did a nice job of making a glass plate variable receiving condenser. It's a big affair but I can't quite imagine tuning the thing. Push-pull.

. . . Down below is an Amrad Quenched Gap, swell for those with a 500-cycle power source but pretty rough on 60 cycles. A wooden-based antenna change-over switch shows a burned groove where it had sparked over for a distance of about two inches. Must have been kinda damp.

. . . Referring to the photograph below, top shelf, to the left, you see a lot of small parts, etc. The original "Monimatch", described in *QST* in October 1956 was one of the first ham s.w.r. bridges. Then

there are three magnetic modulators, invented by Alexanderson of G.E. Co. A number of "low-loss" coils, Tuska products from the early days such as audio transformers, c.w. filters, variometers etc. and some Turney spiderweb coils will bring back memories.

. . . In 1938 W9MWC won the Paley Award for his heroic contribution to humanity in crossing a winter flood swollen Ohio River in an open boat with his homemade rig. We have the rig here, as was.

. . . In January 1935, George Grammer in *QST* described his Autodyne receiver. Later, this was modified by Jim Lamb, W9AL to improve r.f. selectivity. The boys came up with a good one. You may look but not touch! A neat little superregenerative receiver mounted openly on a copper chassis and using a 955 acorn tube covered 1¼, 2½ and 5 meters. It was made in accordance with an article in the 1936 *Handbook*. Remember when the boys occasionally worked VKs on flea power? Well, you should see this little gem of a rig using a W.E. Co. 215a. Output was 50 mw.

. . . A couple of heavy-duty transmitting inductances wound with hard drawn trolley wire threaded through solid spacers are from W2BML, H.H. Beverage's station at Riverhead, L.I. Got across the pond nicely in 1921 tests. Some big Pyranol condensers, a 5-meter mobile transmitter and a number of carbon mikes are also on the bottom shelf.

. . . In the next bay, we have a DeForest T-200 multiwave tuner, a Haynes tuner, some interesting and beautiful replicas and many other choice items.

— WIANA, Curator





Correspondence From Members -

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

WANTED—A TITLE

☐ It bugs me — "Correspondence From Members" as a title for the letters-to-the-editor column in *QST*. Not only is the title about as imaginative as a doorknob, but it lacks even the possibly redeeming virtue of accuracy: some of the letters aren't from members anyway.

A small thing, sir, but mine own. — *Bob Hill, W1ARR, Wilson, Conn.*

EDITORS NOTE: Is there a strong feeling to change the title of this section of *QST*? If so, and you have a suggestion that might be appropriate, send it to us. We'll present a bound copy of the 1969 *Radio Amateur's Handbook* for the best suggestion.]

5-BAND DXCC-WAS

☐ It is not my intention to condone the unethical DX-peditionary activities recently uncovered. However, lest the finger of blame be pointed in one direction only, I must point out that recent events have arisen in part because of conditions which need not have existed. I am speaking of the DXCC policy of adding new countries to the official list consisting of uninhabited rocks, reefs, and the like, which are first discovered as little more than hazards on navigational charts. A program which indirectly encourages excessive expenditures, appealing to the vanities of the affluent, should be called into serious question within the circles of amateur radio. The illegitimacy of one DXpedition has been laid bare. But the root causes of the irregularity have gone unexamined. . . .

Will the advent of a 5-band DXCC program carry this same rude conduct across all five h.f. bands? Furthermore, legitimate DX operations will be pressured to operate five bands now instead of one, or two. By what right can anyone expect a rare DX station to send five QSL cards to a single station when in the past one was sufficient for many awards, including DXCC? The expanded 5-band DXCC program may drive DX into seclusion at a time when band utilization is too much needed for band retention. — *Kurt T. Meyers, W8IBX/2, Bronx, N.Y.*

☐ For whatever interest it might hold, I offer a suggestion: a 5-band WAS to non W-K or everyone.

My reasoning suggests this might be a stimulant to the far out-numbered DX stations to work more W-K. I can imagine it might also be a stimulant to W-K not interested in DX. — *Gene Farley, W0DAK, St. Paul, Minn.*

INCENTIVE LICENSING

☐ When the new FCC incentive licensing regulations were published, I began to prepare for the Advanced and Extra Class exams. I passed the Advanced exam in January and the Extra in August. This wasn't a snap for me, because I am not a teen-ager nor in my twenties. As a priest and high

school teacher, I don't find a lot of time to study. I got into amateur radio only four years ago as a Novice. But I think that the time spent in learning some more theory and code was worth the effort. I think that I am a better amateur radio operator because of it. — *Rev. Walter Peacock, W4SOHS, Bedford, Ohio.*

☐ I have almost a holy regard for the organization and its purpose. Although you have done many a thing for amateur radio, and I feel that incentive licensing is a good idea, the way you did it was down right sinful; 99% of the amateurs I know feel the same way. — *Scott Leviton, W12EVB, Bayside, N.Y.*

☐ I was first licensed in 1948 and kept my ticket alive ever since. It has been a great help in getting and keeping my job over the years. It has given me an incentive to study, to experiment, to build.

I am 63 years old now, but age will not stop me from getting the Advanced Class license early in 1969.

Why so many are against incentive licensing, and why so many are doing so much crying is more than I can understand.

With the approach of a new world frequency conference, one would think these amateurs would be glad to show as much advancement as possible to show a united front to the world. — *Paul S. Crimmens, W3OXN Glen Burnie, Maryland.*

☐ I became the proud holder of a General Class ticket about 15 years ago; about the same time that I faced a wrinkled, sparkling old woman behind a cluttered desk in my high school home room. She studied me for a moment after I whimsically announced that I thought I might try a year of college after high school graduation and, in a slow, deliberate manner she said: "You don't look like college material to me, bub!"

Well, what's all that got to do with incentive licensing? As I write today I do so as a moderately successful college dean holding the Bachelor of Science and Doctor of Law degrees from a large mid-western university. I can't help but believe that the old woman knew she was putting a hurdle in front of me that would prove to make me a better man . . . and likewise I can't help but believe that somebody just applied the sharp stick that is going to make me a better radio amateur. — *Gilbert Peters, W6FGM, Walnut, California.*

☐ The only ones that are being upgraded are the c.w. operators. Heaven knows, they need up-grading the least of all the amateurs. Why should I take another examination to appease a Commission that keeps rules that permit Conditional Class operators to continue to operate and renew their licenses and compete for space in the already crowded bands regardless of their residence? There are several right

here in town that are as healthy and able as I am and the Commission gives exams here four times a year . . . Why should I take another examination to appease a Commission that continues to permit amateurs to administer the examination for Technical Class operators on the pure assumption that an amateur is qualified to administer an examination just because he holds an amateur license? Why should I take another examination to appease a Commission that issues a carte blanche permit to a new amateur to operate without restriction when it has no way of knowing if he understands what is on the other side of the front panel of that expensive gear he just bought besides another coat of paint? — *Dan Umberger, W8ZCQ, Columbus, Ohio.*

¶ I commend you for your very farsighted and courageous stand on incentive licensing in the U.S.A. Being a Canadian, I felt that it was not up to me to comment for publication on a purely American matter, although I recognized the potential impact on Canadian and foreign hams if the situation which was developing in the U.S.A. was allowed to continue.

I have noticed a definite improvement in the operating standards prevalent in the c.w. bands in the past year or so which I attribute to the fact that incentive licensing is eliminating some lads — or making good operators out of them. — *Ken Wilmot, VE7QQ, Smithers, B.C.*

CODE PRACTICE

¶ I wish to acknowledge a large debt owed to the ARRL and WIAW for the code practice which was such a big help in getting me over the 20 w.p.m. hump for the Extra Class exam. I must have passed it, for I received the coveted ticket yesterday.

On many occasions I was about ready to give up the idea, as code speed build-up does not come as easy for a 65-year-old as it does for a young squirt, but with all the assistance of you dedicated people, it finally came off. I'll be sending another call in soon for "Who The Devil Is Who?", I hope.

Keep the code practice rolling. — *Robert R. Ralston, W4IVS, Johnson City, Tenn.*

¶ It seems to me that anyone who is involved in ham radio enough to have a complete RTTY station should know WIAW's operating schedules and frequencies and stay off of them. — *Gerald I. Miles, WA4KJK, FPO, New York.*

¶ When conditions are good and there are not too many inconsiderate operators trying to cover your code practice, we can make use of the practice time. This, of course, doesn't seem to be much of the time anymore. I wonder how the inconsiderate ones got started? — *R. L. Hamilton, WASTRZ, Centerville, Ohio.*

LIFE MEMBERSHIP

¶ Enclosed is my ARRL Life Membership application plus a twenty year old "membership-subscription" form. You will notice that the dues were \$2.50 per year in the 1940s. I figure that if we have another 100 percent price increase in the next twenty years, Life Membership is quite a bargain. — *Ernie Bosselman, W1DO, Farmington, Connecticut.*

[EDITORS NOTE: For complete details on Life Membership see page 81.]

MORE ON NOVICE RENEWAL

¶ I was very pleased to see the FCC's proposed changes to the Novice rules. My Novice expired before I got to the General Class point and I have

been very sorry since.

I plan to get on the air again as a Novice, if the change is approved, and then get my General. — *Robert G. McCoy, Santa Monica, Calif.*

¶ I would like to comment on the new FCC proposal allowing ex-amateur operators another chance to take the Novice Class and get back on the air. This ought to be of great advantage to amateurs who fell by the wayside to take up a career or for various reasons left the amateur bands. Recently a friend visited my shack and after being off of the air for about 38 years he could still copy 10 w.p.m. If this proposal goes through I am sure that he and many others like him would take advantage of this chance to get back in amateur radio again. I think that whosever idea it was for this proposal deserves many thanks from ex-hams who would otherwise not be able to get back on the air without at least taking a Technician Class or higher. — *Phil McMillan, WN9ZAK, Galva, Illinois.*

¶ I am much in favor of adopting Docket No. 18266. If passed, this would give a second chance to a Novice who failed to qualify for a higher class license. Since the Novice license is now a two year term, this would give the ex-Novice more time to improve his code speed and grasp the theory for a higher class examination. Just because a man is slow at learning is no reason to ignore him. I urge you to petition the FCC for passage of Docket 18266 at the earliest possible date. — *Ronald A. Hornek, WA2GQW, Warwick, N. Y.*

[EDITORS NOTE: See page 80 for text of the ARRL's statement of endorsement.]

HAM-ADS

¶ I wish to express my appreciation for the fine response that I received to a small Ham-Ad that I placed in September *QST*. As of this date I have had 23 letters (from 17 states and the Marshall Islands) and 6 telephone calls (from as far away as New Hampshire). All of the ham equipment was sold. — *D. Ross Webster, W6CZP, Pomona, Calif.*

HELLO-GOODBYE DX

¶ In the May issue you ask: "Can we amateurs come up with a new way to convey to the peoples of other nations what we are really like?" And you answer, "simply through expanded personal communication." That's a great idea! But what about those who worship the rare DX QSL, in order to qualify them for membership in your famed, "status-sought" organization, the DXCC? These amateurs idolize the members of your club; many of these operators are those who contribute nothing to the personal aspect of DX communication.

And then, you have the nerve to say, (editorial, October, 1968) "without DXCC there would be no DX as we know it." That's for sure!!! The DX as we know it today is merely "hello-good-bye" — and the DXCC has brought it here. Maybe others will disagree, but, without DXCC the DX world would be a lot more rewarding for everyone. — *Martin Lesser, WB2BCI, Oceanside, N. Y.*

IS \$6.50 TOO MUCH?

¶ With great enthusiasm I enclose renewal of my membership to the ARRL and *QST*. I am fifteen years old and money comes to me a lot less easily than to many people. I would pay ten dollars a year to belong to the League, and feel it worth every cent! — *Andrew K. Weis, WA5VQC, Houston, Texas.*

I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

IARU TRAVEL

International exhibits, meetings and conferences were part of the activities of IARU/ARRL President W0DX during October. Robert W. Denniston represented IARU headquarters at the *Radio Society of Great Britain* International Radio Engineering and Communications Exhibition in London. Estimated attendance was 10,000 including some 6,000 radio amateurs. Our president, pictured below with *RSGB* Public Relations Officer, Mrs. Sylvia Margolis, was a guest of honor at the International Evening during the Exhibition.



While in London, Bob conferred with officers and staff of *RSGB* and with officials of the IARU Region I (Europe and Africa) Executive Committee.

Accompanied by *RSGB* president G3TR, W0DX also attended a joint EI/GI convention. The event was held on the border of the two countries and sponsored this year by the *Irish Radio Transmitters Society*. President Denniston was issued the call EI6BW and did some operating while there.

WESTERN SAMOA SEEKS UNION MEMBERSHIP

The national amateur radio society of Western Samoa, a small island state in the South Pacific, has made application for membership in the International Amateur Radio Union. The *Western Samoa Amateur Radio Club (WSARC)* reports a membership of 10, of which 6 are li-

censed radio amateurs (there is a total of 7 licensed 5W1s). Favorable relations with the government authorities in charge of amateur radio are maintained, and the society has its own amateur station.

Amateur licenses are issued by the Director of Post Office and Radio. An examination is required: the age limit is 14 years, and code speed is 12 w.p.m. Also, a technician's license is available without code examination for work above 144 MHz. General power limit is 150 watts, and frequency assignments exist in the 160, 80, 40, 20, 15, 11, 10, 6, 2, and $\frac{3}{4}$ meter bands and in the 1215, 2300, 3300, 5650, 10,000 and 21,000 MHz. bands.

Headquarters will present the application to member societies for a mail vote in the December 1968 issue of the *IARU Calendar*, a semi-annual newsletter to IARU societies.

RECIPROCAL NOTES

The United States has signed a reciprocal operating agreement with Ireland effective October 10, 1968, and with Monaco effective December 1, 1968. Canada and Nicaragua put into effect a reciprocal agreement as of September 18, 1968. The U.S. now has 38, and Canada 11, such agreements with other nations; a full tabulation appears elsewhere in this department.

OMs ARE OK!

Celebrating the 50th anniversary of Czechoslovakia, OK stations have been using the prefix, OM. This special prefix will be in use from October 1, to December 25, 1968.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: e.g., cards for VP8s go to *RSGB* in Great Britain. W, K, VE and VO stations only may send foreign cards for which no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations.

Algeria: ARA QSL Service, P.O. Box 2, Algiers

Angola: L.A.R.A., P.O. Box 484, Luanda

Antarctica: KC4AA cards go to the Office of Antarctic Programs, National Science Foundation, Washington 25, D. C. KC4US cards go to K1NAP, COMCBLANT, USN, CBCEN, Davisville, E. Greenwich, R. I.

Argentina: R.C.A., Carlos Calvo 1424, Buenos Aires, BA
Austral/French Antarctic Lands: via Malagasy Republic

Australia: VK1, VK2 QSL Bureau, WIA Box 1734, GPO Sydney, N.S.W.; VK3 QSL Bureau, E. Trebilcock, 340 Gillies Street, Thornbury, Vic. 3071; VK4 QSL Bureau, H. Scholz, 95 Stephens St., Morningside, Brisbane, Qld., 4170; VK5, VK8, QSL Bureau, Mr. Geo Luxon, VK5RX, 27 Belair Road, West Mitcham, S. Aust.; VK6 QSL Bureau, Mr. J. Rumble, VK6RU, Box F319, GPO Perth, W.A.; VK7 QSL Bureau, Mr. J. Batchelor, VK7JB, 39 Willowdene Avenue, Lower Sandy Bay, T.A.S.; VK9, VK0, Federal QSL Bureau, 23 Landale Street, Box Hill E, 11 Victoria.

Austria: Oe. V.S.V., Box 999, Vienna 1/9

Azores: via Portugal

Bahama Islands: Bahama Amateur Radio Society, Box 6004 Nassau

Bahrain: (All MP4) Ian Cable, MP4BBW, P.O. Box 425, Awali

Barbados: Amateur Radio Society of Barbados, Highgate Signal Station, Flagstaff Road, St. Michael

Belgium: U.B.A., Postbox 634, Brussels 1

Bermuda: K.S.B. Box 275, Hamilton

Bolivia: R.C.B., Casilla 2111, La Paz

Brazil: L.A.B.R.E. P.O. Box 2353-ZC 00, Rio de Janeiro

Bulgaria: CRCB, Box 830, Sofia

Burundi: via Congo (9Q5) QSL Bureau

Canada: See page 82

Canal Zone: Gloria M. Spears, KZ5GS, Box 522, Balboa

Cape Verde Island: Radio Club de Cabo Verde, CR4AA Praia, Sao Tiago

Ceylon: R.S.C., P.O. Box 907, Colombo

Chagos: via Mauritius

Chile: Radio Club de Chile, P.O. Box 13630, Santiago

Colombia: L.C.R.A., P.O. Box 584, Bogota

Congo: (TN8) QSL Bureau, P.O. Box 2239, Brazzaville

Congo: (9Q5) U.C.A.R. QSL Bureau, B.P. 3748, Elisabethville

Cook Island: ZK1 QSL Bureau, % Radio Station Rarotonga, Rarotonga

Costa Rica: Radio Club of Costa Rica, Box 2412, San Jose

Cuba: ANRAC QSL Bureau, P.O. Box 6996, Havana

Cyprus: C.A.R.S. QSL Bureau, P.O. Box 216, Famagusta

Czechoslovakia: C.A.V., Box 69, Prague 1

Denmark: E.D.R. QSL Bureau, Ingstrup pr. Lokken

Dominican Republic: R.C.D., P.O. Box 1157, Santo Domingo

Ecuador: Guayaquil Radio Club, P.O. Box 5757, Guayaquil

El Salvador: Club de Radio Aficionados de El Salvador, P.O. Box 517, San Salvador

Ethiopia: Kagnev Station Amateur Radio Club, ET3USA, APO, New York, N. Y. 09843

Faeroes Islands: P.O. Box 184, 3800 Torshavn

Fiji Islands: QSL Bureau P.O. Box 184, Suva

Finland: S.R.A.L., Box 10306, Helsinki 10

Formosa: (BV1US calls only) Taiwan American Radio Club USARSCAT, Box 8, APO, San Francisco, Calif. 96263

All other BV stations: QSL Bureau, C.R.A., Box 2007, Keelung, Taiwan, Rep. of China

France: R.E.F., Boite Postale 70, 75 Paris 12

French Oceania: Radio Club Oceania, P.O. Box 374, Papeete, Tahiti

Germany: (DL4 & DL5 only) MARS Radio Station Hqtrs. 93rd Sig. Bn. APO, New York, N. Y. 09175

Germany: (Other than above) D.A.R.C., Box 99, 8 Munich 27

Ghana: G.A.R.S. QSL Bureau, P.O. Box 3773, Accra

Gibraltar: RAF Amateur Radio Club, New Camp, RAF

Great Britain: (and British Empire): R.S.G.B. QSL Bureau, G2MI, Bromley, Kent

Greece: R.A.A.G., P.O. Box 564, Athens

Greece: (SV0s only): Signal Officer, Hqtrs. JUSMAGG, APO, New York, N. Y. 09223

Greenland: via Denmark

Greenland: (KG1, OX4 and OX5 calls only): KG1A-KG1E (OX5) to MARS Director, OX5BX, APO, New York, N. Y. 09023. KG1F-KG1Z (OX4) to MARS Director, OX4FR, APO, New York, N. Y. 09121

Guam: M.A.R.C., Box 445, Agaña, USPO 96910

Guantanamo Bay: Guantanamo Amateur Radio Club, Box 55, FPO, New York, N. Y. 09593

Guatemala: C.R.A.G., P.O. Box 115, Guatemala City

Haiti: Radio Club d'Haiti, Box 943, Port-au-Prince

Honduras: Jacobo Zelaya, Jr., HRIJZ, Bo. Buenos Aires, 13 Calle 505, Tegucigalpa, D. C.

DX OPERATING NOTES

Reciprocal Operating

(**Bold face** indicates changes since last list.)

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Austria, **Barbados**, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Guyana, Honduras, India, **Ireland**, Israel, Kuwait, Luxembourg, **Monaco**, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, **Surinam**, Switzerland, Trinidad and Tobago, United Kingdom and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, **Nicaragua**, Senegal, Switzerland, United Kingdom and U.S.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Barbados (only U.S. stations/8P) Bolivia, Brazil, Canada, (Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela, Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

DX Restrictions

U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Vietnam forbid radio communication between their amateur stations and such of other countries. U. S. amateurs should not work HS XU XV 3W8 or 8F. Canadian amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided are HS JY XU XV XW8 3W8 and 8F.

Hong Kong: Hong Kong Amateur Radio Transmitting Society, P.O. Box 541

Hungary: H.S.R.L., P.O. Box 214, Budapest 5

Iceland: Islenzkir Radio Amateur, Box 1058, Reykjavik

India: A.R.S.I. QSL Bureau, P.O. Box 534, New Delhi 1

Iran: Amateur Radio Soc. of Iran, APO, New York, N. Y. 09205

Ireland: I.R.T.S. QSL Bureau, 24 Wicklow St., Dublin 20124
Israel: I.A.R.C., P.O. Box 4099, Tel-Aviv
Italy: A.R.L., Viale Vittorio Veneto 12, 20124 Milano
Ivory Coast: ARAI, B.P. 20036, Abidjan
Jamaica: Jamaica Amateur Radio Association, Red Cross Bldg., 76 Arnold Rd., Kingston 5
Japan: (JA only): J.A.R.L., Box 377, Tokyo Central
Japan: (KA only): F.E.A.R.L.-M-, APO, San Francisco, Calif. 96525
Johnston Island: KJ6BZ, % MARS Stn., Det. 1, 1957 Comm. Gp., APO, San Francisco, Cal. 96305
Kenya: RSEA QSL Bureau, Box 30077, Nairobi
Korea: Korea Amateur Radio League, Central Box 162, Seoul
Korea: (HL9) HL QSL Bureau, Signal Section, ISFK/EUSA, APO, San Francisco, Calif. 96301
Kuwait: Alhalfi Nasir H. Khan, 9K2AN, P.O. Box 736, Kuwait, Persian Gulf
Laos: Houmphanh Saignasith, XW8AL, P.O.B. No. 46, Vientiane
Lebanon: R.A.L. QSL Bureau, P.O. Box 1217, Beirut
Liberia: Liberian Radio Amateur Ass'n., Post Box 1477, Monrovia
Libya: 5A QSL Service, Box 372, Tripoli
Liechtenstein: via Switzerland
Luxembourg: R. Schott, 35 rue Batty Weber Esch-Alzette
Macao: via Hong Kong
Madeira Island: via Portugal
Malagasy Republic (Madagascar): P.O. Box 587, Tananarive
Malawi: 7Q7RM, P.O. Box 472, Blantyre
Malaysia: QSL Manager, M.A.R.T.S., Box 777, Kuala Lumpur
Malta: R. F. Galea, 9H1E, "Casa Galea," Railway Road, Birkirkara
Mariana Islands: see Guam
Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, FPO, San Francisco, Calif. 96555
Mauritius: Paul Caboche, VQ8AD, Box 467, Port Louis
Mexico: L.M.R.E., P.O. Box 907, Mexico, D.F.
Midway Island: KM6BI, Box 14, FPO, San Francisco, Calif. 96643
Monaco: Pierre Anderhalt, 3A2CN, 49 rue Grimaldi
Mongolia: JT1KAA, Box 639, Ulan Bator
Morocco: A.A.E.M., P.O. Box 299 Rabat
Mozambique: L.R.E.M. QSL Bureau, P.O. Box 812, Laurencio Marques
Netherlands: V.E.R.O.N., Postbox 400, Rotterdam
Netherlands Antilles: VERONA, P.O. Box 383, Willemstad, Curacao
New Zealand: N.Z.A.R.T., P.O. Box 489, Wellington
Nicaragua: Mike Murciano YN1MO/W4, Box 902, Coral Gables, Florida, U.S.A.
Nigeria: NARS QSL Bureau P.O. Box 2873 Lagos
Northern Ireland: via Great Britain
Northern Rhodesia: see Zambia
Norway: N.R.R.L., P.O. Box 21, Refstad, Oslo 5
Nyasaland: see Malawi
Okinawa: O.A.R.C., APO, San Francisco, Calif. 96331
Pakistan (East): Mohd, AP5CP, Tiger Amateur Radio Club Dacca Signals, Dacca 6
Pakistan (West): Lahore Amateur Radio Society, P.O. Box 65, Lahore
Panama, Republic of: L.P.R.A., P.O. Box 9A-175, Panama 9-A
Papua: Via VK9 QSL Bureau
Paraguay: R.C.P., P.O. Box 512, Asuncion
Peru: R.C.P., Box 538, Lima
Philippine Islands: P.A.R.A. QSL Bureau, P.O. Box 4083, Manila
Poland: PZK QSL Bureau, P.O. Box 320, Warsaw 1
Portugal: R.E.P., Rua de D. Pedro V., 7-4., Lisbon
Puerto Rico: Alicia Rodriguez, P.O. Box 1061, San Juan
Rhodesia: R.S.S.R., P.O. Box 2377, Salisbury
Roumania: Central Radio Club, P.O. Box 95, Bucharest
Rwanda: via Congo (9Q5) QSL Bureau
Sumoa (American): Utulei High School Amateur Radio Club, c/o Director, Pago Pago, Tituila, 96920
Samoa (Western): Director of Post Office and Radio, Post Office, Apia
Scotland: via Great Britain
Senegal: Ch. Tenot, 6W8BF, P.O. Box 971, Dakar

Sierra Leone: Radio Society of Sierra Leone, P.O. Box 907, Freetown
Singapore: QSL Manager, M.A.R.T.S., P.O. Box 777
South Africa: S.A.R.L., P.O. Box 3037, Cape Town
Spain: U.R.E., P.O. Box 220, Madrid
St. Vincent: QSL Bureau, P.O. Box 142, St. Vincent, West Indies
Surinam: QSL Manager (PZ1AR), Surinam Amateur Radio League, P.O. Box 240, Paramaribo
Swan Island: Swan Island, West Indies via Tampa, Florida
Sweden: Sveriges Sandare Amatorer, Fack, S-122 07 Enskede 7
Switzerland: U.S.K.A., 6233 Bueroen/LU
Syria: TIR, P.O. Box 35, Damascus
Tanzania: RSEA, P.O. Box 2387, Dar es Salaam
Trinidad and Tobago: T&TARS, P.O. Box 1167, Port of Spain
Uganda: R.S.E.A. QSL Bureau, P.O. Box 3433, Kampala
United States: See page 82.
Uruguay: R.C.U., P.O. Box 37, Montevideo
U.S.S.R.: Central Radio Club, Box 88, Moscow
Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
Venezuela: R.C.V., P.O. Box 2285, Caracas
Virgin Islands: Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, V.I. 00820
Wake Island: Jack A. Chalk, KW6EJ, P.O. Box 415, Wake Island 91930
Wales: via Great Britain
Yugoslavia: S.R.L., P.O. Box 48, Belgrade
Zambia: Radio Society of Zambia, P.O. Box 332, Kitwe

QST



Feedback

Somehow, some way, the top 15 scores in Class B in the 1968 Field Day writeup (November QST) never made it to the printers. We apologize profusely to all who were victimized:

K6YNB/6 } K0GJD }	842-AB-11,808
W6GEN/6 } WB6JSY }	1253- C- 8118
W3CSZ/2 } W2JBQ }	510-AB- 7557
WB6CWD/6 } WB6WEG }	723- B- 6707
VE3GEJ/3	436- B- 6086
W0AWW/0 (WA0s PUJ PXU)	631- B- 5899
W3RQZ/3 (W3AES, opr.)	576-AB- 5438
W2EUP/2 } W2ZRC }	534- B- 5406
WB6RZH/6 } WA5BUG }	837- C- 5222
WB2YPM/1 } WB2ZAV }	516- B- 5044
K9FFA/9 } K9DMV }	804- C- 5024
WA8KEM/8 } WA8GCL }	726- C- 4756
W6ANB/6 } WB6TBL }	436-BC- 4102
K0BHM/0 } WA0NCR }	631- C- 3986
KH6GLU/KH6	408- B- 3872

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Where?

"Where have all the Gs gone?"

This question is raised in recent issues of Radio Society of Great Britain's *Radio Communication*, formerly the *RSGB Bulletin*. We have painfully watched British single-op reporting stations in annual ARRL DX Contests steadily dwindle from a 1939 high of 65 to a measly 17 this year, so we're glad somebody brought up the query. Ham radio is such an international institution that the solution(s) to this puzzle may be vital to us all.

G3FKM leads off in his "Month on the Air" DX commentary for August:

A sad feature of many letters received by your scribe from overseas is the almost universal mention of the fact that although conditions have been good into continental Europe very few stations in the UK have been



A ten-watt power limit, lack of a.c. mains, and scarce factory-built gear didn't daunt English hams of the '30s. One-fisted G5BD and colleagues were thick as flies from dawn to dusk to dawn again. (Photo via W2GP, reprinted from June '67 QST)

worked or indeed even heard. A glance at any set of international contest results will confirm the almost total lack of participation from this part of the world. One is forced to wonder whether we have the lowest activity rate or whether our insular character shows itself and causes the majority of British amateurs to occupy the v.h.f. bands and 160m, content to talk to each other over comparatively short distances. The other, and possibly more sinister explanation is that there is such a seriously high level of TVI in existence that many are afraid to use their equipment during television hours.

G3VA, in his "Technical Topics" pages the following month, acknowledges the validity of Dr. Allaway's concern and enlarges on the theme:

... Words [that] many of us have been wondering for some time—where have all the Gs gone? With British licence statistics at an all-time high, one can often tune the h.f. bands (I can vouch for 14 MHz c.w.) and

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begin to imagine that some secret edict must have been issued by the PMG closing down almost all stations in this tight little island. Soon our overseas friends will be mounting DXpeditions to London!

There is no easy way of quantitating this decline in activity. Back in the 'thirties the Society used to hold regular band-occupancy checks, recording all British calls heard over a weekend—and I seem to recollect that this usually resulted in about half of all licensed stations being logged. There can be little doubt that similar checks today would yield a far, far lower percentage.

G3FKM suggests that British amateurs have quitted h.f. for v.h.f. and Top Band. Yet one has only to read "Four Metres and Down" to find repeated appeals for more activity—and 1.8 MHz can often seem pretty empty of amateurs. It may be, of course, that large numbers are busy building new gear, or swatting up on theory. . . .

G3FKM believes that many stations stay off because of TVI—some may suspect it could be just TV. Then, undoubtedly, many amateurs today retain their licences during long periods when they have no intention of using them, simply because of the difficulty of renewing a call once it has been given up. With licences going up to three pounds a year, it might be opportune for the Society to press for some new arrangement by which licences could be put into temporary cold storage, but renewed without having to retake examinations. It used to be said of "lapsed" amateurs that "they always come back," after those years when work or family considerations interrupt the hobby; but this, I fear, is no longer true, largely because of the difficulty in renewing a licence.

Certainly, the current level of British activity on h.f. compares unfavourably with that of most European countries—especially Germany and to the East. If this is really a matter of TVI then it is time we all did something more about it; if it is rather that large numbers no longer find amateur radio as interesting as when they struggled to acquire their licences, then we should be looking into why (for, technically, there is still much useful development work to be done); if it is because many modestly equipped stations feel it to be an unequal struggle to compete against the "four-element, 80-ft up" types, or because they feel that communications technology has become too complex for the non-professionals, then we must find ways of encouraging the use of simple, as well as of advanced equipment.

Is it perhaps, the endless number of "contests" or the many, often pointless, new certificates announced each month? At one time such awards were a real encouragement in providing a genuine yardstick of achievement, but now too often appear as just fund-raising wallpaper. There would seem to be need of an urgent enquiry into what is happening to the level of British activity, and how it now compares with 10, 20 and 30 years ago. All sorts of "technical" questions would have to be answered—how active is "active"? Is there some critical period when many amateurs give up? What has been the real effect on the hobby of s.s.b.? Why are there now more model-control licences than amateur licences? Do the Societies and publishers do all they might to keep alive interest in the hobby? And of the 14,000-plus UK licencees, just how many have been on the air or active in constructional work in the past three months?

Pat added a few more pointed questions, you'll note, each capable of standing on its own. What, if anything, is wrong? Any answers out there in hamland?

What:

Maybe QSOs are just too darned easy nowadays? No more challenge? Scant skill and persistence required? This could be a factor from the DX end, but competition among W/As/VEs for overseas contacts seems as fierce as ever. Let's see what they're chasing on

15 phone, figures in parentheses representing kHz, above the lower band edge, digits outside parens indicating Greenwich time in whole hours: A2CAH (305) 17, AP2MIR (300) 12, CE5 ICO 21B (260) 1, 3AA1 3PT 3PY 4FB 5DL 5LD 6EZ 7DW 9AAE (410) 18-1, CN8MK, CO2s DL (270) 0, FM HN (200) 21, HQ, CPs 1EN 5AK 5DF 5EQ (290) 22, 6ET (430) 2, 6FP (325) 1, 6FT 21, 6H1 S&B, CRs 3KD 4AJ 4BA 5SP 22, 6AL 6BF 6BX (290) 23, 6CA (362) 18, 6DP (366) 21-22, 6EU 6GM (275) 21, 6IV 6IV (310) 18-19, 6KC 6LV 20, 7CI 7IC SAH (315), 9AK (346) 14, CTs 1AB 1AW 2AR (330) 16, 4AV (330) 16, Cxs 2CC 3MT (210) 18, 7AP 23, 3AAW (410) 0, 9CO 9PP, DU1s AT (270) 18, FH (270) 19, EAs 6FC (267) 13, 6BG 8BQ (302) 20-21, 8EB 15, 8FF 19, 8FG (240) 18, 9AQ 17-18, 9AH (285) 20-23, EAs 2BG 3Y 23, ELs 2AA 2AC 2BA 2BG (270) 16, 2F (350) 15, 8J 9A 9B5 9C, EPs 2DW 3AM (334) 18, ET3s FMA (285) 16-17, RB REL (250) 21, USA 21, ZL, FB8s WW YY, FG7XL (362) 13, FH8s CE CF, FL8DG, FM7WO, FO8s BV (237) 19, BY 11, FR/ZB (275) 17, FS7RT (283) 1, GC8HT (299) 8, GD3RFK (346) 21, HB0LL, HC8s IPC (355) 11-12, 2EJ (406) 0, 2OB (364) 20, 4RA (387) 22, 4WA1 (400) 21-22, 7FD (403) 2, HH9DL, HH8s TEP (270) 22, JXP, HKs 4BIW (356) 22, 6AGH (270) 19-20, 6BAIF 6F1 6BRX (310) 17, HL9Us (321) 8-9, HMLBF 12, HPs LIC 1AD (330), 2JO (407) 1, 2MD (275) 15, 3DA (275) 0, HRS IFAH IIEH (350), IKAs (242) 21, 1A1As (265) 1, 2WT 2WTA (230) 1, ITU/FCC-banned HSs 1AF 3AL (286) 17, 3BA 3DR (300) 20, 3MJ (291) 11, 3KFM 3ZZ, HY8SJ (290) 18-19, IS18CB 21, JAs IRE IETN IWNW IWWIE IXXK 2CNF 2IYJ 3JGB 3N3I 3LED 3TAA 4AFT 4BYN 4CJS 4DLP 4FKX 6BEE 6ERR 6IAY 7ZF 8BFO 8BIO 9DFG, JH1s AYT AZA BIN BAR LOX, JT1KBT, JX2BH (295) 13, KOBAC/8P6 (370) 3, KAs ITI (356) 12, 2VT 9AF (295) 12, KGs 4AM 6AA (290) 23, 6AGQ 6ALY 6APF (290) 10, 6ARJ 6RY, KJ6CF (328) 10, KH6s FRU GKD, KM6B, KR6s DI (265) 23, UD UR US 3, USA, X56s BS C1 20, CN, KY4s AD ES (378) 19-20, EG, KW6s AA (361) 12, EG (375) 11, EJ, KX6s DB (366) 4, EN FN FZ (262) 8, GJ (325) 12, KZ5s NG SS (405) 3, LX1s BW (276) 14, CO (302) 16-17, DV (370) 15, RM, LZ2KKZ (308) 16, MIB (330) 22-23, MP4s BDE BEU (253) 20, BFJ BGE BGU DAT (345) 20, MBB (300) 15, MBC (328) 18, TCE (345) 8, TCF (360) 18, TCN (400) 18, OAs 1QH 1W 2BH 4JR (376) 13-20, 4LW 4UC 4UK 4XZ 5AY (355) 19, 5NY 6BW 8AU (375) 20, 9G (325) 1, OD5s BA (275) 19, BZ ED (302) 15, EJ 22, EQ 20, ET FM (333) 15, FQ, OE3GLW/1, OH0s AA (307) 16, NI (290) 12, OK1ADM (295) 22, OX3s DM EL 21, MT, OY5NS, PA9FE, PIKMA 14, PJ2CQ (325) 23, PYs IEBF 2CPC 2DKF 2ERS 2FG 2ON 6NG 7LC, PZ1s BW CF, SKs 5AJ 6AB 6AW 6BZ (270), OXAs, SLOAs, SVs 1BI (310) 14, QWA1 (340) 22, QWMA1 (368) 16, QWQ (362) 20, QWS 19, QWV, TAAAR (270) 13, TFs 2WKM1 (297) 18, 2WKP 17, 2WKW (320) 14, 3BV (330) 18, TGs 4SR (396) 3, 4VH (350) 15, 7BS (280) 21-22, 9EP (300) 15, 9GF (320) 20, 9RN (305) 19-20, 9US (254) 2, TI5 2EVA (298) 20, 2JVL (200) 13, 2LSA (440) 0-1, 5MH (260) 1, TJ1s AL (280) 16-23, AP AQ 14, AR, TT8AN, TU2s AY (307) 17, AZ (228) 12, BQ (265) 16, CC 21-22, CF (288) 9, UA9s BE VB, UBSs FG (257) 19, OD, UD6s RD HR, UF6FE (295) 12, UH8AI (325) 14, UH8MN, UP2NV, UQ2NW, UTSOM, UW9s AF 14, DZ, UY5XS (290) 21, VE8MB (355) 15, VKs IEF SAV (200) 13, 9DH (250) 18, 9GN (370) 6, 9LR (340) 13, 9VM (331) 11-12, 9VD (333) 11-12, 0Cs, VP5 ILB 2AA (323) 17, 2DAI (260) 20-0, 2DAJ (273) 20-1, 2DT (270) 23, 2GAE (270) 22, 2GAI (290) 22-23, 2GBG (335) 15-16, 2GC (260) 23, 3GLE 2MF 2MT (275) 3, 2VQ 2, 5AA 5CB (230) 22-23, 7DL 7NF 7NO (275) 0, 8JG (312) 1, 8JR (324) 1, 8KD (260) 18, 8KN (304) 0, 8KQ (251) 17, VQs 8CC (305) 19, 9DH (360) 19-22, 9V (280) 21, VRs 1L (370) 4-12, 2DK (290) 10, 2EK 6TC (355) 22, VSs 6AA 6AD 6CR 6DR (291) 12, 9MB (210) 17, VU2s BK (320) 16, DKZ (295) 8, OIK (382) 16, W6FNS, KW6 (310) 15, XW8s AX (300) 13, AY BJ (295) 10, BX (304) 16, CAL (343) 16, YAs 1AB (320) 8-9, 1AD 1SG (320) 13, 1HP 1YB (324) 15, 1ZC 5RG (299) 16-17, taboo YBOAB (322) 15, YJ8BW (270) 12, YN5 1BKC 1GLB 1HRC 1JEL (377) 22, 1MO (355) 20, 1RER (310) 13, 1RMP 2RAC (283) 21, YPS 1FF (318) 20, 1FQM 1RTP (390), 1XEE 2RAR, plenty of YVs, YU2s 2AY (302) 0, 6CB 22, ZC4s BK (330) 20, MO (331) 22, BR TK (284) 20, ZDs 3D (320) 16-17, 3V 17, 5V (320) 18, 7DI (286) 21, 8AB (261) 21, 8CC 8GA (290) 16, 8HAL 8JW 8RK 8Z (270) 18, 9BE (265) 16, 9BL (295) 18, ZEs 1CS 4JS (290) 18, 6JL 6JU 8JN, ZF1CP (285)

18-19, ZP5s FT JN (422) 3, KN MO (380) 2, ZS3s BF (287) 19, HX (315) 18, LU, 3A2CN (340) 18, 4A3AF (358) 20, 4J0AH (325) 11, 4S7PB, 4U1TU (290) 19, 4W1Z (295) 10, 4X4s GV SO (330) 21, TB UF (351) 17, VB XB (260) 4Z4s HF (335) 22, HG (570) 17, HO 19, HT 14, 5A5s 1TG (315) 21, 11Y (366) 16, 5AKR 4TH (280) 21, 5TH (329) 17, 5H3s JL (290) 18, JR 20, KJ (242) 21, 5N2s AAF (423) 11, AAN (390) 13, ABF (315) 11, ABH, 5R8CJ (320) 14-15, 5U7s AB AL (330) 8, 5VZAB, 5X5JK (360) 18, 5Z4s JH JK (335) 16, KO (323) 19, KZ LA 18, LG (300) 18, 6O1GB (400) 19, 6W8s AL (310) 19, BM DY (308) 18-19, 6Y5s JH (270) 12, JR (306) 13, RA RF, 7P8AR (300) 17-18, 7Q7s AM (313) 0, LZ MR (347) 19-20, 7XOAH, 7Z3AB (300) 18, 8P6s AH (250) 19-20, AV AY (315) 22-23, CC, 8R1s E (200) 19, S (251) 0, 9G1s FL (275) 23, FV GD (318) 23, GJ (270) 17, KM (323) 17, NY, 9H1s, BA (380) 20, AI R (305) 15, 9J2s AP BC (327) 20, 9K2s BG (315) 18-19, 8J (360) 22, 1K BK BV (300) 19, CB (350) 18-19, C (8J, 9L1KZ (330) 10-15, 9M2s BD 16-18, DQ (220) 18, DU (385) 11, DW NF (260) 19, NY (320) 18, PO (275) 15, RH (307) 15, VO VQ (295) 16, 9N1AM (228) 11, 9Q5s AA 20, CP (305) 11, CR DG (305) 16, GR (305) 20, HF 20, HU 1A (322) 20, IO PE (345) 19, PT (345) 22, S (235) 18, YR 9U1s HG (270) 18, CR (300) 22, DL (310) 14, DP (280) 18, SK 20, 9V1s LG 15, NP NY CG (370) 14, OG (275) 16, OV (297) 15, OY PA (380) 17, 9X5s AA (262) 20, IH 22, PB (300) 22, SP (223) 20, TA (287) 13-14, VY, 9Y4s CR (260) 0, DS HP (350) 21, LR RT (280) 21, TP 23 and VT (260), about eight to one in favor of the single-sideband, these targets recommended by "Howie" correspondents Ws, 2DY 4AJ 4GTS 4YOK 8YGR 9LQK, KOC5M, WA5 1CJE 1DJG 3GVP 3HRV 3IID 5M1N 5PPZ 6MDT 8MCO 8QJK 9MOI 9TFM 9URY 0FRM, WBS 2BCI 4GSS, KP4DBJ, F3VNAW2 and monitor P. Kilroy.

40 phone, to quote from W8YGR, K4FCB and the clubs press, is featuring folk like CPs 2SB (80) 5, 3DM 7DK 23-0, CM2DC (85) 6, CN8AW (62) C, P6EV (50) 5, CR6s FY (95) 22-23, GO, CT1V, CNXCO (60) 5, DL8s JG MM, DU1EH (85) 22, EA5 3QW 4K1I 7II 8FF, ET3SA (75) 23, GCs 2FMV 5AET (70) 22, GD3M1M (70) 21, GMBs JTG HBs 9HA 0LL, HK4GV, IIs NU TRF, JABBMK, JX2BH, KX6GK/L (263) 10-11, KL7AZN, LA5KJ, LX1s PZ 9, SK (65) 10, SL 13-14, OAs 4NZ (90) 6, 5AM, OH2BM, OY5NS (40) 23, PYs 2ENX 6ABB 7ARP 8CQJ, PZ1CF (70) 20-22, TA2BK, 1G9VD (80) 6, SL3ZY, UAs 1AG 1DJ 1IG 8BL 0BP (90) 0, UYSZA, VKs



W4BPD with DX friends among some souvenirs. Gus threatens to take over DX bands once more next year with a world-spanning DX tour. From left to right, VU2s RF GE HK, W4BPD, VU2s LL BK and LM. (Photo via W4ECI and K6AQO)

EAOAH of Fernando Poo is often found near 21,285 kHz. at 2000-2300 GMT. Jose finds pile-up pressures continually fierce, being Rio Muni's side resident amateur. (Photo via WA1DJG)



2FU (82) 11, 3HW (85) 11, OQZ (90) 17, 3ZL (90) 11, VP1CB 3, XE1HT 8, YU30V, YV's 1R1 1EL 1, 4GD (80) 7, 5HOA, ZC4s MO (95) 23, RB (68) 22, ZD9BE 21, ZLs IAGO (90) 11, 2BCG (85) 7, ZP3AB (62) 23, ZSLIA (68) 22, 4U1TU, 5A3TW (75) 21-22, 6W8RA (69) 22 and 9Y4KR (70) 0-23, mighty interesting fishin' between all the SWBC juggernauts and attendant jammers.

75 phone's early returns, filed by K4IEX, OA8V and noted in literature of clubs and groups, are quite promising: 1JJs 5JK, CT3 8WO, ET3USA (3798) 23, GWs 2AP 2HQ 2OP 3VVJ, HB0LL, KC4USP, KV4AD, KZ4MV, LX1VH, OE's 5DS (3799) 3-4, 8ZWQ, OH2SB, OZs 1CN 5EU, PAQs FCM LX, PY2SU, UP2s CV NW, VO1s AL FX, VP's 2MJ (3796) 3, 7BG (3795) 3, W1FZL, KP4 (3820), ZLs 1AXR 2AJP, 3A2MJC, 4U1TU, 5Z4LE and 9M2DQ. As usual, the stuff hugs the low edge of our Yank phone sub-band, with another cluster near 3700 kHz, and scattered pockets farther downband. Beginning with the new year ARRL's 5-Band DXCC will inspire feverish developments on 40, 75 and 80!

We ticked off 28-MHz. phone last month for the earlybirds. Your "How's" Bandwagon will next tour some c.w. scenery with the guidance of (15 c.w.) Ws 1DAL 3HAM 3HNK 4YOK 7BE 8YGR 9GXR 9LNG, Ks 4PCB 8BCK, WAs 1CJE 1DJG 1FHU 1IDP 2APG 3GVP 3HRV 3HD 3KOS 5MIN 5PPZ 5SOX 8MCO 8VBY 9TFM 9URV, WBs 2BCI 4GSS 6VVS, KP4DBJ Hs DFE ER, WNs 2FOR 2REH 3JRY 3KHZ 4IF HX 4YB 7JG; (20 c.w.) Ks 1HDO 8BCK, WAs 1DJG 1FHU 5PPZ 8MGD, KP4DBJ, Hs DFE ER; (40 c.w.) Ws 3HNK 8YGR, K4FCB, WAs 1DJG 1FHU 2APG 3YVS 5SOX 8MCO, WB4GTI, WN3JRY; (80 c.w.) WISWX, K4IEX, W1FHZ, WN4YJB; (20 c.w.) Ws 1VAH 2DV 3HNK 4YOK 7BE 8BXX/2 8YGR, K4TWJ, WAs 1FHU 1GGN 3HRV 3HD 3KOS 5PPZ 8MCO 9TFM, WVs 2BCI 4GSS 4GTI, HIER, D, Maev. Then we'll hit the phone road again starting with (20 phone) Ws 2DY 2VOZ 3HNK 1NJE 4YOK 8YGR, K4TWJ, WAs 1FHU 3HD 3HRV 5PUQ 8MCO 9TFM, WBs 2BCI 4GSS 6WLH/3 and Mr. Kilroy, plus other reporters to file. Hardly necessary to remind you that the new incentive-licensing sub-subbands are in effect as you read this. Nuisance, eh? Unless you had the foresight, opportunity and diligence to collect your Advanced or Extra credentials. Go get 'em! As for 160, December's Tests are scheduled for the 1st, 14th, 15th, 28th and 29th as detailed here last month.

Where:

ASIA—XW8BP's QSL manager for QSOs after August 1, 1968, is K6HPZ. "Due to the many Stateside stations who have worked XW8BP before that date and have not received cards, I will also QSL for W/K contacts dating from November 20, 1967." W3HNK writes, "I'm now confirming QSOs for JAIIV after October 1, 1968. Toshihiko, a Buddhist priest, is active on several bands." Arkansas DX Association, Box 7323, Little Rock, Ark., 72207, will be Stateside-only QSL bureau for this month's CR9AK encore by VS6DR & Co. "Phil says there will be managers for other areas," notes WA5OFT. WB2-UKP apprises, "Beginning with QSOs of November 1, 1968, I'll be handling BV2's QSLs for the western hemisphere only."

AFRICA—"Effective October 1, 1968, I will act as QSL manager for ZS3D," affirms K4RTA. W7KTL informs, "All who worked me as 9GHTK and still need cards can get them with the usual self-addressed stamped envelopes at my Spokane address." Earl's former QSL aide, W7ATA, has turned all books over to W7KTL. W3HNK iterates that he cannot confirm 5A3TX QSOs after July 4, 1968. A new operator named George now uses the call. Joe understands that the latter can be reached via the Libya bureau. NCDXC's DX'er relays F5OJ's declaration that the only Tunisian QSLs handled through that station are those for 3V8AB. WA1DJG learns that EAOAH sometimes uses this address: Jose M. Perez, Avda. de Aragon 292 4º Deha., Madrid 22, Spain.

EUROPE—H1LCK, QSL tender for IIAV/M1's past fling, finds that many outbound cards have strayed. "IIAV/M1 logs now have been delivered to me. Anyone interested will have to reapply with new QSL." W8IBX/2 identifies all those OM chaps as

OKs using that prefix in conjunction with celebration of a Czech state anniversary. In most cases their suffix identities remain unchanged, e.g., QSL, OM3BG to QK3BG or via the CAV bureau. W3VT holds a batch of QSLs from DP2KBC for expectant W/Ks, s.a.s.e. required. This note via K3OLG/3 who indicates that the bureau will continue. DLs 4FS and 5LR vow, "We intend to QSL 100 per cent for our October operation as W8MJZ/LX and K1DWQ/LX. S.a.s.e. or s.a.r. with International Reply Coupons, will be greatly appreciated." SM8CZS comes through with revised addresses for SK3s AH and AK, stressing that he's no longer QSL manager for either DL4QQ (WA6PMK) writes in SCDXC's Bulletin: "ILS servicemen in Berlin can be identified by the 'Q' suffix of their DL4 or DL5 calls. The British use DL5Y-calls, and German nationals in Berlin use the number 7 in their prefixes."

SOUTH AMERICA—"The postage rate in Brazil went S up 100 per cent last week," laments PY7AKW, concerning QSLs for the current St. Peter & Paul swing of PYOs DX and SP. "Last year only 35 per cent of all stations worked requested our cards. We're hoping for 100 per cent this time." For direct reply they'll need four IRCs with each petition from North America, six from Asia, Europe and Oceania. Other QSLs eventually will be answered by the bureau route. W4NJF, QSL tender for VP8KE (ex-V89ABL), calls attention to his new QTH as listed among the addresses to follow. Regarding the QSL handler for VP8s FI, JH and JI, W4JUK comments: "I sent Mr. Chilvers a self-addressed envelope with two IRCs, and I suggest that others follow this procedure." Carter also learns that OM Chilvers will attend to QSLing for one Les Graves, due for a fresh VP8 tag on Signy island. G. Watt's DX News-Sheet emphasizes that W4QVJ does not confirm CEOZ/mm QSOs. Ed's been stuck with this misidentification since he performed as QSL rep for the land-based CEOZI in October of '63. West Coast DX Bulletin understands that PY4KB may be of assistance toward QSLs for last April's PYOBRL Trindade thing.

HEREABOUTS—"DL3RK became my QSL manager for Europe, Africa, Asia and Oceania starting September 19, 1968," advises TG9RN. "I will personally handle all W/K/VE QSLing through P.O. Box 892, Guatemala City, in response to s.a.p., with two IRCs for annual reply." VOIAW writes, "I'm not particularly interested in collecting QSLs for my operation as VE0MD, seeing as it's maritime mobile, but I will answer all cards received." After QSLing a 6L6, Gray and Lombok Isles, considers himself well on the way to DXCC-BL. A lucid dissemination by WB0LR of ARRL's Sixth call area bureau branch, directed to Sixes but of interest to all: "Each month San Diego DX Club receives over 50,000 DX QSLs for forwarding to California fans, but not all claim their cards. In accordance with ARRL policy all claim their cards for one year are destroyed. Although over 15,000 are discarded each month, the number on hand always remains in excess of 100,000. While some top DXers are prime offenders, the worst is the casual DX'er who works a DX station now and then but doesn't keep an envelope on file in the QSL Bureau. The ARRL Bureau is operated for all amateurs, not just League members. To receive your cards all that is necessary is to send a self-addressed stamped envelope (5" by 7" manila preferred) with your call in the upper left-hand corner. Each month your cards will be mailed to you. Send several

envelopes at a time, and don't be afraid to attach extra stamps with paper clips as any unused postage will be returned." HA5KQD, HI7JPM, IIZMO, PY3 HOCG 2DFR, TJ1AL, VP2AZ, ZD8Z, W2MES, K3EST and WB6HGH are "QSLers of the Month" mentioned in mail from W9TCU, WA5 2CKU 2HIU and 8PVN as significantly snappy replies. . . . "Epl! W4LXA could use tips toward confirming old QSOs with AP5HQ, CE0AE, EA9EO, UH8S CS DC, UO5s AA AN, UR2KAD and 9X5FF, WA5PPZ will settle for scoop on HL9TF and PY0AO. . . . WA1HXU and WN2EKS offer their services as QSL agents for overseas DX ops overburdened in the records department.

OCEANIA—WA5OFT, Arkansas DX Association secretary, pleads, "Our client VS5TJ is so very active on 20-meter single-sideband that s.a.s.e. is a must with every QSL request to keep us from going broke." But verify, for direct reply, unless specifically waived, self-addressed stamped envelopes (self-addressed envelopes with International Reply Coupons when appropriate) should be included in mailings to QSL managers. This is no more than proper when seeking postal response from anybody, for that matter. . . . "As of September 1, 1968, I handle QSLs for DU1UP," confirms WB6GFJ. . . . Now try these out for signs, but remember that each specification is necessarily neither "official", complete nor accurate. . . .

A2CAH, C. Ewels, P.O. Box 17, Gaborone, Botswana
A2CAQ, A. Edwards, P.O. Box 45, Francistown, Botswana

BV2A (via WB2UKP; see text)
CE3AEV, Box 13130, Santiago, Chile
CM2DC, Box 6996, Havana, Cuba
DL4RY/LX (via DL4-DL5 bureau)
DU1UP (via WB6GFJ; see text)
FK8BM, P.O. Box 423, Noumea, New Caledonia
FL8AO, R. Rabaud, B.P. 91, Djibouti, T.F.A.I.
FR7ZL/t, Guy P. de la Rhodiere, 7 eme. K.M. Saint-Francois, St. Denis, Reunion Island
HC1DG, Box 2937 Quito, Ecuador
HK0BMD, Box 18, San Andres Is., Colombia
HS3AL (non-W/K/VE/VOs via W3KT)
IIAV/MI (via IILCK; see text)
JA1IVV (via W3HNK; see text)
K5FKT/KP4, Ray Mote, P.O. Box 279, APO, New York, N.Y., 09845
KP4DED, E. McDaniel, 102 Harrison Dr., APO, New York, N.Y., 09845
MP4BGX, R. Gregory, 3 ACC, Hamala, BFPO 63, England

OD5FM, P.O. Box 1824, Beirut, Lebanon
OM1MP (see text)
SK3AH, Box 83, S-871 01, Harnosand, Sweden
SK3AK, Box 72, S-831 00, Ostersund, Sweden
SM3CZS, C. Nylander, Box 3022, Sundsvall, Sweden
SP5CK, E. Kawczynski, Chopina 74/8, Pruszkow, Poland
VE0NH, HMCS St. Croix ARC, CFPO 5075, Victoria, B.C., Canada
VP2GAR, Box 201, St. Georges, Grenada
VP8s FL JG JH JL, c/o E. Chilvers, 1 Grove Rd., Lydney, Glos., England
VP8JR, c/o Radio Club of Montevideo, P.O. Box 37, Montevideo, Uruguay
VP8KD (via K2JXY or G3LDA)
VP8KE, via G. Milius, W4NJF, 1416 Rutland Dr., Virginia Beach, Va., 23544
W4UDF/AP2 (via W49KMD)
WA4MMO/KP4 (via K5PMT/KP4)
ex-WP4DAJ (to KP4DED)
XW8BP (via K6HPZ; see text)
YV2LL, Box 275, San Cristobal, Venezuela
YV7EM, Box 83, Porlamar, Isla de Margarita, Venezuela

ex-ZD7GO, G. Owen, Plot 40, off Bradden Rd., Greens Norton, Towcester, Northants., England
ZD8DG, c/o BBC, Ascension Island
ZS3D (via K4RTA; see text)
4J0AH, GRC, Box 88N, Moscow, U.S.S.R.
4U0TIC, P.O. Box 275-FER, Turin, Italy
5A2TS, Box 2219, Tripoli, Libya
5R8BP/p, B.P. 437, Tananarive, Madagascar
8R1J, Box 557, Georgetown, Guyana
8R1T, Box 25, Georgetown, Guyana
ex-9G1KT, E. Ringle, W7KTL, W. 4324 Janice Av., Spokane, Wash., 99208

9M8APC, SSG B. Nielsen, HHC, 199th Inf. Bde. (sep I.T.), APO San Francisco, Calif. 96279
9O5HT, Box 7700, Kinshasa, R.C. (or via DL9WB)
9VIOP, 113H Hilltops, Cairnhill Circle, Singapore 9
CE0ZI/mm (see text)
CO2FA (via XF1AE)
CR9AK (see text)
CT3AS (via R5GB)

GC5AJE (to K8CTU)
IP1DK (to IT1ZGY)
IP1IJ (via ARI)
IP1VRS (via ARI)
K1DWQ/LX (to K1DWQ)
K6GARQ (via W48DBI)
OM3BG (see text)
PJ0MM (via W2GHHK)
PY0APS (to PY7APS)
PY0ARM (to PY7ARM)
PY0DX (via PY7ACQ)
PY0SP (via PY7AOA)

TF2WLC (to WA4PFD)
TG9RN (see text)
TL8GL (via VE2DCY)
UP2KBC (see text)
VP1BG (via WA9UES)
VP2KL (via WB6GFJ)
VR2FR (via VE6AO)
V99MB (via G3KDB)
W8IMZ LX (to W8IMZ)
XE0GEN (to W6GEN)
YA8MH (to DL8MH)
5W1AE (via VE8AO)

Contributors of the preceding include Ws 2VOZ 4JUK 4NJF 6GEN 8IBX, Ks 4RTA 5FKT 6HPZ 8RZD WAs 1DJG 1FHU 2CKU 5PPZ 9UES, WB4AHC, DL4FS, SM3CZS, Canadian DX Association *Long Skip* (VE3HJ), Columbus Amateur Radio Association *CARscope* (W8ZCQ), DARC's *DX-11B* (DL8RK), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor.72.T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Wardlaw Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hamnum St., Ballston Spa, N.Y., 12020), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DX Bulletin* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB), VERON's *DXpress* (PA0s FX LOU to VDV WWP) and West Coast *DX Bulletin* (WA6AUD). Is it your turn to feed the kitty?

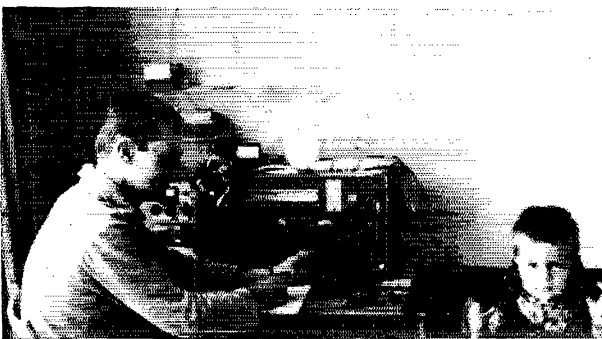
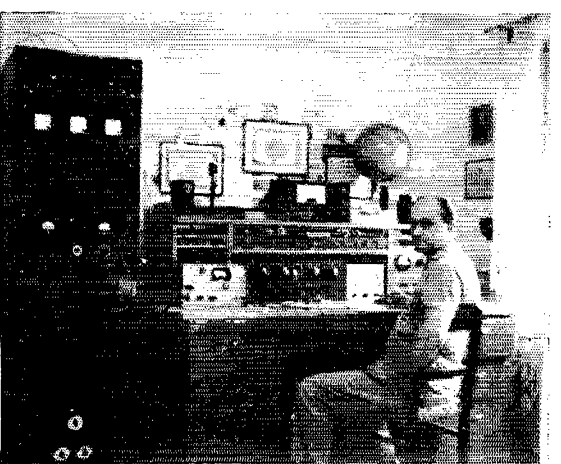
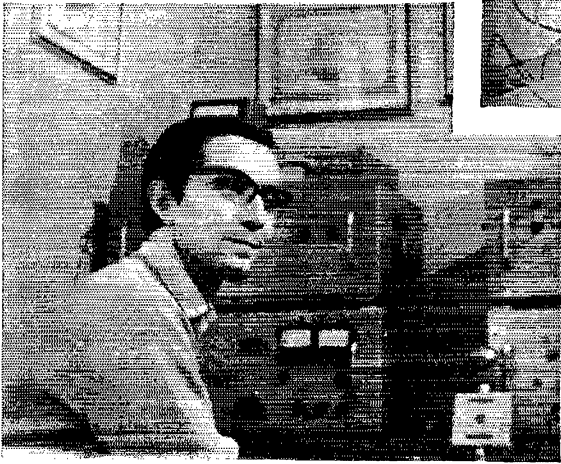
Whence

ASIA—W56DR advises he will go back to CR9AK for his more Meano operation early this month," warns WA5OFT in lines to W1CW. . . . Many casual W/K DXers remain unaware that Thailand still is included on the International Telecommunications Union (hence Federal Communications Commission) Ban List as periodically explained and updated in "Happenings of the Month" elsewhere in *QST*. HS3AL (W9SZR, ex-H18XAL) writes ARRL's W1YYM, "One of the local HS3s has 27 United States worked, thirteen confirmed. My own gear should arrive soon. No c.w. is allowed here." . . . "AP2AD, back on after an illness, plans to be quite active on s.s.h.," cheers WA1DJG. . . . WB2UKP comments, "BV2A's Jim and Tim operate c.w. on 10 and 20 meters at present. Their 200 watts, 3-element yagi and SP-600 are often available Sundays near 14,030 kHz, at 1100-1500 GMT." . . . New or renewed Far East Auxiliary Radio League memberships are claimed by KAs 1MI (WA3-HDM), 2IJ (KH6IJ), 2JC (K9JF), 2KS (K4KCS), 2LS (W5Y0J-K7EMA), W6VOM and K3FUR. FEARL's gala '68 field day was paced by KA2UZ's fast score, followed in order by KAs 2KS 9MF 2LS 2HC 2YP 2IJ and 2USP.

AFRICA—Reunion's Dr. J. Mulhen tells W1CW of the A ARRL DXCC Desk, "FR7ZL/t operated on Tromelin island in January, April, June 20-21 and in October of this year. He will further operate until about December 26th. The program of DX emissions in 1969 may include Tromelin, Juan de Nova and Europa islands." . . . Contacts with three Bulawayo ZFs during November, according to ZEIJE, may qualify you for the city's 75th Anniversary Award. For details on BAA write Matabeleland Branch, Radio Society of Rhodesia, P.O. Box 1372, Bulawayo. . . . WA1DJG has a letter from EA0AH expressing gratitude to all DXdom for so many enjoyable QSOs, and regret for his unfamiliarity with English. Don't mention it, Jose. . . . Now via the clubs press: When you hear ST2SA on sideband it may well be visiting firemen from ET3s REL and/or USA. . . . VQ8CC assisted heroic young solo circumnavigator Robin Graham and 24-ft. *Dore* (see October's *National Geographic Magazine*) with vital repairs. That remarkable kid should be a ham!

(Continued on page 154)

Czechoslovakia has been all too prominent in the news of late, so a photographic salute to Czech hamdom is hardly amiss. Clockwise beginning top left: OKs 2PBM 1Z, 3HM 2WL 2BKH 1CG 1LM and 1MP. (Photos via Ws 11KE 4PNK 9SKR, Ks 2RYK 3CU1, WB2BCI)





YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Adopted YLs

Progress has its unfortunate phases. Often in our attempt to make everything as perfect as possible our zeal to improve eliminates something that we valued, and because of the progressive move we cannot change it. About a dozen years ago YLRL ran into this problem when the Constitution and By Laws were revised. Just as everyone was congratulating themselves on an excellent job it flared up — what about the DX



Martha Edwards, W6QYL, back on the air after two years of enforced silence on the island of Cyprus.

members? Perhaps that sounds like a very simple thing that is as easily solved as making out a check, but it wasn't. Up to this time YLRL had absorbed DX memberships because in a number of countries the red tape surrounding sending money out of the country was quite involved, and in some places it wasn't permitted at all. So suddenly YLs who had been members were no longer a part of the club, and short of much entanglement in all the "slings and arrows" of international fees, YLRL was about to become strictly a group of W and VE gals.

In the fall of 1957, Arlie Hager, W4HLF, YLRL Foreign Correspondent (now we call this position International Membership Correspondent) wrote an open letter to the membership in the November-December 1957 issue of *Harmon-*

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

ics. In it she suggested a plan whereby the overseas women could still be YLRL members without all the tie-ups. Arlie asked, why couldn't the different clubs affiliated with the parent organization, and if they choose, the individual members, adopt one or more of the DX-YLs as associate members? Under this plan all that was needed was for the gals, or the clubs, to indicate their interest in sponsoring a membership and one would be chosen from the waiting list. *Harmonics* announced that there would be a column devoted to the activities of the many overseas gals beginning with the next issue.

The plan was an immediate success: by the middle of 1958 the news from the DX members had developed into several pages in *Harmonics*, and there was a waiting list of people who wanted YLs to adopt under the program. Now, ten years later, there are 47 DX members from 20 different countries on all continents who are sponsored by WAYLARC, WRONE, BAYLARC, YLRC/LA, NYCYLRL, Floridoras, Portland Roses, and Alaska Lassies, as well as several of the very active YL nets, and individual members of YLRL.

True, not every woman with a DX call is an adoptee, a number of them are wives of servicemen stationed overseas and are operating with a call from the country where they are living.

This plan is available to all affiliated YLRL clubs, or nets, or the membership. To adopt a YL all that is necessary is to write the YLRL International Membership Correspondent, Verda Siebenthaler, K7UBC, 905 Hastings Avenue, Coeur d'Alene, Idaho, zip 83814, and indicate interest in the project. Once the DX gal is assigned that is all there is to it. Dues for DX members are \$3.50 a year.

When this plan was first proposed by W4HLF, she mentioned, "in a small way we will be helping with international relations." That was in 1957, now, eleven years later, this very popular activity of YLRL might easily be considered to be their contribution to the present "People-to-People" program of ARRL, for this has been the YLRL program of mutual assistance in a YL to YL plan. Wordsworth once wrote of, "those little, nameless, unremembered acts . . ." and possibly we might catalogue our help to amateur activities in other countries in just those words.

That's Radio!

Who says that the activity in message handling is dull and uninteresting?

So you put your brand new birthday gift transceiver on the air, and settle down on your MARS schedules, and receive several messages that you can easily deliver. The nets secure, and you log out and telephone the addressees and, as is always the case with traffic from overseas personnel, the messages are received with grateful thanks from the families. The last one was particularly welcome because the family hadn't heard from this serviceman for almost four months and they were certain that he was missing or captured, so that "ARL 3" that you translate to them as, "Am perfectly all right. Don't worry." really makes their day. The message the family gives you to relay back is warm and reassuring, and the sort every traffic operator loves to send overseas. The day has been routine, you complete servicing your traffic and are filing it when the telephone rings. A voice says, "this is the Marine Corps Recruiting Sergeant did you just telephone a message to this particular family?" So you say, "why yes, I am an Amateur Radio Operator and a member of the Military Affiliate Radio System." The Sergeant laughs, "We had to be sure," he tells you. "The family just reported it to us thinking that you might be a spy!"

Tall tale? Not at all. It happened to Madge Mason, WA6LWE/NØRAG. Seems that the serviceman hadn't written his family for so long, and they could get no information about him, that they assumed that he had been captured. The wording of the message text was the sort of thing that they had heard was the type that was used to let families know about it through some sort of "spy" group. So that despite their relief at knowing he was safe and well, they decided it should be reported to military authorities just in case there was something clandestine about it.

Madge explained the MARS set up, and her own status in Navy MARS to the Marine so that he could use it in explanation to the family, and let them know that the message was part of the public service performed by amateur radio.

1969 YL-OM Contest

Eligibility: All OM, YL, and NYL operators throughout the world are invited to participate.

Operation: All bands may be used. Crossband operation is not permitted. Net contacts do not count.

Exchange: QSO number, RS or RST report, ARRL



Remember how everyone drooled over the Mustang in Denver? Here is the proud owner receiving the keys. Left to right: Karl Ramstetter, WAØHJZ; Elaine High, WØHEM, President Colorado YLs, presenting the keys; Dale Rogers, WA8FKQ, the fortunate owner; Marge Balk, WAØECG, Convention treasurer; Betty Lindsay, WAØEXX Convention Chairman.



WA6LWE/NØRAG, Madge Mason, newly appointed Editor of YLRL Harmonics.

1969 YL-OM Contest

phone

Start: Saturday, February 22, 1969 1800 GMT

End: Sunday, February 23, 1969 1800 GMT

c.w.

Start: Saturday, March 8, 1969 1800 GMT

End: Sunday, March 9, 1969 1800 GMT

section or country. Entries in log should show band worked at time of contact, time, date, transmitter and power. (ARRL section list is available in any issue of QST, page 6. Or send s.a.s.e. to the YLRL vice president.)

Scoring: A. Phone and c.w. contacts will be scored as separate contests. Submit separate logs. B. One point is earned for each station worked, YL to OM or OM to YL. A station may be contacted no more than once in each contest for credit. C. Scoring: Multiply the number of QSOs by the number of different ARRL sections and/or countries worked. D. Contestants running 150 watts input or less, at all times may multiply the results of (C) by 1.25 (low power multiplier.) E. S.s.b. contestants running 300 watts p.e.p. or less at all times may multiply the results of (C) by 1.25 (low power multiplier.)

Logs: Copies of all phone and c.w. logs showing claimed scores, and signed by the operator must be postmarked no later than March 24, 1969, and received by the contest manager no later than April 12, 1969, or they will be disqualified. Please remember to file separate logs for each section of the contest. Send copies of logs to:

Ebba Kristjansson, VE5DZ
Colonsay, Box 71
Saskatchewan, Canada

Awards: 1st Place Phone: YL — Cup. OM — Cup. 1st Place c.w.: YL — Cup. OM — Cup. The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to the high place phone and c.w. winners in each ARRL district and country. No logs will be returned. Be sure the copy of your log is legible. Please note postmark deadline must be no later than March 24, 1969.

QST

The World Above 50 Mc.

1215-1300 2300-2450 3300-3500 5650-5925 10,000-10,500 21,000-22,000 50,000-9

CONDUCTED BY BILL SMITH,* WB4HIP

**1968 Retrospect,
Prospectus 1969**

1968 year is rapidly ending, and I am sorry. This has been a good v.h.f. year. There have been outstanding accomplishments and no one can complain about DX conditions on the three most popular bands, 50, 144 and 432 MHz.

It began New Year's day with 50-MHz. *F-layer* DX from the Atlantic Seaboard and the Caribbean to Hawaii. Six meters continued DX thrills throughout the year. DX of one kind or another was reported during every month and the *E-layer* produced numerous multiple-hop contacts, several approaching 4,000 miles. Even though the apparent peak of Cycle 20 occurred in mid-summer, high solar activity provided intercontinental 50-MHz. DX through fall and winter months. The next three to four months may be the best those of us now alive will ever experience!

Two-meter fans encountered *Es* June 20th and 21st, the likes of which had never before been heard. It was not just a high-power sport, even the twoer and f.m. clans found thousand-mile contacts gracing their log pages.

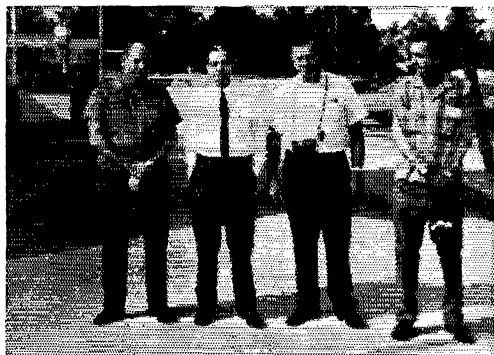
Tropo showed its DX ability in early October with 1,400-mile plus contacts between Texas and New England. These contacts, reported later in this column, are surpassed only by the 1957 span from Hawaii to California.

Meteor scatter buffs likewise were rewarded for their 1968 efforts. W3KWH keyed with nearly 40 states while K1HTV, K4GL, W0DRL and others were in the 30-plus class. During the August Perseids W0DRL worked sixteen stations. While predictable showers accounted for expected contacts, random meteors made daily schedules interesting. The education that random 800-mile or more meteor scatter contacts are possible is gaining momentum — and fast! Moonbouncers were not to be denied in 1968. VK3ATN worked K0IJN in February, and in September, K6MYC contacted SM7BAE.

The long-dormant 220-MHz. band was explored by meteor-scatter addicts. During the Perseids, W6WSQ and W0EYE made the first reported 220 m.s. contact, closely followed by K2CBA and K4IXC.

Many two-meter men are short on new states to work, but 432 offers virgin spectrum. Early October tropo showed this band's DX potential.

*Send reports and correspondence to Bill Smith WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.



A cross-section of active v.h.f. men was present during the Central States V.h.f. Conference in Missouri, including (l. to r.) VE3BPR, W4FJ, W2AZL and K7NII.

W0DRL and K4QIF covered 1,065 miles, a distance bettered only by the over-water path between Texas and Florida in 1965.

W4FJ managed 17 states in 7 call areas during 1968, nearly tying W5RCI, who pushed his states total to 19, tops in the standings. Depending upon geographical location, 300 to 400-mile contacts are almost commonplace, as the result of improved equipment and operating practices.

And to demonstrate how lightning will propagate 432 signals, W5RCI exchanged reports with W0DRL.

The moon stalled more 1296 r.f. in 1968. The Crawford Hill V.h.f. Club, W2NFA, organized April and October tests contacting G3LTF, HB9RG, K6HCP and WB6IOM.

We had no sooner reported the 2300 MHz. record captured by HB9RG and DJ4AU when K1DRB and W2BVU returned the honors to this side of the pond. The previous record was 5 years old. W7CAF and WA7EDI bettered the above 40,000 MHz. record set in 1967. Their contact made the distance slightly better than two-thirds mile.

Singling out specific operators is not easy. I will surely miss several, as there are those working quietly, seldom heard from or about. Forgive me if I err, but these come to mind in addition to those already noted: CE3QG, LU3DCA, LU3EX, OA4C, KL7FNT, KV4FU, VE3EYC, VE7BQH, W2IMU, W5ORH, K5WXZ, K6RNQ, WA9DOT and WA9HUV. And a special salute to W0DRL. He is to be especially cited for outstanding accomplishments on 144 and 432. Kansas could be barren territory for a v.h.f. man with less than Al's prowess!

Yes, 1968 *was* a good year, but what about 1969?

Surely there will be intercontinental DX on 50 MHz. Our knowledge of t.e. will benefit from work being done by our South American colleagues and KV4FU and others on this continent. W2BOC's more than 30-year study of 50 MHz. propagation will progress. I hope Mel has time to publish some of his findings.

Leading 144-MHz. state-seekers have worked most of what they can on tropo and meteors. The likes of KØMQS will turn towards the moon as the path to new states. And random meteors will continue to receive considerable attention.

But I am cautious lest we devote too much effort refining already well-known properties of our two most populated and therefore explored v.h.f. bands. Would it not be better if we were to turn more attention towards 220, 432 and higher? How about meteors at 220? For those believing 220 tropo propagation too similar to 144, there is 432 to further exploit. Is m.s. possible at this frequency? In 1968 we found tropospheric conditions even better than we had thought. Just how good is 432 tropo?

I strongly suspect the more important contributions in 1969 will be made on 432 and 1296. Moonbounce records will be made and broken by W2NFA, K4QIF, K6HCP, K6MYC, VK3ATN and W1FZJ/KP4. And I doubt the 12-year old 3300-MHz. record will survive 1969.

Regardless of specific interests, and it is the wide range of interests that makes v.h.f. so attractive, random operating, without the benefit of schedules, is to be encouraged. It would be to everyone's advantage to restore the every-night activity of three to five years ago.

There are several reasons for the demise of random activity: MARS programs for one, although MARS recognizes it has drained population from the amateur bands and now encourages members to handle non-MARS traffic in the ham bands. F.m. has taken its toll inasmuch as several thousand of us now seem content with a handful of fixed frequencies. Even though the ready presence of emergency communication is worthwhile, we must strike a balance. Many long-time v.h.f. men have all but worked their favorite bands dry, and so may not be on the air except when rare DX opportunities arise. But *activity* is important, because this is how the bands are explored.

The record-setting October tropo is the perfect example. Only a trained meteorologist would have suspected something unusual was afoot. The usual signs we wait for before turning on the rig were not present. More of us could have taken advantage of the conditions had we been on the air. And then some of those who were on, weren't tuning. Had it not been for the telephone, some of the best DX would have surely been missed. And there is the chap who wrote complaining he missed ZF1DT because I didn't publicize the operation in advance. If I had, he said, he would have listened for me! What kind of *communication* is this?

In closing 1968, thanks to those who hid my desk under more than 2,000 pieces of mail this year. I regret not being able to acknowledge each, but I do believe we answered those asking specific questions. Even though it wasn't possible to use each report, be certain each was read and evaluated. A balanced column is the objective. If I fall short, tell me.

Best wishes to you and yours in '69.

Address Change

Your writer has moved to a permanent location. For those who wish to write me directly, the address is 850 N.E. 141st Street, North Miami, Florida 33161, or correspondence may be sent directly to Headquarters for forwarding by V.I.L.F. Editor, W1HDQ. The column deadline is the 22nd of the second month preceding publication; information reaching me by mid-December will appear in the February issue. There is a fudge-factor involved, but to insure publication without delay, correspondence near deadline should be mailed directly to me. Especially newsworthy items have appeared in print as quickly as three weeks, but publication costs rise when pages have to be reset to accomplish this sort of thing.

Also, I have a locally unlisted telephone. If you wish to call, the number is (305) 754-7510.

OVS and Operating News

50-MHz. DX news is breaking so fast that the printed media can not keep pace, but here are highlights. The South America to Hawaii path opened September 30, 0115 GMT, when KH6EQF worked LU3EX and CN7AG. Many similar contacts have since been reported and that path continues active. On October 5th, ZS3E, Southwest Africa, worked ZB2BC and ZB2BO, Gibraltar, for the first Cycle 20 Africa to Europe contacts. October 12th was excellent in many areas of the world. KN6FX, in the Marshall Islands, worked two Japanese stations, KH6NS worked California, KH6EQF worked CN7AG, and ZE1AN, Rhodesia, worked Gibraltar!

Another Cycle 20 first was made on the 13th when ZS3E answered a KV4FU CQ. The Africa-to-



Rich Zwirko, K1HTV, is Connecticut's most active 2-meter DX man. He has been responsible for a good many "first Connecticut" contacts.



One of Florida's strongest 50 MHz. signals comes from W4GDS, Bob Silwanicz, at Pompano Beach.

North-America contact was made at 1534 GMT. Last month's reported "contacts" with W2PV and W2JKI on September 28th are denied by ZS3E, and the work now appears to be the result of a hoax, or mistaken identity.

October 15 and 16 conditions were also excellent between Hawaii and South America. KH6BZF worked OA4C, and KH6EQF, in addition to South Americans, worked 4A3P in Mexico City. That special call was issued to NE1GE for the Olympics. Also on the 15th, KH6EQF worked KN6FX, and on the 17th, KN6FX had a s.s.b. contact with JA2HMO, Japan, at 0500 GMT.

ZS3E, provider of many African contacts during Cycle 19, runs 120 watts, s.s.b. and c.w., to a 6-element Yagi. ZS3B is also active in Southwest Africa. In addition to ZE1AN, there is a Rhodesian beacon. ZE1AZC is on 50.046, f.s.k. Reports go to ZE1AN. ZK1AA is active on Cook Island, but is restricted to above 51 MHz. His frequency is 51.022 and he worked KH6EQA September 26th. ZK1AA has also been heard in California. His transmitter was apparently furnished by WB6KAP. Australian VK2BKL reports numerous TE openings between he and Japan.

LU9MA, who suffers TVI problems, reports seeing television channel 2 (48.25 MHz. video, 53.75 MHz. audio) from Ghana, Africa, October 6, 14 and 15! KV4FU has some observations about TE propagated television signals. Bob says the flutter, common to TE, is not caused by multipath reception, but due to rapidly changing m.u.f. The reception is pulse-like. In one second you can see the m.u.f. pulse from below 54 to above 60 MHz., and back again. Sometimes the pulse is slow enough so that the video information begins tracing between 54 and 55 MHz., moving up in frequency and tracing a picture as it goes. The effect is similar to facsimile. Bob is gathering much valuable TE data from his favorable Virgin Island location.

KL7GLL will be active for sometime to come. Gene writes that he has been appointed Director of Fishery and Forestry Programs at Sheldon Jackson College in Sitka. And wouldn't you know it? His Yagi is atop a 70-foot Sitka spruce!

Thanks K7DTH/KH6 and KH6GHC, the operators of KH6EQA/EQF, KH6BZF, KV4FU, LU3DCA and LU9MA for their much appreciated DX reports.

144-MHz. DXers found October tropo conditions the best experienced in many years. K1HTV says

two large inversions, one at 4500 feet and the other at 8000 feet, and air mass boundaries associated with a large, slow-moving high-pressure area were responsible for the record-setting October 7-8 sessions. The best DX reported was on the 7th between K1RJH, Groton, Connecticut, and K5WZX, Garland, Texas, a distance of 1450 miles! Another fine piece of DX was the 1301-mile contact between K1HTV and W1VTU, Connecticut, and W5HFV in Oklahoma. W5ML, Vivian, Louisiana, worked 24 stations in 12 states and Canada. K5WZX made 20 contacts in 8 states, including nine Ohio (SOs)! W3HB, Maryland, worked four stations in the midwest, one of which was a new state. K0MQS, Iowa, was Brownie's number 20. From Ohio, W8AXR worked three new states, Texas, Oklahoma and Mississippi.

Conditions were nearly as good on the 8th. K2HLA on Long Island worked W9BPB in Chicago and K0MQS. W3TFA, Maryland, also worked K0MQS. W5UKQ, at Baton Rouge, managed contacts with 23 stations in 7 states.

The 9th was quiet, but 2 meters opened again on the 10th over north-south paths. K5WZX worked K0MQS and W0BFB, both Iowa. W0NXX and W0EMS, both Nebraska and Kansas W0DRL and W0EKZ. W0NXX worked his 42nd state, W5RCI in Mississippi. W5GVE in Waco, Texas, and others are chucking that W5ORH was in Mexico and missed all the tropo. It may be something of an inside joke, but we understand a collection is being taken to send the Cowboy back to Mexico during the January contest.

2-METER STANDINGS

W1JSM	35	8	1400	W5HFV	27	10	1285
K1ABR	34	8	1478	K5TOP	27	7	1254
W4ZC	34	8	1412	W5MCC	23	8	1430
K1WHT	29	8	1300	K5PTK	17	5	1330
K1HTV	29	8	1301				
K1WHS	29	8	1300	W6GDO	17	4	1326
K1UGQ	29	8	1280	W6W8Q	16	4	1390
K1HTV	29	8	1301	W6NLZ	12	5	2540
K1BKK	26	7	1275	K6HMS	11	4	1258
W1LDQ	24	7	1010	K6JJO	11	4	1240
K1MTJ	20	7	1223				
K1JIX	18	6	800	W7JRG	27	6	1320
K1RJH	17	7	1150	K7NII	24	5	1290
				K71CW	16	4	1246
W2NLY	37	8	1390				
W2QXY	37	8	1360	W8PT	11	9	1260
W2ORI	37	8	1320	W8IDU	12	8	1150
W2BLV	36	8	1150	W8ITU	24	8	1000
W2AZL	35	8	1380	K8ZES	22	8	675
K2HLA	34	8	1300	W8AVG	13	6	465
W2ZFGK	33	8	1340				
K2RTH	31	8	1215	K9SGD	32	9	1300
W2GRS	26	8	1270	W9DDT	41	9	1303
K2YCO	20	7	750	K9UIF	27	9	1150
WB2FXB	20	6	915	K9AAJ	40	9	1200
W2DNR	19	6	1010	W9AAG	37	9	1200
W4ZPMW	19	6	1000	W9YFF	32	8	1050
W8RUE	36	8	1100	W0BFB	45	10	1350
W8KWH	33	8	1335	K0MQS	43	10	1500
W8KFP	32	8	1108	W0NXX	42	10	1590
W8BDP	33	8	1100	W0DQY	41	9	1300
K3CFA	22	7	950	W0LFE	38	9	1040
K3OBU	21	7	930	W0EYE	35	9	1380
W3HB	20	8	1310	W0ENG	33	9	1334
W3LHF	19	6	700	W0DRL	25	9	1285
W3TFA	17	7	1342	W0LCN	23	6	1000
W4ELQ	39	9	1150	F8DO	1	1	5100
W4WNH	38	9	1350	K16UK	2	2	2540
W4HKS	38	9	1280	OH1NL	1	1	5850
K4CZ	38	8	1403				
K4EJQ	37	8	1125				
W4CKB	34	8	1425	VE1AUC	7	2	500
W4JF	34	8	1150	VE2HW	11	5	800
K4QIF	33	8	1225	VE2BGJ	9	4	600
W4VHH	33	8	1100	VE2DFO	9	4	610
K4GL	31	8	1100	VE3ECC	33	8	1283
W4AWS	29	8	1350	VE3AIB	29	8	1340
				VE3EYV	22	8	1100
W5UGO	42	10	1398	VE3ASO	21	7	850
W5RCI	42	9	1289	VE7BQH	3	2	1248
K5WZX	36	10	1450				
W5AJG	33	9	1360				
W5UKQ	29	8	1150	VK3ATN	3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised May, 1968.

220-and 420-MHz. STANDINGS

220 MHz.			W3RUF				
W1HDQ	13	5	150	W3RUF	9	4	485
K1JLX	11	4	600	W3RUF	9	4	400
K1BFA	8	3	225	K3IUV	9	4	310
K2CBA	17	5	1090	W4FJ	17	7	940
W2SEU	12	5	325	K4QIF	14	6	1065
K2RTH	11	3	300	K4EIQ	12	5	550
W2CRS	8	3	200	K4NTD	8	2	835
K2DNR	7	3	175	W4VHL	4	—	450
W3IUG	14	5	460	W5RCI	19	6	880
W3RUF	10	5	480	W5ORH	11	4	700
K3IUV	10	4	310	W5AJG	7	3	1010
K4IXC	3	2	1090	W5UKQ	6	2	590
W5RCI	9	4	700	W5AWK	5	2	222
W5AJG	3	2	1050	W6DQJ	4	2	360
W6WSQ	2	2	825	K7ICW	4	2	225
K7ICW	4	2	250	W7JRG	2	2	420
W8PT	11	6	660	W8PT	13	7	715
W0EYE	5	2	825	K8DFO	12	6	450
VE3AIB	7	4	450	K8REG	12	5	625
420 MHz.				W8RQI	10	6	425
W1QVY	10	5	400	W8VX	9	6	465
K1BFA	10	4	470	W8MNT	9	6	465
K1JLX	10	4	385	W8WFE	7	4	450
W1HDQ	10	3	250	W8VHG	6	3	290
W2BLV	13	5	500	W9HUV	15	7	780
K2ACQ	12	6	850	W9AAG	12	4	600
K2CBA	12	6	2670	K9AAJ	12	5	425
K2YCO	9	6	525	W9NKT	9	3	400
K2UYH	9	4	350	W9JY	7	4	300
W2EUB	9	4	260	W0DRL	15	5	1065
K2YCO	8	6	550	W0EYE	5	2	425
W2SEU	6	1	220	VE2HW	3	3	750
				VE3EZC	7	5	510
				VE3AIB	5	4	450

October 13th found tropo good in the east as K1HTV worked W8IDU in Michigan. Further tropo reports appear in the 432-MHz. section.

The October Orionids was disappointing. K2HLA clicked with Minnesotan W0RLI. W0LER, also Minnesota, worked W5RCI, Mississippi, and W5UKQ in Louisiana. W0LER, calling the shower "poor," says there were many pings and short bursts, but nothing of any duration.

Tennessee's WA4HGN is back in the meteor scatter business and is accepting schedules. K4GL says the W3GKP C-line matcher, described in September *QST*, works extremely well, providing an adjustable impedance load. CE3QG, well-known for his Chilean 50 MHz. work, says he is going to try 144-MHz. moonbounce. K6MYC is providing details of his highly successful collinear array.

220 MHz. received some attention during the October tropo opening. K4GL, South Carolina, and W5RCI, Mississippi, exchanged reports for a new state apiece. South Carolina was state number 9 for W5RCI, tops in the fifth call area. K1BFA, Massachusetts, worked W1DC/1, Maine and K4GGI/1, Vermont, this fall to bring his 220 totals to 8 states. K1BFA runs 180 watts. Also from Massachusetts, WA1HHK corrects an error in the October column. K4IXC copied him on 144, not 220 MHz. meteor scatter. W9KHH, Wisconsin, says he is now ready for schedules. His transmitter is an 832A.

432-MHz. DXers will not soon forget the nights of October 7th and 8th. W0DRL at Topeka, Kansas, and K4QIF in Portsmouth, Virginia, set a new over-land distance record on the 7th by working 1065 miles. That contact was preceded by another between W0DRL and W4FJ, Richmond, Virginia, 995 miles. The tip-off was when W0DRL began hearing eastern radars about 7 p.m., CDT. Al copied them for more than eight hours, but only worked the two Virginia stations. Too bad no one else was active. Al says he is sure he could have worked the eastern seaboard south of Virginia. He now has 15

states, but schedules with South Dakota's W0IT look promising for number 16. Also on the 7th, W5RCI at Marks, Miss., worked W9AAG, W9UNN and K9AAJ, all Illinois, and W0DRL. W5RCI was K9AAJ's 12th 432-MHz. state. W9UNN also worked W4FJ the same evening.

The next morning W5RCI worked W8RQI, Toledo, Ohio. Tropospheric conditions continued favorable and the evening of the 8th, W5RCI worked K4GL in South Carolina while W4FJ was working VE3BPR. K2ACQ, Lockport, New York found the band open to Illinois where he worked W9AAG, W9UNN, W9WCD and WA9IUV and Missouri's K0DOK, and K8DEO, Ohio worked WA2EMB, New Jersey. Conditions continued excellent through the morning hours on the 9th. K2ACQ worked W5RCI, nearly 900 miles, plus W9WCD again, and W2CLL, W4FJ, W8MINT and VE2LI.

W4FJ is building an array of sixteen 11-element Yagis. Ted has ideas of moonbounce when the 176-element array is completed. And 432 activity in the Gulf coast states improving. W5UKQ, Baton Rouge, reports W5MCC and W5AO in Louisiana, as well as W5RCI, K4NTD and K4IXC appear the best bets for Florida. W0LER and W0LCN are representing Minnesota, both with kilowatts and arrays of four Tilton Yagis. They both offer schedules.

1296-MHz. moonbouncers were active October 12-13, but the results were disappointing. Apparently the only contact was on the 12th between the Crawford Hill group, W2NFA, and K6HCP who was working with K6MYC. W2NFA heard one other signal, WB6IOM, on the 13th. K4QIF says the tests were ruined for him when dew seeped into his dish-mounted parametric amplifier. The W2NFA club hoped to resume the tests in November, including schedules with Europe. We hope to have a more complete report later.

A final 1215 note, K1BFA has completed the WB6IOM amplifier and is also at work on 2300 MHz. equipment.

Moonbounce Special

Dick Hart, K0MQS, joined the growing list of successful moonbouncers November 1st when he worked K6MYC on 144 MHz. The signal exchange was made on c.w., but Dick's s.s.b. echoes were easily readable. K0MQS's antenna is an eight-wire stack of Laport rhombics, and his signals were also copied by K6HAA using an array of four 5-element Yagis. K6MYC's station was the same as during past successes. The distance is 1590 miles.

We congratulate Dick for his progress on v.h.f. It was only some four years ago he became interested in 144 MHz. In the standings, he is now second only to W0BFB.

QST

IMPORTANT NOTICE Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying please give old as well as new address *and your zip code*. Your promptness will help you, the postal service and us. Thanks.



Operating News



GEORGE HART, WINJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE
Contests: ROBERT HILL, W1ARR

DXCC: ROBERT L. WHITE, WICW
Training Aids: GERALD PINARD

Club Territory. A recent accomplishment, thanks to help of all ARRL appointees in letting us know how they felt about it, was to define "club territory" for the purpose of determining which ARRL affiliates club members could submit their scores as part of the club total in the DX, VHF-SS and Nov. SS contests. This is now defined as (1) any member living fifty miles or less (air line) from the club affiliation address, or (2) any member living between 50-100 miles airline from the club affiliation address who attended 50% or more of the inperson meetings during the past year.

How about members over 100 miles out? Sorry, they are not eligible. How about non-affiliated clubs? Sorry, not eligible.

Actually, this is not entirely a new rule. It's more in the nature of a "clarification" of a "rule of thumb" that has been used for many years. Previously, we used a straight 50-mile radius of the club "location" as a guideline. This seemed to work some hardships on clubs in the more remote areas in which it was not in the least exceptional for a regular member to reside more than 50 miles away — and there was considerable protest about this in some cases. The rule is now clear, definite and standard in its application to all. It will be applied impartially and universally.

Some who commented mentioned that they didn't see where the League gets off setting up

requirements for club membership. Please, this isn't the idea at all. Affiliated clubs can set up any kind of membership rules they wish. A club in Atlanta can have members in Seattle, if it wishes. It can have full, voting, honorary, associate or semi-members scattered all over, if it wants to. But *only* those members meeting the above requirements and operating their own or another club member's station may include their scores in the club's total for the SS, VHF-SS and DX Contests.

Let this not be a signal for contest-oriented clubs (or *any* clubs, for that matter) to scrounge around for hotshot contest operators as such, without any other qualifications, for the sole purpose of getting their contest scores into the club totals. A club member should be more than simply a score-contributor; he should be an integral part of a cohesive group of amateurs — yes, even if the club is one which specializes in contests.

Let this also not be a signal for clubs to create a bunch of new member grades, or to include those for club-scoring purposes that were not previously included. The intent is that members contributing scores should be full, regular or voting members of the club, not members who have been added to the roster for an honorary or token reason.

Did someone mention Field Day? This new

OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

December	January	February
4 Qualifying Run, W6OWP 13 Qualifying Run, W1AW 22 Tennessee QSO Party (p. 108, last issue). 29 South Dakota QSO Party (p. 112, this issue).	2 Qualifying Run, W6OWP 4-5 VHF SS (p. 63, this issue). 10-12 Arkansas QSO Party (p. 113, this issue). 11 Qualifying Run, W1AW 11-13 CD Party (c.w.)* 18-19 Connecticut QSO Party (p. 122, this issue). Louisiana QSO Party (p. 113, this issue). 18-20 CD Party (phone)* 25-26 Simulated Emergency Test	1-2 DX Competition, phone (p. 64, this issue). 1-16 Novice Roundup 5 Qualifying Run, W6OWP 7-9 QCWA QSO Party (p. 83, this issue). 8 Frequency Measuring Test 8-9 Arizona QSO Party 11 Qualifying Run, W1AW 15-16 DX Competition, c.w. (p. 64, this issue). 22-23 YL/OM Contest (phone).
	*League Officials and Communications Dept. Appointees, only.	

rule does not apply to Field Day. The club may invite whomever it pleases to participate as a guest of the club, and whatever contacts are made by that person or persons count as do all contacts made by members, to the club score. Only thing is, when you start inviting a lot of hotshot operators to go on Field Day so you can run up a high PD score, is it really a "club" effort? Isn't this an artificial way to boost a score that would be considerably less if the effort depended entirely on the club members? Don't misunderstand, there is nothing wrong with inviting guest operators; only with inviting them as operators more than as guests.

Merry Christmas. Many of us regard Christmas as a season of "Peace on Earth, Good Will Toward Men." Actually, it is only a reminder of this as a desirable way of life the year around. Much has been said, recently, about undesirable practices of amateurs toward each other on these bands that are in our keeping for use in the public interest, convenience and necessity. It must create quite a spectacle to the disinterested observer. Why can't we "freeze out" the dissidents and recalcitrants among us and resist the temptation to "reply in kind"? How about a little Peace on the Amateur Bands and Good Will Among Amateurs? Merry Christmas, gang.—**WINJM.**

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least one year immediately prior to nomination. Petitions must be received on or before 4:30 p.m. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, zip code and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 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.

You are urged to take the initiative and file nominating petitions immediately.

—George Hart, WINJM, Communications Manager

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for September Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPL	6783	1707	1519	188	10197
W3CUL	523	2751	2593	133	6000
K5FEY	7	1438	1388	4	2837
K5BNH	8	1223	1156	26	2413
W7BA	39	1031	909	116	2095
W8TRH	7	924	839	82	1852
W3VR	161	810	749	41	1761
WA9CNU	4	671	662	9	1346
WA4DYL	15	681	587	20	1393
W6RSY	13	683	403	170	1269
K5IMG	6	562	479	10	1057
WA9MHU	108	454	305	128	995
W9IYO	848	58	44	14	964
W50BD	31	431	428	1	891
K4NSN	100	330	330	6	766
W4SEKP	83	324	296	28	731
K9FZX	5	356	352	4	717
W1OJA	8	354	354	—	716
W0LXC	23	368	308	12	711
W3EML	25	378	277	1	681
W4HLD	3	337	3	337	680
W4ZABY	37	341	3	42	619
W4THKR	18	297	292	5	612
K8MYS	18	314	248	13	593
W6GAI	12	279	268	25	584
W9FQO	—	288	288	—	576
W4HPPC	287	—	287	—	574
W4STYH	5	293	236	32	566
W4QPNB	4	265	265	1	535
W7ZIW	25	258	240	8	531
K9KZB	12	259	136	123	530
W4QTHM	9	256	96	169	530
K4YZT	500	10	10	—	520
W4STL	20	349	338	0	517
W6VNO	18	284	207	1	510

Late Reports:

W4ZABY (Aug.)... 81 245 181 21 528

More-Than-One-Operator-Stations

W6YDK 4346 87 22 65 4520

BPL for 100 or more originations-plus deliveries

WB2UVB 288	WA9QOQ 117	WB4BEC 104
W8QUL 191	WA4UJ 115	WA6BZ 103
W43YS 189	WA9HTN 113	W4VFK 102
WB6HVA 178	W4RUF 112	VE2ALE 100
W4RRB 153	W4IGGN 111	Late Reports:
W8IXJ 149	W4ZVYS 109	WB4HTS (Aug.) 201
W4RHA 127	W8V 108	K7TKS (Aug.) 101
W4STL 124	W9KII 105	
W49QNI 121		

More-Than-One-Operator-Stations

K6MCA 347 W5AC 228 W1HPM 162

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listing: WA1GON.

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 origination 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.

Section	Closing Date	SCM	Present Term Ends
Colorado	Dec. 10, 1968	Richard Hoppe	Feb. 14, 1969
Eastern Florida	Dec. 10, 1968	Jesse H. Morris	Feb. 25, 1969
Sac. Valley	Dec. 10, 1968	John F. Minke, III	Feb. 25, 1969
Orange	Dec. 10, 1968	Roy R. Maxson	Mar. 1, 1969
Santa Barbara	Jan. 2, 1969	Cecil D. Hinson	Aug. 10, 1966
West Indies	Jan. 2, 1969	A. R. Crumley, Jr.	Jan. 10, 1968
East Bay	Jan. 2, 1969	Richard Wilson	Feb. 10, 1968
New Hampshire	Jan. 2, 1969	Robert C. Mitchell	Oct. 26, 1968
Mississippi	Jan. 2, 1969	S. H. Hairson	Dec. 15, 1968
North Dakota	Jan. 10, 1969	Harold L. Sheets	Mar. 8, 1969
Missouri	Jan. 10, 1969	Alfred E. Schwancke	Mar. 11, 1969
Minnesota	Jan. 10, 1969	H. Kopischke, Jr.	Mar. 15, 1969
Alberta	Jan. 10, 1969	Harry Harold	Resigned
North Carolina	Feb. 10, 1969	Barnett S. Dodd	Apr. 10, 1969
Michigan	Feb. 10, 1969	Ralph P. Threanu	Apr. 26, 1969
British Columbia	Feb. 10, 1969	H. E. Savage	May 1, 1969
Washington	Feb. 10, 1969	William R. Watson	May 3, 1969
Los Angeles	Mar. 10, 1969	D. R. Etheredge	May 18, 1969

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

San Francisco	Hugh Cassidy, WA6AUD	Nov. 19, 1968
Northern New Jersey	Louis J. Amoroso, W2ZZ	Dec. 9, 1968
Southern Texas	G. D. Jerry Sears, W5AIR	Dec. 10, 1968
Maryland-D.C.	John Munholland, K3LFD	Dec. 19, 1968
Alabama	Donald W. Bonner, W4WLG	Dec. 26, 1968

W1AW SCHEDULE, DECEMBER 1968

The ARRL Maxxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 p.m.-3 a.m. EST, Saturday 7 p.m.-2:30 a.m. EST and Sunday 3 p.m.-10:30 p.m. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed December 25, in observance of Christmas, and New Year's Day, January 1, 1969.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	.....					
0030	← CODE PRACTICE DAILY ¹ 10-13-15 w.p.m. →						
0100	..... C.W. OBS ¹						
0120-0200 ⁴	.....		7.020	3.520	7.020 ⁶	3.520 ⁶	7.020
0200	..... PHONE OBS ²						
0205-0230 ⁴	.....		3.820	50.120	144.120	1.820	3.820
0230	← CODE PRACTICE DAILY ¹ (15-35 w.p.m. TThSat), (5-25 w.p.m. MWFSn) →						
0330-0400 ⁴	.....		3.520	.....	1.820	.....	3.520
0400	..... RTTY OBS ³						
0410-0430 ⁴	.....		3.625	14.095	7.095	14.095	3.625
0430	..... PHONE OBS ²						
0435-0500 ⁴	.....		7.220	3.820	7.220	3.820	7.220
0500	..... C.W. OBS ¹						
0530-0600 ⁴	.....		3.520 ⁶	7.020 ⁶	3.520	7.220	3.520
0600-0700	.....		7.080	3.945	14.100	3.555	7.080
0700-0800	.....		14.280	7.255	3.945	14.100	14.280
2000-2100	14.280		21/28	14.095	21/25 ⁵	14.280	.....
2100-2200	14.100		14.280	14.100	14.280	14.100	.....
2300-2345	7.255		21/28 ⁶	21.1 ⁶	21/28 ⁶	7.255	.....

¹ C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02 and 144.12 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 144.12 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies; 21.02, 21.08, 21.27, 21.41, 28.02 and 28.52 MHz.

⁶ W1AW will listen in the Novice segments for Novices, on the band indicated (but will transmit on the frequency shown) before looking for other contacts.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s Q1S WPR. *Times-days in GMT. Operating frequencies are approximate.

CLUB COUNCILS AND FEDERATIONS

Affiliated Council of Amateur Radio Clubs, Inc., Mr. Ronald D. Mayer, W7NGW, Secretary, 6115 Southeast 13th Avenue, Portland, Oregon 97202.

Council of Conn. ARCs, Mr. James W. Parker, K1VII, Secretary, 17 West Main Street, Niantic, Conn. 06357.

Federation of Eastern Massachusetts Amateur Radio Associations, Mr. Eugene H. Hastings, W1VRK, Secy.-Treas., 28 Forest Avenue, Swampscott, Mass. 01907.

Federation of Long Island Radio Clubs, Mr. Warren Mayer, W2OUQ, Secretary, 25 Aldred Avenue, Rockville Centre, Long Island, New York 11570.

Foundation for Amateur Radio, Mr. Granville Klink, Jr., W3AFV, Secy., 1013 Noves Dr., Silver Spring, Md. 20910.
Hudson Amateur Radio Council, Fred F. Brunjes, K2DGI, Secy., 22 Ivey Drive, Jericho, N. Y. 11753.

Indiana RC Council, Inc., Mr. Hewitt Mills, WA9LTI, Secy. 289 W. Sumner Ave., Martinsville, Ind. 46151.

Los Angeles Area Council of Radio Clubs, Inc., Mr. Glenn Shaw, W6NI, Secretary, 10326 Bogardus Street, Whittier, California 90603.

The Michigan Council of Amateur Radio Clubs, Mr. Merton A. Henry, K8ETU, Secretary, 4626 Stillwell Avenue, Lansing, Michigan 48910.

Ohio Council of ARS, Mr. J. W. Benson, W8OUU, Secy. 2463 Kingspath Dr., Cincinnati, Ohio 45231.

The Puget Sound Council of Amateur Radio Clubs, Mr. Jerry Selligman, W7BUN, Secretary, Drawer A, McChord Air Force Base, Washington 98438.

Radio Society of Ontario, Mr. J. DeZorzi, VE3RSO, Secretary, 86 Crendon Drive, Etobicoke, Ontario, Canada.

San Diego County AR Council, Inc., Mr. D. E. Decker, Jr., WA6TAD, 5901 Streaucivew Dr. #3, San Diego, Cal. 92105.

Tennessee Council of ARCs, Mr. James G. Skeen, WA4NEC, Secy., 213 Stafford St., Bristol, Tenn. 37620.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Dec. 13 at 0230 GMT. Identical tests will be sent simul-

taneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted Dec. 4 at 0500 Greenwich Mean Time on 3590 and 7129 kHz. **CAUTION!** Note that since the dates are given per Greenwich Mean Time Code Proficiency Qualifying runs in the United States and Canada actually fall on the evening previous to the date given. *Example.* In converting, 0230 GMT Dec. 13 becomes 2130 EST Dec. 12. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP for the coming 3-month period.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. **CAUTION!** 0230 GMT Tuesday corresponds to 9:30 p.m. (EST) and 6:30 p.m. (PST) Monday evening. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10, 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

- Date Subject of Practice Text from October *QST*
- Dec. 16: *It Seems to Us*, p. 9
- Dec. 19: *Radiation Resistance of Inverted V Antennas*,* p. 36
- Dec. 27: *Matching with Homemade Baluns*, p. 46
- Date *Understanding Amateur Radio*, First Edition
- Jan. 6: *Polarity*, p. 97
- Jan. 8: *Longer Wires*, p. 97

*Speeds will be sent in reverse order, highest speed first.

Strays

		W6WX APRIL DX CONTEST INSTANT ESTIMATOR (points in thousands)																																							
		1	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	1	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380
Number of Contacts	1500	4.5	60	180	270	360	450	540	630	720	810	900	990	1,080	1,170	1,260	1,350	1,440	1,530	1,620	1,710	4.5	60	180	270	360	450	540	630	720	810	900	990	1,080	1,170	1,260	1,350	1,440	1,530	1,620	1,710
	1400	4.2	84	168	252	336	420	504	588	672	756	840	924	1,008	1,092	1,176	1,260	1,344	1,428	1,512	1,596	4.2	84	168	252	336	420	504	588	672	756	840	924	1,008	1,092	1,176	1,260	1,344	1,428	1,512	1,596
	1300	3.9	78	156	234	312	390	468	546	624	702	780	858	936	1,014	1,092	1,170	1,248	1,326	1,404	1,482	3.9	78	156	234	312	390	468	546	624	702	780	858	936	1,014	1,092	1,170	1,248	1,326	1,404	1,482
	1200	3.6	72	144	216	288	360	432	504	576	648	720	792	864	936	1,008	1,080	1,152	1,224	1,296	1,368	3.6	72	144	216	288	360	432	504	576	648	720	792	864	936	1,008	1,080	1,152	1,224	1,296	1,368
	1100	3.3	66	132	198	264	330	396	462	528	594	660	726	792	858	924	990	1,056	1,122	1,188	1,254	3.3	66	132	198	264	330	396	462	528	594	660	726	792	858	924	990	1,056	1,122	1,188	1,254
	1000	3.0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1,020	1,080	1,140	3.0	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1,020	1,080	1,140
	900	2.7	54	108	162	216	270	324	378	432	486	540	594	648	702	756	810	864	918	972	1,026	2.7	54	108	162	216	270	324	378	432	486	540	594	648	702	756	810	864	918	972	1,026
	800	2.4	48	96	144	192	240	288	336	384	432	480	528	576	624	672	720	768	816	864	912	2.4	48	96	144	192	240	288	336	384	432	480	528	576	624	672	720	768	816	864	912
	700	2.1	42	84	126	168	210	252	294	336	378	420	462	504	546	588	630	672	714	756	798	2.1	42	84	126	168	210	252	294	336	378	420	462	504	546	588	630	672	714	756	798
	600	1.8	36	72	108	144	180	216	252	288	324	360	396	432	468	504	540	576	612	648	684	1.8	36	72	108	144	180	216	252	288	324	360	396	432	468	504	540	576	612	648	684
	500	1.5	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	1.5	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570
	400	1.2	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	1.2	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456
	300	1.0	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	1.0	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342
	200	.6	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	.6	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
	100	.3	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	.3	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114
	1	.003	.060	.120	.180	.240	.300	.360	.420	.480	.540	.600	.660	.720	.780	.840	.900	.960	1.020	1.080	1.140	.003	.060	.120	.180	.240	.300	.360	.420	.480	.540	.600	.660	.720	.780	.840	.900	.960	1.020	1.080	1.140

W6WX's Patented DX Contest Point Estimator

- To determine your present approximate score, find the number of contacts (rounded to the nearest hundred) on the vertical axis and the number of multipliers (rounded to the nearest 20) on the horizontal axis. Read the points (in thousands) indicated at the intersection of the perpendiculars. (For example: 140 mult., 400 contacts = 168,000 points.)
- To estimate the point value of each non-multiplier contact, determine your present number of multipliers (rounded to the nearest 20) and read the point score indicated directly above on the "1" line of the horizontal axis. (For example: 120 mult. = 360 points per QSO.)
- To estimate the value of each new multiplier QSO, follow the procedure described in paragraph 2 and then add this result to the points indicated on the "1" line opposite the number of contacts (rounded to the nearest 100) on the vertical axis. (For example: Approximately 300 QSOs and 120 mult. and you work a new one. You have just added approx. (360 plus 900) or 1200 points to your score.) NOTE: At this stage of the game, it will take approximately 3.3 non-multiplier contacts to equal the value of one multiplier QSO. The ratio increases with contacts and decreases with more multipliers.

W.A.S. RECORD FOR K5MAT, SANTA FE, N. MEX.
C.W. BY BANDS

		W A S					W A S				
		30	40	20	15	10	30	40	20	15	10
1	Connecticut	X	X	X	X	X	X	X	X	X	X
1	Maine	X	X	X	X	X	X	X	X	X	X
1	Massachusetts	X	X	X	X	X	X	X	X	X	X
1	New Hampshire	X	X	X	X	X	X	X	X	X	X
1	Rhode Island	X	X	X	X	X	X	X	X	X	X
1	Vermont	X	X	X	X	X	X	X	X	X	X
2	New Jersey	X	X	X	X	X	X	X	X	X	X
2	New York	X	X	X	X	X	X	X	X	X	X
3	Delaware	X	X	X	X	X	X	X	X	X	X
3	Maryland	X	X	X	X	X	X	X	X	X	X
3	Pennsylvania	X	X	X	X	X	X	X	X	X	X
4	Alabama	X	X	X	X	X	X	X	X	X	X
4	Florida	X	X	X	X	X	X	X	X	X	X
4	Georgia	X	X	X	X	X	X	X	X	X	X
4	Kentucky	X	X	X	X	X	X	X	X	X	X
4	North Carolina	X	X	X	X	X	X	X	X	X	X
4	South Carolina	X	X	X	X	X	X	X	X	X	X
4	Tennessee	X	X	X	X	X	X	X	X	X	X
4	Virginia	X	X	X	X	X	X	X	X	X	X
5	Arkansas	X	X	X	X	X	X	X	X	X	X
5	Louisiana	X	X	X	X	X	X	X	X	X	X
5	Mississippi	X	X	X	X	X	X	X	X	X	X
5	New Mexico	X	X	X	X	X	X	X	X	X	X
5	Oklahoma	X	X	X	X	X	X	X	X	X	X
5	Texas	X	X	X	X	X	X	X	X	X	X

This WAS record-keeping scheme was sent to us by Bill Wageman, W0BUR/K5MAT. The beauty of Bill's system is the provision for measuring WAS performance on different bands. A worked state is indicated by / in its box, and when a QSL comes along the mark is made into an X. All states worked in a call area result in single cross-hatching, and when all are confirmed, the box is filled with double cross-hatching. You can tell at a glance whether or not to check the Callbook when state hunting!

DX Century Club

The following list contains the call letters and country totals of holders of the DX Century Club Award who have submitted confirmations to ARRL for the period from October 1, 1966 through September 30, 1968. New Members in DXCC for the period from September 1, through September 30, 1968 also appear in this list. DXCC members qualifying for the Honor Roll appear in the Honor Roll list below. Since the necessary space to run the complete DXCC Roster is not available (the total number of DXCC certificates issued as of September 30, 1968 was 14,413), this list contains only the calls and totals of those who have shown an active interest in their DXCC rating over the indicated 24-month period.

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through September 30, 1968.

G3FKM... 322/340	W6QGI... 319/336	W1JYH... 317/341	W6CUO... 316/342	W2GKZ... 314/317
W6AM... 322/348	W6EPZ... 319/341	W2BOK... 317/335	W6DZ... 316/330	W2QHH... 314/336
W7GUV... 322/346	W6GB... 319/341	W7BXX... 317/335	W6OZ... 316/335	W2JCS... 314/334
W8K1... 322/342	W6KZL... 319/336	W2PCI... 317/335	W6ID... 316/336	W2ELC... 314/320
HB9MO... 321/339	W7PHO... 319/338	W2ZFS... 317/334	W6WX... 316/325	W4AVY... 314/327
OE1ER... 321/344	W8DAW... 319/344	W3CGS... 317/337	W8IRN... 316/335	W4LVV... 314/335
W1GKK... 321/347	W8KIA... 319/344	W3GAU... 317/341	W8WZ... 316/339	W4RLS... 314/319
W4PDP... 321/339	W8DU... 319/342	W3LMA... 317/340	W8A1H... 316/332	W5AFX... 314/340
W5ABY... 321/349	W8SLA... 319/344	W3MO... 317/331	W8BMO... 316/330	W5OGS... 314/331
W7GBW... 321/346	W8SYK... 319/338	W3NKM... 317/335	W8PNO... 316/339	W5LUK... 314/329
W8JIN... 321/347	CE1AG... 318/343	W4BYU... 317/336	DL1KB... 315/335	W6KUT... 314/335
W8UAS... 321/343	K4TJL... 318/328	W5CKY... 317/337	DL7BA... 315/333	W6MVL... 314/326
W9NDA... 321/346	K6EC... 318/333	W5KBU... 317/336	G2BVN... 315/334	W6HOC... 314/328
HB9J... 320/345	K7GCM... 318/327	W5KC... 317/341	I11TAI... 315/322	W6Y... 314/335
W6PF... 320/338	W1DK... 318/336	W5LGG... 317/333	J1DDM... 315/331	W6AOP... 314/320
LU6DJX... 320/345	W2AGW... 318/343	W5UX... 317/333	K2DA... 315/333	WBRA... 314/338
VE2NV... 320/338	W2BOM... 318/342	W6KEV... 317/340	K4LNM... 315/330	W8DMD... 314/337
W1MV... 320/338	W2BXA... 318/343	W6ONSU... 317/330	K81KB... 315/327	W9LNM... 314/338
W2WZ... 320/344	W2HO... 318/345	W61ZD... 317/339	LA7Y... 315/338	W9RGJ... 314/327
W3KT... 320/345	W2JT... 318/338	W4EYP... 317/332	W1AZY... 315/331	W9PGI... 314/331
W41T... 320/344	W21VU... 318/340	W7AB... 317/331	W2DX... 315/322	4X4DK... 314/333
W4GXB... 320/342	W2SSC... 318/335	W7CMO... 317/329	W2EXH... 315/322	YV5AB... 314/334
W4OM... 320/343	W2SUC... 318/336	W7CNI... 317/336	W2FY... 315/329	G13JV... 313/329
W4PLL... 320/336	W21P... 318/328	W9DWO... 317/331	W2SHQ... 315/331	G2PL... 313/337
W5POA... 320/339	W3RNO... 318/347	D12BW... 316/334	W2AJD... 315/330	G3HDA... 313/326
W6BE... 320/341	W4DOS... 318/326	D16EN... 316/332	W2WMG... 315/327	JA1BK... 314/332
W6WQ... 320/338	W4MR... 318/338	G2BOZ... 316/335	W3EVM... 315/338	K2BZT... 313/327
W8BF... 320/342	W5OK... 318/340	HB91L... 316/333	W3GRS... 315/328	K4ICK... 313/326
W8W5... 320/345	W6NJU... 318/333	VE3CFG... 316/331	W4AAU... 315/335	K9KYF... 313/322
W8MPW... 320/339	W6RKP... 318/333	W1BAN... 316/330	W6LDD... 315/337	OH2NB... 313/335
W8POO... 320/338	W6UOV... 318/333	W1CRA... 316/327	W6ZJY... 315/320	W1FH... 313/340
W9SFR... 320/334	W7AC... 318/343	W2CP... 316/323	W7ENW... 315/340	W1MOV... 313/325
DL1IN... 319/336	W8PHZ... 318/334	W2CR... 316/334	W7UMJ... 315/324	W2ML... 313/326
G8KS... 319/338	W9YFV... 318/343	W2CYS... 316/339	W8KPL... 315/334	W2UVE... 313/332
K6EVR... 319/337	W9MLY... 318/335	W2FXA... 316/330	W8NGO... 315/333	W2RAU... 313/315
ON4DM... 319/339	W9OVZ... 318/340	W2FXN... 316/331	W8ZCO... 315/330	W4LYV... 313/334
W1B1H... 319/344	G3HCT... 317/329	W2FTT... 316/333	W9AMU... 315/332	W4N1C... 313/317
W1CLX... 319/343	G4MJ... 317/335	W2LY... 316/336	W9GCP... 314/329	W9WZC... 313/320
W1HX... 319/340	DL3RK... 317/335	W2MES... 316/325	W9HUZ... 315/336	W6BSY... 313/330
W2CTO... 319/340	K2LWR... 317/331	W2OKM... 316/335	W91LW... 315/322	W6LN... 313/334
W2NUT... 319/336	K2OEA... 317/334	W2RDD... 316/331	W9NLV... 315/332	W8CUT... 313/321
W2SAA... 319/337	K6LGF... 317/330	W2RGV... 316/333	ZL1HY... 315/340	W8EVZ... 313/317
W4BJ... 319/332	K6VVA... 317/327	W2TTE... 316/335	DL9OH... 314/326	W8HGW... 313/339
W4LRN... 319/332	G4DFM... 317/334	W2ZGB... 316/332	K4AEM... 314/329	W8NCA... 313/320
W4ML... 319/340	P00X... 317/338	W2ZX... 316/336	K4TFW... 314/321	W9G1L... 313/331
W4OPM... 319/335	VK3KB... 317/341	W3ECR... 316/334	K8LSG... 314/326	W9JUV... 313/334
W5MMK... 319/342	W1FZ... 317/337	W3WGH... 316/332	K8ONV... 314/324	W9WYB... 313/329
W6CYV... 319/338	W1GYE... 317/333	W4TNI... 316/339	W1CBZ... 314/330	W8LWG... 313/326
		W5OLG... 316/338		

Radiotelephone

W8GZ... 322/345	W6BAF... 317/328	VK5MS... 315/336	DJ3YI... 313/329	W8HGW... 313/336
W8FE... 320/342	G3FKM... 316/331	W1JFG... 315/335	DL9OH... 314/326	4X4DK... 314/333
W3R1S... 319/345	K4TJL... 316/326	W4PDL... 315/326	G13JV... 313/325	DL6EN... 312/326
W8POO... 319/347	G8KS... 316/331	W6RKP... 315/325	I1AMU... 313/321	I1AMU... 312/332
ON4DM... 318/338	LU4DMG... 316/333	W91LV... 315/322	K4A1M... 313/328	OE1ME... 312/326
W2BXA... 318/341	W2HTI... 316/332	HB91L... 314/330	K9KYF... 313/322	W2BOM... 312/326
W2ZX... 318/338	W2JTT... 316/331	T1Z1H... 314/337	K9LUV... 313/321	W2VZC... 312/322
W6AM... 318/343	W9WHM... 316/333	W6Y... 314/335	W1BAN... 313/326	W2RAU... 312/314
W6GVM... 318/340	W3YH... 316/334	W6ZJY... 314/319	W2MES... 313/316	W5POA... 312/328
W7PHO... 318/337	DL1IN... 315/331	W8JIN... 314/330	W2PTE... 313/331	W9RNX... 312/329
W9NDA... 318/339	K8RTW... 315/325	W8MPW... 314/324	W2RGV... 313/328	W0VX... 312/328
W2TP... 317/324	PY4TK... 315/333	YV5AB... 314/334	W3NKM... 313/330	ZPSCF... 312/329
		5Z4RR... 314/337		

336	332	W5EGK	W5HDS	W6IBD	327	W5BRR	W8YCP	323	W2TQR	G13NPP	320	W2AEB	W2CK
VK4QM	I1AMU	W6AN	W5GJ	W9YSX	ON4NC	W5LMD	W0AJU	W5TIZ	W3AFM	K1RPK	DL3BK	W4BBR	W3DJ2
	W9FRC	330	W6CHV	W8QJR	W3MWC	W6SQP	W0JT	W9TKD	W4EE	K9EAB	DL7EN	W6CAE	W3YTF
334		CR6BX	W8QJ	W0VBQ	328	W6DZZ	W8KBT		W7BTH	K8KCD	K2XY	W9KXK	W4CF1
DL7AA		G5VT	W0VBQ		SM3BIZ	W9WHM	W9HB			W51YU	K4ASU	W0JJW	W4JDI
		V02RV			W2GT					W6ULS	KP1RK		W4MS
333	331	W1RB	329	W5CFE	326	325	325	322	321	W7ADS	W1IAS	319	W4SSU
G3DO	G3AAE	W1HZ	W1JNV	W5CFW	K4PDV	HB91U	W0BTD	G13JM	G6TA	G6XL	W1OJR	HB9DU	W6DQ

W9M4K 316 K6KI W3M W6HY W6R	309 11ZL K4HYL K60JH K9LUT W2BKM W41F W5L W60ME W7BA W8BN YV5BOA	K22KU K3HQ K6EDE K8DYZ K8WOT K9BVR PY1HX SM0KV VK3AHQ W1BPY W1QJR W1YWM W2PZI W2ADJ W2AHUV W2BFMK W3DRD W4FRO W4W1P W5NWN W5PIO W5QVZ W65AA W66UF W69EQ W6RGG W6AKNE W6RHM W8AKH W8RMD W8LZU W9BZV W9W6H W2EFN W2BFP W3RQM W6QAQ W6SMV X6ICE	W8YGR W6WRO 288 D9KQ K2KER W2FXE W9ZTD 287 K1HVH SM5RK W3LPF W8KSR 286 11CQD JA6AD K2GMO OK1ADM W4IEU YV5BZ ZL4BO 285 K2GWN K4CEB L6AU W81LC W91HN 284 HB9DX K4YYL SM5BCE 283 K7CHT OZ2YV OY7ML VE3WT W1RLQ W2FAR W2GDU W4QJV W50BS W6BYB 282 K2KBI OZ7BG SM3AGD W1ICP W2LJF W3DKT W6NWI W6AQW W7MX W9LTR 281 D44TZ F8PT I11ZGY IA71J K5GOT K5LJ K6SOK SM6CAS VE3DDR W5AI W60F W9UZS W6AKDI 280 K5BXG V7NS W3ATP W6BLR ZL1AJ 279 K3UZY LA5YE OK1MP VE3AB W3EYF W4AXE W5UTV W6NTU W80CK W9NGF ZS2RM 278 K4BVH K6PCC SM8AJ W4XXI W47AO 277 K40PL K9PPX W1QCG W9AZP ZL3AB 276 W9UIG 275 W8ROC W6GNX 274 K4FYF 273 W3WKD 272 D1JZG K1LGO SM7ANB VE3NE VE7CE 271 W1VMO W3KCA W3VPZ W3QQL W4RRB W44LX W44WA W6GAJ W6PZ W7VGM W8RCM W9KXZ W9MZZ W9PAP ZL1AY 270 K6ALH SM6AEK W4EJN W4BGS W6GOV 269 WA4HOM W9WQV W9WNB 268 K6HOR OEHGW ON4QJ 267 K08TL W2MEL W4RML W6CBE W6DYJ 266 K5VXG V7NS W3ATP W6BLR ZL1AJ 265 F3FA WA4PTE 264 G2GM SM5WI 263 D17CX DL1CG OH3UO VK3YL W4HOS W4THZ W6BCT W6PET W6PLK W7TDC 262 DJ5DA	W81JZ XE2YP 279 11PP K3UZY LA5YE OK1MP VE3AB W3EYF W4AXE W5UTV W6NTU W80CK W9NGF ZS2RM 278 K4BVH K6PCC SM8AJ W4XXI W47AO 277 K40PL K9PPX W1QCG W9AZP ZL3AB 276 W9UIG 275 W8ROC W6GNX 274 K4FYF 273 W3WKD 272 D1JZG K1LGO SM7ANB VE3NE VE7CE 271 W1VMO W3KCA W3VPZ W3QQL W4RRB W44LX W44WA W6GAJ W6PZ W7VGM W8RCM W9KXZ W9MZZ W9PAP ZL1AY 270 K6ALH SM6AEK W4EJN W4BGS W6GOV 269 WA4HOM W9WQV W9WNB 268 K6HOR OEHGW ON4QJ 267 K08TL W2MEL W4RML W6CBE W6DYJ 266 K5VXG V7NS W3ATP W6BLR ZL1AJ 265 F3FA WA4PTE 264 G2GM SM5WI 263 D17CX DL1CG OH3UO VK3YL W4HOS W4THZ W6BCT W6PET W6PLK W7TDC 262 DJ5DA	PA0FAB K1CND K6EIV W2RA W6HRX W9BGX 253 HB9MD K4ET 252 DJ5AA DA6DCE PA0V0 V9EGQ W49NUQ 251 DJ0RM HB9AHA K5SSZ JA8ADQ K1DPC K2LAF LAIK OK1GT W2BXC K9AVK VU2MD V9LJK W9YT 250 DJ3BB G2FYT K0ZRC W1AW W2ABRI W4HFG W0JRI 7X8AH 249 DL3BJ HB9NU WB4BD W7MH 248 K5KHS OH2BC OH2BQ OK1ZL ON5ZO PY2BGL SM1CXE W1ECH W1FJJ W2GHK W1HRI W1MDO W1VAN W3KCA W3VPZ W3QQL W4RRB WB9TT W2RSJ W4TFL W5HTY 247 G3HSR W4GTS 246 HB9TT W2RSJ W4TFL W5HTY 245 K1LWI W2LWI W6ANB W7MVC W0MAF 244 DL3ZA K5LNN K6LAE K9JLR K9YIP WB2MPX W8LVA 243 11ZPR JA4XW K2KNV W1FTX W1JMT W2ZY WB2YQH W4NML W5LJT W5NGW W6AGPY W8HDB WA8MCR 242 DL1PM K4WMB K6KIE SM4CMG V2RCT W18XQ W4NBY WB6AKZ W7DQM W8GMK W90VF W9AVL ZL1HW 241 K1JHX K1OZR K1ZSI K20US K4AUL K4XLO K4HJE LA5Q PY4GA U43CT VE3CTX W1HWH W1WJL W1YRC W2FQV W2FFQV W4ID W48NU W4AFDR W6FLT W9CL W9IGW WA9IBT 240 E44CR K1ITU K4HFX K90TB K8JPL OQ2EGL OQ8KI SM5AM SP4IF U3AHI VE7EH W1RLV W2FVI WB2LMW W2LUKP W4RJJ W6CUT W7AGZ W8NPF WA8LSO W9GXF W9HQH W9CAW 239 F8SE G3FG G6RC K0FBR K0PL K3MVP K4RSY K9JLR K3BZW W5DL W7DIS W9LNO W9TRD W9CPX 238 V83R W1BGD 237 K25LC OH3NY SM6CKS VK5RX 236 W1DEP W5DMR 235 DL3OH KR6UD W4WHF 234 OH5UO WB6CJY WA8HFN W0CU 233 VE6SF K0GVB 232 11LCL K5QVH K9TZH	VR2DK W6AO 231 JA4ONS K6SVT 230 WA9LZA 229 DJ3HW DM2AT K3FGD O27VK W2HX W4USQ 228 OH2SB W6QAQ W60UN 227 11CWN K2LGG 226 G2TA K2IEG K4WJT W8VLL W01WD DL4KD DL8NU H18XAL K1L7M W40EL WA4QX YU1BCD 224 CR7LU W1KID W6BZ W7YEX W9TRK 223 DJ4HR K4IEP K4PZV K0GSV K0XSR W2HTG WA4MUB W90W 222 G5DV K4HF K0TYO LA1KO OH3TH PY1BTX SM0MC SP6JZ VE3XK VK5KO W2IQH WA6AUD WB6ED WA8DXA 221 DL6EZA HB9YL K1GUD K2HVN W3FON SM5AJR VE7BV W3FTU W3JW W4FPW W5KGJ W6ABJ W60MR W8DCH W0CU 220 K8VSL W2BAI W5HJ 209 DL1YA HB9KP K1LBH K8IQJ K9WEH K8PYD SM6AMD W1GVZ 208 K1SCQ K1ZQL W2HC VE3EUV VE6AQL VP7NA W1EOA W1EZD W1PYM W41DJG W2MZV W3HQJ W49CR W5GLZ WA6CAL WA7FG W8ELE W8BGE W9NNC W9PLK YV5BNR ZL3AAD 219 K3BSY K0GSV VE4XJ W2MOF WB2NY W3AG W4YVP W6RF W9AFL W9ALJ K8HJZ K4HJZ SM4CLU W1MJCJ WA4LSK WA6PMK 217 DJ4OJ K6OT K7CVL JA3RQ LA2B PA6JO W3CBY W6LNY W3HVC W0CY 215 JA11B FY4BR 214 W4VJU W5WLD WA5RQA W70EV 213 LA5YJ W5CCR W7FBD DL6IC IIR JA6BXA W2ABM W2ASF W67ON W0VTP W6UDE 4X4CJ 4X4PT 211 CR6CZ K1KDP K8DWB W1KGH W1MJJ 210 K8VSL W2BAI W5HJ 209 K8YCM/5 K8PYD SM6AMD W1GVZ 206 DJ2WN K8BCK OK3LR WA1ERM W7GDS 205 E1SF VE5KG K8UDJ W4DVT W6MPY 204 DL1AM HB9AT K10OJ PY4JD K63FAW V011B WA2PXI WA5AJ WA5JSI W7QY W8LBS 203 DJ3GJ DJ4XA DL1DE H97E JA1ZZ JA3CW JA3RQ LA2B PA6JO W3CBY W6LNY W3HVC W0CY 202 EA2CR F8TM HB9RX JA3BG KP4BJD LA9CH OETUD OK2BCI OK2OP PA6XPJ SP6JZ SP6RT W1EHT W2HWD WB2ZKJ WA3GZE W4REZ WA4HTR W5TKB W6JWD W6QB W67ZN W0VTP W6UDE 4X4CJ 4X4PT 201 CE5EF DL1KS DL1LD G3RFE HARS IT1AQ JA1DFQ LA8PQ OESJVA OH1VA OK3LU OZ5DX SM5CF UW3DR 200 DJ2MN DL1ES HB9AIJ HB9TU JA1PHK JA1MIN K1EIN K2QOU K3ZLJ K3MNJ K4RCS K4RSM K5AEU K5VTA K6CSW K9RNU K0BHM LA9CE SM3BNV SP8SZ SP9DH OZ4F OZ7X VE3FKL VE6HB V7PNQ VQ8AD W1DBM W1GTO W1OBP W2FLD W2IP W2KIT W2LXJ W3AXW W3HTO WA3PFS W4JH W4KJL W40MW W40RT W40HC W4ZSH W4KXC W6BPU W7FKK W7JWE W7NNF W7VRO W80VQ W8TRN WA8OCV W9EXE WA9GLX WA9DVT W5TKB W6JWD W6QB W67ZN W0VTP W6UDE 4X4CJ 4X4PT 199 JA1FDU K2APY K7CAD SM4ARQ VE3MZ WB2PGM W5EJV W5QLX W6AEM W6HVN WA7BOA W8PCS W9PWM W0RZU YU2NEC 198 DJ9NX 195 K4MOJ WB2KTO W4USM 194 JA1P W24UBC 193 K0WKE WB2NXL W8CWY Z85UP 192 G8KU WA2MNQ 191 K0BTH K2BQZ W9ZRX 189 K4CFO W11BA W6QW 188 W12YM OIE1KW WA4NBC 187 DL3CM K6YTH WA5AUJ WA8GPX 186 DL8AM VF4ZX W2BUY W2YA WA2FJW 185 K9DNR VF4SA WAZEZ W8BJW 184 JA1WU U75HP VE1BR W1AJO W7HO W7VSM ZD8HL 183 WA7BOA W8PCS W9PWM W0RZU YU2NEC 182 F2PO K1YPN K2ZCD K5TIN K6BBB SM7ANE SM7ASA VE4DB W2ABL W5DWB W8EW W9UTQ 181 F9TE 11HL K2DXV K2LBB K4BLK K7PJF PY5ASJ SM5BSN SP2IU VE3EU W3HTW WB6CPE W5NFX W8BRK W80K WA8NDL W0GTU WA2MNQ 180 DJ2XT DL7CT HB9T JA1HG JA1JC JA1QJ K10BT K3CJT K4CIA K6TZX K9ALP OH2SF OK1VK SP6KVK UR2KA VE2DR W2MB VE3HL VE5J W3BG W1H0Z W1PNR WA1ABW W2GUR W2RIR W2UGM W2CFG WA2CYQ WA2LOR WB2MO WB2CJZ WB2CGW WB2HZH W3KJ W3QCM WA3GTX W4JD W4HHN WA4PFD W5BGS W5TXN W6EJZ W86FYW WB6IUH W8GCU W9BMD W9PJX W9NVJ WA9JDV W0PFG WA6DUB 179 11BLF K4AVC K4RBZ K5ABV ON4NM W1NF W2AAU W2CUE W7BCV W7CRT W9ALP WA9RQS
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210	209	208	207	206	205	204	203	202	201	200	
LA5YJ	V2AEB V6TLL V8FPM V9BGX	FA8ADQ K1ZBL V2RBA V9GXH	TX3BH L16EZA K41EP DHI1TM W3DRD ZL3RP	DJ2YL DJ4TZ EA7IR Z27BG W4NML W6CJD	DM8CB K56LN W1FLJ W7M5C	R2TA W2MM W4WHF W6ZBS	DL1PM K1BDP JE1PC SM6VR SM7ACB WB2MFX W4AOPX W5RDA W6ISQ XW8AX ZS014	T1TRA K2IEG TN8AA W6OHU W7EPA W81LC	EP3RO K1DFC K4RQC K8VCB K8Z5C Q67UD PY2DSC SM3AZ1	G3NLY L1KDZ L1WT L51VAZ K31VI L1B LA8V VE3RO VE4AS	
210	209	208	207	206	205	204	203	202	201	200	
W1BAB W1DBM W1FXD W1H0Q W1OHJ W1W0G W2VFG W3WQV W4HTR W4HWG W5LGG W50LQ W6KXB W6B0H W6GHG W6GGE W6HKW W6IAR W6IOW W6J9Y W6G1D	W3BYS 184 11ZV W6ZC W7VSM	173 LA4JD W821EC W7YBX	199 K8G0P PY2QJ Y3E1EA W2EYB W2R2LK W4JDR W4NBY W5AJY W8ALUC W9GAI	181 DU2MM DU1FH H89EU K2QPL VE3JC W20EH W5NXX WB8JWY YU6CB YV3KV	198 G5DV W2PDB W8WUO K9RNQ	197 OE1MEW W4LVV	196 K4LFC W8WZ W595D	195 W1HRI W6BZJK VE6AQ VK2ADE	194 IGZ	193 JA1BWT WB2NXL W5DMR W6TZN W8YYN	192 VO1IB W4BA W6DET
210	209	208	207	206	205	204	203	202	201	200	
W183XAL W5LWLD W6KXB ZD8HL 4X4TP	183	171 WB8LR W9A1VL	182 CT1LK DL9RE EA7EM F2FO K4FA K6CZ P6CN W2CNQ W41HN	180 G1VSNWV K2QQ K2RAP W5CQW W6ZQV K3RP K4RHL K3KUK K4RFE K4VKW SM5VS W1PDR W31K K1BJP W5EGS W8SUD W6GLD W6GLDV W8CFC W6NGF W8YDB ZS1DC	180 W9DOR ZF1CG HB9TE JA3RQ K3KUK K4S8B UC2BF	166 HB9TE JA3RQ K3KUK K4RFE K4VKW SM5VS W1PDR W31K K1BJP W5EGS W8SUD W6GLD W6GLDV W8CFC W6NGF W8YDB ZS1DC	165 DJ3BE K1BJP W5EGS K81VK W6GLD W3QCM W7UVF	164 DJ4VZ DL80A IPEEG V5E3G WA80AH	163 CE5EF K1SLZ K411F K7YDO W2ACGD	162 CR6AU JA1IBX K1QMV W6ZJU W6GRX YU3OV	
210	209	208	207	206	205	204	203	202	201	200	
VE3CUS V86A W2A2CF W450U W44PDR W5BTH W9COC W9EXE WA91Y	172 EAZEL V3E3DR W1MZB W4BRE WB6FYW	160 DJ5IH PIAT PIBXK I1TMG JA1MIN K1DRN K4SDW K9TRP PA9QC PY1MB SM7CAL VE3BLD VE3LB VE1XN W1AW W2RIR W4BGW W4PC H89RB K18CQ K4JDC OZ3P UR2KAA K4H6 KW6EJ W32NYM W32NE W5A5RQA W7WS WA8LSO 9LHX	170 DJ3CN WA2PXI W8LAW W9KGO	169 K0YPT W1AA W1MRQ W4MRF	168 K1LW K4YFO VE3ZN W10KG W5NXX WA6RTA YNI1RTS 6Y5GG	167 I1LCT W9DOR ZF1CG OZ3KE VE3FHO W8ZNO	166 HB9TE JA3RQ K3KUK K4RFE K4VKW SM5VS W1PDR W31K K1BJP W5EGS W8SUD W6GLD W6GLDV W8CFC W6NGF W8YDB ZS1DC	165 DJ3BE K1BJP W5EGS K81VK W6GLD W3QCM W7UVF	164 DJ4VZ DL80A IPEEG V5E3G WA80AH	163 CE5EF K1SLZ K411F K7YDO W2ACGD	
210	209	208	207	206	205	204	203	202	201	200	
CT1LN F2VX HK5ACI I18GZ K2CPR K61V K46BVS K3BTI ON4ZU W43FE W6PPO W8GMK WA9PZU	148	147 DL9SV K10JQ K3DQ WB2WOW W3CM W3HTO W4FUM W0DAD/6 W8GHN ZS2FA	146 CT1MW DL1CR I1H K2DJD VE3LB VE5JS V8EK W1DTY	145 H89RB K18CQ K4JDC OZ3P UR2KAA K4H6 KW6EJ W32NYM W32NE W5A5RQA W7WS WA8LSO 9LHX	144 I1TIC K5EXX YV3CN	143 LA7JH VE1XP W2ESC W2GGO W4XLX W5AGUZ W7GDS 4X4HW	142 CT1FL DL6JJ JA1JAN JA7JH K6RSY K1L7MF K9WEH OA4BS SM8PZ VE3CP WA2FYA WB2FWE W4PEW W5FEW W7GVX	141 DL9OK F5S G3KZQ I1B K4WJT OH3NY W6ZJU W6GRX YU3OV	140 DL1AD G61PH OE8KI W1LTY XE1EEI	139 DJ4PT I1AUM K6CWS VE3BSR WA4WPH WA8ORX DL1RA	
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DL5LR F2VX HK5ACI I18GZ K2CPR K61V K46BVS K3BTI ON4ZU W43FE W6PPO W8GMK WA9PZU	148	147 DL9SV K10JQ K3DQ WB2WOW W3CM W3HTO W4FUM W0DAD/6 W8GHN ZS2FA	146 CT1MW DL1CR I1H K2DJD VE3LB VE5JS V8EK W1DTY	145 H89RB K18CQ K4JDC OZ3P UR2KAA K4H6 KW6EJ W32NYM W32NE W5A5RQA W7WS WA8LSO 9LHX	144 I1TIC K5EXX YV3CN	143 LA7JH VE1XP W2ESC W2GGO W4XLX W5AGUZ W7GDS 4X4HW	142 CT1FL DL6JJ JA1JAN JA7JH K6RSY K1L7MF K9WEH OA4BS SM8PZ VE3CP WA2FYA WB2FWE W4PEW W5FEW W7GVX	141 DL9OK F5S G3KZQ I1B K4WJT OH3NY W6ZJU W6GRX YU3OV	140 DL1AD G61PH OE8KI W1LTY XE1EEI	139 DJ4PT I1AUM K6CWS VE3BSR WA4WPH WA8ORX DL1RA	
210	209	208	207	206	205	204	203	202	201	200	
W8PQD K1WYU W7LBN W9LQR 5Z4KL	108	107 H2H8H W3BK W5UAK W9BVU	106 D18X HK3APC K2HER K4AJR K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	105 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	104 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	103 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	102 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	101 W41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	100 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	99 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	
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K1HBM K1WYU W7LBN W9LQR 5Z4KL	108	107 H2H8H W3BK W5UAK W9BVU	106 D18X HK3APC K2HER K4AJR K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	105 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	104 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	103 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	102 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	101 W41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	100 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	99 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	
210	209	208	207	206	205	204	203	202	201	200	
W41ST K1WYU W7LBN W9LQR 5Z4KL	108	107 H2H8H W3BK W5UAK W9BVU	106 D18X HK3APC K2HER K4AJR K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	105 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	104 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	103 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	102 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	101 W41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	100 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	99 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	
210	209	208	207	206	205	204	203	202	201	200	
DJ1YV DJ3YQ DL8LH I1B8R I1PIE I81ET I81TDW JA7BHQ K1ZUP K6ALQ K63VQ K181W I43CT VE1RU WA1BQS WB2VEG W4GRN WA41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	108	107 H2H8H W3BK W5UAK W9BVU	106 D18X HK3APC K2HER K4AJR K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	105 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	104 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	103 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	102 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	101 W41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	100 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	99 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	
210	209	208	207	206	205	204	203	202	201	200	
DJ1YV DJ3YQ DL8LH I1B8R I1PIE I81ET I81TDW JA7BHQ K1ZUP K6ALQ K63VQ K181W I43CT VE1RU WA1BQS WB2VEG W4GRN WA41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	108	107 H2H8H W3BK W5UAK W9BVU	106 D18X HK3APC K2HER K4AJR K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	105 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	104 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	103 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	102 DJ18X DL9XN GW4NZ YA1HD JA8EL Y4HUA SM5BFC YK9BS WA4NIB	101 W41CB W41JHC W7PJJ WA9UGI YA1HD Y4HUA SM5BFC YK9BS WA4NIB	100 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	99 D18X K14CRD K1H6FQB K7UXS K9JTD W9PCP W1DAY W1JN W5CLZ W5LXX W5NQR WA5LMB WA5REB WB6MVK WA7AHO W8GQU W9UEM	

SCM AREC ORS CP SEC OBS TCC OO

Station Activities

OVS AIOPR EC DXCG CLUBS RM OPS RCC

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX, RM: W3EEB. A Merry Christmas and a Happy New Year to all the amateurs in the Delaware section. New officers of the Delaware ARC are K3UDO, pres.; K3ZKD, vice-pres.; and W3BGE, secy.-treas. We welcome two new Novices in the section, WN3KZR and WN3KFR. WA3HWC was voted in as the Two-Meter Net manager. K3GKF sent out 125 OO cards during the third quarter. WA3GSM handled traffic from the Gov. of Wash. to Gov. Terry. WA3DYG attended the state e.d. conference. WA3DUM reports a very poor month. W3DKX has a new amplifier. K3ORU reports that he is now working in Philadelphia. W3EEB reports v.h.f. rig problems. W3ZNF visited ARRL Headquarters. Don't forget the Jan. Annual SET Drill. It's time to check that emergency equipment. Net traffic: DEPN, QNI 47. QTC 6; DS8IN, QNI 42; DTMIN, QNI 38. QTC 2. Traffic: W3EEB 56, W3DKX 52, WA3GSM 20, K3NYG 6, WA3HWC 4, W3MK 4, WA3DUM 3.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3AES, RMs: W3EML, K3MVO, K3YVG, W3MPX, PAMs: K3MYS, K3WAJ, V.H.F. PAM: W3FGQ, OBS reports were received from K3RDM, WA3AFI, K3WEU, WA3TUV, W3ID, K3EMA and WA3EEC; OVS reports from W3ZRR, WA3BIQ, K3WEU, WA3AIZ, WA3EEC and W3CL; OO reports from W3NNO, K3RDT, K3MYS, K3EMA and K3WEU.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	Daily 6:45 P.M.	287	318	K3YVG
PFN	3960	Mon.-Fri. 5:30 P.M.	442	507	K3MYS
PTTN	3610	Daily 8:00 P.M.	168	188	W3MPX
B/AEP&TN	3917	Daily 8:00 P.M.	567	155	K3WAJ
VHF (6)	5025	Mon.-Fri. 7:00 P.M.	12	9	W3FGQ
VHF (2)	145.6	Mon.-Fri. 8:00 P.M.	6	2	W3FGQ

Officers of the Hazleton High School ARC are WA3GYU, pres.; WA3GYT, vice-pres.; WN3KLS, secy.; WN3KKB, treas. WA3AFI is putting up a quad and tower. WA3CUL took his big "A" ticket. Sep. 4 was WA3EEC's 18th birthday. He registered for the draft, started college and received his big "A" ticket. WA3INC got a new HQ-120. WA3CEU built a stereo i.m. rec. W3HK is now a grandfather. WA3IUV is radio engineer at WHHS, Haverford High School f.m. station. W3EML resorted to Flit to finally get rid of all the bugs in his gear. W3NNL and K3NFC both got their Extra Class tickets. W3VR says traffic is heavy now and wonders what the holiday season will bring. K3YVG came out on top in the Pa. Post Office Net exercise. K3FMA made the Extra Class. W3AXA is back from KL7-Land. K3MVO reports that golf is about over so there now is more time for traffic. W3EUI is touring New England. W3HNK got his DXCC certificate. WA3IPG is trying his hand at a little home-brew equipment. I hope! W3CTD is venturing into 2-meter land. W3ICG reports lots of activity in Bucks County. ARFSC on the "Bring 'Em Back Alive Exercise". Traffic: W3CUL 6000, WA3VR 1761, K3NSX 766, W3EML 881, K3MYS 593, WA3JCI 276, W3MPX 267, K3MVO 238, W3ERL 236, W3CTD 155, K3VBA 148, WA3AOL 130, WA3TTO 110, WA3JKB 103, WA3INC 94, K3OIC 78, K3YVG 73, K3PIE 72, WA3GLI 71, W3NNL 68, K3WAJ 65, K3WEU 64, WA3TUV 53, WA3EXW 55, W3HK 55, WA3AFI 54, WA3RXB 50, WA3CFU 48, W3KJJ 32, W3AXA 28, W3HNK 24, K3KKO 20, K3KTH 18, W3FPC 16,

W3GSX 16, W3VAP 16, WA3HAMU 12, W3OY 11, WA3JGS 10, K3RUA 10, W3JKX 9, WA3GAT 8, WA3IPG 7, WA3CND 5, WA3EEC 5, W3PVY 4, W3BNR 3, W3BUR 3, WA3BJQ 2, WA3BSV 2, WA3IAZ 2, W3ONL 2, W3ADE 1, WA3CKA 1, K3EMA 1, W3EU 1, W3ID 1, K3NPC 1, W3YPF 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Anderson, K3JYZ—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI	Mgr.
MDD	3643	0000Z	Daily	30	377	11.5	WA3HTQ, RM
MDDS	3643	0130Z	Daily	35	17	3.4	W3CBG, RM
MDCTN	3920	2300Z	S-F-T-S	16	82	16.7	K3GZK, PAM
MEPN	3920	2300Z	M-W-F	22	69	24.4	K3LAG
						1800Z	S-S
MTMTN	145.206	0100Z	M thru S	27	9	8.4	W3IFW

New appointees: W3ZSR as OO Class IV. Endorsed appointments: W3ZNV as EC for Calvert County, ORS and RM. Two new ECs are K9ZPP for Baltimore County and K3RGB for Baltimore City. SEC W3LDD has worked out an Emergency Operation Plan for all the MDC Nets with WA3HTQ, K3GZK and K3IAG, which will be tested prior to the Jan. '69 SET. The FAR Hamfest was a huge success in all ways. WA3GXX has been elected as a new director of MEPN. W3GEP is still puttering around with 2.304-Gc. equipment. Chesapeake ARC operated an amateur radio exhibit at the Maryland State Fair. K3LFD is a new 2-meter mobiler. Business has caught up with W3GEB so his MDDS operation is suffering. W3FU, the lone Intruder Watcher of MDC, had a busy month both tracking and reporting intruders in the amateur bands as well as wayward amateurs. WA3EOP is now an Advanced Class licensee. K3IRC/3 is a new transplant on Laurel, Md. Springbrook HS ARC swings into action with WA3IAQ, pres.; WA3HUJ, vice-pres.; and WA3HWW, secy.-treas. COMSAT has a new radio club offered by K3JTE, pres.; W3DPP, vice-pres. and trustee; and W3BGO, secy.-treas. W3ECP reports that W3BIN has been placed in the cold-storage bin of Thule AFB for a year. WN3KCP has joined the Explorer Radio Club. W3FA advises that antenna towers go up harder and slower as one gets older. WA3HSU is working on signal improvement via the antenna replacement route. W3ZNV tells a sad tale about antenna and equipment problems after a nice vacation. WA3EKP and WA3JYS made the RPL but MDC stalwart W3TN enjoyed his vacation too well and missed for the first time in 1968. WA3IIR is now Advanced Class. We have a chorus singing the "Reduced Operation-Back to School Blues" in WA3JBY, WA3GAU and WA3IRQ while WA3IYS sings "I've Got It Made—The Honor Roll That Is." W3ICE/3 has been appointed Asst. RM for MDD Traffic. (Sept.) WA3EKP 731, WA3IYS 469, W3CRG 151, W3ZTN 150, WA3IRQ 125, WA3HTQ 119, W3ICE/3 103, W3ATQ 95, WA3IAQ 84, WA3JBY 60, K3GZK 55, WA3ERL 51, K3IYZ 37, W3ECP 28, WA3IIR 28, WA3GAT 17, K3OAE 22, K3LFD 19, WA3HSU 18, WA3IHW 14, K3QDC 9, W3GEB 6, W3FA 5, W3PCP 4, W3ZNV 2, K3IRC/3 1. (Aug.) WA3IAQ 28, W3PRC 31.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YFZ, SEC: W2LWV, RMs: WA2KIP, WA2BLV, PAMs: WB2UVB, W2ZI and NJPN Net Mgr. NJN reports a total of 376 messages with a QNI of 407. NJEPN reports a total of 175 messages with a QNI of 453. W2BDIQ was elected the new NJN Net Mgr. at our annual contab held in New Brunswick Sept. 28. WA2ABY is high traffic man this month and made "RPL 500" the hard way. WB2UVB has made the BPL 5 times and received the Medallion. K2EVV operated an Air Force MARS station at the N. J. State Fair, and coordinated the operation. On his operating staff were W2BWL, WA2OZN, W2QCR, WB2BKJ, K2OYI and W2RAF. The Maple Shade Amateur Radio Club received its ARRL affiliation charter. W4IE, ex-30Z, early spark man from this area, passed away in Florida recently. K2DQC had a QSO with him last. K2SOL is back on NJEPN with a big signal. WA2FGS is the "YF" of W2CDZ. WB2PGE is the new NCS for Tue. on NJEPN. Ex-W2SJI, former member of the net, is now

W4YLR at Deltona, Fla. WB2IYO recently resigned as quality control mgr. of Ford Inst. Co., and has moved to Westchester County, N. Y. K2ARY is faithfully reporting his ORS skeds. WB2SFX passed the Advanced Class exam. WB2MNF entered Lehigh U. K8JLF is chief operator at W2PU, Princeton U. Radio Club station. WA2CAA has been appointed OVS. Traffic: (Sept.) WA2AP 619, WB2UVB 421, WA2KIP 109, W2Z1 102, W2PU 98, WB2VEJ 96, W2ORS 86, WA2ANL 84, W2LU 26, W2YPZ 22, W2BLM 20, K2JJC 15, WA2KAP 8, WB2SFX 7, K2MBW 6, WB2MNF 4. (Aug.) WA2ABY 328, W2PU 102.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—Asst. SCM; Rudy Ehrhardt, W2PVI. SEC: W2RUF. Nets: NYS C.W., 3675 kc., 1900 local time; NYSPTEN, 3925 kc., 2200 GMT; ESS, 3590 kc., 1800 local time. In future columns I plan to publish a more-or-less complete list of section nets. This will include total check-ins and total traffic for the month. If I don't hear from the net, I have no way of knowing if it still exists. Let's hear from you. Congratulations to W2PVI on becoming the new Asst. SCM. WB2ANA moved back to his winter QTH. Through the end of Aug., NYSPTEN has handled 2574 messages in 1968, this with 12,028 check-ins. The Central District Radio Club elected WB2SYE, pres.; WB2CYI, vice-pres.; WA2ANE secy.-treas. The Lockport Amateur Radio Club reports 8 members with new Advanced Class licenses. They are K2ECC, K2QIB, WA2ZVL, WB2TZ, WB2JBH, WA2CGR, WA2MXQ and WB2RJX. WN2GTQ is a new Novice in Rochester. W2CFP would like to hear from those interested in establishing a repeater network across the Southern Tier. EC K2DNN does a very fine job with the Chemung County ARC group. W2PFG can be found these days at W1YK. WB2YQH wasn't able to find anyone to cite. WB2VND and K2KQC earned new OFS certificates. WA2CAL is a new ORS and WA2AWX a new OVS. WIKE, at Hq., continues to search for qualified and active Intruder Watchers. The GRAMS scored big in Field Day despite some catastrophic sounding failures. WA2IV, WB2JD, and K2SFP are new Advanced Class licensees in the GRAMS. WB2VSL has renewed as OFS. K2DNN has his rotator stuck. WB2OYE keeps some interesting statistics on signal strengths on the e.w. nets. WB2WMD has moved to Massena. WN2GFT keeps emergency power handy in case. W2RUF is busy keeping tabs on all the ECs. If your county has no active ARC group, let Clara know. WA2KND continues to do a splendid job editing the *R-1R4 Rag*. The AWA Convention was held in all places, the Smithsonian Institute. Remember, appointments will not be renewed unless the certificate is sent to me for endorsement. Please be sure to use the address on page 6 of QST. Traffic: (Sept.) W2FIR 459, WA2CAL 250, WB2SMD 189, WB2OYE 172, W2RUF 122, W2MTA 115, K2KIP 87, W2QC 87, W2FEB 75, W2HYAT 69, WB2VND 58, WA2ANE 34, K2OFV 25, K2IMT 23, K2KTK 14, W2PNW 14, W2BWRW 12, K2BWK 9, K2DNN 8, WB2WZG 8, WB2HLV 7, W2CFP 4, W2PU 4, W2FG 2. (Aug.) WA2CAL 194, WB2SMD 169, WB2YBX 155, K2RYH 77, K2DNN 16, WA2ANE 14, K2KNV 14, WB2VND 4.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: W3KPI. PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFB, W3NEM. Traffic nets: WPA, 3585 kc. daily at 0000 GMT. KSSN, 3585 kc. Mon. through Fri. at 2330 GMT. WA3AKH has been appointed manager of the KSSN traffic net. K3SOH did a fine job and is commended for his untiring efforts. New officers of the Etna ARC are K3UTQ, pres.; W3TOC, vice-pres.; W3DMK, secy.; K3FGQ, treas.; K3OTY, act. mgr.; W3TZW, director. WA3EPQ has gone to s.s.b. K3ASI and K3YAK put out a 432-Mc. signal. K3CFA worked Iowa for a new state on 2 meters, giving him a total of 22 to date. K3ZNP handles traffic on the PFN traffic net. W3UHN boosted his total DXCC countries to 163. The Steel Amateur Radio Club elected K3ZVB, pres.; W3SVJ, vice-pres.; W3ZPZ, rec. secy.; W3ZDW, treas.; W3UHM, corr. secy. SEC, W3KPI, is on the lookout for ECs throughout many counties. If you are interested in serving this segment of amateur radio a letter or card to W3KPI or your SCM will bring immediate information. WA3JEM works a lot of choice DX on the 20-, 40- and 15-meter bands. Upgrading their licenses were K3EXE to Amateur Extra, W3SVJ and WA3GQJ to Advanced and WN3JBN to General Class. A Sept. election saw the following officers of the Two Rivers Amateur Radio Club elected: K3CHD, pres.; WA3HHC, vice-pres.; W3OFM, treas.; WA3AYC, secy.; WA3FET, act. mgr. Club secretaries are invited to send in club bulletins. Put your SCM on the mailing list so your activities can be acknowledged in this monthly column. WA3HNV is now W3EUQ. New appointments: WA3BSP, EC for Washington

County; K3IOX, EC for Erie County; WA3AKH, ICM; W3BWU, OVS; W3ELZ, ORS. Appointment endorsed: K3SID, EC for Porter County; W2KAT/3, WA3AKH, W3RUL as ORS; K3CFA as OVS. In the past year I have seen two amateur licenses expire because the expiration date was overlooked. It behooves us to remind you to check the expiration date on your license so you will not be off the air while it is being renewed. Traffic: WA3IPU 164, W3NEM 153, WA3AKH 88, K3SOH 80, W3LOS 68, W3MFB 53, K3EXE 44, W2KAT/3 34, K3HCT 34, K3HKK 25, W3GJY 26, W3IDO 21, WA3GQJ 20, K3SN 17, W3SN 10, W3ELZ 8, K3ZNP 5, K3RZE 1, W3YA 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmund A. Metzger, W9PRN—SEC: W9RYU, PAMs: WA9CCP and WA9ILA (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	T/c.
IFN	3940 kc.	1400Z	Sun.	42 Aug.
ILN	3760 kc.	0100Z	Daily	341
NCPN	3915 kc.	1200Z	Mon.-Sat.	430
NCPN	3915 kc.	1700Z	Mon.-Sat.	
IL PON	3915 kc.	1615 CST	Mon.-Fri.	810
IL PON	3915 kc.	0830 CST	Mon.-Fri.	
IL PON	145.5 Mc.	0200Z	M.W.F.	57
TNT Net	145.36 Mc.	2100	Sun.-Fri.	23

The Ninth Regional Net handled a traffic count of 603 during Sept., according to Net Mgr. W9QLW. W2JNO, of CBS, was a guest of the Northwest Amateur Radio Club Aug. 27 while he was in Chicago covering the Democratic Convention. W9FE, W9HSJ, W9AKM, W9GUN, K9DRT, K9ANN, W9RAX, W9POZ, WA9QAR, WA9TTS, WA9UXF, WA9YNS, WN9YFO and WN9ZDV were organizers of the Morris Area Radio Club in Morris, Ill., Sept. 26. Congratulations to WA9ELS and Ginger on their recent marriage and to K9TWF and his XYL Rose on the birth of their son, W9JXV. The new manager of the 75-Meter Interstate Single Side Band Net, WA9JDM received his Extra Class license. According to information received in the mails, many clubs in this section are holding code and theory classes. Now is the time to join and get that new license to beat the frequency changes. W9JCK was married Sept. 1. Best wishes, Russell. WA9WIX has a new Swan 400. This column's sympathy is extended to the family and friends of WA9AJF, who passed away recently. He will be missed by all the traffic gang in the Chicago area. WA9QZE is sweating out his DX certificate. WN9ZRV is a new Novice call heard. WA9MOS, W9KDL and WA9SPA are operating WA9MOS/9 on 15 and 20 meters aboard the Yacht *Carthian* on Lake Michigan and have a special QSL card for these week-end DXpeditions. The Naperville Community HS ARC has received the call WA9ZMP. The new officers are WA9TRT, WA9TFN, WA9WKR and WA9WGI. W9BUR is now on 2-meter RTTY with a frequency of 148.7 Mc. with auto start. K9VGT is now Advanced Class. New appointments include K9DTB as OVS and WA9ZUE as ORS. W9KII has built a two-er for the traffic nets. Hamsters hamfest workers had their annual banquet Sept. 23. WA9CNV, WA9MHU, WA9TUM, K9KZB and W9KII are recipients of the BPL award. Traffic: (Sept.) WA9CNV 1346, WA9MHU 995, K9KZB 530, WA9TUM 530, WA9OTT 352, W9KII 323, W9NXG 194, WA9OXI 141, W9HOT 117, WA9TCC 109, W9JXV 104, WA9WNH/9 74, WA9AKR 72, W9YH 71, WA9SPA 68, W9DOQ 58, WA9LDC 46, WA9QCT 44, WA9ZUE 36, WA9WCP 34, W9PRN 32, WA9QTN/9 17, K9HSK 12, W9LNQ 6, K9XTJ 7, K9RAS 2. (Aug.) W9KII 131, WA9AKR 101, W9LNQ 6.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. Acting SEC: W9BIQ.

Nets	Freq.	Time	Sept. T/c.	Mgr.
IFN	3910	1330Z Daily	2300Z M-F	135 K9IVG
ISN	3910	0000Z Daily	2300Z S-S	695 K9CRS
		2130Z Daily		
QIN	3656	0000Z Daily		120 W9HRY
Ind. PON	3910	1245Z Sun.		61 K9EFY
Ind. PON VHF	50.7	0200Z Mon., Thurs.		41 WA9NLE

I regret to report as a Silent Key W9CLF, of Fort Wayne, W9PMT, mgr. of the Hoosier v.h.f. nets, reports Sept. traffic as 45. Endorsements due in Dec. are W9ZSK as EC; W9CMT, WA9LTI as OPSS; WA9MTY as ORS. QIN Honor Roll: W9BPD 26, K9VAY 23, K9QLW 20, WA9KAF 16, K9DHC 15, WA9MOE has a new 40-ft. tower. W9SNF is back on the air with a Halo and an HT-37. The Indiana Radio Club Council

held its annual fall meeting at Indianapolis Oct. 6. Highlights of the meeting were the plans for the Annual Picnic to be held at Brown County State Park next July and K9HYV's report on the Indiana QSO Party which was held in Aug. W9HPG came down from Chicago. Phil never misses any of the Council meetings and brings us up to date on the League. Indiana needs 40 more ECs to fill the vacancies that exist at present. These counties will be published in the *Bison*. BPL recipients are K9IVG, W9JYO, K9FZX, W9EQO and WA9QOQ for the month of Sept. *Amateur radio exists because of the service it renders.* We wish all of you a very Merry Christmas and a Happy New Year. Traffic: (Sept.) K9IVG 1057, W9JYO 964, K9FZX 727, W9EQO 576, W9HRY 228, W9QOO 177, K9RWQ 79, K9C9Y 76, W9BUQ 74, W9JQB 71, W9ARWS 68, WA9RS1 63, K9STN 55, K9HYZ 33, K9VHY 30, WA9-WMF 30, WA9BHG 28, W9SNQ 28, W9ICU 24, WA9-VBG 24, WA9BNX 22, K9EEN 22, K9LLK 22, W9YYX 22, K9FUJ 21, K9KTB 20, WA9IYG 19, W9ENU 18, K9IQY 18, K9QVT 18, WA9AXF 17, WA9QEQ 17, W9-DZC 15, W9LG 13, W9PMT 13, W9RTH 12, WA9IPS 11, W9FWH 10, WA9BVI, 9, W9UCU 8, W9DGA 8, W9CMT 7, W9ALM 5, K9GBV 5, W9BDP 4.

WISCONSIN—SCM, Kenneth A. Elmetter, K9GSC—SEC: W9NGT, RMs: W9NDN, K9KSA, PAMs: W9-NRP, WA9QNI, WA9IZK, K9DDB and W9LVC.

Net	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1245Z	Mon.-Sat.	329	234	W9NRP
BEN	3985 kc.	1800Z	Daily			W9LVC
WSBN	3985 kc.	2300Z	Daily	1329	407	WA9QNI
WIN	3862 kc.	0115Z	Daily			W9DND
WSSN	3780 kc.	0030Z	Daily	119	20	K9KSA
WRN	3820 kc.	0130Z	Sun.			
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			K9DDB
SW2RN	145.35 Mc.	0230Z	Daily	449	52	WA9IZK

A net certificate went to WA9TUP for W9NRP. New appointee: W9LVC as PAM for the BEN. Renewed appointment: W9DNI (formerly W9MIWQ) as ORS. Congratulations to WA9RAK, who is taking over as net manager of the CAN replacing W9IDYG, who is retiring after 8 years of managing the net. WA9QNI made the BPL in Sept. Thanks were received from the AAA for all helping with the "Bring 'Em Back Alive" program. Traffic: (Sept.) WA9QKP 378, WA9QNI 278, K9CPM 203, W9ESJ 184, WA9GIU 183, WA9RAK 153, W9DYG 139, WA9TMT 67, K9FHI 61, WA9PKM 59, K9KSA 57, W9AYK 46, WA9TXN 40, W9IDM 39, W9RTP 38, K9IFS 36, W9NRP 33, W9BCH 29, K9TBY 22, W9DXY 21, K9WRQ 20, WA9OW 19, W9RIZ 18, WA9KFL 16, WA9-TUP 16, K9GSC 11, WA9QQM 11, K9GDF 4, W9IQW 4, WA9LWJ 4, WA9SAB 3. (June) K9GDF 5.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., W0TCK—SEC: WA0FEF, RMs: KOORK, WA0EPX, PAMs: WA0MMV, WA0HRM. MSN meets daily on 3685 kc. at 0030Z. MJN meets Tue.-Sun. on 3685 kc. at 0100Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1805Z. Sun. and holidays at 1500Z. Evening MSPN meets daily on 3945 kc. at 2151Z. (This is the standard time schedule). W0RQJ hosted the Annual Meeting and Picnic of MSN and MJN in Sept. W0BE attended the Pinlay, Ohio, and Des Moines, Iowa, hamfests during his vacation. WA0LYG is back on the air with an NC-200. K0ULI moved from Crookston to Albert Lea in Aug. WA0LYE now has a W9 call after moving to Wisconsin. K0ODS has been back on the air from Minn., while vacationing here. Piconet had a good turnout of mobile and portable stations for an emergency drill called in Oct. to simulate actual emergency conditions with no plans being announced before drill time. Your SCM's term of office expires in March, and nominations for SCM in Minnesota are being solicited. Let's get some qualified people nominated so we can have an election. WA0LAW, who is active on both the c.w. and phone nets, is willing to be a candidate. Are there any others? Former W0IRJ now is operating from Staples as WA0UIQ. Jean is hoping to get her old call back. Traffic: (Sept.) K0ZRD 325, WA0KWO 197, W0FHH 105, WA0EPX 103, K0MIV 85, WA0PBY 44, WA0LAW 42, WA0ONS 42, W0UMX 41, W0KYG 35, W0BUC 33, WA0MMV 32, W0TCK 28, K0FLT 26, WA0QJ 26, K0DFE 21, K0SRK 21, W0ATO 20, WA0HRM 17, K0MGT 15, WA0DT 14, W0KNR 14, WA0NH 13, W0HEN 9, W0KLG 8, W0FHO 7, K0IKU 7, WA0RF 7, W0BUC 6, WA0JPR 6, WA0DR 6, WA0LV 2, WA0PXT 2, WA0PT 1. (Aug.) W0MMV 104, WA0HRM 13, WA0TQT 8, W0FHO 3.

NORTH DAKOTA—SCM, Harold L. Sheets, W0DM—SEC: WA0AYL, ORS: K0SPH, PAM: W0-

CAQ, RM: WA0ELO. It is with deep regret that we record the passing of W0BII of Aneta. Licensed in 1923, he continued through the years the tradition of amateur radio and will be greatly missed by his friends far and wide. The NDSU Amateur Radio Society has started meetings again every other Thurs. with WA0-FNS at the helm. WA0PSE has been telephone relay-ing for many of the foreign students in school the past summer. The Forx Amateur Radio Society holds meet-ings the second Tue. of the month at the Valley Junior High School. WA0QHH and XYL WA0QHG were in-volved in an airplane crash at Brookings—no casualties though the plane was damaged. K0PYZ and WA0GRX were busy helping Sister Mary, WA0JE, who has been very active in the YL Service International S.S.B. Net. They helped run a shuttle service between Fargo, N.D. and Breckenridge for the celebrities who attended the in-stallation of the new president, WA0ET. WA0UTS has a 2-meter rig going in Minot. W0DM will hold radio classes again this fall and winter at the Valley Jr. High School. Anyone else interested in the Forx area, contact K0RSA, as the club will be organizing classes again this winter.

NDRACES Net, M-F 3996.5 1830 CDT 20 Sess. 477 check-ins 56 Tfs. K0SPH, W0GFE, K0PZK, W0CAQ, W0EJ, W0HU.
NDPON Sat.: 1730-Sun.: 0930 3915 14 Sess. 178 check-ins 12 Tfs. 1730 CDT, WA0HUD, K0PZK, WA0KRI. Traffic: WA0HUD 91, W0NIV 32, K0SPH 27, W0GFE 21, W0CAQ 16, W0DM 12, W0DNJ 4, WA0TBR 2.

SOUTH DAKOTA—SCM, Seward P. Holt, KO-TXW—SEC: WA0CPX, RM: W0PPF, PAM: WA0-

SOUTH DAKOTA QSO PARTY

Dec. 29, 1968

The Sioux Falls South Dakota Amateur Radio Club Inc., realizing that the state of S. D. ap-pears to be rare DX for many hams, will conduct a South Dakota QSO Party on the weekend of December 28. Amateurs throughout the state will be on the air from 0001Z December 29 to 0001Z December 30 answering calls of "CQ SD" or "CQ South Dakota."

In addition to the 7 and 21 MHz. Novice bands, c.w. frequencies of 3.6 7.1 14.1 and 28.1 MHz. and phone frequencies of 3.955 7.260 14.360 and 21.360 MHz. will be manned (each plus-or-minus 5 kHz). It is anticipated that the 50 MHz.-band will also be covered.

All QSLs for Sioux Falls contacts go to P. O. Box 91, Sioux Falls, South Dakota 57101. Other contacts to individual stations.

CWW. Now that summer is over the net managers and NCSs are to be congratulated on the good job in keep-ing their respective nets very active. All net managers are looking for NCSs. Why not give it a try? S.D. C.W. Net in 21 sessions had 87 QNI, 21 QTC with 21 stations. S.D. Morning Net had 407 QNI, 26 QTC, 27 informals. NJQ Net, 324 QNI, 157 QTC, 36 informals. Early Phone Net, 294 QNI, 20 QTC, 19 informals. Late Phone Net, QNI 1121, QTC 83, informals 129. W0DYB has accepted as EC for Lawrence Co. WA0PNB has earned BPL three months in succession. Traffic: WA0-PNB 535, W0IG 65, WA0LLG 40, WA0BZD 7, W0-DJO 4, W0DYB 4, WA0NZA 4, WA0PDE 2.

DELTA DIVISION

ARKANSAS—Acting SCM, Robert D. Schaefer, WA5TIS—SEC: W5PBZ, PAM: WA5PPD, RM: W5-NND. The first annual meeting of the Arkansas DX Association was a big success. Most of our active DX-chasers attended and enjoyed an excellent meal and program. For latest DX information, check 3.815 around Razorback Net time, especially after the net on Mon. WA5TAF is a new OPS. Net reports for Sept.:

Net	Freq.	Time*	Traffic	Stations	Mgr.
OZK	3.790	0000Z	34	201	W5NND
RN	3.815	2300Z	?	?	WA5PPD
PON	3.925	2130Z	177	402	W5MJO
Treasure	3.815	2300Z	26	260	WA5QPI
RACES	3.990 and 50.5	during severe weather alerts			

* Nets will meet one hour later in GMT after Daylight Saving Time ends. Top stations on OZK during Sept., were W5NND 29, W5QOO 25, WA5TIS 25, WA5NOC

18. and W5CAF 11. W5WEE continues to put out a fine bulletin for the North Arkansas ARS. WA5IYW passed the Advanced Class exam. Traffic: W50BD 891, W5NND 241, W5DTR 32, WA5QPI 22, WA5RCK 4, WA5KQU 3, WA5TLS 1.

FOURTH ARKANSAS QSO PARTY

January 10-12, 1969

The North Arkansas Amateur Radio Society of Harrison announces its fourth Arkansas QSO Party and invites all amateurs to participate.

Rules: 1) The time will be the 30-hour period from 2200 GMT January 10 to 0400 GMT January 12, 1969. 2) No time limit or power restrictions. 3) Arkansas stations score 1 point per contact and multiply by the number of states, Canadian provinces and foreign countries worked during the contest period. Outside stations score 5 points for each Arkansas station worked and multiply the total by the number of counties in Arkansas worked during the period. 4) Stations may be worked once on each band and each mode. 5) A certificate will be awarded to the highest-scoring station in each state, Canadian Province and foreign country (with 100 or more points). 6) General call: "GQ ARK". Arkansas c.w. stations should identify themselves by signing de (call) ARK K. Phone say "Arkansas Calling." 7) Suggested frequencies are a.m. 3825 7225 14,225 21,220 28,560; c.w. 3525 7025 14,025 21,025 28,025; s.s.b. 3975 7275 14,325 21,425 28,650; Novice 3735 7175 21,110. 8) Arkansas stations send QSO number, RS(T) and county, all others send QSO number, RS(T) and state, province or country. 9) Logs and scores must be postmarked no later than January 30 and sent to The North Arkansas Amateur Radio Society, c/o Robert E. Townsend, P.O. Box 333, Harrison, Arkansas 72601.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK, RM: K5ANS/5, V.H.F. PAMs: WA5DXA, W5UQR.

Net	Days	Time/GMT	Freq	Net Mgr.
LAN	Daily	0030/0300	3615	K5ANS/5
Delta 75	Sun.	1330	3905	WA5EVU
LAPON	Sun.	1300	3870	W5KC
LaRTTY	Sat.	0100	3612.5	W5GHP

It is with deep regret that I report the passing of W5LA. K5JBC still is having quad problems. W5IYA is active from BR. WA5QVN is working DX with a dipole on 15. W5CEW still is trying to up his input on 3900. There are now ten stations checking into 3900 each morning at about 1230 GMT. WA5GUB and WA5OHH are attending La. Tech. up Ruston way. W5LDH recently addressed the BRARC. Incidentally, LAN badly needs a net mgr. Anyone interested, please contact our RM. WN5VID is having a ball on 15. According to W5MXQ the Fee ARC is presenting a course for Advanced Class each Fri. WA5OJG also has joined the ranks of the Extra grad. We all wish W5CEZ a quick recovery from eye surgery. W5EA has been ailing for the last month but is now feeling much better. WN5YRC is active on both 80 and 40. WN5VED built a new rig. W5FYZ is most active on MARS, while K5WOD is teaching electronics at Springhill High. The GNOARC recently held a Swap Jamboree. The LARC, Lafayette, also held an auction recently. W5EXI again is holding ham classes at USL. WN5UAP has a new jr. operator. W5NQQ and W5NQR have returned from a vacation in Florida. W5BAM has made his second hole-in-one! W5FMO spends most of his time fishing when not hamming. W5BUK and his NYL spent their vacation in Huntsville. Traffic: W5CEZ 147, W5MXQ 133, W5KRX 107, K5ANS/5 63, W5EA 12, WA5QVN 11, WA5OJG 2.

MISSISSIPPI—Acting SCM, Clifton C. Comfort, WA5KEY—We are sorry about W5EMM's resignation as SCAL; his was a job well done for 8 years. All reports should be sent to WA5KEY until an election is held. We welcome W4RIN/5 to Mississippi. WA5JWD is back on the traffic nets after getting his B.S. degree. New liners this month; WA5IXC and WA5JTB. WA5RFG has his working again.

LOUISIANA QSO PARTY

January 18-19, 1969

The Fourth Annual Louisiana QSO Party sponsored by the Lafayette Amateur Radio Club will start at 1800 GMT Saturday January 18 and end at 2200 GMT Sunday, January 19, 1969. All bands may be used, c.w. and phone (phone classified as both a.m. and s.s.b.). The same station can be worked and counted for QSO points on each band and each mode. Louisiana stations score 1 point for each contact (including contacts with other Louisiana stations). All others score 1 point for each contact with a Louisiana station. Louisiana stations multiply total QSO points by number of different states, Canadian Provinces and countries worked. All others multiply total QSO points by the total number of different Louisiana parishes worked. Louisiana stations give QSO number, RS(T) and parish. Others give QSO number, RS(T) and state, province or country. Suggested frequencies are: 3600 3910 7075 7260 14,075 14,300 21,075 21,400, 28,100 and 28,700. In Louisiana, certificates will be issued to the 1st, 2nd and 3rd place scorers. Also, for the first time, a beautiful trophy will be awarded the first place Louisiana winner! Other stations outside Louisiana will be issued certificates for highest scoring stations in each state, Canadian call area and each country. (Note that a minimum score of 50 points for U.S. stations and 25 points for DX stations is needed to win). Logs must show dates, times, stations worked, exchanges sent, exchanges received, bands, modes and scores claimed. Logs must be postmarked no later than February 28, 1969 and sent to the Lafayette Amateur Radio Club, 123 Normandy Road, Lafayette, Louisiana 70501. Anyone wishing to receive a copy of the contest results should send a stamped, self-addressed envelope with his log.

WA5QQT has reported u.f.o.s. near his QTH several times and has been well "tagged" in the ragchews. New officers of the Kessler AFB Amateur Radio Club are Lee W. Cook, pres.; Maury O. Rester, vice-pres.; Charles D. Gulick, secy.; Loren C. Burkett, materials officer; Virginia A. Sweet, librarian/QSL Mgr.; Hugh D. Gibbons, traffic mgr.; Francis S. Morgan, EC. WA5PTE's all coast version of the "Double Bazooka" antenna seems to be the answer for emergency work since it is weather proof and will get out even laying on the ground. The shorting points are changed to 30 in. and 6 in., using 12-11, overall length before trimming. Hats off to WA5KPS and K5AUR for their work with a proposed heart transplant. W5ODV is conspicuous by his absence since changing jobs and becoming a Scout Master. Traffic: W5BW 28, K4RIN/5 18, WA5JWD 12, WA5SIM 6.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH, RM: WA4YEM, PAMs: W4PFF, WA4YBT, WA4EWW, WA4CRU.

Net	Freq.	Days	Time	Secs.	ONI	QTC	Mgr.
TSSB	3980	Tue.-Sun.	0030Z	25	1347	242	WA4YBT
TPN	3980	M-Sat.	1245	30	1266	156	W4PPP
		Sun.	1400				
ETPN	3980	M-F	1140	21	520	84	WA4EWW
TCN	3980	Thurs.	0200	4	27	6	W4TYV
TPO	3980	Mon.	0030	5	119	24	K4RTA
TN	3635	Daily	0100	30	217	305	WA4YEM
TTN	7290	Daily	2200	29	93	79	WA4CRU
ETVHF	50.4	Tue.-Th.-Sat.	0000	13	194		WA4TJJ
ETVHF	145.2	Wd. & F.	0000	4			K4FKO

The International Harvester ARC, WB4HPC, operated a traffic and information booth at the Mid-South Fair in Memphis. WA4ZIR reports traffic was taken for 50 states and at least 1 foreign country. ECs: SET Jan. 26-27. Emergency planning committees: Inform SEC W4WJH of your plans. Tenn. Council chairman, W4TYV met with the Oak Ridge Ops. Club board of directors to discuss the Tenn. Council of Clubs. The Radio Am. Club of Knoxville operated two stations at the TVA and 1 Fair. WA4WZJ reports that 61 prospects for code and theory classes visited the stations. The Oak Ridge Radio Ops. Club

(Continued on page 117)

EIMAC

3-400Z's or 3-500Z's interchangeable in new Swan Mark II amplifier.

Swan's new Mark II linear amplifier uses EIMAC high-mu power triodes to achieve 2 kW PEP SSB input and 1000 watt input on CW, AM, or RTTY.

Unique circuitry permits the choice of a pair of either 3-400Z or 3-500Z zero-bias triodes in this all purpose high-frequency linear amplifier.

Swan chose the heavy duty EIMAC power triodes because these rugged, low-cost power grid tubes are ideal for cathode-driven grounded-grid service, providing a power gain of up to 20 in linear service.

For more information on either the 3-400Z or the 3-500Z, or any other tube in EIMAC's line for advanced transmitters, write Amateur Services Department or contact your nearest EIMAC distributor.

TYPICAL OPERATION

	3-500Z	3-400Z
DC plate voltage (Vdc)	2500	2500
Zero-sig DC plate current (mA)*	130	73
Single-tone DC plate current (mA)	400	400
Single-tone DC grid current (mA)	120	142
Two-tone DC plate current (mA)	280	274
Two-tone DC grid current (mA)	70	82
Peak envelope useful output power (W)	600	560
Resonant load impedance (ohms)	3450	3450
Intermodulation distortion products (dB)	-33	-35
Plate dissipation rating (W)	500	400

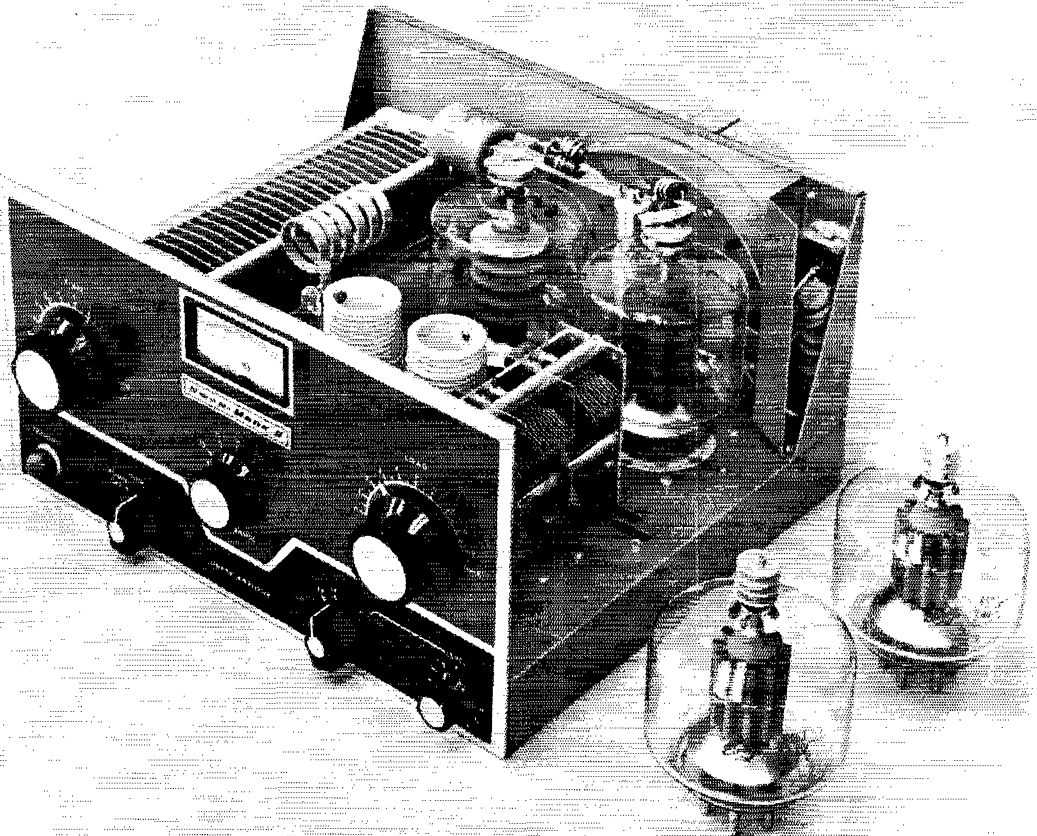
*Approximate

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We knew you weren't satisfied with ordinary push-to-talk mobile and airborne UHF/VHF communications systems. Why? They took up to 60 seconds to warm-up. You needed more power and you needed it with "instant talk" speed.

The EIMAC metal ceramic X2099B is the only tetrode combining 500 watts of plate dissipation with instant warm-up. The quick-heat cathode in the X2099B takes only 250 milliseconds to warm up to half power or 70% of peak current. You can drive the X2099B with low level solid state, and you can air cool it.

The X2099B is available only at EIMAC. We're ready to talk whenever you are. (415) 592-1221.

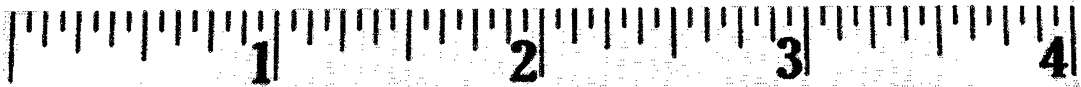
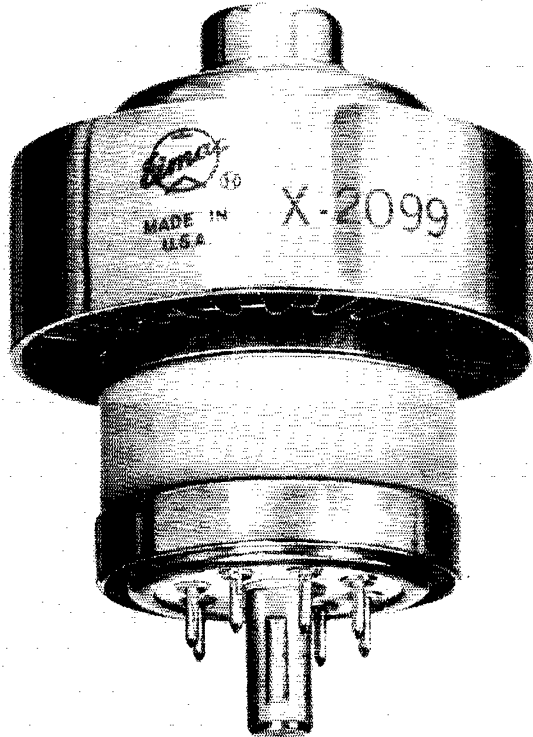
Contact your nearest distributor or Varian Field Office for further information. Offices are located in 16 major cities. Ask information for Varian Electron Tube and Device Group.

TYPICAL OPERATING CHARACTERISTICS
Class AB₁ Radio Frequency Linear Power Amplifier

	DC Plate Voltage	
	1600	2600
DC Screen Voltage	200	250
DC Grid Voltage	-24	-34
Zero-Signal Plate Current	250	225
Max Signal DC Plate Current	455	370
PEP or CW Plate Output Power	400	500
Third Order Intermodulation Distortion	-36	-38
Fifth Order Intermodulation Distortion	-54	-46
Filament Voltage	2.5	2.5
Filament Current	10.0	10.0
Warm-up Time (to half power)	250	-

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San Carlos, California 94070



has revived the club paper with K4LPW as editor and publisher. For a list of Tenn. clubs contact K4KCT or W4TVV. The C. W. Net handled 305 messages in Sept. K4TTA is back on the air from Jolton, Tenn. Appointment: WB4GSS as ORS; Traffic: WB4EPC 574, W4OGG 379, W4BBB 306, W4FX 292, W4OQG 206, W4AZBC 184, W4WRK 170, K4AAC 129, K4AT 122, W4AUAZ 97, W4AGLS 62, W4ANX 57, W4YVY 56, W4PPEC 50, W4SQE 41, W4ACRI 38, W4EHD 30, WB4GSS 36, K4AIQ 24, W4JFT 33, W4HYV 29, K4PUZ 29, W4EHK 25, W4NEC 25, W4FPF 22, W4PRY 20, K4JTA 17, W4WJH 17, W4EWW 15, W4ATWL 15, K4RTA 14, W4VJ 13, W4HLR 8, W4ACGK 7, W4AHGN 2, K4OUK 2.

GREAT LAKES DIVISION

KENTUCKY—Acting SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Newly-appointed ORS: K4HOE, W4HTA, W4UK, W4UHR, W4NLO, WB4EQY, W4AVZ, W4AVEC. Endorsements: K4ZOR as OO; W4AWSW, W4YVI as OPS; W4REW as EC; W4ADH as OVS; K4KIS, K4TRT as PAMs.

Net	Mgr.	ONI	OTC	Freq.	Summer GMT
KRN	K4KIS	311	25	3960	1030
MKPN	K4TRT	444	131	3960	1230
KTN	W4AGH	922	220	3960	2300
KYN/KSN	W4BAZ	463	550	3600	2305/0200
PCATN	WB4BKG	77	96	50.7	0200

W4REW is having fun in the southern sun. WB4HUS chases 10-meter DX while W4TBU and W4YOK are burning big holes in the DXCC. The Louisville ARC and other large chapters are coordinating activities via ham radio. Nice job! Two meters is unbelievably long with these big cold fronts. Remember, traffic functions on MARS frequencies aren't included in monthly message totals. Traffic: (Sept.) W4DYL 1303, K4YZU 520, W4NLO 294, W4BAZ 147, W4WWT 133, W4AGH 128, WB4BKG 108, K4TRT 88, WB4AIN 80, W4OYI 80, W4VZZ 74, K4HOE 63, W4NBZ 60, K4MAN 57, W4VYS 50, W4CDA 49, W4KJP 48, W4UK 42, W4UHR 38, K4OEK 26, K4MPT 24, K4VDO 24, W4SZB 21, W4GHQ 20, K4UMN 19, WB4EOR 18, WB4EOY 17, K4HOW 14, W4AVEC 13, W4GMA 12, K4FPW 8, WB4HUS 8, W4BTA 3, WB4FDK 3, K4AVX 1. (Aug.) WB4HUS 313, K4FPW 10. (July) WB4HUS 222, K4FPW 6. (June) K4FPW 8.

MICHIGAN—SCM, Ralph P. Thetreaux, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, W8ROGR, K8KMQ. PAMs: K8GOU, K8JED, V.H.F. PAMs: W8CVQ, W8VAN. Appointments: W8AAM, W8FSZ, K8LNE as OPS; W8CVQ as OVS; W8DSW as OBS. Silent Keys: W8EYJ, W8SKU, W8ZND. BPLers: W8IHD, W8GAI, W8LXJ, W8IV. Net reports:

Net	Freq.	Time	Days	ONI	OTC	Sess.	Mgr.
QMN	3663	2300	Dy	476	456	30	W8FWQ
WSSB	3935	2400	Dy	882	155	30	K8WRJ
HPEN	3920	2230	Dy	592	51	30	W8ITD
PON-DAY	3935	1600	M-Sat.	419	300	25	K8LNE
PON-CW	3645	2400	M-Sat.	76	12	23	W8DPO
W/R-MEN	3930	2330	M-Fri.	1014	125	26	W8OWG
M6MTN	50 7	2200	M-Sat.	245	38	25	W8LRC

New officers: Blossomland ARA—W8ZJT, pres.; W8RWS, vice-pres.; W8WNZ, secy.; K8CGD, treas.; W8GPB, K8YZW, board, S.E. MARA—W8SQI, pres.; W8BHW, vice-pres.; K8QDZ, secy.; W8GVV, treas.; W8EMJ, W8ANYK, W8KAZ, board. W8WB is back on in Dearborn Hts. with a Swan 500. W8ORB now has Extra and operates from W8UM. W8DZT is now 7Q7-WW in Malawi. The Grand Rapids ARA will hold the ARRL-Sponsored Convention May 9 and 10 at the Pantland Hotel. All Michigan amateur radio clubs are asked to list their clubs with K8ETU, of the Michigan Council of AR Clubs. Do it now! Muskegon Area ARC has rejuvenated its bulletin with W8GVK as editor. The CMARC had a good display at the Lansing Hobby Show, also handled communications for the water ski tournament and has its repeater started. W8LPM is working Army MARS in Vietnam. W8RXY worked K8MFO operating at W7USA on 14-Mc. s.s.b. W8A-VAR, W8OKQ and W8ARIJ now are on 2. WB4JNP was back in Detroit and K4HK was back in Marquette. K8NBF now is over his coronary and back to work. W8AWN has a new Swan transmitter. W8EJE is back on 160 again, as is K8FYG. The W8OWGs have a new junior op. K8AYJ is home from the hospital wearing a back brace. 'a wanna know how old W8QQK is ask "Tate." He won't tell ya either. For over the first ten years of the League, the SCM was called the "A.D.M." Look it up in QST. Traffic: (Sept.) W8IHD 680, W8-

GAI 584, W8LXJ 426, K8LNE 387, K8KMQ 286, K8ZJU 185, K8JED 150, W8IV 108, W8NOH 105, W8JTC 103, W8QQK 100, W8SQI 96, W8BEZ 82, W8AOR 82, W8DET 80, W8UFP 69, W8IWF 64, W8PZT 42, W8UFC 37, W8MO 36, K8GOU 35, W8FN 33, W8YAN 31, W8LXY 26, W8CUP 24, W8AUD 17, W8MPD 16, W8FWQ 14, W8KME 13, W8MGM 12, W8UFS 12, K8MNC 11, W8BW 9, W8HKT 9, W8ARKH 8, W8OWG 8, K8YDA 6, W8AVGQ 5, W8ACNF 2, W8AMCQ 2, W8VBL 2, W8AAM 1. (Aug.) W8AMCQ 81, K8GOU 23, W8LAY 10.

OHIO—SCM, Richard A. Ezbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUL. RM: W8MI. PAM: K8ORB. V.I.L.F. PAM: W8ADU. Sept. net reports:

Net	ONI	OTC	Sess.	Freq.	Time	Mgr.
QSSBN	1535	1159	54	3972.5	1530 & 2345Z	K8ORB
BN	548	321	57	3580	0000Z & 0300Z	W8MI
06MtrN	312	45	30	50.6	0000Z	W8ADU
OSN	161	58	27	3580	2325Z	W8VNU
Apricot	231	44	30	50.1	0200Z	K8ONA

BPL certificates for Sept. traffic went to W8UPH, W8AAU, W8OHU and W8ULF. W8VUP originated a priority message to Vietnam for a neighbor with a wounded husband. The message was put on the Ohio Six Aletor Net and a reply was received by telephone from Washington, D.C., in 36 hours. K8LEI, Lucas Co. EC, originated a message regarding a fourteen-year-old runaway from Tennessee supposedly heading toward Toledo. The boy was known to be interested in ham radio and it was thought he might contact a ham. The message got wide dispersion on section and local nets as a result of the efforts of W8RYP and others. W8IUX, in Dayton ARA's *RE Carrier*, suggests an "All Day Every Day" net similar to one on the West Coast. Anyone interested should contact W8IUX. Welcome to new affiliated clubs, the South Shore Radio Club in the Cleveland area and the Ottawa Amateur Radio Club in Ottawa. New officers of the Miami Co. Radio Club are W8PBL, pres.; W8NASZ, vice-pres.; W8MIV, secy.-treas. The Massillon Amateur Radio Club will hold its seventh annual auction Dec. 8. Winner of the Columbus ARA housebrew contest was K8EHI. Congratulations to new Extra Class licensees W8MJJ and W8IDN, and to new Advanced Class, K8LEI, W8AWR, W8AHC, W8AMH and W8NFI. W8ERD operated portable VE7 from Big Stone Island in NWT during the WAVE Contest. W8KPN addressed a Lions Club group on the subject of amateur radio. W8COA received an ARRL Certificate of Merit, presented by Division Director W8WC. W8WEG reports a trip to Wales and a visit with G6AS. New appointments: K8CKY, W8AVK as OVS; W8KPN as OBS; W8ABU as OPS; W8IUS as OO. W8VUR reports taking part in a communications network in support of the National Air Race in Cleveland in conjunction with AREC, RACES, Red Cross, Sheriff, Police and Fire Units. On duty were K8MVR, K8MJC, W8WYF, K8SYJ, W8ACAC, K8TIA, W8PWI, K8YVK, W8ZJV, W8VVK, K8OPV, W8ZWB, K8PVR, W8AVE, W8ENVV, K8SRA, W8TTO and K8ISE. W8TFY reports lots of 2-meter contacts on Sept. 20, reaching out to a 900-mile s.s.b. QSO. Tim also worked W1YTV on 2 for his 24th state and 8th call area. Visited the up-and-coming Newark Amateur Radio Assn. recently. Newark area hams would do well to contact W8EUG. Also attended a meeting of the Queen City Emergency Net, well-known for its dedication to public service communications. Traffic: (Sept.) W8UPH 1852, W8RYP 361, W8OZK 348, W8SZU 312, W8AAU 305, W8OUL 250, W8MI 201, W8CT 185, W8ULF 186, W8OE 174, W8FYF 168, K8ONA 161, W8SIS 150, W8VNU 150, W8ERD 139, W8GVY 115, W8SED 113, W8UTX 113, W8TID 84, W8OCG 83, W8FGD 82, W8FSX 82, W8MTS 79, W8ZGC 79, W8LRE 76, W8SDZ 76, W8APPK 73, W8DAE 72, W8LAM 69, W8QPK 65, K8UBK 64, W8AJZ 62, W8ANT 60, W8OQU 59, W8AUD 58, W8ARJU 51, W8PMJ 51, W8RWK 47, W8ABD 45, K8LXA 43, W8ATRE 39, W8AMHO 36, W8YAW 33, W8YHU 22, W8IUS 21, W8UX 30, K8DDG 26, W8HNP 26, K8BYR 24, W8FFP 24, W8PNP 24, W8CFI 23, W8ETU 23, W8UFI 22, W8VVP 21, W8ARQ 20, W8SHP 20, W8GOE 19, W8CXV 16, W8WJJ 16, W8FY 15, W8ELE 14, W8ADWL 13, W8AJEH 13, K8VUZ 13, W8FRY 12, K8YEP 12, W8ASKI 11, K8IIF 10, W8ALG 10, K8IFT 10, W8LT 10, K8CKY 9, W8ACJO 8, W8JWS 8, W8AUX 8, W8BAZH 7, K8VCW 7, K8DAJ 6, W8KPN 6, W8WTK 6, W8ARCO 5, W8AEB 5, W8VND 3, W8WEG 3, W8AQ 2, W8BRZ 2, W8TFM 2, K8NQA 2, W8AN 1. (Aug.) W8RWK 40, K8LXA 25, W8LT 17, K8PJH 12, W8HNP 7.

(Continued on page 120)

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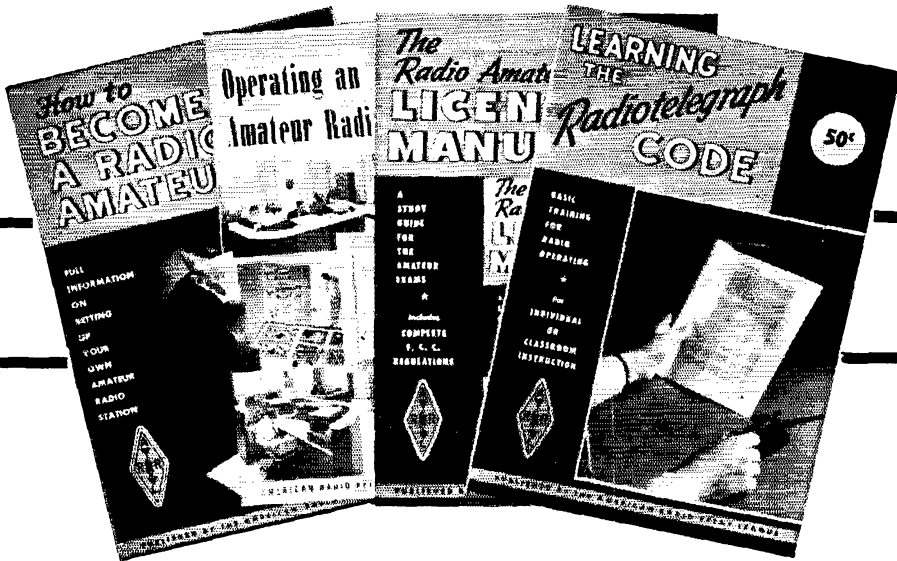
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HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Herry, K2S1N—Asst. SCM and RM; Ruth Rice, WA2VYS. SEC: W2KGC. PAM: W2VJR. Section nets: NYS at 2400Z, 3675 kc. nightly; ESS at 2300Z, 3590 kc. nightly; NYSPT&EN at 2300Z, nightly on 3920 kc. Appointments and renewals: K2BIG and WA2QJD as OCS; K2UTV and W2ODC as ORSS; WA2VEG as OPS; K2AVP as OBS. To quote the latest (C'D Bulletin): "You have to report activity monthly to your SCM and get his endorsement annually to keep your appointment in effect." Related congratulations to WB2UUV on making the BPL in July and Aug. From the club bulletins: Westchester ARA had W2AMJ as a speaker in Sept. and WB2MOI demonstrated installation tips on coax connectors. Harmonic Hills plans code and theory classes on Fri. in Mt. Kisko—WB2ZEC for details. The Westchester (WARA) Technical Net now is on Tue. at 28,690 kc. at 2000 local time with W2KFB as moderator. All are invited to join the net and suggest topics for discussion. NYS certificates went to W2ANV, W2THE, W2ODC, W2CRV, WA2BHN, WA2VYS, WB2VYS and WB2UHZ. NYSPT&EN secy. WB2AEK reports 9-month totals of 12,028 QNI; 2574 traffic count; 409 hours operation by 966 different stations. From ESS—225 handled in Sept. W2JKI and W2VP report contact via 6M with ZS3E Sept. 28. WB2RBG is now Advanced Class. PAM WB2VJB is making "team calls" for the ENY staff in the Albany area. Before you know it the Annual SET will be coming up. All ECs: Please report plans in advance to W2KGC. WB2QDL reports a new NYL and that she's studying for her Novice ticket. W2EAF now is NCS for the Navy MARS net. Newcomer WN2GZK reported in for the first time to the SCM. Welcome aboard! WB2PYZ ordered 250 QSL cards from his printer, received 2500 of 'em. 100% QSLing now is guaranteed! The Niskayuna HS Amateur Radio Club, in Schenectady is now affiliated with ARRL. WB2GMIN is taking reservations for the New Rochelle Club's 8th Annual Dinner Dec. 28. WB2NYJ visited DX friends while on a European trip in Sept. Holiday greetings to all in ENY from the section staff. Traffic: (Sept.) WA2BHN 319, WA2VYS 266, W2EAF 146, WA2VYT 51, WA2HGB 37, K2S1N 35, W2TPV/2 26, W2ANV 17, WB2RBG 16, WB2FOA 15, WA2BUC 1. (Aug.) WA2JWL 1. (July) WA2JWL 4.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

Call	Power	Time	Day	Secy.	QNI	Tfc.	Mgr.
NLI*	3630 kc.	1915/2200	Nightly	WA2UWA	RM		
NL1VHF*	145.8 Mc.	1930	MTWTF	WB2RQF	PAM		
NL1PHONE*	3932 kc.	1600	Daily	WB2ZET	PAM		
Clear Base	3925 kc.	1100	Daily	WA2GPT	Mgr.		
McFarad	3925 kc.	1300	Ex Sun.	K2UBG	Mgr.		
East U.S.	3683 kc.	0001	Nightly	K2UBG	Mgr.		
All Svc	3925 kc.	1300	Sun.	K2AAS	Mgr.		
NYSPTEN	3925 kc.	1800	Daily	K2AAS	Mgr.		

*Section nets. All times shown above are local.

WB2ZKX has been checking into the local traffic nets around here. K2UBG, WA2VYS and WA2VYT went over to WA2GPT's place recently for lunch and a traffic-type gabfest. WB2DRW sat down to gin up the traffic report when he discovered the Form 1s were on the floor-boards of the RPI-bound trunk and had to resort to good old composition paper. A high school student's spare time is rather small, but WA2CNJ racked up 66 traffic points with his ration. WB2DZZ has gone back to N.Y.U., where all the radio club guys are toiling to get the club station back on the air. Listen, I must apologize for not seeing more of you folks than I did at the convention at Tarrytown. My neighbor was out of town on business when his cess-pool caved in leaving a gigantic hole in the lawn and his family defenseless. Remembering the amateur code, I rolled up my knickers and plunged feet first into the task of redeeming our PICON image. Although kneed-up in work for most of the day, I did manage to make the banquet. W2DID answered W2EW's call for a stalwart young man to scale the heights of those bodacious trees and nail down the antenna ends. Hey, Nassau County folks, the 10-Meter AREC Net meets every Mon. at 2000 on 28.72 Mc. and you're all welcome! W2YFM discussed his band-scanner scope at the Sept. meeting of the Amateur Radio Luncheon Club, according to W2Paf. W2AAZ left for a trip to Australia and New Zealand. WB2QIL was forced off the air by a runaway electric bill and was overjoyed to learn that the doxboned frost-free refrigerator turned out to be the culprit. Officers of the J.F.K. HSRG are WB2ZNV. pres.; WB2DBA, vice-pres.; and WN2GOR, secy.-treas. This club is just getting off the ground

and is looking for any kind of parts which may be donated for the school's club station. We are saddened to learn that W2MUV has joined the hallowed list of Silent Keys. Wantagh ARC has the new call W2VA and a new set of officers: WB2MQL, pres.; WB2GYP, vice-pres.; WB2VFI, treas.; WA2HUF and WB2BUZ, secy.; and W2SR, trustee. WB2NLM, reversed OO, has a new TH6-DX beam going up on a 54-ft. tower. Congratulations to WB2CYX on getting his good old General Class ticket! Officers of Explorer Post 673 ARC are WB2YKU, pres. and WB2YCC, secy.-treas. According to K2HGR, the TuBoro RC is looking for RTTY contacts every evening after 2000 on 145.62 Mc. Also, the club's a.m. net meets every Sun. at 1100 on 29.5 and 145.62 Mc. WB2YKU has gotten started in traffic and likes it. WB2WCS has been doing a yeoman job on the NL1VHF Net, according to WB2RQF. If we wish you all a very happy holiday season.

NORTHERN NEW JERSEY—SCM, Louis J. Amoro, W2ZZ—Asst. SCM: Edward F. Erickson, W2CVW. SEC: WA2ASM. RMs: WB2DDQ and WB2RKK. PAMs: W2PEV, K2KDQ, WA2KZF, WA2TEK and WA2TBS.

ARPSC Section Net Schedules

Net	Freq.	Time	Days	Secy.	QNI	Tfc.	Mgr.
NJN	3695 kc.	7:00 p.m.	Dy	30	407	376	WB2DDQ
NJSN	3740 kc.	8:00 p.m.	Dy	23	112	35	WB2RKK
NJEPNT	3928 kc.	6:00 p.m.	M-Sat.	30	453	175	W2ZT
NJPON	3930 kc.	6:30 p.m.	Sun.	5	107	42	WA2TEK
NJAN	50,300 kc.	8:00 p.m.	M-F	21	315	41	WA2KZF
PVTEN	145,710 kc.	7:30 p.m.	Dy	30	212	90	K2KDQ
ECTN	146,700 kc.	9:00 p.m.	Dy	30	217	135	WA2TBS

New appointments: WB2TUL as ORS; WB2ZBI and WB2FEH as OBSs. Endorsements: WB2TKP as ORS. We would like to remind everyone that this report is mailed out on the 6th of the month. Please try to get your report in the mail no later than the 3rd of the month. WA2ASM, our SEC, is looking for additional ECs in the section. Please contact him or your SCM for details. WB2RKK reports working 221 stations in the recent VE/W Contest. WB2SEH has the Watchung c.d. unit in operation. WB2FEH is working on his new v.f.o. WA2CKU is chasing DX on 15. WA2KZF's NJAN net directory is growing. W2NCY is home from the hospital. K2KDQ finally fixed his Thor. K2QZW is back in the section after 6 years as K3NNI. WB2MYI received his Extra Class ticket. WA2DQU joined Army MARS. WA6JY/2 passed the Extra Class exam. WB2VFW is up to seven stations in four call areas on 2 running 12 watts a.m. WA2CUR is using a Swan-350 and is planning a quad. K2MHP now has a Tri-Bander and a 60-ft. tower for his new QTH. W2TPJ is back from his 5-week motor trip to W6-Land. Congratulations to WB2DDQ on being elected net mgr. by the NJN members who had their annual meeting. WB2RKK is asst. net mgr. Our sincere thanks to WA2KIP for the fine job he did as mgr. for the past two years. The PVTEN Dinner was a success with lots of good food. WB2DRJ has 81 worked toward his DXCC after one month as a General. W2ZZ finally worked a VS6 in Zone 24 to complete his WAZ. My sincere thanks to all who have helped so much to make the duties of SCM a pleasure to perform. Your continued help is needed to make Northern New Jersey the activity leader. A Merry Christmas and a Happy New Year to all. Traffic: (Sept.) WB2RKK 369, WB2DDQ 166, WA2TBS 163, WB2NSV 114, WA2ACJ 100, WA2TEK 98, K2KDQ 84, WB2ZSH 64, WB2BXX 62, W2ZF 36, WA2ZDA 27, WA2NJB 26, WB2B17 25, K2F1 21, W2CVW 19, W2EZW 18, K2MHP 17, WA2CCF 15, K2DEL 13, W2DRV 13, WB2TKP 13, W2JDH 11, WA2KZF 11, WA2GLI 9, K2EOP 9, K2JSJ 8, WB2BCS 6, WB2WNZ 6, W2BSC 4, WB2EUX 4, W2TFM 4, WB2DYG 2, WB2DRJ 1, W2LWP 1. (Aug.) W2DRV 22. (July) W2DRV 4. (June) W2DRV 2.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KOMHX—SEC: KOLVB. PAM: WOPZO. RM: WOLGG. OBSs: WOLCX, WAOMIT, WOJEQ. KOLVB is getting fine cooperation in reactivating the Emergency Corps. He hopes to have all areas represented and certificates renewed or issued by Jan. 1. WOPFP reports activity was quite good during the Sept. contest on 8, with many East Coast stations worked. WOETI says activity on 2 is increasing. WAOSDC/WBFAW got his Extra Class license while vacationing in D.C. K0AZJ mailed out a new roster of nearly 60 calls for the Tall Corn Net. These include both old-timers and newly-interested people. Dave will be happy to send out a roster to anyone interested. The Jester Park Hamfest was big-

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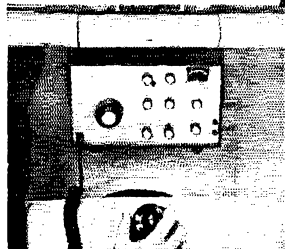
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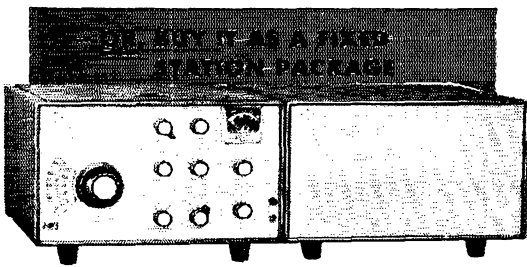
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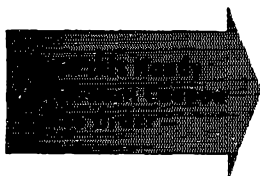
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Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3970	M-Sat.	1830	1261	204	W0PZO
Iowa SSB	3970	M-Sat.	2359			W0YLS
TLCN	3560	Daily	0030	63	10	K0BAZJ
Iowa 160	1815	Daily	0100	575	8	K0TDO
PON	3915	W & F	0030	168	34	W06DYV

Traffic: W0LCX 711, W0OSSB 54, K0TFT 50, W0SRM 32, W0ADYV 30, W0APOE 30, K0KAQ 19, K0TDO 16, K0EVC 12, K0JMA 12, W0AMIT 12, W0GQ 2, W0OTE 2, W0SDC 2.

KANSAS—SCM, Robert M. Summers, K0BNF—SEC: K0FMB, RMs: W0AMLE, W0QJVF, PAM: K0JMF, V.H.F. PAMs: W0QCCW, W0OLSH. The Jayhawk Amateur Radio Society will sponsor the Kansas QSO Party to be held during Kansas week in Jan. 1969. W0AYL/K0BXF may be contacted for information. W0GUO is reported recovering from a recent stroke. The Santa Fe Trail V.H.F. Club, Inc., Gardner, Kans., is now an ARRL affiliated club. W0JYK is pres. New officers of the Pilot Knob ARS, Leavenworth, are W0OEB, pres.; W0AKTA, vice-pres.; W0ARNR, secy.; W0YLN, treas. The PKARS now meets the 1st and 3rd Thurs. of each month. K0BIX, ex-Kansas c.w. operator, is teaching ROTC at Central Mo. State College. His NYL is K0LJH. W0MPT is the new secy.-treas. of the Technicat Club, replacing K0JJR, who is helping Uncle Sam. W0CGZ has been carrying a big load on QKS. K0UNE/O, at Concordia, now is on 2-meter s.s.b. W0LBB is using a Heath Pawnee. A new ham in Parsons is W0SAY. AREC Zones 7-9-13 were activated for a total of 11 sessions, combined 82 QNI and 20 QTC. The V.H.F. AREC nets Zones 7-9-11 and 15, report 20 sessions, 109 QNI, 17 QTC. Club or group nets of the ACARA, Coffeyville and NCK/2 had a combined 9 sessions, 48 QNI, 1 QTC.

Net	QNI	QTC	Sess.
Ks PI Net	18	0	7
QKN	36	33	12
Ks EC	51	26	5
Ks WN	702	156	30
Ks PON	885	1142	50
Ks SBN	711	244	27
KPN	179	18	14
HBN	392	139	22
Aug. report:			
QKS	64	22	24

Traffic: (Sept.) K0JMF 267, W0LLC 239, W0NII 233, W0LXA 222, W0ANPF 120, K0GZP 115, K0BXF 112, W0CGZ 100, W0BGX 81, K0DYN 56, K0LPE 52, W0QCCW 48, K0EMB 37, W0PSN 36, K0UVH 31, W0OZP 30, W0JOG 29, W0ICV 27, W0AKPE 23, W0OWH 20, W0FII 17, K0GII 16, W0SEV 12, W0SPE 12, W0NTAS 12, W0QJFV 9, W0TEF 6, W0HT 2, W0ATVH 2, W0RQG 1, W0TPI 1. (June) K0GZP 27.

MISSOURI—SCM, Alfred E. Schwaneke, W0GS—SEC: W0BUL, W0UCK renewed OPS; W0AFLI renewed OPS. ORS and received OO appointment. Ruskin High School ARC (W0ATKV) is now affiliated with ARRL. W0AVMP, formerly W4VME, is now in St. Louis after moving from Huntsville, Ala. K0BIX and NYL K0LJH are new in Warrensburg after moving from Kans. K0BIX will be associated with ROTC courses at CMSC. W0AVMP would like to arrange for a special railroad car for hams to attend the Las Vegas Hamfest Jan. 8-12, leaving from K.C. Address your inquiries to W0AVMP, 4350 Heidelberg, St. Louis 63123. W0UQP is editor of the new PHD ARC Newsletter. W0UCK has a new 4-1000A linear on the air, but is now restricted to light work while recovering from another heart attack. W0ARMW put up a new TA33 Jr. beam. W0AURJ, recovering from dental surgery, has a new TR-106 of 6 meters with three elements up 50 feet. W0LXV, ex-K7COK, is a new regular on MON. W0ITU made RCC operating on 2 meters. PHD ARC provided communications for the Gladstone Fall Festival near K.C. New members of PHD ARC are W0AQQS, K0OGU and NYL K0PEG. Some reports did not show up in time this month. Send reports to the SCM before the 7th of each month. Net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3885	2330Z	M-W-F	13	134	53	W0BUL
M0SSB	3963	2100Z	M-Sat.	25	768	580	W0RTO
MNN	7063	1900Z	M-Sat.	26	70	46	W0OUD
SMN	3585	2200Z	Sun.	3	7	4	W0OUD
PHD	50.45	0130Z	Tue. (GMT)	5	114	8	W0KUH

Traffic: W0HTN 276, K0ENH 180, W0OUD 152, K0AEM 150, W0QXG 102, K0VHV 79, K0RPH 62, W0RTO 27, W0BUL 23, W0RVH 22, W0KUH 18, W0FMD 15, W0GBJ 13, W0BVL 9, W0AFLI 2.

NEBRASKA—SCM, V. A. Cashon, K0OAL—SEC: K0ODE. Monthly net reports for Sept.; Nebr. Storm Net. W0GLOX, 0030Z session, QNI 886, QTC 84; 2330Z session, QNI 1116, QTC 208. Nebr. Emergency Phone Net. W0AGHZ, QNI 996, QTC 548. Nebr. Morning Phone Net. W0AJUF, QNI 1108, QTC 56. West Nebr. Phone Net. W0NIK, QNI 619, QTC 37. AREC Phone Net. W0LHZ, QNI 210, QTC 37. AREC C.W. Net. W0AEEI, QNI 13. Nebr. C.W. Net (NEB). W0AHRW, 0000Z session, QNI 65, QTC 25; 0300Z session, QNI 94, QTC 10. W0AHRW is the new RM for the Nebr. C.W. Net (NEB) which now meets on 3500. West Nebr. Phone Net frequency has been changed to 3950. W0IXD, INF and MHV set up an amateur radio booth at the Arnold, Nebr. Annual Harvest Festival handled traffic and explained amateur radio. The 160-Meter Phone Net began the latter part of Oct. Prior to checking into a net, zero beat net control. If you must leave a net before it is over, advise net control. For comparisons, Sept. 1967 QNI 5009, QTC 324; 1968 QNI 517, QTC 772. Traffic: W0AGHZ 321, W0LOD 296, W0LBB 224, W0HTA 158, W0QMI 109, K0UWK 62, W0BVF 58, W0AHRW 58, W0AGV 37, W0SRM 33, K0WTD 32, K0JTW 22, W0LXD 18, K0IXY 17, W0OCB 15, W0MJK 15, W0KHE 14, W0AEEI 10, W0GPI 10, K0JPF 8, W0HOP 8, W0AJUF 8, W0OON 8, W0WHY 8, W0CRK 7, K0DGW 7, W0FOB 6, W0GLO 6, W0PCC 6, W0ORP 6, W0QON 5, W0BSX 4, W0AIBL 4, W0XVM 4, K0ODE 4, W0QEF 4, W0YFR 4, W0VTF 3, W0AGK 2, W0FHF 2, W0AJKN 2, K0IUP 2, K0OAL 2, W0PIA 2, W0QLE 2, K0PTK 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1HNS. PAM: W1YBH. V.H.F. PAM: K1SXF. Activity report for the month of Sept.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1815	30	232	334
CPN	3880	M-S 1800 Sun.	1000	39	476	220
VHF 2	145.98	M-S	2200	21	125	87
VHF 6	53.6	M-S	2100	21	228	62

High QNI: CN—W1HNS, W1WCG, W1EFW and W1RFL. CPN—W1GVT 27, W1LHAW, W1JUK 25, W1FNS, K1SXF and W1YBH 24, W1HEK 23, K1LFW 17, W1HEW, W1HEG and W1WHN 16. SEC W1PRT would like year-end reports from all ECs. Thanks. The Candlewood ARS will again sponsor the Conn. QSO Party Jan. 18 and 19. Please pass the

CONNECTICUT QSO PARTY

January 18-19, 1969

The Candlewood Amateur Radio Assn. invites hams throughout the world to take part in the 6th Connecticut QSO Party. Rules: 1) The contest period is from 2000 GMT January 18 to 0400 January 20. Each station may be worked once on each band and mode. The general call is "CO CONN" on c.w. and "CO CONN QSO PARTY" on phone. 2) Conn. stations send QSO number, RS(T) and county. All others send QSO number, RS(T) and ARRL section or country. 3) Score one point per QSO. Out-of-state stations multiply total contacts times the number of counties worked (maximum of 8). Conn. stations multiply contacts times the number of ARRL sections and countries worked. 4) Certificates will be sent to the high scorer (5 or more contacts) in each ARRL section and country, also the two highest scorers in each Conn. county. Novice certificates will also be awarded. 5) Suggested frequencies are 3540 3900 7040 7250 14040 14250 21250 21300 28040 and 28880 kHz. Novices try 3740 7175 and 21125 kHz. 6) Logs must show dates, times in GMT, band, mode, QSO numbers, RS(T) and QTH. Note your class license, your address and show your score calculations. Send all logs before February 20 to the Conn. QSO Party, c/o Tom O'Hara, W1DDJ, 7 West Wooster St., Danbury, Conn. 06810. Include an s.a.s.e. for results.

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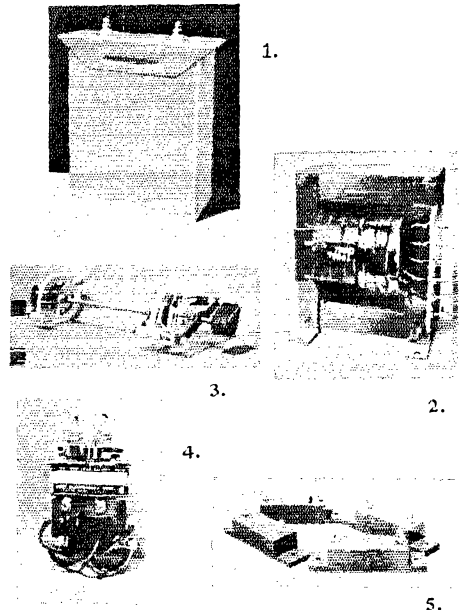
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3. Observe the rugged, high-cost, double section bandswitch.
4. Note the commercial duty 25 ampere mercury power relay.
5. Experience the reliability of special design solid state bridge rectification.
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AMECO		Comm IV 2m	199	Ranger I	139
CN-144 2m Conv.	\$ 29	GC-105 2m Xcvr	169	Ranger II	89
PV-50 Preamp	9	2m Linear II	89	Variant I	139
TX-82 Transmitter	39	6m Linear II	75	SSB Adaptor	175
TX-62 Transmitter	109	6m Linear III	89	500 Transmitter	275
621 VFO	39	G-50 Xcvr	175	KW Amplifier/Desk	595
B & W		913A 6m Linear	175	(store pick-up only)	
5100B Transmitter	\$119	G-66B Receiver	49	Audio Amplifier	49
515B-SSB Adaptor	109	3-way supply	24	Invader 200	275
COMDEL		Thin-pak	19	Invader 2000	549
CPS-11 Processor		G-76 Xcvr	125	Thunderbolt Linear	275
CENTRAL ELECT.		G-76 AC supply	75	6N2 VHF Xmt	89
10A Exciter	\$ 49	G-76 calibrator	12	6N2 VFO	34
10B Exciter	69	G-77 Transmitter	45	6N2 Thunderbolt	275
QT-1 Anti-trip	6	G-77A Transmitter	59	Mob. Xmt (AS-15)	25
10DV Transmitter	349	6m 12v. converter	19	Signal Sentry	9
200V Transmitter	449	VHF conv. (6-10-15m)	29	KNIGHT	
GC-1 Comp. amp.	29	HALLCRAFTERS		X-10 Calibrator	\$ 9
CLEGG		SX-25 Receiver	\$ 49	T-60 Transmitter	34
SQUIRES-SANDERS		S-38E Receiver	39	V-44 VFO	19
22v 7m Xcvr	\$169	SX-71 Receiver	99	RF Generator	12
66'er 6m Xcvr	169	SX-101 Mk III Rec	149	LAKESHORE	
99'er 6m Xcvr	69	SX-101 Mk IIIA Rec	159	Phasemaster II	\$ 89
41B DC sup./mod.	75	SX-101A Receiver	199	Bandhopper VFO	59
Zeus VHF Xmt	325	S-107 Receiver	59	LINEAR SYSTEMS	
Interceptor Rec.	325	SX-110 Receiver	99	USA-3 Linear	\$ 75
Interceptor B. Rec.	349	SX-122 Receiver	225	350 AC Supply	49
Allbander tuner	69	HT-33A Linear	275	350-12 DC supply	75
416 AC supply	75	HT-37 Transmitter	225	400 Century DC sup.	75
Apollon Linear	195	HT-40 Transmitter	49	250-12 DC supply	49
COLLINS		HT-41 Linear	175	MOSLEY	
75A-3 Receiver	\$269	SR-150 Xcvr	299	CM-1 Receiver	\$ 99
75A-4 (ser. #601)	349	SR-160 Xcvr	175	NATIONAL	
75B-3B Receiver	495	PS-150-120 AC sup.	75	NC-183 Receiver	\$ 99
325-3 Xmt	575	PS-150-12 DC sup.	39	NC-183D Receiver	139
30S-1 Linear	950	MR-150 Rack	15	NC-300 Receiver	149
KWM-2 Xcvr	755	P-500AC supply	75	NC-303 Receiver	249
351D-2 Mount	75	P-500DC supply	69	HRO-60 Receiver	199
516F-2 AC supply	115	HA-6 Transceiver	99	SCU-300 Calibrator	197
R. L. DRAKE		P-26 AC supply	49	NCX-3 Transceiver	189
2A Receiver	\$159	SR-46 6m Xcvr	89	NXC-5 Mk II Xcvr	395
2AQ Spkr/Qmult.	25	HAMMARLUND		NCXA AC supply	75
2AC Calibrator	39	HQ-100 Receiver	\$ 99	200 Transceiver	275
2B Receiver	189	HQ-100C Receiver	109	AC-200 AC supply	59
2BQ Spkr/Qmult.	29	HQ-110C Receiver	129	P & H	
2BS Speaker	9	HQ-140X Receiver	99	LA-400C Linear	\$ 99
2C Receiver	175	HQ-140XA Receiver	109	6-150 SSB Conv	149
2CQ Spkr/Qmult.	34	HQ-170C Receiver	179	POLYTRONICS	
R-4 Receiver	275	HQ-170A/C (crack mt)	225	PC-1 2m Xcvr	\$199
R-4A Receiver	299	HQ-170AC/VHF	325	PC-6 6m Xcvr	149
MS-4 Speaker	12	S-100 Speaker	15	RHE	
SC-2 2m Converter	49	S-200 Speaker	15	HF-1020 Converter	\$ 15
CPS-1 Supply	9	XC-100 calibrator	9	6900 Receiver	175
TR-3 Transceiver	375	HEATHKIT		4302 Speaker	43
AC-3 AC supply	65	GC-1A Receiver	\$ 59	SBE	
DC-3 DC supply	75	MR-1 Receiver	49	SB-33 Transceiver	\$199
T-4X Transmitter	299	SB-301 Receiver	249	SB1-LA Linear	159
2MT Transmitter	99	SBA-300-3 6m conv.	19	SB-34 Transceiver	299
MN-4 Matcher	59	HF-24 Speaker	6	SWAN	
EICO		QF-1 Q-multiplier	4	SW-140 Xcvr	\$ 99
720 Transmitter	\$ 49	MT-1 Transmitter	39	117AC AC supply	59
722 VFO	34	DX-40 Transmitter	39	410C VFO	269
723 Transmitter	34	DX-60 Transmitter	59	350 Xcvr (early)	299
730 Modulator	34	DX-100 Transmitter	89	350 Xcvr (late)	299
753 SSB Xcvr	139	TX-1 Transmitter	115	SW-117C AC supply	75
751 AC supply	49	SB-10 SSB adaptor	79	512 DC supply	69
221 TVM	15	HX-10 Transmitter	225	512 DC supply	75
DELICDO		HA-10 Linear	175	500 Transceiver	375
SSB-100F	\$275	HX-20 Transmitter	149	117XC AC supply	80
ELECTROPHYSICS		HW-12 75m Xcvr	89	14-117 DC supply	100
Autronic Keyer	\$ 49	HW-12A 75m Xcvr	89	405X MARS osc.	35
ELMAC		HW-32 20m Xcvr	89	27 VFO Adaptor	22
AF-68 Xmt	\$ 59	SB-300 Linear	225	250 6m Xcvr	275
GLOBE/GALAXY/WRL		HP-14 DC supply	75	TV-2 Transverter	249
5B-175 SSB Xmt	\$ 59	VF-1 VFO	19	THC	
V-10 VFO	29	HW-10 6m Xcvr	149	GPR-90 Receiver	\$249
PSA-300C AC sup.	40	HW-20 2m Xcvr	169	TEKTRONIX	
Galaxy V Xcvr	269	HP-20 AC supply	29	512 Oscilloscope	\$275
Galaxy V Mk II	299	MP-1 DC supply	29	UTICA	
AC-35 AC supply	65	UT-1 AC supply	25	650 6m Xcvr/VFO	\$ 99
DC-35 DC supply	69	HRA-10-1 Calibrator	59	650A 6m Xcvr/VFO	109
AC-400 AC supply	75	HO-13 Hamscan	9	WATERS	
VX-35 VOX	15	T-4 Signal tracer	15	331 Dipper	\$ 89
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VOX-10	9				

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word. All amateurs are welcome. RM WAHNS distributed an excellent *Net Operating Manual* at the CN meeting held at ARRL. WINJM provided an interesting ARFSC program and a tour of ARRL/WIAW. With deep regret we add the call of K1RQO/NØWXX to the list of Silent Keys. Ed was active on CN, CPN and MARS Nets. For late local traffic outlets QSO K1SXF on the v.h.f. nets. Activity? Try 28.0 Murphycycles Mon./Wed. at 8 p.m.! Congratulations to: WIQV, our New England Division Director on another term; W1WPR on a new XYL; WA1GGN on the Sept. BPL, making it 7 times in a row; WICKA, WITS, WA1JG and KIUDD on the Extra Class licenses; WA1GEK, WA1CEJ and WA1JAD on General Class. A year from Nov. 22 all of the new frequency allocations will be in effect. Before then, treat yourself to a higher class license. Be good to yourself—it couldn't happen to a nicer person! Thanks for a wonderful year! Merry Christmas and Happy New Year to all. Traffic: Sept.) W1EWF 467, WAHNS 290, WIWCG 107, WA1GNN 160, K1SXF 155, WA1HEW 154, WA1FJN 141, W1AW 92, WA1HEK 92, W1XY 77, WA1IWN 76, WA1GIX 72, WINJMN 49, K1TKS 58, W1GVT 50, WA1EG 56, W1YBH 53, W1CWH 37, WA1FXS 19, W1BND 17, WA1QVU/1 16, W1BDI 12, WA1HOL 11, K1FTYS 11, WI1C3 3, WA1FUJ 3, WI1QV 3. (Aug.) K1TKS 278, WA1DUV/2 55.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—I want to thank everyone for the many messages, cards and phone calls that I received while I was ill. I landed in the hospital Oct. 1 with a collapsed lung but am now coming along fine. SBC WA1QO received reports from W1RPF, K1RNB and WA1DXI. New YLs: WNLs JVV and JZP. EMN had 30 sessions, 160 QNTs, 145 QTC. W1ZSJ is new manager of the Central N. E. Net. K1JFQ, asst. mgr.; and W1ZSD, secy.-treas. New Extra Class licenses: WEHT, K1KED and K1BBU. W1TWG retired from WBZ. W1EOH is on many bands. W1ALP has a DX-150 receiver and an HW-17 for 2. W1CVO is on 20/75. WA1FYI is on 6. New officers of the Middlesex ARC are W1LPL, pres.; WA1XG, vice-pres.; W1LJO, treas.; WA1CDW, rec. secy.; WA1HLL, corr. secy. W1YHM moved to Braintree. WA1OD/1 is headed for KX-6 Land. K1ZCU has joined the Lowell Tech. ARC. Two groups from W1MX went to VT. during the Sept. V.H.F. Party—WA2PTS/1 at Mt. Equinox and K4GGI/1 at Hogback. WA1IQE is interested in net operating. W1PPI gets on v.e. some. W1BW has a whole new Collins line. W1JOT is on 432. W1OOP spoke at the South Shore Club. The T-9 RC met at W1WNK's. W1PEP, from VT., sends his 73 to all. WA1FNM made General. WA1CRA has an HW-100. W1HE went to Annapolis for a class reunion. W1NJJHM has a new QTH. W1BGW visited the N. E. Wireless Museum. W1NJKZ has a new 40/30 trap dipole and used it on 15 for good DX. W1BB writes from Me. on a piece of birch bark. K1RAW and W1HWK spoke at Wellesley ARS. W1DAL has EAN et al. W1NHE is Tech. Class. WA1FHU has a new 70 ft. tower with TH6-DXX and 12AQ up top. W1N2FRZ is operating W1MTQ from Chatham. WA1GIC is going into net work. Norfolk County, RA, organized in 1993. still holds meetings. W1EWN, ex-K2RYP, ex-SVØWY and chief operator of SVØWT, Island of Crite, is living in Natick, now. W1VAB spoke at the Framingham RC. W1LC/W1MTQ is working for RCA in N. J. W1EUF's wife had their 3rd girl just before the V.H.F. Contest. EMNN in Aug. had 29 QNTs, 8 sessions, 12 QTC and 16 stations. EMN in July had 197 QNT, 121 QTC, 31 sessions. EMN in Aug. had 170 QNTs, 90 QTC. W1ALP on the land phone from Anaheim and it was good to talk with him. The 6-Meter Cross Band Net had 19 sessions, 2 traffic and over 125 QNTs. W1OJM made the BPL. The Capeway RC met at W1OJH's. W1s ECK and VPM spoke on "Radio Operating of Model Airplanes" at the Massanut ARA. The Middlesex ARC meets the 2nd and 4th Fri. at the Walban Library. WA1HYX has his Advanced Class. The Yankee RC is holding an auction. WA1JPS is secy. of the Salem High RC. Whitman ARC is holding an auction. Traffic: (Sept.) W1OJM 716, WA1EY 441, W1PEP 386, WA1EAD 190, W1EMG 158, W1DAL 106, W1CTR 69, K1CLM 59, WA1HKK 30, W1DOM 29, WA1DEC 28, WA1OG 27, WA1FHL 22, WA1ED 20, W1ALX 20, WA1AJN 15, WA1DFI 13, W1JDP 9, W1LE 8. (Aug.) W1MX 35. (July) W1MTQ 2.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLE, RM: W1BJG, PAM: WA1FLG. Traffic nets: Sea Gull Net meets Mon. through Sat. on 3540 kc, at 1700. Pine Tree Net meets daily at 1900 on 3596-kc, e.w. WA1FCM has returned to school and is not quite as active on the air.

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Mark II 80-10m Linear - w/tubes ...	(14.08)	395.00
Mark 6B 6m Linear - w/tubes.....	(14.08)	395.00
Power Supply for Mark II & 6B	(9.38)	265.00
TV-2 2m Transverter - specify IF ..	(10.47)	295.00
117XC AC Supply w/spkr. in cabinet.	(3.61)	105.00
14-117 12v DC Supply w/cable.....	(4.51)	130.00
405X MARS Oscillator - less crystals	45.00
410C Full-Coverage VFO	115.00
210 6 Meter VFO.....	120.00
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100kc Calibrator kit for 350C	19.50
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NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: K1BCS. Endorsements: K1AC as ORS, K1DWK as EC and W1IHH as OPS. K1WPK is now W1JY with a new HW-100. Welcome to new hams W1FLF, W1NJYM, W1NJYW, W1JZK, W1N1KAA, W1KAL and W1KICF. GSPN reports 1107 check-ins and 81 traffic, while NHAREC shows 157 check-ins and 15 traffic. W1AIEI, K1HRC, W1IHH, K1HSI, W1IHGT, W1IHZN, W1JXU, W1AEUJ, W1MHX, K1BCS, K1PGV, K1ITS plus Lucille Lupton and Judy Marchand showed visitors at the Deerfield Fair the wonders of ham radio. K1DWK reports 141 traffic and 4 traffic for the MVAREC Net. The VTNHN plans to use 7070 kc. as alternate for 3685 kc. The 160 Test shows K1NBN, W1CTW and W1SWX in that order at the finish line. W1AEUJ is now scribe for the Manchester Radio Club replacing W1AEUF, who is going to Northeastern. This should be my last report to the N. H. gang. It has been a very enjoyable four years as your SCM. Thanks to all of you for the fine support and best of luck to your new SCM. Traffic: (Sept.) W1IHH 226, W1HPM/1 162, W1MHX 82, K1PGV 76, K1QES 4, W1AEUJ 2. (Aug.) K1QES 7. (July) W1MHX 48. (Apr.) W1MHX 40.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LIL. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. Endorsements: W1POP as EC Johnson, K1TPK as EC Operations and V.H.F. PAM, K1NJT as OVS and K1JYN as OO. The Fidelity Radio Club, K1NQG, elected W1AGND, pres.; W1NJEP, vice-pres.; W1AGNB, treas.; W1NJQP, secy. The Providence Radio Assn., W1OP, reports that W1WKO, W1KKE and Net Manager W1EYH are on actively with Air Force MARS. W1EYH, W1UUX and K1HZN are on RTTY. Recent college graduates of the club are K1NKR, who is entering the Air Force, and K1LPL, who is a design engineer with Raytheon. K1EYH is now a pilot with Bananal Airways. W1IDOG, the club librarian, reports that PRA needs some old QSTs to complete its collection. The club has many issues available for collectors. K1GDS and K1HZN, who work at Raytheon Wavland Labs., met several PRA members there including W1YLB, W1MIJ and W1TT, who is brother to W1TS. The Assoc. Radio Amateurs of Southern New England, W1AQ, reports that W1DK has completed work on the tower and it can be used as an 80-meter vertical. W1IYF is working on remodeling. K1HMO is planning an expedition to New Hampshire and Club Treasurer K1LII announces he is engaged to be married in April. R1SPN report: 30 sessions, 355 ONI, 66 traffic. Traffic: W1TXL 89, W1BTV 82, K1VYC 27, W1ACSO 21, K1TPK 13, K1QED 7.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Time	Days	QNI	QTC	Mgr.
Gr. Mt.	3855	2230Z	M-S	—	—	W1VMC
Vt. Phone	3855	1430Z	Sun.	134	—	W1AIED
VTNH	3685	2330Z	M-F	74	62	K1UZZ
VTCD	3990 1/2	1500Z	Sun.	35	6	W1AD
Carrier	3865	1400Z	M-F	152	4	W1KDD
VTSB	3909	2230Z	M-S	804	105	KL7DVP/1
		1330Z	Sun.			

Welcome to new Novices W1NJYR (Wilder) and W1N1KAH (Burlington). W4SCY/1 is back in Florida. W1AGXI is in Viet Nam. K1YZK is studying hard; also K1EPP, W1AHSI is doing a good job as NCS of the VTSB Net. W1ADHK has the new beam operating. Congrats to W1MRW on passing the Extra Class exam and to W1AJMS on passing from Novice to Advanced Class. Season's Greetings. Traffic: K1QBQ 402, K1MPN 26, W1AGKS 23, K1UZZ 22, W1MRW 11.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM: W1DWV reports 30 sessions for W1MN (3560 kc. daily at 7 p.m.) and 101 pieces of traffic for Sept. Stations in order of attendance were W1AEJ, W1ZPB, W1DWV, K1WZY, W1STR, W1HRC, W1EOB, W1MNG, W1BVR, W1ZEL, W1ABW, W1AITL, W1BKG and K1SSH. We need all the help we can get to keep this fine net going. Make a habit of calling in and you will meet the nicest people. New appointment: W1AJHZ as ORS. Endorsements: W1EOB and W1MNG as ORS; W1MNG as OPS and OBS. W1ADNB is now residing in Belchertown. W1HRH is stationed at Pensacola, Fla. K1ZOC telephone relayed K1YQ into the Sunday Night Net direct from his hospital bed. Clut is the regular Net Control. Frequency is 29,000 Mc. at 9 p.m. with W1KWX, the club call for the VARC, being used. Murphy's Marauders, the fast-growing contest club of Conn. and Western Mass., is looking for more members from our section. If interested, get in touch with

W1ARR or W1WYM at ARRL Hq. W1ZPB's 15-year-old antenna finally broke but has now been replaced with copperlead. The Mt. Hermon Club has skeds for Caribbean students. W1BVR's equipment failure kept him off the air for the better part of a month. Traffic: W1EOB 162, W1DWV 91, W1HC 59, W1STR 58, W1ZPB 52, W1AJHZ 23, W1MNG 22, K1WZY 15, W1BVR 8, W1UHP 3.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—The Sixth Annual Equinox Marathon, sponsored by the U. of Alaska, proved to be a rather hammy affair. KL7s GGW, EWQ, FLO, EVO, GBG, GFU, GJJ, EMA, AZJ and AEQ handled the communications and photo coverage. KL7TCH acted as resident physician, and the following KL7s were noted competing for the shoulder patch: DG, FFJ, GJI, GJC, DIO, EKY, AD. KL7EWO headed up the communications arrangements in his usual efficient manner. Forty enthusiastic prospective Novices are attending classes on the campus. Look for KL7EVO running code practice on 3735 at 7 p.m. Mon. through Fri., 7 to 15 p.m. KL7FLO has joined the ranks of the Extras. KL7DIY is back in the Fairbanks area, after a year in 6-Land. KL7EKZ is presently operating out of Ketchikan, and reports the DX is great. A familiar voice signing K17GJC is just W1ICB/KL7 retreated. KL7GFU is the new pres. of AARC with KL7BIL, veep; and KL7FJW secy. Traffic: KL7FLS 18, KL7FNX 2.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX. The FARM net convenes week days on 3935 kc. at 0200 GMT. The Idaho C.D. Net convenes week days at 1515 GMT on 3991 kc. K7UHM is attending Navy Submarine School in Connecticut. K7LWE/7 reports good results from a three-element fixed 75-meter beam. The Boise Club set up a booth at the Idaho State Fair. W7IZM moved to Nampa. The Lewiston Club plans to sponsor a code and theory class again this year. W7GSM set up a portable station at his elk hunting camp providing communications for hunters in the area. W7CBX has been appointed EC for Lewis County, and K7NDX has been appointed EC for Clearwater County. K7THX has a new 2-meter t.m. installation. KL7OZ/7 is installing a rig in his airplane. FARM Net report Sept.: 18 sessions, 707 check-ins, 41 traffic handled, 1 emergency. Traffic: W7GHT 26, K7UEM 18, W7ZNN 15, W7IY 10, K7OAB 4, K7CSL 2.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: W7RZY. PAM: W7ROE. RM: W7DMA. Section Nets: Montana Traffic Net 3910 kc. 0000Z M-F Sess. 21 QNI 266 QTC 109. Montana Section Net 3950 kc. 1700Z Sun. Endorsement: W7ROE as PAM. The SCM and SEC visited the Missoula Club in Sept. They presented the AREC-NTS film and tape show to the group. W7AFQ won the c.w. contest at the W1MU Hamfest with 40 w.p.m. W7CJB, W7ADMA, W7AQZ and W7AFV have their Extra Class licenses. W7FWC has his Advanced Class license. A meeting of the 2-meter f.m. group in the State of Montana was held in Billings at the QTH of W7WV. K7UPH presided at the meeting. Several committees were set up to further the interest of a repeater group in the state. If you are interested in this amateur radio activity check in with the Montana Section Net on Sun. and get the information you will need. W7CAC is on with an IIV-12. W7AMD is on in Lewiston with an 80D for 146.75. W7HDP, at Great Falls, is now W7MD. K7NDV has a new SW-350 mobile. W7TK is back on in Libby. K7MRZ has a new receiver. If you are interested in appointments write or QSO your SCM and get started. Traffic: W7FIS 2.

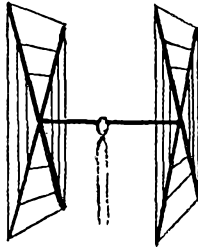
OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—RM: W7ZFH. PAM: K7ROZ. Section net reports: W7ZFB reports for the OSN for Sept., sessions 20, check-ins 91, traffic 21. W7AEHW reports for the AREC Net, sessions 30, maximum number of counties 20, check-ins 915, traffic 25, QSTs 2, contacts 114. The Oregon Post Office Net meets at 6:30 p.m. on 3920 kc. Wed. W7GFS returned from sea duty with the Merchant Marine and now will be with the Air Force. He passed the Advanced Class test while at home. K7YNO and W7GUV are attending eastern colleges on scholarships. W7HERG and W7IBC are attending OTI at Klamath Falls. W7FTN made 280 telephone relays for servicemen in S.E. Asia during the month. K7OUF is checking into the phone nets now. W7GFE was home on leave and is now in New Mexico. W7KLY is in Okinawa operating KR6LY until 1972. Traffic: (Sept.) K7RQZ 400, K7OUF 188, W7EXH 65, W7ZFH 58, K7WWR 23, W7AEHW 20, W7ZPK 16, W7BNS 15, W7DEM 11, W7MLJ 7, W7GLP 3. (Aug.) W7BYP 81, W7EZJ 15.

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Elements: A full wavelength driven element and reflector for each band.

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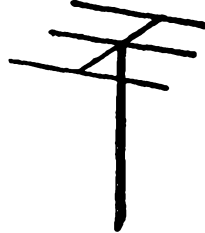
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2 El 20	\$16	4 El 10	\$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		*20' boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15,	
10, 6 meters	\$14.95
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WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

WSN	3590 kc.	Daily	0145Z	QNI	337	QTC	261	Sess.	29
NTN	3970 kc.	Daily	1830Z	QNI	859	QTC	594	Sess.	30
WARTS	2970 kc.	Daily	0100Z	QNI	1329	QTC	253	Sess.	28
NSN	3700 kc.	Daily	0300Z	QNI	258	QTC	106	Sess.	30

May I extend to all Season's Greetings. The license plate committee will be contacting all clubs with details for soliciting support from their representatives and senators. The bill is written and approved up to the point of being submitted and passed in the new legislature. It calls for return to the \$5 fee instead of the present \$30. W7CJL reports tentative draft of the State Council of Clubs is being worked on by the committee. New appointments: W7SLB, K7UNA as ECs; W7KZ, W7AAO, K7JXO as ORs; W7IEU, W7UU as OPSs. WSN Mgr. W7ZIW reports good activity on the net with 4 more new active members. W7PWA moved to KL7-Land and WA7GVP is back from W2-Land. K7JRE is now portable 1 attending the seminary. WSN also is providing daily liaison with the WARTS Net for the interchange of traffic with NTS. OVS W7PUL reports an antenna arrangement with an s.w.r. of 1:1.75 through 10 and good DX. The Northwest Sideband Net reports K7SIU new mgr.; K7REK, sery.-treas.; K7SOM, W7CLU, K7OUV, W7OEB and K7UQH, directors. W7BTB continues special schedules with Alaska traffic daily through WSN. NSN Net Mgr. W7IEU is pleased with the response and would like to see more of the alumni check in. W7BUN resumed OBS for WARTS. K7CTP took a vacation trip to the Midwest. OVS W7SAB is operating Slow-Scan TV on 3845 at 9 nightly. EC K7LRD reports hidden transmitter hunts regularly by WA7GVA. W7BQ attended the Walla Walla Hamfest. W7OEB sends in another FB report from the Richland area. Traffic: W7BA 2095, WA7HKR 612, W7ZIW 531, W7DZX 474, W7PI 296, W7KZ 233, K7CTP 214, WA7AXT 212, W7BQ 171, K7KPA 154, WA7BZY 122, W7IEU 101, W7APS 95, WA7EDQ 85, W7MCW 83, W7BTB 78, W7AAO 68, WA7BDB 52, K7JXO 49, W7GYC 47, W7GYF 43, K7THG 38, W7BUN 27, W7OEB 26, W7CJL 24, K7LRD 22, WA7ACQ 19, W7UWT 16, K7OXL 15, W7JEY 14, K7REK 13, W7RXH 13, W7UU 13, WA7ILC 11, W7ZHZ 10, K7YFJ 9, K7EFB 5, K7SUX 5, K7MWC 4.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: WA7AF/KH6. RM: KH6AD. V.H.F. PAM: KH6EEM. OSL Mgr.: KH6DQ. RACES nets (40, 10, 6 and 2 meters) coordinate with KH6AI.

Net	Freq.	Time (GMT)	Days
League Appointees	7.290 Mc.	0700Z	Wed.
Friendly Net	7.290 Mc.	2030Z	M-F
Pacific Interisland Net	14.330 Mc.	0830Z	M-W-F
S.E. Asia Net	14.320 Mc.	1200Z	All

KH6GPP has made application for the "Intruders Watch." Bob brings a wealth of electronics background, both professional and amateur, to the "islands" during his tour of duty with Defense Communications Agency-Pacific at Wheeler AFB. KH6KS, now operating portable 7, has turned in his KH6 call for W7KD, W4EXAI/KH6 has moved to the Ilikai Marina Apts. Art recently purchased a Trio 2-meter rig on a trip to Tokyo and works the Diamond Head repeater frequently. KG6AQI recently drafted a fine emergency plan for amateur radio to support the Marianas Island during disasters and typhoons. KH6FRL of Kailua, recently received his Extra Class ticket. KG6IC/K8WXXV reports that several OSLS for KG6IB were received. A little checking by Don found that IB was never issued. Don asks that each station send an SASE to him for any QSO which is not QSLed from KG6IC from Oct. 1, '67 to June 25, '68 and KA1IJ from June 26 to Aug. 17, '68 and the QSL for Bonin Is. will be forthcoming. Write Don Janicki, K8WXXV, 44 Magill Street, Manistee, Mich. 49660. Kailua High School Club station KH6GFI is quite active on 10 and 15. Flash! KH6EQA/KH6EQF worked South America on 6 meters on s.s.b. and c.w. during the Sept. 29 flare. Traffic: KH6BZF 14.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. The Las Vegas ARC and Southern Nevada ARC of Boulder City resumed their club meetings for the coming year. K7ICW and XYL W7SNP attended the Peoria Hamfest and noted increased 2-meter f.m. activity along their route. WA7DSP, WA7IER, K7RKH and K7ZOK are active on 8 meters with

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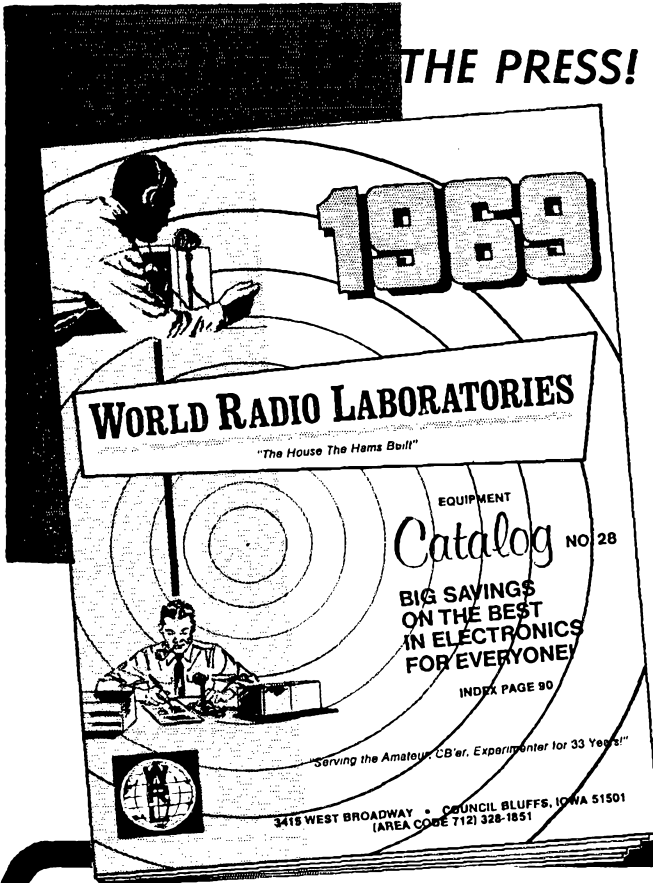
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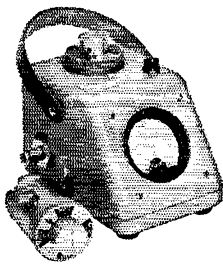
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WA7IER working NE1PY, W6DIO, ex-W7BNJ, and K7JU, ex-W7JU, were visiting in Boulder City. W7PRM and WA7BEU have sold state RTTY TU operational. W7CSB needs two more QCWA members to form a Nevada QCWA Chapter for a special ceremonial installation at "Saroc" in Jan. The Nevada Emergency Net meets on 3996.5 kc, at 1900 local time Mon. and Thurs. K7RBM/6 and W6IPC, ex-W7AAE, visited in Las Vegas. W7FJM is attending FAA school in Oklahoma City. W7TYT will schedule anyone DX or state-side needing a Nevada QSL. K7UXL has a new quad. The W7DDB f.m. repeater is serving Southern Nevada, receives on 146.34 and transmits on 146.94.

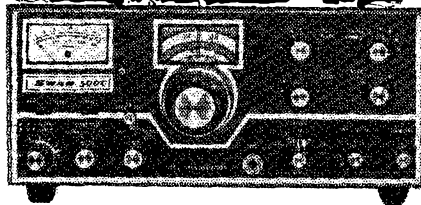
SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, WA6TQJ, RMs: W6LNZ, WB6YTX. The Sacramento Army Depot Radio Club, W6SIG, recently became an ARRL affiliated club. The club meets the first Fri. of each month at the MARS station at 2000 local time. New officers of SacArDep are WA6JDT, pres.; K6TWE, vice-pres.; WB6UNP, secy.; K6JJK, sgt at arms. The North Hills Radio Club has expressed an interest in forming a Sacramento Valley Council of radio clubs like the one they have in the Bay area. If interested, contact WA6JDT. WA6CNB reports K6IKV, WB6HAW and himself handling NCS duties for SCEN for the month of Sept. It is still not too late for the higher class ticket. I got my Extra (after two tries). Traffic: (Sept.) WB6YTX 79, W6LNZ 69, WB6YDA/6 39, WB6MAE 6, WB6EAG 4. (Aug.) K6YZU 8. (July) K6YZU 7.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLW, WB6GVI is with the U.S. Navy in the Philippines for two years. WB6UJO is presently in 9M2-Land on a trip. New officers of the Marin Club are K6JGX, pres.; WB6PQE, vice-pres.; WB6CIE, secy.; WB6UJO, treas. W6AKP has moved to San Francisco from the southland. Heard in the Oct. Phone CD Party were W6RQ, W6BIP and WA6AUD. WA6BYZ made the BPL again in Sept. W6KVQ's traffic count is up again. 7Z3AB visited in the area with K6KQN and WB6UJO. K6TZN hosted a meeting of the Mission Trail Net within the walls at San Quentin. W6BWV and W6WLW attended the Director's meeting held during the Greater Bay Area Hamfest in Oct. WA6GYD has moved to Southern California. K6TVJ continues to be the San Francisco outlet on the Golden Bear Net. WB6JQP is gone from his traffic activity for five months, leaving on a journey to the Orient on the *President Grant*. WB6IMO continues to m.c. the commute mobiles daily around 3815 kc. W6ERS has put up mono-handers for 20 and 15 for some serious DX work. WB6FLT has found that a long commute run each day interferes with his time on the air. W6CYO is back home, being chased out of the mountains around Lassen by heavy snowfalls. W6UDL has found that with the press of business he has not much time for traffic but YXL WA6ALK keeps the 2-meter rig busy. W6PZE spent Sept. in Modoc County operating portable and chasing deer. WA6IVM has returned from a two-month trip to JA-Land. The Marin County DX crowd is turning out the weekly *West Coast DX Bulletin*. WB6YMW edits *Active Keys* for the North Peninsula Electronic Club. W6WLW is looking for up-dated emergency plans with all signs indicating an early and wet winter. W6KUF is planning to put up a quad antenna. Traffic: (Sept.) W6KVQ 352, WA6BYZ 343, W6WLW 123, W6FAX 28, WA6AUD 23, WB6LFT 19, WB6JQP 16, K6TZN 16, W6BWV 12, K6TVJ 11, W6BIP 4, W6CYO 2. (Aug.) W6KVQ 214, W6WLW 116, W6LFT 19, K6TZN 19, W6BIP 2. (July) W6WLW 133.

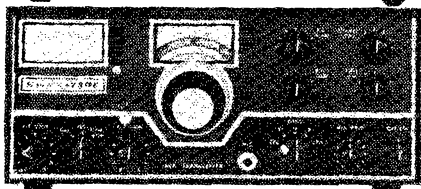
SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—Merry Christmas everyone. The Kern County Radio Club meets the 2nd Wed. of each month at the USNR training center, and all you people in Bakersfield and vicinity, support your club. The same goes for the hams in the Madera area. The Madera Radio Club meets the 1st Tue. of each month in Judge Brown's (W6BWM) chambers. The Delta Amateur Radio Club in Stockton meets the 3rd Wed. of each month at the Webster High School. W6GRA is on 2-meter f.m. WA6BXU is on 6 meters with 300 watts. W6DPD has a complete S/Line down to 2 meters. WB6ZWG and WB6KZC are now Advanced Class. WB6WPX, WB6ZRD and WB6ZRI are now General Class. W6IUZ is heard on 75 s.s.b. W6ZYR is mobile on 40 s.s.b. W6JPS got the bugs out of his NCX-3 and is mobile on 40 s.s.b. W6DTL has a Swan 500C. W6MEY has a Swan 500C, also. K6UJG worked KV4FU and WIHOY/KP4 on 6 meters. W6YKS is on 6 with 15 watts and is working out F.B. W6YKS has his WAS certificate. W6ILR got the Tulare County Amateur Radio Club Boner Award. K6RGZ and WB6TTP are now Advanced Class. K6KOL has a new keyer. WB6RKH has an SB-301. K6KLV is pres.



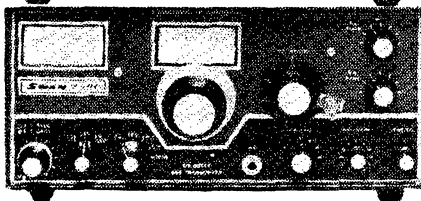
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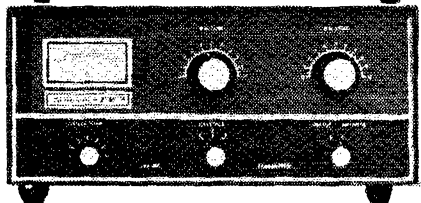
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SAHARA!

LAS VEGAS, NEVADA 89109

of the Madera Radio Club. Traffic: W6ADB 464, WB6-HVA 324, K6KOL 120, WA6SC 107.

SANTA CLARA VALLEY—SCM, Edward T. Turner, W6NVO—(Report written by W6ZRJ acting for the SCM.) SEC: W6VZE, RM: WA6LFA. Our SCM was taken ill and went into the hospital for surgery Oct. 7. He was operated on on Oct. 9 and is recovering very well. Our best to Ed. W6RSY made the BPL. K6DYX went on a vacation to Mexico City for the Olympics. Smitty still is working on slow-scan TV. W6VZT works TCC schedule. W6YBV operates on NCN, RN6 and PAN. W6DEF is busy as ever as EC, traffic man and recently sent out a fine letter to all AREC members. Hal originates traffic poems on the nets. W6IKW is active as OO. WA6LFA spent two weeks on vacation. W6VK received his PWX and WAZ certificates and attended the QCWA Picnic. W6AUC helped locate a missing girl in Honolulu and keeps active on several nets. W6ZRJ made Extra Class and received a WAC certificate. W6RFF still is very QRL with school but makes some skeds. WA6BXH is active on NCN and chasing DX. Sandy attends Fremont High School in Sunnyvale. W6BPT made Extra Class and is very active on NCN. Pinky is a former SCM and now an Asst. Director. WB6IZF still is QRL with work but keeps active on WCARS with the mobile. W6EMS works PAN and TCC. K6HGV is active in Navy MARS work on 2 meters. The SCORCA meeting for Sept. featured a talk by W6UDU, Engineer in Charge, FCC Field Office in San Francisco. W6VZT received his A-1 Operator certificate at the meeting. Congratulations, Al. W6HC is QRL with work at school but is busy getting the rig in shape to take over his TCC spot from K6DYX. Traffic: (Sept.) W6RSY 3269, W6YBV 386, K6DYX 167, W6DEF 110, WA6LFA 106, W6VZT 38, W6AUC 32, W6VK 32, W6ZRJ 20, W6RFF 9, WA6BXH 6, W6BPT 5, (Aug.) K6HGV 70, (July) W6EMS 148.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE, RM: K4CWZ, PAM: W4AJT, V.H.F. PAM: W4HJZ. The Greensboro Radio Club really did itself proud in sponsoring the Roanoke Division ARRL Convention this year, and you who missed it missed the chance to meet and question or congratulate the members of the Executive Committee on policy and operation of our League. From an old Naval Reservist (23 years) the Greensboro Radio Club has earned a hearty "well done." WB4DPT is now Advanced Class and is on with a HW-100 and a Matchbox. K4GHR and K4-DFI were active in the V.H.F. QHO Party operating K4GHR/M atop Mount Mitchell on 2 meters. WB4BXQ has installed a tower light atop his 60-ft. tower. WA4-KWC reports 36K-plus in the July C.W. CD Party with lots of fun. The Rowan County ARS reports v.h.f. activity in the Salisbury area growing with 18 stations now on 2 meters.

Net	Freq.	Time	Days	OTC	Mgr.
THEN	3923 kc.	0030Z	Daily	112	W4ZZC
NCN (L)	3573 kc.	0300Z	Daily	109	WA4CFN
NCN (E)	3573 kc.	0030Z	Daily	104	W4IRE

Traffic: (Sept.) W4EVN 220, W4IRE 158, W4RWL 135, W4ZZC 42, WA4VNV 41, WA4KWC 38, W4FDV 34, K4EO 31, WA4UQC 31, K0JFJ/4 27, WA4GMC 22, W4AJT 17, WA4VTR 16, WA4TV 15, K4VBG 14, K4-ZKQ 8, W4NAP 5, WB4DPT 4 (Aug.) W4RWL 141, W4ZZC 71, WB4IJH 48, K0JFJ/4 2.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ, RM: K6QPH/4, PAM: WB4-BZA.

SCPN	3930 kc.	0930 and 1530 EST Sun.,	1200 Noon Daily
SCN	3795 kc.	0000Z and 0300Z Daily	
SCSSBN	3915 kc.	0000Z Daily	Sept. Tfc. 97

W4VHH, in N. Augusta, is a new OVS. K4GL reports that he transmits on 144.102 kc. daily at 0300Z with 1 kw. towards Texas, Oklahoma and Louisiana and has had many "heard" reports on this meteor scatter sked with K5WXX and W5AO. WN4LAM is a new Novice in Spartanburg. K6QPH/4 has moved to Columbia. Alan is replacing K4LND as RM. Bill has served for nearly five years and the press of other duties caused him to resign. W4AZT has a new 4-400 2-kw. p.e.p. final and is using it on c.w., RTTY, a.m. and s.s.b. WB4CUT. In Anderson, is recovering from a serious heart attack. WA4HFA is busy with new 2-meter and RTTY gear. Please send your local news items to reach the SCM in time for me to prepare this report on the 6th of each month. Traffic: (Sept.) K4OCU 78, W4PED 57, W4NTO 34, W4VTV 30, W4FVV 16, W4FA 13, W4-AZT 12, WA4HFA 3, (Aug.) K6QPH/4 51.

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VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LAIB, RMs: K4MLC, W44EUL, PAMs: W4OKN. Active again after many years absence is W4KYD, a founder and former manager of VN. Bus recently passed the Extra Class exam and will be with us now as K4IX. Many section members enjoyed the 1968 Roanoke Division Convention. W8JM, West Virginia SCM, was cited at the convention banquet for his many years of contribution to the cause of organized amateur radio. We understand that West Virginia will host the 1969 Division Convention. W4BZE is now Amateur Extra. Note the new W1AW transmitting frequencies, generally lower in each band and within the "restricted" segments. Virginia section OBSS are K4KNP for c.w., W4QP and W4BDOY for phone. Listen for them. More intruder Watch volunteers are needed. Contact WITKE direct at Newington. Start planning now for the Annual SET in Jan. Contact your EC or the SEC for details. Traffic: K4BNP 294, W4RHA 218, W4UQ 188, W4XLC 151, W4EDT 137, W4BCVY 109, W44SJT 102, K4TSJ 95, K4FSS 84, W4BDOY 75, W44EUL 53, W44FJK 52, W44GTS 48, W44JFJ 46, W44DRB 42, W44EIJ 40, K4MLC 33, W4OKN 31, K4KDJ 28, W44GEQ 26, W44PBG 20, W4TE 20, W44FLT 17, W4YZC 17, W4WQ 16, W4THV 15, K4VCY 11, W4BZE 10, K4GR 10, W44FUIJ 9, W44GYV 7, W4MK 7, W4KFC 6, W4KX 6, W44NJG 4, W4ZAU 4, W4B4DO 2, K4IX 1, K4YEE 1, W44YRH 1, W4ZM 1.

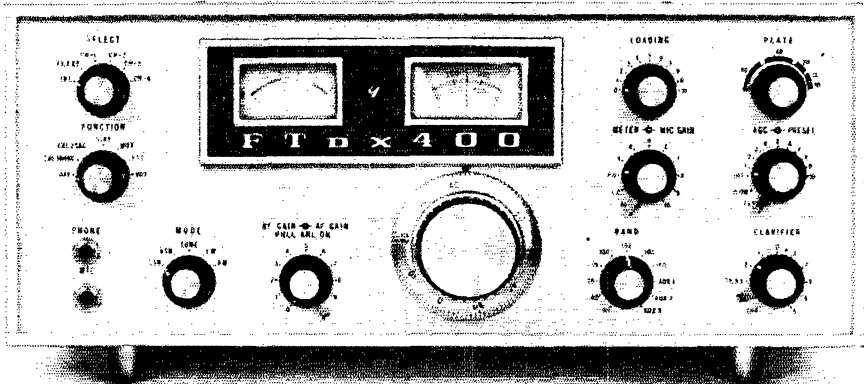
WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV, RMs: K8MYU, K8TPF, PAMs: W8IYD, K8CHW, Net Mgrs.: K8MIYU c.w. and W8YOF phone. W8KQX, pres. of the W.V.U. ARC, reports the club is now affiliated with ARRL. New officers of the Mountain State Transmitters of Elkins are K8TPF, pres.; K8CHW and K8LUR, vice-pres.; W8CXJ, secy.-treas.; W8YHH, act. mgr.; W8YHK, publicity. The C.W. Net reports 30 sessions, 146 stations handling 67 messages. New net members are W8GZX at Parsons and W8HLV at Huntington. During the Roanoke Division Convention at Greensboro W8DUV, representing the Tri-State ARC of Huntington, successfully bid for the '69 Division Convention (tentative dates, Oct. 11 and 12) and W8JM received the Roanoke Division Public Service award from Division Director Clark. The WVN Phone Net, with 30 sessions and 1203 stations, handled 204 messages. W8NDY, W8WYM and W8WCK assisted the CAP in locating a downed aircraft. W8YSB is Class I OO. W8FLF gave a going-away party for K8BIT and K8MQB. W8BQB is a new Novice at Vienna. The Tri-State ARC hosted the State Council Meeting and held a Dinner Meeting with Director Vic Clark as an honored guest. W8LD received an Honorary Doctor of Science Degree. W8AHZ, with 13 operators, meets WVPN, WYN, EAN and TCC. Traffic: W8AHZ 102, W8YSB 63, K8MIYU 62, W8NDY 56, W8RQB 45, W8HZA 40, W8WCK 39, W8YOF 39, W8WIX 30, W8JM 23, W8RPOS 22, W8DUV 19, W8GUL 14, W8WEJ 9, W8CKX 6, K8ZDY 6, W8TWR 5, W8BBG 4, W8KMZ/M 4, W8LFLZ 4, K8TPF 3, K8TTS 3, W8VA/8 3, W8ZNH 3, W8CKN 2, W8DUW 2, W8MIX 2, W8QEC 2, W8AEN 1, W8AGC 1, W8CCK 1, K8CFT 1, W8DYB 1, W8KQX 1, W8MRK 1, W8OPM 1, K8OQL 1, W8OXI 1, K8QQS 1, K8SOR 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—SEC: W5PNY, 00: W5QNG, PAMs: W5DMG, W5FFL, RM: W5FJK, ORS: K5MAT. The morning nets, Breakfast Club and Emergency Phone Net are on 3.902 instead of 3.915 as previously reported. NMN still needs support in the way of check-ins to open 5 weekly sessions on 3.760 at 0100Z. A New Mexico EC Net has been started on 3.915 each Sun. at 1830. All ECs and AREC members are urged to check in. W5MIY passed his Advanced Class exam. Vernon also reports he has put up a new Mosley MP-33 beam. W5BLI now is 1/5 in Alamogordo. W5DMG is going to school in Texas. W5BWV relocated his 15- and 20-meter antennas and has had some good contacts on those bands. Traffic: K5MAT 58, W5FJK 34, W5DMG 21, W5NUI 14, W5UJY 14, W5MIY 8, W5PNY 6, W5JNC 2.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF, RM: W7OCX, BUN needs NCS, ANCS and TWN liaison stations to TWN. At the present time W7OCX and W7GTU are pulling the whole load. W7QWH is sporting a new home-brew quad at 60 feet and W7WKF has a TH6DX at 70 feet. K9LBQ/7, who also has the call W7KUW, is a new OO in Utah. Several appointees have been dropped for lack of reports to the SCM. W7VEO won the annual home-brew contest prize at the UARC meeting with

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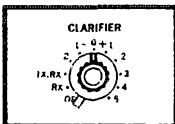
FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limited • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in

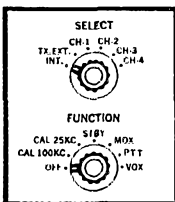
hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

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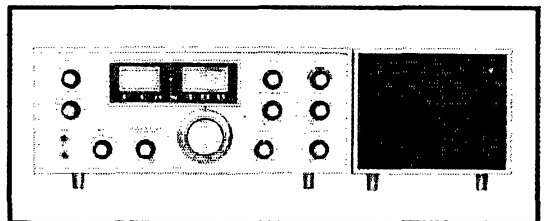


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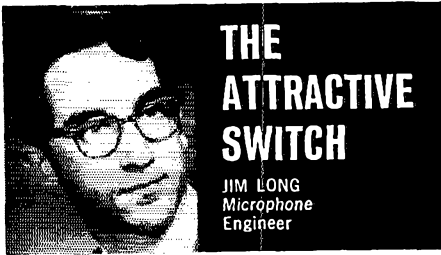


SPECTRONICS

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— PROFESSIONAL EQUIPMENT FOR THE AMATEUR —

One of a series of brief discussions
by Electro-Voice engineers



In the design of a new general purpose microphone, the engineer must provide the features needed to make the unit practical for a broad variety of applications. In some instances however, the switch normally provided is not desirable, since on-off control is provided remote from the microphone.

As a result, some basic microphones are offered in two versions (with and without a switch). Others are available only with a switch, leading to a variety of attempts to defeat the switch, ranging from the use of tape, bits of cardboard or metal that block it mechanically, to changing the internal wiring to bypass the switch.

In designing the new Electro-Voice Model 631 omnidirectional dynamic microphone, a means was devised to satisfy both needs with a single microphone, and without compromising performance. To accomplish this the use of a conventional slide switch was abandoned.

Instead, a computer-grade reed relay was installed inside the microphone barrel. The relay is simply a pair of contacts sealed inside a tube filled with inert gas, and actuated by an external magnetic field. A molded plastic actuator with a magnet embedded in it can be positioned over the relay. Sliding this actuator down the microphone barrel causes the contacts to close, shorting the microphone output. Sliding it upward moves the magnet away from the contacts removing the short and turning the microphone on.

This actuator can be completely removed from the microphone without tools, so that the microphone remains "on" continuously. Replacement of the actuator again provides the switching function, thus the unit is instantly convertible to either mode at any time.

Mounting the reed relay inside the case posed a problem solved by nesting it inside a molded polypropylene insert. This permits accurate and positive location without the use of fasteners or cement. Shallow grooves in the diecast body of the microphone provide a "track" for the magnetic actuator. No holes are needed for the switch since the zinc alloy case material does not affect the switch operation.

Elimination of a hole for a switch permits the designer freedom to use the air volume in the microphone barrel to control acoustic stiffness without fear of an eventual leak around the switch that would affect frequency response. In addition, dirt and magnetic particles are effectively barred from entrance to the rear of the microphone element.

The sealed switch element also contributes to increased reliability, since the contacts are not exposed to contamination from dirt, corrosion, or oxidation. Indeed, a test switch was cycled more than 300,000 times without failure or measurable wear on the actuator, and seemed capable of virtually infinite operation.

This application of the reed relay to microphone design seems to have solved a major problem by permitting a single microphone model to serve the needs of users with opposing switching needs, yet without compromising the performance in either instance. Field performance indicates that the reed relay switch contributes to greater reliability, convenience and better acoustic performance than conventional switches.

For reprints of other discussions in this series,
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a keyer using ICs. W7KSB has received his ARRL Life Membership plaque. OO K7ZJS has been participating in the Frequency Measuring Tests. BUN meets daily at 1830 GMT on 7272 kc.; UARN Sat. and Sun. on 3987.5 kc at 1430 GMT. Traffic counts are up this month. Traffic: (Sept.) K7HLR 219, W7OCX 91, K7SOT 37. (Aug.) WA7BME 23. (July) WA7BME 39.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, Mon. through Sat. at 0630 on 3920. New appointments: K7KSA as RM, W7VDZ and W7LVU as OV's. We had a very successful ARRL officials meeting in Casper in Sept. A new appointment from the meeting: W7TZK as EC. A couple of new Extra Class licensees are W7GSO and WA7KTW, ex-K7UVJ. WA7JES has been transferred to New York City. WA7CLF has a new tri-band beam up and working the world. The Cheyenne and Casper code classes are going great, thanks to WA7KTV and K7TAQ. Anyone interested in a Wyoming QSO Party, write the Casper Club at Box 308, Traffic: K7NQX 251, WA7CLF 146, W7GYQ 98, W7TZK 65, W7HLA 30, K7VVA 16, K7QJW 15, W7NKR 13, WA7KTW 7, WA7EUX 6, W7SDA 3, K7SLM 3.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAM: W4EEC. RM: K4R8K, K4KJD reports that WN4ALO and WN4ICU are new Novices on the air in Athens. WN4LDH is doing a fine job on the AEND, along with NM WB4EKJ. The AEND is our e.w. training net and a real good place to learn net and traffic handling procedure. Whether you are a Novice or an old-timer, you will be welcomed and helped. Give it a try, 2230 GMT daily on 3725 kc. WA4VEK is now operating a new HW-12. His traffic count is holding up well with another BPL certificate this month. Friends of WA4WNE will now find him around his usual operating frequencies as WA0VMP. We regret to report the passing of W4AUS, Phenix City, on Sept. 19. It's just a short time before the 1969 V.H.F. SS Contest. Get set and let's have a good Alabama group on this time. Jan. 4-5 is the date. Traffic: WA4VEK 206, WA4AVM 182, WA4PYO 122, K4BSK 110, WB4EKJ 94, K4AOZ 56, W4MKU 52, WA4EEC 40, WA4PIZ 40, WA4GGD 32, WA4ROP 23, K4WHW 23, WB4KDN 15, WB4FMQ 14, W4DGH 13, WA4AZC 22, WN4KSL 11, K4WOP 10, K4KJD 9, WA4VUG 9, WN4KDE 6, K4UTC 6, K4UMD 4.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5OB—The CZARA was host at a farewell dinner party in honor of KZ5FX and his NYL. Clem has been coordinator of amateur radio activities in the Canal Zone for the past 3 years. He has been very active in nets, c.d., AREC and served as RM. Also honored at the dinner were KZ5VR and KZ5RV. They too have been active in amateur circles for many years, including civil defense and the QSL Bureau. All are leaving to make their home in the land of the big PX. The new coordinator of amateur radio activities is KZ5HL, KZ5FG and KZ5VF are the proud owners of new Drake TR-4s, KZ5S AG, SN and SS are off on stateside vacations. Don't forget, any ex-KX5s interested in forming an ex-KZ5 ham society, contact W5QEK (ex-KZ5UR), WA5NUR (ex-KZ5TT) or KZ5OB. Traffic: KZ5OA 68, KZ5JC 45, KZ5PA 30, KZ5CT 15, KZ5SA 12, KZ5OB 6.

EASTERN FLORIDA—Acting SCM, William G. Blasingame, Jr., WA4NEV—SEC: W4YLT, Asst. SEC: W4FP, RM C. W.: W4LE, RM RTTY: W4RWM, PAM 75M: W4OGX, PAM 40M: W4SDR, V.H.F. PAM: WA4BMC. By now I am sure that all of you know that W4MYB has resigned as our SCM because of the pressure of his work. I have enjoyed serving as his assistant and the experience gained has been truly rewarding. I'm sure that everyone joins me in wishing him the best of everything. W4BKC reports his traffic count was from participating in the BEBA (Bring 'Em Back Alive) exercise. W4FHW has been working on his inverted "V" antenna system for 80-40-20 meters. W4DVO has not been quite as active lately because of his work and his wife being seriously ill. Cy says he plans to retire next year in order to devote more time to hamming. W4PBK has been appointed EC of Sarasota and Charlotte Counties. He has been tinkering with 2 meters and plans to have his RTTY working soon. W4LEP reports that the Vero Beach ARC has started code and theory classes. I think more clubs should

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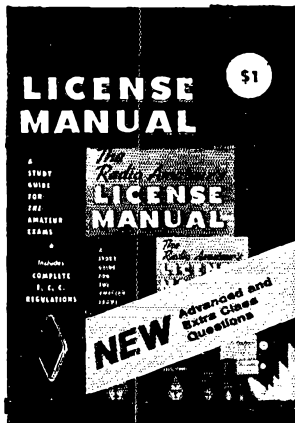
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do this type of thing and work it so there will be a general upgrading of licenses. WA4OHO has gone QRT for college. We certainly will miss Bob and his fine work with the traffic nets. Traffic: (Sept.) WA4SCK 178, WA4NEV 332, WA4FGH 297, W4BKC 212, W4LE 199, WB4AIW 192, W4SDR 138, WB4HJV 113, W4LED 103, WA4LH 87, WB4EPD 83, W4FP 73, W4KQR 60, K4JAN 58, K4LEC 52, W4AKB 46, W4ANBE 45, W4EHW 44, WA4LDH 44, W4OGX 40, W4SMK 36, W4NCR 35, W4YFX 35, WB4DSP 34, WB4FLW 34, W4ACIQ 33, WA4FJA 33, W4YTT 24, W4KRC 23, W4DVO 22, W4GDK 20, W4PBK 19, W4AFYU 18, W4LEP 18, W4ATWD 18, K4LPS 15, W4TJM 13, W4DFU 12, WA4OHO 9, W4SQM 9, WB4GUH 7, K4SJJ 7, K4EBE 6, K4JZI 1, W4VFP 1, (Aug.) W4EHW 120, W8BZY/4 87, W4LVV 70, WA4BCW 26, K4SJJ 13, WB4GUH 11. (July) W8BZY/4 28.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: WA4WQU, RM: W4FDN, PAMs: K4HQI, W4YDN. GSN had a good month to start the fall season with 443 QNI and 249 messages. All 4RN schedules were met. The Ga. S.S.B. Net reports QNI 892 and 101 messages. Augusta has 20 stations keying the rewater with a bit of trouble on the 450-Mc. link. Welcome to WB4FCE, his NYL WN4JGP and son WN4JGO. W4YDN's son Gregory now is WN4LAF operating on 40. W4YDN has a 90-ft. tower on the roof with a telrex beam. He maintains schedules for overseas military personnel. K4UUM has finished a new ham shack and will be active again. WB4CQX and NYL WN4THW have been maintaining mobile schedules on 80-meter c.w. when the OM is out of town. WB4PC/9M8APC writes that he hopes to operate from Sarawak soon. K4HQI reports 50 Mc. relatively quiet. He heard Midwest, Southwest and Western stations working South Americans. WB6UTC/4 is moving to Athens. WA4UQQ is relaying Official Bulletins. W4HYW attended the Director's meeting. He participated in the Wash., Zero, Penn and W4VE QSO Parties. W4HYW signed up 15 new ARRL members. WB4GDQ worked Japan with an HW-16 and one-element beam. W4YE swapped for a W5 call. He is transferring W4GI to Atlanta and his NYL now is WA5WAR. Traffic: (Sept.) W4FOE 144, W4TYE 124, WB6UTC/4 123, W4CZN 96, W4EDN 92, WA4RAY 92, K4IFV 86, WA4TGO 68, W4PIM 67, W4ALLI 61, WA4WQU 55, W4DDY 34, W4YDN 34, W4HYW 12, W4JES 12, WB4GDQ 8, W4RZL 8, WB4EAT 3, W4VE/W4AGI 2. (Aug.) W4FOE 204, WB6UTC/4 69.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB, PAMs: H.P.—W7BNR/4, V.H.F.—W4UUF, RM: K4UBR. Nets:

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957 kc.	2300Z	Daily	30	572	42
QFN	3651 kc.	2330/0300Z	"	60	—	—

Pensacola: K1PKQ/4 entered the Washington, Pennsylvania, WO-Land and W4VE QSO Parties, plus the recent PMT! K4DOT renewed as OO. W4HJ is active on WFPN. New net rosters were made up for WFPN, thanks to WA4AYX. The FFARA held an FB picnic at Ft. Pickens. Meetings are held alternate Thurs., 7:30 p.m., Red Cross Bldg. W4UUF and WB4DHL are working FWB regularly on 2-meter f.m. WB4DHL has a repeater in the works. WA4DDY, WB4IYV and WA8SQG/4 are active on 145.2 Mc. WB4HKM is a regular on the Fla. C.W. Net. Milton: WB4CZT now QNTs the 75-meter WFPN. K4HON has his 2-meter f.m. mobile going. Ft. Walton/Florida: WB4EQU put together a speech compressor. W4RKH put his bunny-hunting techniques to good use when a local's 2-meter transmitter got keyed accidentally while he was away from the shack! Panama City: K4VPY is attending U. of W. Fla. Chiles: W4AZIM left the SRD to work for AT&T. W4IKB and W4RKH attended the Director's meeting in Atlanta. Port St. Joe: W4WEB has his RTTY going FB with the TX-4B and R-4B. Hosford: W4UEU, formerly of Tallahassee, has settled here and is active on 75-meter s.s.b. Traffic: W4WEB 24, W4IKB 18, WA4EOQ 16, W4RKH 8, K1PKQ/4 1.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—PAM: W7UXZ, RM: K7NHL. The Amateur Radio Council of Arizona is planning a hamfest and potluck lunch for Jan. or Feb. in the Phoenix area. W7FRW who got the TR-4 at the convention has even been heard on c.w.! The Saginaw HS Radio Club is sponsoring an Arizona QSO Party during a Feb. week end. K7NHL is working some DX on 21 Mc. between net skeds. W7DLF has a new TH6-DX on a

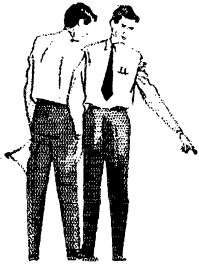
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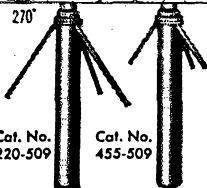
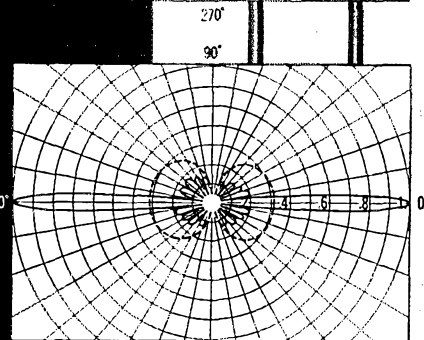
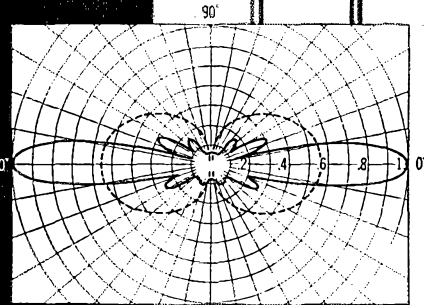
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Nominal Input Impedance	50 ohms
VSWR	1.5:1
Maximum Power Input	500 watts
Omnidirectional Gain (150-174 MHz)	5.25 dbd
Vertical Beam Width	18°

Mechanical Specifications:

Radiating Element Material	Copper
Element Housing Material	Fiberglass
Element Housing Length	20 ft.
Rated Wind Velocity	100 MPH
Lateral Thrust at Rated Wind	79 lbs.
Weight	25 lbs.

Cat. No. 455-509, Frequency Range 450-470 MHz*

Electrical Specifications:

Nominal Input Impedance	50 ohms
VSWR	1.5:1
Maximum Power Input	250 watts
Omnidirectional Gain	10.0 dbd
Vertical Beam Width	7°

Mechanical Specifications:

Radiating Element Material	Copper
Element Housing Material	Fiberglass
Element Housing Length	20 ft.
Rated Wind Velocity	100 MPH
Lateral Thrust at Rated Wind	79 lbs.
Weight	25 lbs.

*Exact frequency range must be specified.

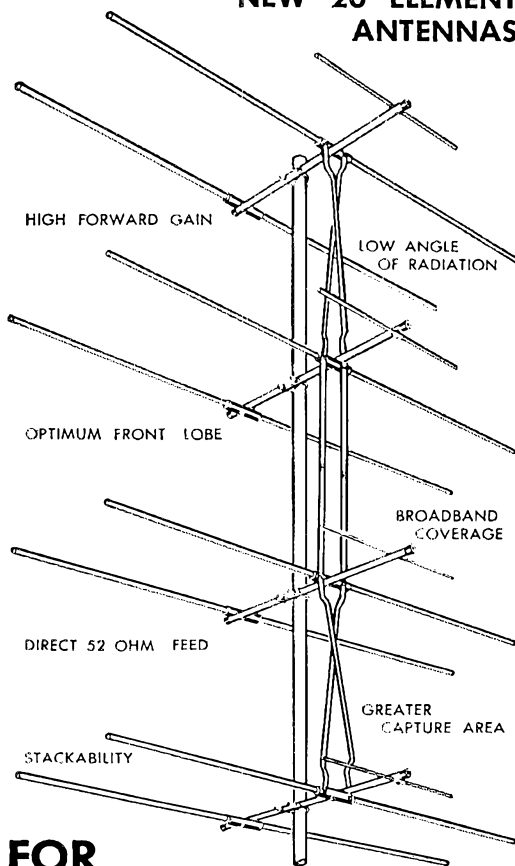


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60-ft. tower. W7FKK now is W7ME. A 75-meter transmitter hunt sponsored by the Arizona Amateur Radio Club was won by K7PLR and K7PRS. The Scottsdale Amateur Radio Club has been running Novice classes and now boasts a club membership of nearly 100. WA7ISP is now on ORS and has added an I.C. keyer and HA-14 to the station. Any ARRL members in this section who desire to be considered for an appointment should contact the SCM. Some nets operating in Arizona are as follows:

Copper State Net	3.878 Mc.	1900 MST	M-F
Post Office Net	3.915 Mc.	1530 MST	Sun.
Post Office Net	3.560 Mc.	2030 MST	Mon.
Twelfth Region Net	3.570 Mc.	2000 MST	Daily
Ariz. RACES Net	2.9905 Mc.	0800 MST	Sun.

Operating Aid 9A and Station Activity report forms are available from your SCM. Traffic: (Sept.) K7NHL 303, WA7ISP 59, W7CAF 6, W7DQS 5. (Aug.) WA7ISP 149. (July) WA7ISP 157.

ORANGE—SCM, Roy R. Maxson, W6DEY—Because of the press of work and studies WA6ROF has been forced to resign as SEC. Jerry did an outstanding job during his tenure and our thanks and appreciation go to him. EC WB6RVM has been appointed SEC and we are assured of continuing progress in our ARFSC and AREC operations. W6EYI, Eagle Mountain, has located the antenna in a new place and seems to be getting out better now. OO W6BUK has the inverted "V" up and working fine all bands. OBS W6WRJ, traffic manager of the Mission Trails Net, notes the new frequency is 3923 at 1900 local time. ORS WB6TYZ notes traffic is down because of school and work. W6PF has sold his place in Palm Springs and will be W7OX/mobile for at least six months. He can be reached c/o J. E. Arthur, 545 Shamrock Ln., Reno, Nv. 89502, or check in on WCARS 7255 at noon. Traffic: K6MICA 387, W6BNX 376, WA6ROF 236, WB6TYZ 214, W6WRJ 73, WB6RVM 38, W6EYI 6, W6GB 5.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM—The Oct. meeting of the ARC of El Cajon saw the El Cajon Mayor and City Manager present among the many guests. The club presented these officials with honorary membership certificates. The North Shores ARC held a retirement party for W6SK during Oct. at the home of WB6GMM. WA6HQJ has been appointed Asst. EC for the North County. All sections ECs, the SEC and 75-Meter Net Manager met at the home of your SCM in an endeavor to streamline the Sunday Morning Net. A trial plan is now in operation, and if it meets with the approval of the members the net will be split into three groups meeting on three different frequencies. WA6DEI has moved to the Santa Barbara section to attend Cal Poly. WA6KHN has joined the ranks of the mobile Swan 350 group. WA6PDE can't get on the amateur bands at present, but he's spending quite a bit of time on the air as chief operator of AB8AJ in So. Viet Nam. WA6PUL celebrated his 73rd birthday by getting his Extra Class ticket. W6LRU is back at Midway Adult High conducting code and theory classes Mon. nights for those of us going for our Advanced or Extra Class tickets. Many section members report they are on 2-meter a.s.b. using the TV 2. From your SCM and family come wishes for a Most Joyous Holiday Season. Traffic: K6BPI 10.197, W6YDK 4520, W6EOT 517, W6VNO 510, W6LRU 252, W6BGF 239, K6HLV 80, W6YKF 29, WA6DEI 25, WB6UMT 21, W6MISC 12, WA6KHN 5, WB6GNM 4.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV. RM: W6UJ. Communications for the annual Semana Nautica yachting affair were handled by members of the Santa Barbara ARC. K6KV handled much of the "Los Amigos de Americanos" traffic during the summer months from Santa Barbara to many of the South American countries. Also in Santa Barbara is K6GJZ, who does a great job with the Med-Aid Net from Duke University and AmDoc. K6GJZ also was my daily contact on a recent sailing trip to Central America so I know first-hand of his reliability. The Santa Barbara Spanish "Fiesta" has come and gone with the amateurs again providing communications and public service as in years gone by. WA6DEI is attending Cal Poly and is an active traffic man with RTTY interests. Those interested in attending the Mike and Key ARC in Camarillo should contact K6VBX. It is a new club with growing membership and interesting programs. WB6BWZ is putting the final touches on an ARC-1 and should be on 2 meters soon. WB6WKC reports he has WAS and WAC to his credit. WB6DPV has a new TR-3. W6ORW is the newly-appointed EC for Simi Valley.

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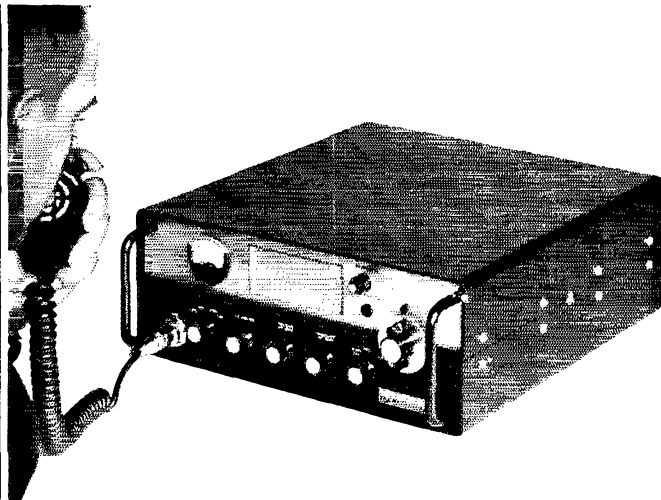
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WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR —Asst. SCM: E. C. Pool, W5NFO. SEC: W5PVI, PAM: W5BOO. RM: (?). This month we received the largest number of reports to date. Our SEC, W5PVI, is interested in all activities. Here is the breakdown we promised on our Northern Texas League Officials: We have 21 ECs, 20 ORSs, 9 OOs, 9 OPBs, 5 OVSSs, 1 PAM and 1 EC. Your SCM attended the Garland Amateur Radio Club meeting Sept. 26 and the Irving Amateur Radio Club meeting as the guest of Pres. K5ZSB Oct. 17. The Key City Amateur Radio Club is now an ARRL affiliate. WA5SIO is pres. A new list from Headquarters shows that many appointments should be renewed. Please send your appointment certificates to me if they need endorsement. A nice letter was received from W5EZY, So. Tex. RM and TEX (c.w.) Net Mgr., reporting on the great activity of the TEX C.W. Net. This net covers all of Texas. WA5QQR, acting as Net Control for TEX Traffic Net, recently participated in an emergency using 3961 kc. Someone called in requesting assistance stating they were in a ditch so Kathy cleared the frequency. The station signed W5BBL/5 (lady's voice) and the Dept. of Public Safety was advised. Traffic: K5BNII 2413, WA5TYH 366, WA5QQR 72, W5PBN 42, W5LR 14, WA5SXS 11, WA5QQQ 8, WA5RAI 5.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5AOB. RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU, K5ZCJ. W5DRZ, an old-timer and very familiar voice on the bands and a former SCM, is on a well-deserved vacation to the northern and eastern states. W5FKL, another of our old-timers, also is on a vacation to the Northern Coast. The new officers of NORA (Northeast Okla. Radio Amateur Club) are WA5IMO, pres.; K5OPK, vice-pres.; K5BPV, secy.-treas. The NORA held a family banquet recently. The Lawton-Ft. Sill Club is undergoing a face-lifting and soon there should be a much different sound from K5VOZ as the old a.m. gear is being replaced with a Drake TR-4. Keep the dates of Feb. 8-9 open and watch for announcement of the Lawton Hamfest. We have a fine crop of teenage hams in this area. Listen for them on the 20-meter TEENET at 14.320 Mc. Contact WA5TSJ for further information. A familiar call, W5EHC, has been replaced by W5JJ. Also a new ham is W5NVAH. K5MTC has been away at school learning all about RACES and c.d. Twd is RACES Radio Officer for the western area. Net reports: OLZ--19 sessions, 146 QTC, 88Z--15 sessions, 45 QTC, STN--412 QNI, 206 QTC, OPON--191 QNI, 6 QTC, OPON--222 QNI, 41 QTC. The new net manager of OPON is WA5RRM. Traffic: K5TEY 2937, WA5IGU 268, W5QMJ 134, WA5KFT 103, WA5IMO 34, W5MFX 26, WA5KZA 24, WA5AOB 23, WA5LWD 17, W5PML 15, K5MBK 12, WA5SEC 10, W5QBF 9, W5FKL 6, K5OCX 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY, EC W5ICL reports new officers of the Orange ARC are W5NMV, pres.; K5RZB, vice-pres.; K5BRN, secy.-treas. The club's 6-meter net is called daily giving ample check-out of equipment for emergency use. EC K5HZR reports new officers of the San Antonio ARC are W5ETG, pres.; WA5RNV, vice-pres.; WA5JPT, secy.; W5BDN, treas.; K5AUW, spt. at arms. EC WA5KHE, with his new Twin Cities Public Service Net on 3955 kc. 1715 to 1800 local time is getting excellent response. EC WA5RXO has a new Tri-Bander beam. EC K5HXR advises the Band Aid Emergency Net has antennas located at several hospitals in the Pasadena area for operating on 146.95 Mc. when needed, under the direction of WA5OYS and says in an emergency around 3000 hospital beds are available. OPS/ORS W5KZT advises from the Austin area that WA5LYX has a new Swan 250. WA5PDD also has a new Swan 250. WA5LYX, WA5SPN and WA5PDD have been working good DX on 6 meters. W5KZT is working DX on 10. WA5MBC is transferring back to 9-Land. The Freshman at Texas A & M held an open house, which accounted for a big traffic jump, according to WA4ARV operating at W5AC. Participation in Southern Texas Emergency and traffic nets is very good. The following stations reported their traffic. If you have traffic, please report to your SCM so we will have a more realistic traffic count for So. Tex. Traffic: W5AC 259, WA5INZ 193, K5HZR 150, WA5GZX 147, W5QJA 135, W5BGE 101, W5EZY 90, WA5QKE 61, W5TPW 40, W5KZT 28, K5HXR 16, W5KLV 16, W5QO 12, K5WYN 10, W5ABQ 8, W5AIR 8, WA5RXO 5.



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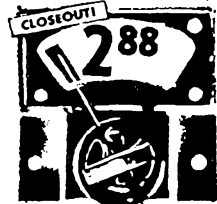
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200	<input type="checkbox"/> .09	<input type="checkbox"/> .30	<input type="checkbox"/> .39	<input type="checkbox"/> 1.25
400	<input type="checkbox"/> .16	<input type="checkbox"/> .40	<input type="checkbox"/> .50	<input type="checkbox"/> 1.50
600	<input type="checkbox"/> .20	<input type="checkbox"/> .55	<input type="checkbox"/> .75	<input type="checkbox"/> 1.80
800	<input type="checkbox"/> .30	<input type="checkbox"/> .75	<input type="checkbox"/> .90	<input type="checkbox"/> 2.30
1000	<input type="checkbox"/> .40	<input type="checkbox"/> .90	<input type="checkbox"/> 1.15	<input type="checkbox"/> 2.70



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200	<input type="checkbox"/> .08	1200	<input type="checkbox"/> .44	3000	<input type="checkbox"/> 1.60
400	<input type="checkbox"/> .11	1400	<input type="checkbox"/> .62	4000	<input type="checkbox"/> 1.90
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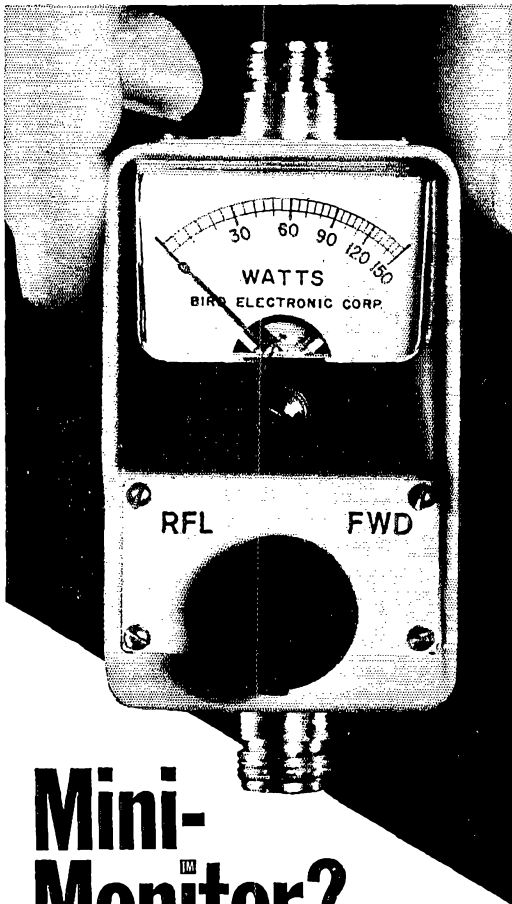
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CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE8TG—SEC: VE6FK, PAM-APSN: VE8ADS, ECs: VE6SS, VE8XC, VE6PL, VE6AFQ, VE6AFR, ORSs: VE6BR, VE6ATH, VE6ATG, OPSs: VE6HM, VE6SS, VE6ATH, VE6AFQ, OOs: VE6HM, VE6TY, OBSs: VE6HM, VE6AIF. Our SEC reports that AREC activities are picking up. I regret that I have had to resign as SCM and I want to take this opportunity to thank everyone who assisted me in this capacity over the past years. As of Nov. 1, 1968, VE6FK will take over as Acting SCM until an election is held. I trust that all will extend cooperation and assistance wherever possible. VE6AAI is now sporting an SR-150 and hopes to be on the air soon with it. VE6YE is activating the 75-meter band with apparent success. VE8RX/6 is enjoying a two-months holiday from Eskimo-land! VE6ABS still is mobilizing in the southern part of the province and doing a fine job! Don't forget the Christmas Party to be held by the Vulcan, Lethbridge and Border Area Radio Clubs. Traffic: VE6FK 21, VE6ATH 7, VE6FS 6, VE6FZ 6, VE6NU 5, VE6SS 4, VE6ALU 3, VE6VF 3, VE6ATG 2, VE6KS 2, VE6YE 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB — Those nice Government QSL cards are from VE7BFW. He also obtained his Class A ticket as did VE7BXQ. VE7BFL is signing VE6GL and is active on BCEN. VE7ASY is back at Tatla Lake. The Beaver Valley ARC members surely did some traveling during the past summer, one going as far as Boston, Mass. VE7CN is now in Comox. VE7AWQ is putting together an SB-40L. VE7BPU has at last mustered the courage to switch from a dummy to a real antenna on his s.s.b. rig. VE7AMW spent his holidays in England. The East Kootenay ARC repeater for 2 meters is up and in action, thanks to the Cominco, city and c.d. The next project is a link with Nelson AREC via the repeater, which is going into operation at the same time. They are located on Mt. Nelson and Mt. Baker. One of our blind members, VE7BXD, has his Advanced Class ticket. VE7BVU was winner of the North and West ARC two-meter hunt. He won a handsome trophy. Traffic: VE7ASY 346, VE7ZK, 108, VE7AC 39, VE6GG 12, VE7SE 9, VE7AMW 6, VE7TQ 6.

MARITIME—SCM, William J. Gillis, VE1NR—Asst. SCM, R. P. Thorne, VO1EL. SEC: VE1HJ. Congrats to VE1AFB on his 2-meter DX to ZF1DT. SONRA has produced an excellent VO call book. VE1AI reports on activity in the VE/W Contest while working on an MSc degree. VE1ARV reports considerable 2-meter a.m. activity in the Fredericton area. A complete list of new and reconfirmed appointments for the section is under preparation and will be published in the next Section Newsletter. Please advise if interested in any appointments. The Newsletter also will have further advice on the license fee situation. VE1AIV is pres. and VE1MY secy. of the Sparkettes. The gals meet each Wed. at 3770. New YLs and ex-YLs are invited to call in on c.w. APN reports QNS 219, QTC 11, sessions 30. A Merry Christmas and Happy New Year to all. Traffic: VE1AMR 32, VE1AUD 6.

ONTARIO—SCM, Roy A. White, VE3BUX—SEC: VE3OF, PAMs: VE3AKO, VE3BLZ, RMs: VE3BZB, VE3DPO, VE3GI. Aug. QST showed VE3AZB as RM instead of VE3BZB. Sorry about that, Chief! VE3CNB has moved from Sudbury to Elliot Lake. Your SCM was a visitor to Pembroke with the Renfrew County ARC. For the past four years they have had a net each Sun. at 0900 local time on 3745. Why not look in on them? Congrats to VE3GNM, of Windsor, who won the 1968 Bermuda Contest. VE3AG advises of the passing of VE7ATI, ex-VE3BRF in B.C. Sept. 26. VE3CO tells me that VE3ES also died on Sept. 26. VE3FXP is now s.s.b. and will be EC shortly. Congrats to VE3AHU, who has just been elected pres. of RSO. VE3ASD and VE3FOB both are out of the hospital and progressing favorably. I hear that VE3BJX is in the hospital and hope it's not too serious. We were all saddened to hear that VE3CIK died Sept. 25.

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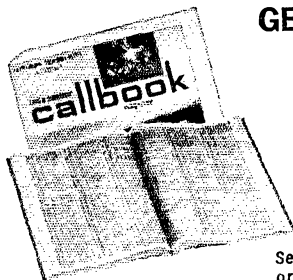
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Our very sincere sympathy to his family. The Ontario Trilliums will hold its Midwest YL Convention in May of next year at the Canadiana Motel in Toronto. This is the first YL convention in Canada so let's give the girls a boost. A big hand to VESGUC who, as far as I know, is the youngest YL in Canada to get her license. She is 15 and has been waiting since she was 12! Incidentally, she was one of the many operators at the CNE this year and congrats go to the Scarborough ARC members for their efforts at that mammoth "do." VE3AYZ is back from a trip out West. If you really want the low-down on fun get the Toronto P.M. Communications Association monthly bulletins. VE3EBC was in Mexico for three weeks taking part in the CIB radio set-up for the Olympics. Traffic: VE3GI 139, VE3DV 69, VE3DPO 68, VE3DMU 63, VE3ATI 51, VE3BZU 51, VE3AWE 44, VE3DBG 37, VE3AUI 36, VE3PGV 30, VE3BUR 29, VE3DU 24, VE3EBC 20, VE3EHL 13, VE3NO 13, VE3VD 10, VE3BEB 9, VE3EWD 5.

QUEBEC—SCM, J. W. Iley, VE2OJ—SEC: VE2ALE, RM: VE2DR, PAM (d.f.): VE2BWL. An apology to the Laurentian DX Club for the oversight in not reporting its formation and affiliation with ARRL. VE2YT is the club secy. VE2DAX now reports from Magog. VE2 stations are pleased with their mention in the Saskatoon Radio Club publication *From Spark to Space*. VE2BYS reports the Laurentian Area Club in Laval meets monthly with good attendance. VE2AGK is pres. VE3DR has gone through the experience of falling off a ladder, breaking a leg. VE2AUD keeps more than busy making 2-meter rigs serviceable. VE2KR is ex-VE1MR and ex-SCM of the Maritime section. Le Radio Club de Québec a repris ses activités avec l'organisation de cours pour les futurs amateurs, sous la responsabilité de VE2BUB et VE2DFR. VE2DHZ est très actif sur le 2 mètres à Québec. VE2BEP est maintenant déménagé à Ste-Foy et espère monter ces antennes très bientôt. VF2BL-VE2DFR-VE2ASU se sont livrés une chaude lutte au WVE contest de cette année. Les clubs de Thedford Mines et de la région du Bas du Fleuve demeurent toujours très actifs. Traffic: (Sept.) VE2LJE 120, VE2BVY 79, VF2OJ 64, VE2EC 39, VE2AJD 29, VE2CP 29, VE2DR 19, VE2PJ 18, VE2DCW 10, VE2BYS 4. (Aug.) VE2DCW 17.

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SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP
—The SCM and his family took a flight to the
British Isles on Aug. 16 for a month. A visit to
RSGB Headquarters was very interesting and served
to stimulate a bit of interest and goodwill. The
meeting in Ottawa, between representatives of
Canadian Amateur Radio Clubs, Noel Eaton and other
ARRL Canadian Division officials, and our own delegate
for SARL, VE5BU, and Department of Transport
officials was held Oct. 7. The "Bring 'em back Alive"
project is getting lots of attention in Saskatchewan.
The v.h.f. boys are hard at it, with repeater stations
first priority. The RTTY boys continue to expand
and gain experience. Our QSL Mgr. of many years,
VE5OP, has decided to retire because of poor
health. It is hard to express the thanks and appreci-
ation of Saskatchewan hams to Fred for his many
years of service on our behalf. The history of Hum
Radio "From Spark to Space" is still available. We
were saddened to learn of the passing of VE5FG, of
Moose Jaw. Don was one of the "old timers"—not
in years but in experiences. Our Saskatchewan hams
provided communication services for many and varied
events recently, including British Week, Walkathons
in many districts, sports car races, exhibition
parades, mexhibitions, etc. How about keeping your
SCM posted on past, present and future events for
this column? Traffic: (Sept.) VE5KR 5, VE5RJ 5,
VE5PZ 3, VE5KZ 2, (Aug.) VE5LQ 18, VE5OF 18,
VE5RJ 13, VE5KZ 9, VE5BO 7, VE5HV 7, VE5IL 7,
VE5EQ 4, VE5OG 2, VE5RE 2, VE5YR 2. **QST**

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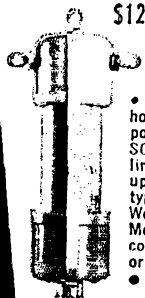
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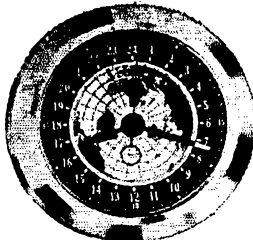
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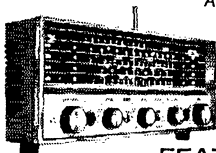
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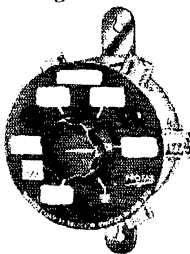
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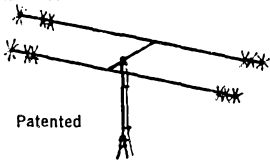
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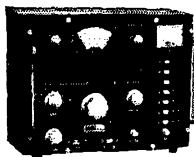
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 W1RQO, Edmund Garvey, Meriden, Connecticut.
 W2DVU, Robert Flowers, Jr., Scotia, New York.
 WN2EZA, Dennis Guerriero, New York, New York.
 W2HEO, Richard Fay, Huntington, New York.
 W2HPZ, John Kleinhans, Tivoli, New York.
 K2ZCB, Robert Reynolds, Lakewood, New Jersey.
 W3FCD, Nathan McDonald, Clairton, Penna.
 W3GRZ, C. E. Gangawere, Pittsburgh, Penna.
 K3MIN, Charles Harll, Buena Vista, Penna.
 W3TY, Alexander Ritchie, Russell, Penna.
 W4DJZ, Conway Bloxton, Atlanta, Georgia.
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 WA9UBN, John Green, Waukegan, Illinois.
 K9WHB/5, William Davis, Las Cruces, New Mexico.
 K9ZLQ, Charles Mattern, Plymouth, Indiana.
 W0GSD, C. L. Kirk, Tama, Iowa.
 W0NVU, Robert Oberman, Trinidad, Colo.
 VE1BL, C. A. Smith, Moncton, New Brunswick, Canada.
 VE1GS, Frank James, Albert, New Brunswick, Canada.
 VE3CIK, W. M. Gardiner, Merlin, Ontario, Canada.
 VE3ES, J. H. McLeod, Scarborough, Ontario, Canada.

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Tilt Over Mast

(Continued from page 43)

meters, etc.). For the larger triband quads or Yagis (10, 15, and 20 meters), 10-foot aluminum TV mast sections coupled together and fastened to the tilt-over section with U bolts, are recommended to reduce the additional stress brought to bear on the tilt-over section during the tilt-

(Continued on page 152)

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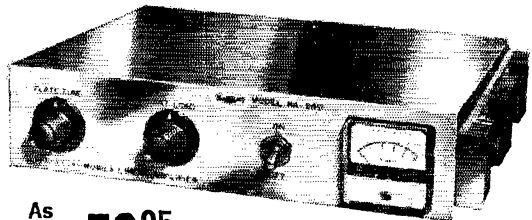
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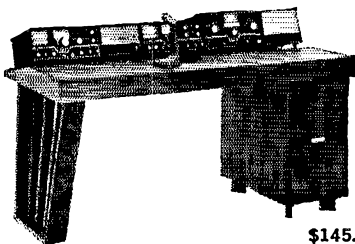
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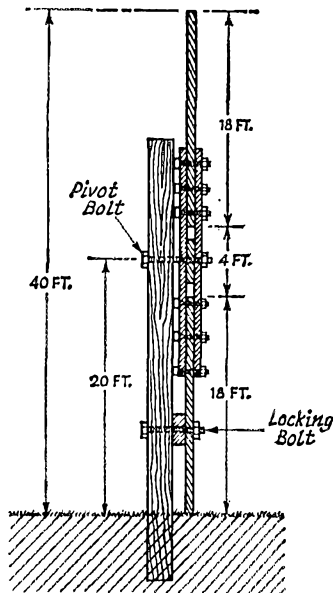


Fig. 2—Sketch showing the assembly of the tilt-over mast. The tilt-over section is made of 2 × 4-inch lumber.

over operation. Additional support and stability may be obtained against high winds or icing when the larger arrays are used, by guying the top of the tilt-over section, or by using an additional locking bolt near the top of the utility pole.

At a cost of about \$1.25 per foot, this tilt-over mast is hard to beat.

QST

ARPSC

(Continued from page 78)

MEPN (Md.-D.C.-Del.); NMRRTN (N.M.); TTN, TEX (Tex.); WBSN, WIN (Wise.); OZK (Ark.); VBSN, VN, VSN (Va.); WSN (Wash.); LAN (La.); VTNH (Vt.-N.H.); NCNL, NCNE, NCSSBN, THEN (N.C.); QIN (Ind.); MNN, MEN (Mo.); O LZ, SSZ (Okl.); BSN (Ore.); MJN (Minn.); AAM, AENB, AEND, AENH, AENM, AENO, AENR, AENT, (Ala.); OQN (Ont.-Que.); WMN (Mass.)

² TCC functions, not counted as net sessions.

W2FR has issued 2RN certificates to WA2s ABY CAL and WB2NSV. K3MVO says traffic is still down from last year, but hopes it will pick up before long; Pres has issued a 3RN certificate to WA3IPU. Sixth Region Net certificates have been issued to W6s BNX WLW, K6KOL, W7As DEI SCE and WB6TMC by WA6ROF, for their steady participation. W7BQ sent RN7 certificates to W7s AAO EKB GHT GYF, K7BPR, and VE7GL. WA8VNU received an 8RN certificate from W8CHT. W0LGG reports net and conditions improving with the VE4s again readable. W6VNQ complains about all the operators who don't know how to count book traffic.

Transcontinental Corps. W0LCX reports just missing the 100-percent-successful mark because of a power failure September 9. W7DZX reports another very good month and says some 20-meter skeds will return to 40 with the time change.

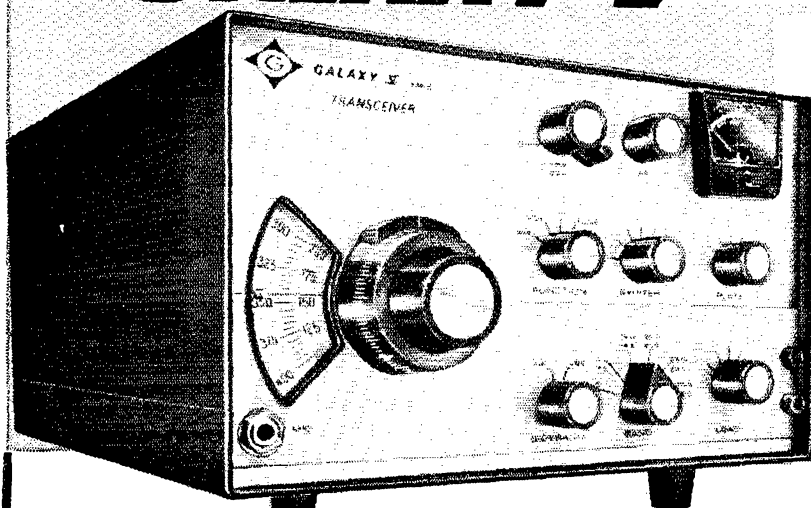
September Summary:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	120	97.5	2072	786
Central	90	98.8	1280	836
Pacific	120	96.6	2076	1039
Summary	330	97.6	5428	2461

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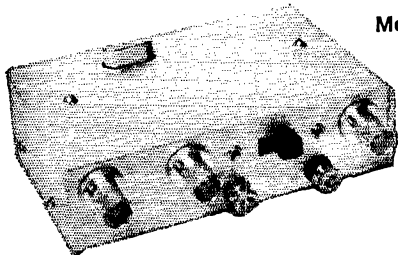


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Independent Net Reports.

Net	Sessions	Check-ins	Traffic
Clearing House	30	450	379
20 M ISSB	25	452	5796
North American SSB	25	454	586
QTC	21	310	210
7290	40	1585	1499
Hit & Bounce	30	345	587
Mike Parad E & T	25	359	243
EASN	17	93	159

QST

How's DX?

(Continued from page 95)

OCEANIA—"I am now assigned the call 9M8APC." Opens WA4ABC from Vietnam, "and hope to be in Sarawak by December. All I need right now is a little help acquiring the necessary light-weight equipment. My license expires at the end of the year." GL, Bill "DU1UP will be workable on several hands through 1969." learns WB6GFEJ Courtesy club newshawks: VR4EK plans to resume Solomons status in February. ... VK3APN succeeds VK4SS as Wireless Institute of Australia DX news chief. ... VK7KJ, after a Tasmania breather, goes back to VK6IA this month for his fourth tour of Macquarie duty.

EUROPE—Wallpaper chasers may be interested in ETDXC's Trieste Award, a certification based (for North Americans) on a pair of confirmed contacts with Trieste IIs, special endorsement for four, dating since April 1, 1957. Check with IJHL for rules, and be advised of the club's Monday Trieste net at 2100 GMT around 14,205 kHz. WA1DJG remarks, "4UOTC is a permanent installation at Turin's International Center." "I signed SP1DC from 1930 to 1939," reminisces SP8CK DL4QQ (WA6PMK) credits W6CLS with the biggest NCDXC signal over Berlin way.

SOUTH AMERICA—PY7s ABU ACJ ACQ AKW and SAOA intended c.w. and s.s.b. operation with high power on 160 through 15 meters from St. Peter & Paul Rocks late last month, three stations in all, radiating with verticals and dipoles. Other visits will follow W4NJF, busy moving his weapons to a new ham shack, manages to sked QSL client VP8KE, Port Stanley, on Mondays at 2400 GMT near 14,205 kHz. Neighbor VP8KD (G3HVB) sports an SB-301-401 and dipole on 28,567-kHz, sideband around 1800 GMT.

HEREABOUTS—"DXCC-squared" No. 58, the fifth for Kiloformia, is earned by K6VVA on submission of a clear photo of QSLs confirming QSOs with 100 or more DXCC members in 100 or more DXCC countries among those members indicated currently active by listing in QST during the 36 months prior to filing. "Sorry for the delay—had it ready a year ago," adds Rick, mighty busy making music for young America VO1AW signs VEOMD on a month-on month-off basis aboard icebreaker *Ambrase Shea* on the Argentina-Sydney run. "She has a capacity of 310 passengers and 100 automobiles. We make three round trips per week at 16.5 knots. My usual frequencies, the same as at home, are about 25 kHz. above the low edges of 10, 15 and 20, and any clear spots near the

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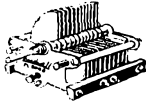
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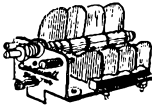
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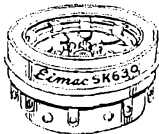


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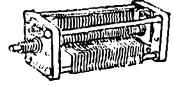
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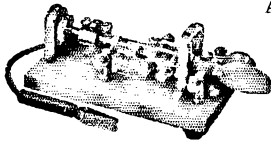
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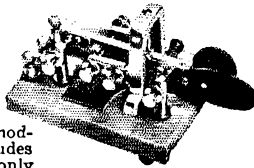
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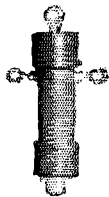


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low ends of 40 and 80 meters." WA6PPZ remarks that active VE1ATJ can supply Prince Edward Island for your WAVE. "Finally worked W6KG at home after QSOing Lloyd in eight African countries." TG9RN species, "During fall and winter I will be on the air daily Monday to Saturday, 1900-2000 GMT, 21,305 or 23,600 kHz." Friend E. Collins of ARRL Hq, calls attention to W6IZE's offering of *DX Awards Log for Amateurs and SWLs*, a fresh publication that could aid certifications searchers "Things are looking up for 100-meter DX this season," opines W6GEN after working WOVXO/KV4 on top band, "I'm arranging skeds with VKs 5KO 9GN and ZL3RB and will be using my NEEGEN call for the next few months." "Had a visit from G2UF, recently a guest at WIDFS," reports WA1FHU whose vertical continues to get out like an all-band omnidirectional beam "Hope to lay into 40- and 80-meter DX again after moving to Flint," threatens WA8PV/8. "WB4GTI is right—DX is just too easy on 20, 15 and 10." WA9UES notes heavy c.w. activity by VP1GB on 7 and 14 MHz. Check with YN1CRN for details on a sheepskin awarded for QSOs with various Nicaraguan call areas VE3HJ relieves VE3DLC at the *Long Skip* editorial helm for Canadian DX Association Ws 4BYB 4KO, WB4BMV and WA4DDG now assist Florida DX Club *DX Report* editor W4BRB as activity analysts for 40, 20, 15 and 10 meters respectively Northern California DX Club bulletin station W6TI transmits DX news on 14,002 kHz. at 1800 GMT, Sundays, and 0200, Mondays. NCDNC's worthy California Award has been captured by 126 DXers in more than fifty countries. Current custodian W6GPB also hunts for old 199S, 201AS, 43-plate condensers, etc. Rebuilding, Joe? W4BPD/7, after pep rallies such as that scheduled by NCDNC at Fresno on the 26th-27th of next month, may head for delicious DX boondocks by February. QST

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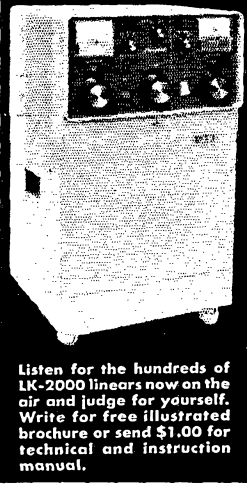
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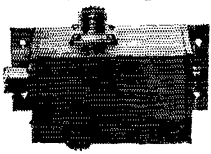
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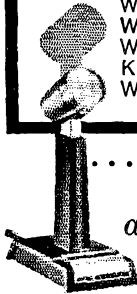
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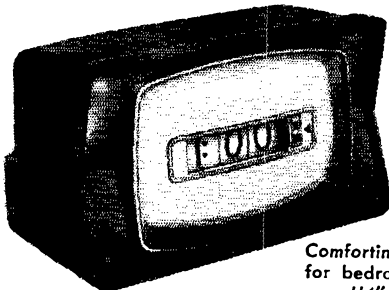
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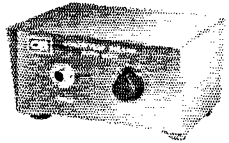
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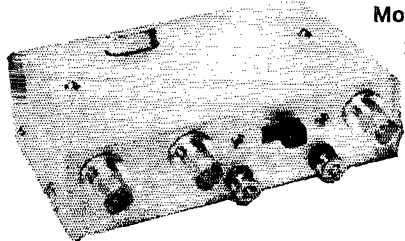
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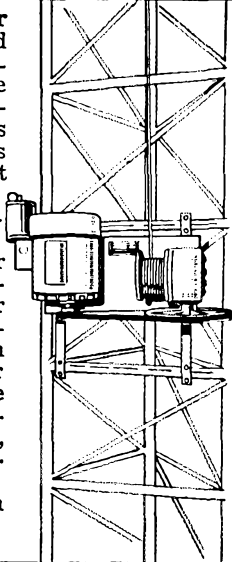
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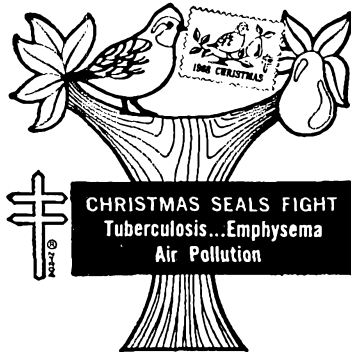
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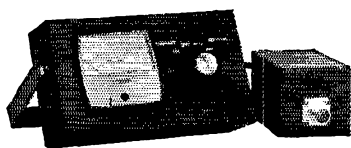
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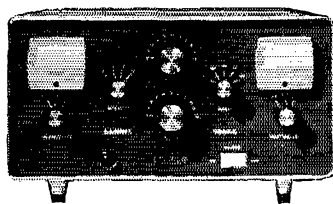
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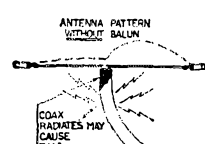
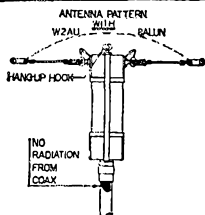
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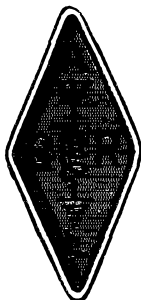
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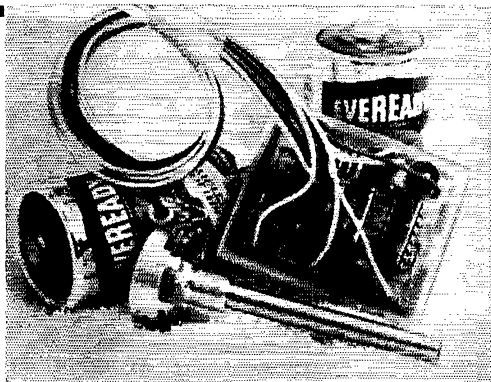
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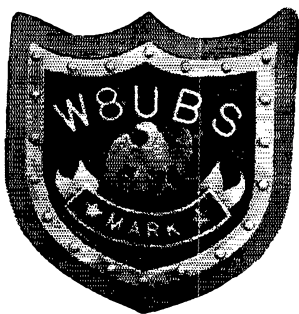


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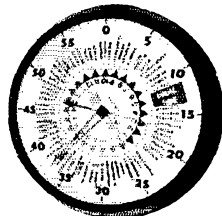
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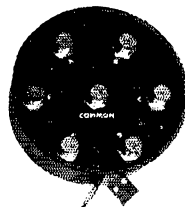
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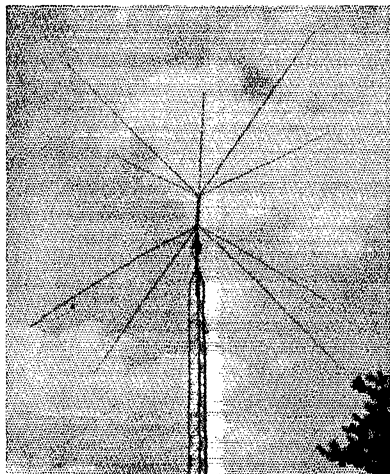
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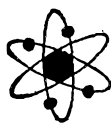


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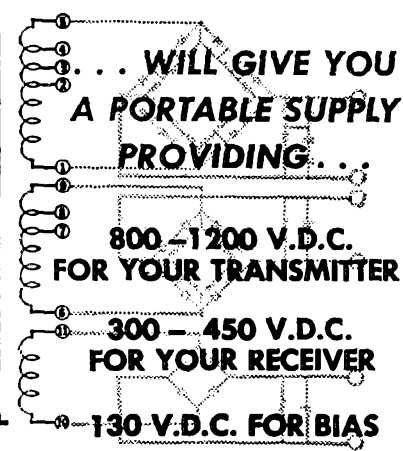
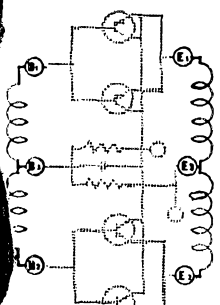
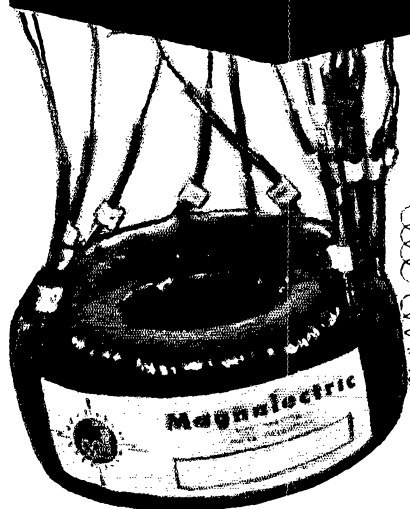
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QS 12-68



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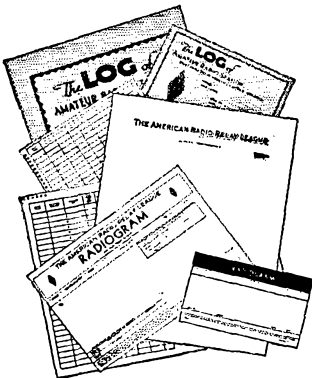
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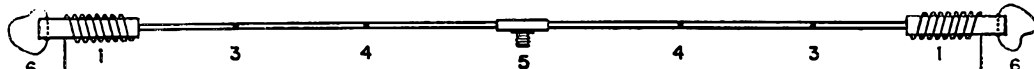
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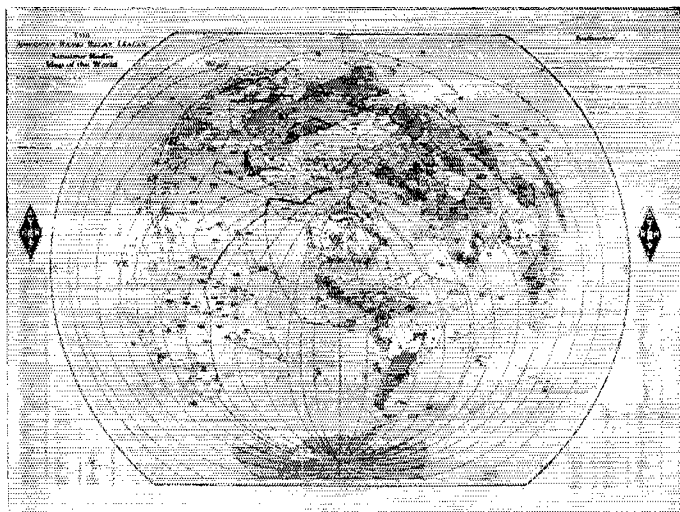


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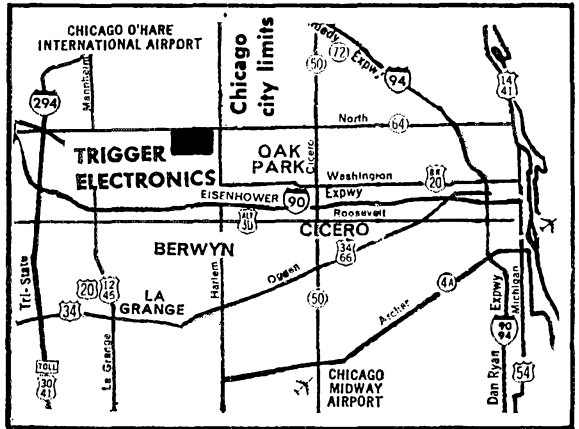
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(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment at the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

INVITATION: New York Radio Club invites New York Area hams and SWLS to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 PM. W2ATT, New York Radio Club.

QCWA—Quarter Century Wireless Association is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information to A. J. Condon, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10543.

DAYTON Hamvention, April 26, 1969. Sponsored by Dayton Amateur Radio Association for the 18th year. Technical sessions, exhibits and hidden transmitter hunt. An interesting Ladies Program for XYLs. Box 44, Dayton, Ohio 45401.

A.W.A. Historical Radio Meet for old time amateur and commercial operators, historians and collector. Smithsonian, Washington, D.C. Oct. 5th. Write W2QY for details.

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MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RF Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. MOrmandy 8-8262.

GREAT LAKE Hams: Swap and Shop to be held December 1968 at Lawrence Tech. 21000 West Ten Mile Road, Southfield, Michigan. Maps available on request. T. P. Smith, Pres.

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SELL swap and buy ancient radio set and parts magazines. Lavery, 118 N. Wycomb, Landsdowne, Penna.

DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

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QSLs "Brownie" W3CJ1, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSL stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs—SMS. Samples 25¢. Malgo Press, Box 375, M. O. Toledo, Ohio 43601

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10¢ Brings free samples, Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLs, Neat, professional, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QUALITY QSLs: Samples 25¢ (refundable). R. A. Larson Press, Box 45, Fairport, N. Y. 14450.

QSL, SWL, cards that are different. Quality Card stock, Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

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QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples, Thomas St., Riegel Ridge, Milford, N.J. 08848.

QSLs—100 3-color glossy \$3.50; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

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QSLs, Free samples. Cut Catalog 25¢. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

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QSL cards, Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

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QSLs, When you're number 28 you try real hard, so try us. Samples 10¢. Alkanprint, Box 5494, Minneapolis, Minn. 55408.

LOW-PRICED QSLs!! Free samples!! K.L.L. Press, Box 258, Martinsville, N.J. 08836.

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QSL's . . . Neat, Fast, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSLs SWLS Hundred \$200, sample dime, Garra, Leighton, Penna. 18235.

NAME PLATES—desk type Call Letters engraved on walnut tone, with holder \$2.50. Engraved Badges with Call and first name \$1.25. Both \$3.50 Prepaid. Engraving of Tri-Cities, P.O. Box 3408, Kingsport, Tenn. 37667.

1000 Gunned, Name Address Labels \$1.00 EE Sales, 8151, Rochester, N.Y. 14617.

CANADIANS! The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. If you will pay to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel. 416-789-1239).

CANADIANS: Hallcrafters VFO 80-2M and Eico 90 watts transmitter 80-10M, in exclnt condx, \$130.00, Schoning, Apt 734, 7400 Sherbrooke, West Montreal, Canada. Phone: 488-2551—Ext. 221.

LOOKING for a gift to a DX hound? Get him a QSO book—Spanish, German, French, Russian, \$3.00. Mail order to M. Holubov, VE2BAG, 22, Vaudrevil Baie Comeau, P.O., Canada.

PRIOR to 1930. Amateur equipment wanted. Please call or write Miss Chris Blake, VE3ART, 48 Megan Ave., W. Hill, Ont., Canada.

HAMS Spanish-English manual \$3.00 Ppd., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 OSTs needed for personal collection. Price secondary. Ted Dames, W2KUV, 308 Hickory Street, Arlington, New Jersey.

3 LINE engraved badges, any color, \$1.25. Special rates to clubs. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

NAMEPLATES Call Letters. Stick-on, \$2.00. Inquire of others. Check or m.o. Dave Forrester, 903 Prospect Ave., Spring Lake Heights, N.J. 07762.

NAME Pin—Eye-catching! Custom engraved with your call and name, \$1.25 prepaid. K6PBE, P.O. Box 1307, Alhambra, Calif. 91802.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3ASUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

JOYSTICK Variable frequency antenna systems, solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S, R388, R390, GRC, Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 32 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 8; The Radio Amateur's License Manual, Editions, 11, 12, W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly, 88 or 44 Mhz. Iridis, five for \$1.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6PVC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WE'RE TRYING to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

WANTED: Model #28 Teletype equipment, R-388, R-390A, Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

TOROLDS: 88 mh uncased \$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE: On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts, 617-598-2530 for the gear you want at the prices you want to pay.

ESTATP Liquidation. SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

3000 V @ 3mf brand new GE Pyranol oil capacitors, \$3.00 each. Can mail, 3-lbs, each shipping weight. FOB P. Wandelt, RD #1, Unadilla, New York 113849.

TELETYPE Gears, shifts, keytops, typebars, motors, forks, typeboxes, typewheels, punchlocks, nonoverliners, CR-LFS TRS, TDs, KSRs, ASRs, FSCs, torolds, fresh paper, testsets, SBT subcases. Buy, top Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

FREE: Lesson Book "Mathematics for Electronics" Please include 20¢ postage. Free lists: Tech manuals, textbooks, lessons, etc. Jim Cooper, POB 73, Paramus, N.J. 07652.

APACHE with manual in exclnt condx, \$100.00. Will crate, ybt pay freight. E2FTDD, Dave Jones, Quevic Drive, RD #4, Ballston Spa, N.Y. 12020.

OFFER \$10 for May 1913 Elec. Experimenter, \$3, Oct. 1914, \$2 May 1919; \$5 1919 issues Radio Amtr. News: \$10 any 1908 Modern Electronics; \$10 gov't. amtr. Callbooks 1922-26. Less for later dates, or poor condition. For historical library, none sold. Wayne Nelson, W4AA, Concord, North Carolina 28025.

SELL: New Yaesu FT-DX-400 Transceiver. W8AO, 2912 River-view Blvd., Silver Lake, Ohio 44224.

WANTED Lampkin mod. 105B frequency meter and modulation meter model 205-A, XE2O, J. R. Agraz, P.O. Box 554, Hermosillo, Sonora, Mexico. Tel: 3-54-46.

SELL Or trade; QST, CQ, Electrical Experimenter, Radio, Modern Electronics Wireless Age and Callbooks, any quantity. Wanted: Old radio gear, books and magazines, Ery Rasmussen, 164 Lowell, Redwood City, Cal. 94062.

FOR Sale: Thunderbolt. Complete with spare tubes. Will ship, \$225.00. K6HLO, 511 Oak St., Roseville, Calif. 95678.

WANTED: Comanche tuning scale. WA6QAY.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass, caps and bridging resistors, 10 for \$3.75. Postpaid USA. With diode purchase, 125 MF, at 350 volt electrolytic capacitors, 50¢ each. Postpaid USA, no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

BRAND New factory-sealed cartons, Hallcrafters SR-160, \$250.00; P-150-DC, \$90.00. All above F.o.b. H D H Sales Co., 170 Lockwood Avenue, Stamford, Conn. 06902.

FOR Sale: Like new condx, SB-200, \$195.00. You pay shipping. Robert Dukas, 834 Butler, Bolivar, Tennessee 38008.

COUNTY Hunters maps, 23 x 35", listing the 48 states and all counties. \$1.50 postpaid. Cameradio Company, 2801 Liberty Ave., Pittsburgh, Penna. 15222.

COLLINS 75S-1B for sale \$400.00. New condition. Sam Davis, WA5DRS, 5766 St. Katherine Ave., Baton Rouge, La. 70805.

NOTICE To all amateurs! Novice to Extra Class! We will make you a good deal, cash or trade, on your needs of new or reconditioned used gear. We also have demos at reduced prices. We have all leading lines of new amateur gear. Good reconditioned, used gear Fully guaranteed. Factory reconditioned KWM2 with 516F-2 A.C./P.S., like new, \$800.00. 30L-1, \$350.00; Galaxy V Mk II, \$365.00; Johnson Invader 2000, \$350.00. Write or call for new listings of used gear at bargain prices. Bob's Amateur Electronics, 927 N.W. 1st, Oklahoma City, Oklahoma 73106. Tel: 405-CE-6387.

NATIONAL NC-300, v/clean: \$145.00; DX-40, VFO, HR-10, all exclnt condx, \$110.00; FA-230 gen. coverage rx exclnt, \$65.00; Wolfenak 1980 perfect, like new, \$210. Steve WA2BUF, 116 Hudson Ave., Haverstraw, N.Y. 10927.

HEATH SB-101, \$3.70; HP-23, \$49.95. Works perfectly. Swan 240, with matching a.c. supply, speaker built-in, \$250.00. You pay shipping. WIERX, Rowayton, Conn. 06853.

WANTED: IRE Proceedings, prior 1926. IRE Transactions, PGCT prior 1949; PGMT prior 1960; BSTJ prior 1930. Trade or buy. LCP, Box 152, La Canada, Calif. 91011.

NCL-2000, perfect condx, no problems: \$325.00. F.o.b. Also SBE-33 with 12-volt supply, \$190.00. R. P. Ache, 707 Barclay Lane, Broomall, Penna. 19008. Phone 215-353-0226.

FOR Sale: Henry Radio 4K, perfect condition. Never used, \$950.00. The Parkview Electric Co., 1390 W. 85th St., Cleveland, Ohio 44102. Days only. Tel: (216)-281-5550.

DON'T Miss Ham Radio Magazine. Your technical and home construction guide, \$5.00 per year; \$10 for three years. Free sample copy. Write Ham Radio, Greenville, New Hampshire 03048.

WANT: Spare plug in units for SRR-12 and SRR-13 receivers. N. K. Thompson, 5 Palmer, Gorham, New Hampshire 03581.

TR-4, \$495.00; AC-4, \$84.00; DC-3, \$115.00; R-4-B, \$370.00; T4-XR, \$380.00; MS-4, \$18.00; RV-4, \$84.00; L-4-B, \$630.00; W-4, \$44.00. Factory sealed boxes, fully guaranteed. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404. Tel: 919-299-8767.

NEW 4CX250B tubes, guaranteed, \$21.00 pr. Ppd. C. M. Pruett, Star Rte C, Flamingo Bay, Ft. Myers, Fla. 33901.

POLICE—FIRE Radio Station Directories. All areas. Call signs, Frequencies! Communications, Box 56-T, Commack, N. Y. 11725.

SELLING My old radio books, magazines, catalogs and parts send stamped addressed envelope or price list. Elmer A. Piercy, W6CID, Box 666, Victorville, California 92392.

SB200 Linear, new, less than 8 hrs. \$195. HO-10 Monitor scope, perfect, \$40. Package deal, \$230.00. Will crate and ship REA your cost. WIICJ, New Milford, Conn. 06776. Tel: (203)-354-2169 evenings.

SELL: Swan 350, AC supply, crystal calibrator, SWR bridge, microphone \$385.00. Hy-Gain 80-40 meter dipper, plus 70 ft. R6-R/U, \$25.00. WA1FVH, 44 Seminole Circle, West Hartford, Conn. 06117.

SWAN 350, 117XC, in exclnt condx, only ten months: \$400. Bruce Baker, WB2ZIN, 50 Carriage Lane, Roslyn Heights, N.Y. 11577.

SELL: Mint HT-37, gud RME 4300, 4301 slicer: \$310.00. LaVern Smith, 3104 Catherwood, Indianapolis, Ind. 46226.

SWAN 350, \$275.00; 117XC AC supply w/spkr in cabinet, \$75.00; 14-117 12 VDC supply, \$85.00; Mark I Linear \$405.00. WA3HMQ, 301 Blacksmith Road, Camphill, Penna. 17011

NCX-5 and NCX-A in exclnt condx, in warranty, \$460.00; DX-60, exclnt, and VF-1, VFO, good, both for \$65.00; NC-270, good, \$120.00; 80-10 meter Transmatch for 2 Kw PEP, home-brew, plug-in coils, \$80.00 with built-in Heath SWR meter, wide-spaced, 3-element 20 meter beam and AR-22R rotator and indicator, both \$50.00. ABC-5, \$5.00. Will Nicholl, 246 Riveredge Road, New Shrewsbury, N.J. 07724.

FOR Sale: YAesu FTDX-400, \$325.00; Heath HR-20, \$70.00; SB-175, \$50.00. All with manuals. WB4APZ, 1900 8th Ave., Immokalee, Fla. 33934. Tel: 813-OL7-3288.

MERRY Xmas and Happy New Year from W8CVU. See you at Des Moines, June 20-22 ARRL 1969 National Convention.

PROP Pitch rotor, WW2, small, excellent, \$45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

WRL's used gear has trial-terms-guarantee! 900A Sidewinder, \$219.95; Galaxy 5, \$289.95; Galaxy 300, \$159.95; HW-22, \$89.95; HT-40, \$49.95; HX500, \$289.95; 513, \$449.00, 75A1, \$169.95; NC-155, \$119.95; NC-190, \$139.95; SB-300, \$249.95; RME6900 \$149.95, and hundreds more. Free Blue-Book List. Write WRL, Box 919, Council Bluffs, Iowa 51501.

SELL: DX-40, \$35.00; VF-1, \$15.00; HW-32, \$35.00; you pay shipping. HC-342-D, \$20.00. You pick up. Leda Guba, 483 Eastbrook Road, Ridgewood, N.J. 07450.

NORTHERN California hams' best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1305 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

WRITE, Phone, or visit us for new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonsel, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry Linear, BTI Linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Henry Radio, Butler, Mo. 64730.

R-100A receiver, \$65.00; Eico 711 receiver, \$35.00. Both in good condition. John Wyncott, 1107 W. Main St., Manchester, Indiana 46962.

WANTED: Polc transformer, at least 7.5 kv, prefer larger. Will pick up. J. Johnson, 305 East John, Champaign, Illinois 61820. Tel: 344-9424, a.c. 217.

MOTOROLA 1021B frequency meter. Like new condx; RCA W033 scope, used once, FM equipment. For reply, SASE Harold Medley, 709 W. 3rd St., Connersville, Indiana 47331. Tel: 317-825-4381.

HEATH SB-300 receiver. Exclnt appearance and operating condition. First \$150.00 cash, check or money-order. Ron Brandon, W4DUQ, 7514 Donder Road, Richmond, Va. 23229.

WANTED: Manufacturer to market receiver with novel crystal filter providing s.s.b. capability. Patent applied for. Atlantic Electronics Labs, 1607 Holly Blvd., Manasquan Park, N.J. 08736.

WANTED: Hallicrafters HT-32B, HT-33B, SX-101A, in excellent condx or cash. C. Johnson, 211 Gordon Ave., Montreal, P.Q., Canada. Write or phone 514-769-8585.

SELL Final amp, pair 811's, some work needed, \$200. in Paris. Also DX-35 with VFO. All for \$70. Jack Lacs, W6WIO, 2015 Alpha Way, Antioch, California 94509. Tel: (415)-757-3992.

SELL Exclnt condx, HT-32A, Turner 454K mike, Johnson low pass filter and T-R switch, all for \$225.00. SX-28 rcvr, \$120.00. Dave Schwankl, Ex-K01VI, 107 2nd St., N., Cold Spring, Minn. 56320.

G2B, \$100; NC100XA, \$50; HC10, \$50; HF45B w/HF45B w/HE61A, \$65.00; Drake F4 receiver, \$185.00; D-104 w/G stand, new, \$200.00; 755 VFO, \$15.00; Vibroplex \$10.00. Cased Verac Lab 7 amp, 4B1K, \$13.00; SB-100 w/HV, duty WRL a.c. nwr, \$300.00; F.O.B. Art Ford, 6 Stoothoff Rd., East Northport, N.Y. 11731. Tel: 516-F0R-6136.

HAMMARLUND HX-500 xmt., in exclnt condx! \$275.00. SBF-34 rcvr, \$235.00. WB2EEU, 1 Grove Court, Roslyn, N.Y. 11576.

SELL: Mini-Beam with 3 new loading coils with Alliance Tenna-rotor and indicator, in gud condx. Package deal: \$60.00 and postage. Bill Asbury, WB4GYZ, 19125 Waterway Road, Jupiter, Fla. 33458.

175-Watt, AM, CW and SSB Heath Apache with SB-10, \$175.00. Will deliver within 100 mile radius. W9FSS, 712 South Elm, Washington, Illinois 61571.

SEASON'S Greetings to all from Steve, WN4JKZ "D.B.", W4UDQ, Paul, WB1K-A4HK and Carol Wilson. See you in '80 and 40 and the world above 50 MHz.

FR/4 freq. meter, one year old, 1-20 MHz, .001%, \$200.00; BC6100, complete, \$250.00; NC240D rcvr, \$75.00. Ship any freight collect on receipt certified check or money order. K9SQV, P. Simandi, 2793 Whippoorwill, Green Bay, Wis. 54303.

MERCURY Relays for HA-1 type keyers, \$5.00 pnd. K3MNI, SB34 Original carton; SBE mike, SB2 mounting mobile bracket, cables instruction book, \$350.00. Used two hours. No room in new car. K2HAM, Swedgal, 2111 Albemarle Road, Brooklyn, N.Y. 11226.

75S-1 Waters Q-X, \$240.00; 75A-4 ser., 3175 3.1 KHz, Vernier dial, \$320.00; filter, F455 J-21, \$40.00; Vertical RV-4, \$16.00; TA-32SR, \$36.00; Cushcraft A14-3, \$38.00. Prop. Pitch motor, \$12.00. F.O.B. John Koszeshy, WA2FNY, 2 Berkshire Rd., Bethpage, L.I., N.Y. 11714.

FOR SALE: RME 6900 receiver, with matching speaker. Just aligned. Best offer over \$225.00. WA9PXT, 309 Lloyd Place, Albert Lea, Minnesota 56007.

VIDEO TAPE—1" type, new Memorex 9" Reel—\$40.00, used Memorex 8" Reel—\$25.00 WBZGKF, Stan Nazimick, Jr., 506 Mt. Prospect Avenue, Clifton, New Jersey 07012.

COLLINS 30L-1 Linear. Not a scratch, extra-extra mint condition. Serial No. 13701. First check or money order for \$375.00. Will ship prepaid in original carton. W7LEB, 1911 Southmore Drive, Salt Lake City, Utah 84117. Phone 801-277-1066.

SELL—EICO 753 transceiver with stable home-brew VFO \$130; Lafayette HA-350 receiver, \$100. H. Mandell 137-21 83rd Avenue, Queens, L.I., N.Y. 11435.

SACRIFICIAL College! Immaculate NCX-3 w/NCX-D mobile supply, \$200; Nutronics Hustler Antenna w/80m, 40m, 20m. coils, spring, bumper mount \$25, excellent. James Weitz, man. K9YJT, 5535 W. Roosevelt Drive, Milwaukee, Wisconsin 53216.

EXCELLENT, brand new SBE-34, all cables, manual, and factory carton; half-hour operating time; Shipped prepaid, first \$385.00 or trade for new Swan 250C. WA7ECY, Room 539 McNary Hall, Corvallis, Oregon 97332.

DRAKE—R-4A, T-4X, AC-4, Power Supply matching speaker. Used only 25 hours, mint condition. First \$700.00 plus freight charges takes them, Reason—Going mobile. W1IIV.

DRAKE R-4B, T-4XB, MS-4, AC-3 for sale. Building house, everything goes. R-4B, T-4XB have less than 10 hours use. T-4XB Serial 13859G R-4B Serial 7589G. Will ship free within 700 miles \$575 for lot. K8AXK, John Berken, 121 Michigan Ave., Marietta, Ohio 45750.

DRAKE T4X, matching MS4, AC3, excellent. \$379. 935-2385, "Bud", 2963 Hannan, Pleasant Hill, California 94523.

DISCOUNTS for Christmas! Drake T4XB \$399, R4B \$379, L4B \$630, Galaxy V, Mk-III \$359, AC-400 \$79, 2000B Lin Amp \$379, Senn-500C (Demo-only one) \$459, Antennas—12% off list, Ham-M \$99, Tr-4 \$59. All prices F.O.B. two great stores to serve you: West—L.A. Amateur Radio Supply, 2302-B Artesia Blvd, Redondo Beach, California 90278. Ph 213-376-4455 (Hours 9 to 6, Mon & Fri to 8, Closed Thursdays) Midwest-Evansville Amateur Radio Supply, 1311 N. Fulton, Evansville, Ind. Ph 812-422-4551 (Hours: 9-6; Monday and Friday to 8, Closed Thursdays.)

COMPLETE Operating station, Collins Power Supply, station control, ZS-S-1, T5-S-1, Heathkit SB300, 14A VFO, Mike, Filter, Coax. Inspect and make offer. No shipments. White, 91 Haddon Place, Upper Montclair, N.J. Tel. 744-8957.

SELL: OST January 1949 thru December 1967, Q3 March 1957 thru December 1967, 73, most since May 1963, 400 issues. Any reasonable offer. Robert Park, W3PKI, RD2 Moscow, Penna. 18444.

COLLINS: 75S-1 rcvr, #11560, excellent \$300; Drake 2B #9485, original owner, \$190, manuals, consider trade, w/mt R-4B for T-4X or companion exciter for 75S-1. Bill McGill, Whites Creek, Tenn. 37189. Tel. (615) 242-7105.

HT32, \$189; SX10A, \$189; manuals included. Both units in excellent condx. Ed O'Brien, W2LJF, 132-38 84 St. Ozone Park, N.Y. 11417.

R-388 COLLINS Receiver wanted, must be in very good mechanical and electrical condition. Will pay \$225.00 cash. Bill Smithman, WA4YFI 919-699-3139, Rt. 2, East Bend, N.C. 27018.

HEATH Seneca VHF-1 6 & 2 Meter transmitter 100.00, DX-40 80-10 Meter transmitter 30.00. Frank Bair, 2669 Clearsprings Blvd, York, Pa. 17402.

NCL-2000 \$375, HX-20 SSB XMTR w/HP-20 Supply \$125, absolutely new P-500-DC supply for SR-400 \$110, W2BWL, 215 E. Main, Somerville, New Jersey 08876.

NCX-3, \$190; Topaz 300XL, \$35; Shure 440 St. Mic, \$20; Transmission tunnel portable mount, \$15; Complete mobile antenna system, \$30, \$265, takes all R. G. Paige \$235 Dogwood, Salem, Oregon 97302.

SWAN-250—All factory improvements. Good condx \$200. Gary Kleinerman, 8-11 45 Ave, Elmhurst, NY, 11373. Tel: 212-611-6315 After 6 pm.

TO BEST OFFER: HW-32, AC supply, speaker, prop. pitch motor. Bill, K4AJF 2847 Mitchell Drive, Decatur, Georgia 30032.

EICO 753 SSB transceiver with A.C. power supply and microphone; nearly new, \$150. You ship. K0DFL/5, 14220 Haymeadow, Apt. 2072, Dallas, Texas 75240.

SELL: BC-342, \$75.00; BC-312 \$50.00 Globe chief XMTR, \$25.00 WB2GWP, Silbert, 2066 Creston Ave., Bronx, N.Y. 10453.

WANTED—Gonsel G & 2 V.F.O. State price and condition in first letter. All letters answered, W8EOX, 108 Penneridge Drive, Geneva, Ohio 44041.

RTTY test oscillator, 2975 cps. Crystal controlled, transistorized, like new. ITT Kellogg. Uses 28 vdc, \$26.50. Fred Firestone, 109R Syracuse Drive, Claremont, Calif. 91711.

KWM-2 with MP-1 supply, original cartons, excellent condition. Will include Knight SWR meter and Turner dynamic mike, \$850. John Garrette 3724 Redbud Rd., N.E., Cedar Rapids, Iowa 52402.

AM going completely cw. Will trade clean Swan-350 plus power supply for excellent CW receiver and good low power transmitter. Jeff Sonin, WA9RPF, 9328 Parkside Drive, Des Plaines, Illinois 60016.

FOR SALE: Motorola mobile F.M. 146.94 mc's complete crystals, control head, cables, 30 watt output, 12 volt Narrow band also, \$85. Motorola F.M. 15 watt output, tuned up on 2 mtrs. less crystals but with cables and control-head \$50. Globe Linear Amplified LA-1 420 watts P.E.P. 80-6mtrs \$75. Heath VFO \$10. Signal Generator, Signal Corps I-208 \$50. 1 mtr transistor receiver converted C.B. \$50. 4CX350B new \$10. Want: HT-32 and mobile supply, K2BYB, Hal Crystal, 14 Codey St. Foris, N.J. 08863. Tel: (201) 549-3523.

LAFAYETTE HF-30 all band receiver excellent condition \$50.00 WB2UWV, Tel: (212)-653-2697.

HEATH SB301, SB401 \$550, Drake 2B \$159, Knight T-150 \$49, Tel: 345-9807, 4062 N. Wallace, Indianapolis.

HQ-170A, like new, \$180, inspection invited, MitCh, WB2UPB, 3403 First Street, Oceanside, N.Y., 11572, Phone 516-R06-7097.

SALE: Collins 75S-1, 32S-3 with 516F-2 power supply, W6RNY, 2516 Ivan Hill Terrace, Los Angeles, Calif. 90039.

COLLINS 75A3 serial #1180 mint condition with product detector plus manuals, make an offer, K2DTV, Roy C. Migliorino, 287 East 19th St., Paterson, N.J. 07524.

SELL: Heath SB-110A six meter transceiver, mint; Hammarlund HQ-100A with noise blanker, excellent condition. Rich John K7MDH '6, 10941 Strathmore Drive, Apartment 62, Los Angeles, California 90024.

CONVERTER 38 to 1000 MHz type CV253/AIR see in 73 Mar. June 65. VY good cond. \$95.00. WB2ZZB Tel: (516) HA1-3041.

TRADE: OSTs 1917, 1919, 1922, 1923 and 1924 (broken run); for Sidsband equipment. George Rancourt, K1ANX, 78 Williston Avenue, Easthampton, Mass. 01027. Tel: 413-527-4304.

FACTORY-Sealed, factory-fresh National equipment: NCX-200-AC-200 \$359; NCX-500-AC-500 \$399.95; NCL-2000 \$566; HRO-500 \$1357. E.J.L. Manufacturing Supply, 1491 Overlook, Alliance, Ohio 44601.

TRADE Lab. Test Meters for Drake 2B. Also have a number of panel meters, assorted ranges for sale or trade. Samkolsky, 201 Eastern Parkway, Brooklyn N.Y. 11238.

AN INDEXX to over 700 electronics construction projects! 4 years in the making! Over 160 test equipment projects, 70 ham projects, and hundreds more! \$3.95. Bel Enterprises, P.O. Box 381 T. Bellflower, Calif. 90706.

SALE: 75A4, 3 filters and matching speaker, mint condx. \$375; SX-122 and matching R-46A spkr, mint, \$165.00. M&M electronic keyer and Brown Bros. CTL keyer, both brand new, \$48.00. Send for list of other items, meters, variable capacitors, etc. Earl Crews, W4DBB, 2522 Shafer St. Norfolk Va. 23513 Tel: 703-853-4903.

COLLINS 75S-3B 23S-3 with 516F-2 power supply, good cond. late model telephone with ESSCO TU-7, TH3 Antenna, Turner & Jim Brown WA4LUN Box 238 Troutman, N.C. 28166 Tel. 704-528-5246.

COLLINS 30S-1 excellent. Interested? Contact Paul Ripple W9SIZ 640 James Ct. West Bend, Wisconsin 53095.

SWAN 350, 117XC. Excellent condition, only ten months: \$400. Bruce Baker, WB2ZIN, 50 Carriage Lane, Roslyn Heights, New York 11577.

300 and 750 vacuum variables, 4-1000 socket and chimney, Galaxy V. W51N. Tel: LA6-3276.

COLLINS: Wanted mechanical filters for 75AY 500 cycles F455J-05, 1.5 kc F455J-15 and Collins Directional Wattmeter, 32 meter only. Frank Linds, Holdrege, Nebraska 68949.

SELL: Collins (like new) KWM-1, Mount, 516F-1 AC power, and D.C. Power, \$400, W2MMN. Phone HA7-3940, 12 Susan Lane, Huntington, New York, 11743.

SALE: NC-98 with speaker Ameco 6M converter 7-11mc with power \$275.00 1941-1967. Make offer. F.O.B. Doylestown, Penna 18901, Ruston, Star Route 2.

CLEANING Out—retiring—cutting down—streamlining—getting rid, etc.: Engineering books, ham components, some units, meters, relays, odd-ball items for experimenters and all non-appliance operators. SASE for list. W2IQ, Box 725, Sag Harbor, N.Y. 11963.

SELL TC3 tube tester and you can test transistors with manual, only \$34.00. A real buy, 12 AVQ vert. antenna, 3 bands c.w. & phone, cheap, \$16.00. Have Drake R4B latest serial number used one week. Sacrifice: \$320. Pse no trades & can't ship. Sell separately. Frank Rodea, 243 Senator Street, Brooklyn, New York 11220.

COLLINS 30L-1 for sale serial 13,971. Absolutely mint. Kept under plastic, \$350.00 F.O.B. Shipped in original carton. Roddick, K7BDG, 5105 East Sunset, Yakima, Washington 98901.

SELL: For price indicated or best offer: National NCL-2000 \$525.00; Hallicrafters SX-100 \$175.00; BC-221-M \$75.00. Marvin Phillips, W3YAE, RFD 2, Fredrick, Maryland 21701.

WANTED: HQ-180 series. Late model. Must be in mint condition. Give aw. Will trade even, violin valued at \$550.00. Details on request, Vernon Fenley, 5232 Rutland Ave., Fr. Worth, Texas 76133.

SELL: Mint HT37, Good RME 4300, RME 4301 Slicer, All \$285.00 won't sell separately, plus half shipping. LaVern Smith, 3104 Catherwood, Indianapolis, Indiana 46226.

FOR Sale: Tektronix Scope 310A \$500.00. New this year perfect condition, factory carton with probe and two instruction books included. Frank A. Hayes, K2VVL, Middletown, New Jersey 07748.

RANGER I with P/T excellent condition, recently aligned by lab. \$100. K1VMT, 46 Oak Hill Dr., Arlington, Mass. 648-5474.

HAMMARLUND HQ-180C, with Heath 2-meter converter, \$225.00; Eico 720 transmitter, 730 modulator, 722 VFO, modified to PPT with cables and relays, \$125.00. Bob, W5QPO, 5512 Granite NE, Albuquerque, New Mexico 87110.

NEW Ameco 2 and 6 meter transmitter. Also VFO Model 621. Converter Ameco with power supply, Dow Key Relay 220 VDC all one package \$150.00 or best offer. Phone 587-7637. Chuck Daidone, 95 Anchorage Dr. West Islip, New York 11795.

WANTED for personal collection: Early WE, BTL broadcast condenser microphones. Also desk type mountings for early carbon microphones such as Palmernberg's WE, Universal, M. L. Gardner, W0JJD, 223 Welch, Ames, Iowa 50010.

SELL: SB400, excellent condition, \$275.00 or make offer. S.A.S.A., pls. Jim, WB6MOE, 91752.

CRYSTALS Airmailed: MARS, SSB, Novice, Nets, Marine etc., Novice .05% crystals \$1.50. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction 3500 to 8600 \$1.90 (five or more this range \$1.75 each), (nets ten or more same frequency \$1.45). 1700 to 3499 and 8600 to 20,000 \$2.95, with overtones supplied above 10,000, 10,001 to 13,500 fundamentals \$2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. OST, Handbook, SSB Manual and Other ARRL builders crystal groups and sngies. Be specific. Write for order-bulletin. Crystals since 1933, Airmailing 10¢/crystal surface 6, C-W Crystals, Marshfield, Missouri 65706.

SELL: New SX-130 still in the box, won at a hamfest. Best offer over \$125.00. Tom Hentz, WA9MCB, Rm. 326, Thomas Jefferson Hall, Kolla, Mo. 65401.

SELL: Heathkit HX-20 transmitter; 90 watts LSB, USB and CW 80 through 10 meters, less supply, \$125. Dick Foster, K3KUE, RD2, Lewisburg, Pa. 7837.

OST's for sale: October 1928 through December 1960. Excellent condition. Will accept reasonable offer. Transportation extra. Don Henrie, 1206 East Seventh St., Plainfield, New Jersey 07062.

SELL: 42 years of QST Mags in one stack. Oct. 1921 missing. Mags in good condx. Reasonable offer accepted. Write Wm. Traver, P.O. Box 365, Pollock Pines, California 95726.

DX-40 VFO-1 and Knight self-powered VFO. All good condx. For \$59.00 dollars. Bob Bagnell, 100 Gateway Rd., Yonkers, N.Y. 10703.

SELL—Viking 11, Viking 11 VFO, Viking 6N2, Viking 6N2 VFO, N.C. 200 with 100 KC calibration, 200 Converter Cabinet with N.C. 2 & 6 meter converters and Ameco power amplifier D-104 Mike, automatic keyer, Drake phone patch, B.C. 221 Frequency meter with calibration book, all connecting cables and coaxial switches. Very good condition, \$400.00. G. M. Anderson, K5GFB, 520 Pasadena Ave., Metairie, La., 70001.

HEATH—Apache with SB-10, \$175. Moving to apartment. Excellent condition very little use. Charles Morran, R.R. 1, Box 334 Carmel, Indiana 46032. Tel: 846-8763.

QST: Jan. 1947 to Dec. 1956. Incl. Make offer, cash & carry. Wm. Breung, 253 E. Kingsbridge Rd., N.Y., N.Y. 10458.

FOR SALE: Swan 500 transceiver, Year old. Mint condx. \$295. Loren M. Shultis, 58 Lowndes Ave., Huntington Sta., N.Y. 11746.

SELL Swan Mark I Linear Amplifier \$325, plus transportation. Dr. Patrick, Box 100, Caldwell, Idaho 83605.

NCX-5MkII, NCX-AC, Mint, no scratches \$450.00. Little use. Perfect electrically, mechanically. Very little use. Original owner, shipped prepared in factory cartons. First certified check to Carl John Palamaro, 1273A Capehart, APO, San Francisco 96334.

EICO 753 with solid state vfo and 751a/c p.s. Mint condition. \$170 or best offer. WA9GJK, M-18 RT. 171 Lockport, Illinois 60441. Phone: (815)-838-1346.

SELL: Gonset GSB-201 linear amplifier, mint condition, PEP 2000 watts, manual, \$200.00 W2CMD, 2206 Smith Street, Merrick, N.Y. 11566.

FOR SALE: 1 DX100 transmitter with push-to-talk in good condition. First \$50.00 sets it, you pay freight! Gerald L. Lyssy, W5BRZ, Box 881, Sinton, Texas 78387.

WILL Trade—Four-inch like-new Unitor telescope with equatorial mount, heavy duty tripod, rubber-castored dolly, and many extras for late model, factory-built transceiver. Value of telescope, \$450.00. Ward J. Hinkle, 8 Wilkes Avenue, Box 88, Amsterdam, N.Y. 12010.

SELL: UHF Transceiver, APX-6 converted to 1296 Mg with 27" reflector, \$29. Three one month old K2-W Philbrick Vacuum tube Op. Amp., \$15 each; RF Gen., EICO, Model 324, Factory wired, \$40; Hi-Fi and Stereo equipment as a complete unit, \$100; Presto turn-table Serial No. 329 with Audax 16 arm, \$20; Heathkit High Fidelity SS-1 Speaker System \$20; and FM tuner, Model FM-3A, \$10; Stereo Amplifier, Solid State, EICO 3070 Cortina, \$75. J. L. Courtney, 222 S. Dale Dr., Lima, Ohio 45805.

ATTENTION Southwestern Hams! Congratulations! You now have your own volume discount ham store! Never before heard-of cash savings on new Drake, Swan, Hallicrafters, Galaxy, National and BTL equipment. Even bigger savings on special packages. Get our quote before you buy. Write or phone today. Valley Discount Ham Shack, 4109 N. 39th Street, Phoenix, Arizona, 85018. Tel: (602)-955-4850.

KNIGHT T-150A transmitter, like new \$60.00 going sideband, W4MPL 7502 Oakmont Drive, Richmond, Virginia 2328.

COLLINS 75S3 with matching spkr. \$375. Central Electronics 1170 with space 6550s, original crate, \$360. Heath Apache Transmitter \$80. All units in perfect condition with manuals. Prices F.O.B. Philadelphia. Power supply items, tubes and other parts. Write for list, K3KRF, 2017 Ogden Street, Philadelphia, Penna. 19130 (215) 232-5599.

A GOOD Eico 753! With Heath AC & DC power supplies. This one works! \$200. Heath Sixer \$35 or trade for twoer. K9KIC/77 1100 1st Ave. S., Great Falls, Montana 59401.

HQ-100 Receiver, excint condx. 24 hour timer. \$125.00; Homebrew 75 watt novice xmt, \$25.00; Want cheap swr meter. R. M. Pleva, 6038 Castlebar Circle, Indianapolis, Indiana 46220.

JOHNSON Invader 200, mint condx. \$275; Johnson Valiant \$125 N.C. 100 Revr \$125. Matchbox \$35. Nick Minko, W0VVE, 4302 W. 18th, Wichita, Kans. 67212.

SELL: L & W 5100B Original carton \$105. HRO-7, coils, power supply, speaker, manual \$50, both \$135. Need 301-1 late serial. WA6JDS, 5263 Aurora Dr., Ventura, Cal. 93003.

SELL: Heath HW-16 CW Transceiver, mint condition, \$90; Hallicrafters S-38D receiver, excellent, \$28; Knight VFO, fair, \$9; K8HJM, Spicer, 334 N. Miami St., Trenton, Ohio 45067.

TRADE Honeywell Pentax Spotmatic 35mm Camera, like new, with electronic flash and other equipment, for GSB-100, CE100V, HT-37, SBE-34, NC-200, Valiant 11, or 32V3. John E. Bagwell, Somerville, Tennessee 38068. Telephone 901-465-2026.

FOR SALE: Collins 32S3, 75S3, 30L1 and AC Power supply 516F2: \$1500.00, WA6ODD, 1519 Randall, Glendale, Calif. 91201. Phone: 246-1595.

HAMMARLUND HQ-110-C w/spkr \$125. Johnson Viking 11 w/vfo and VFO \$115. Dow Key antenna relay \$10. All for \$225. All factory mint condition. Must see to appreciate. Lafayette HE30 \$35, Hallicrafters S-120, Knight 1760. Great novice rig \$60 or \$35 each. Phone: (914) WH84928, White Plains, N.Y. 10605.

NYC Area hams: HT-37, HQ-170AC, Matchbox, TA-33 Jr, beam, AR-22, and over \$200 in related accessories. Best offer over \$500 buys entire SSB station in absolutely perfect condition. I invite your inspection. Srv. no shipping; U pick up. Please call Carl, 9:30-10:30 P.M. (EST) weeknites. Tel: 501-233-6984.

FOR SALE: NC300 with 2 & 6 meter converters & speaker; Gonset 6M Communicator, New York City area, K2YWV, Tel: (212)-TE4-3495.

PREPARE For new FCC exams! You need Post-Check. Multiple choice questions, diagrams, explained answers, IBM sheets for self-testing. Same form as FCC exams. General Class, \$3.25; Advanced Class, \$3.50; Extra Class, \$3.75. 295 to 300 questions or diagrams in each. Each complete for a specific exam. Basic questions duplicated if they apply. Third class postage prepaid. Add 26¢ per copy, for first class mail. \$46 for air mail. Send check or money order to Post-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

SELL: Thor-VI, TX-62, SB-34. Make offers. WA7EGK, Box 3569, Laramie, Wyo., 82707.

COLLEGE Expenses—Must sell: SX-100, Mark 2, \$150.00. Parks, K2LXY, Nashotah House, Nashotah, Wisconsin, 53058.

HALLICRAFTERS SX-111 double conversion rcvr in like-new condx: \$135 or best offer. WB2YCT, Michael Mari, 1460 Jun Hill Rd., Bronx, N.Y. Fone: (212) 652-9383.

NATIONAL Linear NCL2000 Mint Condition, never used on air, new tubes, original carton, \$450.00. W4PDX, 516 Horseman Drive, Lynchburg, Virginia, 24502.

HEATHKIT: SR-100 w/HP-23, SB-600, manuals. Rarely used. Perfect. \$339. Poly Tri Quad, Complete \$59. WB2GND, 196 So. Hewlett Ave., Merrick, N.Y. 11566.

SELLING: B&W 6100 xmtx (read page 58, Sept. 1963 OST), factory PSK, \$345; RME 6900, \$150; plus station and test gear, magazines (OST, RTTY, etc.), s.a.s.e. for list. WA6NAT, 1241 Hooton, Carmichael, Calif. 95608.

NATIONAL HRO-60, coil sets A-B-C-D, matching speaker and manual. Brand new condition in original factory carton used only a few days. \$275.00 or best offer. J. Iannelli 3233 Michigan Avenue, Costa Mesa, Calif. 92626. Tel: (714) 549-0215.

COLLINS 312B-5 like new, \$239.00; Collins 30L-1 absolutely mint, \$325.00; Johnson 275 watt Matchbox with SWR, \$29.50; EICO 730 Modulator \$27.00; Heath IM-10 VTVM, \$25.00; Two new 4CX250B, \$25.00 pair; will prepay all but the 30L-1 in 48 states. W0UDZ, 1030-20th, West Des Moines, Iowa 50265.

SELL: Hallicrafters SX-115, Drake SW-4A. Both excellent condition. Williams, 2473 Sunrise Blvd. N. 101, Rancho Cordova, California 95670.

SELL: DX 60A \$65.00; Heath HQ10 VFO \$25.00; Valiant II \$175.00; Drake 2B speaker and crystal calibrator \$165.00; SX99 with Q multiplier \$70.00. All in excellent condition. R. B. Guthrie, WB4ABP, 811 Southall Place, Sanford, N.C. 27330.

COLLINS S/Linc. mint 75S3, 3253, 312B4, 30L1, 62 S1 (VHF) All complete, with many extras, manuals, etc., cash only, \$1600. F.O.B. W4IWA, 21 Lancaster Terrace, Hampton, Virginia 23366.

HOME on San Francisco Peninsula, 650 foot elevation, beautiful view, superb DX and VHF location, self supporting tower with Tulex Tri-Band, other antennas 160 meters through 2 meters. Very extensive ground system. 200 AMP electrical service, 20 X 40 Ham shack and shop. Nearly 4,000 square feet of luxury living with four bedrooms, three baths, two electric kitchens, central heat and easy maintenance landscaping professionally done. New wall to wall carpeting and drapes \$67,500. Two adjacent building sites available for a total of 1 1/2 acres. W6MOV, (415) 591-5882 Evenings, 783-5611 Daytime.

SOUTHERN California: Communications receivers, transmitters, and SSB transceivers repaired and realigned. Guaranteed work. Special problems invited. Eighteen years communications experience. Gates Marine Electronics 255-A Marina Dr., Long Beach, California 90803. Roker, K6GOC.

DOUGLAS Electronics offers bargains new and used. Swan 14-117 \$98.00, Swan 410 VFO with 22 adapter \$100.00, NCX-3 with Heath DC supply, both \$175.00, practically new original S line, 75S1 \$275.00, 3251 \$350.00, 316F-2 with speaker installed \$95.00, latest model 75S1B used only a few hours \$550.00, earlier model 75S3B \$500.00, 75A2 with speaker, perfect condition \$150.00, 75A4, earlier model with speaker \$250.00, Heathkit HX-20 SSB with HP-20 supply, both \$120.00, DX-100 H, excellent condition \$75.00, Hammarlund HQ-100C, \$75.00. Others received almost daily. Stocks of Hy-Gain Mosley, CDE, B & W, W5GEL, 1118 South Staples, Corpus Christi, Texas 78404.

OLD Timer wants Grube CR-18 receiver, reasonable. W5-ABN, 1412 Highland Road, Dallas, Texas 75218.

SELL: Heathkit HW10D HP23 Power supply excellent condition, factory aligned \$300. Yellin, WB2VIN, 315 Rogers, Brooklyn, N.Y. 11225.

GALAXY 300W Triband transceiver with house and mobile power supplies and New VOX \$220.00 delivered. WA6ESO, 4386 Pacific Highway, San Diego, Calif. 92110.

WANTED: ARRL Antenna Book, second edition; will pay any reasonable price but will swap edition 3, 5, 8, 9, or 10. Charoell, 22206 Del Valle St., Woodland Hills, California 91364.

SELL—Knight R-55A receiver in excellent condition for \$40 or trade with \$20 for R-100A. Jeff Krenz, 821 South Sherman, Bay City, Michigan 48706.

WANTED: Drake DC-3 supply; eight foot parabola; Selling: Ranger, \$60.00; HQ-145C \$150.00; HQ-110C, \$170.00; BC-77 frequency meter, \$55.00; HW-32 with AC supply, \$90.00; BC-348 receiver, \$40.00; SB-101, SR-600 and AC supply, \$400.00; SB-33 rcvr and DC supply, \$200.00; Webster Band-spinner, \$10.00. All items best offer or first check. BARS-WYVT, Electrical Engineering Bldg., University of Wisconsin, Madison, Wisconsin 53706.

ALLTRONICS—Howard Model L teletype converter, new, \$125.00. Dr. H. Rea, Fort Mill, S.C. 29715.

SWAP: NCL-2000, in absolute mint condx, 1 year old, for 1-4 or L-4B WA9HEU, 704 Main St., Dundee, Ill. 60118.

HT-32, \$200. SX-101A, \$150. HQ-110, \$110. Complete with manuals. WA0GOJ, Bruce Dahl, 2114 South First Avenue, Fargo, North Dakota 58102.

DISCOUNT Prices on new equipment in factory sealed cartons. Time payments on any purchase. New Swan 500C \$468, SW-350C \$378. New TRI-EX W-51 Tower (Reg. \$362) only \$299.95 Prepaid. New CDR Ham-M & Indicator \$99.95. New national NCX-500 \$359. All new equipment in factory sealed cartons. New Hygain TH6-DXX \$135, TH3MK3 \$109, Mosley TA-33 \$109, TA-36 \$136, New SBE SB-34 (Reg. \$449) \$395. Send for discount quote on all brands of equipment. Time payments. Package Special: Galaxy V Mark III, AC-400 P/S. Speaker, Shure 444 mike, Hy-Gain TH3MK3 antenna (Reg. \$679.80) only \$619, \$21 monthly. Edwards Electronics, 1316-19th St., Lubbock, Texas. 806-762-8759.

TAPE Recorder—Crown SS-824, Four Speed, SA-20-20 Amplifier, CX Carrying Case, Used 50 hours, \$995.00. A. A. Farrar, Walnut Hill, Amherst, New Hampshire 03031.

HALLICRAFTERS SX-140 Rec. and HT-40 Mark I Transmitter, Both for \$150. wood condition. WA2REK Tel: (212)-763-8726.

CAN anyone donate tapes to teach code at School for the Blind? XEINE, Box 2807, Mexico City, D.F.

WANTED: KWSV parts. Cables (Bandswitch and kilocycles dial), R.F. Choke, L-400 capacitor C-501. A hose strapping for exciter slug-tuning rack, filter cover for rear of RF compartment. James W. Craig, Jr., W1FBG, 29 Sherbourne Avenue, Portsmouth, N.H. 03801.

SELL: Sonar G B Transceiver 8 channels transmit 23 tuneable 110 AC 12 DC 15 watts input. \$110.00 or swap. Gelo 2 meter UFO New \$10.00. Heath HG 10 with tubes \$18.00. Lafayette Simi Auto Hug \$5.00. Turner M&Z Transistorized Preamplifier microphone \$16.00. Alliance T45 Rotor & Control \$15.00. Multi product 300V AC power supply \$8.00. J. Rotunno, 1816 Park View, Bronx, New York 10461.

WANTED: HQ180AX, HQ170(VHF), HRO500, 511, 51G-1, 105B. Lesson course on electronics, and textbooks. State condition and price. John Waskowitz, 541 Marcy Ave., Brooklyn, N.Y. 11206.

FOR SALE: Galaxy III with A.C. Supply, \$180.00 FIRM. James R. Mason, 442 Marilu, Richardson, Texas 75080.

SELL: Johnson Valiant I, recently reconditioned, \$150. SX-100 \$120. Will pay shipping. Roy Fansler, WA9UES, Route 3, Fairfield, Illinois 62837.

DRAKE TR-4, AC-4 and EV-726SR mike, \$550. Like-new condx. Never mobile. Original cartons and manuals. Write: Bill Strong, Box 15352, Millsaps College, Jackson, Miss. 39210. WA5KPE.

6 Meter Lafayette HE-45A transceiver, sutselcher, new crystal & PTT microphone & lowpass filter, HE610 VFO, all very excellent condition; \$80, you ship! Jon Fortune, WA9TTO, 225 S. Hickory, Arthur, Illinois 61911.

HALLICRAFTERS HT 37 xmitter and SX 101A Receiver AM CW SSB. Both in excellent condition, \$400.00 takes both. Will include Dow Key Relay. You must pick up. W2-GIE, 620 West 141st Street, N.Y.C. 10031 Phone 926-3961.

TOROIDS. 88 & 44mhz. Unused, unopened, center-tapped: 5/51.50 Postpaid, 11/16" oiled reperf tape, \$3/box. Page-printer paper, \$5.50/case, Eico 720 transmitter, \$35. Hallicrafters HT-37 SSB electrically perfect \$175. Saturn S1 halo \$9. Johnson 6N2 and matching VFO \$100. Heath weer (lunchbox) \$30. Wanted: Back covers for Model 80 generator. PTO for Collins 51J3 (70E15), RTTY gear, Stamp for list. Van, W2LTI, 3022 Passaic, Stirling, N.J. 07980.

HEATH HW-16; in excellent operating condition. Great for novices, or CW'ers. \$90. Gene, WEARD, 16 Elmire St., Hicksville, N.Y. 11810 (516) WE-5-3112.

G5B-201 linear, perfect. 1 hr use, \$180.00 Shipped collect. Al McMillan, 1441 Madison Avenue, Council Bluffs, Iowa 51501.

CLEGG-Zeus with ps/mid unit, Ask \$375. Art Horwich, WA9IOP, 811 Franklin, River Forest, Ill. 60305.

FOR SALE: Heathkits: HW-18-2 MARS transceiver, \$125.00; HQ-10 monitor, scope, \$45.00, Hammarlund HK-1B receiver, \$35.00. Postage not included. WA0JCI, 5915 Hazel Valley, San Antonio, Tex. 78242.

SELL, trade General Radio 700-A signal generator: two 700-P1 voltage dividers. Best cash offer or trade for good receiver, transceiver. Gene Hubbell, W7DI, 6633 E. Palo Verde Lane, Scottsdale, Ariz. 85251.

GOING Transceive—Sell Drake 2B and 2B0 \$175.00. Also Valiant II F/W \$200.00. R. Burns 421 W. Main St. Warsaw, Ind. 46580.

SELL: Motorola FMR-13V receiver 30 to 44 Mhz 12 volt, Ralph Villers, P.O. Box 1, Steubenville, Ohio 43952.

FOR SALE: Johnson Matchbox 250-30-1 \$50.00, Heath MR-1 receiver \$35.00, MT-1 transmitter, \$30.00. Frank McJannt, 1157 Evanston N. Seattle, Wash. 98133.

NAVIGATOR VFO Exciter; Plesner KE-93, Mobile Receiver, A.C. 6, 20 D.C. supplies, cables, best offer. Jeff 501-PL 7987, P.O. Box 7, Spring Dale, Arkansas, 72764.

FOR SALE: Too much equipment: New Drake TR-4 with RM-3 remote VFO speaker combination and P.S. \$550.00. Brand new in box. Galaxy R-530 \$595.00. New Poly Quad antenna 4 element with wire and 24' ft 3" alum. Boom. Drake R-4A receiver and MS-4 speaker \$300.00. Hunter wattmeter, \$35.00 W9CKF 812-42-59857. W9CKF Porter Barnes, 2922 Munsterman, Evansville, Ind. U.S.A.

SELL: Henry 2K \$450.00 drive it with Central Electronics 100V \$300 Sorry. No ship. Bill Hanberry 1340 Mountain View, South Pasadena, Ca. 91030, Phone 254-2344.

WANTED: Johnson desk KW AM and CW amplifier unit with or without Ranger exciter. Will pay \$300-\$350 depending on condition. Also need a Johnson Viking 500 AM-CW transmitter, \$225 cash. Bill Smithman, WA4YFI, East Bend, N.C. 27018. Tel: 919-699-3139.

HQ-170 immaculate condition. First offer over \$150 gets. KEVQ, 3539 Evans Drive, Santa Susana, Calif. 93063. Free Delivery Southern California.

HX-50 With 160 Meters, in excellent condition, \$225.00. No shipping. srv WB8GNN, 15045 Michael Street, Taylor, Michigan 48180.

FOR Sale: General Coverage receiver: SP-600 JX-26 in metal case, in excellent condition. WA9GUV, 231 So. Jasmine St., Denver, Colorado 80222.

"HOSS TRADER Ed says if you don't buy your ham gear from him you might pay too much. Write or telephone the "Hoss" for excellent cash quotes and trades anywhere in the U.S.A. New equipment, discontinued items; New Drake L-4 Linear, \$525.00; Swan 500, \$395.00; Galaxy V Mark II, \$319.00; new Rohn 50 ft. foldover tower prepa'd \$189.00; new Mosley Classic 3T beam and demo Ham-M rotor, \$199.00. Used equipment: BTI-K-2000 linear, \$575.00; HW-12A, \$88.00; Drake 2-As, \$129.00; TR-4, \$409.00; TR-3s, \$349.00; T4-XB, \$359.00; R4-B, \$339.00; Swan 500C, Ser. #1239814, \$379.00; Galaxy V Mark III, \$329.00. Ed Moory Wholesale Radio Co., Box 506, DeWitt, Arkansas 72042. Phone (501)-946-2820.

NCX-3 and Heath A.C. supply. Ready to operate, \$180.00. KRCPI/4, Box 12, Steinhatchee, Florida 32359. Tel: 904-498-3021.

BACK Issues of QST. Also have old copies of other radio mags and rare copy of 1921 List of Stations, commercial and gov't. Also speakers, excite condx, 1 variometer, 1 tuning coil, 1 "h" eliminator and 1 KW Spink transformer. More items not listed. Mrs. J. Kovell, 313 Hunter St., Niles, Ohio 44446.

HEATH Marauder, \$165.00; Warrior, \$145.00. Both in great condx. F.o.b. D-104C, \$6.00. Knight SWR, \$6.00. K4JUQ, Box 5042, Raleigh, N.C. 27607.

LINEAR World Radio Labs Atlas 2 KW desk-top (resembles Bandit); uses four 572's in grounded grid for full 2 Kw. SSB. Like new condx, and will guarantee satisfaction or your money back: \$260. Prefer local sale but will deliver within 100 miles radius. Sorry no shipping. Drake R4-A, absolute mint condx, \$295.00. Cam shirt, Heath VFO VFI, \$12.00. Les Miller, WA3IKD, 939 Rounfourt Road, Philadelphia, Penna. 19150. Tel: 215-CH7-7943

FOR Sale: Knight T-150A, 6-160 meter transmitter, and complete 2-meter base station. All for \$225.00, or your best offer. Write for full details. A. B. Rogers, 360 Lake Cer Merced, #3, Daly City, Calif. 94015. W6HEA.

FOR Sale: National HRO-7 receiver with all 5 coil sets for 10-160 meter and power supply: \$95.00. W8HFJ, 2108 Virginia Ave., Lima, Ohio 45801.

WANTED: Heathkit electronic analog computer Model EC-1. Advise age, condition and price in letter or call. R. J. Schlesings, K6LZM, #108 Melvin Ave., Tarzana, Calif. 91356. Phone: (213)-342-4376.

DRAKE 2-B, 2-BO, \$190.00; Heathkit: HD-10 keyer, \$35.00; HM-11 SWR, \$5.00; HW-32-A, \$95.00; HP-13, \$60; HP-23, \$40.00; Twoer, \$35.00; Johnson 275-watt Matchbox, \$45.00; CDR Ham-M (new condx), \$95.00; Rohn 40 ft. crank-up tower with guys, rotor mount and hinged base-plate, \$125.00. (Pick-up deal only with tower); W2AU Tri-Band quad, free with tower (vinyl coated spreaders), \$10.00 separate. Hustler bumper mount, mast & 20 meter resonator \$20.00. Make your offer, no trades. Save money on lots of more items. WB2RJ, Robert Schenck, 22 Greenwich St., Bergenfield, N.J. 07621. Phone: (201)-384-1828 Monday nites only.

SELLING Out: NCX, MK-2, NCA Supply, 729SR mike; Heath keyer, HO-10 scope, and HM-11 bridge. All in top condx. Make an offer! Richard Duntley, K1EVU, 88 Perham Street, Farmington, Maine 04938.

SELL: Linear amplifier, grounded grid, 1 kw plus. Completely shielded and filtered for TVI. Never used, with new 3-400Z and chimney. Best quality parts. B&W Jennings, Gardwell, etc. \$125.00, less than parts cost. Meter panel, four Weston under glass, \$35.00. R. W. Emmott, W2AI, 29 East Madison Ave., Florham Park, N.J. 07932. Tel: (201)-377-3832.

VIKING Ranger One for sale, With push-to-talk relay and mike. In exclnt working condx. Accept first best offer. Louis V. Kovi, RD #1, Ringoes, N.J. 08551.

SX-117, \$220. K3LOO, Don Ellis, 43 Poplar Lane, Levittown, Penna. 19054.

SWAP For HW-32A or similar rig Heath radio controlled garage door opener GD-177A, brand new receiver and transistor transmitted mechanism slightly used, also Johnson Ranger, \$79.00; Gonet G-66B, \$39.00; Johnson TR switch, \$15.00; B&W 380 TR switch, \$5.00; Heath SFR, \$20.00; John Winward, 3554 Parkview Drive, Cornwells Heights, Penna. 19020. Tel: (215)-639-7523.

WANT: Collins 714E-3 control, W9AMZ, 1909 Forest Drive, Mount Prospect, Illinois 60056.

MATCHING Heath station, Mohawk RX-1 rcvr, \$125.00; Apache TX-1 xmtr and SB-10, \$175.00. All are in excellent condition and are on the air now. Robert Talbot, Stagecoach Road, Wilton, New Hampshire 03086.

SELL: Johnson Viking Kilowatt amplifier, originally cost over \$1500. Uses pair of 4-400As at one kilowatt input SSB, c.w. Has been converted to grounded grid. In sud condx, with manual and spare pair 4-400A, \$300. Hallicrafters HT-37 exciter. In sud condx, with manual, new, \$1469, \$175.00; Johnson Viking Valiant I, needs work, \$75.00. Variac, 0 to 140 volts out at 55 amperes CCS, almost new, \$50. Hy-Gain 204BA, four element 20-meter beam, pick-up deal only, sry: \$60. Joe Johnson, 305 East John Street, Champaign, Illinois. Phone 217-344-9424.

HAMMARLUND HO-170A receiver with clock, \$140.00; Eico 720 transmitter, \$50.00. Both in very sud condx. WA8ULQ, Robert Wyatt, 3526 W. Hillcrest, Dayton, Ohio 45406.

FOR Sale: Heath Mohawk rcvr, \$140.00; DX-100, \$65.00; Ameco CN-144 factory-wired, \$30.00 J. Manikowski, W9IGV, 6809 Highland Street, Hanover Park, Illinois 60103. Tel: (312)-837-7762.


SELL: Microwave test set "X" band frequency meter. Signal Generator, power meter, TS-147, with manual, \$85.00. RTTY page-printer, paper, 3 ply, \$7.50/case, WB2PLY, Box 207, Princeton Jct., N.J. 08550. Tel: (609)-452-9038.

32S-1 Mint, without a.c. \$395; Collins KWM-2, \$695 without a.c. Trades considered. Want: Collins 312B4, SB-34. Reasonable. F. E. Coble, WA4LXX, 251 Collier Ave., Nashville, Tenn. 37211.

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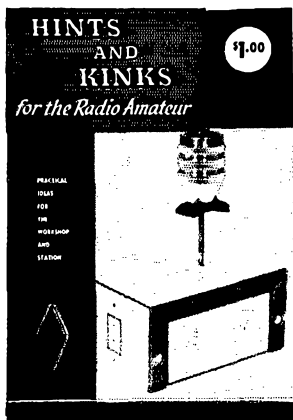
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Index of Advertisers

Alltronics-Howard Co.	150
Amateur Electronics Supply	124, 125
American Radio Relay League, Inc.	
<i>Amateur Radio</i>	146
<i>Hinders</i>	134
<i>Christmas Gift</i>	175
<i>Catalogs</i>	19
<i>Hints & Kinks</i>	177
<i>License Manual</i>	138
<i>Membership</i>	165
<i>National Convention</i>	163
<i>Advertising Policy</i>	177
<i>Publications</i>	166
<i>Single Sideband</i>	142
<i>Supplies</i>	167
<i>VHF Manual</i>	160
<i>World Map</i>	168
Arrow Electronics Inc.	149
Harry Electronics	155
Billada Manufacturing Co.	156
Bird Electronics	144
Brooks, P. E., Carl N.	168
B. T. I. Amateur Division	157
Caringella Electronics Inc.	158
Clemens Manufacturing Co.	150
Cleveland Institute of Electronics	137
Collins Radio Co.	2
Communication Products Co.	139
Comtec, Book Div.	159
Cush Craft	140
Dames Co., Theodore E.	154
Design Industries, Inc.	162
Die-Key	162
Dow-Key Co., Inc.	163
ETIMAC a div. of varian	115, 116
Electro-Voice, Inc.	136
Electrophysics Corp.	167
Evans Radio	152
Fair Radio Sales	159
Farmerle Corp., The	162
Goodheart Co., Inc., R. E.	144
Gotham	127
Hallcrafters Co., The	1
Ham Radio Center	150
Ham Radio Magazine	154
Hammarlund Mfg. Co., Inc.	133
Harrison Radio	178
Hatry Electronics	163
Heath Co., The	Cov. III
Henry Radio Stores	123, 131
Hotel Beauchemer	132
Hotel Sahara	132
Hunter Sales, Inc.	160
Instructograph Co., Inc.	163
International Crystal Mfg. Co., Inc.	7
Jan Crystals	160
J. A. Amateur Radio supply Inc.	153
Lafayette Radio Electronics Corp.	151
Lampkin Labs, Inc.	163
Latin Radio Labs	168
Magnaelectric Corp.	164
Military Electronics Corp.	167
Millen Mfg. Co., Inc., The James	176
Mini-Products, Inc.	158
Montgomery Geodetic Services	157
Mor-Gain	157
Mosley Electronics, Inc.	Cov. II
Nat'l. Tuberculosis & Resp. Dis. Assn.	159
Organs & Electronics	157
Paxitronix Inc.	168
Pennwood Numehron Co.	158
Petering Radio Co.	168
P.J.'s Radio Shop, Inc.	157
Poly Paks	143
Radio Amateur's Callbook	146
Radio Officers Union	155
Radio Publications Inc.	156
Raytheon Co.	4
RCA Electronic Components	Cov. IV
RF Communications Assoc., Inc.	141
SCS Associates	166
Shure Brothers Inc.	158
Sierra/Philco	130
Signal One	145
Skylane Products	155
Solid State Sales	165
Spectronics	135
Stellar Industries	164
Telrex Communication Engineering Labs	167
Tri-Ex Tower Corp.	128
Trigger Electronics	169
Trisiao Tower, Inc.	159
Unadilla Radiation Products	161
U. S. Savings Bonds	118
Van Sickle Radio Supply Co.	158
Vanguard Electronic Labs	154, 158
Vanguard Engineering	159
Vibroplex Co., Inc., The	156
Waters Mfg. Co.	147
Wayne, Harry	162
Wilson, Inc., Willard S.	158
World Radio Labs	121, 129



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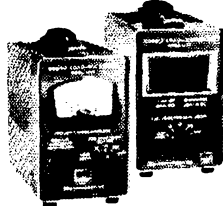


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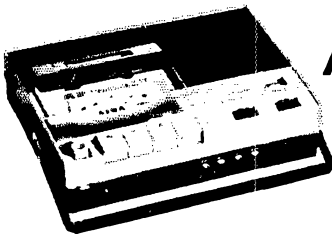
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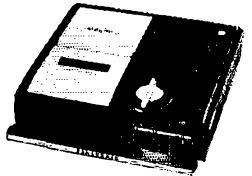
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Index to Volume LII—1968

ANTENNAS AND TRANSMISSION LINES

Antenna, The "Double Bazooka" (Whysall)	38, July
Antenna, The M. A. B. A. L. (Bridges)	11, July
Antenna Type vs. Distance (Tech. Corres.)	43, Oct.
Baluns, Matching with Homemade (Fenwick)	46, Oct.
Balun Required? Is A (McCoy)	28, Dec.
Beam Hints, Forty-Meter (Tech. Corres.)	54, Feb.
Ground-Plane, Multiband . . . Vertical Antenna with Tuned Feeders (Gillespie)	18, Apr.
Helix Antennas, Finding Wire Length for (H&K)	56, Feb.
Hustler, Storing . . . Resonators (H&K)	56, Feb.
Insulators, Base Tech. Corres.)	40, July
Inverted V, An 89-Meter . . . for Field Day (Que)	16, June
Inverted "V", Determining the Length of an (H&K)	42, July
Loop, Army . . . in Ham Communications (McCoy)	17, Mar.
Loop, The Army (Tech. Corres.)	49, 50, 51, May
Loop Measurements (Tech. Corres.)	46, Nov.
Mast, A 40-Foot Self-Supporting Tilt-Over (Robitaille)	43, Dec.
Mast, 64-foot Unguyed Support (The Square-Rigger) (Spaeth)	42, Nov.
10-Meter "Lazy Quad" (Tech. Corres.)	40, July
Mobile Multi-band Antenna System (The "Mobiloop") (Taylor)	18, Nov.
Modified Transmatch For Ease in Matching Very Low Impedance Loads	47, Dec.
Monitor, An R.F. Actuated C.W. (McCoy)	39, Nov.
Mounting, A Simple Method of . . . a Rotary Beam on a Utility Pole (H&K)	52, May
Multiband Antenna (Tech. Corres.)	46, Aug.
Noise Story—Happy Ending (Tech. Corres.)	43, Oct.
Quad Antenna For Four Bands	
The Two-Tailed Monster (Troster)	28, Sept.
Quad, Converting a Mono-Band . . . to a Multiband Antenna (H&K)	57, Feb.
Quad, The Clothes Drier (Bedal)	40, Jan.
Quad, Two-Band . . . Matching (Tech. Corres.)	55, Apr.
Quads and Yagis (Lindsay)	11, May
Radiation Resistance of Inverted V Antennas (Covington)	36, Oct.
Raising Portable Antennas (H&K)	50, Sept.
Tower, a 65-Foot Crank-Up (Fillion)	18, Aug.
Transmatch, Why A (McCoy)	31, Jan.
Where Did The Signal Go? (McCoy)	14, July
Yagis, Some Observations With V.H.F. (Tilton)	31, June
Yagi, The Wooden (Sharo)	44, Feb.

AUDIO FREQUENCY EQUIPMENT AND DESIGN

Generator, Two-tone . . . with Scope-Sync' Output (Noble)	43, Mar.
Filter, A Solid-State Audio (Anciaux)	35, Dec.
RTTY Bandpass Filter For 2125-2975 c.p.s. (Wetherhold)	19, Apr.

BEGINNER AND NOVICE

Balun Required. Is a (McCoy)	28, Dec.
Dipper, Field Effect Transistor (McCoy)	24, Feb.
Harmonics, Getting Rid of Low-Frequency	26, Apr.
Monitor, An R.F. Actuated C.W. (McCoy)	39, Nov.
Preselector, An FET For 20, 15, and 10 (McCoy)	42, Aug.
Receiver, The "GCR-2" (DeMaw)	11, June
Sixer and Twoer, Some Useful Modifications for (McCoy)	28, May
Soldering, How To Do a Good . . . Job (McCoy)	28, June
Transmatch, Why A (McCoy)	31, Jan.
Transmitter for the Beginner, A Simple (400&80) Meters (Mix)	22, Oct.
TVI Can Be Tought! Novice or General (McCoy)	29, Mar.
Where Did The Signal Go? (McCoy)	14, July

CONTESTS AND OPERATING ACTIVITIES

Armed Forces Day	
Announcement, 1968	61, May
Results, 1968	74, Nov.
CD Parties, High Claimed Scores	
(October 1967)	99, Jan.

January	113, Apr.
April	101, July
July	111, Sept.
DXCC	
Annual List	106, Dec.
Five-Band, Rules	110, Oct.
Notes	
VP2ME	104, May
Service Charges	96, June
Endorsement submissions, deletion of Palestine and Kuria Muria, VP2ME	102, July
Addition of Blenheim and Geysler	108, Sept.
DX Competition, 1968 ARRL International	
High Claimed Scores	50, July
Results	56, Oct.
Announcement (1969)	64, Dec.
DXpedition Logistics (Cushing)	62, Feb.
Field Day, 1968 ARRL	
Announcement	58, May
Results	52, Nov.
How I Learned to Love a Contest (Redington)	71, Nov.
How Much Better is Best? (Nighman)	101, Jan.
I'm Not in The Contest But (Nose)	56, Mar.
Novice Roundup	
Announcement	64, Jan.
Results	48, June
QSO Parties	
Ariz. 130, Ark. 104, Jan.; Calif. 132, Sept.; Fla. 126, Feb.; Ga. 154, Apr.; Ind. 105, July; Md.-D.C. 104, July; Mass. 122, Sept.; Minn. 106, July; Mo. 116, May; Neb. 134, Apr.; N.J. 101, Aug.; N.Y. State, 108, May; Ohio, 104, Mar.; Penn., 110, Sept.; R.I., 120, May; VE1 138, Jan.; Vt. 110, Feb.; Wash., 128, Sept.; Wis., 122, Apr.; Zero District, 118, Sept.	
SET Announcement, 1968	66, Jan.
SET Results, 1968 (Hill)	50, Aug.
Sweepstakes, November	
High Claimed Scores	95, Feb.
Results, 34th Annual	62, Apr.
Announcement, 35th Annual	54, Oct.
Sweepstakes, RTTY	
Results, Seventh World-Wide	65, Feb.
Announcement, Eighth World-Wide	70, Sept.
Sweepstakes, V.H.F.	
Results, 21st ARRL	53, June
Announcement, 22nd ARRL	63, Dec.
Try the FMT (Wood)	55, July
VE/W Contest	
Results, 1967	60, Sept.
Announcement, 1968	63, Sept.
V.H.F. QSO Party	
Announcement, June	57, May
Results, June	64, Sept.
Announcement, September	49, Aug.
Results, September	66, Dec.

CONVENTIONS

ARRL National 1968	76, Jan.
	73, Mar.
Central Division	49, July
Florida State	70, Aug.
Hudson Division	89, Sept.
Kentucky State	70, Aug.
Michigan State	61, Apr.
New England Division	75, May
Roanoke Division	89, Sept.
Rocky Mountain Division	79, June
Saskatchewan Province	79, June
Southwestern Division	69, Aug.
West Virginia State	79, June

EDITORIALS

The Amateur's Code	9, July
Another Frequency Conference	9, Aug.
The Appliance Operator	9, June
ARRL and the Communications Dilemma	9, Apr.
ARRL and the Democratic Process	9, Mar.

Communications Escalation	9, May
Delivery Costs	9, Sept.
DXCC	9, Oct.
November Twenty-second	9, Nov.
Novice Retreads	9, Sept.
Phone Patches	9, Dec.
What is the ARRL	9, Feb.
The Year in Review	9, Jan.

EMERGENCIES

Amateur Radio and Distress Information (Dean)	61, Jan.
Iowa Tornadoes	58, Aug.
Simulated Emergency Test Announcement	66, Jan.
SET Results (Hill)	50, Aug.

FEATURES

Address Delivered by Mr. Mohamed Mili, Secretary General of the ITU, on 23 Sept. 1967 at the opening of the Annual Congress of the I.A.R.C.	60, Jan.
Amateur Radio and Citizens Band (Sykes)	61, Dec.
Book Binding Method (Nelson)	60, Dec.
Amateur Radio Expo!	60, July
The ARRL Museum of Amateur Radio	52, Oct.
Part I	00, Dec.
Part II	58, Dec.
Christmas QSO (Truster)	77, Nov.
CQ Contest, de Padre Tim Brine	54, Sept.
Danger Electrical Shock (Zemek)	59, Feb.
Etsel Murphy's Laws (Lawson)	52, Mar.
First Novice WAC, The (Blasi)	62, Aug.
Getting the World in Tune (Meyer)	77, June
Ham 'n' Gravy (Evans)	58, Sept.
Hams Help on Election Returns (Beard)	71, Nov.
How I Learned to Love a Contest (Redington)	113, Oct.
KIGOP "How to Succeed in Politics Without Getting Involved"	70, June
Novice in Wonderland (Pollock)	76, Sept.
QCCN & Community Radio Watch (Weaver)	54, May
QRP Versus QRO (Brine)	62, Dec.
Return to Wonderland (Zimmerman)	73, Nov.
The Ruptured Rhombic (Voorhees)	58, Jan.
Tiny Voice from the Arctic	54, Mar.
War on Hamopathy, The (Fuller)	78, Sept.
Why the Radio Club? (McKee)	

FICTION

A Study of Hertz vs. Cycles Per Second (Hale)	48, Apr.
Crystal Stable Frequency Control with Your Old V.F.O. (Waller)	46, Apr.
Dummy Loads from the Junk Box (Schroeder)	47, Apr.
The Real Life of W2SKG (Leonard)	55, Dec.

HAPPENINGS OF THE MONTH

Advanced and Extra for Shut-Ins	84, Apr.
Amateurs and Members	70, Mar.
Amateur of the Year (St. Louis Club) 1968 Plaque	49, Oct.
Anti-Noise Bill Passed in House	78, May
ARRL Asks FCC to Keep 6 Meters Open	64, Nov.
ARRL/Canada Files Brief on Fees	80, Sept.
ARRL Comments on Slow-Scan TV	72, Feb.
ARRL Supports "Retread"	67, Nov.
ARRL Supports Shut-In Docket	75, June
A-2 Still OK for Novices on 2	74, Jan.
Band Edges for S.S.B. Reminder	80, May
Behind the Diamond	
Wayland Groves, W5NW	73, Feb.
Donald Mis, W1TS	71, Mar.
Gilbert Crossley, W3YA	85, Apr.
Robert Denniston, W9NW	79, May
Noel Eaton, VE3CJ	75, June
L. A. Morrow, W1VG	70, July
Charles Compton, W0BUO	67, Aug.
John Huntoon, W1LVQ	87, Sept.
George Grammer, W1DF	87, Oct.
Lanier Anderson, Jr., W4MWH	79, Dec.
Board Meeting, a Pictorial Report of the 1968 ARRL	74, July
Boston Exams Only Thursday & Friday	70, July
Canada Revises 160 Meters	68, July
Canadian Calls Can Be Held Open	84, Sept.
Canadian Club Wins Antenna Fight	68, Aug.
Canadian Fee Quadrupled	71, June
Canadian License Figures	67, Aug.
Canadian National Exhibition	66, Aug.
Canadian RTTY Ruling	70, Mar.

Canadian Traffic Warning	71, Mar.
The Carterphone Case: Phone Patches	82, Sept.
Cincinnati Amateur Radio Week (photo)	65, Nov.
Club Gear Under Private Call	71, June
Court Upholds FCC on License Denial	81, May
Easier I.D. Adopted	73, Jan.
Election Notice	64, Aug.
Election Notice	79, Sept.
Election Results	64, Nov.
Election Results	72, Jan.
Epistle to A QRM Maker	88, Oct.
Exam Credits Denied	86, Oct.
Executive Committee Minutes No.	68, Nov.
Expansion of 160 Meters	71, June
Extra Privilege Clarified	74, June
FCC Clarifies Four-Month Rule	78, May
FCC Denies Stay on 50.1 MHz	86, Oct.
FCC Policy on Modulation	68, Nov.
FCC Rejects Three Proposals	74, June
FCC Retirements	70, Mar.
Gigahertz Band Change Okay	67, Nov.
Goldwater, Denniston, Myers (photo)	78, Dec.
Harry Engwicht, W6HC and Ronnie Martin, W6ZF Honored by Pacific Division (photo)	65, Aug.
Interference to Other Stations—An FCC Letter	88, Oct.
John G. Doyle, W9CPI	68, July
Latter Cover Plaque (photo)	80, Dec.
License Fees in Canada	78, Dec.
Licenses for Immigrants	76, June
License Revoked	65, Aug.
License Suspended	82, Sept.
License Suspension	84, Apr.; 81, May; 76, June
Minutes, Executive Committee Meeting, March 9, 1968	82, May
Minutes of the 1968 Annual Meeting of the Board of Directors	70, July
More Amateur Radio Weeks	68, July
More Recognition	66, Aug.
Nevada AR Week (photo)	81, Dec.
New Break for G.I. Novice	74, Jan.
New Jersey Ham License Plates	85, Apr.; 67, Aug.; 67, Nov.
Novice Eligibility Proposal	83, Sept.
Penn. Amateur Radio Week (photo)	64, Nov.
Pink Tickets	71, June
Portland, Oregon, Office Moves	65, Aug.
QSL Bureau Change Hands	74, Jan.
Richard Gregorio, K1RAW New England Ham of the Year (photo)	66, Aug.
Rules for Life Membership	76, July
Shut-Ins Win Mail Exams	69, July
Six Meter Footnote	79, Dec.
Slow Scan TV in the U.S.	80, Sept.
Special Callsign Rules Codified	78, May
Staff Notes	86, Oct.
State Legislatures to Meet	74, Jan.
Subbands Challenged	80, May
Suspensions—Feedback	74, June
Technicians Eligible for Novice	68, July
Tryon, Elder, Get Awards (photo)	79, Dec.
VE3ZZ Retires from DOT	65, Aug.
VE3NR Replaces Caton	78, Dec.
VE Tariff Try Fails	78, Dec.
Visitors May Use VOX	68, July
Winner—Cover plaque Award for March	89, Oct.
WA4QSL Bureau Changes	68, July
Who the Devils is Who?	84, Apr.; 83, May; 76, June; 77, July; 82, Sept.; 89, Oct.; 67, Nov.
W9WNV Sues ARRL	81, May

IARU NEWS

Amateur Radio Booklet	91, Oct.
Australian Licensing Notes	74, Mar.
Austrian & Chilean Reciprocity and Regulations	77, Jan.
Callbook Correction	75, Feb.
Canada-Switzerland Reciprocity & Regulations	88, May
Caribbean Emergency Net	80, June
CCIR Seminar in Radio Communications at Geneva	77, Jan.
Changes & Corrections	74, Mar.
EA6ITU	92, Apr.
EI Courtesy Licenses	81, July
Exhibit in Ivory Coast	91, Oct.
Farewell RSCB Bulletin	93, Apr.
Faroe Island Beacon	87, May
Finland Reciprocity & Regulations	75, Feb.
Foreign-Held FP8 License Cancelled	75, Feb.

G B2LO at City of London Festival	92, Apr.
Headquarters Visits	87, May
IARC Convention	71, Aug.
IARC Propagation Research Competition — 1968	75, Feb.
IARU Region II Contest	90, Oct.
IARU Travel (photo W0DX at RSGV)	88, Dec.
Indonesia	90, Oct.
International Meeting will sign VK1EC	92, Apr.
Italian Earthquake Emergency	71, Aug.
Italian Frequency Assignments	75, Feb.
Italy Issues Courtesy Operator Licenses	79, Jan.
KG6I will Become KA1 — Regulations	81, July
Luxembourg Reciprocal Notes and Regulations	77, Jan.
Mauritius Issues Amateur Licenses	85, Nov.
Mexico Amateur Radio Mobile (Group) (photo)	81, July
Mexican Convention	93, Apr.
Monaco Membership Proposed	86, May
Monaco Becomes Member	85, Nov.
New Korean Calls and Regulations	85, Nov.
New Membership Applications	86, May
New Third-Party Traffic Authorization and Regulations	81, July
Nigeria Licensing	74, Mar.
Notes	91, Oct.
NRRL Changes Address	81, July
Partners of the Alliance Radio Network	79, Jan.
Photographs	
Africa	77, 78, Jan.
Indonesia	79, Jan.
WIA, DARC, RSB, RCA	92, 93, Apr.
JARA, LMRE	71, Aug.
WIA, RCV	90, Oct.
WF0ITU	85, Nov.
Goldwater in South Africa	75, Mar.
Miscellaneous	75, Mar.
PK Remains Silent	81, July
QSL Bureau Changes	92, Apr.
QSL Bureau of the World	81, July
QSL Bureaus of The World	88, Dec.
Reciprocal Notes	88, Dec.
Reciprocal Operation and Regulations	85, Nov.
Region III Congress	71, Aug.
Rhodesians on 70 Mc.	75, Feb.
RSGB Officer Changes	74, Mar.
Six Meters from Poland	75, Feb.
Special Czechoslovakian Prefix	88, Dec.
Space Conference Coming	71, Aug.
Spanish Convention	93, Apr.
Temporary Prefix	86, May
Third-party Authorization Withdrawn and Regulations	71, Aug.
Trinidad Reciprocal (photo)	87, May
U.S.—Guyana Reciprocity and Regulations	82, July
Venezuelan Amateurs Provide Emergency Communications	74, Feb.
VOA Broadcast to Brazil	77, Jan.
Welcome to London Program	74, Mar.
Western Samoa Seeks Union Membership	88, Dec.
Zambia Issues Courtesy Licenses	75, Feb.

KEYING, BREAK-IN AND CONTROL CIRCUITS

Break-In C.W. with SSB Equipment (Tech. Corres.)	48, Mar.
Code Reproducer (Tech. Corres.)	44, June
Filter (C.W.), The Chirp Magnifier (Valentine)	16, Dec.
Filter/Monitor for the C.W. Man (Hatch)	47, Feb.
2S-3, Further Improvements in the (Shafer)	38, Dec.
HD-10 with an External Paddle (H&K)	51, Sept.
Lambatic Keying For the "Micro-To Keyer" (H&K)	38, June
Key Adjustment, Semi-Automatic (Murphy)	60, Feb.
Keyer, An Integrated Circuit Electronic (Halverson & Stordahl)	22, Apr.
Keyer, Improved Performance for the HD-10 (H&K)	56, Feb.
Keyer with Dot and Dash Memories, ICKEY — An Integrated-Circuit Electronic (Van Cleef)	28, Nov.
Keying Tip (H&K)	51, Nov.
Micro-TO (Tech. Corres.)	51, Jan.
Micro-TO Again (Tech. Corres.)	40, July
Micro-TO Keyer Revisited (Tech. Corres.)	48, Mar.
Monitor, An R. F. Actuated C.W. (McCoy)	38, Nov.
Paddles, Magnetic Keyer (Nurkiewicz)	35, Apr.
Preventing the HA-1 Keyer from Generating Spurious Dots (H&K)	45, Oct.
Semiautomatic C.W. Break-In With the Swan 350	46, Dec.
Semi-Automatic Key Adjustment (Tech. Corres.)	44, June
Sixer and Twoer, Some Useful Modifications for (McCoy)	28, May

Teletype at Your Fingertips, Perfect Modifying the Keyboard Morse Machine for RTTY (Horowitz)	32, Oct.
Touch To Talk (G&G)	20, Oct.
Transceive With Instantaneous Voice Interruption, IVI (Hildreth)	40, Oct.
Transceiver Monitor Using Transistors, A (G&G)	41, Aug.
VOX, Experimental All-Electronic . . . System for SSB (Hildreth)	36, Mar.

MEASUREMENTS AND TEST EQUIPMENT

Beware the Scrap Box (Burke)	44, Sept.
Binary-Decimal Counter Readout (Tech. Corres.)	54, Apr.
"C" and "L" Measuring Gimmick (G&G)	28, Feb.
Calibrated Ham-Band (Tech. Corres.)	47, Aug.
Calibrator, Simple Crystal . . . Using An Integrated Circuit (H&K)	43, Jan.
Counter, Digital With Teletype Print-Out (Simmons)	22, Aug.
Decibels, On . . . and Noise (Smith)	34, Jan.
Dipper, Field Effect Transistor (McCoy)	24, Feb.
Filter (C.W.), The Chirp Magnifier (Valentine)	16, Dec.
FMT, Try The (Wood)	54, July
Frequency Divider for 100-kHz. Calibrators (A Divide-by-Four (G&G))	2, Nov.
Frequency Dividers, Integrated-Circuits (Staples)	22, July
Frequency Measurement, Increasing the Accuracy of (Golding)	11, Oct.
Frequency Standard, the Mainline PS-1 Secondary (Hoff)	34, Nov.
F. S. Meter, Transistor . . . with Drift Free Amplifier (Czerwinski)	20, Jan.
Generator, Two-tone . . . with Scope-Sync Output (Noble)	43, Mar.
Heathkit SB-620 "Scanalyzer" (Recent Equipment)	50, Apr.
Impedance Matching with the G-Line Matcher (V.H.F.)	23, Sept.
K9CPZ IC Frequency Counter (Tech. Corres.)	17, Nov.
Markers, 25-KC (Tech. Corres.)	55, Feb.
Monitor, An Automatic Band Scanner/Transmitter (Latter)	19, June
Oscillator, Two-Terminal (Tech. Corres.)	50, Jan.
R. F. Probe, Diode Protection for the Heath (H&K)	53, May
Tester for Crystals and Transistors, A (Wilson)	26, Sept.
Zero-Beating Method (Geiser)	17, Feb.

MISCELLANEOUS GENERAL

Address Delivered by Mr. Mohamed Mili, Secretary (General of the ITU, on 23 Sept. 1967 at the Opening of the Annual Congress of the I.A.R.C.)	60, Jan.
Advisory Committees — A Pilot Project	70, Nov.
Amateur of the Year (St. Louis Club) 1968 Plaque	89, Oct.
Amateur Radio and Distress Information	61, Jan.
Amateur Radio — Present and Future (Denniston)	76, May
Amateur Radio Week in Pennsylvania	64, Nov.
Aeronautical ATV At The Pasadena Rose Parade (O'Hare)	106, May
ARRL Awards Honor Roll for 1967 — The Hiram Percy Maxim Gold Medal	79, Mar.
Board Meeting, A Pictorial Report of the 1968 ARRL	74, July
Canadian National Exhibition	66, Aug.
Cincinnati Amateur Radio Week (photo)	65, Nov.
Cleveland Mayor Carl Stokes	72, July
Congress Praises Mars	81, Sept.
Contest Logging While Mobile	47, Dec.
Danbury Open House	79, July
Danger Electrical Shock (Zemek)	54, Sept.
Demik, Illinois Amateur of the Year (photo)	83, Dec.
Digital Clock, GMT for 12-hour (H&K)	38, June
D Expedition Logistics (Cushing)	62, Feb.
February Cover Plaque	73, July
Poster Gets N.M. PICON Award (photo)	83, Dec.
Getting the World in Tune (Meyer)	62, Aug.
GMT Conversion (H&K)	50, Sept.
GMT Clock Face (H&K)	50, Mar.
Hanging QSL Cards (H&K)	45, Oct.
"Harry Engwicht, W6HC and Ronnie Martin, W6ZF Honored by Pacific Division" (photo)	65, Aug.
Hams Help on Election Returns (Beard)	58, Sept.
History Repeats Itself (Chapin)	62, Mar.
How Much Better is Best? (Nizhman)	101, Jan.
Index of QST Items on Commercial Gear, An (Wagman & Wagman)	56, Apr.
The Miller Suit: A Special Report	83, Oct.
National Convention, 1968 ARRL	72, May
New Books	16, Mar.; 83, Apr.; 84, May; 81, 88, Aug.; 21, Oct.; 49, 142, Nov.; 42, 59, Dec.
New Jersey Ham License Plates	67, Aug.

New Jersey License Plates	67, Nov.
Novice and Technician Classes, GCARA (Michel)	34, May
Portable and Mobile Regulations	31, Apr.
QCEM & Community Radio Watch (Weaver)	76, Sept.
QRP Versus QRO (Brine)	54, May
Radio Society of Ontario's Station, VE3RSO	74, June
Richard Gregorio, K1RAW, New England Ham of the Year (photo)	66, Aug.
Rules for Life Membership	76, July
Scouts on the Air, 11th Jamboree-on-the-air	89, Oct.
Snowmobile (Easton)	46, June
Staff Notes	86, Oct.
Those Higher Class License Examinations — Basic Electrical and Electronic Principles	64, Mar.
Those Higher Class License Examinations 2 Series	86, Apr.
TVI in Eskimo Land (Dexter)	108, May
War on Hamopathy, The (Puller)	54, Mar.
WA4QSL Bureau Changes	68, July
Winner — Cover Plaque Award for March	89, Oct.
Why the Radio Club? (McKee)	78, Sept.

MISCELLANEOUS TECHNICAL

Aircraft-Reflected Communication (Tech. Corres.)	51, Jan.
Amplifier Kit, 1G (New Apparatus)	47, July
Antenna Type vs. Distance (Tech. Corres.)	43, Oct.
Aluminum Finishes (H&K)	44, Apr.
APT Weather Satellite Information (Strays)	93, Feb.; 47, June; 17, Sept.; 104, Nov.
ATV Research Focus Deflection Coil Kit (New Apparatus)	21, Apr.
Audio-Measurements and Test Equipment (H&K)	48, Aug.
Auroral Notes (Lund)	36, May
Baluns, Kirk Broad Band (New Apparatus)	36, Apr.
Beware the Scrap Box (Burke)	44, Sept.
Bottom Plate Source (H&K)	45, Oct.
Breadboard, A Simple Experimental Circuit — "The Clipboard" (Thorpe)	28, July
Cabinet, Equipment (H&K)	57, Feb.
Cable for Remote Pickup (H&K)	45, Oct.
Cleaning Crackle Finishes (H&K)	14, Apr.
Cleaning Hint (H&K)	39, June
Clip Lead Improvement (H&K)	51, Sept.
Component Source (H&K)	43, Jan.
Counter, Digital with Teletype Print-Out (Simmons)	22, Aug.
Decal Sealers (H&K)	51, Nov.
Decibels, On and Noise (Smith)	34, Jan.
Dental Instruments for the Amateur (H&K)	53, May
Detection, Synchronous Wead Signal with Real Time Averaging (Adey & Kado)	31, Dec.
Digital Logic Devices Pos.	17, July
Drilling Hint (H&K)	51, Sept.
Eliminating Frequency Modulation in the Linear Master Oscillator of the SB-101 (H&K)	44, Oct.
Equipment Labeling (H&K)	42, July
Etch-Resistant Circles	47, Dec.
Etch-Resistant Material (H&K)	44, Oct.
Filters, Combine V.H.F. Bandpass (Fisher)	44, Dec.
Finishes, Cleaning Crackle (H&K)	43, July
Fire Alarm, Clothespin (H&K)	42, Jan.
Frequency Dividers, Integrated-Circuit (Staples)	22, July
Grounded Grid Amplifiers, A Tuned Input Circuit for Ground Rod Removal (H&K)	34, May
HD-10 with an External Paddle (H&K)	43, July
Higher-Class License Examinations — Part IV	51, Sept.
HW-12 Carrier Null Adjustment (H&K)	64, June
Ice Permits Forming of Difficult Beads in Copper Tubing (H&K)	51, Sept.
Impedance Matching with The C-Line Matcher (V.H.F.)	44, Oct.
83-1SP, Improved Methods for Wiring (PL-259) Plugs (H&K)	23, Sept.
Improved Spotting for the SB-400 (H&K)	44, Apr.
Inductance And Q of Modified Surplus Toroidal Inductors (Wetherhold)	51, Nov.
Inductors, Toroidal-Wound (DeMaw)	33, Sept.
Instability in the Drake 2B (H&K)	11, Jan.
Integrated Circuits, A Look at (DeMaw)	51, Nov.
Integrated Circuit Heat Sink (H&K)	11, Mar.
Interference and the V.H.F. Mountain-Topper (Botts)	34, June
Jewelers' Loupe Helps to Relieve Eye Strain (H&K)	53, May
K9CPZ IC Frequency Counter (Tech. Corres.)	47, Nov.
Key, Vibroplex (H&K)	43, July
Kit Parts, Separating (H&K)	51, Mar.
License Examinations, Those Higher Class — Part III	62, May
Linear-Amplifier Design, Some Ground Rules for Sweep-Tube (DeMaw)	30, July

Loop, Army in Ham Communications (McCoy)	17, Mar.
Los Angeles Handicap (Gilmer)	31, May
Lowering the Pitch of the C.W. Monitor in the SB-101 (H&K)	38, June
Matching, An Impedance Method L Network and Balun (Leo)	Dec.
40-Meter Prefabricated Portable Station	42, Sept.
Meter Switching, Simplified (H&K)	43, July
Meters, New Faces for Old (H&K)	45, Apr.
Microphone, Chest (H&K)	43, July
Modification, Swan 350 (H&K)	39, June
M. U. F. Values (Tech. Corres.)	51, May
Noise, Eliminating Background in the Ham Shack (H&K)	43, Jan.
Noise Story — Happy Ending (Tech. Corres.)	43, Oct.
Noise, Using Sun (Lund)	42, Apr.
Or is it a (FO)? (Tech. Corres.)	55, Feb.
Phone Rig for 1.8 Mc. A Transistor (DeMaw)	11, Sept.
Pipe Sizes (H&K)	51, Sept.
Propagation Predictions Tidewater Handicap (Gilmer)	29, Oct.
QSL Service, Instant DX (Dage)	51, July
Receiver, Picture Story Showing Modular Construction of a Ham (Rush)	42, Feb.
R. F. Attenuators, Building Low-Cost	20, May
R. F. Inductors, Relative Merit of Toroidal and Conventional (Watson)	26, June
R. F. Probe, Diode Protection for the Heath (H&K)	53, May
Safety Precaution for the SCR Motor-Speed Control (H&K)	51, Mar.
SB-101 Improvement (H&K)	50, Nov.
SB-100 Improvements (H&K)	53, May
Slow-Scan With Regular Vidicons (Tech. Corres.)	48, Dec.
Solar Predictions (Tech. Corres.)	52, Sept.
Soldering Gun Holder (H&K)	50, Sept.
Soldering, How to do a Good Job (McCoy)	28, June
Soldering Pencil Tips, Repr. (H&K)	43, July
Sunspot Cycle, Interpreting 50-Mc. M.U.F. Tendencies in the Current (Cooper)	19, Mar.
Switch, Coaxial (H&K)	57, Feb.
Telephone Interference, Stopping (Hoff)	46, Mar.
Those Higher-Class License Examinations	62, July; 72, Aug.
Triode, High-Gain of Forty Years Ago (Tech. Corres.)	49, Mar.
TVI-Maker (Tech. Corres.)	32, Jan.
TVI, Novice or General Can be Tough! (McCoy)	29, Mar.
T4X Hint (H&K)	42, July
VHF Signals, Detecting Too Weak to be Heard (Parrish)	44, Jan.
Weather Satellite Picture Station Evolution of An Amateur (McKnight)	28, Mar.
Where Did the Signal Go? (McCoy)	14, July

MOBILE

Brackets, Transceiver Mounting (H&K)	43, Jan.
Converter for 1.8 Mc. Solid State Mobile Fixed (DeMaw)	16, Oct.
Contest Logging While Mobile	47, Dec.
Mobile Multi-band Antenna System (The "Mobiloon") (Taylor)	18, Nov.
Noise, Kill That Mobile (Carr)	38, July
Phone Rig for 1.8 Mc., A Transistor (DeMaw)	11, Sept.
Power Inverter, A 500-Watt (Dunaja)	46, May
Remote Control for the NCX-5 (Waller)	44, May
Resonators, Storing (H&K)	56, Feb.
Returning a Car Used for Mobile Operation to its Original Condition (Halverson)	44, Oct.
Transceivers, Dial Modifications for Heath Monoband (Sears)	36, June
Transceiver for 144 Mc., "The Connecticut Bond Box" (DeMaw)	11, Aug.
Transistor Transmitter for Two Meters (The 2T/2M) (Schlesinger)	31, Sept.
Suppressors, Ignition (Tech. Corres.)	51, Jan.

OPERATING PRACTICES

Diversification in Amateur Radio (Babeock)	97, Mar.
I'm Not in 'The Contest But (Nose)	56, Mar.
Operating News (Hart)	
ARRL Working Frequencies	94, Aug.
BPL Medallions	99, July
Gentlemen's Agreements	94, Feb.
New WIAW Frequencies	101, Nov.
Poll Survey	110, Apr.; 106, Sept.
Sending Code Spaces	95, Mar.
SS Exchanges	102, May

The Amateur's Code (Segal)	9, July
To Call or Not To Call (Sheldon)	101, July

POWER SUPPLY

Batteries, More on Choosing (Tech. Corres.)	54, Feb.
Power Inverter, A 500-Watt (Dunaja)	46, May
Power Supply, Heathkit IP-27 Low-Voltage	41, May
Power Supply, Modern Design (Allhouse)	20, Feb.
Power Supply, Regulated (Tech. Corres.)	41, July

PROJECT OSCAR

Oscar Signals, Antipodal Reception (Soifer)	32, Nov.
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PUBLIC SERVICE

Amateur Radio and Distress Information (Dean)	61, Jan.
Amateur Radio Public Service Corps (Hart)	
Order in Nets	68, Jan.
Who's the Boss?	66, Feb.
Which Mode?	58, Mar.
Which Approach?	76, Apr.
Refusing Messages	68, May
Recognition	60, June
We Learned Some Things	56, July
Phase Out the BPL?	57, Aug.
Charles City Comments	72, Sept.
Signal Quality of Traffic Stations	77, Oct.
Count Your Traffic Right	78, Nov.
The Case For Belonging	Dec.
How to Succeed in Politics Without Getting Involved, (Bolvin)	113, Oct.
Simulated Emergency Test	
Announcement	66, Jan.
Results (Hill)	50, Aug.

RECEIVERS

Converter for 1.8 Mc. Solid-State Mobile Fixed (DeMaw)	16, Oct.
F.M. Converting Wide-Band Equipment for 420-Mc. Service (Poland)	31, Aug.
40-Meter Prefabricated Portable Station	42, Sept.
Picture Story Showing Modular Construction of a Ham Receiver (Rush)	42, Feb.
Receiver, a Direct Conversion (Hayward & Bingham)	15, Nov.
Receiver, for 600 to 20,000 Meters (Fishback)	18, Sept.
Receiver, The "GCR-2" (DeMaw)	11, June
Receiver, SSS 80-40 "A Simple Solid-State . . . for 80-40" (DeMaw)	11, Feb.
Receiver, the Three Transistor (Lange)	25, Mar.
Receiver, The W5OMX Communications (Curtis)	22, Jan.
Receiver, Transistor for 20- and 75-Meter SSB (The SSB, Mark 1) (Lamontagne)	35, Aug.

RECEIVING

Antenna Type vs. Distance (Tech. Corres.)	43, Oct.
B.F.O., A Stable Outboard (G&G)	34, Mar.
Clock, HQ-180C (H&K)	57, Feb.
Converter for 1.8 Mc. Solid State Mobile Fixed (DeMaw)	16, Oct.
Converter for V.H.F. F.M., A (G&G)	18, Dec.
C.W. with A VHF Receiver, Another Method of Copying	51, Mar.
. . . Lacking a BFO (H&K)	
Detection, Synchronous Weak Signal with Real Time Averaging (Ad. y& Kado)	31, Dec.
Eliminating Frequency Modulation in the Linear Master Oscillator of the S3-101 (H&K)	44, Oct.
Filter, A Solid-State Audio (Anciaux)	35, Dec.
Filter (C.W.), The (Shipr Magnifier (Valentine)	16, Dec.
Frequency Divider for 100-KHz. Calibrators (A Divide-by-Four) (Conklin)	26, Nov.
I.F. Derived Hang A.G.C. (Tech. Corres.)	52, Sept.
Instability in the Drake 2B (H&K)	51, Nov.
Monitor, An Automatic Band Scanner, Transmitter (Latter)	19, June
Monitor, An R.F. Actuate C.W. (McCoy)	39, Nov.
Noise Story Happy Ending (Tech. Corres.)	43, Oct.
Noise, Using Sun (Lund)	42, Apr.
Preamplifier, A 2-Meter FET (G&G)	37, Jan.
Preamplifier, a 10-Meter FET (G&G)	38, Jan.
Preamplifier for 1296 Mc., A two-Stage Transistor (Vilardi)	40, Dec.
Preselector, An FET for 20, 15, and 10 (McCoy)	42, Aug.
Product Detector, A Solid State For the HRO-60	20, Dec.
Selectable-Bandwidth Filter (Tech. Corres.)	47, Aug.

Transceiving ('onverter for "160", A (DeMaw)	11, Nov.
V.F.O., A General-Purpose (G&G)	40, Sept.
Where Did The Signal Go? (McCoy)	14, July

RECENT EQUIPMENT

Drake VHF Converters and Accessories	51, Feb.
Drake W-4 Wattmeter	15, Aug.
DX-150, The Realistic	39, Mar.
FSL-4, The Monarch	55, Jan.
Hallcrafters SR-100 Transceiver and HA-20 Adapter (RE)	49, Oct.
Hammarlund HQ-215 Receiver	50, Dec.
Heathkit SB-620 "Scanalyzer" (RE)	50, Apr.
Hunter Bandit 2000C (RE)	48, Sept.
Power Supply, Heathkit IP-27 Low Voltage	41, May
Transceiver, Heathkit HW-16 C.W. (RE)	53, Jan.
Yaesu FT-DX-100 Transceiver, The	40, June
Yaesu Musen PL-2000 Linear Amplifier (RE)	48, Nov.

REGULATIONS

Advanced and Extra for Shut-Ins	84, Apr.
Anti-Noise Bill Passed in House	78, May
ARRL Asks FCC to Keep 6 Meters Open	64, Nov.
ARRL Supports "Retread"	67, Nov.
ARRL Supports Shut-In Docket	75, June
A-2 Still OK for Novices on 2	74, Jan.
Austrian and Chilean Reciprocity	77, Jan.
Boston Exams only Thursday & Friday	70, July
Canada Revises 160 Meters	68, July
Canada-Switzerland	86, May
Canadian Calls Can Be Held Open	84, Sept.
Canadian Fee Quadrupled	71, June
Canadian RTTY Ruling	70, Mar.
Canadian Traffic Warning	71, Mar.
Club Gear Under Private Call	71, June
Expansion of 160 Meters	71, June
Easier I.D. Adopted	73, Jan.
Extra Privilege Clarified	74, June
FCC Denies Stay on 50.1 MHz.	86, Oct.
FCC Policy on Modulation	68, Nov.
Field Day, New Rules for the 1968 ARRL	58, May
Finland Reciprocity	74, Mar.
Gigahertz Band Change Okay	67, Nov.
Interference to Other Stations — An FCC Letter	88, Oct.
KG6I will Become KA1	81, July
Luxembourg Reciprocal Notes	77, Jan.
160-Meter Changes Imminent	85, May
New Break for G. I. Novices	74, Jan.
New Korean Calls	85, Nov.
New Third-Party Traffic Authorizations	81, July
Novice Eligibility Proposal	83, Sept.
Operation Retread Filing	80, Dec.
Portable and Mobile Regulations	81, Apr.
Reciprocal Operating	85, Nov.
Shut-Ins Win Mail Exams	69, July
Six Meter Footnote	79, Dec.
Slow Scan TV in the U.S.	80, Sept.
Technicians Eligible for Novice	68, July
Third-party Authorization Withdrawn	71, Aug.
U.S.-Guyana Reciprocity	82, July
Visitors May Use Vox	68, July

RTTY

Attache Case RTTY (Krupp)	29, Feb.
Canadian RTTY Ruling	70, Mar.
Filter, RTTY Bandpass . . . for the 2125-2975 e.p.s. (Wetherhold)	19, Apr.
RTTY Autostart (Tech. Corres.)	48, Dec.
RTTY, What Is (Hall)	11, Dec.
Teletype at your Fingertips, Perfect Modifying the Keyboard Morse Machine for RTTY (Horowitz)	32, Oct.
Terminal Unit, An RTTY . . . of Wide Dynamic Range (Buttschardt and Olson)	22, May

SEMICONDUCTORS

Amplifier, Unusual R.F. . . . Circuit (Carlson)	46, Feb.
Beware the Scrap Box (Burke)	44, Sept.
Converter For 1.8 Mc. Solid-State Mobile Fixed (DeMaw)	16, Oct.
Converter for V.H.F. F.M. A (G&G)	18, Dec.
Dipper, Field Effect Transistor (McCoy)	24, Feb.
Filter, A Solid-State Audio (Anciaux)	35, Dec.

F.S. Meter, Transistor . . . with Drift Free Amplifier (Czerwinski)	20, Jan.
Integrated Circuits, A Look At (DeMaw)	11, Mar.
JFET QRP Rig for 40 Meters, A (Doolittle)	24, June
Keyer, Integrated Circuit Electronic (Halverson & Stordahl)	22, Apr.
Milligallon Transmitter for 15 (G&G)	40, Apr.
Phone Rig for 1.8 Mc., A Transistor (DeMaw)	11, Sept.
Power Inverter, A 500-Watt (Dunaj)	46, May
Preamplifier, A 2-Meter FET (G&G)	37, Jan.
Preamplifier, A 10-Meter FET (G&G)	38, Jan.
Receiver Direct Conversion (Hayward & Bingham)	15, Nov.
Preamplifier for 1296 Mc., A Two-Stage Transistor (Vilardi)	40, Dec.
Receiver, A Three Transistor (Lange)	24 Mar.
Receiver For 600 to 20,000 Meters (Fishback)	18, Sept.
Receiver, SSS 80-40 "A Simple Solid-State for 80-40" (DeMaw)	11, Feb.
Receiver, The "GRC-2" (DeMaw)	11, June
RTTY, Attache Case (Krupp)	29, Feb.
SCR Noise (Tech. Corres.)	48, Mar.
Tester for Crystals and Transistors, A (Wilson)	26, Sept.
Transceiver for 7-Mc. C.W. (Rasor)	11, Apr.
Transceiver for 144 Mc. "The Connecticut Box" (DeMaw)	11, Aug.
Transmitters, Guidelines for Transistors (Nelson)	37, Apr.
Transistor Transmitter for Two Meters (The 2T/2M) (Schlesinger)	31, Sept.
V.F.O., A General-Purpose (G&G)	40, Sept.
VO System for SSB, An Experimental All-Electronic (Hildreth)	36, Mar.

SINGLE SIDEBAND

H.F.O., A Stable Outboard	34, Mar.
(Generator, Two-toned . . . with Scope-Sync Output (Noble)	48, Mar.
Grounded Grid Amplifiers, A Tuned Input Circuit for	34, May
Linear-Amplifier Design, Some Ground Rules for Sweep-Tube (DeMaw)	30, July
Monoband Transceivers, Dial Modifications for Heath	36, June
(Sears)	20, May
R.F. Attenuator, Building Low-Cost	35, Aug.
Receiver, Transistor for 20- and 75-Meter SSB (The SSB, Mark 1) (Lamontagne)	41, Aug.
Transceiver Monitor Using Transistors, A (G&G)	11, Nov.
Transceiving Converter for "160", A (DeMaw)	31, Sept.
Transistor Transmitter for two Meters (the 2T/2M) (Schlesinger)	30, Oct.
Transmitting Converters for 50 and 144 Mc. (Moore)	36, Mar.
VOX System for SSB, An Experimental All-Electronic (Hildreth)	

TRANSMITTERS

F.M., Converting Wide-Band Equipment for 420-Mc. Service (Poland)	31, Aug.
40-Meter Prefabricated Portable Station	42, Sept.
Milligallon Transmitter for 15 (Hayward)	40, Apr.
Phone Rig for 1.8 Mc., A Transistor (DeMaw)	11, Sept.
Transceiver for 7-Mc. C.W. (Rasor)	11, Apr.
Transceiving Converter for "160", A (DeMaw)	11, Nov.
Transistor Transmitter for Two Meters (The 2T/2M) (Schlesinger)	31, Sept.
Transmitter for the Beginner, A Simple (400 & 80 Meters) (Mix)	22, Oct.
Transmitting Converters for 50 and 144 Mc. (Moore)	30, Oct.
Vacation Special Notes on the Latter	33, Sept.

TRANSMITTING

Adapting the SB-101 for use with the SB-640 Without Losing the Crystal-Controlled Operation of the Transceiver When the SB-101 is used Independently (H&K)	45, Oct.
Amplifier, Cavity . . . for 1296 Mc. (Laskmann)	17, Jan.
Amplifier, Unusual R.F. . . . Circuit (Carlson)	46, Feb.
Antenna Relays, Keyed (Tech. Corres.)	51, Jan.
H.F.O., A Stable Outboard (G&G)	34, Mar.
Blower, The Noisy . . . Problem (Tech. Corres.)	50, Jan.
Filter for TV Harmonics, Absorptive (Weinreich)	20, Nov.
3S-3, Further Improvements in (Shafer)	38, Dec.
Grounded Grid Amplifiers, A Tuned Input Circuit for	34, May
JFET QRP Rig for 40 Meters, A (Doolittle)	24, June

Linear-Amplifier Design, Some Ground Rules for Sweep Tube (DeMaw)	30, July
Linear-Amplifier Tricks (Tech. Corres.)	48, Dec.
Matching, An Impedance Method (L Network and Balun) (Leo)	24, Dec.
Matching the Big Bottles in the Final (Tech. Corres.)	44, June
Meter Switching, Simplified (H&K)	43, July
PI Tanks, "Flat" (Tech. Corres.)	52, Jan.
R.F. Attenuators, Building Low-Cost	20, May
R.F. Inductors, Relative Merit of Toroidal and Conventional (Watson)	26, June
Swan 350 Modifications (H&K)	42, Jan.
Transceiving Converter for "160", A (DeMaw)	11, Nov.
Transistor Transmitters, Guidelines for (Nelson)	37, Apr.
Transmitter, Improving the (H&K)	44, Apr.
TVI, Novice or General . . . Can Be Tough! (McCoy)	29, Mar.
T4X Hint (H&K)	42, July
V.F.O., A General-Purpose (G&G)	40, Sept.
Where Did the Signal Go? (McCoy)	14, July

V.H.F. AND MICROWAVES

APX-6 Cavity Conversion	82, Feb.
Auroral Notes (Lund)	36, May
Cavity Amplifier for 1296 Mc. (Laskmann)	17, Jan.
Converter, for V.H.F. F.M. A (G&G)	18, Dec.
CW with a VHF Receiver, Another Method of Copying Filters, Combine V.H.F. Bandpass (Fisher)	44, Dec.
Filters, Interdigital Bandpass . . . for Amateur V.H.F./U.H.F. Applications (Fisher)	32, Mar.
F.M., Converting Wide-Band Equipment for 240-Mc. Service (Poland)	31, Aug.
Impulse Noise Reduction	89, July
Interference and the V.H.F. Mountain Topper (Botts)	34, June
Noise, Using Sun (Lund)	42, Apr.
Preamplifier, A 2-Meter FET (G&G)	37, Jan.
Preamplifier for 1296 Mc., A Two-Stage Transistor (Vilardi)	40, Dec.
R.F. Attenuators, Building Low-Cost	20, May
Sizer and Twoer, Some Useful Modifications for (McCoy)	28, May
Sun Noise (Tech. Corres.)	45, June
CATVI (Tech. Corres.)	46, Aug.
Transceiver for 144 Mc. "The Connecticut Box" (DeMaw)	11, Aug.
Transistor Transmitter for Two Meters (The 2T/2M) (Schlesinger)	31, Sept.
Transmitters, Guidelines for Transistor (Nelson)	37, Apr.
Transmitting Converters for 50 and 144 Mc. (Moore)	30, Oct.
TR-108, Notes on the Knight Kit (H&K)	51, Mar.
V.H.F. Conference, Second International	92, July
VHF Signal, Detecting . . . Too Weak To be Heard (Parrish)	44, Jan.
V.H.F. Yagis, Some Observations With (Tilton)	31, June
Weather Satellite Picture Station, Evolution of An Amateur	28, Apr.
World Above 50 Mc., The	

January, page 84	
Plain Language E.M.E.	
February, page 80	
30-KMc. Record	
APX-6 Conversion	
A Layman's Look at E.M.E. — Part II	
March, page 80	
E.M.E. for the Layman — Conclusion	
Altering Crystals	
April, page 105	
VK3ATN/KØJLN QSO on 144	
U.H.F. Signal Source	
May, page 91	
More About the Boxes (Smith)	
June, page 84	
1296 Moonbounce	
July, page 89	
Impulse Noise Reduction — Part I	
August, page 80	
Impulse Noise Reduction — Part II	
VK3ATN Moonbounce Antenna (feedback)	
October, page 94	
2304-MHz. Harmonic Generator	
220 MHz. Meteor Scatter First	
50 MHz. Petition Denied	
November, page 86	
Pulsars	
K6MYC/SM7BAE 2-Meter QSO	
Meteors at 432	

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