

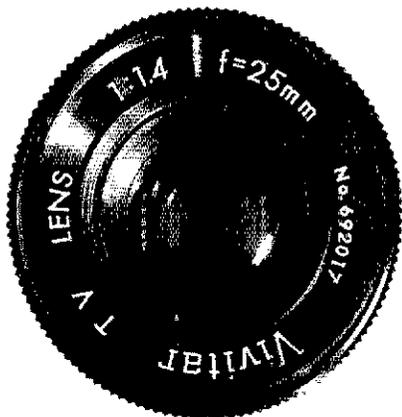
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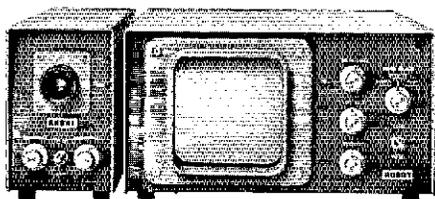
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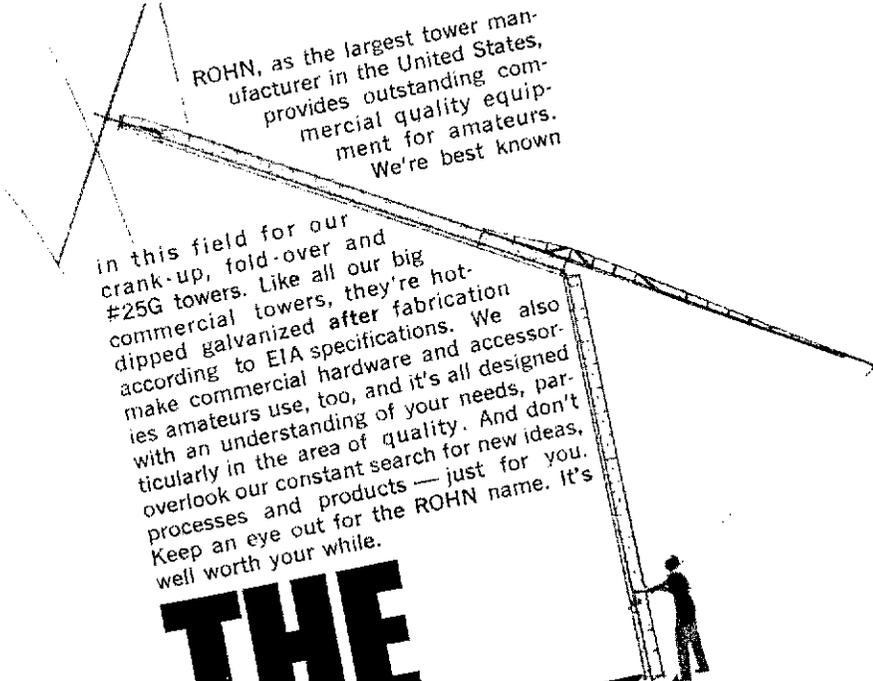
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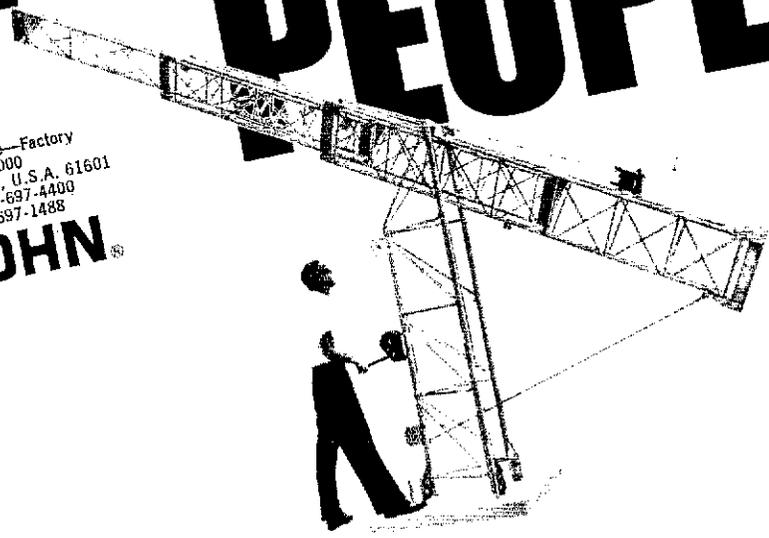
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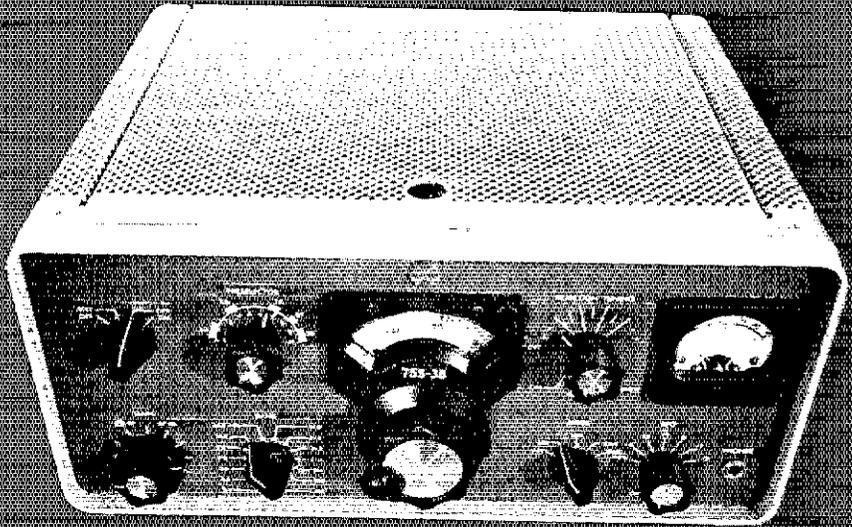
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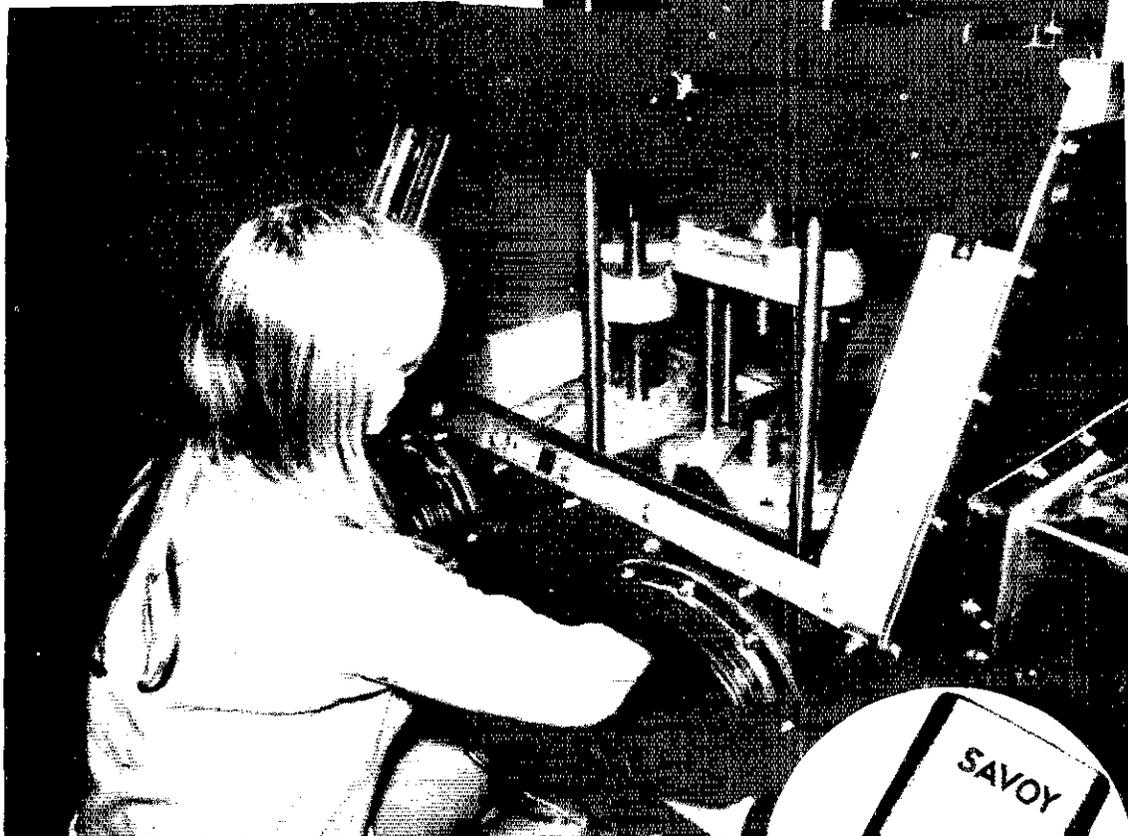
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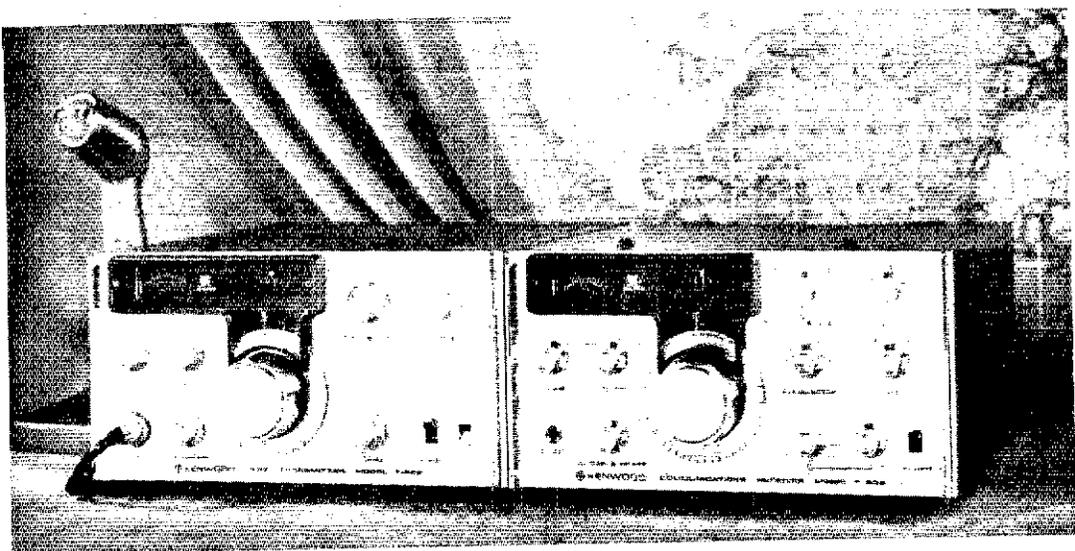
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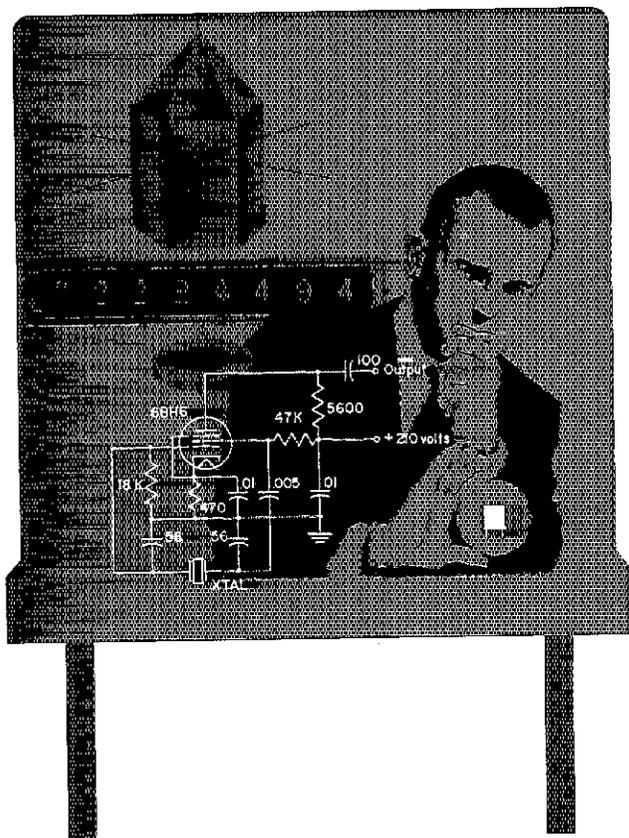
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14940 Hartland St., Van Nuys, Calif. 91405

West Gulf Division

ROY L. ALBRIGHT W5EYB
107 Rosemary, San Antonio, Texas 78209
Vice Director: Leon Vice W5VCE/W5OBC
330 Rusk Ave., Houston, Texas 77002

* Member Executive Committee

League Lines . . .

Last autumn, in the second stage of strong protests to new FCC fees, ARRL and a number of others filed petitions for reconsideration. The Commission's answer has now come: the new fees stand. Without challenging the League's point that amateurs would provide about \$1,000,000 of its budget, FCC labels the fees "generally modest." And that, we guess, is that. (More details next month).

Our Communications Department has come forth with a revised Operating Aid, a card showing details of message form, precedences, handling instructions, prosigns, and most-used Q signals (including special QN net usages). Ask for OpAid 9B.

Whether part of a specific program we don't know, but various FCC field offices are calling in several Technicians a month, apparently at random, for re-examination. It is not a tribute to the stature of the Tech class to learn that about half are turning in their tickets without even trying.

Jobs for Hams. With unemployment and uncertainties currently so high in the electronics profession, perhaps QST can help in a small way -- we'll run in Ham-Ads a section listing openings which hams can best fill. No charge to employers. Please spread the word.

The Society of Broadcast Engineers is contemplating asking FCC to require special endorsements on first-class commercial tickets for use at FM and TV stations, the aim being to upgrade technical capabilities. Shades of incentive licensing! At the same time, industry (National Association of Broadcasters) is plugging for a reduction in these station engineering requirements. Sound familiar?

"Liberty Lobby," a far-right organization, is said to be organizing an emergency communications system through amateur radio. We trust hams will have their customary good sense and not get involved in such an operation any more than one for the Communist Party or SDS or what have you in the political arena. These, plus things like the Ku Klux Klan, are areas in which FCC wants to "protect" us with its interpretations of rules to apply to message-handling privileges. (We think hams are just as capable as FCC's staff of determining what is proper and what is not, as we've demonstrated for 50 years or more).

WØBUO points out that with the tendency to put power lines underground, amateurs planning towers ought to get them up soon -- before they're prohibited! And be sure to get a building permit first, to save a lot of headaches and perhaps even court action.

Those of you with New England in your vacation plans this year: be sure to stop in at 225 Main Street, Newington, CT, for a visit. Make it during office hours if possible, so as to see the place in full operation. And bring your original ticket if you want to do some WIAW operating (subject to bulletin and code practice schedule priorities).

Canadian hams will have a new sharing arrangement for 1800-2000 kHz effective May 1 (see page 76, April QST) but details are not available at press time. WIAW, among others, will carry the news when released.

At press time FCC has issued a Notice of Inquiry seeking to determine what improvements (including receiver design) can be made to achieve interference-free TV reception. Details next month. Comment date is July 1st. ARRL will almost certainly become involved.

Quote of the Month, from the March "Wisconsin Radio Amateur" -- If you don't support ARRL, what do you support?

The Rec/Counter

BY KENNETH MACLEISH,* W7TX, HENRY O. PATTISON,** W7EFV,
AND ROY C. HEJHALL,*** K7QWR

WITH THE great proliferation of frequency counters, both in kit form and commercial types, it has become relatively easy to get an exact digital readout of a transmitter frequency. However, the questions often asked are, "How can I get my counter to indicate the frequency of incoming signals? How can I get my receiver to drive my counter?"

The answer to both questions is the little Rec/Counter shown in Fig. 1. Using three ICs assembled on a 2 1/4 x 4 1/2-inch printed circuit board, this device will place your counter in lock step with your receiver. As you turn the dial, the counter digits will flash the frequency. Those who may be interested in the theory involved, or some further applications of the Rec/Counter principle, are referred to the previous article by Macleish.¹ Here we will not concern ourselves with theory but rather with a straight how-to-do-it story.

The Rec/Counter shown here has been designed specifically to work with a Collins 75S-3, but the basic principle (with other coil values) would be adaptable to any receiver. The authors hasten to point out that they do not have data available for receivers other than the 75S-3. Those who are interested in applying the Rec/Counter to other receivers will have to calculate suitable values for L1, L2, C5, C6, and C7 to fit the different frequencies involved. The Rec/Counter has been used successfully with Heathkit, General Radio, and Hewlett-Packard counters. It should have sufficient drive to operate almost all commercially-made counters.

Construction

The circuit-board layout is shown full size in Fig. 2 for those who prefer to make their own. A finished epoxy board is also available.²

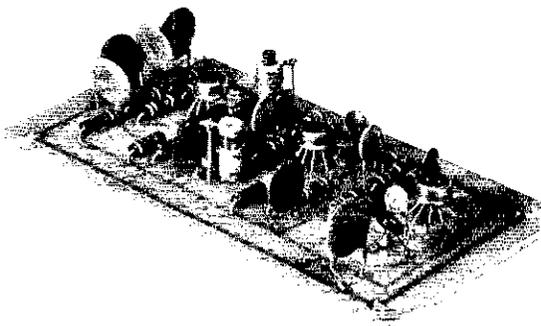
Making up the Rec/Counter is easy. Place all components on the non-foil side of the board. Keep all soldering neat and avoid unwanted solder

bridges. Put in insulated jumpers, as shown in Fig. 2. Next, install the two Motorola MC1496Gs. These excellent balanced mixers greatly suppress unwanted frequencies and are the heart of the circuit shown here.³ The lead under the tab goes into the elongated pad. Be sure to heat-sink all IC leads as you solder them in. Then mount the RCA CA3001, which functions as a broad-band amplifier. Place the lead directly under the tab into the elongated pad on the board here also. Again, be careful to heat-sink all leads as you solder.

Drill two No. 22 holes in the board at the points marked in Fig. 2 and mount the two adjustable coils as indicated. Place an insulated washer on the foil side of the board surface before tightening the coil nuts. Next mount all resistors and capacitors, as shown in Figs. 1 and 2. A dc power supply of 9 to 12 volts should be attached to the Rec/Counter at the points shown.

You are now ready to tap into the 75S-3, or whatever receiver you may have, for the three oscillator voltages that will go into the mixers. Here they are combined to deliver the exact frequency that your receiver is tuned to, which is fed to your counter. Taps should be made to obtain the BFO, HFO and the VFO outputs in your receiver. Follow the diagram shown in Fig. 3

³For a description of these integrated circuits, see Hejhall, "An Integrated-Circuit Balanced Modulator," *Ham Radio*, Sept., 1970. Use of the MC1496G in this application was suggested to us by Walter Stiles, W7NYO.



*740 E. Chula Vista Road, Tucson, AZ 85718.

**Box 737 P, Route 2, Tucson, AZ 85715.

***P.O. Box 3265, Scottsdale, AZ 85257.

¹Macleish, "A Frequency Counter for the Amateur Station," *QST*, October, 1970.

²For \$5 a drilled board is available from: Spectrum Research Labs, 3208 E. President Street, Tucson, AZ 85714.

Now your counter can indicate the exact frequency of your receiver or transceiver.

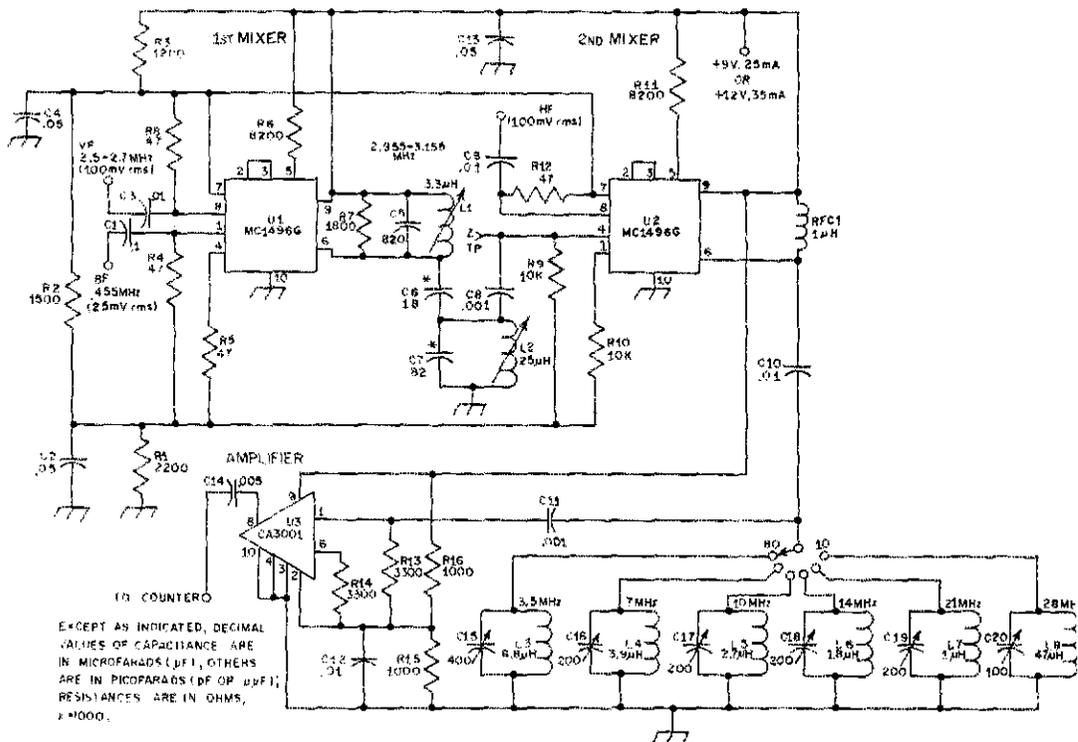


Fig. 1 — Schematic diagram of the counter adaptor. Resistors are 1/2-watt composition and capacitors are disk ceramic, except as noted otherwise. Parts not listed below are labelled for parts placement purposes.
 C5-C7, incl. — Silver mica.
 C15 — 90-400-pF trimmer.
 C16-C19, incl. — 24-200-pF trimmer.
 C20 — 7-100-pF trimmer.
 L1 — Variable inductor (J. W. Miller 4307).

- L2 — Variable inductor (J. W. Miller 4311).
- L3-L8, incl. — Single layer of No. 24 enam. wire on J. W. Miller 4500-2 form, slug removed, number of turns as required for indicated inductance.
- RFC1 — Miniature rf choke (J. W. Miller 70F103A1).
- S1 — Single-pole, five-position, ceramic rotary switch, single wafer.
- U1, U2 — Motorola IC.
- U3 — RCA IC.

for the points to tap in the Collins 75S-3 and for the resistor values to use. When these taps are properly made, the performance of your receiver will not be affected. Use RG-58A/U or RG-174/U cable to carry all three oscillator voltages to the circuit board. A tap for the i-f signal can also be made. However, for purposes of simplification, this tap and its extra switch are not shown here. It is needed only if you want to measure incoming signal frequencies directly, without zero beating. See the article referenced in footnote 1 for more details.

The Rec/Counter can be made to operate on any one or more of the amateur bands, up to 29.7 MHz. Values are shown for the most likely choices, and the builder can choose his own combinations. If more than one frequency range is desired, a band switch must be provided.

To align the Rec/Counter, set the dial of the 75S-3 to 100 and then adjust the cores of L1 and L2 to produce the maximum signal at point Z, as measured with an rf probe and VTVM. It should indicate approximately 0.3 volt when all is in tune.

Be sure that the coil slugs are not bottoming. If this is the case, back out the slug and tune at the open end of the coil form. You should get a definite peak in tuning.

The trimmers of the output circuit may now be tuned with the receiver set to the midpoint of the band being used. Once again, a definite peak should be found. A VTVM attached (using an rf probe) at the output point of the circuit board will show something over 0.4 volt at resonance.

Feed your counter with a *short* length of RG-62/U, being sure to ground the shield of this cable at both the mixer and the counter.

If you have followed these instructions carefully, you should now be able to sit back and see your received frequencies appear upon your counter display tubes. And, what fun it is to watch the numbers flash by as you tune the dial! Above all, though, assuming that your counter is accurately calibrated, you now have a way of knowing exactly where your dial is set.

(Continued on page 32)

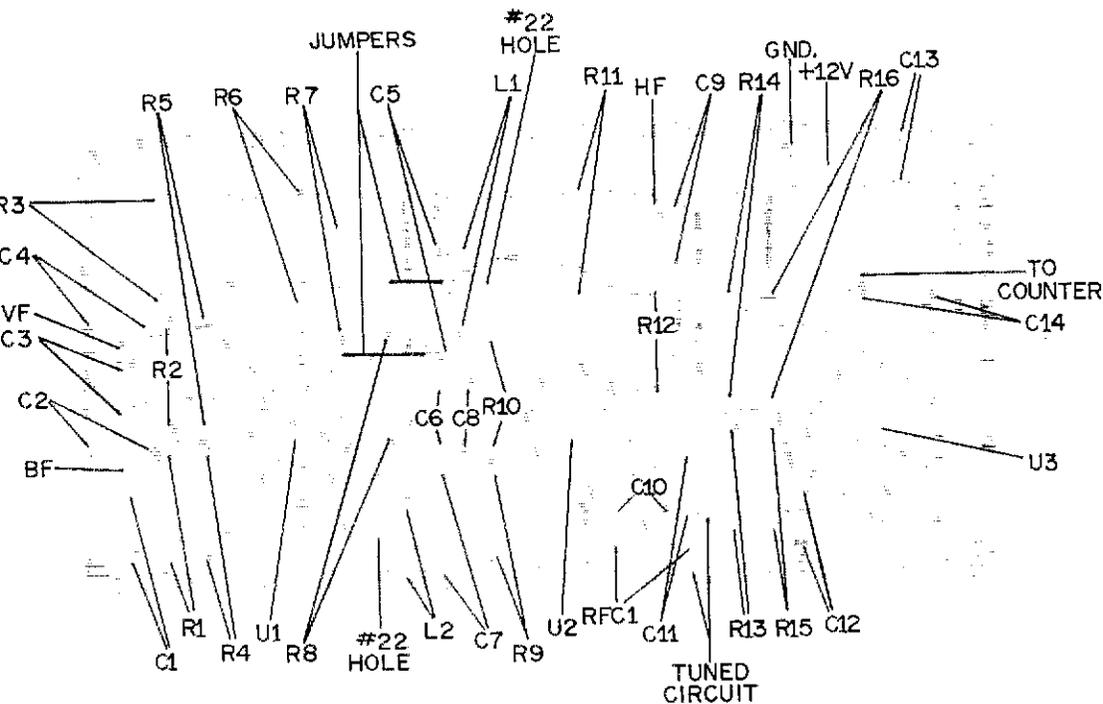


Fig. 2 — Template and parts-layout diagram for the counter adaptor.

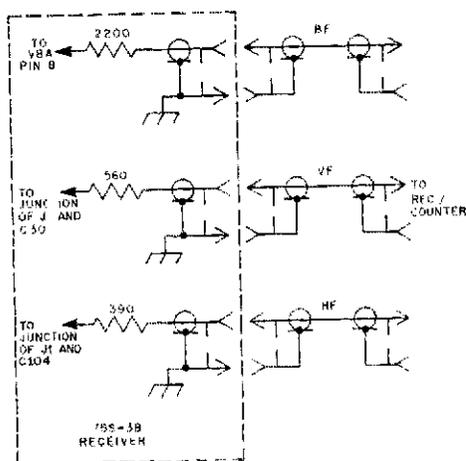
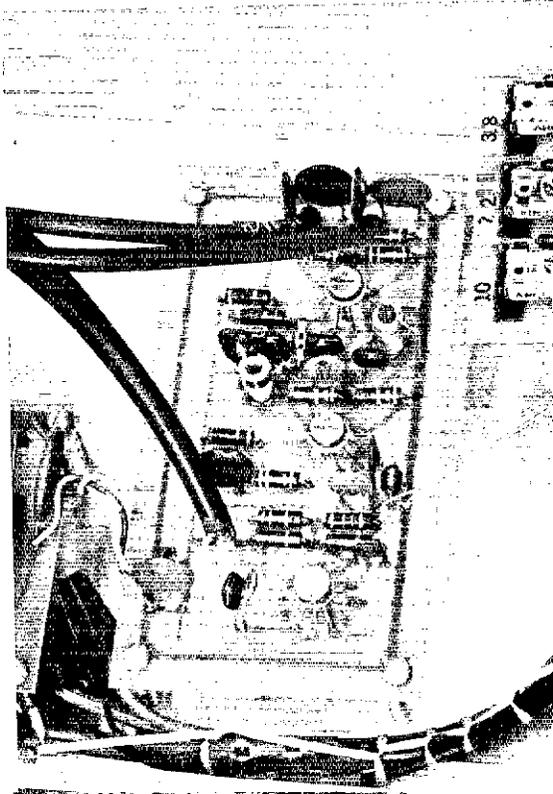
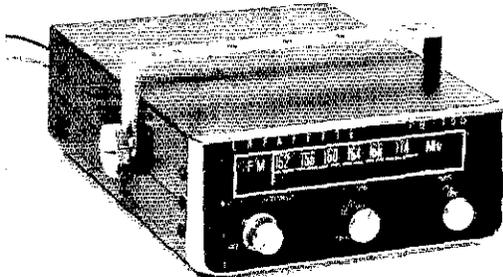
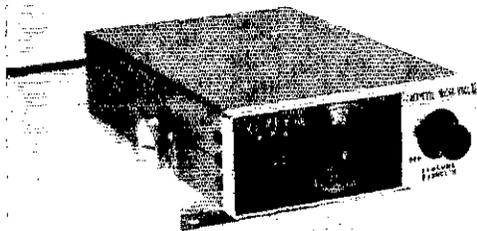


Fig. 3 — Connections to the 75S-3 receiver to sample the BFO, HFO, and VFO for the Rec/Counter.

The Rec/Counter uses two double-balanced mixers (center and upper right) and a video amplifier (lower right). Three coaxial cables carry samples of oscillator voltages from the receiver to the unit. Tuned circuits for the 80-, 40-, and 10-meter bands are contained on the small board at the right.





Here are two imported Lafayette Radio solid-state fm receivers that are suitable for monitoring the fm activity in the 2-meter band. Similar models are available for 6-meter use. Both cover the commercial 2-way radio frequencies, but are easily modified for 2-meter use.

An FM Listener's Potpourri

Some Ways and Means for FM Monitoring

AMATEUR FM operation has moved into high gear throughout the USA and Canada, and fm-ers can be heard around the clock on 10, 6, 2, and 3/4 meters. Unfortunately, the 220-MHz band has not been exploited yet, but this plum is ripe for picking by those who want a QRM-free part of the spectrum in which to operate repeaters.

Perhaps you have wondered what ham fm is all about, but haven't had the proper tools for catching the local activity. Monitoring is really quite simple, and ordinary equipment can be pressed into service for casual eavesdropping in these interesting parts of the bands. A few nights of listening to the simplex (alternating transmissions between two or more stations using one frequency) or repeater activity in your area will offer a refreshing change of pace. Furthermore, you may find a few of your missing low-band buddies on fm, tossing out such strange terms as, "full quieting, timing out, chopping, or whistle on." These expressions are but a part of the vernacular common to fm/repeater work. But, in addition to observing a new style of amateur operation, you will notice the effectiveness of fm transmission and reception. Mobile stations may on occasion be heard communicating with fixed stations or other mobile units over paths in excess of 100 miles and chances are that the signals will

be "full quieting," (very strong signal) or nearly so.¹ This range of mobile communication is seldom possible on 2 meters or higher when the signal is not being "repeated." Power is not the sledge hammer one needs to break the fm DX barrier. Many mobile and fixed stations run less than 5 watts output, and still enjoy good results through the repeaters.² All of this is possible because most repeaters employ receivers with superb sensitivity, utilize gain-type antennas, and are situated atop a hill, mountain, or man-made structure that affords line-of-sight coverage to points many miles from the repeater site. In other words, the repeater does the work and you enjoy the benefits!³

The FM Myth

There has been much unfavorable talk about fm-ers being a group of appliance operators or "motor-mouths," carrying on in a manner not unlike that of CBers. Chatter-boxes . . . perhaps, but what amateur band, regardless of the mode used, doesn't have its ragchewers? The average ham wears many hats, and one bears the label, "communicator." Who is more valuable in time of emergency or disaster than the communicator? The fm operator soon learns the folly of needless verbosity, for repeaters are equipped with timers that turn the machines off after transmission periods (continuous) in excess of three minutes. Some repeaters are set to time out sooner than three minutes, so one quickly learns to be terse and

¹The distance covered is affected by the type of terrain over which the signals must travel, and is principally a line-of-sight proposition. Most mobile stations are equipped with 1/4- or 5/8-wavelength vertical antennas, the latter offering approximately 3 dB of gain over the 1/4-wave type. Most repeaters use gain-type vertical antennas, some with gains as high as 6 db. Power output from repeater transmitters is generally 30 watts or more, and may be as great as 500 watts.

²Basic information on repeater operation is in recent editions of *The Radio Amateur's Handbook*. Also, see Cobb and O'Brien, "Amateur FM and Repeaters," *QST*, Oct. 1989 (reprint available).

³Mobile stations equipped with used commercial transceivers (mostly GE, RCA, Motorola, and Delco equipment) operate at power output levels between 15 and 60 watts, depending on the model used. Most of the solid-state fm transceivers designed for amateur use, imported or U.S. made, operate at power-output levels of 5 to 15 watts. This power class is suitable for working through most repeaters, and over normal distances.

to the point. The leather-lunged windbagger automatically learns improved operating habits after working through the local repeater a few times.

The fm population does not consist solely of talkers. After all, someone has to build and maintain the repeaters. Many of the fm-repeater techniques are more complex and exacting than those common to the modes used on other bands. On fm one has the opportunity to design, build, and perfect to his heart's content. Milking that extra fraction of a microvolt of sensitivity out of an fm receiver front end, designing and building a better gain-type antenna, or assembling that dreamed-of solid-state portable or fixed station can provide the technical challenge that stimulates so many amateurs. The kinds of things done by fm-ers make the bands interesting to listen to. Some of the fm gang are as skilled as those who specialize in other modes of operation. So don't shy away from this facet of our hobby/service because of thoughtless remarks made by uninterested amateurs.

Where Does One Begin?

Human nature dictates the need to investigate before becoming fully committed. The logical first step toward getting into fm is to monitor the goings on, then decide if this is your "thing." The simplest technique for copying fm signals is that of slope-detection with an a-m receiver. To do this is to borrow H. G. Wells' *Time Machine*, and regress to the 1930s. However, it does work satisfactorily if a receiver has provision for a-m reception. Slope-detection opens the way for minimum-investment fm reception, and chances are that you are presently equipped to use this method. The broader the a-m bandwidth of the receiver (say, up to 8 kHz), the better. Most amateurs use a receiver with a broad i-f passband and standardize at 5 or 15 kHz deviation to eliminate that fuzzy sound which makes an fm signal unpleasant to copy. Some modern receivers are set for narrow-band a-m reception — 3 kHz or less — but they will still be suitable for fm slope detection. The narrower response will cause the fm signal to sound slightly distorted, but useable reception will be possible.

For monitoring the bands below 10 meters it will be necessary to employ a vhf or uhf converter ahead of the station receiver. Most vhf fm activity takes place at the high end of each band, so plan to listen above these frequencies: 52 MHz, 146 MHz, and 440 MHz. The so-called national frequencies for 6- and 2-meter fm receiving are, respectively, 52.525 MHz and 146.94 MHz. Most of the 10-meter fm activity centers around 29.6 MHz. The greater part of the ham fm activity at present

is in the 2-meter band, between 146 and 147 MHz, an open door to Technician licensees as well as to those with higher classes of license.

Once an fm signal is located it can be tuned in for best clarity by tuning across it a couple of times (slope detection) and observing where center frequency is. Then, tune to the high or low side of center, *slowly*, until the least distortion is noted. That's all there is to it. Most fm stations use vertically-polarized antennas, so a vertical antenna will afford the best reception at your end of the circuit.

Other Receivers

Some of the surplus WWII receivers are ideal for fm monitoring. Generally speaking, these units have a relatively broad i-f response, and this makes them compatible with amateur fm signals. The 80- and 40-meter Command receivers work very well for slope detection. The 40-meter version has the broadest i-f response, and is recommended. Similarly, BC-348 and BC-312 receivers play beautifully as fm receivers.

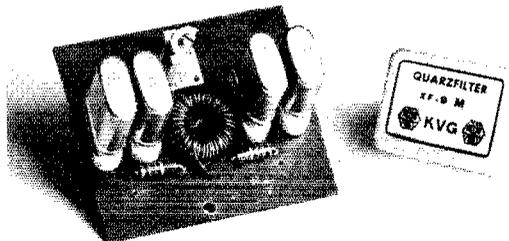
Outboard ratio detectors or discriminators can be added to these and other receivers to provide true fm detection.⁴ When so equipped, they will respond to an fm signal in much the same fashion as an a-m receiver does to an a-m signal. Limiters can also be added outboard to enhance fm receiver performance. The limiter will chop off pulse noise and other amplitude variations riding through the receiver . . . a noteworthy consideration for the mobile operator. Of course, converters are needed ahead of these surplus receivers to permit reception of the higher bands.

Some of the more selective vhf superregenerative receivers can also be pressed into service for casual monitoring of fm signals. Such receivers, by nature of their performance, are very broad in terms of overall selectivity — usually 300 kHz in bandwidth or greater. But, they can be used as slope detectors on very strong signals if there is plenty of audio amplification after the detector. It should be noted that the greater the receiver bandwidth with respect to the bandwidth of the fm signal, the less effective will be the audio recovery from the detected signal.⁵ Slope detection of signals is a simple process, and should be considered as an easy means to listen in on those fm happenings for the first time.

⁴Blakeslee, "Receiving FM," parts 1 through 4, *QST*, Jan. through April 1971.

⁵Information on superregenerative detectors and receivers is given in recent editions of the *Handbook*, and in *The Radio Amateur's VHF Manual*.

Examples of i-f filters for improving the selectivity of low-cost fm receivers. The unit on the left is homemade. A commercial KVG 10.7-MHz i-f filter is shown at the right. It has a 13-kHz bandwidth, and is available from Spectrum International, Box 87, Topsfield, MA 01983.



Another Approach

There are a number of low-cost imported fm receivers available. Two companies sell by mail, and from their branch outlets, pocket-size transistor portables that cover the 2-meter band and the commercial fm two-way service frequencies up to 170 MHz. Both units cost less than \$20 and exhibit good sensitivity. They are, in fact, suitable mates for some simple, low-power fm transmitters.⁶ They lack sufficient selectivity for separating repeater signals of near-equal strength, but in areas where one repeater predominates, they're just fine. They do not have squelch provisions, but can still be used to good advantage in simple portable or home stations.

Pictured in this article are two larger imported fm receivers, the Lafayette Micro P-100 and the older PB-150. Both are equipped for crystal control and tunable operation. Each has squelch provisions, and the selectivity is considerably better than one might expect. The PB-150 is set up for 12-volt operation, while the Micro P-100 has a built-in ac supply. The latter also operates from an external 12-volt dc source. The writer was able to get both units to cover the 2-meter band by simply readjusting the rf, mixer, and oscillator trimmers. Both receivers have space inside to add preamplifiers or if filters. These receivers, after modification, still cover the police, taxi, and telephone frequencies, plus other two-way services . . . plenty of interesting listening in addition to ham QSOs.

Before concluding this story, let's examine a couple of other possibilities for tooling up in the fm receiver department. And remember, the foregoing suggestions are intended primarily for the fm beginner who wants to do some listening. The hard-core fm man who wants the best in results and equipment will fare much better when using stable receivers designed for two-way fm work, notably the presently-available commercial and amateur fm transceivers. — WICER

Another Low-cost Monitor

Radio Shack's "Weatheradio" is easily converted for use as an fm repeater monitor. Though

⁶See Recent Equipment, *QST*, March 1970, for details on these pocket-size fm receivers. They can be used with, "An FM Pip-Squeak," *QST*, March 1971.

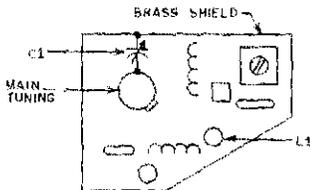
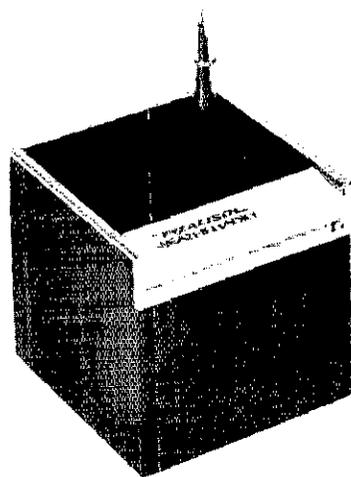


Fig. 1 — Layout of the modifications to the Weatheradio.

C1 — 10-pF miniature variable (Johnson 189-502-5).

L1 — Short No. 16 wire soldered into the center of the antenna input coil. Adjust this wire for maximum received signal strength.



not too sensitive, this receiver can copy 2-meter repeaters at 20 to 30 miles. The unusual package design of the Weatheradio always inspires comment wherever it is shown.

The conversion to receive 500 kHz of the 2-meter band consists of adding a 10-pF miniature variable to the receiver oscillator circuit. One terminal of this capacitor is soldered to the Weatheradio TUNING variable, and the other terminal is connected to the nearby brass shield, as shown in Fig. 1. A hole must be cut in the plastic subbottom to allow clearance for the new variable. Also, a 1/2-inch length of tinned wire must be soldered to the base of L1 and positioned in the center of the coil.

Alignment consists of setting the TUNING capacitor of the Weatheradio to midrange and adjusting C1 until the desired repeater frequency is tuned in. Then adjust the stub in L1 for maximum signal strength. The trimmers on the if transformers should also be peaked up, as the factory alignment isn't always perfect. The completed unit allows you to check the local activity at minimum expense. — Rick Liftig, WA1HSD

A Better Technique

For whatever amateur fm frequency you may have in mind, a 10-meter commercial fm receiver is

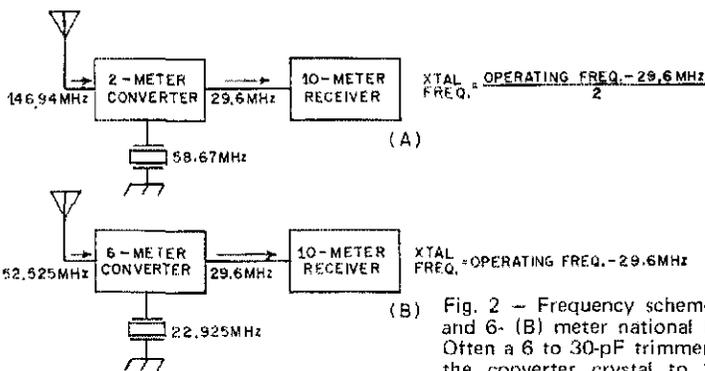


Fig. 2 - Frequency scheme to receive the 2- (A) and 6- (B) meter national fm calling frequencies. Often a 6 to 30-pF trimmer must be added across the converter crystal to "pull" it exactly "on channel."

a "best buy." A review of the advertisements and flyers from fm dealers in used equipment will show that 30 to 40-MHz crystal-controlled receiver strips are priced far below those models that are designed for 50- or 146-MHz operation.⁷ The reason for the lower cost is twofold: much more 30 to 40-MHz equipment is available, and there is less demand for the older low-band gear. A receiver strip that can be converted to 10-meter operation should cost \$5 to \$20, depending on condition, age, and model.

For monitor service, a wide-band (36-kHz-wide i-f) receiver is preferable to a narrow-band (13-kHz bandwidth) model, as amateurs currently use both wide and narrow fm deviation. A wide-band receiver can copy signals of either deviation while a narrow-band receiver is best suited for narrow-band transmissions. The 30 to 40-MHz receiver, once set on 29.6 MHz can be used to monitor that channel, or, using a converter, to receive either 6- or 2-meter fm signals.

The scheme to use a 10-meter receiver for vhf fm reception is shown in Fig. 2. Any of the popular converter designs may be adopted - the "VHF Sandwich" is an excellent choice.⁸ Instead of using the specified conversion-oscillator crystal, however, one is chosen that will heterodyne the desired channel - 149.94 MHz for example, down to 29.6 MHz. In the "Sandwich" converter a 58.57-MHz crystal will be required.

To listen in on local fm activity, this writer invested \$8 in a somewhat dilapidated GE 4ER7A2

⁷Dealers who offer surplus fm gear in their catalogs include:

Gregory Electronics Corp.
249 Route 46
Saddle Brook, NJ 07662

Mann Communications
P.O. Box 138
18669 Ventura Blvd.
Tarzana, CA 91356

Spectronics
1009 Garfield Ave.
Oak Park, IL 60304

⁸"A Solid-State Sandwich for VHF," *QST*, October, 1969, and 1970 edition of *The Radio Amateur's Handbook*, Chapter 18.

receiver. With a receiver in hand, the next job was to find out what crystal would be required for reception on 29.6 MHz. To obtain details on receivers made for the land mobile service, one can purchase a book of schematics,⁹ or can consult with a local amateur who works for a "two-way" radio service company (such firms usually keep files on all popular models).

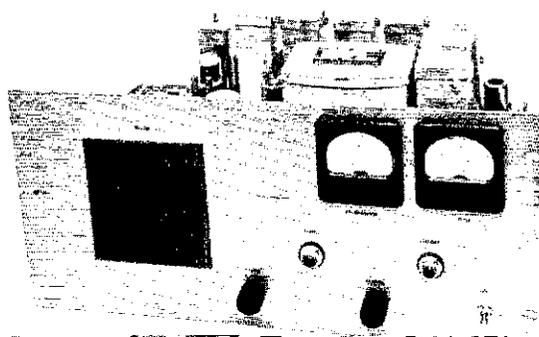
Crystals

The GE receiver required a 23.6-MHz "rock." A few words about the selection of crystals may help the beginner to avoid costly mistakes. The various manufacturers of fm equipment use different oscillator circuits, thus, the capacitance loading on the crystal also varies. Often a crystal that is "on channel" in one rig can be quite far off frequency in another. The crystal manufacturers can grind a crystal for any of the commercial fm rigs - if you supply the necessary information - the make, model, and serial number of your rig. Give the crystal and operating frequencies desired, and mention whether or not the crystal will be used in an oven.

For a 10-meter receiver, where the crystal frequency is not multiplied, and no oven is used, you can order a general-purpose crystal and save a few dollars - if you're a gambler. This writer tried one of International Crystal's inexpensive EX crystals, and it hit frequency in the GE receiver. Anyone taking this approach does so at his own risk, though.

⁹Two-way Radio Engineers, Inc., 1100 Tremont Street, Boston, MA 02120, has a booklet of schematic diagrams covering Motorola equipment up to the early Motrac models. Gregory Electronics (footnote 7) sells similar books of diagrams on the GE Pre-Progress units.

Front view of the modified Pre-Progress GE receiver. The volume and squelch controls have been brought out to the front panel. The panel has been refinished, and a new speaker grill, cut from perforated aluminum stock, has been added.



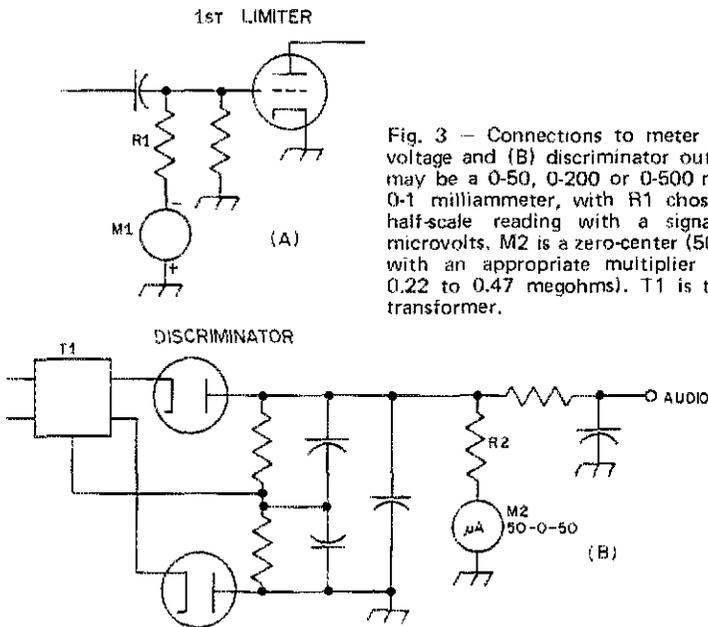


Fig. 3 - Connections to meter (A) limiter grid voltage and (B) discriminator output voltage. M1 may be a 0-50, 0-200 or 0-500 microammeter or 0-1 milliammeter, with R1 chosen to provide a half-scale reading with a signal input of 50 microvolts. M2 is a zero-center (50-0-50- μ A) meter with an appropriate multiplier resistor (usually 0.22 to 0.47 megohms). T1 is the discriminator transformer.

Alignment

With crystal in hand, the next step is to get the receiver going. Though fm receiver alignment can be a complicated procedure, only a few simple adjustments are required to set up most fm receivers. Test jacks are found on most receivers and these points can be used to check the various stages. The oscillator should be adjusted for a point just below maximum output. Then the discriminator must be checked for a zero-voltage output with no signal input to the receiver. Then, injecting a signal from a crystal calibrator, the trimmer across the crystal in the hf oscillator should be adjusted so that the calibrator harmonic on 29.6 MHz also produces a zero voltage reading at the discriminator output. Metering the grid voltage developed at the second limiter, any rf-stage adjustments should be peaked for maximum voltage at the limiter.

If a variable-frequency signal generator is available, it can be used to further check the discriminator. Again metering the discriminator output, check to see that a cw signal 15 kHz on either side of 29.6 MHz produces the same absolute voltage reading. (Note that the voltages read will have different polarities.) If one side or the other is off a bit, adjusting the input trimmer on the discriminator transformer will usually correct the situation.¹⁰

As can be seen from alignment procedure outlined above, voltages measured at the limiter and discriminator stages tell quite a bit about how a receiver is working. Constant metering of these stages will make the receiver more useful in giving reports to other stations. The first meter, Fig. 3A,

¹⁰A complete alignment should only be attempted if the required test equipment is available. The manufacturer's instructions for testing and adjustment should be followed implicitly. Trial-and-error alignment will not work on most fm receivers.

indicates the relative strength of incoming signals. One peculiarity of the fm mode is that, once a signal produces full quieting of the receiver noise, further increases in signal strength will not be detectable by ear. This limiter grid-current meter serves as an S-meter, allowing an operator to observe changes in strength of incoming signals.

A second meter, connected to the discriminator, indicates if a station being received is "on channel." Because of the temperature changes and vibration encountered in mobile operation, and because of the crystal problems mentioned earlier, many stations can get off frequency. (On loud signals, off-frequency operation is also difficult to detect by ear.) Once the receiver is properly aligned with a crystal calibrator, the plus-or-minus voltage indication on the discriminator meter will indicate to which side, and relatively how far off, a particular station may be. Of course to remain accurate, the receiver must be checked against a frequency standard on a regular basis.

A week or two of listening to any popular fm channel should convince the listener of the merit of this mode. With 10-meter transmitter strips available at low cost, a beginner can get a start on 10-meter fm with a small cash investment. WIKLK.



A Single-Band Converter

BY JERRY HALL,* KI1PL AND
GUS M. WILSON,** W1NPC

THE CONVERTER described here, when used with an a-m broadcast receiver, provides for single-band reception of ssb, a-m, and cw signals. An automobile or home radio tuned to 1600 kHz serves as the i-f amplifier, detector, and audio stages. Performance of the converter and broadcast-receiver combination is comparable to that of a good short-wave receiver. The converter may be built to cover any of the five hf amateur bands.

The instrument is completely solid-state in its construction and uses transistors which are available at most electronic supply outlets. As may be seen from Fig. 1, it can fit neatly under an automobile dashboard. With wing nuts or screws used for mounting, the device can be removed easily for home use. In the automobile, power is obtained from the 12-volt system by connecting to either the cigarette lighter socket or to the ignition switch. When used at home, a 9- or 12-V ac-operated supply would be most convenient, although a 9-V transistor-radio battery could be used. Current drain of the converter is 12 mA at 9V or 28 mA at 12V.

The Circuit

The schematic diagram of the converter is given in Fig. 2. Parts values, as shown, give generous coverage of the 20-meter band, 14.0 to 14.4 MHz. For coverage of the other bands, the four tuned circuits in the rf-amplifier, mixer, and heterodyne-frequency oscillator stages must be altered. See Table 1.

A dpdt switch, S1, is used to switch power and antenna connections to the converter. When turned off, this switch connects the antenna to the a-m radio for regular broadcast reception. Inside the converter, CR1 regulates voltage applied to the HFO stage at 9.1 volts. This regulation prevents frequency changes which might otherwise be caused by changing automobile-engine speeds and consequent voltage fluctuations.

To obtain good rf selectivity, double-tuned antenna-peaking circuits, L2 and L3 and their associated components, are used. These two coils are coupled radially, rather than axially, to facilitate grounding one end of each coil.

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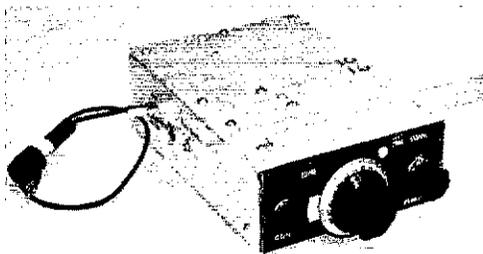


Fig. 1 — The single-band converter constructed for 20-meter coverage. The top of the chassis has an aluminum plate added to provide a rigid enclosure. A short length of plastic sheathing from Romex electrical wire is cemented atop the mounting bracket to cushion the converter away from the automobile dashboard. The tuning dial, calibrated from 0 to 100, has a 6-to-1 tuning ratio.

For 20-meter reception, the HFO operates over the frequency range between 12,400 and 12,800 kHz and mixes with the incoming rf signal to produce a 1600-kHz signal at the output of Q2. S2 is used to turn the BFO on or off. The BFO is left off for reception of short-wave a-m signals, and is energized for reception of ssb and cw signals. Operating at 1600 kHz, the BFO provides a convenient marker for tuning the broadcast receiver to the converter output frequency. Depending on the selectivity of the broadcast receiver, it may be necessary to vary the tuning slightly above or below the 1600-kHz marker to get clear cw reception or to improve reception of ssb signals on the proper sideband.

Construction

The converter is built into a Bud AC-402 chassis measuring 7 x 5 x 2 inches. The layout is shown in Fig. 3. Compartments for the various stages are made by using circuit-board material. Portions of some of the boards contain etched circuit patterns, so little point-to-point wiring is visible. Unetched foil at the extremities of the boards provides shielding from circuits in other compartments. Aluminum angle brackets join the boards where they meet at right angles.

The compartment for the BFO stage, just to the left and below the center of the chassis (Fig. 3), is made on three sides with aluminum sheet stock bent as shown. The circuit board forms the fourth side of this compartment, and the assembly is secured to the chassis with an aluminum strap.

C1, the triple-section variable capacitor, is affixed to the right edge of the chassis as shown in Fig. 3. Just to the rear of this capacitor, nearer the bottom of the photo, are the antenna peaking circuits, L1 through L3 and associated components. In the photograph L3 hides L2, as they are mounted one above the other on the circuit board. A space of approximately 1/4 inch was left between these coils. Other construction details can be gleaned from Fig. 3, and further information is contained in its caption.

TABLE I

Freq (MHz)	HFO Range (MHz)	L1 Sec. Wdg. 2	L2 L3	L4 Sec. Note 7	L5	L6	L9 Sec. Note 4	C1 Double-bearing adjustable	C4, C5, C8	C7 plus C8 total cap. See Note 5	C9
3.5 - 4	5.1 - 5.6	6 t.	8.4 μ H (36 turns B & W stock or equiv. stock, 5/28-in. dia., 32 L.P.T.)	36 t. No. 30 enam.	8.4 μ H See data for L2	Slug-tuned 1.5 - 1.87 μ H (Miller 42A1364-31 or equiv.)	4 t.	6 t. - 104.5 pF (Miller MK21100 or equiv.)	0.01 μ F	450 pF	Omni trimmer provided on C1
7 - 7.3	5.4 - 5.7	5 t.	4.2 μ H (53 turns Polycoid 17.0 or equiv. stock, 1/2-in. dia., 24 L.P.T.)	33 t. No. 30 enam.	4.2 μ H See data for L2	Slug-tuned 1.5 - 1.87 μ H (Miller 42A1364-31 or equiv.)	4 t.	1.5 - 56.0 pF (Miller MK21100 or equiv.)	100 pF	460 pF	Same as for 20 meters
14 - 14.4	12.4 - 12.8	See Fig. 2									
21 - 21.45	19.4 - 19.85	2 t.	1.5 μ H (19 turns Polycoid 17.30 or equiv. stock, 1/2-in. dia., 18 L.P.T.)	18 t. No. 22 enam.	1.3 μ H (16 t. same stock as L2)	Slug-tuned 0.47 - 0.587 μ H (Miller 40A477CB1 or equiv.)	2 t.	Same as for 20 M.	20 pF	110 pF	Same as for 20 meters
28 - 29.7	26.4 - 28.1	2 t.	1.1 μ H (14 turns Polycoid 17.30 or equiv. stock, 1/2-in. dia., 16 L.P.T.)	12 t. No. 22 enam.	0.9 μ H (12 t. same stock as L2)	Slug-tuned 0.33 - 0.413 μ H (Miller 40A337C131 or equiv.)	2 t.	Same as for 20 M.	10 pF	90 pF	Same as for 20 meters

Note 1: For 40-, 15-, or 10-meter coverage, C1 is the same as for 20-meter coverage. For 80-meter reception use a 365-pF 3-gang variable capacitor such as Miller 2113. This capacitor is physically larger than the Miller 1460, and the layout of the circuit components must be altered accordingly.

Note 2: L1 is wound with small-dia hook-up wire over ground end of L2.

Note 3: L4 is wound over ground end of L5.

Note 4: L9 is wound with small-dia hook-up wire over ground end of L8.

Note 5: C7 and C8 are connected in parallel across C3. Reducing the value of fixed capacitance and returning L8 accordingly will increase the range over which the HFO operates.

Note 6: For the band of operation, L3 is tapped from the ground end as follows: 80 - 10 turns; 40 - 9 turns; 15 - 5 turns; 10 - 4 turns.

position for maximum receiver noise. (You probably will hear signals at this point, too.) Peak the amplitude of the noise by adjusting L6. If the broadcast radio has an antenna trimmer, adjust it, as well, for maximum noise. If an interfering 1600-kHz broadcast signal is heard, null it out with L11.

Next, the frequency range of the HFO must be adjusted. See Table I for the band of operation. A general-coverage receiver or a wavemeter with reliable calibration will aid in this task, although an amateur-band-only receiver will suffice. Adjust C3 so its plates are fully meshed. Then adjust L8 until the frequency of oscillation is set for the low end of the HFO range. If the HFO fails to oscillate, reverse the winding connections on L9. Then adjust C3 to its opposite extreme. The frequency of oscillation now should be beyond the high-frequency end of the range. If the means are not readily available for checking the frequency of oscillation, adjustment of the HFO range can be made by listening to received signals. The approximate frequencies of these signals can be determined from an amateur receiver, and L8 and C3 in the converter adjusted accordingly to give full band coverage. Some amateurs adjust the HFO range in their receivers by listening to markers from a 100-kHz calibrator, but when using this method it is very easy to end up having the receiver tuned 100 or 200 kHz away from the intended frequency.

Now adjust the trimmer capacitors associated with the three sections of C1. First, tune the converter to a signal near the high end of the

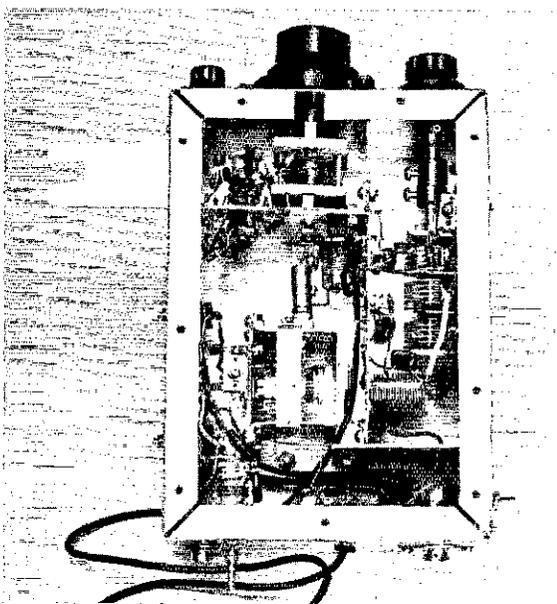
frequency range, and adjust C1 for maximum signal amplitude. The BFO may be either on or off for these adjustments. Then adjust each of the three trimmers for maximum signal strength. Repeat these adjustments a few times, to assure that all three tuned circuits peak simultaneously at a given setting of C1.

The last adjustment is the BFO injection. Tune in a cw or an ssb signal and adjust the i-f gain control for a pleasing level. Now adjust C2 for a clean-sounding signal. Too little injection will cause the receiver to "pump," giving the signal a quality best described as "mushy." Too much injection will reduce the amplitude of the signal.

Operation of the converter is simple. Turn on the broadcast receiver and the converter. Turn on the BFO and use its frequency as a marker for proper tuning of the receiver to 1600 kHz. With C3, tune the converter to the desired signal, and tune C1 to peak the antenna circuits. This type of converter provides quality mobile reception at low cost.

QST

Fig. 3 - The converter with its bottom cover removed for a peek inside. The compartment in the upper left corner of the photograph houses the HFO stages, with the antenna-peaking and rf amplifier stages located along the right side of the chassis. Protruding from the back of the HFO circuit board are coils L4 and L5, and to their left Y1 is visible. L6 and L7 are located near J2 in the lower left corner of the chassis, while L11 is hidden by J2 in the lower right corner.



Simple Arrays of Vertical Antenna Elements

BY JAMES L. LAWSON * W2PV

BECAUSE OF the excellent low-angle radiation properties of vertical antenna elements and also because of the benefits to be gained by horizontal-plane directivity, it is interesting to attempt a determination of "optimum" arrangements of elements to produce "beam" antenna arrays. Because of the enormous variety of configurations possible, and the great difficulty of either experimental modeling or calculating exact theoretical performance, it has not been practical in the past to arrive at valid conclusions. However, it is now quite easy to simulate such antenna arrays by computer programs, and these can produce relatively quick and precise answers to a very large number of postulated configurations. After a number of computer trial runs, "optimum" configurations can be found quite readily. Such a computer program for quarter-wave elements has been written and supplied by H. Hurwitz, WA2VBW. Using a modification of this program, the author has investigated a large number of simple array configurations, which are potentially quite useful at the lower amateur frequencies, with the salient results given here. It is hoped that these will prove interesting to those considering construction of such arrays.

Technique for Optimizing Arrays

We must try to define the problem and the parameters leading to an optimum design. The horizontal-plane pattern of an array of (vertical) elements depends only on the magnitudes of the individual element currents and their phases, and not on the way the currents are produced (e.g., driven or parasitic). The computer program allows one to specify the locations (x, y coordinates) of any number, n , of quarter-wave elements; also one must specify the magnitude of current and its phase in each element (usually normalized to unity current and zero phase for a given fiducial element). With these data inputs the radiation pattern is calculated and plotted out, giving the relative power gain in each azimuth angle interval, say, 5 or 10 degrees. The power gain is normalized to that power which would have been radiated at the same

azimuth by a *single* vertical element using the same input electrical drive power. By using trial values of the current in all elements, in both amplitude and phase, one soon develops a feel for the behavior of the system, and can usually arrive at a "best" value for all the currents and phases. One can then try different geometrical separations of the elements and in this way arrive at the "best" spacing. Usually this best configuration is a compromise between power gain, and good pattern control, e.g. front-to-back ratio, or more generally, main lobe to minor lobe (side or back) ratio.

In addition to the optimization described above it must be noted that if the array is to be used primarily to produce a "beam" in a *given* general direction with little emphasis on other directions, one usually finds a linear array of elements best (equivalent to an end-fire Yagi array). However, if the array is to be used for *all* directions, a more (circularly) symmetrical array should be considered. These points will become clear in the discussion of results.

Two-Element Array

In the case of two elements there is only one possible configuration. Consider one element at the origin of the x, y plane (coordinates $0, 0$) and the other element along the x axis (coordinate $x, 0$). The parameters available are x , which we specify in units of wavelength, λ , the r-f currents I_1 and I_2 in each element (we shall normalize one of the currents, e.g., I_1 , to unity) and the phases, ϕ_1 and ϕ_2 , of the currents (we shall generally normalize the phase of the current in element 1 as zero and specify the relative phase of the current in element 2 in electrical degrees, either positive for leading currents or negative for lagging currents). It soon becomes apparent that the region of main interest is where the spacing x is in the neighborhood of 0.25, i.e. $\lambda/4$, and where the currents are nearly equal in magnitude. The reasons are that, for spacings of 0.5 or greater, other strong lobes appear in the pattern, and for grossly unequal currents relatively poor peak gain and pattern discrimination result. Although the spacing x is not especially critical in the neighborhood of 0.25 (one can essentially compensate by adjustment of phase angle) we shall now examine the case where $x = 0.25$, and where $I_1 = I_2 = 1$. Best overall pattern discrimination (minimum back lobe) for the end-fire case occurs where $\phi_1 = 0$, and $\phi_2 = 90$ degrees, and the power-gain pattern is shown in Fig. 1A.

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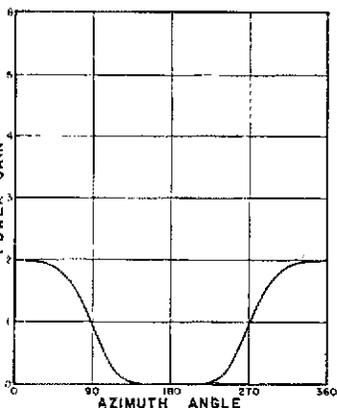


Fig. 1A

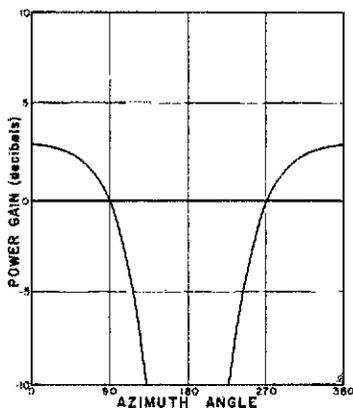


Fig. 1B

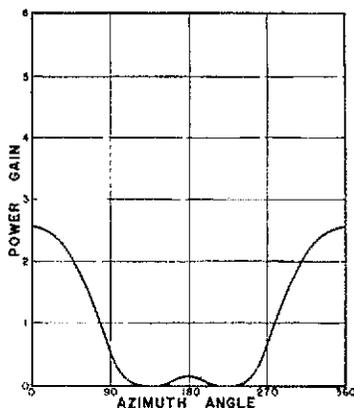


Fig. 2A

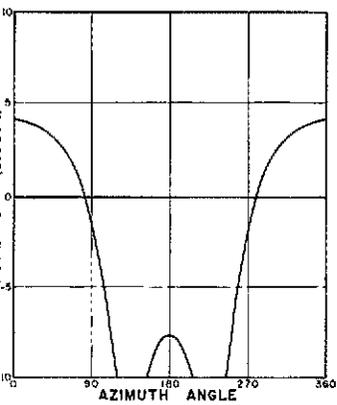


Fig. 2B

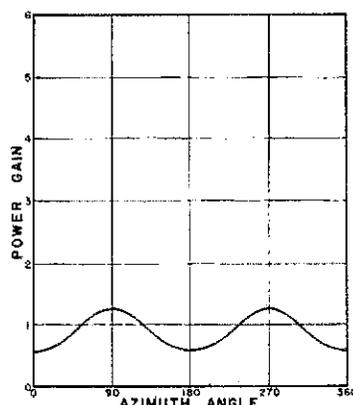


Fig. 3A

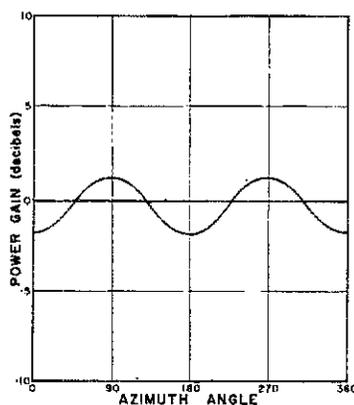


Fig. 3B

Peak gain is 2 (or 3 dB) and occurs along the x-axis direction. Fig. 1A shows the power pattern of the array, i.e., it shows quantitatively where the radiated power goes. However, if one is looking at what an S meter would indicate, one can present exactly the same information on a vertical logarithmic scale as shown in Fig. 1B.

The vertical scale is shown in dB relative to the value for a single vertical radiator. This type of display is useful in judging excellence of pattern with respect to minor lobes. For all future cases discussed here, both displays will be shown.

It is possible to increase the gain of this array at the expense of some back lobe by increasing the phase lag in element 2, e.g., if $\phi_2 = -120$ degrees the peak gain, again along the x axis, is 2.59 (or 4.1dB) and the entire pattern is shown again in Figs. 2A and B.

Note that the back lobe now shows a gain of 0.186, which is -11.5 dB relative to the forward lobe.

These two elements can be used to form either a beam along the +x axis as shown, or reversed along the -x axis (by reversing the phase ϕ_2 , i.e., making it +120 instead of -120 degrees) or if the two elements are driven in the same phase, i.e., $\phi_1 = \phi_2 = 0$, one produces a bilateral broadside beam as shown in Fig. 3.

Here the peak gain is 1.1 dB, but there is a "back" lobe of equal magnitude to the front lobe. Note that all patterns will be symmetrical around the x axis, or more generally around the line of any set of linearly-positioned elements. This example has illustrated some of the aspects of all of the results to be presented; namely, that:

- The best element spacing will be found to be in the neighborhood of 0.25 wavelength.
- Current ratios and phases can be adjusted to produce either a best *pattern discrimination* (minor lobe rejection) or best *main lobe gain*. It is generally not possible to get both at the same time, and a compromise must be made.

It may be useful to tabulate the salient results of each "best" case by noting the coordinates of the elements in the x,y plane, the individual drive currents, the individual phases, main beam heading in the x,y plane, main beam gain, and the largest pattern gain (such as given by either the side of the main lobe or by minor lobes) observed anywhere in the entire 180-degree sector centered just opposite in direction to the main lobe. We shall designate this quantity as "back radiation" and express it in dB relative to the main lobe gain. We shall also tabulate the largest minor lobe in this sector and label it "minor lobe," again expressed in dB

TABLE 1

Case	Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	1	0	0	0	0°	3 dB	-3 dB	-∞
	2	1	-90	0.25	0				
2	1	1	0	0	0	0°	4.1 dB	5.7 dB	-11.5
	2	1	-120	0.25	0				
3	1	1	0	0	0	90°	1.1 dB	0 dB	0 dB
	2	1	0	0.25	0				

TABLE 2

I_1	I_2	ϕ_1	ϕ_2	Beam Gain	Back Radiation	Minor Lobes
1	0.8	0	-120	4.0 dB	-5.5 dB	-10.8 dB
1	1	0	-120	4.1	-5.7	-11.5
1	1.2	0	-120	4.1	-5.6	-12.5
1	1	0	-100	3.4	-3.8	-11.1
1	1	0	-120	4.1	-5.7	-11.5
1	1	0	-140	4.6	-6.6	-6.6

TABLE 3

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	0°	5.6 dB	-8.7 dB	-8.7 dB
2	1	-120	0.25	0				
3	1	-240	0.5	0				

TABLE 4

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	90°	2.7 dB	0 dB	0 dB
2	1	0	0.25	0				
3	1	0	0.5	0				

TABLE 5

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	0.5	0	0	0.145	0°	4.35 dB	-6.1 dB	-15. dB
2	1	-110	0.25	0				
3	0.5	0	0	0.145				

relative to the main lobe. Thus for the cases just described, Table 1 is presented.

The sensitivity of these results to variations of currents and phases is not high. For example, one can summarize case 2 above with somewhat altered I_2 , or ϕ_2 , as shown in Table 2.

The author feels that end-fire case 2, where $\phi_2 = -120$ degrees, probably represents the "best" design with a good pattern and gain. Other more complicated cases presented below are optimized in this same way and only the "best" configuration will be shown with actual results.

Three-Element Arrays

For three elements two different geometries suggest themselves; the first is a linear array, best for a single preferred directional line, but we should also consider an equilateral triangle configuration which is the closest approach to circular symmetry, and which as we shall see could be switched to give "beams" in any one of 6 angular positions (every 60 degrees). Let us consider first the linear array.

A. Linear Array

As in the two-element linear array just discussed the optimum arrangement seems to center around an element spacing of about 0.25 wavelength with approximately equal current drives. The optimum end-fire case is shown in Table 3 and the broadside case is shown in Table 4.

The patterns for these cases are shown in Figs. 4 and 5.

Remember that for the end-fire case, which one can think of as a 3-element Yagi on its side, the rather large side lobe results because the pattern lies in a plane perpendicular to the elements. Side radiation is hard to avoid as one cannot take advantage of the nulls off of the ends of excited elements.

B. Equilateral Triangular Array

For this case the optimum situation appears to be as shown in Table 5.

The behavior is very similar to the case of two elements in end-fire, see Table 1 (we have just split one of the two elements and have moved

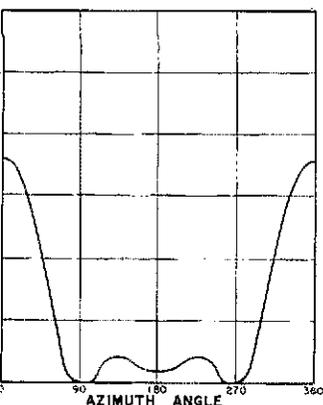


Fig. 4A

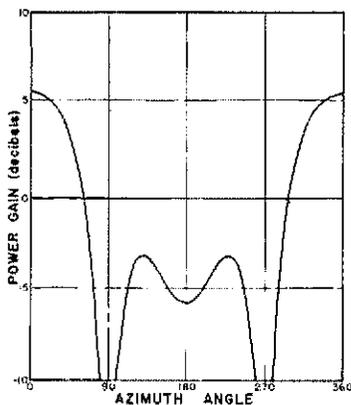


Fig. 4B

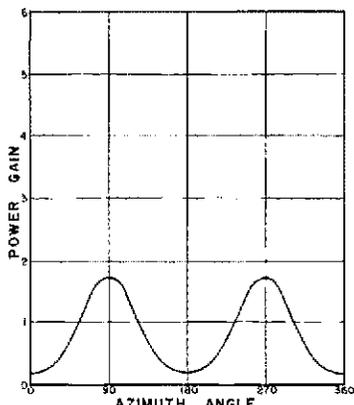


Fig. 5A

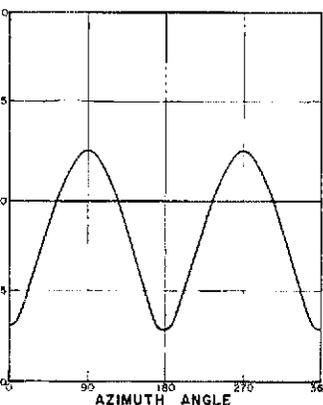


Fig. 5B

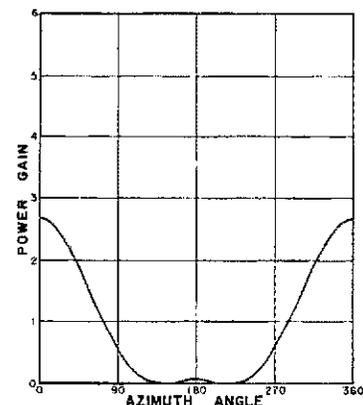


Fig. 6A

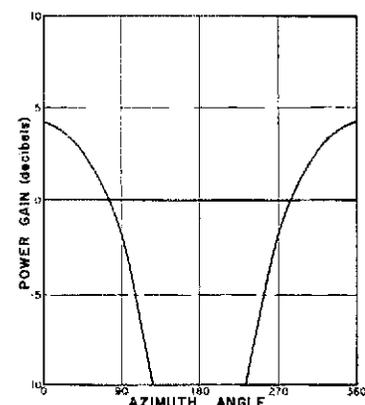


Fig. 6B

the separate pieces to the triangle corners), and the pattern is shown in Fig. 6.

Reversing the phases will reverse the beam direction, and by rotating the drive currents (and phases) around the triangle, one can produce 6 beam directions (every 60 degrees). This is an attractive feature, but it does not come free; the maximum gain of the system is somewhat less than one obtains with the 3 linearly-disposed elements (which are chiefly useful in a direction along the line of the array).

The exact size of the triangular array is not critical - one must simply choose the best phase angle for the particular geometry. The "best" phase angles, $\phi_2(\phi_1 = \phi_3 = 0)$, as determined by computer runs, for different spacings (triangle side lengths expressed in terms of λ) are shown in Table 6.

TABLE 6

Element Spacing	Optimum ϕ_2	Beam Gain	Back Radiation	Minor Lobes
0.2	-130°	4.65 dB	-6.5 dB	-18 dB
0.25	-120°	4.6	-6.5	-16
0.3	-110°	4.4	-6.2	-14
0.35	-110°	4.2	-5.8	-12

Four-Element Arrays

With four elements there are at least three configurations which are interesting to investigate. As before, the linear array with a preferred beam direction is one type, but there are two configurations which possess a measure of circular symmetry. One of these is described by 3 antenna elements at the corners of an equilateral triangle with the fourth element at the geometric center of the triangle. This one we shall designate as a center-filled triangle. The other type is a square array. Let us take these three types in order.

A. Four-Element Linear Array

For this case the optimum end-fire solution appears to be as shown in Table 7.

The gain and major lobe shape of this configuration seems to be excellent. The broadside case is shown in Table 8.

Patterns for this case are shown in Figs. 7A, B, and 8A, B.

Note that for this array there is poor coverage in some azimuthal directions (e.g., ± 45 degrees) if only the two tabulated phase arrangements are used.

B. Center-Filled Triangle

A large number of situations were examined for this configuration but unfortunately no

TABLE 7

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	0°	7.4 dB	-9.9 dB	-9.9 dB
2	1	-120	0.25	0				
3	1	-240	0.5	0				
4	1	0	0.75	0				

TABLE 8

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	90°	4.2 dB	0 dB	0 dB
2	1	0	0.25	0				
3	1	0	0.5	0				
4	1	0	0.75	0				

TABLE 9

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	45°	6.4 dB	-18 dB	-18 dB
2	1	-110	0.25	0				
3	1	-220	0.25	0.25				
4	1	-110	0	0.25				

TABLE 1Q

Element	Current	Phase	X	Y	Beam Direction	Beam Gain	Back Radiation	Minor Lobes
1	1	0	0	0	0°	5.1 dB	-11.5 dB	-11.5 dB
2	1	-120	0.25	0				
3	1	-120	0.25	0.25				
4	1	0	0	0.25				

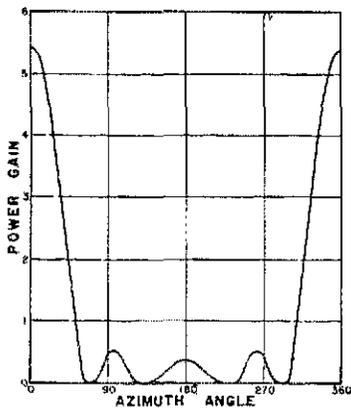


Fig. 7A

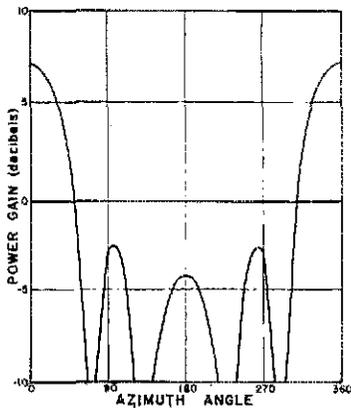


Fig. 7B

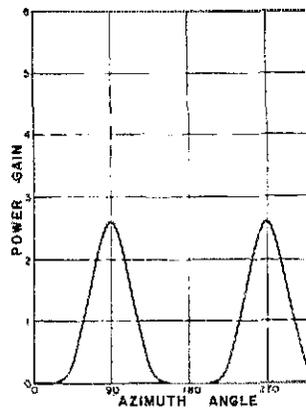
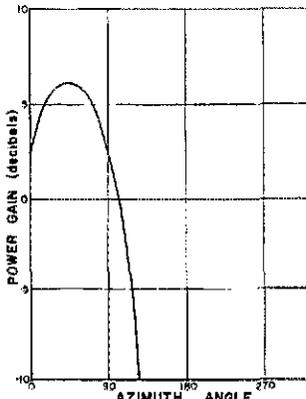
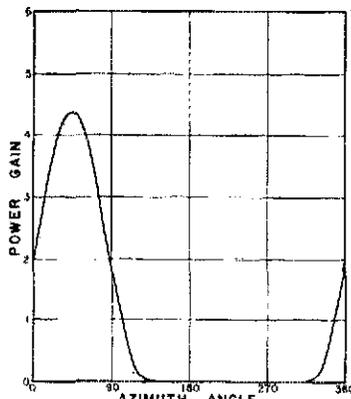
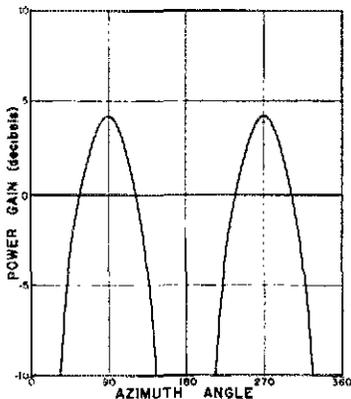


Fig. 8A

Fig. 8B

Fig. 9A

Fig. 9B



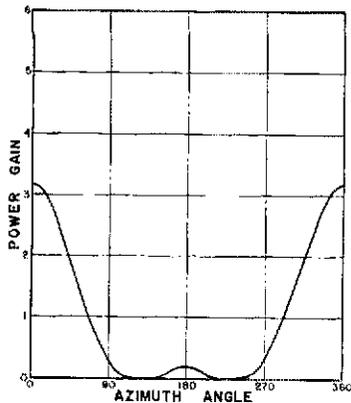


Fig. 10A

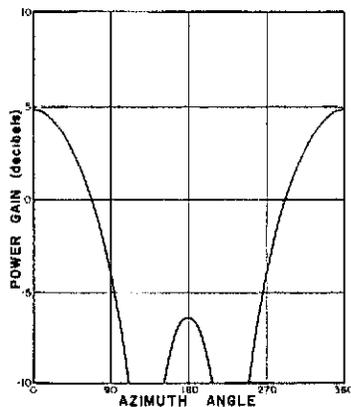


Fig. 10B

Square side Length (in λ)	ϕ_A opt.	ϕ_B opt.	Beam Gain	Back Radiation	Minor Lobes
0.167	-130	-260	6.6 dB	-22 dB	-22 dB
0.25	-110	-220	6.4	-18	-18
0.333	-80	-160	5.6	-18	-18

TABLE II

The author believes that there are two parameters which are noteworthy: first, the gain is respectable in diagonal fire because one can view the square along its diagonal as a three-element linear array in which the center element is split, each half being displaced to the other corners of the square. Thus the array behaves something like a three-element (Yagi-like) linear array which is known to have a good gain. Secondly, the lobes are much smaller than the linear array due to the tendency for the phase cancellation of waves produced by the spatially-separated corner elements.

Again, as in previous examples, the actual dimensions of the square are not very critical, as long as one adjusts the phase (delay), ϕ_A in elements 2 and 4 and the larger phase delay, ϕ_B , in element 3 to the "best" value. Examples of such "best" phase values for different size squares are shown in the Table II.

It turns out that the calculated gain figures for the smaller arrays are actually slightly larger than the gain for the larger squares, but as a practical matter this fact is probably offset by the larger (reactive) currents required for radiation. The larger currents are necessary because of the mutual coupling and phase relations between elements and the required phase relationships; in practice with the inefficiencies usually caused by ground currents when using vertical antennas, the gain differences for the various squares are probably inconsequential. The patterns for all cases are quite good, but the best pattern is obtained for the $\lambda/4$ square. Incidentally, the 0.167λ and $.33\lambda$ square allows the possibility that a single square can be used for two amateur bands, and this has indeed become the subject of a practical antenna system.¹

Conclusion

Computer trial runs, through a program developed by WA2VBW have facilitated the investigation of a large number of $\lambda/4$ vertical antenna-array configurations. "Best" configurations, drive conditions, power gains and patterns have been found for the cases of two, three, and four elements. Especially interesting is the case of four elements arranged in a square whose side dimension is about one quarter wavelength.

Cases using more than four elements have been investigated, but the complexity, probable cost, and difficulty of installation of such configurations, reduces their utility and so they will not be reported here.

The author wishes to acknowledge the contribution of Henry Hurwitz, WA2VBW, who supplied the original computer program for this investigation.

¹Lawson, W2PV, "75/80 Meter Vertical Antenna Square Array," *QST*, March, 1971.

combinations of spacing, currents, or phases were found that looked very good. The best pattern was not particularly better than that of the 3-element triangle alone, and was substantially inferior to that of the four-element square to be discussed next.

C. Four-Element Square Array

For this case the best situation appears to be as shown in Table 9.

Note that this arrangement fires diagonally and produces a respectable gain and excellent pattern. The "broadside" arrangement for the same square is shown in Table 10.

The computed patterns are shown in Figs. 9 and 10.

The diagonal-fire pattern is exceptional, providing extremely low back radiation and minor lobes. The broadside pattern is not nearly as good, somewhat superior but reminiscent of the end-fire pattern obtainable with just two elements (see Fig. 2). In fact, the power-gain coverage at all angles (including the broadside angle) just using the switched four diagonal beams is large enough that it probably is not worthwhile using the broadside arrangement at all even to "fill" between diagonal beams.

This square array is superior to the center-filled triangle, and to all other simpler configurations (circular) in both gain and pattern discrimination. It is sufficiently good that one might ask what particular properties of the square have led to the nearly ideal performance.

The RTL-1 RTTY Converter

Resistor - Transistor Logic

BY GARY O. WHITE,* WA4UNW

THE RTL-1 RTTY converter is the culmination of several attempts to develop a state-of-the-art logic circuit for processing detected RTTY signals. Other circuits utilizing digital techniques have been published.¹ Interest in the digital approach was promoted by various shortcomings of commonly used circuits, i.e., running open with no signal, not running open at the expense of copying on the space signal only, and inability to copy on a single tone.

The block diagram of the RTL-1 is given in Fig. 1. The significant difference between the RTL-1 and conventional RTTY demodulators is the digital logic section. The basis for successful operation comes from the *J-K* flip-flop, i.e., it requires a clock pulse to produce a change of state at the output, and this change is further controlled by input signal voltages.

Fig. 2 is the schematic of the "front end" of the converter. The input amplifier and limiter circuit is an extraction from the Mainline ST-3,^{2,3} and need not be described here. The channel filters are bandpass filters constructed for a space tone of 1585 Hz and a mark tone of 1415 Hz. Filters of this nature for other tones have already been published.⁴ The detector stages rectify and filter the audio tones, developing dc pulses from keyed RTTY signals. Each 3N128 acts as an impedance transformer, coupling the positive pulses from the detectors to the logic circuitry.

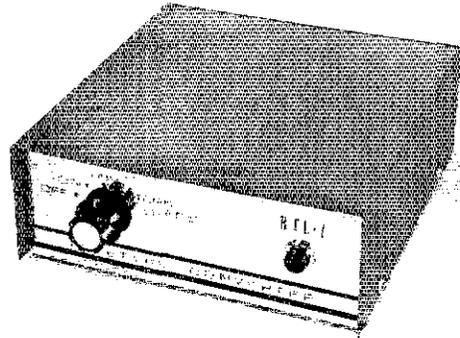
*7503 Cedar Hollow Dr., Fern Creek, KY 40291.

¹Kyle, "Errorless RTTY Converter," 73, September, 1963.

²Hoff, "Mainline ST-3 RTTY Demodulator," *RTTY Journal*, September, 1968.

³Hoff, "The Mainline ST-3 RTTY Demodulator," *QST*, April, 1970.

⁴Hoff, "High-Performance RTTY Filters," Part II, *QST*, September, 1966.



The RTL-1 has been given a professional appearance through the use of a two-piece cabinet with a polished and silk-screened aluminum front panel added. The author uses a single switch to control all functions of the demodulator, replacing the two separate switches presented in the article.

Circuit Operation

The basic requirement for successful RTTY operation is to supply the desired on/off condition to the selector-magnet keying circuit. In the RTL-1 it is accomplished in the following manner. (Refer to Fig. 3.) Clocked operation of the flip-flop, U4, is used to take advantage of the *J-K* feature, which results in single-signal copy and true bilateral copy (two tones alternately). No discussion of IC operation is provided here, since numerous articles have appeared in amateur magazines,⁵ and manufacturers' literature is available.

U2 and U3 each function as Schmidt triggers. The *OR* gate, U8A, combines the mark- and space-signal information into one output at pin 7. With S1 in position No. 2 for normal bilateral operation, U8B and U6B, along with the network connected at pin 6 of U8B, act as a delaying circuit. With no signal present at the converter's input, the pin 6 outputs of U2 and U3 will be low. With both inputs of U8A being low, its output will be high, the output of U8B will be low, and the output of U6B will be high. The high output of U6B is applied through S1 to the C_D reset or clear input of the flip-flop, U4. This flip-flop input overrides all others, holding the flip-flop in the mark condition with its *Q* output low. This causes the output of U5A to be high, and that of U6A to be low. Q3 is held near cutoff, and Q4 conducts 60 mA of current through the printer's selector magnets. In this manner, a mark condition appears at the output of the RTL-1 when there is no signal input.

⁵See Pos, "Digital Logic Devices," *QST*, July, 1968. — Editor.

The RTL-1 uses some "conventional" RTTY demodulator circuits combined with digital logic circuits to produce a device which functions quite differently from units presented in the past. Although the RTL-1 design is somewhat experimental in nature, as far as RTTY is concerned it contains several circuit innovations which should interest any RTTYer.

When U2 receives a space pulse, this produces a positive-going pulse at the set (S) input of U4, and simultaneously at the pin-1 input of U8A, causing its output to go low. This keys the clock on, and through a delaying circuit unlocks the flip-flop by applying a low state to its C_D input. This action permits the high input at the S input of U4 to produce a high Q output at pin 7. When Q is high, \overline{Q} must be low; therefore, one input to the half adder is high (to U5A) and one is low (to U5B). This produces a high output at pin 7 of U6A, and through Q3 and Q4 controls the magnet-keying circuit for the space condition.

If the next RTTY pulse is a space, no change occurs at U4 or its following stages. If the next pulse is a mark, pin 7 of U4 will return to a low state as soon as the next clock pulse appears.

The clock circuit produces pulses at a 500-kHz repetition rate. The 500-kHz rate was chosen to prevent pulse stretching that could occur with a free-running clock. If a negative-going clock pulse does not occur at the same time the input states at S and C of U4 change, the output pulse will be stretched. Therefore, the high repetition rate insures a minimum of pulse stretching.

The time-constant circuit following U8B maintains pin 6 of U4 at a low condition during the presence of signals, so that momentary fades will exercise no control over the flip-flop. The diode prevents C7 from discharging through U8B. The flip-flop is under control of the input signal and the clock as long as the C_D input is low. This

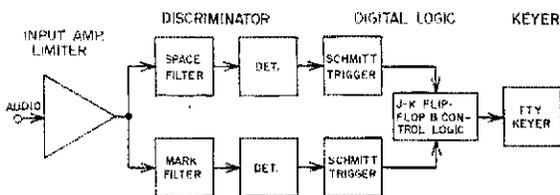


Fig. 1 — Block Diagram of the RTL-1 RTTY Converter.

provides true bilateral copy, because the input signal has full control over the output state of U4. If the signal inputs to U4 are both low, as could occur during periods of selective fading, the flip-flop would ordinarily change alternately from a high to a low state at pin 7, at the clock rate. This would be very undesirable, and is prevented by keying the clock with U8A.

If space-only or mark-only copy is desired, such as copying a shift other than that for which the filters were designed, or for eliminating interference in one channel only, S1 is placed in either of the single-signal positions. This removes the time-delay circuit, and keys the C_D (preset) input of U4 at the same time the clock is keyed.⁶ This

⁶In this configuration, keying of the clock is not necessary, but for simplicity it is left connected to pin 7 of U8A.

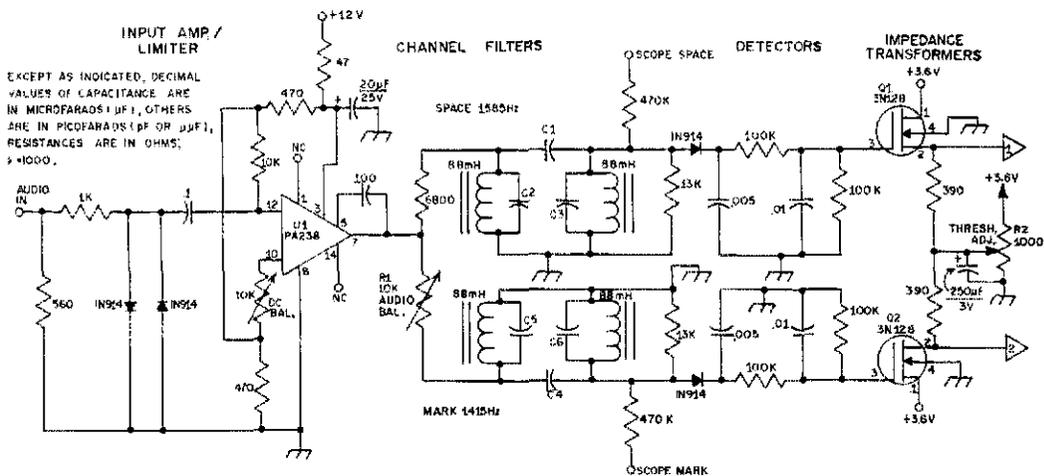


Fig. 2 — Schematic diagram of the RTL-1 "front end." All resistors are 1/4- or 1/2-watt 10-percent tolerance. Capacitors with polarity indicated are electrolytic. Mark and space frequencies of 1415 & 1585 Hz respectively were chosen to receive 170-Hz shift with 1500 Hz as the center frequency, for transceiver operation. Capacitance values for C1 — C6, incl., should be within 5 percent of the values shown in the parts list below.
C1 — .0072 μ F (.005- and .0022- μ F capacitors connected in parallel).

- C2 — 0.1 μ F.
- C3 — 0.105 μ F (.1 μ F and .005 μ F in parallel).
- C4 — .01 μ F.
- C5 — 0.148 μ F (.001 μ F, 0.1 μ F, and .047 μ F in parallel).
- C6 — 0.1455 μ F (.047 μ F, .047 μ F, .05 μ F, and .0015 μ F in parallel).
- Q1, Q2 — Silicon MOSFET (3N128 or 3N152).
- R1, R2 — Linear-taper controls.
- U1 — Integrated-circuit operational amplifier (GE PA238 or equiv.).

Connect pin 8 of all ICs to 3.6 V. Connect pin 4 of U4, U5, and U8 to ground. At U2 and U3 interconnect pins 2 and 4, and at U7, pins 4 and 5.

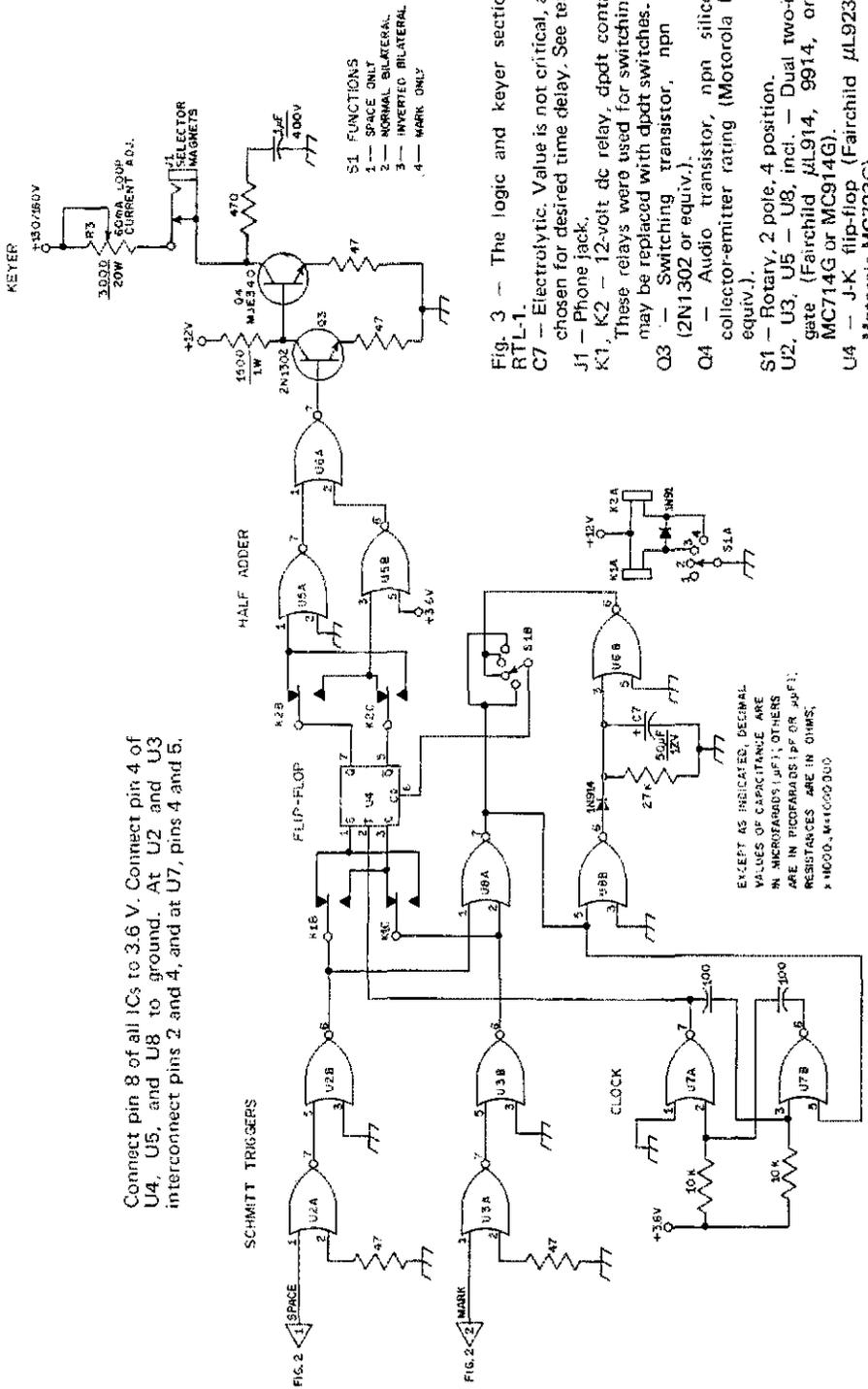


Fig. 3 - The logic and keyer sections of the RTL-1.
 C7 - Electrolytic. Value is not critical, and may be chosen for desired time delay. See text.
 J1 - Phone jack.
 K1, K2 - 12-volt dc relay, dpdt contacts. Note: These relays were used for switching ease, and may be replaced with dpdt switches.
 Q3 - Switching transistor, npn germanium (2N1302 or equiv.).
 Q4 - Audio transistor, npn silicon, 300-V collector-emitter rating (Motorola MJE340 or equiv.).
 S1 - Rotary, 2 pole, 4 position.
 U2, U3, U5 - U8, incl. - Dual two-input NOR gate (Fairchild μ L914, 9914, or Motorola MC714G or MC914G).
 U4 - J-K flip-flop (Fairchild μ L923, 9923, or Motorola MC723G).

causes U4 to be reset to a low output at pin 7 in the absence of input signals, therefore restoring the circuit to the desired static condition, either mark or space.

For those who might be worried about the unlock signal being applied to U4 after the desired signal is applied to either the *S* or *C* terminals during bilateral operation, consider that this time lag is less than 100 nanoseconds, while a signal pulse is approximately 22 milliseconds. The delay circuit has fast-attack slow-decay characteristics. Also, considering that the flip-flop cannot change its state until it receives a clock pulse, the maximum delay is only about 1.1 μ s. Therefore, it should be readily apparent that these time lags can be ignored.

With the utilization of Schmitt triggers, this unit possesses the ability to copy a-m (limiterless) signals, provided they exceed the approximate 1-volt threshold of U2 and U3. In the interest of proving out the logic circuit, it was mated with the limiter-amplifier circuit shown in Fig. 2.

Construction and Adjustment

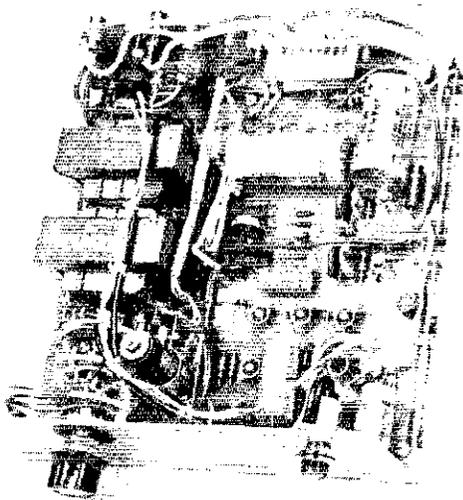
Detailed construction information has been omitted, as normal semiconductor wiring techniques are sufficient. Circuit boards and parts are available if one wishes to use them.⁷ A suitable power supply is shown in Fig. 4.

Values for the channel-filter components were initially calculated from filter equations in the *Radio Amateur's Handbook*, and then cut-and-try methods were used to arrive at the values shown. The use of 170-Hz shift presents an extremely marginal situation when simple filters are used, and this is why more than one toroid per filter was used.

Q1 and Q2, the 3N128 FETs, were utilized in order to provide the necessary impedance transfer between the filter circuits and the logic circuits, while at the same time providing a manual threshold control. (Dual-gate FETs with age are also a possibility.) Watch the handling of Q1 and Q2, keeping a shorting wire around all leads until the transistors are installed.

For optimum performance of the input amplifier circuit after completion of the unit, the offset current in the PA-238 IC should be balanced. This is accomplished by shorting the input terminals and adjusting the 10,000-ohm control connected to pin 10 of U1. With this adjustment, make the output voltage at pin 7 equal to one-half of the value measured at pin 5. In the event that no change occurs at pin 7, or there is insufficient range during adjustment, reverse the connections at pin 10 and 12 and readjust. Then disconnect the short from the input.

The audio balance control at the input to the mark filter is adjusted by feeding 1415-Hz and 1585-Hz tones into the input from an audio generator, and balancing the mark and space filter outputs. Make the measurements alternately at the anodes of the two 1N914 detectors, using either an ac VTVM or an oscilloscope.



Here is the RTL-1 RTTY demodulator with its top cover removed. Neat, compact construction results from the use of an etched circuit board. In the author's demodulator, the channel filters are plugged into the PC connector seen on the rear panel; they have been removed for this photo to expose the remaining components.

The threshold control should initially be set for a voltage of 1.0 dc at pin 1 of U2 (it will be the same at pin 1 of U3). The setting is not extremely critical, and can be for a voltage anywhere between 0.9 and 1.1 dc for this preliminary adjustment. If set any higher than 1.1 volts, noise may occasionally trigger U2 and U3.

Now connect the RTL-1 to a printer and place S1 in the space-only position. With no input signal present, the machine should be in the mark condition, i.e., not running open. Set the loop current adjustment for 60 mA. Now place S1 in the mark-only position. The machine should immediately begin running open. These checks provide a good indication that everything is working.

Next place S1 in NORMAL and feed a 1585-Hz signal into the RTL-1 input. The machine should now run open and continue to run open after removal of signal until C7 discharges. This checks the time-delay circuit that is necessary for bilateral operation.

This completes the preliminary checks and adjustments, and the RTL-1 is now ready for final adjustment of the threshold control. With a good signal being received, or by utilizing any standard RTTY test set providing 170- or 850-Hz shift (depending on the filters), the threshold control should be set for minimum voltage at pin 1 of U2. Then, with mark and space signals being received, increase the voltage with the threshold control until misprints occur, and then back down until perfect copy results.

Comments

The RTL-1 is a proof model for the logic, and it has provided exceptional copy. It does have the

⁷Circuit boards are available from RTTY Associates, Box 91118, Louisville, KY 40291.

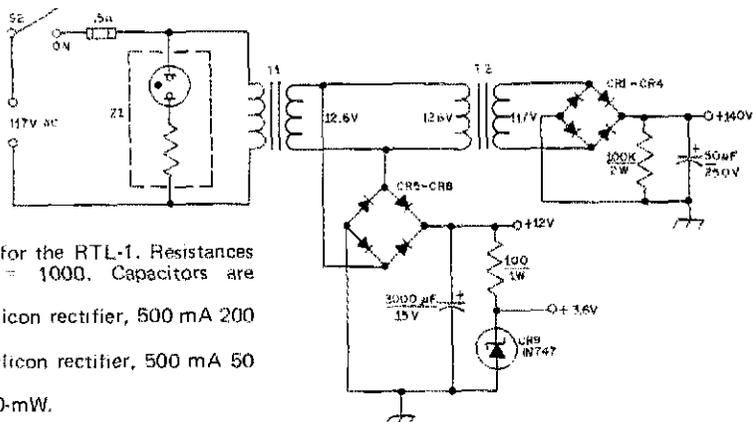


Fig. 4 — Power supply for the RTL-1. Resistances are in ohms, K = 1000. Capacitors are electrolytic.

CR1 — CR4, incl. — Silicon rectifier, 500 mA 200 PRV.

CR5 — CR8, incl. — Silicon rectifier, 500 mA 50 PRV.

CR9 — Zener, 3.6-V 400-mW.

S2 — Spst.

T1, T2 — Filament, primary 117-V, secondary 12.6-V 2-A. Note: A single transformer having 117-V and 12.6-V secondaries may be used.

Z1 — Neon indicator assembly, 125-V.

conventional dynamic-range problem in regard to requiring a limited signal, but the biggest problem experienced with the RTL-1 has been the sharp filters. Their tolerance to drift is not good — 10 Hz is about all that can be handled.

One of the objectives was to develop a circuit that would not be sensitive to voltage variations. The logic circuitry will reliably operate over the range of ± 2 to ± 4 Vdc (100-percent variation). Normal power-line voltage variation causes no measurable deterioration in the performance of the signal-processing or keying stages, and no attempt was made to regulate the voltage applied to them.

The 3.6-V Zener diode in the power supply was used primarily for protection of the IC's, and is not necessary for proper operation. (If omitted, though, some means of protecting the IC's from overvoltage should be provided).

The design of the RTL-1 provides the desired hold or mark condition with no signals being received, yet it "plays" the instant a signal appears. Normal autoprnt includes some initial delay which I didn't want. However, if desired, conventional autoprnt as well as motor-control circuits could be incorporated.

A note of recognition is due to Gordon R. Brame, WA4ZIR, who helped me with the design and fabrication of the cabinet and circuit boards.

QST

The Rec/Counter

(Continued from page 13)

A final word of warning: Remember that your frequency accuracy will be no better than the calibration of your counter. The Rec/Counter is broad enough to allow you to tune in WWV at 15 MHz when the 14-MHz coil and capacitor are used. Carefully zero beat the signal from Boulder. Then set your counter clock until the display indicates 15000.000. For those who may find it more convenient, a set of values is also shown for 10-MHz reception.

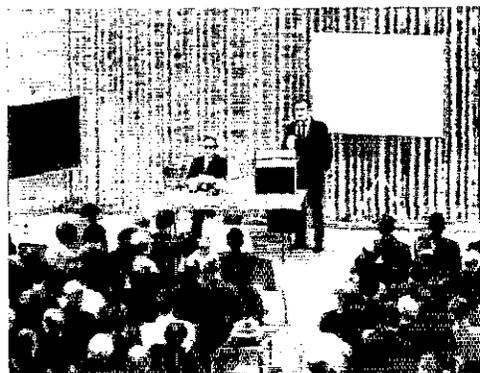
Parts

It should be pointed out that the IC's are not likely to be found at every radio shop. The MC1496C's are generally available from authorized Motorola distributors.⁴ We secured ours from Hamilton Electro, 1741 N. 28th Ave., Phoenix, AZ. As for the CA3001, check RCA distributors. Ours came from Newark Electronics, 4747 W. Century Boulevard, Inglewood, CA 90301.

⁴A list of dealers is available from Motorola, 5005 East McDowell Road, Phoenix, AZ 85008.

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

Strays



More than 250 amateurs and friends attended the opening meeting of the Ontario Science Centre Amateur Radio Club, VE3OSC, in Toronto.

President Bob Rotenberg, VE3AKN, and members of OSCARC hosted the large gathering. All radio clubs in the area from Toronto to Hamilton were invited and well represented. The guest list included amateurs from XE1, W5, and VE7. Guest speaker, on "Antennas: Facts and Fallacies," was Doug Blakeslee, W1KLK. Assistant Technical Editor, QST.

• *Beginner and Novice*

Some Plain Facts About Antennas, Feeders, and Transmatches

BY LEWIS McCOY,* W1ICP

IT IS apparent from our mail that the subject of antennas, feeders, and Transmatches can be very confusing, both to newcomers and to holders of higher-grade licenses. This general discussion of the subject should help the reader to better understand the problem of coupling his transmitter to the antenna system.

The Antenna as a Load

Nearly all transmitters or transceivers are designed to work into a 50- to 70-ohm unbalanced load. A few units will permit some departure from the 50- to 70-ohm impedance load, but they are the exception rather than the rule. If the load mismatch is more than 2 to 1, the amateur may find he is unable to tune or load the final stage in his rig.

Let's assume that one has a dipole whose feed-point impedance is exactly 50 ohms. If we feed this antenna with 50-ohm coaxial cable, the load at the rig will be exactly 50 ohms. However, the antenna will be exactly 50 ohms at only *one* frequency, or at least over a very narrow band segment. As an example, let's suppose we have a resonant dipole on 80 meters which is cut for the center of the band, and the feed impedance of the antenna is 70 ohms. If we shift our operating frequency to the low end of the band, the antenna becomes too short for the frequency (electrically) and if we go to the high end, the antenna is then too long. The impedance will vary considerably as we move from one end of the band to the other.

This brings us to another important point. When an antenna is resonant, only two types of resistance are present at the feed point — radiation and ohmic resistance. The rf energy fed to the antenna will be radiated (radiation resistance) or dissipated as heat (ohmic resistance). When an antenna is operated at some frequency other than resonance, as in our example, the feed point will exhibit reactance. Reactance is expressed in ohms and can be likened to a gate that hinders the flow of current. You cannot supply power to a reactive load. You must compensate for the reactance to get power into the circuit.

There are two types of reactance — inductive and capacitive. If our antenna is too long for the operating frequency it will present inductive reactance. If it is too short, capacitive reactance will be present. In order to get more power into the antenna, we must cancel out the reactance. We can do this by adding an equal amount of the opposite type reactance to the circuit. When we do this, the antenna has only radiation and ohmic resistance.

* Novice Editor

Matching

When we "match" an antenna to a feed line, the matching network is usually designed to tune out the reactance. Also, the matching network can serve as a transformer, stepping the antenna feed-point impedance up or down, as required, to match the characteristic impedance of the feed line. Always keep in mind that one *cannot* change the impedance of a given feed line — it has a fixed value. That being true, the operator should *always* match the antenna to the line.

When considering an antenna as a load, keep these points in mind:

- 1) Electrical length is the primary consideration in determining antenna impedance.
- 2) When the antenna is resonant (and is matched) only ohmic and radiation resistances are present. There should be no reactance.
- 3) The feed-line impedance is a fixed value, but the terminal impedance of an antenna will change as the operating frequency is changed.

You may ask, "If one can get power into an antenna (compensating for any reactance), must the antenna be resonant? Can it be shorter or longer than the resonant length?" The answer to both questions is, "yes."

When the antenna is shortened, the radiation resistance decreases, but the ohmic resistance remains fairly constant. As an example, a resonant half-wave antenna has an impedance of approximately 70 ohms at the center. The ohmic resistance is typically 2 to 3 ohms, depending on the wire size of the antenna. It can be seen that when power is fed to this antenna, most of it is used up in the radiation resistance — exactly what we want. A very small part is dissipated in the ohmic resistance as heat. However, when we shorten that antenna physically, these proportions start to change. A good example is a lumped-inductance 80-meter mobile whip. The ohmic resistance remains about the same as with our full-size half-wave antenna, but the radiation resistance drops to only a fraction of an ohm. This means that most of the power is lost in the ohmic resistance. If we could overcome this problem, a very short antenna would be a more efficient radiator.

The Feed Line

The purpose of the feed line is to transfer the rf power from transmitter to antenna, and to do so as efficiently as possible, and without the feeder radiating. The most popular type of feeder in use by amateurs is coaxial line. Coax consists of two conductors and is tubular in form. See Fig. 1. The shield is one conductor and the inner wire the other. The two conductors are usually separated by

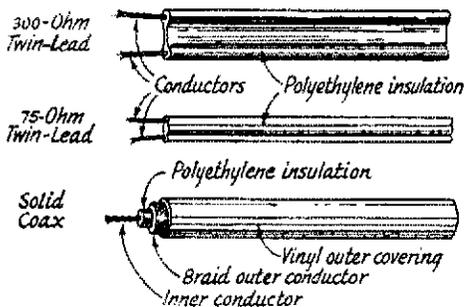


Fig. 1 — This drawing shows some of the typical types of feed lines used by amateurs.

a polyethylene material. Coax is known as an *unbalanced* line, as opposed to Twin-lead or open-wire line, primarily because different size conductors are used, and one conductor encircles the other.

The characteristic impedance of a transmission line is determined by the size of the conductors, the spacing between them, and the dielectric material used to separate them. Two impedances are commonly used, 50 or 70 ohms. (The actual impedance may be slightly different than these figures but the 50- or 70-ohm figure is close enough for all practical purposes.)

The other types of feed line that are popular with amateurs are open-wire feeders and 300-ohm TV Twin-lead. Open-wire feeders consist of two equal size uniformly-spaced conductors. Twin-lead is similar except that a plastic material is used to separate and hold the conductors in place. The impedance of these lines runs from 300 ohms for the Twin-lead to about 600 ohms for the open-wire type.

When we apply power from the rig to the feed line, there is always some power lost in the line before the signal reaches the antenna. This is because of ohmic losses in the wire and the dielectric material used to hold the line together. Another consideration in determining line losses is the frequency of operation. As the operating frequency is increased, transmission-line losses rise (mainly because the dielectric material used in the line has less resistance at higher frequencies).

Let us compare RG-58/U and open-wire line. Assume we have 200 feet of line and a power of 200 watts coming out of the rig. Using RG-58/U on 80 meters, we would lose 30 watts on the way to the antenna. With open-wire line the loss would be less than 1 watt. On 15 meters, our loss with RG-58/U would be 60 watts, but with open-wire feeders, less than 2 watts. Therefore, open wire is the more efficient line. These losses are all based on the line being properly matched at each end. When the line is mismatched, the losses increase. The greater the mismatch (or SWR) the higher the losses become.

In practically any comparison, coax shows up as a lossy line when compared to open-wire or Twin-lead feeders. However, one shouldn't construe this to mean that coax is a poor choice of

feed line. Coax can be buried below ground, snaked through pipes, taped to the sides of towers, and so on, without any effect on its impedance or efficiency. This is not so with open-wire line. It is difficult to generalize about the use of coax versus open-wire feeders because there are so many factors that must be taken into consideration. However, in general, if you plan to use coax to feed an antenna whose resonant frequency will be above 14 MHz, you should select the lowest-loss coax you can afford. Foam-insulated RG-8/U or RG-11/U is a good choice. Also, try to keep the match within 3-to-1 limits — an SWR no higher than 3 to 1. A mismatch of greater magnitude can result in higher losses. And of course, you may have the problem of not being able to load the transmitter output stage because of the mismatch.

The Matter of Coupling

Even though your transmitter is designed to work into the popular 50- to 70-ohm load range, the feed line may present a different impedance to the transmitter. If the difference in impedances is great enough, it may be impossible to make the PA stage load up, as mentioned earlier. This condition is quite common when coax transmission line is used with a dipole whose resonant frequency is slightly different than that of the operating frequency, e.g., a dipole cut for the Novice portion of 80 meters, but which is being used at the low end of the band. Since it would be somewhat impractical to change the length of the dipole for use in various sections of a given band, a compromise can be effected by using a Transmatch between the transmitter and the station end of the feeder. In this instance the device will permit the transmitter 50- to 70-ohm output impedance to be matched to the unknown impedance it sees at that particular point on the transmission line. Because of the existing mismatch at the feed point of the dipole, the impedance at the transmitter end of the line will not necessarily be that of the coaxial cable. This condition can occur even in instances where the dipole is being operated at its resonant frequency. (The height of the dipole above ground has a marked effect of its feed-point impedance, which may contribute to a mismatch that can cause difficulties at the transmitter end of the line.) The reactance which is reflected down the line because of such a mismatch can be tuned out by a Transmatch, thus enabling the operator to use a normally narrow-band antenna over an entire band with reasonable effectiveness. As we said earlier, it is difficult to force power into a reactive load, if not completely impossible!

The Matching Device

The network used to couple the transmitter to the line consists of simple tuned circuits. Such a tuned circuit is called an antenna coupler or Transmatch. Transmatch is the better term (transmitter-transmission-line matcher).

There are many circuits which are suitable as Transmatches. One of the common varieties is shown in Fig. 2. It is the type used with balanced

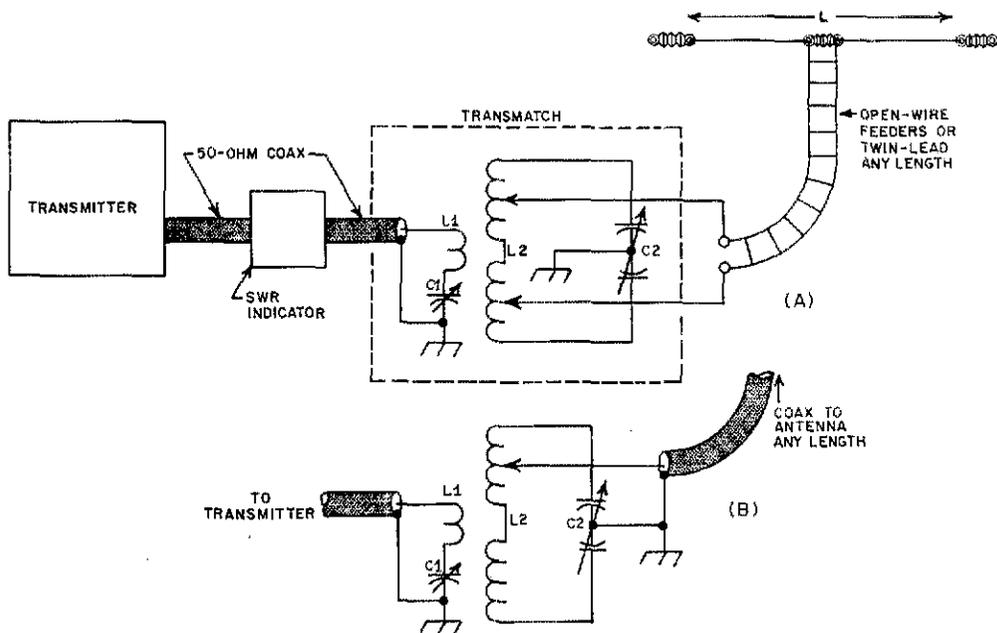


Fig. 2 — At A is the set up described in the text. The same circuit, B, can be used to couple coax to the transmitter. When using coax, always try to keep the length of the line from the station to the antenna as short as possible.

feeders of the 300-ohm Twin-lead or open-wire kind. L1C1 is a series-resonant tuned circuit designed for 50- to 75-ohm impedances, unbalanced. Tuned circuit L2C2 (parallel resonant) is also tuned to the operating frequency. This network can be used to tune out the reactance presented to the transmitter, and will permit impedance transformation between transmitter and line, up or down. The Transmatch also converts the unbalanced transmitter output condition to the balanced characteristic of the feed line.

For example, let's assume we're feeding a dipole with open wire line (Fig. 2). We will not offer a specific length for the feeders or the dipole. We do want to use the antenna on more than one band, say, 80 through 10 meters. Since open-wire line is practically lossless, we are willing to accept a large value of mismatch between antenna and feed line. This being the case, the reactance reflected to the transmitter will not be a matter of great concern as long as we can match the feeder to the transmitter, and in the process, to the receiver.

Adjustment Procedure

The leads of the open-wire line should be tapped on L2, equally away from the center turn of L2, somewhere close to link L2. The taps should be changed a few turns at a time. Readjust C1/L1 and C2/L2 to resonance until the transmitter loads up properly. How do we know precisely when a match has been achieved? Quite simply, by placing an SWR indicator in the coaxial line between the

Transmatch and the transmitter. The matching network is adjusted in the manner just described, while observing the reflected-power reading on the SWR indicator. The Transmatch is tuned for the lowest possible reflected-power reading, usually zero if the transmitter is low in harmonic output. (Harmonic energy, if great enough in level, can provide a false SWR reading since the system is being matched only at the operating frequency.) Once we get this matched condition, we know that the reactance has been compensated for, that we have converted from an unbalanced- to a balanced-line condition, and that the impedance has been transformed either up or down between transmitter and line.

Tricks of the Trade

Some amateurs seem to have difficulty when trying to adjust a Transmatch. One ham we know did a beautiful job of building his Transmatch. There were no wiring errors, yet he couldn't obtain a match no matter what he did. Upon investigation we found that he was trying to adjust for a match while operating his transmitter at full power input. This can be done, but it is not recommended. The transmitter can be damaged, and the adjustment steps have to be made so rapidly that it is often impossible to arrive at the right set of conditions for a match under this kind of pressure. The recommended method is to reduce power as much as possible with the drive control, switch the SWR indicator to read forward power, and set the SWR indicator sensitivity control to maximum. Then, tune up the transmitter for a full-scale reading on the SWR indicator. Next, switch to the reflected-power position and adjust the Transmatch for minimum reading. You'll probably have to retune

(Continued on page 53)



Phone Patching and the Telephone Network

BY GEORGE P. SCHLEICHER,* W9NLT

WHEN WE amateurs make phone patches, we connect two complex but very different voice-transmission systems. We work at a disadvantage, too. Being at the junction point, there is no way for us to evaluate the quality of the voice signal that is delivered to either end of the connection. The purpose of this article is to discuss a few of the elements of telephone transmission and switching that are not generally known to the ham fraternity. Some of these factors can materially affect the success of "patched" conversations. Knowing about them, amateurs who make phone patches frequently can learn to recognize undesirable conditions and to decide what corrective action to take.

First, consider the size of the telephone network. In the United States there are more than 2500 separate telephone companies. These Bell and other operating companies administer more than 21,000 local central offices, and serve some 110 million telephones. Some 1900 offices are involved in switching calls to points beyond their local exchange area. The problem of switching circuits in order to interconnect any two telephones is a big one. Part of the solution is to give each telephone a number that is unique, convenient, and similar in form to all other telephone numbers. The numbering plan that has evolved permits most telephone calls to be completed by dialing seven digits, three to identify the called central office and four to identify the individual line.

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The Bell System is converting to electronic central offices (ESS) for improved service. Here two engineers perform tests at the master control panel of a new office opened in Succasunna, NJ, May 1, 1970. By the year 2000 all Bell central offices are expected to be using ESS.

Most readers will be aware that the North American continent and the major island provinces have been divided into geographical areas and given numbers that are called area codes. More than 125 numbering plan areas have been so designated.¹ When dialing to a telephone outside the local numbering-plan area, we dial the area code, plus the called local number. This brings the number of digits for nationwide dialing to a total of ten.

A degree of logic is built into the equipment in central offices. Through this logic, certain kinds of number groups can be recognized. For example, when we dial a "service code" such as 411 or 611, we are connected to a directory assistance operator or repair service without dialing any additional digits. The central office logic will also recognize if the first three digits constitute an area code; if so, it will wait to receive a total of ten digits before proceeding.² An area code is easy to recognize because it consists of a three-digit group the second digit of which is always a 1 or a 0. This distinguishes an area code from an exchange prefix, since exchange prefixes do not use the digits 1 or 0 in the second digit position. A few other special number combinations are used for testing central office equipment or are reserved for future uses such as international dialing.

Toll Switching

In advancing a long distance call, the equipment in a switching office "remembers" all the digits. Only the first six, the area code and the office prefix, are used in switching the call to its destination. The last four digits identify the individual subscriber line, but they are not needed until a connection has been established with the office in which the called subscriber is located.

You may have wondered how a call can be switched rapidly from one out-of-the-way place to another without building up too many links in the

¹A map showing the numbering plan areas within the U.S. and Canada is included in many telephone directories.

²In some central offices it is necessary to dial a 1 before the area code on long distance calls (a total of eleven digits). Calls to other exchanges within the same numbering plan area may require dialing 1 plus seven digits.

The nationwide telephone system is often called the world's largest computer. This article explains the "whys" behind the technical specifications for phone patches and presents some basic information on how the telephone network routes calls over long distances.

connection. This is done by establishing an organization of offices by class. The number of office classes is limited to five. The office serving customers is the lowest class, or "end office." In ascending order, the other offices are the "toll centers," "primary centers," "sectional centers" and "regional centers." Usually a single machine (above "end office" classification) will function as more than one class of office.

To illustrate how toll switching works, let's take a call from Cresaptown, Maryland, to Dry Gulch, Texas. Since there aren't enough calls placed between these two towns to warrant direct circuits, the switching machines must route each call higher and higher through the organization of offices until an available path is found toward its destination. All calls out of Cresaptown are switched at Cumberland, the area toll center. Lacking direct circuits to Texas, Cumberland will route the calls to the sectional center at Baltimore. (There happens to be no primary center between Baltimore and Cumberland.) If Baltimore has a circuit available to Dallas, it will be selected; if not, the call will be advanced to Wayne, Pennsylvania, which is the home regional center. At this point, the call is switched to the destination regional center at Dallas, and starts down the organization of offices: Dallas to Sweetwater - to Amarillo - to Panhandle - and finally to Dry Gulch. (The routing of this call is indicated in Fig. 1.) There are ten regional centers in the U.S., and each is linked by direct circuits to every other regional center. Circuits are provided between any two offices wherever there is enough traffic to justify them. (Circuit groups of this kind, applicable to traffic between Maryland and Texas, are illustrated by the dashed lines that appear in Fig. 1.)

Switching equipment in each telephone office is programmed so that the most direct route is chosen first. If the direct route is not available for any reason, an alternate is selected. The situation diagrammed in Fig. 2 is an example of the way that alternate routing works. Suppose that a subscriber served from office A wants to call a subscriber served by office B. Under normal conditions his call will be routed via his toll center C to office B's toll center F by way of primary centers D and E. If all of the direct circuits between the primary

centers are busy, equipment at D will route the call to the sectional center G and on to F, F and B. If that path is not available an attempt will be made at D to establish a route through sectional center H, either going directly to sectional center G, or to G by way of the regional center J. The way that the central office equipment is designed and programmed makes it possible for the final route to be selected and connected in a matter of seconds, even though the offices involved may be widely separated.

Interconnection Considerations

Of significance to the amateur operator are the ways that the telephone switching plan can influence phone-patch operation. First, of course, is the matter of end-to-end loss in the telephone connection. Levels received from a distant talker will depend on additional factors, such as the loudness of the distant talker's voice and how close his mouth is to the telephone-set transmitter. Within an exchange, losses will be limited to those in the local "loops" (the circuits that connect the subscribers to their local central office) together with a small loss in the central office equipment. Calls to points outside of the local exchange could encounter from one to nine additional circuit links. A typical loss in a built-up connection between two subscriber offices would be about 8 1/2 decibels (dB). Less than two percent of the long-distance calls encounter more than a 17-dB loss.

A logical question at this point is: Why not increase the amplification in every circuit so that circuit losses are zero? The answer can be summed up in three words - stability, echo and economy. Losses in telephone cables and electronic equipment will vary somewhat over a long period of time due to temperature changes, or for other reasons. If the amount of gain in the circuit amplifiers exceeded the loss in the circuit, it would oscillate or "sing." Even before it reached the point of oscillation, it would begin to sound hollow, as if the speaker was talking into an echo

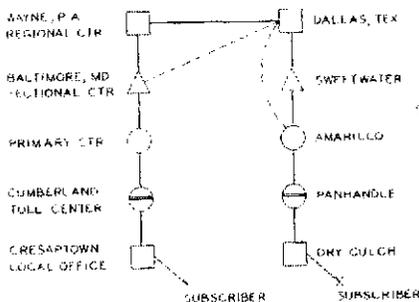


Fig. 1 - Telephone offices used in the example call placed between Cresaptown, MD, and Dry Gulch, TX.

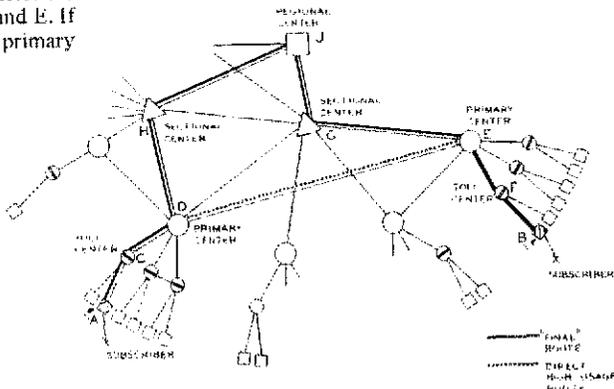
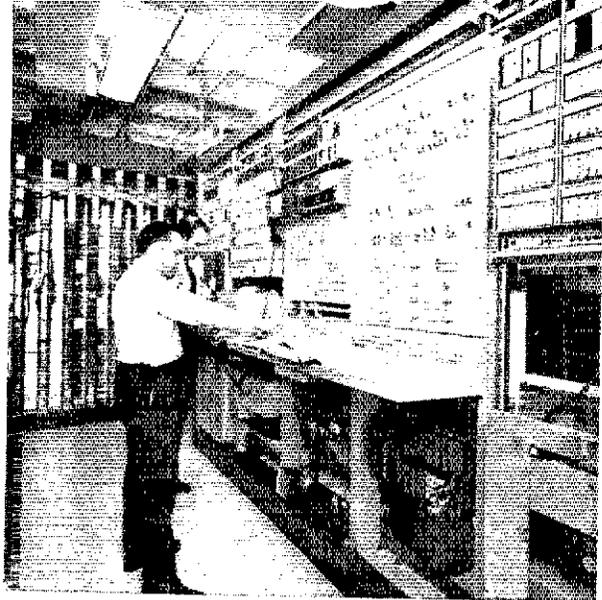


Fig. 2 - Two possible routes through the Bell regional switching centers for the Cresaptown-to-Dry Gulch call.



Keeping a constant watch on the flow of long-distance calls, the Bell Network Management Centers are on the alert for telephone "traffic jams." Calls are sent via alternate routes when trouble develops. The Center shown here is located at Norway, IL.

"four-wire" circuit, (Fig. 4). An arrangement that employs a separate circuit for each direction of transmission requires the equivalent of four conductors, hence the name. Carrier systems, for example, are four-wire systems. Most telephone switching at end office and toll centers is done on a two-wire basis. Most circuits between higher classes of offices is on a four-wire basis. So there is frequent conversion from two-wire to four-wire transmission.

The important point here is that telephone circuits must be operated at a small loss which is related to the speed of the signal along the transmission path. At some points in the telephone network (for example between regional centers) echo suppression devices must be employed.

chamber.³ The hollow sound is the result of echo. (See Fig. 3.) There are two kinds of echo - one heard by the talker, the other heard by a listener - that can be experienced by telephone users. Talker echo is usually the more annoying, and therefore becomes a controlling factor in long-distance circuit design. Tolerance to echo depends on loudness and on the length of time the echo is delayed. An echo will be particularly annoying if it makes the round trip with considerable delay and only slight attenuation.

The speed at which electrical energy travels along telephone lines is one of the main factors contributing to this echo annoyance. On local calls, echo is not a significant problem because, as judged by the talker's ear, it returns almost simultaneously - the talker just hears himself a little louder. But on calls over a long path, a sound may not come back until an instant after it is uttered.

Voice-frequency currents on telephone cable travel at a much slower rate than the speed of light - about 50 thousand miles per second - and at only one fourth of that speed if the cable is inductively loaded. Carrier systems are used to send several voice circuits on a single cable pair and operate at low radio frequencies. Such signals make somewhat better time - perhaps 125 thousand miles per second. Signals travel at almost the speed of light in a microwave radio system, but encounter some delays in waveguide plumbing, intermediate-frequency amplifiers and filters of various kinds. These brief, individual delays, if combined, can result in a significant over-all delay and noticeable echo.

Another factor that contributes to echo generation is that telephones use the same two line conductors for both transmitting and receiving. This is called "two-wire" transmission. As a result of variations in line and instrument impedances, some of the energy sent toward one instrument will be reflected back toward the source. This also occurs where a "two-wire" circuit is connected to a

³Old timers usually refer to this as "rain-barrel" effect.

Over the years telephone transmission between central offices has been provided more and more on carrier systems and less on transmission at voice frequencies. While giving the telephone industry better control over circuit losses, this situation introduces yet another consideration for amateurs providing "patched" connections. When carrier systems are used, it is necessary to send several kinds of signals from one end of the circuit to the other by means of tones in each channel. Of particular interest is an arrangement called "single frequency" signaling. This system uses a 2600-Hz tone to indicate that a circuit is idle. When introduced at one end of a circuit, it causes the disconnection of all central office switches along a built-up path. If we have a phone patch in progress, and our radio receiver happens to pick up a strong heterodyne at or near 2600 Hz, the telephone circuit may be disconnected. Such accidental disconnection is called "talk-off." Whether or not it will prove to be a problem depends in part on our operating habits - whether congested bands are used and whether 2600-Hz energy is filtered from the radio receiver's output. It will depend to a greater extent on the pattern of patched calls - where they go and the kind of signaling that is used on telephone circuits in those routes. If we confine our patched calls to the territory served by our local central office, talk-off will not be encountered. It may become a problem on patched calls to other central offices in a metropolitan area where carrier systems are used.

The three general areas just discussed are of interest to amateurs because they can have an effect on the performance of a phone patch. First, the fact that circuit losses (as well as talker volumes) vary from call to call makes it advisable for us to be able to adjust our operating levels conveniently. The telephone industry has specified only the *maximum* voice power that can be applied to its lines. It is not desirable to send this high a

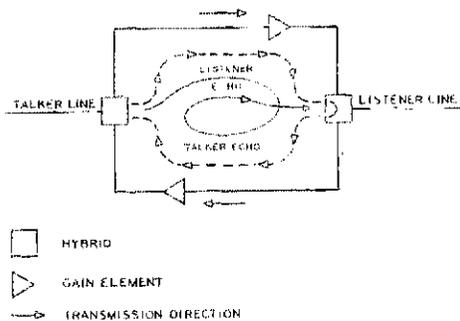


Fig. 3 — An example of a telephone line amplifier which can be a source of echos.

level all the time, however. We should send a level of voice energy that results in a comfortable listening level at the other end of the connection. Furthermore, many people have been conditioned to speak louder on the telephone when they have trouble hearing. As a result, if we receive a low level from the distant talker, we may be able to get him to talk louder by *reducing* the level sent to him.

Second, while echo conditions are controlled within the telephone system, they can be degraded by poor design of the phone patch. Using equipment of too low impedance, for example, may reflect enough energy back toward a distant talker to cause him to receive an annoying echo. If your phone patch was not designed to work at 900 ohms (many commercially-built units were designed to a 600-ohm standard) it would be well to modify it to the higher value. An additional series resistance will usually do the job nicely if you do not want to tamper with the original circuit. Incidentally, the voice coupler connection to the telephone is such that it will present an impedance of between 250 and 600 ohms to your equipment; a value of 450 ohms would be typical. This small mismatch should not be cause for concern.

Most hams are accustomed to carefully matching impedances, however, and may wonder why this situation occurs. The reason is this: Modern telephone instruments and central offices are designed to have an impedance of 900 ohms. Cable pairs have an impedance that varies widely across the voice frequency band, but it is considered to be 900 ohms for exchange telephone design work. If the phone patch has a 900-ohm impedance, it will result in the most favorable power transfer when all three elements — telephone set, line and phone patch — are connected together. In this condition each will be

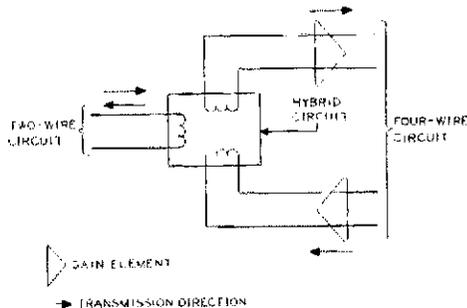


Fig. 4 — A hybrid circuit is used to provide a two-to four-wire conversion for long distance calls.

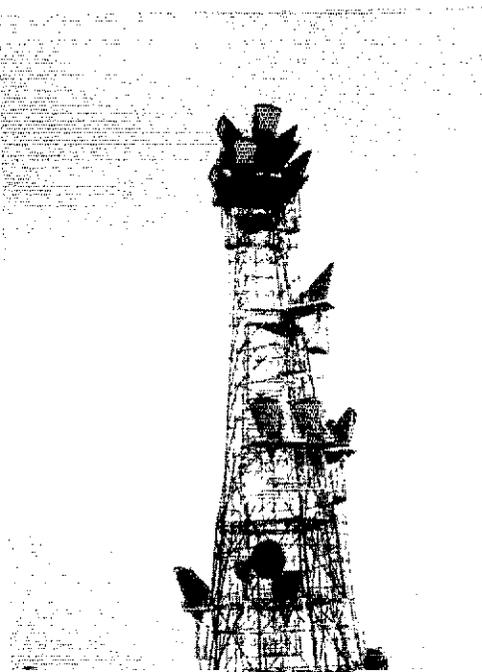
facing an impedance of around 450 ohms, the best possible compromise.

Finally, the introduction of 2600-Hz energy could cause mystifying disconnections of the telephone circuit. A filter can be connected between the receiver output and the telephone voice coupler to cure talk-off problems if any arise. The best place for the filter is to connect it between the radio receiver and the hybrid circuit.

The voice connecting arrangement that the telephone companies provide is designed to make phone patching convenient for the amateur. Connection to the voice coupler is on a two-wire basis and is made with a 1/4-inch phone plug. The interconnecting circuit can be electrically balanced or it may have one side grounded. Both the circuit impedance and the maximum operating level have been standardized.

The amateur's telephone service is protected, too. The wiring between the voice coupler and the associated telephone is arranged so that when the

(Continued on page 53)



Most long-distance calls go either by cable or microwave relay. Shown here is the antenna farm of the Illinois Regional Center.

One-Letter Memory for Touchcoder II

BY LEMBIT TIRRUL,* VE3ETB

IN HIS article describing a keyboard keyer¹ Bryant said, "The development of a simple and inexpensive memory bank would be an interesting project." This statement prompted the author to try out his knowledge of ICs acquired from various articles in *QST*. The result is an inexpensive and simple one-letter memory. It will not completely smooth out the typing difficulties caused by the very different lengths of code characters, but it does allow the operator to release the key immediately, provided he keeps a little ahead in his sending. Thus, operation more closely resembles that of an ordinary typewriter.

The same type of IC is used as in Touchcoder II, and, as this memory is an addition to the original circuit, the reader is referred to Bryant's article. The Touchcoder II circuit is not modified, but some functions are shifted. The ferrite-core transformers do not feed the shift register but set the memory bank which is, in turn, feeding the shift-register C_d inputs through gates U2 and U3. The ferrite cores are homemade from an aerial rod. The number of secondary turns has been reduced to 7 and the leads are reversed. When 6 cores are excited there is still a pulse output which is well over one volt peak in level.

Additional Circuit Description

Gates U5A, U5B, U6, U4, and U7 are connected as flip-flops and form a seven-bit memory bank. They are set by the ferrite-core transformers, T1 through T7, inclusive. When some, or any, of the flip-flops are set, the output

¹24 Central Avenue, Elliott Lake, Ontario, Canada.

²Bryant, "Touchcoder II," *QST*, July, 1969. — Editor

The Touchcoder II keyboard keyer has been duplicated successfully by many amateurs. This article describes a memory, which, when added to the basic Touchcoder circuit, will store one complete cw character, giving the operator some leeway in his typing rhythm.

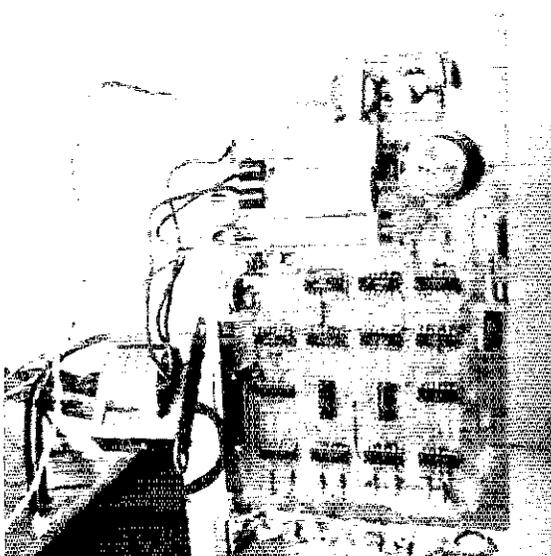
of U9 goes low² at the gate of SCR Q4, and the keyboard is locked out. Any memory flip-flop which is set also puts a low at the U2 or U3 gate input. When the shift register is clear and is waiting for a character, G2A (which is a gate used in Touchcoder II) goes high. This places a low input at gates U2 and U3, and this low, together with appropriate lows from the memory, sends a high to all C_d inputs of the shift register. Now the code formation out of shift register can begin.

When one or more of the shift-register flip-flops is set, G2A goes low. This going from high to low is used as an indication that information from the memory is used and that the memory could now be cleared for the next character. When G2A goes from high to low, U5C and U5D form a positive pulse. This pulse is widened by U8B plus U8C and applied through the inverters to all memory flip-flop clear inputs. At this point it may seem to the reader that an excessive amount of ICs is used, and, in fact, the unit was designed first with fewer components. It almost worked! The inverter stages are required to satisfy fan-out requirements. When there is a character in the memory ready for the shift register, it is processed in less than 40 ns, and G2A stays high only for that long. Thus, gates U5C and U5D are used to form a narrow pulse, and U8B and U8C are used to widen it. A wide, approximately 0.5-ms pulse is required to cover completely the pulse output of the ferrite core transformers, including delays caused by contact irregularities. A narrower cancellation pulse would allow the memory to be set, cleared, and again set by the same input or key pulse.

The Touchcoder II oscillator (clock) cannot be controlled directly by G2A as this puts unwanted

²The terms "high" and "low," alternatively referred to as "ones" and "zeros," are used to designate when the input or output of a digital logic device is near zero voltage (low) or at maximum potential (high). See "Digital Logic Devices" by Pos in *QST* for July, 1968 for further information. — Editor

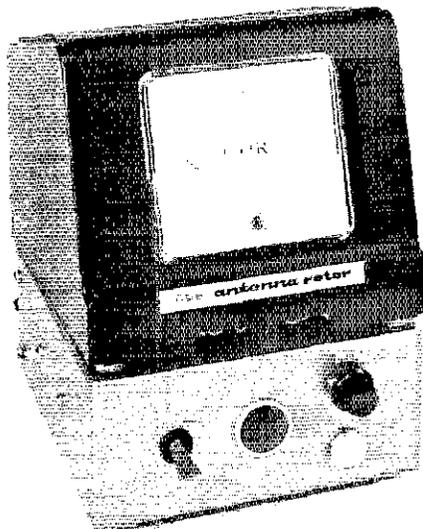
The VE3ETB Touchcoder modification uses a new main circuit board, which bolts just below the homemade keyboard.





Delayed-Action Braking for Antenna Rotors

BY ROBERT M. MYERS,* W1FBY



The Ham-M rotator control.

DO YOU cringe when you let go of the TURN switch on your rotator control box? Or, have you watched that large array or felt the tower while someone turned the antenna? If so, you're all too aware of the torque stress that the rotator gear box is subjected to as the antenna comes to rest at the heading you've chosen. That vision of stripped or broken gears need no longer gnaw at you if you're willing to make a few changes to the rotation system. For those of you who own Ham-M rotators we offer this work- and grief-saving information.

How the Damage Can Occur

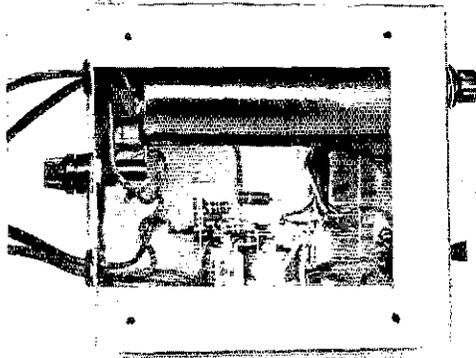
The Ham-M control box has one switch that handles all of the switching functions, S1 of Fig. 1. Contacts 4, 7, and 8 apply voltage to transformer

* Assistant Technical Editor, QST.

T1, which supplies voltage to the indicator meter.¹ Contacts 6 and 7 of the same switch are used to energize T2. This function immediately activates the brake-release mechanism. At the same time, a third set of switch contacts (1, 2, and 3) determines the direction of rotation. When the antenna reaches a certain heading the operator returns the switch to center position. It is at this point when the solenoid releases the brake wedge so that it can drop back into place on the ring gear, abruptly halting the movement of the antenna and mast. The larger and heavier the antenna, the more it will tend to continue its travel, in which case the mast may absorb the torsion, the tower may twist, or the brake will shear the ring gear!

The possibility of rotator damage can be greatly lessened by installation of the simple gadget described in this article. It will hold the brake open while the antenna coasts to a stop.

A modification listed in the Ham-M instruction book mentions how to change the switching arrangement to allow continuous monitoring of the antenna heading. S2 in Fig. 1 is incorporated in the circuit for turning off the control box.



The top view of the homemade chassis shows the location of the components. A bottom plate is permanently attached to this unit using 6-32 screws which also hold the rubber feet in place. The four short interconnecting leads run through rubber grommets on the rear of the chassis. An eagle-eyed reader will note that these wires *should* have been secured inside the cabinet to prevent them from being pulled loose. The large electrolytic capacitor is mounted to the bottom plate using two small terminal strips.

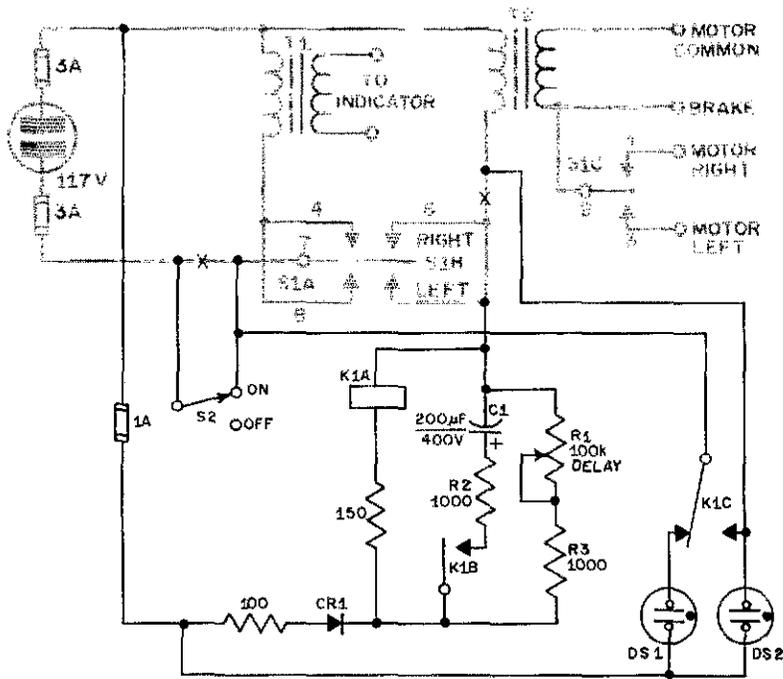


Fig. 1 - Diagram of the modified Ham-M rotor-control box. Fixed-value resistors are 1-watt composition. Connections must be broken at the two places marked "X." The shaded lines indicate original wiring and the heavy lines are additions to the original circuit. Parts designations not listed below are for text reference.

- C1 - 200-µF, 450-volt electrolytic.
- CR1 - 1000-volt PRV, 750-mA silicon rectifier.
- DS1, DS2 - Neon panel lamp, 117 V ac.
- K1 - Dpdt, 3-A contacts, 5000-ohm coil (Advance GHE/2C/5000D or equiv.).
- R1 - 100,000-ohm linear taper composition.

The Circuit

The shaded lines in Fig. 1 show part of the original Ham-M circuit. The dark lines represent the additional connections needed to perform the brake-delay functions. When S1 is activated K1A immediately closes, allowing C1 to charge through R2. K1C is used to apply voltage to T2 which, in turn, opens the brake. Depending on which way the lever is pushed, the antenna turns either left or right. When S1 is released, voltage to the rotator is interrupted by S1C, but K1 remains energized, keeping the brake open until C1 discharges through R2, R3, and R1. The time required for the voltage from C1 to drop to a point where K1 deenergizes is determined by the setting of R1. The range is from 2 to 8 seconds. Two neon lamps, DS1 and DS2, are used to provide visual indication of the brake position.

Construction

No special wiring precautions are necessary. The control circuitry added to the rotator is

completely contained in the lower unit. Four short pieces of line cord interconnect the two boxes.

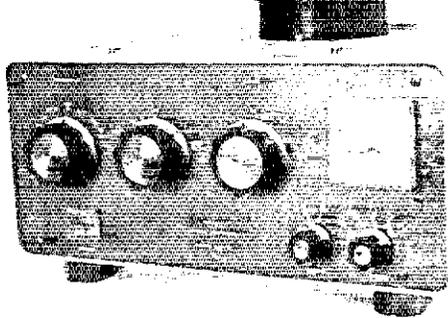
The homemade chassis shown in the photograph is 6 x 6 x 2 inches. It was designed to allow the Ham-M control box to sit on top of it. A Bud AC-1413 aluminum chassis could be used if the builder doesn't want to construct his own. A bottom cover should be used on the chassis to prevent the operator from accidentally contacting ac voltage.

Operation

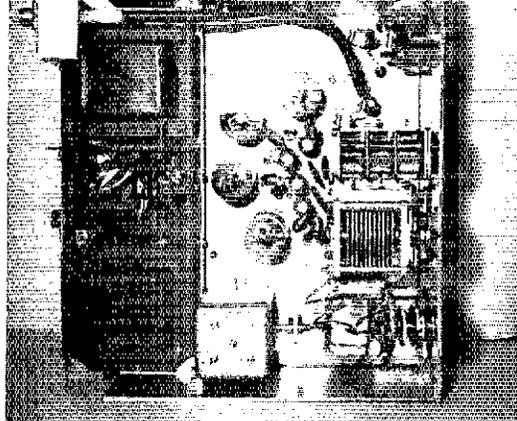
Front-panel control of the delay is desirable. Different time periods are required depending on prevailing winds and the size of the antenna. The operator soon gets a feel for when to let go of the switch to have the antenna stop at the right place. On extremely windy days the delay time should be short to keep the array from windmilling. But on reasonably calm days, the antenna will come to a full stop in less than 5 seconds; therefore the delay time should be set to near maximum. The antenna usually drifts less than 10 degrees. QST

Strays

Louis A. Gebhard is preparing a history of the Naval Research Laboratory. He finds it difficult to relate some of the early events to the operating Navy, and seeks more information particularly from early naval operators in the era between WWs I and II. Anyone who was a shore station or direction finder operator is urged to contact Mr. Gebhard, Naval Research Laboratory, Washington, D.C. 20390. - W3BLC.



A front view of the amplifier shows how the general styling has been matched to the author's Heath SB-line gear. Knobs are Heath replacement parts. The cabinet is a surplus Collins item; an LMB CO-1 (available from Newark Electronics) is a suitable alternate. The front panel has been sprayed with zinc-chromate primer, followed by two coats of Krylon green. Press-on decals identify the controls.

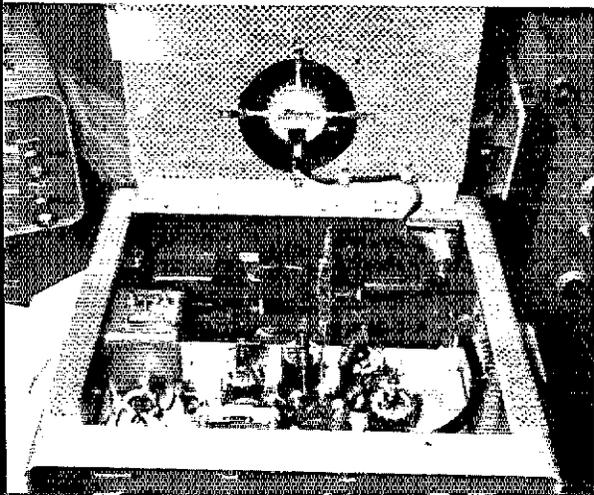


The amplifier layout can be seen in this view. The power supply is located on the rear deck, and the input network is contained in the shielded enclosure at the lower center. The amplifier tubes are grouped around the tuning and loading capacitors. Four 6KD6s are employed in a circuit similar to that described by DeMaw in *QST* for July 1968.

A Picture Story: Construction Details of a Sweep-Tube Linear Amplifier

BY JESSE L. MEREDITH, JR.,* W7JJ

Many circuit diagrams are available for amateur-band linear amplifiers.^{1,2,3} However, the construction details of such a project are often bewildering to the less-experienced builder. Here, in pictures, W7JJ shows how an amplifier can be assembled using inexpensive parts and a little imagination. The finished product has a professional appearance.



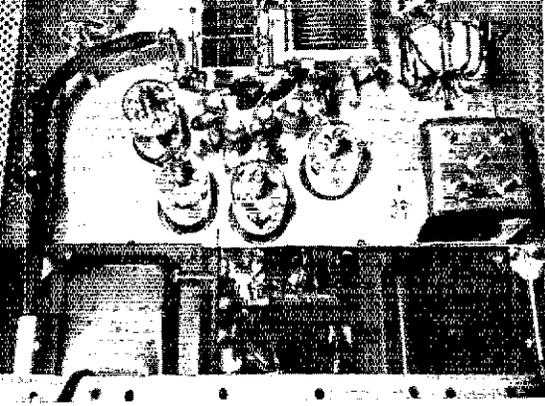
* 2834 Natalie Ave., Las Vegas, NV 89109.

¹DeMaw, "Some Notes on Sweep-Tube Linear Amplifier Design," *QST*, March, 1968.

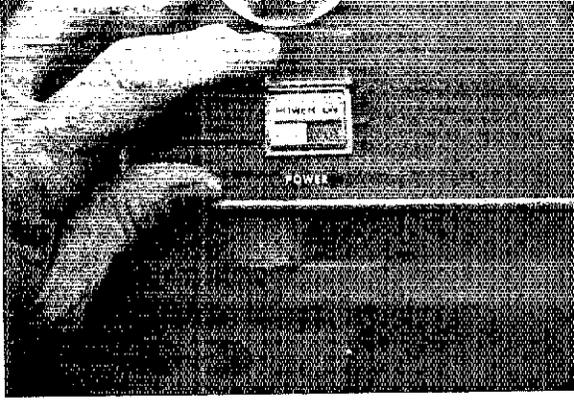
²McCoy, "The Junker Amplifier," *QST*, October, 1970.

³Klein, "The Whole of the Doughnut," *73*, June, 1967.

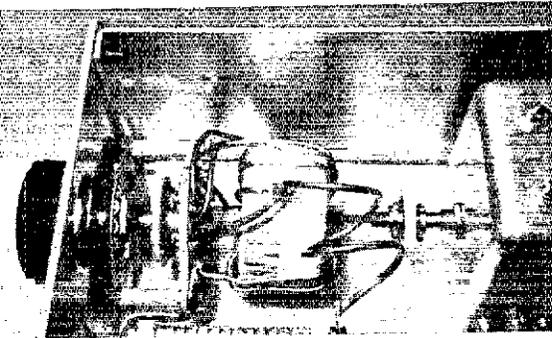
Good cooling is a primary requirement for long tube life in any sweep-tube amplifier. A Rotron "Skipper" fan, bolted to the cover, provides a stream of air to reduce the bulb temperature of the tubes.



Each of the four 6KD6s has its own parasitic choke (5 1/2 turns of No. 16 wire on a 47-ohm, 1-watt composition resistor), plate choke (National 300S), and plate-blocking capacitor (.01- μ F, 3000-V disk ceramic).

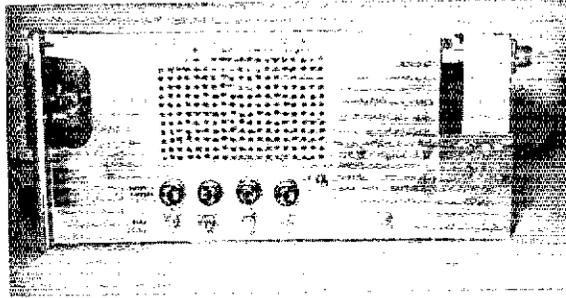


One luxury feature of W7JJ's amplifier is the lighted push-button switch. Built from parts supplied by the Master Specialties Company (Gardena, CA) — a 10EA1C4, a 10EF46827, and a 10E534 — this switch operates relays which turn on the ac power and select the tune or operate modes. The plate voltage is cut in half by changing the high-voltage rectifier from a bridge to a full-wave type when the TUNE position is selected.



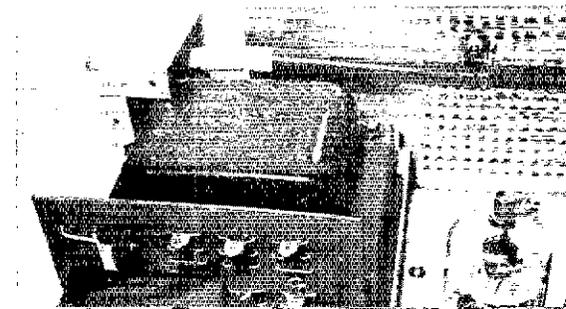
The output network consists of a 10-meter coil (2 1/2 turns of No. 10 wire, 1-inch dia.) and a toroid coil. Two Amidon T-200-2 cores, cemented together and wrapped with teflon tape to provide voltage insulation between the winding and the core, are then wound with 11 turns of No. 10 wire and tapped for 21-, 14-, and 7-MHz operation. The tap points were found experimentally to provide the highest power output. The band switch is a Centralab JV-9032, which is ganged to the input-circuit band switch contained in the shielding can to the left. The tuning capacitor is an E. F. Johnson 250E20 and the loading capacitor is a J. W. Miller 2113, or similar 3-section broadcast variable.

Metering is an important part of any amplifier. This view shows the circuit board containing the series and shunt resistors which allow the 50- μ A panel meter to indicate the plate voltage, total plate current, individual current drawn by each sweep tube, or grid current. All resistors used in the metering circuit are one-percent tolerance.



This side view of the amplifier shows the holes drilled to provide better "air conditioning" for the final tubes. Fuses for the various sections of the power supply are also located on this panel, along with the bias-set controls for each tube.

The rectifier diodes for the power supply, with their associated Transient-suppression capacitors and balancing resistors, are located on a homemade pc board. Two identical power transformers are connected in parallel to provide a continuous high-voltage output of 1200 volts at 300 mA. (See the flyers of Barry Electronics and Fair Radio Sales for surplus transformers.)



Technical Correspondence

IS YOUR GROUND ROD GROUNDED?

Technical Editor, *QST*:

In regard to the hint and Kink article, "Easy Ground-Rod Installation" (*QST*, January, 1971, p. 46), I have a comment. An old-time electrician informed me that the suggested method of sinking a ground rod with water does not assure an acceptable ground. When the soil around the rod has dried out, the diameter of the hole is such that it does not maintain good contact with the rod. I know in this locality the electrical inspector would not approve it. — Tom Seevers, WNØCLH, 1116 Cold Spring Rd., Lincoln, NB 68512.

WHAT ABOUT MICROBAND FM?

Technical Editor, *QST*:

From time to time someone suggests putting the frequency multiplication for fm in the receiver instead of in the transmitter. By transmitting the signals as narrow-band fm and putting frequency multipliers in the receiver i-f to increase the deviation, it has been suggested that the advantages of both narrow- and wide-band fm would be combined.² In fact, someone recently commented that it would use less spectrum space than ssb. You could swing the oscillator maybe 500 Hz or so, and then if you multiplied 16 times in the receiver, you'd have the equivalent of 8 kHz deviation, with a bandwidth of only 1 kHz — less than half that required for a clean ssb signal.

The trouble is that it isn't all that simple. Using the same kind of reasoning would lead to the conclusion that a-m would be even better yet, as it uses only one frequency with just its amplitude varying. No, fm produces sidebands just like a-m, only more of them! If you eliminate all the sidebands except the lowest, the bandwidth is the same as that of an a-m signal.

Without going into the math, which is very much of the "higher" kind, it will be enough here to say that fm produces a whole series of sidebands, spaced at all integral multiples of the modulating frequency and on both sides of the carrier. So if you modulate a 3.9-MHz signal with a 1-kHz audio tone, you'll have sidebands every kilohertz from dc to infinity, but generally only the sidebands nearest the carrier will be strong enough to detect. With up to 600 Hz deviation, you'll be able to hear only 3899, 3900, and 3901 kHz signals. But as the swing is increased, 3898 and 3902 begin to be heard, then those further away from the carrier. One difference between a-m and fm: when the deviation reaches 2405 Hz, the 3.9-MHz "carrier" (signal component) disappears, only to reappear with its phase reversed as the

¹For information on acceptable earth-ground connections, see McCoy, "Grounds," *QST*, December, 1967; also see Hammell, "Lightning Strikes!" *QST*, February, 1971. — Editor.

²Several aspects of the microband-fm principle are expounded upon in an article by John Wasmuth, W8SBQ, in *QST*, April, 1963, "Micro-Band F.M." — Editor.

deviation increases still more. At 5520 Hz deviation, it again drops to zero. The total energy of the signal remains constant; when modulation puts energy into the sidebands, the energy of the carrier is reduced. The amplitude of carrier and sidebands varies as a Bessel function (tabulated in most books of mathematical tables) of order zero in the case of the carrier, of order 1 for the first sideband, 2 for the second, and so on, usually represented by the symbol $J_0, J_1, J_2,$ and so on.

But you don't have to understand Bessel functions to see that it won't work. Let's forget about sidebands completely, and say that an a-m signal is a single frequency that varies in amplitude only, and that an fm signal is a constant-amplitude signal that varies in frequency only. If you reduce the bandwidth below that required to pass the sidebands, you smooth out the modulation. A tuned circuit has a flywheel effect, and stores energy in the form of currents circulating between the inductor and capacitor. If a tuned circuit has a Q of 10, there is ten times as much energy circulating as there is being put in or out. If the tuned circuits are sharp enough (have a high enough Q) to pass only the carrier, any variations of that carrier in either amplitude or frequency are automatically filtered out — the changes occur too rapidly for the level of stored energy to adjust itself to them. The modulation just won't be there any more.

But for reception you must have such a sharply tuned circuit to derive the benefit hoped for from microband fm. Otherwise frequency multiplication would only make the QRM from nearby signals within the passband worse. Frequency multiplication is produced by nonlinear elements in the circuit, and nonlinear elements also produce beats. If you fed two signals 1 kHz apart into a circuit that multiplied the frequency 16 times, you would have two signals 16 kHz apart, but also fifteen birdies in between, separated by 1 kHz each. The last state of things would certainly be worse than the first!

This particular approach does therefore lead to a blind alley — it just won't work. But it is good that hams continue to think along such lines, because it's the way progress is made. — The Rev. Benjamin Clark, WB4OBZ, Mepkin Abbey, Moncks Corner, SC 29461

OR MICROBAND SSB?

Technical Editor, *QST*:

The method proposed by WASUNK for generating narrow-band ssb ("Technical Correspondence," *QST*, February, 1971) was very interesting. It is amazing that we have not heard of this kind of circuit before. I agree that the signal processor designed by Karl Meinzer, DJ4ZC,³ generates an ssb signal which is only 1 kHz wide, and it is possible to transmit and detect this signal. The only problem with using the DJ4ZC processor for this application is that it would have high spurious outputs well outside the passband. This is because the demodulated ssb envelope modulates the signal in the fm path in a complicated nonlinear fashion which has no relationship with the original ssb signal. The calculated output spectrum for a two-tone ssb input is shown in Fig. 1. It can change a great deal with changes in the phasing and amplitude of the demodulated ssb

³Meinzer, "A Frequency Multiplication Technique for VHF and SSB," *QST*, October, 1970.

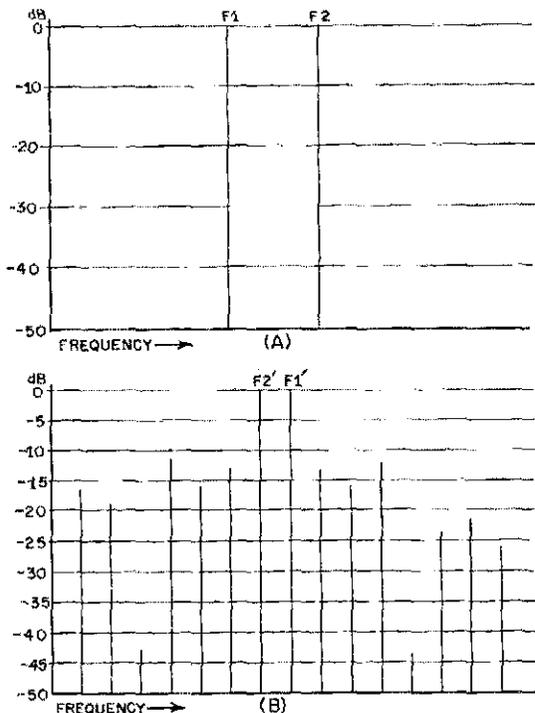


Fig. 1 - Shown at B is the calculated output spectrum from DJ4ZC's processor with two signals, as shown at A, applied to the input. Calculations were performed by WB2FAF.

envelope, but spurious outputs will remain high in any case.

A crystal filter should be used at the output of the DJ4ZC processor if it is to be used for narrow-band ssb applications, or a more linear circuit, such as a regenerative divider, should be used.

As a final note, a user of this system should not expect a greater signal-to-noise ratio than ordinary "wide-band" ssb. This is because, even though the noise bandwidth is reduced, the compression of the signal bandwidth reduces the effectiveness of the modulation. The tripling circuit needed in the receiver, moreover, will add some noise to the system, making narrow-band ssb noisier than ordinary ssb. - Erni Roos, WB2FAF/4, 5821 N. E. 18th Ave., Ft. Lauderdale, FL 33308.

SUCCESS STORY - RIDDANCE OF POWER-LINE NOISE

Technical Editor, *QST*:

I had put up with power-line static for years under the mistaken impression that it was coming from practically every insulator on every pole, and a definite uncertainty that it really was power-line static that I was hearing. One day, for reasons now forgotten, I connected the receiver audio output to the oscilloscope. Using a slow sweep speed, I saw immediately that it was line static. The static came as bursts of pulses, 120 bursts per second, synchronized with the line frequency. As you might expect, there was no static while the line voltage swung through zero and for a fraction of a

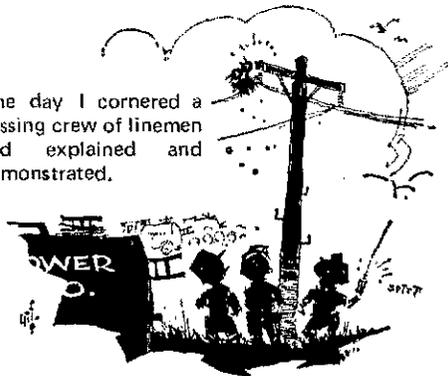
cycle each side of this event. Close inspection of the oscilloscope pattern showed that the pulses came in families, characterized by rather even pulse height and pulse frequency. A high spiking pulse of low pulse rate and a weaker pulse of a faster pulse rate were conspicuously present. The pattern varied with time and was different with the positive and negative voltage peaks, which made interpretation difficult, but it was obvious that I was deafing with just a few static generators, six at the very most.

The next observation of value was that an inexpensive transistor radio could be coupled to a line by holding the ferrite antenna near the line but sideways to it, so that the winding turns were parallel to the line. This receiver picked up the static on the house wiring from a distance of about four inches. It picked up the static from the guy wire on the pole in my yard from a distance of twenty paces. That was the low-frequency pulse. The high-frequency pulse came down the ground wire of the same pole and was detectable up to about three feet away. Fierce static started up on the guy wire of the neighboring pole when it was jiggled. The static could be heard on the pole ground wires throughout the neighborhood, but it was progressively weaker with increasing distance from my place. There was no static on the pole ground wires of the main power line that passes within 200 yards of my place.

I called the power company twice without results. I later learned that a man came out with a receiver and found nothing. One day I cornered a passing crew of linemen and explained and demonstrated. When I showed the boss the oscilloscope picture, his comment was, "So that's what an oscilloscope is." But they were helpful. They tightened connections, shortened bolts, and finally found that removal of an unused lag holt stopped the guy wire static. They left with a promise to notify the experts at the office.⁴ The static is now gone, and I'm grateful for it. - Volney Wallace, W7SJZ, Box 534, Dugway, UT 84022.

⁴An earlier *QST* article by W. R. Nelson, "Electrical Interference," appears in the April and May 1966 issues. Causes, identification, tracking, and cure are discussed, and a generous display of cathode-ray presentations shows various types of interference. In the hope that this information may be helpful to power-company representatives concerned with the problems of radio interference, a limited number of reprints of this article has been prepared. If you desire to present a copy to your local power-company officials, send a self-addressed envelope, 7 x 10 inches or larger, and 12 cents in stamps to ARRL Hq. A more recent article, "Power-Line Interference," by Holloway, appears in *QST* for July, 1970. Reprints of this article are not available. - Editor.

One day I cornered a passing crew of linemen and explained and demonstrated.





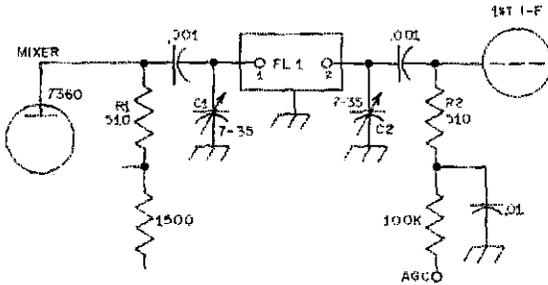
Hints and Kinks

For the Experimenter



A DIFFERENT FILTER FOR THE W50MX RECEIVER

In regard to the W50MX Communications Receiver published in January, 1968 *QST*, several builders have inquired as to the suitability of the KVG crystal filters for this project.¹ A KVG model XF-9B² was tried with the circuit modifications shown in the diagram. Its performance exceeds that of the McCoy filter specified in the original article. The narrower passband (2.4 kHz instead of 2.8 kHz at the 6-dB points) helps to separate signals in the crowded bands. Circuit modification consists of replacing transformers T1 and T2 with 510-ohm terminating resistors R1 and R2, and adding capacitors C1 and C2 for adjustment of the passband ripple. (The impedance matching network is contained inside the KVG unit.) — Robert D. Curtis, W50MX

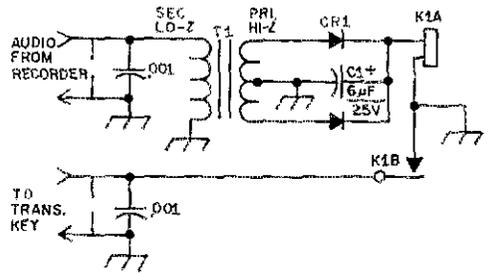


Revised schematic diagram showing how to use a KVG filter in the W50MX receiver.

RELAY DRIVER

After my first few weeks as an Official Bulletin Station, the three-times-a-week cw schedule began to be somewhat of a chore. With the longer bulletins, or even after an evening of operating, the monotony of continued sending can cause errors to crop up. It is also difficult to maintain the character formation and constant speed of a mechanical sending unit. Lacking the equipment to duplicate WIAWs perforated-tape setup, I chose the next best plan.

Reception of the nightly bulletins on 80 and 160 meters is quite good in this area, and it is a simple matter to record them on audio tape. As shown in the diagram, the audio output of the recorder is fed into transformer T1, which uses a full-wave rectifier after its secondary. Filter capacitor C1 can be any value from 5 to 25 μ F, depending on the current requirements of the relay. Several values may have to be tried to obtain "clean" keying.



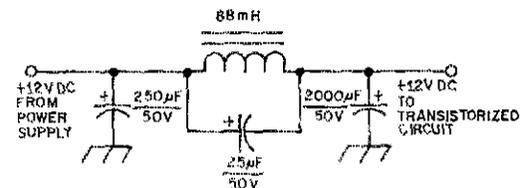
Schematic diagram of the relay driver.

- C1 — 6- μ F electrolytic, 25 V.
- CR1, CR2 — 1N34A germanium.
- K1 — Low-voltage reed relay (Clare MR4MA or equiv.).
- T1 — Audio output, 6000-ohm ct to voice coil (Triad S-64X).

While this circuit performs well for its intended purpose, it also lends itself to any circumstance which requires repeated sending of a set message, such as a CQ loop. — Ken M. Voelker, WA2BCT

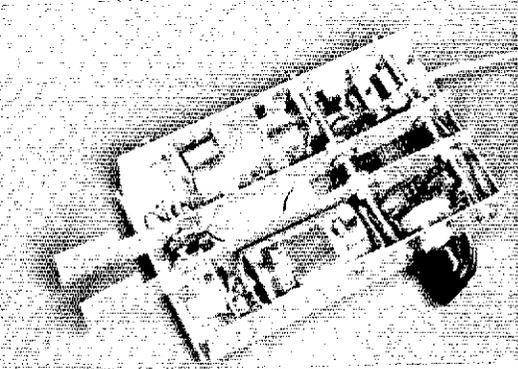
REDUCING RIPPLE IN MINIATURE POWER SUPPLIES

When working with transistors, miniaturization is usually the keyword. For this reason you will seldom see a smoothing choke in the power supply of transistorized gear. Instead a resistor is substituted. This technique is fine for low current demands, but for higher values of current, the resistor degrades the regulation and causes a significant voltage drop. A simple cure is to use a tuned choke. An 88-mH toroid in parallel with a 25- μ F capacitor presents a high impedance at 120 Hz, has an internal resistance of only 10 ohms, and can handle up to 200 mA of current. The component values given in the diagram have a resonant frequency of 106 Hz. With an audio oscillator and an oscilloscope or VTVM, the resonant frequency could be increased to that of the ac ripple by removing turns on the toroid. The filter values given reduce the ripple by a factor of 10 as compared to a filter using a 10-ohm series resistor. — Richard M. Mattels, W4YAA



The filter circuit.

¹ Available from Spectrum International, Box 87, Topsfield, MA 01983.
² A short description of the KVG filters can be found in November, 1970 *QST*, page 49.



FORMICA KEYSER PADDLE

An inexpensive electronic-keyer paddle can be made from a Minibox and two strips of Formica table-top covering. The Formica strips are flexible enough to give a feel similar to that of a bearing movement, yet have enough rigidity to be self-supporting. The mounting shown in the photo provides for adjustment of both tension and travel. I used a Minibox large enough to contain the batteries and electronic components. — *Richard Lamb, KØRJV*

INEXPENSIVE CRANK-UP TOWER

An extension ladder, wood or aluminum, can be used as an antenna support. It can be raised or lowered easily with a rope or winch. Cost and upkeep are reasonable. — *W. C. Holder, W4AAZ*

INCREASING PLATE VOLTAGE

A "smoke test" recently led to disastrous results in one of my power supplies. Among other things, the plate transformer burned up. The closest replacement I could locate was 100 volts short of what I needed. As it happened, though, I had available a 50-VA isolation transformer which, when connected as shown in the diagram, provided the needed voltage. The bridge rectifier assured that the voltage from T2 added to the high voltage from T1. CR1 through CR4 are 200-PRV, 1-A, silicon diodes. The .01- μ F capacitor is necessary to prevent switching transients from damaging the components.

No doubt this same arrangement could be used to advantage with other transformer voltages. Care should be taken, however, not to exceed the ratings of the main filter capacitor or other components. — *F. V. Kohl, W4NM*

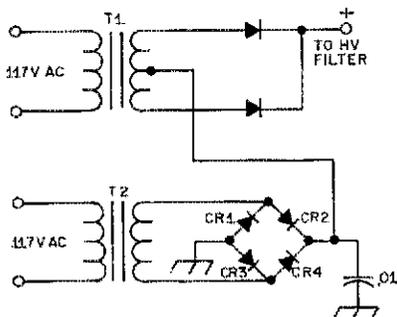


Diagram of the booster arrangement. Component designations are for text reference.

MAKESHIFT RUBBER FEET

Temporary feet for a piece of home-built equipment can be made from Dr. Scholl's Adhesive Foam. This material is made of foam rubber with adhesive on one side and comes in 6 by 6-inch sheets. It is available from most drugstores and can be cut to any desired shape. I have used it on the underside of my transmitter chassis and on the bottom of my key-mounting board to keep it stationary during use. — *Jeff Bauman, WB2WRH*

SALVAGING COMPONENTS FROM SURPLUS PRINTED-CIRCUIT BOARDS

Surplus component boards, currently available at very reasonable prices, are a good source of diodes and transistors. However, it's easy to damage the parts during their removal. If the components are unsoldered, they can be damaged by excessive heat; if the parts are cut loose, they may be of no value because their leads are too short. On the other hand, if the circuit board is literally cut from around them, all the parts can be salvaged.

Cut the board between the components with a pair of diagonal side-cutting pliers or small tin snips. Although the circuit board will be completely destroyed, this is of no consequence since we are interested only in salvaging components. As the board is successively cut into smaller and smaller fragments, each with a single mounted component, it will become easy to completely free the desired item. As a final step, cut through the hole where the lead was inserted and soldered (on the reverse side of the board). This will free the item, with only a blob of solder remaining on each lead tip. Remove the blob by simply crushing it with a pair of long-nose pliers.

As described above, I have salvaged components without heating them or further shortening leads that were already short. I have removed without damage 1/10-watt resistors with 5/16-inch leads and transistors with leads sufficient in length to allow their insertion into transistor sockets.

One word of caution: Some circuit boards shatter violently when cut with diagonal cutters, so the use of safety glasses is strongly recommended. — *John J. Risch, WØFFV*

WINDING COILS

When winding coils of small gauge wire, it often becomes difficult to maintain the desired spacing and still have a neat coil. To avoid this problem, I first wrap the coil form with cellophane tape that has adhesive on both sides. Then when winding the coil, the wire may be placed exactly where it is intended to be located and it will stay put. The completed coil may be protected by covering it with a heavy coat of lacquer or varnish. — *Robert A. Pautsch, WASKIE*

SOLDERING VISE FOR SMALL PARTS

A spring-type wooden clothespin makes a handy vise for soldering small work. Mount it in a vertical position on the workbench. — *K1ZND*

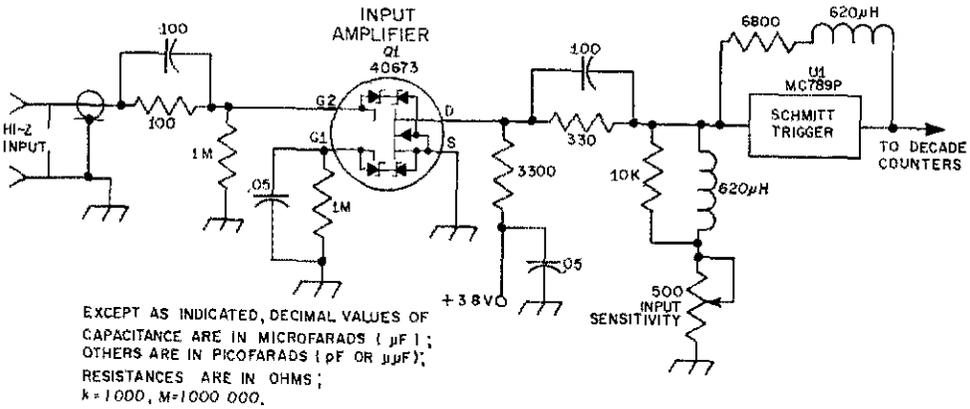


Fig. 2 - Schematic diagram of the dual-gate MOSFET input amplifier. The Zener-diode-protected gates can handle relatively high levels of input signal, as shown in the chart of Fig. 3.

from 1 Hz to 15 MHz, direct ham-band measurements can be made through 20 meters. Experience with the model shown here proved that the unit would work satisfactorily through 23 MHz by using slightly more signal input than is required for its guaranteed coverage range. This equipment should also be useful to experimenter-type amateurs who wish to calibrate oscillators and measure frequency drift on their homemade and commercial gear. A frequency counter soon becomes the right arm, so to speak, of the person who has grown accustomed to having the accessory on hand. Heath has recently announced the availability of an outboard prescaler which will extend the range of the IB-101 to 175 MHz, thus providing measurement capability well into the vhf spectrum. The prescaler kit is sold as the IB-102.

Circuit Information

The block diagram of Fig. 1 illustrates how the various stages are tied together. The solid-state devices that are used in the kit-builder's recipe consist of 7 bipolar transistors, 1 dual-gate MOSFET, 26 ICs, and 6 diodes. There are 5 readout display tubes, each containing separate anodes for the numbers 1 through 0.

The input stage of the counter employs a 40673 dual-gate MOSFET, Fig. 2, to provide a high-impedance input characteristic. This feature prevents loading of the circuits being tested. This device offers further benefits through its ability to accommodate a wide range of input voltages and waveshapes. The 40673 has Zener-diode-protected gates which protect the transistor from excessive input voltage.

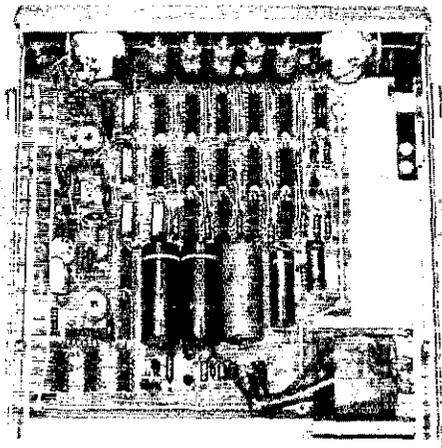
A Schmitt trigger, U1, follows input stage Q1. This circuit shapes the input signal into a square wave so that it will be suitable for driving the logic that follows. Decade counters change the sequential input pulses from the Schmitt trigger into a binary-coded 8-4-2-1 output.

It would be difficult to explain, in depth, the function of the logic circuits without providing symbols and truth tables in this review, and such a presentation would be rather far beyond the scope of this write-up.¹ Following the initial processing of the input signal, as outlined in the foregoing, conventional logic techniques are used. The usual collection of decade counters, buffer storage circuits, decoder drivers, and display tubes are utilized. The instruction booklet covers the theory of circuit operation in considerable detail, and can serve well as a course in counter logic by itself.

Some Specifications

The time base for the IB-101 is a 1-MHz crystal-controlled oscillator. Its aging rate is less

¹Principles of operation, and amateur uses of frequency counters were given in QST: Macleish, "A Frequency Counter for the Amateur Station," QST, October 1970.



It can be seen from this inside view of the frequency counter that the layout is very orderly and uncomplicated. The majority of the parts are mounted on a pc board. Power supply parts are installed on the main chassis, which is metal.

than 1 part per million per month after 30 days of operation. The ambient temperature stability is rated at less than ± 2 parts in 10^7 /degree C, at 20 to 30 degrees C after 30 minutes of warmup, and $\pm .002$ percent from zero to 50 degrees C. Overall accuracy is \pm one count \pm the time-base stability.

The gate times are 1 millisecond or 1 second, with automatic reset. Input sensitivity is rated at less than 100 mV (rms) from 1 Hz to 1 MHz, and less than 250 mV (rms) from 1 MHz to 15 MHz after a 30-minute warmup period. The input impedance is 1 megohm, shunted by less than 20 pF capacitance. Maximum safe input signal (ac only) is 200 volts rms from 1 Hz to 1 kHz. It is necessary to derate the input by 48 volts per frequency decade. A chart showing the voltage input limit versus frequency is given in Fig. 3.

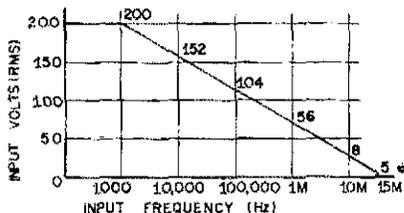


Fig. 3 — Chart showing the maximum allowable rms input voltage versus frequency. M = million.

Assembly Notes

Most of the components are mounted on a single circuit board. The power supply is built on the main chassis, and very few interconnecting wires are needed between the power supply and the circuit board. Similarly, there are not many connecting leads required between the panel controls and the circuit board.

The sockets for the ICs are made up by the builder from long strips of stock which are provided with the kit. The constructor must count the required number of pins per IC, cut off the length of stock needed, then solder it into the pc board. *Use caution during this part of the operation!* The metal is extremely brittle. Excessive flexing will cause the stock to break during installation, or when the ICs are inserted into the sockets. Luckily, in the writer's situation, there was a sufficient excess of stock to take care of two hull-in-the-China-shop errors which resulted from over-zealous attempts at fast assembly.

There was another part of the construction job that caused great consternation to the writer. The display tubes are supplied with plastic base mounts which are used to index the thin wire leads so that they mate with the proper holes in the tube sockets. The instructions call for the base mounts to be pushed up against the tube bases prior to the insertion of the tube leads into the pc-board sockets. With luck, this can be accomplished without difficulty. However, two problems were observed as a result of the plastic collars being used: The tubes would not remain securely seated in their sockets, thus leading to frequent

Heath Model IB-101 Frequency Counter

Height: 3 3/8 inches.

Width: 8 1/4 inches.

Depth: 9 inches.

Weight: 4 1/2 pounds.

Power Requirements: 105 to 125 volts ac,
or 210 to 250 volts ac, 50/60 Hz, 8 W.

Price Class: \$200.

Manufacturer: Heath Company, Benton Harbor, MI 49022.

intermittent operation of the readout tubes. This required the removal of the top cover of the counter and subsequent wiggling and pushing of the tubes to restore electrical contact. A second problem occurred when one of the display tubes lost vacuum because its glass tip was somewhat longer than those of the other tubes, and this tip was broken off when the top cover was installed. The plastic base collars cause the tubes to sit quite high in the cabinet, thus the possibility of damage. The cure came when the collars were discarded and the tubes were placed in the sockets without them. This is a tricky undertaking, however, and one must be very careful to get the tube wires into the proper holes in the sockets. The balance of the assembly effort was fast and without incident.

Final Comments

Checkout and alignment was simple and to the point. Two methods of alignment are given in the book. One requires separate test equipment, and the other calls for nothing more than a standard a-m radio set for calibration. Both methods were tried, and similar good results were obtained.

Indications to date are that all of the manufacturers specifications for the counter are as stated in the instruction book. The IB-101 should make a useful low-cost addition to any ham's workshop, and certainly reflects the current amateur state of the art for frequency measuring.

The cabinet of the IB-101 is finished in the new Heath colors — tan and brown, with chrome trim. The carrying handle doubles as a fill-up stand when the equipment is being used. A test cable is included with the kit, and a UL-approved three-pin ac cable plug is used for connection to the mains. An adaptor plug for the older two-hole ac outlets is furnished. The adaptor has a ground wire which is common to the ground pin the three-connector plug. *WICER.*



Antique wireless buffs will be interested to know that a permanent exhibit depicting the early Marconi station near Glace Bay, Nova Scotia, has been included in the Miners' Museum near Sydney. Although the museum is devoted primarily to coal mining, the Marconi station was an important landmark in the community of Glace Bay and part of the museum has been set aside to represent it in the form of photos and artifacts — *W2LT.*

Some Plain Facts . . .

(Continued from page 35)

the final amplifier to resonance after each adjustment of the Transmatch. Keep in mind that as you tune the Transmatch you are changing the load that the transmitter "sees."

The more reactive the load, as it may be at some frequencies, the more critical the Transmatch adjustments may become. Once you find a tap point on Transmatch coil L2, plus a setting for C1 and C2, that results in a larger forward- than reflected-power reading, you're close to having a match. Only slight additional adjustment of the taps and tuning capacitors should be required to get an SWR of 1. This is a zero reflected reading vs. a full-scale forward reading on the meter. Now you can load your PA stage to full rated power, safely. Of course, the Transmatch will need readjusting when you change bands, but should only require touching up when moving the operating frequency over short spreads in one band.

You may find that there is more than one combination of adjustments that will provide a match. The best plan is to use adjustment conditions where the feeders are tapped farthest out from the center of L2. This will allow the greatest bandwidth, therefore, less need to readjust the Transmatch. Note your dial and tap settings for each band. This will make the tuning job easier when changing bands.

We said earlier that the antenna under discussion would work on 80 through 10 meters. This is true, but for best antenna efficiency the overall length of the dipole should be no shorter than 1/4 wavelength at the lowest proposed operating frequency. In other words, for 80-meter operation, make the antenna at least 60 feet long. Generally speaking, the longer the antenna the better.

References

The following articles cover the construction and use of Transmatches and SWR indicators:

- McCoy, "The Ultimate Transmatch," *QST*, July 1970.
De Maw, "In-Line RF Power Metering," *QST*, December 1969.
McCoy, "Antennas and Methods of Coupling," *QST*, February 1969.
McCoy, "Why a Transmatch?" *QST*, January 1968.
McCoy, "A Complete Multiband Antenna System," *QST*, November 1967. **QST**

Phone Patching

(Continued from page 39)

telephone handset is in place on its base, the voice coupler is disconnected. In this way, an accidental short circuit or other malfunction in the amateur's equipment cannot interfere with his telephone service. During the course of the patched communication the telephone handset may be used or not, depending on the user's preference. The Bell companies offer an option which provides an extra turn-button on the telephone set. When operated, the button will disable either the handset transmitter, the handset receiver, or both. This

feature makes the interconnection compatible with virtually any amateur station arrangement. In ordering one of these voice couplers from a Bell System company the amateur should ask for Voice Connecting Arrangement OKT, making sure to specify which optional arrangement of the turn button is desired.

Phone patching offers amateurs an opportunity to develop their technical abilities and to perform the kind of service that the public will appreciate. With knowledge and practice, any ham can "patch" skillfully. **QST**

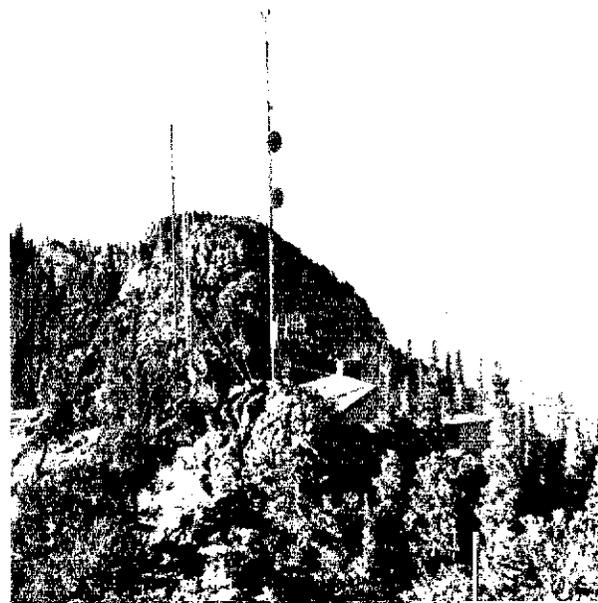
Strays

Hq. Staff Openings

We are accepting applications for future openings in the ARRL Technical Department. Career-minded applicants are invited to send a resume to the technical editor at Hq. We are looking for individuals with a flair for writing. Such persons must be able to spell and punctuate accurately. Also, it is important that the applicant have a good general background in amateur radio circuit design and fabrication. A degree in engineering is desirable, but not essential. Application forms are available upon request. Inquiries will be kept confidential.

Recently a couple of old timers visited League Headquarters and were shown around. They were obviously impressed. One of them was heard to remark as he left the lab, having been shown printed circuits, integrated stuff, etc., "Only thing wrong with this place is they don't have any oatmeal boxes."

At an elevation of 11,500 ft., W0WYX, atop Squaw Mountain, Colorado (30 miles west of Denver), tops WB0DBK's claim to the title of the U.S.'s highest home station ham shack by 300 ft. Can anyone top that?



LDEs, Hoaxes, and the Cosmic Repeater Hypothesis

BY O. G. VILLARD, JR.,* A. C. FRASER-SMITH,** AND R. P. CASSAM***

IN LISTENING to a two-station OSO, have you ever encountered the situation where one operator persistently begins his transmission before the other has completed his remarks and turned it over to him? If so, you may be hearing the interfered-with station via a delayed channel, similar to channels apparently used by some long-delayed echoes, whereas the breaking station is presumably propagating normally. This remarkable state of affairs was reported by K7TUO on the signals of K7ICW (Las Vegas, Nevada) as received by K7BDU at Phoenix, Arizona, during a recent West Coast sporadic-E opening on six meters. If confirmed, this would appear to be another interesting manifestation of the LDE effect (refs. 1 and 2), and as such, very possibly represents an important clue.

The grand total of usable reports is now in the 90s, and the picture which is building up is fascinating in its complexity. The problem of explaining it all is complicated by the fact that there may well be at least three different kinds of LDEs, just as there were different but related diseases called "polio." It seems certain that one kind of LDE is associated with vertical reflection at 3.5 or 7 MHz at night. Another, reported at the higher frequencies and involving delays of 1 to 3 seconds, is suspected of being associated with around-the-world propagation. But the third kind, involving high frequencies and delays in excess of 3 seconds, is the real puzzler. We have no good leads whatever at the moment.

Imagined effects or hallucinations can pretty well be ruled out in general, we believe. There are too many cases where the effect was heard by more than one person, and at more than one station. The psychologists are dubious about 'echoes' lasting more than a few seconds, too.

Fig. 1 shows an original log entry describing an LDE observed in Australia in 1937!

Hoaxes and Practical Jokes

This leaves practical jokes and hoaxes as the principal source of uncertainty in interpreting

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‡Address reports to W6QYT, Radioscience Laboratory, Stanford University, Stanford, CA 94305. All reports will be acknowledged and credit given. Please be sure that when time is given in GMT, the GMT date is used.

some of the reports. The hoax possibility is a major headache to the analyst. One needs only recall the cleverly-fabricated jawbone of the supposed Pittdown man to realize how vulnerable researchers are to this sort of thing. There is also the case of the archaeology professor in Germany whose students nearly ruined his professional reputation by planting interesting human traces in plausible spots in the professor's favorite diggings, thus causing publication of exciting but wholly erroneous research reports! To show the limits to which some people will go, consider the fascinating and ironical episode involving a pseudo-Sputnik in the branches of a tree in the Angeles National Forest. There is little doubt that if anyone has a mind to generate some truly wondrous electronic marvels, the technology to accomplish this is ready and waiting. (See Fig. 2.)

In the face of these depressing facts of life, how does the data analyzer fight back? Unfortunately, the countermeasures available to him are by no means infallible. The problem is reminiscent of nabbing would-be airplane hijackers. If the metal-detector jangles, the concealed object might be a gun — but then it might also prove to be a package of bobby pins.

W7DJ very kindly drew to our attention the fact that one of the items in the summary printed in the February, 1970, article (ref. 2), was the result of a hoax. Apparently the reporter was never let in on the spoof. But he sent in a careful, complete, and accurate account of his observations. On re-reading the correspondence carefully, it was both a source of chagrin and of satisfaction to discover that while the fact of the report's being a hoax was completely missed at the time of its addition to the collection, nevertheless its spurious nature could be established with a high degree of confidence once the tipoff had been received.

Thank you, W7DJ. Are there any others like you standing in the wings, who can be induced to step forward? It would be the greatest possible service to our study to receive additional clues of this sort, and, if it will help, we hereby offer our most solemn promise never to reveal the hoaxer or hoaxee, or the source of information, if that is desired.

By and large, we feel the reports are not to be seriously diluted by hoaxes, and we have evidence bearing on this point that we prefer not to divulge at present lest we trigger some cantankerous soul

The mystery of the long-delayed echo effect — or effects — has not yet been solved, but the insights afforded by the 90-odd reports received thus far are clearly of very great value. To broaden the base for statistical analysis, the authors earnestly solicit additional reports of signal echoes having delays greater than one or two seconds.¹

TABLE I

Name	Call	Date	FMT	Band MHz	Exci- sion	Delay, secs.	Duration	Over- Other	Location	Interval Audible	What Was Heard
Berman, G.	K6BW	5-24-70	1800	14.0	SSB	5	5	None	Marlingham, California	1 min.	Weak Pipsies.
Bertolino, D.	K5014	5-26-69	2400	7.1	AM	30	1-20	None	Frederic, California	Once	Heard 4 or 5 repeats of words being repeated from station. Scattered "DX sound".
Bieber, W.	K2142	11-8-60	0010	21.3	SSB	7	5	Other	North Wood- bury, New York	Once (2)	"XXXXX this is W0XXZ standing by, I am on the air." From nearest police station.
Birch, D.	N9600	3-4-70	0400	21.0	SSB	3-12	1-20	Other	San Jose, California	Several minutes	Heard 2 or 3 repeats of 400 and 100 signals repeated.
Brown, R.	K4ZAP	late July 1969	0500	21.4	AM	2	2	Other	San Diego, New York	10 mins.	Two or three repeats of word repeated.
Bryant, J. A.	K6JF	1-3-70	0800- 0705	3.3	AM	---	---	None	Greenham, Kentucky	10 mins.	Could hear a complete "1" if sent at high speed.
Burton, S. F.	K7PUL	Spring, 1967	---	28.7	Phone	50	7 mins.	None	Spokane, Washington	---	One voice saying "this is W7PUL, I am on the air." Heard dead.
Chidwell, C. E.	K6WQ	Approx. 9-23-69	1900- 2200	21.0	SSB	35	35	None	San Rafael, California	Once	Heard repeat of word being transmitted and some noise interspersed.
Connolly, P.	VE267	5-23-70	0010	14.0	CW	2 mins.	300	Other	Shoreham, Quebec, CANADA	Once	"XXXX, VE2BU, VE2BU de VE2DF, VE2DF, R" at 15 wpm.
Cook, L. W.	W4700	February, 1970	---	2.0 and 14.0	---	10	---	None	Wetumpka, Alabama	---	Two delays audible.
Cotton, E. B.	W5SLU	4-16-67	2200	14.0	AM	same	1-20 and 3-4-20	None	OKLAHOMA	---	14 Repeats.
Cummings, J. W.	W4GAP	1-2-70	1840	7.0	AM	6-7	6-7	None	Paris Ardenne, California	Once	"De W4GAP, de JN", 10 sound.
Dennis, J. D.	K410	1970	Repeating, 10-20	12.1	AM	10	6-10	Other	San Diego, Barber- USS Island	Once	Heard 5 or 6 repeats of word transmission repeated 10000 and signal repeated.
Dietrich, T.	W4G2B	1-9-63	0300	7.0	AM	30	30	None	West Long Beach, California	Once	"10, 10, 10, de W4G2B, W4G2B."
Dixon, D.	K6K11	3-21-69	0400	14.0	AM	5	5	Other	Walt on Shore, (USA)	Once	Word "W4K11".
Droganoff, G.	W411F	9-2-69	0100	28.0	SSB	5	1-7	None	Daytona, Florida	Once	W411A and the group from W411B.
Dwyer, H. A.	K410H	11-16-69	1745	7.0	SSB	1 min.	---	Other	Key West, Florida	Once	Heard voice transmission repeated.
Elliott, W. A.	W410E	8-16-69	0947- 0955	7.0	AM	5	5	Other	Wilmington, Mass.	Once	Heard superposed signal on other signal.
Fisher, H. E.	K7JAC	7-27-70	0824	14.0	AM	13	13	Other	Portland, Oregon	1 min.	Repeat of W0R call to OR station.
Fisher, C.	W410E	2-21-70	0305	3.5	AM	5	13	None	Atlanta, Georgia	30 mins.	"QSO de W410E"--heard twice.
Fitzpatrick, T.	KP0DJ	5-10-70	0007	21.0	SSB	15	5	None	Raney Hill, Puerto Rico	Once	"W0GAP this is KP0DJ do you copy back?"
Grady, W. E.	W8DPT	2-1-70	1200	7.0	AM	1 min.	1000	None	Flint, Michigan	3 mins.	Other station call 4 times x 3 heard heard after 1-second delay.
Griggs, J.	K6KN	10-19-68	Approx. 0800	14.0	AM	8-10	8-10	None	San Diego, California	Few mins.	Call on call repeated, complete. "DX wanted"
Holowaty, M.	W410E	1-22-70	1640	21.0	SSB	3-4 mins.	13-2 mins.	None	Chardon, Ohio	Once	Heard repeat of previous transmission, "DX sound".
Huning, W. S.	G3YDH	12-21-68	1340	14.0	SSB	4	3	None	Burslow, Sussex, ENGLAND	2 mins.	Sound of blowing into microphone (air burst) repeated.
Winter, H. E.	G3JAM	11-26-69	1420	3.5	AM	6	6-1	Other	Boreham, Sussex, ENGLAND	Once	Heard call with superposed signal-- "hand quiet".
Kuench, H. W.	W5XVD 143	1960 or 1961	Winter	14.0	AM	30	10-15	None	Chicago- Illinois	Once	"4-70, 4-70, de W5XVD."
Olson, J.	W700K	3-30-70	2100	21.0	AM	3-8	3-8	Other	Wacoona, Alaska	10 mins.	Previous word of call repeated.

physical laws which we don't now understand – personal visits would require so much transit time as to be out of the question.

On the other hand, "visiting" by probes seems to be a possibility. Assuming that other civilizations share the same curiosity and the same willingness to support scientific research that we do, they could – in principle, at least – send out spacecraft which would be put into orbit around likely stars or preferably planets, to await some sign of civilized activity. Having found some in the form of Hertzian waves, the probe would presumably report that fact back to its senders, while at the same time attempting to alert the discoverers to its presence. (See Fig. 3.) The probe, it may be assumed, will not know in advance exactly what form of electromagnetic communications to expect. Therefore, what more effective way to perform the alerting function, than to repeat back to whomever might be listening, some fraction of a transmission that had just been sent?

The alternative of sending – blind – some kind of an attention-attracting transmission is clearly inefficient; consider the amazingly strong static-like signals from Jupiter. Our high-frequency receiver technology had progressed to the point where these signals *could* have been heard, say, as early as 1925. But their nature and Jovian origin was not established until roughly 35 years later.

The suggestion was accordingly made in 1961, by radio astronomy Professor R. N. Bracewell of Stanford University, that interrogations by cosmic probes might have the appearance of LDEs (ref. 3).

Those who have seen the movie or read the novel, *2001*, will recognize an analogous theme; instead of a repeater, the "probe" in that case was a radio transmitter.

It is reasonable to point out in this connection that there seems to be a powerful human impulse to explain *anything* unknown, as a manifestation of something "out there." Hams in their bifocal years will recall that early short-wave listeners often tuned in mysterious unstable buzzing sounds whose origin initially defied explanation. The less inhibited press of the day lost no time in proposing that these signals were transmitted by Martians seeking to attract our attention. The matter was not laid to rest until a clever engineer armed with an oscillograph showed that the frequency and phase of at least one buzz agreed well with that of the Greater Boston power system; the "Martian" communications were in reality signal leakage from early diathermy machines. (The mystery had been compounded by the skip-distance effect, since the leakage was often heard thousands of miles away from its point of origin.)

Frankly, the chances seem very good that the eventual explanation for LDEs will prove quite unspectacular. But at the moment it must be admitted that the cosmic probe hypothesis, although it has some drawbacks, is about as good

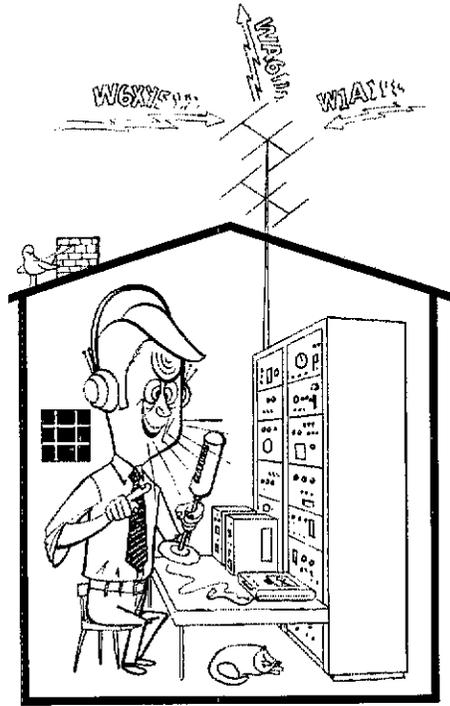


Fig. 2 -- Behold, a hoaxer in the act of hoaxing. Watch out for this particular form of electromagnetic pollution!

an explanation for the really long-delayed echoes (provided, of course, that they aren't hoaxes) as anything else which has been postulated. Perhaps all this says is that we haven't been very ingenious thus far.

A New Finding

A new development of interest in this general connection is a paper which has appeared in the *Journal of Geophysical Research* by Professor F. W. Crawford and Mr. D. M. Sears of Stanford University (ref. 4). They describe four apparent LDEs obtained during the daylight hours with a sounder which directs its signal vertically upward, and offer a theory in explanation of their observations. LDE buffs will undoubtedly find this

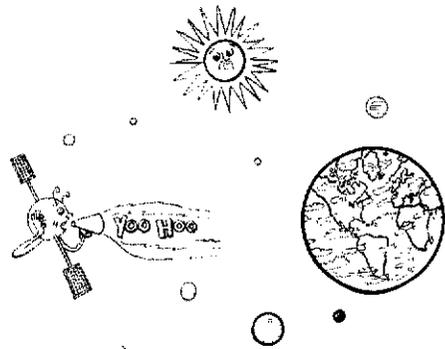


Fig. 3 -- The cosmic probe hypothesis: Is someone out there trying to tell us something?

paper required reading, although it, too, says that lots more work needs to be done.

New Reports Since February, 1970

Table 1 can be thought of as an extension of the corresponding table in Ref. 2. up to a cutoff date of October 5, 1970. The same assumptions and procedures have been used in preparing it; please refer to the earlier article if questions arise.

Acknowledgment

The authors have been greatly aided by N. M. Williams, a student at Stanford University, who investigated the possibility of psychological origin. Thanks are due to L. S. Cotton, VK5LG, for permission to reproduce the 1937 log entry. This work is, of course, made possible by the far-too-numerous-to-mention individual reports and letters received not only from those included in Table 1, but from many others as well. Partial financial support has been received from the Office of Naval Research and the Advanced Research Projects Agency.

References

- 1) Villard, Graf, and Lomasney, "Long-Delayed Echoes . . . Radio's 'Flying Saucer' Effect," *QST*, May, 1969.
- 2) Villard, Graf, and Lomasney, "There Is No Such Thing as a Long-Delayed Echo AR long-delayed echo AR . . ." *QST*, February, 1970.
- 3) Bracewell, "Communications from Superior Galactic Communities," *Nature*, Vol. 186, No. 4726, pp. 670-671, May 28, 1960.
- 4) Crawford, Sears, and Bruce, "Possible Observation and Mechanism of Very-Long-Delayed Radio Echoes," *J. Geophys. Res.*, (Letter), Vol. 75, No. 34, pp. 7326-7332.



Strays

HB9AOY reports that an ATV society will be organized in Geneva during the weekend of May 28, 29, and 30, 1971. Planned activities include an interesting program with reports, lectures, and demonstrations, and a banquet. Those interested in amateur TV may write (in English) to Groupement Experimental d'Emissions TV de Geneve, M. Jean Richez, 1 Rue Samuel-Constant, CH-1201 Geneva, Switzerland, for details.

Stolen Equipment

The following property of the City of Stamford, Connecticut was stolen over the weekend of February 13: 2-Model D53BBN-3100AK, MO-COM 70 Mobile Units, Serials GCO 630 and GCO 640 (operating frequency 155.085 MHz). Anyone with information concerning this equipment should contact Hawley C. Oefinger, Superintendent of Communications, City of Stamford, Connecticut 06905, telephone 203-323-7443.

The following was stolen from W8WNX's car on February 13: Heath HW-32A transceiver w/HRA-10-1 crystal calibrator; HP-13 power supply; HS-24 speaker; and GH-12A mike. Anyone with information contact Lawrence P. Kurtinitis, 6469 Gloria, Romulus, MI 48174.



May 1921

... K. B. Warner accepts an amateur's challenge to build a cw set for \$100 that will outperform a spark set of the same cost. The cw set is rated at 20-watts output, using 4 6V202s in a self-trectifying circuit. According to KBW, this set "worked rings" around a 1-kW spark. Probably did, too.

... Walter S. Lemmon describes his "resonant converter" whereby dc may be converted into ac of any practicable frequency. There is a sort of chopper and a resonant circuit in the primary of the step-up transformer. He gives complete instructions and diagrams.

... The transatlantic tests of February, 1921, were concluded with completely negative results. The British blame the failure on interference from commercial stations and on radiation from hundreds of oscillating receivers. Faint but unreadable, cw signals were heard, but they were not of unquestionable American origin.

... Senator Poindexter has reintroduced his bill whereby all amateur radio activities would be controlled by a Government committee, referred to as a "little group of willful men." This committee would be answerable to no one and there would be no appeal. It was doomed to failure, as was his first attempt in this direction.



May 1946

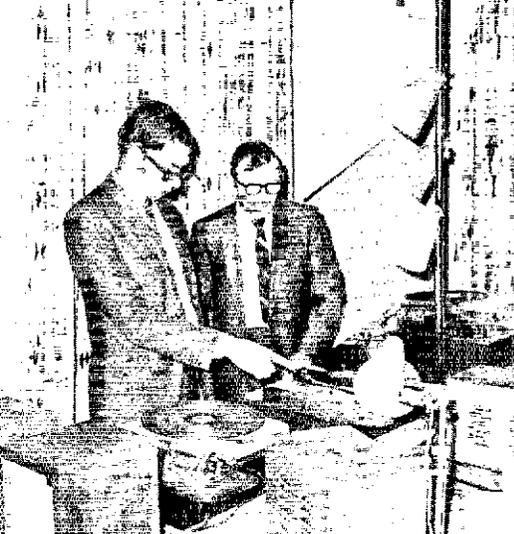
... Our cover this month shows Ed Tilton, W1HDQ, making field strength measurements alongside his new 16-element two-meter beam atop

the roof at Selden Hill. In an article, Ed describes this meter in detail. A two-part instrument, its indicating section is located remotely from the meter, thus avoiding proximity effects of the observer's body, which just might be in resonance.

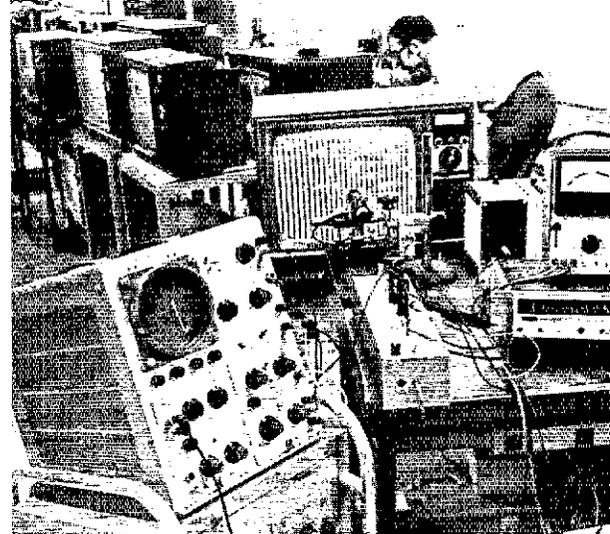
... George Grammer, W1DF, describes a noise limiter particularly well-adapted for cw reception. It is placed in the audio output circuit of the receiver and comprises a couple of diodes, 1N34s with their 1.5-volt batteries, a resistor and capacitor and switch.

... There has been a very recent fine example of coordination between FCC and the armed services in the matter of clearing our bands for the grand opening. Warner says he hopes all the boys will hold their fire until 3 A.M., being sure to check their clocks. The evening before was something else. I'm sure they set their clocks on Timbuktu or Bombay!

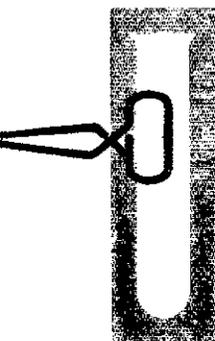
... To the Moon and back! Herbert Kauffman, W2OQU, describes how this feat was accomplished at the Evans Signal Laboratory of the Signal Corps at Bradley Beach, N.J. They used a 1/4-sec. pulse at 111.5 Mc. A block diagram of the circuits is shown. The transmitter wound up with a pair of 1000Ts in push pull. - *W1ANA*



Larry Seligman, who heads up the hi-fi section, and K1PLP examining some of the audio test section.



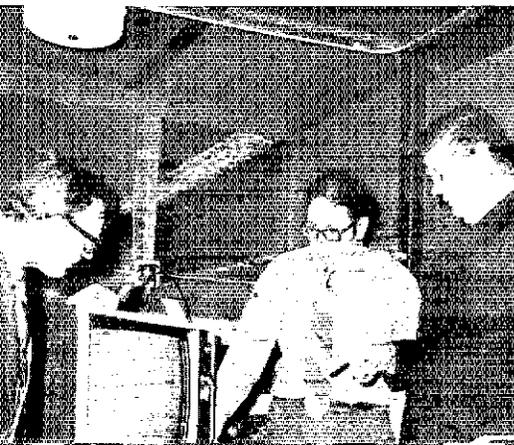
Here is a small section of the TV testing facilities at Consumers Union. Harold Shair, K2TYY, who heads up this activity, is shown in the background.



ARRL VISITS CONSUMERS UNION

EARLIER THIS year, liaison was established between Consumers Union and ARRL - Subject: television and hi-fi interference. Consumers Union of Mt. Vernon, N.Y., publishes *Consumer Reports*, a monthly magazine of 2,000,000 circulation devoted to the evaluation of manufactured products. Among the items tested and rated are television sets, radios, hi-fi gear, and other home-entertainment devices.

From the left, Jerry Hall, K1PLP, Harold Shair, K2TYY, and Lew McCoy, W1ICP, discussing controlled environment testing methods for fundamental overloading in one of the company's screen rooms.



CU has extensive testing facilities for checking performance of the above-mentioned products. One area they hope to cover more completely in their appraisals is the susceptibility of television and hi-fi gear to interference from short-wave transmitters. Such information would be included in the published evaluation of equipment in the *Reports*. The League's position is one of cooperation, guidance, and advice in obtaining methods of testing and standards, since it is a serious problem for amateurs, and Hq. is also involved in some studies.

As a side note, many of the engineers working in CU's electronics evaluation section are hams. In fact, Karl Nagei, who heads the division was an HC and, when in Ecuador, worked with Clarence Moore, W9LZX, the inventor of the cubical quad.

It should be noted that any published evaluation of television and hi-fi equipment is bound to influence the prospective purchaser (and the manufacturer of the equipment). - *W1ICP*.

Here's another section of the audio test department at Consumers Union.



Some QST Abbreviations used in Text and Drawings

- A - ampere
ac - alternating current
A/D - analog-to-digital
af - audio frequency
afc - automatic frequency control
afsk - audio frequency-shift keying
agc - automatic gain control
ale - automatic load (or level) control
am - amplitude modulation
anl - automatic noise limiter
ARC - amateur radio club
AREC - Amateur Radio Emergency Corps
ARPS - Amateur Radio Public Service Corps
ATV - amateur television
avc - automatic volume control
bc - broadcast
BCD - binary-coded decimal
bcf - broadcast interference
bcl - broadcast listener
BFO - beat-frequency oscillator
BPL - Brass Pounders League
CAM - content-addressable memory
CB - Citizens band
CCIR - International Radio Consultative Committee
ccw - counterclockwise
c.d. - civil defense
CD - Communications Department (ARRL)
CMOS or COSMOS - complimentary-symmetry metal-oxide semiconductor
coax - coaxial cable, connector
COR - carrier-operated relay
CP - Code Proficiency (award)
CR - cathode ray
CRT - cathode-ray tube
ct - center tap
cw - continuous wave (code), clockwise
D/A - digital-to-analog
dB - decibel
dc - direct current
DCTL - direct-coupled transistor logic
DF - direction finder
dpdt - double-pole double-throw
dpst - double-pole single-throw
dsb - double sideband
DTL - diode-transistor logic
DX - long distance
DXCC - DX Century Club
FC - Emergency Coordinator
ECO - electron-coupled oscillator
ECL - emitter-coupled logic
EME - earth-moon-earth
emf - electromotive force (voltage)
FAX - facsimile
FCC - Federal Communications Commission
FET - field-effect transistor
FD - Field Day
fm - frequency modulation
fsk - frequency-shift keying
GDO - grid-dip oscillator
H - henry
hf - high frequency
HFO - heterodyne frequency oscillator
Hz - hertz
IARU - International Amateur Radio Union
IC - integrated circuit
ID - inside diameter
i-f - intermediate frequency
ITU - International Telecommunication Union
IW - Intruder Watch
JFET - junction field-effect transistor
k - kilo
kc - kilocycle
kHz - kilohertz
kW - kilowatt
lf - low frequency
LMO - linear master oscillator
LO - local oscillator
lsb - lower sideband
LSB - least-significant bit
LSD - least-significant digit
LSI - large-scale integration
luf - lowest usable frequency
mA - milliampere
MARS - Military Affiliate Radio System
Mc - Megacycle
mf - medium frequency
MG - motor-generator
mH - millihenry
MHz - Megaheitz
mic - microphone
mix - mixer
MO - master oscillator
MOSFET - metal-oxide semiconductor field-effect transistor
MOX - manually-operated switching
ms - millisecond
m.s. - meteor scatter
MSB - most-significant bit
MSD - most-significant digit
MSI - medium-scale integration
muf - maximum suitable frequency
MUX - multiplex
mV - millivolt
mW - milliwatt
nbfm - narrow-band frequency modulation
NC - normally closed
NCS - net control station
NO - normally open
npn - negative-positive-negative
NTS - National Traffic System (ARRL)
OBS - Official Experimental Station
OD - outside diameter
OO - Official Observer
op amp - operational amplifier
OPS - Official Phone Station
ORS - Official Relay Station
osc - oscillator
OVS - Official VHF Station
oz - ounce
PA - power amplifier
PEP - peak-envelope power

(Continued on page 87)

Iron-Wire DX

BY LEWIS B. COE,* W9CNY

AMATEUR RADIO has always had a close tie with the Morse telegraph, dating from the days when radio communication was exclusively telegraphic. It was only natural that many of the early amateurs were Morse operators, possessing as they did the necessary telegraphic skill, plus a lively interest in a new means of electrical communication.

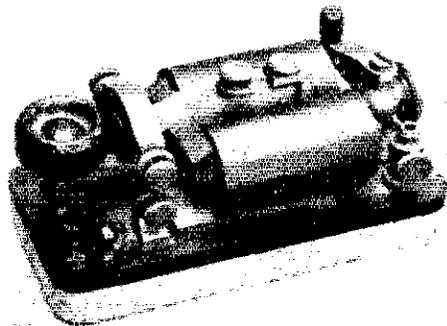
Morse's original apparatus was a mechanical recording device, which traced the dots and dashes on a paper tape. Operators soon learned to read the clicks of the mechanism, however, and the paper tape apparatus was discarded. Thus began a system of communication that was to change little in methods and equipment for over 100 years.

The basic Morse circuit was simplicity itself, a series circuit using only one line wire with earth return. In the U.S.A. the circuits have always been closed on standby, a system ideally suited to the copper sulphate cells originally used for d.c. power. These cells are unique among primary cells in that they deteriorate rapidly on open circuit. In later years, power was almost exclusively obtained from small motor generators. The term "battery" has been used since the beginning in reference to the d.c. potential on a line, and young telephone men, who never saw a copper sulphate cell, are still using the term today! "Foreign battery" is not necessarily from across the border; it merely refers to any dc that shows up where it's not supposed to be!

Equipment

The basic Morse set for main-line operation, consisted of a relay, sounder and key. Occasionally a main-line sounder would be used, eliminating the relay. A telegraph line supported on glass insulators in open air was an extremely efficient conductor under ideal conditions. However, weather conditions, broken or missing insulators, accidental contact with other wires and bad splices could result in widely varying line characteristics in day-to-day operation. Therefore, main line relays and sounders were always fitted with adjustable magnets so that the operator could quickly vary the adjustment for best reception. "Pony wires" were short local circuits as distinguished from "Main line" intercity wires.

A key and sounder mounted together was called a "KOB" (key on base). Hardwood resonator boxes were normally used on sounders and the whole affair was on a swinging arm that allowed placement near the operator's ear. Operators would often "tune" the resonator to their particular taste by inserting an empty tobacco can in the resonator. Some thought that "Prince



Pocket instrument — J. H. Bunnell & Co.

Albert" was superior to other brands for this purpose! Many specialized types of instruments were manufactured and some of the lineman's pocket instruments were very ingenious. Another unusual type consisted of a miniature sounder built inside an earpiece like a radio headset, for use by press telegraphers in situations where an open sounder was not desirable. New Morse instruments, direct from the shop, were handsome pieces of apparatus. They featured lacquered brass mounts, blued steel armatures, polished hard rubber covers on the magnets and were mounted on beautifully finished hardwood bases. These commercial instruments should not be confused with the cheap, "learner" type instruments that were listed in catalogs of supply houses for many years.

Although the Morse system seems very simple today, it is well to remember that it was invented at a time when people were still riding in ox carts and reading by candle light. It remains as one of the most effective and versatile communications devices ever designed. The decline of the Morse system was due primarily to economic factors. It became increasingly difficult to obtain qualified operators and the development of more effective long distance telephony caused a sharp reduction in written message traffic.

Today's amateurs, struggling with 20 wpm, can scarcely visualize the superb operating skill of the Morse telegraphers. Perhaps the most spectacular accomplishment was the ability, possessed by a few, to carry on casual conversation with a visitor while sending or receiving message traffic at 35-40 wpm. Prospective YLs can be encouraged by the fact that many of the best operators were women.

Recently I chatted via 40-meter ssb with Gay, W9MFU, of Lone Rock, Wis. We had a lot of fun remembering a certain Sunday afternoon many years ago. On that occasion, W9CNY, then at Galva, Illinois was remote-controlled via direct Morse circuit from Ottumwa, Iowa by Gay, who was then a telegraph office manager in that city. How's that for "iron wire" DX?

 QST

*P.O. Box 316, Crown Point, IN 46307.

Electronic Testing in Ancient Times

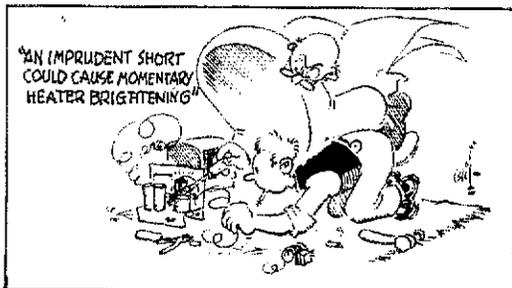
BY JOSEPH E. GALLO,* WIAAK, ex-W2HLZ

IN MY disadvantaged but fun-filled boyhood, the test instruments most readily available to the young (and hence impecunious) radio hobbyist were a shorting jumper, a series battery and headset, one finger, a pencil, and any household appliance with a series motor. The shorting jumper, in those robust vacuum-state days, made an adequate voltmeter — or, more correctly, a volt-indicator. Circuit points supposed to be at a potential above ground were momentarily shorted to ground and checked for sparks while the junior scientist nervously watched for cherry red anodes, orange screens, and smoke. The intensity of the spark indicated relative voltage/source impedance.

For low voltage or high impedance circuits, headphones (without series battery) were substituted, although the clicks sometimes caused temporary deafness. One of the technical superstitions then prevalent was that headphone sensitivity magically rose with impedance (confused by the young with dc resistance), thus making 20,000 ohm headphones something to save for. Most of us settled for 2000-ohm headsets, often donated by grown-ups as left-overs from earlier vintage broadcast receivers.

Jumper testing fell into disrepute at the advent of ac/dc radios with their series heaters and hot chassis. An imprudent short could cause momentary heater brightening — then all-around darkness. Occasionally the entire household was darkened, causing the older generation to take an undesirable interest in the proceedings. (The generation gap was then maintained by the young for the protection of the young, rather than the other way around, as it now sometimes seems.)

*3 Fernway, Lynnfield, MA 01940.



Click Testing

The series drycell and headphones were an all-purpose component tester. To test a capacitor (then a condenser) the circuit was closed through the capacitor, resulting in a click which indicated either a shorted capacitor or a good one charging. Opening and re-closing the circuit was necessary to complete the diagnosis. A second click meant a leak or short; silence, a good capacitor. Because of normal leakage, even a good electrolytic often gave a second click, but considerably softer than the first. This test method also abused the eardrums when inadvertently applied to charged or large capacitors. However, the favored adolescent test method for filter capacitors was to connect them momentarily to a power supply and then to savor the explosive spark that resulted when a good one was short-circuited. Filter capacitors for early broadcast receivers (a prime source of parts) were of paper dielectric, often made in blocks and packaged in a black can filled with tar from which sprang a bundle of anonymous leads. A filter block could contain mixed voltage and capacity ratings, and even include a low-voltage cathode bypass, with common connections adding to the perplexity of the would-be salvager. Sorting this mess out required ingenious combinations of click and spark testing. Spark intensity indicated relative capacity. The cathode bypass rarely survived the ordeal.

Then, as now, adolescents sought privacy and, to ensure it, sometimes left charged capacitors temptingly lying about to cure younger siblings of meddling. Sort of a fractional-generation gap.

Click testing was remarkably effective even for small mica capacitors, and capacitance ranges could roughly be measured by click intensity after the ear had been calibrated against a known sample. The series battery and headphone similarly made a crude ohmmeter, but, for very high resistances, a noise burst generated by brushing the leads was more easily evaluated than a single faint click. Grid-leak resistors of two to ten megohms were common in detector stages. The technical folklore of the times assigned magical properties of sensitivity to high grid, as well as headphone resistances. Boyhood superstitions are only too well absorbed. Transistor circuits still look like a collection of short circuits to some old boys, and only tube-like FETs can lure us all out of the shadows and into the mid-twentieth century.

Checking inductors for continuity with battery and headphones generated special hazards when inductances ran into henries. As the test circuit was opened, the magnetic field quickly collapsed, generating a surprisingly high voltage. The unwary neophyte who still held the inductor terminals (or even headphone terminals) on break received a demonstration of the perils of $L \frac{di}{dt}$ that required no knowledge of calculus for its appreciation.

Meters — for the Affluent

There were meters then, but they were for the affluent. Iron vane types were popular only because they were less expensive than D'Arsonval (moving coil) meters. However, accuracy was poor, and overload appeared to destroy any semblance of

calibration. A few of the older kids — the ones who worked! — had 1000-ohms-per-volt moving-coil meters which were objects of awe. One thousand ohms per volt was as close to the ideal of infinite impedance as a boy then dared aspire.

One finger sufficed for an audio-signal generator. Touching an audio grid connection either directly, or through a piece of wire if the reach was hazardous, caused an output hum which was a function of gain, impedance, and body capacity, and which at least indicated some degree of operability. Applied to rf stages, this method sometimes resulted in oscillation, which, even so, provided clues to operation. Anticipating modern research in infrared mapping as a circuit-test method, the un-metered ones used a finger to diagnose circuit operation by sensing live resistor temperatures. Resistors were larger then, and the hazard of bridging one with a finger was correspondingly low. Beginners very suddenly learned to avoid resting the spare hand on the chassis while probing. Equally non-habit-forming was touching the uninsulated track of a semi-fixed bleeder resistor. Sometimes they were open, and bridging the open point was truly a moving experience.

The radio buffs who graduated to amateur transmitters made further use of their bodies, ostensibly as test equipment, but really to impress their friends. Brushing a finger quickly and lightly over rf connections drew arcs which clearly indicated that rf was indeed being generated. The accompanying odor of rf-cooked skin was unforgettably unappetizing — a bit rubbery, in fact — and a very poor inducement to cannibalism. Graphite pencils drew much better arcs, and they didn't hurt — an important consideration above 25 watts. Pencil-drawn arc lengths were estimated as a measure of the "soup in the tank," and besides, the arcs exuded the pleasing fragrance of burning cedar and wax.

That Silent Keys didn't take up an entire page in those days, despite the prevalence of series-plate feed, must have been purely a socio-economic phenomenon. Most kids simply couldn't afford the high power which might have killed them, in part because the customs of the times kept children at least one economic level below their parents, contrary to the current fashion. (Or did we merely have fewer tensions and drier hands?) Today's safety record, in the face of higher power, must be credited to the maturity of modern youth, to the ARRL's tirelessly-waged safety campaign and to manufacturers who shield against TVI and interlock to keep busy little fingers out of trouble.

The ultimate test method to awe the spectators was that of lighting a household lamp bulb by firmly (to avoid rf burns) grasping the threaded portion and pressing the center contact against one of the balanced 600-ohm antenna terminals. This bit of showmanship was perfectly safe — unless the antenna coupling coil happened to slip against the hot plate tank. (Attempts to duplicate this feat with a modern high power linear can result in damaging the attempter beyond repair, to say nothing of the damage to the linear, which is designed to match 50 ohms, not people.)



The Vacuum Cleaner

For the more complicated tasks of trouble-shooting and aligning receivers, mother's vacuum cleaner was indispensable. Most of the older motor-driven electrical appliances employed series motors because they would run on ac or dc, and the constantly arcing brushes generated noise that appeared to cover the entire radio spectrum. This was normally an intolerable nuisance, and considerate mothers afforded ham sons adequate warning before switching on the infernal machine. (Other-than-considerate mothers suffered a great deal of anguished shouting.) However, the vacuum cleaner (or mixer, or electric fan) also served as a convenient no-cost signal generator. A captive toy electric locomotive with a probe lead clipped to the third rail shoe was also effective. The alignment technique consisted of switching on the appliance (or locomotive), connecting the antenna lead to its case, and then, working back from the last i-f coil, aligning i-f and rf circuits for maximum audio noise output. Trouble-shooting of individual circuits required insertion of noise with a probe lead, as with a conventional signal generator. Aligning receivers by noise alone could be fatal to the dial calibration, or tracking of the commonly used "all-wave" (general coverage) commercial receivers of the day, but it was fine for ham-band home-builts. What if intermediate frequencies didn't always coincide with the i-f transformer manufacturer's intent? After all, the experimenter's only concern was for maximum sensitivity with none of the trimmers at limits. When crystal filters arrived, mother's noise generator was still usable, but final alignment had to be performed with the crystal in the series or sharp position to ensure the correct intermediate frequency. At least one test equipment manufacturer later made a compact noise-generating buzzer probe, and government-sponsored research is now underway on use of broad-band noise as a universal test stimulus.

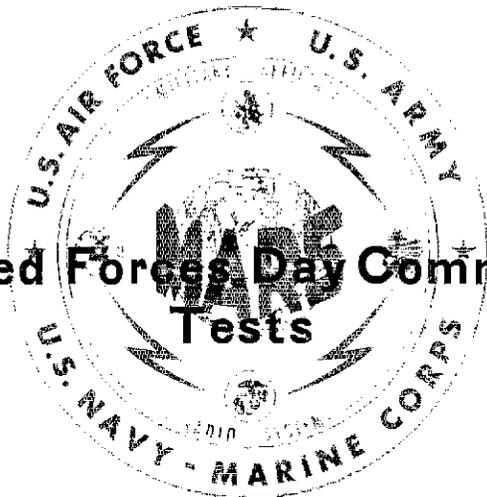
Poverty is the grandmother of invention. QET

Strays

FD — JUNE 26-27

FD 1971 promises to be an interesting one. Double check those new rules elsewhere in this issue — get ready for the operating event of the year. Following the FD, constructive ideas can be directed toward your closest ARRL Contest Advisory Committee representative: W1AX K2KIR W3GRF W3WJD W4UQ WA6DQX W0HP KH6J and VE2NV.

1971 Armed Forces Day Communication Tests



EACH YEAR on the third Saturday in May, the Department of Defense sponsors the observance of Armed Forces Day. As a part of this observance the Departments of the Army, Navy and Air Force annually conduct communication tests designed to demonstrate to the world the close partnership and mutual respect enjoyed between U.S. amateur radio operators and the U.S. military. This year's program will be conducted on Saturday, May 15, 1971, and all licensed radio amateurs are encouraged to participate.

The Radio Amateur's contributions to communication training, international goodwill, military morale and emergency services are recognized by every echelon of the military services. The Armed Forces Day Communication tests are designed as the tangible demonstration of the firm and long-standing Department of Defense policy to encourage and support amateur radio activity. On this twenty-second observance of Armed Forces Day, all radio amateurs are invited to participate and to demonstrate to the world the close partnership and mutual respect that U.S. amateurs and U.S. military enjoy.

Once again this year, several military radio stations will participate in communication tests which include military-to-amateur crossband operations and receiving contests for both continuous wave (cw) and radioteletypewriter (RTTY) modes of operation.

Special QSL cards confirming crossband communications will be forwarded to those amateurs who establish two-way contact with participating military stations. Certificates will be awarded to those who aptly demonstrate their operating ability and technical skill by receiving a perfect copy of the Secretary of Defense originated cw and/or RTTY message(s) transmitted during the receiving contest portion of the communication tests. Interception by short wave listeners (SWL) will not qualify for a QSL card in confirmation of crossband communications. However, anyone who has the equipment and abilities may copy the Secretary of Defense messages and receive a certificate.

Military to Amateur Crossband Test

Military radio stations WAR, NSS, NPG and AIR will be on the air from 15/1400 GMT to 16/0245

GMT. During this test of crossband operations, the military stations will transmit on specified military frequencies while amateur stations will transmit in the indicated portions of the amateur bands. Contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted. The tabulation shows, in addition to the frequencies and modes, the appropriate amateur band on which to respond in each case.

WAR	4001.5 cw	3.5 - 3.65
Army	6997.5 cw	7.0 - 7.2
Radio Washn. D.C.	14405 cw	14.0 - 14.2
	3385 cw	3.5 - 3.65
	4012.5 RATT	3.65 - 3.8
NSS	4040 lsb	3.8 - 4.0
Naval	6970 lsb	7.2 - 7.25
Communication Station Washn. D.C.	*7301 cw	7.1 - 7.2
	7380 RATT	7.0 - 7.2
	7385 cw	7.0 - 7.1
	13827.5 RATT	14.0 - 14.1
	14385 usb	14.2 - 14.35
	14400 cw	14.0 - 14.2
	**21500 cw	21.0 - 21.25
	***27900 usb	28.5 - 29.7
	***49.692 am	50.1 - 54.0
	***143.820 am	144.0 - 145.5

*To be operated from 15/1400 GMT to 15/2200 GMT.

**To be operated from 16/2200 GMT to 16/0245 GMT.

***Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between Washington, D.C. and Maine, during the major portion of the time allotted for military to amateur crossband contacts. The call sign NSSAM will be utilized from the aircraft.

	4001.5 lsb	3.8 - 4.0
	4005 cw	3.5 - 3.65
NPG	4016.5 cw	3.65 - 3.8
Naval	6971.5 cw	7.0 - 7.1
Communication Station San	7301.5 lsb	7.2 - 7.3
	7347.5 RATT	7.0 - 7.2
	7365 cw	7.1 - 7.2
	13922.5 RATT	14.0 - 14.1

Francisco	14356 lsb	14.2 - 14.275
Calif.	14375 cw	14.1 - 14.2
	14,389 lsb	14.275 - 14.35
	20983 cw	21.0 - 21.15
	21475 cw	21.15 - 21.25
	21600 lsb	21.25 - 21.45
	†143,700 am	144 - 148
	††148,410 fm	144 - 148

†Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between San Diego, California, and Seattle, Washington, during the major portion of the time allotted for military to amateur crossband contacts. The call sign NPGAM will be utilized on the aircraft.

††To be operated from Mt. Diablo.

AIR	4025 lsb	3.8 - 4.0
Air	7305 lsb	7.2 - 7.3
Force	7315 cw	7.0 - 7.2
Radio	13995 cw	14.0 - 14.2
Washn.	14397 usb	14.2 - 14.35
D.C.	20994 cw	21.0 - 21.1
	*143.950 MHz am	144 - 146

*Provided it is consistent with operational and training commitments, this frequency will be keyed from a U. S. Air Force aircraft flying between Virginia, and Maine, during the major portion of the time allotted for military to amateur crossband contacts.

C.W. Receiving Contest

A cw receiving contest will be conducted for any person capable of copying International Morse Code at 25 words per minute. The cw broadcast will consist of a special Armed Forces Day message from the Secretary of Defense addressed to all radio amateurs and other participants. The schedule for this broadcast is as follows:

Time	Station	Frequencies (kHz)
15 May 1971		
16/0300 GMT	WAR	4001.5, 6997.5, 14405
15/2300 EDST	NSS	3385, 7385, 14400, 21500
15/2000 PDST	NPG	4005, 6971.5, 14375, 20983
	AIR	7305, 13995

RTTY Receiving Contest

A radioteletypewriter RTTY receiving contest will be conducted for any individual amateur or station possessing the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. The RTTY broadcast will consist of a special Armed Forces Day message from the Secretary of Defense to all radioteletypewriter enthusiasts. The message will be transmitted at 60 words per minute in accordance with the following schedule:

Time	Station	Frequencies (kHz)
15 May 1971		
16/0335 GMT	WAR	4001.5, 6997.5, 14405
15/2335 EDST	NSS	4012.5, 7380, 13827.5
15/2035 PDST	NPG	13922.5, 21600, 148.410 MHz fm
	AIR	7305, 13995

Submission of Competition Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address of the individual submitting the entry must be indicated on the page containing the text. Each year a large number of perfect copies are received with insufficient information, thereby precluding the issuance of a certificate.

Completed entries should be submitted to the Armed Forces Day Contest: ATTN: Chief, Air Force MARS, Headquarters, U. S. Air Force (PRCOM), Washington, DC 20330, and post-marked no later than 31 May 1971.

Other Activities

As they did last year, several military groups are offering certificates to anyone contacting them. The 128 Air Refueling Group (TAC), Wisconsin Air National Guard, WA9DZL, will be operating again (see QST, May 1970, page 59, for the details - the 10-meter frequency will be 28.650 MHz this year) and the 143d Communications Flight, Rhode Island Air National Guard, K1FCO, will be operating as follows:

50.7 MHz	1500-1700 GMT
14.310 MHz ±5 kHz	1400-1600 GMT
21.375 MHz ±5 kHz	1600-1700 GMT
7.280 MHz ±5 kHz	1500-1600 GMT

To qualify for the certificate, make a 2-way contact with K1FCO and send your QSL in an s.a.s.e. to Rhode Island Air National Guard, K1FCO, 143d Communications Flight, R.F. Green Airport, Warwick, RI 02886.

The U.S. Naval Academy ARC will also commemorate AFD by operating several stations and will engage in both amateur-to-amateur and military-to-amateur contacts. The special calls WU3SNA and N0NNN will be used. N0NNN will be working 4008.5 kHz cw/ssb; 6880 kHz cw; 13,975.5 kHz cw; and 20,954.5 kHz cw/ssb. Crossband contacts (transmitting on the above frequencies and listening in amateur bands) will be from 1400 GMT 15 May through 0245 GMT 16 May. N0NNN will not transmit the Secretary of Defense receiving contest broadcast. WU3SNA will operate from 0401 GMT 15 May through 0359 GMT 16 May. Frequencies will be:

CW (kHz)	SSB (kHz)	Novice (kHz)
3590	3930	3718
7060	7260	7175
14,060	14,280	21,125
21,060	21,385	
28,060	28,610	

Special commemorative QSLs will be issued to all stations contacting either N0NNN or WU3SNA. All QSL cards should be sent c/o W3ADO. Guest operators are invited to visit the station and operate during this event. Write Midshipman First Class Brian D. Robertson, USN, President, U.S. Naval Academy ARC, 35th Co. Room 8138, U.S. Naval Academy, Annapolis, MD 21412.

The U.S. Army Ohio National Guard using the call PZ7G will be operating on May 15 from 1300 to 2100 GMT on 5995.5 kHz transmitting and 7040 kHz ±5 kHz receiving, RTTY only. Send call, location, and signal report (no traffic please). For QSL send to Hq., 2nd Sqdn., 107 Armed Cav., Greensburg, OH 44232.

QST

OSCAR

Aircraft

Competition



GET YOUR 10- and 2-meter gear ready! A contest like you've never seen before is coming your way on May 15 and 16.

It centers around an Oscar (Orbiting Satellite Carrying Amateur Radio) repeater of the type which will be launched into orbit in the future. For the Oscar Aircraft Competition, however, the 2- to 10-meter repeater will be flown aboard an aircraft to provide a weekend of challenging fun for all.

You may operate any period during the test, working as many different stations as possible for 2 points per contact. ARRL sections count as multipliers (see page 6). And, if you're not set-up for transmitting to the repeater on 2 meters, just log repeated stations heard on 10 meters for one point each.

A plaque awaits the high scorer; each participant will receive a special QSL.

Two to Ten

The repeater will receive signals from 145.83 to 146.07 MHz (up-link) for retransmission in the segment 29.38 to 29.62 MHz (down-link). It is a frequency translator inverting signals in the passband (usb signals will be repeated as lsb). Since it is a linear system, it will handle a-m, ssb, fm, RTTY, SSTV, and cw.

To use the repeater, you should transmit within the up-link passband. It will require approximately 80 watts erp (e.g. 10-watts output and a 9 dB antenna) to produce full power output from the repeater from a distance of 150 miles. The repeater power will be divided among all stations in the passband. Thus, a strong station will prevent other amateurs from simultaneously using the repeater if the operator does not limit its power to 80 watts erp. He will also reduce the overall repeater gain, through delayed age action, so that he will not be able to hear others who may be trying to call him.

If you do not have a convenient method of controlling your power output, aim your antenna away from the proper heading. It is requested that stations exceeding the 80 watts erp limit, avoid using the center 100 kHz of the 240-kHz passband. This would allow them to take advantage of the designed rolloff of the passband sensitivity. See Fig. 1.

Note: Details have been taken from an Amsat Newsletter article, "A-O-B Repeater Aircraft Tests," by Jan A. King, W3GEY, A-O-B Project Manager.

Flight Plan

The flight designated Amsat Aircraft-1, will originate at Washington D.C., Saturday morning, May 15, fly north to Boston, and then west toward Chicago. At about 1800 EDT, May 15, the aircraft will stop while en route to Chicago. Sunday morning, May 16, the flight will complete the Chicago leg and then will return to Washington, D.C.

Further details on the times will be transmitted by W1AW bulletin during the week preceding the test. During the contest, Amsat's national tracking headquarters (WA1IOX) will be on 7225 kHz transmitting the location of the aircraft. The station will also standby to answer questions about the Oscar Aircraft Competition. At 1900 EDT this operation will switch to 3855 kHz.

WA1IOX will maintain direct liaison with the aircraft on 2-meter fm, and on 7225 kHz with other selected stations in fm contact with the aircraft. The aircraft's call is WA3NDS.

Communication Range

Stations within about 150 miles of a point along the aircraft's flight plan will be able to transmit through the repeater. Stations in other areas will be able to participate by receiving down-link signals via ionospheric propagation. Thus, two-way contacts will be possible over distances up to 300 miles, and reception of down-link signals should be extensive in other areas.

The aircraft is expected to fly at about 11,000 ft. altitude at a ground speed of 150 miles per hour. It will have a longwire antenna for 10 meters and a monopole located on the bottom of the aircraft for 2 meters. The down-link signal will be radiated mostly perpendicular to the flight path, while the reception at 2 meters will be omnidirectional.

Operating Procedure

When the aircraft comes into your range begin listening for the beacon signal on 29.45 MHz. It will be transmitting "HI" or three digit numbers in Morse code simulating a satellite telemetry system.

Delay or postponement due to weather, etc., will be announced by W1AW and WA1IOX.

INPUT		OUTPUT
145.83	HIGH POWER	29.62
145.90	USE LOW POWER	29.55
146.00	HIGH POWER	29.45
146.07		29.38

Fig. 1 — Passband of the AA-1 repeater.

The beacon will occasionally be interrupted by voice identification and brief instructions on using the repeater.

Make note of the beacon's signal strength, then tune to the down-link passband. To transmit, send a test signal in the up-link passband and tune-in your own signal in the down-link. Use the chart in Fig. 1 to find your down-link frequency. Adjust your signal so that on voice peaks or under key down conditions it is about 1 S-unit (6 dB) stronger than the beacon signal. This assures that you do not take more than your share of the repeater power. To avoid reducing the repeater's sensitivity, make this adjustment by starting at a very low power level.

Other Features

Amsat has obtained a special waiver from FCC to allow Novice and Technician signals to be repeated on 10 meters.² As another feature, the repeater is to be operated under simulated orbital conditions. Thus, the signals you hear will be similar to those obtainable from this repeater when it is later orbited. Amsat hopes that additional aircraft tests will be possible for other areas of the U.S. and using other Oscar repeaters. Availability of an aircraft for future tests is a major problem. Anyone who can provide assistance in this regard should contact Amsat, PO Box 27, Washington, DC 20044. *QST* will carry news of future activities. — *WA2INB*

²The waiver applies only to operation of the Amsat-Oscar B repeaters by WA3NDS. It is ordinarily not permissible for an amateur's signals to be repeated in a band or sub-band not available to holders of his class of license. See page 84.

Rules

1. The Oscar Aircraft Competition begins with initiation of the AA-1 flight on May 15, and ends with the flight's termination, May 16. All contacts must be made using the 2- to 10-meter repeater aboard. Reception reports must be of signals from this repeater.

2. Two-way contacts must include an exchange of ARRL section and signal report. Reception reports must include the received station's section and his signal strength.

3. Entrants may be single- or multi-operator stations, receiving-only stations, fixed or mobile stations, etc. There are no special categories for the competition.

4. Count two points for each two-way contact; one point for each station heard; a five-point bonus can be earned for reporting the beacon's signal strength. The sum of these points multiplied by the number of different ARRL sections worked or heard constitutes the final score.

5. Each station can be counted only once for contact or reception credit. A station worked cannot be used for reception credit.

6. Entries should be sent to Amsat, PO Box 27, Washington, DC 20044 and must be post-marked no later than June 15, 1971. Each log must include for each station worked or heard, the call, his section, your signal report (his signal strength in case of reception reports) and points claimed and total claimed score. Please include a description of your station, plus your name, call, and address. Each participant will receive a special QSL. The high scorer will receive a plaque. QST

The 52nd Contest

THERE ARE only 51 major ham contests each year. This causes a serious problem for the hard-core contest enthusiast who finds one weekend with just nothing to do; nothing, that is, except to be reintroduced to his family and household chores. This, of course, is unthinkable.

The obvious solution is to have another contest. My proposal will, I'm sure, gladden the hearts of most competitors, a contest that will favor us soft-core also-rans.

This would be a competition which would score only those calls which were unanswered. Blank CQs would count something extra. A lot of little goodies should be put in the rules such as extra points for duplicate QSOs, unsuccessfully calling in a pileup for an hour, OO reports, or visitors dropping in for a chat.

To make the contest even more exciting, the idea would be to exchange Zip codes. These would then be multiplied by each other.* This would bring even a mediocre score into the trillions of points so everyone would feel good. A guy could take 18th place in the North Dakota section and

[*Providing a small advantage for W6/7 stations — EDITOR]



still brag about his score at the office (or school or old folks' home) all the rest of the year.

It is inevitable that there will be the nut fringe who will make this their major contest and point for it all year. They will move to locations surrounded by smoke stacks and water towers along-side high-voltage transmission lines, below sea level, if possible. Most of us, however, already have some elements of these ideal conditions and will make the worst of what we have.

Best of all, those of us who have developed the skills to excel in such a contest could hold our heads high. It would be an opportunity to take our rightful place along-side the other contest immortals. *Albert Kahn, K4FW, ex-W8DUS*

counted as cw. A station may be worked once on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a novice position may operate on any novice band segment at any time. Contacts made by retransmitting either or both stations do not count for scoring purposes.

7. Exchanges: Stations making contact, in order to count their contact as valid, must exchange ARRL section (see page 6 in any QST) and signal report.

8. Valid Contacts: A valid contact is defined as a two-way exchange (see above) between stations. Class A, R or C stations may contact any other station. Class D or F stations may contact any Class A, B or C station.

9. Miscellaneous Rules:

a. Operators participating in the FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated. This is intended to outlaw any kind of manufactured contacts.

b. A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station, using different calls. It is not, however, intended to prohibit the use of jointly-owned stations which are normally used under different calls by members of the same family.

c. Any Class A group whose entry classification is three or more transmitters may also use one novice operating position (to be set up and operated only by novice class licensees) without changing their basic entry classification. The novice position must use a novice call sign and must keep their own logs and check sheets. The novice position OSO total may be added to the group OSO total before multiplier.

10. Scoring: Scoring is based on the number of valid contacts times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Power Multipliers: If all contacts are made using a dc input power of 10 watts or less and if a power source other than commercial mains or motor-driven generator is used (e.g. batteries, solar cells, water-driven generators, etc.), multiply by 3. If any or all contacts are made using a dc input power of 200 watts or less, multiply by 2. Multiply by 1 if any or all contacts are made using a dc input power over 200 watts up to 1000 watts. Over 1000 watts, multiply by ZERO! Power on ssb phone is considered to be half the peak envelope power. 1. Batteries may be

charged while in use for Class C entries only. For other classes, batteries may be charged during the FD period from a power source independent of the commercial mains. Bonuses: The following bonus points may be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses.

1. 100 points for 100% emergency power, per transmitter classification. ALL equipment and facilities at the FD site must be operated from a source independent of the commercial mains.

2. 50 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made. Evidence must be submitted in the form of a clipping, a memo from a BC/TV station stating publicity was given or a copy of material sent to a news media for publicity purposes.

3. 50 points for message origination. A message must be originated by the club president or other FD leader, addressed to the SCM or SFC, stating the club name (or non-club group), number of operators, field location and number of AREC members participating. The message must be transmitted during the FD period and a fully serviced copy of it must be included with the Field Day report.

4. 5 points for each message received and relayed during the FD period, up to a maximum of 50 points. Copies of each message, properly serviced, must be included with the Field Day report. Club Aggregate Mobile Score. Entries under Class C may be combined to form an aggregate entry for their club, having no connection with the club's portable entry, if any. Individual reports must include the club name. The club secretary or other designated club official must submit the club aggregate mobile score claim. Only bona fide members of a club operating in the club territory (175 mile radius from the club headquarters address) may contribute to this aggregate mobile score.

11. Reporting: Entries must be received by ARRL Headquarters by August 1. The proper summary sheet, plus a list of stations worked on each band and appropriate proof(s) for bonuses constitute an entry. A copy of your FD log is not required unless specifically later requested by ARRL. This does not, of course, relieve you of the responsibility of keeping an operating log as required by FCC/DOC. Send a stamped addressed envelope to ARRL Hq. for FD forms which include the rules, a summary sheet and a sample of a suggested check sheet.



Strays

- I would like to get in touch with . . .
- . . . anyone interested in the National Teenage Radio Society. WA9WUC.
- . . . central New York hams interested in starting a Novice net. WN2PUX.
- . . . copies of an amateur radio magazine, *Kickbacks*, published in Minneapolis-St. Paul during the early '20s. Jerry V. Haines, University of Minnesota, 30 Arthur Ave., SE, Minneapolis, MN 55414.
- . . . hams who got started in our hobby by reading *SOS at Midnight*, *DX Brings Danger*, or *CQ Ghost Ship*, by Walker Tompkins. W1UED.
- . . . other hams who have constructed truck-campers equipped with amateur stations. W2BHZ.
- . . . amateurs interested in chess nets using any band from 80-10 meters ssb. WB2MOL.
- . . . any other amateurs who have received the post office box number of 73 by random. VK9GN.
- . . . North Carolina Novices who would like to start a net. WN4ODB.

Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for \$1 including postage.



Alvino Rey, W6UK, takes a break during videotaping in San Francisco of the King Family's newest TV special. Besides being one of the country's best-known hams, he is senior statesman for the Kings and was responsible for (or guilty of!) developing the electronically-amplified guitar. (Photo by Sheedy & Long, via WA6JNT)

VHF QSO Party Announcement

Starting Time **Ending Time**
 1900 GMT, June 12 0600 GMT, June 14
 Operate any consecutive 28-hour period

IF YOU haven't already done so, it's time now to start planning for this year's June VHF QSO Party scheduled to take place June 12-14.

You may operate any consecutive 28-hour period, working the same station on different bands for additional QSO and section credit. All that is necessary is to exchange your sections. Your final score equals the total QSO points times the total number of band-sections worked.

Read the rules carefully, then send right away for your free contest logs, being sure to state the quantity desired (38 QSOs per log sheet). To aid us in getting these logs to you as fast as possible, please be sure to include with each request a self-addressed stamped legal-size envelope containing your full name, call and mailing address complete with Zip code. We can send 5 log sheets First-Class for 6 cents postage. Using this as a guideline, you can estimate the amount of postage to include.

Be sure your entry is postmarked no later than July 4th and don't forget to include comments and pictures with your log. — **W1KQM**

Rules

1) The June 1971 VHF QSO Party begins at 1900 GMT, Saturday, June 12, and ends at 0600 GMT, Monday, June 14. Entrants may operate any continuous 28-hour period beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the chosen 28-hour period and must be made on amateur frequencies above 50 MHz., using authorized modes of operation.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point (s). A one-way exchange, confirmed, does not count, there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed-, portable- or mobile-station operation *under one call*, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).

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).

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

4) Scoring: *1 point* for completed two-way on 50 or 144 MHz., *2 points* for such exchanges on 220 or 420 MHz., *3 points* for such exchanges on the higher vhf bands. The sum of these points will be multiplied by the number of *different* ARRL sections worked per band, i.e. those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Crossband work does not count. Aircraft mobile stations cannot be counted for section multipliers.

5) Foreign entries: all contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together, and a multiplier of *no more than one* (per band) may be claimed for contacts with all foreign stations worked. Foreign stations may only work stations in ARRL sections for contest credit and will give their country name.

6) A contact *per band* may be counted for each station worked. Ex.: W2EJF (S.N.1) works K1YON (Conn.) on 50, 144 and 220 MHz. for complete exchanges. This gives W2EJF 4 points (1-1-2) and also 3 section-multiplier credits. If W2EJF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.

7) Each section multiplier requires a complete exchange with *at least* one station. The same section provides another multiplier point only when contacted on a new vhf band.

ARRL QSO PARTY LOG SHEET

NAME: **K1ZND** CALL: **W1KQM**

DATE	TIME	SECTION	MODE	QSO	POINTS	SECT
JUN 12	1900	144 MHz	CT	1	1	
JUN 12	1918	144 MHz	CT	2	2	
JUN 12	1938	144 MHz	CT	1	1	
JUN 12	1957	144 MHz	CT	2	2	
JUN 12	2005	144 MHz	CT	1	1	
JUN 12	2032	144 MHz	CT	1	1	
JUN 12	2124	144 MHz	CT	1	1	
JUN 13	0001	144 MHz	CT	3	3	
JUN 13	0042	144 MHz	CT	1	1	
JUN 13	0217	144 MHz	CT	4	4	

TOTAL QSO: 10 TOTAL POINTS: 14

ARRL QSO PARTY LOG SHEET

NAME: **K1ZND** CALL: **W1KQM**

ARRL QSO PARTY LOG SHEET

NAME: **K1ZND** CALL: **W1KQM**

8) Awards: Entries must be postmarked no later than July 2, 1971. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multioperator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in sections of less than three entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final.

Strays

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Full size (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$1.50 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order — we do not bill or ship c.o.d.

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AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity H.R.H.

CONDUCTED BY GEORGE HART,* WINIM

FIELD DAY

AH YES, a favorite topic! Some question whether it should go in this column or "Operating News," since it is really both a contest and an emergency preparedness activity. You will find the detailed rules in this issue.

Take a close look at those rules, please. They are quite a bit shorter, simpler and more concise than FD rules for previous years. This is the result of some hard skull pounding on the part of the ARRL Contest Advisory Committee, particularly Vice Chairman Roger Corey (WIAX) who, after weeks of coordinating and compiling data from other committee members and headquarters, submitted a detailed report of findings and recommendations which is good for an A+ in any classroom. The adopted rules appear elsewhere, but the "rationale" part of WIAX's report is significant because it gives the *reasons* for the new rules or changes recommended and adopted. Not all of them have to do with the public service angle, but since the basic purpose of FD is generally regarded as a testing of emergency capability, let's consider as briefly as possible the reasoning behind the essential changes.

First of all, the elimination of multipliers, a most controversial point that was debated long and loudly. Since practically everybody in Class A (field stations operated by three or more amateurs) and Class B (field stations operated by one or two amateurs) uses emergency power, at least for transmitters and receivers, *anyway*, it was felt that this multiplier could be eliminated by making emergency power mandatory for these classes. Class C (mobile) can't use commercial power by definition, and Classes D and E (home stations on commercial and emergency power respectively) also operate under defined power status, so they aren't involved. Very much involved, however, is the Class A or B group whose generator conks out.

*Communications Manager, ARRL.

In the past, they would switch over to commercial power (if available) and sacrifice the multiplier for those contacts. Now they have to go off the air entirely until the generator is fixed or replaced, or switch over to commercial and go out of competition, except with others in their class in the same fix.

The application of power multipliers has also been changed by eliminating the possibility of different power multipliers for the same group. A group qualifies for only *one* multiplier now, and all contacts take that multiplier. This was intended to greatly simplify scoring and will certainly have this effect. Thus, the new rules not only reduce the number of multipliers, but greatly simplify their application.

Note that the 50-watt power multiplier has been eliminated. It was felt that 50-watt transmitters are hard to come by (especially for ssb), most of those used being rigs designed for higher power and operated at reduced power and reduced efficiency. We predict that 90% of the entries will take the 200-watt multiplier, but we're hoping that some of the smaller groups will stick with 10 watts using products of the club's technical ingenuity. Think of the simplicity! A rig the size of a box of cigars or smaller, no generator to lug around, no gasoline or oil to worry about, no ignition noise problem, and a multiplier of 3!

So much for multiplier simplification. The second major simplification is the elimination of logs. Well, not quite that, since FCC regs require logs, and the new rule isn't to eliminate the necessity for your keeping the same detailed FD log you've always kept, but to eliminate the necessity for sending it in with your score. While unfortunately we have an occasional "cheater" in our contest and awards programs, it is a great deal more difficult to cheat when a group of people, rather than an individual, is involved. There is always at least one stickler in the gang. So keep your log as usual, but don't submit it with your

About the only photos we have for ARPS this month are the net meeting variety. This is the gang that attended the 2RN Meeting at the Tarrytown, N.Y., Hudson Division Convention several months ago.



BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Feb. Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W1CUL/4	284	2134	2064	35	4517
WB6BDO	35	1277	664	246	2222
W0LCK	26	861	756	11	1654
K3NSN	586	411	411	188	1596
WA8LTX	69	603	572	3	1247
WBRSY	25	593	440	151	1199
W6VNO	10	596	597	2	1199
W6INH	31	551	408	143	1133
ES1EY	5	568	548	5	1126
W6EOT	2	516	572	35	1125
W7BA	26	536	454	75	1091
WA1JTM	40	510	491	11	1052
WB4NNO	66	499	466	4	1035
W3FML	15	589	425	2	1031
W6PW	6	451	451	0	908
WA4JJI	22	441	432	5	900
W3VR/4	114	394	361	14	883
WRUPH	3	409	315	90	817
W6BGI	34	350	375	26	785
K0ONK	197	289	272	10	768
WA4ABY	62	369	280	37	748
VF3GI	25	358	283	74	740
W8SZU	8	335	334	1	678
W7FKK	6	332	330	2	670
K6DYX	2	331	331		664
W0INH	10	319	314	3	646
WA7BAV	234	192	9	194	629
W4AFW	5	301	296	8	610
WA6DGI	3	300	286	9	598
WA8WZU	15	299	255	20	589
W4EVN	24	259	253	48	584
W4SOO	22	258	281	18	579
W6LCP	22	260	178	111	571
W1DSC	19	291	245	12	567
K8ONA	338	128	75	25	566
WA0GRX	33	268	265	0	566
W3MPX	83	251	202	29	563
K2RXO	178	193	181	12	564
W8RYP	21	268	270	4	563
WA9QVT/4	39	271	244	7	561
K6KCB	20	255	270	2	547
K3BHU	14	269	257	6	546
WB4SMA	62	262	209	12	545
W1OYY	13	261	254	14	542
W8LAG	35	257	255	2	539
W88ALU	8	255	258	5	526
K0CST	36	246	70	172	524
WA1JVY	71	240	181	29	521
WA2QOO/3	189	167	149	13	518
K4EAC	16	223	268	11	518
W2OC	21	237	243	12	513
WB4OMG	43	238	216	5	502
W66SXY	125	290	75	100	500

BPL for 100 or more originations-plus deliveries

K0ZSO 415	W1CST 153	WB9FRK 109
VE5GL 353	K1BCS 145	WB2LGA 108
VF3RU 300	WA6OOL 143	W7AXT 108
WB8DSV 273	WA1MFB 142	W1YNE 107
WA1HOL 217	W6OCU 139	W8R00 106
WA0VAS 216	WA4MEH 136	WA5TMC/5 105
W6QAE 215	W6JEO 134	WB4KDI 104
WB8AZH 215	W6KVO 129	WA6BYZ 103
K5LBI 200	VE3FD 125	W88BPR 101
W8TFL 194	WA5MIW 120	WA9OQ 101
W0YO 183	W0BGX 117	WA4VTK 100
WA8MFM 172	WA2FGS 114	WA4PRG (Jan.) 124
WA7LUX 169	W8SFD 114	WB8BPU (Jan.) 113
W3TN 167	WB8BPU 113	WB4CVY (Jan.) 107
K1QFD 165	WA1GCT 109	W2GSA (Jan.) 106

More-Than-One Operator Station

W4BCZ 295	K3CZT 137	W1AW 111
W4BNF 171	W8SH 157	W3WC 102

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

score *unless asked*. We may ask for logs of leaders, or for purposes of spot-checking, cross-sectioning, or any other reason. Not having gigantic piles of logs in our Contest Branch will help a great deal in simplifying administration, and save you some postage.

About the only other changes that can be considered major involve the Novice rules. It was felt desirable to continue to encourage Novice participation, as initiated last year, but in small groups a "free" Novice setup could add materially to the score, which would be unfair to those who didn't have or couldn't get a Novice or Novices (not to mention VEs, who don't have Novices to begin with). Nevertheless, the minimum was lowered from 4A to 3A for a "free" Novice setup (i.e., not added to transmitter class) to encourage getting these youngsters out on FD. Also, in order to eliminate difficulties encountered last year from the Novice position using the same call as the rest of the group, the new rules specify that a *Novice* call shall be used but the score added to the group's score - and also that the Novice bands are considered separate bands from associated other cw bands for the purpose of Novice contacts. This latter makes possible, for example, operation by the group station on, say, 3530, while the Novice station is operating on, say, 3725. Whether or not this is *practical* is another matter!

There are also a number of little "clarification" changes. For example, it was never intended that the rule prohibiting a station from being operated under two different calls should work a hardship on "family" station setups, so this has been clarified. It just isn't practical to include repeater contacts in FD scoring, so this is now mentioned as not being allowed. The FD site definition is now clearer and no longer mentions "control points." The "limited setup time" rule now applies only to Class A and B, although it never really applied to other classes anyway. Things like that.

Well, so much for the FD Rules - for another year, anyway. Going out? We have passed up weddings, graduations, even family get-togethers for the purpose, almost since FD was originated, and wouldn't miss it. If you don't go out, get on from home (Class D or E) or from your mobile (Class C), join the fun and add to ham radio's "place in the sun" for that one weekend (and pray for unrain!). - WINJM.

Traffic Talk

Let's talk about message precedences. We still think it ought to be pronounced *precedence*, with a long accent on the second syllable, to avoid confusing it with the plural of the legal term "precedent," which is accented on the first syllable. The dictionary allows this pronunciation, but unfortunately also allows the more common practice of pronouncing on the first syllable. In fact, when you get right down to it, the dictionary allows almost anything - but that's another story.

About message precedences: the precedence is *not* a part of the number. Got that? The precedence is *NOT A PART OF THE NUMBER!* Again and again we hear traffic stations send NR 58R. Again and again we copy service messages referring to UR MSG NR 58R. *The precedence is*

not part of the number. On phone, the precedence should be stated, not abbreviated. Thus: "Message number fifty-eight, routine . . ." not "Message number fifty-eight R." On cw, it is proper to use the letter (R, Q or P) in all cases except EMERGENCY, which is always spelled out.

There are now four precedences. Actually, these four have existed for a long time, but the P2 designation was considered a cupola on the P (Priority) precedence. Now, with its so-extensive use in emergencies, it stands by itself as Q (inquiry). What are the four precedences? Operating Aid 9B details them. This OpAid supersedes Op Aid 9A and is brand new, free for an s.a.s.e. In brief, you use precedence EMERGENCY when a life-or-death urgency exists, Priority (P) when the matter is urgent and/or has a time factor but is not life-or-death, in inquiry (Q) when concern for someone's welfare exists, and Routine (R) for the remaining approximately 95% of all traffic. Traffic is cleared in the stated order. When a message with precedence EMERGENCY appears on a net, all other activity stops until the message is cleared (unless other EMERGENCY messages are already being handled); once such a message reaches a point where normal commercial communication is available, it is transferred to these channels. No one worries about cost in such a case. P, Q and R traffic is handled to its destination by amateur radio, unless instructed otherwise by HXA.

National Traffic System. February was a busy month for NTS, what with SET overflow, the California earthquake emergency and the Mississippi-Louisiana tornados. As far as traffic totals are concerned, February, 1971, is one of the biggest months in history, second only to some Decembers of several years ago.

EAN Manger K2KIR says new records were set for traffic, average and rate, and wonders what it would have been like if this was leap-year. Bud goes on to congratulate the ICC crew on the job they did under very trying conditions. W0NH says this was CAN's second highest February and that the second highest monthly average rate was obtained. W2FR is pleased with the stability of NCS and representation assignments on 2RN. Earning certificates for their performances in 2RN were W2EWZ, K2s B1Q OQJ (WA2DMF, opr.) RXQ, WA2UWA, W2s JAF LZN. On 4RN, W4SHJ has issued certificates to K4FAC, WB4SMA and WA9QVT/4. RN6 Manager W6LRU says he has received word that the Army is closing down all their MARS facilities for handling traffic to Vietnam as of March 5. Traffic for other Pacific areas is still being handled through Air Force and Navy MARS circuits. Don also says the earthquake traffic was a workout, that many stations did yeoman duty, but a bottleneck developed at the local level because of a lack of regular operators. W7BQ says RN7 is handling some traffic with RTTY with W7s AXT BQ KKB and VESGL taking part. W9HRY, 9KN pilot, says that traffic was down even with the big floods of SET and disaster traffic. He is encouraging net personnel to find, originate or otherwise procure traffic. W9KOB was the recipient of a 9RN certificate. W0s HH MOQ NFR ZHN and WA0SSU have been sent their TEN certificates according to manager W0HH.

February reports.

Net	Sessions	Traffic	Rate	Avg.	Rep. %
FAN	30	3630	2,276	121.0	98.3
CAN	27	1789	1,615	73.9	100.0
PAN	27	2349	1,542	87.9	100.0
1RN	56	1008	578	18.0	94.3
2RN	54	819	983	15.2	97.8
3RN	52	654	575	12.1	97.4
4RN	56	856	538	15.3	97.1
RN5	56	1050	512	18.7	94.0
RN6	54	1733	759	32.1	100.0
RN7	55	449	446	8.2	62.0
8RN	58	1305	824	22.5	96.6
9RN	55	640	634	11.6	96.4
TEN	56	830	806	14.8	79.2
ECN	53	491	407	9.2	92.0
TWN	53	415	301	7.8	67.4
Sections ¹	1968	16989		8.6	
ICC Eastern	146 ²	2088			
TCC Central	84 ²	1120			
TCC Pacific	153 ²	2656			
Summary	3059	40,877	EAN 24.3		
Record	3059	34,238	1,494 17.0		

¹Section and local nets reporting (59): W. Que. VHF: QMN (Mich.); EPA, PTTN (Pa.); SGN, PTN (Me.); GSN, GTN (Ga.); NJN, NJAN, PVTE (N.J.); BUN (Utah); KYN, KTN (Ky.); MTN (Man.); BEN, WSBN, WIN, BWN, WSSN (Wise.); MDCTN (Md.-D.C.); OZR (Ark.); WSN (Wash.); VSN, VN, VSN (Va.); CEN, CN (Conn.); ITN, TEX (Tex.); GN (N. & S. Cal.); VEN, PMTN, GN, QFN, TPTN, PPTN, KLN (Fla.); SCN, NCN (Cal.); LAN (La.); BSN (Ore.); IJN (Hil.); OSSB, BN, QCEN (Ohio); NJL, NYS (N.Y.); CHN (Col.); WMN (Mass.); MSN, MJN, MSPN (Minn.); AENR (Ala.); GBN, OPN (Ont.); OQN (Que.-Ont.); RISP (R.I.); QKS (Kans.).

²TCC functions, not counted as net sessions.

Transcontinental Corps. All the TCC Directors put on extra schedules to handle the extra loads of traffic. W3EML says he finds it impossible to list as successful or unsuccessful. "I am reluctant to list a function as unsuccessful when two good operators handled a stack of traffic without strain but failed to clear all traffic because the FAN station had to call a halt in order to clear traffic in Pacific area nets." Bill goes on to say, in a comprehensive report, that the really good news was the splendid response of stations to the overload situation. W0LX says the disaster really boosted traffic but was gratified to see that only one function failed. W6VNO, Pacific Area Director, lists nearly forty extra functions carried out by a number of different stations. Bob reports that the establishment of standard frequencies last fall by the three area directors was a big help in clearing extra traffic.

February reports

Area	Functions%	Successful	Traffic	Out-of-Net Traffic
Eastern	146	99.3	4774	2088
Central	84	98.8	2274	1120
Pacific	153	98.6	5312	2656
Summary	383	98.9	12,360	5764

The ICC Roster: Eastern Area (W3EML, Dir.) - W1s BJG EFW FH NJM, K1SSH, WA1JIM, W2s FR GKZ QC, K2KTK, WA2s ICU UWA, WB2RKK, W3EML, K3MVO, W4s NLC SOO UQ, K4KNP, W4s GTS NNO, W4s POS YVR, WBRALU, VE3ERUJ, Central Area (W0LX, Dir.) - W4OGG, W4s HOW KPE, W5MI, W9CXY, WA9VZM, WB9DP, W0s HI INH LCX ZHN, K0AFM, W4s DOU IAW, Pacific Area (W6VNO, Dir.) - W5RF, W6s BCF BNX EOI IPW MIF MNY VZT, K6DYX, W4s DEL LEA, W7s DZX EM KZ PL, K0FSP.

There was quite a gathering at the meeting of the Kentucky Post Office Net in Lexington in Sept., 1970.



Public Service Honor Roll February, 1971

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below. In some cases scores have been adjusted to agree with new maximum allowable points which have taken effect. Use CQ-190 or submit equivalent information through your SCM. See page 75, Nov. '69 QST for initial description and page 72, Sept. '70 for latest point evaluation. Please note new maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	20	3	5	5	
W6BNX	10		12		12	20		250	5	309
W8WZP		5		12	12			3 125		157
VE3BRU	10		12		12			3 100	5	142
W6IN	10	10		12				3 105		140
W6MNY	10	5	12	3	12			90	5	137
VE3GH	10	5	12		12			3 50	5	97
W6INH	10	12					5	3 50		92
W8FTX	10	10	12	12	12	2	3		5	66
W3LZT	5	8	12	3	9	17	3		5	65
WB4SMA	10	10	12	12	12		3		5	64
WA2DRH	10	10	12	12	12	1			5	62
WA7KJL	10	10	12	12	12				5	61
WA1GCE	10	5	12		12	10	3	2	5	59
W0LRW	10	10	6	12	12		4	5		59
WB8BBG	10	5	12	12	12			1	5	57
WA2KHQ	10	10	12	12	12				5	56
W4OGG	10	10	12	12	12				5	56
W71BK	10	10	12	12	12				5	56
W8IZ	10		12		12				22	56
W1YNE	10	9	12	9			3	12		55
WB2DI1	10	9	12	12		12				55
W6JFO	10						3	42		55
WA8LDW	10		12	12	12		4	5		55
WA2ICU	10	10	9	12	12				5	55
W3MPX	10	10	12		12		3		5	52
WA8UP1	10	10		12	12		3		5	52
WA1LPI	10	5	12	12	12				5	51
K7CTP	10	5	12	12	12				5	51
WB6SXV	10	10		3	12	20	3	2		50
WA2VYS	10	10	12	12					5	49
W6LRU	10	10	12		12				5	49
W8MI	10	10	12		12				5	49
WA9WMI	10	10	12		12				5	49
K0MRI	10	10	12		12				5	49
VE3DV	10	4	12		12			10		48
VE3FXA	10	5	12	12	9					48
W6BGE	10	6	12	12				3	5	48
WA0VAS	10	10		12	3	20	3			48
WB2CGA	10	10	12		12		3			47
WB2LZN	10	8	12		12					47
WB4NNO	10	5	12		12		3		5	47
W4NOG	10		12			20			5	47
WB4OMG	10	10	12	12			3			47
K7NHL	10	5	12		12	2			5	46
WA8ROF	10	10	7	8	12	7				49
WB8CWD	10	9	12	3	12					46
VE3AMD	10		5		12		3	25		45
W7CAF	10	5		12	12	1			5	45
W9HRV	6	10	12		12				5	45
VE3FAI	10		12		12			10		44
K5ROZ	10	10	12		12					44
W7PI	10	10	12		12					44
WA8ZNC	10	10	12		12					44
WA0JLC	10	10	12		12					44
WA0YQ	10	10	12		12					44
W2MTA	10	10	12		6				5	43
WA8RIU	10	10	3	12	3	2	3			43
WA0TZK	10	10	6		12				5	43
WA0YMU	10	10	9	9			5			43

WA3IPU	10	3	12		12				5	42
W7JWJ	10	5		12				15		42
8R1YW4	10	7	12		12		1			42
WA1HOL	10	10	9	9				3		41
WA3LXK	10	10		9	12					41
WB4DAJ	7	10	12	12						41
W7BO	10	2	12		12				5	41
WA1MEB	4	10		12	6			3	5	40
W5RBB	10	6	12		12					40
W7AXT	10	3	12		12			3		40
WB8ALU	10	3	12		12			3		40
W2FR	10		12		12				5	39
W2RUF	10		12		12				5	39
W1OS	10		12		12				5	39
W8NFM	10		12		12				5	39
K4PAC	10	5	12		12					39
W5QJA	10		12		12				5	39
WASVOE	10		12		12				5	39
W7GYF	10	3	12		9				5	39
W8SPM	10		12		12				5	39
W0BV	10	5	12		12					39
W0HI	10		12		12				5	39
WA0RZ				9		20				39
W1BYK	10	4	12		12					38
VE3GL	10		12		12			3		37
WB2LW	10	10		12					5	37
W2QC	10		12		12			3		37
WB4PWD	10	10		12				5		37
W4UO	10	3	12		12					37
VE4FO	10		9		12				5	36
K7KTK	10	1	12		12					35
W0CS	5	10			12				5	35
K3MVO	10	4	9		12					35
W7GUX	10	5	3	12					5	35
VE3GFN	10		12		12					34
K1SXT		5		12	12				5	34
WB2HUG	10		12		12					34
WA3CKA	10		12		12					34
K3HKK*	10		12		12					34
WA3LYC	10		12		12					34
K3JOH	10		12		12					34
W3OKN	10		12		12					34
W31N	10		12		9				5	34
W6EIT		10		12		12				34
W6YBV	10		12		12					34
WA7MAD	10		12		12					34
WA8DOL	10		12		12					34
K81GA	10		12		12					34
WA9DMI	10		12		12					34
WA9VZM	10		12		12					34
WA0HTN	10		12		12					34
K0JSP	10		12		12					34
WB8BLH	10	10		12		1				33
WB4LAA	10	10		12						32
K7UYW	10	5		12		7			5	32
WB0AEM	10	10	12							32
VE2APT	5		12		6			3	5	31
VE3NO	5		6		12		20			31
K4KNP	10		9		12					31
WA0VYB	7	10		9				5		31
W6DFE	10	5	12		3					30
WA8VKF	5	10		12	3				5	30
WA0HRM	3	10		12					5	30

*Denotes multoperator station.

Category Key: (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing assigned liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; (9) Serving as net manager.

Public Service Diary

On Feb. 21 much of the midwest was blanketed by a snow storm of blizzard proportions. Near Wichita, Kans., nearly 1000 persons were stranded in automobiles on the Kansas Turnpike. Among those stranded was W0FKU who used his mobile

rig to call for help on forty meters. The first contact was with WB9BJX near Chicago, who contacted the turnpike authorities. When help failed to come, W0FKU broke into a contact involving K5FNV/Q and K0YEH. Both stations set about summoning aid and additional help was

forthcoming in the persons of WAØHZZ, KØJMF, WAØPRA and WAØUTT, Kansas Zone 9 EC. After quite a bit of effort, the National Guard dispatched several rescue vehicles, but the would-be rescuers were greatly hampered on the highways by accidents and jack-knifed trucks. Many of the stranded motorists weren't reached until more than twenty hours had passed.

On February 22, WAØFVX, Zone 8 EC, led a caravan of some 75 vehicles from Arkansas City to the south end of the turnpike to undertake rescue operations there. — WAØUTT, EC Zone 9, Kansas.

As a result of the same storm described above, travel in many parts of Northwest Oklahoma was difficult. A net was established on eighty meters to help travelers with information of road conditions. A number of stations mobiling in the storm were active, including WA5FSN, WA5FVJ and K5CAY. Near Oklahoma City, WA5QBS was blown off the highway. Using two-meter fm equipment, WA5AOB, W5CDG, K5HQ and W5CIX were contacted and came to the rescue. Liaison was maintained among repeaters operating in Enid, Oklahoma City and the high frequency operation. — WA5FSN, SEC Okla.

At 2200Z on Feb. 22, Columbus, Ohio, EC/RO W8ERD was notified by Civil Defense Communications Officer W8GKN that a standby weather alert was in progress. Radio and telephone alerting plans were activated and WA8TRF and WA8VZE were sent to place the emergency operations center into service. At 2230 the red alert was issued and all available stations were asked to report to the EOC for duty. A tornado had struck the area and power was knocked out. The EOC went on emergency power. In an hour, forty amateurs with 26 mobile units had assembled. At 0100 the Red Cross requested on-the-scene damage reports from several locations and teams of two mobile units were dispatched to each location to gather the information. W8KJM activated the station at Red Cross headquarters to receive the incoming reports. W8LT assisted with relays whenever necessary. By 0300 all damage information had been collected and the operation was secured. It was learned later that the tornado had passed within a few blocks of the EOC, but caused only minor damage to a six-meter antenna. — W8ERD, EC/RO Columbus, Ohio.

KØEXN, EC Zone 12, Kans., received a call at 0330Z on Feb. 23 from local Red Cross officials advising that a train had derailed 25 miles west of Garden City and the passengers were being brought to the local hotel and hospital. AREC was requested to furnish communications. WØMBP was alerted to provide relays and KØENU, net control of the Midwest Mobile Watch, was notified of the forthcoming traffic. KØGZL collected traffic from passengers while WØLRU, W9CV and KS6DV/W5

helped relay it to destination. In slightly more than an hour, all traffic had been cleared. — KØEXN, EC Zone 12, Kans.

Thirteen amateurs, a number of them mobile using two-meter fm, assisted television station KAKE of Wichita, Kans., on Nov. 3 in gathering data on election returns from precincts scattered throughout Sedgwick County. Net control for the operation was WAØHVZ. — WAØUTT, EC Zone 9, Kans.

A number of Highland Co., Ohio, amateurs also helped in relaying election returns to the county seat, Hillsboro, from outlying areas on Nov. 3. This information was then given to local broadcasters for notification of the public. Participating were K8s CKY IZE NTZ, WA8s KIW KFB and MUC. The operation ceased about midnight when the returns were complete. — K8CY, EC Highland Co., Ohio.

The Spartanburg (S.C.) Radio Club took on a similar task for their area. Seven amateurs assisted in gathering data and relaying it to a central point. Other groups were also active in other parts of the state and the gathering of the election results was part of a statewide drill to test emergency communications effectiveness. — WB4MCI.

Twenty-four Columbus, Ohio, amateurs participated in a fund raising drive for the Franklin Co. Muscular Dystrophy Association on Nov. 15. Amateurs picked up collections at 29 neighborhood centers and took them to a central bank. NCS for the operation on two-meter fm was W8ETU while W8ELE helped out with six-meter duties. The activity lasted about three hours and no difficulties were experienced. — W8ERD, EC/RO Columbus, Ohio.

The Northeastern Ohio AREC was also active in the fund drive of Nov. 15 in Portage County. Eight amateurs took part in making five collection pick-ups throughout the area. Six-meter am was used, the activity proving that the necessary area could be covered using that frequency and mode. — K8EIO, AEC, Summit Co., Ohio.

The communications unit of the Bronxville, N.Y., Civil Defense conducted a field exercise on Nov. 21 and 22. Two cw and ssb stations were set up in an emergency van parked atop a vacant field. An emergency generator was used to power the stations and a helium-filled balloon was used to hoist the long-wire antenna. — WB2LRS.

Four Akron, Ohio, area amateurs helped provide communications for a "Hike for Hunger" through downtown areas of that city. K8VAK, K8EIO, WA8PGT and WA8UGD, all mobile, kept
(Continued on page 97)

Here are the attendants of the NJN meeting of last November. Included in the photo, although not specifically identified, are WA2BAN, WA2DMF, WB2TUL, WB2FEH. WA2BAN was elected new net manager, replacing outgoing WA2BLV. (Photo by WA2DRH.)



1) Since stations of one nation are frequently in communication with stations of another nation, it is necessary to have agreements on such operating details as calling procedure, distress signals, call assignments, methods of collecting tolls on radiograms, etc., unless utter confusion is to be encountered when any two stations try to do business over the air.

2) Because it is possible to operate radio stations throughout a wide range of frequencies, it is necessary to agree in advance where various services will locate themselves in the spectrum, so that stations will know where to find each other.

3) Since radio signals are not confined to the borders of the country in which they originate, international agreements on allocations to services are also necessary in order to prevent chaotic conditions on the air and hopeless interference between services.

The first two were probably the major considerations in the earliest radio conferences. The third was not so vital in the early days of radio but today is extremely important.

Pursuant to the international agreements, each nation, both as a matter of common sense and agreement, arranges its own domestic laws so that they conform to the international commitments. Obviously, it would be silly if the various nations, after carefully working out solutions to their problems, disregarded the remedies by permitting the stations within their borders to operate on some entirely different basis.

Now let us trace the course of all the international conferences and all our own national laws to see how the amateur got taken care of as the laws came along. We'll cover the international treaties first, and then cover our domestic (U.S.) radio laws set up under these international treaty provisions.

International Regulations

The very first international radio conference, though it doesn't really belong in this story, was held in

Berlin, 1903

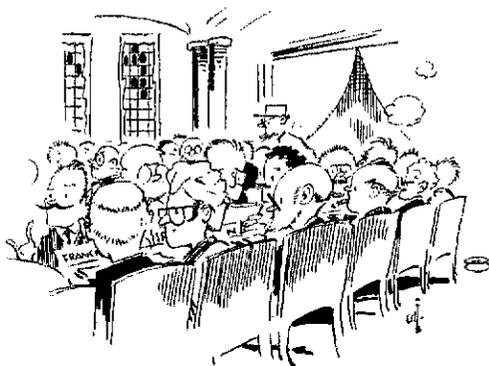
It didn't say anything about wavelengths, operating procedure or anything of this sort and was held primarily for one reason: there was getting to be considerable trouble because of the fact that stations using Blotto Co.'s equipment would communicate only with other Blotto-equipped stations and would turn studiously deaf ears to calls from stations using Blifsky or other gear. Such nonsense obviously had to be stopped and this first conference, participated in by nine nations (including the United States, which was to participate in all subsequent conferences) was called mainly for the purpose of putting an end to such shortsightedness.² A few clauses regarding charges for messages and priority of distress calls completed the brief document.

The next conference, resulting in the first actual treaty, was the one that really started things off.

Berlin, 1906

Twenty-nine nations participated. The principal objective was the setting up of arrangements to deal with ship-to-shore work, that being the main thing radio was then used for. In fact, the only services defined in the treaty regulations were

²This conference didn't settle the question, though, and it came up again at both the subsequent 1906 and 1912 affairs, at the latter of which it finally was eliminated as a problem.



CONFERENCE VOTING 16 BY COUNTRY

coastal stations and shipboard stations — a station, presumably, was either one or the other!

Judged by present standards, the conference resulted in a pretty simple treaty and an even simpler set of regulations to go along with it. However, it is of interest to us because it was here that we see the very first agreements of any kind on wavelength assignments. These agreements were exceedingly simple: coastal stations open to general public service had to be able to use both 300 and 600 meters; ship stations were to use 300 meters for a normal wavelength but could use others if they did not exceed 600 meters; small boats unable to "get up" to 300 meters were authorized to use "a shorter wavelength"; and finally — get this! — coastal stations, apart from their two special waves, could use any wavelength, so long as it was either below 600 meters or above 1600 meters. Had coastal stations in those days wished to use any of the territory represented by our present amateur bands, they were free to do it.

There was no mention of amateurs in the treaty and no provision for them except that if any nation had licensed amateurs at that time (none did, including our own United States) it presumably would have to see to it that they stayed below 600 or above 1600 meters.

In addition to these matters, the treaty and regulations specified three-letter calls, limited shipboard power, normally, to a kilowatt, outlined details of hours of service for coastal stations, the posting of "wireless" telegrams, rates, collection of charges, etc., specified the use of the International Morse code for radio work, designated SOS as a distress call and outlined some very rudimentary regs on methods of calling and working.

This second Berlin gathering also decided on the principle of holding similar conferences from time to time and, as a matter of fact, the next was held six years later. So we come to

London, 1912

Forty-three nations from all over the world participated in this London conference; our radio gatherings were beginning to amount to something! Not much was done to change the 1906 treaty and regulations but they were enlarged on somewhat. As before, general public-service stations had to be able to use 300 and 600 meters, but now they could also use 1800 meters. Ship stations were 300 and 600 meters. A curious addition to wavelength specifications was one prohibiting stations used exclusively for sending signals designed to determine the position of ships from using a higher

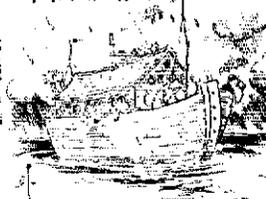
SPACE

LAND
MOBILE

AERONAUTICAL



MARITIME



ALLOCATIONS ARE BY SERVICES

wavelength than 150 meters. Here was the first "short-wave" assignment, as such, and it was to radio-bearing stations! However, this was by no means an exclusive assignment, because, just as in the 1906 treaty, any station could use any wavelength (except that the compass stations had to stay under 150) as long as it stayed under 600 or over 1600 meters.

Ship power was still limited, normally, to a kilowatt; additional power could be used if needed, however, for distances over 200 miles or under unusual circumstances. The Q signals came into being. Revisions and additions were made to other operating details but not a great deal of change shows up in this treaty in these matters as compared with the earlier one. Our old friends, the coastal stations and shipboard stations, were still the only defined services.

At this gathering it was agreed to hold the next conference in 1917, but the first World War and its aftermath upset things so badly that it was fifteen years before another radio conference took place.

Washington, 1927

Nearly eighty nations participated; as of that time, this was the largest international gathering ever held on any subject and the first since the advent of "short waves."

The delegates were confronted with a perfectly stupendous task because of the tremendous strides made in radio development since the previous gathering. All the old concepts of radio had been discarded and new theories evolved; new uses for radio had been found with a resulting terrific enlargement in the number of services; radio telephone had been developed and had given birth to the broadcasting industry; the short waves had found use. As may be imagined, the conference regulations were numerous and detailed, bearing but little resemblance to those in the former documents.

Radio services had segregated themselves into dozens of different distinct classes by this time, so the services mentioned in the list of definitions were considerably more detailed. One of the definitions was that of "private experimental stations." There were two subheads to this definition: the first explained that the definition included stations of the kind we now recognize as "experimental"; the second stated that the definition applied also to "a station used by an 'amateur.'" We had arrived. Here, for the first time, we find ourselves mentioned in an international radio document.

More than that, the radio spectrum — heretofore virtually wide open to everybody — was now split up into channels, from 10 kiloHertz to 23,000 kiloHertz and the various services allotted certain specified channels or groups of channels for

their use.³ And in this table, we amateurs were allocated the following bands: 1715-2000 kHz, 3500-4000 kHz, 7000-7300 kHz, and 14,000-14,400 kHz. Since the regular table of allocations did not go above 23,000 kHz, and since we amateurs urged assignments still higher, special assignments were designated at 28-30 MHz and 56-60 MHz jointly for the use of the amateur and experimental services.

Licenses were required of all amateur operators and it was further stipulated that each such licensee would have to demonstrate ability not only to transmit the Continental code but to receive it — "by ear." The code speed required of licensees was left to each country to determine for itself, however.

Of course, the regulations also went into great detail on all other matters such as revision of the Q-signal list, calling procedure, rates, methods of collection, license requirements (commercial), etc., but we take it for granted that by now our readers are aware that each set of regulations in the international treaties include these matters and we will not refer to them further. From now on we will treat only those portions of the treaties that deal with amateurs and amateur radio.

Madrid, 1932

Very little change was made in the previous treaty or its annexed regulations, except that the general allocations table was extended to 28 MHz, and the "as a guide" aspect was eliminated; thereafter countries agreed to make their assignments in accordance with the allocations table. Our Washington amateur frequency bands were continued intact. However, we had not been satisfied in the Washington regulations with having the definition of an amateur included only as part of a definition of the "private-experimental-station" class; at Madrid, therefore, we sought to have amateurs recognized as a separate and distinct class. The effort was successful and at Madrid, for the first time in an international treaty, we see the amateur service recognized strictly as such. The next international meeting was

Cairo, 1938

By now, the increasing pressure on the high-frequency spectrum brought about by expansion of existing services and the introduction of new ones was creating serious problems in the allocations table. The spectrum between 3 and 25 MHz, once thought to be of virtually limitless extent, was full to overflowing — with more customers clamoring for admission every day. As

³This matter of trying to allocate the whole spectrum by services was a new concept and many nations were a bit cautious about accepting it as binding. In fact, they didn't; the allocations table was specified only "as a guide"!

might be expected, those countries having little interest in amateur radio regarded our amateur bands as legitimate areas for the spotting in of some of the overflow, and the aggregate initial proposals of the other countries (particularly those in Europe) for a revised allocation table cut heavily into all our bands. Only the unswerving stand of the U.S. delegation in our behalf, supported by our neighbors and sister republics in the Americas, saved all our previous bands for amateurs in this region — we in North and South America emerged without the loss of a kilocycle. Elsewhere, however, amateurs did not fare so well: in the European region, the 3.5-MHz band was severed, and amateurs permitted only in the portions 3500-3635 kHz and 3685-3950 kHz; outside the American continents, too, amateurs no longer enjoyed exclusive rights to the entire 7-MHz band, and both amateurs and broadcasting could be permitted to use the territory between 7200-7300 kHz in Europe; the 5-meter band was reduced, at least in practical effect, to less than half its original width of 4 MHz. Spectrum assignments were extended to 200 MHz. A special appendix indicated a regional assignment table for the American continents and included exclusive amateur bands at 56-60 MHz, 112-118 MHz, and 224-230 MHz. Beyond 230 MHz, no amateur assignments were indicated, although assignments to other services (television, fixed and mobile) were made as high as 300 MHz.

Aside from these allocations matters, there were few other developments of even passing interest to amateurs, and all the other strictly amateur provisions were continued without change.

Atlantic City, 1947

Like the 1927 conference, it had to tackle a host of brand-new allocations problems resulting from an incredible development of new applications of radio, particularly in the fields of radar, radio-navigation, and a virtually entire new service — international aviation. Changes from previous international amateur frequency privileges can be briefly summarized: we lost the "160-meter" band to radio-navigation, although retaining sharing privileges to an extent; we lost 50 kHz from the top of the 14 MHz band; we lost 300 kHz from the top of the 28 MHz band; we *picked up a whole new band of 450 kHz at 21 MHz*, went through some readjustment of our previous vhf bands, and picked up all the bands we now have above 225 MHz. So far as the United States is concerned we retained the 3500 and 7000 kHz bands intact, but further curtailment of amateur use of these bands in other parts of the world occurred: this applied particularly to the 7-MHz band, where in Europe and Africa the only exclusive amateur assignment was 7000-7100 kHz.

Again, it was only because of the solid support of the United States delegation, with assist from Canada and our sister American republics, that we came out with what we have in this hemisphere — actually a net increase in amateur frequencies both above and below 25 MHz, *the most we ever enjoyed under international treaty.*

To complete the Atlantic City story, it should be noted that the new or expanded service assignments below 25 MHz came at the expense of the fixed service, primarily (our 21 MHz band is an example), which lost roughly 25% of its frequencies previously held in the 2-25 MHz region. The gainers were chiefly the aeronautical and international broadcast services. General assignments were carried up to 10,500 MHz.

Geneva, 1959

Here were adopted the basic radio regulations under which we now operate.⁴ Several European countries added themselves to a footnote allowing amateur assignments in the 160-meter band making a total of 13; the band continued to be shared in Regions 2 and 3 between the Amateur, Fixed, Mobile, and Radionavigation Services. In Region 2, of course, Loran has priority, and in Region 3, Loran is protected from interference on two 50 kHz frequency bands.

The 80-meter band continued on a regional basis, as established at Atlantic City — Region 1, 3500-3800 kHz; Region 3, 3500-3900 kHz, and Region 2, 3500-4000 kHz, all shared with the Fixed and Mobile Services. Our 40-meter band also continued as at Atlantic City in Region 2; in Regions 1 and 3, the International Broadcasting Service gained an additional 50 kHz of exclusive territory, the allocation ending as 7000-7100 kHz, Amateur; 7100-7300 kHz, Broadcasting. A special conference resolution, published with W3MR's article last month, was adopted to deal with the special 7-MHz situation.

The 20-meter band was completely unchanged, 14.0-14.35 MHz, with the USSR's fixed service permitted to use 14.25-14.35 MHz as well; 15 and 10 also were unchanged. The basic allocation of the 6-meter band continued to be 50-54 MHz in Regions 2 and 3, as at Atlantic City, but several countries — Malaya, New Zealand, Singapore, India, Indonesia, Iran, Pakistan, and Australia — made arrangements for sharing by or allocation to other services by means of footnote. The 144-146 MHz band stayed exclusively amateur, worldwide, and 146-148 MHz was additionally available in Regions 2 and 3.

After Geneva 1959, the bands 220 MHz and up have been shared generally with the Radiolocation Service; these government "black boxes" have been a minor irritation to amateurs, but a major protection to the amateur service — no other service is flexible enough to share these bands, and government users have been adamant against any encroachment by "commercials"! Except for this sharing, 220-225 MHz continued exclusively amateur in Region 2, not available at all to amateurs in the other two regions. Amateurs in Region 1 lost both ends of the 420-450 MHz band but preserved the middle, 430-440; Regions 2 and 3 had no change other than the sharing. Above 1000 MHz, the changes were minor. The 1959 conference extended the allocations, however, up to 40 GHz, including a new worldwide band at 21-22 GHz for hams; Atlantic City's work stopped at 10,500 MHz.

Part II will appear in a future issue of *QST*. QST

⁴The Radio Regulations adopted at Geneva in 1959 were partially revised at the Extraordinary Administrative Radio Conference (Space), Geneva, 1963; the Extraordinary Administrative Radio Conference for Aeronautical Mobile, Geneva, 1966; and the World Administrative Radio Conference for Maritime Mobile, Geneva, 1967. Accordingly, a 1968 edition of the *Radio Regulations* has been published by the ITU; this is the current set of international regulations.

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30 on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway. (For WIAW visiting hours, see the schedule in "Operating News.")

FCC's Chairman Looks at Amateur Radio



FCC Chairman Burch

MEMBERS AND GUESTS of the Association, it's a real pleasure to help you celebrate your 15th birthday this evening. Many thanks for the opportunity, and my sincere wishes for "many happy returns."

Before I'm finished, I hope you'll accept the fact that these wishes of mine are sincere - that, like all of you, I want only what is *best* for Amateur Radio. So far and so long as my writ runs as FCC Chairman, I want to help make certain that you have happy returns to enjoy - for many years down the road.

And in my combined role of watchdog and advocate of the public interest - in a field, let's note, where everyone is convinced he's got a virtual lock on what's best for everyone else - that is exactly what I intend to do. Or at least try to do.

Under the best of circumstances, that's no easy mandate to discharge. And failures of communication itself make it all the harder. One of the things I've been astonished and appalled to note, ever since coming aboard fifteen months ago, is the prevailing lack of accurate and balanced information concerning the purposes and the rationale behind the Commission's regulatory actions.

Let the Commission, for example, attempt to precision tool the crucial distinction in political broadcasting between "equal opportunity" and "reasonable opportunity" - and our friendly headline writers tell the public that we've slapped the President down in his legitimate effort to keep the people informed.

Or just last week, to cite another example, the Commission put all broadcast licensees on warning that they would be held responsible for knowing the content of their transmissions - our particular concern was with song lyrics that might tend to glorify the use of dangerous drugs. But that wasn't nearly dramatic enough for the press. In their reports - this one verbatim from the *Evening Star* - STATIONS TOLD TO HALT DRUG ORIENTED MUSIC.

"Misinformation"

Unfortunately, the Amateur Service is no exception to the "misinformation" rule. And this seems to be so in spite of the fact that at least four magazines of wide circulation are published for amateurs, and in spite of your capabilities for fast exchange of communications within the amateur family.

A case in point, and one that genuinely distresses me, is the implication in so much of the correspondence and so many of the editorials these magazines publish that the Commission is an enemy of the radio amateur, or the Commission is out to get him, or make it hard for him in every possible way. A favorite editorial pose is that of the crusader championing the "poor little guy" against the usual big bad ogre - "the Feds." One anonymous columnist in a local amateur club publication even asked - "can this be an example of the infiltration by Communist interests into the ranks of the FCC?" Well, we've got lots of problems downtown - but I honestly don't think Communist infiltration is one of them! And speaking as one of "the Feds" - in this area, maybe the "super-Fed" - I can assure you the only little guy I've picked on lately is my seven-year-old son (and even that won't last for long).

Let's get down to cases. Late last year, I received a letter signed by a number of New England area amateurs, and I want to read you a part of it:

In view of the Commission's recent drastic change of policy toward the Amateur Radio Service . . . we the undersigned strongly urge the Commission to reconsider its stand on the following issues:

1. Its new schedule of fees for Amateur Radio licenses.
2. Its reversal of its former position of encouraging such public service uses of Amateur Radio as Eye Bank nets.
3. Its restrictive regulations governing the use of "repeaters."

We feel that these issues are a surface indication of a most serious and deeper change of attitude on the part of the Commission.

By this point, I'm sure, most of you realize that the "problem" that has been the subject of all the

■ Statement of Chairman Dean Burch, Federal Communications Commission, before the Fifteenth Annual Dinner, Washington Chapter of the Quarter Century Wireless Association, Washingtonian Motel, Gaithersburg, Maryland, March 13, 1971. ■

correspondence and editorializing is issue number two in the list above, and Section 97.39 of the Commission's Amateur Radio Service Rules.

The Disputed Section 97.39

This rule, in effect unchanged since 1937, reads as follows:

An amateur station license will not be issued to a school company, corporation, association, or other organization, nor for its use, except that in the case of a bona fide amateur radio organization or society, a station license may be issued to a licensed amateur operator, other than the holder of a Novice Class license, as trustee for such society.

Short, simple, relatively unambiguous — yet there has been endless misinformation and innuendo, more heat than light, over the Commission's administration of the rule. Let me, then, put the matter in what I hope you'll end up agreeing is the proper perspective.

The Commission, my friends, is *not* anti-amateur. In fact, it is pledged to encourage and support the Amateur Service — as stated in Section 97.1 of the Rules, which encourages "Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communications service, particularly with respect to providing emergency communications." And I submit that an unbiased reading of the record will show that the Commission has lived up to that pledge.

It has done so with consistency for at least the last 14 years. In spite of one editorialist's reference to "recent interpretations" and another's to "new interpretations" of Section 97.39, the fact is that the Commission has been advising all inquirers, over this entire stretch of years, that the Rule does apply to communications by individual licensees in behalf of non-eligible organizations. As, in my view, it must.

Minimal Enforcement

Furthermore, any punitive application of the Rule over the years has been sparing in the extreme. In the few instances when the Commission has initiated warning letters or violation notices, the rule violations have been so obvious or so defiant of warnings that action could not possibly have been avoided — was required, in point of fact, to preserve the traditions and the very nature of the Amateur Service itself. This service was never intended, after all, as an alternative to Mother Bell!

There never has been a case of violation notices or warnings for the usual amateur communications in behalf of the March of Dimes, the Red Cross, the Eye Bank, the Post Office and similar nets, or for the operation of amateur stations at fairs, hobby shows, or Boy Scout jamborees. While it's perfectly true that some operations have been questionable in light of the Rule *as written*, many of those that one editorial indicated have been "mixed" by the Commission's "recent interpretations" are, in fact, quite in the clear. Section 97.39

is applicable to messages in behalf of organizations — and that is the whole extent of its application.

I'm not going to finesse the question, why *not* issue amateur licenses to non-amateur organizations — and the answer seems to me to be obvious. It simply would not be an amateur radio service any more. Beyond that, there is the danger that entirely well-intentioned amateurs might be used as communications facilities by certain organizations as a way of deliberately circumventing the prohibition against their own eligibility for amateur station licenses. This is the reason for the language in Section 97.39 against issuing a license to an individual for the use of a non-amateur organization — the so-called "nor for its use" clause. To have no bars could conceivably result in so much congestion of the amateur frequencies with organizational traffic that the bands would not be available to the individual amateur for whom the service was created.

Encourages Public Service

As I've mentioned already, the Commission has been far from adamant in its interpretation of the rules. It never has insisted on a harsh and literal application. And I can assure you that we intend to continue not only to permit but positively to encourage Amateur's noteworthy record in public service communications.

But at the same time I'm convinced, as long as the rule remains in its present form, that some of the traditional amateur public service activity will be of dubious legality. The Commission has long indicated, in meetings and correspondence with representatives of the Amateur Service, that it wants suggestions and rule-making petitions looking toward appropriate amendment of Section 97.39 and other Sections, to provide specifically for public service activity.

Up to now, we've received no constructive suggestions from amateurs or amateur organizations that might lead in this direction — and we're still waiting. Ladies and Gentlemen, to be perfectly candid about it, we *do* have a "problem." "We" meaning all of you and the FCC. But it *can* be solved. If you have some ideas that you believe will be helpful to the Commission, please submit them — as correspondence or as petitions proposing amendment of the rules. You are of course privileged to petition the Commission as interested individuals or through your amateur clubs, societies, and organizations.

With this kind of help — with this input from a significant component of the whole public — I am certain that we will arrive at solutions that, on balance, will satisfy all of you and, more important still, will result in a better Amateur Radio Service.

And that — as I've maintained from the start — that is really the objective we all share. QST

— . . . —

Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for \$1 including postage.

COMING A.R.R.L. CONVENTIONS

- May 22-23 - Virginia State, Vinton, Roanoke County
- June 12-13 - Georgia State, Atlanta
- June 19-20 - Rocky Mountain Division, Colorado Springs, Colorado
- July 3-4 - West Virginia State, Jackson's Mill
- July 3-5 - Pacific Division, San Jose, California
- September 4-6 - Southwestern Division, Anaheim, California
- September 24-25 - North Carolina State, Raleigh
- October 9 - Dakota Division, Sioux Falls, South Dakota

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 Hq. for up to two years in advance.

VIRGINIA STATE CONVENTION

Vinton May 22 & 23, 1971

Plan now to enjoy a leisure weekend attending the ARRL Virginia State Convention in Vinton - the nation's Dogwood Capital. The Roanoke Valley Amateur Radio Club is planning the convention as an informal family affair with plenty of activities for everyone, so bring the whole family. To help get things off to a swinging start there'll be a Saturday night dance (both round & square) featuring top talent. Sunday's program will include sessions on the art of home brewing, traffic, and a DX get-together conducted by the

founder of the DXpedition of the Month, Stu Meyer, W2GHK/4. You'll also be able to get the word on the May Board meeting and the operations at headquarters at the forum to be conducted by the division director and vice director, with Lewis G. McCoy, W1KCP, also sitting in. You can browse through the division's largest " flea market" and for the family there's a picnic area, playground, tennis court and baseball diamond, plus lots of free parking. Activities will be held at the War Memorial Building on Rt. 24 (off US460 in Roanoke county), Holiday Inn South No. 3 is located conveniently nearby on US220. There are a number of others in the area.

Order your tickets early. Registration is only \$1.50 per person or four for \$5. The Saturday night dance will be \$1 per person. Send your ticket orders to ARRL Virginia State Convention, Van A. Wimmer, Sr., WA4BIX, Convention Chairman, Rt. 4 Box 446, Salem, VA 24153.

ARRL GEORGIA STATE

Atlanta June 12 & 13, 1971

The Atlanta Radio Club is pleased to announce the annual Atlanta Hamfest and ARRL Georgia State Convention at Lenox Square, Atlanta, on June 12-13, 1971. Highlights will include: ARRL forum, Mars meetings, manufacturer's displays, fm technical sessions, left-foot cw contest, a carnival for the "harmonics" and a gala banquet and dance. Saturday evening. Reservations are available at the Roadway Inn, 3387 Lenox Road (261-5500). This fine motel is directly across from the Hamfest site. In fact, once you get to Atlanta, you won't need your car again. For fun, fellowship, and an all around good time, bring the family. Want further information? Contact WA4VWV, Steve Smith, 5258 Seaton Drive, Dunwoody, GA.



California - The Annual Burbank Hamfest sponsored by the LERC ARC will be held from 10:00 A.M. to 10:00 P.M. Saturday, May 15, at the Lockheed Employees Recreation Club building on Empire Ave. just west of Buena Vista St. Enjoy ham radio talks, films, and fellowship in air-conditioned comfort at Greater LAs largest hamfest.

California - The Fresno ARC will present their 29th Annual Fresno Hamfest on May 7, 8, 9 at the Tropicana Lodge in Fresno. Registration starts at 4:00 P.M. on Friday and re-opens at 8:00 A.M. Saturday. No-host cocktail party Friday evening, swap tables, transmitter hoots, commercial displays, mobile judging, chf roundup, technical talks, ladies luncheon and program, homebrew judging, MARS, "Hams Wide World" movie, and banquet Saturday at 7:00 P.M. Call-in on 7:55 WCARS, 3.952 WPKS, or 146.94 fm Friday and Saturday nights. Motel reservations should be made directly to the Tropicana Lodge, 4061 Blackstone Ave., Fresno, CA 93726. Ask for special Hamfest rates. Hamfest reservations are \$10 per person until May 2, then \$12. Ticket covers everything including Saturday banquet. Make check payable to Fresno ARC, Inc., P.O. Box 783, Dept. HF, Fresno, CA 93712.

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California - The Sacramento Valley Annual Ham Get-Together will be Saturday, May 15, at Carmichael Park, Swap shop, eyeball QSOs, special events for Novices and OTs, food and refreshments, speakers, and commercial exhibits. Pre-registration \$1, \$1.25 at the door. For registration and information write Art Hartwell, 2630 El Segundo Dr., Rancho Cordova, CA 95670. Tel: 916-363-9225. Pre-registration deadline May 8.

Illinois - The Fifth Rock River Hamvention will be presented by the Rock River RC of Dixon on May 16 from 9:00 A.M. to 5:00 P.M. at the Lee County 4H Center, Amboy, which is located 1/2 mile East of the intersection of Highway 52 and 30. No dust problem this year. Hamfest will be held in concrete floor buildings. Advance tickets \$1.50, \$2 at the door. Plenty of parking, food, and tables. Campers welcome. Talk-in on 3.950 and 50.4 MHz. For tickets send check or money order to Carl Karlson, W9RUF, Nachusa, IL 61057.

Illinois - The Starved Rock RC will hold their Annual SKRC Hamfest at the La Salle County 4-H Home and Picnic Area Southwest of Ottawa, Ill. on June 6. Advance registration (until May 29) \$1.50, \$2 at the gate. Free coffee and doughnuts from 10:00 A.M. to 10:30 A.M. Good food available and ample parking space provided. Follow big yellow "Hamfest" signs from South end of Illinois River bridge at Ottawa. For further details and data on available motels and camp facilities, write W9MKS/W9QQLZ SRRC, RFD 1, Box 171, Oglesby, IL 61348.

Illinois - The Kishwaukee ARC Hamfest will be May 2 at Hopkins Park on Route 25 in DeKalb from 9:00 A.M. to 3:00 P.M. More information from Howard Newquist, 421 DeKalb Ave., Sycamore, IL 60178.

Indiana - The Wabash Co. ARC Third Annual Hamfest will be Sunday, May 23, rain or shine, at the Wabash Co. 4H Fairgrounds. There will be activities for all, including bingo for the XYLS, flea market (no set-up charge), repeater talk, film and slide show, and ATV talk with demonstration. Food will be available, admission is still \$1. For more information write Bob Mitting, 663 N. Spring St., Wabash, IN 46792.

Kansas - The Central Kansas ARC will hold their Annual Hamfest Sunday, June 13, at the 4H Building, Kenwood Park, Salina. For early arrivals there will be a dinner Saturday evening. Registration starts Sunday morning at 9:00 A.M. with a program of interest to OM, YL, XYL, and harmonic. Covered-dish lunch with beverages supplied by the club. For more information write WNØYXK, Alvin Wiechman, 1658 Beverly Drive, Salina, KA 67401.

Kentucky - The Mammoth Cave ARC will sponsor a Ham Reunion at Mammoth Cave National Park, Cave City, on Sunday June 6. Contact the Secretary, Ken Beard, Glasgow, KY for details.

Nebraska - The Pine Ridge ARC of Chadron is holding their Annual Hamfest Picnic at Chadron, June 6. Coffee and pop furnished. Bring covered dish and your own utensils. Everybody welcome.

New Hampshire - The Eovy RA and the Contoocook Valley RC are co-sponsoring an auction and fleamarket on Sunday, May 23, starting at 10:00 A.M. at Keyser Pond cottages, off Route 202 and 9 near the junction of Route 127 (near Hopkinton town line), Henniker. Bring your own table. The auction starts at 2:00 P.M. Refreshments and fun for all.

New Jersey - The Bergenfield AR Klub is having their ham auction on May 16 at the Bergenfield's Elks BPO No. 1477 at 40 West Church St., Bergenfield. Doors open at 1:00 P.M.

New York - Rochester is the location for the 38th Annual Western NY Hamfest and VHF Conference the weekend of May 15. Activities start Friday night with a talk by Lew McCoy, W1ICP, followed by a full day of programming with outstanding speakers. Special activities include Navy MARS, AREC, and QCWA meetings, YL program and code contest plus huge flea market. New location this year: Monroe County Fairgrounds on Route 15A, Use Thruway Exit 46. Information from R.A.R.A., P.O. Box 1388, Rochester, NY 14603.

New York - The Rome Radio Club sponsors its 18th consecutive Ham Family Day on Sunday, June 6, at Beck's Grove, 10 miles west of Rome. This is a true ham-family event with a complete program for all ages. Technical talks, vhf roundtable, contests, ladies and kids fun programs. There will be a N.Y. MARS meeting. The Post Office Traffic Net will have their annual meeting. The flea market is a growing favorite. Bring surplus gear, lots of space to display it. Registration starts at 11:00 A.M. with that famous (all you can eat) chicken and steak dinner served at 5:00 P.M. Advance adult reservations \$5.50. Children under 12 at \$2.00, under 6 free. 50 cent ticket at the gate for all. Send your reservations to Rome RC, P.O. Box 721, Rome, NY 13440.

Pennsylvania - The 17th Annual Breeze Shooters Hamfest will be held at White Swan Park located near the Greater Pittsburgh Airport on the Parkway West, May 23. This is one of the largest amateur events in the Western Penn. area, so plan to attend. Plenty of free parking and a large amusement park for the XYL and harmonics. Talk-in on 29 and 146.94 MHz. For additional details write D. J. Myslewski, K3CHD, 45 McMahon Dr., Irwin, PA 15642.

Pennsylvania - The Eighth Annual Penn-Central Hamfest will be held by the Williamsport and Milton clubs on Sunday, June 13, starting at 12 noon at the Union Township Volunteer Fire Grounds on Route 15 in Winfield. Bring your own lunch or use the snack bar. Indoor and outdoor facilities. Auction, contest, and swapping. Gate registration is \$2.50, XYL and children free. Free parking. More information from Al Owen, WA3OWT, 2901 Highland Ave., Montoursville RD 3, PA 17754.

South Carolina - The Blue Ridge Radio Society will be holding their annual Ham-Fest on Sunday, May 2 at Cleveland Park. Good food and fellowship. FCC Exam will be held at 9:00 A.M. for all classes of licenses by Inspector Cline of Atlanta FCC.

Tennessee - The Humboldt ARC Hamfest will be held on May 23 at Trenton Park, south of Trenton across from the Civil Defense Building. For information write WB4JKU, Humboldt ARC, 728 N. 30th Ave., Humboldt, TN 38343.

Texas - The South Texas Emergency Net will hold its 26th Annual Convention at Kerrville on June 12 and 13 at the Del Norte Motel and LCRA Building (next door). For further information write Jerry N. Connaway, W5KLV, 110 Rosemont Dr., San Antonio, TX 78228.

Wisconsin - The 3rd Annual Banquet and Social Evening of the Neenah-Menasha ARC will be held on May 22 at the Eagle's Hall, 1338 S. Commercial St., Neenah At 6:30 P.M. A varied program will be offered. Reservations for the family style dinner and program should be sent to F. H. Cherepow, W9RNZ, 437 Hawthorne St., Neenah, WI 54956 by May 19. Tariff \$3.50.

Wisconsin - The Yellow Thunder Hamfest 71 will be held at the Delview Hotel in Lake Delton on May 23. Afternoon programs will include MARS, WATS, ARPS and others with a banquet in the evening. Tickets are \$5 in advance or \$5.75 at the door. For further information contact Kenneth A. Ebnetter, K9GSC, 822 Wauona Trail, Portage, WI 53901.

Stays



At the Euclid School, Schenectady, N.Y., K2DLD (right) has been teaching a weekly class in theory and code to his sixth graders since 1967. Here he explains Ohm's Law to the current class.

Happenings of the Month

FCC RULES INTERPRETATIONS

Questions asked of FCC/Washington recently resulted in these interpretations of amateur rules:

A repeater whose input frequency is within 145-147 MHz, but whose output frequency is in 147-148 MHz, may not be used by a Technician Class licensee. Indeed, the FCC spokesman said that the "licensee of such a repeater should sit there with the latest *Callbook* showing license class, and his finger on the no-no button" — indicating that the FCC takes a dim view toward even inadvertent repeats of Technician signals outside the segments permitted. (In November 1969, ARRL asked in RM 1535 for full use by Technician s of the 144-148 MHz band; no action has yet been taken.)

On the other hand, there is apparently no legal difficulty with holders of reciprocal operating permits in the U.S. using repeaters licensed to U.S. amateurs, or vice versa.

An applicant for General Class license who fails the 13 wpm code test, but gets enough copy to pass five wpm (at an FCC examining point) may be offered the chance to take the Technician Class written examination. If he passes, he'll be issued a license of that class carrying credit toward General. These licenses carry only the word "Technician"; those issued after examination by a volunteer say "Technician (C)." Warning: A Novice electing this

route who passes the Tech test will have his Novice license cancelled when the new one is issued.

When a U.S. amateur and a DX station are in QSO and are having difficulty getting through because of band conditions, it's okay for a third ham who can hear both to assist on the spot. However, it is *not* okay for the third man to help by relaying at a later time, nor through the use of a recording, unless there exists a third-party agreement between the DX's country and ours.

In times past, the inference from Washington on use of phonetic aids to identification of a call on phone was that these were *only* aids, and that the call had to be given as issued, as well. Now, however, the language of Section 97.87(d) is being interpreted more liberally: "Use of a phonetic alphabet is both encouraged and *completely adequate* for complying with the Commission's rules for identifying amateur stations." Thus, it's okay to say something like: W1 Alfa Whiskey, this is W1 Uniform Echo Delta, go ahead."

MARYLAND LICENSE PLATES

The Maryland General Assembly has under consideration a bill, Senate 186, which would relieve amateurs of the need to pay \$5 extra for call-sign plates; the need to have their amateur equipment actually installed at all times; and the need to carry a regular set of plates in addition. It

Behind the Diamond



Some 90 per cent of all League publications are distributed through radio stores and similar outlets. This month our spotlight shines on the woman who is in immediate charge of this activity from the time orders arrive until the books have been sent and the billing finished: *Miss Leitha Phillips*. Leitha came to headquarters — then in a store-front building on 38 LaSalle Road, West Hartford — as a billing clerk

Number 28 of a Series

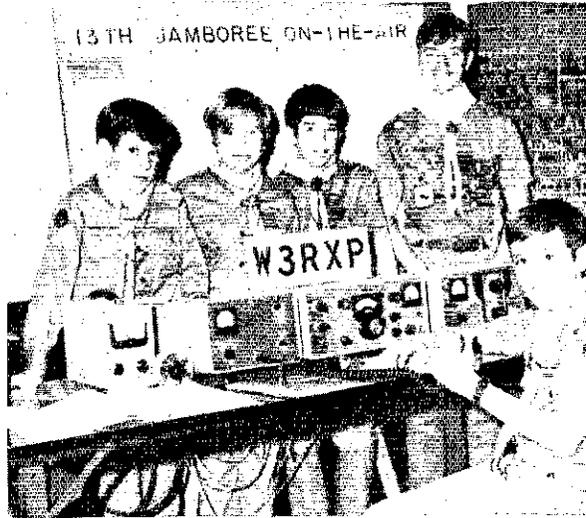
in February, 1947; her devotion to duty and capacity for detail soon made her an important link in the chain of ARRL "business" activity.

Outside office hours, Leitha has earned a reputation for her expertise in arranging flowers, wrapping packages, and similar areas where art and utility meet. She's an excellent cook, one of her specialties being pumpkin cake. A member of Grace Church (Episcopal) in Newington, she sang for many years in its choir. Other singing has included caroling outside convalescent homes and informal groups around a piano with others of the staff whenever the opportunity arises, to sing such "oldies but goodies" as "Heart of my Heart," "Daisy, Daisy," "Down by the Old Mill Stream," and other chants of that vintage.

She's been many times an officer of the ARRL Girls Club and a regular participant in its activities. She enjoys golfing, not only on the do-it-yourself level, but also the spectator version at such events as the Greater Hartford Open. Another favorite pastime is duckpin bowling with a small group from "225 Main" on Monday evenings.

All in all, Leitha adds up to a warm person who — as hinted in the photograph — is almost always cheerful.

Boy Scouts of Troop 90, Shrine of the Most Blessed Sacrament, Washington, D.C., operated in the 13th Jamboree on the Air last October, from Father John Brady's station W3RXP/3. This year's regular JOTA worldwide will be October 16-17; there's also a special JOTA on June 5-6 for the BSA, as part of a nationwide conservation project SOAR (Save Our American Resources). See the Operating Events calendar, page 106, for details.



was introduced by Senator Conroy and went to hearing before the Committee on Judicial Proceedings on March 2. Among the Maryland residents speaking in favor of the bill was ARRL General Counsel Robert M. Booth, Jr., W3PS.

DEADLINES

May 1 is the date 160-meter segments shift for amateurs in the western part of the U.S. to accommodate changes in the Loran radionavigation chain. See page 77 April *QST* for a chart, or send your request with a stamped self-addressed envelope to ARRL Hq. for a copy.

May 5 is the day your director will (probably) be arriving in Hartford for the Board of Directors meeting. Has he gotten your views on phone expansion as set out in Docket 19162 (page 82 of last month's *QST*)? How about your views (Docket 19163) on code-test credit toward Extra Class by holders of the old Extra First, or a drop in the experience requirement for Extra from two years as now to one?

And the deadline for commenting on those two dockets direct to FCC is June 1, 1971. The Notice calls for an original and 14 copies, as usual, but FCC usually accepts even single copies from private individuals as "informal comments."

ARRL FILES ON RTTY DOCKET

The League has filed comments in Docket 19110, FCC's proposal adding RTTY speeds of 75 and 100 wpm, in support of the principle, but asking that FCC go beyond the present proposal (*QST* for February, page 75) and make its rules for amateur teleprinter as flexible as possible. The ARRL text appears below:

At a dinner meeting earlier this year, the ARRL Certificate of Merit was presented to Eunice Gordon, W1UKR; her husband Bob, W1KUL (far right); and Tom Barrett, W1KUE (left), by New England Director Robert York Chapman, W1QV (right center), in appreciation for the volunteer efforts of the Hampden County Amateur Radio Association of Springfield, Mass., in operating the ARRL W1 QSL Bureau. Other bureau workers attending the commendation dinner included: K1QMV, W1DGJ, W1VNE, K1IJV, W1WLE, W1HRV, WA1LPL.

Before the FEDERAL COMMUNICATIONS COMMISSION Washington, D. C. 20554

In the matter of

Amendment of Section)	
97.69 of the Commis-)	Docket No. 19110
sion's Rules to Permit)	RM-1392
Increased Radio Tele-)	RM-1538
printer Speed)	

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Incorporated, by its General Counsel, submits the following comments and counter-proposal in response to the Notice of Proposed Rule Making released December 17, 1970 (FCC 70-1308, 35 Fed. Reg. 19524), to the proposed amendment of Section 97.69 of the Rules relating to the transmitting speed of radio teleprinter signals.

1. The rules and regulations of the Commission traditionally have avoided rigid specifications of characteristics of amateur equipment. This policy has provided the greatest freedom to experiment and develop new techniques, equipment and practices. The only significant exception to this policy is Section 97.69 relating to radio teleprinter transmissions.

2. When Section 97.69 was adopted in 1953, the equipment available to radio amateurs for radio teleprinter use was rather limited as to operating characteristics and to a lesser extent as to numbers. The limitations imposed in subsection (a) concerning codes, in subsection (b) concerning keying speeds, in subsection (c) concerning frequency deviation of frequency shift keying, and in





Harold P. Westman, ex-1AL, received the Marconi Memorial Gold Medal of the Veteran Wireless Operator's Association at the VWOA annual banquet in February. Harold is not now licensed as an amateur but he has been continuously a member of the League for more than fifty years. From 1926 to 1929 he was on the ARRL staff, the last of those years as Technical Editor of *QST*. He was later Secretary of IRE and editor of *Proceedings*. His home now is in Port Jervis, N.J.

subsection (d) concerning audio frequencies of audio shift keying represented, to a very large extent, the state of the art at that time. Over the last eighteen years, however, so many new techniques and equipments have been developed in the radio teleprinter service that the provisions in subsections (a) and (b) are or soon may be outdated. The proposed amendment of subsection (b) recognizes some of the developments in recent years.

3. The time has come when specifications of codes and keying rates are far less necessary or desirable. In recent years, techniques and equipments have been developed utilizing more extensive and flexible codes as well as higher keying speed. Such equipment is becoming available both as used (or surplus) and new equipment. Monitoring equipment and techniques now are available which are adaptable to the ever increasing number of codes and variations in speeds.

4. For these reasons, the Commission is urged to reexamine its proposed amendment of subsection (b), which would add keying speeds of 75 (56.25 bauds) and 100 (75 bauds) words per minute to the present 60 (45 bauds) words per minute of subsection (b), so as to eliminate all references to keying speeds. The Commission also is requested to eliminate the specification of any particular codes in subsection (a) of Section 97.69. By so doing, the Commission will be following its long established policy of encouraging and permitting amateurs to experiment with, develop and use new and improved techniques, equipment and practices.

Wherefore, the premises considered, the Commission is respectfully requested to amend Section 97.69 of its Rules to the extent discussed herein.

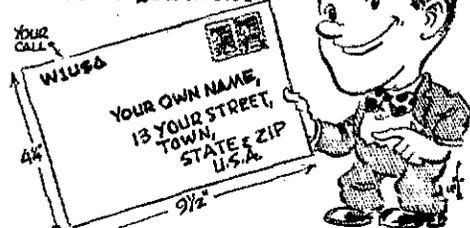
Respectfully submitted,
225 Main St. THE AMERICAN RADIO RELAY
Newington, Conn. 06111 LEAGUE, INC.

By: ROBERT M. BOOTH, JR.
Its General Counsel

1150 Connecticut Ave.
Washington, D. C. 20036
March 1, 1971

QST

IS YOURS ON FILE WITH YOUR QSL MGR?



A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau 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 4 1/4 by 9 1/2 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. Recent changes are in bold face.

- W1.K1.WA1.WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2.K2.WA2.WB2.WN2 - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3.K3.WA3.WN3 - Jesse Heberman, W3KT, RD 1, Box 06, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4.K4 - H. L. Parrish, K4HXP, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4.WB4.WN4¹ - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901
- W5.K5.WA5.WB5.WN5 - Kenneth F. Isbell, W5QM1, 406 Esterfield Blvd., Emd. Oklahoma 73701.
- W6.K6.WA6.WB6.WN6¹ - No. California DX Club, Box 11, Los Altos, California 94022.
- W7.k7.WA7.WN7 - Willamette Valley Dx Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8.K8.WA8.WB8.WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio 43215
- W9.K9.WA9.WB9.WN9 - ARRL 9th area QSL Bureau, Box 519, Elmhurst, Illinois 60126.
- W0¹ - Reggie Hoare, W0QYJ, P.O. Box 115, Mitchellville, Iowa 50169.
- WA0¹ - Lloyd Harvey, W0QGI, P.O. Box 7, Attea, Iowa 50024.
- K0.WB0.WN0¹ - Dr. Philip D. Rowley, K0ZFL, Route 1, Box 455, Alamosa, Colorado, 81101.
- K1¹ - Alicia Rodriguez, K1ACL, PO Box 1061, San Juan, P.R. 00902.
- K2¹ - Canal Zone Amateur Radio Association, Box 407, Balboa, Canal Zone.
- KH6.WH6 - John H. Dea, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.
- KL7.WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - L.J. Eader, VE1EQ, PO Box 603, Halifax, N.S.
- VE2 - John Ravenscroft, VE2NV, 153 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R.H. Buckley, VE3DW, 20 Almont Road, Downview, Ontario.
- VE4 - D.L. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JJ, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 - Karel Tettelaar, VE6AAV, Sub. Po 85, N. Edmonton, Alberta.
- VE7 - H.R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 - George T. Kundo, c/o Ministry of Transport, Norman Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 8, St. John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 242, Goose Bay, Labrador.
- SW1 - Ieoy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹These bureaus prefer 5x8 inch or #50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of *QST*.

Note: Stations operating portable should continue to receive their QSL cards at the bureau in their home call area; i.e., WA1QRX/VE8 gets his cards through the W1 Bureau.

QST Abbreviations

(Continued from page 60)

PEV - peak-envelope voltage
pF - picofarad
PIV - peak-inverse voltage
PLL - phase-locked loop
pm - phase modulation
pnp - positive-negative-positive
pot - potentiometer
PRV - peak-reverse voltage
PSHR - Public Service Honor Roll
PTO - permeability-tuned oscillator
PTT - push-to-talk
RACES - Radio Amateur Civil Emergency Service
RAM - random-access memory
RCC - Rag Chewers Club
rcvr - receiver
rf - radio frequency
rfc - radio-frequency choke
RFI - radio-frequency interference
RM - Route Manager
RM-(number) - FCC rulemaking
rms - root-mean-square
RO - Radio Officer (e.d.)
ROM - read-only memory
RST - readability-strength-tone
RTL - resistor-transistor logic
RTTY - radio teletype
s.a.e. - self-addressed envelope
s.a.s.e. - stamped s.a.e.
SCM - Section Communications Manager
SCR - silicon-controlled rectifier
SEC - Section Emergency Coordinator
SET - simulated emergency test
SNR - signal-to-noise ratio
spdt - single-pole double-throw
spst - single-pole single-throw

SS - Sweepstakes (contest)
ssb - single sideband
SSTV - slow-scan TV
SWL - short-wave listener
SWR - standing wave ratio
sync - synchronous, synchronizing
TCC - Transcontinental Corps
TD - transmitting distributor
TE - transequatorial (propagation)
tfc - traffic
tpi - turns per inch
T-R - transmit-receive
TTL or T²L - transistor-transistor logic
TTY - Teletype
TV - television
TVI - television interference
usb - upper sideband
uhf - ultra-high frequency
V - volt
VCO - voltage-controlled oscillator
VCXO - voltage-controlled crystal oscillator
VFO - variable frequency oscillator
vhf - very high frequency
vlf - very low frequency
VOM - volt-ohm-milliammeter
VOX - voice-operated break-in
VR - voltage regulator
VVM - vacuum-tube voltmeter
VXO - variable crystal oscillator
W - watt
WAC - Worked All Continents
WAS - Worked All States
wpm - words per minute
ww - wire wound
wv - working voltage
xtal - crystal
 μ - micro (10^{-6})

QST

Strays

Feedback

In the 160-meter chart on page 77 of April QST, there are two errors, one by the Coast Guard (as told to FCC) and one by us. In the first column opposite South Dakota, the figures should be 1000/200 and in the second column opposite Ohio, the figures should be 500/100.

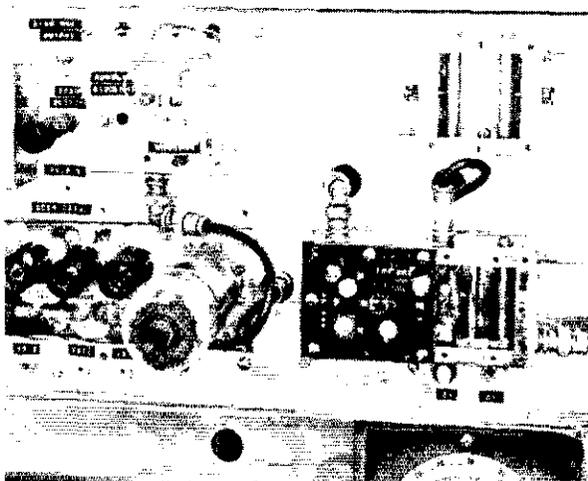
The chart becomes effective May 1, 1971, and mainly affects operations in the 1.8-2.0 MHz band by amateurs west of the Mississippi.

The April 1970 issue of QST (page 59) shows the call of the Chatham, Mass. shore station as WSC. It should read WCC.

Capacitors C23 and C24 in the FM Pip-Squeak (March QST, 1971) are listed incorrectly in the parts list. Instead of being C24 and C25, they are C23 and C24. Also, Fig. 2 shows two capacitors as C35. the .05- μ F capacitor with that label should be labeled C33. Also, diodes CR4 and CR5 of Fig. 2 should be designated CR3 and CR4.

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

If the photograph of the W4HHK 2300-MHz converter, April, 1971, QST, page 35, looked as if something was missing, it's because something was. A misunderstanding about crop marks resulted in the loss of vital parts of this uhf equipment. This is how the picture should have looked.



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

WORLD TELECOMMUNICATION DAY

Again this year May 17 has been designated by the International Telecommunication Union as World Telecommunication Day, and will be celebrated in nations around the world. The ITU's Administrative Council has recommended that 1971 commemorations be organized around the theme, "Telecommunications and Space." This is a particularly appropriate theme since ITU will convene a World Administration Radio Conference on Space Telecommunication in June.

As part of the U.S. commemorative activity, a special aircraft test flight of an Oscar (Orbiting Satellite Carrying Amateur Radio) repeater will take place on the weekend preceding WTD - May 15 and 16. The flight will originate from Washington, D.C., and stop in Boston and Chicago before returning to Washington. Amsat is sponsoring an "Oscar Aircraft Competition" for amateurs using the repeater for communication and for those receiving the repeater's signals. Full details appear on page 66.

ITU STUDY GROUP ADOPTS AMATEUR PAPERS

The Special Joint Meeting of the CCIR (branch of the International Telecommunication Union for technical studies) has adopted two documents pertaining to the amateur service. The SJM met in Geneva from February 3 to March 3 to set the technical ground-work for the World Administrative Radio Conference on Space Telecommunications to be held in June. A number of amateurs were present as members of the U.S. and other delegations; they include: DL1XJ, DM2HGO, HB9AJI, JA1IF, K4BZF, OH2AZN, OH2WS, OK1WI, PA0WN, S5SBLG, VE3AVZ, VE3BLO, VE7BS, VU2FM, VU2GN, VU2IM, VU2ZR, W2NXX, W2QD, W3ASK, W3JPT, W3KYI, W3MR, W4BW, W4RAE, W4TRJ, W0LCT. Three amateurs, EI4N, EP2KK, and WA4NTA, were chairmen of their respective national delegations. Here is the text of the papers:

SPACE RESEARCH

Use of space techniques by the amateur service

The S.J.M. concludes that:

Amateur satellites normally need to be designed for use with simple and relatively inexpensive earth terminals using small antennae and, therefore, may use relatively high eirp per channel. This may increase their interference potential compared with that of other types of communication satellites.

If the amateur service is permitted by the WARC(ST) to employ space techniques in frequency bands allocated exclusively to the Amateur service, there should be no need to

impose power flux-density limits at the Earth's surface provided that the relevant provisions of the Radio Regulations are observed.

If the amateur service is permitted by the WARC(ST) to employ space techniques on a non-interference basis to other services in shared frequency bands, it is technically possible to employ a telecommand link to ensure that transmissions from an amateur satellite are switched off when necessary to avoid causing interference to other services. The administrative procedures which would have to be employed have not been considered by the S.J.M.

Additional developments of telecommand techniques may provide for a change of frequency, power output, and/or type of emission in an amateur satellite, which may enhance sharing possibilities.

ANNEX

Use of space techniques by the Amateur Service

1. Introduction

The Amateur Radio Service has not previously been the subject of study within the CCIR. However, over the past several years, the radio amateurs have been using space communication techniques in the Oscar satellites (Orbiting Satellites Carrying Amateur Radio). Amateur satellites must be designed for use with simple and relatively inexpensive earth terminals using small antennae, and therefore, may use relatively high eirp per channel. There is thus a potential for interference with other services operating in shared or regionally allocated bands, which requires study.

2. Amateur space techniques

Five Oscar satellites have been launched and additional units are being designed and built. The activity is international, with several countries participating in the programme. Launchings, to date, have been by the United States of America, as a part of its experimental programme; all satellites are required to pass standardized environmental tests, as for other experiments. All satellites to date have been in low altitude, non-synchronous orbits. Rf power has been between 50 milliwatts (cw) and one watt (PEP). It is not anticipated that future amateur satellites will show significant change in performance or characteristics.

3. Amateur developments to enhance sharing

Amateur operators have adequately demonstrated the facility of commanding satellites for off-on operation. In the case of the Australis-Oscar 5, the facility was used to command the satellite "on" each Friday night, and "off" each Monday morning, to give operation at the times of greatest amateur activity. Additional important developments in progress provide for change in frequency, power output and/or type of emission.

NOTES

HB9AG is prepared to arrange all the details for any US ham who'd like to spend a mobile holiday

trip in Switzerland. The "details" include the use of a camper equipped with a sideband rig and the obtaining of an HB9 and HB0 license. Write to E. Huber, HB9AG, Bahnhofstrasse 30, CH-9470 Buchs, Switzerland.

DX OPERATING NOTES

Reciprocal Operating

United States Reciprocal Operating Agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France*, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Kuwait, Luxembourg, Monaco, Netherlands,* New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom,* and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write League headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, India, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Senegal, Sweden, Switzerland, United Kingdom, U.S., Uruguay and Venezuela.

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 and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateurs should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Vietnam and Jordan. Prefixes to be avoided by Canadians are JY XU XV and 3W8.

QST

* Agreement includes overseas entities.

**By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, and with AUIITU.



These are some of the attendees at the 49th anniversary banquet of the *Radio Club of Argentina*. The club with now over 4,400 members is preparing for a gala commemoration of its 50th anniversary later this year.

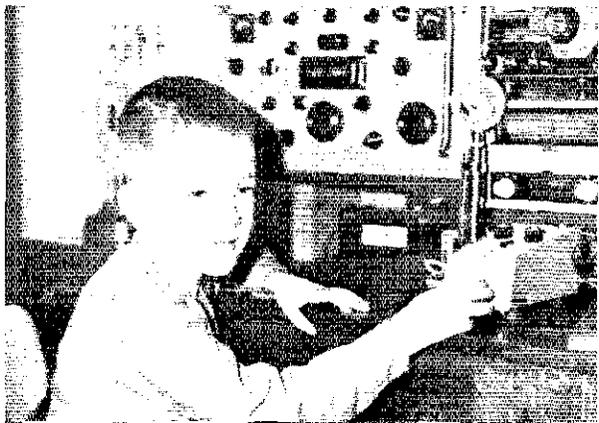
Strays

On-the-air ham radio facilities will again be provided by the U.S. Navy's Washington voice in the amateur radio fraternity, K4NAA, operating daily from the Sheraton Park Hotel in Washington, D.C. during the three days of the Armed Forces Communication and Electronics Association Convention in June. AFCEA convention delegates with amateur radio licenses are invited to take advantage of the Navy's ham radio station to contact friends during the convention on June 8, 9, and 10.

The station will be operational from 0900 to 2200 EDT with two available positions for cw and ssb on the 10- through 80-meter bands. A special QSL card will acknowledge contacts.

WVWH is currently considering changing from a 24 to a 12 hour per day operating schedule. The station which recently moved from Maui to Kauai, Hawaii, transmits on 5, 10, and 15 MHz. Amateurs, especially in Pacific areas, concerned over the operating time reduction should send comments to Mr. Sadami Katahara, Engineer-in-Charge, WVWH, National Bureau of Standards, PO Box 578, Puunene, Maui, HI 96784.

One of the newest and youngest Novices is Brian Reno, WN8ILU, of Euclid, Ohio. Brian is seven and began studying for his ticket a year and a half ago. When he isn't busy with his second grade studies, WN8ILU is looking for contacts on 21,149 KHz with his fine DX-60/R-390A set-up. — W8BAH.





Correspondence From Members -

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

THE PIP-SQUEAK

- Many of the fm boys have been waiting patiently for a construction article such as WICER's "FM Pip-Squeak for 2 Meters," March *QST*. It is indeed gratifying to note that *QST* will favor construction projects for the fm builder. — *W2CY*. I am looking forward to future articles along the same lines. Projects such as this will do a lot to turn hams from surplus to home brew. — *W0IW*. Not being a design engineer, I deeply appreciate the service in providing templates and overlays for the project. — *WB2DKP/9*. Will be building a duplicate of the Pip-squeak. *W8KXP*. Let's see something on the receiver soon. — *K4CHS*, *W4PIB*, *WA0LWP*, *W2KAT/3*, *W4VMO*. Please follow-up this article with a solid state or hybrid linear suitable for car or home. — *W2INS*. More projects like this, please! — *W7VRM*. Looks like a good rig. — *W8UNR*. Nice, neat, and easy to build. Keep *QST* like that, always up to date and very interesting. — *VE2BOL*. Exact type of project I've been waiting for. — *W3JJC*. My compliments to Doug DeMaw for a very impressive article. — *K0QVQ*. Bet you will be surprised at the very large number of requests for this item! — *W7SHY*. [We were indeed — 450 orders for templates filled at press time, and dozens of requests arriving daily — *Editor*.]

MISREAD

- Reference "Man bites dog!" League Lines, February *QST*. Have I been misreading my FCC Rules and Regulations all of these years? AI is allowed throughout the full width of all bands. How can anyone propose an expansion of the cw segment of 20 meters when we at present have 14,000 to 14,350 MHz? There are too many people around these days who think that cw is limited to the sections where phone is not allowed. May I suggest that you tell the gang how to buy Volume 6 of the FCC R&R? — *William B. Gould, K2NP/WINP, Elberon, NJ* [EDITOR'S NOTE: General and lower class licensees should be aware that, although AI is authorized throughout all amateur bands, they are *not* permitted to operate cw within the exclusive Extra and Advanced cw or phone sub-bands. As to Volume 6 of the FCC regulations, you can buy it from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, for \$2 (\$2.50 foreign) including amendments. But the amateur part of the rules in the License Manual, available from Hq for only \$1. Currently the copies we're shipping are updated to March 1, 1971 — and Uncle Sam's Volume 6 has only been corrected up to October 30, 1970.]

'71 HANDBOOK

- The new *Handbook* must be a winner: I carried mine into the office and the attached check for four copies is the result. Only one of the four copies goes to a ham — the other three are electrical and instrument engineers. So's the ham — he is the section supervisor! The others didn't order them simply 'cause the boss did — he was the

last on the list. By the way, he has generously offered to contribute his 1953 copy to the local antique wireless museum. All kidding aside, the *Handbook* still continues to be a standard reference for many a working engineer and this proves it. — *C. J. Bolvin, K4KQ, Miami, FL*

- I have just purchased the 1971 *Handbook*. You have done an excellent job of keeping this manual up-to-date. The past few years have seen the *Handbook* become more than a book of amateur radio circuits. It is a whole course in electronics with a myriad of practical applications. — *Stanley Jaffin, WB4IRK, Arlington, VA*

FOLKSY TRIVIA — II

- Regarding "Folksy Trivia," page 86, the March issue. I happen to enjoy *QST* the way it is, including Station Activities. I suspect both gentlemen would be of different opinions if their own calls were to be included in the various "drivel" (their words, not mine). If it were a totally technical magazine, it would lose touch with members; it would become just a textbook. We need both the technical articles and the "human touch" plus the many other articles in *QST* — including a touch of humor which is so needed today. — *Ann O. Warren, K8LGA, Cadiz, OH*

- The only reason I look in that column is to see what I and others were doing three months ago. I would welcome either more recent activities or scrapping the column and replacing it with an article. The type size is okay — suggest K3SVC get new glasses. One thing I learned while studying for my Extra was that my eyes had gotten slightly worse. — *Thomas F. Carten, WA1DJC, N. Dartmouth, MA*

- I disagree with K3SVC and W2UN's opinion of *QST*. Please continue the Station Activities column each month. Contrary to their feelings, I find these "10-14 pages of drivel each month" interesting. — *Alvah Buckmore, Jr., Russell, MA*

- Let them join IFFE if they wish to become purely technical. I consider Station Activities to be important to the amateurs even though I have not been in print more than a few times in 30 years. I suggest that Messrs. Kochen and Snow simply omit reading them. — *Hugh N. Siegel, K2CP, Boonville, NY*

- In reference to W2UN's letter in March '71 *QST*, I will lend my name to the census of those who like Station Activities. Having lived in Indiana, Alabama, and Ohio, it is very interesting to keep current on goings on of friends, clubs, and other activities thereabouts. With the current mobility of the U.S. population, I suspect I am not alone in this. It seems that if it is cheaper, ARRL might publish an insert section which could be purchased either for their respective Section Division or the U.S. as desired. *Mike Richards, K9JQO/1, Marlborough, MA*

● I recently read the remarks concerning the Station Activities section. I must say that I give a hardy cheer for these long overdue comments on a long outmoded section. Those persons who want to read these one liners about themselves could much more easily do so in a limited edition of a sectional newsletter. If you cannot find a better use for the pages I would suggest you delete them and save on the ever growing costs of publication.

If I may cite an example, the Vermont section has for years been nothing more than a rehash of net schedules and a print of a few new calls in the state. You cannot deny this is both trivia and wastefulness at its highest. — Gary E. Davis, Williston, VT

WHEW!

● Recently I renewed all of my licenses at one time. In filing applications I found that it cost me a total of \$53 as follows:

1. Radiotelephone First Class	\$5
2. Radiotelegraph Second Class	\$4
3. Radiotelephone Verification Card	\$2
4. Radiotelephone Posting Statement for WCLV	\$2
5. Radiotelephone Posting Statement for WXEN	\$2
6. Amateur Extra Class	\$9
7. Additional Amateur Station	\$9
8. Citizens Band Station License	\$20
	\$53

— Joseph Zelle, W8FAZ/W8FHP, Cleveland, OH

LEAGUE LINGO

● Your article on "Infiltration" (page 69, February QST) states a well-known fact in question form: "Would you believe that a majority of amateurs don't know what the letters AREC, RACES and NTS stand for?"

How would they know when you fellows are so careful in seeing that such letters and many more are never spelled out in QST? I always thought that NTS meant Night Time Schedules, but lo and behold, you did give it away in the middle of your article where you mentioned National Traffic System. Congratulations on being so bold!

For several years I wondered about the meaning of MOSFET. I even read the 1970 *Handbook* from cover to cover and found no answer. Then someone at Headquarters goofed and spelled it out in an article on page 11 of December 1970 QST. No doubt that poor chap was immediately fired for using so much ink.

The mania for abbreviating just about everything in QST, and for that matter, other ham publications, is not cute or clever. It is simply poor editing. Earl R. Linder, W9DZG, Lombard, IL

● Please allow me to congratulate you on the February issue of QST. It is a masterly balance of technical and general interest. I have been a ham since 1956, and your highly competent staff has been instrumental throughout that time in enriching the hobby for me through their able communication of the spirit of amateur radio. I know of no other hobby that can claim a similar staff of professionals. Your demonstrated effectiveness in widely divergent fields related to amateur radio are so widely known among hams that we tend to take them for granted. We should all pause from time to time to reflect upon their value. Thanks. — Scott Allen, K4MFL/KH6, Aiea, HI

DOCKET 19162

● Congratulations to the FCC! Docket No. 19162 contains the most practical proposals for amateur radio since reinstatement of incentive licensing.

Although I favor elimination of Extra Class cw subbands, I am going to file an affirmative vote with the FCC on the docket. — James A. Gundry, W4JM, Atlanta, GA

● Please do all you can to keep the 25 kHz space in effect for the Extra Class. The change in fone frequencies is okay, but only 10 kHz for the Extras is robbery. Too many of us older hams have fought too hard for an Extra ticket to have it taken away from us so soon. — Art Filkins, W2FSU, Fly Creek, NY

● I am generally in favor of Docket 19162. However, I urge that the present 25 kHz Extra class cw subbands be left intact. A reduction to 10 kHz would run contrary to the Commission's expressed intent that incentives be provided in the form of allotment of exclusive band segments for the use of higher class licensees. Proponents of the reduction point to the lower occupancy of these segments as proof that Extras do not deserve as much exclusive space as they are now allotted. The implied incentive that these subbands offer is a lack of congestion, with the result of facilitating both DX work and casual usage. Obviously, if these bands were overcrowded, a substantial amount of the incentive would be lost or invalidated. . . . — Ed Kalin, WA1JZC, West Hartford, CT

● Wholehearted approval of the recent FCC proposal to expand the phone bands and to allocate more frequencies to the Extra Class licensee. . . . — Melvon G. Hart, W0IBZ, St. Louis, MO

● I support the FCC proposal to expand the hf phone bands and am very disappointed that you could not have proposed it. I am sure the majority of amateurs support it. — Ellis Jacobs, WA6TAP, Moraga, CA

● With reference to the proposed expansion of the U.S. voice emission bands as contained in FCC Docket 19162, we wish to state our strong opposition for the following reasons:

1. This proposal will destroy the balance now existing between frequency allocations for the U.S. and those utilized by amateurs in the rest of the world.
2. Inevitably severe interference will result from high powered U.S. stations with quite elaborate antennas, to amateurs in the rest of the world using lower power and less elaborate antennas.
3. The presence of commercial cw, RTTY, and radiotelephone stations, dominating most of the frequencies outside the U.S. allocations on 40 and 80 metres particularly, creates a serious interference problem which would be compounded immeasurably by this proposal.
4. Relatively few amateurs from other countries of the world are able to communicate within the U.S. bands because of the higher signal strengths encountered there, hence these bands are of little use to these amateurs. The proposal would limit their operations still further.
5. We might point out the injurious effect that this proposal would have upon good relations presently existing between IARU member societies and U.S. amateurs. This was amply brought out by W4BW in September 1970 QST.

6. It appears incredible to us that, as the result of a mere 15 petitions, the FCC would even consider such a drastic change in U.S. voice band allocations without considering the international ramifications of such a move. Moreover, "it seems to us" (editorial, September 1970 *QST* and "League Lines," June 1970 *QST*) such a proposal did not find favour with the League's Board, and was summarily rejected.
7. Should this proposal materialize, we in Canada would be forced to make strong representation to our Department of Communications for expansion of our telephony subbands into the cw bands. This would further compound the interference problems presently experienced on these bands.
8. We feel that efforts might be better directed towards increasing the total sizes of allocations to the worldwide amateur service in the light of the imminent probability of lessening demands for frequencies by commercial interests as more and more use is made of satellite and cable communications. Such overall expansion might be made at the upper ends of the bands where possible, thus allowing for expansion of U.S. phone bands and at least maintaining the status quo for other amateurs outside the U.S.
9. We wonder if these proposed band extensions have been precipitated by commercial equipment manufacturers acting in their own interests rather than by amateurs.
10. The geographical proximity of Canada to the U.S. already precludes use of the "U.S. phone band." Further expansion into our "Canadian phone band" will produce untenable operating conditions for amateurs in Canada.
11. The proposed allocation of an inter-regional subband in the 7075-7100 kHz range on 40 metres is completely irrelevant to alleviating any overcrowding that might exist in the present U.S. phone band. It would appear that this is merely a ploy to set up an exclusive U.S. DX allocation.

As an ARRL affiliated Society, and as a group of active, concerned amateurs we earnestly request that you give each of these points serious consideration before taking action on the proposal. - *John C. Tessier, VO1FX, President, Society of Newfoundland Radio Amateurs, St. John's, Newfoundland*

- I am in favor of the proposed frequency changes in the amateur bands. *Clark Bishop, WB4POD, Montgomery, AL*
- As one who wishes to see justice done, I reluctantly admit that more A3 space is needed. . . . So, with great sadness, but with the knowledge that it is more humane to make a merciful kill than to perpetuate a long, tortuous death-struggle, I am suggesting that A3 men who wish to brave the band be given all of 40 meters, with the usual option to cw ops to "use it at their own risk." . . . - *Jim McDonough, W3CY, Rockville, MD*

● The League must do everything in its power to reverse this disaster to cw operation incentive.

Such proposals run counter to the recently reported success of the incentive license program by a member of the FCC (*QST*, March 1970). If the phone operators find it difficult or impossible to operate under existing conditions other corrective measures are possible: (1) They can learn the code and utilize the cw mode for part of

their communications. (2) Power reduction would greatly aid in reducing effective bandwidth of signals. After listening to ssh it is obvious that the usual S9 plus signal is originating from a station in violation of FCC rules requiring use of minimum power to effect communications.

Besides laziness and greed on the part of amateurs, it is obvious that the manufacturers are pushing the rule change solely to enhance their profits from high power ssb equipment. The average commercial unit utilizes excess power levels. - *Richard J. Klinman, K3IOI, Philadelphia, PA*

● This will be my last membership if ARRL tries to scuttle the FCC proposal!! - *Richard E. Sears, W7FSI, Sedona, AZ*

● New band proposals sound great. Take credit for the improvement to be and keep up the good work. - *Armand Spring, K5HKH, Metairie, LA*

● As a Member Society of the International Amateur Radio Union, the Jamaica Amateur Radio Association, through its members, objects to any change in the amateur frequency allocation for phone use by American amateurs. We feel existing phone allocations provide some measure of separation between U.S. and foreign amateurs, in the best interest of amateur radio on a worldwide basis.

We are all aware of the growing interest in amateur radio around the world, and we believe this very useful service to the public should be tampered with as little as possible. As foreign operators (from the U.S. viewpoint) we strongly urge that the proposals brought forward in Docket 19162 be dropped. - *Jamaica Amateur Radio Association, Kingston, Jamaica, W.I.*

● The FCC's proposed phone band expansion is the best thing to happen to amateur radio in the States since the reopening of the bands after World War II. . . . - *John E. Brown, Jr., WB6WHM, San Diego, CA*

● I am in complete agreement with the proposals in FCC Docket No. 19162 and would like to see them implemented as soon as possible. . . . - *Irv Binger, W2IB, New Rochelle, NY*

● This new proposal by FCC would put some "icing" on the incentive licensing cake. I'm going to be very interested in hearing what ARRL will have to say, especially since some 15 individual hams petitioned FCC to come up with something like this. I've had my Extra Class ticket since March 1969, and I suggest you people at ARRL get behind this proposal and help put it into effect, thereby making your incentive licensing law a bit more popular. (Or should I say a bit less unpopular!)

I think this new proposal should become law even if it takes some exclusive territory from the cw men. Our bands can't be made larger, so this proposal is the next best thing. It'll spread out activity on phone and cw across the bands and prevent over-congestion in some places. - *Fred N. Mertin, W5YHT, Fayetteville, AR*

[EDITOR'S NOTE: In case you missed it, Docket 19162 appeared in full in April *QST*. The Board meets May 7 so your Director should have your views on the proposals by May 3 latest. Of course you may file comment with FCC until June 1. It's still an original and 14 copies for formal comment but you may make your views known informally by letter.]

QST



CONDUCTED BY BILL SMITH,* KØCER

More on Sporadic E

EVIDENCE CONTINUES to mount that more sporadic *E* propagation is possible at 144 MHz than is being observed. The most recent reported opening, the evening of February 12, was localized between the Texas Gulf Coast and the area around Las Vegas, Nevada. This may not be the full extent of the opening, but it was from only these areas that reports were received.

Al Olcott, K7ICW, began seeing cochannel TV interference on Las Vegas channel 3 early in the evening. Shortly afterward, about 1800 PST, 50 MHz opened to east and central Texas and Oklahoma. By 1840 Al was seeing cochannel on local channel 5, and several unidentified commercial stations were heard in the fm broadcast band. Five minutes later a weak K5 was heard just above 145 MHz. This was K5PTG, Houston, who did not hear K7ICW calling on 144.1, but with the help of WA5HMK on 50 MHz, Al worked K5PTG twenty minutes later. K7ICW also worked K5PTK, Galveston, and heard W5NPD, Victoria, Texas. The hour-long 2-meter opening ended at 1944 PST. 50 MHz closed two hours later. K5PTK's report on the opening was similar, and Sam also mentioned that 12 of the 24 states he has worked on 2 meters were worked on sporadic *E*!

Mel Wilson, W2BOC, has not finished analyzing the fantastic November 8 *E* opening, but has offered these preliminary remarks from a large volume of reports:

"I still have not hit on the key. Apparently the individual clouds were not long-lived and therefore are hard to track. The clouds were quickly generated, but I don't think they lasted long individually. So far I can't get any direction to them. One interesting thing to come from my study so far is that much of the backscatter over the eastern half of the country was a *two-cloud* path. This had never occurred to me to look for before. There were some cases where the backscatter appears to have been forward propagation and, where it hit the ground, came back from a different cloud. I wish I could get antenna heading information on such occasions. Another interesting fact is that the opening started on the West Coast and ended in the East, which is

*Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington Conn. 06111.

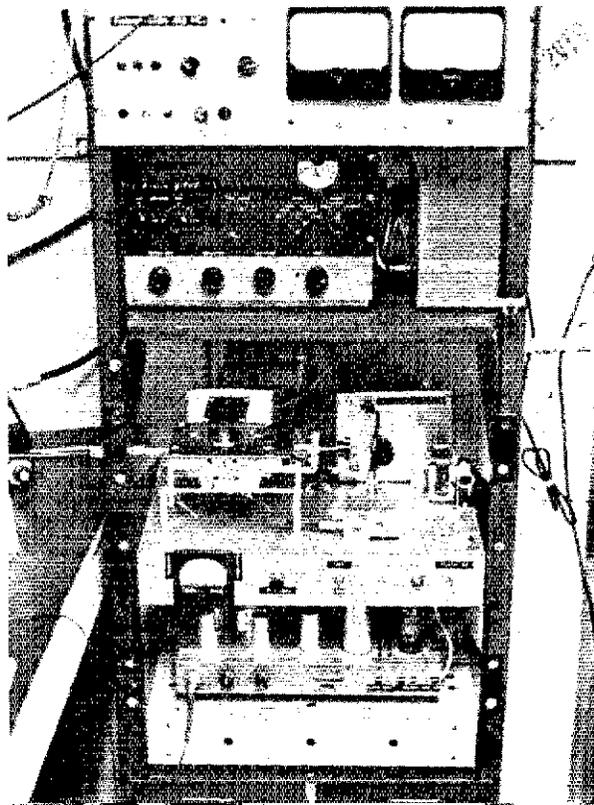
This is WA2VTR, as operated on 432 (top deck), 144 next below, and 1296 MHz, middle deck. The two bottom shelves contain an Eico Modulator for the 1296 rig, and a variable-voltage power supply. The 1296 section has a varactor tripler, 144-432, right rear; another for 432-1296, right front; and a pair of 7289s in parallel, left, delivering 105 watts output. The final amplifier is a W2CQH design.

unusual. The 2-meter data, however, vaguely follow east to west, with the sun. I am surprised that the 2-meter band was not reported open in the eastern USA, as the MUF appears to have been rather high and I have many fm broadcast reports in that area."

Anyone in the eastern USA hear anything on 144? And if you have accurate beam heading information for backscatter *E* signals, please let Mel know.

All this 2-meter *E* is prompting more interest in a national calling frequency. The unofficial frequency of 144.1 has been used in most areas of the country, but Technicians are unable to transmit on this frequency. W6GTFJ says 145.05 is popular in California. The popular 146.94 fm channel is used throughout the country and is worth watching, although the MUF might not rise that high in the 2-meter band.

At least one beacon will be operating this summer on 220 to aid in looking for *E*. WB6NMT/6 will run a beacon on 220.005 from mid-May through at least July, beamed east. When Louis is present, the beacon will transmit "Test de WB6NMT" and while he is at work, "de WB6NMT" will be sent. Louis' telephone numbers are 916-678-3869 at home, 916-678-5760 at work,



220- and 420-MHz STANDING

220 MHz		420 MHz	
WIHDQ ...13	5 450	K2CEH ...14	7
KJIX ...12	4 600	W2CNS ...14	6 525
WA1MUG ...11	3 306	K2YCO ...12	6 675
WIAZK ...10	3 375	K3IUV ...17	5 720
KJBA ...10	3 225	W3RH ...14	7 585
		W3UJC ...19	4 400
K2CBA ...19	7 2650	W4TI ...20	7 995
W2DWJ ...15	5 740	K4QIE ...19	7 1065
K2RTH ...13	5 960	K4LJO ...19	7 800
K2DNR ...13	5 600	W4HJZ ...15	5 560
W2STU ...12	5 725	K4SUM ...15	3 462
W2CRS ...12	4 600	W4VHI ...15	4 750
W3UIG ...14	5 460	K4GL ...13	3 720
K3IUV ...11	4 340	K4NID ...19	2 835
W3RU ...10	5 480	K4XC ...14	2 800
K4XC ...15	3 1115	W5RCL ...19	6 880
K4GI ...14	2 485	W5ORH ...12	4 700
W5RCL ...10	5 910	W5AIG ...17	3 1010
W5AIG ...13	2 1050	W5UKQ ...16	2 590
W5LO ...12	2 660	W5GVI ...13	1 365
W6WQ ...16	4 1142	W6DQJ ...14	2 360
W6BNT ...13	3 2650	K7ICW ...14	2 225
W7CNC ...16	3 923	W7JRG ...12	2 420
W7JRG ...14	2 959	K8DFQ ...23	7 675
K7ICW ...14	2 280	W8YIO ...11	7 650
W8PT ...11	6 660	K8REG ...21	7 760
K9HMB ...13	5 1070	W8HVX ...16	8 660
W0EYI ...10	4 950	W8CVQ ...13	7 625
WA0QLP ...13	2 923	W8MNT ...13	7 600
VE2HW ...15	2 225	W8ROI ...10	6 425
VE3AB ...17	4 450	W8CVO ...10	6 400
		W8WTF ...17	4 450
		K8UQA ...15	6 360
		K8BBN ...14	6 420
420 MHz		W9WCD ...20	7 825
KIHTV ...17	5 610	W9HUV ...17	7 780
WA1JR ...16	5 680	W9IY ...15	6 550
WA1MUG ...15	5 740	W9AAG ...15	5 800
K3EAV ...14	6 700	W9NKT ...13	6 850
KJBA ...13	5 710	K9AAJ ...12	5 425
WA1TK ...11	4 715	K9CNN ...12	5
KJIX ...11	4 460	W0DRI ...19	6 1185
WIHDQ ...11	4 380	W0LER ...11	4 709
WIOVF ...10	5 400	W0LCN ...11	4 200
K2ACQ ...24	8 925	K0TLM ...10	5 700
K2CBA ...20	8 2670	W0YZS ...18	4 650
K2UYH ...20	6 840	W0EYI ...17	2 703
W2CTI ...20	6 790	VE2HW ...16	3 750
E2VDK ...18	6 750	VE3DKW ...12	7 940
WA2MB ...18	6 730	VE3AU ...19	5 600
K2RIW ...17	6 817	VE3EZC ...17	5 510
WA2GK ...17	6 345	VE4MA ...12	1 420
W2HUV ...17	6 732		
W2DWJ ...16	4 570		
K2ARO ...15	6 740		

and he says he can be home in 2 minutes if called at work.

2-Meter Mystery Carriers

During the past year or so we have had complaints of unidentified carriers near the low end of the 2-meter band. The source of these signals, which are particularly troublesome in the larger cities, appears to be the ever-increasing number of cheap police-band fm receivers. Many of these receivers have a 10.7 MHz i-f and excessive local oscillator radiation. You can tell if this is the

problem by reading the 2-meter frequency and then checking 10.7 MHz higher for a public service outlet such as police. If you locate a receiver known to be giving trouble at appreciable distances, send ARRL documentation of it, and we will notify the manufacturer or distributor. Usually the owner of the offending receiver will not know of the problem, and it may be corrected without going through the legal process. FCC does have standards for incidental radiation enacted for just such purposes.

Drake SC-2 Improvement

The Drake SC-2 is a currently-popular 2-meter converter. Its rf stage uses a TIS 88, a device which was designed several years ago and does give better performance than most vacuum-tube amplifiers. Several SC-2 users, including WA1FEO, have replaced the TIS 88 with the newer 2N5397, achieving even better performance. The 2N5397 may be substituted directly for the TIS 88, though the converter will have to be retuned. Alignment instructions are included in the SC-2 manual.

States Worked Boxes

Elsewhere in this column are the current states worked boxes for 144, 220, and 420 MHz. In the past several months there has been some dissatisfaction expressed that the boxes are not fairly representative. Several of our Canadian friends say they feel we should also include provinces worked and the fact that we don't, has made it difficult for them to get schedules with US stations. The VEs have a valid point; now all we have to do is come up with a solution. I would be interested in reader comments on this, and if you think the boxes actually serve a meaningful purpose. Several months ago we posed the question whether we should begin a 1296 listing. A few comments were received, including some listings showing one or two states worked with a maximum distance of 30 miles or so. I may be mistaken, but these hardly seem worth the column space. Am I wrong?

OVS and Operating News

50-MHz DXers in the Pacific are reporting some DX worked, but from the states the pickings are slim as the sunspot numbers drop. VK8AU writes from Australia of working Japanese JA1MRS February 2 and JA1ODA, JA3WNR, JH3APN, JH3DOI, HL9WI, Korea, and KR6CR, Ryukyu Islands, on February 24, the same date as a stateside aurora. David is running ionospheric scatter schedules with VK8KK and says sometimes the JAs QRM their schedules. W/Ks should be so unlucky! VK8AU and VK8KK run 400 watts, the Australian legal limit, and their schedules are 75-percent successful when run around local sunrise. This is a 540-mile path. VK8KK has a 36-foot Yagi, VK8AU has a 9-element Swan Yagi. David also schedules VK5ZWW over an 1100-mile path with good success. David says other VKs attempt scatter with the more common 5894 and 5-element Yagi station combinations, but that their success with the lower power is usually limited to meteor-type exchanges. Thanks, David, for the information from Down Under.

From Korea, HL9WI reports good F_2 success February 24 and March 1, working Australia and Japan. Bill says one problem in working the VKs is that they are not allowed below 52 MHz and they have to wait for the MUF to climb from 50 to 52

MHz. JAs are permitted use of 50 MHz and, according to HL9WI, he and many of the JAs are equipped to work both 50 and 52 MHz.

KH6GRU, Hawaii, says the band has been quiet since January 27, when he heard K6QEH for about 20 minutes. Bert says KH6NS is setting up 6-meter gear again and is considering moonbounce to work the states he yet needs for WAS. KH6GRU is considering a try at 432 eme and is curious if there is enough stateside interest for him to go ahead with the project. This was written in late March and I'd guess that KH6GRU has enjoyed more DX since late January. WA5HMK and K5LZJ, Texas, heard the ZK1AA beacon on March 16 and 20, so it would appear that path will have again been worked by the time this reaches print. The report from WASHNK was the first concerning ZK1AA this year. Joe says also that VR61C hoped to be active in April around 50.11 and that CE0TS is running a beacon on 50.1. One final note on WASHNK. He was married April 17 - best wishes to the XYI, when she becomes more familiar with Joe's 50-MHz interests!

Looking ahead to the summer E season, don't forget the planned activity of KL7GZZ from Ketchikan by K7HTZ, W7CNK, WA7OTT, and VE7SV during the June contest. W4GDS, K8BBN, and K0CER will be in the Caribbean at contest time. Operation will most probably be from Grand Cayman again, but at this writing a VPS operation from Turks has not been ruled out, depending mostly upon logistics. I have sketchy details of two other planned DXpeditions, but not enough at this time to warrant publication. If anyone has definite plans, I would appreciate knowing of them, to prevent possible duplication of effort. No use in two groups battling from the same location is there?

VE2BYG, ex-VE6AHE, has a 24-hour beacon running on 50.065 at Alouette, Quebec, 220 miles northeast of Montreal. Randy listens between 50.098 and 50.115 for North America and 70.150 for Iceland and Europe. His telephone number is 418-677-2744 and he may be written to at P.O. Box 73, Alouette, Quebec, Canada.

144 MHz activity should increase again with the coming of warm weather tropo conditions and more meteor activity. The lack of activity during the winter months has been reflected in the number of reports received. From around the country, here is what we had at deadline in late March. K1HTV, Conn., lost his 80-element collinear in a March 5th storm. Rich says others in New England lost antennas during the intense storm.

WA2UDT caught a 30-minute aurora opening February 24 hearing and working 8s and 9s. W3BDP, Delaware, says 2 meters was quiet during the winter with a few auroras. He ran several unsuccessful random schedules with K5AGI, La. W3ZNF, Delaware, reports six members of the Maverick Amateur Radio Club active on 146.94 fm in the Dover area.

Dick Allen, ex-W5RAG, now K4FKD in Fairfax, Virginia, spent several weeks pondering topographical maps before selecting his new homesite. Dick says the effort has been paid off with ten states and Canada in his first two weeks of operation. He will be active soon on 432, with 50 watts, ssb, and a 52-element Yagi array.

WA5CDQ, Garland, Texas, is looking for schedules for his 829B amplifier driven with a solid-state exciter. K5PNV, Austin, reports forma-

2-METER STANDING

K1ARR	1135	8	1478	K5WXZ	1138	10	1450
K1HTV	1135	8	1310	W5HVA	1137	10	1285
W1AZK	1134	8	1412	W5AIG	1135	9	1360
K1WHI	1131	8	1300	W5UKQ	1133	9	1290
K1UGQ	1130	8	1370	W5WAX	1131	9	1310
K1WHS	1129	8	1300	W5LO	1129	7	1375
W1XLU	1129	8	1296	K5P1K	1123	8	1330
K1BKK	1128	7	1275	W6GDD	1118	5	1376
W1SAM	1125	7	1100	W6WSO	1116	4	1390
W1HDG	1124	7	1040	K6HAA	1113	4	1380
K1RHH	1122	7	1450	K6JYO	1111	4	1240
K1MTI	1120	7	1225	K6HMS	1111	4	1258
WA1MG	1119	5					
W1MX	1118	6	850	W7JRG	1117	6	1320
K1JJA	1118	6	800	K7NH	1115	5	1290
				K7JW	1114	4	1278
W2NLY	1113	8	1300	K7YFM	1110	6	950
W2CXY	1113	8	1460	W8PT	1111	9	1260
W2ORL	1113	8	1320	K8AXD	1108	8	1275
W2AZL	1113	8	1380	K2ZAA	1106	9	1310
W2RIV	1113	8	1150	W8JDU	1106	8	1150
K2RDD	1113	8	1215	W8YIO	1106	8	1100
WA2GK	1113	8	1340	W8D1	1106	8	1150
W2CX	1113	8	1334	K8D1	1105	8	1200
W8PWK	1112	8	1080	W8NOH	1101	8	1165
WA2CFK	1111	8	1160	W811U	1104	8	1000
W2CRS	1110	8	1270	K8ZPS	1102	8	675
K2CFH	1105	8	1200				
K2DNR	1105	7	1200				
W8SHH	1105	6	1000	K9SGD	1102	9	1300
WA2MB	1104	8	1335	WA9D1	1101	4	1303
W2ONS	1103	8	1150	W9AAC	1101	9	1200
K2BWR	1103	7	1350	K9AAJ	1101	9	1200
W2DWW	1103	6	860	K90H	1101	9	1150
W8YUW	1102	6	850	W9YYI	1100	9	1050
WA2PMW	1101	6	1000	W9BRN	1100	9	1260
W8NCR	1101	6	915	W9PBP	1100	8	820
K2YCO	1101	7	750				
				W881B	1100	10	1380
W3RUI	1100	8	1100	W8NXI	1100	10	1369
W3KWI	1100	8	1365	K8MQS	1100	9	1276
W3BHG	1100	8	1260	W8LLR	1100	9	1440
W3GKP	1100	8	1108	W8DQY	1100	9	1300
W3BDP	1100	8	1225	W8111	1100	9	1100
K3CY	1100	7	950	W8FYI	1100	9	1380
K3CA	1100	8	1200	W8FNC	1100	9	1360
W3HB	1100	8	1310	W8FMS	1100	10	1320
B311A	1100	8	1342	W8CFK	1100	9	1120
K3ORU	1100	7	930	E8CTR	1100	9	1276
W3ZD	1100	7	850	W8LCN	1100	9	1100
W31MZ	1100	7	975	W8DRL	1100	9	1295
				VE1ADC	1100	2	500
K4GI	1100	9	1270	VE2D10	1100	3	1420
W4HIQ	1100	9	1150	VE2BZD	1100	2	1309
W4WNI	1100	9	1350	VE2HVV	1100	6	800
W4HHC	1100	9	1280	VE3BQN	1100	8	1250
K4JQ	1100	8	1125	VE3ASQ	1100	8	1290
K4XC	1100	8	1403	VE31ZC	1100	8	1283
W4V1H	1100	8	1100	VE34TR	1100	8	1340
W4CKB	1100	8	1440	VE3CW7	1100	7	1072
K4OP	1100	8	1225	VE3FVW	1100	8	1100
W41J	1100	8	1150	VE7BQH	1100	5	1248
W4AWS	1100	8	1350				
				VK3AIN	1100	3	10417
W5UGO	1100	10	1398	ZL1AZR	1100	2	11055
W5RUT	1100	9	1289	SM7BAL	1100	1	11055

The figures after each call refer to states, call areas and mileage of best DX. Revised May 1971.

tion of the Texas State Capital a-m and ssb net on 145.1. The net meets Thursdays at 2000 CST.

K8BHH, Alliance, Ohio, says fm has taken over most 2-meter activity in that area, with three repeaters operating on 146.94. David reports several other Ohio repeaters active, but open to members only. W8FWF, Michigan, reports similar

2-meter activity in Michigan with the 146.94 channel popular.

WA8YYW, Michigan, heard the February 24 aurora in Detroit, copying 1s, 8s, 9s, 0s and VE2DFO. WA9QZE, near Chicago, reported the same aurora and seeks schedules. He, like WA5CDQ, has recently completed an 829B amplifier. Are the 829Bs making a comeback? At Bowling Green, Mo., WA0CHK has reached 34 states and is working on antennas and a kilowatt. VE2BZD, Montreal, found tropo good February 29 through March 2.

220 MHz operators are upset over an Electronics Industries Association proposal to FCC to assign 220 to 222 MHz to the Citizens Radio Service. ARRL is filing strong opposition to this proposed invasion of an amateur band. Another similar proposal is fostered by W2NSD/1 who claims to have consulted a number of 220 operators and to have received their endorsement for the CB assignment. WB6NMT reports having contacted leading 220-MHz operators around the country who have told him they have not been consulted by Green and strongly oppose the CB proposal. Perhaps we should undertake a crash program to heavily-populate 220.

While we don't make a practice of publicizing the large volume of certificates issued for one thing or another, WB2GXF says the Dutchess County VHF Society will issue a special June VHF contest certificate to Stations contacting WB2FKJ/2 on two or more bands on 220 and up.

Don Farwell, WA6GYD, continues to publish his *Bay Area 220 Newsletter*, designed to create more 220 activity along the west coast. One recent edition contained information for converting the popular Heath Two'er to 220. Details are available from WA6GYD, I'm sure, for a self-addressed, stamped envelope. Reading in Don's newsletter, it appears several other persons are attempting to begin similar publications in other areas of the country. Contact WA6GYD for details as Don is one of the most avid 220 buffs anywhere.

At Montreal, VE2BZD has a 220 kilowatt nearly completed and will be looking for meteor and tropo schedules.

432 and Up should be recovering now from the winter lull. A large number of operators have reported winter projects underway to put them on uhf come warmer weather. W3GKP has retired to North Carolina where he is now signing K4RJ. Smitty may be contacted at Route 7, Box 315, Franklin, NC 28734. He is now rebuilding his 2.3 GHz station for renewed eme and tropo work. In Missouri, W0YZS has several projects underway including a 200-watt amplifier and converter for 1296.

Dolph Vilardi, WA2VTR, says that anyone who has had trouble locating transistors for his 1296-MHz preamplifier (recent editions of the ARRL *Handbook*) may be interested in the Nippon Electronics 2SC1090. This transistor has given results similar to the one used in his first stage. The 2SC1090 (\$20 each; \$16 in lots of 10) is available from California Eastern Laboratories, 87 Terrace Hall Avenue, Burlington, MA 10803, attention Marvin Groll; or from Dolan-McCloskey Associates, 16 Spring St., Red Bank, NJ 07701. Another device from the same sources (but at \$60) is the 2N5762, having a claimed noise figure under 2.5 dB at 1296 MHz. The 1296-MHz rig of WA2VTR is pictured herewith.

ARRL Repeater Directory

For some years now we've been asking for repeater news and statistics for use in this column, with something less than overwhelming success, though the response has been growing in recent months. An objective, other than reporting in *QST*, has been to amass repeater statistics for eventual inclusion in an ARRL Repeater Directory. The form the directory would take was undecided until Communications Manager Hart suggested that a logical place for it would be in the ARRL Net Directory, which is issued yearly.

This seemed like a fine idea on many counts, so a repeater registration card was prepared, and distributed through all available ARRL channels. Spaces on the card are marked for the area the repeater serves, its call, its input and output frequencies, sponsoring organization, access method, and any special features that might be of interest to potential users. In addition to providing listings for the directory, these cards will be retained in a special file, that hopefully can be kept up to date, with the cooperation of the repeater operators.

If your repeater has not already been registered, you can send us the necessary information and we'll make up a card for the file, or we can send you the cards to fill out yourself, and return them to us. Please do this soon. Accumulation of data for the directory will have to be concluded about the end of May. Anyone sending in a registration will receive a copy of the directory later in the summer. Anyone else who wants one can have it by sending a stamped self-addressed envelope to ARRL, Newington, CT 06111. Simply mark it "repeater directory." We'll let you know, in *QST*, by way of official bulletin on WIAW, and in mailings to League Officials and affiliated clubs, when the directory is to be ready, the size of the envelope, and the postage to include on it.

A sizeable pile of registration cards is in as we write, and it is growing daily. Already we have enough data on hand so that we will no longer be able to carry repeater statistics in this column. We will, however, be glad to run information on any new repeaters being set up, and on any important changes (call, frequencies, access methods) in these pages, so that you can keep your directory up to date.

Texas VHF FM Society Repeater Plan

An important item of business at the convention of the Texas VHF FM Society in San Antonio, February 26-28, was adoption of a frequency allocations plan for the 144- and 420-MHz bands. This recognizes existing uses of these bands, and makes specific recommendations as to repeater uses. Reduced to its basics, this would make space for 13 input frequencies, 30 kHz apart, beginning at 146.01 MHz, and similar output channels from 146.61 to 146.97 MHz. In between there would be seven channels for direct communication, 146.4 to 146.58 MHz. The 420-MHz breakdown is as follows:

- 420-422 - Intercity in/out
- 422-425 - Audio links
- 425-427 - Intercity in/out
- 427-429 - Audio links
- 429-431 - Repeater control
- 431-432 - Guard (non FM)
- 432-436.5 - cw, ssb, a-m, and any other narrowband mode, with DX and EME in the first 200 kHz

- 436.5-437.2 - Guard
- 437.2-441.7 - ATV, with ATV audio at 444.25
- 442-445 - Repeater output
- 445-447 - Direct
- 447-450 - Repeater input.

A program for development of a Texas Intercity Repeater System was adopted, and committees were formed for planning and presentation of details at a meeting to be held during the summer. — *WIHDQ*

Late 50-MHz Reports

After the body of our copy was on the way to the printer, interesting DX reports were received from Monty Werry, VP2MJ (VE3EW), and Vince Varnas, K8REG/KV4. Monty, who has been on 6 from Montserrat, WI, several seasons in a row, found the band open less frequently, and with generally weaker signals and shorter openings, than in the past. He heard the ZK1AA beacon only on March 5, 14, and 15, between 2000 and 2120 GMT each time, with signals peaking 539. The KSAGI beacon was heard on the 15th for two hours, starting at 1930. W5FSW was heard calling CQ at 1950. On March 21, W6PYH and WB6NMT were heard, and XE1PY was worked. K8REG/KV4, XE1PY, XE1GE, and VP2CGB/Nevis were worked on the 5th. Monty did not list dates of LU contacts via TE, but he mentioned that LU3EX worked KH6IJ on the 15th.

K8REG/KV4 was on from St. Croix from March 3 to 9, using a TR6 and a 3-element beam up 25 feet. He found the band open daily between about 2055 and 0240 GMT. His list: LUs 6DCO, 3EX, 1DMA, 2BG, 3DCA, 2FAO, 2DEK, 2BN, 2BNM, 6FDU, 8AHW; VP2s MJ and GGB/Nevis; and ZP9AY. The band would open with strong F₂ signals from South America, with characteristic TE effects noticeable after about 2300 GMT. During the night of March 6 all South Americans seemed to peak on a heading of 220 degrees, instead of the usual 180. Vince hopes to do some island hopping during the sporadic-E season. QST

ARPS

(Continued from page 75)

track of the 5,000 marchers and were ready to provide help in case of emergency. — *K8EIO, Asst. EC Summit Co., Ohio.*

A transmitter hunt was used to simulate a search operation for Monroe Co., Mich., AREC members on Nov. 29. K8AMU collected triangulation reports from base stations and mobile units were sent to search the wide areas disclosed by these bearings. The pirate transmitters were located after much effort, but much was learned about emergency communications ability. — *W8EFK, EC Monroe, Co., Mich.*

For the past three years the Middle Tennessee Amateur Radio Society and Coffee and Franklin Counties AREC have provided the city of Tullahoma with parade control for the annual Christmas Parade. This year, twenty amateurs using two and eighty meters participated as mobile units along the parade route to provide marshalling duties and report any accidents or emergencies to the authorities. — *WB4ANX, SEC Tenn.*

It seems that January is becoming a low-ebb month for SEC reports. Perhaps it's just that all the

May 1971

SECs have been tied up with SET and are more hard pressed. Anyway, thirty-eight reports were received for January, 1971, encompassing an AREC membership of 12,122. Last year, for the same period, we had 43 SECs and 13,934 members reported. Reporting sections: Alta, Ariz, Ark, Colo, Conn, EFla, EPa, Ind, Iowa, Kans, Mar, MDC, Mich, Mont, Nebr, Nev, NLI, NC, NNJ, NTex, Ohio, Okla, Ont, Org, Que, SDgo, SE, SJV, Sask, SDak, SNJ, Tenn, Utah, Va, Wash, WVa, WMass, WPa.

Who sets the precedence? The operator of the originating station sets it. Once it is set and the message is on the air, *no one* changes it. You might wish to argue with the originating station about it; that's your prerogative, but you don't change it without his permission and you don't hold it while waiting for his permission. Get the message cleared, *then* argue about the precedence if you must. But don't argue with the station that gives it to you, unless he is the originator. He can't do anything about it.

Precedences are a fairly new tool in the amateur message-handling game. Despite the fact that 95% of our traffic takes the R (Routine) precedence, it is a very useful tool but, like most tools, only if used right. — *WINJM.*

Independent Net Reports

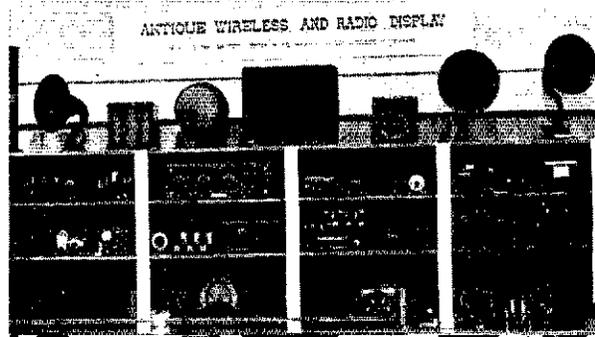
Net	Sessions	Check-Ins	Traffic
Northeast Barnyard	—	689	14
EC1FN	24	252	91
Hit & Bounce	28	428	1379
Twenty Meter Interstate	19	464	1757
7290	40	802	1820
Northeast Traffic	28	332	553
Clearing House	24	444	324
EASN	27	158	106
All Service	4	76	24
North American SSB	24	527	489

QST



As a part of the Michigan Week celebration, May 16-22, the Catalpa Amateur Radio Society will be operating on 20, 40, and 75 meters with the special call WM81CH. Contacts will receive a commemorative QSL. Cards may be sent to C.A.R.S., 22060 Charter, Southfield, MI 48075.

This fine exhibit of antique wireless and radio equipment, which includes a model 1920 wireless station, is on display at the Aero-Space Museum, Balboa Park, San Diego, California. Thanks are due W6KCO and his fellow members of the San Diego chapter of the QCWA who assembled this interesting collection.





YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

We Were Ready

ANITA BIEN, W8TAY, knew her YLs well when she selected QRV as the YLRL motto, for helping others is a part of being a woman. To YLs, QRV means that all women operators are ready and willing to lend their skills, and time, to assist when they are needed. We are ready to help in the hunt for badly-needed medical supplies, to locate lost hikers, or a child that has wandered away from the family picnic. We help every day in the year to bring members of the armed services all over the world into contact with their loved ones at home, and through our being ready, people have received the priceless gift of sight.

We are a part of specialized services such as the Hurricane Watch, and Weather Nets, and when disaster strikes, as it so often does without warning, we are ready again to help, for disaster has the effect of rousing the concern of the average citizen. When tornadoes and floods and hurricanes are reported by commercial news, then as never before the public remembers someone and wants information about his welfare, and we are ready to help them find the answer.

The February earthquake in California's San Fernando Valley shook the country into sudden concern over friends and relatives in the area, and amateur radio operators were very popular in every state when the commercial systems overloaded. The women who were busy handling the greetings from the Florida State Fair, found the texts were changing from "having fun" to health and welfare inquiries. The casual morning chat nets began to fill up with messages, and the gals were right there to assist the relay of the stacks of inquiries that began to flow across the country within a few hours after the first news of the quake was received.

On the West Coast, other YLs who had been literally "all shook up" never thought about all those little bits of advice on how to be calm when "terra" turns out to be anything but "firma." They checked the power and antennas and went on the air. From then on there was no time to adjust to the effects, and though aftershocks occasionally rocked the tables as they worked, they were all busy. Many of the ladies from MARS were watching the paper in their printers as message after message came through RTTY circuits. On vhf bands other gals were already beginning to originate those very welcome "We are safe" or "Evacuated but all well" texts that often met or preceded the inquiries coming in to them.

*YL Editor, QST. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, CA 91001.



They handled traffic by the ton until their throats were husky and voices almost unrecognizable, while others were so dit-happy at the end of six to eight hour stretches each day that the code became a blur, and they no longer remembered which side of the bug was which; but the next day they were right back doing it all over again until the flow became a trickle and finally stopped.

YLs were a part of this service of giving assistance when the particular skills of the amateur radio service were needed, not as YLs in a special group but as a unified effort of all amateurs that justifies our existence.

YLRL "Tape Topics" Project

"Tape Topics" is one of YLRL's activities to bring the current issue of *Harmonics*, the official organ of the club, to sightless YLs. The project began as the result of a discussion on Tangle Net of the possibility of making *Harmonics* available in some useable form to the blind YL members, and resulted in a group effort of K1FKO, K9QGR, K7ADI, W7NJS, K0EPE, K6OQD, whose planning brought the first tape, which was a success. K9QGR handled the project in 1963 and it was taken over in 1964 by K0EPE, until her duties as YLRL President made it impossible to continue. In February 1964, Raj. Rendsland, K7NZO, was appointed to continue the program. In 1970, the project that had been sanctioned by YLRL up to that time, was given official status as one of the club's permanent activities and the office of Tape Topics Librarian was created.

Seven-inch 3-3/4 in./s tapes are made of each issue of *Harmonics*, and usually include the current "YL News and Views" column, plus other information regarding activities of women radio operators. It is sent "round robin" with the address card included in the mailer for each recipient to use when she is ready to forward it to the next YL.

The card also includes the call and the number in sequence for forwarding in Braille to assist the gals in mailing them if there is no help in reading the cards as is sometimes the case. At present Tape Topics is sent to 10 YLs.

YLRL is now thinking of appointing a second such librarian to handle the project on the eastern side of the country to make the tapes available more quickly than at present.

W3GCW + W3ZI = 100 Years of Radio

Eunice and Ken Thompson, W3GCW and W3ZI, are the first YL-OM team to celebrate a combined total of 100 years as amateur radio operators.

The new calls may not be familiar, but Eunice is very well known indeed under her former calls of ELR, 1CDP, and W1MPP, and Ken as 2FL and W1PS.

"YL News and Views" congratulates them both on their "Century of Progress" from the wideband of spark to sideband.

WAIYL Certificate now available

WAIYL means a new YL certificate, the first to be offered by the Young Ladies Radio Club Italiano. It is available to all YLs and OMs upon receipt of proof of contacts with Italian YLRC members after January 1, 1970. All bands and all modes of operation are permitted. Contacts with charter members count 2 points each, with other DX-YLs 1 point each. Total points required to qualify are: Italian stations must have 10 points; European Stations, 8 points; Extra-Europeans, 6 points.

To receive the certificate, Italian stations send 10 IRCs and log extracts signed by 2 OMs; Europeans send 15 IRCs and log extract signed by 2 OMs; extra-Europeans 20 IRCs and the log extract signed by 2 OMs. The certificate is free to blind and paralyzed applicants who qualify under the regulations.

For scoring purposes the Charter members are: 11YG, 11MOG, 11IYL, 11ATB, 11BJ, 11CWK, 11HA, 11CLL, 11LIL, 11PLH, 11GLK, 11ZRE, 11ZNA, 11ZMT, 11LBP, 11RGI, 11XYL, 11SGZ, 11YD, 11BL.



K7NZO, Raj. Rendsland, YLRL "Tape Topics" Librarian.



K7QGO, Mae Hipp, 1971 YLRL Vice-president, isn't satisfied with the tough job of computing the scores of the YLRL contests, and planning the calendar of activities. She is also the new editor of *Harmonics*. An A1-Operator Club member and holder of many certificates, Mae is also active in Navy MARS as N0JKY.

Proof of contact may be sent to the Awards Manager: 11XYL, Anna Conti-Salvioni, Via G. Parini, Bologna, Italy

Those W and K Calls

To work a YL in each of the 50 states is not the completion of the story of YLs licensed by the United States. For a total picture of women holding the W or K type prefixes it might be a real challenge to try to find gals whose calls are different from the KH or KL prefixes. They would be: On Canton Island, KB6CM; Caroline Islands, KC6CK, KC6CC; Guantanamo Bay, Cuba, KG4CV; the Marianas, KG6ASU, KG6JAD, and for the Novices WG6ARY, WG6ARZ. The Virgin Islands, KV4BX, KV4DD, KV4FS. American Samoa, KS6DJ. The Canal Zone, KZ5CO, KZ5CS, KZ5EJ, KZ5EW, KZ5GS, KZ5JU, KZ5MF, KZ5MP, KZ5NAW, KZ5SA, KZ5RT, KZ5SA, KZ5SN, The Ryukyu Islands, KR6YL, and for the Novices KR6NET.

So far as is known there are no women amateur radio operators on Wake, Swan, Midway, Marshall, or the Johnson Islands.

WB8CLG, Margaret Noble

Marge became curious about all the mysterious things that the OM and their son were discussing and, as so many other YLs have done, solved the mystery by joining them in their training and receiving her license when they did. General followed, and two months ago Marge received her Advanced Class license.

For the past two years Marge has spent most of her time on 20-meter phone, although she really enjoys cw and is planning to become a part of the traffic nets just as soon as the antenna system changes from vertical for a better signal on the bands where the traffic nets are found.

A member of ARRL, YLRL, YLISSB, the Buckeye Belles and, with the rest of the family, a member of the Dayton Amateur Radio Association, Marge has just about completed the

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1CDT, Edgar F. Wheeler, Sr., Manchester, NH
 W1FTB, Oliver Rantanen, Newbury, MA
 W1HHU, Dr. Alfred B. Cobb, Quincy, MA
 WA1MVK, William Sequeira, New Bedford, MA
 K1RYI/K4DCR, C. Kendall Morse, Bradenton, FL
 W2BY, Erwin Oeffler, West Hempstead, LI, NY
 W2DQN, Hillis S. Peterson, Oakdale, NY
 K2IPT, Benjamin Sadowski, Jr., Fair Lawn, NJ
 W2KBP, Carl K. Toth, Avenel, NJ
 K2KGU, John C. Vergne, New York, NY
 WB2KUU, George L. Smith, Mount Holly, NJ
 K2UBG, Martin J. Bligh, New Hyde Park, NY
 WA2VJE, John J. Parker, Riverside, NJ
 W2ZX, C. Dale Kentner, Cherry Hill, NJ
 W3EBP, Harry W. Poole, Lansdale, PA
 K3MMM, W. Earl Spill, Pittsburgh, PA
 W3PBR, Mason W. Frankenfield, Upper Darby, PA
 K3WJE, William B. Jones, Reading, PA
 W4BF, Austin C. Poling, Arlington, VA
 W4BGS, John P. Hyde, Nokesville, VA
 W4DRD, Richard L. Smith, Miami, FL
 K4EG, Francis E. Beaudry, Sr., Graham, NC
 W4FI, Polk Perdue, Gallatin, TN
 WA4GZ, Arthur A. Krauss, Decatur, GA
 W4ICI, J. Binford Thompson, Portsmouth, VA
 JW4JGM, Edwin M. Quimby, Bradenton, FL
 K4JW, Robert R. Ralston, Johnson City, TN
 WB4UDS, Kenneth K. Evett, Tampa, FL
 K4LJ, George E. Lauterborn, Jensen Beach, FL
 W4SS, John C. Hagler, Jr., Augusta, GA
 W4YH, H. A. Daly, Arlington, VA
 K4YLP, Bertrand B. Simons, Richmond, VA
 W5MCP, Charles G. Benson, Sour Lake, TX
 W5NIO, Hubert E. Abfalter, Oklahoma City, OK
 K5MWO, Frank H. Johnston, Arlington, TX
 R6G1Q, Dr. James Plusch, Long Beach, CA
 K6JWU, Calvin R. Hughart, Corona, CA
 W6LSL, Cyril Fvan Farrand, Long Beach, CA
 WB6YHK, John P. Witt, Chula Vista, CA
 W7ALU, Robert C. Olin, Seattle, WA
 WA7BYR, George Meister, Portland, OR
 W7YZQ, Theodore A. Hildebrand, Billings, MT
 WB8AOK, Ervin I. Schreiber, Orchard Lake, MI
 W8ARV, Leslie A. Jackson, Dayton, OH
 K8BAT, Robert E. Hinde, Toledo, OH
 EX-W8BZC, Raymond C. Meckley, Cresson, PA
 W8ESN, Lee R. Kemberling, Toledo, OH
 W8KAH, Frank J. Zink, Toledo, OH
 W8LMS, Cornelis Van Zoest, Grand Rapids, MI
 W8LNE, Charles J. Leedke, Saginaw, MI
 WA8MJH, Ralph E. Lowen, North Olmsted, OH
 W8SPJ, Arthur C. Lyman, Birmingham, MI
 W8SVB, Donald C. Rees, Toledo, OH
 K8YJV, Dr. Richard T. Dolloff, Dayton, OH
 W9BBB, John H. Kucera, Sr., East St. Louis, IL
 K9GZD, James Edward Egan, Alsip, IL
 K9IVG, M. Roberta Kroubk, Michigan City, IN
 W9KGS, George H. Ackmann, Elgin, IL
 W9MSB, Charles (Wes) Wilson, Martinton, IL
 W9OVI, William F. Plambeck, Kaukaee, IL
 W9SPB/K9HBZ, Dr. A. Anthony Kriz, Chicago, IL
 W0CLH, Loren H. Ford, Edgerton, KS
 WB0CTL, Maynard W. Tullefson, Ely, MN
 W0EQO, Ottem E. Miller, Faribault, MN
 W0OBS, Robert P. Erickson, Minneapolis, MN
 W0RJE, Kenneth C. Robieson, Minneapolis, MN
 W0TJA, Milton S. Miller, Rochester, MN
 W0UCV, Francis C. Dear, Minneapolis, MN
 WA0ZZH, Edwin LeRoy Cox, Jefferson City, CO
 VE4KX, Harry L. Eddy, Winnipeg, MB
 HB9SI, Walter Baumgarten, Geneva, Switzerland
 ON4FG, Gaby Felix, Belgium
 ONSAJ, Henry Wauters, Belgium

The Post Office Department promises faster mail service with Zip codes. Use yours when you write ARRL. Use ours, too. It's 06111.



WB8CLG, Margaret Noblet.

requirements for WAS, and is now busy collecting contacts towards DXCC.

Radio has been a big help in the what-to-give-mother-for-Christmas list for her son who built her a scope as his gift. She says that amateur radio has more fringe benefits than are listed in the publications telling about it. For instance, when the bands are open and the contacts are rolling in, there is no worry about nerves or inhibitions, for amateur radio is better than any tranquilizer on the market.

The Noblet family has no communications-gap problems either with OM. Sam, WB8FNR, and their son, Brad, WA8WDG. The only problem is who gets to the rig first.

Feedback

Error in the rules of the Florida contest in the March "YL News and Views." The rule should read that only the Florida member must be in Florida at the time of the contest.

QST

Strays



K4IV was originally licensed in 1916 as 9AAS (Kentucky was then in the 9th District). Recently he decided to apply for an Extra Class license under the grandfather clause. Although 9AAS was not listed in the Department of Commerce's 1916 callbook, this photo, taken in May 1916 and showing K4IV and his original rig, along with several notarized letters, enabled him to obtain the Extra Class ticket.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Whereee:

Long Hall's marquee, bedecked with psychedelic QSL-strewn bunting, shook in brassy blasts of our *Wouff Hong Song* blared by six marching DX bands. Gay May had arrived; all great-circle paths led to the DX Hogger & Poetry Depreciation Society's 20th annual conclave where our DX Idol of the Year was to be installed in ceremonial splendor. We fought through the riotous mob to balcony seats, careful not to slip on Old Haywire overspill, just in time to catch chairman N. Les Liszt's frantic call for order. He caught a painful jug of O.H. as our program opened from the floor. . . .

Splattering audio? Yikes!
The messiest used to be Mike's.
Our patience expired,
We sneakily wired
Ten mikes across each of Mike's mikes.

Our guest of honor was introduced, a sour specimen with all the charm of a guillotine oiler. This crab acknowledged hoots and jeers from the audience by forecasting a sunspot count of minus eight by 1972. . . .

It's Cody McLidd we abhor.
His keyer we hate even more.
He sends lots and lots
Of dashes and dots -
The spaces he left at the store.

Rumblings backstage indicated preparatory activity by our DXHPDS idolization committee. Now the prune-face blackly thundered his belief that FCC would tax homebrew ham rigs annually at ten dollars per watt by 1973. . . .

Careless young Saul of St. Paul
Raised all-metal masts very tall.
One shiny stick's bolts
Rubbed on 8000 volts -
We no longer raise Saul at all.

The head idolizer appeared at the rostrum making tape measurements. Picklepuss shouted his firm conviction that 20 meters would be channelized for five-watt a-m rigs by 1974. . . .

Sparky MacToast, fearless one,
To whom jolts were just part of the fun,
Liked safety and care
Only medium rare
But his linear liked *him* well done.

Suddenly the entire idolization committee appeared on stage in asbestos suits. Our gloomy

*7862-B West Lawrence Ave., Chicago, Ill. 60656.

OD5BA's Beirut pad displays enough unique Levantine architecture to serve well as your QTH of the Month. An ARRL DX Century Club member since 1955, Joseph is a regular feature in annual League DX Competitions.

guest barely had time to scream "QRN LIVES!" before two hot jets of instant epoxy froze him in his tracks. . . .

Power-sick Smokey O'Socket,
Less in his head than his pocket,
Shorted his balun
With more than a gallon
And popped through his quad like a rocket.

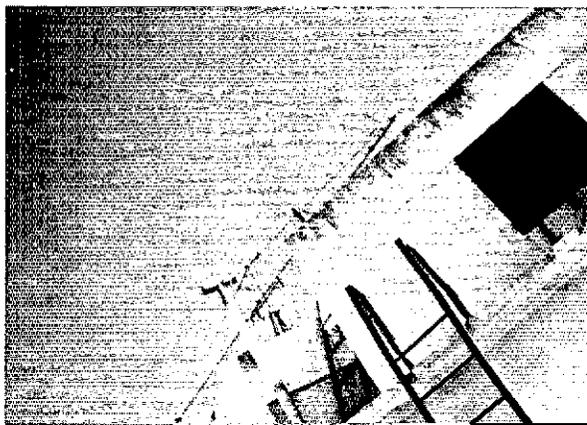
Whirling committeemen wrapped our pessimistic prophet in yards of black crepe as a molten alloy of solder and recycled Class-B modulation transformer cores poured down on him from hidden ceiling spigots. He hardened nicely. We grabbed axes, sledges, chisels, pneumatic hammers and danced madly around our glittering idol. Finally the chairman's signal came: "Okay, fellas - break it up."

+ + +

What:

We had intended recording lobby interviews with the DXHPDS man on the street but we were lucky to escape alive with our souvenir paperweights. Operating from the relative safety of the mailbag, then, let's tune in once more on the world-wide "How's" roundtable, *vox DX populi* from hither and yon. Firstly from

YON - Some years since I last wrote you from K4OMR and other points, I'm now set up for DX in New Delhi. - *VU2OMR*. . . . Perhaps the *QST* gang will be interested in some info from APO 96630. - *KJJSV/KG6*. . . . My brother, *TTRAD*, signs F8RP when home in France. - *F2MO*. . . . Please continue my ARRL membership for 1971-72 from my new Swiss QTH. - *CE7DW*. . . . My homebrew equipment is that used by the *WB2JXE* group who scored so well in the one-transmitter Field Day category last year. - *KG4EY (WB2MIC)*. . . . Contest activity sure puts a fellow behind in his QSLs! - *VP2AAP*. . . . My friends *JAS 1KSO 1OJE* and *5BTY* had many QSOs from the Bonins as *JD1s ABX ABS* and *AAZ*. - *JH1EXV*. . . . Still no telephone service to Guantanamo base where my job as transportation officer includes running the only scheduled airline between the U.S. and Cuba. - *KG4CS*. . . . Pirate operators should be made to sit high on their antennas: voltage nodes in all weathers, but the trouble is catching them. - *ex-GC8NO via W7EA*. . . . Our ARSI would appreciate, in lieu of donations, W/Ks joining the society as corporate members to participate in



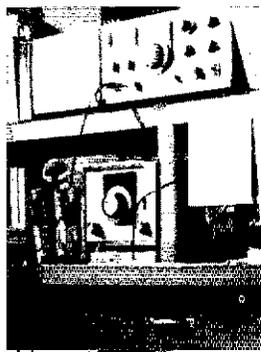
various activities including such DXpeditions as VUs 5KV and 7US, - VU2CZ. . . . I Always look forward to receiving my QSTs. - PA0WGS. . . . I am first-operator at club station HW6KAW. - F5QE. . . . My Madagascar license remains valid for future 5R8AB operation. - JA3DYU. . . . Worked a KH6-portable-KH6 the other day and the two of us spent more time identifying than QSOing. - K4BZH/VP7. . . . We hope to hear from more WJK/VEs in this year's PACC contest. - PA0s KOR LOU. . . . Found a real friend when JA8BI visited Kuwait in September. - 9K2AH. . . . Unless I get too busy I'll pass along more Pacific DX info from time to time. - KG6JAR. . . . Very 73 from an ARRL member since 1960. - SM6CLH. . . . Have an FTDX-400 and TA-33 on from the Land of the Rising Sun. - K42AI. . . . Greatly enjoyed my Kuwait visit with 9K2AH. - JA8BI. . . . I'll let W1BB know if it's possible for me to get on 160 from 9L1GC. - G3DYU. . . . Worked much DX while using the AX prefix last year. VK3ARV. . . . Here's my first report to "How's." - SV0WPP (WASUKR). . . . XYL W4EJQ and I don't get the pile-ups from Belgium that we got as FT3USA. - ON8UL (W4EJP). . . . Best regards from the Wizard of Oz. - SV0WOO (WA3KCP). . . . I'm stationed at Pearl with the Navy. - K2DUV/KH6. . . . Roundtable guests KH6EFW, VK2s DK and DO joined in my 2000th contact with K6NB recently on 7123-kHz cw. - VK2NS. . . . Another French amateur is expected to join 3V8s AB AH and me with a fourth active Fionian station this summer. - 3V7AL (W4KIL). . . . Most of my recent W/K contacts have been on 15 cw. - IER. . . . No money at the moment for the triband beam I'd like. - PA0SN. . . . Best regards to the "How's" gang from an associate ARRL member and avid reader of QST. - ZLIBKE. . . . I'm with civil service in Zweibrucken. - DL4VA (W4WME). . . . Called for hours on 7070-kHz ssb from HB0XSB but only three W/Ks found us. - DJ8KB. . . . Incentive licensing is one of the real challenges in amateur radio. - HS4ADT. . . . Our Jerusalem Award has gained considerable popularity. - 4X4SO. . . . Likewise the Gotland Award we introduced two years ago. - SM1AWD. . . . We expect that G6UW's GM6UW operation will not have the DX appeal of previous GD6UW DXpeditions. - G3YMH. . . . Varied activities here leave little time for hamming at one of the world's better DX locations. What a waste! - KM6DU. . . . Our first QSO from ZA2RPS last year was with W2NIN, our last with LU5AH four days later. DL7FT. . . . K2GNC was the only U.S. 160-meter station heard during a recent balloon-antenna test. - HB9IN. . . . My usual frequencies are 3530, 7030, 13,332, 21,360, or 28,550 kHz. - CE0AE. . . . I study electronics design in England. - EI6AU. . . . We transmit EKG cardiographs via amateur radio for readouts at a remote doctor's office. - 9Q5s EL GE. . . . Used to write to "How's" as WA6DNM years ago. - KG6JAR. . . . Is your print getting less readable or am I entering the ranks of oldtimers? - PA0XE. . . . New QTH here, a hill overlooking Pearl Harbor, is fine for DX but windy enough to drop my quad a few times. KH6BC. . . . It's impossible to measure the morale value of amateur



KC4USG gets around handily on Deep Freeze Antarctic assignments aboard USCGC *Burton Island*. Operator Lee is at the mike. (Photo via K2QHT)

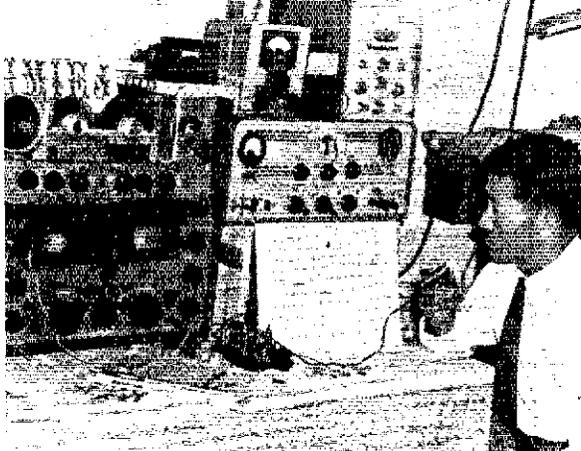
radio in the white wilderness of Antarctica where I made several thousand QSOs as ZS1ANT. - R. Johnston. . . . Alaska may not be rare DX but after 27,000 QSOs from a radar site at Galena I'm convinced the gang still goes for KL7s. - WA8EKI/KL7. . . . Legal maximum power in Turks & Caicos is 100 watts. - VP5JA (K4HF). . . . I'll fire up on Wake as KW6HA come June. - KH6GMP. . . . A vertical radiator mounted off the beach with the ocean as a ground-plane works out beautifully. - VP2ES (W2BBK). . . . JWs 1EE SNM 7UH 8IL 8MI and 9QH are active from Svalbard. - JW5NM. . . . Amateur radio is one aspect of the Jamaica Tourist Board's "meet the people" campaign. - 6Y5GB. . . . And now, while space remains, from.

HITHER - The locals around got real mad/And formed up a lynch mob, egad!/they use a Wouff Hong/Go beat lids like a gong/So be careful that you're never had. - W44ZZU. . . . Worked more than thirty new countries since replacing my old W9VFZ call about a year ago, still hunting for my first JT contact. - W9FT. . . . All my DX operation in February was on 80 cw which I found a good band for 75 watts. - WAZKWB/2. . . . I'm back in a San Antonio apartment but manage to get out to the shack, 90 miles away, on holidays and weekends to add to my 135 confirmed with an NCX-5 and 14-AVQ. - W5IB. . . . Got about eight weeks to wait for my linear to get repaired (never got off the pad) so I'll be about 90-percent cw for a while. - W3HNK. . . . VP2VA-VP2VL now has a 1200-foot wire pointed across a small salt water bay directly at the States. - WA1OBL (W0DRE). . . . All DX contacts here over several weeks were on 28-MHz sideband. - WA1HAA. . . . I'd appreciate my correct address in the earliest issue. - W4WHF. . . . Ten meters is swinging toward Africa from Europe. My gripe is kW DX hogs who tie up rare DX with idle chatter. - W2HAE. . . . DX sure improving on 75 and 80 but we need a listing of those new odd prefixes that keep appearing. - W3TV. . . . EL2BA likes to try the



JD1ABO is a popular Pacific performer representing Minami Tori Shima, formerly Marcus Island. Dick runs Kenwood gear, spins a triband Yagi, and also tries his luck on 40 and 80 now and then. (Photos via JH1EXV)

HM1EJ, one of the more active members of Seoul's DX gang sends this picture via QSL tender W3HNK.



American phone bands during noncontest periods, especially 40, to give the boys a chance at Liberia. — *WA2DHF*. . . . My main mode is cw but I occasionally use ssb for personal contacts with old friends. — *W6CMH (SVØWP)*. . . . ZL5AX is quite active from Antarctica on 20 cw. — *W6SO*. . . . Worked 4U1ITU with WA3NHG at the mike and he delivered the QSL to me personally two weeks later. Beats mail! — *W3HPU*. . . . Here's some Mauritius info courtesy PZ1AH. — *WA1KQM*. . . . W7DXH will sign KG6SW on several bands in the Marianas for an indefinite period. — *W7YBX*. . . . Books and gear rained all around me in the San Fernando earthquake but I lost only two meter faces. — *W6EAY*. . . . Clipperton Island, boasting an old radio mast, two clumps of coconut trees, a stagnant lagoon and little else, must be approached with extreme caution even under the most favorable conditions — *WN6MKV*. . . . ARRL Vice-Director W1AX really needed to work only 100 stations for his Five-Band DXCC because Rog worked the same station in a given country on each of five bands. — *W1RAN*. . . . Freezing rain didn't stop OM WICW and son WN1NCC from throwing up another inverted-vee skyhook in the middle of the Novice Round-up. — *W1YYM*. . . . Long work hours cut into my DXing. — *WA8TDY*. . . . Old AC4s RF and UN, Robert Ford and Reg Fox, are prominently mentioned in the interesting book *Seven Years in Tibet*. — *W5QPX*. . . . K9CQV and I put up 40- and 80-meter antennas for HKØBKX, and gave our 160-meter vertical plus a 250-watt rig to HKØAI. Victor will be on top band when I finish his converter. — *W9UCW*. . . . 4U1ITU's ssb layout tongue-ties a visiting cw man. — *WA3NHG*. . . . I'm honorary president of the DX Old Timers Club headed by IIs AA KDB, IT1s SEZ TAI and ZGY. — *W4VPD*. . . . My present 160-meter DX antennas are two end-fed 268-ft. wires used singly or in combination. — *W9PNE*. . . . Would *Commonweal* magazine, which reports an upswing in devil-worship and the occult, go along with a D-Hex-CC for working 100 witches? — *WA1DJC*. . . . Maintaining logs, dupe sheets, summary sheets, etc., for DX contests is more difficult than running up QSOs. — *W1PL*. . . . Here's a little something for your Africa department. — *WB8BTU*. . . . 9Q5CH and I will appreciate his QSL info in your pages. — *WA8KQF*. . . . I'm working hard on 5B-DXCC after DXCC No. 1337. — *W9MWO*. . . . Left Vietnam tired but happy. — *W3JZJ/9*. . . . I'll bet my friend Francisco, HKØBKX, was surprised to see his picture in *QST*. — *WA5YQV*

Where:

HEREABOUTS — "QSLers of the Month" highly praised for quick confirmations are CEs 3CF ØAE, CP1GF, CR61K, CTs 1QA 3AW, DJ6SI/LX, EL2CB, ET3USA, FB8XX, FL8HM, FR7AG, HC1KP, JD1ABO, KX6LS, LZ2EE, OHØAA, OK3TQF, TJI is AW QQ, VK9RH, VPs 2KX 8NA 8LR, YN1s CW URJ, ZB2AV, ZL4OL/A, ZS6ED, 4S7DA, 4U1ITU, 5H3LV, 7P8AB, 7Q7AA, 9H1BL and 9K2AH, together with QSL aides Ws 2CTN 2LGU 4DQS 4FOA 6AFI 6FJ 8CNL, Ks 4ZCP 6RA, WA3s HUP IUV

HB9NL, proprietor of Switzerland's USKA QSL Bureau, hits the slots with a fresh batch of incoming pasteboards. *Somebody* has to do this job — do you give your local ARRL QSL Bureau Manager a square shake by keeping self-addressed stamped envelopes on file?

NHG, WB4FIN, VE3s IG ODX, DJ2IB, F2MO, G3VPS, JA1s BA ZZ and ZL2GX, all commended in correspondence from Ws 1SWX 2ABL 3HPU 5IB 6EAY, Ks 4EVY 7VPF, WAs 2HIU 2HZR 9EZT 9UEK, WB9CJS and VE7BAF. Any worthies overlooked? . . . *Halp!* K7VPF could use suggestions toward running down tardy VQ8CDC, UK6QAA and ZP9AC pasteboards, while WA2HIU will settle for assistance on 3A2CL of '68. . . . I'm available as QSL manager for needful DX ops. — *W9FT*. . . . QSLs for VP2ML operation from December, 1967, through January of '69 may go via WB8ACF or K8EHU. The call has since been reissued. — *WB8ACF*. . . . Effective the first of this month W2GHK's DXpedition of the Month takes over QSL chores for FM7s WF and WQ. — *WAOPM*. . . . W4EXO disclaims FY7YN QSL connections. — *W5BZK*. . . . As QSL manager for VP2s VA and VL I'll send out Bob's cards via bureaus only. No self-addressed stamped envelopes or International Reply Coupons, please. — *WA1OBL*. . . . Normally it would take two or three weeks for QSL exchange via my Guantanamo address but QSL manager WA2IRS can do the job in a few days. — *KG4EY*. . . . My new manager, WA5UHR, should have QSLing up to date very soon. — *VP2AAP*. . . . Surinam calls suffixed ITU, such as PZ1ITU, can be QSLd as follows: PZ1—PZ1AC, PZ2—PZ1AK, PZ3—PZ1AP, PZ4—PZ1AV, PZ5—PZ1BH, PZ6—PZ1BK, PZ7—PZ1CM, PZ8—PZ1CK, PZ9—PZ1CU and PZØ—PZ1DF. — *DXNS*. . . . I've made a lid list of stations who don't QSL so I won't waste time reworking them in contests, etc. — *WA6CPP*. . . . W3HNK was the fifth QSL manager of the month to win Scott's QSL Service's golden microphone trophy. — *WA5UHR*. . . . Those



who worked me from YNIRTS, HTIRTS, WA7OJW and now from Honduras will have a full set of my "alligator" QSLs. — WA7OJW/HR1. . . Golden Gate QSL Bureau, 71 Surrey St., San Francisco, CA 94131, would be glad to help amateurs reply to shortwave-listener reports. — E. Hammill.

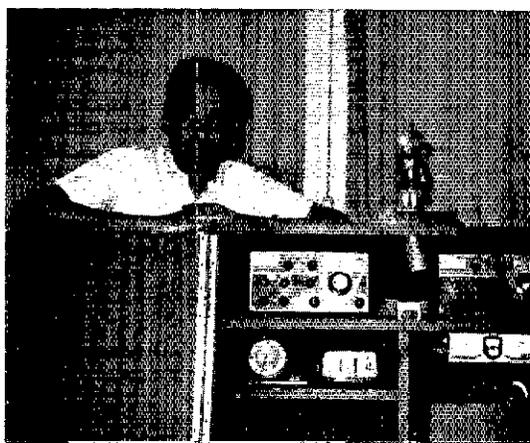
AFRICA — The ZS1 prefix is officially designated by our PMG as that to be used by South African stations operating in Antarctica. ZS1s AMB and ANI are calls currently authorized. Unfortunately this causes much confusion. My own original arrangements for QSL managership came unstuck after my departure for Antarctica. Stations who worked ZSIANT while I was operating from February 15, 1969, to February 20, 1970, and who still need QSLs should write me at P.O. Box 197, Benoni, Transvaal, South Africa, for prompt reply. — R. Johnston. . . I'm EL2BA's QSL manager as of March 1, 1971, and will be receiving Ben's logs every two weeks. Cards arriving without self-addressed stamped envelopes (s.a.s.e.) will be answered via bureaus, and foreign mint postage will be accepted in lieu of IRCs. — WA2DHF. . . Just mailed 200 unconfirmed QSLs to CR6CA because his log shipments got so far behind. — VE3GNM. . . TT8AD's logs arrive twice monthly. — F2MO. . . I am QSL manager for 9Q5BV effective February 18, 1971. — WA2MSE. . . My correct address as 3V8AL's QSL manager is 205 Carib Dr., Merritt Island, FL 32952. — W4WHF. . . Another year, another address for 912XZ—916XZ QSLing. I still keep logs open for six months after contacts, then close the logs by clearing all remaining cards via bureaus. With about two hundred monthly QSOs plus a few thousand contest contacts to be confirmed it's just too much to hold off longer. Many thanks to the ARRL Bureau gang for forwarding QSLs still sent to my old WA2KFK and WA0ZT addresses. — WB5DRU.

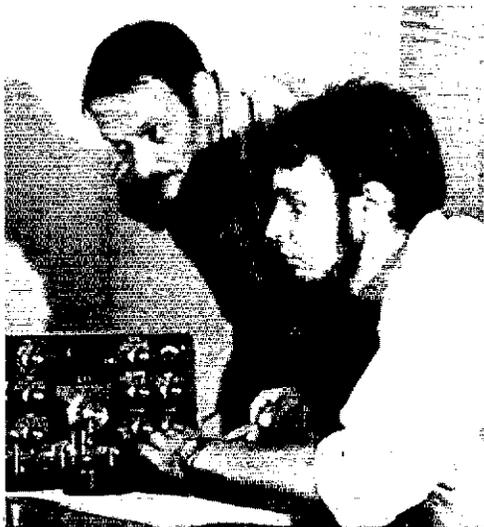
OCEANIA — Gerard Jacot, F2JD, an operator at FB8XX and also operating VK0HM with the French scientific expedition, will bring his Heard island logs back to France. As his QSL manager I hope to have cards cleared by this month. I do not confirm QSOs made by the previous VK0HM operator. — F2MO. . . I have JDIABO logs and QSLs, handling confirmations for overseas stations. — JH1EXV. . . ZL2GX came through with my ZL4OL/A QSL ten days after QSO. — K8LUH. . . YJ8JM produced his card after our second QSO and says his work keeps him from staying current with QSL chores. — W5IB. . . W7VRO took over ZK1CF QSL matters as of February 23, 1971. — WCDXB. . . Appropriate QSLs will be forwarded to all stations contacted by Auckland Centennial station ZL1AA between April 17th and May 2nd. — ZL1TB. . . Many Statesiders don't realize that ordinary U.S. postage is perfectly okay to and from APO addresses. Lack of self-addressed stamped envelope enclosures is hard on the budgets of lower-ranking military men. In addition to the direct route QSLs will reach me via my home QTH or through ARRL's Three branch bureau. — K3J5V/KG6.

ASIA — I'll gladly QSL any QSO as requested and plan to get a post office box for incoming cards. This takes time. — VU2OMR (K4OMR). . . Effective March 1, 1971, I am QSL manager for all 4X40G contacts. W2BHK. . . The XYL handles my QSLing from States. — HSJAEN. . . Anyone still needing my HL9WK QSL for contact during 1968-'69 should be advised that cards are still available. — W7YBX. . . I can assist in confirming UA9VH/JT1 QSOs but this takes three or four months working through UA9VB. Same goes for any UH—UI—UJ—UM QSLs, working through UM8FM, but it's still faster than Box 88. — W3HNK.

EUROPE — LI2B logs are still awaited by QSL manager LASKG. The cards will be beauties telling the story of raft Ra. — LIDXA. . . QSLs for OE1ZNL, ON8KH, G8GUU/DL and G8GUU/LX QSOs of March 16 to April 9, 1971, go to G8GUU. Since he's not yet in the *Callbook* you might try the RSGB bureau marked to his attention. — W1UED. . . The Dutch Society released a new callbook with information of use to DXers, details available through PA0TO. — VERON. . . Germany's post office issues an amateur callbook indexing hams by call, then by name, and again by town. — DL4WJ (W4UVV). . . Yes, IS1BDO does QSL, mine coming through the bureau two years after contact.

VU2s BEO (top), OLK (left) and VAE are among India's most available DX regulars, respectively radiating from New Delhi, Bombay and Calcutta. Doyle is scheduled to close VU2BEO for Stateside return next month but Dave and Jim should carry on. (Photos via W3BWZ)





TU2s CW (left) and DD unravel a pile-up in Abidjan. TU2DD signs F5ZZ back home and gads about an oceanographic ship *Capricorn*. (Photo via K2QHT)

WSIB. . . . With postal rates rocketing let's keep in mind that, unless specifically waived, it's only fair to supply s.a.s.e., or s.a.e. with IRCs, when soliciting mail response. This is true when corresponding with QSL managers in particular, and do you have s.a.s.e. on file with your local ARRL Bureau branch? Now a few routes suggested by the "How's" grapevine, stressing that each is necessarily neither accurate, complete, nor "official." . . .

- FR8CY, Box 438, Moroni, Comoros Islands
- FR7ZP/e, M. Turpin, Meteo Chaudron, P.O. Box 4, Sainte-Clotilde, Reunion Island
- HB9s XPG XPS (via W3DJZ)
- H18FED, Box 431, Santo Domingo, D.R.
- H18SAV, P.O. Box 1157, Santiago, D.R.
- HK1BVL/ø, Box 219, San Andres, Colombia
- HS3AEN, P.O. Box 1024, Grand Junction, CO 81501
- ID1s BGI BUP (to I1BGI)
- K3JSV/KG6, W. Rogers, Box 120, Div. 24, USNavComSta, Guam, FPO, San Francisco, CA 96630
- KG6JAN, C. Shouse, Jr., P.O. Box 1738, Agana, Guam, M.I.
- KG6SY, Box 209, Capitol Hill, Saipan, M.I., 96950
- KH6BC, A. Martin, 1781 Hookupa St., Pearl City, HI 96782
- OX3EN, E. Nilsson, Greelandair Inc., Box 612, 3900 Godthaab, Greenland
- PZ2AC, P.O. Box 86, Nickerie, Surinam
- VK9LV, L. Varney (G5RV), P.O. Box 900, Port Moresby, Papua
- VP2LAW, Box 91, Castries, St. Lucia, W.I.
- VU2OMR, R. Porter (K4OMR), New Delhi, Dept. of State, Washington, DC 20521
- YBøAAN, G. Ganges, Box 2463, Djakarta, Indonesia
- ZK1s BM CE (via W7VRO)
- ZK2AH, Box 125, Simpsonville, MD 21150
- ZS3KC, P.O. Box 551, Swakopmund, Southwest Africa
- 9G1CO (via RSGB, attn. G3WEQ)
- 9J2XZ-916XZ, via D. McCarthy, WB5DRU, 118 California Dyess AFB, TX 79607

- CE3HG/ø (to CE3AG)
- CE7DW (via HB9ARH)
- EL2BA (via WA2DHF)
- ELøK/MM (via DL8U1)
- FM7s WF WQ (see text)
- FY7YN (see text)
- FYøBB (via PZ1DF)
- ex-HL9KB (to KH6BC)
- HUøA (via WA8TDY)
- JD1ABO (see text)
- JD1ABS (to Ja1OJE)
- KG6SW (via W7YBX)
- KH6GMP (via WB6ZZX)
- KW6HA (via WB6ZZX)
- KZ5ZZ (via K4BBF)
- OE2ZNL (see text)
- ON8KH (see text)
- PZ-ITU (see text)
- TT8AD (via F2MO)
- VKøHM (see text)
- VP2AAA (via W4DQS)
- VP2AAP (via WA5UHR)
- VP2AGA (via G3JUL)
- VP2ES (to W2BBK)
- VP2EZ (via WA9VOL)
- VP2ML (see text)
- VP5JA (via K4DSN)
- VU2FC (via DJ9ZB)
- W9IGW/CEø (to W9IGW)
- WA8EK1/KL7 (via K1HMO)
- ZA2RFS (via DL7FT)
- ZF1VP (via W4VPD)
- ZS1ANT (see text)
- ZS2MI (via ZS6LW)
- 3AøFL (via W3DJZ)
- 3V8AL (see text)
- 4X4QG (via W2BHK)
- 6W8GE (via F6AZN)
- 9J2GE (via W2GA)
- 9Q5BV (via WA2MSF)

Yea, team! Namely: Ws 1UEF 2ABL 3HNK 4RM 4WHF 6EAY 6SO 91LW, Ks 4EVY 411F 7VPP 9YNL, WAs 1HAA 1KQM 2HIU 2HZR 2KWB, WBS 2MIC 8ACF 9CIS, VE7BAE, KG4EY, JH1EXV, *DX News-Sheet* (G. watts, 62 Bellmore Rd., Norwich N. 72 T., England), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4FRO), International Short Wave League *Monitor* (A. Miller, 62 Wardward In., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA3UI), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, Ill., 60104), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (W6EJJ), UBA's *On the Air* (ONs 4AH 5VA), VERON's *DXpress* (PAøS FX LOU TO VDV WWV), West Coast *DX Bulletin* (WA6AUD) and 3KM *DX Bulletin* (JA1KSO, JH1EXV). Any QTH hints in *your* archives lately to help the lads along? QST-



YBøAAH probably is the most delicious of VE71R's several overseas calls. John, who really gets around the Oceania and Asia DX scene, relaxes here in Singapore with his 9V1OQ layout. (Photo via W5MVP)

Operating Events

de W1YYM

MAY

1-2 OZCUA cw, see p. 104 April.

1-2 New York State QSO Party, sponsored by the ITRA ARC WB2OZC, 1900 May: 1 through 0600 May 2, 1200-2359 May 2. All times GMT. Stations may be worked once on phone and once on cw each band, phone and cw are the same contest. NY stations may work other NY stations. Exchange QSO number, RS(1) and QTH; NY stations use counties, out-of-state stations use ARRL sections. Suggested freqs.: cw 1810 3560 7060 14060 21060 28060, phone 3975 7275 14285 21375 28875, novice 3740 7175 21110, 6 and 2 encouraged. Try the even GMT hours for phone activity. Score one point per contact on 80 through 10, 2 points for QSOs on 160, 6 and 2 meters. Multipliers are the number of different NY counties (62, max.) for out-of-state stations. NY stations use the number of different ARRL sections (74) and countries. Logs must contain date, time, bands, mode, stations, numbers, QTHs. Number the first contact for each new multiplier. Include a check list if more than 50 contacts are made. Multiops must note calls of all operators. Appropriate awards. Logs, comments, photos must be sent no later than June 1 to the club, c/o Martin L. Shulman WA2RH, 6 Howard Drive, Spring Valley, N. Y. 10977. For results, include a number 10 s.a.s.e.

7-7 Georgia QSO Party, p. 104 April.

7 Tennessee QSO Party, p. 104 April.

6 W6OWP Qualifying Run (W6ZRJ, alternate) at 0400 GMT on 3590 and 7129 kHz, 10-35 wpm. This is 2100 PDST the night of May 5. Copies to ARRL for grading.

8-9 Russian Contest, cw, p. 104 April.

12 W1AW Qualifying Run, 10-35 wpm. at 0130 GMT on 1.805 3.52 7.02 14.02 28.02 50.02 and 145.6 MHz. This is 2130 PDST the night of May 11. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and mailing address.

15 Armed Forces Day, full information elsewhere this issue.

15 FMT, open to all, info. p. 104 April.

15-16 Oscar Aircraft Competition, see p. 66.

15-16 Michigan QSO Party, sponsored by the Central Michigan ARC starts 2100Z. The same station may be worked on phone and cw each band. Mich. stations may work each other. Exchange RS(1), number starting with 001, and county (for Mich.); others substitute state, province or country. Score 1 point per contact. Mich. stations multiply by sum of states, provinces and non-WVVE countries (Mich. may be counted). Others use the number of different Mich. counties worked (83 max.) as their multiplier. Suggested freq.: cw 3560 7060 14060 21060 28560 (yes, 3560); phone 3975 7260 14290 21360 28560 50400 52525 145350 and 146940. Mich. stations urged to be QRV on 21 MHz at 1600 and 1900 GMT and on 28 MHz at 1700 and 2000 GMT. Appropriate certificates plus trophy for high out-of-state score. Logs showing dates, times, stations, exchanges, bands, modes, location and final score must be mailed no later than June 30, 1971. Send to the CMARC, P. O. Box 73, Lansing, Michigan 48901. Log forms are available from CMARC.

21-23 VLASSB QSO Party, p. 104 April.

JUNE

2 W6OWP Qualifying Run, see May 6 listing.

3-6 Jamboree On The Air, JOTA, April 6, 104.

5-6 International LU DX Circumference Contest. In commemoration of its fiftieth anniversary, the Radio Club of Argentina is sponsoring an event lasting the full 48-hours GMT. Four classes of competition, phone and cw single and multioperator (all multiband). You can work anyone. QSOs with LUs count 3 points, other stations count 1 point. Repeat contacts on additional band permitted. QSOs with your own country do not count for points but do count for multipliers. Multis. are each LU state (the first letter following the numeral in the call indicates the state). Letters ABC count as 1 (the capital city). Sum of all LU states and other countries on all bands represents the multiplier. Exchange report plus the number of years in amateur radio (4 figures on phone, 5 on cw). Log in GMT, separate logs for each band. Check for duplicates. Each entry must contain a summary with all scoring info., competition category and the participant's name/address in block letters. Indicate the power and antenna used. Special certificates and plaques with medals to high scorers on each continent, certificates to the 5th place. Logs must be postmarked no later than July 31 and go to the Radio Club Argentino, LU DX Contest, P. O. Box 97, Buenos Aires, Argentina.

6 Minnesota QSO Party, open to all, phone 0900-0400 and 1600-2000, cw from 1200-1600 and 2000-2400. Either phone or cw from 0400-0800. Minn. stations may work each other. Valid contacts may be made once on cw and once on phone except during

scheduled net sessions. Only one transmitter may be used at any one time. Crossband not permitted. Suggested frequencies: up 10 kHz from (cw) 3580 7080 14080 21080, (phone) 3980 7280 14285 21380 29600. Listen carefully to avoid nets, please. Exchange QSO number, RS(1) and county (for Minn. stations), other substitute section/country. Minn. stations multiply total contacts times the multiplier (sum of ARRL sections and countries worked on phone plus those worked on cw). Minn. may be counted as a section, if worked. Countries per DXCC list and may not include or be a part of any ARRL section. Mobiles in different Minn. counties score separately for each county and must make 20 QSOs in one county to be eligible for an award. Outside stations multiply total Minn. QSOs times multiplier which is the number of different Minn. counties worked on cw plus the total worked on phone (possible 87 each mode), appropriate certificates. Logs must contain all the usual exchange information plus date, time, band, mode, multiplier list and score computations. They must be postmarked on or before June 25 with an s.a.s.e. if results are desired. Indicate your call and section (or country) on your log. Send to: Viking Amateur Radio Society, Box 3, Waseca, Minn. 56093. Suggestions for contest improvement welcomed.

10 W1AW Qualifying Run, see May 12 listing.

12-13 VHE QSO Party, this issue.

12-14 Oregon QSO Party, sponsored by the Portland ARC from 2000Z June 12 to 0300Z June 14, no time or power limits and open to all. Stations may be worked on different bands/modes (cw, phone, RTTY). Exchange QSO number, RS(1) and state/province/country for non-Oregon stations (Oregon stations send county). Suggested freq.: 1800-25 at 0600Z, 3560 3900 7060 7260 14060 14280 21060 21400 28060 28600 (also vhf). Complete exchanges count 1 point, except that RTTY and 160-meter contacts worth 5 points. Multiply by number of counties (for non-Oregon stations) or states/provinces plus countries in case of Oregon stations. Appropriate awards. Send summary with log, listing sections worked, computations and claimed score with appropriate statement. Postmark deadline June 30, enclose an s.a.s.e. for results. Send entries to Marty Kirk, WA7JMA, 5209 N. Amberst, Portland, Oregon 97203.

13-19 Mass. Amateur Radio Week, from 0001Z June 13 to 2400Z June 19. Certificate of recognition to amateurs taking part. Mass. amateurs must work 16 other Mass. amateurs, rest of New England amateurs must work 8 Mass. amateurs, all others in the U. S. must work 5 Mass. amateurs. DX (including KH6/KL7) must work 2. Logs must show date/time/frequency. Applicants include a number 10 self-addressed stamped envelope (DX enclose 1 IRC) and send no later than July 31 to Bill Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass. 01011.

15-19 Worked All Mass. Cities and Towns Contest, open to all from 0001Z the 15th to 2400Z the 19th, no time limit. Exchange report and city (or town), county and state. One point earned for contact with each amateur in Mass., regardless of band. Multipliers are the Mass. incorporated cities/towns, total of 351. Mobiles do not count as multipliers. Community subdivisions are only for the city/town of which they are a part (i.e. Dorchester is part of Boston, Hyannis is part of Barnstable, Assonet is part of Freetown, etc.). Final score is number of Mass. amateurs worked times the number of cities/towns worked. Appropriate certificates. Entries must be received no later than July 31, 1971 and sent to: Steven Rich, WA1DFI, 31 Arlington Ave., Revere, Mass. 02151.

19-20 Cali VI Panamerican Games, full 48-hour GMT period, phone only on 15-2040 meters, single operator. Exchange RS plus a 3-digit serial number starting with 001. Only amateurs from the Panamerican countries eligible to compete. Contacts with HK5CCP (official station) count 20 points, with HK5VD 10 points, other HK5 stations earn 5 points, with other stations in the Americas 2 points. Twenty points extra will be credited to the station submitting in his log the list of countries eligible to take part in the games and 10 more points to the station who fills in the following info. (to be given by the official contest stations): geographic position of Cali, altitude above sea level, average temperature, population, date of foundation, name of founder. Appropriate awards for multiband and single band. Logs must be mailed before August 31 to Cali Concurso, Panamericano, HK5CCP, P. O. Box 6149, Cali, Colombia, South America.

20 Worked All Britain vhf phone, p. 103 March.

26-27 ARRL Field Day, new rules this issue.

30 W1AW Morning Qualifying Run, 1300Z (this is 9 am EST) June 30. Same frequencies as well as additional details can be found in the May 12 information breakdown.

NOVEMBER

13-14 SS phone

20-21 SS cw

Operating News

GEORGE HART, W1NJM
Communications Manager

ELLEN WHITE, W1YYM
Deputy Commis Mgr.

DXCC: ROBERT L. WHITE, W1CW
Contests: ALBERT M. NOONE, W1KQM

Training Aids: GERALD PINARD
Public Service: WILLIAM O. REICHERT, WA9HHH

Anyone for SSTV? The expression "Glad ta see yuh!" is very common in the average man's patois, and as often as not it has nothing to do with the sense of sight. In amateur radio lore. For example, the cw abbreviations CUL (see you later) or CUAGN (see you again) go quite far back and are still often heard.

With SSTV (Slow-Scan Television) gaining popularity and acceptance, soon when we say "Glad to see yuh!" we may mean exactly that. TV is long since past the experimental stages, and the only thing keeping it out of the amateur operating field has been the extremely large chunk of frequencies it takes out of the spectrum. Now, with the development of SSTV, it takes no more space than the average sideband signal and is permitted on some of the phone bands.

Perhaps sidebanders will deplore it as much as a-m'ers deplored sideband, as much as cw operators deplored a-m, as much as spark adherents deplored cw, etc. Will we never learn? The new techniques arrive somewhat more quickly than they used to, but they still arrive, and most of them are here to stay. We might as well accept them. First we found a way to communicate over the air waves; then we found a way to do so without taking up half the spectrum; then we found a way to *talk*; and now we're finding a way to *see*. What's next? Feel? Smell?

But amateur TV raises all kinds of interesting operating possibilities. With commercial equipment becoming available, perhaps soon to be economically practical for the average ham, think of what can be done. You'll actually see the person you're talking to in addition to talking to him, see what his shack looks like, what the people around him look like. He can *show* you things, instead of just telling you about them. An amateur basking in the Florida sun may get a first-hand "live" look at a New England blizzard through some W1's shack window - or vice versa.

5BWAS No. 46

Here's a rare one indeed! CEØAE, Fr. Dave, received his 5BWAS award with a date of March 16. He's one of a very small handful of non-Ws to qualify to date (KH6SP XE1WS PJ2VD KH6HCM VE3ACL CEØAE). That CEØ call sign did make up for some of the disadvantages. A distinct help, however, were the following stations K2INP, K11JJ, W7BZ, W8BT, WØKZZ, and W1EVT. The biggest kudos of all to his QSL Manager, Mary Ann Crider, WA3HUP.

Think of the mobile possibilities. "Traffic is very heavy. OM, as you can see." "This 'il buggy can really roll, here's the speed on my speedometer, but don't tell." "Wanna see something pretty? Take a look at this waterfall." Or, using SSTV/mobile, government officials won't have to visit disaster sites to view the extent of the damage, they'll be able to see it over the air. Authenticity of emergency communications can be provided by *seeing* the person originating it, not just by hearing his voice or seeing his name on a recorded message.

With video telephones coming along, the future will undoubtedly bring video phone patching!

Yes, amateur SSTV may be the coming thing. You will find it is regulated by FCC in the amateur regulations (Secs. 97.61-97.65). Equipment is a little expensive still, but hardly more so than good sideband gear, and if you're so inclined, you can build your own. Better look into it; don't be left behind.

Where the Action Is. An interesting letter from K2BZT analyzes his quest for 5BDXCC. Perhaps it will help some of those working so hard for this cherished award. He says: "I find that 205 band-countries were worked for the first time in contests (41% of 500), and of these, 161 came through with QSLs (32.2% of 500). That's a 78.5% rate of return, which is amazingly good. Furthermore, of the 44 band-countries which were worked for the first time during contests but didn't QSL, it's quite possible that the card I ultimately received resulted from another contest QSO, but it would be a real puzzle to dig that out of the logs."

He then presents a chart to show the band-countries worked and confirmed for seven



DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

February 1 - 28, 1971

New Members

YV5AIP 325	UG6AW 191	KR8BU 122	WA6LLY 109	K7CXZ 102	LA5VD 100
K1DRN 260	WA8ASV 181	WB6QNU 122	CN8HD 107	WA5PAU 102	PY0APS 100
DL3BA 236	W4GEQ 165	WB6UX 121	HA5KBM 107	WA0WST 102	VE3SFV 100
DL8MM 230	DL9XX 161	W5AAK 117	OF6FWG 105	VE1AL 101	W1FFB 100
WIHGA 229	WA1LDA 161	DI9CN 112	WICHA 105	WB2SXT 101	WA2EFV 100
JA2IOD 213	OE6MAG 157	DK3KD 112	W6BAB 104	WB8OMY 101	W3KNC 100
WBDCD 212	WA3NOS 135	UB5KGL 112	GM3VAR 103	WA9MAG 101	WB8KK 100
OH3MK 206	DL9WC 132	VF5CJ 111	WA4DRU 103	WA9TCW 101	WB9QVO 100
WA5VDH 202	DL6HB 130	JA1HRN 110	WA7IRD 103	WA0UAV 101	WA8LTI 100
ILBUP 200	WA8VRB 127	KR8BY 110	DL4LO 102	F8UJ 100	WBALO 100
K0PMZ 195	WA1LRN 123	GM3CUH 109	ILBCB 102	K9VTD 100	YU2CAL 100
					9V1PM 100
DL3EA 200	W9LAX 146	WB6QNU 121	VE2CN 108	W6JTD 105	W2MPK 101
ILBUP 199	DK3LP 139	W4HSV 120	DL9PH 107	W3TL 104	WA5PAU 101
W8SH 182	WA3NOS 134	DL8WE 111	JA6ERR 107	WA3MSU 104	WA7MGK 101
WA8ASV 179	DL9XX 130	DK2BL 110	WA3GMN 107	WA4DRU 103	WA2GXC 100
UG6AW 157	DL7ZN 127	VE5PB 109	W0QBX 107	WB7TS 103	W4SEQ 100
K0PMZ 152	YU1BKL 123	VP7NN 109	K9DXO 106	WA3HX 102	WA9TCW 100
PZ1CU 151		WASVDH 109		W0GFU 102	

Endorsements

In the endorsement listings shown, totals from 120 through the 249 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W6KG 330	VE3CTX 290	VE4MP 260	K2DNL 220	W0IU 200	HB9ZE 140
VE2YU 325	W4NBV 290	W4ZSH 260	KR8EA 220	HA5AW 180	K4KA 140
VE5RU 320	W4RJL 290	WA6GFY 260	W1GKJ 220	K9VQK 180	OH2NQ 140
W3GYJ 320	K3SGF 280	DL4XA 250	W2HL 220	DZ7RO 180	VU2VAE 140
W6ABA 320	K8HFF 280	JA1CB 250	W3ZUH 220	VE1AL 180	WA2DHF 140
JA1ADN 315	K8RWL 280	K3AFQ 250	WA4DZU 220	VE5NW 180	WB2VFT 140
W2HH 315	PY1DH 280	WA2LMW 250	W9ZWH 220	W4YTH 180	WB4LXF 140
G2FYT 310	W1CIK 280	WB2HC 250	WA0UFS 220	W7GSP 180	W6ONG 140
SM0AJU 310	W1RLV 280	WB2PWU 250	DI7MQ 200	YU1BKL 180	W9OYZ 140
VE7CE 310	W2CW1 280	W3CRE 250	G3ZY 300	K2QHT 160	CT1OI 120
W1MM 310	WA4FDR 280	W2GHK/4 250	K6TXA 200	KR8DE 160	HR9DI 120
W3PVZ 305	W7MVC 280	W5KYD 250	PY1FH 200	PA0LRK 160	JA11LN 120
W6KNH 305	DL1QT 270	WBPA 250	PY5UG 200	PY5UG 200	K8HF 120
WA6OET 305	K3JLI 270	WA0DUB 250	W1CNU 200	WB2DIM 160	W2SEG 120
K4ZCP 300	OH2QQ 270	WA0NFC 240	W1MRO 200	WB4MKB 160	WA2AUB 120
K5QHS 300	YU2MD 270	K2SHU 240	WA3JDA 200	WB6ZUC 160	WB2FSC 120
PY4AP 300	WB4KZG 270	WA2HLH 240	W4HDK 200	W8KZO 160	WB2TSB 120
W1MIJ 300	W6MUM 270	W5QIX 240	W5ZSX 200	W9KYZ 160	W5DOS 120
W1YRC 300	JA2HNP 260	HB9TE 220	W9MCR 200	WA0PKX 160	WB6IEX 120
W5LZZ 300	OZ3PO 260	HK3AVK 220	WA9VOL 200	DJ6OZ 140	W8ODV 120
K0BLT 290		K1UDD 220		DJ0QT 140	

W5LZW 325	YV4QG 290	OE3SAA 260	JA2HNP 220	WB4KZG 200	WA0PKX 160
VE5RU 320	JA6ADQ 280	W4CYC 260	W3CRE 220	W6KUZ 200	JA9BMG 140
F3DJ 315	W1CIK 280	W6ZC 260	WA3HGJ 220	YU3OV 200	K2QL 140
W2NUT 315	W6ABA 280	K3GKU 250	WA4FDR 220	K3YBN 180	VK2AOU 140
VE3MR 310	W6FZJ 280	OF1MEW 250	W9ZWH 220	VO1CU 180	K6TXA 120
W4SSU 310	W9KRU 280	W1EAB 250	HB9TE 200	W2LEJ 180	K6WS 120
W5LZZ 300	W0SFU 280	W2GHK/4 250	DJ4XA 200	W3IF 180	VE2BZD 120
W6KNH 300	6W8DY 280	WA4WTG 250	DL5GJ 200	W7GQC 180	VU2VAE 120
W6KUT 300	VE2YU 270	WA7GHK 250	K2ANT 200	W7GSP 180	WB2TSB 120
EA7GF 290	VS6DR 270	WB2ILC 240	K2KGB 200	WBPA 180	W31WF 120
JA1ADN 290	W4NBV 270	W4QAW 240	K0WXX 200	W0PAN 180	W5DOS 120
K5QHS 290	W4RJL 270	WA6OET 240	VE7HP 200	WA0EMS 180	WA9OFM 120
VE3CTX 290	W8GHN 270	W7EKM 240	W1AW 200	DL9XN 160	WA0VZF 120
W2JX 290	W8GUZ 270	W7MVC 240	WA3JDA 200	VE5NW 160	ZL1SZ 120
W5MB 290		CR4BC 220		WAILDA 160	

different contests, an overwhelming majority of it in the ARRL DX Competition. "No doubt about it," he concludes, "the ARRL contest is where the action is."

QSLing is important! Make sure both your logs and your cards are correct. Do your part to help the other guy and by doing so help yourself.

Log Check for QSLs. VQ8CC asks us to say something about a proper check in the relevant log before sending out QSLs. QSLs are valuable, these days, with two of our most important awards based on them. If they are made out incorrectly there is a possibility that they will be rejected, or the contact you are trying to get a QSL from may

WIAW SPRING-SUMMER SCHEDULE (April 25-October 31)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 p.m.-1 a.m. EDST, Saturday 7 p.m.-1:00 a.m. EDST and Sunday 3 p.m.-11:00 p.m. EDST. 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 May 31, July 5 and September 6.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000							
0020-0030 ⁴			3.700 ⁶	14.020	14.020	7.150 ⁶	14.020
0030			3.700 ⁶	14.100	14.100	7.150 ⁶	14.100
0100							
0105-0130 ⁴			3.820	50.120	145.600	1.820	21.270
0130							
0230-0300 ⁴							
0300			3.555		1.805		3.555
0310-0330 ⁴			RTTY-OBS ⁸			RTTY-OBS ⁸	
0330			3.625	14.095	7.095	14.095	3.625
0335-0400 ⁴							
0400			7.220	3.820	7.220	3.820	7.220
0420-0430			3.700 ⁶	7.020	3.945	7.150 ⁶	3.520
0430-0500			3.700 ⁶	7.080	3.945	7.150 ⁶	3.555
1300							
1700-1800							
1900-2000							
2000-2100							
2200-2300							
2300-2330							
2330							

¹ CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.588 MHz.
² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.22, 28.52, 50.12, and 145.588 MHz.
³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 28.095 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 or 28.52 MHz.
⁶ WIAW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
⁸ Sent with 170-Hertz shift.
 Maintenance Staff, Wis QIS WPR, WAINEU. *Times-days in GMT. Operating frequencies are approximate.

not confirm the contact. Care and accuracy must exist on both sides. If the QSO is entered incorrectly in the log, a QSL may not be forthcoming even if the supplicant has the time, date, band, etc., correct. If the card is incorrectly made out, its recipient, on checking his log to confirm, may not find it and consequently refuse to QSL.

Is Your License Current? Many amateurs continue merrily operating after their licenses have expired. Five years is a long time, and often we forget. We know one ham, not active on the air, who inadvertently let his license expire and didn't notice it until months later. Not having been active over the past year and not being willing to perjure himself by saying he had complied with all requirements for renewal, he lost his license and must now take the examination over. In another case a few years back a newly-elected SCM discovered that his license had expired prior to his election.

It can happen to most anybody. Don't let it happen to you. Take a look at the expiration date on your license, and burn it into your memory.

- WINJIM.

WIAW CODE PRACTICE

WIAW transmits code practice according to the following schedule showing speeds, local times/days and GMT times/days. Frequencies are: 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.588 MHz. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

10-13-15	7:30 P.M. EDST dy 4:30 P.M. PDST	2330 dy
5-7 1/2-10-13-20-25	9:30 P.M. EDST SnTThS 6:30 P.M. PDST	0130 MWFSn
5-7 1/2-10-13-20-25	9:00 A.M. EDST MWF 6:00 A.M. PDST	1300 MWF
35-30-25-20-15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThS
35-30-25-20-15	9:00 A.M. EDST TTh 6:00 A.M. PDST	1300 TTh

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending in step with WIAW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and March QST practice text to be sent in the 0130 GMT practice on the following dates:

- May 7: It Seems to Us
- May 13: Correspondence
- May 19: League Lines
- May 25: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

- June 2: A 100-Watt Transmitter, p. 177
- June 7: A 150-Watt Amplifier, p. 183



SWITCH TO SAFETY!



SCM — AREC — ORS — CP — SEC — OBS — TCC — OO
Station Activities
 OVS — A1OPR — EC — DXCC — 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. Applications for the WDEL award should be made to Jerry Smith, K3UDO, 28 Center St., Newark, Del. 19711. We thank K3AMC for handling the awards for the long period in which he did such a fine job. WA3LTA has been appointed Asst. Mgr. of the DEL PON and wishes others to join him on 3970 kHz. Sun. at 1900. The U. of Del. ARC have started a novice class with over eighty prospective hams attending. WA3KFR reports that he is rig hunting. The Mavencik ARC held its first 2-meter transmitter hunt with K3RUJ and WN3NRL as winners. ARPSC forms should be sent to the New Castle EC, WA3DYG. Field Day is just around the corner. Check with your local club for some real enjoyment. The Kent County ARC held an auction with their usual good success. Traffic: (Feb.) W3EEB 255, W3DKX 26, W3TRC 16, WA3LTA 9, WA3DUM 4, WA3KFR 1. (Jan.) W3DKX 86.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3CC. RMs: W3EML, W3MPX, K3MVO, WA3AFT. PAMs: WA3GLI, K3PSO. VHF PAM: W3FGO. OO reports were received from W3NNC, K3RDI, W3BFF. OVS reports from K3WRY, W3ZRR, WA3EEC. OBS reports from W3CBH, WA3AFT, K3SLG, K3BHU, WA3EEC. RPIs: W3MPX, W3EML, K3BHU, K3NSN. PSHR: W3MPX, K3OJO, K3MVO, WA3CKA.

Net	Freq.	Operates	QNI	QTC	RM/PAM
PA	3610	6:45 P Dy	354	327	W3MPX
PITN	3610	6:00 P Dy	272	202	WA3AFT

Nets not listed did not report. WA3LVC has an old Valiant just for cw nets. The Penn Wireless ARC made a pilgrimage to ARRL. WA3OGM put up an antenna just for EPA and PITN traffic work. W3EML really keeps things going on TCC. W3MPX still needs liaison stations from cw to phone and vice versa! K3MVO says chow time interferes with his phone seds. WA3ATO has been real busy handling traffic from the Hospital Ship Hope. K3VBA is back on EPA. W3BNR is now sporting a phone patch. W3HMK was nominated as QSL Mgr. of the month for Jan. W3AXA is back in swing, will do better when weather lets up and he can fix antenna. K3KTH spent 21 days in KH6-Land. W3GMK, an old cw man, was on phone and the receiver quit. W3EU keeps active on the Intruder Watch. K3WRY has a new Swan rig and also is reaching out for DX on 6 meters. Field Day soon and the VHF Sweepstakes. Traffic: (Feb.) K3NSN 1596, W3EML 1031, W3MPX 565, K3BHU 546, K3MVO 274, K3PIE 214, WA3CKA 114, WA3AFT 98, WA3ATQ 91, WA3LVC 90, WA3OGM 73, WA3IYC 62, K3OJO 59, WA3LMO 46, W3HK 44, K3VBA 44, K3SLG 39, W3OY 27, W3BNR 26, W3VAP 25, W3CBH 22, W3KCM 22, W3ADE 19, W3HMK 19, W3ZLD 19, W3AXA 16, W3BUR 12, K3KTH 11, K3HKW 9, W3VA 9, WA3KKM 7, WA3EEC 5, WA3MOP 4, W3OML 4, W3ZRR 4, K3FOB 2, W3YR 2, W3AIZ 1, WA3BJQ 1, W3EU 1, W3GMK 1, WA3IAZ 1, K3WRY 1. (Jan.) W3CBH 19, W3HMK 11, W3KCM 8.

MARYLAND—DIST. OF COLUMBIA — SCM, Karl R. Medrow, W3FA — SEC: W3LOJ.

Net	Freq.	Time(Z)	Days	Sess.	QTC	QNI	RM/PAM
MDD	3643	0000	Dy	26	222	10.2	W3EZT
MDDS	3643	0245	Dy	25	58	4.3	WA3LWT
MDCTN	3920	2300	TSS	14	67	16.1	W3FUS
MEPN	3920	2300	MWF				K3FAG
			1800 SS				
MTMTN	145.206	0200	TS	10	8	7.3	K3FV

PSHR for Feb.: W3EZT, W3FCS, W3TN and W3OKN. BPLs: WA2UOO/3, W3TN, W3CWC and K3CEZ. New appointees are W3GEL as ORS and K3RUQ as FC for the Southeastern Eastern Shore. WA3GVP renews his ORS, W3MVB his OO and WA3IV his

OPS. W3FU is Maryland's Intruder Watch. W3FZV multi-oped at K3JYZ who was disguised as WA3GVP/3 in the DX tests. W3CDQ keeps her hand in the YL net between trips to Fla. W3LQY had the section SET going full tilt in Feb. W3OKN can be found in the Northeast and Canadian nets. WA3MSW is planning for a new 80-meter antenna. WA3MJZ's 12-year old brother is WN3OQT. WA3GDC, EC' Frederick, reports into the AREC nets on 145.32 MHz. W3ZNV mans the AREC and RACES circuits in Calvert County. WA3APO finds time for the 50.4 MHz nets. W3TN had carry-over traffic from the SET. W3GEL is a low and high frequency man. K3LDD found time to debug his antenna system and his regular rig has one 2-meter birdie left. W3HXF sneaks a new QSL card in with his report. W3PT is an Asst. Director covering AMSAT. He spent a month at CCTR meetings and made 600 phone contacts from 4U1TU in the DX test. K3CEZ, WA2UOO/3 and WA3NYU handled traffic in the Calif. earthquake. W3FCS submits a nice phone activities report along with SFT results. W3EZT talked his way into a good DX score while keeping MDD up to snuff. WA3GXN represents Aberdeen. W3FOV, W3FZV, K3LFN report by radio. W3DMZ and W3BZW file their EMT results for future use. WA3IV was phone NCS 7 times. W3OMN sounds good with emergency power. W3BHE has been reduced to QRP and a crystal oscillator. WA3JOHF has organized the club at Loch Haven Jr. High. The Maryland Mobilecars ARC is run by W3GBE, W3EDU, W3CVD, W3AHGC, WA3ERU and WA3NCT. Traffic: WA2UOO/3 518, W3OKN 386, W3TN 315, W3CWC 210, K3CEZ 147, W3FZV 119, W3GEL 118, W3FCS 108, WA3IV 96, W3FA 92, K3LED 92, K3ORW 87, W3EZT 69, W3LOJ 67, K3GZK 66, WA3MSW 41, WA3LWT 35, WA3EOP 24, W3EOV 17, W3HXF 17, K3RUQ 17, K3LFN 14, WA3IHW 13, WA3GXN 11, WA3GDC 9, W3ZNV 4, K3ODC 1.

SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW. PAMs: WB2FJE, W2YPZ.

Net	Freq.	PM/Days	Sess.	QNI	Tcf.	Mgr.
NJN	3695	7:00 Dy	56	787	669	WA2BAN
		10:00 Dy				
NJSN			16	31	18	WA2DRH
NJPN	3930	6:00 Su	4	78	115	WB2FJE
NJEPTN	3950	6:00 M-S				WA2TAF
Mercer Co VHF TN	145.9	8:00 F	4	29	2	W2YPZ

The SET was very successful and plans and preparations are underway for a great Field Day. The Gloucester County ARC reports the election of officers as follows: WB2FJE, pres.; WB2JJZ, vice-pres.; WA2SEA, 1st. secy.; WB2WAK, treas.; WA2FZ, corr. secy. WA2FGS has completed requirements for the Brass Pounders Award. Congratulations and best wishes for your continued success. A recent visitor at the WA2FGS QTH was Marcos DaRocha, PY1DJT, an exchange student living with a family in Baltimore while attending the Polytechnical Institute. A new AREC net in the section (see above) is the Mercer County VHF Emergency and Traffic Net, W2YPZ, net mgr. with W2KGM as asst. net mgr. Those wishing to join are cordially invited. Membership includes stations from Mercer and Burlington Counties and present capabilities extend to Camden Co. and one from Atlantic Co. Your cooperation is solicited. FC appointments are available. Traffic: WB2VEJ 159, WA2FGS 126, WB2ORG 108, W2LVW 58, W2ORS 52, K2RKB 34, WA2KAP 31, W2YPZ 31, W2DFN 21, WB2FJE 18, WB2SFX 15, W2ZQ/K3CPI 15, WB2HMU 10, WA2DVU 9, W2ZI 1.

WESTERN NEW YORK — SCM, Richard M. Pitzerouse, K2KTK — Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. The list of section nets appears in last month's column. I understand that contrary to what I said last month, W2FR does not hold the first WNY 5BDXCC. W2SSC got it. Apologies to both. Both are well below the first 100 mark in 5BDXCC award numbers, for the entire world. WN2HZM tells me of a novice net by the name of SON operating on 3705 kHz on Mon., Wed. and Fri. at 7 P.M. local time. Don't forget the Western New York Hamfest in Rochester May 15. There will be a meeting of AREC and all appointees at the Hamfest. Tickets can be had from WR2FR. The Fulton Amateur Radio Club elected new officers as follows: WA2NUP, pres.; WN2SPD, vice-pres.; WN2SWT, secy.; WA2ZXT, treas. W2EMW plans to OSY to Tex. after his retirement from the Post Office. K2PVN gives us the following on the BARRA repeater. Input frequencies are 146.31

and 146.34 MHz with the outputs at 146.91 and 146.94 MHz. Access method is whistle up. Congratulations to the Syracuse U. Amateur Radio Club, newly-organized and an ARRL affiliate. NYS held 56 sessions in Feb., handled 448 messages with 727 check-ins. EC W2OKS sent a very detailed report on his ARFC group activity during the SET. The Northern Chautauqua Amateur Radio Club will hold its annual "Ham of the Year" banquet May 22. Congratulations to new General Class licensee WB2IKL. Also congrats to K2UIR on the new Extra Class. Inputs from you guys have been sparse for the last few months. I would appreciate all the news you can give me either via a note or your club bulletin and all information for the column by the tenth of each month. BPL for Feb. with * indicating PSHR: W2QC 513*, W2FR 306*, WA2ICU 301*, W2RUF 259*, K2KQC 146, W2MTA 135*, K2RTQ 115, WA2BEX 109, W2HYM 102, W2FEB 90, K2KTK 84*, W2FZK 81, WA2ICB 72, W2MSM 59, WB2VND 58, K2DNN 41, WB2HLI 35, W2RQF 31, W2PVI 27, W2DBU 24, WA2MPC 22, WA2JLE 18, WA2ANE 17, WA2HSB 16, WB2QAP 13, K2UIR 11, K2OPV 8, K2IMI 7, W2CFP 6, W2PNW 6, WB2IKL 6, W2CGS 4, WA2AIV 1. (Jan.) WA2JLE 9.

WESTERN PENNSYLVANIA - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI, PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3IPU. The WPA CW Net meets daily 3585 kHz 7:00 P.M.; WPP meets daily 3955 kHz ssb 10:00 P.M.; KSSN meets Mon. through Fri. 3585 kHz 6:30 P.M. All times local. It is with deep regret that we report the passing of W3UHN on Feb. 10, 1971. KR6WK is home from the service and now is WA3GVQ operating a Swan-350 on 40- and 15-meter ssb in the Sharon, Pa. area. The Nittany ARC held their Annual Inauguration Banquet and installed the following officers for the coming year: WA3IFC, pres.; K3UMT, vice-pres.; W3SAY, secy.; W3NEM, treas. The Etna RC reappointed for 1971 their technical committee comprised of W3YO, W3OVM and K3OTY. The Foothills ARC says K3TLU is a newly-appointed sheriff. Looks like the club station W3LWW now has built in protection. The Presque Isle ARC reports their new club call is WA3QDT. PARC also reports their new repeater station is in operation under the call WA3KUV. PARC's original founder, K3ENW is sunning himself in Fla. The Radio Assn. of Erie reports they also have a new repeater station in operation with the call W3ZLO. RAE also reports WA3GUL received 5BWAS No. 38. W3MFB is welcomed back to WPA from a long stay in the mid-west. Congrats to WA3NAZ as a new ORS appointee. Check your license for expiration. The WPA Traffic Net had 28 sessions, 401 QNI and handled 215 messages. KSSN had 19 sessions, 107 QNI and handled 18 messages during Feb. Traffic: W3NEM 224, W3KUN 221, K3HKK 141 (W2KAT, W3NEM ops), W3LOS 141, W3ATQ 102, WA3IPU 79, K3HCT 36, K3SMB 30, WA3NAZ 29, W3UT 28, W3MFB 27, WA3LDA 24, K3VQV 21, W3SN 19, WA3GSH 15, W3IYI 11, WA3JH 11, WA3KSA 10, K3SAN 3, W3LOD 2, W3EDO 1. Total traffic handled for Feb. 1175 messages.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU, RM: WA9ZUE. PAMs: WA9CCP and WA9PEI (vhf). Cook County EC: W9HPG.

Net	Freq.	Times(Z)Days	Tfc.
LEN	3940	1400 Su	10
ILN	3690	0030 Dy	195
NCPN	3915	1300/1800 M-S	136
III PON	3915	1430/2245 M-F	432
III PON	145.5	0200 MWF	26
III PON	50.28	0200 M	6

This column's deepest sympathy to the friends and family of K9IVG who recently passed away. Roberta was a top traffic-handler when she resided in Berwyn, Ill. She moved to Michigan City, Ind. and served a term as SCM for the Indiana section. She will be missed by all. New officers of the Chicago Area Teleprinter Society (CATS) are W9BT, W9IUV, W9LYO and WA9EHL. The new officers of the Illiana Teleprinter Society are W9KFO, W9HPG, WB9DIH and WA9EWO. WN9DYY now is WB9DYY. Reports are that the Wheaton Hamfest was an FB success. The Ninth Region Net had a traffic count of 486 as reported by NCS W9HRY. W9SXL now is chief of maintenance at the Kathryn Beich Candy Co., Bloomington. The Prairie Amateur Radio Club at Galesburg started their code and theory classes Mar. 18 at the Carl Sandburg College; officers are K9GUH, K9MEJ and WA9AAY. A new Ill. ham is W9NKH, formerly K8AFN. New appointees in Feb. include K9WGN as OO and WA9ZLN as OVS. The Chicago Suburban Radio Assn. held their Hamboree and all had a good time. W9HPG will speak at the Apr. 8 meeting of the Southeastern Illinois Ham Society. W9RGO, W9MAP, K9RUK, K9QYY, WA9BWK, WA9IYK, K9WMA, K9PZZ, W9FX, WB9EZY,

W9LRZ, K9AMJ and W9HSY participated in the Red Cross emergency communications during the flooding of the Rock River at Rockford. WN9UGL is vacationing in England. Our sympathy to WB9BXX (and his father WA9VKT) upon the death of his brother. Traffic: K9AVQ 260, W9NXG 253, W9FLE 239, WB9DUO 231, K3PYS/9 118, WB9EBK 109, WA9OBP 105, W9JXV 90, W9HOT 59, WA9LDC 54, W9DOO 41, K9HSK 17, W9LDU 11, WA9NZF 11, W9PRN 10, WB9ADQ 3, WB9MDP 3.

INDIANA - SCM, William C. Johnson, W9BUQ - SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT, WA9ZKX. PAMs: K9CRS, WA9OHX, (vhf) W9PMT.

Net	Freq.	Time(Z)Dy	Tfc.	Mgr.
ITfcN	3910	1330 Dy	494	WA9OHX
		2130 M-S		
		2300 Dy		
QIN	3656	0100 Dy	238	WA9WMT
		0400 Dy		
ITN	3740	0100 Dy		WA9ZKX
PON	3910	1245 Su	91	WA9UMH
		1830 S-S		
PON VHF	50.7	0200 M-Th	13	WA9TJS
Hoosier VHF			37	W9PMT

It is with deep regret that I report K9IVG as a Silent Key. About 300 people attended the Lake County ARC Banquet. WN9JIT made 450 contacts in the Novice Roundup. WA9FDQ, W9EHZ and W9BUQ have the new Regency 2-meter fm transceiver. Officers of the Central Indiana Radio Assn. are WA9WUG, pres.; WA9LVQ, vice-pres.; WN9ERV, secy.; WN9BKM, treas.; WN9ERV, editor. WA9ABI is active on vhf. K9LSB reports that the Northeastern Indiana 9 county was covered during the SKT. K9CEG is back from Fla. K9HYV has a new electronic keyer. WN9ESD, WN9BOZ passed their General Class exam. K9YBM is active in Army MARS. WA9NYU lost his transceiver and is now using an am transmitter until his is repaired. DJ6RD/9 is very active on the nets. Don't forget the IRCC Hamfest will be held at the La Porte Fairground, July 11. QIN Honor Roll: W9HS 24, W9BDV 23, W9JBQ 16, W9QLW 16, WA9WMT 16/15, WB9AMT 15/24, W9EJ 15, K9HYV 15, W9QXF 15. BPL certificates went to W9JYO, W9QQQ. Amateur radio exists because of the service it renders. WA9WJA is taking a course in electronics. Traffic: (Feb.) WA9WMT 304, W9JYO 282, WA9WJA 248, W9HRY 237, W9ICU 204, WA9VZM 181, W9QLW 163, W9BUQ 120, WA9OHX 107, WA9QQO 101, K9HYV 96, W9FWH 80, W9JBQ 76, WA9CHY 68, K9FZX 59, K9YBM 47, W9PMT 43, W9HWR 35, K9CBy 32, WA9AUM 30, WA9OAD 23, K9EFY 21, K9ILK 21, WA9BHC 20, K9JQY 18, K9DIY 16, W9KWB 15, W9YXX 15, W9EJS 14, K9RWQ 14, K9RPZ 12, W9RTH 10, W9LQ 6, K9QVT 6, W9DZC 5, WB9HAP 4, W9WSB 4, W9BDP 3, WB9BAQ 2, W9EJW 2, W9FPZ 2. (Jan.) W9FC 106, W9MZV 61, WA9AUM 37, W9HRW 32, WA9AQW 2.

WISCONSIN - SCM, S.M. Pokorny, W9NRP Asst. SCM: Joseph A. Taylor, W9OMT. SEC: W9NGT. PAMs: WB9CKE, WA9IZK, WA9OAY, K9FHI, WA9QKP. RMs: WB9FFY, K9KSA.

Net*	Freq.	Time(Z)Days	QNI	QTC	Mgr.
WSSN	3662	00TTS71	25		K9KSA
WIN	3662	0115 Dy	324	184	WB9FFY
WRN	3620	0130 Su (RTTY)			K9GSC
SW2RN	145.35	0230 Dy	140	2	WA9IZK
SW6RN	50.4	0300 M-S	182		WB9CKE
BWN	3985	1245 M-S	442	249	WA9OAY
W-RACES	3993.5	1400 Su	74		(Feb.) W9NRP
W-PON	3925	1801 M-F	326	82	W9EMC
BEN	3985	1800 Dy	668	124	WA9QKP
WSBN	3985	2300 Dy	1407	247	K9FHI

*All nets one hour earlier during daylight saving time period. The Yellow Thunder ARC Hamfest is May 23 at Delvieu Hotel, Lake Delton. The WNA Family Picnic will be Sun. July 11 at Woodlawn Park, Hartford. WN9ARP took his General and now is WB9ARP. W9EWC has a new fm mobile on 146.94. New officers of WNA for '71 are K9KSA, pres.; K9FHI, secy.; W9OMT, treas. K9KSA keeps a sked with 9Q5BG. WA9EDU and WA9SQN gave a 2-meter fm repeater operation demonstration at the Feb. meeting of W9RA. W9GKJ received his DXCC certificate. W9RQM's DX tally is 313/313. How about Wis. ARCs sending information on your activities for this column, also more individual activity reports? Traffic: W9CXY 483, K9CPM 328, W9DND 241, WA9YSD 218, WB9DXK 146, W9ESJ 130, WB9BJR 97, K9KSA 91, WB9FFY 75, K9FHI 72, WA9UNN 62, W9NRP 48, W9IWH 35, K9JPS 29, W9KRO 27, WB9ABF 26, W9DXD 24, WA9YFC 23, W9ZGQ 22, WA9OAY 21, WA9PKM 21, WA9THF 19, W9OMT 18, K9UTQ 16, W9YT 11, WA9YCS 10, W9ROM 7, K9VER 6, WB9DAN 4.

DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, K9MVF - Asst. SCM: Edna M. Thorsen, WA9RA. SEC: WA0MZV. RMs: WA0IAW,

W0AAU, PAMs: W0ADWM, W0AHRM, W0AMMV, K0FLT, W0FXV, W0OBS and W0RJE are Silent Keys. W0BEPX and pres. of the Pico Net, reports the Pico Net All Day Watch (PAW) as a big success with a QNI in Feb. of 1823 and 134 hours of operation. Watch stations were K0ZNG, W0AIB, W0AYVT, W0QWE, W0JUT, K0JIT, W0AVTZ, W0AYER, W0ATFC and W0PCIS. W0JPR reports a lot of activity on 6 meters in Winona in their Civil Defense setup. W0ISI was busy as TEN liaison during SFT. W0MZV and K0MVF were operating from MVF's QTH during SFT. Harley didn't miss a word when a filter capacitor gave up the ghost in the linear with a loud and prolonged hiss. W0CAP has finished his WAS and reports 14 DX countries worked. Handi-Ham System of Minn. is planning another Convocation at Camp Courage. The dates are May 21, 22, 23. W0TLE is the new pres. succeeding W0LQO, a recent Silent Key. The St. Paul Radio Club is celebrating their 40th Anniversary in May. A banquet is being planned to commemorate this event. Traffic: (Feb.) W0BGRX 566, K0CSE 524, W0AVAS 359, W0ZHN 301, W0TOT 236, W0ORRA 114, W0BUC 111, W0AVDG 105, K0ZRD 89, K0ZNE 86, W0BEPX 71, K0MVF 71, W0WTA 68, W0BHK 65, W0BZQ 63, W0AYVT 63, W0PET 62, W0AONE 61, W0ATFC 61, W0AYMU 58, W0QWE 56, W0AAU 46, W0LYP 42, W0AYGE 39, W0AHRM 37, K0ORK 36, W0UAH 36, K0FLT 34, W0PCIS 32, W0BCNB 30, W0AMMV 30, W0VYB 30, W0AONH 27, K0ICG 25, W0ARKV 22, W0ATO 21, K0ZBI 19, W0RAF 18, W0OBB 16, W0RQI 16, K0SRK 16, W0YWA 16, W0ASGI 15, W0AYER 15, W0HH 14, W0JPR 14, W0AQK 14, W0NCAP 12, W0QIT 12, W0CGZ 9, W0ISI 8, W0BPA 7, W0BUO 7, W0KLG 7, W0BFEU 7, W0SJI 1, (Jan.) W0AQI 10, W0EDM 10, (Dec.) W0OMC 16, W0OEF 4, W0ZSG 1.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC; W0AYL, OBS; W0BATJ, PAM; W0CAO, RM; W0RRS, OO; W0BF, We miss K0ITP who went south for the winter, on the TEC nets. W0BKK is a new call at Belcourt and a new Novice in Grand Forks is W0DITJ at the AFB. The Forx Amateur Radio Club, with a nice delegation from Fargo-Moorhead, had a nice turnout for their Annual Dinner Party Feb. 27. W0BHI has a group of 7 pupils from the State School for the Blind and friends enrolled in a novice class and W0DM has eight in school classes with an additional eight outside of school working to his home for novice class. W0AXQ with help from OM K0KLG is on the air from Grand Forks. The Dickinson area hams had a chance to see the movie "Hams Wide World". W0BBAU is building a new SB-102. A new Novice in Dickinson is W0DDK while W0RTK, W0ZCM, W0BHF and W0NZO are on 160-meters. W0BHCZ, the UND amateur station is having difficulty with the rotating mechanism for the large beam on the Student Center. W0DM fell on the icy driveway and has been grounded for awhile. On top of that he had rig trouble! A rig was loaned to him by W0GFF.

Net	kHs	CDT/Days	Sess.	QNI	QTC
Goose River	1990	0900 Su	4	53	3
NDRACTS	3996.5	1730 M-F	40	861	55
		1830 M-F			
YLWX Net	3994.0	0730 S-Su	28	664	522
NDRPON	3996.5	0900 Su	11	226	6
		1830 S-S			
NDCW	3640.0	2100 M-F	18	45	11

Traffic: W0RRS 84, W0SUF 52, W0REW 32, W0WWL 32, W0CDO 30, W0DM 25, W0AZPI 16, W0SJB 15, K0RSA 8, W0APT 3.

SOUTH DAKOTA - SCM, Ed Gray, W0CPX - The South Dakota CW Net now operates 7 days a week. New Novice licensees are: W0NDLA, Rapid City; W0NDRD, Clear Lake; W0NDOL and W0NDIM, Sioux Falls; W0NDPV, Lake Preston. The Huron Club is working on plans for a South Dakota Picnic to be held this summer. We are looking forward to a Dakota Division Convention at Sioux Falls, Oct. 9, 1971. W0SMM is now on RTTY. W0YRI, Madison and W0YAK, Colome are now mobile. W0CPY and W0CPX are putting up two-element 40-meter beams. Net reports: Morning Net - average 25 QNI; NIQ - 507 QNI and 23 QTC; Early Evening - 758 QNI and 25 QTC; Late Evening - 1187 QNI and 37 QTC; SDN CW Net - 162 QNI and 11 QTC. Traffic: W0HOJ 84, W0IG 44, K0AIE 24, W0FUZ 21, W0RIQ 5, W0SMM 2.

DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, W0SVH - SEC; W0PBZ, RM; W0STLS, PAM; W0SKT, The Hot Springs ARC has been reorganized with new officers: W0SRRO, pres.; W0SOQ, vice-pres.; W0RRP, secy.-treas. Meetings will be on the 1st Thurs. of the month. K5DKT is working on his station and hopes to have some "shoes" on his SB-102 soon. WSKL has his 70-ft. towers up 40-ft. W0SFBG has a new tower for his 20- and 15-meter quad. W0SWLJ is running a new HB4-1000A linear. W0PBZ with K5BOC

and W0SWMC with W0SMDU operated both week ends of the ARRL DX Contest as multiop stations; both did very well. The Razorback Net has been trying new procedures to increase check-ins and interest in the net. They are planning a picnic in North Little Rock during June, further details on nets.

Net	GMT/Day	Freq.	Tic.	QNI	Wins.	Mgr.
CZK	0100 Dy	3790	72	202	600	W0STLS
Razorback	0030 Dy	3445	68	570	672	W0SKT
PON	2130 M-F	3925	140	353	700	W0SMDU
APN	1200 M-F	3937	13	440	1344	W0SFEW
CAREN	0200 Th	146.34	(46.94)			W0SOD
DX INFO	0045 M	3860				W0SEFL
EC Net	0000 Su	3995				W0SP7

Traffic: W0STLS 61, W0SEFL 58, W0SWMC 32, W0SFEW 26, W0SOQ 22, W0SKL 8, K5DKT 2.

LOUISIANA - SCM, J. Allen Swanson, Jr., W0SPM - SEC; W0SJO, RM; W0SVOE, Your SCM, W0SPM was hospitalized after an attack and is doing fine. The SEC is writing the column for this month. W0EXI is conducting a novice class which began Mar. 3. W0SVUN reports that 6 Monroe hams went to Delhi to assist after the tornado. The Ozone ARC started a code and theory class Mar. 15. W0SEK is having rig trouble. The Lafayette ARC is reviving 2-meter am net on 145.3. W0VUH is busy installing the high power mobile in his new Cadillac El Dorado. W0SPWX has changed his address and is busy getting antennas up. W0SVCN passed the Advanced Class exam. W0TSP's car was stolen during Mardi Gras but was found intact a few days later. W0BMM is installing a mobile rig in his new car. W0SCAU still is on from either the fishing camp or home. Traffic: W0SVOE 230, W0SMI 220, W02UFG/5 106, W0SWBZ 52, W0SVON 19.

MISSISSIPPI - SCM, Walker J. Coffey, W5NCB - SEC; W0SJD, RM; W0SBB, PAMs: W5JHS, K5MDX. Appointment: W0SCLR as EC. The terrible tornadoes Sun. Feb. 21 and the following four days and nights spotlighted the need for more ECs. Let the SEC hear from you if you can serve. What a job was done by amateur radio communication. W5RUB received 5HWAS. Welcome to new Novice licensees: W5NDKO, W5NDLW, W5NDKZ, W5NDMS. New Generals are W5SBKM and W5SCGT. W0S5UE is working on DXCC. W0SMLW is putting a new rig together. The Tombigbee ARC has a real lively gang. Does your club have a public relations man? An effective way to comment on the FCC proposal is to send your views in writing to the Delta Div. Director. MTTN net misses W0SBB. Net reports:

Net	QNI	QTC	Mgr.
C5CHN	142	51	W0SOEB
MSBN	1020	211	W0SUYW

Come to the Jackson Hamfest July 24, 25. Traffic: K5URI 400, W0SUYW 190, W0SIMC/5 149, W0SEIN 112, W5NCR 96, W5WZ 96, W5EIT 72, W5YZW 71, W0SAHE 55, K5TFV 44, W0SSEG 42, W0SYJA 29, W5BZ 27, W5TUF 24, W0SMPQ 20, W0SASN 12, W0SGOH 10, K5HIC 10, K5SVC 10, W0SSKI 8, W0SPDG 7, W0STH 6, W0SVOR 5, W0SRIE 4, K5MDX 4, W0SULL 3.

TENNESSEE - SCM, Harry A. Phillips, K4RCT - SEC; W04ANX, RM; K4AMC, PAMs: W0PFP, K4MOI, W04EWW.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC	Mgr.
TSSB	3980	2330 M-S	24	1642	204	K4MOI
IPN	3980	1145 M-F	28	1271	99	W0PFP
		1300 S-Su				
FTPn	3980	1040 M-F	20	565	67	W04LWW
UPON	3980	2330 Su	4			W04RHZ
TN	3635	0000 Dy	28	138	80	K4AMC
E1VHF	145.2		8	40		W04IOB
FVHF	50.4		12	240	30	W04IOB
E11M	28.7	0200 W-F	8	80	1	W04QXC
MTTM	28.8	0200 T-F	9	94	1	W04GLS

Tornadoes struck hard in several areas of Miss. resulting in heavy damages, killing and injuring hundreds. Amateur radio operators moved into the more seriously affected areas to supply much needed communications. Our thanks to those who stand-by ready to be of service to our fellow man. The Oak Ridge R.O. Club hopes to have their 1m repeater operating (146.28 in 146.88 out) soon. W04SZP, was named Bristol ARC Ham of the Year and nominated for the 1m Council Ham of the Year Award. The Delta ARC has nominated W04GG and Tullahoma has nominated W04WH. The MARA (Memphis) held a dinner meeting honoring past presidents of the club. The Nashville Amateur Radio Explorer Post 15 has become affiliated with ARRL. June 1, is the deadline for comment on FCC proposed rule making concerning operating privileges. The Kingsport ARC will operate a message center at the Bowling Tournament in Kingsport. The Delta ARC will also supply message services to out-of-state bowlers participating in a tournament in Memphis. Traffic: W4Z1Y 248, W04DAJ 174, W04WBK 109, W04GG 105, W04ANX 78, W04GLS 49, W04PPP 34, W04RUW 25,

DRAKE



...everything for the Ham

DRAKE FINEST 4 LINE

R-4B Receiver

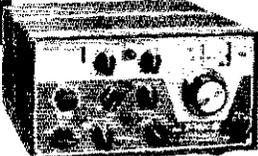
- Permeability-tuned VFO reads to 1 kHz
- Crystals cover all of 80, 40, 20, 15 mtrs. and part of 10
- Ten 500 kHz accessory ranges (1.5-30 MHz)
- Four bandwidths
- Passband tuning
- Noise Blanker on CW-SSB-AM, Notch Filter, Xtal Cal

Amateur Net \$475.00

T-4XB Transmitter

Frequency coverage and VFO similar to R-4B

- USB/LSB
- Semi break-in CW
- Controlled Carrier AM
- VOX or PTT
- Adjustable Pi-Net
- Xmit AGC, no flat topping
- 200 watts
- 8 pole SB Filters



\$495.00

Transceiver with R-4B or T-4XB VFO or use separately.

L-4B Linear Amplifier

- 2000W PEP-SSB, 1000W AM, CW, RTTY
- Class B Gnd Grid
- Broad Band Tuned Input
- RF Neg Feedback
- Xmit AGC
- Directional Wattmeter
- Taut-band Meters
- Plate Current Meter meets FCC reg
- Quiet hi-volume blower

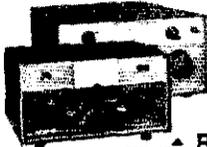
Amateur Net \$825.00 Incl. sep. sol-st. Power Supply

DRAKE 4 LINE ACCESSORIES

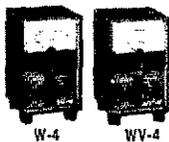
Matching Networks

Integral Wattmeter: fwd pwr in watts and VSWR direct • Can read refl pwr • Matches xmtr to ant VSWR 5:1

MN-4 200 watts... \$99.00
MN-2000 2000 watts PEP... \$195.00



MN-4 MN-2000



W-4 WV-4

RF Wattmeters

Fwd and refl pwr directly in watts • Two scales each direction • Calib Acc: ±(5% of reading + 1% of full scale)

Model	Range	Full Scale	Price
W-4	1.8-54 MHz	200/2000W	\$61.95
WV-4	20-200 MHz	100/1000W	\$73.50

Matching Speaker MS-4

5"x7" speaker, space for power supply \$22.00

Cardioid Mike

60-8000 Hz, ceramic, Hi-Z, highly directional, plug...

Model 729-SRD \$17.00
Standard Crystals, ea \$ 5.00
Power Supply AG-4... \$99.95



DRAKE TVI FILTERS

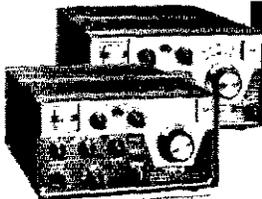
TV-300-HP High Pass Filter... \$ 4.95
TV-1000-LP Low Pass Filter... 18.75
TV-100-LP Low Pass Filter... 6.50
TV-CB-LP Citizens Band... 7.65
TV-300-FMS FM Band Stop... 4.95
TV-300-FM1 FM Tuneable... 4.95
LN-4 Power Line Filter... 8.00



FMS

DRAKE SIDEBAND TRANSCEIVERS

TR-4 & TR-6



TR-4 \$699.95

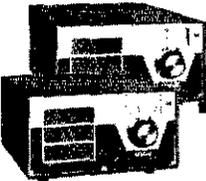
TR-6 \$650.00

BOTH have Linear VFO, 1 kHz acc, 300W PEP-SSB, Semi Break-in CW with Sidetone, VOX or PTT, Adjustable Pi-net, Plate and AGC Mtrs, built-in noise blanker.

TR-4 covers 10-80 meters; USB/LSB, CW, AM; TR-6 tunes 6M plus MARS with 9 xtals (2 furn), USB-CW-AM.

RECEIVERS: Sensitivity for 10 dB S/N: TR-4 .5 µV, TR-6 .1 µV (FET front end) Selectivity: Both 2.1 kHz @ 6 dB, TR-4 3.6 kHz @ 60 dB. BOTH have diode & prod detectors, S-meter.

RV-4 & RV-6 REMOTE VFO's



Permit rcvg, xmtg or xcvg on separate freq in same range as transceiver.

RV-4 OR RV-6 \$110.00

TRANSCEIVER ACCESSORIES

MMK-3 Mobile Mounting Kit... \$ 6.95
Power Supplies: AC-4... \$ 99.95
DC-4... \$125.00
MS-4 Matching Speaker... \$ 22.00
FF-1 Fixed Freq. Adapter... \$ 46.95
MC-4 Mobile Spkr/Wattmeter \$ 69.00



MC-4

HAMS SAY... "Best Receiver buy since the 2-B"

2-C Receiver



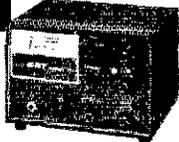
- Xtal control 1st converter
- 500 kHz Ranges: 80, 40, 20, 15, 10 meters
- Accessory Ranges 3-30 MHz
- SSB-AM-CW
- Accessories: Spkr, Q-Mult, Calib, Noise Blanker, Xtals.

Amateur Net \$255.00

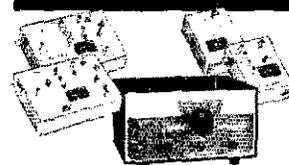
CW Transmitter 2-NT

- 100 (or 75) watts
- Break-in CW with 2-C
- 80, 40, 20, 15, 10 mtrs xtal controlled
- Ant. Relay
- Sidetone
- LP Filter
- Pwr. Sup. incl.

Amateur Net \$164.00



DRAKE 2 and 6 Meter CONVERTERS



For Receivers

FET, Lo Noise, Uniform Gain, Low Spurious Response

6 meters—SC-6..... \$71.00
2 meters—SC-2..... \$76.00
Power Supply CPS-1 \$19.75
YHF Xtal Cal CCS-1 \$26.95
Console..... CC-1 \$26.95

Transmitting Converters



TC-2 • Entire 2-meter band • 180 watt input
TC-6 • All of 6-meter band • 300 watt input

BOTH: • Xmit AGC—no flat top • Antenna Relay • Need no separate pwr supply with Drake xmtrs.
TC-2 \$300.00; TC-6 \$250.00

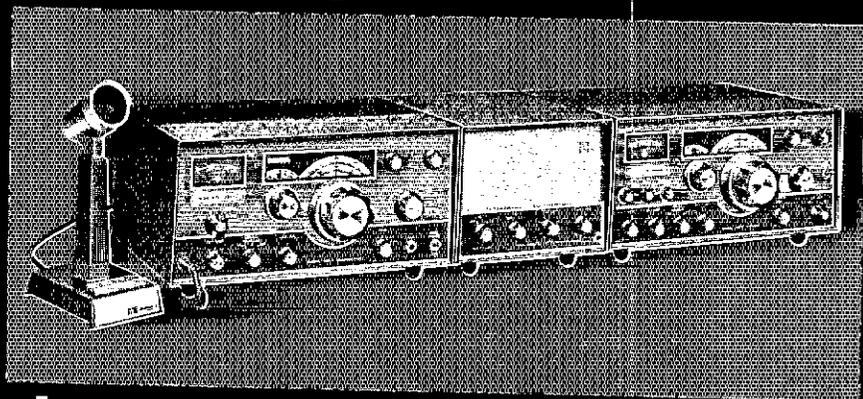
SPR-4 PROGRAMABLE RECEIVER • All solid state • 1 kHz acc. dial • 3 bandwidths • SSB-AM-CW • 24 500 kHz ranges 150 kHz-30 MHz (10 ranges furn., others \$5 ea.) • 12 VDC/120 VAC • Acces avail: Calib, Noise Blanker, Notch. \$499.95

TR-44B Communications Station • Consists of R-4B and T-4B in same cabinet • Less power supply and crystals \$975.00

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Examine the list of features and specifications, and compare them with those of any other receiver and transmitter units on the market... then compare the prices. The amateur radio operator now has a new standard of performance, quality, reliability and value in transmitters and receivers.

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Phone: (714) 757-7525

600-R SPECIFICATIONS:

- SSB, CW, AM and FSK superheterodyne receiver.
- Freq. Range: In addition to full coverage of 10, 15, 20, 40 and 80 meters, continuous coverage from 3 to 30 mc may be provided with an external oscillator, either tunable or crystal controlled.
- Ultra-smooth vernier tuning, with large knob and dial. The incomparable feel of the Swan tuning system.
- Sensitivity: 1/4 microvolt at 50 ohms for 10 db signal plus noise-to-noise ratio.
- Selectivity: 2.7 Kc bandwidth with 1.7 shape factor is standard. Options include 0.5 Kc CW filter, 4 Kc AM filter, and SS-16 super selective filter.
- Crystal Calibrator with 25 and 100 kc selection.
- Hybrid Design: 7 tubes, 8 transistors, 12 diodes, Transistors used where they provide definite advantage. Tubes used where they still provide superior performance.
- Features Swan's exclusive Single Conversion design, with fewer spurious responses than multi-conversion designs.
- Fully compatible with 600-T transmitter, providing for transceive operation as well as separate frequency control. Also, CW sidetone, and genuine CW break-in operation.
- Built-in AC power supply.
- Dimensions:
15 in. wide, 6 1/2 in. high, 12 in deep.

\$395*

600-T SPECIFICATIONS:

- Freq. Range: Full coverage of 10, 15, 20, 40 and 80 meters. Extended frequency coverage for MARS operation with plug-in crystal oscillator accessory, Model 510X.
- Power Rating: 600 watts P.E.P. input, 500 watts CW, 150 watts AM. 100 watts continuous AFSK.
- Pi-Network output for 50 or 75 ohm coax.
- Suppression: Carrier 60 db, unwanted sideband 50 db. Third order distortion approx. 30 db.
- Audio response: Plus or minus 3 db from 300 to 3000 cycles.
- CW Keying: Grid block circuit, Full Break-in system. Includes sidetone to receiver.
- VOX accessory, plug-in.
- Internal AC Power Supply.
- Dimensions:
15 in. wide, 6 1/2 in. high, 12 in. deep.

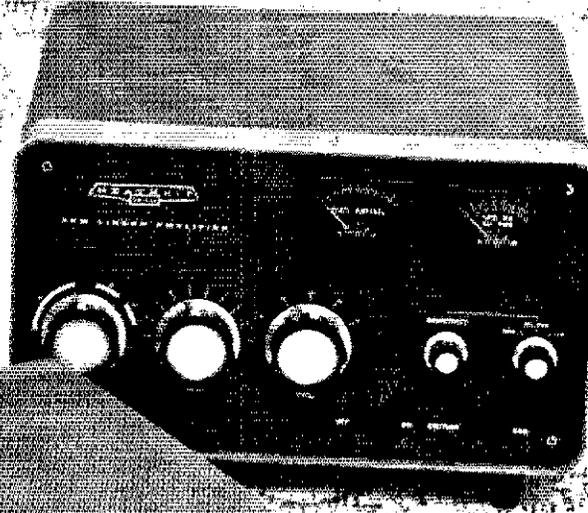
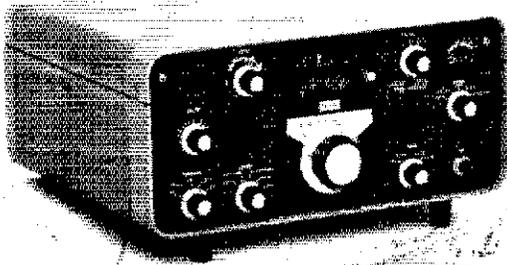
\$495*

600-R ACCESSORIES:

- Speaker in matching cabinet \$18*
- I.F. Noise Blaker. Installs internally \$79*
- Adjustable Audio Notcher. Installs internally \$44*

*Factory price

DX Maxi-Rig...



Heathkit® "303", "401", "220" combo

When the skip is in and the bands are hot, you need the best gear you can get . . .

When the call comes over the land-line that a Anna-Tuva Zone 23 is loose on 20, you need the best gear you can get . . .

When Gus is out island-hopping to places that aren't even on most maritime charts, you need the best gear you can get . . .

When one more QSL will provide that coveted 100 sticker for your DXCC, you need the best gear you can get . . .

Whether you're chasing the rare ones in AC3-land or the Rare Ones in New Orleans . . . sweating out that seemingly impossible 5-band DXCC or looking for #50 for WAS . . . chatting with the crew at the South Pole or working everyone's friend in 9N1-land — if you work serious DX, you need the best gear you can get: the Heathkit DX Maxi-Rig.

The DX Maxi-Rig: the SB-303, hot new all solid-state receiver that's made DX easier to work than ever. The SB-401, the most popular transmitter on the air because of its modest price, top performance and high reliability. The SB-220, 2 kW linear that made history when it was introduced because of its low, low price and red hot performance.

The "303", "401", & "220" . . . the rig owned by more serious DXer's than any other . . . because it produces results that can't be equalled. The DX Maxi-Rig — more hot ones from the Hams at Heath.

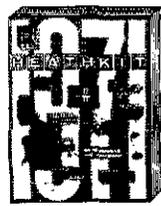
- Kit SB-303, 21 lbs. 319.95*
- SBA-301-1, optional 3.75 kHz AM Xtal fltr., 1 lb. 20.95*
- SBA-301-2, optional 400 Hz CW Xtal fltr., 1 lb. 21.95*
- Kit SB-401, 36 lbs. 299.95*
- Kit SB-220, 69 lbs. 349.95*

SB-303 SPECIFICATIONS — Frequency Range: (MHz) — 3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.5, 15.0 to 15.3, 21.0 to 21.5, 28.0 to 30. Intermediate Frequency: (IF) — 3.395 MHz. Frequency Stability: Less than 100 Hz drift per hour after 10 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% line voltage variation. Frequency Selection: Built-in Linear Master Oscillator. Modes of Operation: SSB — Single sideband (suppressed carrier, with selectable upper or lower sideband.) CW — Keyed continuous wave. AM — Amplitude modulated continuous wave. RTTY — Radio teletype (frequency-shift keyed continuous wave). Sensitivity: Less than 0.25 μ V

for 10 dB S+N/N for SSB operation. Overall Gain: Less than 1.5 μ V input for 0.5 audio output (single tone SSB). AGC Characteristics: Blocking — Greater than 3.0 V CW/SSB/RTTY. Dynamic Range — Greater than 150 dB CW/SSB. RF Attenuator: Variable 0-40 dB nominal. Selectivity: SSB — 2.1 kHz @ 6 dB down, 5.0 kHz maximum @ 60 dB down (crystal filter supplied). CW — 400 Hz at 6 dB down, 2.0 kHz maximum at 60 dB down (crystal filter available as an accessory). AM — 3.75 kHz at 6 dB down, 10 kHz maximum at 60 dB down (crystal filter available as an accessory). RTTY — 2.1 kHz at 6 dB down, 5.0 kHz maximum at 60 dB down (uses SSB crystal filter). Image Rejection: 60 dB or better. IF Rejection: 3.395 — greater than 55 dB. 8.595 — greater than 50 dB. Spurious Response: All below 1 μ V equivalent signal input. Temperature Range: 10°C ambient. Dial Accuracy: Electrical — Within 400 Hz after calibration at nearest 100 kHz or 25 kHz point. Visual — Within 200 Hz. Calibration: Every 100 kHz or 25 kHz. Dial Backlash: No more than 50 Hz. Antenna Input Impedance: 50 ohm nominal unbalanced. Power Requirements: 105 to 125 or 210 to 250 VAC, 40 W max. Dimensions (with knobs & feet installed): 12 $\frac{1}{4}$ " W x 7 $\frac{1}{4}$ " H x 14" D. Net Weight: 15 $\frac{3}{4}$ lbs.

SB-401 SPECIFICATIONS — Emission: SSB (upper or lower sideband) and CW. Power input: 170 watts CW, 180 watts P.E.P. SSB. Power output: 100 watts (80-15 meters), 80 watts (10 meters). Output impedance: 50 to 75 ohm — less than 2:1 SWR. Frequency range: (MHz) 3.5–4.0; 7.0–7.5; 14.0–14.5; 21.0–21.5; 28.0–28.5; 28.5–29.0; 29.0–29.5; 29.5–30.0. Frequency stability: Less than 100 Hz per hr. after 20 min. warmup. Carrier suppression: 55 dB below peak output. Unwanted sideband suppression: 55 dB @ 1 kHz. Intermodulation distortion: 30 dB below peak output (two-tone test). Keying characteristics: Break-in CW provided by operating VOX from a keyed tone (Grid block keying). CW sidetone: 1000 Hz. ALC characteristics: 10 dB or greater @ 0.2 mA final grid current. Noise level: 40 dB below rated carrier. Visual dial accuracy: Within 200 Hz (all bands). Electrical dial accuracy: Within 400 Hz after calibration at nearest 100 kHz point (all bands). Backlash: Less than 50 Hz. Oscillator feedthrough or mixer products: 55 dB below rated output (except 3910 kHz crossover which is 45 dB). Harmonic radiation: 35 dB below rated output. Audio input: High impedance microphone or phone patch. Audio frequency response: 350-2450 Hz \pm 3 dB. Power requirements: 80 watts STBY, 260 watts key down @ 120/240 V AC, 50/60 Hz. Dimensions: 14 $\frac{7}{8}$ " W x 6 $\frac{3}{4}$ " H x 13 $\frac{3}{4}$ " D.

SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. Driving power required: 100 watts. Maximum power input: SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. Duty cycle: SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 50% (maximum transmit time 10 minutes). Third order distortion: —30 dB or better. Input impedance: 52 ohm unbalanced. Output impedance: 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. Front panel controls: Tune, Load, Band, Sensitivity Meter switch, Power CW/Tune — SSB. Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). Rear Panel: Line cord, Circuit breakers (two 10 A). Antenna Relay (phono), ALC (phono), RF input (SO-239). Ground post. RF output (SO-239). Tubes: Two 6E6C 3-500Z. Power required: 120 VAC, 50/60 cycles, at 20 amperes maximum. 240 VAC, 50/60 cycles at 10 amperes. Cabinet size: 14 $\frac{7}{8}$ " W x 8 $\frac{1}{4}$ " H x 14 $\frac{1}{2}$ " D. Net weight: 48 lbs.



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AM-248R

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AMATEUR ELECTRONIC SUPPLY, says:

"Operating all bands (160 thru 2 Meters) is a real pleasure with my DRAKE 4 LINE setup. You, too, can eliminate all of that extra gear and mess usually needed for that much frequency coverage. Let me help you go the same route. . . . all the way, as I have done - or just one unit at a time.

Visit our store or write me at AMATEUR ELECTRONIC SUPPLY for the best Trade or No-Trade Deal on new DRAKE equipment. You will be surprised how little per month it would cost you to own new DRAKE equipment when you use our convenient Revolving Charge Plan.

Remember, too! When trading with AMATEUR ELECTRONIC SUPPLY you can use our STAY-ON-THE-AIR PLAN, which means you can keep your trade-ins until your new equipment arrives. - Lose no operating time! CU on the air!"

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THE most versatile keyer available. Send for full details on the HAL 311BC and the complete line of HAL electronic keyers. There is a model to fit your requirement and budget from \$16.50 to \$53.00. Shipping extra. Available in kit form for even greater value.



HAL MAINLINE ST-6 RTTY TU

Complete parts kit for the W6FFC ST-6 now includes all parts except cabinet. Only 7 HAL circuit boards (drilled G10 glass) for all features. Plug-in IC sockets. Custom transformer by Thordarson for both supplies, 115/230V, 50-60Hz. \$135.00 kit. Wired units available.

OTHER RTTY EQUIPMENT

MAINLINE ST-5 TU KIT . . . \$37.50 to \$50.00
HAL RT-1 TU/AFSK KIT . . . \$51.50
Shipping extra. Write for full details.

HAL TOUCHCODER II KIT \$55.00

Complete parts kit, excluding keyboard, for the W4UX CW code typer. All circuitry on one 3 x 6" G10 glass PC board. Plug-in IC sockets. Optional contest ID and RTTY features available. New keyboard under development.

HAL ID-1 REPEATER IDENTIFIER

TTL logic. Power line frequency counter for 3 minute or less timing and control. Easily reprogrammable diode ROM uses only 27 diodes (depending on call) to send DE "any call". Low impedance audio with volume and tone control. All circuitry including PS on small G10 glass PC board. Write for full details.....\$70.00 Kit.

Available soon:

Parts kit for ARRL FM transmitter.

Part	Qty	Price	Part	Qty	Price
Not Carrier Diodes: HP2800	30C	1/4/8100	Resistors by HAL	4-34	29
Linear IC's:			2N1700A	1	75
7418	1	\$1.00	2N1700B	1	75
7419	1	\$1.25	2N1700C	1	75
7420	1	\$1.25	2N1700D	1	75
Digital IC's:			7410	1	50
7410	1	50	7411	1	50
7411	1	50	7412	1	50
7412	1	50	7413	1	50
7413	1	50	7414	1	50
7414	1	50	7415	1	50
7415	1	50	7416	1	50
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7469	1	50	7470	1	50
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7474	1	50	7475	1	50
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7476	1	50	7477	1	50
7477	1	50	7478	1	50
7478	1	50	7479	1	50
7479	1	50	7480	1	50
7480	1	50	7481	1	50
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7494	1	50	7495	1	50
7495	1	50	7496	1	50
7496	1	50	7497	1	50
7497	1	50	7498	1	50
7498	1	50	7499	1	50
7499	1	50	7500	1	50

ORDERING INFORMATION

Postage is not included in the prices of HAL products. Please add 50¢ on small parts orders, and \$2.00 on larger kits. Shipping is via UPS when possible, and via insured parcel post otherwise. Please give a street address.

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OHIO - SCM, Richard A. Egbert, W8ETU - SEC: W8OUL RM: W8IMI. PAM: K8UBK. VHF PAM: WA8ADU. Feb. section no reports:

Net	QNI	QTC	Sess.	Freq.	Time(Z)	Mgr
OSSBN	2351	1483	58	3972.5	1430/2245	KRUBI
ON	734	820	59	3580	0201/2300	WBIM
06MtrN	465	52	55	50.16	0100	WA8ADU
				50.61	2300	
OSN	171	94	28	3580	2300	WA8WA
BN RTTY	219	70	78	3605	2200	WA8YU

Please note that the times given are one hour earlier in GMT; the same local time EDT. BPLs were earned by the following: WA8FTX, W8UPH, W8SZU, K8ONA, W8RYP, W8LAG, W8BALU, W8BDSV, W8BAZH, W8ASSED, W8QCU, W8MEM, W8RUO, W8RBPB, W8TEL and W8BPU. W8FOG takes over EC chores for Licking Co. from Central Ohio EC W8ERD. WA8COA is a new OPS and W8CCI was appointed OVS. W8GDO worked HR2HH and T19CF on 160-meter ssb. K8ONA had a visit from ZL4HG. OX W8KAJ won the section award in the Calif. QSO Party. Stu also piled up 563 contacts in 64 sections in the Novice Roundup. W8ZCO suggests a DX information net on 14075 to be a continuous operation. Repeater operators are reminded to register their repeaters with ARRL for listing in the next Net Directory. K8RIG made a DXpedition to the Virgin Islands planning extensive 6-meter cw and ssb operations. W8QMJ now is K4FC residing in Hollywood, Fla. I regret to report that WA8UUN and K8YIV joined Silent Keys. EC W8FPA needs AREC members from Meigs Co. SEC W8OUL tells us that AREC is now 1245 strong and operates 37 nets, all having liaison with NTS. Massillon AKC is conducting novice and general code and theory classes with 14 and 15 participants respectively. Warren ARAs new officers are W8ATNO, pres. W8KAK, vice-pres.; W8BZL, secy. and W8MKF, treas. Queen City Emergency Net's recent election produced the following leaders: W8CHT, pres.; W8STX, vice-pres.; W8DFD, secy. and W8PKR, treas. Dayton ARAs novice class has begun with W1AZM/3 presiding. Inter City RC has a new memorial club station call W8WE. Treaty City ARA announces that it will join forces with the Greenville H.S. ARA for this year's Field Day. Traffic: (Feb.) W8BETX 1247, W8UPH 817, W8SZU 678, K8ONA 566, W8RYP 563, W8LAG 539, W8BALU 526, W8BDSV 373, W8BBLH 358, W8IMI 351, WA8WAK 313, W8BAZH 298, W8ELW 294, W8ASD 287, W8QCU 275, W8AVS/8 268, W8DWL 264, W8GVX 253, W8RCWD 249, W8MEM 249, W8CHT 238, W8LT 228, W8RUO 218, W8BPP 217, W8TEL 210, W8BPU 209, W8CUT 202, W8PNS 174, W8MOK 154, W8OUL 142, W8UPL 138, K8LGA 126, W8BAK 120, W8PMJ 119, K8DHI 118, W8ZUK 113, W8JD 110, W8QFK 109, W8HCR 87, K8BHI 86, W8MD 75, W8HGH 74, W8ZX 70, W8COA 65, W8ETU 64, W8FGD 56, W8TYF 54, W8NL 52, W8CRG 51, K8EHE 50, W8NAL 43, K8YK 39, W8RSP 38, K8BYR 37, W8OE 37, W8ZNC 36, K8UBK 32, W8QZK 30, W8DFA 29, W8VWH 28, K8TVX 25, W8ERD 24, W8YTB 24, W8ADU 23, W8JH 23, K8ONV 23, W8ULF 23, W8MIH 20, W8WPO 20, W8BHC 19, W8GVE 19, K8OYR 19, W8SSI 17, W8RAJ 16, W8BU 16, K8LFI 16, W8PNE 15, W8VNU 14, W8FSK 13, W8LVT 13, W8RAR 12, W8EPA 12, W8LZE 12, K8KXD 12, W8VVP 12, W8AYC 11, W8GED 11, W8FXD 9, W8GRR 9, W8AJW 8, W8BDH 8, K8EK 8, W8RDZ 7, W8GBY 7, K8CY 6, W8YHN 6, W8LAM 5, W8KAJ 4, W8SHP 4, W8AQ 3, W8BAZ 3, W8KWX 3, W8WEG 3, W8EEF 2, W8MCR 2. (Jan.) W8BPU 223, W8SHP 29, W8FWX 7.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SJM - Asst. SCM/PAM: Kenneth M. Kroth, W2VJB. SEC: W2KGC. RM: WA2VYS. VHF PAM: W2YQU. Section nets: ESS 2300Z daily, 3590; NYS 0011Z and 0300Z daily, 3675; NY County Net 1400Z Sun., 0045Z Tue.-Fri. 3677; NYSPT&N 2300Z daily 3925; NYPON 2145Z daily 3912. Get in touch with WN2LXF if you want to help organize a Novice Net. Appointments: W2DXM and W2KXW as ORNs. On the club circuit: SCM to Overlook Mt. ARC; New officers at RPI, W2SZ, are WA1HCO, pres.; WA2EUX, vice-pres.; W2ZUI S, treas.; W2SQN, secy.; KH6DL-K, equipment super. The Glenshire HS Club elected WN2KKW, pres.; WN2QPS, vice-pres.; WN2BSU, treas.; Dan Sugarman, secy. The club operates WA2TKB. Yonkers ARC spearheaded a successful drive for towers. New officers are W2SLO, pres.; W2QK, vice-pres.; W2LHW, secy.; K2BM, treas.; W2AJN, W2JUT, K2BOT, W2OCY, W2LHW, WA2YGA and K2BJH, dir. New Rochelle heard Hugh DiGiovanni on amplifiers. The Albany ARA showed "Hans Wide World" to open meeting for the public and plans a TV course to start shortly. The Schenectady Club manned W2IR at a local museum. The Colonic Central High field operations day at WA2DNR - 3rd annual

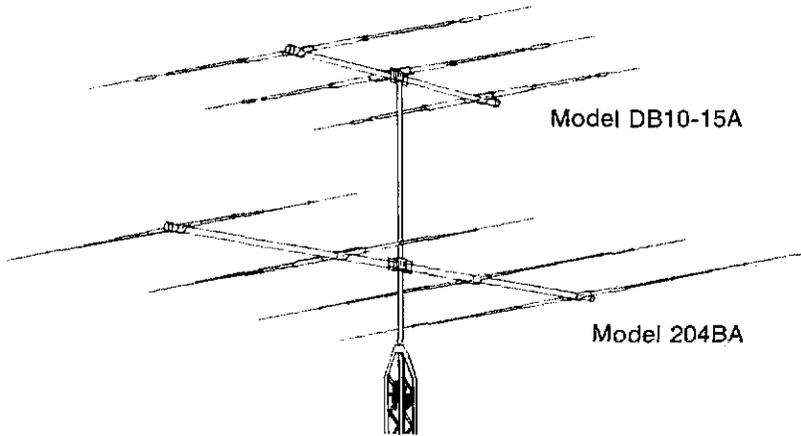
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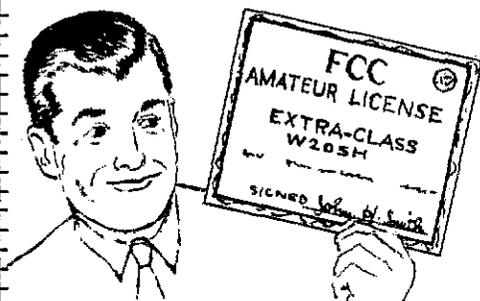
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open house. The Harmonic Hills RL now has a new constitution. Individual station activities: WB2VJB has new SB-401/SB-220 operational; WB2ZPN and WB2BXL at K2BK for the DX Contest session; K2BQQ operated as HB9XSE and HB0XSE while in Europe. WB2YQU is off sick list after major surgery. WA2EAJ is active from the State U. of NY, Buffalo, during terms. Section traffic handlers will miss K2UBG, who became a Silent Key in Feb. WA2OMT is back in ENY after law school and army reserve time. K2RRZ is now operating mobile. If your club isn't a member of the Hudson Council, check K2SJO, secy. for details — and see to it you're represented at Divisional Level meetings. Several ENY counties have openings for ECs; get in touch with W2KGC if you are interested — the spots should be filled as soon as possible. Traffic: WA2FBI 195, WA2GTK 73, WA2VLS 60, W2SZ 52, WA2VYS 48, K2SIN 45, WB2LXW 38, WB2FUV 33, WB2JLR 32, W2URP 30, W2ANV 27, WB2VJB 23, WA2UCV 22, WB2LGA 19, WA2JXR 16, WB2FWK 14, WN2KDC 14, K2HNW 10, K2UYK 8, WB2BXL 6, WA2EAH 4.

NEW YORK CITY AND LONG ISLAND — SCM, Fred J. Brunjes, K2DGI — SEC: K2OVN, RM: K2UAT, HF PAM: WA2UWA, VHF PAM: WB2RQV. The following nets are major AREC Nets, join one!

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Brooklyn	28.64 MHz	50.40 MHz	145.26 MHz
Richmond			147.12 MHz
New York	29.5 MHz	50.48 MHz	
Queens	29.50 MHz	50.20 MHz	145.62 MHz
Nassau	28.72 MHz		145.32 MHz
Suffolk	29.5053, 51 MHz	146.82 FM	
Brookhaven		50.46 MHz	146.82 MHz
Huntington	28.73 MHz	50.46 MHz	145.59 MHz

Note: Nets usually open 2000 local Mon. Looks like the club activity is back in swing again! It appears that the secret is in specializing! The Tu-Roro Radio Club reports ATV interest is building within the club along with their already high activity on RTTY, and the Long Island Mobile Amateur Radio Club (LIMARC) is deeply involved in vhf fm with active repeaters covering the entire section. W2OQL of the Suffolk County Radio Club reports expanding of their repeater, with overlapping coverage with the LIMARC "machine." Both repeaters operate on 146.34 input 146.82 output, with the Suffolk "machine" tone burst activated and the LIMARC "machine" PL'd (private line) for club members. Another very active repeater is the Staten Island "machine," which operates with an input on 146.25, and outputs on 146.88; with just carrier to operate it. The Staten Island repeater is operated by the New York City Repeater Assn. Those interested in either of these organizations, contact them or myself (see page 6, QST) for meeting information or mailing address. New officers to report out Staten Island ARA way: W2DMW holding the gavel, K2KQZ handling the hieroglyphics and W2EUY keeping track of the coffee "kitty." WB2HLM is now running the show as prexy of Suffolk County RC; WA2FQG is now in the NNJ area. For you high power fans, the QRP ARC Int'l, NYC chapter No. 1, meets every Thurs. at 2030 EST on 145.64 am with a round-table type on-the-air meeting. The Larkfield ARC is running a membership drive. If you are interested in this active club, contact them; C.D. Hdqtrs., 209 Main St., Huntington, New York 11743. Meetings are held every 2nd Fri. of the month. W2EW reports his dipole gave up the ghost in high winds and he now is looking around for a trained monkey, or whatever, to haul it back up to the 40-ft. mark again! Well! it's that time again; Field Day is just around the corner. All of the "putt putts" have just about have been "fired up" and running smoothly, and the tents and canvas have been guaranteed not to leak! Traffic: W2DSC 567, WB2LGA 385, WB2LZN 201, W2EC 161, WB2DLJ 112, WA2LJS 69, W2GP 67, WA2HOP 25, W2DBQ 16, W2EW 15, WB2WFI 2 10, WR2HW 4, W2PF 4.

NORTH NEW JERSEY — SCM, Louis J. Amoroso, W2ZZ — SEC: K2KDO, RMS: WA2BAN, WA2DRH and WA2TAF. PAMs: K2KDO, K2SGX and WA2TAF.

Net	Hz/Time (PM)/Days	Sess.	QNI	T/c.	Mgr.
NJN	3695 7:00 Dy	28	491	509	WA2BAN
NJN	3695 10:00 Dy	28	296	160	WA2BAN
NJSN	3740 8:00 Dy	16	31	13	WA2DRH
NIPON	3930 6:00 Su	4	78	115	WB2FFE
NJEPN	3950 6:00 M-S	29	718	388	WA2TAF
NJAN	50425 8:00 M-F				K2SGX
PVETN	145710 7:30 Dy	15	82	51	WA2JNO
ECTN	145800 8:30 M-S	28	99	80	WB2LTW

New appointments: WA2DRH as RM, W2ZEP and WB2JAE as ORSs. W2TPI sent in his usual outstanding OO report. WN2RRE and WN2RRF are new hams in Teaneck. Both are from the local PAL radio club. WN2OXI has a new HQ-170C. W2TP turned in his old TR-4 for a new one. W2YT received 5BDXCC No. 60 and is the

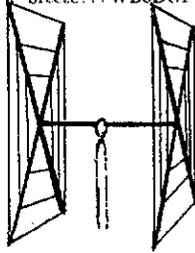
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Elements: A full wavelength driven element and reflector for each band.
Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

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Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

- 10-15-20 CUBICAL QUAD. \$37.00
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BEAMS "Just a note to let you know that as a Novice, your 3-E1. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

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| 3 E1 15. 21 | 12 E1 2. 27* |
| 4 E1 15. 27* | |
| 5 E1 15. 30* | *20-ft. boom |



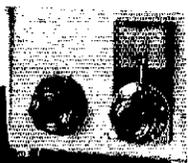
ALL-BAND VERTICALS

"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, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MZY, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

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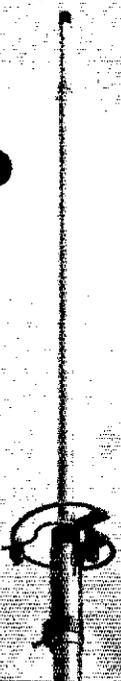
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fourth member of NIDXA to make it. K2IEF is home from the hospital. WB2RJJ is planning a mobile fm rig. WB2VFT has a new Swan 500-C and is chasing 10-meter DX. K2KDO is home after second trip to the hospital. K2ZFF's rig is giving him problem. WA2UDT slowed down with the usual college overload. WB2TUL now using an HT-44. The Belleville ARC is sponsoring Novice class at their local high school. K2DOT and WB2NSV have the detail. The group at K2OOJ is keeping a sked with 912MA and family. WA2NLP received his Advanced Class license and an NCK. WB2FEH passed the Extra Class exam. WA2EUX was elected vice-pres. of the W2SZ group. WA2UOO appeared on a TV new broadcast and gave an account of the part ham radio played during the recent W6 disaster. Your SEC is looking for more h.Cs. Contact him or the SCM if interested. WN2PQL is the son of W2ZEP who is the son of W2ABL. How about that for a family. Both OMs are no ORS and we hope to get the third member. You have probably read or heard about the latest FCC proposal on frequencies. I hope you can find time to comment through your ARRL Director prior to the Board Meeting. Traffic: (Feb.) K2RXQ 564, WA2BAN 304, WB2VFR 285, WA2DRH 253, WA2JNQ 172, WB2JAE 161, WB2LW 152, K2OOJ 129, WB2NSV 102, WA2KHQ 81, WA2ER 73, WA2FVH 66, WA2CAK 61, WA2HAD 49, WA2EPI 41, WA2UOO 44, WB2NOM 38, WA2EUX 37, W2ZZ 36, W2EWZ 31, WA2CCF 31, WA2YXQ 29, W2CVW 25, WB2WNZ 25, WA2FUI 21, K2MFX 18, K2CBG 12, K2ZFI 12, WA2JIM 10, WB2NSV 10, WB2TUL 10, WA2LX 9, WA2JXE 7, W2CU 4, W2SBL 2. (Jan.) WA2JNQ 185, W2GSA 109, K2DOT 90, WA2DMF 46.

MIDWEST DIVISION

IOWA — SCM, Al Culbert, K0YVU — SEC: K0LVB. OBS: W0JQA, W0LXC, W0LR, WA0MT, W0SEF. New appointments: K0LKH as OPS; K0DDA as ORS. W0BDTN is a new ham in Decorah. W0NPD is W9OPD's new call and he is the Motorola representative so better get to know him. That 4.0 grade the WA0PUJ received at ISU last term would explain his absence on the band lately. W0ZYB suffered a cruel blow of fate when a recent F-106 fire burned out his bakery. WA0RXX is hoping to promote some 2-meter fm operation in the Decorah area this summer. With the warmer weather now, thoughts should be turning to antenna projects and Field Day planning. Speaking of Field Day, if your chairman, would forward a tabulation of your scores, to me, I'll see we can't show who was tops in our section a little earlier than Nov. Don't forget those time changes when looking for the nets if your clock is on GMT — and whose isn't?

Net	kHz	GMT	QNT	QTC	Mgr.
Iowa 75	3970	2300	1268	53	W0YL
Iowa 75	3970	1730	1479	176	K0LV
TLCN (cw)	3560	2330	196	157	K0AZ

Traffic: W0LXC 1654, K0AZJ 285, WA0VZH 174, K0DDA 123, WA0AUX 110, W0MOQ 73, WA0OTQ 57, WA0VVG 17, W0WB 11, K0JGI 10, WA0PUJ 8, WA0YJW 7, K0LUZ 6, WA0EFN 5, K0LKH 4, WA0POE 4, WA0RXX 3.

KANSAS — SCM, Robert M. Summers, K0BXF — SEC: K0LPE. PAMS: K0JMF, K0ENU. RMs: K0MRI, WA0TZK, VHF PAMS: WA0CCW, WA0TRO. I will list part of our nets operating in Kansas this month. WA0LLC reports K0BDVN won top honors for KWN in Jan. and W0BGX is the Weather man of the month for Feb. Midstates Mobile Monitor Service has really developed into a fine net. Reporting for Feb. QNT 1429, QTC 44; 55 mobile check-ins and 83 phone calls or patches, 130½ hours of operation. Information following indicates net, frequency, time (CST) and days, net mgr., unless otherwise noted. QES-3610-1900/2200 Dy. K0MRI - QNT 404 - QTC 387 - Sess. 54; OKN-3735-2000 Dy. WA0TZK, 3905-1230 Su-K0JDD, 3735-1730 Su-K0EXN, 3910-0930 Su-K0UVH, 3920-1900 to 2300 Dy-K0ENU, KWN-3920-1800 Dy - WA0LLC - QNT 863 - QTC 8 - Sess. 28; KSN-3920-1830 M-S-K0JMF - QNT 1223 - QTC 1268 - Sess. 24; KPN-3920-0645 MW/0800 Su - K0JMF - QNT 267 - QTC 67 - Sess. 16; JARS-3920-0830 Su-W0MCH, 0900 Su-W0BGX, 0930 Su-W0LBB, 1830 Su-K0ENU, 1900 T-WA0PMS, 1900 F-W0GUR, 3925-1230 Su-WA0OZP, 3930-1900 W-W0LXA, 3935-0800 Su-K0EXN; KPON-3955-0830 Su-W0LXA - QNT 1395 - QTC 621; 3975-2100 T-F - WA0UMZ, 7255-1230 M-S-W0LXA, 7255-Dy. FCARS WCARS, 7258-Dy MIDCARS, 7275-1400 Su-WA0UTT, KEC-7278-1300 Su-K0LPE - QNT 104 - QTC 4 - Sess. 4; HBN-7280-1205 M-F-WA0UPA - QNT 617 - QTC 58 - Sess. 20. Next month the AREC Nets will be listed. Traffic: W0LNH 646, W0H 333, WA0LBB 196, K0MRI 173, W0BGX 167, W0MA 132, F0BXX 98, K0JMF 96, WA0JFC 58, W0CCJ 49, K0LPE 42, W0FDJ 34, WA0SQ 26, W0CHJ 24, WA0KC 23, WA0OZP 27, W0FCL 19, K0UVH 18, W0GUR 17, K0EXN 16, K0JH 16, WA0WXY 16, WA0OWH 15, WA0TZK 15, K0FIG 14, W0B0F 13, K0JID 10, W0PB 9, K0ENU 8, W0LYC 4, K0AYO 2.

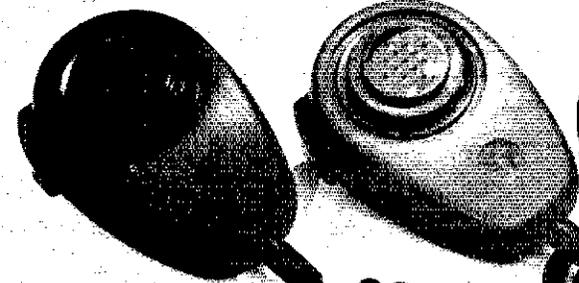
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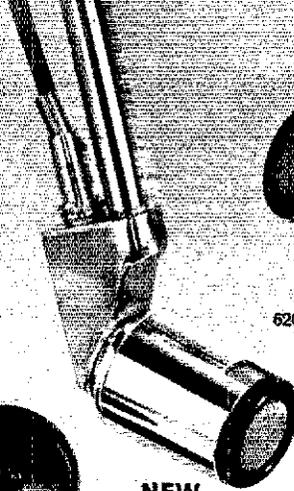
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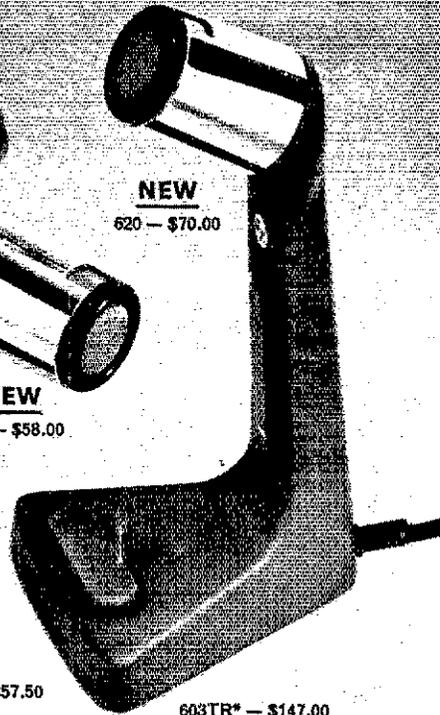
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MISSOURI - SCM, Robert J. Peavler, W0BV - SEC: W0ENW. New appointments: W0LCO as EC for Ozark County, WA0VLT as EC for Clinton County, W0B0ZP as OVS. PHD Net certificates go to K0HHM and WA0HHB. Net reports:

Net	Freq.	Time/Days	Sess.	QNI	QTC	Mgr.
MoPON	3933	2200 M-S	24	300	56	WA0TAA
MoAREC	3905	2240 M	3	20	0	W0ENW
MoSSB	3963	2300 M-S	24	1210	122	W0RTO
MON	3585	0000 Dy	23	130	97	K0AEM
MON 2	3585	0245 Dy	29	128	86	W0HH
PHD	50.45	0030 T	4	145	14	WA0KUF
MMN	3715	2100 S	3	7	3	WA0ZLI

The above times became effective with the shift to Daylight Time, Apr. 25. WA0ZGP announces the formation of the Intercontinental A.M. Net, which meets in the St. Louis area at 2 P.M. Sun. on 29.16 MHz; am stations only. New officers of the Tri-State ARC are WA0ZWN, pres.; W0OUD, vice-pres.; WA0LYU, secy.; W0MOQY, treas.; WA0FKD, sgt.-at-arms. Congratulations to WA0ZLI, who, as WN0ZLI, won the Novice SS award. WN0DUF is a student at the University of Illinois and received her license through the help of the Synton ARC at the University. WA0WOW is now in the Navy. Traffic: K0ONK 768, K0AEM 456, W0HY 243, WA0HTN 160, W0HH 140, WA0KDE 65, W0OUD 34, WA0TAA 32, W0GBJ 21, W0HVJ 19, W0MKJ 16, WA0WFN 14, WA0ZLI 5, WN0ZLP 2.

NEBRASKA - SCM, V.A. Cashon, K0OAL - Asst. SCM: Velma Sayer, WA0GHZ. SEC: K0ODF. Renewed appointments: K0BRS as OO; WA0DDU as ORS; WA0SOP and WA0OOX as OPS.

Net	Freq.	GMT/Days	QNI	QTC	Mgr.
NSN 1	3982	0030 Dy	1213	52	WA0LOY
NSN II	3982	0130 Dy	894	31	WA0LOJ
Neb. 160	1995	0130 Dy	644	3	WA0CBJ
NEB	3590	0400 Dy	*	*	WA0HWR
NMN	3982	1330 Dy	1181	33	WA0JUF
WMN	3950	1400 M-S	509	66	W0NIK
AREC	3982	1430 Dy	200	4	W0IRZ
CHN	3980	1830 Dy	1560	84	WA0GHZ

*Not received. I regret to report that K0LXS has joined Silent Keys. The Smoke Signal Senders Pow-Wow is scheduled for June 5, 6 and the Pine Ridge ARC Hamfest June 6 at Chadron State park. W0NIK was in the Scottsbluff hospital in Feb. and now is back on the air. W0BCAU has kw for cw use when needed. The Box Butte Co. 2-Meter ARCC Net reported 20 QNI for Feb. W0BADH is now 2-meter mobile equipped. Blizzard conditions hit the eastern part of the state with flooding problems afterwards. No reports received to date regarding amateur participation. Traffic: (Feb.) WA0DDU 392, W0LOD 216, WA0SCP 156, K0ODF 69, W0BCAU 46, K0UWR 35, WA0IXD 32, WA0CBJ 25, WA0BOK 23, K0FRU 18, WA0QEX 15, W0DMY 13, WA0GHZ 13, WA0OOX 12, W0YFR 10, K0EJT 9, W0BPN 8, WA0JH 8, WA0EEI 7, W0LJO 7, WA0PC 7, K0DGW 6, K0JFN 6, WA0UPX 6, W0EOB 5, W0HTA 5, W0MYT 5, K0OAL 5, WA0YGI 5, WA0PF 4, WA0QEI 4, WA0TMC 4, W0AGK 3, K0HNT 3, WA0LOY 3, W0VEA 3, W0BADH 2, K0AJM 2, WA0MYT 2, W0NIK 2, WA0NXM 2, K0SFA 2, WA0SOP 2, W0SWG 2, W0WZR 2, WA0HAL 1, WA0JKN 1, WA0JUF, (Jan) W0LOD 217.

NEW ENGLAND DIVISION

CONNECTICUT - SCM, John J. McNassor, W1GVT - SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1845 Dy	28	329	589
		2200			
CPN	3965	1800 M-S	28	386	209
		1000 Su			
VHF 2	145.98	2200 M-S	20	82	41
VHF 6	50.6	2100 M-S	20	104	19

High QNI: CN - K1PQT, W1KY, WA1GFH and W1CTI. CPN - K1EIC, W1DOJ, W1GVT and W1MPW. SEC: W1HHR requests ECs to send their reports covering winter activities - advise if there is no EC in your area. Director W1QV sends newsletter to all clubs. Write W1QV re your comments by letter on the latest FCC proposal now for action at the May Board Meeting. The CN Bulletin from K1EIR covers SET and late session for CN daily on a trial basis. The Trumbull ARC had a dinner meeting for installation of officers. FB program for Hamden ARA in Harascope. The Tri-City ARC follows Handest with Homebrew Contest. W1MOW is busy with the Ledyard High School station, "Early 80 Free Net" 3733 kHz daily 6:30 A.M. Please join, W1ZEC/I now is W1A0FP. Send repeater station information for listing in the Net Directory. VHF appointees: send activity information to ARRL @ W1NJM for input to OVS Bulletin. Congratulations to: W1JVV for Feb. BPL the long way again; W1H0L also Feb. BPL; W1J3SU/I First Class Commercial; W10RU, W1N1MN, W1N1YO, W1N1KTS, W1N1NW and W1N1OCG new Novice licensees; W1N1P, General Class and

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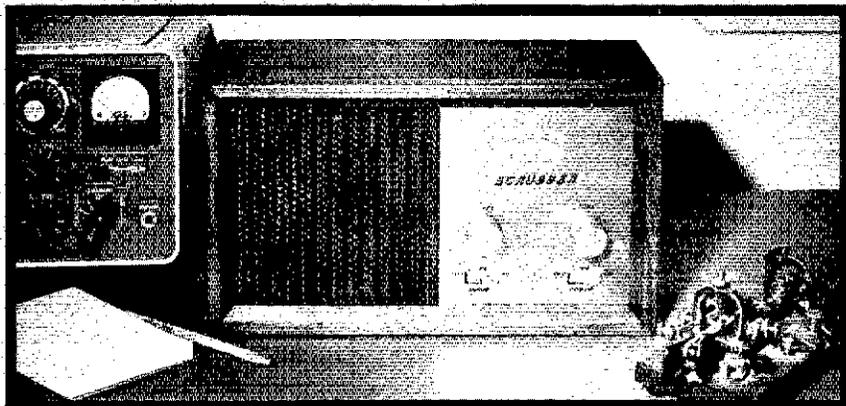
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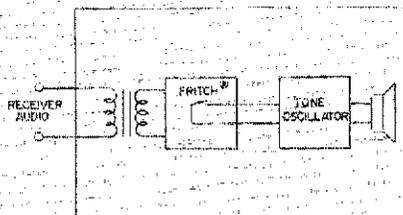
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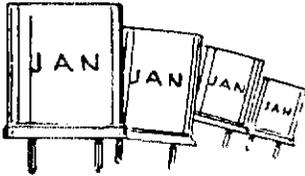
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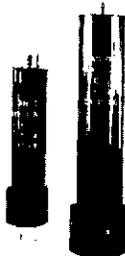
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K1FQT for General, Advanced and Extra Class all at the same time! Field Day is almost here, be sure to use VHF but not through repeaters! Traffic: (Feb.) WA1JVV 521, WA1HOL 455, W1E1 372, W1EFW 295, W1CT1 252, W1AW 219, W1MPW 170, WA3JSU/1 163, WA1GFH 131, W1GVT 66, K1YGS 65, K1SXF 62, WA1HNS 49, WA1MOW 42, W1BD1 41, WA1JMO 26, W1QV 22, WA1JVP 18, WB2ZC/1 18, WA1JGA 14, K1SRF 12, W1DQJ 9, W1KAM 9, W1FUE 7, W1YBH 7, W1CUH 6, W1YBI 3, W1FWL 2. (Jan.) W1EFW 350, W1HHR 46, WB2ZC/1 18.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, Jr., W1ALP - SEC W1AOG is in Fla. K1VGM passed the Extra Class exam. The T9 Radio Club met at W1TYP. W1HHU, W1FTB are Silent Keys. W1AME's wife passed away. K1JYI is on 10. The OOTC had quite a turnout at Valles in Saugus. W1MX has the "S" line. W1BNS has a new beam on 2. K1EPL says the New Eng. Emerg. Phone Net had 4 sessions, 4 traffic, 94 QNIs, W1NF has been an OO for 24 years. K1UCT has moved back to Hull. W1ALP and his XYL attended the annual banquet of the Whitman RC and a nice time was had by all. K1MTH is RO for Norwell. D1.2AA/W1 in Westwood has a repeater on 432 MHz at his QTH; K1HRV is working with him. W1M1KM passed his General Class exam. W2AQV/1 is on 2 in Dennis, New YIs: W1QBI, W1NOIC, W1NOEM, W1QEB. The South Shore Club had a discussion on fm. W1AINME is on many bands. K1BHF in IMRA. W1IPZ has QSOs with sons W13PUB and W8KFW. W1AIKZE now 15, passed the Advanced Class exam. K1PBF is handling traffic again. New officers of the Southeastern Mass. ARA, W1AEC: W1AGVY, pres.; W1ACCW, vice-pres.; K1VIP, secy.; W1LAZ, treas. W1AMHJ has a Swan 500-C running phone patches on FCARS. W1M1SB is on with a DX-40, has 38 states. W1A1DC worked an FM7 on 75. New officers of the Norwood ARC: W1L1P, pres.; W1L1HQ, vice-pres.; W1K1BG, secy.; W1L1DL, treas. W1A1FNM is active on 2. W1K1DL has 49 states on 10. The 6-Meter Cross Band Net had 16 sessions, 61 QNIs. The Somerset ARC, W1A1DGW has a Rag Chewers Net on Wed. at 8 P.M. on 50.25 MHz, and have applied for ARRL affiliation. W1L1BD is secy. FM1MN had 20 sessions, 144 QNIs, 170 traffic. W1KWD. W1E1Y are in the hospital. K11KT got married and W1K1YW was best man. W1AKY has the call W1SM for his home QTH and old call for down on the Cape, note the "SM" prefix for Sweden of course, hi. W1L1FF has joined the Navy. W1WSN spoke at the Waltham RC; they will have a repeater at K1MON's QTH. W1J1YY has an SB-100. W1L1JWO has his station on 6 with a 99er, hilltopper beam. New officers of the Massasoit ARA: W1K1KP, pres.; W1C1UY, vice-pres.; W1H1I, secy.; W1A1GAJ, treas. W1GRN is now in F. Bridgewater. W5GNI/1 in Bedford is on 40 through 10. W1R1PE is EC and RO for Avon. New appointments: W1L1DA as OO; W1ATX, W1ALS BYM, MJD as ORSs; W1A1MJD as OVS. Endorsed: W1ALS JVL, ECV, JYJ as ORSs; W1NF as OO; W1ALS JYJ, JHQ as ORSs; W1SH as EC. W1Q1YY made BPL. K1YHZ as RO and EC for Weymouth. W1ALS GSP and EMN have been giving a 12-weeks course for new hams. W1DQM has a new TA-33 beam. K1R2O has her WAS. W1H1I and K1SHN working the DX. W1M1WM is in Jamaica. W1A1NNT is on 75 and works son-in-law W1A3NET. W1M1SB has a new net going "Early Eighty Free Net" on 3733, 1130 GMT every day. W1AUQ has a new Drake R-4B. Traffic: (Feb.) W1Q1YY 542, W1O1JM 422, W1A1FAD 189, W1EMG 133, W1A1HF 81, W1M1NK 81, W1UX 68, W1A1MJD 61, W1ATX 49, W1DQM 49, W1A1MFG 36, W1A1IG 28, W1L1HQ 14, W1M1SB 14, W1A1DJC 13, W1MX 13, W2TPV/1 7, W1PL 6, W1KZE 5, W1A1FNM 1. (Jan.) W1ABC 204, W1A1FSI 152, W1A1MHJ 37, W1M1SB 3, W1ARC 1.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLF, PAM: W1ALCM. RM: W1BJG. W1BHA still is looking for an asst. ngr. for the Barnyard Net. W1VLU has a new SB-220 on the air with an FB signal. The Portland Amateur Wireless will have an auction in the spring so start cleaning out your cellars! W1SJS has a new Clegg fm rig. New hams in Maine are K1N1ZZ, W1NOBA, W1A1OBM, W1A1ODM, W1N1ODE. W1ALCM is on the air with a new linear. The Maine Yankee Repeater Assn. hopes to have a repeater on the air by spring. K1ACT now is K1ENY. K1BAZ is back from DU-4 and living in Fla. W1Q1I, ex-W1FAX is back from Saigon. K1BQT operates portable from Durham, N.H. The Maine Post Office Net is managed by W1VLU. The Horsetraders Net is being managed by K1DAP and K1BQT and they are doing an FB job. I am sorry to report the death of W1HHU. Traffic: W1J1HT 38, W1A1JCN 10, K1TFV 6.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX, SEC: W1LUD. RM: W1AGCE. Welcome to new Novices W1N1WK, W1N1XL, W1N1YI, W1ANYS, W1N1NZC and W1A1NZL. Endorsements: W1BYS as OO; W1JSM as OVS; W1AJTM as ORS; W1SWX as OO. Appointment: K1ALG as OO. Former OO K1N1BN now is W6M2W. W1UBG is building the TO keyer from the ARRL

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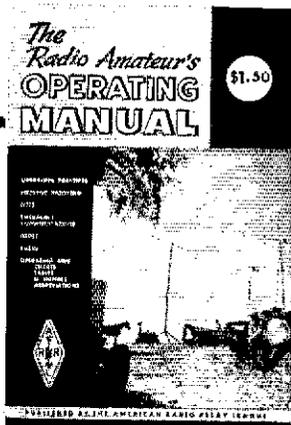
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Handbook. The VTNNH report shows 177 check-ins and 407 traffic. WBYS is adding a 40-meter antenna while rebuilding station. WIDX and WA1JFM worked rare WA1ARF/KS4 on Swan Island on 80-meters. K1NQZ is on 6-meters. K1HDO says 10-meters still good but needs Del. and Ky. for WAS. Retired W1JB is on 160-through 10-meters. WICTW (alias W1IQD) works W1QHS on WBFM on 220 MHz. W1RCC is back from Fla. vacation. K1AEG is active again with new equipment recessed into wall. W1YWC is working in Nashua. Traffic: WA1JFM 1052, WA1GCT 370, K1BCS 276, W1UBG 110, K1VXX/1 46, K1WQV 46, WA1MXT 32, W1SWX 30, W1BYS 5, W1DXB 1.

RHODE ISLAND — SCM, John E. Johnson, K1AAV — SEC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK. RISPNC report: 28 sessions, 624 QNL, 184 traffic. W1FVY was appointed as EC of New Shoreham and W1JFB endorsed as EC of Newport. Traffic on the Rhode Island Nets increased greatly during Feb. because of the recent earthquake in Calif. The IRN handled more than 220 pieces of traffic for the Red Cross through the Rhode Island State Phone Net and the Post Office Net. Taking part in the traffic for IRN were K1QFD, W1FQZ/1, W1QYY, W1YNE, W1LOM and K1YFV. K1FGK as Net Mgr. for the RISPNC did an excellent job in assisting the Red Cross in the Providence area helping them to get their emergency traffic to Calif. W1YNE handled 114 messages for the Red Cross and 30 inquiries direct to the Los Angeles Civil Defense station W6LN on 20-meters. He has worked several DX stations recently and completed the EMT on Feb. 14. Traffic: W1YNE 206, K1FGK 167, K1QFD 157, W1TXL 145, WA1IST 52, WA1HBW 24, K1CFP 12, WA1CXF 5, K1VYC 3.

VERMONT — SCM, E. Reginald Murray, K1MPN.

Net	Freq.	Time/21 Days	QNL	QTC	Net Mgr.
Gr. Mt.	3932	2230 M-S	478	34	W1JLZ
Vt. Fone	3954	1400 Su	89	15	W1KKM
Carrier	3945	1400 M-S	368	6	W1RCC
VTNH	3685	6000 Dy	148	254	WA1GCL
VTCD	3990.5	1500 Su	20	12	W1AD
VTSB	3909	2230 M-S	515	78	WA1HSSG
		1330			

Welcome to new Novices WN1OAF, WN1OCV and WN1OCW all of Bennington; also to K1HK now in the Mt. Snow area. Remember Green Up Day May 1. Congrats to K1WQU, Rutland, who has worked all U.S. Counties—any other Vermonters? Hope you remembered to turn your clocks ahead Apr. 25. Traffic: K1BOB 201, WA1GKS 35, K1MPN 26, W1JUG 7.

WESTERN MASSACHUSETTS — SCM, Percy C. Noble, W1BVR — SFC: WA1DNB. CW RM: W1DVW. 75-meter PAM: WA1MFB. AREC WMEN had 46 QNLs and handled 31 messages during its four Sun. sessions. The AREC 10-, 6-, and 2-meter nets are also going quite well (see last month's QST for days and frequencies). WMN had 161 QNLs and handled 128 messages. Top five in attendance were: W1BVR, WA1LNF, W1DVW, WA1LPI and WA1FBE. WMEN had 92 QNLs and handled 130 messages. Top five in attendance were: WA1MFB, WA1LPI, W1CSF, WA1LZS and WA1LNF. Both W1CSF and WA1MFB made BPL (the latter for the 3rd time). F.B. Phone net certificates have been issued to all five. New appointees: WA1LPR as OPS and OO: WA2BCT/1 as ORS and OPS. W1LJQ received an award from the city of Northampton for his 25-years service as CD officer. WA1ITL is NCS of the new Pioneer Valley VHF CW Traffic Training Net Wed. 1930 on 28,985. WA1HBF has 2-meter fm repeater equipment. W1CSF reports that the Pioneer Valley AREC Net operates Wed. on 29 MHz at 2000. W1DVW now has a new Drake R-4B receiver to go with his new T-4XB transmitter. From CMARA: New officers are K1HIS, pres.; WA1KRG, vice-pres.; WN1OAS, secy.; K1RNG, treas. Classes for novices are held Tue. evenings from 7:00 to 9:00 with WN1OAS as instructor. New Novices in the club are WN1OAS, WN1OAZ, WN1OAT, WN1OAU, WN1OAV, WN1OAR, WN1NYV, WN1OAX, WN1OAW and WN1OAY. From HCRA: Speaker of the month was Mr. Charles Watts who spoke on fm repeaters. K1ANE was the club's top scorer in the VHF contest. From MARC: A Chinese auction was held at the Feb. meeting. W1JQF and XYL leave in May for a three-week vacation in Italy. W1EIP has been on vhf for 40 years. From VARC: WA1LGO (and W1CSF of AREC) report on the new Novice Training Course being given in the Northampton CD radio rooms. WA1OCK is active on 2-meter fm. K1PQU is operating with a real ground-wave signal. WN1PL is building a 600-watt linear. WN1PL, WA1CXD and K1ZKH are putting up a 2-meter MARS fm repeater station. Traffic: (Feb.) K1SSH 392, W1CSF 342, WA1LPI 284, WA1MFB 202, W1BVR 77, W1EOB 65, W1DVW 63, W1HII 20, W1KZS 5, WA2BCT/1 5, (Jan.) W1CSF 93, WA1BXQ/1 70, WA1LGO 15, W1KZS 3.

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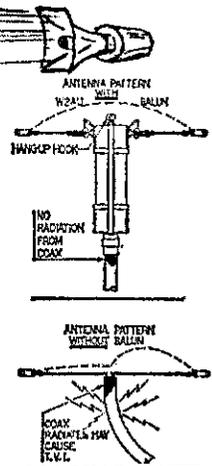
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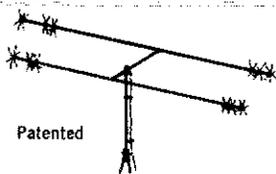
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ALASKA - Acting SCM, Kenneth R. Klopff, KL7EVO - It seems that because there are more hams in the metropolitan areas Novices have a much better chance of obtaining free equipment or of borrowing gear to get them on the air than those out in the bush. Occasionally I am given equipment to pass on to newcomers as, I am sure, many of you are. If any of you hams in the bush who know of Novices who need gear to get on the air please let me know and if anything is available I will let you know. Don't send me any equipment. KL7HCN is now at Barrow. KL7AEQ and KL7AZJ have returned from their tour of the outside. KL7DG would like to form a "running" net on 14050 at 0200Z for amateurs interested in long distance running for health. KL7CZ's QCWA dinner was a success, thanks to the members of the QCWA. KL7EY is at the Port Clarence Loran Station; but he doesn't work 160. KL7GIH is at college. Traffic: KL7CAH 195.

IDAHO - SCM, Donald A. Crisp, W7ZNN - SFC: WA7EWV, RO: W7YON. The FARM Net meets each day on 3935 kHz at 0200 GMT. The Idaho RACES Net meets week days on 3990.5 kHz at 1515 GMT. WA7LRP has upgraded his Novice license to Advanced Class. WA7CTS has moved from Orofino to Lewiston. W7EMT is back on the air with a Ranger and vertical. WA7MMG built a new ssb transceiver. WA7BDC, W7PDV and WA7MMG are instructors for 45 students in a code and theory course in Coeur d'Alene. 42 hams and wives attended the annual Northwest Weather Net banquet held in Coeur d'Alene. W7BPL was MC and K7UBC made the arrangements. K7UAE is using a unique directional receiving antenna which he reports is very effective in reducing QRM. FARM Net report: 28 sessions, 1117 check-ins, 117 traffic handled. PO Net report: 12 sessions, 83 check-ins, 12 traffic handled. Traffic: W7GHT 236, WA7EOT 119, WA7BDD 89, W7IY 87, K7URC 34, W7ZNN 26, K7CSL 4.

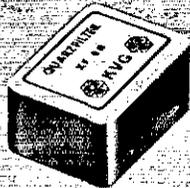
MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN, PAM: WA7IZR, VHF PAM: W7IAC. Congratulations to K7NHV for the FB SS score at W8FH. W7SMY is building a homebrew 5-band transceiver. K7ZZZ is being transferred to W6-Land. W7ZOH is moving from Livingston to Hozenam. The Yellowstone Radio Club officers are WA7KKN, pres.; WA7BKW, vice-pres.; W7BMI, secy.-treas.; WA7IOA, K7VCA, K7VSS, board of dir. Billings also has 25 students in their novice class. New appointees are WA7OBH as OPS and WA7PDC as OVS. WA7NWP has a 20-A and linear. K7EKB has made BPL again. W7LNU is building an fm 2-meter rig. WA7PZO has a new FTDX-560. The Butte 2-meter repeater is located at 7000-ft. and the call is WA7KZF. The Montana call books are available and can be ordered from K7EJL in Great Falls. The Capital City Amateur Radio Club has an interesting schedule set for the spring months. We will miss W7YZQ of Billings. Our condolences are extended to Vera and son WA7KKP. Gallatin Radio Club hams are providing radio communications for the snowmobile races from West Yellowstone to Bozeman. Communications to be held on 2- and 75-meters. The Glacier-Waterton Hamfest will be held on July 17 and 18. Traffic: W7EKB 670, K7EJL 32, W7L BK 30, WA7IZR 14, WA7OBH 14, WA7NWP 11.

OREGON - SCM, Dale T. Justice, K7WWR - SEC: W7HLE. RM: K7GGQ, PAM: K7ROZ. Net reports: WA7GTX reports for the AREC Net for Jan., sessions 29, check-ins 484, traffic 11, contacts 45. Feb. sessions were 28, check-ins 304, traffic and contacts 42. K7ZQU reports for the BSN for Jan., sessions 62, check-ins 1515, traffic 140, contacts 209. For Feb. sessions were 56, check-ins 1283, traffic 112, contacts 195. WA7KIU reports for the OSN for Jan., sessions 23, check-ins 156, traffic 102. For Feb. sessions were 20, check-ins 116, traffic 38. WA7FTN ran 782 patches to S.E. Asia during the month, and his XYL, WA7JNQ, is helping out. WA7KRH is on 2-meter fm. WA7FQE is raising a new tower. WA7ACV entertained the SAUDSN for Feb. meeting. WA7ONC has been running 3 watts QRP and doing very well with DX. Traffic: (Feb.) K7QFG 177, WA7ICX 107, WA7KIU 51, W7BDU 48, WA7IFS 39, WA7KRH 28, WA7MOK 11, W7MLJ 10, K7YOM 7, K7KPT 5, W7LT 5, WA7MIF 3. (Jan.) K7ROZ 231, WA7KIU 171, K7NTS 167, K7QFG 161, W7HLE 64, WA7IFS 64, WA7ICX 57, K7YOM 43, K7GGQ 27, WA7HDO 21, WA7KRH 12, W7LT 10, K7KPT 9, W7MLJ 8, WA7MOK 7, WA7MIF 6.

WASHINGTON - SCM, Harry W. Lewis, W7JWI

Net	QNI	QTC	Sess.
WSN	307	178	28
NTN	1340	145	28
WARTS	1342	157	28
NSN	236	76	28

The Spokane Dial Twisters will hold their annual banquet May 8. The RN7 stations are organizing RTTY to handle bulk traffic in real emergencies. New stations to register for AREC are the following:



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Insertion Loss	< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3 dB	< 5 dB
Input-Output Termination	Z_I 500 Ω C_I 30 pF	500 Ω 30 pF	500 Ω 30 pF	500 Ω 30 pF	1200 Ω 30 pF	500 Ω 30 pF
Shape Factor	(6:50 dB) 1.7	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:40 dB) 2.5 (6:60 dB) 4.4			
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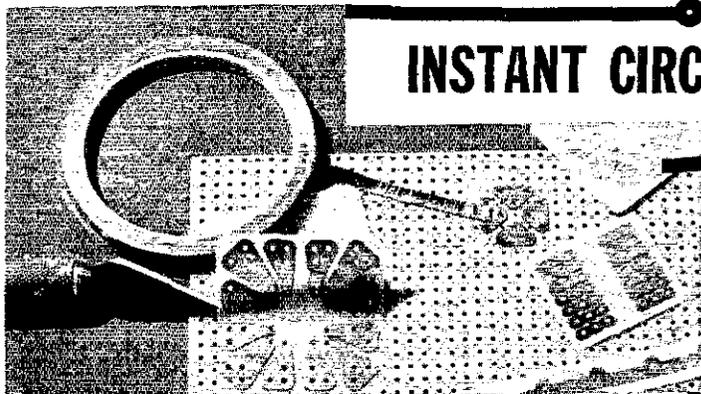
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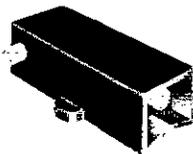
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WA7LOV, WA7OCV, WA7NVV, WA7NSM and WN7QHN. AREC members in the Wash. section now total 253 with 8 emergency nets active. Frequencies are as follows: 29.0 MHz, 50.29 MHz, 50.85 MHz, 29.6 MHz, 145.35 MHz, 146.76 MHz and 3930 kHz. K7VNT, of Bellingham has been voted Wash. State "Ham of the Year" by the Pudget Sound Council of Radio Clubs. The Radio Club of Port Angeles has recently joined the Council. WA7ESD is one of those amateur sky-divers as well as a ham. He also is mending a broken leg that he suffered in one of the two hobbies. The Radio Club of Tacoma now holds the trophy for edging out the Boeing Employees Amateur Radio Society in the Sweepstakes competition. The Bellingham club will have a special float in the annual Blossomtime parade May 22. This follows their banquet on May 9. Nick Foster, formerly W7RX, retires June 12. Nick has been teaching the essentials of electronics to hundreds of students for over 45 years. We regret to record the passing of W7LN professor emeritus at WSU and founder of KWSU (formerly KWCS). May 21 will find the North Seattle Amateur Radio Club having dinner at Ivar's Salmon House 7 P.M. Traffic: W7BA 1091, W7DZX 482, W7PI 477, WA7HXR 199, W7AXT 187, K7CTP 115, W7JH 75, W7BQ 54, W7UWT 42, K7TCY 31, W7BUN 28, K7LRD 26, W7APS 29, WA7DZL 23, W7AIB 11, W7JWJ 9, W7RXH 9, W7ZH 6.

PACIFIC DIVISION

EAST BAY - SCM, Paul J. Parker, WB6DHH - Much activity in Feb. can be attributed to the SET and also to the real thing that occurred in the earthquake that shook the L.A. area. W6IPW made many message points in handling traffic. The transmitter broke in the thick of things but he got it back working. Many members of the Mount Diablo Amateur Radio Club assisted the local Red Cross in handling emergency traffic. W6LGV, W6QEN, K6SAS, K6POU, WA6GCS and WA6FKU were among the busiest. W6AKB recently got new Swan gear and it too received a good workout during the earthquake aftermath. Please let me know what emergency traffic you handled. Much work has been done by WA6FDB in Vallejo to spread ham radio around with code classes and other public service projects. Traffic: W6IPW 908, W6AKB 54, WB6VEW 21, W6AR (1).

HAWAII - SCM, Lee R. Wical, KH6BZF - SEC: KH6BZF. RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. QST Mgr.: KH6DQ. EC: KH6s GPO. LP. BAS, GCU, UKD, KIHN0/KH6, KC6EJ and W7UZH/KG6. RACES Net coordinate with Dick Hamada, Radio Officer.

Net	Mhz	Time(Z)/Days
Friendly	7.290	2030 M-F
World-Wide Boy Scout	21.360	1800 S
Confusion (Patches)	21.400	0030 AH
Pacific Interisland	14.335	0830 M-W-F
Micronesia	14.335	0800 T-Th-S-Su
S.P. Asia	14.320	1200 AH
Pupule	7.290	0630 AH
Gecko	14.290	0730 T

I regret to report the death of well-known amateur, Honolulu ARC member and friend Norin Koboyashi, KH6HP. It is with deep regret that we record his passing to a Silent Key. Someone once said, "that you never miss the water until the well runs dry." I guess that's what happened when a combination of Christmas mail, late reports and personal business, I missed a Hawaii section news column! Well I know how many of you read it now! Mail those reports before the end of the month so that I can make my deadline to League Hq. Comm. Dept. OK! KH6CD has a new rotor on his arrays, KH6AIO and XYI. KH6AJD have their new three-element quad up. A new resident in our islands is W6EI and family in Honolulu. W6SAI and his gang are in and out of Maui. K5LTH/KH6HDB the "chop" at KH6SP passed his Extra Class exam. KH6HCM has a pair of phased verticle on 40-meters. W7WQX/KH6 is a proud father. KH6GKD has a new used tower and is working on his DXCC list. Mike has a new SB-220 also. KH6BWT has been looking for a Collins 312-B5 console to complete his station. W4UAF, ex- of KH6, hopes to return to Orlando, Fla. soon. May I take this opportunity to express my personal appreciation to KH6GOW/W6GBW, ex-KR6UD, who recently retired as our SEC Hawaii. Traffic: (Feb.) KH6GOW 83, KH6BZF 15, K2HBA/KH6 1, W7UZH/KG6 1. (Jan.) KH6GOW 111, K2HBA/KH6 4. (Dec.) KH6GOW 71.

NEVADA - SCM, Leonard M. Norman, W7PBV - SEC: Lewis Mike Blain, WA7BRU/W6LBS, 560 Cherry St., Boulder City, NV. 89005. Many Nevada amateurs handled messages for the Southern Calif. earthquake victims. WA7BAY conducts a General Class amateur examination instruction for 30 students. WA7MXQ is a crew member on 3903, WN7QKE, a new call in Las Vegas, uses a TCS-9 transmitter and an NC-300 receiver. Mobilizing in Nev., remember W7AKE fm repeater input 147.180, output 147.850;

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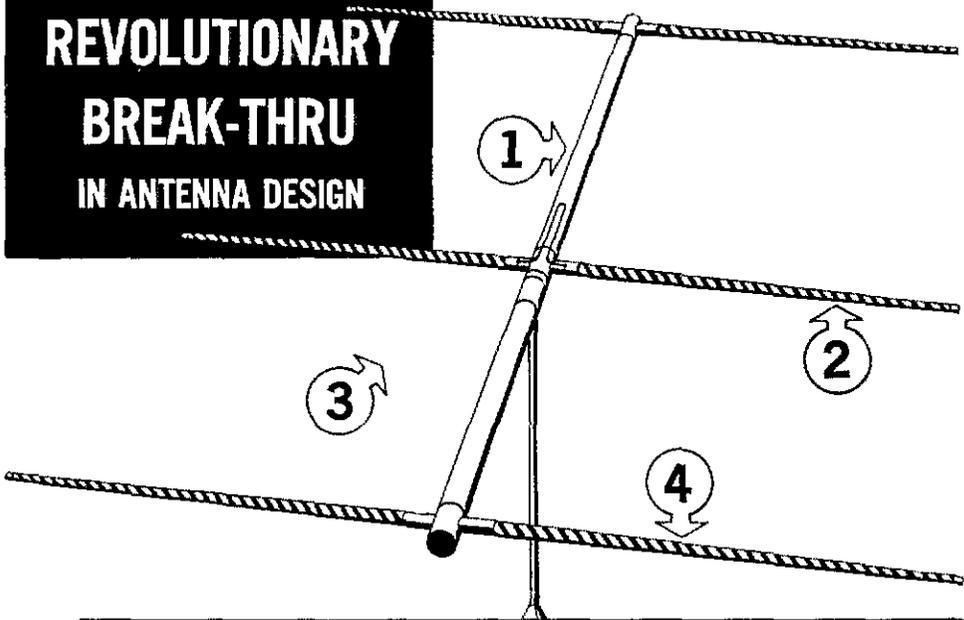
SACRAMENTO VALLEY - SCM, John F. Minke, W6KYA - Start planning now for the Pacific Division Convention during the July 4 week end, to be held in San Jose. Contact Associated Radio Clubs, P.O. Box 6, San Jose, Ca 95103 for details. WASTOS (also known as W9OIF) is looking for a contact with Modoc County. I would like a contact also. Interest in coordinating activities between clubs is being stirred up again by the Sacramento ARC. Maybe this is a good time to put out a feeler again for forming a Sacramento Valley Council of Clubs. Let's hear some feedback. W6JDN in Dunsmuir kept up the spirit of amateur radio during the Los Angeles earthquake by obtaining information on the welfare of relatives in that area. Don't forget Field Day. It will be here before you know it. W6NKR blew out his coax switch during the phone portion of the ARRL DX Contest and lost much time in operating. WB6ZOI, the RAMS repeater, should be on the air by this time. The Sacramento Army Depot now has over 30 members. The FCC's proposed suballocations for voice operations looks very interesting. Novices on 10-meters is also a nice move. The Calif. QSO Party will be held Oct. 2 through Oct. 4. Those planning portable operation please contact W6KYA Traffic: W6NKR 99, W6KYA 14, W6VUZ 8.

SAN FRANCISCO - SCM, Kenneth S. McTaggart, K6SRM - WA6BYZ is active on NCN after a trip to DU-F and. W6SLX, in Eureka is a new OPS appointee. WA6AHD in Sonoma Valley is active on 75 and 40 with a Swan-500. W6RNL enjoys schedules with old time shipmates. W6KVO checks into the Redwood Empire Net at 0130Z on 3980 kHz. WB6FZN is busy with shack projects that include a high power linear and RTTY. W6RQ claims the new Pioneer Radio Club is the largest in the city with 62 paid up members. W6GHP now is WB6DIP. W6PZF says a new repeater at the south end of Sonoma Mt. will cover both Sonoma and Petaluma more effectively than WB6SXC. Petaluma amateurs meet the 2nd and 4th Fri. of the month at 2000 at the Petaluma Sky-Ranch. W6EAJ continues 160-meter operations. W6FCX moves to Yuma this spring. The SEC thanks those EC's who have submitted monthly reports. Congratulations to W6BWP and helpers for the multiop cw win in the last sweepstakes. I would like to hear from more fellows in the section who are operating the less common modes. Valley of the Moon Amateur Radio Club meets at 7:30 P.M. on the 1st Fri. at the Community Center. Section members are reminded that the net directory is available from ARRL headquarters for a large SASL with 12-cents postage affixed. Traffic: W6KVO 258, W6WLV 196, WA6BYZ 192, W6BWW 50, W6PZF 19, W6RNL 8, W6RQ 1.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - WA6CPP ran 13 phone patches for Okinawa and MMS. WB6JAX has an FT-200 and is attending Stockton Jr. College. W6BKI is building a ham shack and expects to be active. WB6KGI is on 80-10 cw. WA6GIQF is active on Air Force MARS. WB6UYG is active on 6-meters. WB6YMO is on 15 cw and ssb. WB6JUI is running phone patches for the boys overseas. W6JMP is working on some 2-meter fm equipment. W6Q spent the winter in Mexico. WA6HJP was the winner of the Super Novice Award by the Delta Amateur Radio Club. W6YFP handled many messages to Southern Calif. during the earthquake. W6PIX is on 2-meter fm. The Tulare Co. Radio Club reports their 2-meter repeater is going great guns. The Southern San Joaquin Valley 2-meter fm net is held Tue. at 1900, 145.22 input 146.88 and. WB6URJ is heard on 2 am. The Fresno Amateur Radio Club meets the 2nd Fri. of every month in the PG and E building. The Madera Radio Club meets the 1st Tue. of every month in the Courthouse. The Tulare County Radio Club meets on the 3rd Fri. of each month in the County Courthouse. Traffic: WA6JDB 63, WA6CPP 3.

SANTA CLARA VALLEY - SCM, Albert E. Gaetano, W6VZT - RM: WA6LFA. W6RPT reports that Army MARS has stopped handling traffic into the Pacific. W6CUF reports that eleven (X) reports were sent out in Jan. W6DEF and XYL went to Paris and Nice for a vacation. K6GHX is recuperating from a mild heart attack. W6MMG reports that being QSL Mgr. for KC6RS on Truk sure keeps him busy. Members and family of the United Air Lines Amateur Radio Club enjoyed a brunch get-together in Millbrae and all had a good time. K6KCB is the new asst. mgr. to PAN. The West Valley and the Santa Clara Amateur Radio Clubs have joined forces in setting up a TVI committee to better service the whole Santa Clara Valley. They will need lots of help and if anyone is interested, please contact either club. Don't forget the Pacific Division Convention in July. Traffic: W6RSY 1209, K6DYX 664, K6KCB

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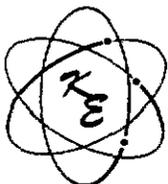


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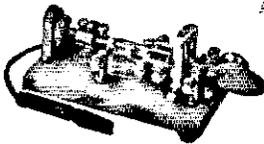
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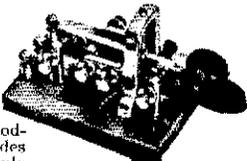
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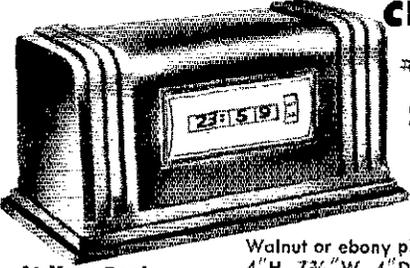


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ROANOKE DIVISION

NORTH CAROLINA - SCM, Calvin M. Dempsey, WA4UQC - SEC: W4EVN. PAM: W4AJT. VHF PAM: W4HJZ. RM: W4WXZ. During the emergency when the tornado hit the Fayetteville, N.C. area 18 amateurs did a fine job of getting messages in and out of the disaster area. SEC W4EVN has done it again. He made RPT- WA4KWC has been bitten by the RTTY bug. WA1CYT4 reports that W4WE, the club station at UNC, Chapel Hill, N.C., will be off the air for building repairs. Gerry is also working 5-watt QRP. The Franklin Communication Club of Franklin, N.C. has 13 charter members and all are ARRL members. The Buncombe County Radio Club of Asheville, N.C. has 16 notices with calls running consecutively from WN4TMR to WN4TNG. Thanks to all who made SET one of the best. The Forsyth Amateur Radio Club at Winston Salem, N.C. has elected new officers and are looking forward to an exciting year.

Net	Freq.	Time (Z)	Days	QTC	Mgr.
NC SSB	3938	00.30	Dy	10	WB4ADE
CNCE&L	3573	2.45	Dy	227	W4WXZ
				6.000	
TFEN	3923	00.30	Dy	75	WA4UQC

Traffic: (Feb.) W4EVN 584, W4WXZ 151, WB4MTG 105, K4MC 53, WN4PYN 52, K4VBI 50, WB4SKB 46, W44VNV 39, W4RWL 36, K4CFY 25, WB4PWZ 22, WB4HGT 17, WB4JMG 15, WA4UQC 12, K4TTN 5, K4ZKO 3, WN4ODR 2. (Jan.) W4WXZ 140, K4TTN 4.

SOUTH CAROLINA - SCM, Mrs. Elizabeth Y. Miller, WA4EFP - SEC: WA4ECJ. Asst. SEC: W4WQM. PAM: WA4GAW. RM: K4LND. K4LNI and K4NJS each did an excellent job in handling traffic in and out of Calif. during the recent earthquake. Clark further represented us all in some highly favorable publicity given amateur radio by station WBCL. We're sure there were others in the section who performed similarly but their deeds will forever remain unrecorded because they failed to advise the SCM. W4DX recently was appointed Roanoke Division Asst. Dir. WB4IMS planted a new tower. W4SII is tuckin' an HW-101. W4KWI, chief at WSPA, is "springing back" after major surgery. W4HDO is a new EC for Sumter County. All appointees are requested to send in their certificates for endorsement when due. Check yours now. Nets: SC SSB, 3915 kHz, 0000Z dy, mgr. WA4GAW; SCPN, 3930 kHz, 1700Z M-S (Sun, 1330Z & 2030Z); CN, 3573 kHz, 2345Z dy (early), mgr. W4WXZ; CN, 3573 kHz, 0400Z dy (late), mgr. WB4TF. SCSSB 229. Traffic: (Feb.) W4OAJ 85, W4MTR 67, W4WOM 38, W4NTO 25, W4RQF 18, W4JSD 14, W4JA 13. (Jan.) W4JA 17.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, Jr., W4THV. SEC: W44PB. Asst. SEC: WB4CVY. PAMS: W4OKN, WA4YXK. RMs: WA4EIJ, WB4NNO, W4SHI. The Calif. earthquake disaster following right on the heels of SET taught us some more on our shortcomings. W4SQ is debugging an M-19 teleprinter. W4UQ is assembling an SR-303. VSN is coming alive under RM WB4NNO who has all NCS filled with a waiting list - 28 sessions. QNI 380. QTC 202. WA4HQV is designing a new RTTY converter. K4JM and K4IYM joined the QRP generation. WB4NSF, WB4HRA and WB4FDT were among those at K4CG during the DX Contest. WB4FDT is undertaking to pick up the Va. Ham from WA4EUL, so get your news to him. WB4GMC and WB4RMQ were bitten by the traffic-handling bug. WB4SIK is an Advanced Class licensee. WA4WQG has the mobile back. Roanoke Division Dir. W4KFC attended the Executive Committee Meeting in Hartford. K4ZKU is pres. of the newly-formed Blue Mountain ARC. K4CPO got 50 countries in the DX Contest. The New River Community College ARC meets the 1st and 3rd Sat. and also have code classes. SEVWA operated WC4RBT from the Chesapeake Bay Bridge Tunnel during the Tidewater QSO Party. WB4DRC is at Ohio U. and works part time at WOUB. WB4ODN had another operation. Studying taking priority with WB4FLT and W4YZC. WB4RNT got the hum out of his garbage can. The Va. Beach ARC is sponsoring license classes. WA4TNS made the Dean's list but complains about studying. Alexandria EC W4LNT held surprise rest - turned out 8 mobiles, 5 portables and 3 fixed. WB4OXD is a new General Class licensee. WB4SLH is en route KX6BO. Traffic: (Feb.) WB4NNO 1035, W4SOQ 579, K4KNP 382, W4UQ 263, W4NLC 259, WB4CVY 156, WB4GTS 141, WB4KSG 122, WA4JFF 121, K4P0L 104, WB4KIT 100, K4FES 84, WA4PRJ 79, W4OKN 75, WB4RMO 53, WA4HQV 50, K0PIV 45, WB4KRN 40, K4JM 38, K4LMB 38, K4GR 29, WB4NSF 38, WA2DQE/4 24, WB4KCM 23, W4LOO 22, WB4GMC 21, WB4SIK 20, WB4RNT 18, WA4WQG 17, W4KFC 16,

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WEST VIRGINIA — SCM, Donald B. Morris, W8JM — SEC: WA8NDV. RM: W88RRG. PAMS: W8DUW, K8CHW, W8YD. Phone Net Mgr.: W8LFW. CW Net on 3570 at 0000Z and 0300Z daily. WVN Phone Net on 3995 at 2300Z daily. W88DBH, W8BT, W8CLX, W8FLP, W8YTP, W88YYO, K8NVF, W8LFFZ and W8HZA are instructors for the Kanawha ARC novice school. K8OYQ received a stereo record of ZS1ACD's accreditation selections. W88EPS was active in Novice round-up. W8NGYY built a 15-meter beam. Virginia Thompson, past pres. of MARA, now is W88CPK. WA8EQI has his Extra. OCWA held their Annual Spring Dinner Meeting in Fairmont. WA8ART and New Martinsville area amateurs now have 2-meter fm repeater in operation. The W. Va. State ARRL Convention is at Jackson's Mill, July 3 and 4 with W8YD as general chair. Nominations in writing for W. Va.'s Outstanding Amateur for '71 should be sent to W8DUV. Comments on the proposed changes in phone bands will be accepted by the FCC until June 1. WA8LAI and K8VQG are now active from Maryland and WA8EN has settled in Fla. W8MIS, K8OYQ, W8HZA report good 160 operation. The Wheeling ARC 71-OM dinner will be held May 15 and the Huntington ARC Hamfest will be June 6 at Camden Park. The WVN Phone Net reports 565 stations and 441 messages; The CW Net 275 stations and 194 messages. Traffic: WA8POS 401, W88BBG 254, W8SAKO 241, WA8NDY 102, W88CYB 100, W8DUV 50, W8JM 48, W8HZA 37, W8AEC 33, WA8ZNH 33, WA8LEW 22, WA8OKU 22, W8CKX 19, W8BDQX 16, WA8ROB 13, WA8THX 11, WA8WC 11, W88FOH 8, W88AKR 6, K8HJH 6, W8FRO 5, W8FZP 5, K8QEW 5, W8OEC 4, WA8UNP 4, K8AON 3, W8BDXF 3, K8BGR 2, K8CFT 2, W8FFC 2, W8KBM 2, WA8BUM 1, K8CWM 1, WA8DMR 1, W8DMS 1, K8DOL 1, W8BEEZ 1, W8KLM 1, W8KWL 1, WA8LEF 1, WA8MRI 1, W8NYH 1, K8OYQ 1, K8SLG 1, K8ZDY 1.

ROCKY MOUNTAIN DIVISION

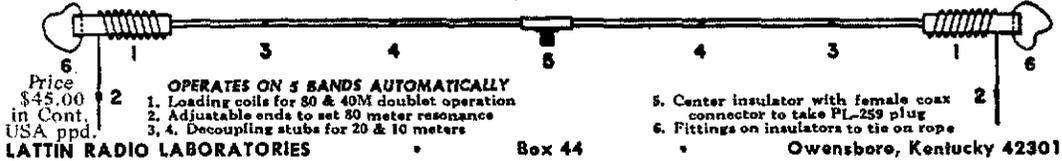
COLORADO — SCM, Clyde Penney, WA8HLQ — SEC: WA8OQY. RM: W8WRN. PAMS: W8BAWG, K8IGA, W8LRW, W8CXW. The Colorado Traffic Nets spent many hours handling traffic in connection with the Los Angeles earthquake disaster. Especially active were the Colorado Code Net and the Silver State Net, both of which maintained liaison to TWN. A nice writeup appeared in the Colorado Springs Press commending the Pikes Peak Radio Amateur Assn. for their communications work in connection with the earthquake. Newly-elected officers of the Pueblo Ham Club for 1971 are K8WZX, pres.; K8WR1, vice-pres.; WA8VTD, secy.-treas. Congratulations and best wishes to these new officers. It is with deep regret that we record WA8ZZH as a Silent Key. W8WYX, who resides year-round atop 11,500 ft. Squaw Mtn., reports enduring highest wind velocities recorded over the past 10 years. Once again very little antenna damage was sustained. Net traffic for Feb.: Hi-Noon QNI 988, QTC 84, 10 phone patches, time of 959 minutes. Colo. Code Net QNI 179, QTC 145, time of 661 minutes for 29 sessions. Columbine Net QNI 1246, QTC 60, informals 215, time of 1486 minutes. Eye Emergency Net QNI 592, time of 519 minutes, 193 eyes reported or requested, 18 eyes shipped. Traffic: (Feb.) K8ZSQ 830, W8WYX 298, W8LQ 284, W8LRW 189, W8WRN 132, K8JSP 124, WA8ZWA 81, WA8MNL 71, W8SIN 69, W8LCE 43, W8LVI 41, W8YCD 36, WA8SIG 33, K8DCW 30, K8OCR 30, W8LEK 24, WA8LYM 18, WA8HLQ 9, W8YNP 9, K8IGA 6, W8KPH 6, WA8YED 4, K8TEZ/D 2. (Jan.) WA8YNP 10, W8KPH 4.

NFW MEXICO — SCM, James R. Paine, W5NUI — The New Mexico QSO Party afforded a unique opportunity for all stations in the section especially in some of the less populated counties. Was your county represented? W5RE reports a unique experience working in the Novice Roundup as better than BX. W5PGI has overhauled the antenna system and installed a ballun with considerable improvement of signal on 75-meters. The NMU station W5SAX has a Viking-2000 on the air. The section CW Net on 3750 kHz is in need of additional participation each week day evening at 0230Z. The emergency generator, unused during the winter, is probably in need of a good check out just in case. K5MAT has suggested an addition to the handling instructions of HXG - Mail Delivery Requested if no other means are available. Originating stations should provide the phone number as the stamps do get expensive. Traffic: W5RE 176, K5MAT 175, K5DAB 53, W5SAX 39, W5PDY 31, W5NON 24, W5MYM 22, W5MSY 9, W5DAD 8, W5SOH 8, W5JNC 4, W5H11 1.

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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 5-71

UTAH - SCM, Carroll F. Soper, K7SOT - SEC: W7WKE, RM: W7OCX. A novice class has been started under the direction of W7FM, assisted by W7VTJ, WA7MEL and WA7JRC. WN7OXZ, 12 years old, is very active on 15 and 80. WA7BRB, Draggerton, Utah, has made 900 phone patches for the servicemen on Okinawa, 228 made during Feb. RUN QNT 785, QTC 40, average time 16.11 minutes; meets daily on 7272 kHz at 1230 MST; UAREC RACES Net meets Sat. and Sun. on 3987.5 kHz at 0800 MST. Wasatch VHF Net meets Tue. 146.34, 146.94 MHz at 1900 MST and the Weber County 2-Meter FM Net meets Tue. 146.35, 146.94 MHz at 1945 MST. The 2-meter fm repeater, WA7AKL, at the last count has over 100 stations using this facility. Traffic: W7EM 186, W7OCX 99, WA7HCQ 30, K7CLO 7.

WYOMING - SCM, Wayne M. Moore, W7CQL - SEC: K7NOX, RM: W7GMT. PAMS: W7TZK, K7SLM. OBSs: K7SLM, K7NOX, W7SDA, WA7EHA. Nets: Pony Express, Sun. at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7260; Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. New appointments: W7GMT as RM, K7TXZ as LC and WA7DNZ as GVS. We were saddened by the loss of WA7FDC in Feb. Roland was a very active ham and was well liked by everyone. Don't forget the Wyoming Hamfest to be held in Casper at the college July 17, 18. The Casper Club has now gone 2-meter fm. W7NNX is in Phoenix. The Wyoming Repeater Society, WA7DNZ, pres., is in the process of building a new repeater and plan on relocating to a higher point. W7PVN is back from Mayo's and recuperating. Traffic: WA7EUX 170, W7TZK 79, K7YWA 59, W7YRW 57, W7SDA 45, W7BHH 23, W7GMT 23, WA7MNC 14, WA7LEA 5, K7SLM 4, K7BTE 3, WA7EGK 3, WA7AUV 1, W7BKJ 1.

SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4FKJ - SEC: WA4DGH, RM: W4HTU. This report was prepared by W4WLG. Congratulations to all the net operators in the section for a good job during the recent tornado watch. Luckily our state was not damaged very bad but preparations were in the making via ham radio even before the weather front moved through. Our regrets go to our friends in Miss. where the tornadoes hit the hardest. Don't forget the Birmingham Hamfest this year on May 1 and 2. WB4DOY says that BARC has an SB-102/SB-220/speaker/power supply combin-

ation for sale real cheap. (ht). The new officers of the North Alabama DX Club are K4AIB, pres.; K4BBF, secy. I see that K4HPR was high cw and phone scorer during the Sweepstakes Contest. Congratulations. Remember that all items and station activity reports for this column are due by the 7th of each month and will be published 2 months later. Those making BPL in Feb. are WB4KDI and WA4VER; making the PSNR are WB4KDI, WB4JMH, W4HFU and WB4KSL. Traffic: WB4KDI 209, WA4VER 185, W4HFU 175, WB4KSL 84, WB4JMH 83, K4AOZ 36, WB4OVR 32, WB4QD 25, WN4SON 18, W4DGH 10, W4WLG 7, K4HJM 4, WN4PEW 3.

EASTERN FLORIDA - SCM, John F. Porter, W4KGJ - Asst. SCM: Albert Hamel, K4SJH. SEC: W4IYT. Asst. SEC: W4SMK, RMs: W4LE and K4EHY. PAMS: W4OGX 75 and W4SDR 40. W4CUL, W3VR/4, WA4ABY, WA4JH, WB4AIW, WA9OVT/4, WB4SMA, K4FAC, WB4OMG, W4BCZ and W4BNE made the BPL in Feb. WB4SMA, WB4OMG, K4FAC, WB4PIW, WB4IAA, K4IEK made PSNR. The Tampa Bay Repeater Assn. now publishes a newspaper with special interest to FMs and is free to those who request it. W4BNE handled lots of Red Cross welfare traffic for the Calif. earthquake. Congratulations to WA9OVT/4 for his first BPL in over four years. OO reports were received from W4FRL and WB4CAP. The Brandon ARS plan to incorporate. The West Palm Beach Radio Club is now affiliated with ARRL. Welcome to the team fellows and gals. K4AC made WAS. WA4QHO is back at Ga. Tech. for a few months. New appointees are WB4MIO, K4FAC as ORS, K4AVH as ORS, K4IXG as OO, WA4ABY as ORS/OPS, WB4SMA as ORS/OPS, WB4GMB as EC Marian County and WB4KOR as LC Monroe County. The Gator Net is picking up new members from transplanted snowbirds and meet daily 1330 GMT at 7115 kHz. A new QCWA Sun Coast chapter was formed at Sarasota. W4GHR, W4GIO and W4DWD are the new officers. W4CKB, Lake Placid, lost his 100-ft. tower to a tornado. Lee County RACES is being reactivated by W4LRH. CD Comm. Dir. The Country Cousins are in the process of having their organization incorporated as non-profit. Remember that traffic reports are due on the 7th of the month at my P.O. Box. Late reports will make the next month's report but will not make the next issue of "Florida Skip." Sorry but they have a deadline also. See you at Orlando in May. Traffic: (Feb.) W3CUL/4 4517, WA4JH 900, W3VR/4 883, WA4ABY 748, WB4AIW 610, WA9OVT/4 361, WB4SMA 545, K4FAC 518.

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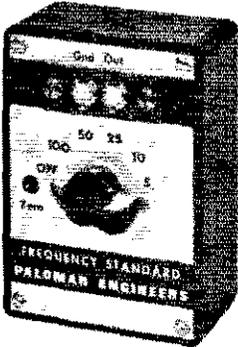
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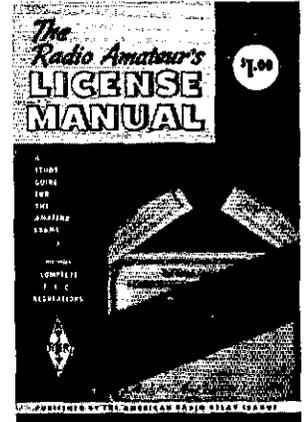
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GEORGIA - SCM, A.J. Garrison, WA4WQU - Asst. SCM: John T. Laney, III, K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4JXO. PAMs: K4HQI, W4LRR.

Net	Freq.	Time(Z)Days	QNI	QTC	Mer.
GSN	3595	0000/0300 Dy	772	366	K4BAI
JRN	3975	0100 Dy	870	91	WA4VWV
GTN	4718	2300 Dy			WB4JXO
Ga. Cracker	3995	1300 Su	501	5	WA4IQU

The Georgia State ARRL Convention will be held in Atlanta this year June 12, 13. A good program is in the final stages. W4PFE recently was promoted to General Class and now is WB4PFE. W4QVJ has QSY'd from Hollywood, Fla. to Augusta, Ga. W4YDN has almost completed assembly of a new SB-102. All traffic-handlers are urged to forward their station activity reports as soon as possible after the first of each month. Traffic: K4BAI 393, WA4RAV 185, WB4RUA 113, WA4MB 109, W4CZN 106, WA4WQU 91, K4VHC/4 76, WA4IWO 72, W4DEP 68, W4RNL 53, K4FLR 41, WB4MJO 36, K4NM 20, W4KRE 19, WA4LLI 12, W4FDN 4, K4GVG 2, W4ISS 1.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4KB. RM: K4LAN. RTTY: W4WEB. PAM: W4NOG. VIII: W4UUF.

Net	Freq.	Time(Z)Days	Sess.	QNI	QTC
WEPN	3957	2300 Dy	28	512	32
QFN	3651	0000/0300 Dy	56		

Pensacola: New pres. of FFARA is W4NOG; WB4JHQ was elected vice-pres. and WB4PKR, trustee. WA4ECY has a base station on 146.94 m. They keep hf skeds with KU4USP and KC4USX. W4QHP and W0EXD/4 wangled a Navy trip to Navassa Island. WN4TPP is a new ham. WB4PKW hopes to put a balloon in the air with a 6-meter marker beacon attached. It would send a taped test message on 51.900 MHz. The F-1 ARA has started a crystal bank; if you need to borrow a crystal contact WB4PKW. Fort Walton Beach: Local hams provided communications between check points for the 25-mile March of Dimes March. EARS had an interesting tour of local Cablevision facilities, conducted by W4OMN, chief engineer. WB4GPI was appointed an OO and took part in the last FMT. W4ZGS has his fold-over tower up, but is QRL with his trailer court. Panama City: K4VFX is back from Tenn. WB4PNJ is the new F-1 for Bay County and is also RACES RO. WN4TTR is a new Novice. Marianna: WB4TUF, CD Dir. for Jackson Co., has received his ticket. Bristol: The county EOC is getting 2-meter fm gear; also W4UEU in nearby Hosford. Tallahassee: WB4RCI moved up from Novice to General Class. Traffic: K4VFX 278, 8R1Y/W4 125, WA4ECY 124, W4WEB 28, W4RKH 19, W4FDJ 16, WB4DWM 10, W4UUF 10, WB4NH9 9.

SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SEC: K7GPZ. RM: K7NHL. PAM: W7UXZ. The Old Pueblo Radio Club of Tucson (an ARRL affiliate) has organized a net, meeting five nights a week on 28.770 MHz at 0300 GMT. All are invited to participate in this net and in the regular 6-meter net which has been in operation for some time. In addition, two code and theory classes meet once each week. The club also holds regular meetings the 2nd Wed. each month at Randolph Park and has special events such as a swap-meet, pot-luck picnics and Field Day activity. Field Day is the week end of June 26, 27, so start finalizing your plans. If you want to go with one of the clubs, contact one of the following for more information: Ariz. ARC, Bill Poole, 959-2427; Old Pueblo ARC, Merle Hutton, 327-9179; Scottsdale ARC, Tom James, 945-4867. Two-meter fm repeaters in operation are: WA7CEM, 146.34/94, Phoenix; WA7CEM, 146.16/76, Phoenix. Remote base stations that usually monitor 146.94 MHz are: WA7HUH, Pinal Peak (Globe), WA7KYT, Mule Mountain (Bisbee), and K7KEO, White Tanks (W. Phoenix). Public Service Honor Roll (PSHR): K7NHL 50, W7CAF 40, WA7MAD 38, K7UYW 32, W7FVD 26. Traffic: Feb., K7NHL 420, K7NTG 147, W7CAF 56, WA7MAD 56, K7UYW 45, K7EXF 37, K7ZMA 34, WA7JCK 25, W7PG 25, K7EMM 15, W7FVD 15, WA7NQA 8, W7OUF 5, W7LLO 3, (Jan.) W7DQS 41, W7OUE 19, K7EMM 18, W7UXZ 2.

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LOS ANGELES - SCM, Harvey D.D. Heiland, WA6KZI - Asst. SCM; Philip J. Goetz, W6DQX, Act. SEC; WA6QZY, RM; W6LYY. The main operating activity in Feb. centers on disaster communications and the health and welfare efforts of amateurs as a result of the Feb. 9 earthquake. A QST article will be devoted in detail to this subject, but of particular note is the efforts of the East San Gabriel Valley AREC and the San Fernando AREC/ RACES and the effectiveness of 2-meter fm. As a result 146.82 MHz fm simplex has been designated as this section's emergency operations/mobile frequency, and if left functioning will be repeated to 146.70 MHz by W6FNO. The repeater is used day to day and AREC members are encouraged to equip themselves to operate these frequencies. 14302 kHz will be used by the AREC for health and welfare efforts in the event of another disaster. Arrangements are being made for a low-band frequency for use as gathering frequency in event of emergency and will be announced shortly as will an AREC command frequency on 2-meter fm. A note of commendation for WB6UZS, WB6TXX, WB6VYX, K6UMV and WA6QZY for their leadership efforts on behalf of AREC operations in the San Fernando area during the four days following the quake and the approximately 150 AREC operators who were on the scene providing emergency communications for the city services. Section net certificates were issued to the following SCM members; K6CDW, K6CL, W6FVC and W6OEO. K6ASK earned CP 20 wpm and enjoyed the Novice Round-up. WB6WIT has been active /6 at UCLA. W6USY found his generator very handy following the quake. W6HUIJ is back on the air. WB6USZ is limited to 20-meter mobile while the 2-meter fm is in for repairs. New appointees: K6ASK as OO, OVS; WB6TXX as deputy SEC; W6LYY as RM; W6MZW as OO. WB6GHH reports that the North Valley Rag Chew Net meets Wed, 8 P.M. on 21.4 MHz. W6EJT reports wind damage to the new W6YKA antenna farm at UCLA. WB6MCW has a new tower going up. WA6KZI and K6VNX are temporarily off the air. W6NJU spoke to the W. Valley RC on 80-meter DX. W6LH and 5 other QCWA members mobiled to W6GH's wireless museum. WB6ZTI added 6-meters to the shack. K6AEH has a new Culver City QTH. Net reports (Feb.):

Net	kHz	Time	QNI	QTC	Mgr.
SCN	3600	6:30 P.M.	581	1563	W6LYY

fM Repeater information: WB6ZDI, 146.61 MHz in, 147.33 MHz out; W6FNO, 146.82 MHz in, 146.70 MHz out. Traffic: (BPL/PSHR): K6AEH 0/6, K6ASK 6/21, WB6HG 142/13. K6CDW

4/3. K6CL 72/0, W6DGH 5/13, W6DOX 26/0, W6ED 33/0, W6EJT 6/34, W7GAQ 17/10, W6BGG 0/3, WB6GHH 0/19, W6HUIJ 11/0, W6LH 15/24, W6IN 4324/140, W6INB 1133/92, W6IVC 169/25, WB6KKG 33/17, WA6KZI 51/12, W6LYY 276/28, W6MMW 8/14, W6OEO 231/55, WB6PAV 7/10, W6QAE 429/21, WA6QQL 278/3, K6QPH 131/0, WB6SXY 500/51, W6USY 142/0, W6VIO 0/18, WB6WIT 55/0, WA6ZKI 5/0, WB6ZTI 71/13.

ORANGE - SCM, Jerry L. VerDuft, W6MNY - Asst. SCM; Richard W. Birbeck, K6CID, SEC; WB6COR, RM; W6BNX, WB6AKR, K6OT is remodeling his ham shack. Kudos to WB6YXA who was pictured on the front page of "The Hemet News" for SET publicity including a feature writeup on AREC and ARRL. Gary's XYL is working for her novice ticket. WB6TYZ presented a talk on traffic-handling to the Fullerton Young ARC. EC WA6YWS reports the following Inyo County amateurs on standby readiness during and after the LA earthquake: W6APD, W6BNO, WA6GQI, W6LHY, WA6YWS, ORS WB6ZOK suggests more use of 10-meters, OO WB6QNU received his DXCC certificate. EC WB6WOO announces a new Orange Co. 2-meter FM AREC Net, Tue, at 7:30 P.M. local on 146.52 MHz. NCS WA6UDR, OVS K6YNB presented his Alaska/Yukon VHF DXpedition slide collection to the Fullerton RC. Automatics RC MARS station, AFC6YPX, scored the highest standing in Jan. for SFA phone patching of all MARS stations in the nation. OO W6VOZ completed his antenna farm consisting of a tri-band beam, 2 inverted vees, a long wire and a dipole. The Orange County DXCC now meets the 2nd Tue. of each month, 7:30 P.M. at Sir George Smorgashov, 400 So. Euclid in Anaheim. Officers of the McDonnell Douglas Astronautics RC, W6VLD, are: WA6UEI, pres.; K6TXA, vice-pres.; WA6JKO, secy.; WA6PIU, treas. The Citrus Belt ARC announces code and theory classes at Upland High School Tue. evenings in room 108 and 111. Valley College, K6LHO, will soon be on the air all bands including 2-meters. VHFers be sure and get your repeater registered in the ARRL Net Directory - use form CD-85A. Comments on Docket 19162 phone band expansion must be filed with FCC by June 1. PSHR: W6BNX 313, W6MNY 141, W6CPB 35, Traffic: (Feb.) W6LCP 571, W6MNY 299, WA6FOQ 187, W6BNX 170, WB6YXA 67, WB6AKR 65, WB6ZEC 51, W6WRJ 37, K6GGS 16, WB6QNU 15, W6QBD 12, W6FB 7, WA6YWS 4, W6BUK 3, WB6ZOK 3. (Jan.) W6WRJ 32.

SAN DIEGO - SCM, Richard E. Lefler, WA6COE SEC; W6INI. My sincere thanks to K6EDA for his work this past year as SEC. The new SCM will select his own SEC in July. Feb. traffic

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reports indicate many here were involved in the L.A. earthquake health/welfare traffic, including many Novices. We have now pass the 300-member mark in the AREC. A very significant increase considering just 2 years ago there were less than 100 members. TI Southern District held a breakfast in Feb. with WB6JQI (EC) host. Listed below are the new AREC Novice Nets in this section

District	Freq.	Day	Time	VO
Eastern	3725	T	7:30 P.M.	WA6BJ
Imp. Valley	3725	W	6:15 P.M.	WB6RM
Central	3725	Sa	8:00 A.M.	WB6LYC

Club activities: Here is an area of real growth, too. The El Cajon ARC met on the desert with the IVARA for a week end in Mar. TI Palomar RC has elected W6DEF as pres. The SD DX Club Feb meeting was held at the home of K6ZMZ. The No. Shores had TI City Communications Engineer while SOBARs had an antenna design program in Mar. Don't forget the ARRL Convention in Anaheim, Sept. 4, 5, 6. Traffic: W6VNO 199, W6EOT 112; W6BGF 785, W6LRD 450, WA6M10 193, WB6HMY 147; WB6RMG 113, W6YKF 62, K6HAV 61, W6JHG 34, W6GCDT 31; WA6AAF 25, W6GNI 23, W6MI 13, W6PUM 5, WA6COT 4; W6GFMJ 3, W6NED 3, W6GFM 1.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6GKN - SEC W6JTA. RM: W6UI. The author of many ham construction article in QST K6TS, has moved to Thousand Oaks. The XYI of W6GUI has received her own WA6HMY. K6PHT received the Captain Cool Award for working 50 AX stations during 1970. K6UFI is going vth with a 2-meter transceiver and a beam. W6IDU is off the air because of a QTH change from Newbury Park to Thousand Oaks. WB6VGC has moved out of the area. WA6MLL is QRL with a new outside job after spending half his life in a photo dark room. K6SUA has been busy cleaning up the QTH after quake damage but did manage to acquire a tower and beam. WA6WVC has his 4-1000 amplifier finished and is completely hooked on DX. W6GESH is a new Novice in Thousand Oaks. The Estero ARC now has 33 members, one o whom is our Director W6KW. W6MOF has a new 1A-33 beam operating. WA6DEI reports his 3rd RPI in as many months. Traffic WA6DFI 598, K6MIM 56, W6MOF 42, W6JTA 19, W6UI 7.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Gene Harrison, W5LR - Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM, PAM: W5BOD, RM W5CGZ, W5SHN is the EC for Cherokee Co. Congrats OM, W5BOK has been reappointed as PAM and OBS and will preside at the Cen Tex emergency Net meeting Sun. May 30, Huntsville State Park. The Kilocyte ARC Ft. Worth meets at the Oak Grove Airport. WASKHE is active in OO circles. W5MGC is interested in traffic a is K5TCK. RM W5QOZ's new QTH is 1204 Eastside Dr., Mesquite. W5UE returned from the Pa. area and is now in Wichita Falls permanently. He also has Ham gear for sale. W5ARUF is back in the NoTexas fold. W5QOZ is trustee of the Buckner Orphans Home club. The following were heard in the SET: W5ADQP, W5VJW, W5JSM, W5QU, W5WLA and W5QOZ. Considerable QRM was noted on WIAWS code proficiency runs both local and out-of-state. Who said there was a "Wouff-Blong", (ht). W6RNY of the Edgewood Radio Society suggests SCMs list all repeater frequencies in area operations. Good idea but column space is limited so we'll settle for listing in the League Directory. W5CFT announces meeting of the AREC group. W5GQV, the Waco slow-scan TV expert, has worked 15 or more stations. The Atlington ARC, K5JNM, invites NoTex hams to the Woodland West Recreation Center. W5EZY, the SoTex RM, turned in a good job on the SET (Tex) Traffic Net. Your SCM attended the Irving ARC's meeting in Feb. during W5PCF's Slow-scan TV presentation. W5GQV's letter to the SCM regarding slow-scan was read to the membership by W5KWO. SEC W5JSM has some ideas on the SET that require thought by all of us. Your SCM and Director attended the Lawton-Ft. Sill Hamfest. W5IZU is recovering from surgery and W5PVF expects to be on 3730 kHz with code practice at 7:30 P.M. The Lake Murval Hamfest is June 19, 20. W5BAAR sent his first report. W5BAQI is a new ORS at Weatherford. The Abilene CO has a new station and the call W5DPP. W5NFO reports heavy snow in Feb. and the 3940 net was active with 70 stations reporting. W5BAM is Net Mgr. of FTN. W5PBN is active in OO work. Traffic: 11eb3, W5PPI 232, W5QU 208, W5NFO 58, W5PBN 31, W5IVE 28, W5IZU 14, W5LR 17, W5QOZ 10, W5AOF 9, W5EVS 2. (Jan.) W5ARUF 59, W5FYK 20, W5QOZ 2.

OKLAHOMA - SCM, Cecil C. Cash, W5PMI - Asst. SCM: W.L. Smoky Stover, K5CIV. SEC: W5ASRN, RM: W5AYRO, PAM: W5MFX, W5WHV, K5DLE, W5ZRU. QSL Bureau: W5QML. Repeater: Enid W5QYF 146.34/146.94 (147.7 day time) - Oklahoma City W5YTI 146.34/146.94 Tulsa W5LVT 146.34/146.94 Altus, Ardmore, Ponca City, information not available. The 24th Lawton-Fort Sill Hamfest was a success and was well attended despite the snow storm. Some talks from the northern and western part of the state were snowbound en route home.

Radio contact was maintained with them and assurance of their comfort and security was also maintained thanks to the Oklahoma City and Mid repeaters. Director Albright was scheduled to visit the QSL Bureau Feb. 22 but had to cancel out because of the snow storm. New club officers: Tulsa Electron Benders ARC - K5ZCI, pres.; W5GZS, vice-pres.; W5GZD, secy.-treas., Oklahoma Central VHF ARC - K5DLH, pres.; WASVHN, vice-pres.; WA5KFT, secy.; WASNRJ, treas.

Net	kHz	Local Time	Sess.	QNI	QTC
OPEN	3915	0800 Su	4	198	16
OPON	3913	1700 M-F	20	523	308
OFWXN	3913	1745 M-F	23	421	72
STN	3850	1730 M-S	24	467	61
OTZ	3682.5	1900 M-S	19	64	6
SSZ	3682.5	2145 M-S	19	35	7

Traffic: K5TFY 1126, WA5YRO 202, W5FKL 63, WA5ZOO 39, K5WPP 34, W5MFX 28, W5PML 12, WASNZM 11, W5JJ 5.

SOUTHERN TEXAS - SCM, E. Lee Ulrey, K5HZR - SEC: K5HXR, PAM: W5KLV, RM: W5EZY, Renewed appointments: W5EZY as RM, W5OXQ as EC, K5JKV as OBS, Congratulations to new EC's W5BRZ and K5UYH and OPS WA5CBT.

Net	kHz	Sess.	QNI	QTC
TEX*	3770	50		242
TN*	3961	28	1516	126
7290 Tte	7290	40	1820	802

*NTS, OBS WA5AUB reads bulletins on 3955 kHz Sun. at 1300Z and on 146.94 MHz Sun. at 1400Z. SCM K5HZR and SEC K5HXR visited the Corpus Christi ARC in Feb. New Corpus Christi ARC officers are W5IRO, pres.; W5TPY, vice-pres.; W5YCV, secy.; W5GMT, treas.; WNSZUN, pub, W5RBB is applying for ORS, DC W5IC1, reports 14 2-meter stations active in Orange county. The Houston ARC has added a Triplett 1200 Multitester (1935) and Brush Crystal Earphone Microphone to its club museum. K5TLO won the WA6 (twokel all El Paso) cup this year. OBS W5LPO hosted VK6WT and KYL. EC W5ZPJ reports the Calhoun county AREC had a traffic-handling session through W5KTC on Feb. 25. W5TMT/KZ5MM is looking for South Texas contacts on 15- and 20-meters. EC's K5GDH and WA5ABA report about 20 amateurs were involved in a communications emergency during the Amateur Radio Campers outing Feb. 14. About 175 VHF FM Repeater group representatives attended the Tex. VHF FM Society winter meet in San Antonio. Congrats to K5ROZ, W5QJA and W5RBB on making PSRR in Feb. FC W5QMJ reports that K5EG was appointed as asst. FC for Weather Bureau activity. RM W5EZY plans a Slow Speed Net with phone net liaisons. W7WAH/5 and K5BBM are experimenting with Toroid Baluns. OO K5FJZ conducts code and theory classes at W5AC. OO reports were received from K5FJZ, K5SBR, W5NGW, W5RBB, W5VW and W5LES. Traffic: W5MXY 193, W5EZY 138, K5HZR 109, W5RBB 90, K5ROZ 86, K5GDH 85, WA5EJN 75, W5QJA 68, WASZJY 55, W7WAH/5 51, W5VW 36, W5ABO 33, W5BGF 24, K5RVE 23, K5JKV 22, W5TFW 19, W5BHO 16, W5QMH 7, W5TX1 4, W5KLV 2, K5SBR 1.

CANADIAN DIVISION

ALBERTA - SCM, Don Sutherland, VE6FK - SEC: VE6XC, ECs: VE6SS, VE6AFQ, VE6AZU, ORSs: VE6WG, VE6LZ, VE6ATH, OPSs: VE6SS, VE6AFQ, OBS: VE6OE, OOs: VE6HM, VE6MJ, VE6TY. Congratulations and best wishes to the new ARLA pres. and secy., VE6ASL and VE6KS. Welcome back to Calgary to the former CARA pres. and former SCM ex-VE6VM, now VE6AVL. Congratulations to VE6WG on his appointment as ORS. The Hamfest Committee of the Lethbridge and Border Clubs, under chmn. VE6ABS, is very busy but well organized for the combined Alberta and Waterton Glacier International Hamfests on July 17-18. No one should miss this event, which is sure to be the highlight of 1971. The Powder Puff Derby, for the first time, will start outside the U.S.A. In Calgary, of course, 2-meter and 40-meter communications will be required. VHF repeaters will now be listed in the annual Net Directory. Be sure your repeater is listed. VE6XE, VE6WL and VE6TY did excellent work on the Canadian Winter Games traffic from Saskatoon. VE6XF would like assistance as western net control on the Trans Canada Net. Traffic: (Feb.) VE6FK 126, VE6XF 65, VE6XC 29, VE6TY 24, VE6LV 15, VE6YW 7, VE6SS 6, VE6ASL 4, (Jan.) VE6XC 39.

BRITISH COLUMBIA - SCM, H.E. Savage, VE7FB - VE7AMW EC for Vancouver gave a talk and demonstration of amateur radio at Prince of Wales Secondary School. The SET was well attended by VE7s but again 75-meters packed up and good use of relays and 2-meter links were used. VE7IQ holds a ham clinic Sun., at 0930 PST on 7190 kHz. If you are having problems or require information check into the meeting. To find out what is taking place in British Columbia and Canada subscribe to Zero Beat and

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the VE News. VE7YH is going to NATO Ghana. Merritt now boasts two active amateurs VE7BAF, VE7BZY. The Burnaby ARC officers are VE7BWC, pres.; VE7BRP, vice-pres.; VE7BPI, secy. North and West ARC: VE7OF, pres.; VE7BDS, vice-pres.; VE7BNS, secy. Columbia ARC: VE7BDW, pres.; VE7BDD, vice-pres.; VE7BOA, secy. The annual dinner Italian-style spaghetti feed, entertainment was the film "Hans Wide World." The Vancouver Island Annual Picnic is June 6, 1971 at the Mountain View Resort, Shawnigan Lake. Traffic: KA7NXG/VE7 199, VE7BL0 48, VE7SE 14.

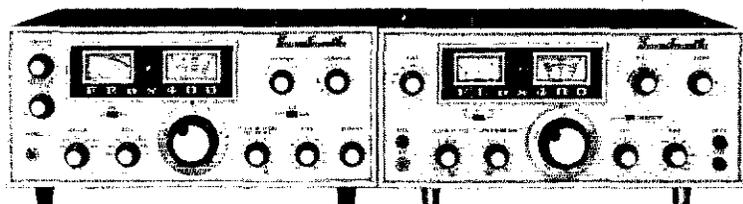
MANITOBA - SCM, Keith C. Witney, VE4EI - In all it was a busy month for public service work. WARC provided communications for the Saint Johns Boys School on Feb. 27 and 28 for the Festival of the Voyageur. It appears that the nets have hit their winter peak with the phone net reporting high QNI and the cw net averages back to normal. By the way we have only one active PSIR participant. If you are engaged in public service work it is quite likely that you are eligible for listing. Hope to see you all again on Field Day. Traffic: VE4FQ 64, VE4RO 38, VE4MK 22, VE4KE 20, VE4HR 15, VE4DI 14, VE4JA 6, VE4QJ 6, VE4LN 4, VE4NE 4, VE4YC 2, VE4EG 1, VE4FU 2, VE4PA 2, VE4XN 2, VE4ET 1.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - Planning for Field Day June 26, 27 should be well advanced. Don't forget to take advantage of the extra points by sending me or the SIC a message giving name of club or non-club group, numbers of operators, location and number of AREC members. Congratulations to VE3DZA on getting his Advanced Class license. My letter on SFT '71 and AREC in general to a number of Ontario ARCs brought in few replies but those received were most useful. Another letter on The Integration of All Modes for Traffic-Handling is in the works. Congratulations to the Brantford ARC who are celebrating their 38th anniversary. Keep the dates Oct. 23, 24 open and plan to attend the RSO Convention at Hespeler. All ARCs who sponsor repeaters are urged to list them with ARRL for inclusion in the ARRL Net Directory. Ask for form CD-R5A (271). The White Cane Net which meets Wed. evenings at 8 P.M. recently celebrated its 4th year of operation with 51 check-ins. Although the weather was generally bad the visit of WKLK and his talk on antennas brought out the boys and had them scurrying back home to dismantle their antennas as he exploded a few well entrenched myths. Now that ARRL has stopped sending out bulletins to affiliated ARCs it is imperative that we have some OVSs. Check with SCM please. VE3DSS is a new OVS appointee. Traffic: (Feb.) VE3GI 740, VE3FRU 495, VE3FXI 230, VE3DV 187, VE3EWD 149, VE3DPO 140, VE3ARS 133, VE3BUR 71, VE3GFN 56, VE3DBG 43, VE3AWL 38, VE3DU 25, VE3CRW 17, VE3APL 16, VE3AC 11, VE3DH 5, VE3GEO 3. (Jan.) VE33AW 99, VE3GCE 89, VE3AC 19.

QUEBEC - SCM, Joe Unsworth, VE2ALF - MARC elected VE2II, pres.; VE2AO, vice-pres.; VE2HJ, secy.; VE2NB, treas.; VE2ZD, VE2SH, VE2BSQ, VE2BLC, VE2BGI, VE2PO, dir. VE2UN ARC (50th year of radio) VE2DCW, pres.; WA2UPC, vice-pres.; VE2BZD, treas.; VE2BH, secy. Through the efforts of VE2QA, ARS VE2IQ operated air mobile aboard Air Canada Flight 747-26 Seattle, Wash. to Montreal, Que. and delivery of first 747 and VE2s contacted on 20-meters were VE2s DR, QA, DEW, GJ, GS, XP, OJ, BYW, JS, JJ, WT, XY, CL and BG on ssb and VE2DM on am? The Laurentian DX Club elected VE2BZD, secy. Comments re FCC Docket 19162 not favorable in this section. Many projects during Feb. were side-tracked because of heavy snowfall in the section. Prepara ns nos vacances: 1e Congres '71 de Trois Rivieres aura lieu les 25, 26 et 27 juin. Le gagnant du concours QSL VE2AQC est VE2DLP. Les premiers prix pour le concours technique sont des montants de \$50.00. VE2BPT s'est construit un HW-101. Felicitations aux nouveaux amateurs qui ont gradue des cours donnees par les nombreux clubs de la province. Le concours VE2 a remporte beaucoup de succes, felicitations a l'organisateur VE2WM. The Sherbrooke ARC now using call VE255 for repeater as memorial to Pierre, VE2RQM now has new SB-102. Traffic: (Feb.) VE2DR 124, VE2BZD 57, VE2AP 34, VE2EC 23, VE2ALE 22, VE2WM 11, VE2APT 10. (Jan.) VE2BZD 120, VE2DR 33.

SASKATCHEWAN - SCM, Barry Ogden, VE5BO - RTTY is really gaining momentum in VES-1 and, with more units soon to be available, the interest is increasing. VESLG racked up a total of 128 typed out in Feb.; RMGORS VESGI handled 215 in Jan. and made BPL with 414 in Feb. Congrats on your persistency to qualify for BPL. Lorne! VE55C handled 50 in Jan. and nearly tripled this total in Feb. This shows that good old cw can still be fun! The phone net is busy with informal traffic. The VESs communication set-up at the Canada Winter Games in Saskatoon came in handy as a backup system, especially when the main power failed! The Saskatoon club utilized their emergency power plant and kept in operation throughout the failure. Mobile activity is again coming alive. The hamtest location is Lancer Park in Saskatoon the week end of July 24 and 25. Check into the nets for more information. Traffic: VESGL 414.

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Picture this pair in your shack. The Yaesu FLdx 400 transmitter and the FRdx 400 receiver. Loaded with power. Loaded with sensitivity. Loaded with features. Loaded with value. Read on, and discover how you can have the most up-to-date receiver-transmitter rig in the world... and at an unbelievably low price.

The FRdx 400 Receiver

Get a big ear on the world with complete amateur band coverage from 160 meters through 2 meters, including WWV and CB reception. Four mechanical filters do it—they provide CW, SSB, AM and FM selectivity. Separate AM-SSB-FM detectors are included, along with squelch and transmit monitor controls. Plus a noise limiter and a variable delay AGC. And a built-in notch filter with front panel adjust for notch depth.

The FRdx includes calibration markers at 100 KHz and 25 KHz, with accurate calibrator checks verified by WWV. A solid-state FET VFO for unshakable stability. And a direct-reading 1 KHz dial affords frequency read-out to less than 200 Hertz.

The FRdx 400 sells for \$359.95.

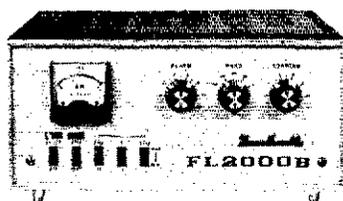
The FLdx 400 Transmitter

Here's how to set yourself up with dual receive, transceive or split VFO operation. The FLdx 400 with its companion receiver brings you the ultimate in operational flexibility. Flexibility like frequency spotting, VOX, break-in CW, SSB, AM and even an optional FSK circuit.

The completely self-contained FLdx 400 features a built-in power supply, fully adjustable VOX, a mechanical SSB filter, metered ALC, IC and PO. A completely solid-state FET VFO provides rock-solid frequency stability.

We rate the FLdx 400 very conservatively. That rating guarantees you 240 W PEP input SSB, 120 W CW and 75 W AM. The FSK option will go all day at a continuous 75 W. And you get full frequency coverage on all amateur bands—80 meters through 10

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FL2000 B Linear Amplifier.

Ideal companion to the Series 400, this hand-crafted linear is another example of Yaesu's unbeatable combination of high quality and low cost. Designed to operate at 1500 watts PEP SSB and 1000 watts CW, this unit provides superb regulation—achieved by a filter system with 28 UF effective capacity.

Other features include dual cooling fans (one for each tube), individual tuned input coils on each band for maximum efficiency and low distortion, and a final amplifier of the grounded grid type using two rugged carbon-plate 572 B tubes. Ready to operate at only \$299.95.

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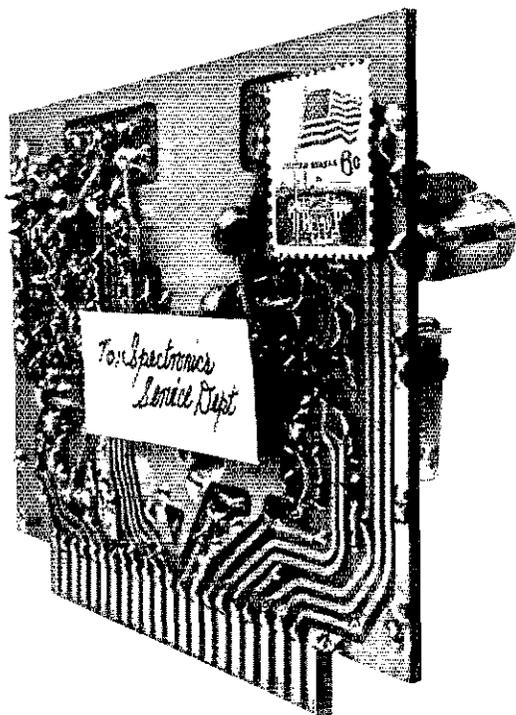
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Repair by mail.



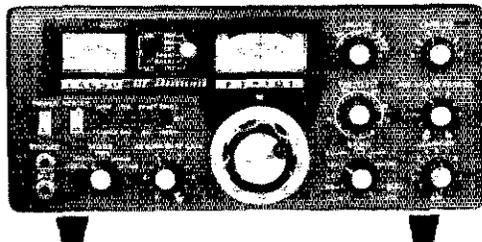
Except for driver and finals, the Yaesu FT-101 is all solid state. Ten FET's, 3 IC's, 31 silicon transistors and 38 silicon diodes do the job—solidly. Most of these components are found on computer-type plug-in modules. Should one of them ever give you trouble, just send us the module. We'll send you a factory-new replacement by return mail.

But with the FT-101, you can expect everything but trouble. Like a built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band,

built-in power supplies right in the package. You supply the 12 or 117 volts plus an antenna and you're air-ready.

For in-motion operation, a noise blanker is essential. We didn't forget to include it in the FT-101. It picks out noise spikes and leaves you with nothing but clean, crisp signal copy.

Though plug-in modules mean quick, convenient repair, we don't really expect to hear from FT-101 owners. Unless it's on the air. Maybe that's why we unconditionally guarantee it for a year. The FT-101 — only \$499.95.



a high Q permeability tuned RF stage and a 5 KHz clarifier. All of that in a portable rig that sounds like it was home base.

The FT-101 is thirty pounds of power. You can work the world on 260 W PEP, 180 W CW or 80 W AM maximum input power. The world between 80 meters and 10 meters. And you'll hear it back with 0.3 microvolts sensitivity — and a 10 db signal-to-noise ratio.

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Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QSL are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10643.

PROFESSIONAL CW operators, retired or active, commercial, military, etc. are invited to join Society of Wireless Pioneers - W7GAQ/6 Box 530, Santa Rosa CA 95402.

AN INVITATION NYC area hams and SWLs are invited to attend NY Radio Club meetings - 2nd Monday of every month, George Washington Hotel, 23rd St & Lexington Av at 8 PM - New members wanted.

FREE sample copy Long Island DX Assn bulletin. Latest DX news. Business size sets to K2A/FY Box 74 Massapequa LI NY 11762.

WABASH Co. Amateur Radio Club's third annual hamfest, Sunday May 25. Rain or shine, \$1 donation for admission. For information write Bob Mitting 463 Spring, Wabash IN 46792

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ANTIQUE Wireless Association Historical Radio Conference, Canandaigua, NY, Sept. 24 and 25. Programming for the old time operator. Historian and collector, W2ICE, Sec'y.

JUNE 6, 1971 - Save this date for the Starved Rock Radio Club Hamfest. Same place as last year. Details on request. See May Hamfest Calendar in QST. Write ARRC/W9MKS, G. E. Keith - W9QLZ, Sec'y/Treas. RFD No. 1, Box 171, Oglesby, IL 61348

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CRYSTALS airmailed: QST "Novice Special," all frequencies 40M - 15M, FT-243, active-accurate five or more \$1.25 each, 80M \$1.50. Mix OK. Less than five \$1.50. Add postage. Fast service from Mid-America, SSB - MARS. Custom finished etch stabilized FT-243, .01%, 3500-8600 kilocycles \$1.90. (minimum five same or mixed \$1.75). Crystallize your net. Ten same frequency \$1.45). 1700-3499 and 8601-19,500 fundamentals and 10,000-30,000 overtones \$2.95. .005% add 50 cents/crystal. HC-6/u hermetics above 2000 add 75 cents/crystal. Airmail 10 cents/crystal. 1st-cl - 6 cents. Free order-bulletin. Your crystal shop since 1933. Bob Woods, W0LPS, C-W Crystals, Marshfield, MO 65706

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CREATE a QSL with a "Sampler instruction kit" 25c. Same manufacturer of (Xtra Class) and regular printed QSLs. WZ Sameo, Box 203, Wynantskill, NY 12198

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QSLs, samples 10c. Fred Leyden WINZJ 454 Proctor Av. Rev. MA 02151.

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SAMPLES 10c. Harry Sims, 3227 Missouri Ave. St. Louis MO 63118.

QSLs 3-color glossy 100. \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for \$4.50. samples 10c. W9SKR, George Vesel Rte.1, 100 Wilson Rd., Ingleside, IL 60041.

RUBBER stamps 1.50 includes tax and postage. Clint's Radi W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

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QSLs "Brownie" W3GL, 3111 Lehigh, Allentown PA 1810 Samples 10c. Catalog 25c.

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DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 984 Austin TX 78757.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, deals. Malgo Press, Box 375 Toledo OH 43601.

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100 two color glossy QSLs \$3.25. Yutz Printing W3LX Pottsville PA 17901.

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WANTED - pay good - two tuning knobs KWS-1, VOIFN, Box 596, Mount Pearl, NE, Can.

WANTED: All types of tubes. Top prices paid for Varian or Elmac. Jaro Electronics Corp., 150 Chambers St., New York, NY 10007.

WE BUY all types of tubes for cash, especially Elmac, subject to our test. Maritime International Co., Box 516, Hempstead, NY 11581

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 61 Broadway, NY 10012.

WIRELESS sets, parts, catalogs, bought, traded, Lavery, 118 Wycombe, Lansdowne PA 19050).

NOVICE crystals: 40-15M \$1.38. 80M \$2.08. Free flyer. N Shinnette Electronics, Umatilla FL 32784.

AMATEUR museum buying old radios, books, magazine catalogs, parts. Selling QSTs and CQs. Erv Rasmussen 10 Lowell, Redwood City CA 94062.

WANTED: An opportunity to quote your ham needs. 32 years ham gear dealer. Collins, Signal/One, Drake, Galaxy and others. Also \$25,000 inventory used gear. Request list. Chas Schaefer, W8UGC, Electronic Distributors, Inc. 1960 Peck St Muskegon MI 49441.

1AM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information, Clayton Radio Co. 20 Mira Mar Av. Long Beach CA 90803.

ROTOR Pitch Rotor, 10,000:1, unmodified, excellent \$45. Safety belts, climbing body portion \$15. Counter 100 kc. Bealey \$80. Search CW 133.2 401% 20 100 Mc \$350. LW Handtalkies on 46.94 \$35. FOB Link, 1081 Aron St. Cocoa FL 32922

WANT 23K early wireless magazines for W4AA historical library, send for list. Wayne Nelson, Concord NC 28025.

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SPIDERS for boomless quads, Heliarc welded aluminum. A's Antennas, 1339 So. Washington St., Kennewick, WSN 99336

RICO Transceiver 720 20-40-80 meters. Factory wired with power supply, speaker, and mike \$195. 602-277-4606, 1545 W. Hazelwood, Phoenix, AZ 85015

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductor and resistors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. Tel. 210-354-3141

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APACITORS - brand new 275ufd electrolytics at 500wvdc. Ten for \$19.50. Menaffey, R4HHP, P. O. Box 642, Marietta, GA 30060

NOVICES: Need help for general ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk VA 23508

TELETYPEWRITER machines, parts, bought-sold. S.a.s.e. list Typetronics, Box 8875, Ft. Lauderdale FL 33310

SELL: Hammarlund HQ-170A-VHF receiver, 160 thru 2 meters \$190. WB6SLT, John Myers, 1344 Orchid, Santa Barbara CA 93105

WANTED: Teletype machines, parts, Models No. 25, 32, 33, 35, 37. Cash or trade for Drake equipment, Altronics-Howard Co., Box 19, Boston MA 02101. (Tel: day or night 617-742-0048)

1000 PIV @ 2 amp, new epoxy diodes includes disc bypass & bridging resistors. 10 for \$4.50. Diodes only 10 for \$3.50. New 450 MF @ 500 volt. Electrolytic caps. \$1.50 ea. Postpaid (USA). Coast Electronics, 123 St. Boniface Rd., Cheektowaga NY 14225

WE'RE trying to complete our collection of callbooks at Hq. Anyone have extra copies of Government Callbooks 1928-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington CT 06111

WANTED - For personal collection. The Radio Amateur's License Manual, Edition 12. ARRL "Map of Member Stations," 1914. W1CUT, 18 Mohawk Rd., Unionville CT 06085

DIODES - 1000 PIV 1.5 A Epoxy 24 cents each ppd. Toroids 8MHY or 14 MHY 5 for \$1.50 ppd. Weinschenker, Box 353, Irwin PA 15642

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info contact Al Marey, W4LD, Sec'y., 461 17th Av. Eau Gallie FL 32927.

WANTED: Hallicrafters S-27 C receiver (130 to 210 MHz.). Also want early Hallicrafters receivers. Howard Hoagland, 639 N. Sierra Bonita, Los Angeles, CA 90036

WANTED: Transmitter to cover all MARS frequencies RTTY gear - 2-meter John to cover 145.5 Mc. 21 x 3/4 or 4 x 5 speed Graphical John Waskowitz, 35-30 73rd St., Jackson Heights LI, NY 11372

SALE or trade, BC 610 D. You pay shipping. W6YQY, Rudy W. Martens, 1170 Huntington Dr., South Pasadena, CA 91030. Tel: 213-254-5667

HEATH HW-100, HP-13A, little used, Excellent Condition. With manuals. \$320 plus shipping. WA1KZU

SAVE on all makes of new and used ham equipment. Write or call Bob Gimes, 89 Aspen Rd., Swampscott, MA 01907. Tel: 617-598-9700/617-598-2530

VERY inter-est-ing! Next 6 issues \$1. "The Ham Trader," Syracuse, IL 60178

WANTED: Heathkit SB-640 external vfo. Top dollar for unassembled kit. Assembled unit must be perfect. Write WA0ZXR, 2501 West 67th St., Shawnee-Mission, KS 66208

SIGNAL One - including deluxe cw filter - latest model - warranty - will ship in original carton - best offer. Harry Burhans, RDI, Box 103, Malvern, PA 19355. Tel: 215-827-7374

\$500 cash for good R390 receiver. R. E. Brown, W9EXR, 25352 Martindale Rd., North Liberty, IN 46554

SB-300 and SB-400 w/CW filter: \$500. SB-630 console: \$65. Built by Heath Tech. Beautiful. W2ERV, 14 Bernice Dr., Freehold, NJ

SB-401, 301 with all crystals, cw filter, \$500 pair. Will split. Also much RTTY and other equipment including very nice TT1-2. S.a.s.e. for descriptions, WB4RKA, R. Wanat, 443 Atlas Dr., Madison, AL 35758

R390, \$550; Telrex 4el 10 mtr beam, \$30; EV635 mike, \$12; 5' DuMont 304 scope, \$38; Key J36, \$7; Eico 900B cap ckr, \$6. A Berger, 8519 Brauburn Dr., Annandale, VA 22003

DRAKE SPR-4 New Dec. 70, \$325; B & W 5100-B with 51B-ssb factory attached \$150. Godfrey Delcuze, West Point, ME 39773. Tel: 601-494-5721

LOWEST discount prices! We guarantee to beat any legitimate written price quote submitted to us. Factory-sealed cartons. Full warranty. New equipment, Drake R4B (Regularly \$475) \$390; 4XB (\$495) \$415; AC-4 (\$99.95) \$85; TR-4 (\$599.95) \$590; TR-6 (\$650) \$650; C4 (\$299.95) \$255; Marker Luxury \$299.95 \$278; Galaxy FM-210 (\$229.50) \$184; Mosley antennas CL-36 (\$171.92) \$135; CL-33 (\$145.15) \$115; TA-36 (\$167.85) \$134; TA-33 (\$133.10) \$106; Hy-Gain 400 Rotator (\$189.95) \$149.95; THGDX (\$179.95) \$140; 204BA (\$149.95) \$129; Ham-m Rotators (\$129.95) \$99.95. Tri-E Towers W-51 prepaid (\$393.40) \$333; MW-65 prepaid (\$359.65) \$306. Package Prices Too! Discount Radio Sales, Box 6044, Lubbock, TX 79413

WANTED: The following co-ax connectors of the HN series. 6 - UG 495A, C, or D. 4 - UG 333, A or B. 4 - UG 60 A, B, or D. State condition and price. W3RNQ, 413 Johnson Rd., Penn Hills, PA 15255

SR 102 with HP 23 supply, Turner 254C mike, Eico keyer. Excellent condition. \$425. K7LQJ, Frank McJannet, 11557 Evanston N. Seattle, WA 98133

SIGNAL-ONE, Tempo-One, Kenwood Pair, late KWM2, Priced low! Trade, Don Payne, Box 525, Springfield, TN 37172. Nites (615) 384-3643

CAMERA Leica 111G with f2 50MM Nikkor lens. Like new condition. \$175. Trade? Homer Schulz, Box 8, Valentine, NE 69201

WANTED: several Instructographs, 117 v ac driven complete with 10 tapes. Write Amateur Radio Supply, 6213 13th Ave. South, Seattle, WA 98108

FINE stainless, other threaded, washer, hardware! Guying accessories! Insulators. Basic Lists 20c coin! W8BLR, 29716 Briarbank, Southfield, Mich. 48076

JENNINGS type UCS 10-300 10KV vacuum variable capacitor \$40. RME preselector like new \$25. Gonset GPP-1 phone patch \$20. Knight swr bridge 38, Johnson Mobile (60 watts am) \$10. Morrow 5BR-2 5-band mobile converter \$10. Knight grid dip meter \$15. Knight KG-600 tube tester \$25. Bill Curren, 3308 West Commonwealth, Fullerton, CA 92633

SWAN Cygnat 260. Brand new, under warranty, in original carton \$300. Gonset GSB 201 MKIV Four 572B's 2KW linear \$200. WB6JRW, 3511 Suncrest Av., San Jose, CA 95132. Tel: 408-251-7101

WANTED: Hallicrafters S16 SX17 S20R SX25 SX28 receivers in good working condition for personal collection. State price and condition. Al Martin, KH6BC, 1781 Hookups St., Pearl City, HI 96782

MOTOROLA U43GGT, 2 channel, 2 FM with radiotelephone control head Converted for 146.34 and 146.84. Excellent condition \$199. James DeMott, 207 A S. March, Grand Forks AFB, ND 58201. Area 701-594-9197

HW-100, SB-200, HP-23A power supply w/speaker cabinet, HDP-21A desk mike, excellent condition - \$425. Kent A. Rowder, WA6JXC, 14503 Hayward St., Whittier, CA 90603. Tel: 213-493-7087

MOBILE - Base station, SB34 with mic, mount, xtal cal. \$259. Hustler antenna, 80, 4U, 2D, 15 meter resonators \$45. WA7DCD, Box 2347, Everett, WA 98201

SELL: SB 2-LA linear, excellent condition, with manual. Used only a few hours. \$150. E. Sapiro, K1JMH, Caputo Rd., North Branford CT 06471

SELL: Eico 753, ac supply, separate WWV conv., 100/5 kc cal., \$150. G. B. Garrott, c/o BCQ NWL, Dahlgren, VA 22448

SWAN 350, 117XC p.s., xtal, calibrator, vox \$300. WB2FGR, 786 Grand Terrace Ave., Baldwin, NY 11510. 516-223-0101 - 212-592-9928

SELL: Heath twoer, mike, manual, GP-11 mobile power supply \$50. WA6IDY, 2128 Carroll, Lawton, OK 73501

DRAKE R4A - perfect condition inside and out with many extra xtals. Will ship. \$290. C. Jones, 48 University Crt., Buffalo, NY 14226. Tel: 716-833-4290

SELL: HW-22A and ac supply \$110; SB-610 scope \$75; SX-146 w/xtal, \$150; CE 20A w/vfo \$75. All perfect with manuals. E2BDU, Dew Hofstetter, 98 Blue Ridge Dr., Levittown, PA 19057. Tel: 215-943-5465

WANT: Gonset GSB-101 linear. Jim Roberts, 509 Greenbriar, Auburn, IN 46706

LABORATORY test equipment at steep prices. Large SASE for listing. Electronicraft, P.O. Box 1113, Binghamton, NY 13902

HEATH DX100B, AM2, Mike, bug, extras, Hallicrafters SX101A excellent \$250. WB3COF, 9822 Brookfield, Livonia, MI 48150

QSTs before 1922 and amateur teletype publications wanted. Orville Maroon, 1941 Oakdell Dr., Menlo Park, CA 94025

OPENINGS for Ham Radio counselor for co-ed camp, Poconos. Reply to Kattitany Camp, 119 S. Easton Rd., Gelside, PA 19038

HAMMARLUND HQ 170 & speaker. Like new. 16618 Bahama St., Sepulveda, CA 91343. Tel: 213-892-5037. \$150.

APACHE TX-1. Needs some work, nothing serious. Come with \$75 and take it away. K1REM, 504 Amity Rd., Woodbridge, CT. Tel: 203-387-2393

COILED cord microphone cable 1 shielded and 3 unshielded \$300. \$1 postpaid. Vega Electronics, 2115 DeLa Cruz Blvd., Santa Clara, CA 95050

VIKING Valiant \$100, Hy-Gain DB62 \$20. W1CKA

COLLEGE expense, must sell Hallicrafters SX-117, HT-44, (2) Dumont 5 inch scopes, Collins 310-B cw xmttr, all excellent, \$350 takes all. Will deliver 150 miles. Jim Anderson, R.D. No. 3, Newburgh, NY 12550. Phone: 914-561-1426

75S1 with Walters rejection tuning \$260, Clapp Eastman loose coupler want Instructograph. W2HP, 241 Academy St., Bayport, NY 11705

"HOSS Trader Ed Moory" says he will not be undersold on Cash deals! Shop around for your best price and then call or write the "Hoss" before you buy! New Equipment: Display Galaxy GT-550, \$389, factory warranty; Swan 260 Cygnat, \$309; Swan 270B Cygnat, \$389; New Mosley Classic 33 and Demo Ham-Motor, \$199. Trade in accepted on new Swan 500CX at \$499; New Rohn 50 ft. foldover tower, prepaid, \$219; Demo - new NCX-1000, \$672; Used Reconditioned Equipment: Drake TR-4, \$419; T-4-XB, \$369; R-4-B, \$349; Ham-M, \$89; 75A-4, \$375; HT-32, \$219; HX-500 xmttr, \$185; In Stock New Two Meter Fm by Drake, Vantronic, Clegg, Regency, Moory Electronics Co., P.O. Box 506, DeWitt, AL 36024. Phone: 501-946-2820

HRO-500: Lab grade remanufactured prototype. Two notch mech. and elec. condition. \$700. Dean Straw, W1IRG, 18 Bryant St., Wakefield, MA 01880. Tel: 617-245-3966

SB-301 with all filters SB 401 with xtal pack professionally wired and in top condition. Together \$500. Herb Ostrom, 4400, Boca Raton, FL 33432

SELL: Heath Apache with SB-10 ssb adapter \$110. Good condition. Ship collect or pick up only. Hornet TB-750 Triband beam. Good condition. \$30. W6LCO, 45 Skywood Way, Woodside, CA 94062. Tel: 415-851-1041

ELDICO TR-1TV: For sale, 300 watt xmitter, modulator power supply cabinet. Cannot ship. \$60. K8ZWH, 26651 Zenan Ave., Euclid, OH 44132

NEW Minneapolis Honeywell W612B mobile power supply \$30. Viking 2 and 122 vfo \$50, pickup. Lafayette HA-410, mint cond. \$80. W3KXX, 1866 Watson Rd., Abington, PA 19001

SELL: mint HD10 keyer \$30. Knight R195 communications receiver. Factory checked and aligned September 58. WA5SFM, 304 Tansy, Borger, TX 79007

SWAN 240 \$160; w/s \$200; both in perfect operating condition. W3AMC, Tel: 215-826-5418

WANTED: 1 kw Johnson "matchbox." WA0TUJ, 136 North 8th St., Fort Dodge, IA 50501

HEATH DX40, VF-1, relay mint condy \$50 Hallicrafters S-102 2mtr test \$20. WA3MTF. Tel: 412-827-2767

FSKER-KY-45 w. man. Northern Radio P.S., model 4B. Make offer. You ship. W. R. Blum, WA7OOO, Broadus Route, Miles City, MT 59301

ESTATE W1YMJ, Drake R4, MS4, 6 xtals \$250. Heath Test gear 60% list price. K1RSC

FOR SALE: DX-60B and HG-10B vfo. New! I will pay postage. Both for \$120. WA4DNY/G5AEL, Box 3117, APO NY 09179

COLLINS S line and other gear for sale. SASE for complete detailed list. J. Lynch, Box 9638, 533 East Dunlap Ave., Phoenix, AZ 85020

SB301/SB401 \$405. Incl. c.w. filter and spkr. SR220 \$350. All \$715. Expertly assembled and aligned. Call 313-641-3341 for inspection or to schedule on-the-air test or QSO any mode and freq. W8DEH, Homer Dunham, 708 North Campbell Rd., Royal Oak, MI 48067

SELL: extra Swan 250 with 117CX, \$225 plus shipping. Lafayette HA 750 B meter, \$70 postpaid. Both excellent. Robert Monroe, WB9FIP, 502 Millikin Bldg., Decatur, IL 62543

GENERAL radio signal generators. 1001A \$645, 805C \$495. Both in excellent condition. H. Sayers, 39 Elm Hill Rd., Clifton, NJ 07013

DRAKE 2C receiver with matching 2CS speaker for sale. \$200. Certified check or money order. W5DSC, 2202 SO43, Temple, TX 76701

NEED manual for Solar capacitor analyzer model CE. Buy or borrow. Will reimburse your effort. W7NLU, 4152 W. Bilby Rd., Tucson, AZ 85706

WANTED: HRO coils A, B, D, and E sets. Advice on condition and price. WA6QVS, 428 - 28th St., Richmond, CA 94804. Tel: 415-232-3427

NC-300 ham band receiver with two meter converter. Excellent condition. \$110. W2WFW. Tel: 516-724-0805

DRAKE 2NT transmitter, used five months, absolutely mint cond. With cables, manual, \$110. Shipped job. Lacey Wilson, W9NMJ/7, 1445 Lynn Ave., Billings, MT 59102

SELL: Galaxy GT550 transceiver with power supply, speaker, calibrator, vox. New complete station only \$549. Val 500A Keyer, new \$59. Best equipment: 5" wide band precision Instrument Corporation model 10-55, \$99; Pico m 35 r.f. signal generator \$45; Eico model 944 flyback & y tester \$35; Eico model 715 transmatch antenna checker \$ Mercury model 120 tube tester - all latest tubes and dco \$45. All like new and guaranteed perfect. F. W. Couper, W3 8258 Britany Place, Pittsburgh, PA 15237

MANUALS: \$6.50 each - R-390/URR, R-390A/URR, R-390A/URR-25D, CV-591A/URR, Hundreds more. S. Consalvo, 48 Romaine Dr., Washington, DC 20021

COLLINS revr 75A-2; xmt 32-V-2 excellent; supply, L new. Highest offer. S. Stoller, W9TMB, 1535 P Lincolnwood, IL 60466

OLD schematics urgently wanted: Clapp-Eastman regenerative receiver type H.R. 175-825 meters. Atwater Kent model serial 2138423. K1KPS, 12 Hubbard Park, Cambridge, MA 02138

WANTED: R-4B Drake in excellent condition. Also T-4B. Moser, Rt. 10, Box 461-43, Charlotte, NC 28213

WANTED: W2RUK would like to compile a list of Hams who are interested in model railroading. Card to 7 Charles, Aubur NY 13021

SELL: FR HW16 transceiver; HG10B vfo, xtals free. T 201-694-2041

NOVICES: HT-10B, calib, spkr, 5 mo. Like new \$70. R. Chi 1057 S. Kingsley Dr., L.A., CA 90006

CLUBS: Send membership list for QSLs. World QSL Bure 5200 Panama Ave., Richmond, CA 94804

DRAKE 2B, full 10 mtr. and WWV, \$170. Hallicrafters 2 m hand-talkie, extra batteries, charger, etc. \$65. WA9PUD 4424 Purdue Ave., Culver City, CA 90230. Tel: 213-398-2858

WANTED: Fine Collins receiver-transmitter. McCool, 301 - St., North Bergen, NJ 07047

SB-200. New, unassembled, Heath guarantee. \$220. Purchase pick up. 118 Cedar Lane, Princeton, NJ 08590. T 609-921-7351

AMPLIFIER 4-1000A, TR-44A rotor, antenna parts. 3 Jackson Ave., W. Hempstead, NY 11552. Tel: 516-481-2021

HAM/CR operators. 6" x 12" custom auto tags with your initials. Heavy Plexiglas. Chrome letters on black background. \$5.95 each 2 for \$10. Auto Motivation, Box 206, Avond Estates, GA 30002

DRAKE SPR-4 new Dec. 70. \$325; B & W 5100-B with 51B-S factory attached \$150. Godfrey Delcuz, West Point, ME 397. Tel: 601-494-5721

R390, \$550; Telrex 4el 10 mtr beam, \$30; eV53b mike, \$12; Du Mont 304 scope, \$38; Key J36, \$7; Eico 950B cap chr, A. Berger, 8519 Braeburn Dr., Annandale, VA 22003

NATIONAL HRO-500 receiver with speaker, good condition. \$700. Transceiver power supply, needs some capacitors but stock. \$35. Heath scanalyzer, SB-620, good shape. \$70. Want mainframe or 21-6 RTTY converter. 5-8 element 20 meter beam. Hy-Gain rotor. W1BRJ, 7 Pickwick Rd., Marblehead, MA 01945

WANTED: Hallicrafters HA 10 LF tuner. F. Cuitini, 6359 Keeler, Chicago, IL 60629. Tel: 312-767-8938

OPERATIONAL amplifier type 741 integrated circuit. Full quality 4 for \$5. Bob Duke, K5DZM, 13526 Pyramid L Dallas, TX 75234

COMPLETE station for sale, EG, TR4, NCL2000, kw matchbox HP Oscgpe, many other irresistibly priced goodies. SASE for list. K2YHK/E, 883 Darshire, Sunnyvale, CA

HEATHKITS - excellent condition. 10 months old. HR10 DX60B - oscilloscope, mike, xtals - Hallicrafters revr. P many extras. R. Gunsher, 67-66 108st, NY 11375

CONTACT us for the best deal on new or reconditioned Coll. Kenwood, Tempone, Drake, Swan, Galaxy, Hallicrafters, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, etc. equipment. We try to beat any deal and to give you the best service, best price, best terms, top trade-in. Write for price list. Trv us, Henry Radio, Butler, MO 64730

WANTED: hvy duty tower 50' up. Crank up &/or tilt rotating. S. Falago, Rt. 3, Box 130A, Bridgeport, WV 26330

CONTESTERS - Ohio, Indiana, Kentucky. Openings MVARCS. For info, contact W8JLO

T4XB, R4E perfect condition, less than one year old. WA1KO 27 Locust Ave., Lexington, MA 02173. Tel: 617-498-3471

SELL: SBE 34 transceiver with calibrator, mount. All for \$2. Cost new \$490, 10 hrs use, quitting. John Olson, 1113 Ado Great Falls, MT 59404

PEARCE-SIMPSON two meter fm 25 watt output solid-state transceiver \$249.95. National NCX-1000, 1000 watt ssb 5 b solid-state transceiver \$839.95. All types Ham crystals 72 hr service at low cost. Discount to Ham clubs. Shipping charge prepaid. Land-Sea Electronics, P.O. Box 9484, St. Petersburg FL 33740, Bill Vogel, W4NES

WANTED: HT-32B, HT-33B, SX-115. State condition and price. Wayne Macabee, WA6JPM, 7082 Kernmore Lane, Stanton, CA 90680

HEATH SB-101 \$325; SB-600 \$45; HP-23 \$16; SB-630 \$65; total package \$400. Excellent condition. W3LGS, Hunda 1832 Spera Ln., Norristown, PA 19401

AN 500 C, 117 XC supply 510 X, Atal oscillator. All new addition. Never mobile, 40-80 trapped dipole. All \$550. W. Kins, 2025 Lakewood Dr., St. Albans, WV 25177. Tel: 4-727-3066

NT latest HQ180AC general coverage receiver \$285. Hustler TV vertical \$30. Three-inch aluminum ten foot for boom \$12. Lectors 1924/25 electrical engineering course, two binders \$6. You pay shipping. Jakob Bara, WJJKP, Greenough, MT 836

ESSENGER cb gear by E. F. Johnson, Never used. Selling at 1/2 price. Transceiver 300, Transceiver III, Tone alert, Nicad power pack, Tone alert with a.c. supply, Crel slide rule & math course & new \$12. Witmer, 803 N. II, Melrose Park, IL 60160

LI: Heath HX-10 180 watts sb/wc 80-10 \$185. Hammarlund 100-10 sb/wc 160-6, speaker, \$125. Teiten, 9432 Oakland, Minneapolis, MN 55420

OR SALE: NCX-3, HP23A, SB600, HP-13A, Hustler 20-75M. 25 or best offer. K7CEG, 2747 Terry Ave., Longview, WA 632

-101, SB-600, HP-23, Knight swr meter, Astatic JT-30 mike, complete station, perfect, \$380 all or part, WR2YFG, 756 Elmstock, Syracuse, NY 13210

ANTED: VFO for B & W 5100-B & power transformer for HQ 9-X. Harry Campbell, 1939 Forest Green Dr., N.E., Atlanta, GA 30329

OU all come to International Independent County Hunters convention in Kansas City, July 2,3,4, 1971. SASE to WA0SRE for information.

ANTED: Used equipment. Collins KWM-2, a.c. power supply & speaker; Collins 30L1 linear; Drake TR4, a.c. power, speaker, Drake LB4 linear, H. F. Cushing, W6LXZ, 3224 Bobbie Dr., San Jose, CA 95130

EMPO One/FT200 xcvr & ac/one pwr \$379.95. Like new. Donald M. Nagano, W6RQZ, 1330 Curtis St., Berkeley, CA 94702. Tel: 415-826-7345

OLLINS 75A 4, Venter tuning, noise blander, All factory modifications, 800 cycle filter - mint. Also home brew linear. All sell both or trade for SB-series station accessories. Call or write WA8CDU, 7717 Julie Dr., Kalamazoo, MI 49002. Tel: 616-327-4316

LI: NCX-600 transceiver, AC-500, \$250, Drake 2B, 2BQ. 75. All excellent. Peter Miller, K1DSS, 6 Keane Rd., West Roxbury, MA 02132. Tel: 617-327-6514

3GKP has new call, QTH: William L. Smith, K4RJ, Route 7, box 316, Franklin, NC 28734

ILL, sell Swan 350 (late) with vox and cal. With or without ac pply. Make offer. Ira Deutsch, 1575 Tremont St., Boston, MA 02120. Tel: 617-277-0729

JOHNSON Invader 2000/2000 for sale, \$275. Hammarlund HQ 70 C for sale, \$165. Includes manuals and original cartons. 56QV1, 1013 Gorgas Circle, Fort Sam Houston, TX 78234

OLLINS 75A-4, Venter tuning, noise blander, All factory modifications, 800 cycle filter - mint. Also home brew linear. All sell both or trade for SB-series station accessories. Call or write WA8CDU, 7717 Julie Dr., Kalamazoo, MI 49002. Tel: 616-327-4316

ANTED: Elmac PRM-8 rcv. State condition & price. Bud McCormick, 557 Zion St., Hartford, CT 06106

ASTING service - gear to sell? Need rig? sellers - \$1. Lists formation year. Buyers - free. SASE brings details. Listing service, Box 1111, Benton Harbor, MI 49022

ORLD-RADIO has used gear with trial, terms, guaranteed galaxy FM210/AC210 (2M, FM, 10 watts 115VAC/12VDC) - \$169.95; Galaxy GT750 transceiver (SSB-80/10M) \$399.95; N2 - \$79.95; 2N1 - \$119.95; SB2LA - \$149.95; 75S1 - \$279.95; R4 - \$299.95; R4B - \$329.95. Free "blue-book" for more. 3415 West Broadway, Council Bluffs, IA 51501

OBLE power supply HP-13A new \$55; Hustler base, spring, mast, 4 resonators \$45; CBCO swr bridge \$15; Hy-Gain beam H2MK3 with balun \$85; escode practice set with Ameco oscillator and speed key \$15. W0DSP, Box 593, St. Ansgar, IA 0472

ALAXY V MK II, ac supply, speaker console, vox, calibrator, w filter, \$325 - or will trade for VHF/UHF FM, especially GE progress station TX-RX w/ power supplies. WA7DNZ, 400 South 10th, Laramie, WY 82070. Tel: 307-742-2471

ONG receive: HT37; HQ170C, matching speaker; Manuals, Good condition. Used daily. Warranty req. realigned both October, 175 each, or \$325 both. Fob, W9KKV, Box 523, Salem, IN 47167. Tel: 812-883-4505

ANTED: Heathkit HA-14 linear and HP-24 ac power supply in excellent condition. Write WA0FZR. Quarters 4166, USAF Academy, CO 80840

IKING Challenger \$45. WZAM1

OR SALE: QST complete from 1927 to 1969. Some copies 92-1 through 1926. Condition fair to excellent. Wireless World 954 through 1965. First best offer takes. Mrs. Hank Pehr, 414 66th St., Berea, OH 44017

ANTED: Teletype model 33, W5TYC, 307 Sudbury Rd., Annapolis, MD 21090

BE-34, little used, xtal calib, sb-mike; unused mobile mount. \$255. Heath HW13, 160 W. 470 mod 5 new unused xtal; 232-A pwr supply, \$175, R2HNS, 57 Meeting Lane, Hicksville, NY 11801

X-42, \$100; SX-43, \$35. Both cover 0.55 MHz to 110.0 MHz (am & fm); R-42 matching sply \$15; HRO-60R with everything, exc. condx, \$290. Will ship anywhere. W3FOR, Dave Mello, 114 Westway, Arnold, MD 21012

SALE: Hallicrafters HT46 cw-sb transmitter 10-80 meters, 180 watts complete - mint condition. \$200. K2HMY, Seneca Falls, NY 13148. Tel: 315-568-5286

HEATHKIT SB-101 trnscevr. HP-23 power supply, SB-600 speaker cabinet, SB-620 scanalyzer. Complete station, \$395. Tel: 212-478-1764

TRANSFORMERS rewound, W4CLJ, 507 Raehn, Orlando, FL 32806

ANTENNA rotor controls, brand new, for CDE AR-10 and AR-22 model rotors, \$11 each postpaid USA, \$10 each for five or more units, Sterling Telemotor, 187 State St., Hackensack, NJ 07601

WANT: Trihand quad or beam. Also tower, rotor, etc. SB-101 or SB-102 transceiver. State price and condition in reply. Ken, W8BDVI, 745 Corrida, Covina, CA 91722. Tel: 213-339-0131

MUST sell 2 Communicator II's, 2 meters, good condx. \$60 each. HB linear 4-400, no pwr sup. HB final 2 - 813's with pwr. \$50. Heath Sixer. \$25. W3INW, 222 Housatonic Ave., Stratford, CT 06487

HOOSIER Electronics, authorized dealers for Drake, Hy-Gain, Ten-Tec, Galaxy, Regency, Hallicrafters, All equipment new and fully guaranteed. Write today for our low quote. Hoosier Electronics, Dept. C, R.R. 25, Box 403, Terre Haute, IN 47802

SWAN 270 ac/dc transceiver, Turner M-2/U transist. mic. Hy-Gain Ham cat ant. with 15-20-75 meter resonators, all bkts., mtrs., and manuals. Perfect. \$325. Stan Tyler, K4ANN, 538 Southern Comfort, Clearwater, FL 33515

HOBBYISTS - Electronic components at huge savings. Transistors, 2N3566 and 2N3567, 6 for 25c. 2N3638, 4 for 25c; capacitors 10c, carbon resistors 5c. Thousands of components. Catalog free. Saseco Electronics, 1009 King St., Alexandria VA 22314

LINEAR Swan Mark II, One hour's use. Absolute mint condition. Insured postage paid for certified check of \$335. Tom Simek, 2804 Beam Lane, St. Paul, MN 55121

HALICRAFTER SX-146, calibrator, cw filter, mint, \$165, fob. Stein, WA2NGG, 26 Wistar Ave., Metuchen, NJ 08840

MOTOROLA FM 43G S85; 41V S85; Aerotron 35 watt \$160; GE 20A \$80; Eldico SRA-1, \$25; WRL 6&2 transmitter \$30; W5SYR, 5000 Hall, Ararillo, TX 79109

SELL: Apache TX1, \$100, Hammarlund HQ110AC, \$125, Galaxy V Mk 3, \$290, WA2PVN, 642 Selmaster, Union, NJ 07083

SWAN 350, ac/mobile dc supplies, spurious filter, \$335; SB-301 w/cw filter, \$239; 4CX1000A, \$45; M14 non-typing reperf, \$19. All equipment in excellent condition. Local interest preferred. K3MNJ, 8361 Langdon St., Philadelphia, PA 19152. Tel: 215-725-2373

TRANSCEIVER Auto-Mount, \$7.95. See ad in June '70 issue QST. Alco Mfg. Co., Box 817, Grand Forks, ND 58201

SELL: QST Jan., 1929 to Jan., 1964. Johnson, 92 Lawson, Hempstead, NY 11550. Tel: 516-486-4517

75A RCVR with vernier dial and Collins filter kit and two filters \$200; HW-22 \$50; Heath HX-20 and supply 4125; New 6C21 tubes \$15; Model 14 base \$10; Cover \$10; Both for \$15. W8CEG

FOR SALE: Swan 350 117XC ac supply and 14-X dc supply \$360. Used 10 hours excellent condx. Norm Riquier, W1GNS, 78 Norwood Rd., Bristol, CT 06010. Tel: 203-583-3957

JOHNSON T-R switch & lowpass filter, 2400V pole pip (C-tap), 304th tubes. Make offer. Jim, P.O. Box 1321, Lafayette, IN 47901

KWM-2 zero hours since reconditioned noise blander - notch filter heavy duty ac and dc power supplies, mobile rack. Best offer. W8FUF, 8200 E. Jefferson, Detroit, MI 48214

HW12A with homebrew ac supply \$100; HQ110A \$100; Apache \$60; R4A \$300. Pick up preferred. WR2YU, 958 Vail Rd., Parsippany, NJ 07054

WANTED: Drake T4XB-R4B MN2000. Reasonably priced please. Collins 32S1 \$395, 75S1 \$280, 75S2-C extra crystal board, noise blander. Also 500 cycle cw filter. Beautiful, \$395. WA4LXX, Foy Cable, 251 Collier Ave., Nashville, TN 37211

NATIONAL NCX-3 sbx xcvr w/ac pwr supply, and Shure model 44 microphone \$235. You pay shipping. William Lazzaro, Box 29 Golding Hall, S.U.C., Oneonta, NY 13820

FOR SALE: KWM2, supply \$825, KWM2A, supply \$675, CC1 \$40, NCL 2000 \$300. Items in perfect condition, W2LEC

WANTED: Paragon RD-5 and DA-2, West. RE tuner, Grebe CR-9 rheostats, DeForest D-10 coils, other old radios, msc. parts. Joe Horvath, 522-Third St., San Rafael, CA 94901

2 METER transmitters: surplus model TDQ, 45 watts am, new, 11.5v 60 cycle, \$125. Aero, 900 G, Rio Linda, CA 95673

CI-EGG THOR-6, with ac supply, six meter transceiver, factory aligned. Excellent. \$200. John Keramidas, 1833 Lake Howard, Winter Haven, FL 33880. Tel: 293-0190

WANTED: Hallicrafters S-30 Radio Compass. Howard Hoagland, 639 North Sierra Bonita, Los Angeles, CA 90036

SBE SB 34 transceiver, very clean with mike, \$240. Gonset Communicator II, 2 meter transceiver, no modifications, \$80. K6POU, 2712 Kinney Dr., Walnut Creek, CA 94595

HW-32A w/calibrator: HP-13A; complete Hustler antenna and mount; all 6 months old; manuals/cables, \$140. Bill Baker, W840UR, 546-A Hickory St., Shaw AFB, SC 29152

HALLICRAFTERS HT-46, ultra-compact 80-10 SSB-CW transmitter, 180 watts, \$150 or trade for clean Ranger 2, James Cain, WA9AUM, 5713C Port Irving, Indianapolis, 46224. Tel: 317-247-8963

FOR SALE: Henry 4-K, \$995, TR-3, AC-3, RV-3, \$400, 75A-4 No. 5115, 2.1, 3.1, 6.0, \$525, HRO-5TA1, 6 coils, \$100, Galaxy-300, PSA-300, \$185, 32S-1, 516F-2, \$450, Wanted: 32V-3 cabinet, H. V. Choike (30S-1), 4CX-1000, sockets, chinneys, James W. Craig, 29 Sherburne Ave., Portsmouth, NH 03801, Tel: 603-436-9062

SELL: Drake T4XB, AC-4 \$400, 2C, 2CQ \$185, SB-630 \$50, Shure Mic 444 \$15, Dowkey Relay \$10, Vibroplex box \$10, Possible delivery 200 mile radius of my QTH, Dick Corp, K2POF, RFD No. 1, Mechanville, NY 12118, Tel: 518-664-6406

WANTED: Transcom SBD-3A dc power supply, Wendell Lewis, Box 128, Rockland, ME 04841, Tel: 207-594-4714

R-390/URR Collins Digital read-out receiver, 0.5 - 32 MHz, Good working condx, \$475, W8CV, Loupoint, Pontiac, MI 48053, Tel: 313-FES-1021

DUMMY loads, 1 kw, \$9.95; phone patch, \$8.95, Wired, \$4.00, Ham-Kits, Box 175, Cranford, NJ 07016

DRAKE 2C, Mint, recent Drake alignment, Manual, \$160, Smith, WA2LLR, 37 Rosemont, Madison, NJ 07940

TELEX 3 el 26 foot boom 20 meter Yag \$85; Drake R4A, T4X, AC4 \$595; Henry 2K \$395; HT-37 \$175; 75A4 \$325, K4YY1, Box 1294, Jupiter, FL 33458

SELL: Heathkit SB-200, Mint condition, \$185, No shipping, Stanley Levinson, WB2GYG, 59 Forsythia Lane, Jencho, NY 11753, Tel: 516-WES-4804

Hv-Gain mobile antenna 15 20 40M coils must mount \$35, Mint, You ship, WB2MQI, Ken Sobel, 1560 E. 102 St., Bklyn, NY 11236

SELL: 40-mtr quad, Drake-line, extras; TR-3; Eico 753; 5-1 C1-20; HO-10; s.a.s.e. for details, K1VTM/1, 25 Sunrise, Saybrook, CT 06475

EICO 460 oscilloscope \$90; Turner compressor mike \$30; signal generator \$25; Champion bug \$15; tube tester \$27; cpo/cw monitor \$8; RG64 13c/ft; adding machine \$25, Mitch, WB2JSG, 252-61 Leith Rd., Little Neck, NY 11362, Tel: 212-FA1-0202

GALAXIE FM-210 - AC-210, New in original carton, Never opened, Warranty card, First money order or certified bank check for \$200, Bernard Madenck, 84-57 126 St. Kew Gardens, NY 11415, V1-9-8484

SAN DIEGO hamst! Fleet an outstanding amateur, Paul Thompson, W6SR8, Section Communications Manager, W6INI

2KW Johnson Invader 2000 w/ps all cables manuals, can't tell from new, excellent cond, \$350, Drake R4A w/M54, manuals, mint \$295, Panoramic PCA 21 200 455 KC \$40, WB2ZBL, Roger, 1219 Taylor Ave., Bronx, NY 10474

DRAKE MN-4 matching network, Flawless, \$70, Wanted to buy: MN-2000 matching network, Bill Neill, K2GXP, RFD No. 2, Box 92, New Canaan, CT 06840, Tel: 914-E63-2101

75A4 - 5 - 2.1 filters \$325, HA-14 linear - A.C. p/s \$110, Vic, WA8TND, 143 Longford, Elvira, OH 44035

SELL: Drake R4-A, T-4X, AC-4, MS-4 with 160/10 meter xtals, \$625, Bob Fritz, 719 Horace Ave., Thief River Falls, MN 56701

EVANSVILLE, Indiana Hamfest 4H Grounds (Highway 41 North 3 miles Sunday, July 11, 1971, air conditioned, section, overnight camping, ladies' bingo, reserved flea market booths, Advance Registration, For flyer, contact Morton Silverman, W9GJ, 1121 Bonnie View Dr., Evansville, IN 47715

THE Delaware Amateur Radio Association, Muncie, Indiana, will hold a Hamfest on June 4, 1971, at the Prairie Creek Reservoir shelter house, on the NE corner of the lake, Flea market and auction, Free coffee, Bring the family and spend the day. For info, write to WA9VEI, 2806 So. High St., Muncie, IN 47302.

DRAKE L4B, Excellent condition. Will not ship, Prefer Indiana sale, \$600, WB9BEF, 204 King Arthur, Franklin, IN 46131, Tel: 317-746-7377

"DON and Bob" new guaranteed buys, Monarch kw swr relative power dualmeter bridge \$14.95 plus \$1.50 postage; Amphelon PL-259, SO239 3.9/10; Motorola Hep170 epoxy diode 2.5A/100V/17 3sc; 800V/1A 24c; Quote new discontinued tubes, stock Ampex 8302/4500Z \$32; \$145B \$4.45; C66 \$3.50; 4FT test leads Simpson, Triplet \$1.49 pr.; Ham-M 899; TR44 \$59.95; AR22R \$29.95; Trix W61 freestanding tower \$229; MW65 \$299; B&W 650 dummy load/wattmeter \$49.95; prices freight collect or include sufficient postage, excess refunded, Quote SPR-4, Galaxy, GECC, Mastercharge, Bae, Madison Electronics, 1508 McKinney, Houston, TX 77002, Tel: 713-224-2668

IN749A, 4.3V, 5%, 400MW Zeners, 10/61, s.a.s.e., Larry Nurmi, WN4RZO, 706 South B St., Lake Worth, FL 33460

SELL: 6 meter Polycrom \$110, 6 meter Gonset Communicator 4, \$100, Heath VHF-1 Seneca \$60, Heath RX-1 Mohawk receiver \$100, Heath Warrior linear amp, \$125, Johnson 6n2 xmtr, \$75, Johnson VFO \$20, Viking Valiant xmtr, \$75, Johnson KW Matchbox w/SWR bridge \$85, Contact George Hawrysko, WB2GWUD, 220 Highland Blvd., Apt. 1-12, Brooklyn, New York 11207, Phone: ac212-277-4001 between 5-9 P.M.

ROCHESTER, N.Y. is again Headquarters on Saturday, May 15th for one of the largest Hamfests in the East. Full day of programming covering all phases of amateur radio, plus high surplus equipment sale. See Hamfest calendar for more information.

SM3LX interested in sked 14,3373, 21,3373 pse write me.

WANTED: Drake T-4X, T-4XA, or T-4XB, any condition, repair if inoperable - looking for a bargain, State price condition, P. H. Bock, Jr., K4MSG, Box 40, USNCS, PPO 1 York 09544

SWAN Cygnit 270 with vox, immaculate, Sell, but prefer trade for old toy trans (w/ my other hobby). If possible, please number or lettering on trans(s). Don Hilde, K9CWM, 3381 Howell, Milwaukee, WI 53207

SELL: RCA-US Navy very low frequency receiver Model RA covers 15 to 600KC with original power supply and schematics. Good working condition, Asking \$75, Roberts, 217 79th Brooklyn, NY 11209, Tel: 212-836-6262 evenings

R390A, mint, \$650; 51J4, excellent, \$495; R38N, clean \$1 SK115, mint, \$295; 301-1, original box, \$345; 312-B4, \$1 KWM2, \$595, Collins KWT, mint, \$495, Tom Nash, K4WBNWA, 1100 Canterbury, Dallas, TX 75208

SELL: 2 meter fm, 1C-2F-STD, \$180, W4YNP, 612 Archow Norfolk, VA 23502

SELL: Swan TV-2 excellent condx. Used only ten hours, s.a.s.e. \$170, Contact Lon Cerame, 77 Glass Ave., Bellevue, 07109

COLLINS 32V3 with TTY stuffer and book \$175, 75A2 \$1 WAZHQE, 456 Ewing, Princeton, NJ 08540

SB200, excellent condition, \$165, foh, W9OEF, RR No Mokena, IL 60448

SELLING HT-44 with ac, ps, new finals, mint condition, manuals, \$165; SK-101A, new tubes, perfect \$135, WA2D 90 Locust St., Floral Park, L.I., NY 11001, Tel: 516-352-4141

PRIVATE collector wants old wireless gear, Buy, trade, I Septe, 1945 E. Orangegrove Blvd., Pasadena, CA 91104

SELL: Eico 753 xmtr, ac supply, Turner 254C mike, Heath Tweer, Knight T-60 xmtr, Lafayette KT-320 xmtr, HD-10 key, Best offer, Bob King, 1249 Lynn Dr., Potstown, PA 19464

WANTED: E. F. Johnson Viking equipment, All types; cw, ssb. Prefer factory wired but will take kit in excellent condition. Must be completely original without any modifications whatsoever. Must be with original manual. Prefer local area will travel reasonable distance. Also wanted: Hallicrafters S and Collins filters for 75S3B, WA2OAK

GETTING married - Must sell excess, Heathkit: RX-1, condx \$100, HA-10 FB \$130, HX-10 FB except needs xform ps rewire, now rigged to run off HP-23A, make offer \$140, Northern Rio Co; VMO type 115 Mod-1 with curveman needs thermostat, FS keyer type 105 Mod-6, make offer \$100, buyers shipping, Scott, WB4BGU, c/o FCC, Box 6 Kingsville, TX 78363

SIX meter Virginia kilowatt final, pushpull 4CX1000s; \$4 Send \$2 for photos, W4UCH

SIGNAL, One CX7 for sale, \$1550 firm, John Maguire, P.O. 1 612, Ridgefield, CT 06877, Tel: 203-438-2742

VIKING Valiant/FW excellent \$185, Central Electronics 10B hr total time \$65, HQ-129-K w/R Slicer \$125, excellent K9CDB, RR3 Box 51, Shelbyville, IN 46176

DRAKE 2B, mint condition \$195, Heath Marauder, never used \$200, Hallicrafters S-86 revr, \$65, Write WN7MLE, 4109 S Concord, Milwaukee, WI 53222

GETTING married: SB-200 linear, excellent, with manual, \$1 HD-10 solid-state keyer, excellent, with manual, \$35, SB-6 monitor scope, excellent, with manual, \$50, Franklin Davy, 37th St., Frenchtown, NJ 08825

COMPLETE TMC station for sale: consists of GPR 90 with slicer, SBE-2 + pwr supply, PAL 350B + pwr supply, V separate, A. Bruno, 24 Butternut Dr., New City, NY 10956

SELL: Collins 75A-4 Serial 1765 w/w & ssb filters, M condition, \$350 or offer, Central 200V xmtr-cw, ssb, p.a., very good condition, \$300 or offer, Cornell ARC, 401 Bartlett, Ithaca, NY 14850

COLLINS 3011 linear, mint condx, \$350, W0NMM, 18 Bookbinder, Creve Coeur, MO 63141

LAMPKIN frequency meter 105-B, near new \$225, or try SB-401 xmtr, Bill McVey, KL7GFB, Box 623, Sitka, AK 99801

GONSET GSB-100 transmitter, \$150, Hammarlund HQ-17 receiver, \$160, Both units are clean and work good, W6LGO, P.O. Box 121, Alamo, CA 94507

HW-100 without power supply, Ex condx - \$200, DJ-60A \$50, Eric Ellison, WB2CHT, 609-448-3944, Cranbury, NJ

KWM-2, HP-23A ac power, 301-1, like new, \$795, WA4EC 403 Dell Ave., Huntsville, AL 35802

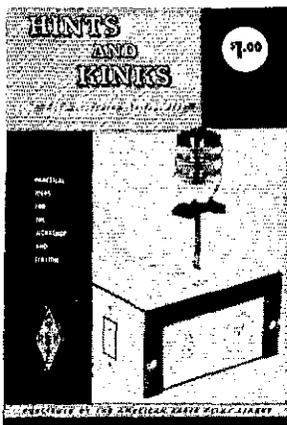
SALE: Drake 2B revr, Has calibrator, extra xtals MARS & WWV, included is Drake 2BQ spkr & Q-multiplier unit, \$1 Swan 175 with EV717 mic, \$70, Karl Z. Ayres, WA2ANE, 14 Taylor Ave., Utica, NY 13501, Telephone: 315-724-7885

QSOs in Spanish, German, and Japanese, Course one language cassette \$10.95, reel \$11.95, manual \$2.50, Foreign language QSOs, Box 53, Acton, MA 01720

COLLECTORS: 1919-1926 radio catalogs, crystal detector, Estate of W5VO, Wallace Bond, 9847 Briarwood, Houston, 77055

SELL Swan 260 Cygnit, best offer over \$250, Also have MM-1 Scope, Meissner all band, switching signal shifter a Lafayette HA-650 six meter transistorized transceiver, K Cornell, P.O. Box 721, Westfield, NJ 07090

WANTED: Antenna tuner, name brand, Send info and price Wayne Pfohl, 18047 Karen Dr., Salinas, CA 93901



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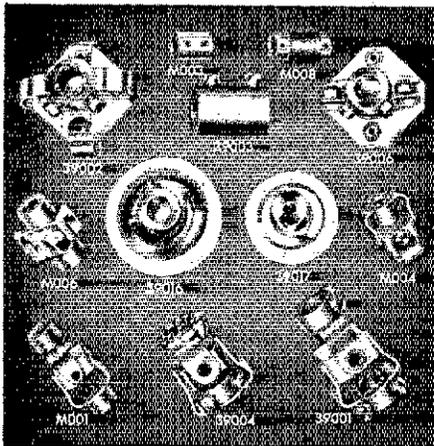
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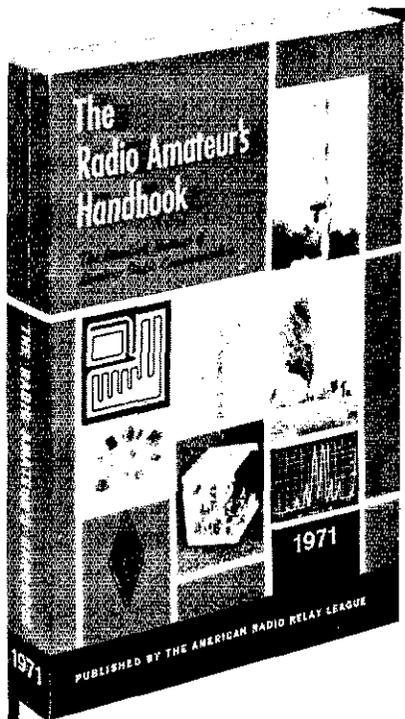
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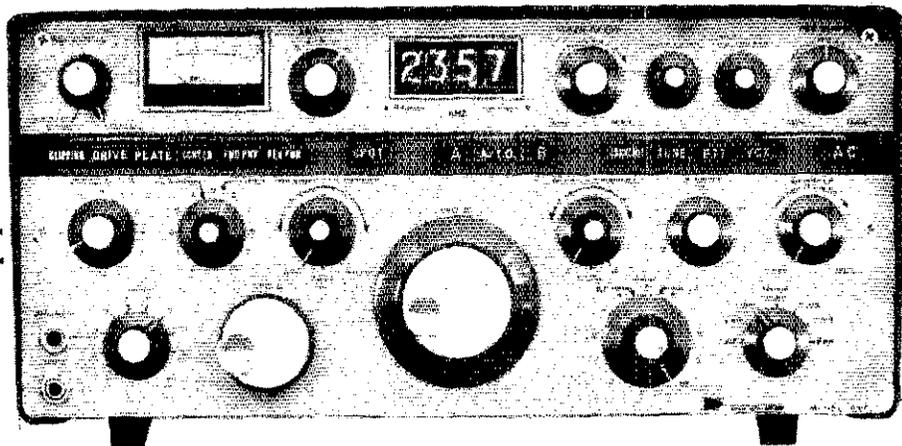
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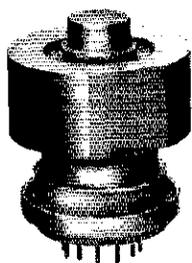
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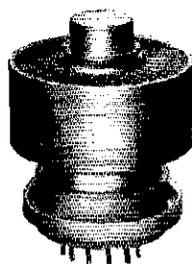
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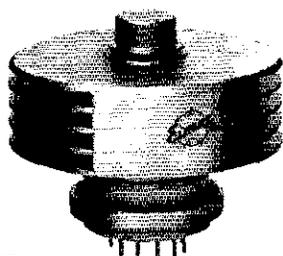
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