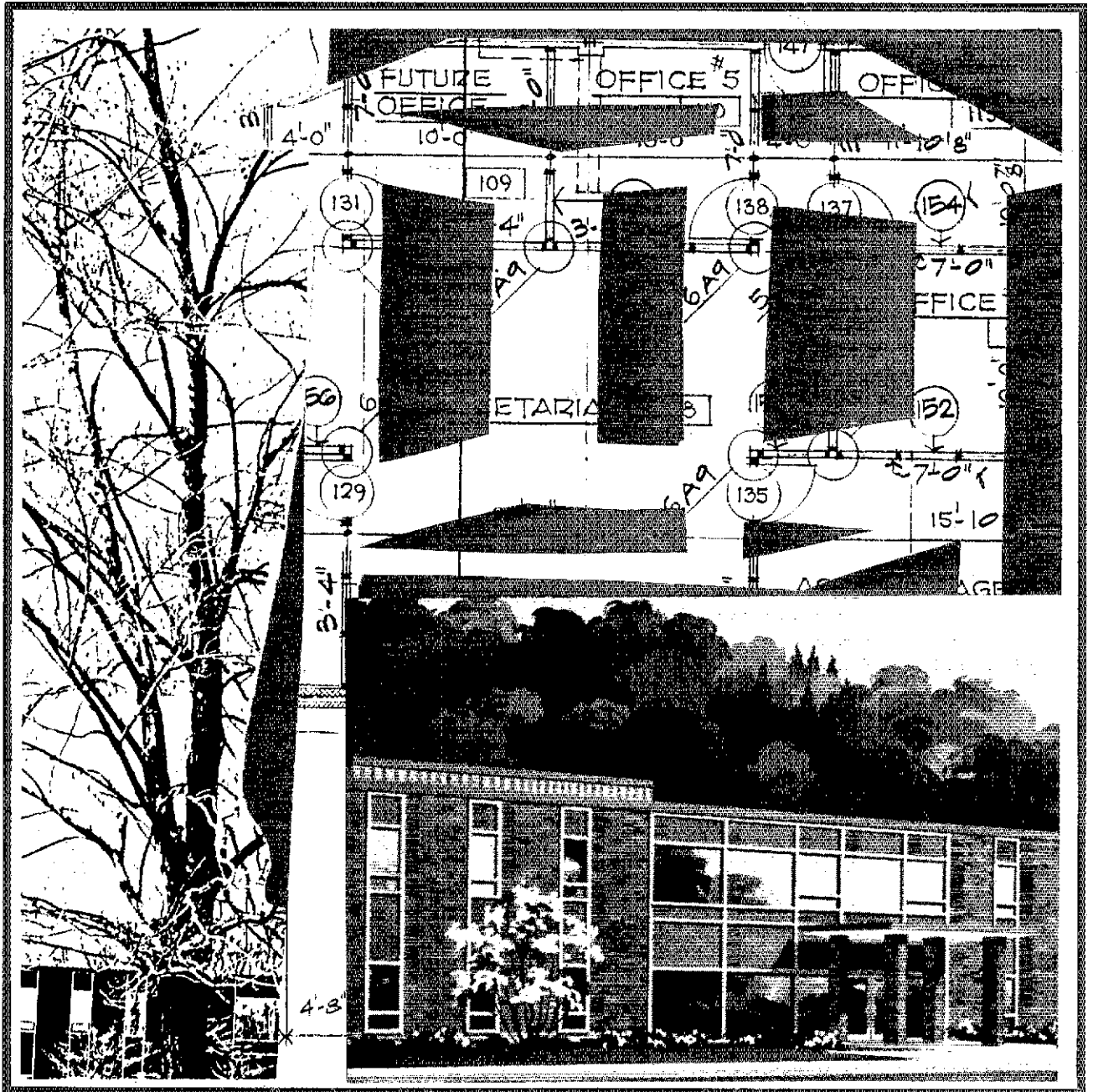


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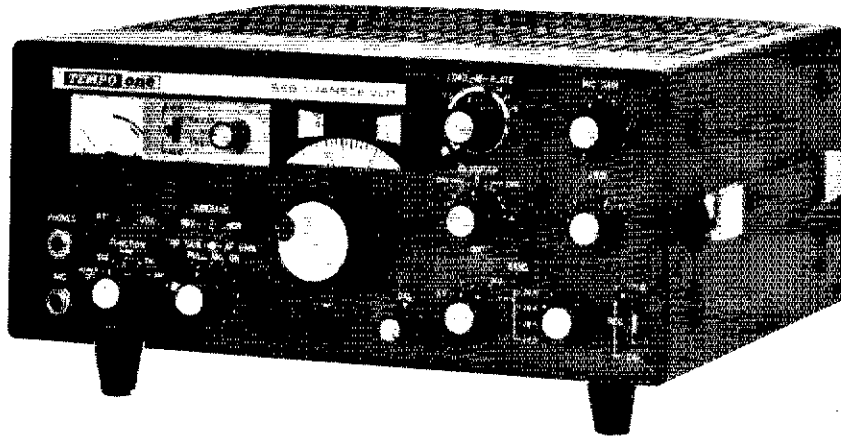
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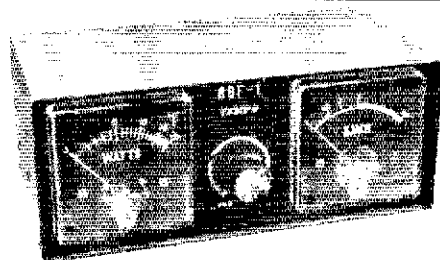
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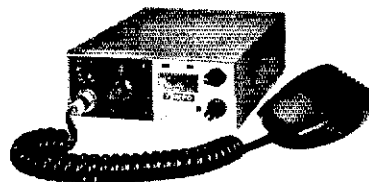
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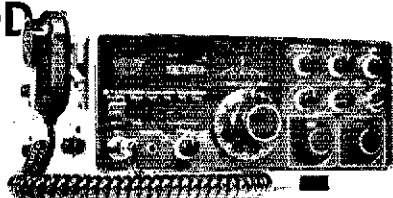
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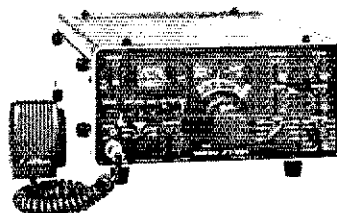
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KENWOOD TS-700A

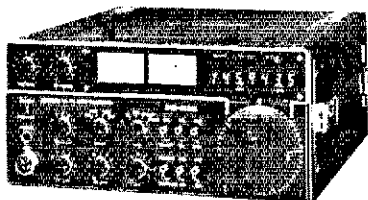


The promise of 2 meter operation...the Kenwood way. The TS-700A operates all modes: SSB (upper & lower) /FM/AM/CW and provides the dependability of solid state circuitry. Has tunable VFO and 4 MHz band coverage (144 to 148 MHz). Automatically switches transmit frequency 600 KHz for repeater operation. AC and DC capability through its built-in power supply. Outstanding frequency stability Complete with micro phone and built-in speaker.

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A compact, versatile transceiver designed for the active 2 meter enthusiast. Features all mode operation — SSB/FM/CW/AM — with repeater offset capability. Advanced phase lock loop circuitry, computer-type modular construction. Preset pass band tuning provides the optimum selectivity and performance needed on today's active 2 meter band. Complete 144-148 MHz coverage. Built-in AC and DC power supplies and speaker. \$679.00



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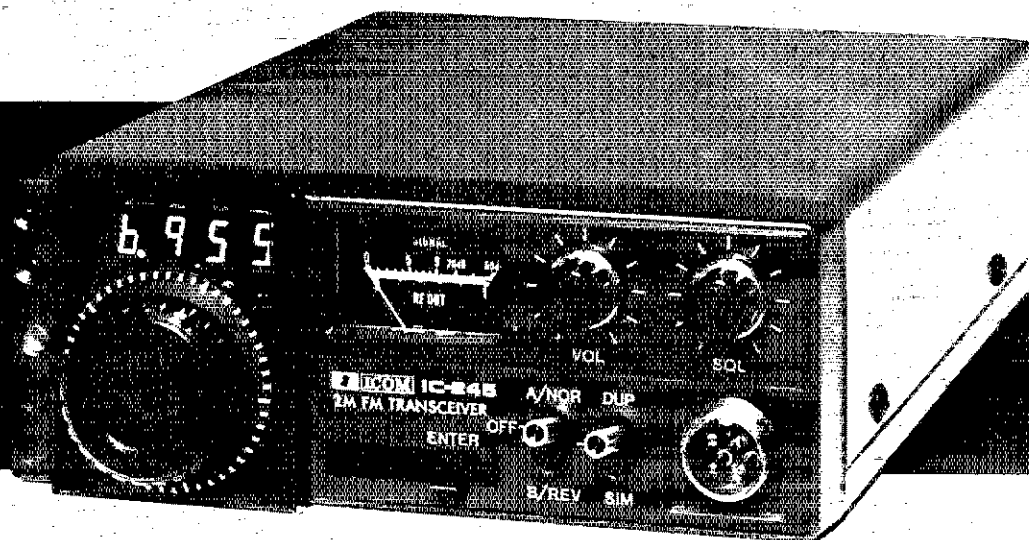
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Introducing the IC-245, 144-148 MHz FM Transceiver

The VFO Revolution goes mobile with the unique, ICOM developed LSI synthesizer with 4 digit LED readout. The **IC-245** offers the most for mobile on the market. The easy to use tuning knob moves accurately over 50 detent steps and assures excellent control as easily as steering the vehicle. With its optional adapter, the **IC-245** puts you into all mode operation on 12V DC power with a compact dash-mounted transceiver. In FM, the synthesizer command frequency is displayed in 5 KHz steps from 146 to 148 MHz, and with the side band adapter the step rate drops to 100Hz from 144 to 146 MHz. For maximum repeater flexibility, the transmit and receive frequencies are independently programmable on any separation. The **IC-245** even comes equipped with a multiple pin Molex connector for remote control.

The **IC-245** is a product of the revolution in VFO design, from its new style front panel, to its excellent mechanical rigidity and Large Scale Integrated Circuitry. Your **IC-245** will give you the most for mobile.

SPECIFICATIONS

GENERAL	
Frequency Coverage Modes	*144.00 to 148.00 MHz FM (F3)
Supply Voltage	*SSB (A3J), CW (A1) DC 13.8V +15%
Size (mm)	90H x 155W x 235D
Weight (kg)	2.7
TRANSMITTER	
TX Output	F3 10W *A3J 10W (PEP), A1 10W
Carrier Suppression	40 dB or better
Spurious Radiation	-60 dB or less below carrier
Maximum Frequency Deviation	±5 KHz
Microphone Impedance	600 ohms
RECEIVER:	
Sensitivity	*A3J, A1 0.5 microvolt input gives 10 dB S+N/N or better F3 0.6 microvolt or less for 20 dB quieting S+N+D/N at 1 microvolt input, 30 dB
Squelch Threshold	-8 dB or less (F3)
Spurious Response	-60 dB or better
SYNTHESIZER:	
Frequency Range	144 MHz to 148 MHz
Step Size	5 KHz for FM *100 Hz or 5 KHz for SSB
Stability	per C in the range of -10 to +60 C, ±0.0000145% per C

* Valid with SSB Adapter only

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OFFICES

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Your headquarters expands as amateur radio grows. See page 64.



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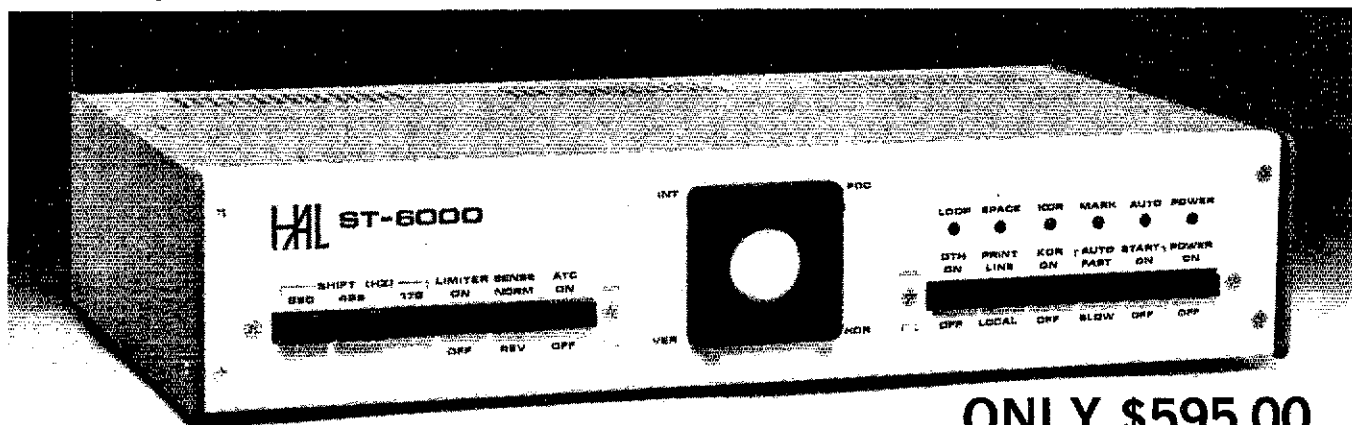


Amplifier in actual operation.

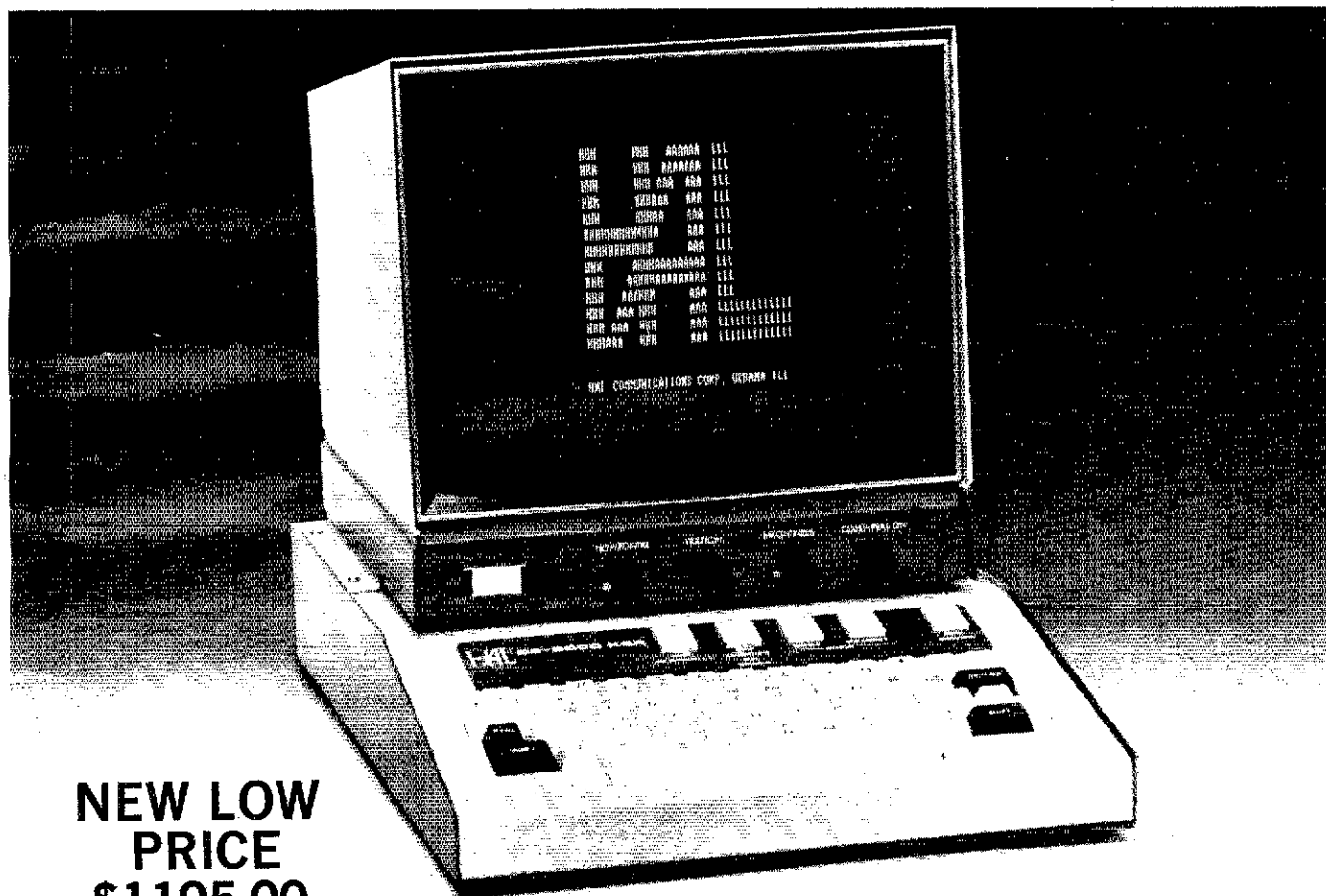
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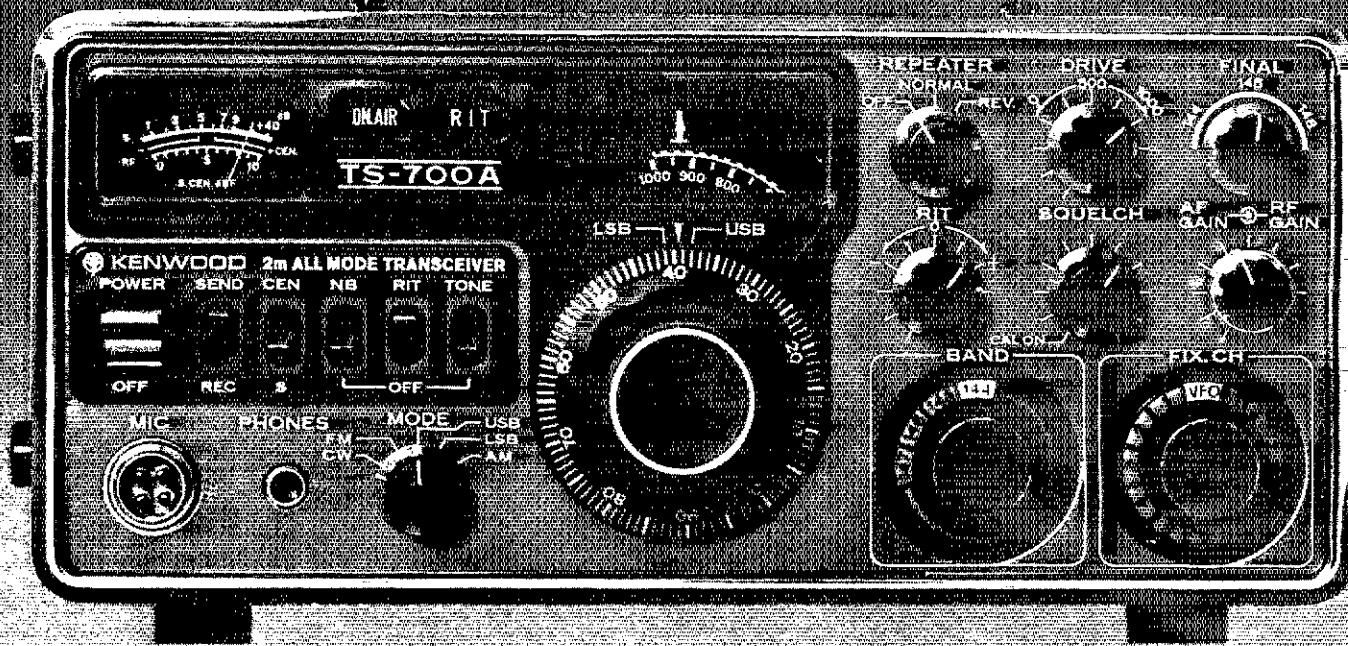
The DS-3000 and DS-4000 series of KSR and RO terminals provide silent, reliable, all-electronic TTY transmission and reception, or read-only (RO) operation of different combinations

of codes, including Baudot, ASCII and Morse. The powerful, programmable 8080A microprocessor is included in the circuitry to assure maximum flexibility for your present needs—and for the future. The KSR models offer you full editing capability. The video display is a convenient 16-line format, of 72 characters per line.

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SP-70



MC-50

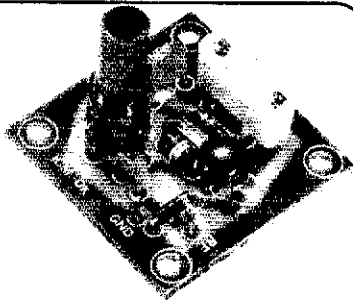
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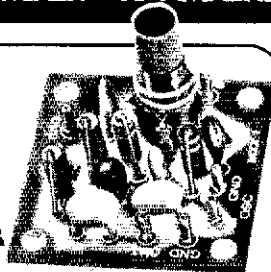
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OX OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
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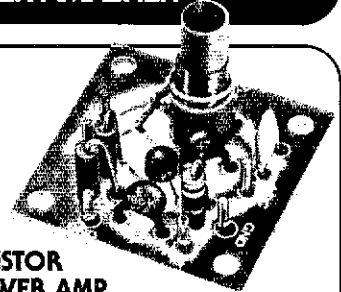
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MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
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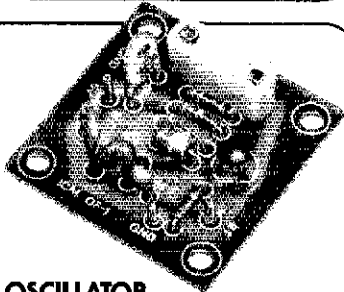
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PAX-1 TRANSISTOR RF POWER AMP

A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
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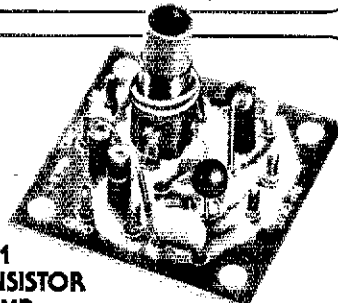
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Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
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Specify when ordering.

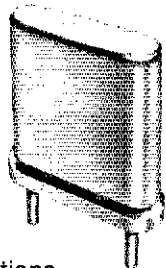
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P. O. Box 2067, Georgia Southern Branch, Statesboro,
GA 30458
Vice Director: Bev. B. Cavender, W4ZLD
P. O. Box 1083, Lake Placid, FL 33852

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Vice Director: Jay A. Holladay, W6EJJ
5128 Jessen Dr., La Canada, CA 91011

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3515 Windsor Road, Austin, TX 78703

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THE AMERICAN RADIO RELAY LEAGUE, INC.



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

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

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

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

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

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"It Seems to Us..."

RFI/TVI — How Large a Problem?

In 1973, ARRL formed an RFI Task Group. The chairman was ARRL Vice President Vic Clark, W4KFC; secretary was Ted Cohen, W4UMF; and the members included Hal Richman, W4CIZ; Bill Grenfell, W4GF; Ed Redington, W4ZM and Don Gerue, K6YX. ARRL Board Liaison was Atlantic Division Director Harry MConaghy, W3SW, and both Lew McCoy, W1ICP and Doug DeMaw, W1FB, served as Hq. liaison at one time or another.

The goal of the RFI Task Group was to develop a greater awareness on the part of amateurs about RFI/TVI, to encourage the passage of legislation which would alleviate some of the problems, to cause manufacturers to be aware of what they could do to reduce the difficulties, and to urge the publication of material which would aid amateurs in their solution of the problem.

It was a committee that worked with a great deal of dedication, particularly on the part of Secretary Cohen, who spent many hundreds of hours in correspondence, meetings, and otherwise promoting the cause of the group. In recent months, Ted Cohen has found the press of other responsibilities taking more and more of his time, and he has reluctantly resigned as secretary of the League's RFI Task Group.

In his place, President Dannals has recently appointed Morton I. Blender, W4LPZ. Mort is press secretary for Congressman Beard of Rhode Island and has a unique and valuable background of experience in getting things done in Washington. Hal Steinman, K1FHN, has been named Hq. liaison, while the rest of the Task Group remains the same. They will continue to work on the many-faceted problem of RFI/TVI.

But we need your help in determining just how big that problem is. On the one hand, there are indications that it is a large and dangerous problem. We know that modern solid-state equipment is more prone to interference troubles than tube-type gear. We know that, generally, present-day commercially built amateur transmitters aren't as well designed in relation to RFI/TVI suppression as they might be. We know

that FCC has many thousands of RFI/TVI complaints each year, even though by far the majority of them result from the operation of CB units. We believe that many of our tower and zoning problems are rooted in cases of interference to a neighbor's reception by an amateur transmitter.

And yet, only some one percent of our Technical Information Service inquiries are about RFI/TVI problems. We get only a very modest number of phone calls per month at Hq. asking for info on what to do about RFI/TVI. Although in the early days of the RFI Task Group the secretary sent out well over a thousand RFI packets, we get relatively few requests now for such information, although there was a flurry of requests following a September *QST* article. When the RFI Task Group asked amateurs to support the Vanik bill, fewer than a thousand letters were written to Congress. When we asked in August *QST* for information from people with RFI/TVI problems, we received less than two dozen responses.

Is this apparent apathy on the part of amateurs about RFI/TVI a result of ignorance? Don't we realize that we have a problem? Do we blithely operate without regard for what may be happening to nearby fm and TV sets, tape recorders, electronic organs, and whatever? Don't we care enough about our amateur radio to support protective legislation?

Or, is the problem perhaps less severe than we have led ourselves to believe?

Where is the truth?

We need your help in getting a better perspective on this problem. We need your support in an informal poll. If you have or have had RFI/TVI of some magnitude which has caused any difficulty whatsoever, please let us know, and include your appraisal of what sort of help you need in overcoming the problem. Or, if you don't have an RFI/TVI problem (or think you don't!), please let us know that, too.

We need to get a better handle on the dimensions of the RFI/TVI problem. Please write. — W1RU

League Lines...

Send no money - just applications. All license fees for all radio services - including amateur - have been suspended under a court order which took effect January 1, 1977. This includes fees for Extra class 1 X 2 call applications. More details in Happenings next month.

Happenings this month discusses Docket 20990, which proposes to allow remote control and security devices in several ham bands above 220 MHz. FCC has extended the deadline for comment to March 28, "reply comments" to April 28.

Under a Notice of Proposed Rulemaking and Inquiry (Docket 21033) released December 22, 1976, the FCC is considering proposals which would simplify repeater licensing and operation. Proposals include elimination of separate, distinctive (WR) licenses and permitting operation under primary, secondary and club licenses; easing logging requirements (taping of transmissions); and allowing a greater choice of frequencies for repeater use (outside of current repeater bands). Comments on the proposal are due by April 1, 1977, and reply comments by April 15, 1977. Copies of the proposal are available from ARRL Hq. Send an SASE with 24¢ postage and mention "Docket 21033."

Even though notifying the FCC of extended portable operation is no longer required, all amateurs should have a current, valid mailing address on file with the Commission. All licensees are responsible for FCC mail sent to the address of record. Failure to answer official mail from the FCC could result in fines or revocation of the amateur's license.

You could be missing out on a lot of good things that the ARRL Club and Training Department has for your amateur radio organization. Now that there's a department devoted exclusively to affiliated clubs, we want to do all we can to help. Drop us a line.

If all goes according to plan, AMSAT-OSCAR D, the eighth amateur satellite, will be launched alongside NASA's Landsat-3 earth resources satellite on Oct. 15, 1977. The new OSCAR will contain a 2- to 10-meter transponder similar to those in the two amateur satellites presently operational, and a 2-meter to 70-cm transponder designed and built by JAMSAT, the Japanese Radio Amateur Satellite Corporation. A-O-D is expected to have extensive educational and experimental applications. Watch for further details in QST.

The revised ARRL OSCARLOCATOR is now available from Hq. for \$1.00 postpaid. Consisting of a North polar projection, an acetate overlay, and a 1977 Reference Orbit schedule, it allows you to determine exactly when AMSAT-OSCAR 6 and 7 will be within range of your location.

Arrested, indicted and fined: Gale Bodner of Anchorage, AK pleaded guilty to unlicensed CB operation in Federal Court, December 2, 1976 after investigations by FCC engineers over a two year period. Bodner was fined \$1000, ordered to not operate a CB set for two years and to sell his equipment within two weeks of it being returned to him or forfeit it to the U.S. Government.

Ads in newspapers and magazines for illegal CB linear amplifiers have been around for years, much to the consternation of the FCC. But WB9RRT uncovered a new wrinkle: a shop advertising them on his local radio and TV stations! Since both are FCC-licensed there's some possibility for action on complaints about such ads, so we'd like to hear from anyone else who has encountered them. A transcript of the ad, call letters of the station, and the date and time you heard it would be helpful.

If you'll look at the antenna article on page 42 of the January issue of QST by WB8VCS, and then turn to page 48 of the October issue of 73, you'll find an amazing similarity. Seems that author Volpe submitted his article to both magazines, apparently without telling either that he had done so. Howcome the QST staff didn't spot the October 73 article and relate that to the similar article in process here? Well, we goofed, pure and simple.

TVI Sleuths at Work

The days of Hertz and other German pioneers in electromagnetics may be past, but their successors haven't forgotten their technical heritage. Learn how interference is handled in the land where radio was born.

By Ed Harrington,* DJ0MW/W1JEL

I am sorry Herr Harrington, but you must discontinue operation until the television interference problem is resolved. With this surprising statement my more than 40 years of amateur operation ground to a halt. My operation as a DJ0 began in 1964 and in about 1971 I was checked out by the Bundespost and given a clean bill of health. No real changes had been made in either the transmitter or the antenna system. So when the Post made an appointment for a checkout, I felt confident that the source of the problem would be either fundamental overload in the TV receiver or at least some problem unrelated to my installation.

However, I was told that harmonics of my 14-MHz signal were interfering with nearby TV receivers. Measurements made by the Post indicated some were 30 dB above the permissible level. We are limited in Germany by Post regulations to the use of a final-amplifier tube with a plate dissipation of 150 watts or less. Some of us have found out that the Siemens type RS1007, although rated at 125-watts dissipation, will take a peak input of about 1 kW without jumping out of the socket if the duty cycle is reasonable. This I use in my transmitter with a final-amplifier input of 800 to 1000 watts. The antenna is a three-band two-element quad with separate feed lines and a balun for each band.

TV in Germany

Having lived in Germany for the past 16 years, I have lost track of what the present-day, stateside, television-antenna installation looks like. However, I suspect that most of the installations are somewhere between what they were when I left and what the Germans have at the present time. Rabbit-ear antennas and 300-ohm ribbon

are for all practical purposes unknown in Germany. The usual installation here is much tidier than I remember them being at home. Most consist of several antennas located on the roof with signal combiners used to couple the antenna outputs which are then fed through one coaxial cable to the receiver. Here it is split to separate the vhf and uhf inputs to the receiver. This is done either externally to the receiver using a special splitter and balun, or in the more modern TV receivers, it is done inside the receiver. When a pre-amplifier is used to improve weak-signal reception, it is located at the antenna or in the attic and tuned to the channel of interest. But the output is normally combined on the same cable.

The Post takes a dim view of makeshift TV antennas and unless the amateur installation is obviously not right, *the TV viewer with a poor antenna gets little sympathy*. I can't speak for all areas but in the Munich area every Post official I came in contact with was cooperative, friendly and technically capable. Also they were armed with the best array of test equipment, connector adapters, and test antennas that I have ever seen. A VW bus was equipped with a rotatable calibrated TV antenna which could be raised from within the bus to a

height of 10 meters. The Post has the ability to measure the fundamental and harmonic field strength in a very few minutes.

In Munich, we receive two programs in the vhf range, one from the Wendelstein (mountain) about 55 km away on 210.25 to 215.75 MHz and one from Salzburg on about 196 MHz (110 km away). Since both of these stations operate above 190 MHz, the possibility of amateur TVI is reduced immensely. Harmonics in this range are greatly reduced in amplitude since they are high-order harmonics. Also a low-pass filter on the transmitter output becomes much more effective.

However, if harmonic energy is radiated from a transmitter operating in the 20-meter amateur band, it will almost certainly hit either the Austrian vhf program or the first German program. The worst interference is caused if the harmonic falls near the picture carrier. During the previous Post checkout, I had an old Philco tube-model TV set operating in the shack to prove that I was not responsible for any disturbance. This old warrior was resurrected from the attic and, lo and behold, this time interference was present.

Since most of us are not equipped with the type of equipment needed to perform accurate measurements, we usually try a brute-force method such as additional lead filtering and additional low-pass filtering in the feed line. This I did also and the additional feed-line filter showed an attenuation of 95 dB at the TV frequencies when measured in the lab. Some repair work was done on the quad transmitting antenna. However, if any improvement was made, it did not show up in the TV receiver in the shack. I think that all of us at one time or another have reached this point where we have about exhausted the filtering possibilities both at the transmitter and at the TV receiver, but the

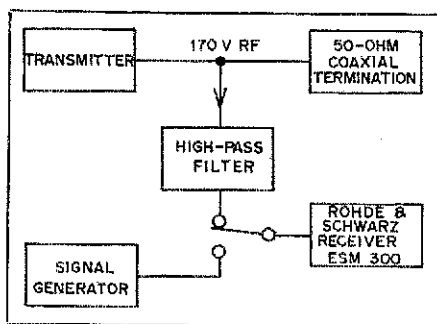
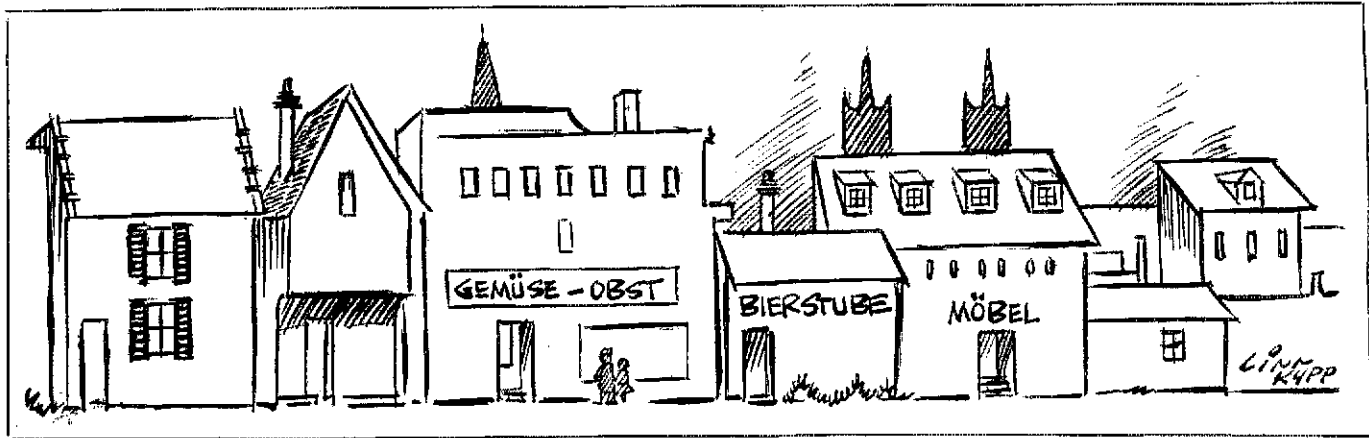


Fig. 1 — Block diagram of test setup for determining harmonic levels.

*Schwammerweg 10, 8 Munich 82, West Germany



interference remains. No easy method seems to suggest itself to pinpoint the exact source of the interference.

On the Scent

Obviously a new approach was needed. A Rohde and Schwarz ESM300 receiver was borrowed and a test (dipole) antenna was made for 210 MHz. Sure enough, a strong signal appeared at 213 MHz when the transmitter was operated at 14.2 MHz. A search was made using the dipole antenna and although a number of badly corroded and loose ground connections were located in various parts of the house (I never did find out the reason for this array of hidden ground connections), the presence of reflections and the lack of receiving antenna directivity made the going slow. Finally, it was decided to make up a three-element Yagi for 210 MHz by scaling the dimensions for a 3-element, 6-meter antenna found in the ARRL *VHF Manual*. Then, the direction-finding game started to make sense.

A strong harmonic was located in the vicinity of the operating position but it did not increase in the immediate vicinity of the linear amplifier. Further careful checking traced the source to some unshielded speaker and switching leads associated with a homemade

solid-state receiver built about six months ago. When these leads were shielded, the interference entirely disappeared in the TV receiver in the shack.

The quad is located just above the operating room and the leads in the shack were in the strong rf field created by the antenna. Some rf voltage was induced in the leads, the semiconductors were driven into conduction and harmonics were produced. These harmonics were then radiated from the wires which perhaps were accidentally resonant near the 213-MHz frequency.

Despite the fact that no TVI was now present on the TV set in the shack, the ESM-300 receiver showed a definite signal with substantial amplitude at 213 MHz. This is the 15th harmonic of 14.2 MHz. Using the small Yagi and the quad as DF antennas, tests indicated that the source of the signal was a neighboring house almost directly in back of my own. A report was submitted to the Post stating what work I had done and what conclusions I had drawn and a new checkout was requested.

Two VW buses with two crews showed up at the appointed time and testing resumed. I was given a small walkie-talkie and this kept me in contact with the two crews doing the testing. However, due to the very bad

weather conditions on that day and the presence of really bad reflections, no firm conclusions could be drawn.

The neighbor's house was equipped with three TV antennas and an internal inspection seemed to indicate that all was in order. One TV receiver was no longer in operation and wasn't even plugged into the ac line. The Post measurement showed that my harmonics were still above the limit in level and for a while I entertained the thought that my quad was producing the signal, perhaps as a result of broken strands acting as rectifiers. I had already proved to myself that the signal did not come from the transmitter by feeding a shielded load and measuring the level of the harmonics on the feed line. (A method of doing this is described later.) After a period of further checking with the small Yagi in the yard and on a clear day, I was convinced that the problem was in the neighbor's house.

Thanks to the open-minded attitude of Post Engineer Baumgartl, another test date was established. This was a very critical stage. Had Herr Baumgartl said the problem was mine not his, I would be off the air indefinitely. The idea of convincing the neighbor that I should be permitted to pry around in his house is unthinkable, especially in Germany. Also to complicate matters, the neighbor operates a noisy business. There is loading and unloading of trucks with sheet metal and pipes at all hours of the day and night in a residential area. Naturally he is not on very good terms with those of us in his immediate vicinity.

Another good point was considered . . . suppose that the neighbor had a TV receiver or amplifier that was being driven into overload, thus producing harmonics which were being reradiated every time my transmitter was switched on. Could the Post force him to disconnect it or to add a high-pass filter to protect it? If not, then could I operate my transmitter? Fortunately this question did not have to be answered. Herr Baumgartl and I made a tour of the

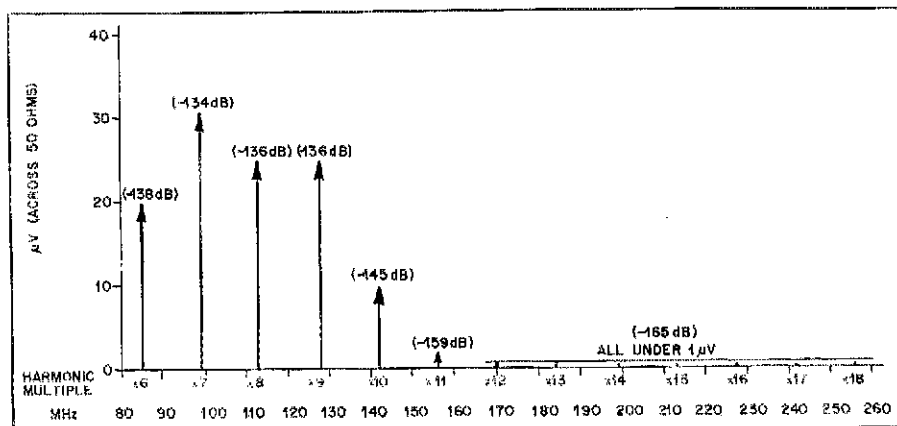


Fig. 2—Measured harmonic levels of a typical transmitter.

neighborhood carrying a battery-powered receiver tuned to 213 MHz and a beam antenna suitable for this frequency. At every location we tried, the maximum signal was found to come from the direction of my neighbor's house and not mine. Very strong reflections were still present and to a certain extent complicated taking the readings.

Unfortunately, the neighbor was away on vacation so one more visit by the Post was needed to locate the exact source of the interference. It turned out to be a transistorized broadband pre-amplifier tucked away in the attic of the neighbor's house, unused and perhaps not even connected to the ac line, but it was connected to the antenna on the roof. The first transistor was being driven into conduction by my 20-meter signal. This produced harmonic energy (likely enhanced by the first tuned circuit in the amplifier being resonant at 213 MHz) which was then fed, via the feed line, back to the TV antenna . . . also a very effective radiator at the TV frequency.

A Practical Method

At the conclusion of this work, I remembered that I had never seen an article giving a step-by-step procedure for diagnosing the source of TVI. Perhaps others have similar problems or ones which can be diagnosed by the methods used. The equipment is somewhat specialized and is normally not found in a typical ham shack. But hams seem to have a real talent for procuring anything that is needed when the occasion arises.

Here is a procedure which should help to find the source of a TVI problem when all else fails:

1) Make a plot of the various transmitter harmonics showing which ones fall in TV channels.

2) Find a well-shielded vhf receiver with good input selectivity.

3) Make or buy a shielded high-pass filter suitable for use ahead of the vhf receiver. It should be capable of handling the voltage on the transmitter feed line. (In my case, this was 170-volts rf and the ordinary small ceramic capacitors used in the filter worked fine.)

4) Find a 50- or 75-ohm shielded load capable of handling the full power output of the transmitter. (Even some light bulbs in a metal box are suitable, as an exact match is not very important.)

5) Find a signal generator with a calibrated attenuator which will tune to the harmonic frequencies.

6) Connect the transmitter, dummy load, high-pass filter, vhf receiver and the signal generator as shown in Fig. 1.

7) Tune in each harmonic on the vhf receiver suspected of causing trouble



and determine the signal level using the signal generator as a comparison signal source. Plot the amplitude of each harmonic. The level should not be higher than about 50 microvolts. If it is, additional low-pass filtering is needed. If a ratio between the fundamental and harmonic level is desired, the fundamental can be measured with an rf voltmeter connected to the line. This figure in volts can then be compared with the measured harmonic level to arrive at the ratio, usually expressed in dB.

8) Connect a dipole antenna cut for a harmonic frequency (which is suspected of causing trouble) to the receiver.

9) With the dipole antenna held about three meters from the transmitter, and with the transmitter still fed into the dummy load, tune the vhf receiver to the harmonic frequency as

shown in Fig. 2. Then determine the received signal level. The signal generator is used for this purpose. Make sure that the receiver is operating in a reasonably linear mode when making these comparison measurements. Bringing the dipole antenna up close to the transmitter may be necessary to locate the harmonic. If at a distance of about three meters the received level is below 25 microvolts, the direct radiation from the transmitter probably will cause no trouble. If it is above this level, better cabinet shielding and lead filtering are needed. No exact figure can be given for the allowable radiation as any interference depends on the distance to the TV receiver antenna and the strength of the signal on that channel.

An interesting test was performed during the investigation to determine approximately how effective the quad antenna was as a 200-MHz radiator. The first Austrian picture carrier on 196 MHz was tuned in on the vhf receiver using the 20-meter quad for the receiving antenna. The quad was then rotated through 360 degrees and a pattern was produced as shown in Fig. 2. The peak-signal amplitude was then compared to an 8-element, single-channel TV Yagi mounted at about the same height as the quad. The Yagi produced a signal 10 dB stronger than the quad which means that the quad would be about as effective as a dipole in its best direction. Tests made using the 15- and 10-meter loops showed approximately the same multilobe pattern but with lower amplitude.

In closing I wish to thank Herr Baumgartl for his patience and understanding.

QST

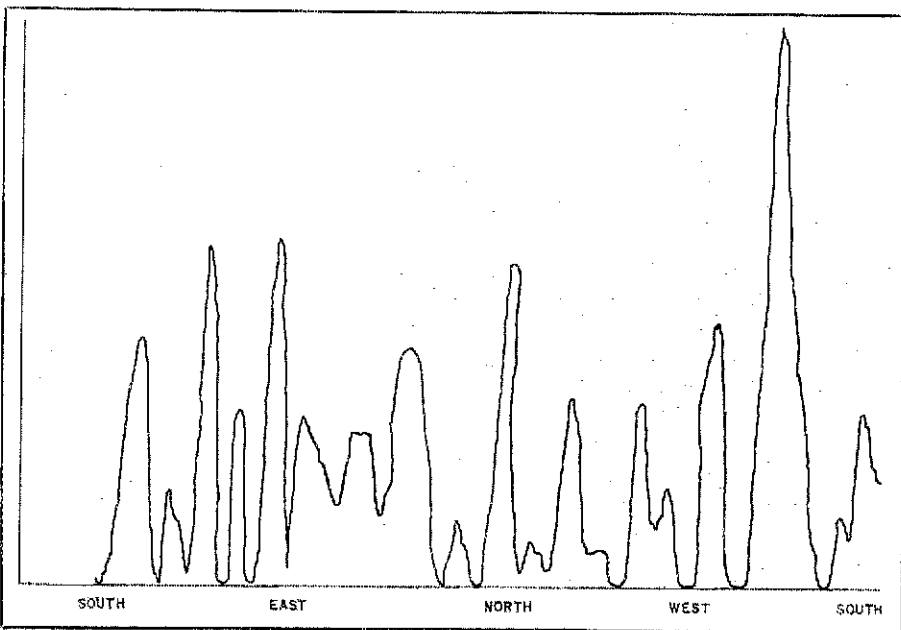


Fig. 3 — Antenna pattern of a 20-meter quad when used at 200 MHz.

Codzila 1

350-milliwatts output from a Tuna-Tin 2 won't always cut the mustard. During poor band conditions another 10 dB would certainly be welcome!

By Tony Mula,* K6QIC

You say you've lost too many contacts using 350 milliwatts because of QRM and QRN. Well, try this nifty little 3.5-watt, 40-meter amplifier and keep the logbook pencils sharpened! As with DeMaw's Tuna-Tin 2¹ QRP transmitter, special attention was paid to using easy to obtain components. Radio Shack parts, which are inexpensive and readily available, are used throughout the circuit. This amplifier is exceptionally easy to build and get running.

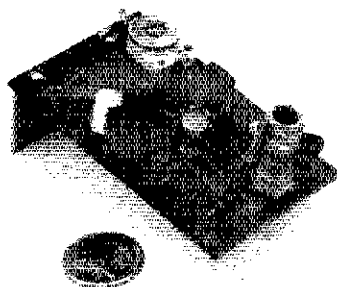
Circuit Details

A Tuna-Tin 2 or similar power-level transmitter should be used to drive this

amplifier. The schematic diagram of the amplifier is shown in Fig. 1. Output power from the transmitter is fed to the base of Q1 through the input matching network consisting of L1, C1 and C2.

L1 is an adjustable coil that is tweaked for an optimum match between the transmitter and the amplifier.

Output from the amplifier is fed to a three-turn link that is wound over the center of L3 — a Radio Shack rf choke. This coil, along with C6 and C7, are resonant in the 40-meter band. C7 is adjustable and is set for maximum output as indicated by an SWR indicator or low-power wattmeter. L4 is a five-turn link wound over the ground end of L3 and is positioned for maximum rf output. A half-wave filter at the output of the amplifier was used to ensure that the harmonics are kept to an acceptably low value.



Construction

The printed-circuit board for this project measures 2-1/8 × 3-1/2 inches.

*4572 Rhapsody Way, San Jose, CA 95111

¹DeMaw, "Build A Tuna-Tin 2," *QST* for May, 1976.

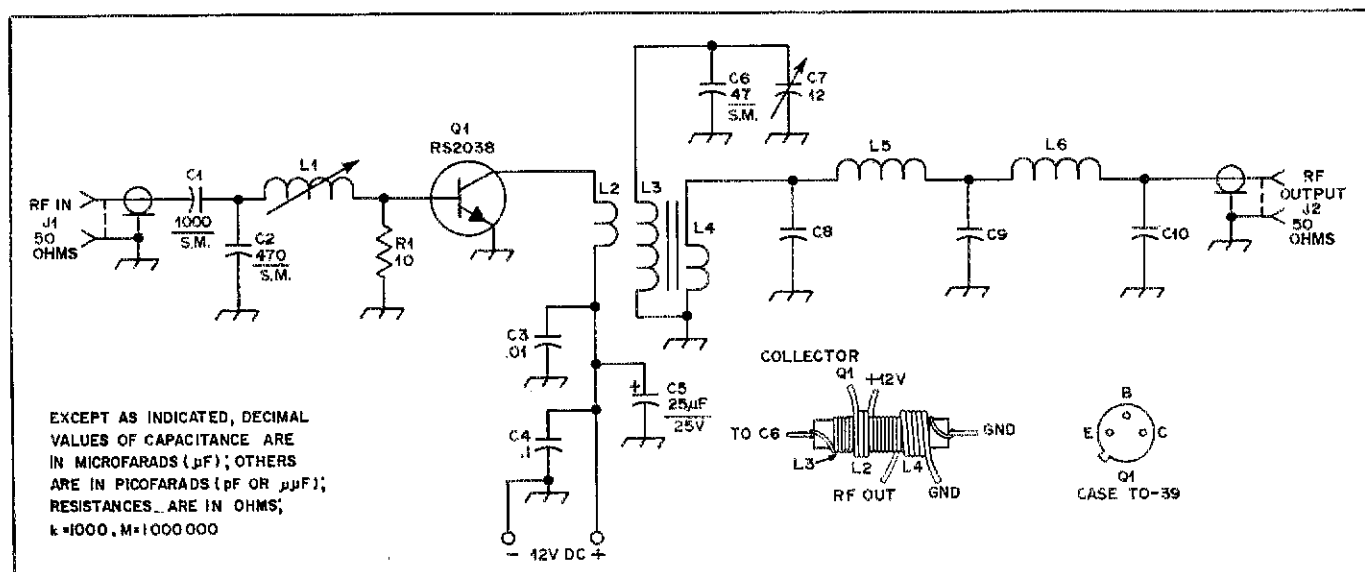


Fig. 1 — Schematic diagram of the Codzila 1. Numbered components not appearing in the parts list are for text reference only.

C8, C10 — 500 pF.

C9 — 1000 pF.

L1 — 11 turns No. 30 enamel wire spaced to occupy an entire Miller 4500-4 coil form.

L2 — 3 turns No. 22 insulated wire wound over L3.

L3 — Radio Shack choke (273-101).

L4 — 5 turns No. 22 insulated wire wound over ground end of L3.

L5, L6 — 18 turns No. 18 or 20 enamel wire wound on a 5/16-inch diameter plastic form. Space turns so that the length of each coil is 1-1/4 inches.

Q1 — Radio Shack transistor (RS2038).

Single-sided copper-clad board is used. Parts location is not especially critical, but the foil pattern shown in Fig. 2 should be followed as closely as possible. I used Dixon asphaltum varnish for the resist and Dixon muriatic-acid etching mordant to dissolve and strip the exposed copper.

Q1 can get rather hot when transmitting, so one should plan on using a heat sink to be safe. I made mine from a small piece of brass tubing that was slit along one side so that it would slip onto the TO-39 case. Thin brass cooling fins were soldered to the brass tubing.

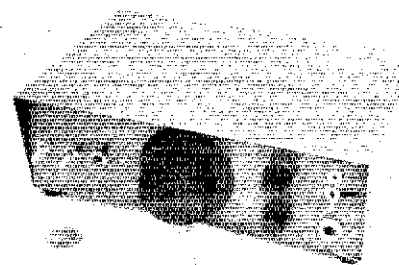
Making It Work

In my unit, I key both the driver and the amplifier. It is wise not to hold the key down for more than ten seconds at a time while adjusting the amplifier. Also, let the power amplifier cool down between adjustments. Start by applying drive and adjusting C7 for maximum output as indicated on an SWR meter. Next, L1 should be tuned for maximum rf output. L2 and L4 can then be positioned on L3 — likewise for maximum power output. Finally, it might be necessary to readjust the output coil on the Tuna-Tin 2 for maximum drive to the base of Q1. Again, look for maximum output on the meter. L5 and L6 can be adjusted in the same manner.

Results and Further Ideas

It works! And quite well, I might add. My very first CQ with the rig got me a return from WN6OJO in Los Angeles — 400 miles away at 3 o'clock in the afternoon. The signal was reported as clean and chirp free. The receiver that I used during the QSO was the Herring-Aid 5, the plans for which appeared in July, 1976, *QST*. It works quite well for a simple design. I've made two modifications to the receiver. One was a push-pull audio-output stage and the other was the addition of a small variable capacitor from L7 to ground so that the circuit could be peaked anywhere within the band.

I have mounted the transmitter, receiver and amplifier in a single metal



This photograph shows the outside details of the packaged trans-receiver. The large dial in the center is for receiver tuning.

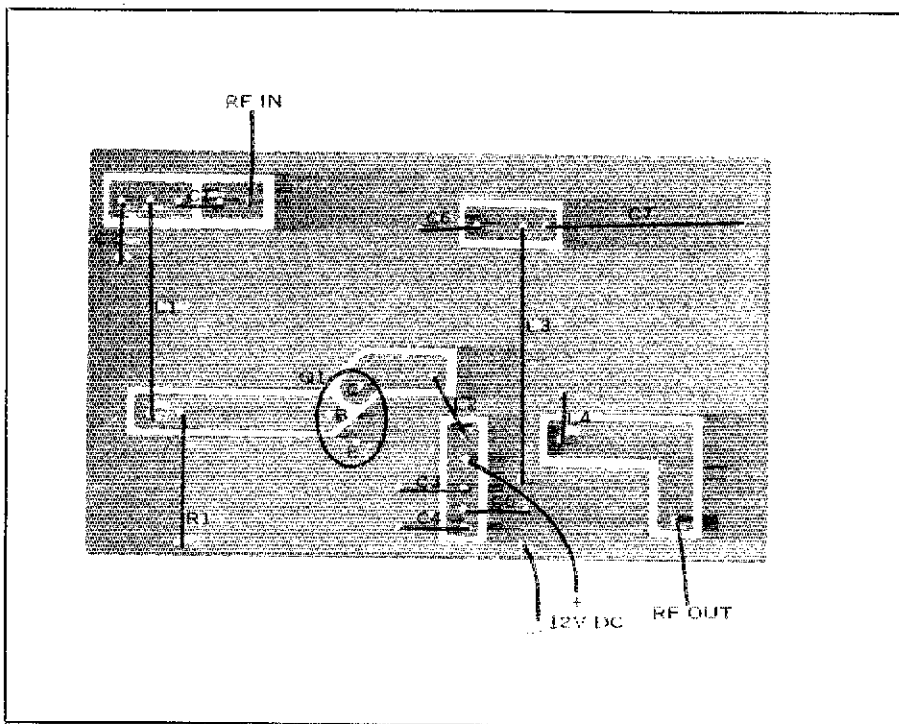


Fig. 2 — Actual size template of the printed-circuit board. Grey areas represent unetched copper. Parts placement is shown from the foil side of board. Whole-number values represent resistors; decimal values are capacitors unless specified otherwise.

enclosure and thus have a very nice cw trans-receiver. Fig. 3 shows a block diagram of the system. In the trans-receiver I have a "spot" switch to locate exactly where my transmit signal is on the receiver. It was necessary to install a 10-kΩ resistor to reduce the oscillator output so it wouldn't overload the

receiver front end. The blocking diode in the Tuna-Tin 2 prevents the driver and power transistors from being keyed when the spot switch is activated. You'll have to do a little surgery on the Tuna-Tin 2 to include this spotting feature, but it is easy and well worth the effort.

QST

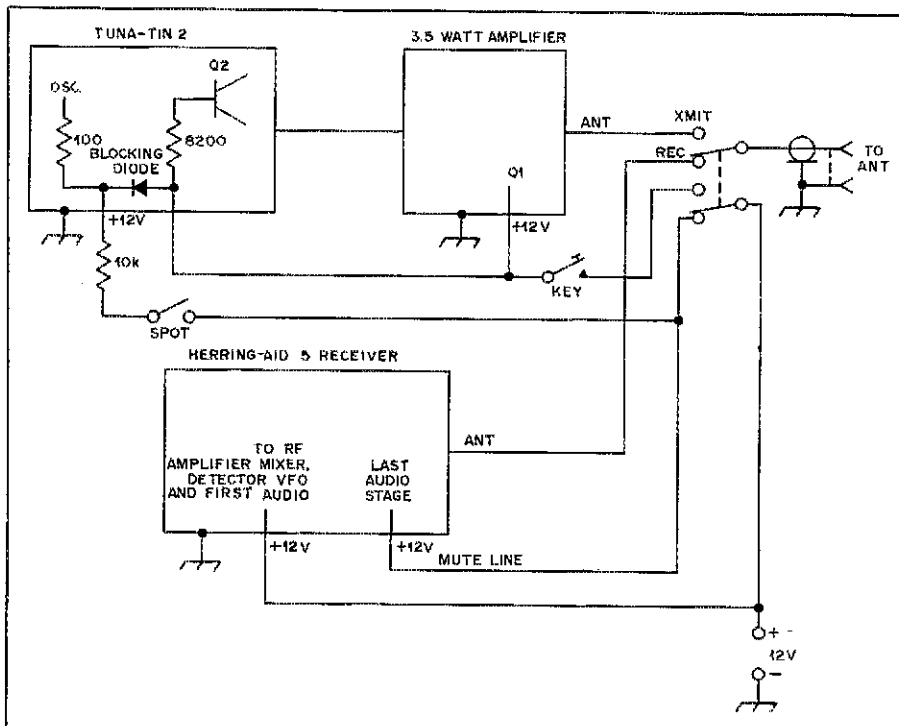


Fig. 3 — Block diagram showing how the transmitter, receiver and amplifier are connected together.

A Time-Delayed Tone Decoder

Weather Emergency Alert warnings are great stuff, if the casual chatter on the channel doesn't lull you to sleep. Shut 'em off without missing a thing.

By Jerry S. Paquette,* WB8IOW

Tone-triggered alerting devices are in use in many services today, from fire companies to paging systems to civil defense networks. In most instances it is highly desirable to keep the monitoring receiver muted until the proper set of tones is received, activating the

*RR 1, Box 268, Owens Road, West Union, OH 45693

speaker or other indication when an emergency situation demands attention. Here is a circuit that can perform this function with a minimum of modification to the receiving equipment. It may be applied to almost any receiver — weather broadcast, repeater monitor, standard a-m or fm broadcast, or whatever.

Before our local AREC 2-meter net begins, a listener will hear the net control station identify and transmit a tone for several seconds. This tone is capable of sounding an alarm or turning on a muted speaker, or both. Using this same method, local amateurs may be alerted in an actual emergency at any time, day or night, while not having to listen to normal QSOs.

The Weather Amateur Radio Net (WARN) in nearby Cincinnati transmits two tones through the repeater before announcing severe weather warnings. If a weather emergency exists, as determined by the National Weather Service in Cincinnati, another set of tones will be transmitted to alert everyone monitoring to this condition. These tones are not standard Touch-Tone frequencies. The two-tone system could use, for example, a 0.5-second, 400-Hz tone and a 1.5-second, 500-Hz tone.

Decoding two tones in sequence would allow for a more reliable alerting system, but if standard Touch-Tone frequencies are not used, one need not worry about someone setting off the decoder by testing their pad. This decoder circuit uses a phase-locked-loop (PLL) integrated circuit and a 555 timer integrated circuit. Cost and size were the most important factors in this design. The cost should be less than \$15, and the heart of the circuit may be mounted on a printed-circuit board measuring less than three square inches.

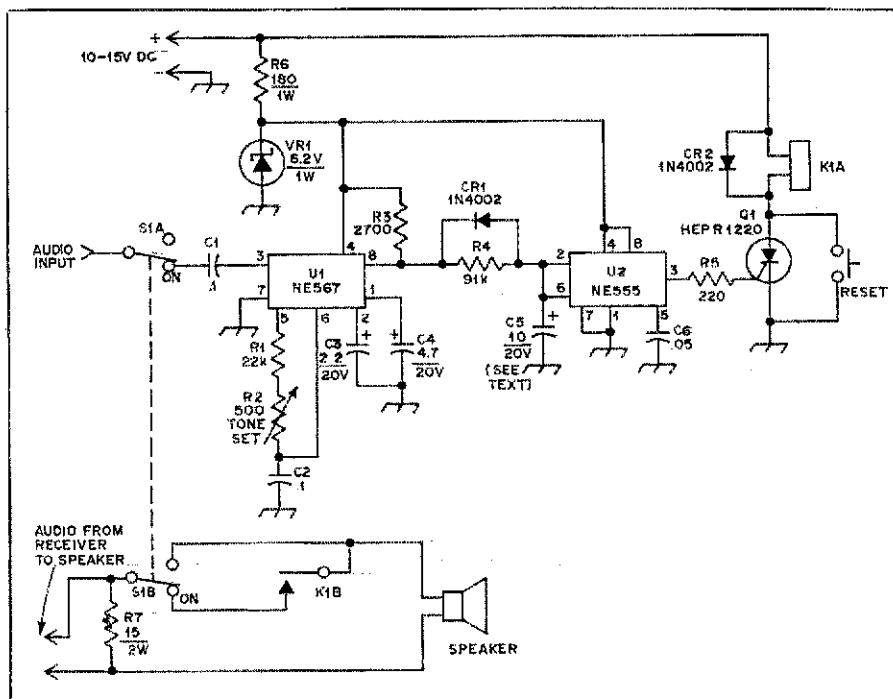


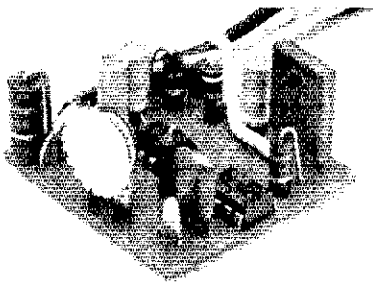
Fig. 1 — Schematic diagram of the timed-tone decoder. Values for C5 and R4 are for approximately 1-second delay; R1, R2 and C2 for a 450-Hz tone. See text for determining values for other times and frequencies.

CR1, CR2 — Silicon diode, 1N4002 or equiv.
K1 — Miniature 12-V relay, Radio Shack 275-003 or equiv.

G1 — Silicon-controlled rectifier, Motorola HEP-R1220 or equiv.

Operation

The basic operation of the PLL decoder is explained in *The Radio Amateur's Handbook* and need not be repeated here. If a tone is received that is



within the bandwidth of the tone decoder, the voltage at the output of the decoder goes to nearly zero. Capacitor C5 starts to discharge through R4. When the voltage at pins 2 and 6 of the 555 IC reaches 1/3 of Vcc, the 555 output goes high and triggers the SCR. The relay remains energized, even after the 567 decoder stops decoding and the output of the 555 goes low again, because of the holding action of the SCR. If the tone is interrupted while the 567 is decoding, the output of the 567 goes high and instantly charges C5 through R3 and C1. When the voltage at pins 2 and 6 of the 555 goes above 2/3 of Vcc, the output of the 555 goes low and remains there until the voltage again drops to 1/3 of Vcc. Usually, when the unit is first turned on the 555 IC triggers the SCR and energizes the relay. To reset the relay simply press the normally open push-button switch and the relay current is bypassed around the SCR. The SCR will not allow any current to flow when the button is released and the relay will open.

Component Considerations

While the layout of this circuit is not at all critical, component selection is important for proper operation. It is suggested that tantalum capacitors be used for C2 and C5. Tantalum capacitors seem to be very stable over a very wide temperature range whereas a disk ceramic or paper capacitor may change value enough to make the circuit operate improperly. When using the for-

mulas in this article, keep in mind the large capacitance tolerances of certain types of capacitors. I've seen some listed in catalogs at +20 percent. Some were even -20 percent + 100 percent. If you build the circuit and it doesn't seem to work, consider the tolerances of the resistors and the capacitors.

Power Supply

It is important that a regulated power supply be used for the ICs. The 6.2-volt on-board regulator will provide the necessary regulation. The input to the regulator should be 10- to 16-volts dc. Filtering of the power supply is important, particularly if the frequency of the tone to be decoded is a multiple of 60 Hz (this applies, of course, to a power supply operated from the 60-Hz power-line frequency).

Adjustment

If a frequency counter is available, connect its input leads across C2 and adjust R2 for the desired frequency. If a frequency counter is not available, the next best way to adjust the frequency is to have the proper tone at the input of the decoder, and measure the voltage at pin 8 of the 567 IC. As the 567 decodes the tone, the meter will read near zero. Adjust R2 for a voltage indication at pin 8 of the 567 of zero.

To test the decoder and the time-delay circuit, place a resistor (approximately 100 kΩ) from the junction of R2 and C2 to the input of C1. This test resistor will help you ascertain that the circuit is working at some frequency and that the time-delay circuit is operating. Remember that this resistor is for testing purposes only and should not be left in the circuit after testing is completed.

567 frequency

$$R = \frac{1.1}{f(C)}$$

where

$$R = R1 + \text{the setting of } R2 \text{ in ohms}$$

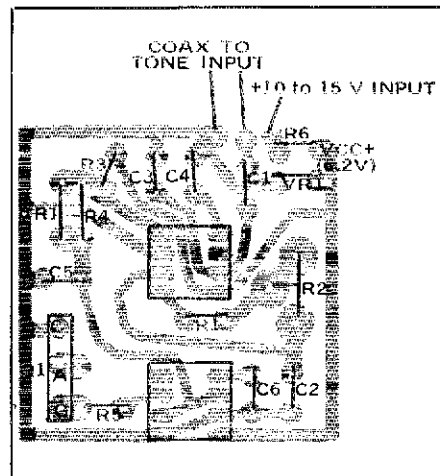


Fig. 2 - Foil-side, full-scale pattern of the pc board. Circuit board is single-side glass-epoxy material. Grey represents copper.

f = frequency in Hz
 C = capacitance in farads of C2

555 time delay

$$R = \frac{t}{(1.1)(C)}$$

where

R = R4 in ohms
 t = time in seconds (i.e., 1.5 s)
 C = capacitance in farads of C5

Use of Circuit

A tone source for the decoder input may be the audio signal going to the speaker of the radio receiver. However, if the volume control is set too low, there may not be enough signal for the decoder. If the volume control is set too high, the detection bandwidth of the decoder is increased. The decoder operates on a 50-mV to 1-V audio signal.

The best place to obtain the signal for the decoder is across the outer terminals of the receiver volume control. When the tone signal is taken from this source, the volume control may be set in any position. QST

Strays

STOLEN EQUIPMENT

□ Drake TR-22C, serial no. 121103, taken from room 1537, San Francisco Hilton Hotel, between 8 P.M. and 12 midnight on Oct. 18, 1976. Sheldon S. Gilbert, WA3WHL, 11924 Stoney Creek Rd., Potomac, MD 20854.

□ Swan 350 with power supply, serial no. C-628253. Wayne Wilkins, 2925 Sidney, St. Louis, MO.

□ The Big Rapids (MI) Area Amateur Radio Club presented an exhibit last fall for the people of Big Rapids. Club members WD8CQZ, WB8ZYC, WB8TVD and W8OWN operated on 40 cw, 20 cw and phone, 15 cw and phone, and two-meter fm. Contacts were as sparse as the number of visitors on that "miserable" rainy day, but the club will not be discouraged. Their next exhibit is scheduled for May.



Bruce Werner, WB8TVD (right), points out an article from *New Ham News* to Novice Garry Seither, WD8CQZ. (WB8TVD photo)

Inexpensive Traps for Wire Antennas

For the amateur who does not have everything but who enjoys making equipment, this easy approach to constructing a trap antenna pays off.

By J. R. Mathison,* WB9OQM

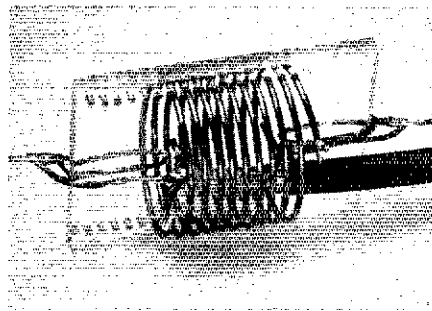
Not every amateur is blessed with ample room to install an antenna for the lower bands. For the higher bands there is also the matter of cost where the luxury of a tower and a beam outstrip the family budget. An alternative is to construct a wire antenna which contains traps an industrious amateur can make with a minimum of cost.

The only materials required for each trap are a small piece of 1/4-inch-thick Plexiglas, a length of bare No. 12 copper wire, and a couple of feet of RG-8/U or RG-11/U coaxial cable. The Plexiglas serves as a strain insulator and coil form. Ceramic insulators are not needed for the traps. The coaxial cable functions as a high-voltage capacitor, eliminating the need for obtaining expensive commercially made capacitors for the trap assemblies.

Getting Started

To find a suitable antenna using the trap design, it is suggested that the amateur refer to the five-band dipole described in the 1977 edition of *The Radio Amateur's Handbook*. It will be noted that this particular antenna uses two 10- μ H trap coils consisting of 15 turns of No. 12 wire, 2-1/2 inches in diameter and with 6 turns per inch. Across each coil is a 50-pF capacitor.

To begin making the traps, a piece of Plexiglas is cut to form two rectangles of equal dimensions, 2 \times 3 inches. The photograph of the sample trap in Fig. 1 shows that holes have been drilled in the Plexiglas to accommodate the coil wire. These holes are 1/4-inch from the lengthwise edges, and they should be slightly larger in diameter than that of the wire to be used for the inductor. Also, to make winding easier, stagger



Construction of the trap is shown with the coaxial-line capacitor dressed from the shield end of the coil.

the set of holes on one edge from those on the opposite edge of the Plexiglas by half the turn spacing.

Prepare the wire by straightening any kinks or bends. The wire is then wrapped in one layer tightly around a cylindrical form. The form should be of a size that will allow the coil of wire, when released, to be approximately 1/16-inch smaller in diameter than the required coil. The coil of wire thus formed is then threaded into the drilled Plexiglas rectangle in the same fashion as a wire spiral is threaded into a spiral notebook.

The Coaxial Capacitor and Coil

Drill two more holes in the center-line of the Plexiglas at the position of each end of the coil wire. One hole is for the antenna wire. The other hole is for a wire soldered to each end of the coil and anchored through the Plexiglas. These wires serve as an adjustable tap for each end turn of the coil and as a terminal strip for the antenna wire and coaxial capacitor.

To determine the capacitance per foot of the coaxial cable to be used for

the trap capacitor, a cable manufacturer's catalog should be consulted.¹

The capacitance required for the antenna trap shown in *The Radio Amateur's Handbook* is 50 pF. To compute the length needed for the coaxial capacitor, divide this value by the nominal capacitance per foot. For RG-8/U in this example the required length would be approximately 20-5/16 inches, and 29-1/8 inches for RG-11/U. Be sure to allow a couple of extra inches for lead, as it is the braid length remaining on the cable after preparation which will determine the effective capacitance.

Final Touches

Trim one end of the coax so that the inner insulation and center conductor can be passed through the center of the coil and soldered on a radial tap. The braid is then soldered to the other radial tap. Use heat sinks to avoid melting the plastic. Cut off the other end of the coaxial cable a half inch longer than required. Use a tubing cutter to trim the outer insulation and braid from the remaining half inch. This will allow a longer insulating path in the air between the center conductor and braid than a square end cut. For other applications where air-wound coils are required and excessive heat is not a problem, this type of construction is suitable.

Resonance can be adjusted either by moving the tap wire or by pruning the coax capacitor. Install the antenna wire after adjusting the trap to the desired frequency. The coaxial-line capacitor is then taped to the antenna wire to support its weight and prevent straining the connections.

GET

*P. O. Box 351, Carbondale, IL 62901

¹[Editor's Note: For RG-8/U the nominal capacitance per foot is 29.5 pF. For RG-11/U the nominal capacitance per foot is 20.6 pF.]

Understanding Linear ICs

Part 2: In Part 1 we dealt with the essentials of linear ICs and described one module of our workshop project. Now, a deeper look into the subject of "linears."

By Doug DeMaw,* W1FB

Perhaps the most versatile linear IC is the differential amplifier. It provides exceptional balance between the differential inputs (base elements of a push-pull pair of bipolar transistors). This results from the built-in match in base-to-emitter voltage resulting from the transistors being formed on a common silicon chip. Furthermore, in the classic circuit a single resistive divider is used to provide the dc base voltages (forward bias) for the two bipolar devices in the amplifier pair. In circuits where gain is required, the differential amplifier is perhaps the optimum choice in the interest of high gain, inherent stability, and minimum external component parts.

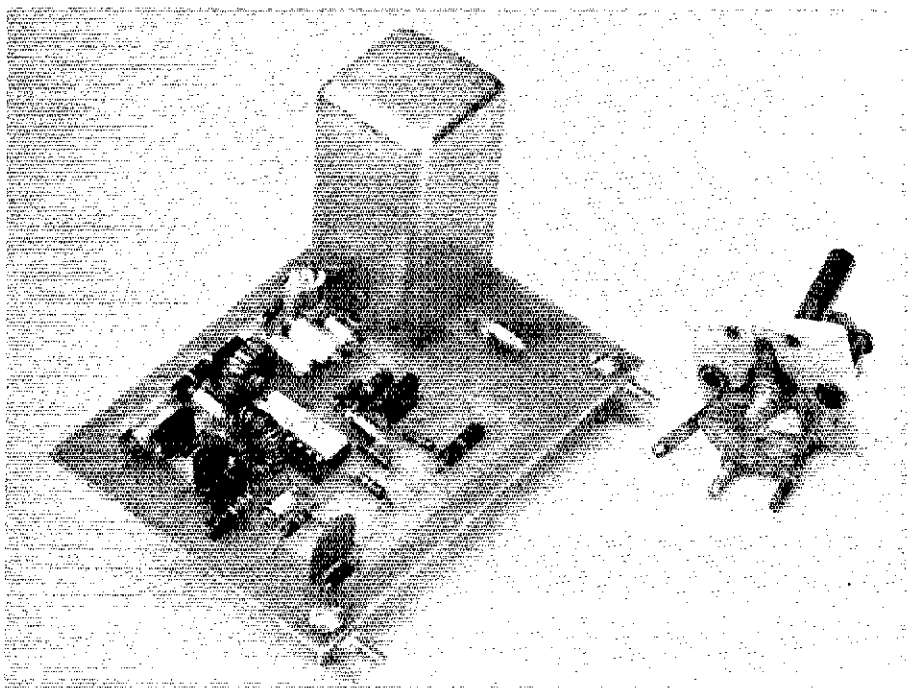
There are numerous differential-amplifier ICs on the market, but we will mention only three of them in our topical examination of the subject. Similar in configuration and characteristics are the RCA CA3028A, Motorola MC1550G and NS LM171. The internal workings of a CA3028A are shown in Fig. 1. It can be seen that U1A and U1B form a common-emitter pair of transistors. The bases and collectors are available at the IC pins for connection to external circuit elements. The emitters are connected to U1C, which is a *constant-current source* (CCS). The resistances shown in Fig. 1 are formed on the chip along with the three transistors. It is possible to ignore two of them by selecting pins 2 and 4 of the IC instead of pins 3 and 7. This adds considerable versatility to the character of the IC.

In a more mundane example of an emitter-coupled transistor pair (discrete transistors), one would see a single

resistor connected between the emitters of U1A/U1B and ground. Proper performance calls for a resistance that is considerably higher than the characteristic impedance of the parallel emitters. This would be necessary to prevent the signal at the emitters from being shunted to ground through the emitter resistor. However, use of a resistor in place of the CCS, U1C of Fig. 1, does not provide the best condition of balance for U1A and U1B. By substituting a transistor (U1C) for the resistor, a much better CCS results, for the collector of U1C has a very high impedance com-

pared to that of the emitters of U1A and U1B. The emitter current of the differential pair (U1A and U1B) can pass through U1C quite effectively since it has a low-value emitter resistance (500 ohms). The same would not be true if a resistor of sufficiently high value was substituted for U1C.

The total function of the constant-current source, U1A, is rather complex — somewhat beyond the scope of this series. But, for our purpose let's summarize its role by saying that it helps to maintain the dynamic balance of the differential pair of transistors, U1A/



View of the assembled local-oscillator circuit.

*QST Technical Editor

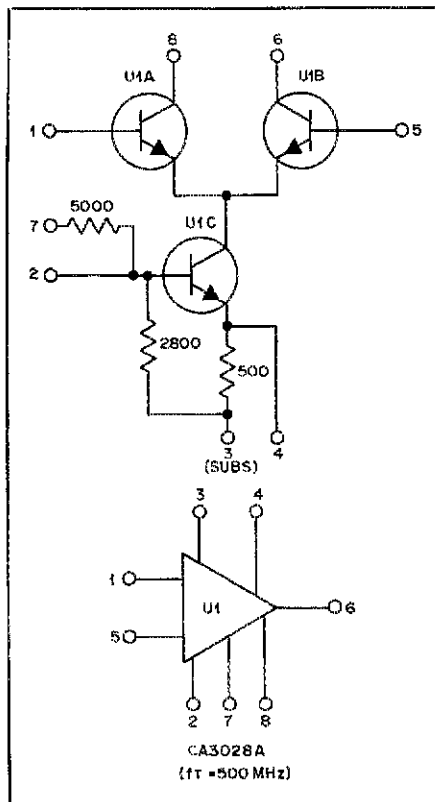


Fig. 1 - Internal circuit of a CA3028A linear IC compared to the usual block representation. U1A and U1B are connected as a differential pair, while U1C functions as a constant-current source (CCS).

U1B, of Fig. 1. If the emitter current of U1A or U1B increases, the emitter current of the remaining transistor in the pair decreases by the same amount to assure the desired circuit balance. A thorough treatment of the subject is given in RCA's *Linear Integrated Circuits*, Tech. Series IC-42, pp. 36-46.

Differential-IC Applications

Because of the almost universal nature of the differential-amplifier (diff amp), one could consider it a member of the transistor-array family discussed in Part 1 of this presentation. The CA3045 array chip used in the workshop section of this installment is simply an elaboration of the CA3028A. It contains an emitter-coupled transistor pair, plus three separate npn transistors. One of the single npn devices could be connected to serve as a CCS, leaving two transistors to be assigned to other chores. Practically, it's the same game, but there are a couple of additional players!

Diff amps can be used as oscillators, rf or i-f amplifiers, audio amplifiers, mixers, balanced modulators, product detectors and dc amplifiers. Fig. 2 shows some typical circuits which employ the CA3028A. As an rf amplifier the CA3028A is within its gain and noise-figure ratings up to 120 MHz, but

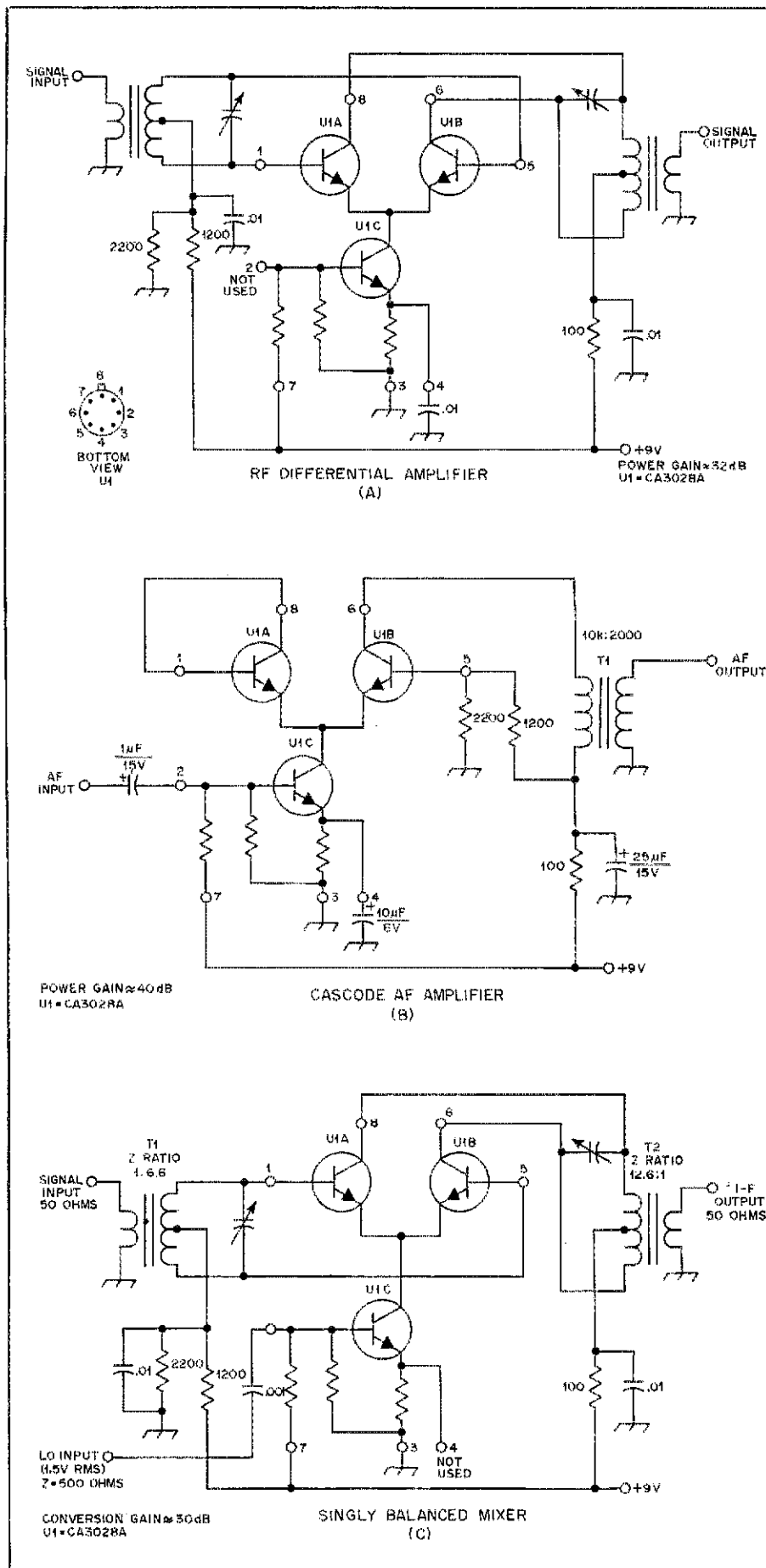


Fig. 2 - Various circuit examples of how a CA3028A can be used in amateur applications (see text).

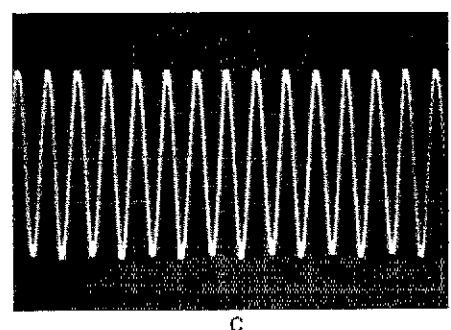
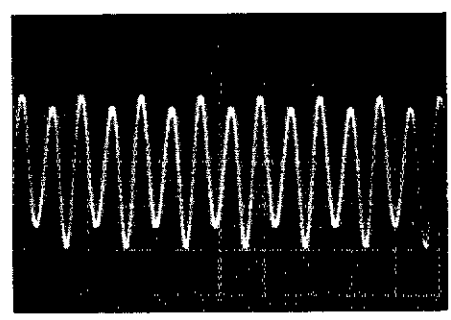
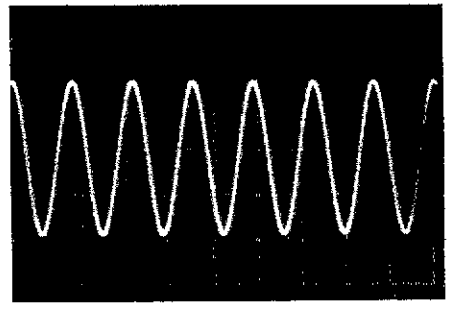
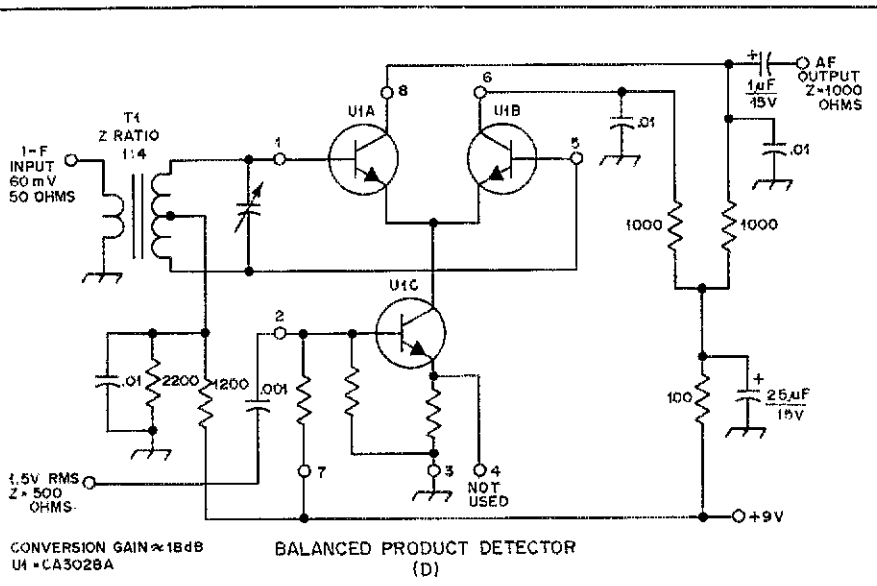
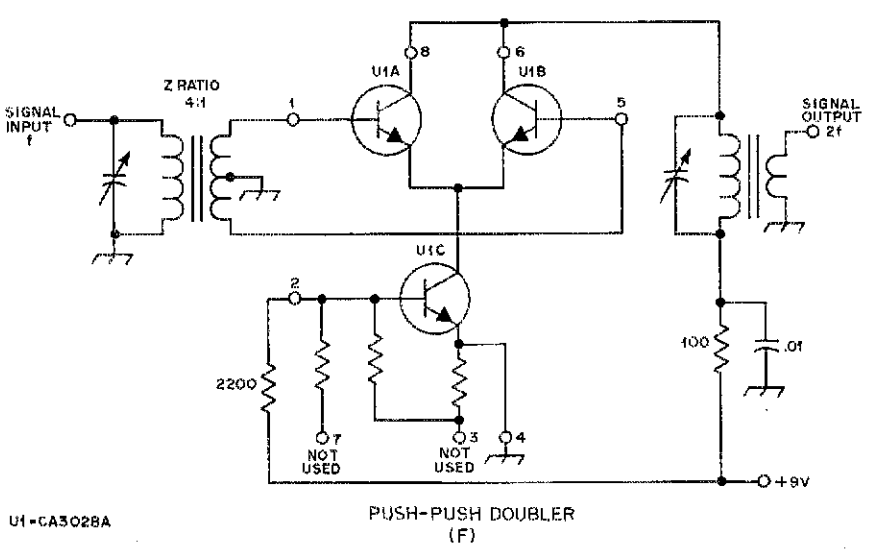
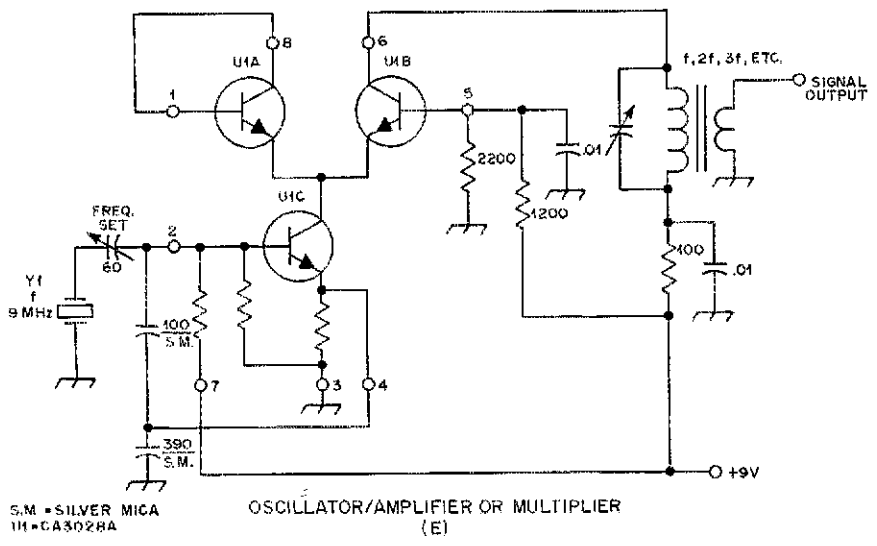


Fig. 3 — Waveforms taken during the testing of the local-oscillator chain of Fig. 4. At A is the 7-MHz waveform seen at the output of the tunable oscillator, U2A. The "unsanitary" waveform at B was taken at the output of U2C before L7 was adjusted for peak output. The display shows a mixture of 7- and 14-MHz energy. The waveform at C is the desired one (14 MHz) and was obtained at the 50-ohm output tap of L7 after T1 and L7 were peaked at 7.1 and 14.2 MHz, respectively.



the f_T of the chip transistors is approximately 500 MHz. It could be used at 144 MHz with some reduction in overall performance.

The base-to-base input impedance of a balanced differential rf amplifier or mixer is roughly 2000 ohms. The collector-to-collector impedance is on the order of 8000 ohms. The audio amplifier of Fig. 2B has an input impedance of approximately 500 ohms and an output impedance of 10,000 ohms.

When the IC is used as a crystal oscillator, Fig. 2E, the CCS functions as the oscillator in a Colpitts circuit (U1C). U1A is not used, so the base and collector are tied together as shown. U1B performs as a common-base amplifier (a 0.01- μF capacitor bypasses the rf energy to ground). Output can be taken from the collector of U1B at the

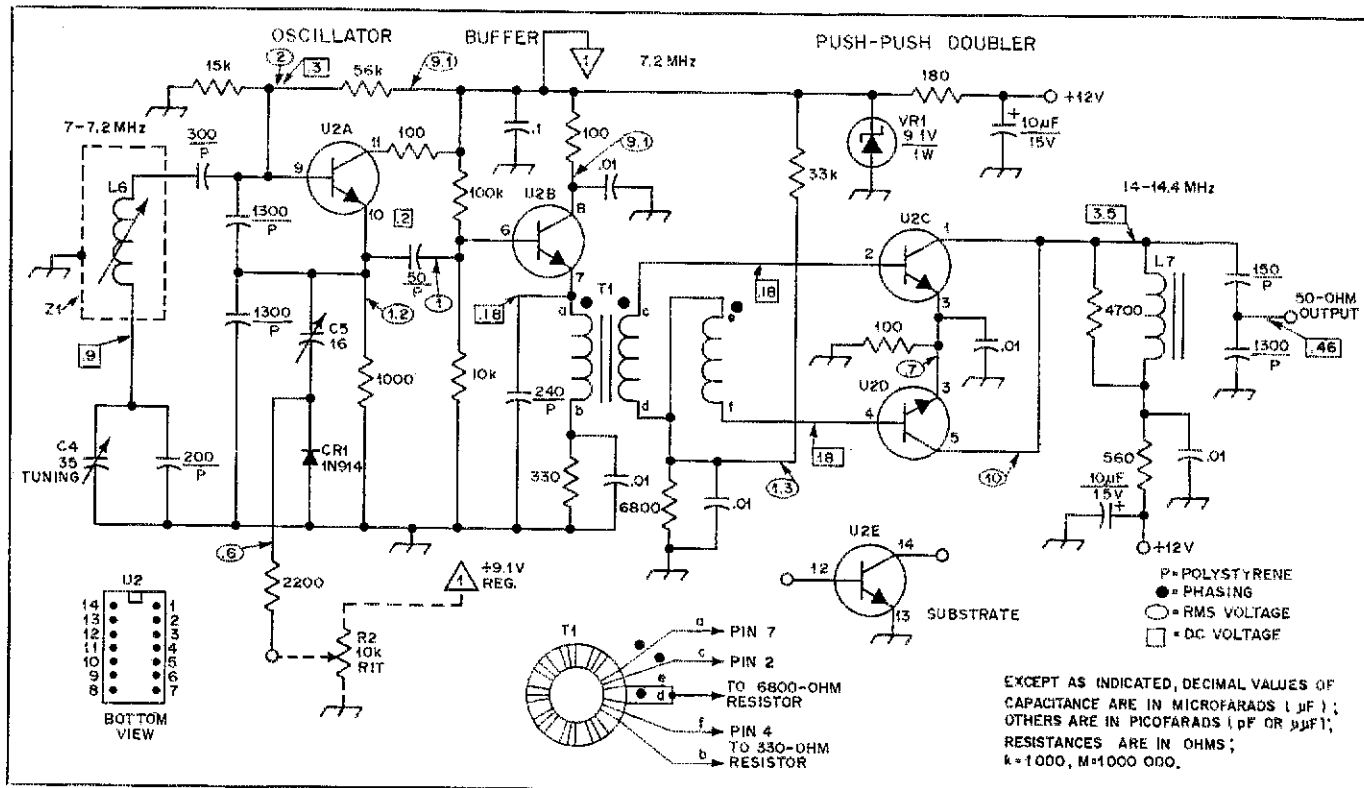


Fig. 4 — Schematic diagram of the local-oscillator system used in the 20-meter receiver. Fixed-value capacitors are disk ceramic or monolithic chip types, unless otherwise noted. Capacitors with polarity marked are electrolytic. Fixed-value resistors are 1/4- or 1/2-W composition unless noted differently. The pictorial inset drawing shows how T1 is connected.

- C4 — 35-pF air variable (Millen 26035 or Hammarlund HF-35).
- C5 — 16-pF air trimmer, pc-board mount Johnson 187-0109-005.
- CR1 — Silicon high-speed switching diode, 1N914 or equiv.
- L6 — Slug-tuned inductor, 3.6 to 8.5 μ H (Mil-

- ler 42A686CBI or equivalent). Use shield can (35-mm film canister or Miller S-33).
- L7 — Toroidal inductor, 0.9 μ H. Use 12 turns of No. 24 enam. wire on a T50-6 toroid core. (See QST ads for toroid suppliers — Amidon, G. R. Whitehouse and Palomar Engrs.).

- R2 — Optional circuit (see text), 10,000-ohm linear-taper composition control.
- T1 — Trifilar-wound trans. 2 μ H, 20 turns, twisted six turns per inch, No. 38 enam. wire on a T50-2 toroid core (see text).
- U2 — RCA CA3045 array IC.
- VR1 — Zener diode, 9.1 V, 1 W.

crystal frequency or at various harmonics of the fundamental frequency, f . The collector tuned circuit must be approximately resonant at the desired output frequency.

The push-push doubler of Fig. 2F is useful in VFO output circuits where the oscillator operates at half the doubler output frequency. The virtues of the technique were discussed by this writer in *Ham Radio* for June, 1976, page 16. A push-push doubler output stage helps reduce oscillator instability during load changes at the doubler/buffer output. Also, a push-push doubler is approximately equal in efficiency to a straight amplifier. This is not true of a single-ended frequency multiplier. In the case of a single doubler, efficiency is roughly 50 percent.

Since a frequency multiplier should operate in Class C, the CCS (UIC) of Fig. 2F has been switched to an "on" state by applying high forward bias to its base through a 2200-ohm resistor. The emitter is at dc ground. This procedure removes U1B from the circuit, electrically. No forward bias is applied to the bases of U1A and U1B, thereby

establishing Class C bias conditions (cut-off). However, forward bias can be used if the driving signal is low in level, provided the peaks of the driving signal can overcome the forward bias and drive the transistors beyond cutoff (Class C).

The principal advantage of using the differential pair of a CA3028A or similar IC for push-push doubler service is that the transistors are perfectly matched. If discrete transistors were used, an external balancing control would be necessary to establish dynamic balance — usually a potentiometer connected between the emitters, with the control arm at dc ground. The more perfect the balance, the better the doubler efficiency, and the more pure the output waveform. Some of the driving energy will appear in the output if the balance is poor. Fig. 3A shows a 7-MHz waveform as applied to a push-push doubler. Fig. 3B shows an improper waveform which would be seen at the doubler output if poor balance existed. The waveform at Fig. 3C shows 14-MHz output from a properly balanced push-push doubler. The tuned circuits should be peaked to the proper operating fre-

quencies (7 and 14 MHz) to help assure waveform purity.

Workshop Project

This month we will construct the local-oscillator system for our 20-meter receiver. Actually, the circuit should be called a BFO (beat-frequency oscillator) because output from it is applied to a product detector rather than to a mixer. The audio signal from the detector is the frequency difference between the BFO and the incoming signal. For example, during cw reception we may prefer a 700-Hz audio note (average choice among cw operators). So, if we were receiving a signal at 14,025 kHz, we could set the BFO at 14,024.3 kHz or 14,025.7 kHz to obtain the desired note in our headphones. The greater the separation between the BFO and signal frequencies, the higher the pitch, and vice versa.

Fig. 4 shows the circuit we will build. A CA3045 transistor-array IC serves as the nucleus of the assembly. U2A is a series-tuned Clapp oscillator. In the interest of good stability we have specified polystyrene capacitors in the

Radio Propagation and Solar Activity

Sunspot cycles run in smooth sine waves, right? Wrong! Contemporary methods of examining the 300-year record indicate future trends that should encourage the DX fraternity.

By Paul E. Argo,* Jay R. Hill,* Robert B. Rose,* K6GKU and Michael P. Gannis*

In October the sunspot number reached 209, the highest value in recorded history. Several months earlier FCC had warned users of frequencies up to 50 MHz to expect communications disruptions when it learned that U.S. highway patrol vehicles were experiencing interference from Europe and that South American cab drivers were unable to decipher instructions from Florida dispatchers.

Amateurs working DX never had it so good. The 15- and 20-meter bands were open around the clock. Ten meters was usable from before dawn to far into the night, around the world. Even the 6-meter band was very good for work over 2000 miles and more regularly, at least 12 hours per day.

Maximum usable frequencies for F-layer propagation reached 70 MHz on peak days. European television signals could have provided snow-free pictures in eastern USA, except that their channels and video standards did not match ours. But they made plenty of video buzz in our 50-MHz receivers, and TVI spanned the Atlantic, as thousands of British viewers heard American 50-MHz voices along with their TV sound.

This was October, 1957, and Cycle 19. Could it also be 1981, and Cycle 21?

Since 1961, students of sunspot

cycles have been predicting that the remainder of the twentieth century would be an era of low solar activity. This thinking was based on unsophisticated attempts to "eyeball" past patterns in the 200-year record of sunspot numbers (Fig. 1). Holders of this view were surprised when Cycle 20 soared above the predicted highs, to 126. This was no match for 1957-58, or even 1947, but it was above expectations.

More sophisticated techniques have been developed since the early '60s, but it is still common to read predictions

that Cycle 21 (the "new" cycle now upon us) will not rise above 50. Recently developed spectral-analysis methods have indicated Cycle 21 may go high enough to surpass even the record 1957 peak. This same view shows the cycle getting underway in late 1976, rather than the September, 1977, turning point often projected. The maximum is indicated for 1981-82.

Solar Activity Variations

The activity of the sun, as measured by sunspot number, has been observed

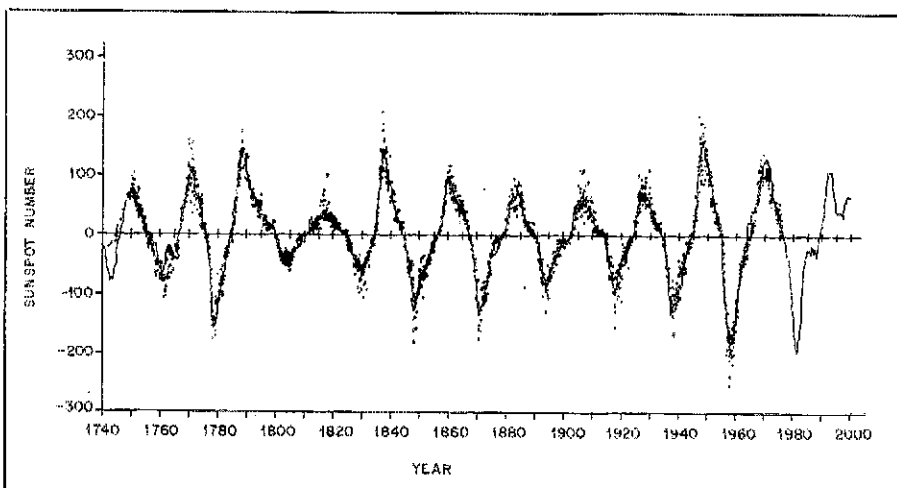


Fig. 1 — Observed sunspot numbers (dots) and predicted values (solid line) using the method outlined here.

*Naval Electronics Laboratory Center, 271 Catalina Blvd., San Diego, CA 92152

telescopically since 1610, and fairly well documented since 1749. It appears to have a cycle of roughly eleven years, which has been identified recently as a 22-year magnetic period, with alternate cycles having reversed average solar magnetic field. Since the amplitude and frequency of the cycles vary slowly with time, it has become a point of interest to determine if sunspot activity variation is regular and constant over extended periods of time. If it is, then it should be possible to make predictions based on historical observations.

Eddy has pointed out that solar activity may have been greatly different during the Maunder Minimum (a period of very low solar activity between 1645 and 1695) than has been generally assumed.¹ He states that Schöve, in a 1955 analysis,² relied on the assumption of nine cycles per century, to identify solar maxima back to the fifth century B.C. Eddy discounts Schöve's estimates of solar maxima during the 1600s as systematically high, noting that the magnitudes were sometimes based on "auroral counts and other unspecified data." Eddy states that "the present cycle of activity may be unusual, if not transitory."

On the other hand, Wolff discusses physical processes within the sun, from which it is reasonable to expect long-term persistence of discrete line spectra in the sunspot activity record.³ He has developed a rigid and differential rotation model of the solar interior with modes having beat frequencies which are mathematically related. Using two adjustable frequencies in the model, he predicts 20 of the 25 periodicities observed in the sunspot data by Currie and Cole.⁴ The longest period found by Wolff is 178 years. He considers the difference between his adopted value of 178 years and the 190-year period found by Cole to be insignificant, since the uncertainty in an estimate of a frequency present in a record of length T is commonly given as $1/(4T)$. Cohen and Lintz have assumed that the 179-year periodicity, along with several others, is constant in amplitude and frequency.⁵ It is not clear that their extrapolation backward in time would produce the Maunder Minimum, particularly since they use a dc component of 47.4 smoothed sunspots in their model.

The sunspot record from 1749 to 1975 has been analyzed by Hill⁶ using a high-resolution spectral analysis to determine not only the frequencies of the periodicities but also the amplitude and phase of each line. Since a number of closely spaced lines are resolved, it is possible to project backward in time and form a comparison with the ex-

tended record as determined by Eddy. (See Fig. 2, July, 1976, *QST*, page 25.) The analysis shows that discrete lines do exist in the sunspot record, and a beat between several closely spaced lines produces a long (1,000-year) period fluctuation in solar activity. This analysis was performed with 2,724 monthly sunspot values given by Vitinskii in 1975,⁷ and by *Solar Geophysical Data*. The algebraic sign of alternate cycles is negative, to conform to an assumed 22-year magnetic-reversal cycle.

Several methods for analyzing spectra have been applied to the sunspot record by the authors already mentioned. Cole used the fast Fourier transform to analyze the autocorrelation function and the solar cycle phase data of Schöve, and obtained the power spectral density as a smooth continuous function of frequency.

Both Currie and Cohen-Lintz used the maximum entropy method to find the smooth continuous power density function. Both methods estimate the frequency of a suspected spectral line at the point of peak power. The method developed by Paul⁸ is very accurate and sensitive for determining frequencies, amplitudes and phases of unknown lines in a spectrum consisting of broadband noise and discrete lines. Paul demonstrated its accuracy by analyzing two years of bi-hourly tide data and forecasting tides (reference 8 and personal communication). Hill has used the Paul method to determine a Fourier-Series fit to sunspot data.

The summed Fourier Series corresponding to the sunspot model is plotted along with the monthly data record in Fig. 1. The series is evaluated beyond the data record at both ends, to provide a forecast for the future and a backward view of past solar cycles. Note the striking agreement between the model and observations between 1720 and 1975. The fact that the summed series fails to fit the data as accurately in the first and last cycles as in the central cycles could be an artifact of the method, or it may indicate changes in the

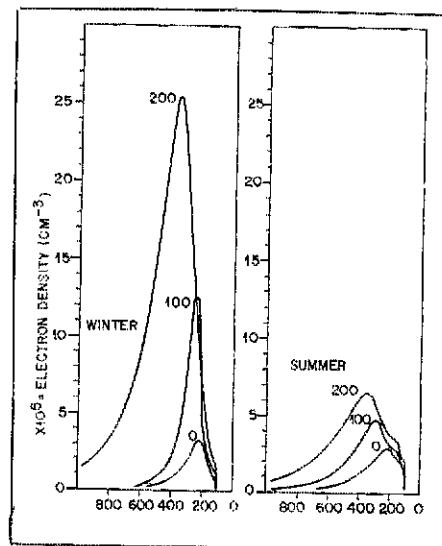


Fig. 2 — Typical electron density profiles vs. sunspot-number epoch, for winter (top) and summer (bottom). (After J. W. Wright, 1962.)

physical processes of the sun; for example, changes in oscillation mode excitations. (See Editor's Note at the end of this discussion.)

The fit in Fig. 1 is good enough to forecast a few years in the future. Using the zero-crossing as an indicator, the model shows Cycle 21 beginning December, 1976. Several authors (Cole, Jose and Cohen-Lintz) have predicted a low activity level for Cycle 21, with a peak around 50 to 60. The present analysis predicts a peak between 130 and 200, during 1981 or 1982. It will be interesting to watch the sun and radio propagation conditions closely in the next few years to see how these varied views work out.

Solar Cycle Effects on Radio Propagation

The ionosphere undergoes long-term variations that follow solar activity and affect radio propagation in various ways. In the following section the cycle-to-cycle ionospheric variations in response to solar activity changes are

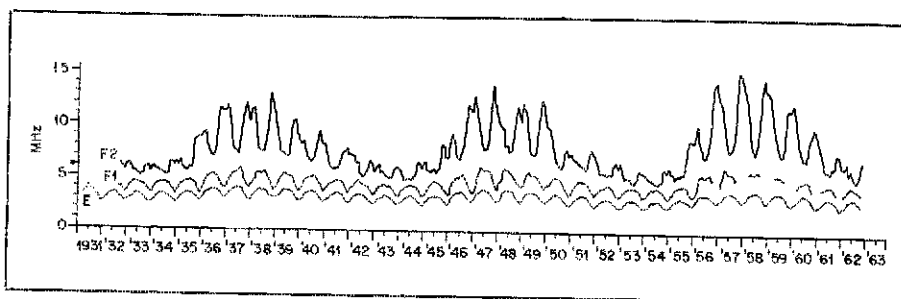


Fig. 3 — Monthly mean noon critical frequencies at Slough, England, in three sunspot cycles, 1932-1962. E, F1, and F2 layers are shown. Note that only the F2 critical frequency changes markedly with sunspot number, though all ionospheric layers change with the seasons.

¹ Footnotes appear on page 27.

examined, and some of the pitfalls that the radio spectrum user can avoid are presented. It will be shown that commonly used ionospheric indices may not adequately describe the ionospheric variations unless used with care. The practical effects are very dependent on the user and frequency concerned. The amateur 50-MHz band opens for F-layer midlatitude propagation only during very high levels of solar activity, as

represented by a sunspot number of about 190. The 27-MHz citizens band, and the adjacent amateur 10-meter band may experience considerable skywave interference of the F-layer variety, even in a low-cycle maximum (sunspot number of 50 or so).

A common method of quantizing the ionosphere uses the critical frequency of the F2 peak (f_oF2). The monthly mean noon f_oF2 values for Slough

(England) covering three solar cycles (1932-1962) are shown in Fig. 3. The short-period variations in Fig. 3 are the seasonal variations indicated in Fig. 2. If the Slough data are used as a whole, plotting the monthly mean values of winter f_oF2 as a function of the twelve-month smooth running average of sunspot number, Fig. 4A, the result is a relationship showing flattening above SSN = 130. This has been attributed to saturation effects. However, if cycles are plotted separately as suggested by J. W. Wright, Fig. 4B, one sees immediately that each cycle has a linear (but different) f_oF2 /SSN relationship.

A problem in comparing solar activity to ionospheric variations is that sunspot number is not a particularly good measure of solar effects on the ionosphere. The chief ionizing agent for the F region is the extreme ultraviolet radiation (EUV). EUV has not been measured accurately and continuously for long periods of time, because such measurement can only be made by satellite methods. What this boils down to is that a sunspot number of 50 in a low cycle may be a very different thing from a SSN of 50 in a high one. Ionospheric measurements may lead to better understanding of the solar process.

What has been said here applies strictly to midlatitude propagation. For paths that cross the equator, ionospheric tilts tend to cause a ray to travel much farther, raising the maximum usable frequency on such paths for a given level of solar activity by as much as 1.5. This means that when a 34-MHz signal propagates at midlatitudes the 50-MHz band may be open transequatorially. Thus, though a sunspot number of 190 may be required for long-distance communication on midlatitude circuits, optimum transequatorial paths may be open for 50-MHz work, at lower levels of solar activity.

The 28-MHz band is unlikely to be useful other than on occasional peak days at a solar minimum, except transequatorially, but for moderate to high levels of solar activity it is good for 10 hours or more a day, except during the summer months. The 21-MHz band is available during all levels of solar activity, though the winter months in periods somewhat above the minimum solar activity levels are optimum. (This condition prevails currently.) The 14-MHz band shows the effects of low solar activity mainly in the nighttime hours; during higher levels it often stays open around the clock. It is least affected by solar activity changes of all the DX bands.

Conclusion

We have reviewed the effects of solar activity on the ionosphere and on hf

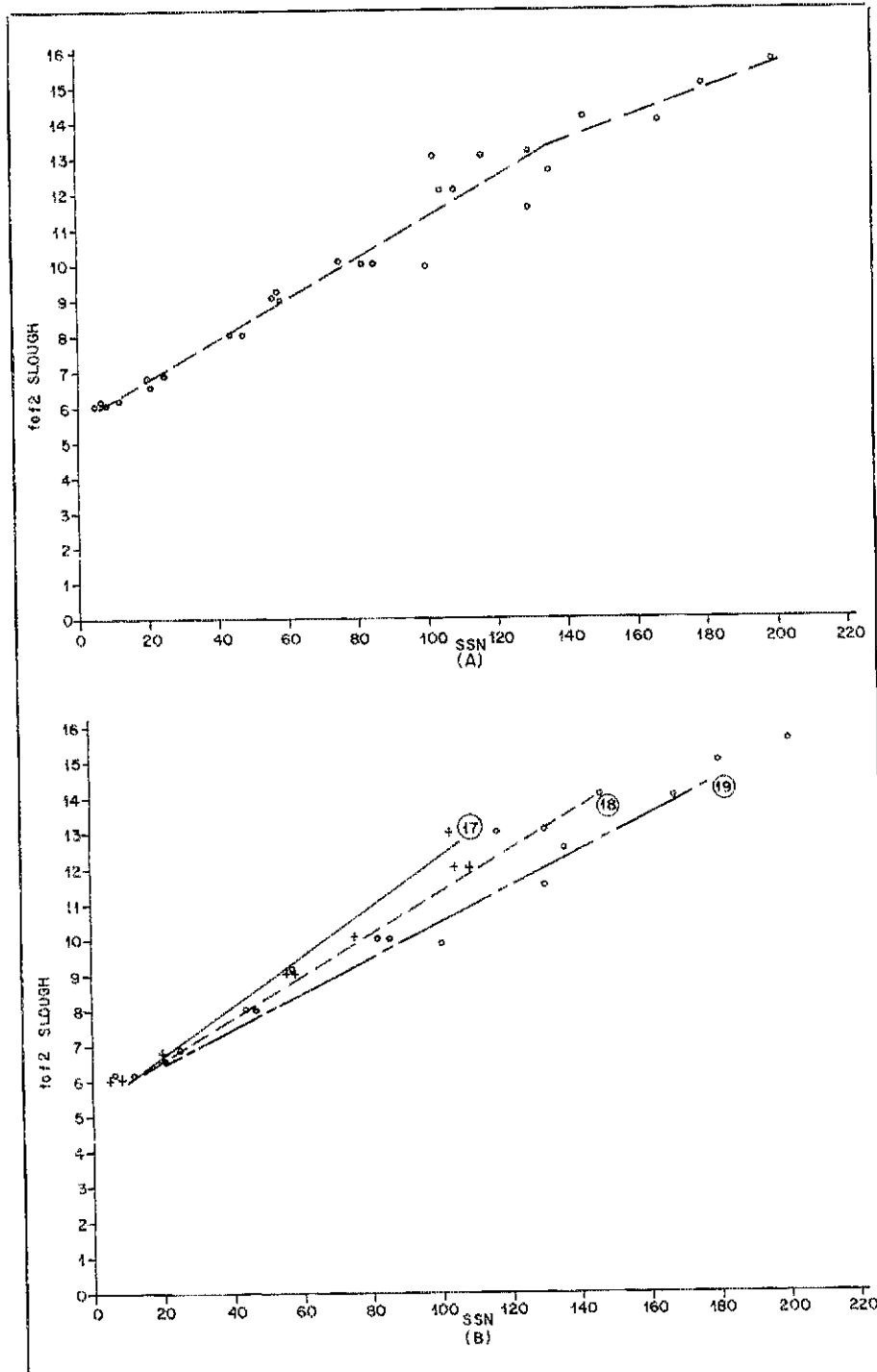


Fig. 4 — Plotting the data from Fig. 3 as a whole (A), indicates a flattening of the curve at sunspot numbers above about 130. However, if the cycles are shown separately, as in B, a very different picture emerges, showing substantially straight lines for each of the cycles.

and vhf propagation. The peaks of solar cycles allow much different propagation than the low of a solar cycle, and peak-to-peak variations may be significant, under certain conditions. For example, midlatitude openings were quite common on the 50-MHz band in 1957 and 1958, while in 1968 they were rare.

Many other estimates of the upcoming solar activity have been that it will be much lower than the last cycle, which peaked in 1968. If this were to be true, the 6-meter band would be effectively unusable for F-layer DX, and the 10-meter band would be marginal at best, a good part of the year. Our analysis indicates that the next cycle of solar activity may even soar above the 1957 high. If this happens the 6-meter band will be useful for F-layer distances for a record period in time. A more cautious estimate still places the level of activity for the new cycle well above the 1968 peak, so frequent openings would be expected.

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We would like to express our thanks to Jerry Clapp and Dr. Ilan Rothmuller, for discussions that helped develop this paper, and Kirby Spalding for his help in preparing it. This work was supported at NELC by NAVAIR Project F52551.



[Editor's Note: Readers will have a better understanding of the vagaries of radio propagation observation and prediction based on sunspot number if they bear in mind that "sunspot number" does not mean "number of sunspots." It is a time-honored method of rating solar activity, but its chief virtue is that it provides a statistical link with the past. As such it is useful mainly in comparing solar activity cycles on a long-term basis. Even in this it is far from infallible, as the farther one goes back in history the less accurate the records become. In reference 1, Eddy rates sunspot number records as follows: back to 1848 — good, 1847 to 1818 — fair to good, 1817 to 1749 — questionable, and 1748 to 1700 — poor.]

Footnotes

- ¹ Eddy, *Nature*, vol. 192, p. 1189 and 1202 (1976). See also Lynch, "The Maunder Minimum," *QST* for July, 1976.
- ² Schove, *Journal of Geophysical Research*, vol. 60, p. 127 (1955).
- ³ Wolff, *Ap. J.*, vol. 205, p. 612 (1976).
- ⁴ Currie, *Ap. and Space Sci.*, vol. 20, p. 509 (1973).
- ⁵ Cohen and Lintz, *Nature*, vol., 250, p. 398 (1974).
- ⁶ Hill, submitted to *Nature*, 1976.
- ⁷ Vitinskii, "Solar Activity Forecasting," Leningrad, 1962. 1965 English translation available from U.S. Dept. of Commerce, Springfield, VA 22151.
- ⁸ Paul, *Math Comp.*, vol. 26, p. 437 (1972).

Cycle 21 — Four Divergent Views

If you keep your hats 10 years or more, paste these predictions about Cycle 21 inside one and wait to see for yourself.

By Joseph L. Lynch,* WA6PDE

Most recent predictions for the "new" sunspot cycle cite 1977 as the year of the beginning of the upswing. What follows is a summary of the various predictions that have been made concerning the makeup of Cycle 21. This is designed as a "pay your money and take your choice" approach and does not draw any conclusions as to who has the right information.

The works of four different researchers are reviewed and summarized. There have been others, and some have interpolated predictions from still others' works, but these represent highly diversified approaches to solar forecasting.

Gliessberg

In 1971 W. Gliessberg¹ of the Astronomical Institute in West Germany wrote concerning the use of the 80-year period for solar forecasting. He had previously developed the 80-year period from Wolff's study of the sunspot numbers. Gliessberg predicted that the minimum of Cycle 20 would occur in the first half of 1975, and that Cycle 21 will peak between 1979.5 and 1980.5 with a mean sunspot number between 56 and 96.

This approach examined the mean sunspot number for a group of four cycles. He determined that, based on the evidence of the previously recorded sunspot numbers, the solar cycle showed a rough repeatability every 80 years. Because of the downward trend of Cycle 20 (mean maximum number of 110) he assumed that the mean maximum

of Cycle 21 will be lower still. He has already been proven wrong in his prediction for the timing of the minimum. His approach using the 80-year period tends to restrict the sun into a previous behavior pattern.

Cohen and Lintz

The very widely publicized work of Ted Cohen, W4UMF, and Paul Lintz² in *Nature* magazine has given rise to predictions of solar cycles based on a periodicity of 179 years. This was arrived at by using the maximum entropy spectral analysis (MESA) of the recorded solar cycles. This analysis indicated various peaks at 89.6, 57.1, 11.2, 9.9 and 8.1 years. They derive the 179-year period by saying it is a result of a beat frequency of the various peaks and not a period of its own. They use the evidence of Cycles 1, 2, 3 and 4 and their relative comparisons of Cycles 17, 18, 19 and 20 as evidence for their theory. Because of this comparison, they predict that Cycle 21 and the following two cycles will be low in their maximum mean sunspot number. Their approach differs from Gliessberg in that they apparently do not see the 80-year period that he does. The closest they come is the period of almost 90 years. A possible weakness also lies in the questionable accuracy of sunspot data for years prior to 1850.

Smith

This past summer F. M. Smith,³ G8KG, described an interesting concept to explain the sudden upturn of Cycle 20. He suggests that Cycle 20 is actually two cycles slightly out of synchronization. He comes to this conclusion by

*P. O. Box 73, Bonita, CA 92002

¹ Footnotes appear on page 28.

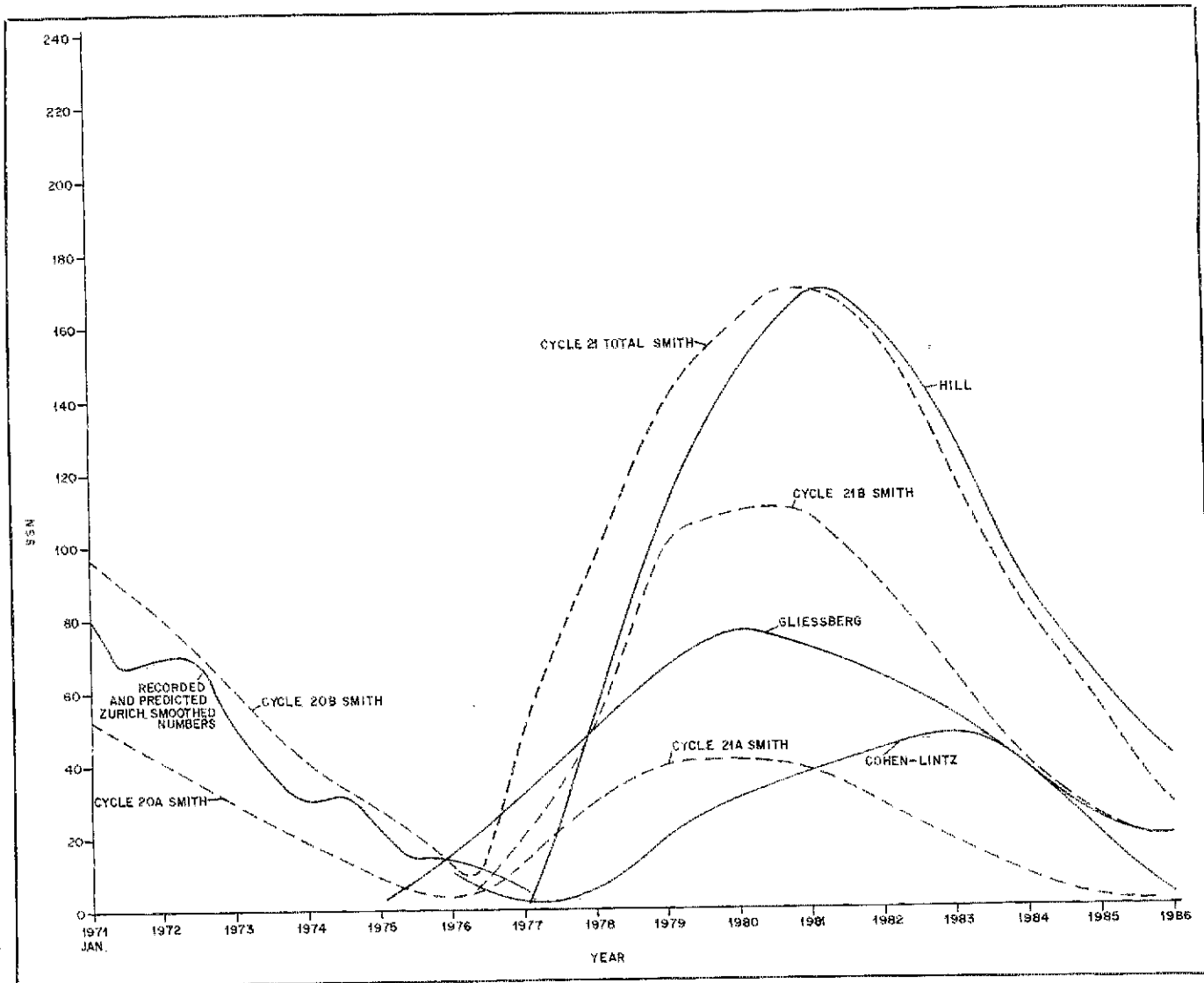


Fig. 1 — Smoothed sunspot numbers observed and predicted by Zurich, and the predictions of each of the authors mentioned. The plots show the median range of each of the predictions. Since this drawing was made, Zurich has confirmed that Cycle 21 began in July, 1976.

stating that the solar cycle is locked into the tidal variations on the sun produced by the influence of the planets. He states that this cyclical behavior became unsynced and that Cycles 20A and B are an attempt by the sun to get locked back up. Smith predicts that Cycle 21 will be as high as Cycle 20 and could even have a sunspot number of over 150. He comes to this conclusion because he sees a continuing of the double-cycle phenomenon, but Cycle 21B will be in sync with Cycle 21A, and the combined power of the two will create the high sunspot number. The article is hard to follow in some places, and therefore should be read carefully.

Hill

The latest entry into the sunspot-numbers game is from Jay R. Hill⁴ of the Naval Electronics Laboratory Center in San Diego. Hill has a complicated mathematical analysis of previous sunspot cycles using the fast Fourier trans-

form (FFT) method.

Since the Hill theme is stated in this *QST* issue, I will not go into an analysis of his work. He predicts that Cycle 21 will begin in late 1976 or early 1977 and that at its maximum it will have a sunspot count of at least 130 and possibly as high as over 200, topping Cycle 19.

Summary and Conclusions

Fig. 1 shows plots of the various predictions presented here. It is interesting to see the sharp contrast between them. It will be even more interesting to see who, if any, is proven right.

There are about as many predictions as researchers in the field of solar activity. These predictions range from the very low (40) to the very high (200). It is important to remember that solar research is a relatively new field. Observations such as the magnetic-field reversal during solar minima have been

made for only a relatively few cycles. Important data pertaining to the effect of solar activity on hf communications are probably yet to be discovered. A common misunderstanding lies in the belief that sunspots are the *cause* of changes in band conditions. There is something else that is responsible for these changes but as yet science has not discovered what that "something else" is. Until that discovery is made relative sunspot number can still be a useful tool for determining general band conditions on a long-term basis. QST

Footnotes

- ¹ Gliessberg, "The Probable Behavior of Cycle 21," *Solar Physics*, Vol. 21, 1971.
- ² Cohen and Lintz, "Long Term Periodicities in the Sunspot Cycle," *Nature*, Vol. 250, No. 5465, Aug. 2, 1974.
- ³ Smith, "Some New Insights into the Mechanism of the Sunspot Cycle," *Radio Communication*, July, 1976.
- ⁴ Hill, "Long-Term Solar Activity Forecasting Using High-Resolution Time Spectral Analysis," submitted to *Nature*, July, 1976.

TR-4C Outboard Receiver Modification

DXers and contesters take note! Here's a simple "mod" that will increase your rig's operating flexibility.

By Dr. J. R. Sheller,* W8ZDF

After trying most of the popular transceivers available for amateur use over the past six years, I have found the Drake TR-4C to be close to ideal. For the purposes of DXing and contesting the transceiver does have one shortcoming. It is impossible to listen simultaneously to both the TR-4C and an outboard receiver. One must throw the side-mounted slide switch on the transceiver in order to transfer the antenna and muting connections to the external receiver. These connections are removed from the receiver in the transceiver when this is done, rendering that receiver useless. This article will illustrate how to modify your TR-4C in order to eliminate the necessity of using the TCVR-RCVR switch.

Modification Details

Before tearing into your unit, read through this article carefully and study the diagrams to acquaint yourself with the circuitry involved. Once you are familiar with the intended modification, remove the bottom cover. Locate the sealed relay and the circuit board to which it is mounted. Carefully remove the relay (K1) from its socket. Next, unsolder the heavy yellow wires connected to the transmitter output (RF) and antenna (ANT) terminals on the relay board. Unsolder the rf choke where it attaches to the relay board and push it aside. Remove the sheet-metal screws that hold the board to the chassis and carefully position the board so that the foil side is exposed and accessible.

With the aid of a sharp knife, break the foil connection between pins 8 and

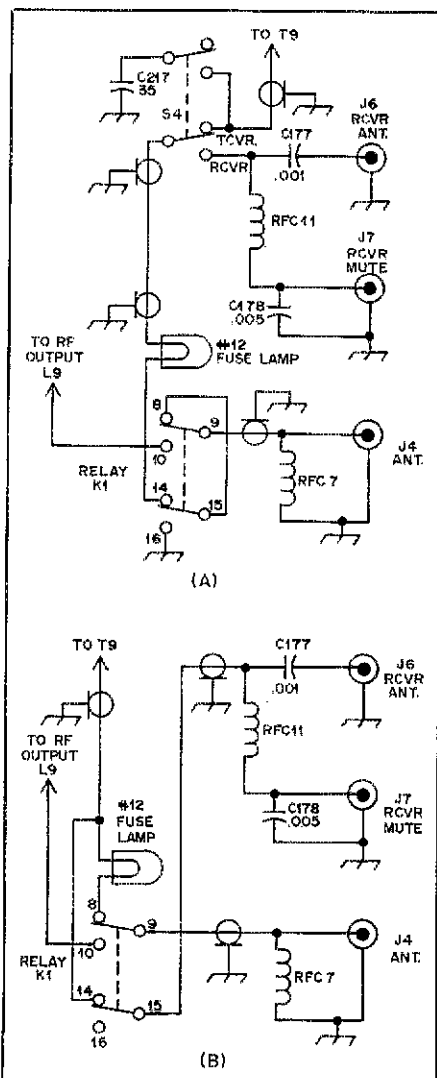


Fig. 1 — Shown at A is the unmodified TR-4C circuitry. The diagram at B shows the circuit changes.

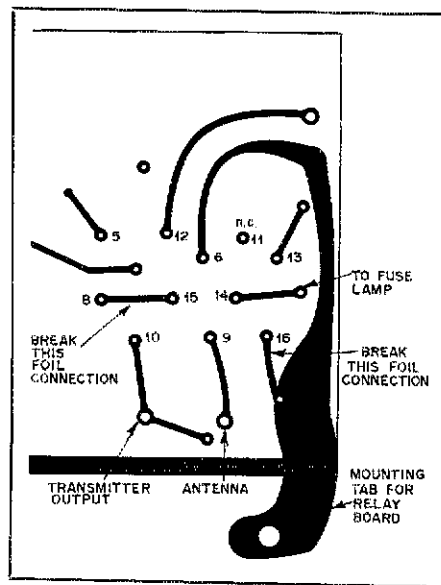


Fig. 2 — Here is the foil pattern of the relay circuit board complete with the necessary changes.

15 and 16 and ground as indicated in Fig. 2. Next, remove the center conductor of the coaxial cable connected to the fuse-lamp socket. From this socket pin, run a piece of No. 22 insulated hook-up wire to pin 8 on the relay board. Now, connect the center conductor of an 18-inch piece of RG-174U cable to the same socket pin on the fuse lamp. Ground the shield. This cable will be routed along the existing main wiring harness to T9 and will replace the cable that presently connects T9 to the TCVR-RCVR switch.

Returning to the relay board, solder the center wire of the coaxial cable, which was removed from the fuse-lamp

socket, to pin 15 on the relay board. Be sure to ground the shield. This completes the modifications to the relay board. Carefully remount the board, remembering to resolder the heavy yellow wires and the rf choke.

Now, proceed to the modification of the TCVR-RCVR switch. Since this switch would not be used after the modification, I chose to use the rear pins as terminal lugs. Locate the gray-colored coaxial cable attached to this switch — the one that runs along the rear of the chassis. Remember, this

cable is now attached to the relay board at pin 15. Connect the center wire of this coaxial cable to one of the rear terminals of the TCVR-RCVR switch and make this the common junction for R11 and C177 (0.001) which connect to the RCVR MUTE and RCVR ANT receptacles. Remove and discard the other gray-colored coaxial cable which was connected to T9.

Recheck all joints and wire placement. It may be necessary to slightly repeak the rf and mixer coils as per the alignment instructions. This completes

the modification. The bottom cover can now be replaced.

This is not a very difficult modification to perform; however, it is wise to take your time. From start to finish the entire project should take approximately three hours. Having used the modified transceiver in several contests, I can notice no degradation of performance but rather a tremendous increase in flexibility. With this modification installed, one can concentrate on working DX — not on throwing switches! QST

Strays



□ Alice Johnson, one of 15 members of Central Missouri Amateur Radio Club's Novice class, is meeting a very special challenge. At age 61, she not only finds that electronics is "out of the way of what most women would know about," but she has been blind since childhood. Her classroom study is supplemented by cassette recordings, braille text, and specially raised diagrams she can "read" with her fingers. (The special learning materials are available from an Illinois correspondence school for the blind.) She takes notes in class with her braille typewriter. "Even with the inconvenience of being blind," she says she has had a good life and "this ham stuff is an outlet for me. In other words, I'm a little young to retire and completely vegetate."

Alice says that her course instructors Jim Keck, WBØFRX and Jim Alcorn, WBØOLE, and her classmates have been encouraging along the way. She is planning to join the radio club when she gets her license so she can "attend their meetings and conventions to make friends on the air and in the area. . . . They've accomplished something and they have a right to be proud."

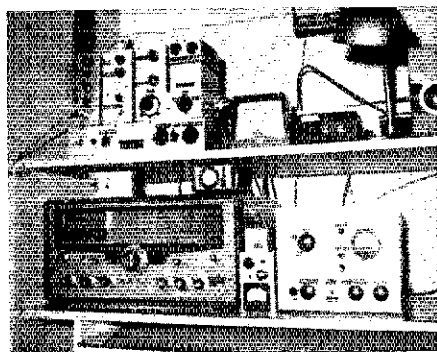


Alice copies in braille while being tested on code by instructor WBØFRX. (photo courtesy of Sedalia Democrat-Capital)

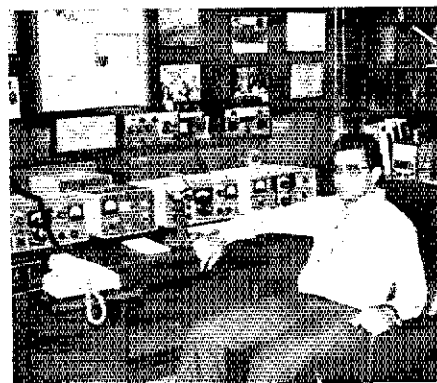
MORE HOMEMADE EQUIPMENT

□ The photograph shows the neat job done by Jack Rossier, K6PZC, relative to his homemade station equipment. Here is more proof that some amateurs like to build and use equipment which contains solid-state devices. Many of the items seen in the picture contain circuits taken from *QST* articles. The main items in the collection are a 7-watt exciter (just above the receiver) and a 100-watt solid-state linear amplifier (to the right of the receiver). Our compliments to the "chef." The units have that "wholesome" look which should inspire laudatory responses from other amateurs.

Jack would like to see a club formed by those who prefer to build their own equipment. He is particularly interested in getting together with others in his area who find home-construction projects an important part of being a radio amateur. We believe that Jack has a great idea! Why not an international club for designers and builders of homemade gear? — *W1FB*

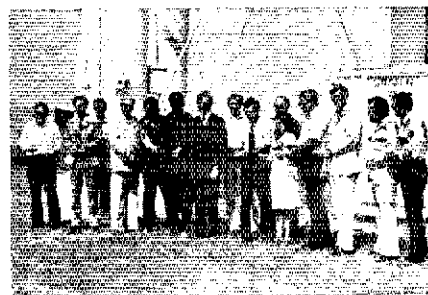


A homebrew club, anyone? Jack Rossier, K6PZC, already has a start with his 7-watt exciter (upper left), and 100-watt amplifier (lower right), both solid-state.



Carlos Albuquerque, PY7AZZ, of Recife, Brazil, is shown here in the Atlanta, GA, hamshack of Woody Rogers, WA4MDS. Woody and his XYL visited their DX friends in Brazil in 1974.

□ The Ellis County Amateur Radio Club recently held a dedication and wire-cutting ceremony for its newly completed WR5ALN repeater in Waxahachie, TX. Friends, club members and city officials joined President Tom Alexander, WB5KQV, and Civil Defense Director Captain Charles LaFevre, in the wire cutting. The repeater equipment, donated by Southwestern Bell Telephone Company to the club for civil defense use, serves both as an amateur and a RACES repeater for Ellis County.



A Control System for Your Station: Simple and Economical

Stop! Before you turn this page read about this nifty switching panel which can improve your operating position. It's compact and easy to build. Try it . . . you'll like it!

By Jon G. Harder,* W1GVN

Even in this age of the transceiver, a good station control system is still a must for the many hams who use separate receivers and transmitters. Newcomers and others with assorted gear often have to scramble around to find out how to put together a switching arrangement that's simple, economical, yet comfortable to use when operating.

In getting a station integrated for a new Novice, I found the simple package described here worked well. Parts for this project can be purchased at most electronic-parts stores and construction should proceed easily with a little advance planning. Keeping everything in one small box contributes to a neat layout, a high degree of operating convenience, and ease in switching a particular piece of gear in or out of use.

Performs Four Functions

The beauty of the circuit is that two sets of relay contacts are used to perform four functions. At the heart of the package is a dpdt plug-in relay, made to do duty in place of an expensive coaxial-type relay. A 3pdt relay is an alternative, as you may need the spare set of contacts if you add more equipment to your station in the future. The relay mounts in a socket on the back of the box next to the cable fittings. A 3 × 3 × 10-inch box was on hand and was used because it fit underneath a small shelf on the operating desk. But by all means use whatever size fits your needs.

The send-receive switch, on-the-air pilot light, and receiver monitor level control are right at your fingertips, along with two audio output jacks (one

is for a tape recorder) and the key jack. All the rest of the cables enter the box at the back, out of sight, but are easily disconnected for servicing, changing antennas and such.

For antenna control, use is made of an idea that has surfaced from time to time in *QST* and other publications — the T-R switch principle. Instead of

switching the antenna back and forth between the receiver and transmitter, the antenna is always directly connected to the transmitter. During transmit periods the receiver is simply disconnected from the transmission line and its input shorted to ground to prevent damage to the antenna coils.

Using this arrangement also means

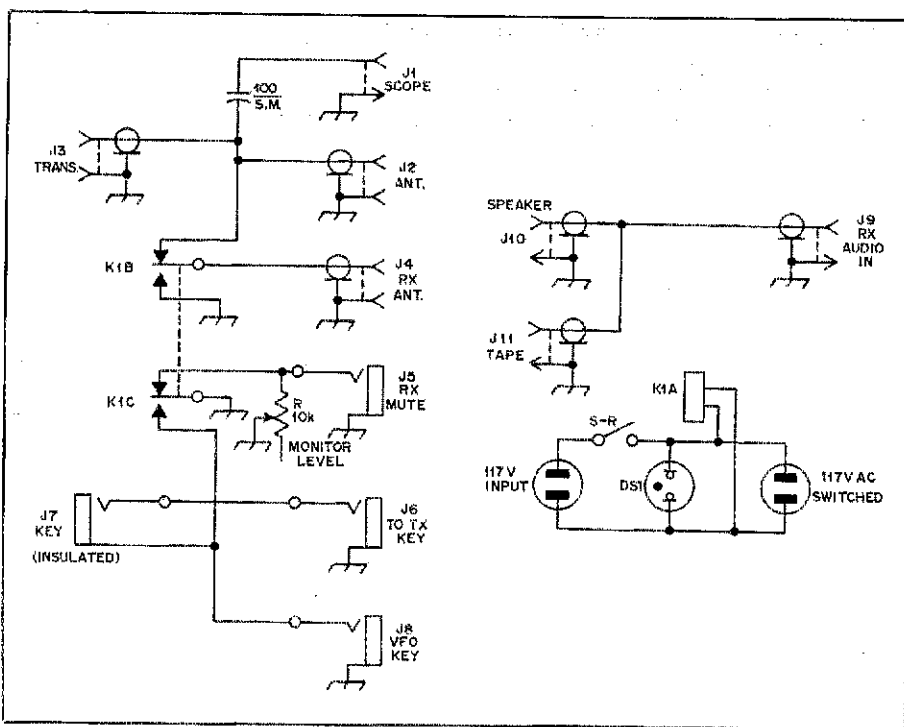


Fig. 1 — Circuit of the control box. A 3 × 3 × 10-inch metal box will accommodate all of the components.

DS1 — Panel-mounting 117-V neon lamp with built-in dropping resistor.

J1 — BNC chassis connector.

J2-J4, incl. — S0239 uhf chassis connector.

J5, J6, J8 — Open-circuit 1/4-inch phone jacks.

J7 — Open-circuit 1/4-inch phone jack mounted on insulating board.

J9, J10, J11 — RCA phono jacks.

K1 — Dpdt or 3pdt relay, 117-V ac coil, Potter and Brumfield KA-4314-1 or equivalent (Olson Electronics catalog number SW-633).

the relay doesn't have to handle any rf power. Impedance bumps in the transmission line are avoided by keeping the lead between the transmit and antenna coaxial-cable fittings about an inch in length. In fact, if a T adapter is used, only one fitting would be needed at the box.

A Safety Feature

Another trick prevents possible receiver burnout if the key is struck accidentally during receive. This allows the transmitter plate power to be left on at all times, so only one switch has to be thrown. The solution is to mount the key jack on a small piece of phenolic board before fastening it to the box. The key cannot complete the circuit to ground except when the relay is energized. K1C is wired to connect the ground lead to the key jack during transmit. At the same time it turns on the VFO, which runs continuously. Keeping the VFO unkeyed helps prevent chirp problems that plague many cw operators with simple frequency-multiplying transmitters. For phone operation or tune-up, a shorted plug is inserted in the key jack, J7.

The other function of K1C is to control receiver muting, or monitoring during cw operation. It permits the receiver i-f stages to operate normally while receiving. When transmitting, K1C allows R1 to control the monitoring level by supplying additional bias to the receiver. Monitoring your actual signal is the only way to judge its quality -- and is something the transceiver operator can't do without some extra gear. You'll also send better and be able to tell if your key-down frequency is the same as when the VFO is turned on alone for spotting. (Receiver overloading effects may cause differences of several hundred hertz in some cases.) The level control can be set so that you just barely hear the VFO come on before you start to send, and this permits a minor shift in frequency *before* you press the key and transmit. R1 can be set to allow for this without making the level so high that a blast of sound hits your ears when the key is down.

With some receivers, R1 may require minor resetting when changing bands. For phone operation, R1 is turned all the way down to prevent feedback. But it can be turned up to provide a useful

check on signal quality when using earphones and a dummy load.

Other Conveniences

The rest of the features are conveniences you may not need. A BNC jack is added for tapping into the rf line for scope monitoring of signals. Multiple audio jacks allow flexibility when taping or using more than one speaker or headset without resorting to cumbersome Y adapters. A switched 117-V ac socket is added to control a power relay in a spare transmitter.

This little unit doesn't give you break-in operation, but it does provide the switched equivalent of semi-break-in. And it has the added plus of monitoring your own transmitted signal, rather than just a sidetone oscillator. For convenience during contest operation, the control unit can be plugged into a foot switch, and the toggle switch left in the SEND position. No problems have been encountered from having rf, af and control lines together in the same box, but you may want to bypass the audio and keying leads for rf with 0.01- μ F disk ceramic capacitors to ground. [QST]

Strays



□ Storm spotters have been organized in the Fort Worth, TX, metroplex as a Skywarn network sponsored by the Radio Amateur Civil Emergency Service, RACES. During severe weather situations, Skywarn spotters turn their eyes upward and their reports of suspicious storm activity ring out on two meters.

Besides being licensed amateurs with regularly scheduled practice nets, members of the Skywarn net have had extensive Weather Service and civil defense training in locating, identifying and reporting severe storms.

Ham radio operators were the first to sight a funnel cloud that developed into the Dallas tornado over an hour before it touched ground in North Dallas last spring. The amateur spotters had the storm under surveillance from

its birth at 4:35 P.M. until it lifted from its path of destruction at 5:35. On that day alone, the Weather Service logged over 70 important reports from Skywarn spotters in the metroplex.

Jeter Pruett, in charge of the National Weather Service office in Fort Worth, is an enthusiastic booster of the volunteer spotters. "Their rapid emergency radio communications get reliable reports to the National Weather Service in real time for tornado warnings," he said.

Claude Whitley, WBSFLQ (left), and Brian Peters, WBSOFM, are shown here at the October open house of the Fort Worth office of the Weather Service where they demonstrated to the visiting public the Skywarn station they set up at the NWS during severe weather. With the weather radar printer between them, Brian, works the Dallas net on 146.28-88 and Claude works the Fort Worth net on 146.34-94. During 1976, Peters and Whitley accumulated more than 40 hours of operation at the National Weather Service.

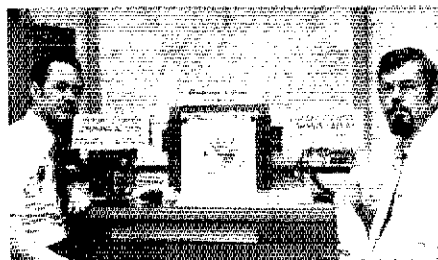
In addition to the NWS station, Walt Baugess, WA5JJI, operates the permanently installed 2-meter station at KXAS-TV, reporting from their weather radar and assisting the TV meteorologist with spotter information; Claude

Taylor, WB5PTT, usually mans the 2-meter installation from the weather radar room at Carswell AFB; and Ben Myers, WB5HFH, deputy coordinator of the civil defense office of Fort Worth and Tarrant County, opens the RACES net and is always on duty to advise from the c.d. office.

Net controls include Tom Chance, WA5VJX, Eddie Kuykendall, W5UXP and Ed Eddins, WB5FPI, on 146.34-94 and Johnny Davis, K5LZA, Jim Haynie, WB5JBP and Phil Clements, W5DWL, on 146.28-88.

□ Gus Koth, ex-WØEGI, had a special advantage when he was able to request the call of his choice. Now he uses his name whenever he repeats his new call, KØTH.

□ ARRL hq. is open to visitors on a "drop-in" basis from 8 A.M. to 5 P.M., Eastern time, Monday through Friday. Groups may be accommodated at other times by prior arrangement. In addition, the Maxim Memorial station, WIAW, is open from 1 P.M. to 1 A.M., Monday through Friday; 7 P.M. to 1 A.M., Saturday and 3 P.M. to 11 P.M., Sunday. Both are located at 225 Main Street, Newington, CT 06111. Maps with local street detail are available on request.



RTTY Distribution and Control Box

Tired of weeding through a tangle of wires when switching from one band to another for RTTY operation? Get it all together!

By Alvin L. Mumby,* WB2MCP

Here is an easy-to-build accessory for centralizing the control and distribution of power to equipment in an RTTY station. Interest at this QTH includes RTTY operation on vhf/a-m, vhf/fm and hf amateur bands. This project was developed to ease growing frustrations encountered while connecting, disconnecting and reconnecting the equipment necessary to satisfy these interests. Teletype equipment here includes a model 15 page printer, model 14 TD and a model 14 reperf. An ST-5 terminal unit and an AK-1 afsk comprise the signal conversion gear.

Control-Box Functions

This control box provides a central point from which the following functions may be performed.

- 1) Change from RTTY to voice operation.
- 2) Switch reperf. from primary loop to auxiliary loop so that tape may be punched while copying off-the-air signals on the page printer (interchange reperf. jack with spare jack).
- 3) Return reperf. to primary loop to punch tape using off-the-air signals.
- 4) Switch the ST-5 and AK-1 between each transceiver.
- 5) Start and stop each piece of equipment.
- 6) Monitor auxiliary loop current. At this station the ST-5 and AK-1 are housed in the same enclosure. The primary-loop supply is a part of this unit. The auxiliary-loop supply is the

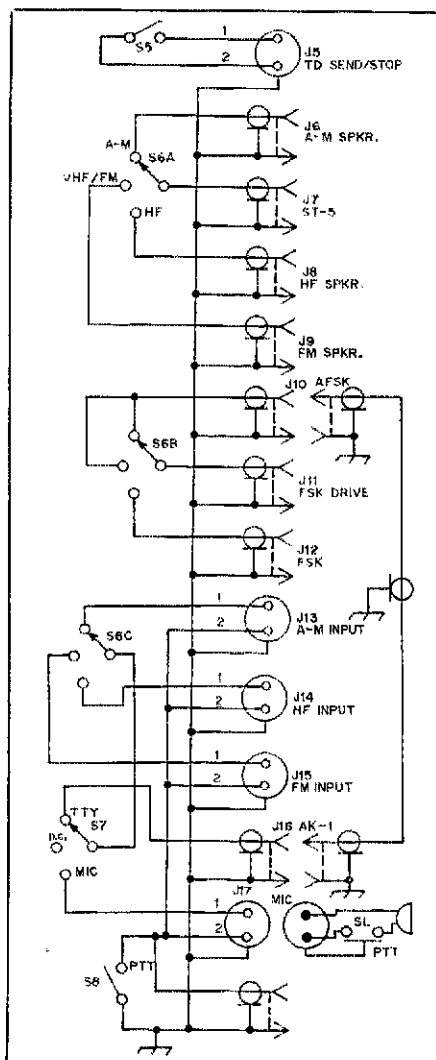


Fig. 1 - Schematic diagram for the audio distribution and transmit/receive control. Suggested connector and switch part numbers and manufacturers are given in the text.

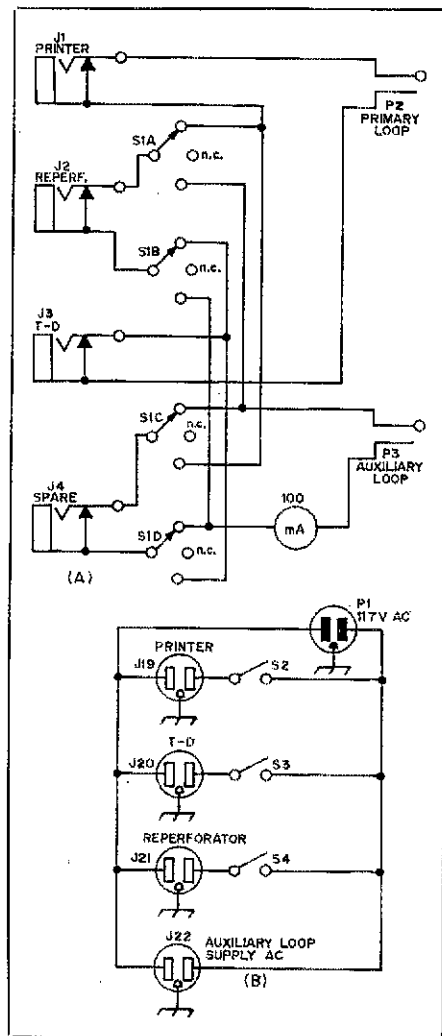


Fig. 2 - At A is the schematic diagram of loop supply distribution and at B, 117 V-ac power-switching scheme. When wiring a circuit for 117-V connections, a 3-wire plug with a ground is recommended.

*161 Shorecliff Dr., Rochester, NY 14612



Front view of the control box (top) with location of switches and loop-current meter. Back-panel view (bottom) gives an indication of the various types of connectors available for interconnecting the station accessories.

original unit that came with the page printer. An outlet on the rear apron of the ST-5/AK-1 housing provides 117-V ac for the control box. Shielded interconnecting cables transfer control of functions to this accessory.

Construction

A study of the schematic diagrams and illustrations will clarify construction and interconnection of the control unit with other equipment. J1 through J4 are closed-circuit phone jacks insu-

lated from the chassis. I used two pairs from a Teletype test set. J5, J13 through J15, and J17 are two-pin microphone connectors (Amphenol 80-PC2F). J6 through J12 and J16 are RCA phono jacks. J19 through J22 are 3-wire ac receptacles (Arrow-Hart 5284).

S1 and S6 are 4-pole, 3-position rotary switches (Lafayette 99F61566). Only 3 poles of S6 were used. S2 through S5 and S8 are spst toggle switches. I used a telephone lever switch for S8 to balance the appearance of S7,

which is another lever switch (surplus). P1 is a 3-wire ac cord and plug while P2 and P3 are single-circuit phone plugs. The meter (auxiliary loop-current monitor) is a 0- to 100-mA dc unit (Lafayette 99F50890). The box is a 15 X 6 X 3-inch chassis. You may wish to use different types of connectors at J5, J13 through J15, and J17 to avoid confusion in making connections. Almost any type of switch may be used at S7 and S8. I used what I found in the "junkie" box.

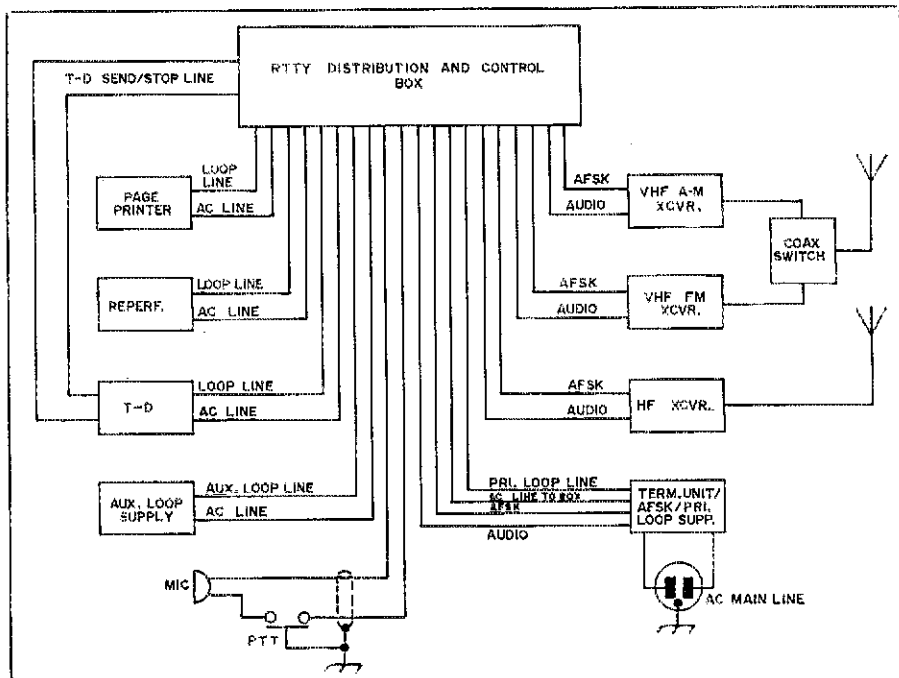


Fig. 3 — Overall block diagram of the RTTY station showing connections of the various equipment to the control box.

Strays



Four generations of ham! Great-grandmother Osier, KØPOF, who will be 93 in May, keeps daily schedules with her family of amateurs. Standing, left to right, are grandsons, Ed, ex-KNØLMM and Jerry, WBØOSK, with son Frank, WØCPC. Seated are great-grandmother Mina Osier; Beverly, WØWDC (XYL of WØCPC); and great-grandson David, WBØOTQ. Another great-grandson and his wife are preparing for their Novices, too!



This is another "pretty" example to prove that chivalry and 2-meter fm are alive and well. Miss Vermont, Suzanne Wind, was to present an award during the 1976 Veterans Day Ceremonies at the White River Junction, VT, V.A. hospital but her car was disabled en route. The V.A. Amateur Radio Club station, WA1WMJ, contacted Gordy, W1RNZ, via the Mt. Ascutney repeater. Shortly thereafter, Miss Vermont was whisked to the ceremonies where she was able to participate fully in the day's activities.

Solid-State BC-221 Frequency Meter

Modernize that fine old BC-221 of yours with FETs and a 9-volt battery! These complete instructions show you how.†

By R. S. N. Rau,* VU2CX

The tubes used in the BC-221 frequency meters long ago became obsolete and are now difficult to obtain — especially the older non-octal types — and as all models of the meter have excellent accuracy it would be a pity if the instruments have to be junked for want of tubes. However, with very little effort these instruments may be modernized with FETs, with no sacrifice of accuracy, by changing and adding a few components. In the author's model no recalibration was required, and the instrument now operates from a small 9-V battery.

Modifications

The only description of replacing tubes with FETs in the BC-221 known to the author is by Charles Landhal (73 *Magazine*, May, 1971, p. 61), and using this as a guide, he has modified his BC-221-1. The modifications given below specially concern this model, particularly regarding part numbers and base diagrams. However, all BC-221s and LM counterparts are basically similar and hence the modifications apply to most, if not all models.

The three tubes used are replaced by four N-channel JFETs, type 2N3819, but BFW10 or BFW11 may also be used. The only new components required in addition to the FETs are three octal plugs, five resistors, one capacitor and a 9-V transistor radio battery.

The tube used for the VFO is a VT116-B (6SJ7-Y), which is replaced by the N-channel JFET, Q1 (2N3819), mounted inside an octal plug as shown in Figs. 1A and B. Fig. 1C shows the modifications to the anode load resistor

of 56 k Ω (part no. 19). The value of R1 will depend on the particular sample of the FET used and ranges from 1 to 6800 Ω .

Mixer and Crystal Oscillator

The tube used for the mixer-oscillator is a VT167 (6K8), which is replaced by two 2N3819 JFETs, Q2 and Q3, one for the mixer and the other for the crystal oscillator. Fig. 2 shows the necessary connections. The two FETs, together with the associated components R2, R3 and C1, are mounted inside the octal plug. R2 and R3 may need some experimentation in the vicinity of the values given (6800 Ω and 3300 Ω , respectively).

It is important to note that the original leads going to pin numbers 2, 7 (heater) and 4 (screen grid) should be cut and insulated. The top-cap clip of the mixer valve should be connected to pin 4.

A short stiff wire of appropriate length is soldered to pin 4 and the other end of the wire is soldered to a small grid cap obtained from a defunct tube. The lead bearing the clip formerly going to the top cap of the mixer tube now goes to the new cap.

Beat-Frequency Amplifier

The tube for this is a VT116 (6SJ7), generally connected as a triode in all models using this tube. This again is replaced by a 2N3819 FET (Q4) mounted and connected inside an octal plug exactly as in the case of Q1 (Fig.

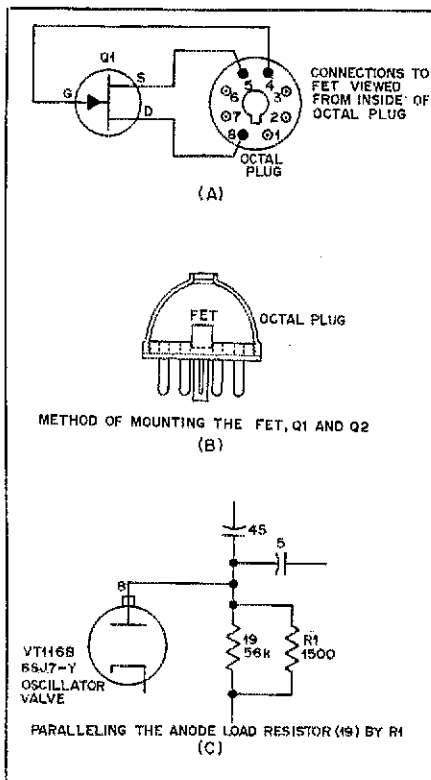


Fig. 1 — Modifications to the VFO circuit.

†Adapted from *Radio Comm.*, Aug., 1976.

*41/2 VI Main Road, Bangalore 560 003, India

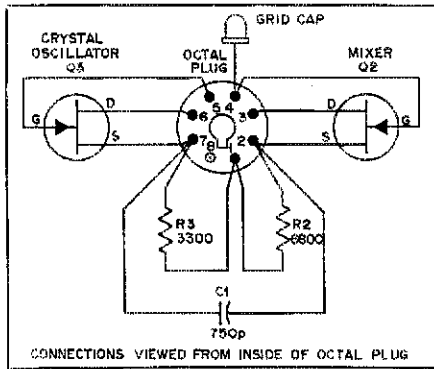


Fig. 2 — Modifications to the mixer and crystal-oscillator circuit.

1A and B). Parallel the 15-k Ω anode load resistor (part no. 24-2) by a 4.7- Ω , 1/4-watt resistor. Remove the original

300- Ω cathode resistor (part no. 41) and replace with one that gives a source current of approximately 1 mA; typically this is in the range 1000 Ω to 3300 Ω .

The power supply is shown in Fig. 3 and is self explanatory. A small 9-V transistor radio battery fastened by a clip to the side of the instrument now powers it. The total current drain is approximately 3 mA, which assures almost shelf life for the battery. The instrument can also be operated from the mains via a filtered low-voltage dc supply stabilized by a 9-V Zener diode.

Performance

All the checkpoints listed in the calibration book for low and high ranges could be clearly located and brought to settings noted in the book using the

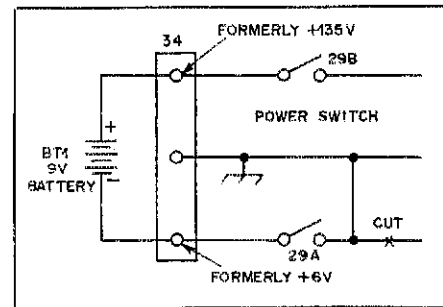


Fig. 3 — Battery connections.

corrector. No recalibration was found to be necessary. The beats were sufficiently loud, although not as loud as the tube version. From the instant of switching on, there was practically no drift.

Strays

NEW POST FOR W3ASK

□ George Jacobs, W3ASK, chief of the Voice of America's Frequency Division for the past 23 years, moved into the newly created post of Director of Research and Engineering at the Board for International Broadcasting, effective November 21, 1976. The five-person board is appointed by the president; it supervises grants of money from Congress to Radio Free Europe and Radio Liberty, and oversees their operations.

At Voice of America George had played a leading role in the development

of VOA's present worldwide broadcasting system. His new job will entail research, scientific, engineering and regulatory aspects of broadcasting and telecommunications, and their relationship with political considerations that often influence international broadcasting.

George is well-known to the amateur fraternity as a propagation expert, having been the propagation columnist for *CQ Magazine* for many years. He holds a BSEE degree from Pratt Institute, MSEE from the University of Maryland, and is a Fellow of the Institute of Electrical and Electronics Engineers.

□ Here's an idea for a club outing — hold a QRP competition like the Denton County (TX) Radio Club did on one Saturday in October. Each entrant's basic goal was to make a single contact during a 20-minute period while using a club-provided receiver, dc supply and antenna. The judges based their scoring on a miles-per-watt figure with a 500-milliwatt maximum input power limit. Though no other design criteria was specified, all five entries were of the Tuna-Tin 2 style (*QST*, May, 1976).

Band conditions prevented any contacts outside of Denton, so the main prize went to Jack Deines, WB5MST. He had the strongest across-town signal. All who built the rigs had good luck and fun on QRP, many for the first time.



Participating in the Denton County Amateur Radio Club QRP contest were (left to right) WB5MST, W5SAN, WB5RQZ, W5FXQ and WB5WDS. (Larry Reese photo)



Fred Stevens, WA5LIE, really tries to dig one out of the band. Below the bug and alongside the HW-101 is the Tuna-Tin 2 transmitter. (Larry Reese photo)

Build This Solid-State PA for 440 MHz

Is your uhf signal suffering the doldrums of power-output lassitude? The tonic effect of this compact unit will stir up a 15-watt breeze to push it along.

By Rick Olsen,* WA7CNP

Whether the application is by a person using a hand-held transceiver as a mobile rig or by an experimenter building a repeater with HT-200 boards, a medium-power amplifier would come in quite handy for increasing the effective range of his station. This article describes a compact, inexpensive, 10-dB gain power amplifier which is simple enough for nearly any experimenter to build.

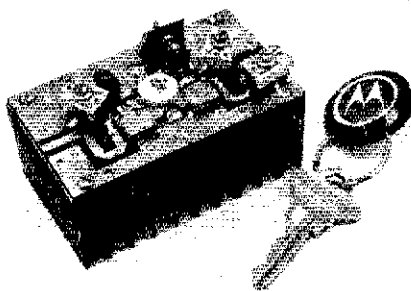
Circuit Analysis

The circuit employed is essentially a basic narrow-band amplifier capable of being tuned over a broad range of frequencies — 430 to 450 MHz. Input-match and collector-load transformations are accomplished by using multiple L sections comprised of 50-ohm microstrip-line and mica-compression variable capacitors. The active device is the Motorola MRF618 — an internally matched, 12.5-volt, controlled- Q transistor designed for application from 420-512 MHz. Fig. 1 shows a simple schematic diagram illustrating the internal-matching components on the base side of the MRF618.

Construction

The amplifier is built on double-sided G10 glass-epoxy board. Fig. 2 is a 1:1 drawing of the board layout. Care should be taken in etching to maintain the line width of the microstrip at 0.110 inch for a Z_0 of 50 ohms.

After the board has been etched, the first step is to cut the hole in the board



This close-up view of the amplifier helps to show the relative placement of the parts. Note that the transistor emitter leads are soldered to the top of the Unelco capacitor cases.

for the transistor heat sink (flange). The transistor flange can be used as a stencil for laying out the hole. When the hole

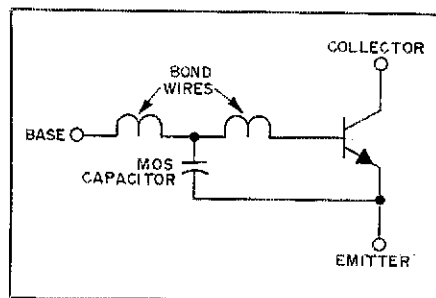


Fig. 1 — Controlled- Q transistors have internal-matching configurations that make it somewhat easier to design circuits for them. In the MRF618 this matching is accomplished in part by the bonding wires and the built-in MOS capacitor.

has been formed, the next thing is to ensure that a good rf path is continuous from the ground plane on one side to

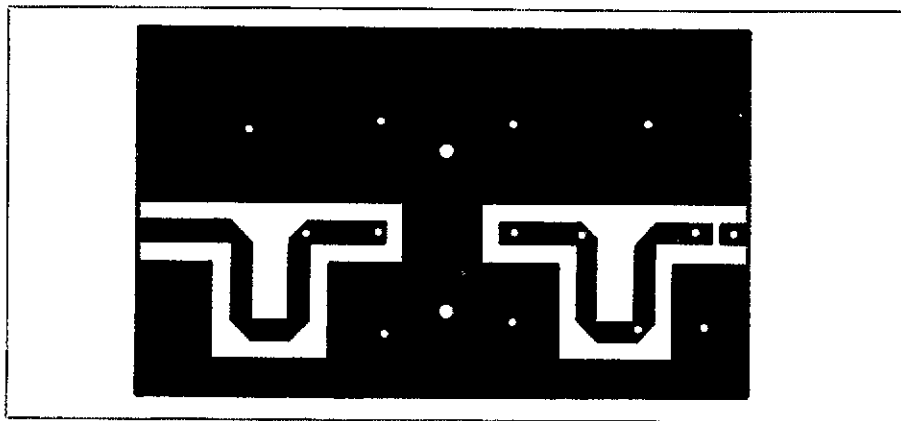


Fig. 2 — This scale drawing of the pc-board layout can be used to make a pattern for etching the board. The width of the strip-line inductors should be held very closely to 0.112 inch for best match between the transistor and 50 ohms. Material is double-sided G10 (glass-epoxy) board.

*Department 11, Cubic Corp., 9233 Balboa Ave., San Diego, CA 92123

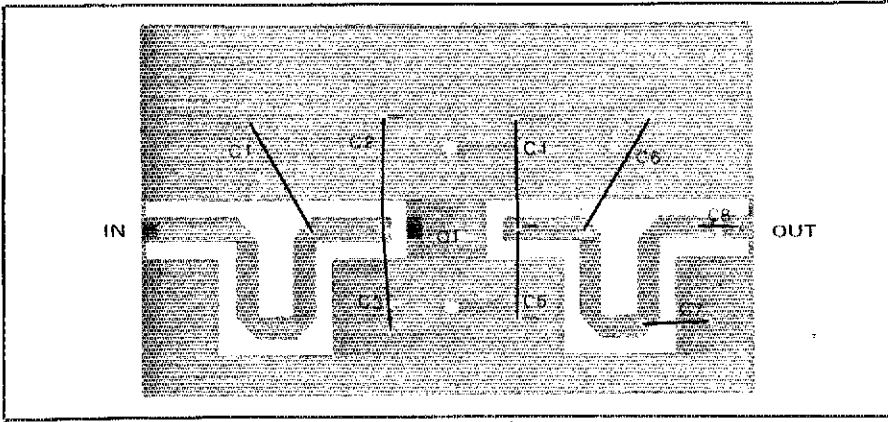


Fig. 3 — A parts-placement guide for the amplifier board. Be sure to provide rf-connecting paths between the top and bottom ground surfaces, as explained in the text.

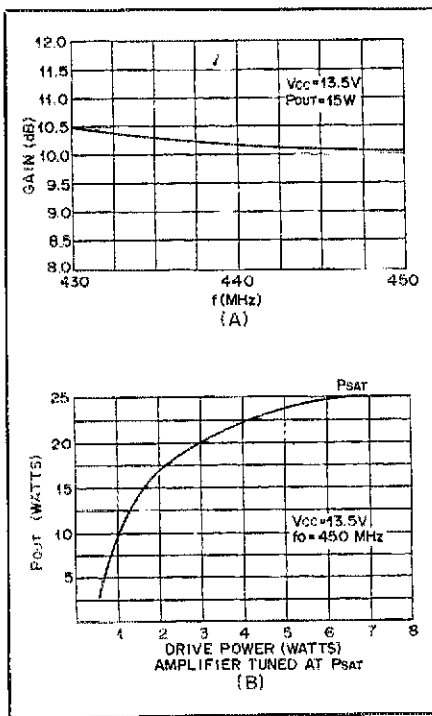


Fig. 4 — These gain and output-power graphs show what performance can be expected from an amplifier utilizing the MRF618.

that on the other. I prefer to make such connections with copper or brass eyelets crimped and soldered to both sides of the board. If no eyelets are available, these connections may be made by drilling a No. 50 hole through the board, inserting a piece of No. 18 wire through the hole, and soldering and trimming both sides flush with the board. Be sure that there is one such connection made under each Unelco capacitor and alongside the microstrip line and dc feed point.

Next, the Unelco capacitors are mounted as closely to the transistor package as possible, and at the same time they double as mounting surfaces

for the transistor emitter leads. Connections to the input and output lines may be made with 2- to 5-mil copper strap or foil.

The transistor can be mounted at this time. The holes in the transistor flange are made to clear No. 4-40 screws. Drill and tap two No. 42 holes in the heat sink, using the flange as a drill guide. Next, clean the heat sink and bottom of the transistor flange so that foreign matter will not prevent the transistor from seating properly on the heat sink. Apply a very small amount of thermal compound to the flange and bolt it firmly to the heat sink. The transistor leads may then be soldered to the circuit.

The base-return choke and dc collector-feed circuit may now be put into place. C10 may easily be installed by

drilling a 0.192-inch hole in a small copper strap (0.02-inch thick) and then putting a right-angle bend in the strap so that the capacitor can be mounted upright above the board. Be sure to make the base return and dc-feed connections as close to the transistor package as possible.

Now comes the remaining tuning elements and output dc-isolation capacitor. Fig. 3 shows the mounting position. Care should be taken to solder the ground tabs of the trimmers to the ground plane to reduce the amount of lead inductance inherent in these capacitors at uhf. C8 should be mounted after cutting a small break in the output line near the end. This capacitor need not be a 0.018- μ F chip, but care should be taken in choosing a substitute that will not grossly effect the output load characteristic of the circuit (see parts list). Depending upon your application, any 50-ohm outside-world connection may be used, ranging from a piece of coax to RCA phono plugs.

Tune-up

Tuning is simple: Apply low power (about 3/4 watt) to the input and tune the input capacitor until a small amount of collector current begins to flow. Then tune the output capacitors for peak output. Switch back and forth between input and output, and tune until the desired operating conditions are achieved. Fig. 4 shows examples of typical data taken in the lab. You will find that operating frequencies greater than 1 MHz away from the tune-up frequency can be used without the necessity of further adjustment. Q37

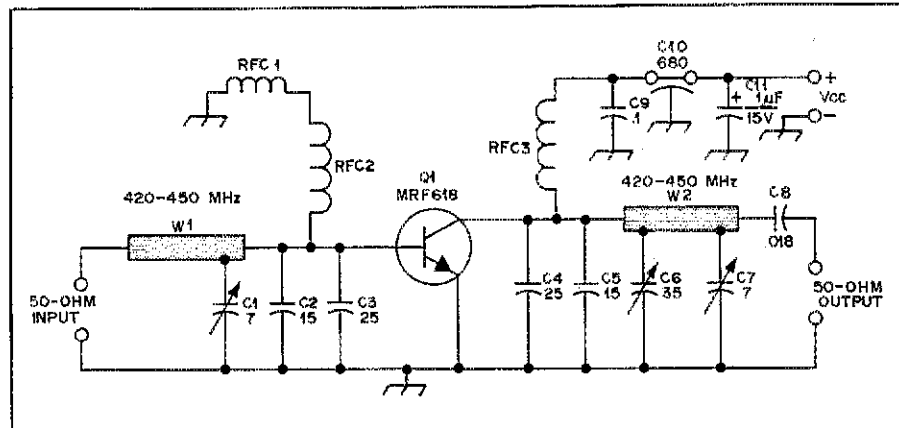


Fig. 5 — Schematic diagram of the 15-watt amplifier.

- C1, C7 — 0.9- to 7-pF mica compression trimmer, ARCO 400.
- C2, C5 — Unelco 15-pF mica.
- C3, C4 — Unelco 25-pF mica.
- C6 — 3- to 35-pF mica compression trimmer, ARCO 403.
- C8 — 0.018- μ F chip capacitor, ATC or equiv. (a 250-pF Unelco mica or a 0.001- μ F Erie Redcap may work as a substitute).

- C9 — 0.1- μ F disk ceramic.
- C10 — 680-pF feedthrough capacitor.
- C11 — 1- μ F, 15-V tantalum.
- L1, L4 — 50-ohm microstrip line, 2.3-inches long, 0.112-inch wide.
- RFC1 — Ferrite bead on cold lead of L2.
- RFC2 — 8 turns No. 22 enam., 1/8-inch ID, close wound.
- RFC3 — 4 turns No. 22 enam., 1/4-inch ID, close wound.

Technical Correspondence

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

THE BOBTAIL CURTAIN ARRAY

I've been searching the literature for information about a fascinating antenna system, the bobtail curtain. There isn't much to be found. Construction information appears in *The ARRL Antenna Book*¹ and in *The Radio Handbook*,² and an article by VE1TG on this antenna appears in *Ham Radio*.³ But each of these references is meager on the theoretical aspects of the array.

Correspondence with the editor of *The ARRL Antenna Book* and discussions with Wes Hayward, W7ZOI, finally enabled me to get my head turned around in phase with the appropriate currents. Basically the antenna performs as three in-phase top-fed vertical radiators approximately 1/4 wavelength in height and spaced approximately a half wavelength. Thus, the antenna is a broadside array. If one assumes equal currents in each vertical section or element (1:1:1), the calculated pattern is propeller shaped, but with significant sidelobes off the ends of the array. But because of the feed arrangement (only the center element is fed directly), the current in the center element must be divided between the end sections, yielding a current ratio of 1:2:1 (disregarding radiation). The significance of the 1:2:1 ratio becomes apparent when plotted. See Fig. 1. The sidelobes completely disappear.

Note that the discussion refers to in-phase elements spaced 180°, although the published dimensions place them slightly closer and slightly out of phase. Apparently the inventor of the "bobtail" modified the dimensions so that the real antenna would show the charac-

¹ Footnotes appear on page 40.

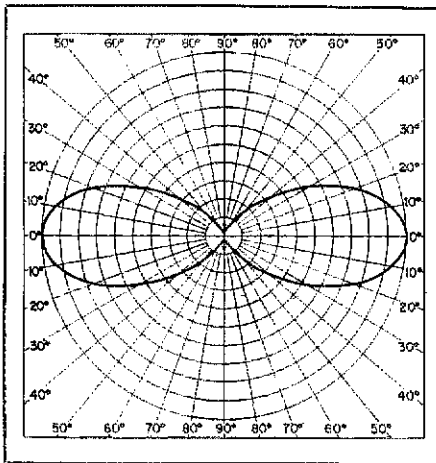


Fig. 1 — Theoretical horizontal radiation pattern of the bobtail curtain array. The arrow shows the direction of the antenna axis. The three broadside elements are assumed to be spaced 180° apart and fed in phase with a current ratio of 1:2:1. Theoretical gain is 4.9 dB over a single vertical element.

teristics of three in-phase elements at 180° spacing. — Roy W. Lewallen, W7KJF, 5470 S.W. 152nd, Beaverton, OR 97005.

ELIMINATE 215 DIODES IN THE CODE BOX

Since the Code Box described in September 1976 *QST* seems likely to become popular, I would like to suggest modifications which will save some 250 diodes. By using dpst switches and redesigning the matrix, only 35 diodes are necessary to generate the letters and numbers, with a few more for punctuation. See Fig. 2. This should reduce the cost and will certainly reduce assembly time.

The Morse code for every character may be analyzed as a string of dot-length time intervals. The odd-numbered intervals are always on, either as dots or as one end of a dash. The even-numbered intervals are off for spaces or on for dash centers. Instead of connecting the odd outputs through diodes to each of the matrix rows, connect them directly to the U4D input. Then the diode matrix need only generate the middles of the

dashes. A 0 is generated by joining the 0 row of the matrix to columns 2, 6, 10, 14 and 18 by diodes.

We need a method of stopping the dots when the letter is finished. The end can be signaled by connecting the even column after the last desired odd one through the second half of the dpst switch to the input of U3B (point A). For the 0 this would be column 20.

Now another simplification appears. To generate the letter O we need only cut off the 0 prematurely. Join the left side of the O switch to the 0 row of the matrix, and the right side to column 12. The same row of diodes can also be used for M and T by connecting the right sides of their switches to columns 8 and 4 respectively. Other combinations which can share diode rows are (7, Z, G), (6, B, D, N), (3, V), (2, U), (1, J, W, A), (C, K) and (L, R). The characters S, H, S, I and E need no diodes at all. Finally, if a row is connected to only one column (only one dash in the code), the connection may be direct rather than through a diode. This applies for 6, 4, L and F. — J. B. Rowbotham, VE4X, Box 2348, The Pas, MB, R9A 1M1.

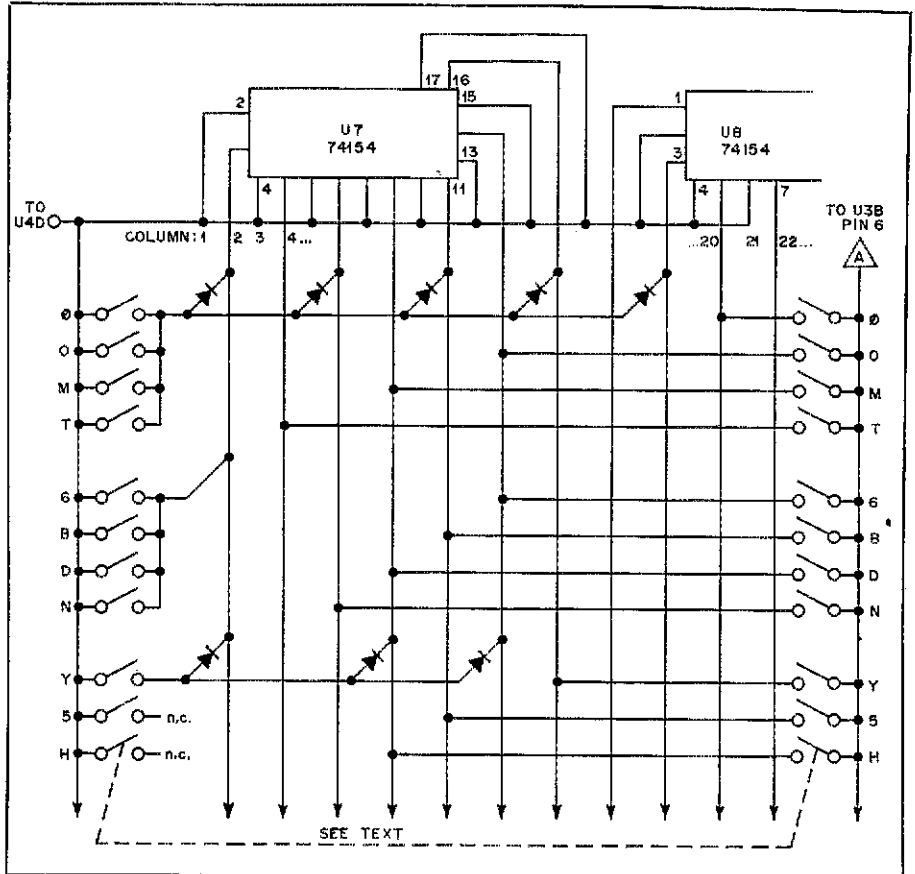


Fig. 2 — A modified matrix for the Code Box described in September 1976 *QST* (McMullen). Only 35 diodes are required to generate all letters and numerals if the odd-numbered timer outputs are connected directly to the oscillator section and if double-pole single-throw switches are used to vary the reset time.

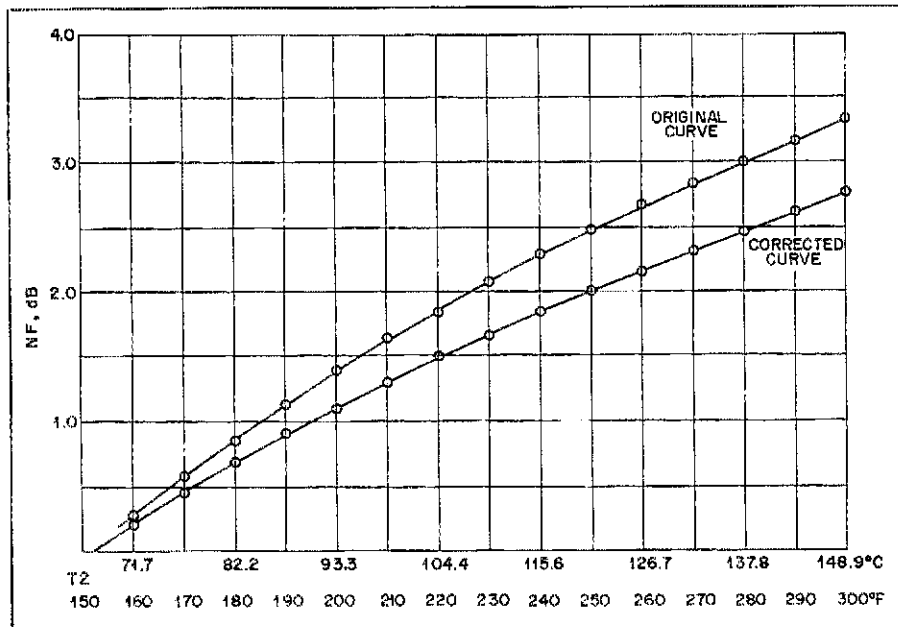


Fig. 3 — Noise figure vs. "hot" resistor temperature, T_2 . The "original curve" is that published in *QST* for September 1976, shown with the corrected curve. The T_2 axis represents the temperature of the resistor. Curves are calculated based on a value for T_1 of 0°F (-17.8°C).

HOT- AND COLD-RESISTOR NOISE SOURCES

I would like to call your attention to a fairly serious error in the article, "Hot and Cold Resistors as UHF Noise Sources."⁴ The tip-off is in the calculation of the cold load noise temperature on page 34, which is greater than 290°K , although the load and transmission line are all less than 290°K . If this were correct, one could attach a 290°K load to the output of the "cold" load and there would be a net transfer of power from the cold load to the hot, in violation of (among other things) the second law of thermodynamics. The error is in the formula at the top of the second column on p. 34. This is a misuse of the relation for the equivalent noise input temperature, not output temperature, of a two port. The formula should be

$$T_1 = \frac{T_{r1}}{L_2} + \frac{[L_2 - 1] T_{L2}}{L_2}$$

L_2 is the loss (1/gain) of the line outside the oven or freezer, T_{L2} is its temperature ($^\circ\text{K}$), and T_{r1} is the temperature of the line and load inside the oven or freezer. T_e , is not present in the equation because the temperature of L_1 is the same as that of the load, so the line may be considered part of the load.

I would like to make note of some cautions about the method. One must be quite certain that the response characteristic of the detector used ahead of the VTVM is linear in dc output volts vs. rf input volts. At low levels, most diode detectors exhibit more of a square-law than a linear response. It is hard to circumvent this problem by calibrating the receiver with attenuators, because the receiver must be calibrated at the same detector input level as that at which noise measurements are made. The signal level will then be approximately the same as the noise level, and because of the additive noise, a 1-dB change in input level will not give a 1-dB

change in output voltage even if the detector is linear. The best way around this problem is to apply the calibration signal directly to the receiver i-f input after disconnecting the uhf front end; in a well-designed receiver, this will eliminate the major noise source, and calibration can be made at the desired level with a good SNR at the detector.

It is also very important that the VSWR of the hot and cold loads be good. A poor VSWR will not only reduce the noise power coupled into the receiver input, but noise radiated from the receiver input (which usually has no relationship to the receiver noise temperature) will be reflected back into the amplifier. Consequently, I recommend using commercial microwave terminations instead of carbon resistors. These are available surplus and at hamfests for less than \$10 each. If resistors are used, they must be mounted with great care to assure good VSWR.

It is usually difficult to determine the noise temperature of a long, lossy transmission line because the temperature is not constant along its length. Moreover, the loss changes with frequency so it is necessary to recalculate the load for each band. It is best to minimize this loss by keeping the line from the load to the receiver as short as possible. — Steve Maas, K3WJQ, National Radio Astronomy Observatory, P. O. Box O, Socorro, NM 87801

I have been corresponding with Steve Maas regarding the error in my *QST* article on noise-figure measurements for low-noise amplifiers.⁴ We are in complete agreement on the corrected curve for noise-figure vs. temperature. See Fig. 3.

My primary interest in writing that article was to provide information to those amateurs that may not have the most elaborate test equipment at hand for making accurate noise-figure measurements, but somehow the error slipped through. I'm glad Steve went to the trouble to check my work, since amateurs

and others should be supplied with the most accurate data available. — Ben Lowe, K4VOW/WASUVM, 818 Mountain Gap Ct., Huntsville, AL 35803

THE DVM/FREQ. COUNTER REVISITED

I followed the series, "Learning to Work with Integrated Circuits" with great interest ever since the first installment and have built up the voltmeter/freqmeter which works fine.⁵ I see that the authors recommend using no socket for the 74H04 IC. Let me tell you about my experiences with the 74H04. In the HUA type of input circuit I built I used Molex pin sockets and the instability of the circuit nearly drove me crazy. After trying everything I could think of to cool it down I removed the pin sockets and mounted the IC directly on the circuit board. Lo and behold, everything worked beautifully and has ever since. I do not recommend using sockets for this IC either; 7404s (plain) don't seem to be so critical — Don Hanna, VE2CD, RR 2, Mansonville, PQ JOE 1X0

Having completed the DVM project (with the usual problems of getting some parts here in Europe) I'd like to let you know that I'm very pleased with its performance. Here are some facts which I'd like to pass along.

a) For the voltage-divider network (Fig. 26, *QST* for July) I selected only 1 percent tolerance resistors; some combinations had to be made, e. g., for $9.1\text{ M}\Omega$ I used $9\text{ M}\Omega$ and $0.1\text{ M}\Omega$, and so on. It really pays off to select those resistors very carefully. To do the job, I borrowed a precision ohmmeter and hand-picked the correct values.

b) For stability reasons I tried several $0.022\text{-}\mu\text{F}$ capacitors (pin 7 of U22, the 566). Some drifted more than others.

c) Final values for $R_2 = 2210\ \Omega$ (1 percent), and $R_3 = 96.2\text{ k}\Omega$ (1 percent). It took me a long time to get the correct values during calibration.

d) *One more important point:* Even with the correct voltages and proper operation of the voltage-to-frequency converter, I couldn't calibrate the DVM to get an acceptable linearity. After checking the board again with all my available instruments, I replaced the MPF102 and all my troubles were solved. This means even with all voltages within limits, linearity can be poor and it is recommended to select another MPF102!

e) With all the above-mentioned measurements, I arrived at an accuracy of better than ± 0.05 volt on the 10-V range, checked against an industrial precision DVM. Checking voltages with my old instruments is really guesswork!! — Hans Nafziger, HB9AQZ, Obstgartenstr. 6, CH-8302 Kloten, Switzerland.

Footnotes

- ¹ *The ARRL Antenna Book*, 13th edition, p. 300.
- ² *The Radio Handbook*, Editors and Engineers, Santa Barbara, CA.
- ³ Cousins, "A 40-Meter Bobtail Curtain Array," *Ham Radio*, July, 1969.
- ⁴ Lowe, "Hot and Cold Resistors as UHF Noise Sources," *QST*, September, 1976.
- ⁵ Hall and Watts, "Learning to Work with Integrated Circuits," *QST*, January through July and October, 1976.

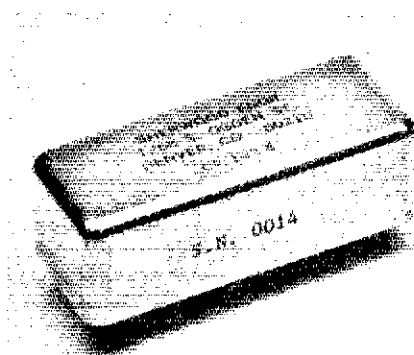
Product Review

Sherwood Engineering Crystal Filter

A filter with razor-sharp bandwidth is now available from Sherwood Engineering. This filter may be plugged directly into any Drake R-4C receiver to produce a very high degree of selectivity for cw reception. The model CF-125/8 is an eight-pole crystal filter having a rated bandwidth of 125 Hz at -6 dB and 325 Hz at -60 dB.

The limiting factor in a system using a CF-125/8 installed in an R-4C receiver is not the skirt characteristics of the filter, but the leakage around the filter system in the receiver itself. There is no question in this writer's mind that the filter far exceeds the capability of the receiver. This was determined by some adjustment of the wiring within the R-4C itself around the filter sockets and from the filter selector switch to the various points in the receiver circuit. The amateur should be aware, however, that changes to the receiver itself could void any warranty and under no circumstances should even be considered by anyone not having highly developed skills in this type of work.

In actual operation, the CF-125/8 should be used in conjunction with at least one of the other Drake filters for cw operation. The CF-125/8 is not a device used for normal operation but only for extreme conditions of interference, such as is found at the low end of the 40-meter cw band during a DX contest. Tuning becomes quite critical with the sharp filter, and the station being received must be



stable in its transmitted frequency. Drifting or chirpy signals are almost impossible to copy with the CF-125/8 filter. It is sometimes easier to tune a signal with the passband tuner control than with the frequency tuning dial! For the amateur using the C-Line system from Drake, a CF-125/8 adds about the sharpest selectivity one can use. It should be pointed out, however, that it is not adaptable to the earlier R-4B series of receivers and will not be directly usable with any other manufacturer's equipment. Unless that equipment has an i-f system identical to that of the R-4C.

In addition to the CF-125/8 sharp cw filter, which electrically connects at the output of the second i-f stage in the R-4C,

Sherwood also manufactures a six-pole cw filter with a 600-Hz selectivity characteristic for use at the first i-f point in the Drake R-4C receiver. The unit, designated the CF-600, is interchangeable with the existing 8-kHz filter supplied with the receiver from the factory. It is not a plug-in device, however, and some soldering is necessary. The transfer is relatively simple and takes about 15 minutes. The amateur must keep in mind that once the changeover to a CF-600 is accomplished, the receiver is no longer usable for ssb or a-m operation. The primary function of the CF-600 is to add some selectivity ahead of the second mixer, which reduces the susceptibility to receiver cross-modulation problems created by strong local signals. It also enhances the operation of the other cw filters (at the second i-f) by placing a selective element *ahead* of the normal cw filters and their associated wiring. For cw operation, whether the operator uses the 500 Hz, 250 Hz, or the Sherwood 125-Hz filter, the CF-600 is a valuable aid to improved receiver performance. Those high-pitched signals a kilohertz or two off of the operating frequency are no longer audible (even though quite weak); they are nonexistent!

At the time of this writing, the filters are in the price class of \$75 for the CF-600 and \$125 for the CF-125/8 and they are available from Sherwood Engineering, 1268 South Ogden St., Denver, CO 80210. - *W1FBY*

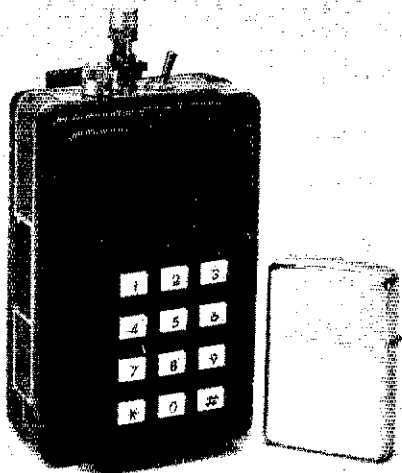
PIPO COMMUNICATIONS PP-1 AND PP-2 TONE ENCODERS

The mention of the letters vhf brings to mind a different concept of the 30- to 300-MHz frequency range today than it did five years or so ago. Vhf as it is used today to many amateurs means *vhf fm* or more correctly, 2-meter fm. And along with 2-meter fm comes a new feature for amateurs, the automatic phonepatch; autopatch is its more common name. Autopatch is a system which uses the Bell System Touch-Tone two-tone encode/decode method for dialing telephone numbers.

Pipo Communications offers a slim profile tone encoder which is Bell System compatible, small, is easy to install, and is especially suited for installation on many of the 2-meter fm hand-held transceivers available on the market these days. Snap-action switches are used for keying the encoder to help eliminate false encoding resulting from intermittent switch contacts. Output level adjustment is easily accessible from the front (top?) of the pad housing. The Mostek type 5086 IC is used as the heart of the encoder. Oscillator circuitry is crystal controlled more for maximum frequency accuracy and all components used in the tone generation

circuit are to military specifications.

Overall size of the two units is as follows: PP-1 - 0.375 (9.53 mm) x 2 (50.8 mm) x 2.65 inches (67.31 mm); PP-2 - 0.375 (9.53 mm) x 2.5 (63.5 mm) x 2.65 inches (67.31



mm). At the time of this writing, the units are priced at \$55 (PP-1) and \$58 (PP-2). For further information write Pipo Communications, P. O. Box 3435, Hollywood, CA 90028. - *WA6GVC*

SOLID STATE SALES' CCD CAMERA KIT

This camera sure is different! No long image tube. In fact, no tubes at all, of *any* kind. This camera uses a new solid-state device known as a charge-coupled display



(CCD). The image array of the CCD is arranged in a 100 x 100 matrix and produces an EIA compatible video signal. The light-detection bandwidth of the CCD begins in the invisible, infrared region and goes through the visible wavelengths of light. The output from

the camera is easily converted to digital information for use as an SSTV or computer image identification video source.

The camera kit includes all of the ICs necessary for a complete system. However, one will have to find his own enclosure and a suitable

lens for use with the camera, since none is supplied with the kit. Price for the kit at the time of this review is \$225. Further information on the camera kit is available from Solid State Sales, 139-145 Hampshire St., Cambridge, MA 02139. — WA6GVC

Strays

□ What do you do with a fairgrounds after the fair is over and the people have all gone home? You choose one of the buildings and turn it into a club house. The Hall of Science Radio Club (NY) members' club house is in Flushing Meadows, Corona Park, in one of the buildings from the New York World's Fair of 1964-65. All of the club functions are held there. The building houses a museum, a laboratory, an auditorium, a club station, WB2JSM which is mainly a public exhibit, and all of the club's licensing classes. The auditorium is much needed when all 296-plus members gather to listen to a guest speaker. Last spring 1200 new hams graduated from the Hall of Science's Novice classes. For that many people, you *do* need a whole building!

□ Radio amateurs throughout the Buffalo area teamed up with the Salvation Army and radio station WKBW for the tenth annual 700 fund drive last December. People were asked to donate toys, clothing and cash to aid the 700 neediest families in western New York. The amateurs, members of the Buffalo Amateur Radio Repeater Association, used local 31/91 repeater WR2ABU and operated from mobile units all over Erie County to pick up donations from hundreds of people who could not get out to the drive's collection point at a local shopping center. Net control station was Carl, WA2OLW, who coordinated the efforts of approximately 35 amateurs over some 2000 miles of driving. — WB2LKO



Here's another amateur on the move. When he was fourteen Ted Rappaport, WB9QNB, became a Novice, and he received his General and Advanced tickets at the same age. Now at fifteen, he has his Extra Class and has set his goal for a First Class Radiotelephone license by the time he finishes high school. Ted's favorite pastime is to chase DX with his dipole farm, but he also enjoys high-speed code.

Feedback

□ In November, 1976, *QST*, page 22, the footnotes to the article titled "The Synthesizer" had their dates crossed. The footnotes should read: Rasmussen, "Tuning Control . . . *QST*, June, 1974, page 29. McMullen, "GLB Electronics . . . *QST*, October, 1973, page 42. Thanks to Ray Bass, W7YKN, for spotting those errors.

□ Thanks to the discerning eye of WA1KYU, we offer this correction to the "Coils for the Beginner" article in December, 1976, *QST*, page 24. The discussion about rf chokes having typical *Q* values of 50 to 75 is correct, but Murphy visited the copy room and inserted the word "ohms" in that sentence. The two terms are related, but do not belong together in that sentence.

□ A slant bar was omitted from the text on page 33 of December, 1976, *QST*. The expression $W = E^2 R$ should read $W = E^2 / R$.

□ The circuit-board pattern for Fig. 6, page 14, of January, 1977, *QST*, has an error. The circuit foil for pin 6 of U1 should not join the foil for pins 3 and 8 as shown. Pin 6 should join the 12-volt line where the incomplete jumper line is drawn. Also, WA0UZO reports that addition of a 270-ohm resistor between the upper right and lower left 12-volt input points caused an improvement in receiver performance. He added the resistor across the bottom of the pc board.



Passing the Novice code test!

STOLEN EQUIPMENT

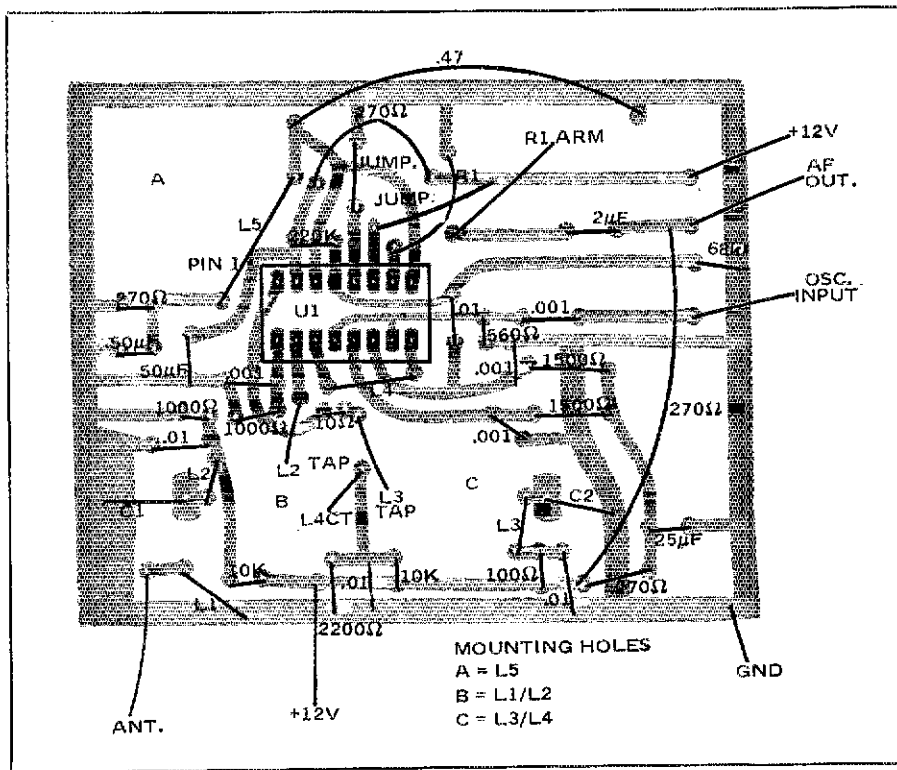
□ AVQ 384, Model 12, antenna; serial no. PN-805452. Contact Police Dept., Guilford, NC. Tel. 919-621-5724.

I would like to get in touch with . . .

□ amateurs involved in management of hospital clinical laboratories. David Littlewood, WB1AGG, 13 Green St., West Lebanon, NH 03784.

□ all amateurs who are dentists. We would like to meet at an International Dental Federation meeting in October. Dr. Ted Sparrow, VE3BQN, Suite 701, 1849 Yonge St., Toronto 7, ON.

Corrected circuit-board pattern for Part 1 of "Understanding Linear ICs."



Hints and Kinks

HINTS AND MORE HINTS

I've noticed quite a few hints on ways to keep one's hand key from moving about on the table. The best and least-expensive method I've found is to use loops of masking tape between the key base and the table. Two loops are formed with about two inches of masking tape. The top half of each loop is secured to the base of the key, and the key is then pressed down on the operating table. This method keeps the key firmly in place, yet it may be removed without leaving any gummy residue on the table.

I recently built a shelf for my operating table to hold all my equipment about six inches above the surface of the table. This permits me to store my hand key, bug and keyer in the space beneath the shelf. With the keyer under the shelf, I am no longer able to see the indicator knob for adjusting keyer speed. I cemented a small piece of plastic to the knob, to protrude above the edge of the knob. By locating the position of the plastic with my fingers, I am able to determine the setting of the speed control, and thus control keyer speed without looking at the knob. This might be a useful accessory for sightless hams.

I have always envied owners of transceivers equipped with "spinner" knobs on the VFO. After seeing the frequency control knob on the Heath SB-104, I considered purchasing such a knob from Heath. Instead, I found a button with a recessed center in my XYL's sewing box, and cemented it to the edge of the knob on my SB-102. The button was selected to provide a good fit to my fingertip, and also to match the color of my rig. I can now shift effortlessly from one end of the band to the other. — *Stu Levens, WB00GK*

ACCU-MEMORY KINK

While playing with my recently completed Accu-Memory, I discovered some interesting operational modes. The RESET buttons for message selection are normally inhibited while a message is being read from the memory. However, if a full word space (U7 times out, display has stopped) exists in the message being sent, and if any RESET button is held depressed, upon completion of the word space, the message ceases and the new message is initiated from its beginning.

Here is an example: Load memory 1 with one CQ, followed by one complete word space, the DE and another word space. Load memory 2 with your call, a full space, K, and another full space. You can now send CQ in any combination of the characters CQ and your call, and repeat in any combination, by using RESET switches 1 and 2 as follows: Press RESET 1 and hold it depressed. CQ will

continuously repeat. When the last desired CQ has started, release RESET 1. When the DE commences, depress and hold RESET 2. When the characters DE are completed, the keyer will continue to send your call. RESET 1 should be depressed if you wish to continue sending CQ, or do nothing, and the character K will be sent.

This feature could prove useful in any situation requiring a variable number of repeats, such as during contests, or in DX pileups. Load the other station's call and DE in one memory location, and your call followed by K in another. The combination is easily varied to suit changing conditions, and the technique will work with any sequence of memory selection. — *Steve Lawrence, WB6RSE*

ADJUSTABLE TEMPERATURE COMPENSATION FOR VFOs

While trying to stabilize a VFO with temperature compensating capacitors, I couldn't seem to find the correct value of capacitor. I connected a 100-pF air-variable capacitor in series with a 10-pF N750 temperature compensating capacitor. After a few tries, I found a setting of the variable capacitor that yielded the desired VFO stability. — *Philip J. Reich, W2HUG*

CORRECTING ERRATIC DIRECTION INDICATORS IN CDR ROTATORS

The resistance wire in the direction indicator potentiometer in CDR rotators is terminated at each end with a rivet. The connection between the wire and the rivet often corrodes, resulting in erratic indication, or no indication at all. My solution for the problem does not require the operator to remove the rotator. After determining which terminals on the control box connect to the ends of the potentiometer, I charged up an 80- μ F, 450-volt electrolytic capacitor and discharged it across the potentiometer. The brief, high current will actually weld the connection between the wire and the rivets, without damaging the potentiometer. In one case, the connection at one end was completely open when measured with an ohmmeter, but after one "shock treatment" normal operation was restored. — *Maryan W. Plaza, W9TMU*

A BETTER-LOOKING DIAL FOR THE HW-101

After owning my HW-101 for awhile, I grew tired of looking at the plain, harsh black-and-

white dial: I think it ruins the otherwise excellent appearance of the rig, subjectively speaking. I cut a 3-1/2 \times 1-3/4-inch piece of heavy, green plastic sheet, such as that used on report covers and overhead projectors, and taped it in place between the circular dial and the dial window. Another piece of green plastic sheet, 4 \times 2-inches in size, was fitted around the meter case and behind the panel: It may be necessary to loosen the meter case in order to facilitate slipping the plastic around it for a light-tight fit. When fastening the plastic behind the dial, be sure the plastic does not interfere with the operation of the dial drive.

These simple changes give a soft green glow to both the dial and the S-meter, and greatly enhance the appearance of the rig. When the HW-101 is turned off, the plastic sheet gives the dial a "blacked out" appearance. — *Jim Milburn, WB5BYK*

ADDED SWITCH FOR CONVENIENT OPERATION OF HM-102 WATTMETER

I recently purchased a Heath HM-102 wattmeter, and have noticed that it is easy to change the position of the sensitivity control when pulling out and pushing in the switch that selects forward and reverse indication. I replaced the original switch with a miniature spdt toggle switch. If the switch is centered on the panel just below the meter, it does not affect the appearance of the instrument. — *Robert Werner, W8BTD*

FASTER RELAY RESPONSE IN THE SB-401

I am a cw traffic handler, and was disturbed by the slow response of the VOX relay in my SB-401. I connected a 10-k Ω resistor in parallel with R135, the cathode resistor for V12B. VOX relay response is now much faster. — *Andrew Teetzel, WB8KVU*

DESK-N-PORT: THE MOBILER'S DESK

One disadvantage of working mobile is not having as much space in a car as is often needed. I wanted to be able to keep my log, equipment manuals and other papers in a compact unit which would provide a small writing desk as well. I used a thick, three-ring, loose-leaf binder, and punched all documents I wanted to carry to fit. Important papers, such as a band-allocation chart and DXCC

countries list, were plastic-laminated before punching. A large spring clip keeps the log firmly attached to the notebook cover. To carry pencils and QSL cards, a plastic, zippered pouch was found to be useful. — *Henry G. Campbell, Jr., WA4DLN*

SHOCK MOUNTING FOR MOBILE RIGS

A large percentage of mobile-equipment failures may be caused by vibration damage while in motion. Before installing my new mobile rig, I placed a rubber grommet over each mounting bolt, to act as a shock absorber. The grommets are installed so that they are compressed between the mounting bracket and the dashboard of the vehicle. — *Howard A. Johnson, WA8QBJ*

ANOTHER SOURCE OF EQUIPMENT FEET

A handy source of supply for equipment feet is the local automobile tire shop. It is general practice when mounting or changing tires, to replace the rubber valve stem. This is usually done by tearing the old valve out of the rim. The nub which held the valve in the rim is dropped on the floor. The limit to the number of feet that may be obtained is only how busy the tire shop is. — *WICW*

TOROIDAL COIL FORMS FROM PLASTIC TUBING

In situations where a low- Q toroidal inductor is desired, it is practical to cut a section of plastic tubing for use as a coil form. Acrylic and polystyrene tubing are better than nylon or vinyl, due to the high rf losses of the latter two. I found that 3/4-inch diameter tubing, cut to a height of 1/4-inch and wound with No. 20 wire, yielded coils with a Q of 40 to 50 for a 2- to 5- μ H inductor. Some plastic supply houses may give away small scraps of tubing. — *Don Lawson, WB9CYY*

ANOTHER SEALANT FOR ANTENNAS

There are many kinds of weatherproofing material available for sealing antenna connections and coaxial-cable fittings against moisture and corrosion-causing substances. Some of the compounds are messy to work with and result in an unsightly mess once they are applied.

During some recent experiments with various sealants, the writer tried a tube of Dupont No. 6111N clear windshield sealer. A 1-3/4-ounce tube was purchased for less than a dollar in the automotive department of a nearby variety store. The substance was applied to a 450-MHz Cushcraft 4-pole antenna to provide a protective coating over the mounting bolts and nuts (to prevent rusting),

and over each of the gamma-rod joints to insure against corrosion. Finally, each of the coaxial connectors on the antenna were doped with the compound to keep moisture from entering them.

The result was excellent. After the sealant dried it was completely invisible, yet provided a thin, durable coating over the protected parts. The life span of the 6111N material should be similar to that of other compounds designed for outdoor use. — *WIFB*

A CLOTHESLINE-SUPPORTED ANTENNA

Some of the old gang wanted to reactivate a Sunday morning roundtable on 75 meters, but a problem immediately became apparent. A dipole used for the purpose had long since met its demise during a New England ice storm and its successor hadn't fared much better. While the remains of the latter antenna worked on 75, performance was inadequate.

The alternative seemed to be climbing up on an icy roof to install something better, but this prospect was not met with much enthusiasm. However, a clothesline ran from the back porch to a pole in the backyard, and this seemed like a good possibility for supporting a temporary antenna. Approximately 100 feet of plastic-insulated hook-up wire were reeled out to the end of the line, and fastened every ten feet or so with clothespins. The wire was then connected to a homemade matching network and the transceiver. Results were gratifying, and after the roundtable the wire was rolled up for future use. Since the stations contacted were within 60 miles, the high angle of radiation from the antenna, because the antenna was so low to the ground, proved to be a definite advantage. — *W1YNC*

PERKING UP SLUGGISH HEATHKIT SB-101 TRANSCEIVERS

After six or seven years of use, my SB-101 began to show signs of age. The S-meter could not be zeroed, and the strongest signals barely moved the meter pointer. A check of the age and alc diodes revealed no fault there, but a slight positive bias was detected on the grid of the first i-f amplifier in the transmit mode, and on both the first and second i-f amplifier tube grids when receiving. This problem was traced to pin 12 of relay RL2. With the relay removed from its socket, a resistance of 30 megohms was measured between pins 11 and 12 of the relay. When the accumulated dust between the relay contacts was cleaned out, the positive bias problem was cured. The S-meter was zeroed, and I found it necessary to replace the 6AU6 first and second i-f amplifier tubes. After the alignment was touched up, the SB-101 performed like new. — *Tom Monroe, W6GGR*

QUICK CURE FOR AN R-4B VFO PROBLEM

After several years of use, some owners of the Drake R-4Bs may experience intermittently

low VFO level, or find the equipment develops a vibrating, warbling quality. Before digging into the VFO, short the forward and center lugs of each pole of slide switch S-4, located on the left side of the receiver. This switch allows fixed frequency, crystal-controlled operation of the receiver. When the contacts of the switch become loose from wear, the problem mentioned occurs. — *Marty Woll, WB6VZI*

USING STILL-CAMERA LENSES ON SSTV CAMERAS

Many SSTV cameras are designed to use lenses having a "C-mount." This type of mount is used on many 16-mm motion picture cameras, and dealers often stock adaptors allowing various 35-mm still-camera lenses to be fitted to a C mount. In addition to allowing the use of lenses which may be already available, still-camera lenses are usually of higher optical quality than those commonly supplied for use on video cameras. — *Bill Levy, WA2ROD/5Z4PI/VQ9BL*

ELIMINATING AC BUZZ IN THE HEATHKIT SB-102 TRANSCEIVER

My Heathkit SB-102 produced an annoying ac buzz at low volume settings. My homebrew power supply was suspected, but a check made with a Heath HP-23 power supply at a local Heath store gave the same problem. The problem was solved by connecting a 9-inch length of coaxial cable from point C on the audio circuit board, directly to the AF GAIN potentiometer, R930, and the cable shield was grounded at both ends. The original shielded wire (red band) was cut at the points where it emerged from the wiring harness. Apparently, its long, circuitous route through the harness, and poor shielding properties allowed the buzz to leak into the cable, because with the new RG-58 cable installed, the buzz was almost completely eliminated. — *Joe Martorelli, WA6BUY/WA2TCE*

HY-GAIN 18AVT/WB VERTICAL ANTENNA MODIFICATION

The Hy-Gain model 18AVT/WB is a vertical antenna, designed for use on the 80- through 10-meter amateur bands. Operation on 80 meters is possible because a mobile-type 75-meter loading coil and whip are mounted at the top of the antenna. Bandwidth on 80 is narrow, and the operating frequency is selected by adjusting the length of the whip. When the whip is cut to the proper length for 75-meter phone operation, it is not possible to obtain a proper match on the cw end of the band unless the whip is replaced with one of the proper length. Rather than purchase a new whip assembly, I fastened a 12-inch long piece of No. 12 copper wire to the whip with two Fahnestock clips. This allows me to slide the wire up and down on the whip until the proper position is found, using an swr bridge connected at the feed point of the antenna. — *Al Skornicka, K8WXQ*

[Editor's Note: A more permanent method is to use small cable clamps to secure the added wire to the whip.]

Moonbounce Boondoggle

Already, one summer had been spent in the wilderness on a moonbounce expedition for just a handful of complete QSOs. But the vow to steer clear of such ventures didn't last long.

By Wayne Overbeck,* K6YNB

If you had just bought a catamaran and a new house beside a sunny Southern California beach, and finagled a long summer break from your work, how would you spend the time?

To most people, the answer would be obvious. But then, most people aren't ham radio operators, let alone vhf moonbounce enthusiasts. Because this writer is both, his beach house sat vacant and the Sol Catamaran never left dry land last summer. Their owner was off to a place where there are few sandy beaches, still fewer Sol Cats, and where it rains so much you wonder if old Sol himself exists.

Why?

Without becoming philosophical, let us just blame it on W6PO. The prominent 2-meter moonbounce helped arrange a grant from the Northern California DX Foundation for K6YNB to go on an EME expedition to Alaska, which is about as rare a state as a 2-meter DXer could imagine.

This was neither the first trip to Alaska nor the first moonbounce expedition for K6YNB. But after the "Boondoggle in the Boondocks,"¹ that seemingly wasted the entire summer of 1975, your author absolutely swore off moonbounce expeditions. And Donna, WB6IDK, who has probably been dragged off on as many vhf expeditions as ever a ham's wife had to endure, was even more emphatic about staying home and enjoying the beach in 1976. Inexplicably, though, we accepted the DX Foundation's grant and went off to Southeastern Alaska when the opportunity came along.

When it was over, we were glad we had done it, because the Alaskan moonbounce DXpedition produced some

gratifying results for the 2-meter DX fraternity. Probably nobody was more gratified than KØMQS, who worked K6YNB/KL7 for his 50th state on 2 meters to complete the first Worked All States award ever granted on that band! More than 20 other 2-meter DXers also worked Alaska during the expedition. In all, K6YNB/KL7 worked 15 states on 2 meters — almost all of them for first-ever QSOs with Alaska on 144 MHz.

North!

The tale begins with our departure August 1. Enroute north, there was a brief stopover at Mt. Ashland, Oregon, to work vhf DXers from San Francisco to Seattle on all bands through 432 MHz. Alan Brubaker, K6QPH, interrupted his northwestern vacation to join us there — and regretted it as we struggled through rain, hail, high winds,

fog and lightning to get the antennas up and then down again. The stop did result in nearly 100 vhf QSOs during one evening. But that was only a sample of the weather to come.

Next, we traveled through Seattle and north to Prince Rupert, British Columbia, a coastal town 1000 miles north of Seattle by road. From there, it's a short (120-mile) ferry ride to Ketchikan, Alaska, where Hank Prentiss, KL7IBG, was waiting to meet us on August 11. We can never thank Hank enough for his help while we were in Alaska.

Choosing a Site

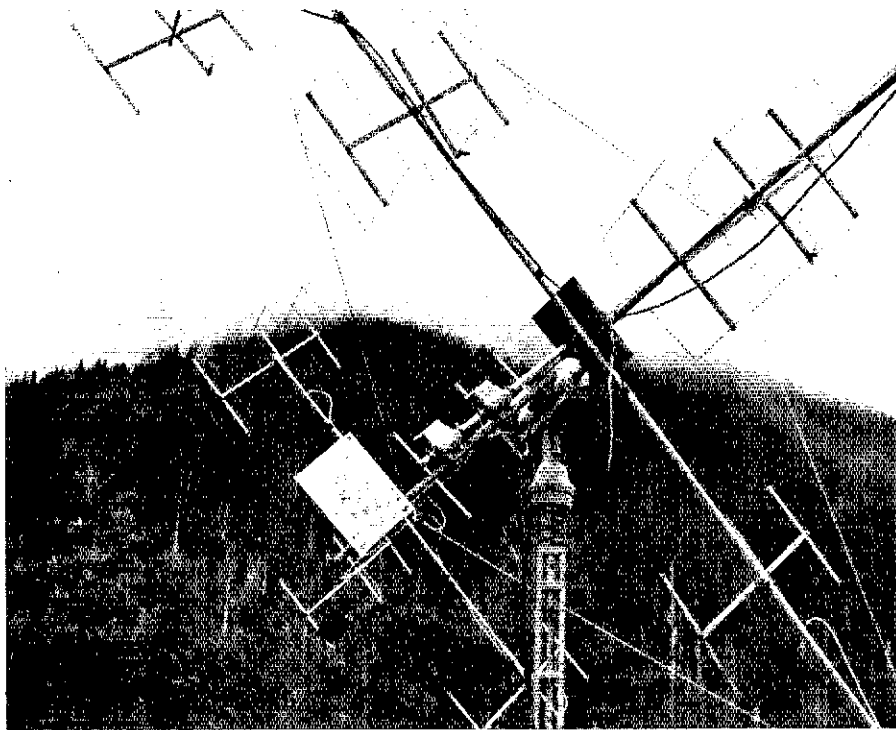
Hank immediately set to work finding us an operating site — no easy task when you need lots of room, a little privacy and commercial electricity. On the Utah-Nevada border expedition,



The most valuable person in the expedition was XYL Donna, WB6IDK, who was given a special award by the Seattle vhf fraternity for putting up with it all.

*5113 Whitecap St., Oxnard Shores, CA 93030

¹ Footnotes appear on page 47.



This view shows the three-way rotating mount for moonbounce. The Ham-M rotor controls azimuth rotation while two Alliance T-45s elevate the array and another pair of T-45s spins the setup on its axis to shift polarization. A 10-H, 200-mA choke provides counterweight.

we learned that generators are great for Field Day, but lousy for extended EME efforts. The site problem was even tougher because of Ketchikan's terrain: the city of 8,000 hugs the shoreline on Revillagigedo Island [not to be confused with XF4, Mexico — Ed.], confined by steep, inaccessible mountains that plunge abruptly into the sea. The town

is about ten miles long and one block wide. The surrounding mountains produce a 20-30 degree radio horizon in all directions except southeast and northwest along the channel that is the main access route up and down Alaska's "inside passage."

There was, Hank told us, one good radio site on something of a hilltop with a road: It turned out to be the only city dump in the world that is also the area's best radio location.

Armed with a key to the locked gate at the bottom of the hill, kindly provided by the city, we rushed up to the dump the evening of August 11, anxious to get on 2 meters for the peak of the Perseids meteor shower that night.

We were a little too anxious, it turned out. It was dark and rainy, and the portable tower that goes on these expeditions² was slippery. What happened was one of the more humiliating experiences in many years of vhf expeditions: One false step on the tower led to a most undignified and rapid descent. Fortunately, or maybe unfortunately, the effluent below cushioned the fall, and the wounds were minor — except to the pride. Ever fallen in a huge pile of garbage, much of it wet and rotten? Bringing a friend to drive our truck back down to his house, KL7IBG rushed up to rescue us. Hours later we finally got a 2-meter antenna system up at Hank's house and worked three northwestern stations on meteor scatter



Indispensable to the K6YNB/KL7 operation was Hank Prentiss, KL7IBG, the local ham who provided logistics support, time and time again.

before the night was over.

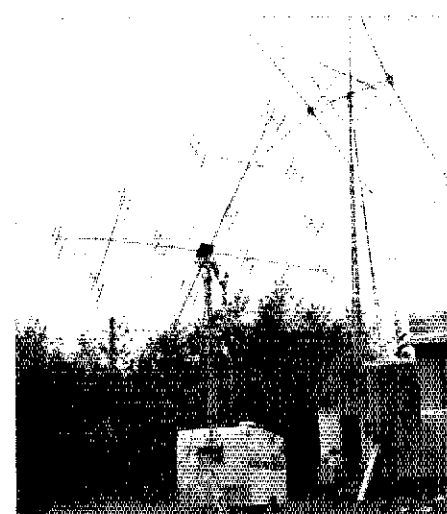
Then we asked Hank if there was any sort of second best radio location in town, one with more pleasant aromas. At that point Hank pulled his ace, the goodwill he had built up in more than 30 years of Coast Guard service. He got us permission to set up the entire moonbounce station on a secluded, forested little bluff at the Ketchikan Coast Guard base — with two 110-volt ac circuits no less! Except for the almost constant rain (Ketchikan averages 160 inches of rainfall annually) and hungry mosquitoes, it turned out to be a great place.

The first few days there produced more meteor scatter DX on 144 MHz, as the Perseids shower gradually ended. When it was over, the Alaska-on-2-meters club included W7FN, WA7BJU, W7DNU, K7KOT, K7OFT, WA7KYZ, WA7RTA, W7UBI and, under unusual circumstances, K7GBZ.

A "Blue Whizzer"

Experienced meteor scatter DXers know that m.s. contacts require long precisely timed skeds, lots of patience and plenty of operating savvy. What made the QSO with K7GBZ unusual is that he had never run a meteor sked before and, therefore, didn't know how hard it was.

So Les proceeded to catch a "blue whizzer" (meteor vernacular for a very long burst that produces extremely loud signals) on his very first 15-second transmission and was loud and clear in Ketchikan, over 1,000 miles from his Boise, Idaho, QTH. The burst lasted long enough for exchanges of calls, reports, rogers, 73s, and the works for a



Squeezed in between two trailers owned by Coast Guard personnel at the Ketchikan base is the "Cabover Kilowatt," with its 20-meter quad that was used for liaison communications. Beside it is the moonbounce antenna made of 16, three-element quads.

complete ssb contact in 37 seconds!

Now W7UBI, Les' neighbor and a veteran meteor DXer, is trying to convince him it isn't always that easy to work Alaska on 2 meters!

Moonbounce Work

After the meteor action ended on August 15, the newly redesigned moonbounce array went up. This unusual antenna stirred considerable curiosity among moonbouncers and will be the subject of a forthcoming bulletin in the Eimac moonbounce series (available from W6PO).³ Basically, the array consisted of 16, three-element quads on a three-way rotating mount. Any moonbounce array must be pointed at the moon in azimuth and elevation, of course. But this system was also designed so the entire 16-bay array would rotate around a central hub, shifting the polarization from horizontal to vertical and back.

Intended to correct for the signal-nullifying polarizations' shifts of radio energy as it passes out of and back into the earth's atmosphere (i.e., Faraday rotation), this technique is often used with parabolic dish antennas on 432. With a dish, polarization can be changed by merely rotating the small feed antenna. But on 2 meters, where amateur-size dishes are too small for moonbounce work, polarization rotation has rarely been attempted.⁴ At K6YNB/KL7, the scheme worked out extremely well. It produced numerous moonbounce QSOs that could never have occurred with fixed linear polarization. In skeds with the better-equipped EME stations, a QSO could be completed within a few minutes, regardless of the Faraday situation.

Murphy Was There

However, the reader should not assume that all was just peachy as soon as the moonbounce array went up. Murphy's Law is definitely still in force in Alaska. For instance: As the EME skeds began, the Accu-Memory Keyer developed a serious glitch and never worked right thereafter. Then the rain so drenched the antenna-mounted relay that it failed. This produced a very high SWR, causing the borrowed 8877 final to arc, destroying the tube. Sometime during this sequence, the high-voltage plate meter arced off to oblivion and



The Cabover Kilowatt arrives at the Ketchikan Coast Guard Base, site of the K6YNB/KL7 moonbounce expedition.

the blower in the 20-meter liaison final inexplicably stopped blowing. Oh well, who needs an 8877 final or air to cool 4-400s?

When the bout with Murphy was over, we were running EME skeds with a humble and elderly 4CX250B final, and 50 feet of feed line between antenna and receiving preamp. Somehow the system worked well, nonetheless. When the 2-meter moonbounce skeds were completed, these stations had made EME contacts into Alaska: K1WHS, WA2BIT, K2RTH, K3PGP, W4DFK, W5ORH, WA5UNL, W6PO, K6QEH, WA7BJU, WA7KYZ, K8III, W4WNH/8, K9HMB, WAØCHK, and of course, KØMQS for his state no. 50.

Near the end of the Ketchikan operation, we repeatedly attempted to get a 432-MHz EME system going, without success. The basic problem was that the




KØMQS wasn't the only one to complete a 144-MHz WAS. A slightly different award was presented to K6YNB for his Worked All Seattle effort from Ketchikan. Working the 600-mile path on 2 meters were (left to right) K7OFT, W7FN, K7KOT, K6YNB, W7DNU and WA7KYZ.

eight long Yagis could not be kept pointed at the moon, given the rain and wind. In fact, rarely were more than three of them pointed at the moon at once!

Incidentally, the Mt. Airy VHF Club moonbounce DXpedition to Colombia, HK1TL, apparently encountered the same problem — but they had enough manpower to station one person at the antennas at all times to keep them oriented on the moon. With more help and better raincoats we might have been able to do the same. . . .

By August 28, it was time to leave Ketchikan and return home, happy about the expedition but anxious to dry out from the constant rain. We got home just in time to be told how wonderful the weather had been at the beach — and to catch an unprecedented tropical storm that brought nearly 10 inches of rain in two days to our part of "sunny" Southern California!

Acknowledgements

Although K6YNB has been running "single-operator" vhf expeditions for years, no undertaking of this scope could be carried out alone. The author wishes to thank the following organizations and individuals for their very valuable assistance: the Northern California DX Foundation, Eimac Division of Varian, KLM Electronics, Micro-Comm, AngleLinear, C & C Electronics of Ventura (CA), KL7IBG, AL7IKO, WA7BJU, W7DNU, W7FN, K7KOT, WA7KYZ, K7MWC, K7OFT, W7UBI, W6BXO, WA7RTA, K6JYO, W6PO, K6QPH and many, many others. These groups and individuals provided material, encouragement, information, hospitality, chauffeuring in strange places, and many other kinds of help. Above all, of course, thanks go to WB6IDK for agreeing to go along on still another "Boondoggle in the Boondocks." 

Footnotes

¹ Overbeck, "A Boondoggle in the Boondocks," *QST*, May, 1976, p. 11.

² Overbeck, "The Cabover Kilowatt," *QST*, August, 1971, p. 48.

³ Requests for the moonbounce notes may be mailed to Bob Sutherland, Eimac Division of Varian, 301 Industrial Way, San Carlos, CA 94070

⁴ For a fuller discussion of the Faraday rotation problem and the use of polarization rotation to combat it, see Bill Smith's "Plain Language EME" series in the "World Above 50 MHz" column in *QST*, January, February and March, 1968.

Strays

QST Congratulates . . .

□ Floyd Fellows, WA4CLG, who was just accepted as a Life Member of the

Institute of Electrical and Electronics Engineers, an honor reserved for those who have had a great deal of experience in the profession and a long association with the IEEE.

□ Chuck Woolford, W5VFX, (ex-K4LOY), who recently received a "Per-

formance Award Recommendation" for his vital role in saving the life of co-worker Jack Mills after a severe electrical shock. His "alertness, diligence and sensitivity to a person in distress reflect the highest levels of humanitarianism." — *Coastal Bend Amateur Radio Digest and K5CN*

Portable Victor Papa Nine

Want a change from digging through pileups of snow and DX? The ARRL DX Test from the other side is a remarkable experience, and one well within the range of many an avid contester.

By Charles J. Harris,* WB2CHO

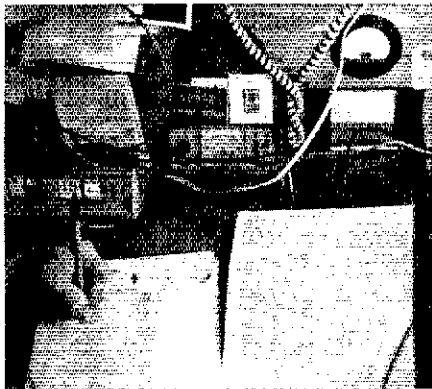
Time to make decisions — what band do we start on? Who will start? What kind of shifts are we going to work? One operator or two? Twenty is open and won't be for much longer. I take the first shot and will fight the early morning band openings. John volunteers for the all-night stand on 40 and 75. We'll dupe if the contacts come that slowly. Only one op will be on at a time so that the others can rest. We have five minutes left before it all starts.

It started with a note: "You have PJ9 location; I have PJ9 license. Want to get together for the phone (Ugh!) weekend?" What John Nelson, W1GNC, said was true. I did know of a possible Netherlands Antilles location that would be available in the spring. Intriguing, but time was short. So, I made a person-to-person call to Aruba. . . . Yes, the station is available, and yes, he will look into the license situation. A short trip to the travel agent and we're booked to Aruba for the DX phone test week!

But problems arise. My PJ9 license application was snarled in the sort of bureaucracy only small countries can contrive. It cannot be sprung from the system until I get down there; even then there would be no guarantee that I could operate. John's license cannot be easily moved from Curacao to Aruba. There's always the PJ9JT location, site of many a contest operation, but John Thompson will be using it himself for the DX test. I guess we'll stay home and fight the big guns stateside.

An Alternative

All is not lost, though. Only two hours away is Bermuda and John re-



At close to 200 contacts per hour, you only log the time every ten minutes, and dupe sheets and multiplier checkoffs wait for later.

members an avid DXer who just might be willing to loan out his station. Another transoceanic telephone call (you can dial Bermuda direct!) and Ed Kelly, VP9GE, agrees.

With less than a week for all the preparations we rush to the travel agent, again, "Now you want to go where?" The tickets are set, and I tell the boss we'll be gone for a week. The morning arrives — a typical Connecticut ice storm. My snowtire-less Subaru can maneuver on the slick pavement, but not the other cars. Traffic backs up on the expressways. We're going to miss our flight. Fortunately there is a back way to the airport. We walk through slush and snow to our plane. It is almost a striptease act on the way down as every few minutes we take off another layer of clothing. After being bundled for the New England March, we must prepare for the Bermuda sun.

Following that slight misadventure,

we went through the border formalities. Even the 500 feet of wire to restring the four-element quad went through without hassle. At last, high above the city of Hamilton, we arrived at Ed's studio and house. While waiting for him to finish a photography assignment, we have our first look at the station. Soon we are on the air since he had already taken care of the simple reciprocal license obligations. After dinner we checked into the Murphy Marauder net on 75. "You're portable where? Are you going to be on in the contest?" they innocently asked.

The next day, the day the contest begins, is antenna day. The quad must be taken apart, completely restrung, and retuned. Hoping not to get sunburned (in March!), we set to work. Removing the elements involved a precarious perch on the end of a fully extended aluminum ladder. What with the ladder swaying, the movement of the quad, and the shaking of my knees, it was a job undoing the bolts. The beautiful view of Bermuda from that height was another distraction. Somehow it is taken down with time to spare and Murphy barely making an appearance. The quad still had to be tuned, of course, and that took many hours, but it was finally all tuned, adjusted and tested. It had 25 dB front-to-back; that'll keep the Europeans off our back on 20 meters. Minutes remain before the contest.

0000 UTC — Go!

14215 is open. We camp there, ragchewing and waiting. The zeros fall in place across the digital clock — we're off! "CQ contest, CQ contest, this is W1GNC/VP9, contest." The band explodes. We're working two a minute. The dupe sheet falls neglected to the

*Club and Training Manager, ARRL

floor. It's hard enough merely logging at that speed, much less trying to keep an accurate dupe sheet.

The contest progressed and the true joys of working from the "other side" became apparent. One of the great pleasures (yes, contests *can* be enjoyable) turned out to be working split. Dropping our transmit frequency to the relatively interference-free region below 7100 kHz while listening up in the U.S. phone band made for rapid and efficient operation. There were always considerate amateurs to point out any problems on your transmit frequency, which you seldom monitored.

And yet it was very surprising to see how few U.S. amateurs really knew how to work split properly. Our receiver was very carefully calibrated, a must for split operation, and when we said we were listening on 7185.5 kHz, we meant it. Yet, hams called us all up and down the band. Further, few stations used the trick of zero beating the last station we worked. Obviously we were listening on exactly that frequency and a call immediately after the last exchange was always effective. It means listening to both the DXer's transmit and his announced received frequencies. The extra receiver is worth the effort, however, for multipliers on 40.

As to be expected, 20 meters was the bread and butter band. In fact, it was so good that we stayed away from it at many times when we could have made very good rates. It was simply too hectic. I guess the best part of 20 meters was listening to the pileups. Having a large number of stations calling on one frequency is standard fare for U.S. DXers and testers. Having them all call *you* is not. The quad performed well on 20, as evidenced by the fact that we could hold 14205 for hours. Just for fun, as we moved to 20 after a few hours on another band, I gave a long CQ on that frequency. I timed it: exactly one minute. Then a quick "go ahead," and the band exploded! There must have been more than 100 stations call-



John Nelson, W1GNC, takes it easy during a slow (100 contact/hour) time on 20 meters.

ing, spread over 10 kHz. What a feeling of power to know that we could do that. But we came to Bermuda to work stations, not to cause QRM, so we started picking calls out of the hordes calling.

Tricks of the Trade

When there are a large number of stations calling, copying complete call signs is almost impossible. The only stations that stand head and shoulder over the rest you have already worked in the first few minutes of the contest. They are mostly multi-operator affairs, with spotters and more, to quickly nab multipliers. But getting a full call sign out of a pileup of more than five stations, all of the same strength, is just about impossible.

The traditional methods of making a list, or running by call areas, are worthless in a contest. They take far too much time. We considered our rate on 20 poor if it slipped below 100 contacts per hour. And we broke 200 QSOs per hour on two occasions. Dupe sheets? You can barely log at the rate of three contacts per minute.

So how do you work stations at this rate? First, listen for parts of call signs. You seldom need more than a prefix or a letter or two of the suffix to identify the station. Put down three or four of these at once. You might hear, for example, a WB8, an 8D, a GH, and a portable 4. Immediately call one of those stations, "The portable 4, you're 59100, go ahead." By FCC regs, the stations you work must give their complete call signs as they work you and your logging chores are complete. Then you work the others you already have in your log.

As will all good ideas, this doesn't always work. First, some stations will

call you no matter what you say. It is usually much faster to work these lids so that they will go away, than to explain that you are listening only for the WB8. But then courtesy dictates that you try again for the covered-up station. These breakers don't make for efficient operation.

Other Hints

Sometimes the crowd is all so weak, or there are so many stations calling, that you cannot get even a part of a call sign. This happened after long CQs, for example (we didn't try too many of those). Then you make up a call sign, "The WB4, go ahead." There is bound to be a WB4 calling you, or someone who thinks he might be, or "The zulu station, go ahead." Even if there isn't a station with a "Z" in the call in the pileup, enough stations will stand by so that you can pick out the individual call signs, and you're off again, on another string of 40 or 50 contacts without a CQ.

And yet, as in the case of split, it is amazing how few amateurs use the tricks of the trade in working pileups. Few stations take the time to listen to what kinds of calls the DXer is answering, and fewer still use good tail ends and other ploys to get the call in the log. A good tail ender was a real joy to work, as it saved the ears and nerves from that tremendous pileup. A simple "ZND" tossed in at exactly the right time, right after the U.S. station gives his exchange, results in a ZND in the log. We made a point of thanking stations using good procedures in the hopes that others would copy them.

Even that did not seem to do a great deal of good. Though it was obvious that we were only coming back to the shortest possible calls, some stations



"CQ contest, CQ contest, this is W1GNC/VP9," 25,000 times in 48 hours.

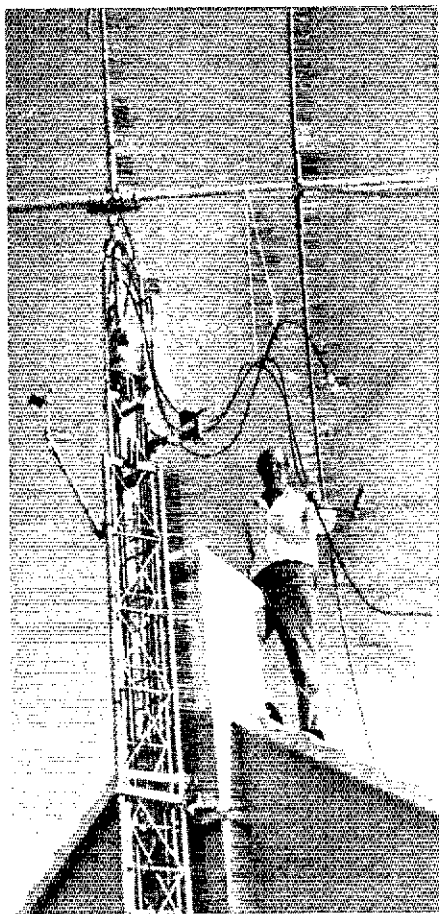
insisted on our call four times, then theirs four times in bad phonetics. "The Motel station, go ahead." Meanwhile we had worked two stations underneath him. Fortunately, the large number of fine contest operators in the U.S. made the rapid-fire exchanges actually enjoyable, for much of the contest.

Many of the good operators were friends or acquaintances. We were on at least speaking terms with many of the members of Frankfort and Potomac Valley, and have been known to converse with Northern California boys once in a while. But we always wanted to stop and chat with the hometown Murphy gang. Both we and they had better things to do during the contest than swap stories, but it was hard to resist the temptation. And then there was the booming 40-meter signal of WA7WXY. Rick called me on 40 split, and I first worked a weaker station underneath him, as I knew Rick would wait. Then I called "WA7WXY, 59100 go!" Rick responded, "Wow, for a minute there I thought you didn't hear me! W1GNC/VP9 you're 59 Idaho WA7WXY."

Even a mere 48 hours of contest operation can generate a wealth of good stories for the next club meeting. One of our most frustrating experiences was on 10 meters. We had a good E-skip opening to Texas, but only Texas. We worked about 40 Texan stations, all many dB over 9, and then I called, "CQ 10, for anyone outside of Texas." Nebraska was our other 10-meter multiplier. And throughout the time on 10 we could hear PJ9JT working stations at better than 100 per hour. Such was the benefit of the north-south propagation.

Pulling the Last Multipliers

On the other hand, our best experience was near the end of the contest on 20 meters. We hadn't paid much attention to multipliers — when you are working stations at better than 100 per hour, they are meaningless. But as things began to slow up, we realized that there were a lot of easy multipliers we should pick up. We dropped below the U.S. band, pointed the quad north, and started working VEs for multiplier credit. We called for, and got, a VO1,



Ed Kelly, VP9GE, examines the driven element of the four-element quad before it is cranked to contest height.

VE1, VE4 and a VE6. I decided to press my luck: "Is there a VE8 on frequency? A special prize for any VE8 on frequency." I really believed VE8 was some concoction of the ARRL Communications Department to keep the number of clean sweeps down in SS. Nevertheless, I called for one. When I heard the instant reply, "This is VE8CF; what's my prize?" I was so flabbergasted that I almost forgot to work him! And then, only about five minutes later, while we were still running VEs, another VE8 called. Two VE8s in one contest! I wish I could have saved one for next SS. . . . By the way, VE8CF's prize was a handsome certificate, for his "invaluable contribution to amateur radio."

But now the contest was almost over. We had worked just about everybody who needed VP9 as a multiplier, and even a few who needed Bermuda for DXCC. And we have even worked a lot of people who have nothing whatsoever to do with contests or DX. When things got slow on 20, under 75 QSOs/hour, we went up to the upper part of the band, around 14310, and begged for contacts: "Please, help us set a world's record; all we need is your state; give us a call." Sort of degrading for a station which worked more than 200 QSOs in a single hour, but necessary to break the previous record for a one-weekend DXpedition of 1.6-million points.

2359 UTC — Stop

Finally, those four zeros rolled around on the clock again and we turned off the rig for the first time since we arrived, three days prior. Now, to see Bermuda at night, or to sleep? After 48 hours of continuous contesting, not even the lure of the famed Bermuda nightlife could keep us out of bed. There was always tomorrow.

Tomorrow brought a quick tour of Hamilton, the harbor and a few post-cards home. Then back to the ice, the snow, the job and the dupe sheets. Duping took about 30 minutes per sheet, more than it took to fill it in some cases. But we were trying to make Jim Cain's job as easy as possible by putting down the time we worked each dupe. Then it is a simple matter for him to scan the other logs for those invalid contacts.

The final result of the weekend trip? About 2800 QSOs, and fifth in the world in the multi-single category. No certificate, however, as Hq. employees are not eligible. Mainly we learned a lot about operating, a lot about conditions from Bermuda, and a lot about what a great guy Ed Kelly is, for without his constant encouragement and assistance, we would have never accomplished any of the above. And finally we learned what it is like to be on the other end of a big pileup, what it is like to work more than 200 stations in a single hour, what it is like to be called and not the caller. And we liked it! Wait until next year! QST

Strays

STOLEN EQUIPMENT

□ National SW3 with matching power supply stolen from Holloway Beach and campgrounds during summer of 1976. G. S. Beck, W2CE, 8604-55th Rd., Elmhurst, NY 11373, or the Maryland State Police at North East, MD.

□ Theft from auto on Nov. 23, 1976, in Chicago, IL, ICOM 22A, serial no. 4611. Cicero police report no. 35310. Edward C. Holz, WB9FVG, 7927 S. Komensky, Chicago, IL 60652.

□ Kenwood TS-700A, serial no. 340134, stolen from apartment during

burglary on Nov. 12. Nathan E. Erikson, W2VEH, 400 Rugby Road, Brooklyn, NY 11226.

□ ICOM 22A taken Oct. 8, 1976, in San Luis Obispo, CA. Mike McBirney, 3412 Calle Noguerra, Santa Barbara, CA 93105.

Beware! Amateur Radio'll Get Ya if Ya Don't Watch Out!

Are transceivers, oscilloscopes and dip meters taking over the family room? Has the License Manual replaced the newspaper at the breakfast table? Well, if you can't beat 'em, join 'em as the adage says.

By Mary Jane Meyer*

Don't let anyone tell you amateur radio is a hobby. It is a way of life, take my well-earned word for it!

My hobby is writing; or, at least it was. I had a little room just off the kitchen where it was cold in the winter and hot in the summer and reasonably quiet all the time. I arranged to write in the early morning hours during the spring and summer months and the late evening hours during the fall and winter months. That way I benefited from the early morning cool, the late evening quiet and the sunny day's warmth.

I loved my little studio in spite of its lack of modern conveniences. You see, this is the first time I had ever had a place set aside just for writing, so it

seems only fitting that it should become a very special and hallowed spot.

But, that was before my husband took up amateur radio! I didn't pay much attention when he announced one evening through a big mouthful of fried potatoes, "They're startin' an amateur radio class tonight. Think I'll go."

"I didn't know you liked radio." My voice reflected the surprise I felt at discovering another part of his makeup unknown to me after all these years.

It Won't Hurt To Go See

"Don't know that I do. Just always thought I might. Won't hurt anything to go see." He reached for a second helping.

"I guess not." I answered, but already I was having premonitions of what was to be. I could so clearly recall the days of my girlhood when my older brother ate, talked and slept ham radio and the whole family, of necessity, had to digest at least a small part of it.

I shrugged it off, telling myself that ham radio is a lot of hard work and he probably wouldn't take to it anyway! I hurriedly washed the dishes piled in the sink, locked the door behind him and settled in for an evening at the typewriter. And that was that . . .

Until one sultry summer evening several months later. I came home from work and there was this big hole in my studio wall. Bless him, I thought after sizing up the situation, he is installing that old air conditioner so it won't be so miserable for me. I was so touched I couldn't say a word and I hummed happily as I got supper on the table

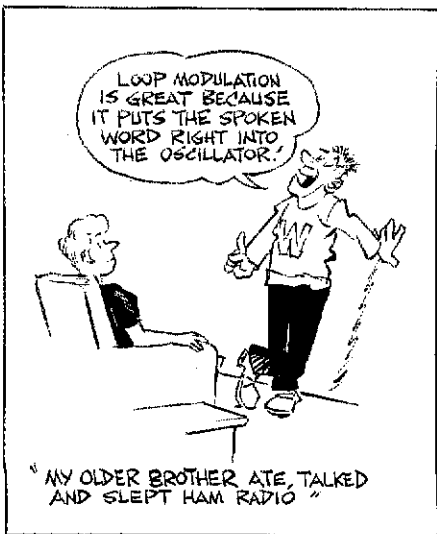
while he finished the job at hand.

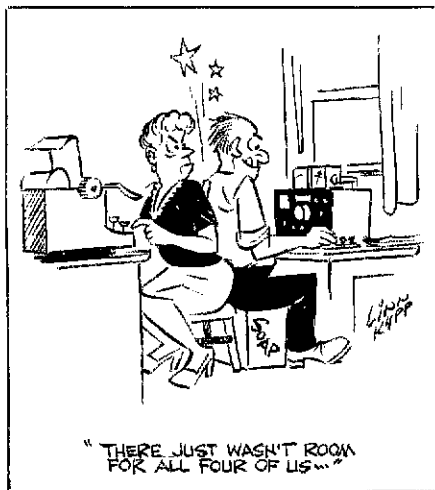
Off he tramped, right after supper, to another ham meeting — and I retired to my nice, cool studio. Now, I thought, if he can just find the time to put that light over my desk. . . .

Time passes swiftly when I am writing and in what seemed only a few minutes, but what, in fact, was a couple of hours, there was a bang, bang, banging at the door. "I got it!" He grabbed and whirled me across the kitchen floor. "I'm a Novice!"

Novice? I was soon to learn that being a Novice wasn't exactly what I had in mind at all. It was, instead, the key to turn the lock to open the door to his new world of amateur radio. I thought maybe his high spirits must be a bit akin to some sort of excitement I

*411 East Walnut, Enid, OK 73701





dreamworld isn't such a bad place to while away at least a few hours of your life. We both enjoyed the dreams . . . and the ride home.

Sharing the Resources??

Mother was right. Sometimes I can be so naive! The next evening I came home from work and he was busy putting in an overhead light — directly over a big, long workbench built across the end opposite *my* desk in *my* studio! Can you believe that?

Believe it. My old, hard-hitting electric typewriter and his telegraph key just never did hit it off and something had to give. We finally made a compromise and took turns . . .

For awhile, that is. But, then he made General and, you guessed it! There just wasn't room for all four of us in *our* little studio. Two of us had to go: It was me and my typewriter.

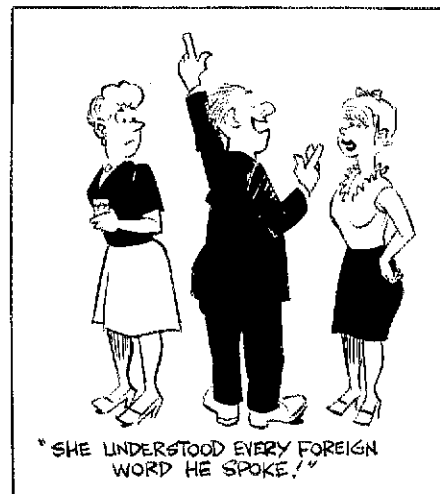
I found a crowded corner of a bedroom and crawled into it, almost all the way back to the fetal position. I couldn't even talk to him anymore. He spoke a whole new language. I decided to ignore it and see if it went away. It didn't.

Thank goodness for appetites. That assured me I would get to see him at least three times a day, even if I couldn't understand a word he said. Then it happened. . . .

He went to a local writer's meeting with me and there she was — and *she understood every foreign word he spoke!* I listened for awhile and it became very clear to me that you couldn't very well sue a radio for alienation of affections and I sure didn't want to go to all the trouble of suing anything else, so I had a language to learn.

Now I Get Mine

I enrolled in the very next class offered by our local amateur radio club.



vaguely recalled having heard him talk about.

So, off we went — to our first hamfest. I followed him meekly around trying to spark up a little interest in the various thousands of unidentifiables surrounding me end-on-end on tables with walking-sideways-only room. We didn't find a used radio set we could afford after all, but we did get the prize for the oldest Novice in attendance and had a lot of un-radio-related fun. So, I told myself, the trip wasn't a total loss!

I guess about the nicest thing about his growing interest in amateur radio was that it pulled him away from his auto body and paint shop out back of the house; now I'm not so sure.

Still, we had a radio to buy. Finally, the big day. We had made a trip to a not-too-far-distant city and just, by chance, came across this radio shop — and they had just what we needed and what our budget said we could have. So all the way home, keeping a careful corner-of-my-eye on the newly acquired treasure perched on the back seat, I shared his dreams of conversations to far-off places. And I discovered a

Torture! The alphabet converted into unintelligible dit-dahs exploding in gray matter like emitted electrons in a mercury vapor tube. Components of strange formulas hidden in every short circuited wave of my brain — and, what's worse, no time left to write.

Funny thing is, now that my class is almost over and I am about ready to stride forth into that vast new dimension, I am having a few regrets. I've met such fun people. I get to go out to eat twice a week on class nights, and I'm feeling the thrill that accompanies delving for knowledge. It's going to be hard to give all that up.

But then, who says I have to? Give it up, I mean. Amateur radio has gradually become more to me than just a necessary end in order to communicate with my husband. It has suddenly become necessary in order to communicate!

Just you wait until *my* call letters are displayed on *my* studio wall and *my* CQ CQ rings out across the land — then we'll see who returns to the fetal position!

Epilogue — She did get her ticket, WB5WNP.

QST

Strays

TOTAL "HOMEBREW"

□ During a DXpedition visit to Barbados in November of 1976, W1FB/8P6EU and W8JUY/8P6GU were the guests of Ron Gibbs, 8P6BX, an ardent builder of homemade ham gear. The photograph shows Ron at his operating position. All of his station equipment is homemade, and the interesting aspect of the matter is that he refuses to purchase commercial gear or new component parts for his projects. He has vowed that everything he uses on the air must come from scrounged parts and

junk equipment! Ron's favorite band is 10 meters, and the large unit at the upper right is his transmitter. It contains three 807s in parallel, operating in Class A. The low-profile unit (second from the lower left) is his homemade receiver. Directly in front of him (open chassis) is an audio filter he was testing when we arrived at his shack. Ron's yen for scrounged components does not result from his being impoverished — Ron has a good job in Bridgetown, and he owns a 200-acre sugar cane plantation! — W1FB



Ron Gibbs, 8P6BX, at work with his homemade ham gear.

Getting to Know OSCAR— from the Ground Up

Part 2: Whether just listening, or actually sending your voice through space, the unique excitement of satellite communication is within reach. And it's a lot easier than you think!

By Charles J. Harris,* WB2CHO and James Kearman,** WA1WVK

Many people are surprised to learn that they don't even need an amateur license to get their feet wet with OSCAR. In fact, you can make a valuable contribution to the amateur satellite program — and have a great deal of fun doing it — simply by transcribing the telemetry data that tell how the satellites are functioning. If you do have a Technician or higher class of license, however, the entire world of satellite communications is yours.

Read on, and you'll be on your way to joining the thousands of people around the world who listen to, learn from — and most of all enjoy — the amateur satellites.

Listen First

Each satellite continuously transmits telemetry data on the state of the various satellite systems, and this information is vital to proper operation of the satellites. All you need to get into this program are a 10-meter receiver and an antenna. Any 10-meter antenna will do, with simple antennas being preferred to complex beams. High-gain, directional antennas have a relatively low angle of radiation and reception, and receive poorly during direct overhead passes of the satellite. They also require directional control during the passes — one more thing to worry about. A 15-3/4-foot (5.1-meter) dipole or even a regular CB antenna is a fine antenna for satellite work, as almost all reception is direct line-of-sight.

Sensitivity is the primary concern when selecting a receiver. Any receiver which covers the upper portion of the



VE7CFX and VE7BPB operate through OSCAR during the recent Boy Scout Jamboree-on-the-Air.

10-meter band and has a BFO will work, but many receivers lack sensitivity in this range. A preamplifier may be useful in producing Q5 signals. Tune to the downlink frequency, which is the frequency at which signals are transmitted from the satellite. (See Table 1, *QST* for January, 1977, p. 52.) Then disconnect the antenna. If the noise level drops, you have sufficient sensitivity in the receiver. If not, try a simple preamplifier tuned to the downlink frequency. Hamtronics, Inc., 182 Belmont Road, Rochester, NY 14612, has an excellent and very inexpensive kit for this purpose. Janel Laboratories, 250 N.W. Polk Ave., Corvallis, OR 97330, also sells a fine preamp (30 dB) for \$19.95. See the ad in *QST*.

When to Listen

When your receiver and antenna are ready, the next step is to determine the time to listen. To get you started, Tables 2A and 2B contain selected-cities

information for the month of February. These are the times the satellite comes within range of several major U.S. cities. If you are within 500 miles (1000 km) of this city, you should be able to copy signals from the satellite at about the listed time. These times are given in Coordinated Universal Time (UTC) so remember to convert to local time. Subtract five hours to convert to Eastern Standard Time. That switches the times late in the evening to the previous day. Subtract six hours to convert to Central Standard Time, etc.

You can also use the OSCAR-LOCATOR, available for \$1 postpaid from ARRL hq., to determine when the satellites will be within range. Finally, if you have hf capabilities, you can check into the AMSAT nets on Tuesday evenings on 75 meters and ask for further information. In general, you will be able to hear OSCAR 6 in the evenings local time on Sunday, Wednesday and Friday, and OSCAR 7 in the mornings and evenings on odd-numbered days of the year.

Telemetry

The cw telemetry from the satellites is sent at 20 wpm, in a regular format (see Table 4). The format makes copying the code very easy. You can even record the code at a high pitch and reduce the speed of the tape after the pass to lower the code speed to 10 wpm. The telemetry information should be sent to AMSAT, Box 27, Washington, DC 20044, on a special telemetry reporting form available for a self-addressed, stamped envelope (s.a.s.e.) from the ARRL hq. Each telemetry report is important to AMSAT, as each contains valuable information on the

*Club and Training Manager, ARRL

**Assistant Technical Editor, *QST*

†Part 1 appeared in *QST* for January, 1977.

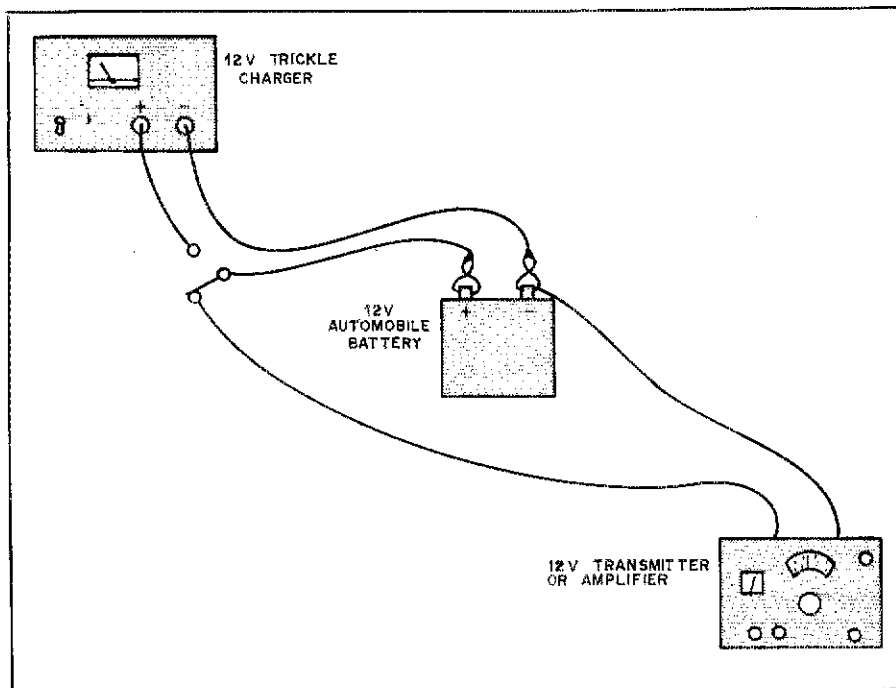


Fig. 1 — Bargain-basement high-current supply for 12-V linear amplifiers. The battery is charged constantly, except during the actual satellite pass.

state of the satellite, information which is necessary to keep the satellites functioning properly. On request, AMSAT will reward your first telemetry report with a colorful QSL card. Thanks to the volunteer efforts of a large number of reporters, OSCAR 6 is in its fifth year of successful operation: not bad for a satellite with a projected lifetime of only one year!

Along with your supply of telemetry reporting forms from ARRL, you will receive a telemetry decoding chart, so that you can monitor the solar-panel current drain, the temperature of the various satellite modules and many other vital statistics. By copying several consecutive frames of telemetry, you can determine the tumbling rate of the satellite, as the solar panels produce more current when the tumbling brings them into the sun's light. You can also watch the temperature of the transmitter module change with use as well as many other aspects of live satellite operation. Decoding telemetry from a satellite passing overhead makes a great school demonstration!

Transmitting

You've listened to a few passes. You've reported your telemetry information and stations heard to AMSAT. Now you're ready to try a two-way contact yourself. To transmit a signal through the satellites, you need a 2-meter transmitter and antenna capable of producing about 100 watts erp. Erp stands for *effective radiated power*, which is a measure of the apparent

power level out of the antenna. You can determine erp by multiplying the output (not input) power of the 2-meter transmitter times the gain of the antenna. A 50-watt output transmitter into a 10-dB gain antenna results in an erp of about 500 watts, well in excess of that needed or desirable for operation through an OSCAR satellite!

Equipment

Almost any transmitter which puts out a signal on the 2-meter band can be used to put a signal through the satellites. Old a-m rigs, transverters, even 2-meter fm transceivers will work. One popular unit is the now-discontinued Ameco TX62. A similar unit without built-in power supply is the Johnson 6N2. These combination a-m/cw 6- and 2-meter transmitters generate about 50 watts of rf on 2 meters, which is plenty for cw OSCAR communications. Both units require the use of an external VFO or crystal. Another possibility in the same power class is the Heath SB500, 2-meter transverter. Used equipment can often be obtained at reasonable prices through the Ham Ads in *QST* or at flea markets and swap fests.

On a more modern level, a number of transverters for commercial transceivers are now available. They usually have a significantly lower output, in the order of 5-10 watts, but with a "brick" power amplifier, the power level may be easily boosted to the necessary level of about 100 watts. If you wish to operate ssb, be sure the amplifier is designed for linear operation.

Table 2A
AMSAT-OSCAR 7

DATE*	DAY	CITY	TIME*
Feb. 1**	Tues.	Detroit	0110
		Salt Lake	0305
3**	Thur.	Detroit	0103
		Dallas	0256
4	Fri.	New Orleans	0155
		Los Angeles	0351
5**	Sat.	Buffalo	0057
		Dallas	0250
6	Sun.	New Orleans	0150
		Los Angeles	0344
8	Tues.	New Orleans	0143
		Seattle	0340
12	Sat.	Chicago	0133
		Seattle	0328
13**	Sun.	New York	0032
		Houston	0225
14	Mon.	Chicago	0126
		Salt Lake	0322
15**	Tues	New York	0025
		Houston	0218
17**	Thur.	New York	0020
		Houston	0210
18	Fri.	Detroit	0114
		Salt Lake	0308
19**	Sat.	New York	0012
		Houston	0204
20	Sun.	Detroit	0108
		Denver	0300
22	Tues.	Detroit	0060
		Dallas	0253
24	Thur.	Buffalo	0055
		Dallas	0247
25**	Fri.	New Orleans	0145
		Seattle	0347
26	Sat.	Buffalo	0050
		Dallas	0240
27**	Sun.	Chicago	0143
		Seattle	0340
28	Mon.	New York	0042
		Dallas	0234

*All days and times UTC.

Notes:

- 1) Double asterisks (**) follow the dates that OSCAR 7 is in Mode B. Listen around 145.950 MHz.
- 2) All days and times are UTC. Refer to Time Conversion Chart to find local time.
- 3) The satellites are available for two-way communication on the days listed. North-bound (evening) orbits only are listed.
- 4) The satellites pass almost directly over the cities listed. Begin listening at the times listed.
- 5) Since both satellites have a range of about 2,450 miles (3920 km), New York will be within range of an orbit that brings OSCAR directly over Chicago, and vice versa. If you live a significant distance south of the city listed, begin listening a few minutes early, and vice versa.

Transverters permit ssb operation through the satellites as well. A transverter mixes the low-level output of an hf transmitter with a crystal oscillator to produce a "model" of the hf signal, transposed to a higher frequency. A majority of amateur satellite communication is still via cw, but the increasing availability of ssb 2-meter equipment has resulted in more ssb signals on OSCAR. In addition to commercial transverters, there are several transceivers specifically designed for 2-meter sideband operation. Most can be found advertised in *QST*. Again, most of these

Table 2B
AMSAT-OCSAR 6

DATE*	DAY	CITY	TIME*
Feb. 3	Thur.	Chicago	0100
		Los Angeles	0255
5	Sat.	Chicago	0055
		Seattle	0250
7	Mon.	Chicago	0050
		Seattle	0245
12	Sat.	Houston	0133
		Los Angeles	0328
14	Mon.	Omaha	0127
		Los Angeles	0322
17	Thur.	New York	0022
		Dallas	0220
19	Sat.	New York	0017
		Dallas	0215
21	Mon.	New York	0012
		Dallas	0210
24	Thur.	Chicago	0100
		Los Angeles	0255
26	Sat.	Chicago	0057
		Los Angeles	0252
28	Mon.	Chicago	0050
		Salt Lake	0245

*All days and times UTC.

rigs have power levels of about 10-watts output. The addition of an external amplifier will bring the power up to the desired level. These power amplifiers are usually designed for mobile operation and require 12-volts dc at up to 10 amps. Commercial power supplies in this range are quite expensive. One solution is to homebrew your own such as the Ugly Duckling power supply in the November, 1976, issue of *QST*. Using a discarded automobile battery is another possibility. If the battery will not hold a charge, it is still usable to power an amplifier for OSCAR contacts. The satellite is only in range for a maximum of 20 minutes out of every two hours, and that leaves plenty of time for the battery to recharge between passes.

If you use the circuit in Fig. 1, your amplifier battery will be constantly charging except during the actual pass. Be sure to provide good ventilation for the battery as flammable hydrogen gas is a by-product of the charging process. Check the electrolyte level regularly, adding distilled water as needed. This system has been in use at WA1WVK for several months. The battery was obtained for the asking from a local gas station.

Two-Meter Antennas

If the output of your amplifier or transmitter is about 100 watts and feed-line loss is minimal, a simple omnidirectional antenna is sufficient for the 2-meter uplink. A turnstile or a slightly tilted vertical (to avoid the loss of signal on directly overhead passes) are both possibilities. Another is to salvage the remains of that 2-meter Yagi that didn't

make it through the last ice storm. The first two or three elements mounted straight up will provide an adequate uplink signal whenever the satellite is more than a few degrees above the horizon. For the beginner, the best advice is to "keep it simple." Once you have some operating under your belt, you'll have a better idea of what type of antenna system is best for you.

Operating

Using the selected cities information, or the OSCARLOCATOR, find an orbit that brings the satellite within about 1000 km (600 mi) of your station. The downlink signal should be loud and clear, with some fading due to polarization shifts. Using the frequency chart or the relationship $F_{downlink} = F_{uplink} - 116.45$ MHz, determine the appropriate uplink frequency to give you a downlink about 25 kHz in from the edge of the band pass. The center of the passband tends to get very crowded, especially with ssb signals, so it is easier to hear yourself if you start out a little further from the crowd. But be sure to avoid the actual band-pass edges, where the telemetry beacon transmits and sensitivity of the transponder receiver decreases.

Once you have determined an approximate frequency (say 145.925 MHz for OSCAR 6) and you can hear the satellite downlink in the receiver, tune to the appropriate downlink frequency corresponding to your uplink. That is 29.475 MHz in this case. Send a string of dits and tune the receiver around this frequency until you hear the dits. By starting and stopping the dits, you can determine which of the downlink signals are yours. The downlink frequency as determined above is only approximate, for reasons we will discuss later, so be sure to tune at least plus or minus 10 kHz looking for your signal.

Duplex

Note that satellite operation is full duplex. That is, you constantly monitor your own signal throughout the transmission. You always know exactly how loud you are, what your tone sounds like, and what your downlink frequency is. Obviously if you can't hear yourself, nobody else will hear you either!

Once you have found your own signal, start calling CQ. With the equivalent of full break-in provided by the full duplex operation, you can hear other stations as they tune up near you. The vagaries of propagation and Doppler shift mean that few stations will exactly zero beat your signal. But most stations will not wait for you to sign to begin calling you. You can copy their calls simultaneously with your own CQ!

Satellite conversations tend to be brief, as the time any two stations can

Table 3
Time Conversion Chart

UTC	EDT/ CDT/ MDT/ PDT/				
	AST	EST	CST	MST	PST
0000	2000	1900	1800	1700	1600
0100	2100	2000	1900	1800	1700
0200	2200	2100	2000	1900	1800
0300	2300	2200	2100	2000	1900
0400	0000	2300	2200	2100	2000
0500	0100	0000	2300	2200	2100
0600	0200	0100	0000	2300	2200
0700	0300	0200	0100	0000	2300
0800	0400	0300	0200	0100	0000
0900	0500	0400	0300	0200	0100
1000	0600	0500	0400	0300	0200
1100	0700	0600	0500	0400	0300
1200	0800	0700	0600	0500	0400
1300	0900	0800	0700	0600	0500
1400	1000	0900	0800	0700	0600
1500	1100	1000	0900	0800	0700
1600	1200	1100	1000	0900	0800
1700	1300	1200	1100	1000	0900
1800	1400	1300	1200	1100	1000
1900	1500	1400	1300	1200	1100
2000	1600	1500	1400	1300	1200
2100	1700	1600	1500	1400	1300
2200	1800	1700	1600	1500	1400
2300	1900	1800	1700	1600	1500
2400	2000	1900	1800	1700	1600

Universal Coordinated Time (UTC) is the time at the zero or reference meridian. Time changes one hour with each change of 15° in longitude. The five time zones in the U.S., proper and Canada roughly follow these lines.

talk to each other is quite short. The typical contact is an exchange of signal reports (somewhat redundant, since you can copy your own signal as well as the other guy can) and the state or province name. A quick 73, and then another station will probably start calling you.

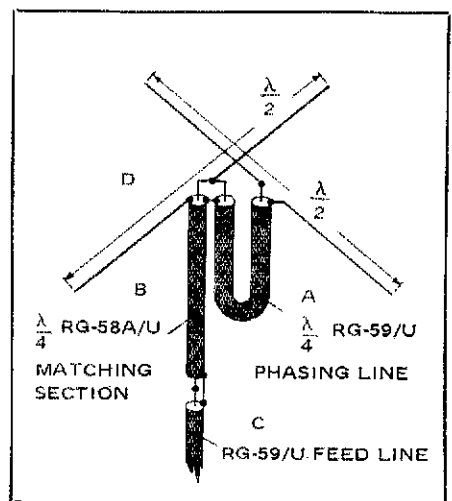


Fig. 2 — A simple turnstile antenna for OSCAR use. Parts A and C are made from RG-59/U or RG-11/U coaxial cable. B is made from RG-58/U. Dimensions for 10-meter antenna: A — 56 inches, B — 54 inches, C — to reach receiver, D — 16 feet. Mount 8 feet above ground. Dimensions for two-meter antenna: A — 13 inches, B — 13 inches, C — to reach transmitter, D — 39.75 inches. Mount 21 inches above a 45-inch diameter circle of metal screen.

Table 4
Sample AMSAT-OSCAR 7 Morse Code Telemetry Frame

HI	180	196	195	196	
	296	298	296	245	
	365	373	368	341	
	442	438	447	448	
	548	500	500	544	
	600	600	600	650	HI

A telemetry frame consists of six lines of four channels. The word HI precedes and follows each frame. The first number of each individual measurement refers to the line number; the number remaining is substituted into the appropriate equation to determine the spacecraft's vital functions. For example, the first channel measures total solar array current, using the formula

$$I_t = 29.5 N \text{ (mA)}$$

where $N = 80$

$$I_t = (29.5) (80) \text{ mA} \\ = 2360 \text{ mA}$$

As the satellite passes overhead, you will notice a sudden change in the downlink frequency, without any change in your uplink. This is called Doppler shift.

Doppler

Just as the tone of a train whistle or car horn is higher in pitch as the vehicle approaches you, and then suddenly drops off as it passes, so the signal from the satellite is higher in frequency as it approaches you and drops quickly as it passes overhead and starts moving away from you. The nearer the pass is to an overhead one, the more abrupt the change. This Doppler effect makes prolonged contacts on the same frequency a matter of both stations constantly adjusting their transmit frequency as the downlink frequency is usually changing at different rates for the two stations.

Because of the greater complexity of zero beating another station, it is easier to get started in satellite communications by calling CQ. After you have been worked by the regulars (whom you will soon come to know well, as they are on almost every pass), you will develop the expertise to begin to answer CQs. The trick is to zero beat, or at least approximate, the other station's downlink, without filling the passband with your swishing VFO.

With a little practice you will learn the relationship between uplink and downlink with your equipment. When you hear a station calling CQ, determine

Table 5
AMSAT Nets and Bulletin Schedules

The following AMSAT Nets meet regularly to disseminate information to newcomers and to keep regular satellite users in communication with one another.

USA-East Coast Net	Wednesdays	0100Z	3,850 kHz LSB	Net Control W3ZM or W3UN
USA-Mid States Net	Wednesdays	0200Z	3,850 kHz LSB	Net Control W0CY
USA-West Coast Net	Wednesdays	0300Z	3,850 kHz LSB	Net Control W6CG
International Net	Sundays	1800Z	14,280 kHz USB	Net Control W3ZM or W3UN

Bulletins of general interest to those interested in amateur satellites are transmitted regularly on OSCAR-6 reference orbits, at approximately 10 minutes after ascending node. These bulletins are transmitted on a downlink frequency of approximately 29,490 kHz and can be received over most of eastern North America.

Educational bulletins are transmitted regularly by AMSAT Educational Bulletin Stations in North America on even numbered weekdays of the year via the AMSAT-OSCAR 6 2-to 10-meter transponder. These bulletins, addressed to schools, can be heard on 29.50 MHz during morning passes having equatorial crossings between 250 and 305 degrees W. longitude.

the approximate uplink frequency to bring your signal near his. Then send a string of dits to locate your signal. If it is five kilohertz above the CQ, move down that much (without transmitting) and you should be very close. Because of the duplex operation, you can make minor adjustments to your frequency as you answer the CQ. Major frequency changes of more than a kilohertz or two are best done with the transmitter off, however, to avoid disrupting QSOs in progress.

The process takes a little getting used to, as does any aspect of operating, but practice makes perfect in satellite communications as well, and soon this procedure will become as automatic as tuning up the transmitter.

Paperwork

Satellite communication is unique in that it gives you plenty of time to handle the paperwork chores in between contacts. The extraordinary nature of satellite contacts results in a modified reporting procedure. First, AMSAT should be kept informed of all your satellite efforts. Their responsibility includes all aspects of operating the satellites, from scheduling the operating time and QRP days to control functions. To convince government agencies they should cooperate in the launching of future amateur satellites, they need complete records of contacts and reception reports. Suitable reporting

forms are available for an s.a.s.e., from the ARRL or AMSAT.

After your first contact through the satellite, you may request a handsome Satellite Communicators Club certificate from AMSAT. Just check the appropriate box on the reporting form and enclose an s.a.s.e. You can request endorsement stickers for each satellite as well.

The QSL procedure is also a bit unusual. Filling in the band the contact was made on is not as simple as with hf contacts. Most OSCAR 6 and 7 mode A operators use 145/29 as the frequency on the QSL card. Additional information which should be included on the card is the satellite number and the orbit number. This helps ensure that the card will be accepted for the various satellite awards.

AMSAT has established a separate QSL bureau for confirming satellite (and only satellite) contacts. Merely send your cards and a few s.a.s.e.s to WA1EHF, Dennis Grindrod, 564 Stillman St., Bridgeport, CT 06604.

Amateur satellite communications is actually easier to do than describe, as you will discover in the middle of your second contact. And it introduces you to a whole new world of amateur radio. So, see you on the next pass!

Coming next month: more sophisticated tracking techniques, antenna polarizations, azimuth-elevation control and more.

Strays

I would like to get in touch with . . .
□ anyone who received calls from Amelia Earhart before her mysterious disappearance on July 2, 1937. Reports

indicate that hams heard calls from her, received bearings from her, and possibly even communicated with her. Copies of these reports could prove very im-

portant in light of new information recently uncovered. James Hajek, WASMI, 5802 Valkeith, Houston, TX 77096.

RFI Assistance List

Suppress your RFI difficulties and your frustration as well. Consumer service help is available from these manufacturers.

By Harold R. Richman,* W4CIZ

A list of addresses for manufacturers of home-entertainment equipment and their policies in dealing with RFI and TVI problems is part of each RFI packet. A supplement to that list appeared in *QST* for July, 1976. Here is an updated inventory of RFI assistance information.

Allen Organ Company

When a complaint is received via the dealer, Allen Organ Company sends the dealer an informational service bulletin on RFI and sufficient components to cover all amplifiers in the affected instrument. This service is offered at no cost to the customer. Refer RFI problems to the local Allen dealer. Inquiries may be directed to Mr. David L. George, National Service Manager, Macungie, PA 16162. Tel. 215-965-9801.

Arvin Industries, Inc.

Customer problems involving RFI should be referred to Mr. John Currey, Manager of Field Service, 15th Street, Columbus, IN 47201. Tel. 812-372-7271.

Audio Research Corporation

In the event of an RFI problem, customer may write to Mr. Scott Crist, Chief Engineer, Audio Research Corpo-

ration, P. O. Box 6003, Minneapolis, MN 55406. Tel. 612-721-2961.

Baldwin Piano & Organ Company

RFI complaints are usually handled by the local Baldwin service technician. Factory personnel are available to assist the technician when needed. Baldwin maintains its own staff of technical representatives who travel in the field and may be called upon to assist the dealer technician with difficult problems, including RFI. Baldwin provides technicians with a detailed instruction bulletin entitled "Hints on Suppressing RF Interference." RFI complaints should be referred to the local Baldwin dealer. Inquiries may be directed to Mr. Robert C. Scherer, Manager, Organ Technical Service, 1801 Gilbert Avenue, Cincinnati, OH 45202. Tel. 513-621-4300.

Benjamin Electronic Sound Co.

Refer RFI problems to Mr. Robert Rosenberg, Service Manager, 790 Park Avenue, Huntington, NY 11743. Tel. 516-673-8600.

Conn Organ Corporation

RFI complaints should be referred to the local Conn dealer, whether instrument is in or out of warranty. Factory assistance is available to the dealer if he is unable to correct the RFI. RFI problems encountered within term of

instrument warranty are usually corrected by the selling dealer without cost to the organ owner. Mr. Thomas A. Umbaugh, Assistant Service Manager, 1101 East Beardsley Avenue, Elkhart, IN 46514. Tel. 219-264-7511.

Dynaco-Dynakit Division of Tyco Laboratories

Inquiries related to RFI involving Dynaco products should be addressed to Customer Service Department, Dynaco Division Tyco Laboratories, Coles Road, P. O. Box 88, Blackwood, NJ 08012. Tel. 609-228-3200. Dynaco has available for owners of Dynakits an excellent information sheet on solving RFI problems.

Elpa Marketing Industries, Inc.

Complaints are handled with respect to parts and labor on an individual basis. Necessary modifications for RFI are made on a no-charge basis, parts and labor, during the term of instrument warranty. Beyond warranty, modification parts are available free of charge. Customer then pays for labor involved in the installation of the parts. Refer RFI problems to Mr. John F. King, Thorens Building, New Hyde Park, NY 11040. Tel. 516-746-3002.

Emerson Quiet Kool Company

Customer should refer RFI problems or inquiries related to Emerson or

*ARRL RFI Task Group, 3908 Lake Blvd., Annandale, VA 22003

Dumont products to Mr. Jerome Roth, 16th & Coles Streets, Jersey City, NJ 07302. Tel. 201-795-3500.

Garrard Plessey Consumer Products

Garrard advises the consumer on methods which may eliminate RFI. In unique cases where the suggestions are ineffectual, customer should refer the RFI problem to Mr. Havens or Mr. Coll. "Any RFI problems which are referred to us are always handled on a no-charge basis." Mr. Ed Havens or Mr. Ron Coll, Assistant Service Managers, 100 Commercial Street, Plainview, Long Island, NY 11803. Tel. 516-694-7377.

General Electric Company

RFI problems involving G.E. television and stereo consoles should be referred to the selling dealer. If the dealer is unable to correct the RFI, the consumer should refer the problem to Manager, Customer Relations, General Electric Company, Watterson City East, Appliance Park, Louisville, KY. RFI problems involving G. E. radios, record players, portable and audio products should similarly be referred to the dealer, or, as a last resort to Manager, Consumer Relations, General Electric Co., Electronics Park, Syracuse, NY 13201.

Gulbransen

Gulbransen cooperates with dealers and customers in offering suggested solutions to RFI. Gulbransen does not reimburse the consumer for servicing. However, when extreme cases are encountered due to proximity of the transmitter and relative power, the dealer may sometimes absorb the cost of servicing RFI problems. Customers should refer RFI problems to the local dealer. Inquiries may be directed to Mr. J. A. Iacono, Customer Service Supervisor, A Division of CBS, Inc., 8501 West Higgins Road, Chicago, IL 60631. Tel. 312-693-6262.

Hammond Organ Company

Hammond maintains a staff of technical service representatives who become directly involved in RFI cases that the dealer's service personnel are unable to solve. Hammond states that the services of engineering and technical field service departments under its control are provided to consumer and dealer alike without charge, whether or not a product is within warranty. RFI problems should be referred to the local Hammond dealer. The Hammond Technical Service Department asks that it be informed of any unique interference problem involving the Hammond instrument. Mr. J. J. Welch, Technical Field Service Mgr., 11700 Copenhagen Court, Franklin Park, IL 60131. Attention: Technical Service Department.

Harman-Kardon, Inc.

Customers should refer RFI problems to Mr. Len Gaynor, Manager of Customer Service. Customer RFI problems are handled on an individual basis. If local, the customer is invited to bring the affected set into the plant. Non-local customers are referred to the nearest warranty station. Corrective action is provided at no cost to the customer. Subsidiary of Jervis Corp., 55 Ames Court, Plainview, NY 11803. Tel. 516-681-4000.

Heath Company

If interference problems should arise, customers may contact the Heath Company, Technical Consultation Department, Benton Harbor, MI 49022, for individual assistance.

Hitachi Sales Corp. of America

Customers with RFI problems should contact the service manager of the nearest regional office: Western Regional Office, 401 W. Artesia Boulevard, Compton, CA 90220; Mideastern, 1400 Morse Avenue, Elk Grove Village, IL 60007; Eastern, 48-50 34th Street, Long Island, NY 11101; Midwestern, World Trade Center 183, 2050 Stemmons Freeway, Dallas, TX 75207.

JVC America, Inc.

Inquiries related to RFI involving JVC products may be referred to the office of Mr. Akira Deguchi, Chief Engineer, 50-35 56th Road, Maspeth, NY 11378. Tel. 212-392-7100.

Kenwood Electronics, Inc.

Kenwood asks that customers with RFI problems take the affected unit to an authorized service center where an adjustment will be made at no cost to the customer if the product is properly registered with Kenwood and within warranty. It is suggested that prior authorization for the return be obtained from Mr. Toshi Furutsuki, 15777 South Broadway, Gardena, CA 90248. Tel. 213-323-1400.

KLH Research & Development Corporation

KLH initially provides the customer with a listing of suggested steps for isolating and correcting RFI. If self help does not resolve the problem, the customer may write to Jeff Ayres, Manager, Customer Service, 30 Cross Street, Cambridge, MA 02139, for authorization to return the affected unit to the factory. Return can then be made through contact with the nearest KLH factory authorized service station. KLH absorbs the cost of service for units returned to the factory for any RFI problem. Customer bears the responsibility for shipping the unit to and from

the repairing service station.

Lafayette Radio Electronics Corp.

Customers should refer RFI problems involving Lafayette products to the local dealer. If the dealer cannot alleviate the problem the customer may contact Mr. P. Morgillo, Vice President, Engineering, 111 Jericho Turnpike, Syosset, Long Island, NY 11791. Tel. 516-921-7700.

Magnavox Consumer Electronics Co.

Customers should direct RFI problems involving Magnavox products to Magnavox at the nearest of the nine divisional service offices: Pacific Division — Magnavox Co., 1360 San Mateo Avenue, South San Francisco, CA 94080; Los Angeles Division — Magnavox Co., 2645 Maricopa St., Torrance, CA 90503; Southwestern Division — Magnavox Co., 8813 John Carpenter Highway, Dallas, TX 75247; Great Plains Division — Magnavox Co., 7510 Frontage Road, Skokie, IL 60076; Great Lakes Division — Magnavox Co., 24092 Detroit Road, Westlake, OH 44145; Southeastern Division — Magnavox Co., 1898 Leland Drive, Marietta, GA 30062; Northeastern Division — Magnavox Co., 607 North Avenue, Door 17, Wakefield, MA 01880; New York Division — Magnavox Co., 161 East Union Avenue, East Rutherford, NJ 07073; Mid-Atlantic Division — Magnavox Co., 2201 Route 38, Suite 750, Cherry Hill, NJ 08034.

Montgomery Ward

Service for RFI should be obtained from the nearest Montgomery Ward location. If service is not obtainable locally, customer may write to the customer service product manager at the corporate headquarters in Chicago. Corporate Offices, 535 West Chicago Avenue, P. O. Box 8339, Chicago, IL 60680. The Montgomery Ward field service organization can call upon factory and corporate engineering talent for assistance in handling difficult RFI problems.

Norlin Music, Inc.

Norlin offers local service organizations technical help in treating RFI through the Norlin Service Manager and his staff assistants. Customers should refer RFI problems to the local Lowrey dealer. Inquiries may be directed to Norman B. Erickson, Director of Engineering, 7373 North Cicero Avenue, Lincolnwood, IL 60466.

North American Phillips Corp.

Each RFI situation is handled individually by the service manager of the particular division whose product is involved. Inquiries related to RFI should be addressed to the proper division.

sion of North American Phillips Corporation. 100 E. 42nd Street, New York, NY 10017. Tel. 212-697-3600.

Nutone Division

Refer RFI problems to Mr. Norman W. Aims, W8JYD, Consumer Relations Department, Scovill Housing Products Group, Madison & Red Bank Roads, Cincinnati, OH 45227. Tel. 513-527-5415.

Quasar Electronics Corporation

For a high-pass filter, consumer should contact Quasar Electronics Corporation, Consumer Relations Manager, 9401 West Grand Avenue, Franklin Park, IL 60131. Model and serial number of the receiver, frequency of the interfering signal if known, should be included with the written request, as well as whether sound or picture, or both are affected. The Quasar distributor serving the local area should be contacted relative to any other interference problem that is unique to Quasar products.

Radio Shack

Customers who encounter unique interference problems involving Radio Shack audio products may write to Mr. Frank Roberts, Product Development Manager, or Mr. Peter Falcone, National Quality Control Manager, National Headquarters, 2617 West Seventh Street, Fort Worth, TX 76107. Tel. 817-335-3711.

Schober Organ Corporation

Customers with RFI problems are supplied with the necessary parts, free of charge, to correct the trouble. Schober Organ Corp. also assists customer in location of offending stages in the organ. Refer RFI problems to Mr. Warren A. Boehling, Development Engineer, 43 West 61st Street, New York, NY 10023. Tel. 212-586-7552.

H. H. Scott, Inc.

Manufacturer offers simple instruction sheet to aid customers in resolving problems involving RF pickup. The information includes suggestions about suitable equipment grounding, power line bypassing, hints and suggestions on how to determine where RF is entering the equipment. Refer RFI problems to Mr. D. F. Merryman, Engineering Dept., 111 Powder Mill Road, Maynard, MA 01754. Tel. 617-897-8801.

Sears, Roebuck & Company

Sears asks that customers with an RFI problem involving a Sears product contact the nearest Sears service department for assistance. Inquiries may be directed to Mr. R. C. Good, Manager, Marketing Communications, Home Appliances, Dept. 703, Sears Tower,

Chicago, IL 60684.

Sharp Electronics Corporation

Sharp Electronics will, with proof of purchase, supply customers with a Drake TV-300 high-pass filter at no cost. Audio rectification problems are handled on an individual basis by the Sharp Electronics Service Department. Refer RFI to Service Manager, 10 Keystone Place, P. O. Box 588, Paramus, NJ 07652. Tel. 201-265-5600.

Sherwood Electronic Laboratories, Inc.

Customers with interference problems should contact Mr. John Davis, Service Laboratory Manager, Sherwood Electronic Laboratories, Inc., 4300 N. California Avenue, Chicago, IL 60618. Tel. 312-478-7300.

Shure Brothers, Inc.

Manufacturer recommends the use of balanced line, low-impedance microphones, cables . . . If an RFI problem persists after the above measures have been taken, the consumer should contact Shure Brothers, Inc. with specifics, so that they may be able to help solve the problem. Refer RFI problems to Mr. F. F. Hoffman, Customer Service Manager, 222 Hartrey Avenue, Evanston, IL 60204. Tel. 312-679-5830.

GTE Sylvania, Inc. (Philco)

Sylvania Policy: "Factory field service and field engineering personnel work together to solve many of the TVI and audio rectification problems. If the consumer has an interference condition, he should contact his local dealer. He is in touch with the manufacturer's services that will help resolve it." Consumer should contact the dealer and work through their services first. RFI problems are handled on an individual basis. Sylvania has available for their technicians, an excellent pictorial TVI training manual titled, *Diagnosis, Identification and Elimination of TVI*. GTE Sylvania, Inc., Entertainment Products Group, Group Headquarters, 700 Ellicott Street, Batavia, NY 14020. Tel. 716-343-3470. Mr. Jack Berquist, Field Training Supervisor.

Tandberg of America, Inc.

When RFI occurs in Tandberg products the manufacturer suggests that the unit be returned to them. "We will do any modification possible to eliminate the RFI." Prior authorization should be obtained from Mr. Tor Sivertsen prior to return of the unit. Mr. Tor Sivertsen, Technical Manager, Labriola Court, Armonk, NY 10504. Tel. 212-892-7010.

Thomas Organ Company

RFI is usually resolved at the dealer level. If the manufacturer's field service

is made aware of a consumer complaint regarding RFI, they contact the seller and advise him on how to eliminate the problem. Should that fail, "we continue to pursue the problem utilizing our own people." Thomas Organ Company has six field service engineers. In the event of a call for assistance, an engineer personally contacts the consumer by telephone, makes an appointment to visit the home of the consumer to correct the RFI condition, with or without the dealer's technician. "We do not charge the consumer for this service." Refer RFI complaints to the dealer. Inquiries may be directed to Mr. Daniel E. Hofer, Manager, Field Service, 7310 North Lehigh Avenue, Chicago, IL 60648. Tel. 312-647-0700.

U. S. Pioneer Electronics Corp.

Consumers in the Eastern Region may contact Mr. Fred Ellis, 75 Oxford Drive, Moonachie, NJ 07074; in the Midwest, Mr. John Kempinski, 1500 Greenleaf Avenue, Elk Grove Village, IL; in the Western Region, Mr. Steve Hase, 13300 South Estrella Avenue, Gardena, CA.

Yamaha International Corporation

Yamaha organization attempts to cure each RFI problem on an individual basis. Yamaha supplies all necessary technical information at no charge. If interference is due to design error, Yamaha takes steps at its own expense to remedy the problem. Refer RFI problems to the local dealer. The dealers are kept well informed and current on RFI countermeasures. Inquiries may be directed to Mr. Dan Bryden, WA6PXO, Electronic Service Department, 6600 Orangethorpe Avenue, Buena Park, CA 90622. Tel. 714-522-9011.

Zenith Radio Corporation

Zenith gives consideration to handling and providing relief for RFI problems on a case-by-case basis. RFI problems should be referred to Service Division, Zenith Radio Corporation, 5600 West Jarvis Avenue, Niles, IL 60648. RFI referrals should include model and serial number of the effected product. Customers with a unique, difficult RFI problem may direct a letter to Mr. Brian J. Marohnic, W9DCN, National Service Manager, same address.

Ms. Sally Browne, Director of Consumer Affairs, Consumer Electronics Group, Electronic Industries Association (EIA), 2001 Eye Street, N.W., Washington, DC 20006. Tel. 202-659-2200, may be contacted for assistance in handling RFI problems involving manufacturers who are not listed here.

Amateur Radio Celebrates 20th Anniversary of Sister Cities International

From high atop the Sheraton Hotel in Mobile, Alabama, N4SCI sends the message to the world: The Sister Cities program is 20 years old! You too can get involved.

By Hal Steinman,* K1FHN

For the third year in a row amateur radio played an active and important role at the annual conference of Sister Cities International. This year's conference — celebrating the 20th anniversary of Sister Cities International — was held in historic Mobile, Alabama. Members of the Mobile Amateur Radio Club did an outstanding job of setting up and operating special events station N4SCI for the four days of the conference. Attending this annual affair were about 500 delegates from over 35 countries. To many of the delegates from overseas, N4SCI was their first exposure to amateur radio. We hope that the impressions

they received of amateur radio at this conference will further the cause of amateur radio in their native lands.

Sister Cities Program

Inaugurated in 1956, the idea behind the Sister Cities program is to pair cities in the U.S. with cities overseas and to establish cultural exchange programs between the two cities. These cultural exchange programs can take many forms: Cities can exchange teachers, for example. Or the local museums can exchange museum pieces. The city of Palo Alto, California, provided its Sister City, Oaxaca, Mexico, with an astronomical observatory! Palo Alto constructed and equipped the observatory,

and Oaxaca provided the architecture, labor and location. Recently it was realized that the most powerful cultural exchange program of all — amateur radio — was still relatively untapped. As a communications medium, amateur radio has no equal. Gone are all considerations of race, country of origin, age and creed. Amateurs in all countries want to communicate with one another; radio waves do not stop at a country's border. Sister Cities International also wants to break down barriers to international understanding. Amateur radio and Sister Cities International are a natural for each other!

A milestone in the continuing relationship between amateur radio and Sister Cities International came in September 1975 when the Executive Committee of the League approved the *Cooperative Understanding Between the American Radio Relay League and Sister Cities International*. In this document the ARRL and SCI pledged their resources to each other in pursuit of amateur radio's and SCI's common goals of international goodwill and increased understanding among nations.

Local Involvement

The great backbone of the ARRL is its vast network of affiliated clubs. These clubs play a prime role in boosting amateur radio. They create growth by conducting classes and creating new hams. They also have the potential of playing a huge public relations role. By performing public service deeds for the community, be it providing communications for a local parade, or saving the day by maintaining communications in the face of disaster, they enhance the



Louis Wozar, president of Sister Cities International, and Dewey Crowder, convention chairman, ham it up for the camera. Ralph Holberg, W4AMD, looks on.



Bruce McCrory, WB4BXM, station chairman of N4SCI, takes SCI convention chairman Dewey Crowder's request for more information about amateur radio.

image of amateur radio in the eyes of the mayor, civic officials, and each and every citizen. It is here that the Sister Cities program enters the picture.

The Sister Cities program is a vehicle through which local amateur radio clubs can gain more exposure to government officials and the public. This is good for the amateur radio club, and it's good for amateur radio. It's a way to show non-hams exactly what amateur radio is about: to show them the public spiritedness of amateurs, their value to the community, and their value to international relations.

On an international level, there is even more to be gained by close cooperation between amateur radio and Sister Cities International. We mentioned barriers to international understanding before. It is these barriers that have prevented the establishment of more reciprocal operating agreements between countries. It is these barriers that have prevented the establishment of more third-party agreements. With SCI's help to break down these barriers, we can move closer to these goals.

Mobile, Alabama - 1976

The Mobile Amateur Radio Club's participation at the 20th anniversary conference of SCI is a splendid example of local involvement in the Sister Cities program. The setting up and operating of a special events station can only be done on the local level; it requires a lot of hard work, but it's also a lot of fun. Additionally, there is a great deal of satisfaction in knowing that you have helped to put amateur radio in the international limelight.

N4SCI was located on the 17th floor

of the Sheraton Hotel in Mobile, Alabama. From the station one had a picture-window view of downtown Mobile, which at night was absolutely breathtaking. The station was situated so that it was in direct view of the delegates as they got off the elevator to attend meetings on the 17th floor. There was a constant flow of delegates through the station, and this is what is most important to a special events station: exposure to the public. Many of the attendees asked for further information on how amateur radio can help the Sister Cities program; and they will be put in touch with amateur radio clubs in their hometowns.

Perhaps the most satisfying experience for the members of the Mobile Amateur Radio Club was explaining amateur radio to several delegates who had no previous introduction to amateur radio; many of these delegates were from countries which have only a handful of amateurs compared to the United States. These people were seeing amateur radio for the first time; depending on how it was presented to them they could either leave in a state of confusion and wonder of how amateur radio could ever be of use to them, or with a deeper understanding and appreciation for the practical assistance that amateur radio can provide in the Sister Cities program. It may not be apparent at first, but some of the visitors to N4SCI may someday play a role in determining the



Fred Brittan, chairman of the board of Sister Cities International, takes his turn at the mic.

future of amateur frequencies. Presenting amateur radio to these people is truly an awesome responsibility, but it's one of the challenges of the Sister Cities program. The members of the Mobile Amateur Radio Club did a great job, with true southern hospitality.

Get Involved

There are over 500 cities in the U.S. with active Sister Cities programs. There is probably one in your area. If you or your amateur radio club would like to get involved with this exciting project, write Hq., and we will put you in touch with the Sister Cities officials in your community. Someday, we may be writing about *you* in *QST*. QST



King Louis XIV and his entourage visit N4SCI during Mardi Gras night.

The U.S. WARC Position Begins to Take Shape

The FCC says some amateur band expansion is possible, but new hf bands will take more "convincing."

By David Sumner,* K1ZZ

On November 24, 1976, the Federal Communications Commission took an action which is of vital importance to every user of the radio spectrum. The resulting document is officially entitled, "Third Notice of Inquiry (NOI) in Docket 20271, an inquiry relative to preparation for a General World Administrative Radio Conference (WARC) of the International Telecommunication Union to consider revision of the International Radio Regulations." It represents an attempt on the part of the Commission's International Conference Staff to resolve the conflicts between the various services in the U.S. which require access to the radio spectrum. As such, it indicates the relative priorities which impartial frequency management experts place upon the conflicting needs of these services, including ours. And, while the Notice contains both good news and disappointments for amateurs, the general picture at this stage is optimistic.

There are both good news and disappointments for amateurs, but the general picture is optimistic.

Ironically, though the impact of the 1979 WARC will not be felt until the next decade, and while the proceeding will probably determine the spectrum which will be available to services for the remainder of this century, there is so much to be done between now and the opening of the Conference in September, 1979, that, of necessity, the Commission's deadline for filing comments in response to the Third Notice was January 31, 1977 — which probably will have passed by the time you read these words. The reason for the tight

schedule is that the Notice was released somewhat later than was originally expected. So the work would not slip still further behind schedule, it was necessary for the Commission to provide a shorter comment period than was generally felt desirable. Because *QST* deadlines made it impossible to cover the document in the January issue (other than with a brief "League Lines" item), the League had to use other means to insure an adequate response on behalf of the amateur radio community. As soon as possible after the

release of the 188-page document, on December 6, extracts covering those items of interest to radio amateurs were mailed to the 1500 ARRL-affiliated radio clubs and to more than 600 Assistant Directors. The availability of the extracts was publicized as widely as possible, and hundreds of additional requests for copies were filled by League hq. upon receipt of a stamped, self-addressed envelope. The same mailing highlighted those points to which amateurs might address themselves in filing comments in support of, or in

Table 1

How the U.S. amateur bands below 1 GHz might be affected by WARC proposals. Shown are the present allocations to the Amateur Radio Service, the Advisory Committee for Amateur Radio proposal and the FCC Third Notice of Inquiry proposal. Unless otherwise indicated, frequencies are in MHz and * denotes exclusive allocation.

BAND (METERS)	PRESENT ALLOCATION	ACAR PROPOSAL	FCC PROPOSAL
1750	None	160-200 kHz*	160-190 kHz*
160	1.8-2.0 shared extensively	1.715-2.0*	1.75-1.8 shared, 1.8-1.9*
80	3.5-4.0 shared	3.5-4.0*	3.5-3.9*, 3.9-4.0 shared
40	7.0-7.1*, 7.1-7.3 shared with broadcasting in other regions	7.0-7.5*	6.95-7.1*, 7.1-7.3 shared with broadcasting in other regions
30	None	10.1-10.6*	None
20	14.0-14.35*	14.0-14.5*	13.95-14.4*
17	None	18.1-18.6*	None
15	21.0-21.45*	21.0-21.5*	20.7-21.2*
12	None	24.0-24.5*	None
10	28.0-29.7*	No change	No change
6	50.0-54.0*	No change	No change
2	144-148* (amateur satellites 144-146)	No change	No change
1-1/4	200-225 shared with government radio-location	Add amateur satellite operation; no other change	Add amateur satellite, share with mobile
(CM)			
70	420-450 shared with radiolocation (amateur satellites 435-438)	Greater flexibility for amateur satellites, 435-438; no other change	As proposed by ACAR
33	None	902-928 shared with industrial heating, scientific, and medical devices (ISM)	902-928 shared with ISM, fixed, radiolocation, and mobile

*Assistant General Manager, ARRL

opposition to, various aspects of the Notice.

Of course, while the thoughtful comments of individual amateurs and local clubs are encouraged at every stage of WARC preparation, the League fully accepts its responsibility as the primary spokesman for amateur radio in this proceeding. No aspect of U.S. (or Canadian) WARC preparation has taken place without the participation of the League to the fullest extent possible. Much of this participation was described in November, 1976, *QST*, page 9, and need not be repeated here. In response to the Third Notice in Docket 20271, the League's staff has drafted a comprehensive document which will have been presented to the Board of Directors for approval at its annual meeting on January 20. It is fair to say that this draft has been four years in the making, for it has been that long since preparatory work began on the specific proposals which have been adopted, in part, in the Third Notice.

The ARRL mailed out thousands of extracts from the document as soon as it was released.

As described in the aforementioned November, 1976, *QST* editorial, the FCC has had another major source of input to its WARC preparations in addition to the comments in Docket

20271: its Service Working Groups, made up of industry representatives of the various radio services. One of the most active of these groups has been the Advisory Committee for Amateur Radio (ACAR), in which the League has participated fully. The ACAR proposals were developed in a series of meetings which began in May, 1975, and were considered carefully by the Commission's International Conference Staff in its development of the Third NOI. Many — but by no means all — of the requirements identified by the ACAR were met in the process of resolving the conflicts between the services. The present amateur bands in the U.S., the ACAR proposals, and the FCC's Third NOI proposals are summarized in Tables 1 and 2.

In the letter accompanying the extracts which were mailed during December and January, the League called attention to three broad areas in which comment by individual amateurs and local clubs would be beneficial. First, favorable comment should be made wherever the Commission has taken action with which we agree. This is to reinforce positions already taken, in the face of possible opposition from other services. For example, the proposed new band at 160 — 190 kHz is bound to come in for close scrutiny by the services now occupying the neighboring bands; a lack of favorable comment by amateurs might be interpreted as a lack of interest in this valuable new allocation.

At 160 meters, the Commission proposes a 100-kHz exclusive segment and a 50-kHz shared segment. While this may appear at first glance to be a net loss of 50 kHz, the real result would be a significant improvement over the present sharing arrangement with its severe limitations on frequencies and power. Radiolocation and other services are anxious to have more spectrum here, and are bound to file comments on their own behalf. At 80 meters, the Commission proposes making 80 percent of the band exclusively amateur — a significant improvement over the present arrangement, where the entire band is shared with a multitude of services. The high-frequency broadcasting advocates will certainly press their case for a band at 3900-4000 kHz, which would displace a high percentage of amateur public service nets. Favorable comment by amateurs would help to reinforce the decision not to create a new broadcasting band here, at the expense of the Amateur Radio Service.

One of the most active FCC Service Working Groups has been the Advisory Committee for Amateur Radio, in which the League has participated fully.

At 40 meters, the Commission proposes a 50-kHz expansion. This is not as much of an expansion as desired by the ACAR, but would be an improvement over the present situation in this crowded band. A 100-kHz increase at 20 meters is certainly worthy of favorable comment. Maintenance of the bands at 10, 6 and 2 meters, and at most of the higher frequencies, is also positive action which should be supported by amateurs.

The deadline for filing comments may have passed by the time you read these words.

On the other hand, adverse comment is in order in response to the proposed changes at 21 MHz. After careful analysis of the needs of all services in that part of the spectrum, the League's own WARC preparatory staff has concluded that these needs can be met without a major realignment of the amateur allocation. Whether the present allocation can be preserved without surrendering the 50-kHz gain proposed by the Commission is a question which has not yet been resolved. However, comments about the impact of a dramatic shift in the band allocation, which would necessitate the modifying of hundreds of thousands of existing units of amateur

Table 2

How the U.S. amateur bands above 1 GHz might be affected by WARC proposals. Shown are the present allocations to the Amateur Radio Service, the Advisory Committee for Amateur Radio proposal and the FCC Third Notice of Inquiry proposal. Unless otherwise indicated, frequencies are in MHz. (Sat. means to add amateur satellites.)

PRESENT ALLOCATION	ACAR PROPOSAL	FCC PROPOSAL
1215-1300 shared with radiolocation (RL)	1290-1300 (Sat.) no other change	Sat. 1290-1300, add sharing with radionavigation satellite at 1215-1240
2300-2450 shared with RL, fixed, mobile	2300-2310 (Sat.) no other change	Sat. 2310-2320, add sharing with wireless transmission of power at 2400-2450
3300-3400 shared with RL, 3400-3500 shared with RL, fixed-satellite (space to earth)	3400-3410 (Sat.) no other change	Sat. 3400-3410 (subject to agreement by government users), add sharing with fixed at 3300-3400
5650-5670 shared with RL, 5670-5725 shared with RL and space research (deep space), 6725-5925 shared with RL and ISM	5650-5670 (Sat.), no other change	Sat. 5650-5670, sharing with wireless transmission of power at 5750-5850
10.0-10.5 GHz shared with RL	10.475-10.5 GHz (Sat.), no other change	No change
24.0-24.05 GHz shared with ISM, 24.05-24.25 GHz shared with ISM and RL (amateur satellites at 24.0-24.05 GHz)	No change	Add sharing with radioastronomy at 24.16 GHz
48-50, 71-76, 165-170, 240-250, above 300 GHz shared with experimental stations	Add amateur satellites in all bands	Delete 48-50 GHz, add amateur satellites and various sharing arrangements in other bands

equipment, are certainly in order.

Finally, the fact that the Commission has made no provision for *any* amateur allocation at 10, 18, and 24 MHz indicates that this need has not been adequately recognized. Even a narrow band at 10 MHz would permit improved communication between amateurs in all parts of the world at those times when the maximum usable frequency does not reach 14 MHz. Now,

Even a narrow band at 10 MHz would permit improved communication between amateurs.

such communication must be conducted at 7 MHz, with relatively high power, because of interference from other services and absorption. New bands at 18 and 24 MHz would also assist the Amateur Radio Service in using efficient spectrum management techniques. All three new bands would help bear the heavy load of new stations, which is expected to swell the number of amateur stations worldwide from its present level of 750,000 to more than one million in 1980, and to more than six million by 2000. Although the Commission sees a continuing need for Fixed Service frequencies for the next several years, actually this need is decreasing and will continue to decrease as satellites, undersea cables, and microwave links proliferate. The solution may lie in a sharing arrangement between the

Fixed and Amateur Services, with a gradual phasing-out of Fixed Service assignments in the bands in question over a 20-year period.

The cover letter which accompanied the League's mailing of extracts from the Commission's Notice of Inquiry also called attention to the need for informed comments on the proposals made at the uhf and microwaves. While there would be only one deletion of an amateur allocation, at 48 GHz, some additional sharing arrangements are proposed which might have an adverse effect on amateur occupancy (see Table

A Fourth Notice of Inquiry will be coming in about three months.

2). Also, while most of the ACAR requests for amateur satellite access are included in the Commission's version of the table, the satellite band at 10.475-10.5 GHz is not. The new band at 902-928 MHz, although subject to significant limitations because of sharing with other services, would be sufficiently close to the new Land Mobile band to permit useful cross-fertilization between the two services. On the other hand, the proposed sharing at 220 MHz with the Mobile Service would have a severe negative impact upon the development of amateur repeaters in that band. (However, this proposal does *not* mean that the Commission has given any further consideration to a Class E CB

service at 220 MHz. The inclusion of this sharing arrangement in the proposed table simply keeps the Commission's options open.)

What will the final outcome be? At this point, we can only speculate.

What's next? Interested parties will have until February 21 to file comments in reply to those filed by others. After that, the Commission's staff will digest all of the comments and possibly modify the draft table in response to those comments. This process will continue with a Fourth Notice of Inquiry to be released in about three months. The final draft of the U.S. proposals will be completed by spring of next year, when coordination with the other member-nations of the ITU will commence. The official U.S. proposals will be forwarded to the ITU by January 1979. The remainder of the time available before the opening of the Conference in September, 1979, will be devoted to completing the U.S. position papers, including contingency plans.

What will the final outcome be? At this point, even the best informed of us can engage in little more than idle speculation. But there will be a lot going on, and the League will be in the thick of it. We'll report as much as we can in the pages of *QST*. QST

Strays

EXPANSION TO ALLEVIATE CRAMPED CONDITIONS AT HQ.

□ Building expansion — popular coffee-machine chatter around ARRL headquarters these days. Why? Probably it's because many of your staff members are finding difficulty navigating around piles of books, materials, supplies and even desks stacked in hallways. In fact, in our 12- by 20-foot outgoing-mail room eleven or twelve people work sorting, stuffing and bagging the more than 500 pounds of *first-class business mail* which is carted off to the Post Office each day! From another corner of the building, we ship out another 2,500 pounds of mail daily to the Newington P. O. This includes individual orders for books and supplies which are not practical for shipment by freight. By freight we ship out over 10,000 pounds of books on a single day! And we didn't even mention the incoming mail.

Needless to say, these are some of the pressing reasons more space is needed at 225 Main Street. The Board of Directors foresaw the potential rapid growth of amateur radio and, in fact, authorized the addition to the present facility. That was last July. We anticipated that an extension of the present building by 75 feet to the rear would be more than adequate. We even thought there would be some room left over. Original plans called for a 5,000-square-foot storage area for the *Handbook* and other publications. In the back of our minds was the thought that maybe 10 years down the road we might want to convert that stockroom to another office area if need be, and we wouldn't be looking toward another revision to the building complex. But as we sit here in January about to award the contract to the "lowest bidder," it seems ironic that we have already converted one-third of that stockroom to office space.

Why? The Overseas QSL Bureau needs more room every day: the mail bags get larger every day, the phone rings more each day, more visitors come in each day, and like that, and like that (as one NYC detective likes to say).

Here is the plan in a nutshell. Construction will begin during the month of February (assuming we are not snowed under — no pun intended). The addition will be two floors extending 75 feet to the rear of the building for the full width (approximately 117 feet). The revision should be completed sometime about midsummer. Come on in and look us over. There are two excuses: one to see the actual construction underway, the other to see the final product. In either event, we'd be glad to show you around. If you're not sure how to get here, drop us a note. We'd be glad to send you a map of the local roads and major highways leading into central Connecticut. — WIFBY

Happy Birthday, W1AW!

Steeped in a colorful heritage, W1AW commemorates forty years of use as the ARRL call. Yet, in every sense this classic image is "today's" model station.

By George Hart,* W1NJM

The year 1936 had not been with us long when ARRL was hit three sharp blows by Dame Fate. First came the sudden passing of ARRL Vice President Charlie Stewart, W3ZS, on February 12. Only five days later, on February 17, our beloved founder and first president, Hiram Percy Maxim, W1AW, joined Silent Keys. The League was rocked to its foundations by this double blow.¹

The Great Flood of 1936

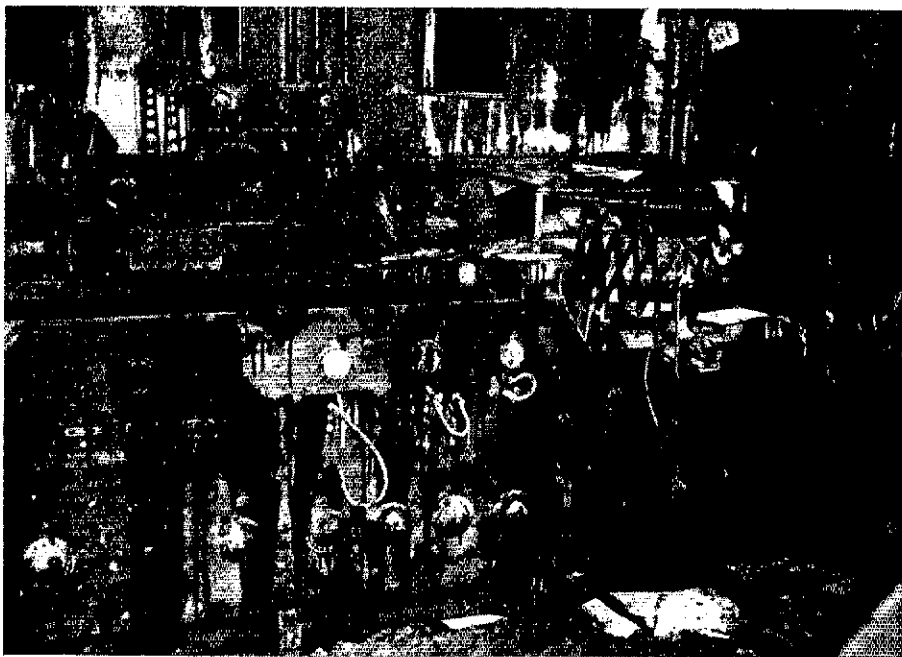
But fate was not yet through with us. The winter season of 1935-36 was one of the severest ever in terms of snowfall in the northeast. This was aggravated by heavy spring rain, and devastating floods resulted. In Hartford, the Connecticut River overflowed the dikes that had been constructed to prevent just this, and water swirled over the municipal airport, Brainard Field.

So what? So plenty, Brainard Field was where Headquarters station W1MK was located. The water rose so rapidly that only a few loose items could be rescued. Ham rigs in those days were big and heavy, especially the high-powered equipment in use at W1MK. The station was a total loss. It was the end of W1MK.²

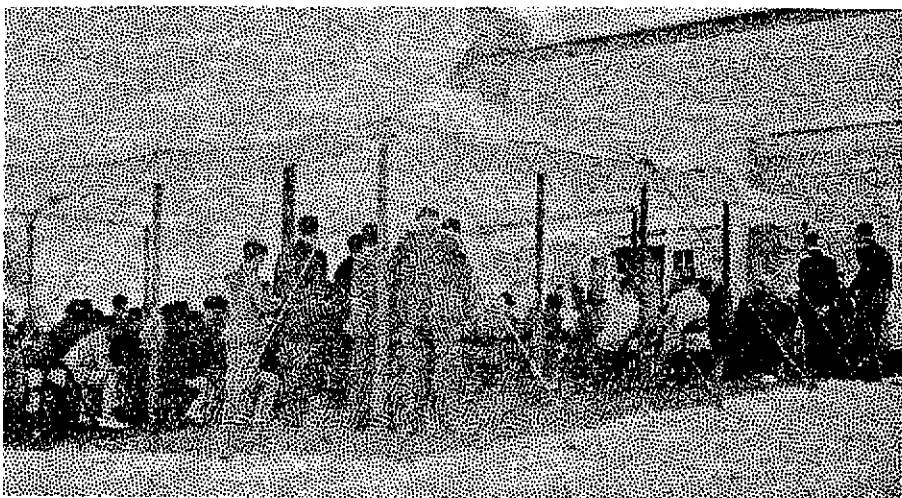
The scene of Headquarters station operation was moved to the West Hartford office of the League and a rig was set up in a corner of the Communications Department, using some salvaged parts, including the HRO receiver, and parts on hand from the lab and elsewhere. The call used was W1NF. Headquarters bulletins and other operation continued on reduced power until additional facilities could be arranged.

The Board Acts

The call W1MK was never used by ARRL headquarters again. In May, the Board of Directors authorized funds for

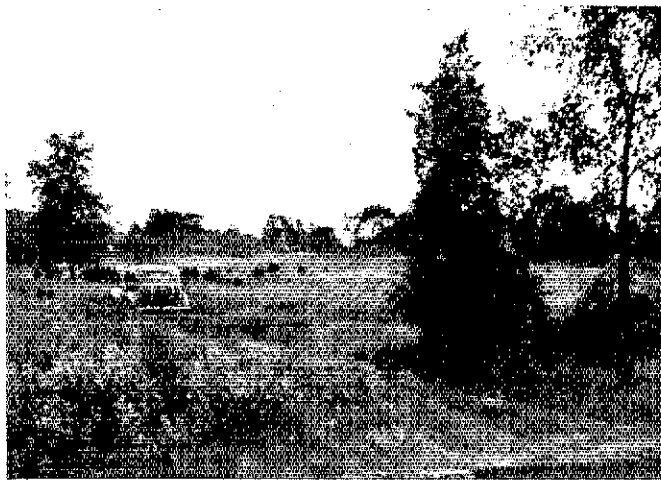


The March, 1936, flood completely inundated our then Headquarters station, W1MK (above), with this result when the waters receded. W1MK was no more. Out of this tragedy, some two years later, came the rebirth of a new, bigger, better Headquarters station, W1AW. The dedication ceremony (below) took place on September 2, 1938, Hiram Percy Maxim's birthday. It was broadcast over WTIC and the CBS nationwide network. The Maxim Memorial Relay, signaling the beginning of a new era in Headquarters station history, took place that night.

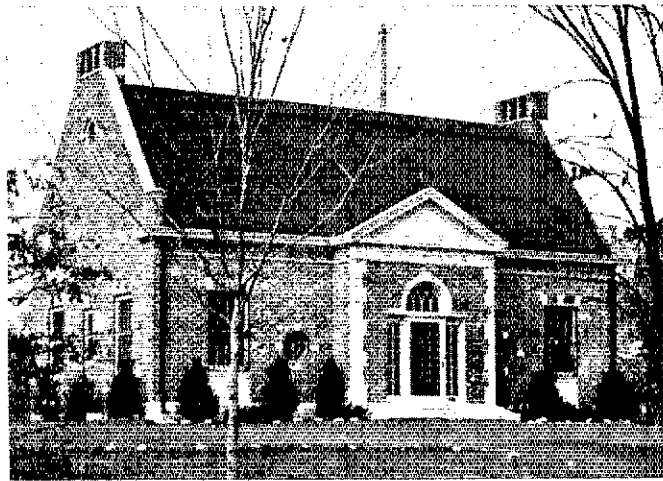


*Communications Manager, ARRL.

¹Footnotes appear on page 68.



Above is the W1AW site just after purchase in 1937. The W1BD1 car is parked on what is now Starr Ave., looking westward from Main St., Newington. W1AW will be located just out of the picture at the right. Below (left), a view from Starr Ave. looking northward today, with the Headquarters offices looming large and W1AW out of the picture at the right.



W1AW was dedicated in 1938, and above is how the station looked from Main St. at that time, with the front facing Main St. Below (right), W1AW today, showing the OSCAR antenna over the far chimney and one of three beam-supporting towers. What was the front is now the back, with the new front facing the Headquarters building.

the construction of a new station as a memorial to founder Maxim, and negotiations commenced with FCC for acquisition of Maxim's call, W1AW, to be used at this station.

W1AW Assigned

In February of 1937 W1AW was assigned to the League's Headquarters Operators' Club in a special FCC action. The call was first used from the West Hartford location at 6 P.M. on February 17 (the first anniversary of HPM's death) in a bulletin from ARRL President Woodruff, W8CMP, kicking off an operating event called the Maxim Memorial Relay.³ Several hundred messages were handled that night and during the ensuing days by W1AW, headquarters staffers, other Connecticut amateurs and the corps of ORS and OPS appointees. W1BD1's account of the relay in April '37 *QST* (p. 10) wound up with: "It was a great relay!"

From that day to this, W1AW has

been the call used at the ARRL headquarters station — forty years of outstanding achievement in the service of the amateur fraternity!

Selection of Site

The site eventually selected for the new station was in the town of Newington, CT, a rural-suburban community between Hartford and New Britain, with plenty of open country. It was the choice of several sites under consideration and was thoroughly checked out for propagation characteristics prior to purchase. This site is the same as that on which your Headquarters building now stands.

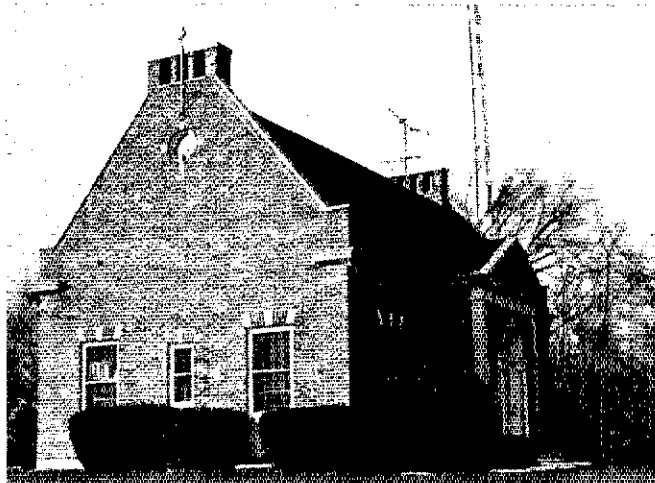
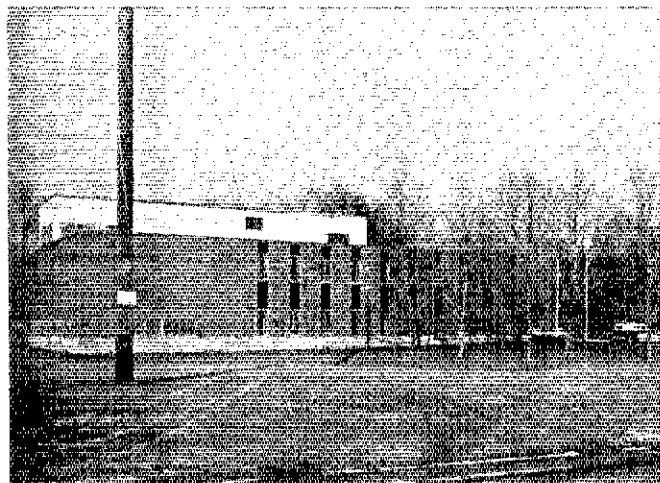
Construction

The first order of construction was the antenna farm, including a rhombic antenna directed so that W1AW's signal would be strong in western areas. Five wooden poles of western red cedar were ordered, arrived on the site in good

time, and were in place when the first snow flew in late fall of '37, ready to support the rhombic and other W1AW antennas. Building of the station commenced that fall and progressed through the winter and spring of '38. By summer it was ready for installation of transmitters and other equipment.

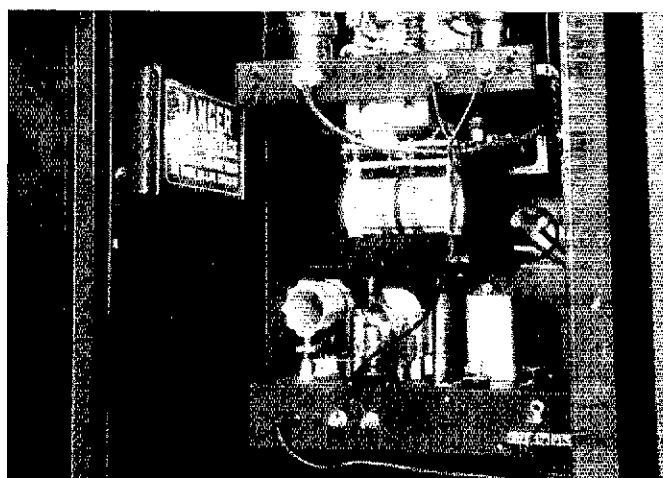
What transmitters? During the winter and spring months of 1937-38, Hal Bubb, W1JTD, W1AW's operator, put in many hours building new transmitters for W1AW, in the ARRL lab, with the advice and assistance of some of the Technical Department.⁴ Five complete kilowatt transmitters were planned to operate both phone (a-m, except on 40) and cw. By the time the building was ready, the transmitters were ready, and all that was left was the installation.

No simple job, that, but it was accomplished during July and August, including the erection of antennas. The rhombic proved itself in early tests. By





The above interior shot shows how W1AW looked at dedication time in 1938. That's Hal Bub, W1JTD, at the controls. The skinny guy in the rear is W3AMR (now W1NJM). Below (left), is the station today, with Chuck, W1WPR, at the main control console and Al, WA3JSU, at the visitor's position. The compact row of amplifiers and associated gear is partially visible on the right.



Inside one of the original transmitters, in this case, the 10-meter rig. Note the danger sign, which lit automatically when the door was opened. Below (right), a peek inside one of the modern cabinets, showing the back of four transverters furnishing excitation from a master exciter to four of the big linears. Also, note the interlocks on right.

the end of August, the station was operating, but not yet officially. This awaited yet another operating event.

That event took place on September 2, 1938, Maxim's birthday, following the dedication. The second Maxim Memorial Relay⁵ got under way, while WTIC broadcasted a program from inside the station, interviewing WIBDI amidst the clatter of keying relays as the two operators made contacts.

A hundred messages were started in the field, addressed to ARRL, commemorating the dedication. Participating amateurs were asked to assist in finding these messages and relaying them to their destination. Hundreds of other congratulatory messages were originated spontaneously in the field and relayed to Headquarters. But many amateurs just wanted to work W1AW, whose signals were outstanding on all bands. This continued throughout the night.

But tragedy continued to bedevil us.

The new W1AW had not been in operation two weeks before Ross Hull, *QST's* editor, was accidentally electrocuted in his home. Then, in late September, while W1AW was still ironing out its newness kinks, a hurricane swept up the coast, over Long Island Sound and smack into the middle of Connecticut, taking everybody by surprise and leaving W1AW without power, since the emergency generators had not yet been installed.⁶ Power was lost in midafternoon and stayed off for several days. W1AW was on the air, nevertheless; a group of Headquarters operators assembled some gear and operated as W1AW/1 from Stafford Springs, CT, one of the worst-stricken communities. W1AW's generators were installed shortly afterward and the station has been equipped with emergency power ever since.

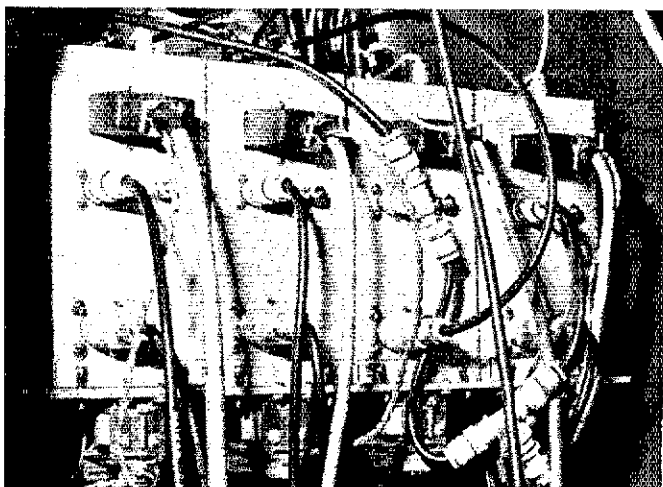
By this time, of course, the clouds of war were gathering in Europe, resulting eventually in our involvement in late

1941. W1AW continued to operate by special FCC dispensation,⁷ to send bulletins only, but on January 8, 1942, we made our last transmission and closed the station for the duration. Some of us wondered if the career of W1AW was to end after a period of only slightly over four years.

But no, following the Japanese surrender, W1AW was reactivated again by special FCC dispensation, before the amateur bands were reopened.⁸ The first postwar transmission from W1AW took place on October 31, 1945, following several days of feverish preparations to make the station airworthy. This transmission, heard by thousands of yearning amateurs, signaled the start of postwar amateur reactivation.

Fire!

Well, things went along pretty well until 1953, and that's when the fire occurred. Nobody knows for sure how it happened. Operator Murray Powell,



W1QIS, closed the station at the end of his shift at three o'clock one morning. Everything seemed in order. At 6 A.M. a passerby saw smoke coming out of the building and turned in the alarm. The fire burned a hole through the floor in the main operating room, directly behind the operating position. By the time firemen could break into the securely locked building, the smoldering hole was about four feet in diameter. Smoke damage was extensive, and the heat in the main operating room had melted polystyrene coil forms until the coils collapsed and were unusable.

Once the fire was out and we were free to enter, the first order of business was to get the station back on the air. All day we worked at it, replacing or straightening collapsed coils, replacing parts destroyed or rendered unusable by heat damage, testing and troubleshooting, while insurance appraisers surveyed the damage and arranged for restoration, and an electrical contractor ran auxiliary cables to replace those burned out. By 8 P.M., W1AW took the air with its regular bulletin. The code proficiency qualifying run scheduled for that evening went out on schedule. Not a single bulletin or code practice transmission was omitted because of the fire.

Modernization

By the early sixties, the old Bubb-built rack and panel rigs were beginning to show their age, although many modifications had been made through the years to keep them reasonably up to date. With a brand new Headquarters building going up across-lot, it seemed appropriate to modernize W1AW. Consequently, the building's interior was drastically remodeled and new equipment was ordered and installed. It was a startling transformation. The new amplifiers were linears built to special order, taking up less space than previously required. Partitions in the interior of the building were torn out and two new consoles were installed, one especially for visitor operation. Beam

antennas were put up for 20, 15 and 10 meters and modern omni-directional radiators for 6 and 2. The memorial lobby was changed so it would face the new Headquarters building. Anyone seeing the building before and after from the east (Main St.) side would recognize it as the same building. Inside, it looked completely different.

People at W1AW

If one were to ask the question: "Which single person had the most to do with the operation of W1AW during its forty years as ARRL headquarters station?" there could be only one answer: F. E. Handy, W1BDI, the League's communications manager for 42 years, 1925 to 1967. Ed not only was responsible for everything about W1AW, he also did all the leg work in setting up W1MK before it, and was deeply involved in the construction, maintenance and operation of both stations. Stand-outs among the two dozen or so personnel whose specific duty was to operate and attend the station were Hal Bubb, W1JTD, the first W1AW operator; Murray Powell, W1QIS, who operated W1AW 22 years until his retirement in 1972; and of course the present chief operator, Chuck Bender, W1WPR, now in his 25th year at the station. A complete chronology of W1MK/W1AW operators was given in April '73 *QST*, page 104.


W1AW Today

The station today is fully equipped for all popular modes of amateur operation and occasionally tries out something new. Amateur radio continues to change, more rapidly than ever, and W1AW has changed with it. New equipment has been added, obsolete or obsolescent equipment abandoned. Operation is frequently juggled to meet new needs, and antennas are modernized. More attention is being devoted to one-way transmissions. Visitors by the hundreds show up every summer, from all corners of the globe, and many of

them operate from the "visitor's console," a layout of gear used exclusively for this purpose that any amateur would be proud to have in his shack.

What's Ahead?

As amateur radio licensees become more numerous and the amateur bands more crowded, the demand for W1AW services increases, and W1AW strives to meet it. The cedar poles are getting old (almost 40 years!) but are still serviceable; however, they won't last forever and some day will have to be replaced. To increase western coverage, the immediate future calls for a new 120-foot tower with a 40-meter beam and stacked 20-meter beams. As newer techniques become popular, equipment to suit will be installed and operated at W1AW. If present trends continue, expansion of operating hours will be required, and this means increase in personnel. A new exciter for the five separate linear amplifiers is in the works. We see visions of 24-hour operation, more emphasis on training-oriented operation, and increased dissemination of current amateur radio news and general information. We also see, along with all this, the necessity for continued and increased support of the League from the amateur fraternity to make it possible for this and the League's many other nonpublishing programs to continue and to expand.

More than ever, W1AW is your Headquarters station, operated for your benefit and for a better, more progressive amateur radio. The fortieth anniversary of the use of the call is noteworthy. Let's hope the next forty years will be as progressive and beneficial for Amateur Radio Service. 

Footnotes

- ¹ April, 1936, *QST*, p. 7.
- ² May, 1936, *QST*, p. 20.
- ³ February, 1937, *QST*, p. 11.
- ⁴ July, 1938, *QST*, cover photo.
- ⁵ September, 1938, *QST*, p. 45.
- ⁶ November, 1938, *QST*, p. 11.
- ⁷ January, 1942, *QST*, yellow insert.
- ⁸ December, 1945, *QST*, p. 72.

Strays



□ These mountains are stalked by BEARS — the ones from the Boeing Employees Amateur Radio Society's search and rescue communications support group. Soon after the BEARS was founded, Roy Brashear, W7RJW, became active in establishing the group, which provides communications for the

King County (WA) Search and Rescue Association. He was its Emergency Coordinator until his retirement last year. Even now he is active as an assistant EC and is shown here by Mount St. Helens providing communications in the search for two hikers lost on the mountain in November.

Roy is strictly an hf man. This was the first time he was on the mic of a 2-meter rig. He admits that 2 meters might be here to stay, but he wouldn't be caught on the mountain without 80 meters along, too. — W47YIM



Next Month Is Auction Night

A change of pace from the regular monthly meeting + a booster for a sagging club treasury = Auction Night. Follow these proven formulas from clubs across the country who've done it.

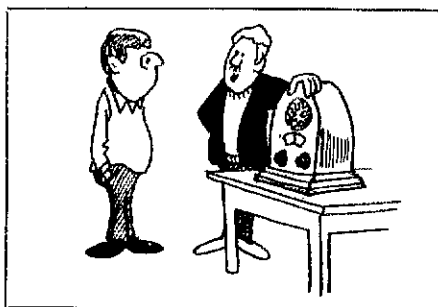
By Rosalie Cain,* WA1STO

“**O**ur favorite source of funds” — that is what the San Fernando Valley Radio Club (CA) members label their auctions. Is your club hurting for money? Tired of raising the dues and need new equipment for the club station? With one or two auctions a year, profit can be raked in for the club. Besides, commissions from equipment sales, bake sales or coffee/doughnut concessions at these functions help the treasury build up. Members often donate their miscellaneous equipment to the club to be sold with all money going to the treasury. If nothing else, an auction is a change of pace from the regular monthly meeting and you may just find that SWR bridge, dummy load or 24-hour clock of your dreams.

Send Out the Word

Want people to know about your auction ahead of time? Quannapowitt Radio Amateurs (MA) give this suggestion: “After reading the auction notice [the centerfold in their bulletin] remove it carefully from the *QRA News* and post it on a public bulletin board in your shop, office, school or other similar location. (After October 4 [date of the auction] turn it over to show the Invitation Notice for all those interested in coming to the next QRA amateur radio meeting.)” Let other clubs in the area know about the auction a month ahead of time so that it can be announced. News releases sent to newspapers will bring out those “woodwork” members that never make it to regular meetings.

Spring and fall seem to be the best



“Three years ago I refinished it and made it look new . . . now I'm making it look old again.” (cartoon courtesy Des Moines ARA)

time for drawing crowds. These house-cleaning seasons bring out the boat anchors that members will want to trade back and forth! If lots of people are expected, and thus much equipment, a combined auction/flea market could be the best answer.

Auctions are usually held at the home of the club member with the most-cluttered basement, but staging it at a shopping mall or the parking lot would attract more, unsuspecting participants!

Set Up Guidelines

Members should decide beforehand on auction rules to follow. The typical club profit is 10 percent of all sales. Overlook Mountain Amateur Radio Club (NY) suggests that the seller write up a brief description of the item, to be read aloud before bidding, if it is not obvious what the object is. This is especially important if the auction isn't limited to amateur gear and accessories. A minimum price should be given, if there is to be one. The club also thinks

every effort should be made upon the seller's part to provide manuals for the new owner/sucker! Red stickers with call signs and minimum prices printed on them are used by Radio Amateurs of Greater Syracuse (NY) to designate members' equipment where complete proceeds will not be donated to the club. Participants at Albany Amateur Radio Association (NY) are given a half hour to browse amongst the goods before bidding starts. This gives them a chance to plan ahead as to what to pay, what's available and figure out their bank accounts! “Those with gear to sell, be there early to provide ample time to get it properly displayed. (Be sure that the rusty part does not face the front.)” — de Kilocycle Club (TX). If the price of Amateur Radio Club of El Cajon (CA) members' items is greater than \$15, the gear is placed on a separate table and not sold by the auctioneer. This reduces slow-moving, expensive gear. Old radio magazines and surplus components are sought-after items at Intercity Radio Club (OH) auctions. Pictures of antennas and towers could be used as evidence for sales of these immobile goods. Remind members ahead of time to bring small bills and plenty of change to ease the strain on the treasurer.

During the auction one free bid is usually allowed to sellers. This may be to set a minimum or to get things moving along at slow periods. Mt. Diablo Amateur Radio Club (CA) adds, “Bid in at least 25-percent increments.” Dos and Don'ts of the Kilocycle Club (TX) are as follows: “Don't scratch your ear — it causes a distraction to the auctioneer . . . and besides, you may have just bought another boat anchor. When bidding don't make comments like, ‘I'll raise you five.’ Outsiders passing by may get the wrong idea!” El Cajon club rules are “No deals before or after the auction. All sales are final.”

For something completely different, try the San Fernando Valley Radio Club's (CA) version. A Chinese Auction. Each person present receives a handful of wooden sticks to write his call sign or name on. As items are placed up for bid, a person bids a small amount, then places his money and one stick in a basket along with the sticks and money of others who wish to make a bid on that item. The money in the basket is presented to the club treasurer, and one stick is drawn. The owner of that stick receives the article. A very nice item is won for a very small price. And at the same time, the club makes a nice little sum of money.

If your club is a small one and members don't think they can handle an auction, get several clubs together for one big shindig. Your treasurer will love it, and you may get a treasure to love.

*Asst., Club & Training Dept., ARRL

WL2USA=Freedom

New York City area hams of many ethnic backgrounds converged on Liberty Island at Thanksgiving to celebrate 200 years of freedom.

By Pete O'Dell,* WB8NAS

During Thanksgiving weekend, November 25 through 28, nearly one hundred hams of many major ethnic backgrounds operated the special-events station WL2USA at the base of the Statue of Liberty to celebrate two-hundred years of freedom in the United States. It would probably be impossible to choose a more meaningful symbol of the noble ideals of the United States and of ham radio.

The United States Department of Interior gave complete and full cooperation to the Hudson Amateur Radio Council which organized the effort. Since the rules of the park strictly forbid erecting structures, operation was done without the convenience of any shelter — twenty feet from the cold water of New York Bay. Providence assisted by providing warmer tempera-

tures than normal and very little precipitation.



WA2NVG operates 2-meter fm while WB2UDD logs. Is this the first DXpedition to use 2 fm?

Each day, the station had to be dismantled and stored away when the park closed at 5 P.M. and then the operators had to leave Manhattan the next morning at 7:30 A.M. to set up the station before the first visitors arrived. Although not a DXpedition in the sense of *Clipperton*, the same spirit was there. Everyone working WL2USA will receive a miniature of the QSL in the photograph. Hundreds of visitors to the Island stopped by the station to see what was going on. Several hams were on hand to assist and answer questions. The OSCAR station seemed to draw the biggest crowds, with many people remarking that they did not know that amateurs had satellites!

QST



In the shadow of the Statue of Liberty, WA2DMF makes contact with hams on 40 meters. Unfortunately, regulations forbid attaching dipoles to the torch!



Celebrating Thanksgiving from special-event station WL2USA, WB2ERD and WA2DMF operate the 20-meter installation. WA2ZNW and WA2NVG hold the blowup of the commemorative QSL to be sent to all amateurs working WL2USA.

Happenings

Conducted By Perry F. Williams, W1UED

Introducing New Advisory Members

One of the ways members of ARRL can make their opinions known to the decision-making structure of the League is through a number of Advisory Committees, each dealing with a special part of amateur radio, and each composed of eleven volunteers chosen to represent Canada and each call area of the United States. Members wishing to serve on a committee are nominated by three other members at any time; forms for the purpose are available from Hq. on request.

Toward the end of each year, ARRL President Dannals picks (from among those who have been nominated by fellow members) enough people to replace those whose terms have been completed and any who may have resigned. For 1977, the following appointments have been made.

VHF Repeater Advisory Committee

Jerome H. Horwitz, W3EZT, of Silver Spring, Maryland, holds the Extra Class license and has been a member of the League for 21 years. He's licensee and chief constructor of WR3AFC 146.40/147.00 in Ash-ton, Maryland. After two years as president, Jerry now serves as a director and chairman of the operations committee of the PVRC Repeater Association, Inc. He has just completed a term as president of The Middle Atlantic FM & Repeater Council (T-MARC), wrote its comments in Docket 20282 (restructuring, 1975), and its Request for Rulemaking, RM-2780, which would relax logging requirements for automatic control of repeaters and for third-party traffic.

Another appointee to VRAC is Charles Durst, WA4WTX, of Durham, North Carolina, an engineer with General Telephone Southeast. Charles is frequency coordinator for the Carolinas-Virginia Repeater Association, and earlier had the same position with the North

Carolina FM Repeater Association. He's trustee of WR4AGC, Durham. Licensed since 1960, and holder of an Advanced Class license, WA4WTX has been a League member since 1965.

Contest Advisory Committee

If we introduced the next man only by his current call, K3ZO, not many would know we meant Fred Laun, more famous as W9SZR, HI8XAL, HSSABD and LU5HF1 - who also has contested quite a bit under the calls W9YT, W9EWC, W3AU and W4BVV. Under the HI8XAL label Fred took top honors, phone and cw, in the 1967 ARRL DX Test and in 1974 again won the top cw mark from LU5HF1. Fred has been a member of the Potomac Valley Radio Club since 1963, and was one of the first to advance the idea of Advisory Committees. He was one of the officers of Radio Amateur Society of Thailand (RAST) at the time it joined the International Amateur Radio Union. Earlier he had been a cofounder of the Badger Amateur Radio Society, W9YT. K3ZO is Extra Class, has been licensed since 1952, and a League member since 1953.

Mel F. Wardell, K4PJ, and ex-K4LPW of Oak Ridge, Tennessee, is Extra Class, has been licensed and a League member since 1927. He is an active participant in almost every contest: ARRL DX, Sweepstakes, CD Parties, Field Day, VE/W, VK/ZL, WAE, CQ World Wide, and so on. In 1956, under the W3DGM/3 banner, he nailed down top cw score in the ARRL DX Test. He's held several offices in the Oak Ridge Radio Club, and is an assistant director from the Delta Division.

The next man joining CAC used to work at contests as a living: Rick Niswander, WA7WXY of Pocatello, Idaho, who was ARRL's Assistant Communications Manager

for Contests from 1972 to 1975. An Extra Class, Rick has been contesting since 1970, licensed and a League Member since 1967, and also holds WA8VRB and WA1PID.

DX Advisory Committee

From Gaithersburg, Maryland, comes James A. Douglas, W3ZNH, Founding President, currently vice president and activities manager of the National Capitol DX Association. W3ZNH is past treasurer of the Potomac Valley Radio Club, assistant director of the Atlantic Division and a DXCC member with 311 places confirmed. He's been licensed since 1954, joined the League the next year, and currently holds Extra Class.

John C. Kanode, W4WSF, lives in Boyce, Virginia, and manages the ARRL W4/K4 QSL Bureau. Licensed since 1952 (currently as Extra Class) John has been chasing DX for 22 years, reaching the 313 mark for DXCC, 300 for DXCC on phone, and 131 for the newer DXCC-CW award. He also has the Five Band DXCC and some 50 DX awards for IARU societies. He's president of the Potomac Valley Radio Club for 1976-1977, is an assistant director of the Roanoke Division, and is active in the National Capitol DX Association. Now a Life Member of ARRL, John first joined the League in 1953.

The Emergency Communications Advisory Committee has no new members at this point, since those whose terms expired were all reappointed.

All members are invited to participate in the work of these committees by sending along suggestions for their consideration. Address your ideas to any committee member, or to the liaison person at ARRL headquarters: W1ICP for VRAC, W1YL for CAC, WA1VCG for DXAC and WA1WEM for ECAC.

REMOTE CONTROL AND SECURITY DEVICES

The Federal Communications Commission has proposed in Docket 20990 new rules for remote control devices, such as garage door openers, and security devices. The rules would be in Part 15, Incidental and Restricted Radiation Devices, where individual licensing of covered equipment is not required by the Commission. The gadgets would be allowed to operate on a "non-interference" basis in eight bands of frequencies, including four ham bands: 220-225 MHz, 2.4-2.5 GHz, 5.725-5.875 GHz and 24.0 to 24.25 GHz. The Notice of Proposed Rulemaking was published in the December 1, 1976, issue of the *Federal Register* and called for comments to be filed by December 27, with reply com-

ments due January 6, 1977.

Since the short filing time would not permit general discussion of the matter among ARRL members and the Board of Directors, the ARRL Legal and Regulatory Committee authorized a filing by Hq. through the General Counsel's office. Our remarks pointed out that the interests of the consumer would not be served by any commission action placing a consumer-oriented device in an amateur band, where stations are located in the same neighborhoods as the likely customers for the devices; a comparison was drawn to the earlier rules which permitted garage door openers on frequencies in the 27 MHz band, where they experienced interference from CB. Moreover, the level of emission to be permitted for the gadgets in the 220-225 MHz band is proposed to be 900 microvolts per meter at three meters, a level which could cause interference to a sensitive amateur repeater or auxiliary

link receiver at distances up to a kilometer. Yet it would be difficult to track down an unidentified signal in a residential neighborhood; even tougher to convince the owner he should close it down for the amateur's benefit!

HAM RADIO TEACHES FOREIGN LANGUAGES

The use of amateur radio in the teaching of foreign languages was a main topic at a presentation sponsored by the National Association of Learning Laboratory Directors (NALLD) at its annual meeting held in New Orleans in November. Both the convener of the meeting, NALLD Vice President Dale Lally, W0OWF and the speaker, Dr. Philip D. Smith, W3DZR, of Westchester (PA) State College, are active hams. Dale reports a highly interested, capacity crowd monitored Phil's

*Manager, Membership Services, ARRL

presentation which included the setting up of a ham station with a tossed-out-the-window antenna.

Bruce Alan Johnson, WA1ZQP, International Services Assistant at ARRL hq., will be on another NALLD program April 25, 1977, at the Miami, Florida, Convention Center. He will highlight the use of hf radio for student-to-native-speaker communications and will demonstrate both slow-scan television and OSCAR contacts for the convention goers. The meeting is jointly held with the Association of Educational and Communications Technology.

Incidentally, Bruce would like to hear from amateurs who are members of NALLD or who use amateur radio in teaching foreign languages; please drop him a line at ARRL hq.

ED TILTON RETIRES — AGAIN!

The man we've known as "Mr. VHF" since the late thirties retired from the full-time service of the League back in 1972. Two years later, catastrophic medical-care costs made it necessary for Ed, WHDQ, to seek full time work in the ARRL Technical Department — just as the ARRL Board was calling for an increase in *QST's* propagation coverage. Knowing Ed's almost lifelong interest in propagation phenomena, General Manager Huntoon asked him to look into ways of complying with this mandate. Shortly thereafter, WWV began a new radio propagation bulletin format, in which solar and geomagnetic field data were presented in much closer to real-time form than ever before. This suggested a new approach to amateur propagation study, and Ed began recording WWV bulletins in complete detail. He is still doing it, and now has more than two years of



ARRL and the Salvation Army signed a national agreement on Nov. 18, 1976, at Salvation Army national headquarters in New York. Signing the agreement is Commissioner William E. Chamberlain, national commander of the Salvation Army, while ARRL President Harry Dannals, W2HD, holds pen in readiness to countersign for ARRL. Looking on approvingly is ARRL Communications Manager George Hart, WINJM. Copies of the agreement are being distributed to all ARRL SECs and ECs, as well as to Salvation Army personnel.

monthly charts containing all WWV information, plus detailed solar and radio observations to match.

Viewing the sun by projection methods, begun in the rising phase of Cycle 19, in 1946, and done intermittently ever since, now became a mandatory part of every sunny day for WHDQ. First with simple methods, and in the past year with increasingly sophisticated direct viewing equipment and techniques, sun-watching has come to dominate Ed's life — with results that have been detailed to some degree in *QST* and recent editions of the *Handbook*. There will be more of this.

The financial emergency now past, Ed is forsaking his desk in the ARRL TD, but not his "new career" in the radio propagation field. As of January 1, 1977, he resumed a title that the late K. B. Warner invented for him in 1939, when he became ARRL's first regular nonresident contributor. You'll find him on the masthead, along with other "Contributing Editors" added in more recent times.

At age 69, Ed still enjoys travel, and is ready to resume another long-time role: that of ARRL emissary at radio club meetings, hamfests, and conventions. He will take a limited number of such engagements. You may be able to arrange for him to be at your affair by contacting the Travel Coordinator at ARRL headquarters.

NEW NOVICE PROCEDURE

The Federal Communications Commission, anticipating a large increase in Novice examinations as a result of club training programs, has waived section 97.28 (b)(1) of its rules until June 30. The waiver permits the mailing of written examinations, blank answer sheets and application forms (610's) to qualified examiners who will be testing five or more Novice applicants at a time. The examiners must be over 21, hold a General Class or higher license, and not be related to the applicants they are testing. They should apply at least 30 days before the intended date of the test, and should establish a method of control to insure the integrity of each examination; they will be held accountable for returning all test papers, both those that have been used and any unopened copies. Examiners must provide the Commission with two mailing labels bearing their name and address, plus a photocopy of their license. Questions about the new procedures can be directed to the Clubs and Training Department at ARRL hq. — which incidentally has a wealth of instructional material available.

RECIPROCAL LICENSING WITH DU

The governments of the Philippines and of the United States have concluded an agreement permitting amateurs of one country to operate in the territory of the other, upon appropriate application. Philippine amateur licensees wishing to operate here obtain FCC Form 610-A from any FCC office or from ARRL hq., and send it with a photocopy of their DU license to FCC, Amateur & Citizens Division, Washington, DC 20554, at least 60



The Kaw Valley Radio Club's President, Dick Dehn, WA0SQN, here accepts from Director Paul Grauer, W0FIR, the certificate honoring 50 years of affiliation with ARRL, which we mentioned in December. The original charter is at the bottom of the picture, still in good shape after a half century!

days prior to the date of proposed operation.

U.S. Licensees wishing to operate in the Philippines should write to International Services, here at ARRL hq., for details.

Other agreements exist between the U.S. and Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Chile, Colombia, Costa Rica, Denmark, The Dominican Republic, Ecuador, El Salvador, Fiji, Finland, France, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg, Monaco, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Surinam, Sweden, Switzerland, Trinidad & Tobago, United Kingdom, Uruguay and Venezuela. The agreement with France includes: Atars & Issas Territory (French Somaliland), Comoro Islands, Reunion, Guadeloupe, Martinique, St. Pierre and Miquelon, French Guiana, French Polynesia, New Caledonia, Wallis & Futuna Islands, French Antarctica and New Hebrides. The agreement with the United Kingdom also covers: Bahamas, Bermuda, British Honduras, British Virgin Islands, Cayman, Falkland Islands, Gibraltar, Hong Kong, Montserrat, Seychelles, St. Helena, Turks & Caicos, British Solomons, New Hebrides, Gilbert & Ellice, Line Islands, Antigua, Dominica, Grenada, St. Lucia and St. Vincent.

Canada has similar agreements with Belgium, Brazil, Costa Rica, Denmark, Dominica, Dominican Republic, Ecuador, Finland, France, Germany, Guatemala, Honduras, Iceland, Israel, Luxembourg, Netherlands, Nicaragua, Norway, Panama, Peru, Poland, Portugal, Senegal, Sweden, Switzerland, U.S., Uruguay, Venezuela and the British Commonwealth.

JIM JARVIE AWARD

Toronto's Metro Amateur Radio Club has presented its Jim Jarvie Memorial Award, in recognition of outstanding service and devotion to the principles of amateur radio, to ARRL Canadian Director Ron Hesler, VE1SH and Assistant Director Noreen Nimmons, VE3GOL at a meeting November 6, 1976. Our congratulations!

Washington Mailbox

Q. Logging requirements have changed through the years. What exactly are the current rules regarding amateur station logs?

A. Logging regulations are really quite simple. First of all, the log should record the call sign of the station and the signature of the station licensee. However, a photocopy of the station license could be substituted for these items (97.103a).

Second, you must record the location and dates when you initiate and terminate fixed operation of your station (97.103b). This does not mean that you have to make a new entry each time you turn your rig on or off. Here's an example: If you received your amateur license on November 26, 1976, and you began operating your station on that date, that is the date you should enter in your log, along with the location, of course. You may then operate your station at that site for several years without ever entering the date or location in your log again. If you move, that would be considered terminating operation at that location, and you should enter that date in your log.

If you operate your station in portable status at any time, the locations and dates upon which portable operation was initiated and terminated at each location must be entered in your log (97.103b).

In most instances, that's all the FCC requires in a log.

Q. Most instances? What are the exceptions?

A. If the station licensee ever designates some other amateur as the duty control operator, the date and time periods must be logged, and the signature and primary station call of that duty control operator must be recorded in the station licensee's log (97.103b(1)).

Additionally, each time a station is used to send or receive third-party traffic, a log entry must be made. This entry must include the names of all third parties, and a brief description of the traffic content (97.103b(2)).

Q. What if I allow a non-ham to speak over my station under my supervision. I would be considered the control operator. How do I log this?

A. Anyone (whether licensed or unlicensed) other than the control operator, is considered a third party, and as such anything that he transmits over your station is considered third-party traffic (97.3w). This means that you should enter his name in the log (his signature is not required, although it's little bother to include it) and a brief description of the content of his transmissions (97.103b(2)).

Q. Aren't the logging requirements for repeater stations, remotely controlled stations, control stations and auxiliary-link stations a bit more complicated than the above?

A. Yes, they are. They are a bit too lengthy to explain here, but are not all that complicated. In fact, they are "one time" entries that need only be recorded at the commencement of operation of the station and amended only if the frequency, power or some other characteristic of the station changes. See FCC rule sections 97.103c, d, and e, and 97.111f for details.

If you are contemplating establishing a repeater station, remotely controlled station, control station or auxiliary-link station, the ARRL has a "repeater licensing kit" which explains the logging requirements and gives instructions on how to determine the information that goes into the log. You may obtain it by sending a large (9 x 12) self-addressed envelope, with 24 cents postage affixed thereon, to Repeater Licensing Kit, ARRL, Newington, CT 06111.

Q. Are there any logging requirements if I operate my station mobile?

A. There are only two circumstances under which you must enter information in a mobile station log: If the duty control operator is other than yourself, and if you send or receive third-party traffic. The information that's

required is the same as that required in a fixed-station log in these instances.

Q. I gather that there is no objection to my keeping a more detailed log if I desire?

A. None at all. The Commission only requires the logging of the minimal information necessary to conduct its enforcement program, and nothing further. Many amateurs prefer to keep a more detailed log; it provides a history of the operation of the station and is useful for checking whether you've sent or received QSLs, etc.

Q. Does the station log have to be in written form?

A. The FCC rules (97.103) say the log entries must be "legible," and this implies that they must be written, printed or typed. However, this applies only to the minimal information; i.e., station call sign, signature of station licensee, location and dates upon which operation is initiated and terminated, date and time periods the duty control operator is someone other than the station licensee, and that duty control operator's signature and call sign. However, notations of third-party traffic may be in a form other than written (recordings, for example), but must be capable of being transcribed into written form should the FCC request so.

Q. How long must a log be kept?

A. For one year following the last entry (97.105).

[Note: Send your FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.]

QST

Strays



Your Novice class-ites have graduated and that makes thirty hams in your town. The last of your group of high school students just received his Novice call sign and the group wants to get together regularly. There are 17 hams in your county but they've never wanted to organize a group, until now. Your club has 63 members but 21 of you are especially interested in building a repeater, contesting, or DXing. Do you fit any of these niches? Then you may be in need of a "club kit."

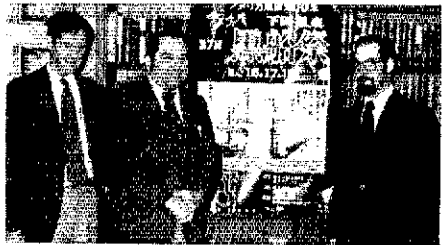
A club kit includes everything we could possibly think of that would help organize a club and keep it active. *Your Radio Club*, a part of the kit, is a booklet that contains ideas

on what to do from day one until the club is on its feet and has suggestions for finances, insurance, where to meet, bulletins, programs and TVI committees. Also, a sample constitution, information on licensing club stations, affiliation papers and *Radio Club News* (a quarterly bulletin full of hints from other affiliated clubs) are included.

Do you need help getting the attention of those people who would be interested if they knew you were starting a club? We have posters, sample enticing letters, and sample news releases to send you. We can give you a list of full and associate (unlicensed but interested in ham radio) members in your area to write to, if you send us a list of the Zip codes about four weeks ahead of when you want them.

Have you thought of something that we can do for you to make things easier? Let us know. We're open to all suggestions and can implement most, now that there's a full-fledged department just for clubs and training. — *WA1STO*

From Spark to satellite, Bud Schultz, W6CG, of Anaheim, CA, has gone the route and is now an AMSAT Area Coordinator. On December 13, 1976, he paused long enough, though, to have a QSO with Dick Briggs, W1BVL, of Beverly, MA, marking the fiftieth anniversary of their first contact. Back then, Bud was using all homebrew gear. W3UN sat in this time to make sure they didn't cheat!



Mayor Humphrey Donnelly of Newport, RI, recently strengthened the link between the Newport County Radio Club and the radio club of Shimoda, Japan, Newport's Sister City. The mayor and his wife received public donations to enable them to travel to Japan and return with firsthand reports and great respect for their Sister City. Shown here with a poster for Shimoda's annual Black Ship Festival, which commemorates the arrival in Japan of Newport native Commodore Perry, are (l-r) Art Westneat, W1AM, the club's "contact man" with Shimoda, Mayor Donnelly and NCRC President Jeff Cashinski. The Japanese amateurs have sent a number of photos and mementos, and the NCRC has forwarded photos to Shimoda. — *W1JFF*



Hudson Division Vice Director George Diehl, W2IHA, awards the Charter of Affiliation to the officers of the Public Service Terminal Athletic Association Amateur Radio Club.

Correspondence

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

SWEET SWEEPSTAKES

□ On Sunday afternoon at the peak of Sweepstakes we were attempting to pass a priority message. It took over a half hour to pass this one message. I was disgusted with ham radio at that time. *W2UYE* Suggest that you have written frequencies assigned for contest so that the traffic nets can operate. *K1BQB* Why not close traffic nets down for 48 hours during contests? *W2YJR* I'd like to lodge the strongest possible protest against the manner in which the Sweepstakes, CD, and other state-side contests are conducted. *K4DLA* Many of us traffic handlers consider contests a curse, will have absolutely nothing to do with them, feel they are just a lot of useless QRM. But could it be our own fault? Our nets are scattered throughout the bands without any planning or frequency coordination. *WB4OBZ* This one was about the worst as far as I can remember. I've been hamming for over 60 years and each contest makes me wonder what I have gotten myself into. *W2EAF* What gave the net and phone patch people the idea they have specific and exclusive use of self-assigned frequencies? — *W4EN*

10-34????

□ I guess it was bound to happen. I was working a young ham on 40-meter cw and I asked him if he could copy me OK. He replied, "That's ten-two." And when I said "AS," he asked, "What does that mean?" Who was it who said these people would make good hams? Tell me again. I would like to believe it . . . really I would. — *Norris Maxwell, K5BA, Stillwater, OK*

SCANDALOUS SIDEBANDERS

□ I suggest that SSB should stand for Scandalous Sidebanders. These are the rules of operation: After tuning up on the air to two-kw PEP, switch in the speech processor adjusted for flat topping; more stations will now be able to hear the signal. Make all scheduled calls on the exact frequency. Do not delay by first checking to see if the frequency is in use. If the frequency is in use, order those using it to move. If you are in QSO and receive a request to move, regardless of the nature of the situation and the politeness of the request, refuse to do so. Always call CQ but never acknowledge any reply that is less than 20 over. Identify very rapidly and slur the pronunciation of your call. There should be no pauses as such practices tend to encourage breakers. Doubling with the other party will add a touch of mystery. To earn an air of distinction, it is desirable to use the sideband opposite of the one normally used. — *Kenneth Haywood, WA2THD, Pennsauken, NJ*

"LARGE ENUFF"

□ I like the new size of *QST*. Keep the type large "enuff" for us 75 year olds to read without the use of powerful reading glasses! — *Col. Frank Shannon, Sr., USAF (Ret.), W3QR/K4GT, Tampa, FL*

□ I just received the free copy of *Operating an Amateur Radio Station*. Again I have the same complaint — the printing is so small that

it's almost impossible to read. A little larger print would be helpful. — *L. K. Parker, WB0JTX, Oakdale, CA*

VAST RESERVOIR

□ I have just completed teaching a 10-week Novice course — using *Tune in the World*, which is great! When we reached the final week, 16 had successfully completed the course and 10 of them were CBers. One student, Sam McGee, *WB0YDZ*, took his code test the fourth week of class and passed. The eighth week of class he went down to the FCC and passed his General and on the tenth week he returned to the FCC and passed his Advanced — all from ground zero ten weeks earlier. I think that Sam is a glowing example of a vast reservoir of talent in the CB service. — *Bob Novak, WB0RCQ, Apple Valley, MN*

PROS AND CONS

□ Some of my ham friends take no interest in the ARRL, and see no reason to join. In my opinion, the ARRL is fantastic. Not only can I obtain information about my hobby from writing to you, I find that *QST* is terrific. It has really helped me gain a lot of practical knowledge through construction articles, "Hints & Kinks" and stories. — *Jim Hartland, WD8BMQ, Parma, OH*

□ Your new format of *QST* is superb and I particularly enjoyed the October issue. I have been thoroughly enjoying my first year as a "hamateur" and have found new friends. Each contact is rewarding if only because contact was made. — *Priscilla G. Clafin, WB7BXR, Blachly, OR*

□ Look at the photos of people you print. I daresay that if one goes by the photos in *QST* one has to be aged at least 67 to be a member of ARRL. Your letters page is really hysterical. I am sure there are hams who write with more important things than the page size of *QST*. (expletive deleted) The pages have changed size and all the doddering old men get off their spark gap sets long enough to send *QST* a letter about page size. You may be interested in this: Most of my ham friends are in my age group (27) and not one of them thinks much of *QST*. When *QST* comes around and starts doing articles about things I wish to read about, and when you cut out that contest result rubbish, and when you have some intelligent letters in the letters column, then I will come back to *QST* — *David J. Mann, WA6MHD, Redwood City, CA*

□ I have found in the short time that I have been in ham radio that the old-timers really help the new man or woman. John Bohannon, *W8AKP*, a retired newspaper man, has been a real help. He runs a real fine station. — *Glen Cumberlandge, WD8AVZ, Columbus, OH*

A BETTER SOLUTION

□ A state registration of radios would do nothing but create a myriad of problems for owners, not the least of which would be more expense and trouble. A much better solution has been developed and instituted by the Cincinnati Police Department. They will issue to any owner of a CB or ham radio a serial number, which is engraved on the radio in a conspicuous place. The number consists of CPD's nine-character National Crime Infor-

mation Center (NCIC) identifier, plus a number assigned to that specific radio. This information, along with the owner's name and address is kept on file by CPD, both alphabetically by last name and by serial number. When CPD receives a report of a stolen radio, the serial number is entered into the computer, which is linked with NCIC's computer. Any law officer who recovers the radio will run a check on it through NCIC and CPD will be notified. The rest is obvious. — *Roger Troy, W8SWHS, Cincinnati, OH*

BETTER PART OF VALOR

□ In several well-documented cases in Detroit and Toronto, hams have announced over the local repeater systems that they were stopping off at a particular shopping mall. They returned to their cars to find the rig, antenna and/or other things missing. The general consensus is that it was someone looking for a CB rig. Personally, I can only conclude that it was a person with capability to monitor the repeater (possibly a fellow ham). I wonder how many rigs for sale at the swap and shop meetings have a really clean bill of health? — *Ross Carr, VE3GLY, Puce, ON*

UNDER AND OUT

□ On November 3rd, two people were killed in an automobile accident on the high-rise bridge crossing the Houston Ship Channel in Pasadena, Texas. The newspaper reported that the driver was giving all his attention to talking on his CB and was not paying attention to his driving. As he approached the high point on the bridge, he ran under a truck loaded with steel pipes. Let this be a lesson to all of us mobile operators. — *Jon Bennett, WA5KER, Houston, TX*

HOLY TOLEDO

□ Toledoans are listening to the Dick Van Dyke tapes over several local radio stations; three large license classes are in progress; and *Moving Up* has been shown to non-amateur groups on the average of twice weekly. My reservation calendar shows no letup through December. Never before have I seen such grass roots approval of and enthusiasm for an ARRL program such as the promotion now under way. — *Jim Apsley, W8JBP, Toledo, OH*

BURY CONGRESS

□ According to my friends on Capitol Hill, our efforts to pass a RFI bill have been ineffective because we did not devote enough attention to the congressmen and senators who are on the relevant subcommittees, where most of the actual work of Congress is done. We should reach these people by having hams from their districts writing letters in support of our RFI bill, since congressmen often ignore letters that are not from their district. We should bury these key congressmen in a flood of letters from their home districts. — *Nickolaus Leggett, WA3YFU, Washington, DC*

NEW HAM NEWS

□ I'm pleased that you have suspended sending reprints of my article "Your Novice Accent" as a mailing piece to new licensees. It's about time, as the article in its present form is no longer all that applicable. I'm happy if it has in any way served its intended purpose. "New Ham News" should be very successful. I am sure new licensees will find it interesting and informative. — *Keith S. Williams, W6DTY, Oxnard, CA*

International News

Conducted By Bruce A. Johnson,* WA6IDN/WA1ZQP

Want to Operate in the USSR?

As reported in this column in the December, 1976 *QST*, IARU officials visited extensively in eastern Europe and the Soviet Union late in 1976. We're pleased to be able to report to you that the Soviet Union's IARU society, the Radio Sports Federation (RSF), announced to our IARU visitors that it is now possible for foreign amateurs to operate in the Soviet Union. Taking along your own rig (as is possible in countries with whom the United States and Canada hold reciprocal treaties) is not allowed in the USSR, but the permit that will be issued to you will be good for the

thousands of club stations there, and possibly some individual stations. All amateurs, regardless of nationality, should submit the following as the application package: two photocopies of your current amateur license (copies of station and operator's, if issued separately in your country); proof of citizenship; a letter giving your complete itinerary of your USSR visit, including hotels and all dates; a letter from your country's IARU society certifying membership in the society and recommending that the permit be issued to the applicant. It is most important that application be made

several months in advance of the scheduled visit. U.S. and Canadian amateurs should send their application packages to the International Services desk at ARRL/IARU headquarters in Newington, Connecticut 06111. All others should ask their IARU society to forward the package to the RSF, P. O. Box 88, Moscow, USSR.

Amateur radio is very much alive in the USSR, with more than 100,000 licensed hams and 42,000 stations. Now radio amateurs visiting the Soviet Union can have a hand in the operating - Russian style!



Pictured outside Friendship Hall, Khartoum, Democratic Republic of the Sudan, is part of the amateur contingent at a seminar on satellite broadcasting in the 12-GHZ band, held in November. Left to right: Hilario Brito, D4CAD (ex-CR4AD); Omar Kone, TU2AJ; Dr. Sid Ahmed Ibrahim, ST2SA; Malik Alsarag of the Sudan; Paul Poueba, TN8AQ; Dexter Anderson, K3KWJ. Sewell T. Brewer, EL2S, Herbert St. Lambert, 3B8BZ, and Akira Arai, JA1IF, also attended the seminar.



IARU President VE3CJ and Mrs. Noel Eaton visited with Madama Gandhi, Prime Minister of India, in her home during a 1975 visit to the Amateur Radio Society of India (ARSI). Madama Gandhi's son Rajiv is VU2RG. In April 1976 the Government of India allocated a plot of land to the IARU society so that buildings and antennas could be erected. Construction is in progress, and we congratulate the amateurs of India for having kept amateur radio before the government's eye as an important national resource.



At the end of October, the United States and the Republic of the Philippines signed a reciprocal agreement. The first permits issued by the Philippines under the long-awaited agreement were issued on 8 November 1976. Present at the event (l-r): Phil, K9PNT; Bob, W8KVL; Caril, DU1CP; David, K0W1Q; Nick, DU1BOS. Seated is Heracleo L. San Juan, chief of the Regulation Division.



They call it the South East Asia Net (SEANET), but as this photo shows, the net encompasses hams throughout the world. Meeting daily at 1200 UTC on 14,320 kHz, the net has amassed an impressive record of public service, including many rescues at sea, the saving of lives through locating medical assistance, and providing communications for an Australian town isolated by natural disaster. Shown here at SEANET's 6th convention in Jakarta, Indonesia, last November are (l-r) IARU Region 3 Secretary David Rankin, 9V1RH/VK3QV; Lou, PA@LOU; Paddy, 4S7PB; Father Moran, 9N1MM.

*International Services Assistant, ARRL

WHAT'S A WARC?

Some amateurs may associate the term "WARC" with WARC-79, the World Administrative Radio Conference that, among other things, will revise the Table of Frequency Allocations and thus is of tremendous importance to the amateur service and to all other radiocommunication services.

Actually two other WARCs are to precede WARC-79, a Broadcasting-Satellite Conference, presently in progress, and an Aeronautical Mobile (R) Conference in February-March 1978.

In preparation for the Broadcasting-Satellite Conference, three seminars - at Kyoto, Rio de Janeiro, and Khartoum, were held last year to provide background on the technical issues involved. The final seminar, held from 13 to 25 November 1976, under the auspices of the International Telecommunication Union, was attended by some 84 participants, 16 observers, and 17 lecturers.



Every two years, the international Frequency Registration Board (IFRB), one of the permanent organs of the International Telecommunication Union (ITU), sponsors a seminar on frequency management and the use of the rf spectrum at its Geneva headquarters. The latest of these seminars attracted 122 participants from 55 countries, including many of the emerging nations. Among the participants were at least a dozen radio amateurs, underscoring once again that amateur radio often leads to a career in a related field. Standing (l-r) are Bernd, DJ7RT; Asher, 4Z4CF; Elmer, W3IBD; Karl, SM0UB; Knut, LA2NL; and Nicolau, ex-3X1P. Kneeling: Dave, K1ZND; Jan, ON1VJ; Jose, PJ2MI; and Dex, K3KWJ. Helio, PT2HK/PY1DGH, arrived too late for the group photo.

YL News and Views

Conducted By Louise Moreau,* W3WRE



The YL Picture - Global Focus

DX YL interest in amateur radio began in England in 1913, but not until 1937 did the WAC-YL certificate become a possibility with added feminine calls posted on the amateur radio map. In the next 40 years, the number of women in over 100 countries rapidly escalated.

Today, 24 African countries list YLs among their amateur operators; in Asia, 17 countries have been added to the YL map since 1934 when Japan and China opened the door to us. In the Pacific 15 of the islands included in Oceania have YL operators, while in Europe there are 30 countries where the

interest of women in amateur radio increases monthly.

The South American YL story began in Brazil in 1926 while the old IARU "Intermediates" were still being used as calls. At present, YLs operate in 15 South American countries. Here in North America where the feminine touch dates back over 70 years ago, 22 countries have YL operators.

This international expansion of YL calls made possible the DX-YL certificate designed to bring women amateur operators in contact with each other. Now that there are 100 plus countries on the YL map, the DXCC-YL of

CLARA and the YLCC-DX of YLRL have opened awards for working women operators to meet and know one another through the YLRL sponsored DX YL to North American YL Contest, the adoptee programs of CLARA and YLRL, and the sponsors in YLISSB. It depicts almost 50,000 women, on all continents, tied together through the common bond of amateur radio.

Worldwide, the YL picture is more than certificates. It is a growing concern of women to meet and know one another through the YLRL sponsored DX YL to North American YL Contest, the adoptee programs of CLARA and YLRL, and the sponsors in YLISSB. It depicts almost 50,000 women, on all continents, tied together through the common bond of amateur radio.

YL DXCC AND YLCC DX

Sponsored by CLARA, the YL DXCC award is available upon submission of proof of contact with 100 YLs in 100 different DX countries, plus \$1 to cover cost of postage. The custodian is VE3GJH, Cathy Hrischenko.

YLRL's DX YLCC certificate is awarded for proof of contact with 100 DX YLs, no more than two from any DX country. For this certificate the custodian is W2GLB, Phyllis Shanks.

Both clubs offer stickers for additional contacts.

EVELYN SCOTT AWARD TO BE PERMANENT

Myrtle Cunningham, WA6ISY, sponsor of the Evelyn Scott award has announced that this award will be one of the permanent awards of the YLRL's Anniversary Party held each fall. Originally offered as a part of the bicentennial year, this cup, given in memory of Evelyn Scott, W6N7P, will be made to the DX YL with the highest AP phone score garnered using low power.

GERMAN YL ACTIVITIES GAIN PRESS COVERAGE

Beginning in December, 1976, a newsletter of activities will be published for the women amateur radio operators of Germany. Designed to tie the many YLs in West Germany more closely together, this publication will carry pictures and features of YL happenings in Germany.

FIRST GERMAN YL

We have received several queries regarding the listing of D4KAK, Erika Capelle, as the first German YL. Gustav and Erika Capelle of Bremen are both listed under that call. Many of those who questioned the listing had worked Gustav; however, W1PEG, Bill Lightfoot, has sent "YL News and Views" a QSL that he received in 1937 stating that "YL was on transmitter!" This, in a way, verifies the claim of German YLs that Erika was the first in their country.

Until information documenting earlier YL activity in Germany is received, we will consider Erika, one of the two operators at D4KAK, to be the earliest known YL operator in her country.

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

YL-OM REMINDER

The YL-OM contest, being held this month (phone) and March 5-6, (cw), is a good time to log those contacts for the various certificates offered by YLRL and CLARA. Please remember to send the logs to Carol Bourne, WA9NEJ, 362 Hawthorne, Glen Ellyn, Illinois, 60137.



Although still busy on the Novice bands, Jane Price, WB0VHZ, is studying for her General class license. With encouragement from fellow PHD Radio Club members and from OM WB0SJD, that next step can't be too distant.



As one active YL member of the growing amateur radio ranks in India, VU2NC is looking forward to working stateside YLs.

Strays

FIFTY YEARS OF ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for two dollars postpaid. Titled *Fifty Years of ARRL*, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic *200 Meters and Down*, a reprint of which is also available from the ARRL for three dollars.



Ah, summertime! The Milford (OH) Amateur Radio Club provided spotting and communications for the National Canoe Races last August. By utilizing a neighboring club's repeater in Cincinnati, MARC was able to maintain communication among the dispersed field-spotter network along the course on the Little Miami River. Besides this national event, the club has given the same services for the regional qualifying event, thus always expanding their capabilities for charting the racers' progress. (W3BRKY photo)

Coming Conventions

February 12-13
Southeastern Division, Orlando, FL

March 25-26
Great Lakes Division, Muskegon, MI

May 21-22
New York State, Rochester, NY

May 21-22
Wisconsin State, Lake Delton, WI

May 28-29
Tennessee State, Knoxville, TN

June 3-5
ARRL National, Toronto, Ontario

June 18-19
Georgia State, Atlanta, GA

July 2-3
West Virginia State, Jackson's Mill, WV

July 9-10
Roanoke Division, Norfolk, VA

July 16-17
West Gulf Division, Austin, TX

July 30-31
Northwestern Division, Seattle, WA

September 23-25
New England Division, Hartford, CT

October 7-9
Midwest Division, Wichita, KS

October 7-9
Southwestern Division, Santa Maria, CA

50 Years Ago 25 Years Ago

February, 1927

- John Clayton leaves the assistant technical editor post to join the staff of the Institute of Radio Engineers — the first of several *QST* graduates who will follow that route.
- His parting article complains that current signals have "too much d.c." to be easily copied, and his recommendation is a pure d.c. crystal oscillator followed by a self-rectified a.c. powered amplifier to provide a bit of modulation!
- Plenty of meat for the longhairs in this issue. F. J. Marco deals in depth with r.f. transformer design; David Grimes elaborates on his "tuned inverse duplex" circuit; and Robert Marriott (first president of I.R.E.) describes the new Loftin-White circuit in which a phase shift in r.f. coupling prevents oscillation.
- The editor laments Congressional inaction on the proposed new radio law which has been under discussion for months and months. But an emergency measure now requires any applicant for a station license to waive claim to any particular frequency.
- *nc5GO* (the "nc" for Northamerica-Canada) is keeping the Baffin Bay outpost crew in touch with family and friends as well as officialdom.
- Glenn Browning has designed an airplane transmitter, suspended by springs in a wooden frame to avoid vibration effects, and using a simple throat microphone.
- 9AUT suggests that a voltmeter in series with condenser across the 110-volt line gives a reading proportional to the capacitance, and thus can be used to measure unknown units.
- 1BIG wins the Traffic Trophy as champion brasspounder of recent months.

February, 1952

- Proposed rules for a new Radio Amateur Civil Emergency Service (RACES) include band segments at 10, 6 and 2 meters, plus some special 160- and 80-meter spots, which will be reserved for amateur civil defense communication in the event of military takeover of our bands.
- The shortest distance between two points is not always the best, says W1DX in an extensive article on good wiring techniques.
- General Manager Budlong addresses a firm letter to manufacturers of television receivers, pointing out that much improvement in design and circuitry is needed to avoid TVI problems.
- For those interested in radioteletype operation, W4SQF presents the fundamentals and basic circuits for such signaling systems.
- FCC has proposed opening a part of the all-c.w., 7-Mc. band to voice operation, but the League says we need more time to study the pros and cons, and obtain membership opinions.
- W1DF has a neat 90-watt rig which simplifies the problem of shielding, even with plug-in coils.
- W2VLQ takes some of the mystery out of matching line and antenna with the T and Gamma approaches, using a Maxwell bridge. Professor Beers, W2AWH, has an extensive treatise on antenna factors in choosing a frequency for most effective communication.
- The skipper of the sinking *Flying Enterprise* has become world-renowned for sticking with his vessel to the last — we know him as W2ZXM, Kurt Carlsen. — *W1RW*

Hamfest Calendar

Arizona: Winter Hamfest, sponsored by the Amateur Radio Council of Arizona, is March 6 at South Mountain Park. Swap meet, eyeball, pot luck. South Mountain Park is at the south end of Central Avenue, Phoenix.

California: The twelfth annual South Peninsula Amateur Radio Klub (SPARK) auction is Saturday, February 26, in the Aeronutronic-Ford Corp. cafeteria building behind 3838 Fabian Way in Palo Alto.

Illinois: The Wheaton Community Radio Amateurs' 15th annual Midwinter Swap n' Shop is Sunday, February 13, from 8 A.M. to 5 P.M. at the DuPage County Fairgrounds on Manchester Rd., (near County Farm Rd.) on the west side of Wheaton. Some tables provided, but bring your own if possible. Inside large, heated buildings at the fairgrounds. Advance tickets (available until February 1) are \$1.50; at the door, \$2. Write Oran Hiscox, WB9JLL, Ticket Chairman, Wheaton Community Radio Amateurs, P. O. Box QSL, Wheaton, IL 60187. Commercial exhibitors write Paul Sexauer, W9JTO, at the same address.

Illinois: The Sterling-Rock Falls Amateur Radio Society's 17th annual hamfest is Sunday, March 6, in the Sterling High School Field House.

Indiana: The Lake County Amateur Radio Club's 24th annual banquet is Saturday, February 19, at 6 P.M. at the Griffith Knights of Columbus Hall, 1400 South Broad St., Griffith. All the delicious home-cooked food you can eat, wine fountain, entertainment,

guest speakers, special band after. Tickets are \$7.50 each; no door purchase. Prior to February 3, write Herbert S. Brier, W9AD (W9EGQ), 409 S. 14th St., Chesterton, IN 46304.

Indiana: The LaPorte ARC's winter hamfest is on the 27th of February at 8 A.M. at the LaPorte Civic Auditorium. Good food, plenty of free tables, 50 miles east of Chicago. Talk-in on 01/61 and .94. Donation \$2 at the gate. Info from LPARC, P. O. Box 30, LaPorte, IN 46350.

Iowa: The annual Davenport Radio Amateur Club Hamfest is Sunday, February 27, at the Masonic Temple in Davenport. Admission is \$1.50 advance; \$2 at the door. Talk-in on 28/88 and 146.52. Refreshments and tables are available. For info and tickets write (s.a.s.e.) to WA0GXC, Dick Lane, 116 Park Ave. So., Eldridge, IA 52748.

Massachusetts: The 4th annual Norwood Amateur Radio Club auction is Friday evening, February 25, at the Norwood VFW Post 2452 on Dean St., Norwood, MA. Auctioneers: WIWSN and WA1IEB. Activities begin at 7 P.M. Info available from Dave Doe, K1HRV, 617-668-4259. Fm talk-in: 52 and 147.69/09.


Michigan: The Cherryland Amateur Radio Club's 4th annual Swap n' Shop is Saturday, February 12, from 9 A.M. to 4 P.M. at Northwestern Michigan College in Traverse City. Donations of \$1. Free display tables for electronic equipment and parts. Everyone is welcome. For more info write Bill Mader,

WA8WWM, at 616-326-6392 or Box 2, Empire AFS, MI 49630.

Michigan: The Livonia Amateur Radio Club's 7th annual Swap n' Shop is Sunday, February 27, from 8 A.M. to 4 P.M. at the Stevenson High School in Livonia. Plenty of tables, refreshments and free parking. Talk-in on 04/64 and 146.52. For info write Neil Coffin, WA8GWL, Livonia Amateur Radio Club, P. O. Box 2111, Livonia, MI 48150.

Michigan: An unconventional swap fest, Saturday, March 5, at Marshall High School, Marshall (near I-94 at I-69). Tech sessions, computer sessions, DX, vhf, YL meetings, plus a home tour of historical Marshall and dining at the world-famous Win Schulers. For details and reservations write Goodrich, 117 Parrott Dr., Marshall, MI.

Michigan: Blossomland Amateur Radio Assoc.'s 11th annual Spring Swap n' Shop is Sunday, March 6, at Bridgman Middle School, Lake St. at Tower, Bridgman (exit 16 on I-94). Expanded facilities, refreshments, fun. Table space restricted to radio and electronic items only. Advance ticket donation \$1.50; tables \$2. Write John Sullivan, P. O. Box 345, St. Joseph, MI 49085. Make checks payable to Blossomland A.R.A.

Virginia: The Vienna Wireless Society's annual Winterfest is Sunday, February 20, at the Vienna Community Center. Indoor tables, sales, technical sessions and food from 8 A.M. to 5 P.M. Admission is \$3; tables \$5. For info write Box 418, Vienna, VA 22180. 

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

1977—What Can We Expect?

As this column is being put to bed (December, 1976), one cannot help looking to the next year, and what it will bring. We have had tremendous growth in amateur radio during '76 and '77 looks even better. This in turn means more people coming onto repeaters and vhf/uhf. We already know that there is a big frequency crunch existing on 2 meters in many states. In fact, we just

received a compilation of 2-meter repeaters within a 60-mile radius of the Empire State Building — 97 machines! Yes, that is right, 97 repeaters in a 60-mile radius! Fortunately, 220 MHz is being discovered by more and more groups, and by the end of '77 maybe we'll be able to complain about crowding on that band. It stands to reason that equipment design will improve this year. As we get

crowding, it means that manufacturers will have to look at better selectivity if they want amateur acceptance of their products. Overall, we like to be optimistic about fm and repeaters for 1977. Our biggest problem will be avoiding serious trouble arising from uncoordinated repeater operation. But hopefully, we will be able to settle our own differences without government intervention.

MORE ON 220

The following from the Ohio Area Repeater Council (OARC) is of interest:

Good news! The 220-MHz band continues its constant growth, several Ohio repeaters are on the air or under construction. The Ft. Wayne repeater in Indiana can claim being first in the Hoosier State. Cleveland has two very successful systems on 220 and more are being added at Columbus, Toledo, etc. Oh yes, Dayton and New Carlisle also boast 220, too. In light of what is becoming troublesome on 2 meters, more and more amateurs will be adding 220 capability.

The most important item on the January meeting agenda was the very future of the OARC. There were three alternatives to consider: (1) we can abandon attempts to coordinate 2-meter repeaters, and let anyone who wants to put one on the air pick his own frequency pair; (2) we can organize to bring pressure on uncoordinated repeaters to join, support and accept frequency coordination by the Council. To succeed, this plan would require practically unanimous agreement by Council members to boycott all pirate repeaters and to actively urge their club members and all repeater users to refuse to either use or support such a repeater or to welcome on their repeaters others who regularly use a pirate repeater system; (3) we can actively support the move to get FCC to give recognized repeater councils/coordinators the authority to disapprove a repeater license request, either new or renewal.

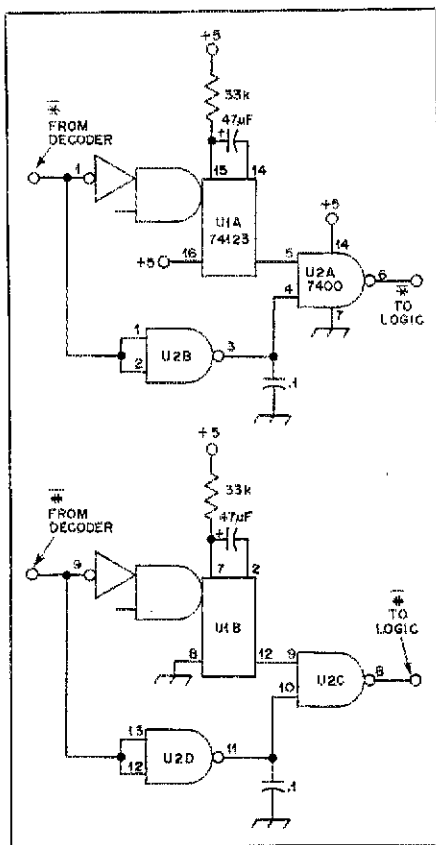
USER VERSUS TRUSTEE RESPONSIBILITY

As you may or may not know, if the user of a repeater violates the FCC rules, such as spouting out profanity, the FCC considers that both the user and trustee/licensee of the repeater are equally responsible and any citation or fines could be imposed on both parties. During some informal discussions with the amateur division of FCC, we argued that the responsibility of what is said on a repeater should be that of the user. FCC argued that the rules were better the way they were because it gives the licensee/trustee the right to say, "Hey look, it is my license that is on the line so either you cease and desist or the repeater gets shut off." In other words, the present rule gives the licensee the big stick. (Of course, orderly communications should always be the goal of the amateur service.) Good point? What do you think?

ONE-STEP DE BOUNCE

Shown in the diagram is a circuit that appeared in *CVRA Handbook*, (Carolinas-Virginia Repeater Assoc.) This circuit, designed by Buff Buffington, W4VWZ/WR4AIF/WR4AKY, is called "One Second De Bounce." As Buff points out, all repeaters with autopatch need this circuit to prevent voice signals talking up or down the autopatch.

The circuit requires the decoder output to be low constantly for one full second before the output can go low. Since the 74123 is retriggerable, any glitching or false voice operation will keep adding one second to the time of the single shot multivibrator. Only a constant low for one second will cause the output to go low. (Note: The two 0.1- μ F capacitors are used to compensate for the long propagation delay of the 74123.)



All repeater groups who have their machines located near a major interstate or other heavily traveled highway usually have a problem getting information to 2-meter-equipped travelers to supply facts about roads, accommodations or weather conditions. The Valdosta, Georgia Amateur Radio Club with its repeater WR4AEW, 16/76, solved the problem this past Christmas and gave the club members some interesting competition among themselves.

It was suggested that a contest be held and each of the club members would compete to see who could answer the largest number of tourists during the Christmas holidays. WA4KYB (standing) won the contest by answering 45 tourists; second place went to W4SWK (at bottom) with 33 tourist QSOs during the contest.

Along with the routine QSOs, the members checked with the weather bureau daily and passed along weather information, including road conditions and temperatures. To top off the contest, at the January club meeting, engraved trophies were presented to WA4KYB and W4SWK as winners of the contest. The contest was found to be highly competitive to see who could get their hands on the mic first, and the prime objective of getting traveling hams answers was successfully accomplished along with some friendly southern QSOs.

*VRAC Liaison, ARRL hq.

How's DX?



Conducted By Rod Newkirk,* W9BRD

For He's (and She's) a Jolly Good Fellow

And nobody can deny that paths to Hamland fortunately grow less rocky and more numerous. There are more and more enlisted Elmers around to be thankful for. "How's" periodically QSPs your appreciation to that collective spirit, those kindly guys and gals who unselfishly guide newcomers toward unforgettable first QSOs. And eventually to that spine-tingling first real DX. . . .

I'll never forget making the grade in an amateur radio class taught by W6GNS. He really knew how to inspire achievement. When Bob heard that I had passed my General, he beamed like a new father. W6GNS is gone now but his gently teasing "faint heart never won fair lady" still echoes in my ears. (WA6IQL) . . . Among several amateurs who helped me qualify for Novice status are WB8s

UIP JYO JYX and WN8ZPN, a really great bunch of Elmers. (WB8AYV) . . . Mine? ARRL itself, ever since 1957 when I first became a Novice. While immersed in medical studies for years thereafter I found QST an invaluable lift and diversion. Keep it up, Elmer, for all of us electronic nonspecialists who simply and thoroughly enjoy the art of radio. (WB8NYP) . . . W8GEH and his XYL were fabulous inspiration to a pesky group of Michigan teenagers back in the '50s. We would all bicycle across town for frequent evenings with Dale and Gladys, our Mr. and Mrs. Elmer. (9M2JJ/W8SWN) . . . After a solo struggle with code and theory I luckily found WA4AWL to help me over the final hurdles. Then Elmer no. 2, WA4NFF, guided me in getting my station together and on the

air. (WB4EHS) . . . Old IAIN had to be something of an Elmer in self-defense. Sid gave me his ancient spark transmitter to teethe on back in the '20s, then updated me with a UV202 cw rig to get relief from my awful QRM. (WB2GTE, ex-1BK8) . . . When WA2WDW heard that I had learned some code in my Boy Scout days, he dumped a practice oscillator into my lap and announced, "You're gonna be a ham." With Walt's urgings, despite an early exam failure or two, I reached Advanced level last May. I've entered a new and wonderful world for which I'll ever be thankful to WA2WDW. (WB2FFT)

Verily, without a friendly tug or two from Elmer, most of us might well have missed out on this great game entirely. How about yours? Remember?

FROM QST's DX MAILBAG

ASIA: OEIASC, visiting Japan, was featured with JA6s AEX and BLV on national TV in "Let's Enjoy a Ham QSO." Reviewers acclaimed it highly entertaining and very promotional. (W5QFX) . . . When I reached my Iwo Jima duty station late in 1975 there were no amateurs on the island. I ordered equipment for KA11W operation at the MARS site but gear didn't arrive until the summer of '76. Due to heavy radioman/postmaster work, I wasn't able to fire up until late September. Because the requisitioned TH3 failed to appear, I rigged a 14-MHz dipole to go with the SB104/SB230 combo. Finally, after being QRT since 1971, KA11W hit the air for contacts from September 24 to October 3, 1976. The majority of stations worked declared me a "new one" for them. Iwo may become rarer than ever now because JH1KSB/JD1 was transferred to Marcus. (WA6DJA) . . . Most of my six-month Masirah Island operation will be on cw about 25 kHz inside each band edge. Hope to have my FT101/ER101, dipoles and assorted beams in all contests possible. (A4XVK-G4BVH) . . . Very pleasant stay in Singapore as an active member of SARTS with a KWM2, S-line, quad and back-up vertical. Back on in Indiana now as W9CW after four years in Asia. (ex-9V1RF-W9GHK) . . . JAs 2PIC 3KWJ and I intend more '77 DXpeditions after last year's successful venture as VRs 1AK 4CW 8D and YJ8CW. 8J2HAM, operated by JE1JKL, JF1KTG, JH1s GTQ GTV JLR, JR1AIB and myself at JARL's big '76 convention, collected some 4500 QSOs. (JA0CUV/1) . . . Old VU2GG now works his DX from Doncaster as G3VLL. (VU2CBE) . . . Those 9D5s are EP2s commemorating fifty years of Iran's Pahlavi dynasty until March 21st which is the end of year 2535 on the Persian calendar. (EP2OD-9D5A) . . . Asian addenda via DX publications of clubs, groups and individuals: G3XHZ, in Qatar for a couple of years, wants to help A7XA make the place less rare. . . . HL9TD tunes for W/K/VEs near 3800 kHz while transmitting just below the top Korean band limit, 3550. . . . PA0GMM visited Nepal for QSOs from 9N1MM in October. . . . Eighty lucky W/Ks were among SM0AGD/S2's 600-contact Bangladesh collection. . . . VU2GDG, in search of 10-meter WAS, monitors 28 MHz for openings to North America which some-
*c/o ARRL, 225 Main St., Newington, CT 06111

times occur around 1500 UTC. A recent windstorm did in Gopal's 80-meter tower.

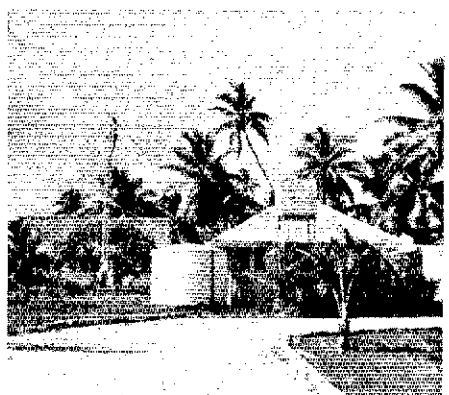
OCEANIA: In this month's 43rd ARRL International DX Competition, I'll be hunting Vermont and Wyoming on 80 cw. They're among the ten or fifteen states I still need for the League's Five-Band WAS. As for 160, after five years on that band I still need 25 more states - hi! (VK6HD) . . . 3D2AJ occasionally breaks open 10 meters. Caught him on 28,774-kHz cw with my old 90-watt DX60. (WB4GTP) . . . I'm completing a homespun multiband cw rig with a half-gallon 813 final. Hope to make lots of 13-wpm noise with it on 40 and 80 thanks to a 65-foot vertical. With ssb on higher bands a triband quad up 76 feet does great from my perfect midocean QTH. I intend to help keep the Marianas available indefinitely. (KG6RT) . . . VR3AR was a very welcome early-season catch here on old 160. (W6BLZ) . . . FO8EH, ZL2AFH and thirteen other countries answered my single-watt QRP and groundplane on 14-MHz cw. Gangway for Cycle 21! (VE6AUP) . . . Delightful 75/80-meter DX sport from Guam, especially Europeans, with a kW and 65-foot vertical. South America and the Caribbean are tough

from here on that band. A TH6DXX up 54 feet soon will bolster my signal on higher bands. (KG6JH-K6QHC) . . . VK2FT of Lord Howe Isle DXpeditionary fame says he won't bother further with place until the sunspot count builds up to fifty or so. (PA0TO, VERON) . . . More than a few W/Ks rushed to qualify for freshly available Philippines reciprocity hamming authorization. . . . HB9AHL anticipates signing VR7B on research assignment in the Line Isles before the year is out. . . . ZK1BA/p could activate Manihiki again about now, this time with adequate 80-, 20- and 15-meter facilities. (WCDXB)

EUROPE: Fantastic mid-November conditions at this end on 28 MHz from 1030 to 1630 UTC, many needle-pinning signals from the Americas. Our UK prefix is an ARI commemorative and will be used through next month. (I2CBM) . . . I've been guest-operating CTs IEM 1LV IREP 4AT and other shore stations when off shipboard. (WA7ZLC/mm) . . . Fine DX business in Liechtenstein last autumn and we'll do it again this year. (HB9s AIC NL) . . . DXhibition station ON7VT was inspected by many of the 50,000 visitors to our Kortijk hobby show last November. Much



WAX, marine voice of Tropical Radio Telegraph for more than half a century and a familiar fixture to scanners of shortwave ship bands, joined Rocky Point in virtual hf retirement last summer. Here operators C. Grimm, P. Smith, W4LAL and K4ZZV ceremoniously throw the big switch that put the Ojus, Florida, station's future traffic on cable and satellite channels.



VR8D, a twelve-day Tuvalu triumph late last year by JAs 2PIC 3KWJ and 0CUV, churned out eight-thousand contacts from this QTH of the Month. Their portable two-element quad is slightly visible near center.

DX was worked including all ten W/K call areas. I hear that Poland's SPPA certification is now canceled due to revision of SP call areas. A new award is planned. (ON5KD). . . Seekers of DARC's WAE, EU-DX-D and Europa certifications may file inquiries and applications via my new address: P. O. Box 440, Halifax, Pennsylvania 17032. (WA3KWD) . . . Continental comment via the vine: Things come big on lower frequencies. UV3GM, whom you may recall as UAQFGM, devised a 75/80-meter end-fire monster about 250 feet off the ground. Points Statesward, too. . . PAQGMW also means business on 80 with a quad directed westward plus a five-element fixed sloper. . . Meanwhile, back on the 20-meter ranch, OH8OS toys with his 36-element, three-bay stacked batch of Yagis on 63-foot booms atop a rotating 200-foot tower for a theoretical 17-dB gain advantage. . . G3SZA, GD4BEG and other Europeans are heard near 1828 kHz around 0600 UTC working our West Coast, a tough 160-meter path indeed. . . Fs 3AT 8EX 8VJ, 12XKE, OZs 1LO 1W 5DX, SM3CWE and other would-be Continental top-band DXers insistently petition their licensing authorities for liberalized 160-meter privileges. . . QRQers in the U.K. must remember to identify their radiotelegraphy at 20 wpm or less. . . Dead 28-MHz band? G4DYO is said to have worked well over a hundred countries on 10 meters during 1976. . . 9H4G is on the verge of elusive YL-DXCC.

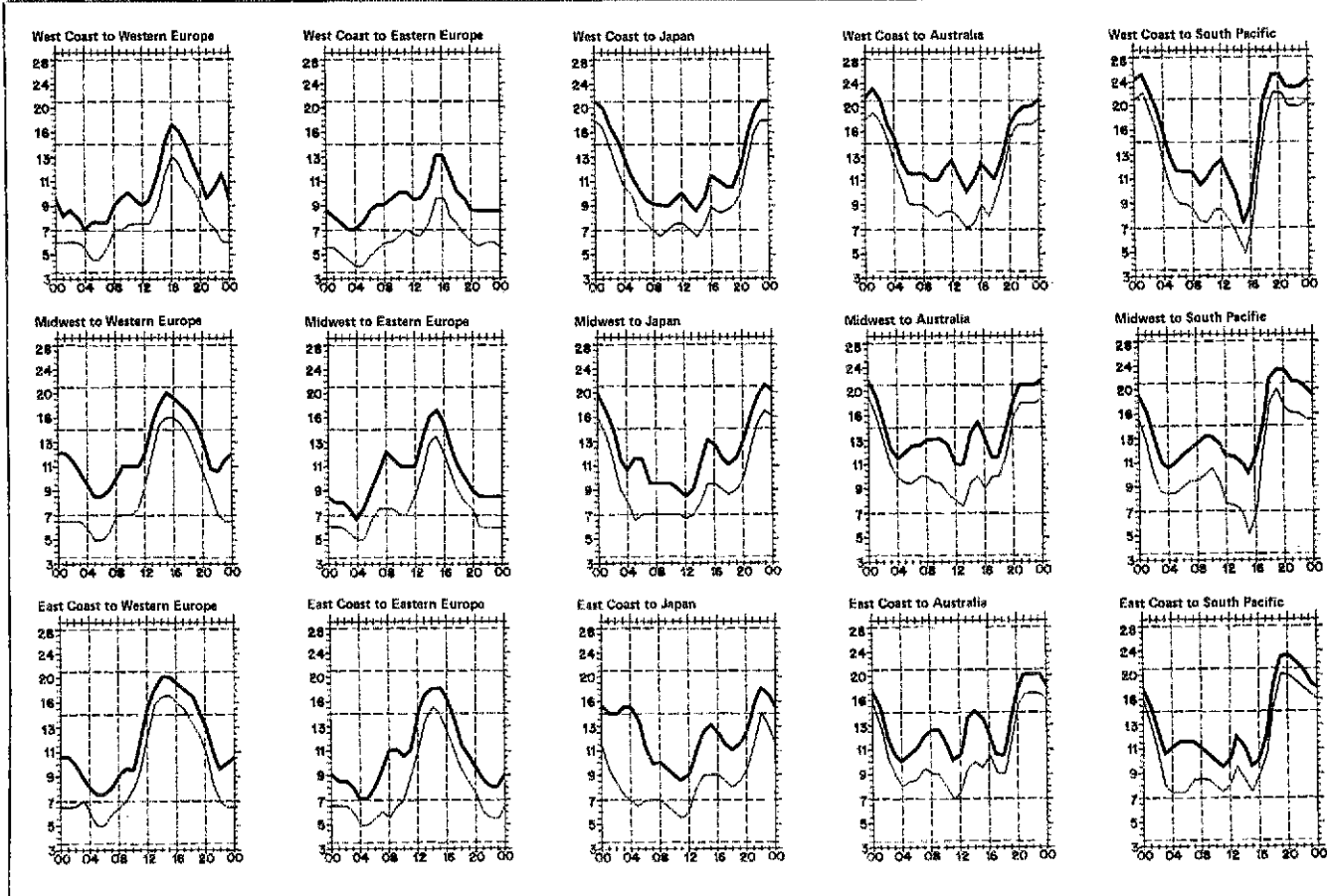
NORTH AMERICA: I plan to concentrate on 7040 and 14,050 kHz from Thule Air Base when my OX5 call arrives, also running 2-watt QRP now and then. OX3EA is the only other ham hereabouts. (WA1DBR/OX) . . . Speaking of big QRM, we HPs are lately afflicted with broadband 7-MHz noises appropriately dubbed "the motorcyclist" because it scoots up and down the band.



KG6RT likes the homebrew-from-QST DX approach on Saipan with multiband voice and moderate-speed cw output. You probably worked or heard Byrd previously as W6FHM/DU1 and VQ9N.

(HP1AC) . . . Nine thousand QSOs with 124 countries from Beef Island as VP2VDJ got our current Yasmie Foundation DXpedition off to a flying start. (W6s KG QL) . . . Finally succumbed to top-band DX temptation with a new 160-meter vertical. (W1CDC) . . . Fifteen is far from dead in Florida, but needs more activity to keep it humming. On days when nothing is heard a short CQ DX may turn up goodies. An HW16 and rotary dipole dug up 35 countries and 48 states for me on 21 MHz. (WB4EHS) . . . November brought general improvement in band conditions, most notably on 15. (W7HPI) . . . KP4CC, who pioneered Puerto Rican amateur radio with the late KP4KD, regrettably is added to Silent Keys. When the latter passed away years ago Juan's hamming interest flagged. (KP4RK) . . . Enjoyed another fruit-

ful QRP DXcursion as VP2MNR last fall. (WA6VNR) . . . A piece of wire tacked around my bedroom was good enough for 13 PAQPY4 YU2 and 8P6 on 75 watts of 7-MHz cw. (WB2CIR) . . . Still snagged at 298 confirmed though stalking A4-6-7, BV2, etc., at the same time stashing away 75/80-meter trophies for SBDXCC. (K8IP, ex-KZ5IP) . . . After a two-year DX layoff, I hung a 3.5-MHz end-fire array on my site for an amazing variety of 80- and 40-meter cw DX. Do we really need sunspots? (WA9OZC) . . . Sure hope those abandoned Rocky Point kW-plus rigs don't show up on 11 meters. As for nostalgia, I still miss commercial markers WIZ and WIK off the low edges of 14 and 7 MHz. (W4ZZ) . . . Panama's old HPC was a handy 40-meter, band-edge indicator for our old portable blooper. (W9BRD) . . . Big rigs? While working for RCA, we tested a 300-kW Navy transmitter and the largest sender I ever worked on, WLW's half-megawatt broadcast behemoth. (WB2GTE) . . . When shore-to-ship WAX switched over to computer/cable/satellite message handling, I grabbed early retirement in favor of high-frequency hamming, my hobby since 1930. (K4ZZV) . . . Hadn't thought about that old WAR-WVNA circuit for years until December's "How's" brought it all back. W9BRD and I used to relieve each other on that one, I recall. Those weak and watery signals from Karachi were quite a challenge. (K1AA, ex-WIKYK) . . . Just finished a heel-and-toe, two-letter-suffix "DXCC" - goes EA4CR-CR7LU-LU3HR-etc. - which turned out to be one of the toughest DX projects I've ever undertaken. (W8KPL) . . . Our group of five DX hounds is bent on tackling a DXpedition this year and will welcome all advice and encouragement. Organizational, travel and licensing hints will be greatly appreciated. (WB4CRW/3, 4819-B Faith Ct., Ft. Meade, Maryland 20755) . . . Bicentennial OSO No. 32,000 for AJ3AA was WBQGY in early December. In one unusual 14-MHz opening, I worked consecutively two-



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. On 50 percent of the days of the

month, the highest frequency propagated will be at least as high as the upper curve. On 90 percent of the days of the month, it will be at least as high as the lower curve. See January, 1977.

dozen JA stations. (KV4AA) . . . W4WSF, K4CFB, K4GKD and W3AZD are respectively new pres., v.p., sec. and treas. of Potomac Valley Radio Club. (PVRC) . . . Local scatter via club newshawks: Ws 4BRB 5USM 8LRL and K1PBW offer information varied and detailed to anyone contemplating a DXpedition with 1.8-MHz activity in mind. . . . ZB2DN/VP9, late of ZD8RR, looks forward to two years of Bermuda Cable & Wireless duty. . . . Local appliance QRN often hinders CE0AE's DX reception, but Fr. Dave nears the 200-country mark anyway while awaiting arrival of 160-meter apparatus. . . . South of the border there is said to be possible Revillagigedo XE4 reverly brewing this month or next. . . . K6ZE/PY8, 21,295 kHz around noon UTC, accompanies a biological research team in Amazon jungles. . . . North Florida DX Association moved their DX gab net from QRM-clobbered 3895 kHz back to 21,420. . . . Watching the sunspot kettle too anxiously won't make it boil. W8ZCQ feels we should all stop fidgeting so much and just keep digging deeper.



VR4CW produced 5300 Solomons QSOs on the recent Pacific junket by JAs 2PJC 3KWJ and 0UCUV, the latter shown operating. The touring trio also managed 3300 contacts from VR1AK and another 900 as YJ8CW.

0500 UTC, represents the remaining French portion of the Comoros, and according to WB6EWH/VQ9 some thirty potential Chagos actives are studying for ham licenses. (WCDXB) . . . "How's DX?" and its readers gratefully acknowledge inclusion of data from Canadian DX Association *Long Skip* (VE1AL/VE3), Columbus Amateur Radio Association *CARAScope* (W8ZCQ), *DX News-Sheet* now in suspension (G. Watts), Japan DX Radio Club *Bulletin* (JR3BHW), Newark News Radio Club *Bulletin* (M. Witkowski, Rte. 6, Box 255, Stevens Point, Wisconsin 54481), Northern California DX Club *DXer* (K6SSJ), North Florida DX Association *News* (WA4UFW), Southern California DX Club *Bulletin* (WA6KZI), *VERON's DXpress* (PA0TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB). Felicitations, by the way, to the NNRC gang in its gala 50th year.

AFRICA: VE2ZN/SU is quite active each weekend looking for W/Ks near 14,210 kHz. ARRL's Worked All States certification is the lure. Neighbor W7JXE/SU prefers 15 when the band is decent. (VE2YM) . . . 7P8BC (W9JER) operates from the technical school at Leribe on a three-year hitch. Jerry, particularly active Saturdays near 14,283 kHz around 1800 UTC, is adding a CL36 beam to his Drake outfit. (WA9SMM) . . . SU11M's old Super Pro inhaler conked out so Northern California DX Foundation plans to provide Ibrahim and daughter SU11M with more modern gear through W3KT's good offices. (WCDXB) . . . ZS6DW completes top-band DXCCs and WACs for diligents who spot his nightly 1964-kHz cw. (WWDXA) . . . SM0KV expects to be signing 5Z4NI well into May. (VERON) . . . FH8GV, 7028 kHz at

DXAC NOTES

The following recommendations from the DX Advisory Committee were submitted to Headquarters by the DXAC Chairman in October, 1976:

- 1) The ARRL will not consider a new request for country-status for any area which is requested on the basis of an exception to the current DXCC Country Criteria.
- 2) Aldabra, Desroches and Farquhar should be deleted from the ARRL Countries List.
- 3) FH8, the Comoro Islands, should be deleted from the ARRL Countries List, and two new countries, D6A, the Comoro Islands and FH8, Mayotte, should be added to the ARRL Countries List.

The first recommendation was rejected by the Communications Manager; the second and third were accepted. For more information on the function of the DXAC, see page 90 of *QST* for December, 1974.

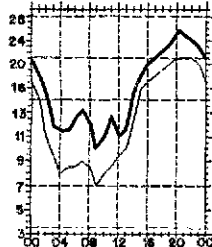
DXCC NOTES

Two new countries on the ARRL Countries List are D6A, the Comoro Islands and FH8, Mayotte. QSOs made on and after July 6, 1975, count for these two countries. QSL cards for QSOs with D6A and FH8-Mayotte will be accepted for DXCC credits starting March 1, 1977. FH8, the Comoro Islands, is a deleted country as of July 6, 1975. This country is deleted because of the split of this island group into D6A and FH8-Mayotte.

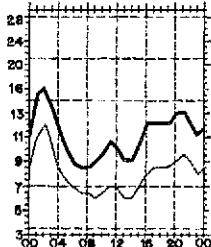
Three VQ9 listings on the Countries List, Aldabra, Desroches, and Farquhar, are deleted as of June 28, 1976. These three islands were returned to the Republic of the Seychelles upon its independence last June.

These actions bring the grand total on the ARRL Countries List to 363 - 319 current and 44 deleted countries.

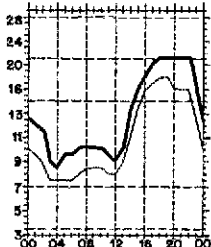
West Coast to South America



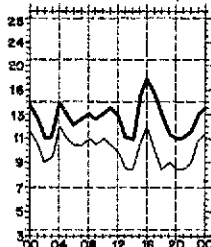
West Coast to Central Asia



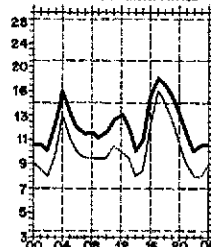
West Coast to Southern Africa



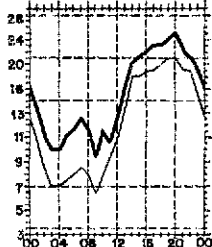
West Coast to Eastern Europe*



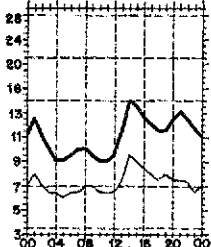
West Coast to Southern Africa*



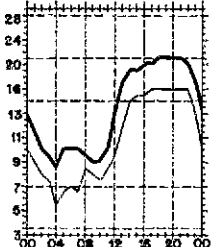
Midwest to South America



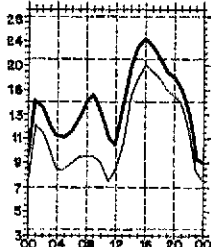
Midwest to Central Asia



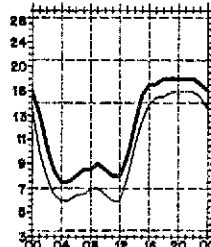
Midwest to Southern Africa



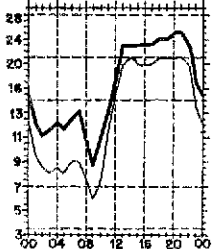
Midwest to Central Asia*



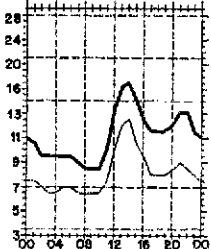
East Coast to West Coast



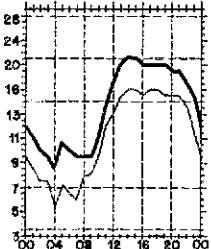
East Coast to South America



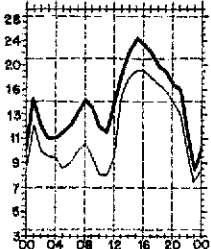
East Coast to Central Asia



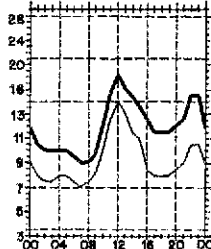
East Coast to Southern Africa



East Coast to Central Asia*



East Coast to Australia*



QST, page 58, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the

Institute for Telecommunication Sciences, Boulder, Colorado. These predictions for February, 1977, assume a sunspot number of eight, which corresponds to a 2800-MHz solar flux of 70.

DX Century Club Awards

Administered by David Newkirk, WA1VCG

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. But there's more — you can endorse your certificate in 20-country increments through 240, in 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1, through October 22, 1976. The remainder of October credits and 5BDXCC awards will appear in next issue's DXCC listings. Think you may be ready to qualify for DXCC? Write Headquarters for details.

New Members

Mixed

W9VNE/317
JA1BWD/271
W2YD/257
WB4HQE/208
WB0HAD/202
HB9HT/135

DK6CS/134
WA6ENG/131
DA2DX/130
F3TR/127
YU5CZ/125
W6TD/124

DL1EY/123
I8RHZ/120
WB4FOT/120
W0DP/115
JH1QJC/113
JA2BJW/110

K1OEY/109
W6PRP/108
VE3ECP/104
W2HVO/104
WA3GYT/104
W9LMI/104

F6DYG/103
OH3NY/103
W7ISY/103
OZ2TY/100
W4NMK/100

Radiotelephone

WA4HSE/186
I71VL/179
I2ZLG/161
W9VNE/161

W3JGM/126
5B4IS/126
K4BZF/118

WA3YEE/114
WA4CHG/109
DJ9NB/107

HB9AST/106
YU3WS/X/104
KIATY/101

KH6ILF/101
F6BGV/100
F0CG/100
KA6JA/100

CW

JA0CUV/1/127
JA1MCM/120

W3GRS/109

ON5NT/103

JA1BWD/102

WA6ENG/100
WA8TDY/100

Endorsements

Mixed

W8AH/351
W9GFF/344
VE3AAZ/340
DL7AH/326
JA1GC/325
OH4NS/325
W3PVZ/323
W0BL/323
K6BCE/322
JA8JL/321
WA8ZDF/321
JA8ZO/320
PY4OD/320
ZL1AV/320
W4BBP/318
W1FJJ/315
W3CRE/315
W4FPW/315

JAIJRK/312
W91VG/312
K2QOU/311
K4EWG/311
JA6DG/310
W4ZSH/310
W9KNI/307
W4YUU/306
ZP5CE/306
W6CDJ/302
WB5BD/300
K3EH/299
WA0LT/294
K9VQK/293
OH2BCV/293
K4BVQ/292
WB9EBO/291

K4TSJ/289
VE3IR/282
G3KAA/280
W8NPF/280
W6JZU/276
K5YMY/271
WB4DIU/271
K4OMR/270
WB6WIW/265
K9HMB/262
W3VRT/262
W4WRV/257
JA8AYN/256
K4JEY/255
CE6BGZ/254
EA3NA/250
JH1QOJ/250

WA4BTC/249
WA9FWY/242
W7JUC/240
JA1FGB/233
LA5ID/223
VE3DU/220
W4HU/220
WA0TKJ/220
K0IKZ/204
WA2DNY/202
OE5LX/200
W4LVM/200
WB5HY/200
K5BDS/180
VE3AKG/180
W4IMB/179
YU1NFR/172

JA7UIQ/170
JA2IU/169
WB2FYS/165
W2ABE/162
W4DZZ/160
WA9WKA/159
JH7BRG/147
JA8DWR/143
G3IMK/140
PY3CEN/140
WA2AQG/140
WA2MVQ/139
WB25JG/123
W1IG/121
WA2URD/120
W6BE/120
WA7GVM/120
WA7MCK/120

Radiotelephone

W8AH/351
I6FLD/335
W6PTS/321
WA8ZDF/320
JAIJRK/312
VE3AAZ/312
SM0ATN/310
W3CRE/310
JA8ZO/308

K2QOU/307
W6CDJ/301
ZP5CE/300
JA6DG/296
JA1GC/290
K3EH/290
W9LA/287
WB9EBO/287
DL9DY/286

ZL1AV/285
W91VG/283
WA8TDY/277
K4BVQ/273
K6BCE/270
W2GA/270
LU1BAR/W3/270
WB6WIW/265

K5YMY/263
K9HMB/261
W4WRV/253
JA8BAR/251
CE6BGZ/227
K7SEK/227
K4TSJ/226
LA5ID/220
IHAG/211

K2AAC/200
VE3DU/200
W1GKN/199
WA4BTC/171
WA1NSJ/171
DK9KD/161
VE3AKG/155
W4LVM/138
I1GJ/120

CW

W9KNI/251
K4LRO/180

JH7BRG/145
K6AC/140

WA5VDH/140
OZ3Y/130

W4LVM/128
WA8ZDF/126

VE3DU/120
WA6TLA/120

THE ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 x 7-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL HQ.

- W1, K1, WA1, WN1* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
- W2, K2, WA2, WB2, WN2* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.
- W3, K3, WA3, WN3* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
- W4, K4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.
- WA4, WB4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

- W5, K5, WA5, WB5, WN5* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.
- W6, K6, WA6, WB6, WN6* — ARRL Sixth (6th) District DX QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.
- W7, K7, WA7, WN7* — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.
- W8, K8, WA8, WB8, WN8 — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
- W9, K9, WA9, WN9 — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
- W0, K0, WA0, WB0, WN0 — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.
- KP4, WP4* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.
- KV4 — Graciano Berlaro, P. O. Box 572, Christiansted, St. Croix, VI 00820.
- KZ5* — KZ5 QSL Bureau, KZ5OD, Box 407, Balboa, CZ.
- KH6, WH6* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.
- KL7, WL7 — Alaska QSL Bureau, Star Route, Box 2401, Wasilla, AK 99687.
- QSL Cards for Canada (VE and VO) may be sent to: ARRL Central QSL Bureau, P. O. Box 396, Downsview, Ontario, Canada M3M

Strays

I would like to get in touch with . . .

□ radio amateurs under 18 for an OB- and YL-under-18 net, to exchange ideas and interests among the younger generation of hams. The net will meet on 75- and 40-meter phone and 80- and 40-meter Novice cw. Dave Vitkus, WB9RXV, RFD 2, Box 639, Knox, IN 46534.

□ hams who also enjoy organ playing, to exchange sheet music and tips on playing techniques, especially with blocked chords. Dan Mahony, ZS6OS, P. O. Box 1729, Johannesburg 2000, TVL, South Africa.

QST Congratulates . . .

□ Hugh Aitken, WA1FBE, upon receipt of the Dexter Prize of \$1,000 and a plaque, for publication of *Syntony and Spark — The Origins of Radio*. The prize was presented by Dexter Chemical Corp. for an "outstanding book in the history of technology."

□ John F. Kienzie, WA2UON, who was recently selected for listing in *Who's Who — School District Officials*. The listing is a result of John's achievements as a teacher and media technician in Castleton, NY.



John Kienzie, WA2UON, set up WB2YCR, his school's amateur radio station.

3A8. Or, QSL cards may be sent to the individual bureaus.

- VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS.
- VE2 — A. G. Daemen, VE2UJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.
- VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON, Canada M3M 3A3.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg, MB R3N 0E8.
- VE5* — A. Lloyd Jones, VE5J1, 2328 Grant Road, Regina, SK S4S 5E3.
- VE6* — D. C. Davidson, VE6TK, 1108 Trafford Dr., N. W., Calgary 47, AB.
- VE7 — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.
- VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.
- VO1, VO2 — William Coffen, VO1KM, P. O. Box 6, St. John's, NF.
- SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

□ QSL bureaus for other areas can be found in the December, 1975, issue of QST, page 64.

Silent Keys

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

W1BJK, George D. McHugh, Madison, CT
 W1CDJ, Joseph Casey, Melrose, MA
 Ex-W1COO, Arthur E. Bent, Wayland, MA
 W1DKF, Moy Gar On, Boston, MA
 K1GJJ, Harley F. Reed, Waltham, MA
 W1GW, J. Kenneth Fowler, Kingston, NH
 W1JMO, Edwin J. Robinson, Barnet, VT
 W1KFM, George Gracia, New Bedford, MA
 K1RAO, Harry B. Downing, Mattapoisett, MA
 W1TH, Theodor E. Schreyer, Newfane, VT
 W1VGV, Richard J. Kelly, Framingham, MA
 K1WFW, Irving E. Jennings, New Durham, NH
 WN2CAO, Lawrence G. Rommel, Niagara Falls, NY
 W2CBS, Joseph F. Tucker, New Windsor, NY
 W2CPY, Newell K. Chamberlin, Bridgeton, NJ
 WA2CUB, Raymond T. Gianchetti, Mickleton, NJ
 WB2EPY, Philip Gandolfo, W. New York, NJ
 W2GGU, Donald G. LeFevre, Brooklyn, NY
 W2HGR, Paul Morrison, Sussex, NJ
 W2KH, George W. Bailey, New York, NY
 K2MNV, Clayton D. Labosier, Gansevoort, NY
 WB2NAA, Howard W. Wessenberg, Moorestown, NJ
 W2RML, Joseph G. McNelis, Woodstock, NY
 K3GQA, Philip J. Polito, Pittsburgh, PA
 W3HDV, Edward H. Martin, Washington, DC
 W3IL, Carl G. Lorber, Mt. Rainier, MD
 K3RVW, Gerald L. Quint, Washington Crossing, PA
 W3UVT, Willard R. Hall, Milford, DE
 Ex-W4BGE, Lawrence Manning, Jr., Atlanta, GA

W4KTE, Walter W. Lindner, Pompano Beach, FL
 WA4MFD, Wilson W. Kohli, Clearwater, FL
 WN4MFO, Jack P. Langley, Lexington, NC
 K4RB, James A. Young, Clearwater, FL
 W4RCB, Albert Elliott, Charlotte, NC
 K4TLM, John L. Hopkins, De Leon Springs, FL
 K4YA, Richard "Ken" Rohan, Boynton Beach, FL
 W4YKB, Stanley R. Harvey, Sr., Sarasota, FL
 Ex-W5BHU, Hugh Duffy, Clayton, NM
 W5DZ, William P. Clarke, Waco, TX
 K5HYC, Bennie B. Lackey, McGehee, AK
 Ex-W5IHG, Henry H. Batjer, San Angelo, TX
 WB5TCV, Roy E. Geyer, Jr., San Antonio, TX
 W5TFW, John N. Naff, Nederland, TX
 W5UCW, Roy W. Pratt, Flippin, AR
 WB5WPT, Jerry R. Tomme, Amarillo, TX
 W6AOE, John B. Erramuspe, Idylwild, CA
 W6BLC, Carleton W. Campbell, Crescent City, CA
 K6CVE, George W. Walls, Hughesville, MD
 W6FYZ, Samuel F. Bowby, San Marino, CA
 W6GET, William H. Kindrick, Monrovia, CA
 W6HQ, Joseph T. Bindner, San Bernardino, CA
 K6IN, Aaro W. Hershey, Escondido, CA
 W6KSN, Clyde B. Harrison, Azusa, CA
 W7BRV, Brooklyn I. Lamoreaux, Salt Lake City, UT
 WA7HYE, William R. King, Great Falls, MT
 W7MZB, Vernon Van Note, Seattle, WA
 W7RBV, Walter M. Haynes, Las Vegas, NV

W7SCG, Harry Darby, Bridger, MT
 W8DCE, John E. Probst, Hamilton, OH
 W8HWF, George M. Sheldrick, Perrysburg, OH
 W8UUS, Melvin G. Marsley, Kalamazoo, MI
 K9CBB, George L. Lone, Indianapolis, IN
 W9FOA, John W. Storch, Northlake, IL
 W9FSY, James DeHaan, Chicago, IL
 W9GRS, R. G. Elston, Marshall, IL
 W9HOF, Dr. William E. Nolting, Elmwood, IL
 W9JIA, Everett DeBeck, Chicago, IL
 WA9KKT, Dolly R. Buchicchio, Roselle, IL
 W9KZI, Charles J. Krainas, Chicago, IL
 K9MDY, John Milliman, Des Plaines, IL
 WA9PDQ, Conrad C. McIntosh, Springfield, IL
 W9SBA, John A. Rosinski, Calumet City, IL
 WN9TRV, Carl Berglund, Rolling Meadows, IL
 W0BGR, James B. Fronkier, Kansas City, MO
 W0LCX, Alfred W. Kruse, Des Moines, IA
 W0NZJ, John E. Christianson, Mason City, IA
 Ex-W0UCR, Myron Evans, Calhoun, MO
 WA0ZMJ, Cecil F. Sherman, Tracy, ID
 VE1AZB, C. D. "Drew" MacKenzie, Dalhousie, NB
 VE3BYE, William J. Bye, St. Catharines, ON
 VE3EYX, Donald J. Dauphin, Chatham, ON
 VE3GWO, Norman Finney, Haliburton, ON
 VE3GXM, Fred Hellyar, Toronto, ON
 DL3SA, Hans Zimmermann, Rheinf., Germany
 G5PP, Robert Palmer, Coventry, England
 KP4CC, Juan B. Castanera, Rio Piedras, PR
 SM3DKL, Georg Nyman, Sundsvall, Sweden

GEORGE WILLIAM BAILEY, W2KH ARRL PRESIDENT, 1940-1952 A PERSONAL RECOLLECTION

Former ARRL President George W. Bailey, W1KH and W2KH, died in his sleep on December 19, 1976, in Nashville, TN. For the benefit of more recent hams in the fraternity, I'd like to recall some memories of him so you will understand why we elders regard him as one of the giants in amateur radio.

The amateur calls W1KH and W2KH have been well known over the world to other amateurs, as he was constantly on the air. Between 1930 and 1941 he acted as a radio link between the Grenfell Mission to Labrador and the rest of the world. In 1933, he went mobile after installing equipment in his automobile.

The Bailey family, living in Weston, MA, in March of 1933, were entertaining some friends in their home on the evening of the 10th of that month. A strong earthquake took place in Long Beach at 8:54 P.M. (EST). Some hours later the group heard of it and George brought the guests into his shack while he tried to make contact on cw with southern California. Contact was made about 1 A.M. the next morning with W6RO, Dwight Williams of Long Beach. Later that morning George called the story in to the local press, the *Weston News Review*. The story appeared on the 15th. Incidentally, the call W6RO has now been assigned to the Long Beach Associated Radio Amateurs.

W1KH was a pioneer uhf enthusiast. His 5-meter signals were reported heard in Europe, in the middle 1930s — perhaps the first transatlantic "heard report" in amateur history. His exploits on 224 MHz were reported in the first edition of the *QST* vhf column, in 1939.

He was president of the American Radio Relay League from 1940 to 1952 (and of the International Amateur Radio Union), vice president from 1936 to 1940 and New Eng-

land Division director from 1932 to 1936. He received the Marconi Medal of Service from the Veteran Wireless Operators Association and a special citation from the 1956 Edison Radio Amateur Award Committee.

Many amateur groups had him as a member — the Broadcast Pioneers, the Old-Old Timers' Club (OOTC), an honorary member of the International Mission Radio Association (IMRA) and several local radio clubs.

Despite the many honors and high positions he held, he was always ready to assist fellow men and women in amateur radio. Many a time you would hear him on cw helping a Novice on his code. His acquaintance with the State Department, especially in communications, solved many international problems for amateur groups.

He had an effusive manner of greeting another ham on the air. Even if you had contacted him for a dozen consecutive days, he would greet you in his beautiful voice as if he were talking to a friend he had not met in some years.

George was born in Quincy, MA, May 14, 1887. He was graduated from Harvard University in 1907, and served as class treasurer up to the time of his death. In 1958, he was awarded an honorary D.S. from Lawrence College in Appleton, WI.

In 1941, George was engaged by the National Research Council as chairman of the Radio Section, Office of Scientific Personnel. From 1944 through 1946, he was chief of the Scientific Personnel Office of the Office of Scientific Research and Development, under Dr. Vannevar Bush. For his labors, he received the Certificate of Merit from President Truman. Concurrently, he held a number of other wartime communications and advisory positions.

Following World War II, George joined the Institute of Radio Engineers as executive secretary from 1945 through 1962. He received the Distinguished Service Award of the IRE together with a bas-relief portrait in bronze. With the merger of IRE and AIEE on January 1, 1963, he was appointed executive consultant to the Institute of Electrical and Electronics Engineers, a post he held until retirement.

He was a member of the Harvard Clubs of Boston and New York, the Cosmos Club of Washington, and the New York Academy of Science.

He is survived by a daughter, Mrs. J. Montgomery of Nashville, TN, and two sons, Richard Bailey of Marblehead, MA, and George W. Bailey, Jr. of CA. Two grandsons are amateurs, ARRL Life Member Dick Crouch, WA4END/WB6MXQ, of CA and "Pat" L. H. Montgomery, WA4UDB, of Nashville, TN, and a great grandson, Chris Williams, WA1WMW, of Lincoln, MA.

The world of amateur radio is better because of Dr. George William Bailey (W1-W2KH), administrator, scientist, engineer, communicator and gentleman. — *Rev. Daniel Linehan, S. J., W1HWK*



George William Bailey, W2KH.

The World Above 50 MHz



Conducted By
William A. Tynan,* W3XO

They Don't Need It, But We Do

The recent FCC order deleting the requirement for signing portable and mobile has particular significance for those of us who call the world above 50 MHz home. In this world, propagation is of particular interest and importance. Therefore, we should be sure that we make it clear where we are at all times. Just imagine the confusion that could be caused by W3XO calling CQ on 2-meter ssb from San Diego, as I do on periodic business trips, without saying "portable 6." Sure, it would be fun to hear them fall all over themselves calling me, but would it be sporting and would it constitute good operating practice? I say the answer is a definite "no" to both questions. I believe that it is akin to the lids who get on 75 meters during DX contests and sign trumped-up exotic calls. Of course, signing false calls is strictly illegal, so there is no question as to status of that

practice. But isn't the intent the same as if I were to deliberately try to lead the southern California gang into thinking that, by some freak mode of propagation, a 3 was putting a 2-meter signal into their area? As urged in "It Seems to Us" in *QST* for December, 1976, we should all continue to use the portable and mobile designations when they apply because it makes good sense to do so and because it is good operating practice.

Those using vhf repeaters should not assume that they are special cases because of the "local" nature of their communication. During the Es which reached 2 meters on numerous occasions last summer, very often the first indication of something interesting occurring was a strange call on one of the nearby repeaters. If it becomes common practice for us to fail to indicate portable and mobile operation while working fm, as is now

permitted under FCC rules, this valuable use of the mode as a propagation warning system could become lost to us — as we may get used to hearing all sorts of calls coming through our repeaters with no indication as to their place of origin. This situation would be particularly prevalent in areas with large transient populations such as near military installations or resorts.

Another fallacy may arise that once communication is established, it is no longer necessary to indicate that you are far from home. Everybody in the QSO knows where you are because you told them at the beginning, so why keep telling them? But what about someone else, not in the group, who might have just happened by the frequency? No, the best thing we can do is to continue signing our calls the same way we were required to before November 26.

ON THE BANDS

6 Meters. As this is being written in mid-December, we should be well into the winter fs season. However, I have heard only a few fairly poor openings at this location. WAS1YX reports from San Antonio that the November conditions were quite good in his area with 6-meter Es openings of 45 minutes or more occurring on seven days of the month. The

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

best was the 24th when the band was open for over three hours. The Es muf reached the fm broadcast band on three days. There are some 6-meter operators who stick it out during the lean months. One of these is WAØMRH of Omaha. John's efforts were rewarded by catching good multistate openings on November 2, 14 and 25. Another stalwart is K7ICW. Al observed Es sessions on the 2nd, 3rd and 24th. Still another loyal 6-meter devotee is WAØTRO of Smith Center, KS. Larry reports contacts in FL, LA, TX and AZ on November 25. He also notes an opening on December 11 which netted QSOs with three Tucson stations, WB7CKK, W5AMO/7 and WB7DQD. On the same occasion he heard, for about three minutes, the WA6MHZ beacon which was operating on 50.110. Larry reminds us that good distances can be covered on a regular basis via scatter. Sunday morning is the time that most of this type of activity takes place. His recent successes via this mode have been with K8III OH, WA9DOT WI, WA4OSQ GA and WA4AGO TN. In local work, stations in Kansas City 250 miles away are worked regularly.

Better days may be on the way with respect to the solar cycle. There are a couple of indications that we hit the bottom last July. W1HDQ says that in his viewing since then, Cycle 21 spots have been more numerous than those of the old cycle. The 2800-MHz solar-flux measurements collected in Ottawa by the Canadian National Research Council and published, among other places, in *The Radio Observer*, a quarterly journal devoted to amateur radio astronomy, shows a rising trend from July through late September. In addition, semi-official information passed on to me by K5LZJ indicates that the crossover point may have occurred in mid-1976. Here's hoping that Cycle 21 will be better to 6-meter enthusiasts than Cycle 20 was. More on this elsewhere in this issue.

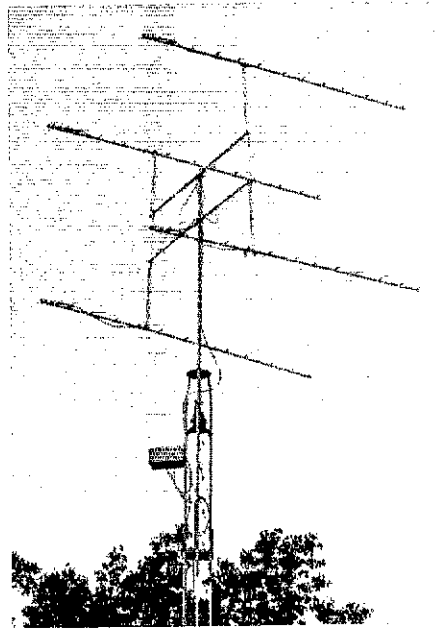
We should have regular activity from KV4 by summer. Bob Billings, WB4PXW/WB2RLK, informs me that he is moving to St. Thomas and should be set and ready to go by the beginning of the season. From the Pacific Northwest, 6-meter operator, K7ZCB of Boring, OR, files an OVS report stating that Monday and Thursday evenings at 1900 local on 50.120 are the time and frequency of the Northwest SMIRK Net. Speaking of the 7s, we find that we have really been doing one dirty, and one on the

distaff side at that. Be it known that 50-MHz WAS certificate no. 90 belongs to K7KHU not K7HKU as listed in October *QST*. Our apologies Orissa.

The SMIRK group originated in Texas so you would expect that the regular 2100 CST Sunday evening SMIRK Net would be popular down there, and it is. According to K5ZMS, the December 12 affair set something of a record with 48 check-ins from El Paso to Houston. There were 23 from the Dallas/Ft. Worth area alone. Who said there is no activity on 6 during the "off" season?

WB9RSK wants it known that the 6 M Club of Milwaukee is offering a certificate to anyone furnishing proof of working 48 states on 6 meters. Endorsements for 49 and 50 states are available as are single-mode endorsements.

2 Meters. Meteor scatter is one of the bread-and-butter modes for making long-distance contacts on 2 meters. Certainly the state totals for most stations would be much less impressive than they are without m.s. to provide contacts in the 500 to 1,400-mile range. M.s. doesn't require the big station that EME does. A moderate-to-well-equipped lash-up, coupled with quite a bit of patience and operating skill can make the grade, especially during the showers. W1FZA reminds us, however, to look also when no showers are present. Ken suggests that skeds be run for 30 minutes rather than the one hour often used. He maintains that shorter skeds are less taxing and can produce results even on random meteors. We all know that it is common practice to coordinate m.s. schedules via long-distance telephone or over the air on one of the hf bands. Coordination of frequency time and sequence is fine but several have complained that "coordination" is all too often extended beyond that. One of these is WA6UAM who says that some people he has tried to sked refuse to run unless he keeps the hf circuit hot throughout the course of the attempt. Paul feels strongly that this practice should be discouraged. He points out that it is very tempting for one station to tell the other via hf or telephone what he is going to send. All would agree that it is much easier to copy under difficult conditions if you know what the guy on the other end is going to send. KØDAS has a similar comment. Rod believes part of the problem is that some of those



Effective and neat describes the 70-cm array at W4ISS of Augusta, GA. The four Yagis are K1M 16-element "Long Boomers." (W4PED photo)

engaging in m.s., particularly the newer ones, may not know what constitutes a valid QSO. He suggests that some knowledgeable person write an article on the subject and that the article be reviewed by several others experienced in m.s. operating procedures before it is published. How about one of you veteran ping jockies taking typewriter in hand and giving it a try?

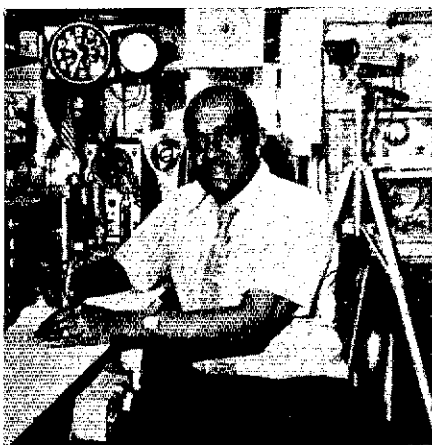
W7RUC near Tucson passes along an interesting account of his m.s. attempts with W7VEW in WY. They were running random skeds the week after the Leonids without much success until at 0750 MST, November 21. Steve says "it was as if someone upstairs turned on the stream switch" and a QSO followed. He speculates that it could have been the last remnants of the Leonids or more likely the Andromedids. The ARRL's *The Radio Amateur's VHF Manual* lists this shower as due to return in 1977, and notes that it has not been very dense since being deflected by Jupiter, but that it might revive. In its peak years the Andromedids produced meteors at a rate of 100/minute. This storm should bear watching next November.

Geminids' reports are just starting to come in as this is being written in mid-December. VE3DSS provides information via the telephone recorder, that he had success with WA5TUD LA and W5JTL MS bringing his state total to 37. K4GL found the shower poorer than usual but managed a QSO with W5UWB TX, nevertheless. Jack also reports an EME contact with K7NII in AZ for state number 44. A 2-meter EMEer who has been down due to moving is WA7BJU. Dan should be back in business again by the time this appears. His new QTH is Rte. 1, Box 314 A1, Beavercreek, OR 97004. The phone number is 503-632-6972. Incidentally, Dan is looking for m.s. skeds with NV, UT, SD, ND, NE, CO and KS. I would bet that he would accept EME skeds in these states as well. For EMEers with access to an HP25 or 55, W4WNH/8, along with W8BAH, has developed programs for these calculators which provide moon azimuth and elevation as a function of GHA (Greenwich hour angle) and declination. Those who can use a copy of either program may write Selby Ennis, W4WNH/8, 214 Old St., Clio, MI 48420.

The Side Winders on Two (SWOT) group continues to grow at a steady rate. This writer recently received his membership card with the number 300. In addition to sponsoring nets, the organization puts out a newsletter which is sent to all members and associate members. Associate membership is available to anyone interested who has as yet not qualified for regular membership by virtue of working two SWOTers on 2-meter ssb. For information, contact W5JTA at 1704 Glenn Dr., Fort Worth, TX 76131. An OVS report filed by WB0IUT of Lincoln, NE, tells of a SWOT net in his area. It is held at 1900 CST on Tuesdays with himself or W0NGG as net control. Like all SWOT nets it is on 145.1. Not all 2-meter nets are on ssb. W6DPD reports that the Fresno Two-Meter A-M Net meets 2100 local time Tuesdays on 145.35.

A new convert to 2-meter ssb and cw, actually a number of new converts, is the radio club at the University of Missouri at Rolla. According to a letter from WB0IXI, the gang there has discovered the advantages of horizontal antennas and, despite the use of rather low power (50 watts), they are working out quite well. One of the first contacts was with W5ST in Arkansas. We'll be expecting to hear of a lot of good work from W0EEE, Jim.

Having trouble with intermod from other services outside the 2-meter band? K3TRM of Hazleton, PA, found that the strip-line filter from the ARRL's *Radio Amateur's VHF Manual* cured that trouble for him. Another type of interference which is undoubtedly more difficult to correct is cited by WA3UFU of Allentown, PA. Tom notes that CATV systems use frequencies between 120 and 174 MHz for accommodating additional channels. One of these, designated "E" by the CATV industry, has its video carrier at 145.25 and its sound at 149.75 MHz. He says that there is enough radiation from the CATV cables to make the 145-MHz section of the band useless at his QTH which explains why he only operates the 144-MHz segment. There are two other such channels which could effect the 1-1/4-meter band. Has anyone else had problems with this type of interference?



This 439.25-MHz ATV station belongs to Harry, K2VNW. He is former c.d. RACES officer for Paterson, NJ, and member of the East Coast VHF Society. (WB2MZ photo)

70 Cm - This season of the year is not generally thought of as a prime time for vhf tropo DX. But, in the case of 70 cm and higher frequencies, it may be worth considering especially in cases in which the signals must pass through trees. Of course, good tropo conditions are not as likely during winter months as they are the rest of the year but they do occur nevertheless. The effect of trees on 70-cm signals is illustrated by a letter from W4FJ of Richmond, VA. Ted says that he tried for months to work W4ISS in Augusta, GA, with little success. Both stations have trees surrounding their antennas. Once the leaves left the trees, both began to hear weak signals. Finally, on November 22, it happened. They got reasonably good tropo conditions and made a solid QSO. Ted notes that the distance is only 375 miles but that those leaves prevented them from contacting before. Working tropo is not all W4FJ has been up to. On Dec. 5 he completed an EME QSO with W0YZS. Ted is justifiably proud of this accomplishment as it is his first EME QSO with a "home" type ham station as distinguished from the "big" stations such as WA6LET and KP4BPZ.

How long does it take to get an EME system going? Most would say weeks or months but K0WOW did it in four hours. Jack admits that he had a start in the form of a functioning high-power transmitter, but he did erect an antenna consisting of stacked 250-foot-long rhombics. Once in place K0WOW's echoes were heard with S-2 strength despite use of a preamp with a 3-dB noise figure.

Very soon we should have another "big" station on the EME scene. The Southern Maryland Amateur Radio Club have the use of an 84-foot dish and are assembling equipment for 70-cm EME and later 23 cm as well



JE1RXJ is primarily interested in 6-meter work but also operates 80, 40, 15, 10 and 2 meters, and 70 cm including OSCAR.

as 2 meters. K3LFO says they have checked out the drive mechanism and constructed a feed antenna. This should be a real boon to EME on various bands because the facility is to be available on a continuing basis, not just a few weekends per year.

In a letter to K2UYH which Al passed to me, Franck Tonna, well-known as F9FT, makes a plea for somewhat faster code speed on moonbounce. He urges use of about 10 wpm with character speed equivalent to around 13 wpm but increased spacing between characters. He feels that the ultra slow speed used by many EMEers is hard to copy.

Two-Meter Standing

Figures are states, call areas and best DX in miles.

K1WHS	43	11	10749	W5SXO	25	6	1265
WA1FFO	40	10	2624	W65MFZ	32	10	8000
K1UGQ	30	8	1370	K6HMS	11	4	1258
W1FZA	35	10	2750	K6QEH	18	7	5900
K1ABR	35	8	1478	W6GDU	18	5	1326
W1AZK	34	8	1412	W6WSQ	16	4	1390
W1YTW	33	8	1430	K6HRA	13	4	2580
K1PXE	33	8	1400	K6JOY	13	4	1240
WA1QUB	32	8	1525	WA6JRA	11	5	2591
K1JGC	30	8	1370	W6NMT	10	4	1250
W1JSM	30	8	1290	W6GAA	6	5	2500
W1VTU	29	8	1296	K6HMS	34	10	2289
K1BKK	29	8	1275	WA7KYZ	30	10	6000
K1MNS	28	8	1368	WA7BJU	30	10	2600
W1AAI	27	7	1300	W7JRG	28	9	1320
W1FJH	26	7	1250	W7RUC	25	9	2200
K1MTJ	26	7	1040	WA7B8M	21	7	2175
W1HDC	26	7	1450	K7ICW	18	4	1278
K1RJH	22	7	1450	W7VEW	13	7	1300
K2RTH	42	10	11000	K7CVT	11	4	1225
W2AZL	38	9	2500	W4WNH/B	47	10	10500
W2CUX	38	8	1334	W8KPY	45	10	10100
W2NLY	37	8	1300	K8AXU	38	8	1275
W2CXY	37	8	1360	W8IDU	38	8	1150
W2ORI	37	8	1320	W8IDT	36	8	1150
W2BLV	36	8	1150	K8HWW	36	8	1100
WB2WIK	35	8	1680	W8KIC	24	7	900
WA2CJH	35	8	1100	K8DEO	35	8	1200
WA2BIT	34	10	10000	WA8PIE	34	8	1100
WA2FGK	33	8	1340	W8NOL	31	8	1165
W2CRS	30	8	1230	WA8LLY	28	8	820
K2EVW	29	8	1232	WA8HTL	27	8	1102
K2CEH	29	8	1200	W8TJU	24	8	1000
WB2CUT	27	8	1350	K9KID	42	9	1300
W29MW	27	8	1245	K8ZES	22	8	675
W2CNS	27	8	1150	K9HMB	47	11	9894
K2DNR	27	7	1200	WA9DDT	46	10	4795
WB2SIH	25	6	1000	K9UIF	45	10	1874
WA2UDT	24	7	1020	W9YYF	44	10	4500
W2UJL	24	8	1310	K9UGD	42	9	1300
WB2CUT	23	8	1200	W9AAG	41	9	1200
WA2EMB	23	8	1335	K9AAJ	41	9	1200
K2BWR	23	7	1350	W9CAV	41	9	1052
W2DWJ	23	6	860	W9UDJ	29	8	1000
W3BHG	40	10	2488	W9WHJ	41	9	1000
K3QCQ	37	8	1375	W901I	37	8	1075
K3CFY	37	8	1250	K9UNM	37	8	930
W3RUE	36	8	1250	W9BRN	36	9	1260
WA3QVN	33	10	2500	K9UYK	35	9	1600
W3ZEL	33	8	1350	WA9EUA	35	8	881
W3BDP	32	8	1275	K9KQR	34	8	1105
W3TMZ	31	9	2410	W9PEP	34	8	820
WA3UFU	31	8	1280	K9OXY	30	8	1350
W3XO	31	8	1200	W9VWY	30	8	1052
W3LNA	27	8	970	W9UDJ	29	8	1000
K3CFA	25	8	1200	K0MGS	50	12	8008
W3ZEL	25	8	1350	WA9CHK	47	11	2165
WA3KPS	22	8	1200	W0LER	44	9	1440
K3WHC	21	8	1700	W0RLI	40	9	1345
W3TFA	21	8	1342	W0WBY	40	9	1300
K3QBU	21	7	930	W0EMS	40	10	1320
K4GL	44	10	4850	W0LNC	39	9	1450
K4IXC	40	10	4850	K0DAS	38	9	1138
W4HJQ	40	10	2000	W0PW	35	9	1380
W4DFK	39	11	12000	W0ENC	35	9	1360
WA4CGG	39	8	1350	W0PMN	34	9	1235
WA4MVI	38	10	2300	W0GHI	30	8	1073
W4HHK	38	9	1280	W0DRL	27	9	1295
K4EJQ	38	8	1350	W0MJS	26	8	1118
K4QIF	36	8	1225	W0BVC	24	8	1000
W4VHH	36	8	1125	W0PS	22	8	1287
WA4GPM	36	10	2500	K6N5	3	2	6000
K4VW	35	8	1440	K6YNS/KL7	15	11	2800
WA2CJH/4	34	8	1285	VE1ZN	7	2	500
W4FJ	34	8	1150	VE2DFO	41	10	10600
W4ISS	33	8	1000	VE2YU	32	8	1200
W4AWS	29	8	1350	VE2HW	18	6	800
K4RFL	29	8	1200	VE3ASO	38	9	2140
R1FAM/4	29	8	1190	VE3BGN	37	8	1250
W4LNG	29	8	940	VE3DSS	37	8	1200
W5ORH	48	11	4600	VE3EJC	33	8	1283
K5BXG	47	11	4500	VE3AIB	29	8	1340
W5UGO	43	10	1398	VE3EJV	28	8	1100
WA5UNL	42	10	1725	VE3EMS	27	8	1100
W85LUA	42	10	1664	VE3FVN	25	8	1300
W5RCI	42	9	1289	VE3FKX	23	7	1070
K5WZ	40	10	1450	VE3AGG	18	8	1300
W5WAX	39	10	1370	VE7BGH	12	3	7920
K5HFV	38	10	1285	VE7BQE	12	3	7920
W5HN	37	10	1500	SM7BAE	12	7	11055
W5FF	34	8	2005	VK5MC	7	7	10000
W55WV	34	8	1260	VK3ATN	4	4	10417
K5AWW	33	10	5200	SM6CKU	4	4	4200
W5UKQ	33	9	1290	ZL1AZR	2	2	11055
K5PTK	29	9	1350	WINU/VP9	8	3	800
W85BKY	29	9	1407				
WA5HNK	27	9	1550				

Survival

This month's column is "guest-authored" by Bob Schmidt, W5GHP, section communications manager for the Louisiana section and director of the central area Transcontinental Corps. The following is adapted from his article in the Louisiana Traffic Nets bulletin.

It has been suggested that, in many respects, handling formal written traffic is an anachronism. Nowadays, why send a radiogram when you can use Ma Bell? To a large extent, this might be true. However, what do you do during a *disaster*, when all lines of commercial communications are out?

This is why we handle formal traffic. When a disaster starts, we wouldn't have time to set up networks, train people and efficiently handle emergency traffic right on the spot.

The National Traffic System is a developed network that practices during normal times with messages from amateurs and the general public, in order to be ready for any emergency situation. Years ago, we had plenty of traffic and people were glad to receive messages via ham radio. But as mentioned above, the advanced technology in the communications field has relegated amateur radio to the background, during most normal situations. Yet to survive, we must generate as much traffic as we can during these normal

situations. If a network has no work, it will die.

We must generate more traffic than we are presently doing. How? As a start, if each amateur traffic handler were to send at least three messages a month, traffic totals would dramatically increase. One of those should be a message to your SCM, providing him with information for his station activities column in *QST*. You could have your club do the same.

How about sending a message to ham friends, setting up a schedule? How about birthday or Christmas greetings, or congratulations to other hams who have made the AI-Operators Club or BPL? And obviously, more contact with the general public pays off with all sorts of traffic opportunities. All it takes is for each traffic handler to try.

The next point is progress. When you started in traffic work, you might have been somewhat confused. But in no time you learned the ropes. You learned by doing. Now that you're a competent traffic handler on the section level, how about advancing to the region net level? Of course it's a challenge. So are all worthwhile operating activities.

If you wish to progress to the evening region net, your code speed might require

some improvement; you must be capable of *receiving* and transmitting faster. All region nets, regardless of mode, require more snappy operating skills. And in the normal occurrence of events, you will upgrade your station equipment.

To work the higher level nets, such as region and area, you'll have to improve your antenna system and perhaps run more power. Nothing is more discouraging for you *and* the others on the net, for a station to try to operate these nets with a weak signal. Sure, 100 watts and a dipole ten feet off the ground will do fine on the section nets, but it won't cut it at the higher levels.

Therefore, in order for traffic handling to survive in our present world, we must strive to improve not only our ability and station equipment, but most importantly, our ability to produce more traffic.

[Editor's Note: Hq. receives many net bulletins each month, frequently containing material, like the preceding, suitable for publication in *QST*. If we're not seeing your bulletin presently, how about sending us a copy? If you're on the verge of putting out a bulletin but need some tips, drop us a line and we'll put you in touch with some of the bulletin experts.]

PUBLIC SERVICE DIARY

▣ Vancouver, BC - September 23. The Maple Ridge ARC supplied emergency communications for over 30 air cadets stranded in Golden Ears Park. The whole group was airlifted out by the Royal Canadian Air Force, with amateurs providing communications at each point. (VE7FB, SCM BC)

▣ Southeast MO - October 9. Members of the Tri-County ARC and the Southeast MO ARC, led by W0OMF, provided communications for the move of patients to a new medical center. Many of the patients were from the intensive care unit and required special apparatus and life-support systems. (WB0RJP)

▣ Weymouth, MA - November 3. Weymouth c.d. and the South Shore Repeater Association took charge when the South Shore Hospital's communications system malfunctioned. (WA1OWQ, ASCM EMass)

▣ Gulfport, MS - November 13. W5GDF called WB5DCY on .52 simplex for police and emergency medical help following a multiple-vehicle highway accident. K5BER also assisted at the scene. (WB5DCY, SCM MS)

▣ Manvel, TX - November 30. WB5YIH spotted two men trying to break into a parked car. He notified police via radio and the men were apprehended. (WB5YIH)

▣ Norfolk, VA - November 23. WA1KN and WA4ISA tracked down the Constantine family who were aboard ship in the Norfolk area, following a sudden illness and death in their family. (A. A. Constantine)

*Assistant Communications Manager, ARRL

▣ *Repeater Log.* According to reports received to date, repeaters were used to report 48 traffic accidents and related occurrences and one disturbance. Repeaters involved were WR1AAC, WR3s ABI ACM, WR4s ACO ADZ, WR5s ABA ABY ADP AJG.

▣ For November, 36 SEC reports were turned in, with the number of AREC members totaling 13,263. Last year at this time, 36 reports were submitted, with membership totaling 13,635. Sections reporting were Alta, Ariz, Ark, Colo, Del, ENY, EPa, Ga, Ind, Kans, Ky, Me, MDC, Mich, Miss, Nev, NLI, NC, NFla, Ohio, Okla, Ont, Org, SDgo, SBar, SCV, Sask, SFla, SNJ, STex, Utah, Va, WVa, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

November completes three consecutive months of 100 percent representation on CTN. In fact, all three areas have been represented each day since August 8! WA5HNN has been appointed assistant manager, RNS. K8LGA has assumed the 8RN-D managership, thereby relieving WA8MCR of some of his extensive responsibilities. Certificate issuances: W4FMZ WA4PBG WB4DBK (4RN-D); W5REC (RNS-D); WB8II WB8OIE (8RN); W8ALS W8DCX W8DIL W8PTT K8BYR K8IKD K8LGA WA8HGH WB8CJU WB8DXF WB8III WB8KWD WB8MRL WB8MZZ WB8OFR WB8OMQ WB8QXN WB8SAW WB8TEF (8RN-D); K2HI/VE2 VE2BYJ VE3CDK VE3FRG VE3HGJ VE3HTT (ECN).

November Reports

(Evening sessions)							
(Daytime sessions)							
	1	2	3	4	5	6	7
EAN	30	1520	50.6	1,169	93.8		
EAN	59	791	13.4	649	93.6		
CAN	30	1167	38.9	992	98.9		
CAN	56	247	4.4	235	92.2		
PAN	30	952	31.7	901	100.0		
PAN	60	183	3.0	203	89.4		
1RN	53	501	9.4	392	93.2	100.0	
1RN	30	174	5.8	350	90.0	90.0	
2RN	86	523	6.0	419	88.4	73.3	
2RN	56	372	6.6	494	93.2	95.0	
3RN						96.6	
3RN	30	157	5.2	511	97.7	98.3	
4RN	58	908	8.7	394	92.9	96.6	
4RN	62	394	6.4	309	70.8	96.6	
RNS	60	703	11.7	457	93.6	100.0	
RNS	30	197	6.5	261	80.8	93.3	
RN6	60	531	8.8	367	96.7	100.0	
RN6	30	210	3.0	240	98.3	90.0	
RN7	54	278	5.1	311	73.0	100.0	
RN7	42	71	1.7	152	36.6	88.3	
8RN	50	259	5.1	270	67.7	96.6	
8RN	30	148	4.9	307	86.7	98.3	
9RN	60	527	8.7	392	87.0	100.0	
9RN	30	181	6.0	272	91.6	90.0	
TEN	59	437	7.4	340	77.0	96.6	
TEN							
ECN	60	249	5.8	359	96.6	100.0	
TWN	60	440	7.3	341	96.7	100.0	
TWN	20	54	2.7	127	48.0	90.0	
CTN	30	352	11.7	518	100.0		
TCC	112 ¹	662					
Eastern							
TCC	86 ¹	598					
Central							
TCC	109 ¹	683					
Pacific							
Sections ²							
	4258	17007	3.9				

Summary 5573 31076 5.5
 Record 5052 30541 18.4

¹TCC functions not counted as net sessions.
²Section and local nets reporting (133): MSN MTN (MB), APN (Mar/NFid), CMN GBN ODN OPN OSN (ON), WQV/UHF (PQ), AENB AEND AENJ AENM AENW (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NCN NEN SCN (CA), CWN (CO, WY), CN (CT), DEPN DTN (DE), FAST FMTN, FPTN GN QFN QFNS SPARC TPTN (FL), CVEN GAREC GSBNS GSN (GA), IMN MTN (ID, MT), ILN (IL), I75MN TLCN (IA), KWN QK5-SS (KS), MKPN KNTN KRN KTN (KY), LAN LRN LSN LTN (LA), MASN PTN SGN (ME), MDCTN MDD (MD), EMRPN GNBN NENN WMN WMPN (MA), HEN KCAN MACS M16MN MNN GMM WBSN (MI), MSN MSPN MSSN MWX PAW (MN), MTN (MS), MON MSN MOSSBN PHD (MO), BARTEN NJN NJPN NJSN (NJ), NAN SWN (NM), NLI NLIPN NLS WDN (NY), BRTMN CN NCSBN SCSSBN THEN (NC, SC), BN BNR COAREC-10 MASER ONN O6N OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN STN (OK), EPA EPAEP&TTFN PTTN WPA (PA), SDSSBN (SD), ETTMN (TN), TEX TTN (TX), BUN UCN (UT), VFN VBSN VSN (VA), WVN WVNN WVPN (WV), BEN BWN WIN WNN WBSN (WI).

1 - NET
 2 - SESSIONS
 3 - TRAFFIC
 4 - AVG.
 5 - RATE
 6 - % REP.
 7 - % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Eastern	120	93.3	1816	662
Central	90	95.5	1186	598
Pacific	120	90.8	1386	683
Summary	330	93.2	4388	1943

1 - AREA
 2 - FUNCTIONS
 3 - % SUCCESSFUL
 4 - TRAFFIC
 5 - OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (November): Eastern Area (W2FR, Dir.) - W1s NJM QYY, K1s EIR GQ SSH, WA1s FCM MSK WEM, W2s FR GKZ, K2HI/VE2, WA2s DSA ICB PJL UYK, WA3s SXU VBM, W4UQ, K4KNP, W8s LTA PMJ, WB8ITT, VE3s GOL SB, Central Area (W5GHP, Dir.) - WB4SKI, K4VM, W5s GHP MI RB UGE UJJ, K5s TFG TTC, WA5IQU, W9s CXY DND NXG, WA9EED, WB9s NOZ TWT, W0s AM HH HI QMY, K0s AEM CVD, WA0TNN, Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF OA VZT, K6HW, W7s DZX GHT KZ, K7s IWD NHL QFG, W0s ETT IW LQ LRN, K0s DRL TER, WB0s DJY QOT, VE7ZK.

Independent Nets (November)

1	2	3	4
Hit & Bounce Slow	17	59	138
IMRA	26	421	971
Mike Farad	26	93	329
North American SSB	25	199	415
Washington Region PON	13	36	249
75 Meter ISSB	30	538	1071
7290 Traffic	42	427	2122

1 - NET
 2 - SESSIONS
 3 - TRAFFIC
 4 - CHECK-INS

indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

67 WB5KGP	58 WB5NUM	WA5ANV W7GHT	WA5JYH WB6FTY
64 WA1FCM	57 WA2BMI	WA7MEL K8LGA	W6RFF WA8JPX
63 WA6TVA	WA2WKH WA4FBI	K9ZTV K0MRI	W9NXG AB9OEC
62 K1PAD	56 AA1UDB	WB0QFO VE3DPO	WB9QKH VE1AAO
61 WA1MSK	AA1UGJ	VE3GFN K0EVH	VE3CDK VE3GOL
K1PNB	AA1VGP	47 VE3DZK	43 WA2PJL
AA1VEI	K4BKX	46 W9MMP/0	K6GJES W6JXR
WB2CST	W5GHP	W0OTF	WB6UZX W0HXB
W2MTA	W6RNL	VE3FGT	42 K3ORW
WB2YKG	VE3GJG	45 WA1MJE	WA5VBM WB0QOT
WB4EKJ	55 WA4EPJ	44 WB2LZN	W0WYX 41 W2MLC
WA4EPJ	K0CVD	45 WB1VR	W6AUC WB7CAG
WB4QBZ	54 W5KLV	WA1QMZ WA2DIW	WB0TAQ 40 WA1MUX
WA4UKU	W5KLV	WA2ZJP K3KAJ	W4ANK W6BGF
WA51QU	WB6PVH	W3RJ WA3VBM	WB8NCD W9SFL
K5MAT	WB0HOX	49 W1RWG	
WB5NKD	53 WB4ARJ	AA3YKK WB4FHT	
WA5YEA	WA4PSL	WB4GHU WA4JGG	
W7OCX	50 WB0LFY		
WB8JGW	49 W1RWG		
WB9RWZ	WA2AIV		
WB0HBM	K3YHR		
VE3FRG			
59 WB2RUZ			
WB2VTT			
WA8RQQ			

Brass Pounders League November 1976

BPL Medallions (see December, 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings:
 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



During the EAS meeting, Second Region Net Manager W2MTA graphically presents the committee report on revising NTS. (W1YL photo)

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.

Winners of BPL Certificates for November Traffic

1	2	3	4	5	6
W3CUL	397	1262	1476	51	3186
W0WYX	54	985	447	538	2024
WA0RWM		478	59	470	1007
W3VR	275	221	395	10	901
K0YFK		438		438	876
K9CFM	1	455	54	326	836
W4MEE	6	375	321	17	719
W7SQT	4	430		217	651
K0ONK		489	286	12	628
WB6EIG	12	281	281		574
WA1FCM	1	235	298		534
WA3YJG	19	213	165	113	510

BPL for 100 or more originations-plus-deliveries

WA4WBM	216	WA4EYW	104
WA3ATQ	208	WA8RQQ	103
W0FIR	194	K3CDK	102
K4BFT	180	W7SQT	114
WA3THT	117		



**Public Service Honor Roll
 November 1976**

This listing is available to amateurs whose public service performance during the month

W2JJ (K2KIR) and W2FR entertain a comment from the floor during the NTS Eastern Area Staff meeting held on October 23-24, 1976. For details, see January QST. (W1YL photo)

Frequency Measuring Test

Results of November 6 Test Runs. 179 parts per million or better qualifies an OO, any more a qualified "oh oh!"

By Bill Jennings,* WA1AHI and Jean DeMaw,** W1CCK

"Do not adjust your receiver or call the station, we are experiencing propagation difficulties. Please standby." Such an announcement, if possible, would have been quite an appropriate statement on the 20-meter band, for those looking for 14-MHz signals in the FMT of November 6. The lack of 20-meter signal to measure did not represent localized occurrences, for from the 111 participants (33 making the honor roll) making 1,263 measurements, less than 10 percent ventured a 14-MHz reading. The "umpire" did not fare any better, thus the official measurements for the early run were 3535.256 and 7039.083 kHz, the late run was recorded at 3542.412 and 7022.789 kHz.

The next FMT is coming up pretty quickly on the 13th of February (see rules, January *QST*), with the results scheduled to appear in May *QST*.

Jean, W1CCK, deserves the credit for compiling the facts and figures.

Honor Roll

This top listing is the standing of the frequency measuring leaders. In consideration of the minimum possible error due to Doppler (and other unavoidable factors), we accredit as of equal merit all those reports computing 4/10th parts per million (or better) accuracy. Please note that a participant must submit a minimum of two measurements to qualify for this listing. Again the following top achievers are of equal merit, most conveniently shown in alphabetical listing by call area and suffix: W1BGW K1VHO AA2VPA WB2WQA W3JW K4KA W4NTO W4RHZ K4VA K5EVK W5FMO W5IJW W5OS W5QIV WB6AAL WA6MWG W6OQI W6RQ WA6WXH W7ANF

K7EGA ex-7HM W8CUJ W8HVX W8MDL W8OK WA9AAT W9FKJ W9HPG W9KO W9MNY WØRUR Ireland.

Better Than 35 Parts Per Million (Class I OO Qualification)

(.6) W1JH K4FUP K6MZN W8OW, (.7) W6CLM W9REC WØBJ, (.9) W6CBX, (1.0) K9WGN, (1.1) W6ME, (1.3) W1AYG W1JOT WA4BRI WB8STQ, (1.4) W3AHZ, (2.1) K4MZK, (2.3) W3FYK, (2.4) W6ASH, (2.5) W1DDO, (2.7) W5YTN, (2.8) WØGW, (3.6) W7DQS, (3.7) WA2DBT, (4.0) W8PZT, (4.1) K6HI, (4.7) WB5NGF, (4.8) WA2FIL, (5.6) W8HZA, (7.6) K6EC, (8.6) WA6FXM/9 WØSS, (8.7) WA6INF/7, (9.1) K9BGL, (9.3) W6SSB, (9.4) WA9ITB, (9.5) K7TQM, (9.6) K7DUE, (10.7) W8LYF, (11.0) W8BU, (12.3) W4QN, (12.7) K5EWJ, (13.3) W2AIQ, (14.4) WAØYCY, (14.5) K9CCX, (15.1) WA7HGB, (15.8) K6EPX, (15.9) K4JOY, (16.2) W4HU, (18.1) W3ADE, (19.2) W3BFF, (20.5) W3PLI, (21.0) K6VRS, (24.5) W6PRP, (25.3) W7DAZ, (26.5) WA1SER, (26.8) K6GG, (28.0) W4UCL, (30.8) W7FIS, (34.7) K4MC.

Better Than 179 Parts Per Million (Class II OO Qualification)

(37.8) K6CL, (42.8) WAØUCU, (43.4) W6WIS, (44.6) K3HJI, (48.7) VE6MJ, (50.2) WB4HAG, (52.0) WA1SQB K1ZND, (57.4) W4SHL, (58.8) WB6JFD, (62.9) W1BEA, (65.3) K6QPG, (69.7) W5FFW, (83.5) WA1QOI, (110.0) K4FMA, (135.4) VE6XO, (140.9) WA1FBE, (144.7) W6MTJ, (155.5) K1EPL.

Honor Roll Measuring Methods

1-MHz oscillator, dividers to 100, 10, 0.1 Hz, audio interpolation oscillator, scope (W5FMO). Homebrew standard (5-kHz marks), Heath counter,

scope and R-4B receiver (W6RQ). Usual "junque" . . . homebrew secondary standard with 4-MHz oscillator dividing to 10 kHz, audio oscillator, counter, scope, 75A4 receiver (W8OK). Measurements made using R4 receiver, BC-221 signal source, Heathkit IB-101 frequency counter. 221 output measured while beating (zero) with W1AW. IB-101 calibrated against WWV same time period (W9HPG). I used my R4C receiver, picking off HFO and BFO frequencies, through an interface and switching arrangement to an IB-1100 counter. I tuned off from zero beat by approximately 1 kHz, beating this against audio generator to obtain a null, then subtracted audio reading from receiver reading to obtain net readings (WØRUR).

QRGee

The early 80 run was badly clobbered with heavy QRM (W1JH). There were no 20-meter signals from W1AW, just a few ZLs and JAs coming through. Eighty and 40 were weak on the early run, but much better at 9:30 P.M. We had the usual jammers doing their utmost to louse up the frequency (W6CBX). During the late readings, my line voltage meter kept going from 117 to 122 volts, so I don't have too much confidence in getting a really good score (WB8STQ). This is my first whack at the FMT, so please don't laugh if I'm in the wrong band (WA2IFL). On 80 meters W1AW was strong, but so was a 6Y commercial station, which was within heterodyne range (W8HZA). Managed to miss the early run. On 20-meter late run, the signal was too weak and variable to permit anything better than a wild guess (K3HJI). I would favor shorter measuring periods. The W1AW frequency is not constant for the duration of the current periods (K1HVO). My scope went sour (25-kΩ leak on CRT

*Communications Assistant, ARRL
**Communications Assistant, ARRL

transformer filament winding). Hope my 'ole ear's still good enough to get me in "holy row" (W4NTO). The 3.5-MHz early run was plagued by a key-down spurious from the beacon-type signal signing "W." On the late run, there were

at least three different stations calling WIAW on the FMT frequency. On 7 MHz, both the early and late runs, "Chester," the tester (and several of his ilk), was up to belated Halloween tricks (W9KO). Thanks for giving us the

challenge. My 1942 HRO thinks it is great spot (W9MNY).

Feedback

The Sept. listing for W1WH should read 22.9 ppm. QST

November Sweepstakes High Claimed Scores

The following are high claimed scores received at Hq. as of January 3, 1977, for the 1976 November SS contest. Listings read call sign, claimed score, contacts, multipliers. This listing contains all entries

claiming scores of 100,000 points or more. Final results will appear in an upcoming issue. — WA1STN

PHONE	SCORE	CONTACTS	MULTIPLIER	PHONE	SCORE	CONTACTS	MULTIPLIER
W0TR (WB0DJY,opr.)	287,850	1919-75		W1FYB	162,060	1095-74	
KV4FZ (K7VPP,opr.)	285,300	1902-75		W2LJOO	161,768	1108-73	
WA7NIN (W6OAT,opr.)	265,950	1773-75		W3LPL	159,432	1092-73	
WA7WXY	262,800	1782-75		K4VX (WB4SGV,opr.)	157,392	1093-72	
WB2OEU	256,000	1707-75		W5RTX	157,388	1078-73	
K8LWL	246,600	1644-75		W2YU (WA2SRQ,opr.)	156,366	1071-72	
W7RM	242,700	1618-78		W5ARTC	156,150	1041-75	
WB5OOE (WB5IZN,opr.)	241,800	1612-75		W1ZM (WA2CLQ,opr.)	154,956	1047-74	
K4VX (K3EST,opr.)	237,450	1583-75		WA3WIK (WA3SZQ,opr.)	154,468	1058-73	
W5WMM	228,900	1526-75		W9CKIR	153,184	1049-73	
W3LPL (WA2LQZ,opr.)	226,050	1511-75		W7TTL	151,200	1008-75	
WA1LNG	226,050	1507-75		K6PU (WB6CEP,opr.)	149,628	1011-74	
WA1ABV	225,150	1501-75		W4YJUJ	148,602	1032-72	
WA1MAC	224,664	1518-74		WBEDU (WA3BGE,opr.)	146,730	1005-73	
K6AC (WB6ZVC,opr.)	223,800	1492-75		WA9CPX (WB0DGA,opr.)	146,544	1032-71	
K5PFL (WB5QWX,opr.)	223,776	1512-74		WA9ONL	146,402	1031-71	
W5TMN	222,000	1480-75		WB0ANT	145,872	1013-72	
W1LFC (K1OME,opr.)	220,950	1473-75		WA1ABV	145,008	1007-72	
WA9ONL	218,150	1461-75		K1ZND	144,600	964-75	
W9HAD	216,750	1446-75		WA1LNG	144,144	1001-72	
W9ABWY	216,450	1443-75		K1WJD (K1GQ,opr.)	143,360	1024-70	
WB9YBL	216,300	1442-75		WA1ABV	142,998	985-72	
K4YF (WB4UKA,opr.)	214,850	1433-75		WABPLZ (WB8AYC,opr.)	140,296	988-71	
WA1ABW	214,500	1430-75		W1CW (WA1NNC,opr.)	139,968	972-72	
WABPLZ (WB8AYC,opr.)	213,014	1459-73		W6JZU (WA6TLV,opr.)	139,800	932-75	
W6PRA	211,500	1410-75		W9BWWY	139,586	983-71	
W9HAD	206,600	1404-75		WA2NPP (WB2LFF,opr.)	139,124	956-72	
K6LLG	209,850	1399-75		WA6NGG	138,982	985-72	
W8QNV	206,928	1437-77		K9DX	137,664	956-72	
K3KQW (WB3AJQ,opr.)	204,150	1361-75		K8RMM	136,556	936-73	
K3ZO	202,356	1386-73		W1GNC	136,500	923-74	
W1ZA	202,350	1349-75		W5TMN	136,308	921-74	
W1ZM (WA2CLQ,opr.)	201,428	1361-74		W1DAL	135,752	956-71	
W2PV (K1ZZ,opr.)	201,334	1379-73		WA1MAO (WA1NRF,opr.)	146,588	916-74	
W4AKKP	201,132	1359-74		W6RRT (WA6OTU,opr.)	134,976	912-74	
WA9CPX	200,836	1357-74		W8WPC (K8BXP,opr.)	134,976	912-74	
K1GQ (K1PKQ,opr.)	196,950	1313-75		K3ZO	134,928	937-72	
W8QLLR	193,500	1290-75		W66AIN	134,904	924-73	
W3GRF (W3ZZ,opr.)	192,750	1285-75		K9GXR	134,320	920-73	
WA3WIK (WA3SZQ,opr.)	192,720	1320-73		W3KWB (WB3AJQ,opr.)	134,320	920-73	
WA9PBK	192,600	1284-75		K8MFO	134,088	906-74	
K6RV (K6PU,opr.)	192,150	1281-75		K8HLR	133,920	930-72	
WA9TKL	188,352	1308-72		W9DX	132,912	923-72	
WB4OSS	187,960	1270-74		K8CCN	129,600	907-73	
W7TTL	184,800	1322-75		K9BL	131,984	904-73	
W5YUJ (WA9WU,opr.)	181,596	1227-74		VE7WJ (VE7AON,opr.)	131,868	891-74	
WB6AIN	180,900	1206-75		K3BNS (K3OAE,opr.)	131,838	903-73	
W4GVKP	180,560	1220-74		K1WJ (WA6TJ,opr.)	130,776	893-73	
K9GXR	180,250	1178-75		W5VDH	130,688	891-73	
W8PRK	179,820	1215-74		WA9TKL	129,888	902-72	
W8YUJ	179,550	1197-75		W3ABT (W3IFG,opr.)	129,600	900-72	
W7BUN	177,750	1185-75		WA1JZC	129,504	812-71	
W1RR (WA1JY,opr.)	177,150	1181-75		WB2OEU	128,736	894-72	
K5FPO	177,098	1213-73		K9KGA	128,044	902-71	
WB9MIV (WB9QHV,opr.)	176,100	1174-75		K4CFC	127,872	888-72	
K9KGA	173,400	1156-75		K9UWA	127,872	864-74	
WA2LCC	173,232	1203-72		K6DC (K6ST1,opr.)	127,836	857-74	
W6OKK (WB6DSV,opr.)	171,750	1145-75		W1FCC/A	125,800	850-74	
K9BGL	168,450	1123-75		W1AF (WA1UIK,opr.)	125,670	825-71	
WB2FLFZ	168,276	1137-74		AD4BAI	124,468	841-74	
K6SSJ (WA6QGX,opr.)	166,046	1151-73		W5ZSX	124,224	841-74	
K3OWN/5	167,536	1132-74		W2REH	123,408	857-72	
AA6PGB	167,100	1114-75		W8WXQ	123,408	857-72	
W1FLM/3	166,732	1147-75		AA6TVC (AB6PKA,opr.)	122,848	844-73	
W5YUJ	166,650	1117-75		WB4QGW	122,988	831-74	
K8PU (WB6CEP,opr.)	165,456	1149-77		WA1QNF	122,202	837-73	
W2HHC	165,020	1115-74		W8LTL (WA1LKU,opr.)	121,818	833-73	
WB2TJ	162,060	1110-73		WB2FIT	121,180	830-73	
W6KQG	161,250	1075-73		W2AZO	120,150	823-73	
W5JOT	160,728	1086-74		K4DTD	119,990	845-71	
WA1QZM	159,284	1106-72					
K6CCY (WA6VEF,opr.)	158,952	1074-74					
AC3USS (WA1FEO,opr.)	158,112	1098-72					
AB9CEP	158,100	1054-74					
WASUCT	157,050	1047-75					
W3AZD	157,050	1047-75					
W6JZU (WA6TLV,opr.)	156,000	1070-73					
AA4UFW	155,916	1098-71					
W3ZKH/4	154,950	1033-75					
WA4FFW	154,906	1061-73					
K3WX (W3ADT,opr.)	153,476	1037-74					
AB2RJ	152,132	1042-73					
K6NA	151,800	1012-75					
WB5LZC	151,800	1012-75					
WB9DZS	150,825	1084-75					
WA1WEM	149,480	1010-74					
K1RQF	148,000	1008-74					
K6HHH	146,550	977-75					
WB4LOK (WB4TVU,opr.)	146,064	1074-68					
AB1AEE (WB2CJH,opr.)	142,272	988-72					
K8YRV	142,058	973-73					
W1MX (WB2MZE,opr.)	142,000	1000-71					
K3DPQ	141,600	944-75					
W1GPK	141,600	944-75					
WB4JBS/7	141,036	968-73					
K4CFC	140,978	979-72					
WB7CYU	140,688	977-72					
ABUUKX	136,950	915-75					
AA6DQM	136,456	922-74					
W3FA (WA3ZAS,opr.)	136,364	934-73					
W6SVN	135,050	907-75					
K7IVR	135,000	904-75					
WB8MZZ	135,360	940-72					
W9ANVF (WA9GNJ,opr.)	134,450	997-75					
W6AGTK	134,256	907-74					
K3ZAW	132,750	889-75					
W5AYTX	132,624	921-72					
WB6LPK	131,100	874-75					
WA3UVB	130,950	873-75					
K6DC (WB6KBK,opr.)	130,670	899-73					
WB3AVN	129,500	925-70					
K8MCC	129,336	901-71					
W4WSF	128,400	856-75					
W8SAAR/5	128,084	902-71					
W470BL	127,960	914-70					
KH6I	127,534	886-72					
W8RGG	126,800	850-75					
AC3IN	125,528	884-71					
K7DS	125,136	869-72					
K7RSC	125,122	857-73					
WA3TBW/3	124,950	880-71					
WA1QNF	120,600	804-75					
WA1JZC	120,150	801-75					
K6BR (WA6ENP,opr.)	119,922	869-69					
W9NA	119,880	825-74					
W2AZO	118,512	823-72					
WB9SHK	118,080	820-72					
WA5ALC	117,852	819-72					
W8TR (WA8PSD,opr.)	117,860	832-71					
WA1VMT (WA2QJK,opr.)	116,340	805-73					
W4JVTM	116,340	831-70					
WB0DSJ	116,060	829-70					
AB8IJ	116,028	879-66					
AA6JVD	115,056	800-72					
AD6BPH	114,464	841-73					
WB9AOF	114,392	829-69					
AD5LRL	113,968	838-68					
K0VVU	113,458	801-71					
WA6ELX	113,040	785-72					
WB5WB	112,800	662-75					
WB2SZO	112,420	770-72					
W47UWE	111,444	753-74					
KA5TA	110,778	749-74					
W1UQ (K1LPA,opr.)	110,550	737-75					
WBEDU (WA3BGE,opr.)	109,646	751-73					
K8YQW	109,646	751-73		</			

Official Observer Topics

The League's OO corps is on the job all the time. If you don't hear from any of them, this means one of two things: Either you aren't on the air much, or your operation, from all standpoints, is unimpeachable. Very few signal or operating discrepancies escape the notice of our observers for very long.

When or if you receive an OO notice, it's nothing to get excited about. OOs are not policemen, and the notice (either a postcard or a letter form) is not a black mark of any kind against you. On the contrary, it's an attempt to be of assistance. You might compare it to a fellow motorist pulling up alongside you and saying, "Hey, Mac, did you know you have no taillights?" or "One of your rear doors looks slightly open." OOs do go just a little further than that when they point out operating discrepancies, like missing or improper identification, or even use of obscenities and profanity (seems to be a lot of the latter going around, lately!). The object is to keep our bands clean. That's the *only* object. We're not out to crucify anybody or to "run anybody in." We ask our OOs always to keep this in mind. It is part of their standing instructions. We ask you to keep it in mind too, if or when you receive an OO notice. You may disagree with him, and you may even feel inclined to write to tell him so. You can tell him to mind his own business, or blast him, or question the savoriness of his parentage. He's probably used to it, and won't reply. Whatever your reaction, you will take into account the possibility that he may be right.

If you ask him for additional assistance, you may get it and you may not. OOs are observers, not advisors. We know a few OOs who conduct exhaustive correspondence with recipients of their notices who don't know what to do to correct a technical difficulty. Most observers don't have the time for this, and indeed it isn't part of their function.

But all OOs are pleased to receive a note of thanks. It helps make some of the aggravation of OOing worthwhile.

As listeners on the bands, observers often come up with hints that will help average amateurs like you in your daily operation, or things that are or may be useful for you to know. They tell us. We tell you, from time to time, in this column. Here are a few that have come in since our last list.¹

1) If you buy a rig in Japan and bring it to the U.S., chances are it is wired for 100 V, not 120. It can do strange things as a result. The transformer tap has to be changed to tame it down.

2) When operating usb, stay at least 3 kHz inside the high end of the band or sub-band. Similarly, if using lsb, stay at least 3 kHz inside the low end. If you don't your modulation peaks will probably be out of the band, contrary to 97.63, FCC regs.

3) Third-party regulations continue to be troublesome. Note that the rule is no longer specifically tied to whether or not *you* get paid or compensated. It now applies to anybody -- you, the other licensee, the third party concerned or anyone else. It's hard to know just how strictly to apply this. It can be carried to the ridiculous extreme, or it can be applied too loosely, and there is no fine line between the two. The thing to remember is the intent, and that is to prevent the conduct of commercial business by amateur radio -- anybody's business, whether it be yours, his or theirs, whether it be profit or nonprofit, gain or loss, left-handed or right-handed. There are a lot of cases in between the extremes that are subject to interpretation. If you need an interpretation, how about asking us; not FCC. Formal interpretations can set precedents that haunt. If necessary, Headquarters can usually get an informal interpretation.

4) When is interference "willful" or "malicious"? We can go 'round and 'round on the difference between these two words. Obviously, the latter is the stronger of the two; if you do something for the avowed purpose of interfering, it is malicious -- that is, done with malice aforethought -- no question about it. If you cause interference knowing and regretting that you are doing so but feel that it is justified, this is certainly not malicious, but is it willful? The trouble with defining words and terms is that you have to use other words and terms, each of which itself has a definition, and you can really get fouled up in semantics. The best tack is to avoid interfering if you can. If you do this, you may still get hoiered at occasionally, but only by purists and nitpickers, and seldom if ever by FCC.

5) There seems to be an upsurge of "dirty talk" on the air, these days. This is probably a sign of the times in which we live, being made

popular by various entertainment media and spreading into our younger generations. Many of our OOs are sending phone discrepancy notices. If you should get one, consider that *anyone* can be listening to you, so refrain from using language or terms that you wouldn't use in front of your children, your preacher or your parents. Most profane and obscene words and terms are a means of expressing strong sentiments and emotions. Your "peer group" may accept them, but others may not. So try to remember that you are not talking only to your own peer group when you are on the air, and keep that kind of talk in its proper place.

6) Some of the OOs have been reporting some horrible examples of cw identification, especially on RTTY. There can be any number of reasons for this, but the principal one is just plain carelessness. If your cw identification is not decipherable, it is *not* legal identification. The same goes for phone, come to think of it. If you identify yourself as "W9 Babbledy Bab," without phonetics, you might as well be talking Greek insofar as anyone trying to ascertain your identity is concerned. Remember, the purpose of the i-d is so someone listening (like FCC monitors) will know who you are. If you i-d and they still don't know because your i-d is not clear, you haven't i-d-ed. As for the RTTY problem, check your automatic i-d-er. Sometimes rf from the rig gets into it and louses it up; you test it off the air and it sounds okay, but when you start spraying rf around, it's a different story.

And so it goes. Your appointed OOs are doing a good job of monitoring the bands, considering their numbers (only about 400), and they need help. *Your* help. Fully 99 percent of all responses to OO notices exhibit gratitude. That other one percent can do a lot of damage to OO morale. The veterans laugh it off. The newer OOs are puzzled and hurt by it. When or if you receive an OO notice, even if you should disagree with it, it goes a long way toward cementing our self-behavior program to drop the guy a line or radio message expressing appreciation for the intent and assuring him you'll look into the matter. Saying things like "You know what you can do with your silly little cards" only makes you look small and doesn't help anybody or anything.

WIAW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.M. (all local Eastern time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street details and the general contact schedule are available upon request. All frequencies shown

*Communications Manager, ARRL

¹ July 1973 *QST*, p. 114.

are approximate. If you wish to operate, you must have your original operator's license with you. The station will be closed Dec. 24-25, Dec. 31, 1976; Jan. 1, Feb. 21, Apr. 8, 1977.

Staff: Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

In a communications emergency monitor WIAW for special bulletins as follows (times in UTC):

Phone: On the hour.

RTTY: At 15 minutes past the hour.
CW: On the half hour.

Code Practice

Approximate frequencies: 1.82 3.58 7.08 14.08 21.08 28.08 50.08 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. Details on Qualifying Runs appear monthly in *QST* Operating

Events. The 0230Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	EST	UTC
5-7½-10-13-20-25	9 A.M. MWF 9:30 P.M. TThSSu	1400Z MWF 0230Z MWFSu
10-13-15	4 P.M. M-F 7:30 P.M. Dy	2100Z M-F 0030Z Dy
35-30-25-20-15	9:30 P.M. MWF 9 A.M. TTh	0230Z TThS 1400Z TTh

To improve 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 UTC dates and QST text to be sent in the 0230Z practice from the issue of QST 2 calendar months past.

2/7 It Seems to Us	2/24 Public Service
2/8 Correspondence	3/4 World Above
2/18 League Lines	3/7 YL News

Bulletins

Columns indicate times in EST-PST-UTC(Z).

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0200Z Dy
2330 M-S	2030 M-S	0430Z T-Su

CW Bulletins at 18 wpm (1.82 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2130Z M-F
2000 Dy	1700 Dy	0100Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 T-Su	2100 M-S	0500Z T-Su
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RTTY Bulletins at 170-Hz shift are repeated at 850-Hz shift when time permits (3.625 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2230Z M-F
2300 M-S	2000 M-S	0400Z T-Su

OSCAR Bulletins (18 wpm on cw frequencies):

0840 M-F	0540 M-F	1340Z M-F
1400 M-F	1100 M-F	1900Z M-F
1600 Su	1300 Su	2100Z Su

OSCAR RTTY:

1700 Su	1400 Su	2200Z Su
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SCM ELECTION NOTICE

To all ARRL members in the Alberta, Nevada, Rhode Island, Northern New Jersey, San Joaquin Valley, Canal Zone, Utah, Maryland-DC and New Hampshire sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on that petition. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition. Petition forms (CD-129) are available on

request from ARRL headquarters but are not required. The following form is suggested. Communications Manager, ARRL

(Place and date)

225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . Zip . . .)

George Hart, W1NJM

Communications Manager

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must have been received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 10, 1977.

Wherever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, returns counted on May 24, and SCMs elected as a result of the above procedures will take office July 1, 1977.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning July 1, 1977.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July QST, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

Operating Events

FEBRUARY

1-12: Second Black African Festival of Arts and Culture to take place in Nigeria (the event started January 15). Special events station 5N2WBF will be operating through February 28. To obtain a special award contact 5N2WBF and 4 other countries participating in the Festival, phone only on 15, 10 and 20 meters. For your award, send your confirmations along with 10 IRCs or \$2 U.S. For your 5N2WBF QSL include sufficient return postage for your return QSL. QSL cards for the 4 participating countries as well as 5N2WBF go to Awards Manager, 2nd WBACF, P. O. Box 448, Apapa, Lagos, Nigeria.

3: West Coast Qualifying Run, W6OWP prime, W6ZRJ alternate, 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with Z used as a designator), on approximately 3590/7090 kHz. This is 2100 PST the night of February 2 (9:00 P.M. PST). Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify that the copy was made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large addressed stamped envelope will help to expedite your award/endorsements.

5-6: DX Competition phone, p. 88 Dec.

5-13: Novice Roundup, p. 86 Jan.

12-13: New Hampshire QSO Party, Ten-Ten International Net Winter QSO Party, QCWA QSO Party, p. 90 Jan.

13: Frequency Measuring Test, p. 90 Jan.

16: WIAW Qualifying Run, 10-35 wpm at

0230 UTC, transmitted simultaneously on 1.82 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. (Note, please, that this is 2130 EST, 9:30 P.M. local Eastern time, the night of February 15.) Underline one minute of the highest speed you copied, certify that the copy was made without aid (typewriters OK), and send to ARRL for grading. Please include your name, call (if any) and complete mailing address. A large s.a.s.e. would be welcomed. 19-20: DX Competition cw, p. 88 Dec. YL/OM Contest phone, p. 90 Jan.

26-27: French Contest phone, p. 99 Dec., and p. 90 Jan.

MARCH

2: West Coast Qualifying Run.

5-6: DX Competition phone, p. 88 Dec. YL/OM Contest cw, p. 90 Jan.

12-13: Commonwealth Contest cw, 1200Z Mar. 12 to 1200Z Mar. 13, open to all members of the RSGB resident in the UK and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories. Operation only on 80, 40, 20, 15 and 10 meters. Contacts may be made with any station using a British Commonwealth call sign, except those within the entrant's own call area. UK stations may not work each other for points. In accordance with current IARU recommendations, contestants are requested to confine their operations to within the lower 30 kHz of each band. Each completed contact counts 5 points. In addition, a bonus of 20 points may be claimed for the first, second, and third contact with each Commonwealth call area. All British Isles stations (G, GB, GC, GD, GI, GM and GW) count as one call area. Separate logs for each band. Each

band log should be separately totaled and should include at the end a check list of call areas worked on the band. Separate band totals should be added together and the total claimed score entered on the cover sheet. Entries may be single or multiband (multiband will not be eligible for single band awards). Include usual signed declaration. Entries go to D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, East Sussex TN22 1UB, England, to be received no later than mid-May. Awards. Virginia State QSO Party, sponsored by the Sterling Park Amateur Radio Club, from 1800Z March 12 through 0200Z March 14, open to all. Exchange QSO no., RS(T), and QTH (county for Virginia stations; others send state, province or country). Score one point per QSO. VA stations multiply total QSO points by the sum of states, provinces, countries and VA counties worked. Out-of-state stations use VA counties for their multiplier (maximum of 98). Suggested frequencies: cw, 60 kHz from the low end of each band and novice bands; phone, 3930 7230 14285 21375 28575. (Check phone bands on the even hours UTC.) Awards. The same station may be worked on each band and mode. VA stations may work other in-state stations. Note: with your results please indicate each new multiplier worked. A summary sheet and a check sheet is also requested. Only QSOs 160-10 meters count. Logs must be received by April 15 and go to: Gary D. Poorman K4VT, 1114 South Dickenson Ave., Sterling Park, VA 22170. Maine QSO Party rules next issue.

13: South Dakota QSO Party, sponsored by the Prairie Dog Amateur Radio Club, the full 24-hour period UTC. Suggested freqs.: cw, 70 kHz up from the bottom; phone, 1,975 3,920 7,230 14,280 21,380 28,510; novice, middle

of their bands. SD stations exchange RS(T) and county (no SD-SD contacts permitted), all others report plus state, province or country. The same station may be worked on different bands, modes and counties for multipliers. To score: SD, contacts times states, provinces, countries. All others, contacts times countries. Awards. Send logs by April 1 to WBØEVQ, Box 493, Springfield, SD 57062.

17: WIAW Qualifying Run.

19-20: DX Competition cw, p. 88 Dec.

21: WIAW Morning Qualifying Run.

26-27: BARTG Spring RTTY Contest, from 0200X Mar. 26 through 0200Z Mar. 28. No more than 30 hours of operation is permitted. Times spent in listening count as operating time. The 18 hour non-operating period can be taken at any time during the contest, but off-periods may not be less than 3 hours at a time. (Note times on/off on your entry.) Separate categories for multi-op. and SWLs, in addition to single op., categories are 80 through 10 meters. Stations may not be contacted more than once on any one band. Additional contacts OK if different bands used. Multipliers are countries per the ARRL DXCC list, and - in addition - each W/K and VE/VO call area will count as a separate multiplier. Exchange: time in UTC (full 4-digit figure), RST and message number (starting with 001). All two-ways with stations within one's own country earn 2 points, contacts with stations outside one's country earn ten points; a bonus of 200 points per country worked (including you own). Scoring: two-way exchange points times total

countries worked; add to this the total country points times bonus points times number of continents worked. Use one log for each band and indicate rest periods. Logs must contain date/time(Z), calls, exchanges. Logs must be received by May 31, 1977 to qualify. Awards. The judge's decision will be final. Send entries to: Ted Double, G8C/DW, 89 Linden Gardens, Enfield, Middlesex, England EN1 4DX. CQ World Wide WPX SSB Contest, full 48-hour period UTC. Only 30 hours of the 48-hour contest period permitted for single-operator stations. The 18 hours of operating time may be taken in up to 5 periods anytime during the contest and must be clearly noted in the logs. Multi-ops. may utilize the full period. Two-way ssb only, all bands 160 through 10 meters. Competition categories: single op. all band, single op. single band, multi-op. all band only, single transmitter, only one signal permitted and multi-transmitter, one signal per band permitted. Exchange RS plus serial starting with 001. Multi-transmitter stations use separate numbers on each band. Points: contacts between stations on different continents count 3 points on 20-15-10 meters, 6 points on 40-80-160 meters. Contacts between stations in the same continent but not in the same country count 1 point on 20, 15 and 10 meters, 2 points on 160, 80 and 40. (Exception: Contacts between different North American countries count 2 points on 20, 15 and 10; 4 points on 160, 80 and 40. This applies to North American countries, only.) Multipliers are prefixes, to be counted once only. A prefix is considered to be the two or three letter/number combination which forms

the first part of an amateur call, as in W1, WA2, 4X4, 5A1, etc. For single op: score is total QSO points from all bands multiplied by the number of different prefixes worked; for single band score, QSO points on that band multiplied by the number of prefixes. Scoring for multi-ops, is the same as the all band scoring for single ops. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken once only regardless of the band. Awards. Usual disqualification criteria. Entries must be received by May 1. Send to CQ WPX SSB Contest Committee, 14 Vanderventer Ave., Port Washington, L.I., New York 11050.

APRIL

2-3: Wisconsin QSO Party, Ø District QSO Party, QRP Contest, SP DX Contest.

7: West Coast Qualifying Run.

12-13: DX/YL Contest, cw.

15: WIAW Qualifying Run.

16-17: CD Party, cw. VP9 Contest.

23-24: CD Party, phone. PACC Contest.

25: Special WIAW Qualifying Run.

25-26: DX/YL Contest, phone.

30-May 2: Connecticut QSO Party.

May 14: FMT.

June 11-12: VHF QSO Party.

June 25-26: FIELD DAY.

July 4: Straight Key Night.

July 9-10: IARU Radiosport Competition.

Strays



OPERATION OUCH A PAINLESS SUCCESS

□ The greater Cleveland, OH, swine-flu inoculation program was a great success with the help provided by the Lake Erie Amateur Radio Association. LEARA's brand-new 220-MHz repeater performed flawlessly for the three consecutive Sundays of the program. The 220 provided doctors with instant communications when any difficulties arose. Apparently the doctors were so impressed that they will be relying on ham radio for similar public service projects in the future. For the hams who took part, it was a great opportunity to test themselves, their equip-

ment, and their capability to serve. And perhaps most noteworthy was the cooperation displayed by the many users of the 28/88 machine, who stood by and left the system available without interruption for the duration of "Operation Ouch." -- WB8JYR



Each inoculation site had both 2 and 220 capability. Hams with Handie-Talkies were scattered throughout the schools and shopping malls to lend assistance, to advise the site coordinator as to the length of waiting lines and to be alert for any problems that might develop. A helicopter shuttled constantly between the Academy and the various sites to facilitate distribution of the vaccine and other supplies. A Handie-Talkie-equipped ham was aboard, so that the progress of the chopper was known at all times to the project coordinators and the net control. Here WB8TSM (left) maintains communications with the chopper while WB8JYR handles the 220-MHz link. (WB8JYR photos)



LEARA was called out for the event by the Red Cross, since the Cleveland Academy of Medicine insisted on the reliability of ham communications. Two of LEARA's four repeaters were dedicated to the program for three consecutive Sundays - 28/88 (WR8AGA) and 223.30/224.90 (WR8AGA). A station at Red Cross hq. served as net control while a station at the Academy provided direct contact between doctors, nurses and medical technicians at the various inoculation centers and supervisory personnel at Headquarters. At a high school on the west side of town W8BLAS, W8URX and W8AZH (I-r) monitor both repeaters.

FEBRUARY 17, AN ANNIVERSARY TO REMEMBER

□ Have you read the "Happy Birthday, WIAW" story in this issue? If not, check it out and then mark your calendar to copy the ARRL President's special message to all radio amateurs to be transmitted by WIAW special bulletins that day. Send Headquarters a copy of what you copied for your special card commemorating the event.



A quarter of a million persons received the shots and hams proved that repeater communications were without equal for such efforts. In the left foreground, LEARA member W8HAL watches part of the over 20,000 people receiving shots at the Richmond Mall for any signs of medical problems:

Station Activities

SCM & AREC & ORS & OVS & SEC & OBS & TCC & OO & NTS & WAC & CP & A-1 OPR & EC & DXCC & CLUBS & RM & OPS & RCC & PAM & WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — Once again it is necessary to report the passing of two of our fellow amateurs, VE6JK was well known and highly respected, VE6AMA also well known and highly respected. Both had served amateur radio well, and will be missed. Meetings were held in Edmonton and Calgary with the QC official regarding the proposed new types of licenses. The call VE6MC has now been issued to the NARC for use in a repeater in Edmonton in the future. This will perpetuate the memory of Brian Wilson, an outstanding operator and a hard worker in the local club. If you are talking to ZM ask him where he acquired "the duck." BFU is a new call at Saba station. LQ is presently in hospital and we hope by the time this appears in print is well again. Traffic: VE6FS 65, VE6AMM 22, VE6XC 10, VE6MJ 9, VE6HO 8, VE6YV 5.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — British Columbia Amateur Radio Assn. held their annual meeting; new officers are VE7BBQ, pres.; VE7CJS, secy.; VE7A1T, treas. The amateur community for doing the most to improve amateur radio and winner of the cup if VE7BG. Walt is one of our blind amateurs, and he justly deserves recognition. British Columbia Chapter, QCWA net on 38.10 kHz, at 11 A.M., Sun. VE7CR is operating KH6 at Kenel for the winter. Asst. Dist. and LQ, and leaving for the south. With so many VE7s going south for the winter, wonder who will be left home. Traffic: (Nov.) VE7ZK 108, VE7DKY 77, VE7CDF 67. (Oct.) VE7DKY 74, VE7BLO 47.

MANITOBA: SCM, Steve Fink, VE4FQ — RM: VE4UI, PAM: VE4JP, VE4PG, has been appointed Asst. SCM for Manitoba with special responsibility for net coordination. We also welcome VE4QU as a new ORS. VE4CA is QSY to Brandon from Shilo, while VE4WR has left for VE7-Land. The Agassiz Chapter of the Ten-Ten International Net meets at 2000 local time at 28.725 MHz Sun. in an effort to reactivate ten meter activity in Manitoba. Everyone is invited to check in. Our net managers report the early winter sessions have been plagued by poor conditions much of the time. MFPN: 30 sessions, 963 QNI, 38 QTC. Traffic: VE4PG 137, VE4UL 118, VE4RO 56, VE4IX 36, VE4NM 13, VE4OP 10, VE4FG 9, VE4QJ 7, VE4JP 6, VE4CR 5, VE4EN 5, VE4HA 5, VE4JA 5, VE4LU 5, VE4VV 5, VE4ID 5, VE4XP 3, VE4LA 2, VE4LN 2.

MARITIME & NFLD.: SCM, Aaron D. Solomon, VE1OC — With regret I report VE1AZB became Silent Key. Cl b station VE1CR to be reactivated. MAARC Directors are VE1AMB, VE1EG, VE1SL. Hosp. Incl. VE1s ALB AWS EL FT JU VS, MAARC had display at local mall. Talk by VE1JS on Aircraft Control Com. K4OK, VE1EAC wants VE1 contacts on 21300 kHz. VE1EY doing well on CNIB course in Toronto. VE1FQ & VE1OC spoke to PCARC on ARRL. SONRA elected VO1FX, pres.; VO1JN, vice-pres.; VO1IM, secy.; VO1CR, treas. Timburs elected VO1FR, pres.; VO1GB, vice-pres.; VO1HL, secy.; VO1LI, treas. HOWL elected VO2AI, pres.; VO2AJ, vice-pres.; Laing, secy.; VO2AG, treas. APN, sessions 25, QNI 81/16, QTC 178. Traffic: VE1AAO 278, VE1ZH 219, VE1ACU 165, VE1BDT 87, VE1ST 33, VE1OC 22, VE1AIF 8, VE1JH 6, VE1ARN 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: Noreen Nimmons, VE3GOL. Happy New Year. Ready and prepared to assist in SET '77, Jan. 29th? Monitor local repeaters, NTS HF nets and ONTARS (3.755 MHz 6 AM-6 PM daily). SET provides experience in handling a REAL emergency. Please plan to participate. Welcome to ex-WA1BLN now VE3ILN in Don Mills. Congrats to award winners: Ottawa ARC, President's Award, best publication; "Ground-wave"; Clifford Marsh Trophy, VE3CGO and OM VE3GX, first husband and wife team so honoured; IEE General McNaughton Award to VE3UD; Keith Russell Memorial Trophy to Scarborough ARC, 1st place FD; Elizabeth Memorial to South York ARC, 2nd place. Jim Jarvis Memorial to VE3GOL. All clubs report busy Nov. with Auction sales and Annual dinners. Sky Wide ARC celebrated their 25th anniversary and had in attendance their second club pres., VE3CD. VE3KF new prez of Champlain VHF Mini-Net. VE3CDM new prez of RSO. A happy time was had by members of Queen Elizabeth Hospital ARC and Sunnybrook Hospital ARC during annual TOT sponsored Christmas party. VE3BFN new VE district chmn. for YLRL. Trillium'20 to get net no longer active. Hamilton ARC's VE3s EYC DTQ HBX & DDK now working Oscar. Northorn ARC's Marconi Trophy (by perpetuity) missing. Contact VE3A for more info. Northorn members helped VE3EM take down tower prior to his departure for ZL-Land. Scarborough ARC pres. and '77 ARRL National Convention committee showing their own excellent "promo" film on both sides of the border. Wheel-chair facilities at the Sheraton Centre put to a test run by VE3GJ who advises those using motored chairs to bring a battery charger with them due to drain caused by heavily carpeted areas. All is highly approved facilities for the handicapped. VE3AJM now Advanced, congrats. Metro ARC continues fine work with those confined to hospital. VE3BRE donated a 2-meter "Hospital Circulating" rig available to those who find themselves confined for a length of time. Repeater VE3TTT providing 5 W/15 Wpm code practice nights 7 to 13 PM. Metro ARC's Nov bulletin carries schematic of VE3AL's "Coffee Can Code Converter" which converts VE3TTY's 146.70 audio to any FM receiver tunable from 88 to 108 MHz. Guelph ARC repeater on the air: 147.96/147.36 with temporary call of VE3ZM. VE3APZ putting finishing touches to microphone amplifier extra goodies (for on 2, out on 6 meters). Our sympathies to the families of Silent Keys VE3GG and VE3VD who was a long-standing ORS. Traffic: VE3GOL 352, VE3SB 338, VE3CDK 268, VE3DPO 167, VE3GJ 2

153, VE3GFN 108, VE3FRG 107, VE3HTT 100, VE3DZK 95, VE3GT 78, VE3FT 71, VE3GNW 60, VE3ATF 56, VE3EWD 45, VE3DVE 35, VE3HGJ 21, VE3PQ 16.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP announced to announce the appointment of Ron Nagel, VE5RN to the position of Asst. SCM and VE5XC as RM. I would like to thank VE5TT for his fine work he displayed during his term as RM. VESCU has just completed an excellent text for the instructor. For those who wish to teach amateur radio I recommend you contact VESCU for a copy. I would like to congratulate the Prince Albert amateurs for the help in communications for the army exercise. Was it cold Barry! Traffic: VE5HP 30, VE5BO 27, VE5RP 15, VE5LN 3, VE5NJ 3.

ATLANTIC DIVISION

DELAWARE: SCM: Roger E. Cole, W3DKX — SEC: K3KAJ, RM: W3EEB, PAM: WA3DUM. New Novices from DARC classes WB3ERC WB3ESJ and WB2JCP. WB3ENF upgraded to Technician. First State ARC entertained their ladies at 3 Little Baker's Dinner Theatre. First State Officers: W3FIB, pres.; W3RAU, secy.; W3AQD, treas.; W3HDS, act. mgr. George Read Middle School ARS and W3TCI, Sponsor, are grateful to W3HGA for his gift of 3 bound QST volumes, Annual Kent Co. ARC Auction Court House, Dover Mar. 8, 7:30 P.M. DTN (Oct.) QNI 334, Tfc 46; (Nov.) QNI 318, Tfc 45; DEPN (Sept.) QNI 69, Tfc 13; (Oct.) QNI 63, Tfc 9; (Nov.) QNI 45, Tfc 0. Traffic: K3KAJ 135, AC3EEB 55, W3DKX 37, K3YHR 30, W3AWY 24, W3WD 21, W3YAH 5, W3BANC 2, W3HKS 2.

EASTERN PENNSYLVANIA: SCM, George S. Van Dyke, Jr., W3HK — SEC: W3BFB, RMs: K3MVO WA3OGM WA35XU. PAMs: W3AVJ WA3PZO. Net reports: AREC 2, QNI 7; AREC 10, QNI 7; PFN, QNI 551, QTC 379; EPA, QNI 289, QTC 147; EPAEP&TN, QNI 253, QTC 79. OVS reports: WA3ZRE W3GOA WA3NDQ WA3BJQ W3CL. OO reports: K3RDT W3NC W3RJ. OBS reports: W3AVJ W3ATJ W3TI W3I W3CL. BPL: W3CUL W3VR WA3YJG WA3AT WA3THT. W3RJ W3RI WA3NDQ W3IPX. WA35XU will be acting RM for EPA while WA3OGM in school in Europe 3 months. WA3YJG will be acting RM for PTTN while WA35XU is with EPA! WA3ATQ busy shoveling snow. K3MVO recovering slowly from stroke and may move to sunny FL. W3RE running low in speaking dates! RMs report band condx slowly improving. CM6 net report missed — QNI 23, QTC 14. New ham WB3ENN. EC WA3VUE busy getting new members and reviving old ones! New calls: K3OMP now K3KW, W3ZRR now W3TI, K3OIO now W3RJ, WA3VDQ says he can keep up with college and make the nets! W3BUR doing a terrific job trading in his gear! W3EEU recovering from spell at hospital. OO's report discrepancies seem to come in bunches! Guess we get excited during heavy traffic times. We should do the job right but not nit pick and hold up delivery. Glad Santa was good to all of you and wish you all a Happy New Year. Hope all of you are in the SEC and did well in the CT. You YLFRs are really tough. New Year's weekend followed by a contest week-end! Traffic: W3CUL 3186, W3VR 901, WA3YJG 510, WA3THT 411, WA3ATQ 309, WA3OGM 166, W3IPX 93, K3GJL 82, W3RJ 61, WA3PZO 47, W3WRE 44, W3ID 41, W3ATI 38, WA3NDQ 28, W3AVJ 2, WA3PZO 26, K3OMP 21, AA3YD 23, K3RV 19, W3CL 15, W3YJG 14, WA3WQP 10, WA3VDQ 8, W3ADE 6, W3TI 6, WA3ZBR 5, W3HK 4, WA3BJQ 2, W3BUR 1, W3EU 1, W3GOA 1, WA3VUE 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Marlow, W3RC — SEC: W3FCS, RMs: W3FZP, PAM: WA3EOP, NCM: WA3PRW. Thanks to EC W3YWK and EC K3ORW and congrats to new EC, K3EUG, Frederick and EC W3FAE Carroll. WA35JY and WB3BYT have moved from MDC. The Severn School ARC has WA3YSW, pres.; WB3AKW, veep; WB3DLZ, secy. Congrats to WA3YSW awaiting his Tech. ticket. WB3CFR got his Novice and a TS-20 the same day and now awaits his General ticket. Congrats. W3BHE shack is rebuilt to cozy. The Mountain ARC got a full page spread in the Allegany County Bicentennial Book. W3OYY has more out-of-staters in his MDC-PON than in-staters. WA3KCY has enough confirmed for DXCC. Congrats. W3IDF and WA3EOP are busy teaching new Novices. W3BTR spots autopatch gear working. FB, W3FCI did one nighter multi-op stints. AA3YKK is about to get into Oscar. W3EOV is into a radiology course. W3ZNV is active on 10, 6 and 2 plus a regular 80 man. W3CDD is not so lazy as the WDC QCWA secy. WA3HKR back at Purdue for higher things. With the nets! Sessions/Tfc QNI and MDC/PON: 16/50, 8/7, MFPN 22/38/16, W3PON 13/36/13, MDC PON 4/10/24, and Oct. MDD 62/217/5.6 Top Brass AC8BZY/3 K3KAJ and WB3BYT. MDC/TN top honors to WA3UYB and W3ADQ. MFPN tappers were W3ADQ WB3AUK and WA3PRW. Others W3DKX and K3ORW. W3ELS has his hands full with rpt problems. Other OO reports from W3CFC, WA3NSA, W3B3L, W3SUI, W3WBY, WA3ZTW meets 3RND. WB3BUA has emergency power capability. WA3SJS keeps trying new rigs. WA3UYB made it big in the SS. W3IHM is a 3RN regular. WA3ZAS is still trying to keep up with the NCS spots. W3FZV made an emergency trip to NH. WA3ZCE says her mail service not so good. W3FCS is getting into a new moving again. ARS, W3DJR, WB3EPL along with plans to YK-Land early Dec. Traffic: (Nov.) W3FA 186, WA3UYB 158, WA3SJS 50, W3FZV 47, WA3EOP 41, WB3BUA 36, WA3HKR 31, W3IHM 31, WA3ZTW 30, WA3ZAS 21, W3EOV 20, K3ORW 16, AA3YKK 16, W3IDF 11, W3FCI 4, W3ZNV 1. (Oct.) WA3HKR 63.

SOUTHERN NEW JERSEY: SCM, Raymond E. Clancy, WB2GTE — SEC W2JL retired to FL. Our new SEC W2HOB requests all EC reports. Stone Harbor ARC has new ant. up 115 ft. for Repeater. Shores



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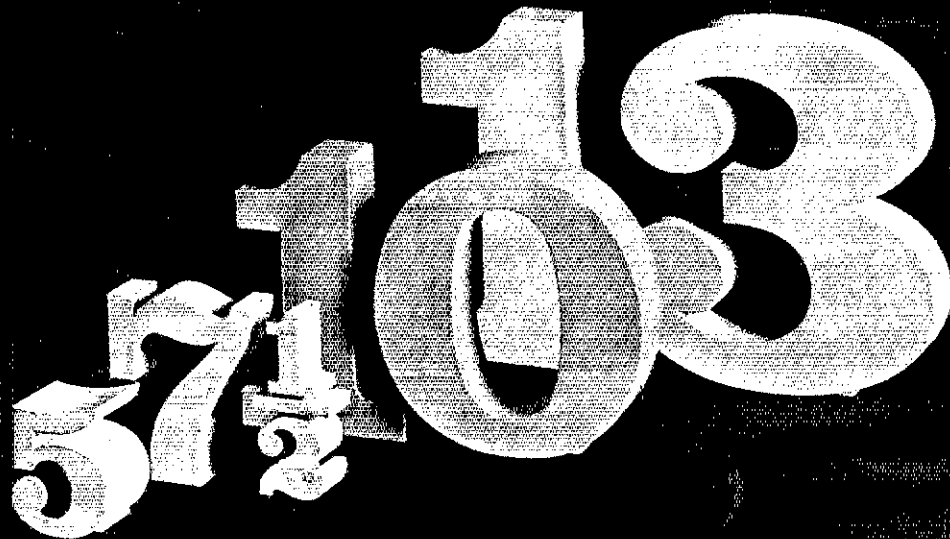
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Points ARC has "home brew nite" at meetings. West Jersey Radio Amateurs report 59 members. WB2LST sez Novice class coming along fine. K25G5 sez new officers elected. Gloucester Club has new officers: K2HPV, pres.; K2RUJ vice-pres.; WA2GCS, treas.; W2TDS, RS. Code class 40, held at Glou. Co. College. WA2VEE instructor. SJRA RC oldest in USA; founded 1916 starts class at the Camden Co. Voc. School sez K2EA, Member W2IL was licensed in 1912 and W2BQ in 1914. W2AFZYL was licensed in 1921. John Tobin reports from NCS in MIT 211 Sardinia will be hammering in Jersey in Feb. WB55OU, TX moved to 2-Land. WB2JJN has delta loop for 80M on tower. WB2OSQ cooling off after Nov. 55. WB2IDQ new OO. Congrats new hams, WA2HDY WN2HTZ WB2HRD WN2HWS, New jr. op at WB2DRD makes WA2BJ grandpup. WB2JFS and WA2AML have new harmonics. WA2PTQ works 2 transcon nets. K2BG enjoys 160M with new rig. WA2N2J off emergency. TX now Advanced. WB2KET moves to 4-Land. W2SEA resigns as EC. W2KGM resigns OPS. AD2GMF built an SWR bridge. W2SDO got new FT221. W2FXN is getting ants, ready for DX. WA2DWX passed Advanced and worked 50th state. W2SDB has retirement party. WA2WCT out of hospital. WA2ZDU has Advanced. K2JOC wks 160M from Calif. W2J165, W2AWU 28, WB2LCC 26, K2BG 10, W2FPY 4, WA2PTQ 4, W3IU 2.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YAH - Asst. SCM: W. B. Thompson, W2MTA, SCC, WB2EDT. Thanks again to the Drumlins ARC for their hospitality at their Nov. meeting. An interesting point was that the meeting was opened to interested area CB operators and the turnout was surprising. The CBers outnumbered the amateurs and I think every one of them signed up for the Novice course. A nice feather in the Drumlins ARC cap. RACAS reports the testing of a new dual frequency receiver licensed as W22JOC (90/30) for regular use and WC2ACV (93/33) for RACAS emergency use. WA2AJQ is moving to KL7Land. WA2DGN and WA2JWV both moved from the Rochester area and applied for two letter calls which they both received the same day. DGN is now W6GQ and JWV is W7EF. Welcome to new WNY ops WB2DZW WB2IWM WB2IWP WB2IWR WB2ILX WB2IJJ and WB2IID. RARa's Nov. auction was a huge success with attendance estimated at over 300. W2MPM turned in Feb job as auctioneer. He even sold yours truly some goodies which turned out to be his! W4FR says he finally finished that HW-202 he has been working on for mobile use. WA2AIV is publishing a Western District Newsletter and requests any net member interested in helping to defray the cost of printing and mailing the newsletter to send him a small donation. Effective Dec. 1, 1976 the Canandaigua FCC Monitoring Station will become a Limited Enforcement Office. This means that H.F. monitoring activities will be terminated and the new LEO will reduce its staff and concentrate on VHF/UHF monitoring. Acting Engineer in Charge of the LEO is Richard Holbert, WA2OXJ. Concurrent with the changes Holbert is the retirement of W2VM, the Engineer in Charge of the Monitoring Station. Ed has devoted 39 years to serving the FCC as an Engineer, I'm sure that all WNY amateurs join me in thanking Ed for his service to the amateur fraternity and in wishing him well in his retirement. Finally my apologies to W2LVE who's traffic totals have been reported under W2UIE for the past couple months. Looks like phonetics are needed even on the twisted pair. Traffic: W2FR 246, W2MTA 215, W2RUF 195, WA2ZJP 104, W2PZL 86, WA2TPC 81, WA2LJL 76, WA2AIV 75, WA2PUJ 63, W2UIVE 63, W2EAK 33, W2EAT 19, W25FT 15, WA2DKF 14, K2DF 11, WA2LCC 4, WB2HPC 2.

WESTERN PENNSYLVANIA: SCM, Donald J. K3SGD - SEC: W3ZUH, Asst. SECs: K3SMB, WA3LH, PAM: K3SMB, RMs: W2KAT/3 W3NEM W3LOS W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

New appointments: WA3VIR as EC for Westmoreland Co., K8MYU/3 as ORS, K3YLI as GD. I am still looking for ECs for Bedford, Clearfield, Erie, Forest, Fulton, Jefferson, Potter, Somerset, Venango and Warren counties. Blue Knob repeater WR3AIZ is operating on 147.75/15 MHz. Steel City officers for 1977: WA3TSL, pres.; W3TVB, vice-pres.; WA3F-WA & W3SDV, secy; W3DOW, treas.; W3WVH, conducting Novice classes for several CBers. K3F-GL & W3TLE erected double stacked eleven-element, 2-meter beams for DX. The Butler County AREC has a fine 6-meter net every Wed. at 9:00 PM on 50.160 MHz. The following have upgraded: WB3CCU WB3AAC WA3ZL WA3ZAH WA3ADQ to Advance Class; WB3AYZ Extra Class; WB3JTB General Class. I am in the process of compiling a handy WPA Net Directory. If your club or group meets on the air on a regular basis as a net, let me know. Activity on 29.6 MHz fm continues to increase in the Pgh. area. The WPA Phone & Traffic Net had 29 sessions in Nov., handled 12 messages, with 216 QNI. The WPA CW Traffic Net had 30 sessions in Nov., handled 177 messages with 384 QNI. PSHR: WA3VBM 44, Itratt: W3VBM 47, W2KAT/3 175, W3EJG 175, K3CHD 60, K3RXK 60, WA3AHP 50, K3HCT 41, W3KUN 39, W3LOS 33, WA3ZAO 21, W3HDH 19, WA3MDY 17, K3SMB 15, W3SN 13, K3VGV 10, W3IDQ 9, W3YD 8, W3ATQ 7, W3GQJ 6, W3UT 6, W3KQD 5.

CENTRAL DIVISION

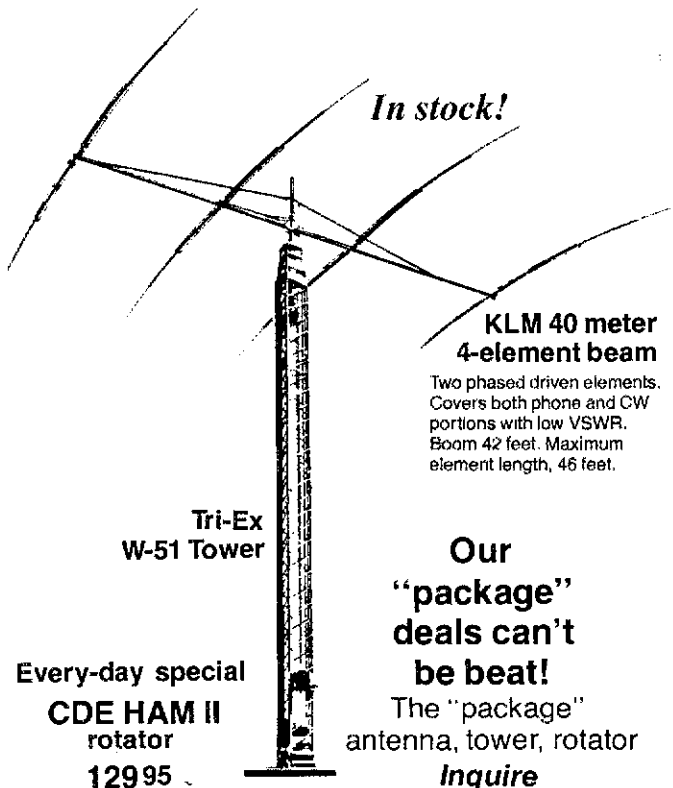
ILLINOIS: SCM, Edmond A. Metzger, W9PRN - Asst. SCM: Harry Studer, W9RYU. SEC: W9AES, PAM: WA9KFK. RM: K9ZTV, Cook County EC: W9HPG.

Net - Freq.	GMT	Days	Tfc.	Swss.
ILN - 3690	0030/0400	Dy	188	58
Ill Phone - 3915	2245	Dy	232	30
NCPN - 3915	1200/1700	Mo	229	52
IEU - 3940	1400	Su	8	
ISSB			304	20

K9ZTV, RM, for the IL Section reminds us that the ILN is the only net in the State affiliated with NTS and meets daily at 0030/0400Z on 3690 and invites check-ins. K9ZWU, WA9FH, K9ENZ, K9ZVW, Blanche Thuma, W9RFG, WA9FR and WA9ML were elected officers of the Six Meter Club of Chicago for the coming year. Your SCM, W9PRN was a guest of the St. Clair ARC (Belleville) on Fri. Nov. 26 and met with the gang. W9VRC has passed his General Class exam and waiting for his ticket. W9YTO also waiting for his General ticket. Don Alteneberger and Harold Thomas employees of CRSCO were honored by their company's house organ for teaching prospective hams

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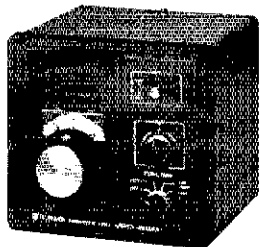
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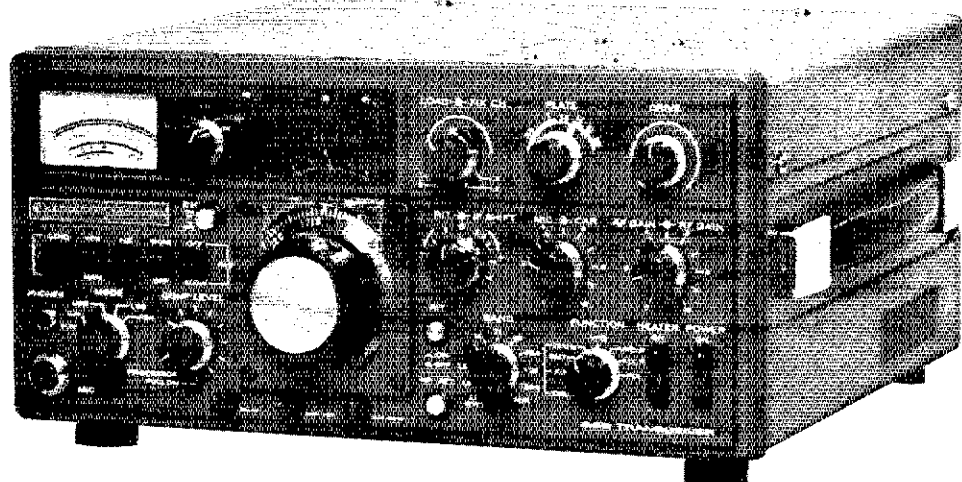
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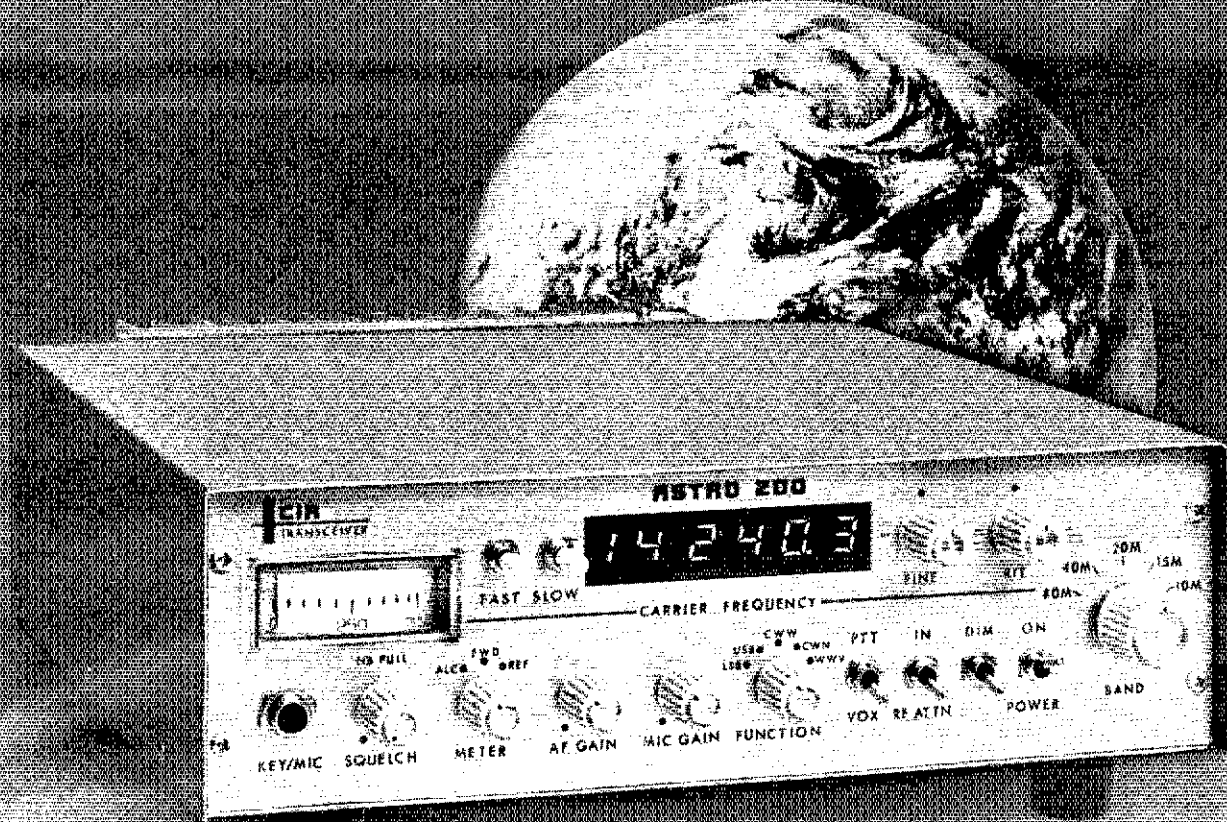
In the Montgomery area which boast the largest number of amateurs per capita of any county in the USA. The CENQIS (Decatur) Amateur Radio Club cooperated with the Salvation Army in their annual radiothon. New appointments this month are: WB9RZ as ORS WA9BA 29 00, WB9SNA received his WAC certificate and also his FCC 2nd class radiotelephone license. The VHF Society (Waukegan repeater) will change to 147.63 input in Feb. The Rockford Amateur Radio Assn. held their Nov. meeting at the Earth Satellite Station near Hanover. New amateurs in the Waukegan area are WB9ZAN and WB9ZBN. WA9ZAK is now Extra Class. WB9WKE Advanced and WB9WQJ is now Technician and all are from the Galva area. W9LN is the new editor of the Northwest Amateur Radio Club's paper LOUD MOUTH. W9NKF (better known as Stu Collins) to his listeners has been promoting ham radio on WIND. Traffic: Nov. W9NXC 247, W9HOT 220, WB9TWT 196, W9DK 131, W9NJP 126, W9KRC 121, K9ZTV 118, WA9JE 115, WA9KFK 106, K9KHI 81, WB9NOZ 79, WA9AQN 75, WA9VGW 72, WB9SNA 70, K9EEA 47, W9LNQ 42, AB9DED 36, WB9NEH 32, W9PRN 24, W9OYL 19, W9HPG 9, W9SAV 6, K9DQU 4. (Oct.) K9EEA 48.

INDIANA: SCM, M. P. Hunter, WA9EED — SEC: W9UMH. The Laughery Valley ARC is at work on a new 31/91 repeater. WR9AIM. Antenna will be at 1050 feet above sea level. WB9PFZ sent a resume along with his preliminary field appointment application — quite impressive for 18 years of age. FWRC maintains regular meetings with Japan on 14301 at 2400Z every Sat. Furt Wayne Repeater Assn. recently reorganized with a management council. QIN reports lousy conditions and are experimenting with an earlier session. Organization is underway for a new section NTS phone net. Contact WA9OM for information. CWDX members were treated to good conditions on the low bands, much 160 activity. Our hearty congratulations to W9NTP on his election as Central Division Dir. W9BTZ requests QNI to the 1MO 2-meter net on the Ft. Wayne repeater (no time or days given). Net Trc. IPON 1, ITN 714, QIN 367. Hours. VHF 120. Traffic: Nov. W9YB 813, WB9KTR 407, W9GGW 372, WB9SKA 312, W9LW 191, WB9OT 192, W9IOH 161, WB9PIR 136, WB9OZW 125, K9DCX 112, K9TKE 86, K9YBM 85, W9HUF 79, WB9IHR 69, WB9THY 68, K9LZN 53, W9DZC 52, K9FOV 45, WB9QEZ 44, WB9SQH 36, K9EQT 32, WA9SBR 20, WB9DIX 18, WA9QCF 17, WA9TJS 17, W9EGV 16, K9HIZ 16, WA9OHX 15, K9RWG 13, WA9UXP 12, W9PML 11, W9RTT 11, W9DLI 10, K9WVJ 9, K9RGF 8, W9ENU 6, K9DVI 5, K9HMC 5, W9SGH 4, W9BDP 1. (Oct.) K9DCX 114, W9UEM 54, W9PMT 17.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9PKG. PAMS: W9AYK, W9IEM, K9LTK, RMC: WB9IGH, K9KSA, W9MFG, K9LGLU. Nets: Time, QNI, QTC. Mgr.: BWN, 3985 kHz, 1245Z M-Sa, 982, 491, W9AYK; BEN, 3985 kHz, 1800Z Dy, 700, 162, W9IEM; W9BN, 3985 kHz, 2330Z Dy, 1081, 244, K9LTK; WNN, 3725 kHz, 2315Z Dy, 98, 7, WB9ICH; WIN-E, 3662 kHz, 0100Z Dy, 171, 121, W9MFG; WIN-L, 3662 kHz, 0400Z Dy, K9LGLU; WIFXPCo net, 3925 kHz, 1801, M-F, 617, 99, W9WIK, W9VJG. New Gen. in Portage. New officers: of WARAC, K9WIF, pres.; WA9KRF, vice-pres.; WA9POV, secy.; WA9AKV, treas.; K9IAG, WB9VYP, W9KYZ, WB9JYR, board. From Hamitrix, Manorad Club has cv net on 3705 kHz on Sun. 1530Z. Their officers are WA9AJC, pres.; W9QMC, vice-pres.; WB9MVZ, secy-treas.; K9DIN, WA9DOL, W9WBL, W9VJG. WB9VJG member-at-large. WB9FZC has 26 countries worked as Novice. OVS OBS PAM EC certificates endorsed K9LTK. Eleven new Novices in Wisconsin Rapids area, WB9RZK, WB9RZJ (husband and wife), WB9UJ, WB9VUN, WB9WJ, WB9ZCX, W9LDO licensed for 40 years has his wife who has her own license. WB9QXO and WB8SYG and his XYL's call is WB9SYH. WNN WIN-E certificates to WB9QKH, WB9KPK passed Advanced. Oshkosh new officers: WB9KZH, pres.; WA9GUS, vice-pres.; W9JIF, secy.; WB9JW, treas. New Novices in Oshkosh: WB9WFM, WB9YMF, WB9WFL, WB9YML, WB9YD, WB9YFR from Intercom. K9CPM made BPL. Officers for WNA, W9AYK, pres.; K9LTK, secy.; K9GSC, treas. Traffic: (Nov.) K9CPM 836, W9DND 286, K9MZO 186, WB9RWZ 150, W9PVH 115, WB9QKH 113, W9SFL 102, K9FHI 98, W9IEM 71, WB9HLS 67, WB9LGL 58, WB9JW 52, W9AYK 50, K9LTK 47, AB9QEC 39, WB9MFG 35, K9JPS 21, WB9PYG 19, WB9SHK 18, W9KHH 16, WB9LKC 12, WA9ND 12, WA9QVT 12, K9ANV 11, WB9SXX 10, WB9KMW 5, WB9QXO 6. (Oct.) WB9QXO 23, WB9LKC 12, WB9NRK 1.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K4ZXE — MN participated in the governors to presidents relay. WB9LJH originated a message from Gov. Anderson and relayed it to Pres. Carter via ARRL NTS channels. The HTG So. Campus ARS was recently affiliated with ARRL. The club pres. is WA9CCQ. WB2IWH visited with W9TIV and was cordially received by many MN amateurs. VARS of Waseca reports their annual hamfest was well attended. VARS had new officers with WB9MPN, pres.; WA9VHX, vice-pres.; WA9GKN, secy-treas.; WB9OZK, act. mgr.; W9POFZ, trustee, WA9PRS was received. K9CNC (no W9BFJ services the St. Cloud 34/94 machine and reports an emergency net meets there Sun. at 9:30 PM. WB9PCR, WB9WCK and WB9WEW stepped from Novice to Tech. The Robbinsdale ARC (K9LTC) active with a high antenna, radio classes, and CD activities. Officers are WB9FRN, pres.; WB9SNG, secy-treas. They report new Gen. WB9SNG, WB9SNH and Adv. WB9SCK. New members welcome. The Mankato ARC is having a homebrew contest with prizes for the winners. Club members, WB9RUD and WB9SCN are now Techs. Also a complete set of ARRL publications was presented to the public library. The NCJ contest magazine formerly produced by W9YF is now available from W6RTT. AK9SID placed 15th among the Novices in the ARRL Bicentennial contest. Novices are reminded of the Novice Roundup contest Feb. 5-13. See QST for rules and how to get in the fun. The FCC will give amateur exams, except Novice, in Duluth about Mar. 8. Amateur form 61M and include your fee now. All members are reminded to send their monthly traffic totals to the SCM by the 3rd of the month. Talk to your net control if you need details. Public Service Honor Roll should be reported if your points are over 40. Traffic: (Nov.) K9CVD 219, AB9HOX 194, WA9YVT 172, W9HKE 141, AB9LDW 129, K4ZXE 125, K9ZBI 109, W9MMFZ 72, K9PIZ 71, WB9LSI 67, WB9OUH 65, WB9PCP



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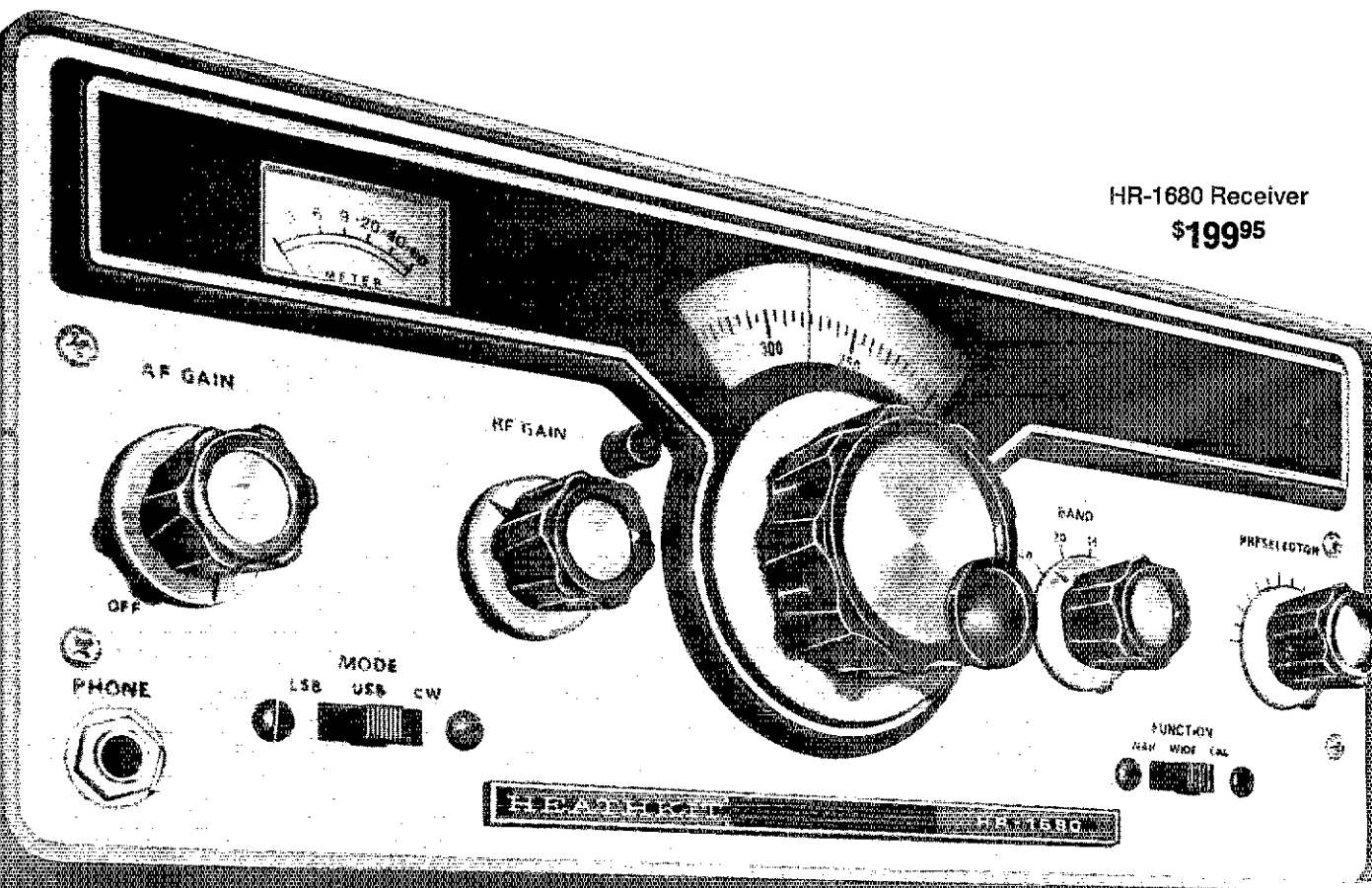
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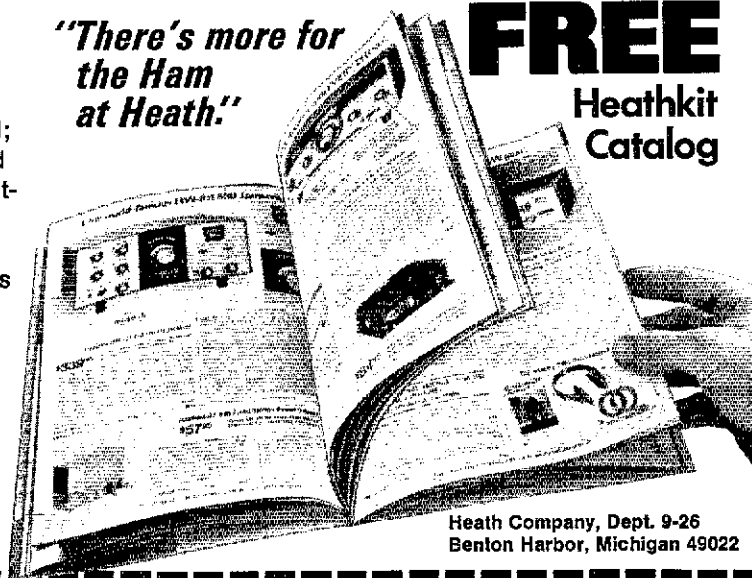
SPECIFICATIONS: Sensitivity is excellent at less than $0.5 \mu\text{V}$ for 10 dB S+N/N for SSB operation. IF Selectivity is 2.1 kHz min. at 6 dB down and 7 kHz max. at 60 dB down. Frequency stability is rock-steady: less than 100 Hz per hour drift after 30 minutes warmup and less than 100 Hz for a 10% change in line voltage. And the receiver input dynamic range is an outstanding 120 dB for excellent reception of widely varying signals.

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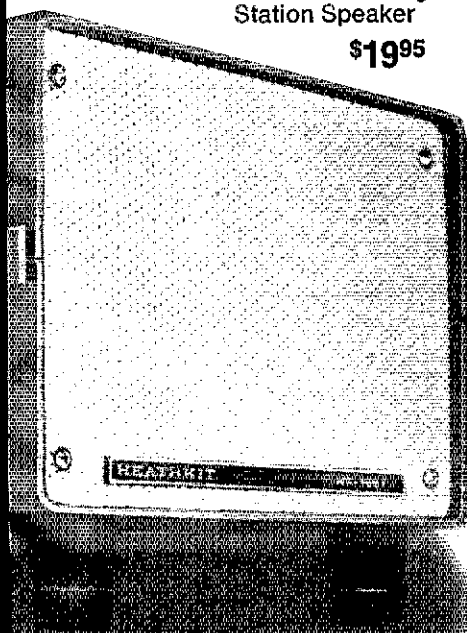
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62, WB0PKG 53, W0DUW 52, WB0QFQ 51, WA0TFC 51, W0QMY 46, WB0PMZ 36, W0BMAO 34, WA0TGM 28, W0HZU 22, K0RHX 22, WB0GEU 22, W0RIG 20, WA0DU 20, W0OPX 17, WB0NZL 11, WB0OCT 11, WA0JPR 6, WB0JY 6, K0SGN 4, K0FLT 3, K0SKQ 2, (Oct.) WB0OCT 37, W0BJYT 14, WA0TGM 10, WA0W0V 9.

NORTH DAKOTA: SCM, Mark J. Worcester, WA0WLP — The area ham meeting at G.F. was a great success, with about 50 people in attendance. The ham auction went well. There were hams from Winnepeg. The highlight was the guest speaker Gar Anderson, Division Director, Weekend DATA net will now meet at 2300Z. Sat. meetings after the VL Weather Net WB0PDP of the National Weather Service will be around to answer any questions about weather observations. K7QJW/0 new ham at Beulah. Bismarck Ham Club starting license classes.

Net — kHz	CDT/Days	Shss.	QNI	QTC
DATA — 3996.5	1700 S-S	52	556	205
WA0SUF	1800 M-F			
YL Wth. — 3996.5	0700 S-S	30	632	616
WA0RWM				
Goose River — 1990	0900 Su	4	45	3
W0CDO				

Traffic: WA0RWM 1007, WA0SUF 173 W0CDO 90, WB0BMG 61, W0DM 37, W0WWL 34.

SOUTH DAKOTA: SCM, Ed Gray, WA0CPX — Black Hills ARC officers for the new year are WA0UEN, pres.; WB0BAG, vice-pres.; WB0JHD, secy.; K0CXX, treas. The BHARC are planning on activating a two-meter autopatch repeater in Rapid City. There is already 70% activity on the repeater in the area. The SD DX gang consisting of WA0NL, WB0DGA, K0HUD, W0SMV, W0GKE, and WA0CPX won the CW DX challenge between MN and SD. This will be an annual fall event open to any DX group in the Dakota Division. Persons interested should contact WA0CPX at the Twin Cities DX Assn. Recent Generals are WB0JRM, W0QPM, W0M, W0W, W0W, W0W, and Novice WB0TML. Net Reports: Total all Nets, 2361 QNI and 497 QTC. Anyone wanting their traffic listed should report it to WA0CPX. Traffic: WA0VRE 104, W0EVQ 80, W0IG 51.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W0UAU — SEC: WA5VNV. PAM: W5POH, WA5ZWZ. RM: W5MYZ. Nets, kHz, Time/Day, QNI, QTC, Mgr.: ARN, 3995, 0030/Dy, 433, 28, K5FCY; OZK, 3760, 0100/Dy, 192, 31, W5NYZ; APN, 1997, 1200/M-S, 878, 31, W5POH; M-BIRM, 3928, 2230/M-F, 644, 28, WA5ZWZ. New ECs: WA5DMT, Sebastian Co. K5TMM, Hot Springs Co. Welcome to new AR hams: WN5s VEA, V10, V1D, V1E, V1K, V1N, V1O, V1X, V1L, V1M, V1R, V1Z, V1X, V1P, V1Z, V1T, V1R, V1U, V1H, V1P, V1U, V1Q, V1V, V1V, V1V, V1U, V1H, WB5s V1Q, V1U, V1G, V1R, V1A, V1V, V1A, V1V, V1W, V1W, V1T, V1K, V1X, V1Z, V1W, W5HNN 103, W5UAU 29, W5NIG 28, W5POH 25, W5BED 10, K5GKN 6, W5GQH 1.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NYY. SEC: W5C1Q. RM: WA5PRI. PAM: W5KFY. VHF PAM: W5VBX. Many thanks to W5C1Q and WA5NYY, for their plans and efforts for SET 1977. Their work is appreciated. Ruston ARC new officers for 1977 are W5UXS, pres.; W5UBO, vice-pres.; W5N1K, secy.; K5LVZ, treas. Their new Novice Class which started Jan. 11 is doing very well. Instructors are W5FXF, W5UXS and W5RPN. New Extra WA4CHE/5, Shreveport. New Advance Licenses W5VEE and W5RFG, Shreveport. The Delta DX Club of N.O. had W1CW for their Dec. meeting, which was well attended. W5VRO made WAS on 75 meters, scored well in recent sweepstakes contest. W5FBS activated club station at Southeast Univ. Campus Dec. 2nd for amateur radio demonstration. New officers for 1977 for the Baton Rouge ARC are K5WMT, pres.; W5IBT, vice-pres.; W5SJK, secy.; W5ZAB, treas.; W5FBO building new twenty-two-element, 2-meter beam. W5MXE active on GRP. Lake Charles Club repeater call is WR5ALG on 13/73.

Net — Freq.	Time/Days	QNI	QTC	Manager
LSN — 3615	7 & 10 PM Dy	285	190	WA5PRI
LSN — 3910	8:15 PM Dy	249	31	W5KFY
LSN — 3703	8:30 M-F	140	33	W5B5N
LSN — 3587.5	7:00 PM Su	16	28	W5FHU

Traffic: W5GHP 425, W55PTH 257, WA51Q 208, K5TTC 178, K5TFG 86, W5M1 79, W56CQJ 74, WA5VQE 64, W55NVB 33, W5BANV 31, W55LBR 19, W55NEZ 18, W5TQA 16, W55OOM 14, W5YN 12, K5BLV 4.

MISSISSIPPI: SCM, W.L. Appleby, W5DCY — Oct. late report. W5LL reappointed Asst. SCM thru Sept. 1978. K30WN/5 ORS, W5VVDY QVS. Enjoyed FB Hamfest at Greenville. K2UGU now K2AG5. MNT cert to K30WN/5. Newcomers on MTN, W5TXA, K5RGG. W5T2M, W5QGP on 6 meters. W5BW recd msg from MS Gov. Finch regarding his 62 years on the air. W5AQ heard on 160, W5CH heard on vhf. W5EM5 now Adv., W5VDF Gen. W5TXA soon on 160. KMSBSA huge success. Welcome new MS amateurs W5s V1J, V1U, V1P, V1V, V1X, V1Z, V1O, V1W, V1W, V1C, V1V, V1J, W5s V1W, V1G, V1F, V1B, W5D, W5X, W5T, W5K, W5V, V1N, V1P, V1T, V1W, W5J, W5F, V1Z, W5K. Congrats to W5SXX, new Div. PRA. W5UCY on 2 sbs. Tombigbee Repr Assn., WR5ARA, K5EFA, pres.; WA5RRR, vice-pres.; W5BWT, secy.; W1JED visited with Kenner, ARC and Vicksburg ARC. RNS Net Mgr. reports 100 percent participation for MS in Oct. '76. DRN5 reports 93.5% in Oct. FB! W5SRU W5BW participated in Bicentennial relay with Gulf Coast 5B Net and MSBN & MTN. W5WYP active on 40 cw. MSBN Oct. QNI 1354, QTC 119; GCHN QNI 1955, QTC 65; MSLL Weather Net QNI 107, QTC 2; MTN QNI 214, QTC 95; MSN QNI 49, QTC 7. Traffic: (Oct.) W5EDT 144, K5OAF 142, W5FHA 120, W5LXX 93, K5RRG 69, W5NCB 43, WA5YZW 35, W5OKA 20, W5SXX 20, W5SQCA 19, W55SNB 18, W5RUB 13, WA5ZLX 13, W5WB 9, W55NJZ 8, W5YTN 8, K5VXV 8, W55NGF 5, W5LSG 4, W5SHAS 3, W5TXA 3, W5LL 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: W4ZML. November Nets:



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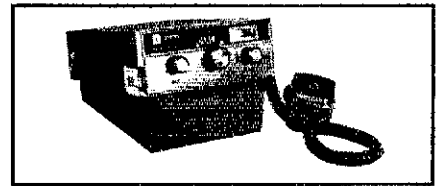
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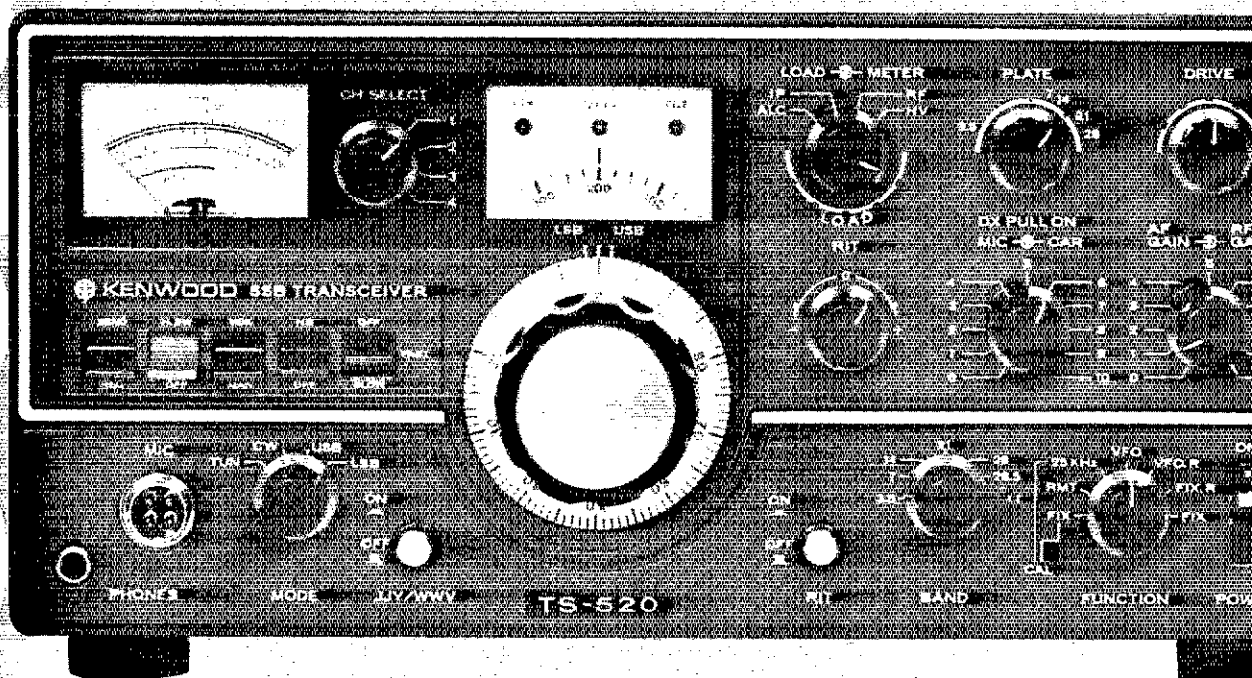
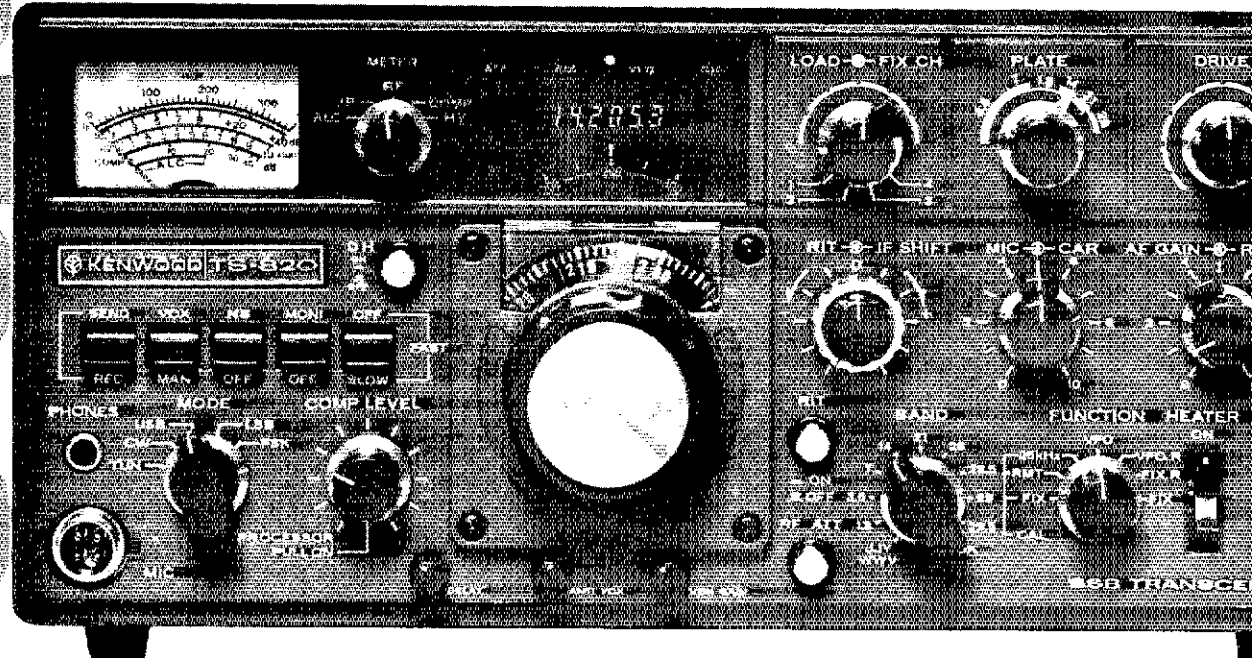
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KENWOOD... *the Pacesetter*

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The ultimate transceiver . . . Kenwood's TS-820. No matter what you own now, a move to the TS-820 is your best move. It offers a degree of quality and dependability second to none, and as the owner of this superb unit, you will have at your fingertips the combination of controls and features that, even under the toughest operating conditions, make the TS-820 the *Pacesetter* that it is.

Unprecedented demand plus the painstaking care Kenwood lavishes on each TS-820 has created a back-log of orders, but rest assured, it's well worth waiting for. Once you have operated the TS-820 you will not be satisfied with anything else.

Features

Following are a few of the TS-820's many exciting features:

SPEECH PROCESSOR • An HF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is

adjustable to the desired level by a convenient front panel control.

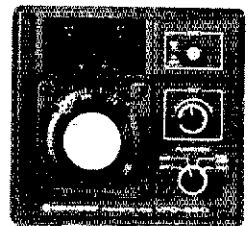
IF SHIFT • The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820 the pacesetter that it is.

PLL • The TS-820 employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

TS-820 Specifications

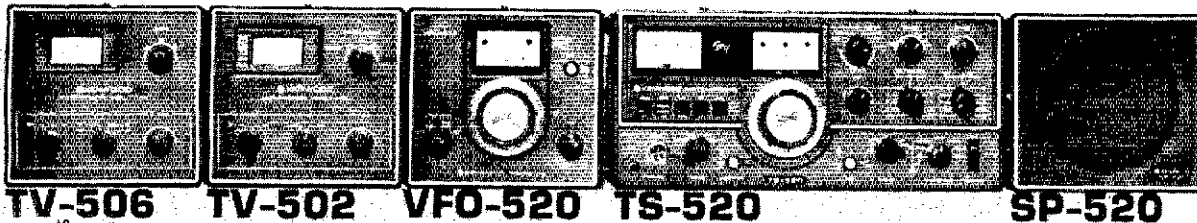
FREQUENCY RANGE: 1.8-29.7 MHz (160 - 10 meters)
 MODES: USB, LSB, CW, FSK
 INPUT POWER: 200W PEP on SSB
 160 W DC on CW
 100 W DC on FSK
 ANTENNA IMPEDANCE: 50-75 ohms, unbalanced
 CARRIER SUPPRESSION: Better than 40 dB
 SIDEBAND SUPPRESSION: Better than 50 dB
 SPURIOUS RADIATION: Greater than -60 dB (Harmonics more than -40 dB)
 RECEIVER SENSITIVITY: Better than 0.25uv

RECEIVER SELECTIVITY:
 SSB: 2.4 kHz (-6 dB)
 4.4 kHz (-60 dB)
 CW: 0.5 kHz (-6 dB)
 1.8 kHz (-60 dB)
 * (with optional CW filter installed)
 IMAGE RATIO: 160-15 meters: Better than 60 dB
 10 meters: Better than 50 dB
 IF REJECTION: Better than 80 dB
 POWER REQUIREMENTS: 120/220 VAC, 50/60 Hz, 13.8 VDC (with optional DS-1A DC-DC converter)
 POWER CONSUMPTION: Transmit: 280 Watts
 Receive: 26 Watts (heaters off)
 DIMENSIONS: 13-1/8" W x 6" H x 13-3/16" D
 WEIGHT: 35.2 lbs (16 kg)
 DG-1, digital readout optional



VFO-820

Solid state remote VFO designed exclusively for use with the TS-820 "Pacesetter". Contains its own RIT circuit and control switch . . . is fully compatible with the optional digital display in the TS-820.

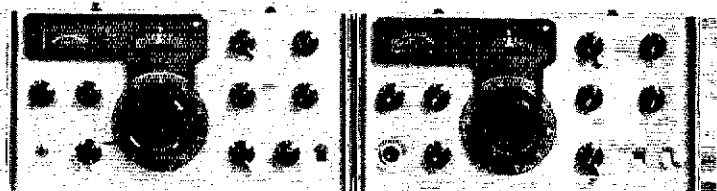


As a TS-520 owner, you go on the air with a sense of pride and confidence. Thousands of these precision-built beauties are in operation all over the world . . . in ham shacks, field day sites, in DX and contest stations and in countless mobile installations. No other rig has ever offered the performance, dependability, versatility and value that is built into every KENWOOD TS-520.

You have certainly heard the TS-520's clean signal on the air and have probably heard a lot of glowing praise by other hams. So if you don't already own a 520, maybe it's time you did.

MODES: USB, LSB, CW
 POWER: 200 watts PEP input on SSB, 160 watts CW input on CW
 ANTENNA IMPEDANCE: 50-75 ohms, unbalanced
 CARRIER SUPPRESSION: Better than -45 dB
 UNWANTED SIDEBAND SUPPRESSION: Better than -40 dB
 HARMONIC RADIATION: Better than -40 dB
 AF RESPONSE: 400 to 2600 Hz (-6 dB)
 AUDIO INPUT SENSITIVITY: 0.25uV for 10 dB S+N+N

SELECTIVITY: SSB: 2.4 kHz (-6 dB), 4.4 kHz (-60 dB); CW: 0.5 kHz (-6 dB), 1.8 kHz (-60 dB) (with accessory filter)
 FREQUENCY STABILITY: 100 Hz per 30 minutes after warmup
 IMAGE RATIO: Better than 50 dB
 IF REJECTION: Better than 50 dB
 TUBE & SEMICONDUCTOR COMPLEMENT: 3 tubes (2 x 6X4, 12BY7A), 1 IC, 18 FET, 44 transistors, 94 diodes
 DIMENSIONS: 13.1" W x 5.9" H x 13.2" D
 WEIGHT: 35.2 lbs.



R-599D T-599D

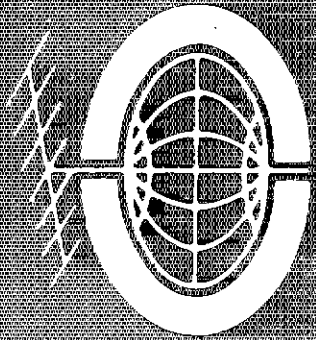
The R-599D is the most complete receiver ever offered. It is entirely solid state and covers the full amateur band, 10 thru 160 meters, CW, USB, AM and FM. The T-599D transmits CW, LSB, USB and AM, has only 3 vacuum tubes, built-in power supply and full metering.

Because of the larger number of controls and dual VFOs, the combination offers flexibility impossible to duplicate with most transceivers . . . for example, transmitting and receiving on different frequencies, no matter how far apart.

ATB-34

THE COMPLETE 3 BAND ANTENNA

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Net	QNI	QTC	NET	QNI	QTC
KRN	354	31	KYV	228	76
MKPN	154	107	KNTN	139	52
KTN	1045	112	DAREC	82	5
KPON	60	9	SEKEN	37	0

WB4ZML is our new SEC. Jerry replaces Jim, WA4GHQ who has been SEC for four years. Thanks for FB job well done Jim and good luck Jerry! WB4KTR reports a good score in phone 55. WB4ZWK reports on a new club being formed in the Hopkinton area. Plans at present include a repeater and satellite activities. Traffic: W4BAZ 83, K4HRF 74, WB4QVS 73, W4CID 45, K4UNW 40, WA4JTE 40, WA4IGS 39, WA4JQS 39, WB4EOR 34, WA4AVV 31, WA4JAV 23, WB4JMQ 20, K4FUM 18, WA4NAR 18, WB4AUN 17, W4IGZ 17, W4CDA 17, K4HOE 14, WA4FAF 7, K4AVX 6, WA4SAC 5, WB4KTR 2.

MICHIGAN: SCM, A. L. Baker, WBTZZ - SEC: W8MPD. RMs: W8JYA W8NCD. PAMs: W8JIX K8LNE. VHF PAM: W8WVV.

Net - Freq.	Time/Day	QNI	Ttc.	Sess.
MACS - 3953	1600 Dy	955	320	35
GMN - 3663	2300/0300 Dy	932	308	88
BR/MEN - 3930	2230 Dy	727	110	30
WSBN - 3935	0001 Dy	728	81	30
UPEN - 3922	2230 Dy	805	47	34
GLETN - 3932	0230 Dy	389	46	29
M16M - 50.7	0001 Dy	284	34	26
MINN - 3720	2230 Dy	83	22	21
MIAREC - 3932	2300 Su	78	18	4
VHF PAM		432	8	29

Election results: Kent County Repeater Assn. W8BESK, pres.; W8CCV, vice-pres.; W8JPN, secy. Menominee & Marquette ARC W8JUI, pres.; W8FWD, vice-pres.; W8PFB, secy-treas. S.E. Mich. ARAWB/JW, pres.; W8TJB, vice-pres.; W8BPRJ, secy. W8JY, pres.; Lawrence Institute of Technology ARC W8MBZ, pres.; W8KGI, vice-pres. Bill Olsen, treas. Tin Lizzy Repeater Net on Wed. 9:30 PM 147.63/03. WA80IE has a Triton 4. W8PFB working much DX with SB 230. K8BZL has stacked eleven-element CushCraft at 40-ft. New licenses: General, W8VFK W8YAV W8BWD: Advanced, K8GUL W8BCNQ W8BZKG W8BKW W8YDZ 71, W8YIG 69, W8GLC 53, WA8WZF 52, W8BFB 48, W8JYA 40, WA8DHB 39, W8NOH 39, W8TZZ 39, W8BHX 36, WA8TBL 36, K8JED 34, K8ZJU 34, W8BNC 33, W8IHX 31, W8UFS 26, K8AMU 21, W8BRYG 20, K8WRJ 20, K8GXV 18, W8SDB 18, W8BJS 17, K8TAK 16, W8YIZ 15, WA8FXR 14, W8CSO 13, WA8FJF 13, W8UFS 13, W8YUL 3, W8CLP 12, W8BPPY 10, W8LJU 10, W8QBE 9, W8RNQ 9, W8DC 8, K8DTG 7, W8BKB 7, W8JLD 7, W8LDS 7, WA8WV 6, W8CCU 5, W8BNO 5, W8CIP 4, W8HKL 4, WA8MDK 4, W8JAX 3, W8TB3, K8SWW 3, W8PVB 2, W8TXM 2. (Oct.) K8KMQ 256, W8BVM 5.



HEAR YE... HEAR YE
RUSH... RUSH...
SAVE! SAVE!

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THREE BIG DAYS
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SHOP THESE STAR-SPANGLED SAVINGS!

COME IN.....
 TAKE YOUR PICK OF
100
BRAND NEW
RCVRS - XMTRS
TRANSCIVERS
FANTASTIC
SAVINGS!
 Come in! You won't be disappointed!

COME IN.....
 CHOOSE FROM
101
TOP CONDITION
TRADE-INS
 In the world famous
 Harrison Trade-In Center
 All prices Chopped way
 down for this Super Sale!
YOUR TRADE-INS
WELCOMED
BRING 'EM ALONG

OHIO: SCM, Hank Greeb, W8CHT/W8AJO/W8BAJP W8ETU and W8BAKU arranged the Bicentennial Relay Message to President Elect Jimmy Carter. Net Reports (Nov.)

Net - Freq.	Time(Z)	Sess	QNI	QTC
O6MN - 50.16	0200	30	367	56
O55BN - 3.9725	1530/2100/2345	90	2431	850
ONN - 3.708	2330	21	67	36
BNR - 3.695	2300	30	116	135
BN - 3.577	2345	53	353	274
OSN - 3.577	2310	30	183	95
BN - 3.577	2345	53	353	274

K8LGA is new BRN(D) Mgr. W81SY is NOARC (Lima) Amateur of the Year. QCEN (Cincinnati) is starting Novice class. W8DAN is new Cincinnati Novice. K8CLD is homebrewing 10- and 2-meter antennae. Balbrook ARC (Kenia) is newly Affiliated Club. W8TRK is new Advanced Dayton Cincinnati QCWA officers W8TH, pres.; W8WYH, vice-pres.; W8TYL, Dayton-Cincinnati QCWA officers W8IH, pres.; W8WYH, vice-pres.; W8TYL, Vocational School. O6min certificates issued to W8AYM K5BY2/8 K8CKY W8BDHN W8DIB W8ENI W8EOK W8BWK W8JHT W8JJD W8JW W8JWS W8LTV W8LWN W8MNS W8BOK W8BOK W8BOK W8BOK W8SKP W8SSX W8STX K8TSC W8UQB W8UQB W8VWH W8BWH W8ZCV. Traffic: W8PMJ 426, W8RQQ 362, W8DIL 307, W8MCR 284, W8BKI 169, W8JGW 154, W8LTA 148, K8LGA 136, W8JPK 125, K8BYR 118, W8BOMQ 111, W8BWT 103, W8BYV 76, K8BMR 75, AD8MLG 71, A8TYE 70, W8JQ 54, W8BSS 54, W8YK 42, W8BWH 52, W8QZK 45, A8BCOA 46, W8XCM 42, W8TH 40, AC8CHT 39, W8CQU 38, W8QCE 34, W8UIN 33, W8GOE 27, W8IBX 27, A8BKK 24, W8DCK 22, K8ONA 21, W8BGG 20, W8VLR/N 19, K8NTZ 18, W8BBOV 15, W8BPI 15, W8BYV 14, W8BALS 13, K8BYR 13, W8BHL 12, W8BUL 12, W8DCT 10, K8IOW 8, W8KJA 8, W8BYP 8, W8TSX 7, W8OUU 6, W8UJM 6, W8WEG 6, K8CKY 5, W8BUNE 4.

HUDSON DIVISION
 EASTERN NEW YORK: SCM, Gary Ferdinand, W8PJJL - SEC: K2AYG, Asst. SEC: W82VUK. RMs: K2DYG W82IXW. PAMs: W82GEI W82EMU. RTN reports 25 sessions, 73 check-ins. New Novice WA2SS/N in Poughkeepsie, interested in starting a Novice net on 40 meters. W82QH received Bicentennial WAS No. 1587. W82CQ had antenna trouble over the summer, but back on now. Local club at Maple Hill High School featured in ARRL Radio Club News. Special thanks to W8LGA, who publishes a beginning amateur column in his weekly local paper. W8PAU will offer a Novice licensing course at Skidmore College. W82SZ working hard on the intruder watch. W2YJR recovering from a trip to the hospital now has 100 watts on 40, 20 and 15. W82CJY can't decide if he likes marginal winter conditions or summer QRN better. W82EKM is putting up a new delta loop on 40. SARA has awarded a certificate of commendation to W82ICP for his outstanding service to the club and the community. SARA officers: W82ILC, K2IR, W2FW, W2CPB. New two letter call sign for W2HVA is K2AV. W82CNE saving up for a new TS-820. PSHR this month to W82RUZ W82EMU WA2PJL. Don't forget the Novice Roundup. W82EMU and I enjoyed meeting so many of you at the Hudson Division Convention. Hope you had a nice holiday season. Traffic: (Nov.) W2YJR 269,

Thousands of other items specially reduced for this big, famous Harrison annual event!
 New Bargains announced every hour during all three days. (We reserve the right to limit quantities per customer.)
 PHONE ORDERS welcome during all three days, (except for used, and some limited quantity items.)

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 At light, turn right.
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Via Southern State Pkwy: Exit 32N.
 On Rte. 110, north 3 miles, At Hess Gas, turn right.

VALLEY STREAM STORE-
 Via Cross Island Pkwy: South, to Exit 33,
 Right on F. Lewis Blvd. 3/10 mile to Sunrise Hwy. Left, 2 miles east.

Via Southern State Pkwy:
 East, to Exit 23B.
 On Sunrise Hwy, East 2 1/2 miles.

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OPEN NITES TIL 9 Saturdays til 6

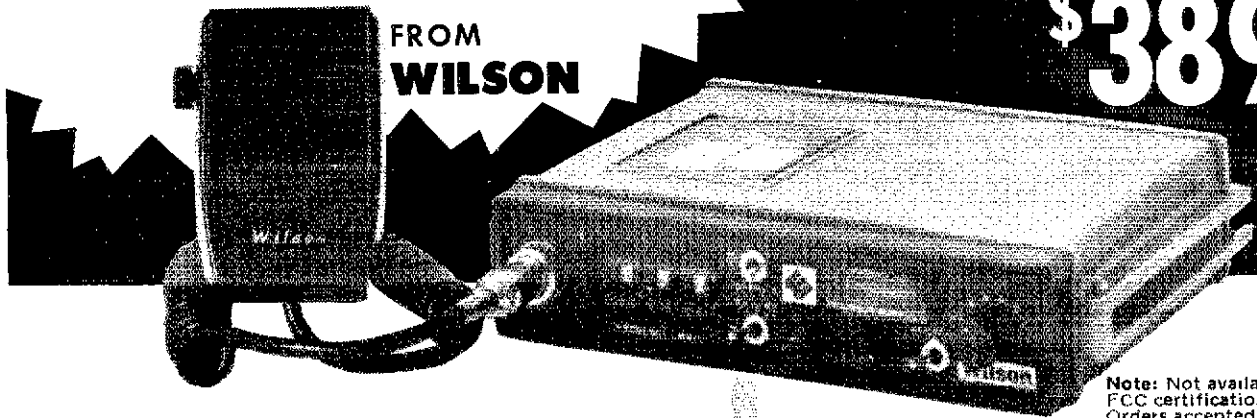
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NEW
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INTERNAL NI-CAD BATTERY OPERATED
SYNTHESIZED RADIO

FROM
WILSON

WE-800

PORTABLE

\$389⁰⁰



Note: Not available for sale.
FCC certification pending.
Orders accepted as soon as
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WILSON'S NEW WE-800 2M RADIO

Wilson's New Portable 800 Channel 2 Meter Synthesized Radio that can go anywhere with you • 12 watts output in automobile • 2 watt output with internal Ni-Cad Battery Pack (10 "AA" Ni-Cads for Portable use) • Ni-Cads charge when used in auto • CMOS low current drain synthesizer Rx 45 Milliamps, 2 watt Tx 450 Milliamps.

- Uses Wilson's standard BP-1 Battery Pack (Batteries not included) and includes mounting bracket and speaker-mic
- Covers frequency range 144-148 MHz in 5 Hz steps • 600 KHz off-set up or down • 6 Channels sub-audible tones available as option • Size 8-1/4" x 6-3/4" x 1-7/8" • weight 1 lb. 15 ounces.

450 & 220 HAND HELDS

MODEL 4502 . . . \$299.95

FREQUENCY RANGE 420 - 450 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 21.4 and 455 KHz IF
- 3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 1.8 Watts Output @ 12 VDC
- Current Drain - RX 25 MA, TX 400 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case

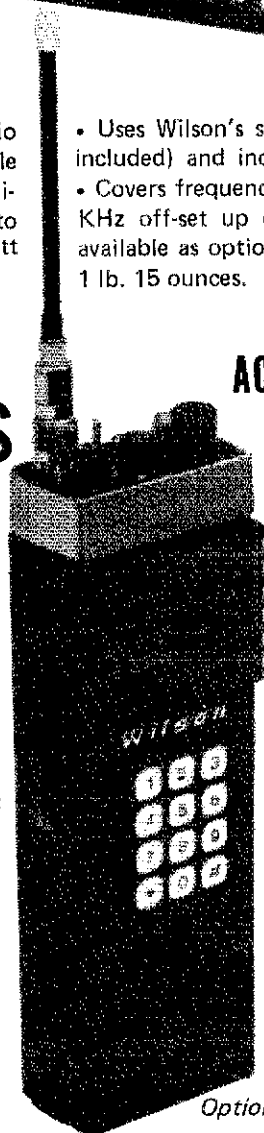
EACH UNIT INCLUDES
FLEX ANTENNA AND
SIMPLEX XTAL FREQ.
INSTALLED DURING
SPECIAL. 446.00 or
223.50 MHz.

FREQUENCY RANGE 220 - 225 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- 3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 2.5 Watts Output @ 12 VDC
- Current Drain: RX 25 MA, TX 400 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case

BOTH MODELS USE THE
SAME ACCESSORIES AS 1405.

MODEL 2202 . . . \$249.95



(Photo Shown with
Optional Touch-Tone Pad)

ACCESSORIES & OPTIONS

- ★ Battery Charger (BC2)
- ★ 10 ea. AA Ni-Cad Battery Pack (BP-1)
- ★ Extra Battery Tray (BT-1)
- ★ Leather Case for 1402 (LC-1)
- ★ Leather Case for 1405, 2202, 4502 (LC-2)
- ★ Speaker Mike (SM-2) 6 pin connector
- ★ TE-1 Sub-Audible Tone Encoder, installed
- ★ TE-2 Sub-Audible Tone Encoder/Decoder, installed
- ★ TTP - Touch-Tone Pad - installation free if ordered at time of purchase of radio
- ★ 10.7 KHz Monolithic Xtal Filter (XF-1)



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BE ON THE AIR NOW WITH A Wilson Electronics Corp.

HAND HELD

Wilson 2 meter Hand Held radios . . . The dependable ones . . . proven performance for the discriminating Ham who insists on quality and value.

1405 SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 25 MA TX 400 MA (1w) 900 MA (5W)
- Microswitch Speaker Mic
- Unbreakable Lexane Case



Shown with Optional Leather Case

\$249⁹⁵

1405SM
HAND HELD
5 WATT
TRANSCEIVER
144-148 MHz

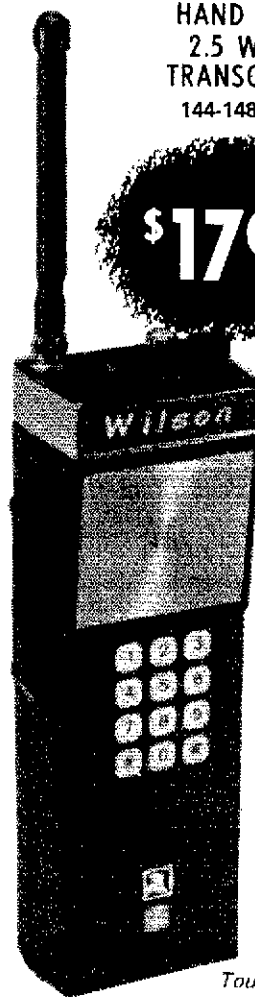
Two models are available: the 2.5 watt model 1402SM, and the switchable 1 watt or 5 watt model 1405SM . . . options include Touch-Tone Pad, Battery Charger, Battery Case, and Tone options.

Join the thousands of amateurs now using Wilson . . . the radio that goes where you do.

FAST DELIVERY!!

1402SM
HAND HELD
2.5 WATT
TRANSCEIVER
144-148 MHz

\$179⁹⁵



Shown With Optional Touch-Tone Pad

SPECIAL ON EACH RADIO INCLUDES:

- Flex Antenna
- 52/52 Xtal

1402 SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- 5-Meter/Battery Indicator
- Size: 8 7/8 x 1 7/8 x 2 7/8
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain RX 25 MA TX 500 MA
- Microswitch Speaker Mic
- High Impact Plastic Case

Can be Modified for MARS or CAP

90 Day Warranty

10 Day Money Back Guarantee

OVER 35,000 XTALS IN STOCK

BC-2 NI-CAD BATTERY CHARGER WITH REGULAR AND TRICKLE CHARGE FEATURE

***** USE THIS HANDY CLIP-AND-MAIL ORDER FORM FOR FEBRUARY SPECIAL SALE *****

- * ___1402 SM @ \$179.95
- * ___1405 SM @ 249.95
- * ___2202 SM @ 249.95
- * ___4502 SM @ 299.95
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- * ___LC-2 @ 14.95
- * ___SM-2 @ 26.95
- * ___TE-1* @ 59.95
- * ___TE-2* @ 100.00
- * ___TT-P @ 59.95
- * ___XF-1 @ 12.95
- * ___ Factory XTAL
- * ___ Installation Netting @ \$7.50/Radio
- * ___ Specify Frequency

TX or RX XTALS, All Common Repeater Freq. 146-148 at \$4.25 ea. All other 2M, 220, 450, MARS or CAP XTALS at \$10.00 ea.

Shipping and Handling Prepaid for February Sale Nevada Residents add Sales Tax

Please Equip Transceivers as As Follows

	XTALS RX	XTALS RX
A		
B		
C		
D		
E		
F		

* Amount Enclosed \$ _____ Check Money Order *

* BAC Master Charge *

* Card # _____ Exp. Date: _____ *

* Name _____ *

* Address _____ *

* City _____ *

* State _____ Zip _____ *

* Phone AC _____ *

* Signature _____ *

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Valid February 1-28 only

TEN-TEC ULTRAMATIC KEYSER

MODEL KR50

- SUPERLATIVE "FEEL"
- 5-50 GRMS PADDLE FORCE
- AUTOMATIC OR MANUAL WEIGHTING
- DIT AND DAH MEMORIES WITH SEPARATE DEFEATS
- "STRAIGHT KEY" OVERRIDE FOR QRS OR TUNE-UP
- GUARANTEED FOR LIFE BEARING PIVOTS

A sparkling new keyer with a host of exciting features. A powerful aid to cleaner, more articulate CW that is relaxing to use and a joy to copy.

The paddle assembly will delight the CW purist as well as the recent graduate from a bug or hand key. The superlative "feel" is attained by a magnetic return force, instantly adjustable to exactly the right touch for you.

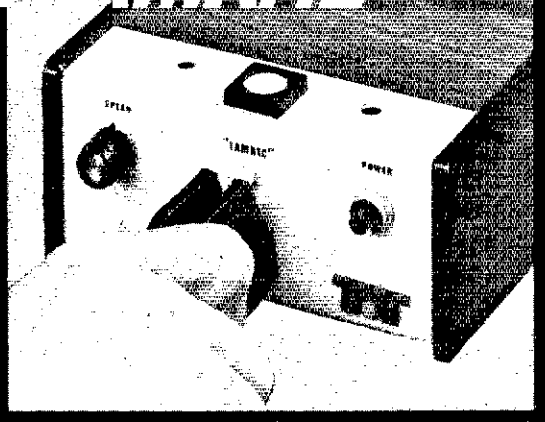
Weighting, the ratio of dit and dah (bits) lengths to the spacing between them, is either automatically or manually varied. In the automatic position, it is programmed to lengthen the bits at slow speed for enhanced smoothness and decrease them as you advance the speed, for highest articulation. Or, it can be adjusted to a constant value.

The KR50 is versatile. Dit and dah memories are provided for full iambic (squeeze) keying. Either dit or dah, or both, may be turned off for operation as a conventional type keyer. Self-completing characters at all times.

A convenient "Straight key" is built-in for QRS sending or tune-up. Also an internal side-tone and 115VAC/12VDC operation is provided.

The KR50 is designed to have a permanent place in your shack for the years, perhaps decades, ahead. An investment in the enjoyment of CW.

PRICE \$110.00



KR20-A

Paddle has unique principle with excellent feel for rhythmic CW. Characters are self-completing. Bit weighting is optimized for normal speeds. Manual key button conveniently located for hand sending. Slide tone signal, Reed relay PLUG-in circuit boards, 115VAC or 6 to 14 VDC. HWD 2 1/2" X 4 1/2" X 8 1/4", Wt. 2 1/2 lbs.

PRICE \$67.50

KR1-A

This is the paddle mechanism used in the KR50. Requires 6-14 VDC for adjustable electro-magnetic paddle return force. Adjustable contact spacing. For iambic or conventional keyers. "Straight key" button. Housed in an attractive metal case with cream front panel, walnut vinyl top. Size: 2" X 4" X 8", Wt. 1 1/2 lbs.

PRICE \$25.00

KR5-A

Similar to the KR20A but without monitor signal and AC power supply. A great value. For 6-14 VDC operation. Size HWD 2" X 4" X 6". Weight: 1 1/2 lbs.

PRICE \$38.50

KR2-A

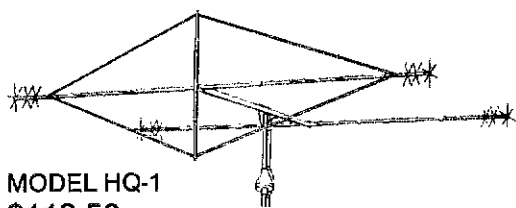
The paddle used in the KR20A. Single paddle for non-iambic keyers. "Straight key" button conveniently located, cream aluminum case with walnut vinyl top. Size: 2" X 4" X 6", Weight: 1 1/2 lb.

PRICE \$15.00

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WA2PJL 121, WB2EMU 102, WB2TGI 109, WB2RUZ 68, AA2YVM 63, WB2EKM 47, WA2UYL 43, AB2QQH 36, WA2CNE 35, WA2CNE 31, K2FOY 28, WA2CJY 18, WB2VVS 14, K2HNW 9, WB2ZCM 8, WB2ELA 6, AA2YXY 5, WA2HGB 2, (Oct.) WA2UYL 27. (Aug.) WB2ZCM 6.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM; Art Malatzky, WB2WEJ. SEC: K2HTX. RM: WB2LZN. PAM: WA2ECO. The following are traffic nets in and around the section:

Net	kHz	Time/Day	Manager
NLI*	3630	1900/2200 Dy	WB2LZN
NLI Phone*	3928	1730 Dy	WA2ECO
NLS*	3730	1800 Dy	WB2YKG
Clear House	3925	1100 Dy	W11JK
Mic Farad	3300	1300 MTWThFS	W1DJT
ESS	3890	1800 Dy	K2UJR
NYSTPEN	3925	1800 Dy	WA2RSP

*Denotes Section Net, all times are local. WB2EMU has designated WA2WKH an Asst. D2RN mgr. Both of the Section cw nets are looking for more people to check in, why not try it at least once a week. WA2HY5, WA2DHF, and WB2RF are the people responsible for the FB 11MARC ham radio show heard every Fri. night on WBAU-FM 90.3 MHz, at 7:45 PM. The Coney Island ARC is looking for anyone interested in establishing a 220 MHz rpt in the NYC area, autopatch is anticipated, for further info write: WA2BSR, Coney Is. ARC, 2790 W. 5 St., Brooklyn, NY 11224. WB2YK is the mgr. of the NLS Net, he also does a really good job on the NLS bulletin, lots of helpful little tips on nets and traffic; contact him on NLS for further details on getting your copy. WA2YEI has put in his application for Life Membership. New officers for Grumman ARC are: K2JAT, pres.; WA2BD, vice-pres.; WA2HSQ, secy.; WA2FW, treas.; W2ZUN, WB2EJU, WA2JKT, WB2PUE board. Also from Grumman ARC is a very nice picture of WA2HSQ with two of the bunnies at the HARC Convention. Congratulations to new QRS/OPS WA2ECO. WA2KKJ is the new EC for the town of Brookhaven. We are still looking for an EC in Inis and a few other towns, for further info contact K2HTX. I hope everybody participated in the SET. Now is the time to write down those ideas and perhaps use them in the upcoming Field Day. W2PF's new QTH is: Harbour House No. 1533-S, 10275 Collins Ave, Bal Harbour, FL 33154. Dave will be missed by all up here in the cold north, but we all wish him all the best in his retirement. I think WB2FM should get some kind of award, after suffering a heart attack which forced his retirement from the Hall of Science, he has gotten a Radio Club and Novice Classes going out in Shelter Island and the North Fork. For those living out east and want further info, join them on 3960 kHz from 10 to 10:45 AM on Sun. Suffolk County ARC also had 50 students at their 9th and 10th sections. W2ZAI is the new EC for Nassau County. Traffic: WA2WKH 272, W2EC 269, WB2LZN 178, WB2YKG 148, WA2BHI 84, W2HXT 67, K2GCE 32, W2MLC 22, K2JFE 8, WA2YEI 4, WA2HSQ 3, W2PF 2.

NORTHERN NEW JERSEY: SCM, Louis J. Amoroso, W2LZ

Net — Freq.	Time(PM)/Days	Sess.	QNI	QSP
Manager				
NJN — 3695	7:00 Dy	30	294	117
WB2CST				
NJN — 3695	10:00 Dy	30	151	74
WB2CST				
NJSN — 3730	8:15 Dy	30	152	56
WA2WIW				
NJPN — 3950	6:00 Dy	34	560	260
WA2SLF				
NJPN — 3950	9:00 A Su	4		
WA2SLF				
NJPN — 145.7	8:00 Dy			

SEC: WB2PBO. PAMS: WA2OPY, WA2SLF and WB2VTT. RMS: WA2WIW and WB2CST. OO reports from K2JFJ, W2NR, W2TPJ and WB2TC. WB2ELT is a new ham in Dumont, welcome to ham radio. K2BHL and WA2FZJ passed the Advanced. WA2ALU and WB2CCJ passed the General. W2NHV passed the Extra. WB2XS passed Tech. Congrats to all. K2ZEK is now K4KO. W2HZY now W2GW. WB2UKP now K2CM. W2BVE now W2JC and WA2CCF now W2CC. Good luck to all with the new signs. AB2VTT added the Accu Keyer to his shack. WA2DIW will again teach a Novice class at the Wayne Adult School this spring. W2CWF moved back to 47. WB2WV moved to 43. W2JFJ rec'd the QST Cover Plaque Award at the recent ARRL Division Convention. WB2IWH visited W0TIV and rec'd the royal treatment from the MN gang. Here are some new club officers for 1977. For the Tri-County ARA, WA2WDJ, pres.; WA2RMZ, vice-pres.; WB2GFC, treas.; WA2CKK, secy. For the Kearny ARC, W2JXX, pres. K2YFF, vice-pres. W2SWE, treas.; WB2TRS, secy. For the Old Barney ARC, WA2PCF, pres.; WA2BTO, vice-pres.; K2IGH, treas.; K2IKX, secy.; W2FWY, act. mgr. Morris Radio Club, WA2OFT, pres.; WB2YJQ, vice-pres.; W2CZE, treas.; WA2QCE, secy. WB2YJQ rec'd his WAC, WAS and Bi-Cen WAS. would like to remind you all that I took this job only temporarily waiting for someone to step forward and take it permanently. We are QRL at the salt mine and would like to see some new blood in this spot. We would be glad to train someone who is interested. Traffic: (Nov.) AB2ASD 328, AB2CST 238, K2BHL 162, AB2VTT 149, WA2RMZ 95, WA2WP 73, W2CJ 60, WA2QW 54, W2SWF 50, WB2RMK 44, WB2BLM 47, AA2ZEP 40, WA2SLF 39, WA2PCF 34, AA2KFE 31, WA2CAK 29, WA2BAW 27, WA2DSA 27, K2ZFI 21, W2ZZ 19, WB2RKK 12, WA2WXM 10, WA2FZJ 9, WA2DLZ 9, AA2CCF 9, WA2YWK 8, WA2UOJ 7, WB2DFO 6, WA2FUI 5, WA2QJU 5, W2CC 4, W2CVW 4, W2ODV 2, WB2VFT 2. (Oct.) W2WHB 30, WA2BAW 26.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — Inva lost one of its great traffic handlers when W0LFX became a Silent Key. WB0ACU at Iowa City is changing to 65/83. The Cedar Valley ARC had a successful "Witch-Watch" thanks to W0AID on 40/00. The watchers drove 2080 miles and used 164 gallons of gas. W0IKT is new OBS and WB0SEL a new OPS. W0EIT is again back on VHF. WB0FHH chasing Oscar. W0PFR has a new Drake C-Line and K0DBW a new S-8. WA0XZ has a kW on 2. WB0SSV made WAS on 40 as a Novice. W0NGS now W0EZ. Yours truly introduced ham radio to the Mid Prairie High School Science Club. An SSB contact with 3 states opened their eyes. WA0MIT, W0OM, K0OOD and WB0DBG eyeballed at a Red Cross meeting in Des Moines. W0OWG has twelve

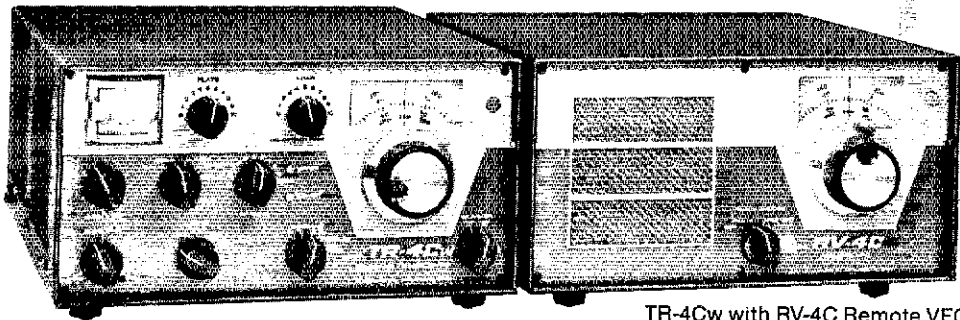
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**the TR-4Cw
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- Drake RV-4C, Remote VFO 120.00
- Drake 34PNB, Noise Blanker 100.00



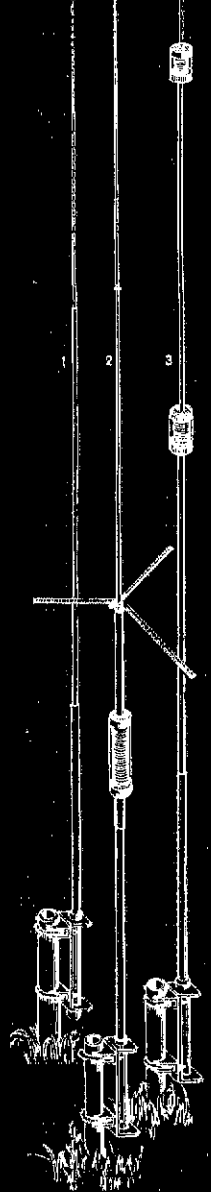
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1 The Denfron EX-1 is the antenna experimenter's delight. The EX-1 is a full 40 meter 1/4 wave, 33' self-supporting vertical. The EX-1 has a heavy duty base, mounting brackets, stainless steel clamps and the highest quality seamless antenna aluminum. The ideal vertical for any band you choose. The EX-1 is great for phasing! **\$59.50**

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elements horizontal up 40-ft tied to a T5-700A. Our SEC W01YW would be surprised if he received a report from all ECs. Let's surprise him. The 3900 Club now accepting Associate and Novice members, W0BVO moved his station to Iowa City. Happy Ground Hog Day to all.

Net - Freq.	Time/Days	Sess.	QNI	QTC
IA, 7.5M - 3970	1830 M-S	26	1612	84
WA9VZH				
IA, 7.5M - 3970	2330 M-S	26	1239	96
WA9ACX	0030 Dy	60		
Tall Corn - 3560	0400 Dy	26	343	110

K9EVH
Traffic: WA9AUX 517, W0YLS 155, K0EVH 142, W9SS 106, W0LIW 24, W0AVW 23, W0LFF 11, W0PPYD 10, K0KAQ 8, W0BW 2.

KANSAS: SCM, Robert M. Summers, K0BKF - SEC: W0KL, RM: K0MRL, PAMS: WA9SEV, W0B0CL, VHF PAM: WA9EDA. Hawatha ARC elected W0DSY as pres.; W0LPE, secy.; W0B0NEV, vice-pres.; W0WXY, treas.; Bob O'Conner, 1977 Hamfest Chmn. W0OYH is one card away from the big WAS certificate. Nov. reports are: KWN QNI 184, MMM QNI 50, serving 5 mobiles and QTC 8. K5BN QNI 326, QTC 90 and KRN QNI 24, QTC 22. QKS QNI 476, QTC 164. QKS-SS QNI 45, QTC 17. This net will change time by the time you read this. Meeting at 6:30 PM Local time on or near 3735 kHz with W0RFF acting as net mgr. If you know of a new Novice invite her or she to join the KS Slow Speed net. If you need to brush up on your code or want to learn more on handling message traffic 3735 kHz, Central states Traffic net QNI 928, QTC 80. WA9SWC now at McPherson Radio Station, graduated from KSU and should be more active in the nets again. DTRN still trying to keep its head above water. Needing more KS representation - if interested in liaison spot contact WA9SEV for particulars. Its not very often a town boasts about doubling the number of Hams in the town, but Norton, KS did just that when WA7YXX and WA7QXX moved into NW KS. Traffic: W0FIR 206, WA0MLE 136, W0AM 133, W0CHJ 115, WA2VEN 115, W0B0HM 84, K0JDD 76, K0NRI 69, WA9LBB 61, K0LBN 61, W0LUN 45, WA9SEV 43, W0LLI 41, W0B0QX 41, K0GBX 40, W0H 40, WA9OWH 32, W0OYH 32, WA9VCE 24, W0BKE 23, WA9SG 16, W0KL 14, W0PB 14, WA9SRQ 14, W0RBO 13, W0KL 11, W0ERQ 8, WA9KVP 7, WA4HRG 4, WA9OWH 4, W0TRO 4, W0BCUY 3, WA9WJX 2.

MISSOURI: SCM, L. G. Wilson, K0RWL - Asst. SCM: Joe Flowers, W0TF. SEC: W0BDBW. Congratulations to Novices, W0BTPK through W0BTPQ, W0BUEJ, W0BUEG and W0BUXR (10) through the Mid-Mo ARC or Jefferson City; W0YBA through W0YCI (35) through the PHD ARC of Liberty. The PHD ARC pilot class graduated 35 out of the 40 that finished the class. Also understand W0PLY graduated about 6 from classes at Fulton. Very fine work ladies and gents. Congratulations to WA9TAY who retired from the Kansas City Fire Dept. with the rank of Captain and W0HSK who retired from IPI.

Net	QNI	QTC	Net	QNI	QTC
MON 167	113	MOSSBN	266	152	
MON 2	120	57	MSN	241	87
PHD	57	11	HMBTCHN	250	92

Condolences to the family of W0RNJ who recently passed to the ranks of the Silent Keys. W0GLTD and W0LTF are holding a meeting at 7:00A and twenty-two-element beam. New pres. of the Neosho ARC is W0VXS, XYL of WA9DKG. WA9DKG presently has 15 in Novice class at Neosho. Pres. of the Lungview Community College ARC is W0YBU and the college is offering a one-hour credit course in amateur radio. Officers for the Heart of America ARC for the coming year are WA9WRC, pres.; W0BLYF, vlc-pres.; W0B0WZ, secy.; WA9KUH, treas. Traffic: K0CNK 628, W0HH 464, W0B0NX 163, W0NUB 121, K0AEM 108, W0TF 105, W0BV 101, W0BLY 93, WA9OCU 68, W0UD 65, A09FKD 59, W0MEO 53, W0B0ND 52, WA9KH 52, W0EE 49, K0SL 38, W0VY 25, W0EP 25, W0B0FK 24, W0GD 18, W0LW 17, W0NPC 16, W0MOP 14, K0AHL 6, W0BDBW 6, W0RLO 6, W0VHN 5.

NEBRASKA: SCM, Dick Dyas, W0JCP - Asst. SCMs: W0GWR & WA9GHZ. SEC: WA9ASM. The Crete ARC held their annual fall steak fry with an enjoyable evening, had by all. New two letter call sign W0US and W0LS both in Fairbury and only 2 couple of blocks apart. The Holdrege ARC had large turnout for annual pancake feed, everyone enjoyed the micro processor demonstration. Net reports: QCWA, QNI 57; Sandhills Wx net, QNI 227, QTC 6; Eastern Neb. 2-meter net, QNI 463, QTC 20; Afternoon net, QNI 206, QTC 20; AREC net, QNI 160, QTC 2; 160 Wx net, QNI 278, QTC 15; Western Neb. Wx net, QNI 493, QTC 3; Nebr. Morn. Phone net, QNI 1340, QTC 51; Cornhusker Net, QNI 1529, QTC 80; Neb. Storm net, QNI 1069, QTC 44. Traffic: W0VEA 101, WA9CBJ 60, W0SGA 32, W0HOP 30, WA9PCC 28, W0B0EDS 23, W0GKK 20, WA9CSA 16, W0B0UH 14, W0DGV 10, W0B0V 10, W0JCP 7, W0B0JK 10, W0YFR 10, WA9QEX 7, K0SFA 7, WA9GHZ 6, K0NNI 6, W0B0JW 6, W0M 6, W0GEQ 4, W0NIK 3, WA9EE 2, W0B0JM 2, W0VYX 2, WA9BSX 1, WA9LOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNasser, W1GVY - SEC: W1DGL, RM: K1EIR, PAM: K1EIC. VHF PAM: WA1ELA.
Net - Freq. Time/Days Sess. QNI QTC
CN - 3648 1900/2200 Dy 60 37 278
CPN - 3968 800 M-S 30 757 193
1000 Su
VHF-2 - 28/88 2130 Dy 29 316 239
High QNI: CN W1CTI and W1KW. High QTC VHF-2 - WA1ALZ. SEC W1DGL has appointed WA1SJV new EC for Wallingford and W1E2S new EC for Greater New Haven area. Dir, W1BGR and Dir, W1DGL will serve in either two year term as New England Division Directors - our congratulations and full support to both! Again this year Candlewood ARA, Danbury, will sponsor the Conn. QSO Party on Apr. 30 to May 2. Your assistance will be appreciated. Check Q5T for details. send logs to W1VH. Shoreline ARC provided eleven new amateurs from their last Novice class. Hamden ARC furnished EC for Columbus Day Parade in New Haven. Stamford ARA "Squelchburst" notes Norwalk ARC Halloween Patrol very successful. Southington ARA enjoyed a most interesting speaker at a recent meeting - WA8IDN from ARA - explaining the importance of the preparation now in progress for the coming WARC Conference. Tri-City ARA Christmas Party was held at



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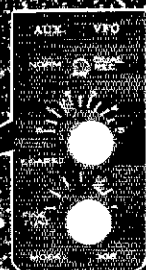
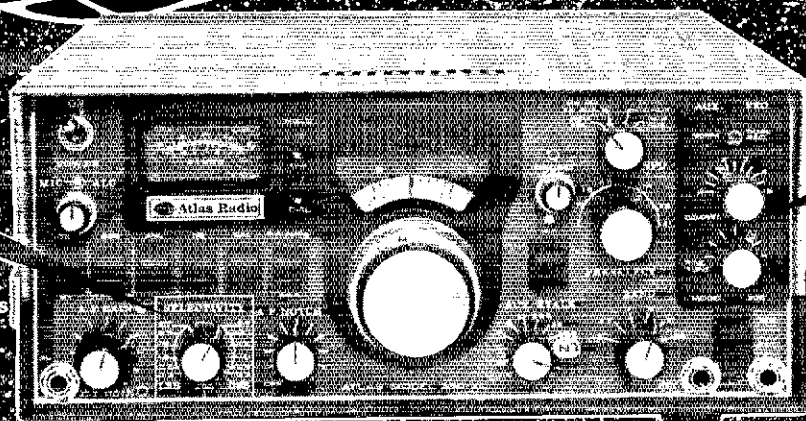
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AMECO		
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PV-144 2m preamp	19	15
CSB Conv selector box	9	5
ATLAS	reg. NOW	
DD-6 Digital readout	\$199	99
DD-6B Digital readout	229	179
BRIMSTONE	reg. NOW	
144 2m FM Xcvr NEW	\$650	479
CDE	reg. NOW	
Big Talk Moderate duty rotor	\$ 99	69
CD-44 Medium duty rotor	129	99
HAM II Heavy duty rotor	159	129
CLEGG	reg. NOW	
FM-21 220 MHz FM Xcvr	\$319	119
FM-27B 2m FM Xcvr	479	349
22'er FM ser 25 2m Xcvr	384	234
031 8A 12v supply, spkr	89	69
COMCRAFT	reg. NOW	
CST-50 2m/220 FM Xcvr	\$869	669
CTR-144 2m FM/AM Xcvr	489	289
DRAKE	reg. NOW	
L-4B 80-10m linear	\$895	749
TR-22C 2m FM Xcvr DEMO	229	179
SCC-1 VHF calibrator	26	19
BBLT-144D 2m tnk mt ant	27	14
SSR-1 Shortwave Rcvr	350	299
ETO	reg. NOW	
274 80-10m linear	\$995	699
77D 160-10m linear	2995	2395
EICO	reg. NOW	
752W DC supply wired	\$109	49
752K DC supply kit	79	29
GALAXY	reg. NOW	
GT-550A 80-10m Xcvr	\$595	395
G-1000 DC supply	129	99
RV-550A Remote VFO	95	89
XO-550 Xtal oscillator	49	39
F-3 CW filter	37	29
R-1530 General cov Rcvr	1550	1295
FL-5305 500 Hz filter	70	60
FL-53015 1.5 KHz filter	70	60
FL-5306 6 KHz filter	80	70
RPA-1530 Rack adaptor	170	99
HALLICRAFTERS	reg. NOW	
MR-400A Mobile mt - SR-400	\$ 89	29
HENRY	reg. NOW	
2K Ultra 2kw PEP linear	\$895	795
HI-PAR	reg. NOW	
6MHT 3 el 6m beam	\$ 21	15
S-2 Saturn 6 ant only	15	10
MT-1 Matching transformer	6	4
S-6 2-piece 5' mast	2	1
6R 6m Ring	14	10
ICOM	reg. NOW	
IC-230 Synthesized 2m FM	\$489	379
IC-22A 2m FM Xcvr	249	199
KLM	reg. NOW	
Multi-2000A 2m FM/SSB Xcvr	\$679	499
KENWOOD	reg. NOW	
R-599A 80-10m Rcvr	\$459	379
TS-700A 2m SSB/FM Xcvr	599	539

	reg.	NOW
MOSLEY		
A56S 5 el 6m Scotchmaster	\$ 35	29
A76S 7 el 6m Scotchmaster	43	39
A92S 9 el 2m Scotchmaster	20	15
A310C 3 el 10m beam	53	39
A315C 3 el 15m beam	66	49
CL-10-15 2 el 10/15m beam	107	99
CL-20 5 el 20m beam	306	299
MB-10 3 el 10m mini-beam	42	35
RV-3C Jr 20-10m vert, 300w	23	22
TA-31 Jr 20-10m 300w dipole	23	29
TA-36/CL-36 Conversion kit	38	35
X-15 Novice 15m beam kit	32	25
NYE	reg. NOW	
250-23-4 275w matchbox	\$202	139
REGENCY	reg. NOW	
HR-212 2m FM Xcvr	\$259	199
HR-2S 2m FM ac xcvr/scan	349	239
ACT-W-10 Whamo scanner	329	199
Also works on 2m FM		
DFS-5K Dig freq selector	199	149
SBE	reg. NOW	
SB-450 450 MHz FM Xcvr	\$399	199
SB-1CTV SSTV camera only	469	249
STANDARD	reg. NOW	
146A 2w 2m FM HT	\$298	229
Horizon 2 2m FM Xcvr	298	179
826M 2m FM Xcvr	359	179
Horizon 29 CB Xcvr	229	129
SWAN	reg. NOW	
300B 80-10m Xcvr w/ps	\$569	449
300B/SS16 16-pole filter	639	499
508 Remote VFO	269	169
1200X 1200w PEP linear	349	299
160X 160m Xcvr	469	349
117XC AC supply/spkr	159	129
117X Basic AC supply	114	89
SS-100 80-10m Xcvr	699	439
PS-10 AC supply	99	79
SS-200 As above, 200w PEP	779	499
SS-208 Remote VFO	269	169
MB-80 80m Xcvr	299	219
P-1215A AC supply	75	69
600R Custom Rcvr	599	449
600R Custom USED*	599	399
600R Custom/SS16 USED*	659	449
600T 80-10m Xmtr	649	429
600T USED*	649	379
FM-1210A 2m FM Xcvr, ps	319	199
1040V 40-10m vert ant	111	79
*Factory reconditioned - with new warranty.		
OLIVER SWAN	reg. NOW	
9 element 2m ant	\$24	19
14 element 2m ant	39	29
8 element 6m ant	44	34
TEMPO	reg. NOW	
FMP 2m FM Xcvr DEMO	\$225	149
FMA 25w 2m FM Xcvr	349	175
ACA AC supply	49	29
TEN-TEC	reg. NOW	
315 80-10m Rcvr	\$249	179
Triton I 80-10m Xcvr	579	439
Triton II 80-10m Xcvr	669	529

Holiday Inn in Groton. Congratulations to: W1VS for Extra Class; and to the many Clubs who sponsor Novice Classes! Several clubs operate a "Buddy" system to benefit Novice class graduates; this provides an experienced amateur to assist the new amateur operator. It can be a big help, please try it. Happy Valentines Day to All! Traffic: W1EWF 342, A1V1P 20, W1G1T 221, W1A1E 155, W1A1J 100, W1A1W 11, W1C1F 64, W1A1U1F 32, W1G1T 41, W1A1U1B 39, K1S1R 36, W1B1D 32, W1A1K 32, W1A1U1H 23, W1K1V 16, W1K1M 15, W1B1I 14, A1A1R 6, W1C1U 5.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP - New appointments: K1TK1 EC Foxboro; W1ARVZ ORS/OPS; W1A1WGM ORS. Endorsements: W1G1T QVS; W1A1P2 OPS/ORS. Silent Keys: W1A1W1G, K1A1A ex-W1A1G, ex-W1A1CQ. New calls: W1U1U was W1B1P; W1N1N W1M1A; W1G1G W1O1G; W1O1T W1V1H; W1B1J K1A1P; W1S1B, W1A1N1V, ex-K1F1H1N now in Ga. W1W1N1K retired, moved to ME. K1K1Y1B in Halifax, W1G1G new house in E. Bridgewater, W1H1Y back in Wareham. W1A1U1G Asst. Mgr. to W1A1M1S1K for EM1R. W1K1B 175-8200, ex-W1A1CQ, new house on Thur. on 3963 S. 230 PM. W1B1A1O ex-W1A1M1R in Brewster, wife of W1H1W. K1U1W W1U1E on 1750 meters. W1U1E has new HW-16. W1M1P1T talked at South Shore ARC on "Basic Logic". T9 Club had Ladies Night. W1A1W1G's rig blew up. W1A1M1U1G RC for Action and Assn. to E. Boston. W1A1M1R assisted Walkathon HTM had 157 QNT. Q1C. W1A1W1G Net Mgr. W1A1Z1Z going for General. W1A1U1Y has RTTY. W1A1T1K has General. W1A1J1Y has PSHR of 43 in Oct. W1A1D1B in Thula, Greenland will be on ssb on 14230 and cw 14040. K1H1Z1N appointed PRA by Dir. Sully. Ashland Middle School ARC had thatday Night on APR at 7:30. W1A1H1W had nice write up in the Sun. Post. Malden CD Net Monday at 7:30 PM on W1A1A1A on 31-91 with W1T1Y1M W1B1A1B W1A1R1T1R W1A1O1G W1A1Q1V W1B1H1D K1N1F1W checking in. W1G1U1U has General. W1J1A1A spoke at Chelmsford ARA on SWR. K1D1P, ex-W1A1G1N back on visit. W1A1K1J has tower. W1A1E1A says the GRN has Ringo ant. W1A1K1W1A reports that the Amateur Comm. Experimenters will have W1R1A1T in Somerville on 22.58 in 224.18 out, all breakers are welcome, he and W1E1P1G on 223.5 direct. W1E1F1R new pres. of Whitman ARC. W1A1F1S1D Dir. Mr. Devlin of Hewlett Packard talked about Spectrum Analyzer Basics at Guannapowit, MA. W1A1Y1A says the GRN has Net on 180 kHz on Sat. night. W1A1W1V1K from ARRL spoke on the Oscar program at the Massachusetts ARA. W1A1W1Q1C & K1E1J1X have Yaesu 101Es. W1A1M1R1J W1A1V1F1J W1A1P1E1V members of a Tribunal. K1V1V1C secy.; W1A1R1F1Q, treas. will lead the Framingham RC this year. Capeway RC met at W1Y1T1B Q1H. W1K1D1Q in So. Mass. on 2. W1A1S1K1R on 450 & 296, at Ft. Devens. K1F1V1V on RTTY on 2 & 6; wrkd K5W1V1X in OK. 6 ssb. has Advanced. N1E1P1N had 69 QNT. 16 QTC. N1E1N1N had 52 QNT. 41 QTC. reports K1P1N1B a new OBS. SEC W1A1O1G received reports from: W1S1B B1H D1C P1E1X E1Q1H; W1A1S1 R1T1J; K1S1 P1B B1W1V. EM2MC had 63 QNT. 40 QTC. EM1R1P1A had 63 QNT. 24 QTC. W1J1J1I new Club Dir. W1B1C1H1O presented ARRL Charter to the Lexington ARC, now affiliated. W1P1D1A a Silent Key. EM1H1I had 441 QNT. 355 QTC. Traffic: (Nov.) W1A1V1E1 427, W1A1M1S1K 280, K1P1A1D 192, W1A1G1M1Z 147, W1A1U1G 133, W1A1Z1A 133, W1H1L 127, W1A1T1Y 116, W1A1E1Y1 102, W1A1R1V2 99, W1A1O1W 92, W1A1V1M1G 89, W1E1J1 85, W1E1M1G 79, W1A1O1M1S 66, K1P1N1B 42, W1E1Q1H 28, W1A1P1G 26, W1N1F 24, W1D1M1H 20, W1A1F1N 14, W1A1O1G 13, W1A1I1E 9, K1L1C1Q 7, W1A1L 2, W1A1T 2, W1E1P 2. (Oct.) W1A1J1Y 40, W1A1V1Z 3.

MAINE: SCM, Ed Bristow, W1M1U1X - SEC W1A1T1Z reports new calls: W1H1D1C W1K1Y1Q & K1G1D1. Nets: Barnyard QNT 891, QTC 37, (Oct. QNT 912, QTC 32); MSSN QNT 49, QTC 9; P1N1 QNT 210, QTC 197. PSHR: W1R1W1G W1A1F1C1M W1A1M1U1X. BPL: W1A1F1C1M. SET plans under way says W1A1Y1U1Z. New in ME: W1A1S 20X 20Z 2VZ 2VZ 2VZ (PT) 2VZP 2YB(N) 2YCN) 2YX (T) 2ZHN) 2ZR(N) 2ZS(N) Y1A1C1C applied for and invited for next year's Friendship Sloop activities. Bath Jr. HS ARC granted League charter. W8SWN/1 faculty advisor for WMPG fm (10 watts). W1A1Z1B (UMPG ARC) has HW202 nearly ready to go. Aroostock ARA has RF-144D rcvr for its repeater under construction. W1A1V1F1 received General ticket & on the air. FB Traffic: (Nov.) W1A1F1C1M 534, W1A1E1W 100, W1G1P 92, W1R1W1G 92, W1A1H1T 70, K1P1Q1S 67, W1A1M1U1X 39, W1O1T1G 22, W1S1O 21, W1C1E1V 15, K1T1Z 10, K1G1D1 8, W1G1U 8, K1N1A 4, W1A1J1C1N 2, W1A1E1R1 2. (Oct.) W1A1H1J 5, W1A1J1C1N 4.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX - SEC: K1R1C1S. RM: W1A1G1C1E. Welcome to new hams W1A1S 2RE ZRP Z1M 20G ZNZ ZPB; W1N1S ZQM ZPW ZPU; W1A1S ZOM ZNO Z5J Z5X. Word has it that W1A1J1M is in W6-Land. W1G1D1E & K4N1A1J back in FL. W1E1E1F now W1M1K a call which he held from 1923. W1A1E1A 1PEL 92. AD1A1C1 received the ARRL Bicentennial Celebration Award. K1N1H in the CQ WW DX test. W1G1U1X a pilot for TWA and an ARRL member since 1936. Dir. Sullivan, W1H1H1R appointed K1H1Z1N Public Relations Asst. John welcomes any amateur newsworthy stories. He can be reached by the Derry Repeater W1A1B1Q, phone or mail. K1M1N1S building a triple quad array for AD1A1C1 receiving. W1A1R1F1G receiving in FL on 2 meters. W2B1U1/1 & W1S1W1X met with Governor Thomson to obtain congratulatory message to President-elect Carter which was sent by W1NH on the NH CW Net to K1NH for relay to the National traffic system. W1A1P1W1 mobile assisted state police during NHCT from Newport to Manchester. NHCT reports: 97 traffic. 115 check-ins. K1B1C1S reports (SSPN) had 138, 414. Traffic: K1N1H 97, AD1A1C1 42, K1P1Q1V 24, W1N1H 4, W1A1P1E1L 2.

VERMONT: SCM, J. Breakstone, W1A1P1S1K - SEC: W1V1S1N. Nets: VT, RFD, 3:00p, Su, 2:30p, QNT 71, QTC 11; K1B1C1S; Vt. Fone 3:32, Su, 2:00, 129/13, (W1K1K1M); Q1N1 Mt., 3:32, M-S 1:30, 159/55, (W1J1L1Z); Carrier, 3:35, M-S 1:30, 568/30, (W2D1S1K); VT SSB, 3:00p, M-S 2:30p, 1330 Su. Many thanks to K1Q1K1Y who keeps us posted on net activities as well as to diehard K1B1Q1B of Bellows Falls. A hearty welcome to new amateurs: W1A1S 2VZ Z1C 2XQ and to W1B1C1F A1C1 and A1C1P. Apologies to those who missed last month's report misplaced on my QSY to Milton (another new QTH). Congratulations to W1K1J1G on his 50th Wedding Anniversary. Parks, a former VT Attorney General, is active on the Mt. Mansfield Repeater, W1A1E1A (34-94) and 75 mtr. phone. W1A1U1J1A is trying to form an SET group Net of the Mt. Ascutney Repeater, W1R1A1C1A (16-76). Traffic: (Nov.) K1B1Q1B 169. (Oct.) K1B1Q1B 126.

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WESTERN MASSACHUSETTS: SCM, Percy C. Noble, WIBVR — A reminder to all that you will be welcomed on the weekly (or monthly) AREC nets being operated by our five county ECs (on 75 or 2 — or both). For info get in touch with W1KZS Berkshire Co., K1RGG Franklin, W1GQP Hampshire, W1STR Hampden, W1JL Worcester. They can furnish AREC application blank for AREC.

Net — Freq. Time/Days
 WMPN — 3935 4:30 PM M-F
 WMN — 3562 7:00 PM Dy
 WMEN — 3935 8:30 AM Su

Net — Freq. Time/Days
 WMPN — 3935 4:30 PM M-F
 WMN — 3562 7:00 PM Dy
 WMEN — 3935 8:30 AM Su

Net — Freq. Time/Days
 WMPN — 3935 4:30 PM M-F
 WMN — 3562 7:00 PM Dy
 WMEN — 3935 8:30 AM Su

Net — Freq. Time/Days
 WMPN — 3935 4:30 PM M-F
 WMN — 3562 7:00 PM Dy
 WMEN — 3935 8:30 AM Su

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — The Presidential Relay message from AK was relayed right on time from AK to the East Coast by KL7MF. There are several classes in sessions both in Anchorage, Fairbanks with many students. It appears we will soon have a bunch of new stations on the air. The Alaska Snipers Net broke another record for check-ins which KL7HOV (PAM) reports was over 800. KL7HMH handled 5 public service messages this month. We can use more of this type of service to show our value to the public. KL7AF is a newly appointed Asst. EC for this section, KL7AF will be off the air for a month or so while he moves. KL7RU resigned as EC for Juneau area due to business pressure. KL7HLP is his replacement, please give Walt your cooperation. Remember the Simulated Emergency Test coming up. All ECs will receive their instructions soon. We want to wish every one a Merry Christmas and a happy New Year. Traffic: KL7AF 10, KL7HMH 5, KL7CUK 3, KL7MF 1.

IDAHO: SCM, Dale A. Brock, WA7EWV — SEC: W7JMH, PAM: WA7HOS, RM: WA6KKR/7. Net — Freq. Time/Days
 FARM — 3.935 0200 Dy Manager
 IMN — 3.635 0230 M-F 147 59 W7GHT
 RACES — 3.99 1415 M-F

Boise Chapter of the Idaho Society of Radio Amateurs reports they have 42 people in their Novice license class. The FCC is now scheduling examinations in Pocatello on a semi-annual basis. West bench will be the temporary site of Pocatello's new repeater. W7OHH recently returned from a "hamcation" in Europe. K7MIY is now the proud owner of an Atlas 210. W7PKA and W7ALY are wintering in AZ. Traffic: W7GHT 192, W7KDB 4, W7YJ 3, W7FIS 2.

MONTANA: SCM, Robert Lee, W7LRL — WA7GVT is teaching Novice classes. The Bozeman Novice class taught by K7KER & W7LR passes 11 on cw. W7BXL & K7CHY helped in the Blicent relay. W7LR attended a VHF meeting in Chester; and WA7PZO W7DEO K7CHY & W7LR met in Wolf Creek. The Bridger Club is now ARRL affiliated. They are working with their local Search & Rescue team. W7RAE is the new Helena/Hogback 25/85 call. OBS W7DB puts ARPL bulletins on MTN and 2 meters. W7VIK Libby is a Silent Key. W7LR has Blicent, WAS all 2-letter calls; plus WAZ. K7CTI W7YB K7ABV K7CPC WA7BSZ W7LR were active in contests. New Helena club officers: W7SVB, pres.; W7LTI, vice-pres.; K7SRA, secy-treas. Traffic: W7GU 63, W7LR 7, WA7PZO 7, WA7OB 2.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — SEC: K7VAS, PAM: K7YRQ, RM: K7OZA, VHF PAM: K7GWE. It is with regret that I report the passing of W7BQ, former SCM Washington Section, member of PAM staff and for 8 years held the Tech Net on 3970 and also the passing of "Wapato Max" or W7CCCT. They both were with W7BGJ/R2 reports a night time medical transfer of a crewman from the NOAA vessel of which he was radio operator. It isn't easy to find a vessel at sea in the dark even with a radio signal to home in on. WA7FIC sent a newspaper PR clipping on 16 year old WB7AIX, an Extra Class licensee and she has a traffic total of 145 this month. Congratulations to W7BQV on new license. ESNS new officers are W7MIF, net mgr.; WA7VXG, secy-treas. Western WA Amateur Relay Assn. officers are W7FHZ, chmn.; W7ZZL, vice-pres.; WA7WMC, secy.; WA7WMD, treas. WA7FKM is new pres. Puget Sound Council ARC and K7OKC is vice-pres. WA7LWP and helpers held annual Santa talk at hospitals for children to talk with Santa Claus. I would like to thank everyone who helped me with NW Division Director election and everyone for their vote. Sorry we didn't make it but there is always a next time. Now let's all pull together for amateur radio. See you in July '77 at Seattle Convention Center.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCMs: W6ZF, VE2AQV/W6. SEC: W6IHH, Asst. SEC: W6BDSI. Fern and Rubin Hughes, WA6AHF have taken over the QSL work for the Yasmé Foundation. The date for the Fresno DX meeting has been set for Apr. 1, 2, and 3. For information on this great get together contact K6SJA Mt. Diablo ARC reports the following officers for 1977. W6PFW, pres.; WA6OJT, vice-pres.; W6BFOA, secy.; WA6TMC, treas.; W6B6KNU, EC; WA6JUD and WA6GEBB, board of dir. Good luck to all. For the second year in a row K6JZR has received a Certificate of Recognition from the AF/MARS for outstanding performance. W6TYM now W6OA and W6AI is W6WC. W6DNY and W6NQJ both spent time in the hospital. The good news is that both are home and recovering well. W6B6DXR has gone from Novice to Advanced in one year. WA6FSI has been named Amateur Of The Year in the Napa Valley. CCRC lists the following new calls in the section: W6BQV, W6GPN, W6GNY, W6GQV, W6GVM, W6GNMV, W6GNNS, W6GNMX, W6GNMZ, W6GNNN, W6GNNO, W6GNNE, W6GNNH, W6GNNL, W6GNNA, W6GNNK, W6GNKZ, W6GNMU, W6GNNI, W6GNMW, and W6GNKI. Traffic: K6JZR 340, K6HW 247, W6JXK 233, W6OA 223, W6GUXZ 78, K6PMG 38, WA6BMV 11, W6ZF 6.

NEVADA: SCM, Leonard M. Norman, W7PBY — SEC: K7ZAU. Notices were sent to all NV Section League Official of Hq. records to bring the SCM

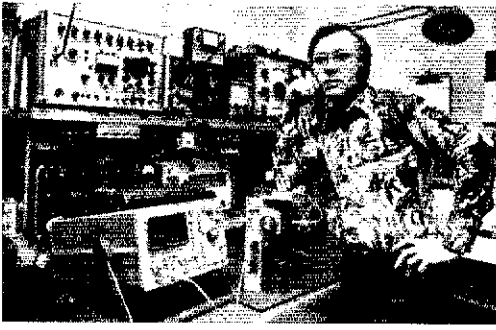
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records up to date and encourage sending in station activity report. LO appointments are open to qualified applicants, may we hear from you. W7ILX now handling traffic on CW, SSB and 60 & 100 wpm RTTY. K7UJ is interested in hearing from those interested in Field Day '77. WA8D is sales mgr. for R. L. Drake Company, Las Vegas. WA7BAV is sales mgr. for Wilson Electronics, Las Vegas. K7AAD now 4Z4LG and is an advisor to their telecommunications. W7YKN and K6DYX running tests on FAX. W7MWF W7OK W7PBV WA7RPZ W7VH and K7ZOK. Q3VVA members meet in a picture taking session with NV Gov. Mike McCallister for the President Elect Carter congratulation message. Traffic: W7ILX 159.

PACIFIC: SCM, Pat Corrigan, KH6GQW — RM: KH6JAC. EC Honolulu, KH7CKJ; EC Kauai, KH6FMT; EC Big Island, KH6HOU. Windward Oahu now has a new EARC repeater (Olomana) on 16776. Looks like SAROC-Hawaii may be late this year, pass Nov. More on that later. Congrats to KG6JCE, KH6AHZ GPC and GNR on Life Membership. KH6GKJ (EC-Hono) had good turnout of AREC members to man the CD Emerg. Ops. Ctr. during high wave activity in Nov. Hams got good praise from CD. New officers for 1977 for the Big Island ARC are: KH6HML, pres.; KH6JAF, vice-pres.; KH6IMB, secy.; KH6KKX, treas. Congratulations go to the UHF staffer, KH6HQG attended HARC Christmas dinner, ARRL Nov. Sweepstakes and CQ WW Contest had good participation from Pac. Sect. including KH, KG, KX6. New amateur classes had good success on Oahu with ARRL training material and new expanded classes are expected this spring. KH6JE helping on Pac Tlc Net. Traffic: KH6JAC 53.

SACRAMENTO VALLEY: SCM, Norman Wilson, AA6JVD — SEC: W6SMU. WN6s NQP NRY NRR NRX and GPU are new Novices in the Chico area and WA6SIM is a new Novice in South Tahoe. WB6JRT and WB6MRQ received their Tech. tickets and WB6MFP is now Advanced grade. Congrats to all. W6DEF reports that his 2 student class are waiting for their Novice calls. W6SMU has been operating 9 in IL for 2 weeks on business. An old timer in Willows, W6KUI, has joined Silent Keys. A new Novice/General/commercial class has begun at McCellan MARS and is again joint sponsored by the Grant Adult Ed. Center. WA6KJ has been in the UHF repeater, WR6AVA. The Tahoe ARS has a new repeater, WR6AXA, on 146.25/146.85. Many thanks to K6SWS for their help in lessening GRM on 34.94. AA6JVD's new Accu Keyer developed problems two QSOs into the SS contest, had to finish the rest of the 24 hours with the straight key (again). Traffic: W6HSP 218, W6DEF 39.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT. W6BIP teamed up with WA6EJL for multi-op effort in SS and for the first time ever they managed to work all 75 Sections on both modes. W6RQ scored an average of 0.1 ppm on four frequencies in the Nov. FMT. W6KHI is contemplating a 3 mo. work/visit to France. Congrats to newly licensed WN6s NSQ NQM Q3D and WA6s QNB and QFG. Also to WA6s MDS MUD and MUE who passed General and to WA6YDU who passed Advanced. WB6MOV now W6VV. WA6JPK moved to Yreka; WA6DMN to Guafala; and WA6ZQJ to Bakersfield. New NPEC officers: WA6GAY, pres.; WB6PVG, vice-pres./act. mgr.; W6GGA, secy. CCRG officers: WA6CTV, pres.; WA6VKE, vice-pres.; WA6GKB, treas. ACS directors: K6UC WB6CIE & WA6POR. W6GGR busy with new decoder for 2m repeater. With sadness we note the passing of W6LGC W6HVQ WB6GFS and WB6RZT. Traffic: (Nov.) W6RNL 194, W6NLI 189, K7TP 179, W6IPL 133, W6BUPV 32, W6BITN 2. (Oct.) WB6JEO 22, W6GGR 3, W6BITN 2.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6HNO. Congrats to WB6KAD WA6GJV on passing General and Tech exams respectively. W6YKS now K6YK, has worked 50 states on 6M. The Turlock ARC meets 2nd and 4th Tu. at the War Memorial Auditorium in Turlock. W6GJN, pres. WA6OVP, vice-pres.; WA6BZP, secy.; W6SM, treas.; K6SNA, PR. Officers of Delta ARC are WA6SSE, pres.; WB6IGL, vice-pres.; WN6BXA, secy.; WA6FVI, treas.; WB6OPQ, editor. Don't forget the Fresno Hamfest on May 6-8, 1977 at the Airport Holiday Inn in Fresno. WA6WL is schm. AD6YK and AA6CP and on 2m RTTY. WB6KAD and RT101. WA6FVI now Advanced licensee. K6AO K6AYA AD6YK AA6CPP WA6YAK WB6ITM and W6DPD were in the CA QSO Party. WN6IQZ active in Stockton. WN6BXG has an HW101 transceiver. All appointees are reminded that a monthly report to SCM is part of the appointment. WA6UW K6RAL W6MHW K6UO and W6DPD attended the Pacific Division Director's Meeting on Dec. 4, 1976. WA6GJV is QVS. Traffic: WA6RXI 36.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — SEC: WA6RXB. W6RFF WA6UC made PSHR. W6QIE still offering his excellent code practice daily (except Mon.) at 8:00 PM local on 3599 kHz. Stand by for the announcement, due shortly, of the dates for the next Pacific Division Convention. Most by the San Mateo County gang. What NCDXC and West Valley ARC member has worked six European countries via Oscar 677? Why, DJ6RX, of course, although he had to do the job from his Mainz (W. Germany) QTH. DXer and traveller W6SP also gave Oscar devotees a treat last month by making over 40 QSOs while signing QXNB. The game of musical calls is ever popular, with W6ICJ now signing W6KM and W6DXF now W6XX. Attention clubs: Any PR problems or help needed? Pacific Division PR Asst. K6WT (ex-WB6GWT) is QRV to help. It's election time again, with SCCARA, PAARA and CCRG announcing new managements, as follows: SCCARA: W6ZM, pres.; WA6BQ, vice-pres.; WA6CPC, secy.; K6S, treas. PAARA: K6FS, pres.; VE3FZT, vice-pres.; WA6LNV, secy.; W6BFH, treas. CCRG: WA6CTV, pres.; WA6VKE, vice-pres.; WA6NIL, secy.; WA6VKB, treas. W6OCP and WB6LSN will be missed as they retire from a 3 year tour as Editors of the Foothills ARS Footprint. WA6UJ has been very QRL with phone patches into KC and KTH. A flock of new E-stations moving down into the lower 25, including K6YGS K6EIH K6SMH and WA6UpgradeAmateurMicrowave (WA6UAM). Don't forget to mark your calendars at Feb. 26, 1977, the date of the ever popular SPARK Auction in Palo Alto. Welcome back to WA6NDN, just returned from a visit to CL. Latest ham news is available on the 1st and 3rd Tu. each month from W6ZRJ and W6VZT. The skeds are held at 1900 on 3590 kHz, CW, 1930 on 3810 kHz SSB, and at 2000 on 3615 RTTY, with all times local. W6MXO has been QRV with CW mobile on 40 M. Traffic: W6YBV 233, W6RFF 122, WA6UC 76, W6NW 54, W6KZJ 34.

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ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC. W4EHR. RM: K4MC. PAM: W4OFO. VHF PAM: K4GHR. EC of the Month is WB4LDO and Mike is in Haywood Co. So contact him if you are near. Inx W4CJ. K4FB reports on K4FTB & K4EZH have earned Fourth Region Daytime Net Certs and WA4PSL & W4EAT are fast earning theirs. 4RND will now be managed by WB4OZB due to departure of WA9NEW/4 and Bruce did a fine job as 4RND organizer, hearty congrats. WA4KWC has new FT210B. Carolinas Net (CNI) Early 30 sessions, 337 QNT, 161 QTC. Late had 30 sessions, 252 QNT, 108 QTC. So try ur CW on 3573, 7 and 10 PM. K4MC replaces WB4OZB as mgr. CN & Chuck moves up to 4RND, congrats to OZB for a fine job and fine newspaper CN News. Central NC Tfc. Net 13/73 Salisbury had 80 sess, 1103 QNT, 26 QTC. Inx WB4VIM. K4FBG reports 77 Novice exams at Cary/Raleigh classes. WB4WUY has Winston-Salem classes going and Forsyth Tech has Gen. Class course running with W4DBT teaching. Forsyth ARC has spearheaded classes under past pres. WB4JGZ and New pres. WA4HRD, congrats all. Lots of new 2-1tr calls like K4CDZ is K4HG. ex-W4RUH is K4HF & ex-K4IQD is W4YV. Congrats W6QNB & WB4MFM for fine efforts in Bi-Centennial QSO Party. Congrats W4UG on election to Vice-Dir. and many thanks to W8JM for his fine past support in this position. Traffic: (Nov.) WA4PSL 240, W4FMN 105, W4EAT 89, W4OFO 86, WB4MXG 72, WA4KSO 69, K4FTB 65, K4MC 32, W4WXZ 28, W4WVYR 25, W4EZH 23, W4FBG 18, K4TTN 12, W4PCN 11, WB4OZB 10, WA4JL 8, W4EHR 4, (Oct.) K4EZH 31, WB4UBA 23, WA4TCR 22, K4FBG 12, (Sept.) K4FBG 8.

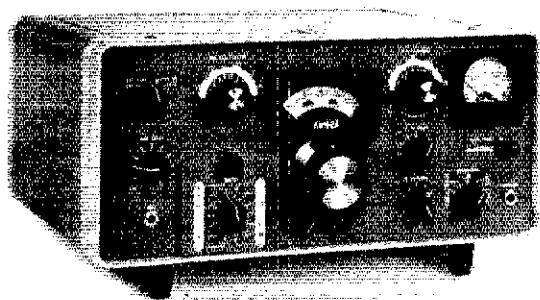
SOUTH CAROLINA: SCM, Tom Lufkin, WA4DAX — Asst. SCM: Garry Barnette, WA4MDP. SEC: WB4TNS. Chief PAM: W4MTK. PAM: WA4DZG. WB4OZB wishes to thank all who helped him during his term as RM. Congrats to WA4KXZ and W4FMZ on qualifying for a Region Net. Congrats to WB4OZB & WB4MFM and WB4ARJ on qualifying for Area Net Certificates. SC was 100 percent represented in 4RND. I enjoyed visiting the Piedmont Tec ARC this month. They have a very active club and are one more example of the vigorous growth of amateur radio in SC. It's getting toward Hamfest time again and I am looking forward to meeting you there. We are going for mgr. for Carolina Novice Net. Any interested novices? Net reports: SCSSBN QNI 904, QTC 182, FTX, QNI 256, QTC 115; CNN, QNI 250, QTC 54; CNE, QNI 337, QTC 161; CNL, QNI 252, QTC 108. Traffic: WB4ARJ 654, WB4OZB 248, W4MTK 127, WA4UQU 114, W4ANK 80, W4NTO 73, K4EJK 49, WA4DZG 37, W4FBG 32, WB4OZB 28, W4EAT 28, W4DAD 23, WA4ECJ 18, K4GGG 8, W4DRF 14, WB4JNE 12, WB4NBK 7, WA4BDG 4, WB4MOT 1.

VIRGINIA: SCM, Robert L. Follmar, W4QDY — SEC: WB4DTG. PAM: K4VWK. Asst. PAM: WA4YIU. RMs: VN K4IAF; VSN WA4EPJ; 4RN W4SHJ. Net Freqs: VSN-VN 3680 KHz. VFSN-VSN 394 KHz. EAIN Stewart W4JQ reports a pickup in ttc. K4GGG says his new microcomputer is finally "waking up." Hi. Novice classes will start in Jan. at the NVRC per WB4DBK. W4SHJ attended Pearl Harbor reunion on 35th anniversary of the attack. K4MLC rptd illness in family & low ttc. count. W4TMN was thrilled to receive Public Service Award for his part in the Truck-Train crash in Hazwell. He was NCS of the Emergency Net. W4OCL rptd W4OHM (Chief-of-Police), of Winchester, is back on the air. WA4AJF enjoyed the CW 55 with his HWB (QRP). Wrkd 89 stns, also participating was WA4KUT. QRS, OBS W4YZC says that his new 40 mtr. scoping dipoles wrk FB. Has plans for five-element Yagi (on order) and that DXing is fun again. FB! WB4DRB rptd the Charlie rpt now on air (16/76). Marc has new FM144. K4CKY will be operating in HC-Land from mid Dec. til mid Jan. County-Hunter W4JUU completes Idaho rpt counties making 40 states and 3048 counties wrk'd! Ex-SCM W4KX rptd having "a ball" with his 2 mtr rig in car. Watch It! Jno, you may get trapped with ions, Hi. W4KFC has repaired his balun and is back on 40. W4ZAU is now W4YV. It seems about everyone is going for the two letters. Yer SCM thinks abt it with 47 yrs continuous licensed. Oh hum. Too many contests in Nov. sez W4ZM with one ttc. ck-in. By the time this column hits the print it will be almost spring in 1977, how time do fly! Best wishes for the New Year. A lot of club papers rec'd im Lynchburg, Portsmouth, Richmond & Armdad with interesting info. Newcomer radio amateur is a lady who submits a very FB letter of her activities which include upgrading from Tech to General; new stn equipment; teacher; traffic; awards; etc. She also is an active member of a number of organizations. Her call is W4OZB. Kids: Marsa & W4OZB had good work. QCs W4HU WA4PRP and WB4OXD busy with CE out-of-banders, Russian, African, Chinese, German, Pakistan (and Voice-of-America) interference on the amateur 40-mtr band. The QG reports will prove valuable at the WARC in 1979. Traffic: (Nov.) W4EAT 167, W4KX 155, W4JL 157, K4DND 99, K4GR 135, K4IAF 118, WB4DBK 98, W4ZNB 94, W4LXB 91, WB4KIT 85, K4JM 80, WB4FLT 77, WA4KKP 73, W4SHJ 72, W4QDY 69, K4MLC 65, WA4RDI 59, WB4DTG 55, WB4DQZ 44, W4TMN 35, WB4UPA 34, K4ITV 28, W4SUS 27, K4PEL 16, WA4OZB 24, WA4QGI 20, W4VGS 22, W4OCL 17, WA4AJF 15, W4OZB 14, W4YV 12, W4WVY 8, WB4DRB 8, W4MK 7, K4CQY 7, WB4FDT 6, K4KA 5, W4JUU 4, W4KX 2, W4KXE 2, K4TY 1, (Oct.) WA4GFS 2, (Sept.) WA4GFS 12.

WEST VIRGINIA: SCM, Kay Anderson, W8DUV — Asst. SCM: Donald B. Morris, W6JM. W8LRL has DXCC on 160. WB8LJV with 1550 contacts in 35 Contests, mixed. K4EAT New. W4KND 157, WB4OQ WB8DPQ WB8DGX WB8DUF WB8DUE WB8DQL. CW Net in 29 sessions, with 117 stations, had 41 msgs. WVN Phone Net in 30 sessions, with 1226 stations, passed 167 messages. WB8ZA made good score in FMT with new counter. WB8CCN checks in the SWOP and QTC 14 MHz Nets. WVN Noon Day Net in 30 sessions had 634 stations, had 431 messages. WVN QGWA Net meets daily at 7:15 AM on 3568 KHz. Novice Net in 29 sessions with 181 stations, totaled 115 messages. Opequan Radio Society, holds net on 146.46, 8:30 PM Tue. Officers of the Logan Co. ARC are WB8WGG, pres.; WB4DXS, vice-pres.; WB8RFL, secy. Monongalia Wireless Assn. Morgantown planning Hamfest on Labor Day, 1977. K77KW active in EC work in Mineral Co. Mountain State ARC of Elkins,

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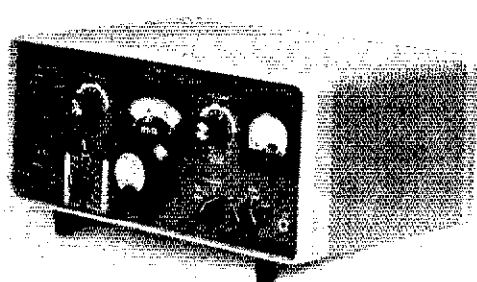
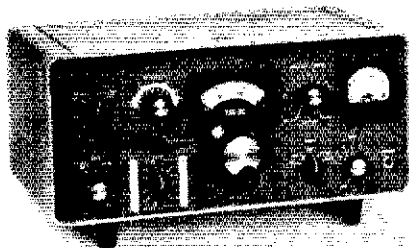
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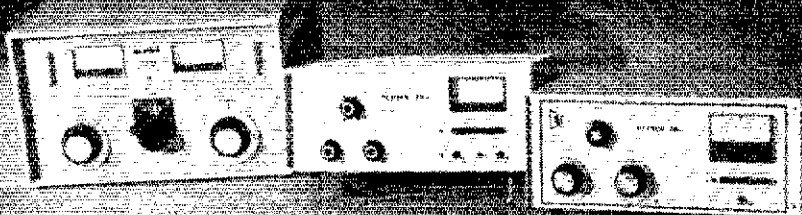


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Parsons new officers are WA8ZGX, pres.; WA8YHK, vice-pres.; WA8TOX, secy-treas.; WB8NMP, act. mgr. Traffic: WB8TD, 64, WB8CGX 59, WB8SAW 59, WB8ZA 34, WB8XC 29, WB8UII 20, WB8JWX 20, WB8JM 20, WA8LFW 17, WB8UL 16, KB8QEW 13, WB8RUZ 11, WB8TEE 11, WA8POS 9, WB8VMJ 9, KB8DY 9, WB8YSM 8, WB8FZP 7, WB8CNN 6, WB8AQO 5, WB8EUE 5, WB8ZMX 5, WB8YUJ 4.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA0HLQ — SEC: K0FLQ, RM: WB0HCK. PAMS: K0CNV WA0YQG. Newly elected officers for the Boulder Amateur Radio Club for 1977 are WB0NEU, pres.; WB0MMH, vice-pres.; WB0FFV, secy.; WB0NFV, treas. NTS operators will monitor local area repeaters for traffic around 6:00 PM and will call around 7:00 PM if they need a particular town. Congratulations to WB0JVA who recently received his ticket. It is with deep regret that we add to the list of Silent Keys, the calls K0SJM and W0BUI. WB0TAQ now has alternate PAN duties on Sat. nights. K0PFI is enjoying his new 1300 ft. tower, toped out. Q0GBA, 20-meter beam. K0HPE reports contacts on 15 meters in 7 hours operating time during Sweepstakes Contest. Net Tfc. for Nov.: Columbine QNI 1425, QTC 104, Informals 355, GNF 1882 min., Hi-Noon QNI 1151, QTC 48, Informals 146, 28 sessions, QNF 1104 min. Late Net Tfc. for Oct.: CWN QNI 274, QTC 258, 30 sessions, GNF 974 min. Traffic: INOV WA0VYX 2024, K0YFK 676, AB0QOT 304, W0EJD 247, WB0IBS 226, W0HXB 145, WB0TAQ 98, W0KLE 82, K0TER 79, W0IW 76, W0PGX 62, WB0NDH 60, K0WZN 58, K0RTO 47, WB0PVT 44, K0PVI 42, WA0REX 32, K0CUT 30, WB0IZO 26, WB0NHA 23, W0MYB 21, W0LFG 18, W0RE 15, K0CNI 13, W0NFM 13, W0WGS 9, W0CWP 5, WA0YED 5, WB0AL 3, WA0LYM 3, K0FLQ 2, K0STX 2. (Oct.) W0IW 74, W0KLE 30, WA0MYB 23.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALW. PAMS: W5DMG W5PNY. RMs: W5UJH K5KPS W5VDH. SWN, 3585 kHz, daily at 1915 local time, had QNI 279 and handled 158 msgs. NMRRN, 3940 kHz daily at 1800 local time reports QNI 990 and handled 50 msgs. Breakfast net 11:00 daily. 0700 local time had QNI 636 and handled 18 msgs. W5KSS enjoyed two weeks working 2M mobile in CA, AZ and NM. Our Novice net doing better. For info, write W5VDH, Michael Daly, P. O. Box 1538, Bloomfield NM 87413. WA5MIY reported accident on I-25 via WR5ABG and W5SQDC, waited until police arrived. W5RE reported to NMRRN from NM and going thru. Clovis had QSO with W5YQ on 75. W5QNR and W5JOV of Albq. continue to do a fine job collecting reports for this column, and W5PDY helps out with a report whenever the SCM is away. Traffic: (Nov.) W5UJH 318, W5JOV 239, K5MAT 233, W5DAD 204, K4KPS 136, W5ENI 94, W5KSS 78, W5VDH 68, WA5YTX 34, W5RRN 22, W5DMT 16, W5YQ 16, WA5OHI 12, W5QNR 10. (Oct.) W5VDH 65, WA5YTX 44. (Sept.) W5DMT 20.

UTAH: SCM, Ervin Greene, W7EU — Thanks to the Net mgrs. W7OCX for BUN and W7MEL for UCN on a very successful year. BUN meets 1230M daily on 7272 MHz and UCN at 1930M on 3575 MHz. New officers for Utah Amateur Radio Club 1977 are WA7JLU, pres. WA7JNC, exec. ce-pres. W7CWX, vice-pres. WB7AZZ, secy.; WA7QBQ, treas.; K7TLX and K7UJG as pgm chmn. K7HFV continues as Micro-volt editor with WB7EQO as asst. WA7ZBO very active in Oscar work and doing very well as SEC. K7CVB, Salt Lake County EC organizing an emergency preparedness school to be conducted at the club. One is also being planned in emergency medical procedures also. May 1977 brings us all the DX, traffic, rag chews or whatever. Have a happy 77. Traffic: WA7JRC 82, W7MEL 54, WA7TEH 40, W7OCX 27, W7DKB 25, W7BE 19, W7UTM 8, W7EU 5, W7KHV 5.

WYOMING: SCM, Chester C. Stanwley, W7SDA — All 75-meter nets in WY are not meeting on 3923 kHz. No changes in net time. A big vote of thanks to our ex-SCM W7VB for a great job. A group of Sheridan and Story amateurs are working on a 2-meter FM repeater and hope to have it ready to place in operation next spring. The Great Plains Repeater Assn. is starting a 2-meter net through the club repeater in operation. He also reports good fellowship meetings at their Sat. morning breakfasts. WB4GYS new job assignment in AK. W4EXE reported 108 attended a chili supper and the Mobile ARC realized considerable profit. They also had a demonstration at one of the Mobile malls recently. W4DFE and K4D50 are compiling a history of the Birmingham ARC; if you have/know of any date, contact either of them. The Twin Base ARC latest roster shows 85 members and the club meets 1st and 3rd Fri. monthly. Welcome W3JZJ/4 to the AL Section. W4MHO says the Cheaha repeater handled 9 emergency-type situations in Nov. such as auto accidents, fires, storm damage and that they soon will have another repeater in operation. 107.70 with auto patch. All stations welcome to join our nets; report your traffic to me. The Huntsville ARC provided communications again for the Arabian horse endurance ride. Also had a traffic station set up at a mall and originated 180 messages. Appointed WA4TMC as QMC and WB4IT as QRS. Traffic: (Nov.) WB4EKJ 421, WA4JDH 401, K4BET 190, W4RGS 168, K4AOZ 96, WA4JGG 92, W44RND 69, WA4TMC 52, WA4EUD 25, K4LYY 20, WB4RCF 17, WA4RMP 16, K4CLU 8, WA4MDH 8, W4MHO 6, WB4TVY 4. (Oct.) WB4YD 6. (Sept.) WA4JDH 218, WA4CYF 39, WA4TMC 2.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — It is with deep regret I report WA4ELX as a Silent Key. K44JM lost most of his antennas in the fire but now back in operation. He also reports good fellowship meetings at their Sat. morning breakfasts. WB4GYS new job assignment in AK. W4EXE reported 108 attended a chili supper and the Mobile ARC realized considerable profit. They also had a demonstration at one of the Mobile malls recently. W4DFE and K4D50 are compiling a history of the Birmingham ARC; if you have/know of any date, contact either of them. The Twin Base ARC latest roster shows 85 members and the club meets 1st and 3rd Fri. monthly. Welcome W3JZJ/4 to the AL Section. W4MHO says the Cheaha repeater handled 9 emergency-type situations in Nov. such as auto accidents, fires, storm damage and that they soon will have another repeater in operation. 107.70 with auto patch. All stations welcome to join our nets; report your traffic to me. The Huntsville ARC provided communications again for the Arabian horse endurance ride. Also had a traffic station set up at a mall and originated 180 messages. Appointed WA4TMC as QMC and WB4IT as QRS. Traffic: (Nov.) WB4EKJ 421, WA4JDH 401, K4BET 190, W4RGS 168, K4AOZ 96, WA4JGG 92, W44RND 69, WA4TMC 52, WA4EUD 25, K4LYY 20, WB4RCF 17, WA4RMP 16, K4CLU 8, WA4MDH 8, W4MHO 6, WB4TVY 4. (Oct.) WB4YD 6. (Sept.) WA4JDH 218, WA4CYF 39, WA4TMC 2.

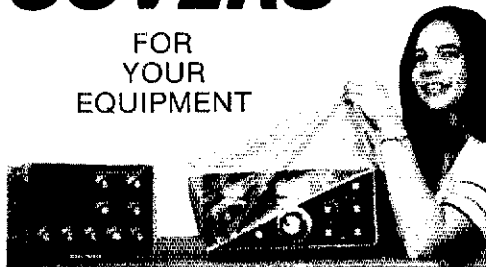
GEORGIA: SCM, A. H. Stakely, K4WC — Net — Freq. Time(2)/Days QNI QTC GSN — 3.595 0000/0030 Dy 429 233

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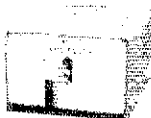


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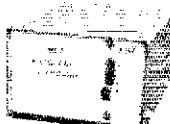


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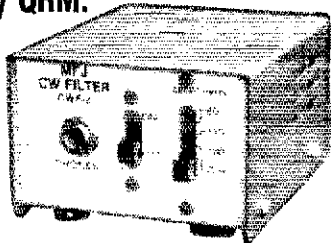


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SEC. K4YRL, RM: K4FLR, DM: K4JNL. Congrats to W4SHL for CP15. Americus ARA for Plain's special event election night, newly licensed W4KPFZ. WB4WRA WB4ZBV and WB4INK making General. GLERC W4QPL, officers K4DKH, pres.; WA4NRY, veep; WB4FRY, treas; WA4VXM, secy.; WA4TNZ, act. mgr. Central GA ARC solicits your membership via Box 1924, Warner Robins, 31093. WA4M received phone SS but says he can't compete like the young'unsl W4BTZ sporting new C-Line, L4B. K4YRL and WA4AKU met to plan the best SET. ARC of Savannah 1977 officers are W4QBM, pres.; WA4CTV, veep; W4GHR, treas.; WA4VXL, secy.; K4IAC, act. mgr. Sav. Rptr. Assn. has K4OUY dir.; W4GHR, act. dir.; WA4BOD, tech. mgr. K4MIC, secy.; WA4QJG, treas.; K4OUY WA4BOD W4KGP WB4NTW WA4QJH, monitors. WB4IGS editing a fine bulletin for Sav. ARC. QCWA sponsored congratulatory message from Gov. Busbee to Pres-elect Carter made Atl. Journal. Not even weather kept F4vention at St. Mt. from being great. Americus ARA has new rptr. on 34/99 as well as office class at 3a. Southwestern College, Traffic: W4FOE 222, K4FLR 123, WB4WQL 117, K4NMI 61, WA4AKU 38, K4WC 37, W4SHL 35, K4FRM 34, WB4TEK 31, AC4HON 28, W4VTA 22, W4GLM 18, WA4LLI 16, W4UVP 12, W4JM 8, W4PZD 6, W4DOC 5, AD4BAI 1.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM, RM: WA4FBI, PAM: WB4VDM/75; WB4GSZ/VHF. W4WNY appointed NM of NFPN. Late session of NFPN dropped; check into late EAST Net at 2330 GMT on 3940 kHz. WA4CR qualified for QCCS with WB4FHT named "Gator of the Month." BPLS (Nov.) WA4WBM & WA4EYW, (Oct.) W4IZ. OO reports received from K4LAN K4MZX WA4GDG, WB4QBB meets 9 traffic nets; had a QNI total of 115 last month. Liberty Bible College ARC now ARRL affiliate. WB4NH reactivating Gulf Coast Propagator Net on 80 and Mt. Airy on 15. GMET W4OCG and K4PLT starting new club in north Okaloosa Co. W4SYP active on SSTV. W4LRC assembling RF portion of the PARC's new repeater, using a MICOR receiver. New officers of the Panama City ARC are WB4SHN, pres.; WB4IKK, WA4DEN and W4N9FS, W6OSD/4 transmitting WX info daily on 42.95 MHz AF5E RTTY, 75 wpm, Flor-Ala Chapter. QXWA, held luncheon in Marianna, with 18 attending. WB4VMA running Novice class in Lake City; newest graduates are WA4s ZFG & ZFR. WB4GHU assisting Jax Beach with AREC plans. W4SDR memorial call will be used only on FM7N and VEN. NOF4RS/RANGE had a fine booth at Greater Jax Fair, with 2M and HF RTTY, plus message handling plus Oscar & RTTY displays. WA4CQG and WB4GCC headed it up. W4ZTW and AA4UFW had top scores in ARRL DX contest. WA4CQG, W4HJW and WA4JCP passed Advanced exam; WA4FGG and W4N4HR received General. WB4FKL runs nightly CQ net on 15M at 7:00 PM in Daytona area. W4IL looking for antenna space in mobile home park. Traffic: (Nov.) WA4WBM 464, WA4EYW 269, WB4NMU 234, WB4GHU 222, WA4FBI 219, W4LDM 173, WB4SKI 158, K4DDY 137, WB4FHT 99, W4JL 91, WB4DTS 87, WB4QBB 78, W4KIX 64, W4MGO 53, K4B55 48, W4RH 44, WB4YAP 44, WB4FJY 43, WB4DXN 40, WA4TNC 38, K4CVO 34, WB4NLY 34, WA4EYU 27, K4OER 27, WB4HRG 24, WA4CRI 18, WB4FTA 14, W4GUJ 14, WA4HHC 14, K4RNS 14, K4IEK 12, W4ILE 10, WB4VMP 6, WB4YRL 2, W4SDR 1, (Oct.) W4IZ 863, K4CC 13.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH, Asst. SEC: W4WYR, RMs: K4KBE W4MEE, PAMs: WA4NBE W4OGX. New appointment this month WB5QDW/4 ORS. Endorsements K4DAS 00-IV. The "First Annual Amateur Radio Council in Clearwater on Nov. 6 & 7 was a great success with over 2000 attendees. See you there next Nov. K4NE was active in SS and DX(CW) Contest winning 4th district Bermuda contest. W4ZR had nice trip to Turks Island for some DX contest. W4IRA WB4AID and W44QGV all ordering new T-520 rigs. W4QGG sponsored Florida Insurance for amateur radio to Sarasota ARC meeting Nov. 16. St. Petersburg ARC has new slate of officers: WB4HYH, pres.; W4GPL, vice-pres.; WA4ORX, secy.; W4VIP, treas. Florida Atlantic Univ. Club: WB4FLW, pres.; WA4UGA, vice-pres.; WB4YKT, secy.; WA4ZLW, treas. WB4IKX reports a new AREC net for Osceola County on 146.52. The 2-meter "explosion" continues with more people showing up daily on the local repeaters. WB4PNV is new mgr. of SPARC Repeater Net which averaged over 40 check-ins per session in Nov. — highest in the state. The Daytime NTS is now well-established with good liaison and traffic flowing smoothly. QFN is having such good representation that very little traffic is left over for late sessions of EAST and NFPN. They need traffic to keep going. Traffic: W4MEE 719, K4SCL 484, WA4WDM 279, K45JH 275, WA4NBE 197, WB4WYV 184, W4NFK 173, W4EH 170, WA4JPV 169, WA4SCK 157, WB4AID 123, WB5QDW/4 110, W4WYR 91, K4CFV 78, WB4JW 65, W4IRA 66, W4DVO 64, K4EJK 62, W4YU 47, WA4GGV 47, K4BLM 47, K4YSN 46, W4QM 44, W4GPL 34, WA4GBC 29, W4NTE 27, K4TH 23, W4BK 21, W4PFK 17, WA4GNI 15, W4AIC 9, W4SMK 8, W4DRH 3, AB4FLW 1.

WEST INDIES: SCM, David Novoa, KP4BDL — The mini-hamfest held in Aguadilla by the Radio Club de Puerto Rico was a great success with good attendance and a lot of fun. Pres. KP4CV is very active. The new treas. is KP4ABN. KP4AOC will be the next abogadito of the Club. CP4s EAJ and EKJ back in the island after a 3-month expedition to Ascension Island. KP4ACM joined W6KG and W6QL and operated as VP2VCM from the BV1. KP4EJE active on 75. KP4BR1 and KP4DIM passed their Advanced Class exams. Because of the responsibilities of my new job I must reduce ham activities. Need the help of two Asst. SCMs. If interested please contact me.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DGS — RM: K7NHL, PAMs: WA7KQE W7UQQ. New officers of

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RECEIVER SPECIFICATIONS

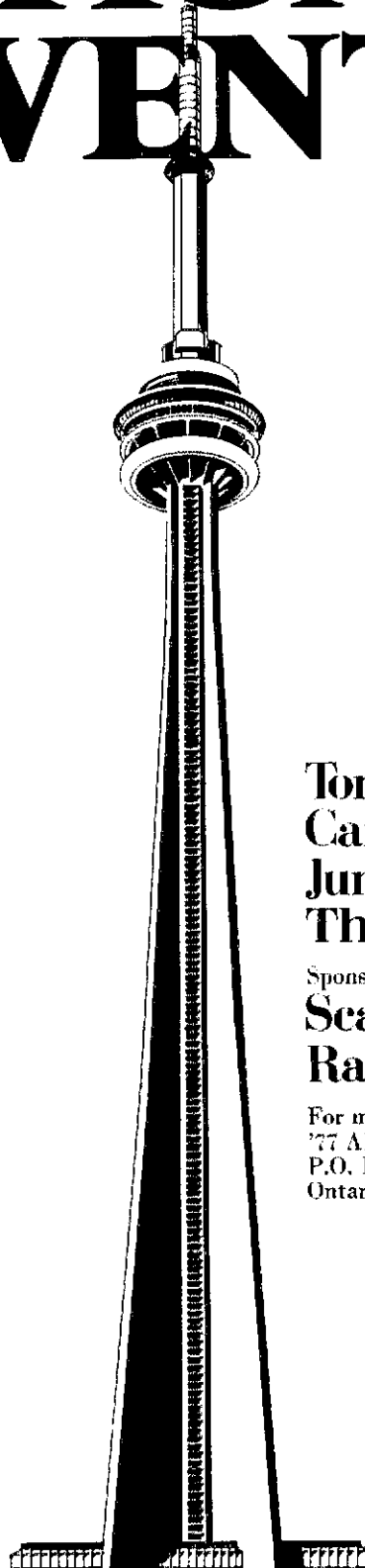
Frequencies: 143 to 148.995MHz **Usable Sensitivity (12dB sinad):** 0.35uV @ 50% audio. **Quieting Sensitivity (20dB):** 0.5uV minimum. **Squelch Threshold Sensitivity:** 0.25uV minimum. **Squelch Limit Sensitivity:** 2.0uV or less. **Modulation Acceptance Bandwidth:** $\pm 75\text{KHz}$ minimum. **Adjacent Channel Selectivity:** 70dB minimum. **Spurious Response Attenuation:** 70dB minimum. **Intermodulation Attenuation:** 60dB minimum. **Local Oscillator Frequency Stability:** ± 10 parts per million. **Audio Output Power:** 4.0 Watts into a 4 Ohm load @ less than 10% distortion. **Audio Frequency Response:** +2dB to -8dB from the standard 6dB per Octave de-emphasis from 300Hz to 3,000Hz. **Hum & Noise:** -50dB squelched and -30dB unsquelched. **Chassis Size:** 7 $\frac{1}{8}$ " W x 2 $\frac{3}{8}$ " H x 10". Specifications and prices subject to change without notice.

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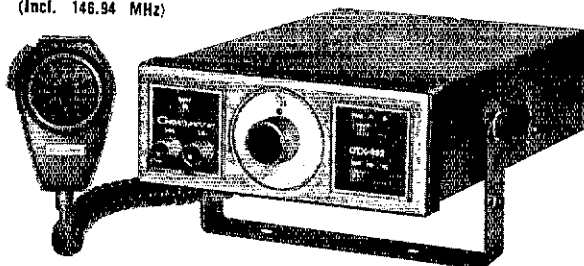
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| <input type="checkbox"/> GTX-200-T | \$249⁹⁵ | <input type="checkbox"/> Lambda/4 2-M and 6-M Trunk Antenna | \$29⁹⁵ |
| <input type="checkbox"/> GTX-200 | \$199⁹⁵ | <input type="checkbox"/> TE-I Tone Encoder Pad | \$59⁹⁵ |
| <input type="checkbox"/> GTX-10-S | \$149⁹⁵ | <input type="checkbox"/> TE-II Tone Encoder Pad | \$49⁹⁵ |
| <input type="checkbox"/> GTX-2 | \$189⁹⁵ | <input type="checkbox"/> PS-1 AC Power Supply for use with all makes of transceivers 14 VDC—6 amp | \$69⁹⁵ |
| <input type="checkbox"/> GTX-1 | \$249⁹⁵ | and the following standard crystals @ \$4.50 each | |
| <input type="checkbox"/> GTX-IT | \$299⁹⁵ | Non-standard crystals @ \$5.50 each: \$ _____ | |

Add \$4 per Radio for Shipping, Handling, and Crystal Netting.

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| <input type="checkbox"/> PS-18 Optional Nicad battery pack | \$29⁹⁵ |
| <input type="checkbox"/> PS-2 Charger for GTX-1(T) battery pack | \$39⁹⁵ |
| <input type="checkbox"/> GLC-1 Leather carrying case | \$12⁹⁵ |
| <input type="checkbox"/> TE-III Tone Encoder (for use with GTX-1) | \$49⁹⁵ |

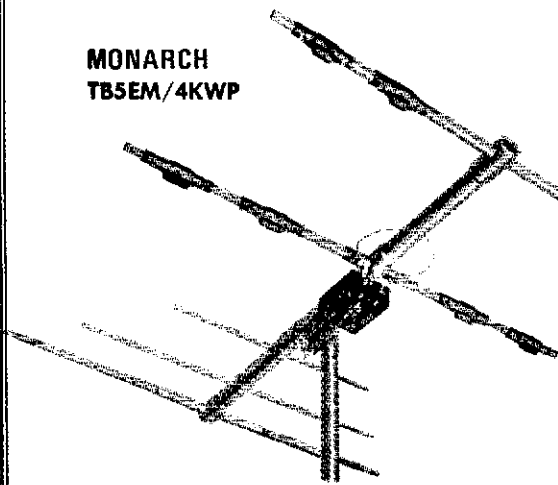
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the Scottsdale ARC are WB7DYD, pres.; WB7DYC, vice-pres.; W7KIH, secy.; WA7ZHJ, treas.; W7FCQ, trustee. W7GYX is the new chairman of the AZ chapter of QCWA. WA7YKM is now W7FH. New alternate RACES radio officers in Mohave County are W7JU, Bullhead City; WA7NGK, Lake Havasu City, and W7KAX, Kingman. W7YS has worked all 47 JA prefectures, and reports to Mountaineer. WNTFCT is pres. of the Flagstaff Junior HS ARC. Nets (Nov.), Cactus Net QNI 1.181, QTC 482; ATEN QNI 673, QTC 47; SWN QNI 279, QTC 158. ATEN certificates to K7NTG W7RQ K7NMQ, Traffic: (Nov.) K7NHL 214, WB7CAG 158, K7NTG 96, W7UJGQ 43, W7KQGE 40, WB7CMI, W7YFH 22, W7FDS 14, K7NMQ 6, WA7NHQ 4, K7GLA 4, W7RQ 1. (Oct.) WB7BGC 4.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM, Kevin A. Berasly, WB6OYN. SEC: W6SPK, RM: WB6PKA, Attn.: The 20th annual QCWA QSO Party starts 2300 UTC Feb. 11, and ends: 2300 UTC Feb. 13, 1977. This should be a very interesting event for national and foreign members. Information should appear in QST for more information on the SASE to Ralph Cabanilla, W6E9N, 2355 Creston Dr., Hollywood, CA 90068. News picked up recently is that QST will have to increase membership dues, so get a couple of years subscription ahead of time. W6ABE has been closed down due to jammers. They will be back on Jan. 1, 1977, in the meantime these individuals are attempting to disrupt other repeaters, fortunately with very little success. The San Fernando Valley RC held their second annual March of Dimes 20-mile superwalk, the event was again successful, under the watchful eyes of WB6IPY and W6LPJ. WB6YID complains that the Russian "Dotter" is heard over the entire 20-meter band from his QTH. (wonder what's wrong with their form of qth?) The local repeater group are readying the annual Christmas programs for the hospitals in the area, chaired by K6OYB ole Paul and with the able help of WB6YFT. W6CPM now settled down in W7-Land and new call is W7CL. From reading the club Bull's this month it seems that most clubs are either having Holiday parties or preparing for a QSO party. W6EYV is working with a group of young Novice applicants and hopes to have some eleven year olds ready for The tests soon. You fellows should be advised that my term as SCM ends in May and that I do not plan to re-run, what after 6 years? So it would be advisable to look around for a good Net operator while there is time. A new beginners class is starting up Jan. 4 at the Canyon Country High School Adult class at 7 PM, for those living in that area. Traffic: W6INH 252, W6EOE 132, W6HJ 109, K6CL 80, W6QAE 30, W6NKE 19, W6BRO 16, K6EA 14, WA6EYV 12, WB6YID 2.

ORANGE: SCM, Wm. Helttritter, WB6AKR — Asst. SCM: Dick Birbeck, K6CID. SEC: W6QAS, RMs: WA6TVA WB6AKR. WA6WYS reports NEN (Novice Emergency Net) has shifted back to Sat. 9:30 A.M. on 3.730. This net is excellent NT5 training net for all license classes. WA6WZO operating SSB only in the Bicentennial Contest placed fifty third overall. Congratulations to W6ROR for his 1000th and operated WA6WZO/WA6WZN in CW Sweepstakes with claimed scores of 601 QSOs 73 Sections as WA6WZO; 626 QSOs 73 Sections as WA6WZN. SSB Sweepstakes claimed by K6LL 1400 QSOs 75 Sections. New officers at the Orange County ARC: WA6WZO, pres.; WA6LFF, vice-pres.; K6LJA, treas.; W6WHC, secy. New officers at the Riverside ARC: WB6HKX, pres.; WA6NVN, vice-pres.; W6TDA, secy.-treas.; WA6KER, Comm. dir. Officers at the Fullerton ARC: W6QKE, pres.; WA6CGZ, vice-pres.; WA6DCB, secy.; K6ATK, treas. WB6AKR attended the Riverside ARC and the Morongo Basin (Yucca Valley) ARC 9th program on NTS Message Handling. Dester RATS ARC (Palm Springs) reports a Novice Net Thur. evenings on 3710 at 7:00 P.M. Anza Valley ARC has installed antennas for future repeater at the QTH of W6VJS in Pine Cove. The repeater is being built by W6ITG who now is WB6SKL. WB6AKR acquired a Kenwood TR-220A. Traffic: WB6WZ 574, WA6TVA 135, W6QBD 48, W6RE 46, W6CPB 31, WB6AKR 27, WA6QB 26, WB6SKL 11, WA6WYS 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — ECs by District: W6PZU Northern, W6INI Central, WA6UFY Eastern, K6JES Southern. Appointees are reminded that a report must be filed with the NTS by the 4th. Newcomers heard on 2 mtr tm: W6GWY W6KD WA6WMM. Additions to AREC: K6BY WA6DIT WA6EOD WB6KYG W6LEY WA6LZA WA6MFF WA6PWH WA6UJB. Upgraded to Gen.: WA6MAE. New Telephone Company Club (TRAC) has K6VV, pres.; W6ERF, vice-pres.; WA6RYZ, secy.-treas. New officers for Palomar RC: WA6KZN, pres.; WA6WVX, vice-pres.; WA6AEZ, secy.; K6SLA, treas. ARC of El Cajon 1977 officers: WA6WJP, pres.; WB6DPO, vice-pres.; WA6MHZ, secy.; WA6JQL, treas. WB6HCF transferred to Guam by Navy. W6SIF made first traffic report in over 40 yrs. What are YOU doing for Amateur Radio? Participation in the National Traffic System or the Amateur Radio Emergency Corps will provide many opportunities for public service. Contact me (page 8) for info. WA4YPF (ex-WA6JSY) on 14270 0800 local. Traffic: (Nov.) WB6PVH 360, WB6FTY 254, K6JES 70, W6PZU 40, W6DEY 28, W6BGF 24, W6SIF 11. (Oct.) WA6UFY 18.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI — PAM still needed for the section net which meets on 3935 Wed. at 2000. WA6BLS filling the spot temporarily. W6RIC has taken over as EC in the Ventura Co. K6YNB writing for QST and recovering from a severe auto accident. W6ITW again busy with patches to KC4AAC. The Ventura Co. Club installation dinner was a success with WB6CNO guest speaker. Their auction is set for Feb. 11 at the Oxnard Community Center. They also are sponsoring a code class in Jan. The new pres. of the Satellite ARC is WA6IET. W6OAL gave an OSCAR presentation at the Sulphur Mountain meeting. Santa Barbara City now has 175 members and W6KNC was quest speaker on DX operation. WA6MHA now on RTTY. Hams in Simi Valley took up the new Simi Valley Settlers Amateur Radio Club. PSHR: WA6VBS 30, W6ITW 15, W6BBO 16, WA6DEI 24. Traffic: WB5KPL 140, WA6VBS 102, AB6CWE 98, WA6MBZ 80, WA6DEI 27, W6JTA 9, WB6BBO 2.

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OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Last month, I issued a challenge regarding Holiday Traffic,

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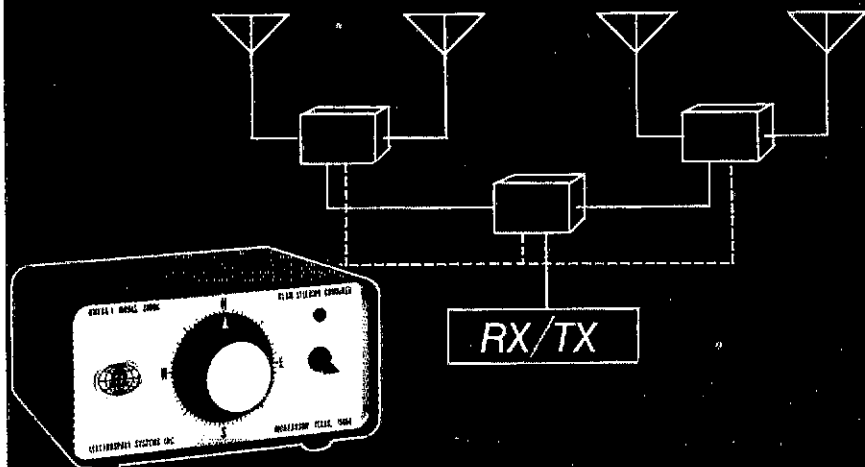
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and what happens; Nov. traffic total is down. I hope that changes real fast when the Dec. reports come in. Tulsa Repeater Organization added to their Public Service laurels when they put the WX Bureau on the air and now are pushing the sale of single channel monitor receivers for this very fine service. 1977 officers for Tulsa Repeater Org.: K5ONM WB5OOL & WB5CME. Officers for Woodward are WB5OVQ and W5YQR with Donna Reid as secy. K5CXC now K5EA, K5TCG now K5II. WB5SOH WB5SAG WB5UDR and WB7EYT are active on OAH. WB5RXZ active in phone nets and soon will be an OPS & QRS. WB9TPF new call for Enid High School ARC. WR5ARU new repeater at Vicq. W5UWH has classes going on College Campus at Wilburton. Altus also using College facilities. WB5WEW WB5VXM WB5ZXX WB5YRN WB5TPF WB5XHR & WB5XHT among the new calls recently heard. Traffic: W5REC 249, WB5NKD 238, W5RB 161, WB5KGP 58, WB5RXZ 53, WB5NKC 52, WB5AZS 46, WB5UG 43, WB5ELG 33, WB5FKL 33, WB5FSI 33, WB5PVL 27, K5ZDB 18, WB5OCZ 15, WB5OYU 6, WA5OUV 6.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W6KR - Asst. SCM/PAM; WB5AMN. SEC. WB5TOP. FM WB5UE. QRS reporting this month: WB5CIT, K5HGB WA5LIG. QVSS reporting this month: WB5CIT K5ZMS. QRS WA5YEA is new QRS. QRS/EC W6UJJ busy on nets and picking up surplus test gear. OPS K5RVF reports Jefferson County Amateurs handled communications for Boy Scout Good Will Sun., used two meters. EC WB5TNN needs manual for Teltronics 545 scope, appointed W5YI and WA5RVT as asst. ECs for Brazoria County; Brazoria ARC has nine new Novices; WB5UVI and WB5UER upgraded to General. W5HNS has thanks to WB5XJK and WB5KCA for help in raising two-element quad; WB5XJK and WB5XPP new husband-wife team on Novice bands. OO K5HGB says busy getting back on NAVMARS. QRS WA5JYH enjoying new Drake TXB and RXB; has had 12 new Novices licensed this fall, 6 more soon. QV5/OO WB5CIT busy with installation new rotator. WB5ILK reports El Paso ARC W5ES has graduated 6 new Novices; new officers for 1977 - K4YUA, pres.; WB5MBL, vice-pres.; WB5ILK, secy.; W6QVH, treas. QV5 K5ZMS SMIRK No. 1, sent big report on 6-mtr activity; sent it to VHF editor. Traffic: (Nov.) W5KLV 384, K5HZR 333, WA5YEA 266, WA5VBM 158, W5UJJ 125, WB5NUM 85, K5ZSI 62, WB5GVO 58, WA5JYH 52, W5KR 23, W5BHO 12, WB5TNN 7, K5RVF 2. (Oct.) W5UJJ 153.

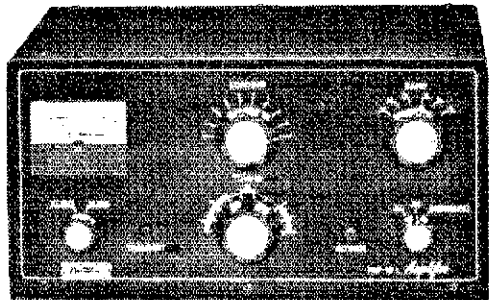
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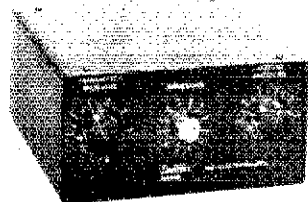
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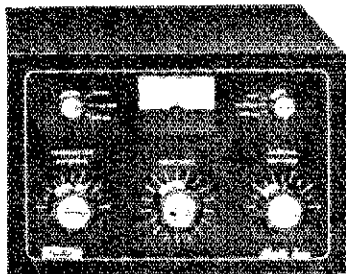
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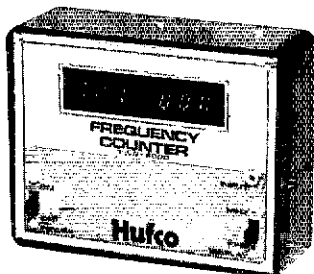
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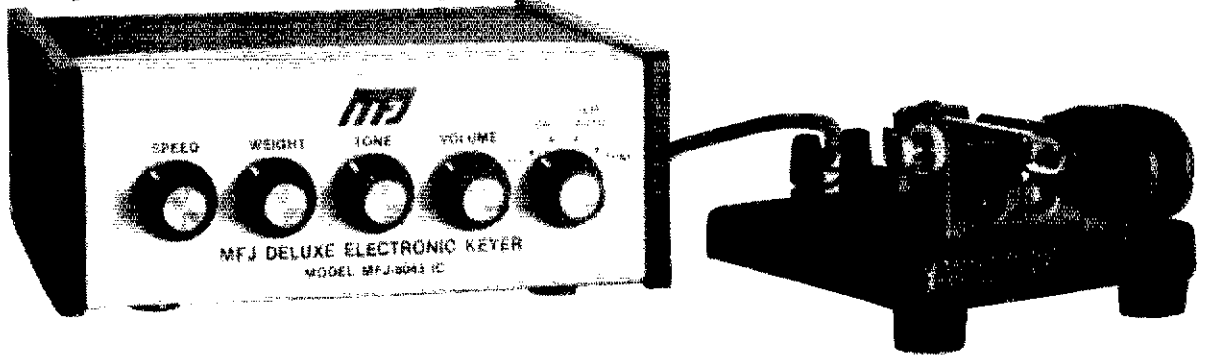
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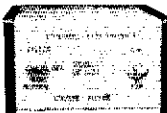
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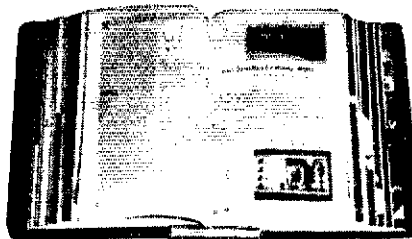
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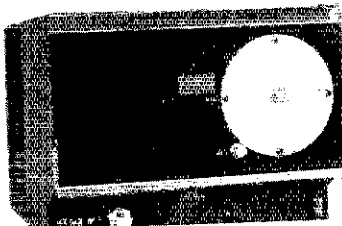
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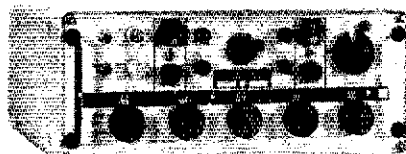
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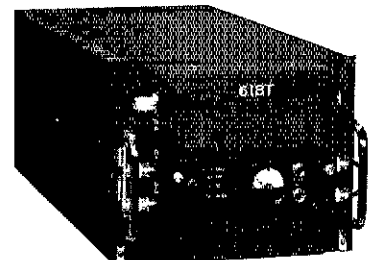
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- Over-voltage protection crowbar.
- Electrostatic shield for added transient surge protection.
- A foldback output limiter operates for loads outside of the operating range.
- Isolation from ground. The circuit is isolated from the case and ground.
- 115/220 volt input - 50/60 cycle.
- Units are factory wired for 110 volt AC, 50/60 cycle power. A simple jumper will reconfigure the input for 220 volt AC, 50/60 cycles.
- Temperature range-operating 0 to +55 C.
- Black anodized aluminum finish.

SPECIFICATIONS

Voltage Output:
adjustable between 10-15V
Load Regulation:
2% from no load to 20 amps
Current Output:
25 amps intermittent
(50% duty cycle)
20 amps continuous
Ripple:
50 mV at 20 amps
Weight:
25 pounds
Size:
12 1/4" x 6 3/4" x 7 1/2"

PS25M wired & tested	\$169.95
PS25C wired & tested (without meters)	\$149.95
PS25M Kit	\$149.95
PS25C Kit (without meters)	\$129.95

Export prices slightly higher. Prices subject to change.

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COLORADO
Listening Post & Electromagnetics, Durango, CO
Communication Specialties, Aurora, CO

FLORIDA
Amateur Wholesale Elec's., Miami, FL
West Indies Sales Co., Ltd., Miami FL

ILLINOIS
Klaus Radio, Inc., Peoria, IL
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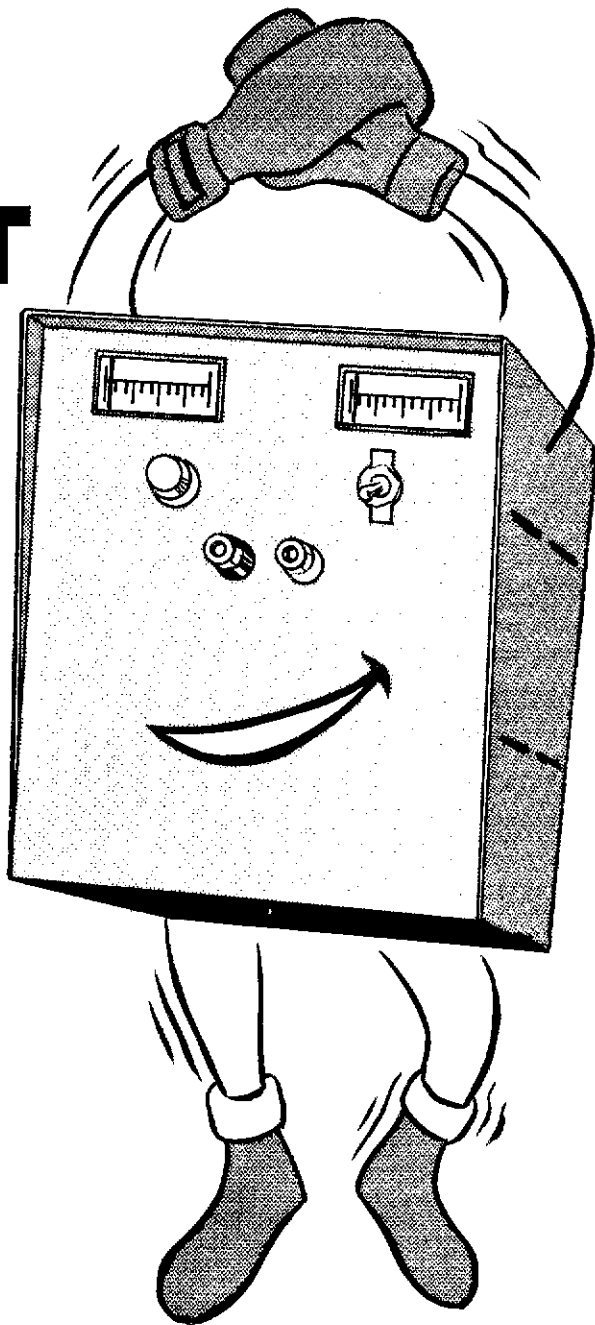
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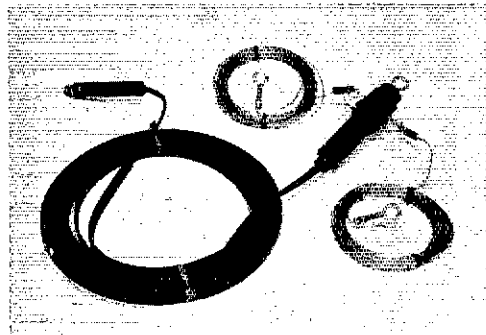
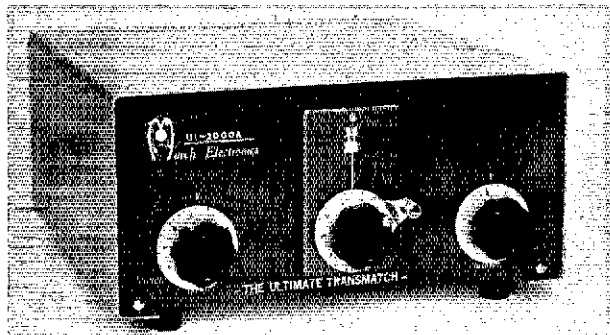
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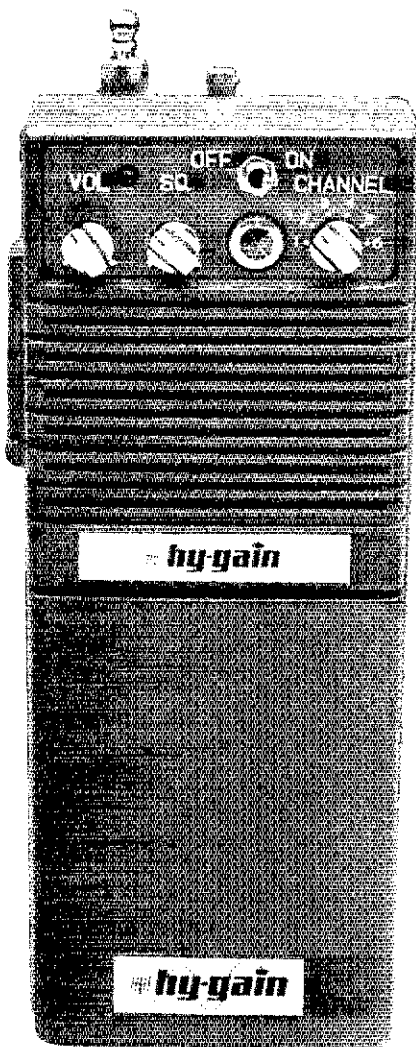
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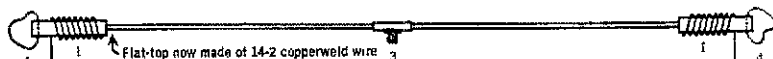
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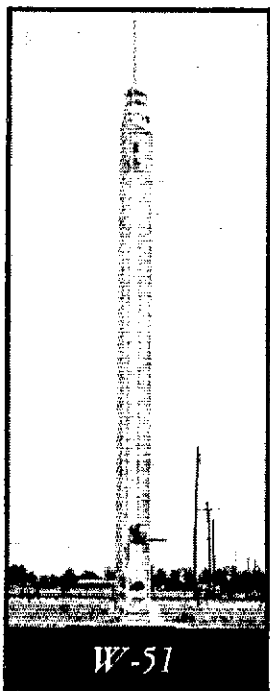
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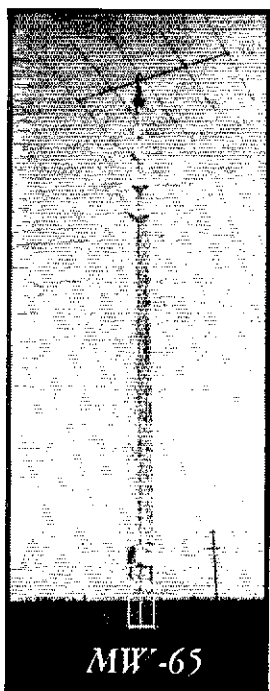
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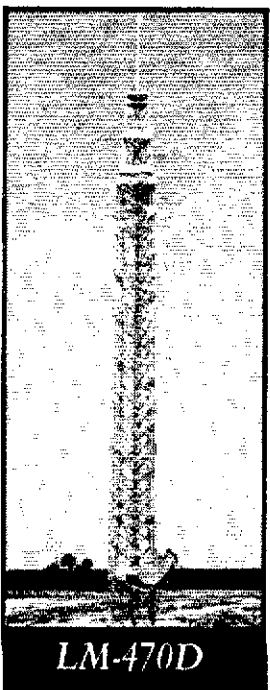
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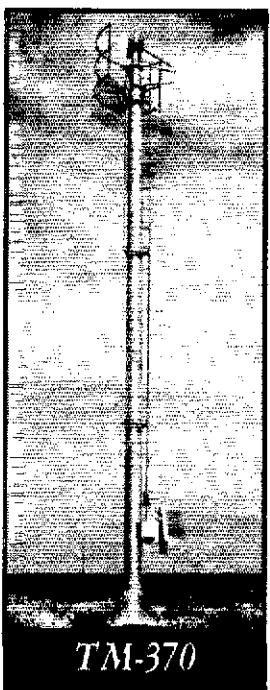
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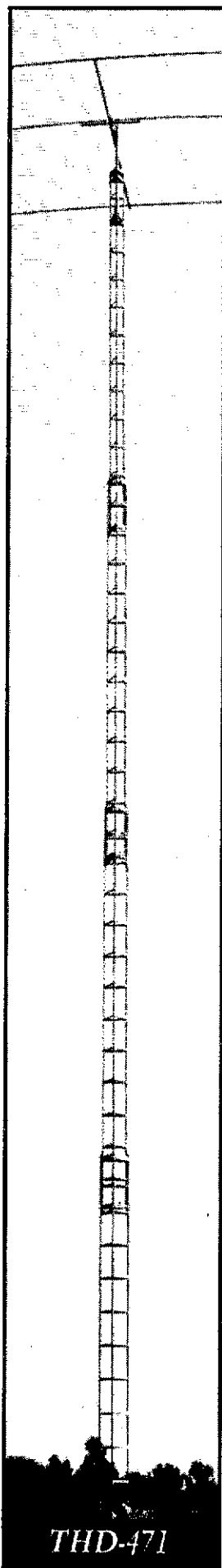
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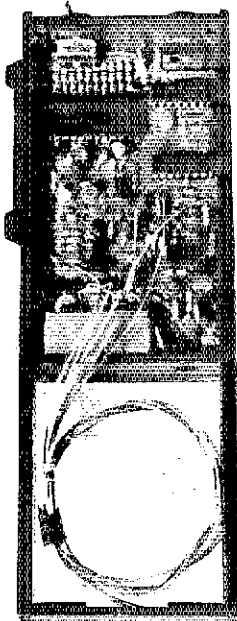
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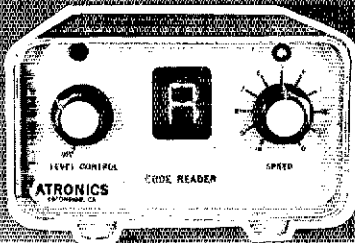
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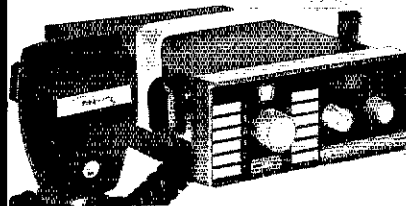
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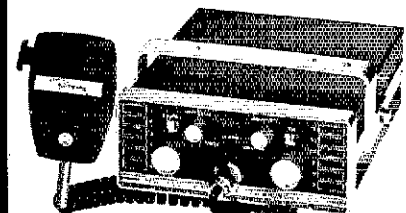
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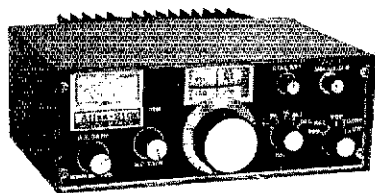
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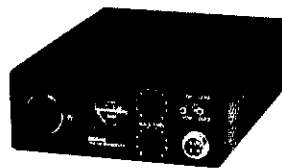
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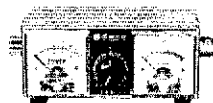
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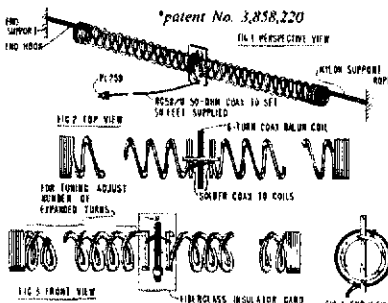
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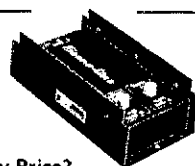
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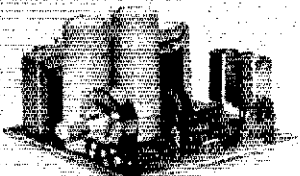
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1N459 to 1N461	2N720 28 2N4011 1-81	CP642 54 00	LM3045 6 1-16	LM3045 6 1-16
1N462 to 1N464	2N722 31 2N4012 50 74	CP654 54 00	LM3045 6 1-16	LM3045 6 1-16
1N465 to 1N467	2N724 35 2N4013 50 74	CP658 54 00	LM3045 6 1-16	LM3045 6 1-16
1N468 to 1N470	2N726 39 2N4014 50 74	CP662 54 00	LM3045 6 1-16	LM3045 6 1-16
1N471 to 1N473	2N728 43 2N4015 50 74	CP666 54 00	LM3045 6 1-16	LM3045 6 1-16
1N474 to 1N476	2N730 47 2N4016 50 74	CP670 54 00	LM3045 6 1-16	LM3045 6 1-16
1N477 to 1N479	2N732 51 2N4017 50 74	CP674 54 00	LM3045 6 1-16	LM3045 6 1-16
1N480 to 1N482	2N734 55 2N4018 50 74	CP678 54 00	LM3045 6 1-16	LM3045 6 1-16
1N483 to 1N485	2N736 59 2N4019 50 74	CP682 54 00	LM3045 6 1-16	LM3045 6 1-16
1N486 to 1N488	2N738 63 2N4020 50 74	CP686 54 00	LM3045 6 1-16	LM3045 6 1-16
1N489 to 1N491	2N740 67 2N4021 50 74	CP690 54 00	LM3045 6 1-16	LM3045 6 1-16
1N492 to 1N494	2N742 71 2N4022 50 74	CP694 54 00	LM3045 6 1-16	LM3045 6 1-16
1N495 to 1N497	2N744 75 2N4023 50 74	CP698 54 00	LM3045 6 1-16	LM3045 6 1-16
1N498 to 1N500	2N746 79 2N4024 50 74	CP702 54 00	LM3045 6 1-16	LM3045 6 1-16
1N501 to 1N503	2N748 83 2N4025 50 74	CP706 54 00	LM3045 6 1-16	LM3045 6 1-16
1N504 to 1N506	2N750 87 2N4026 50 74	CP710 54 00	LM3045 6 1-16	LM3045 6 1-16
1N507 to 1N509	2N752 91 2N4027 50 74	CP714 54 00	LM3045 6 1-16	LM3045 6 1-16
1N510 to 1N512	2N754 95 2N4028 50 74	CP718 54 00	LM3045 6 1-16	LM3045 6 1-16
1N513 to 1N515	2N756 99 2N4029 50 74	CP722 54 00	LM3045 6 1-16	LM3045 6 1-16
1N516 to 1N518	2N758 103 2N4030 50 74	CP726 54 00	LM3045 6 1-16	LM3045 6 1-16
1N519 to 1N521	2N760 107 2N4031 50 74	CP730 54 00	LM3045 6 1-16	LM3045 6 1-16
1N522 to 1N524	2N762 111 2N4032 50 74	CP734 54 00	LM3045 6 1-16	LM3045 6 1-16
1N525 to 1N527	2N764 115 2N4033 50 74	CP738 54 00	LM3045 6 1-16	LM3045 6 1-16
1N528 to 1N530	2N766 119 2N4034 50 74	CP742 54 00	LM3045 6 1-16	LM3045 6 1-16
1N531 to 1N533	2N768 123 2N4035 50 74	CP746 54 00	LM3045 6 1-16	LM3045 6 1-16
1N534 to 1N536	2N770 127 2N4036 50 74	CP750 54 00	LM3045 6 1-16	LM3045 6 1-16
1N537 to 1N539	2N772 131 2N4037 50 74	CP754 54 00	LM3045 6 1-16	LM3045 6 1-16
1N540 to 1N542	2N774 135 2N4038 50 74	CP758 54 00	LM3045 6 1-16	LM3045 6 1-16
1N543 to 1N545	2N776 139 2N4039 50 74	CP762 54 00	LM3045 6 1-16	LM3045 6 1-16
1N546 to 1N548	2N778 143 2N4040 50 74	CP766 54 00	LM3045 6 1-16	LM3045 6 1-16
1N549 to 1N551	2N780 147 2N4041 50 74	CP770 54 00	LM3045 6 1-16	LM3045 6 1-16
1N552 to 1N554	2N782 151 2N4042 50 74	CP774 54 00	LM3045 6 1-16	LM3045 6 1-16
1N555 to 1N557	2N784 155 2N4043 50 74	CP778 54 00	LM3045 6 1-16	LM3045 6 1-16
1N558 to 1N560	2N786 159 2N4044 50 74	CP782 54 00	LM3045 6 1-16	LM3045 6 1-16
1N561 to 1N563	2N788 163 2N4045 50 74	CP786 54 00	LM3045 6 1-16	LM3045 6 1-16
1N564 to 1N566	2N790 167 2N4046 50 74	CP790 54 00	LM3045 6 1-16	LM3045 6 1-16
1N567 to 1N569	2N792 171 2N4047 50 74	CP794 54 00	LM3045 6 1-16	LM3045 6 1-16
1N570 to 1N572	2N794 175 2N4048 50 74	CP798 54 00	LM3045 6 1-16	LM3045 6 1-16
1N573 to 1N575	2N796 179 2N4049 50 74	CP802 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N627 to 1N629	2N832 251 2N4067 50 74	CP874 54 00	LM3045 6 1-16	LM3045 6 1-16
1N630 to 1N632	2N834 255 2N4068 50 74	CP878 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N648 to 1N650	2N846 279 2N4074 50 74	CP902 54 00	LM3045 6 1-16	LM3045 6 1-16
1N651 to 1N653	2N848 283 2N4075 50 74	CP906 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N657 to 1N659	2N852 291 2N4077 50 74	CP914 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N666 to 1N668	2N858 303 2N4080 50 74	CP926 54 00	LM3045 6 1-16	LM3045 6 1-16
1N669 to 1N671	2N860 307 2N4081 50 74	CP930 54 00	LM3045 6 1-16	LM3045 6 1-16
1N672 to 1N674	2N862 311 2N4082 50 74	CP934 54 00	LM3045 6 1-16	LM3045 6 1-16
1N675 to 1N677	2N864 315 2N4083 50 74	CP938 54 00	LM3045 6 1-16	LM3045 6 1-16
1N678 to 1N680	2N866 319 2N4084 50 74	CP942 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N687 to 1N689	2N872 331 2N4087 50 74	CP954 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N699 to 1N701	2N880 347 2N4091 50 74	CP970 54 00	LM3045 6 1-16	LM3045 6 1-16
1N702 to 1N704	2N882 351 2N4092 50 74	CP974 54 00	LM3045 6 1-16	LM3045 6 1-16
1N705 to 1N707	2N884 355 2N4093 50 74	CP978 54 00	LM3045 6 1-16	LM3045 6 1-16
1N708 to 1N710	2N886 359 2N4094 50 74	CP982 54 00	LM3045 6 1-16	LM3045 6 1-16
1N711 to 1N713	2N888 363 2N4095 50 74	CP986 54 00	LM3045 6 1-16	LM3045 6 1-16
1N714 to 1N716	2N890 367 2N4096 50 74	CP990 54 00	LM3045 6 1-16	LM3045 6 1-16
1N717 to 1N719	2N892 371 2N4097 50 74	CP994 54 00	LM3045 6 1-16	LM3045 6 1-16
1N720 to 1N722	2N894 375 2N4098 50 74	CP998 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N726 to 1N728	2N898 383 2N4100 50 74	CP1006 54 00	LM3045 6 1-16	LM3045 6 1-16
1N729 to 1N731	2N900 387 2N4101 50 74	CP1010 54 00	LM3045 6 1-16	LM3045 6 1-16
1N732 to 1N734	2N902 391 2N4102 50 74	CP1014 54 00	LM3045 6 1-16	LM3045 6 1-16
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1N744 to 1N746	2N910 407 2N4106 50 74	CP1030 54 00	LM3045 6 1-16	LM3045 6 1-16
1N747 to 1N749	2N912 411 2N4107 50 74	CP1034 54 00	LM3045 6 1-16	LM3045 6 1-16
1N750 to 1N752	2N914 415 2N4108 50 74	CP1038 54 00	LM3045 6 1-16	LM3045 6 1-16
1N753 to 1N755	2N916 419 2N4109 50 74	CP1042 54 00	LM3045 6 1-16	LM3045 6 1-16
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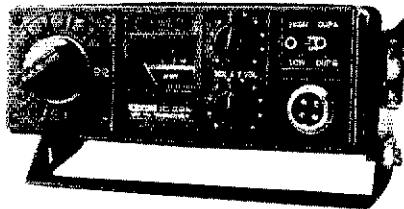
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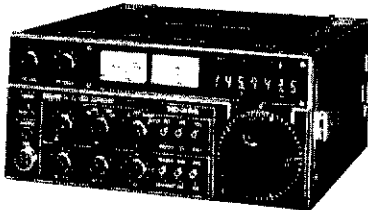
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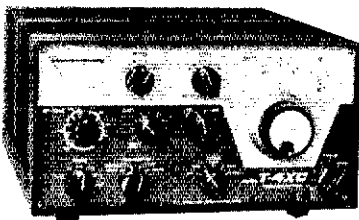


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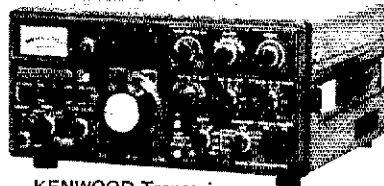


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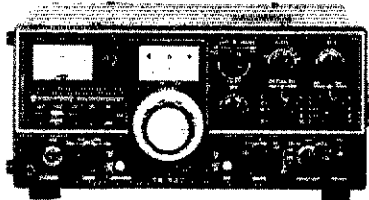


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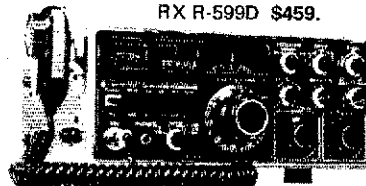
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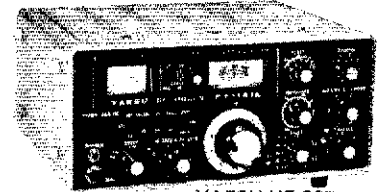
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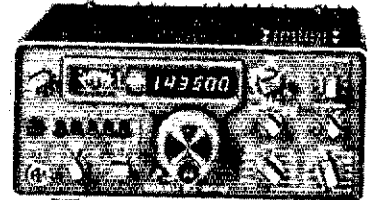


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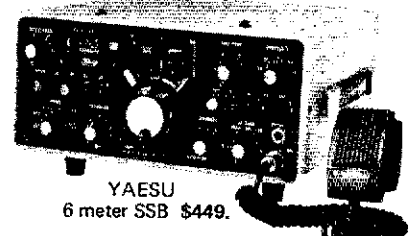
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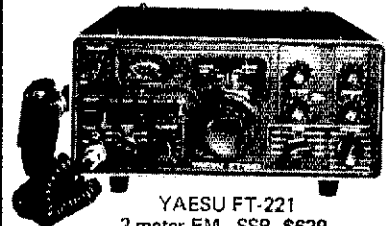
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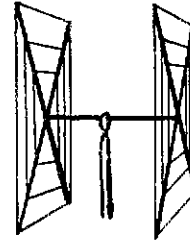
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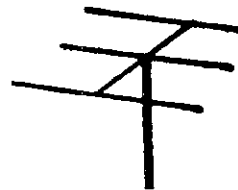
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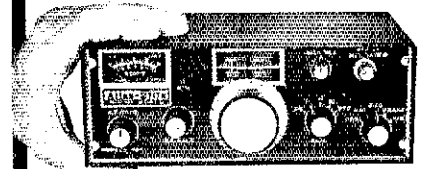
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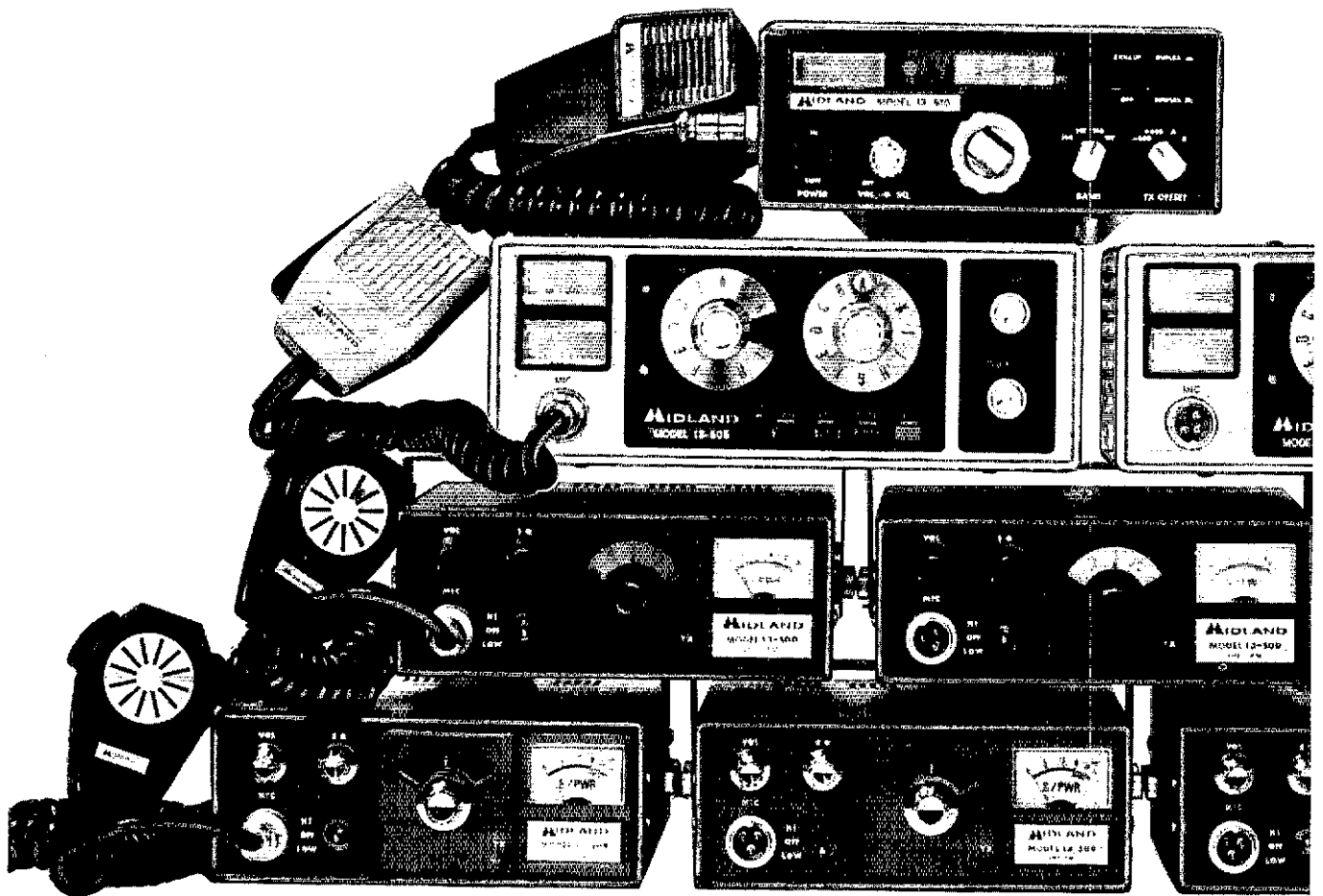
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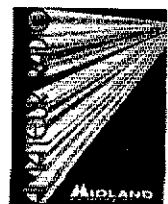
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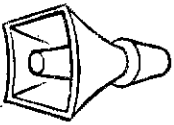
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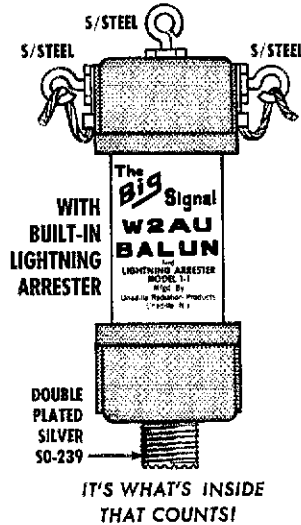


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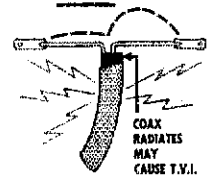
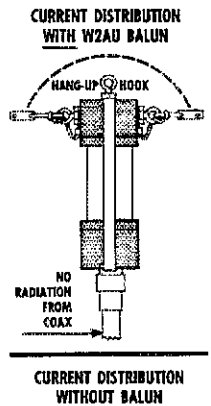
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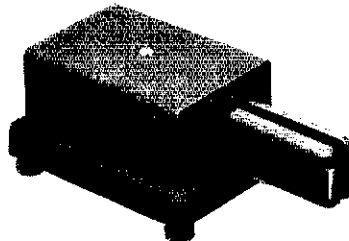
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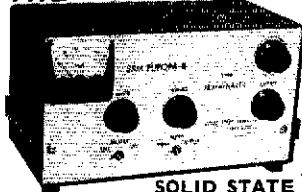
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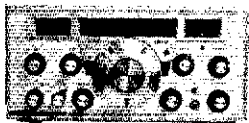
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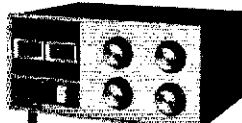
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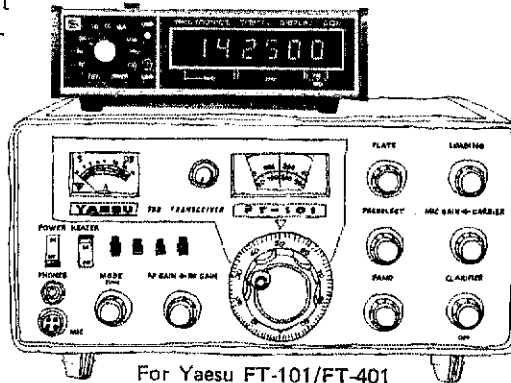
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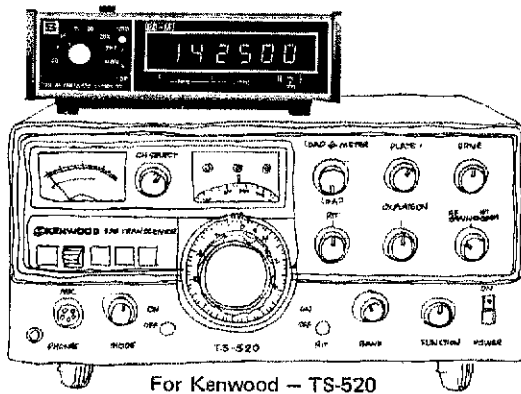
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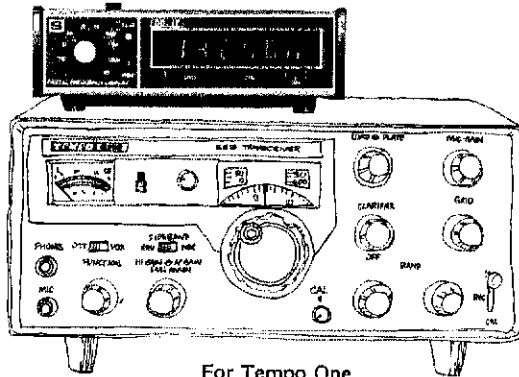
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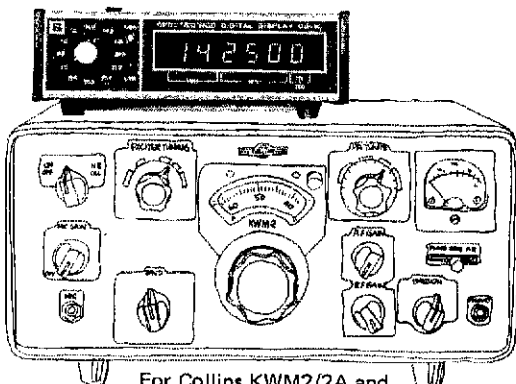
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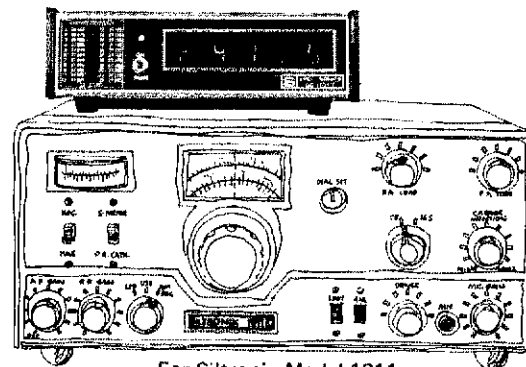
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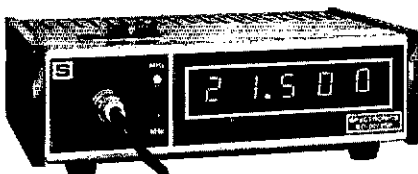
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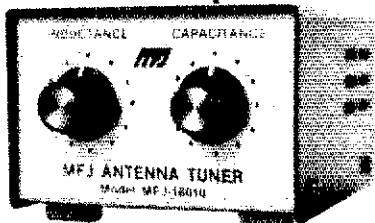
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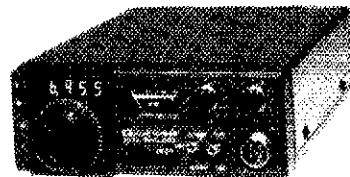
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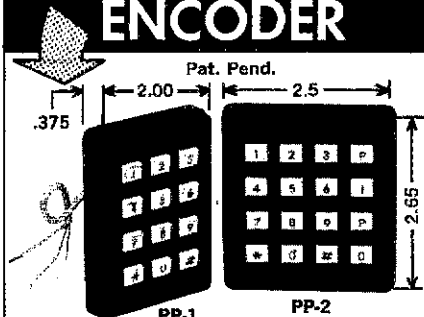


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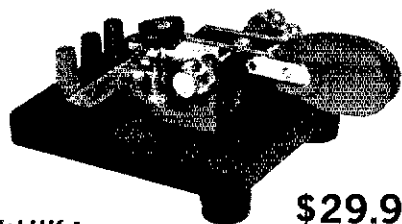
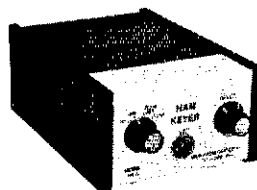
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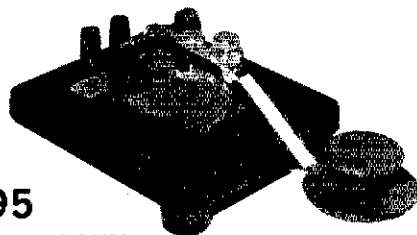


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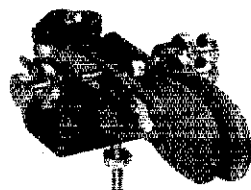
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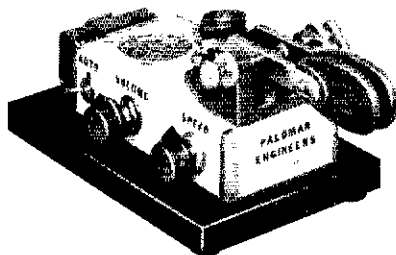
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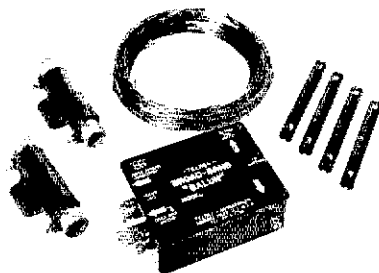
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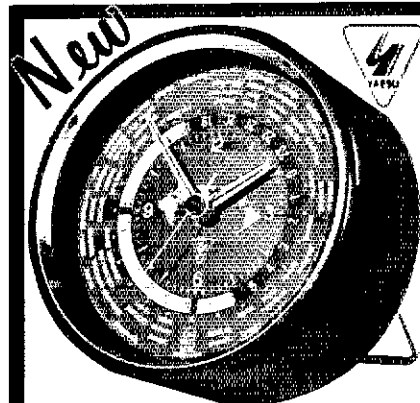
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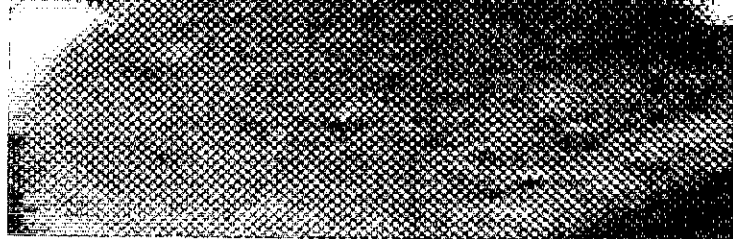
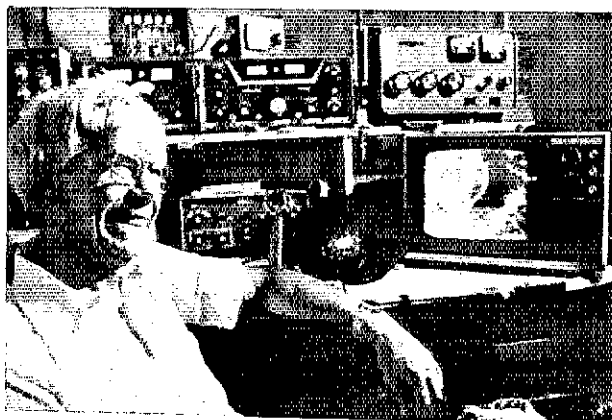
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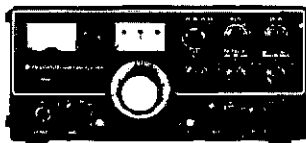
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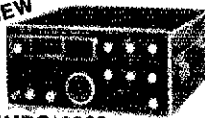
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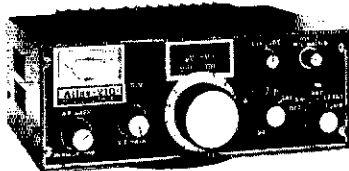


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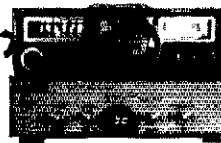
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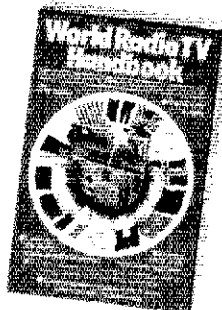
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NEW! FM144-10SXRII

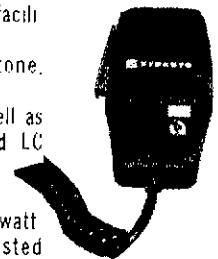


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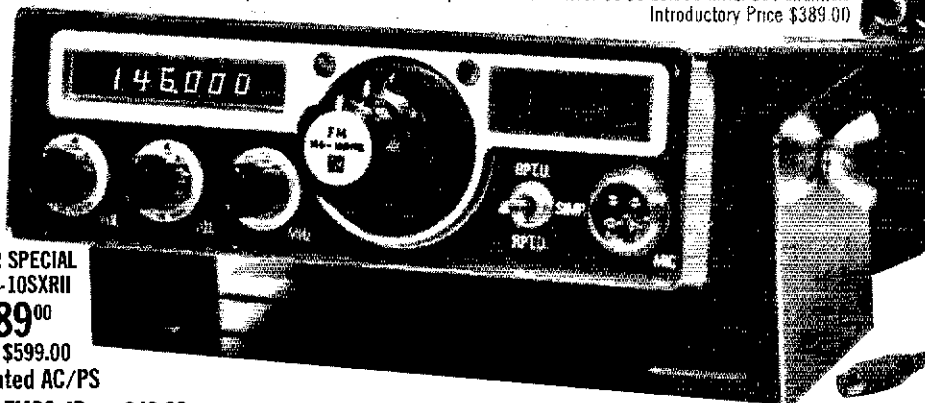
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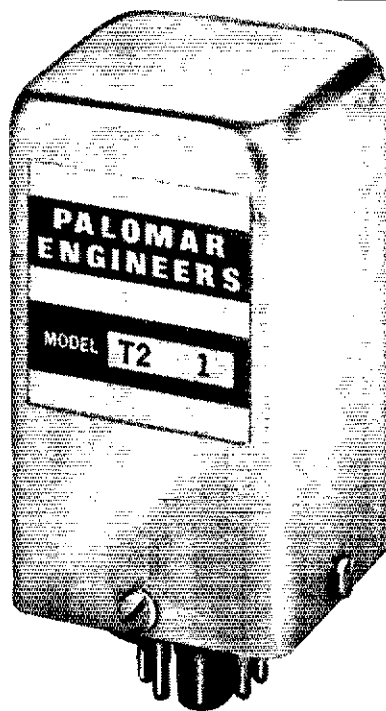
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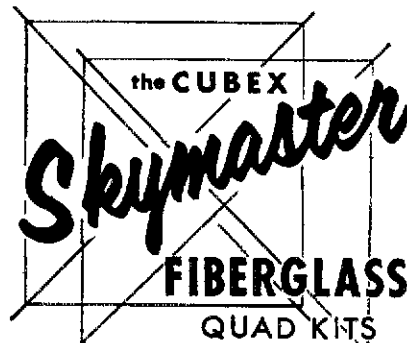
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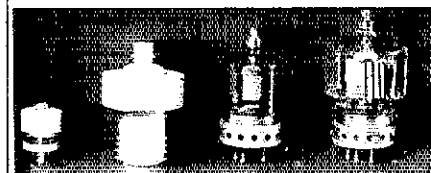
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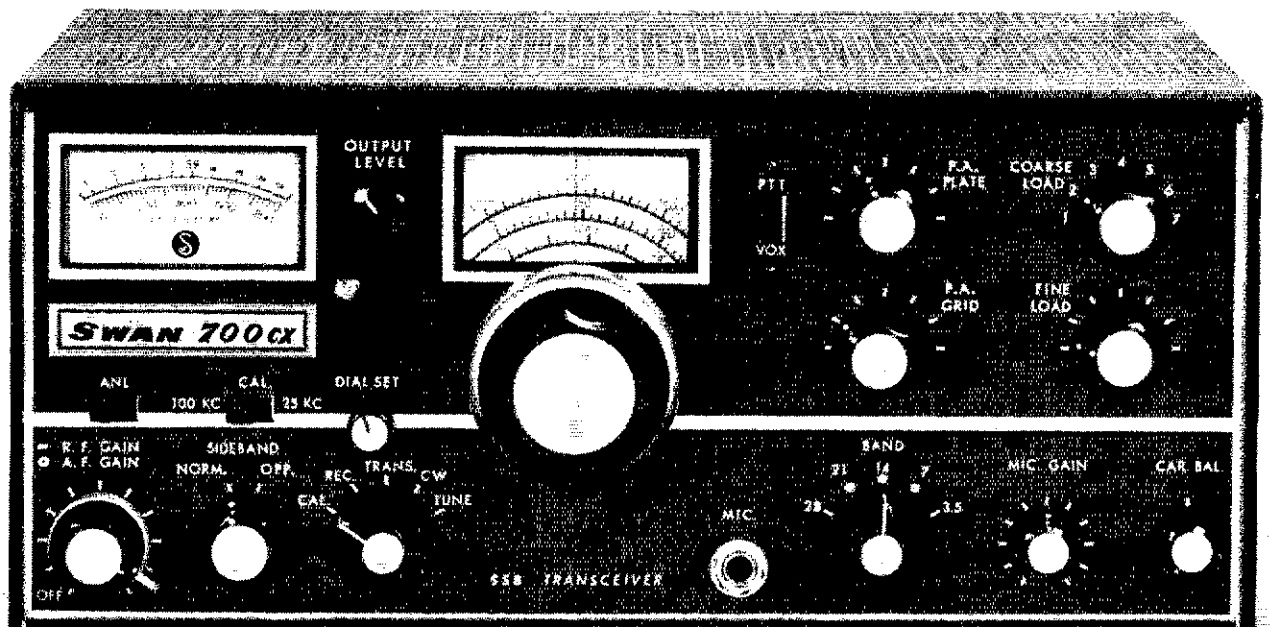
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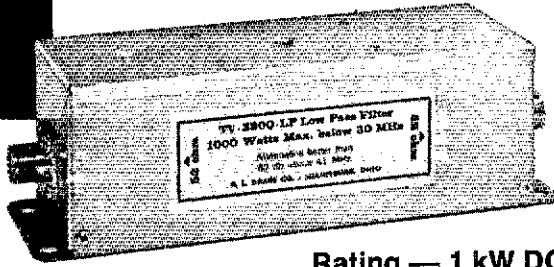
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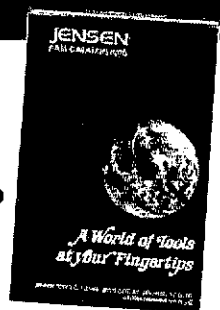
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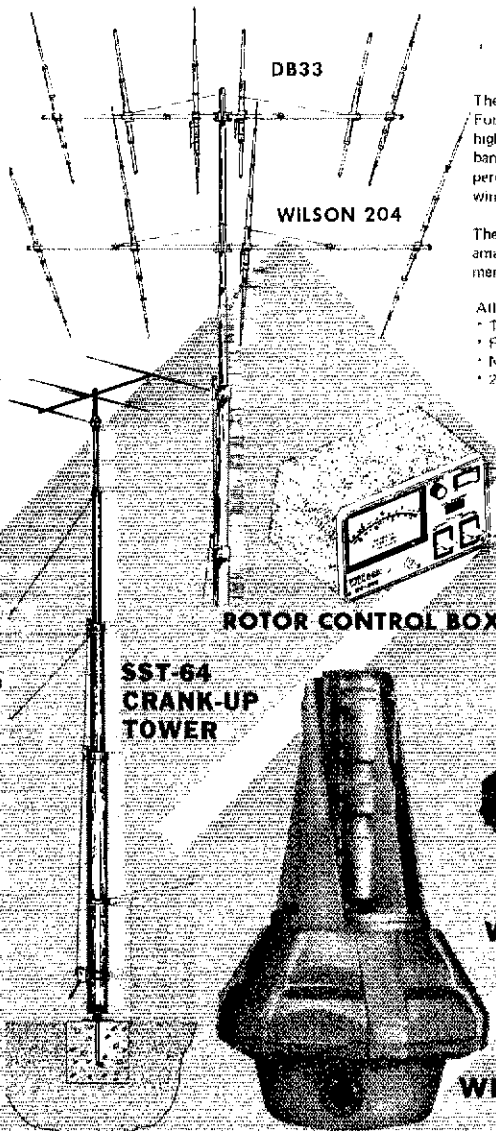
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WR 500 ROTOR

WR 1000 ROTOR

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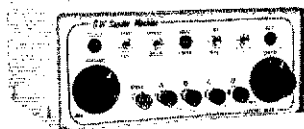
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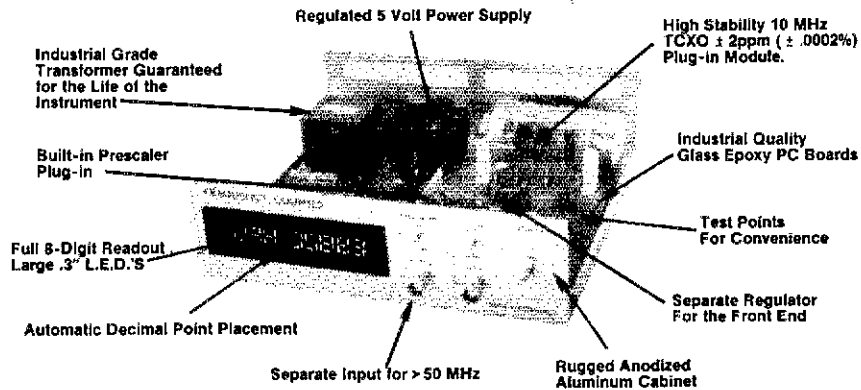
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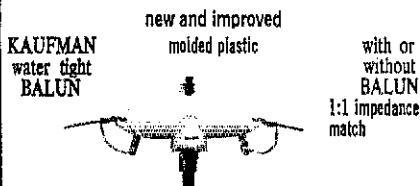
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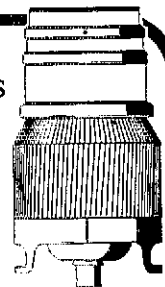
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thoughts to consider about the New Drake TR-4Cw



Of the many questions and comments we receive, we feel the following are very significant. Please spend a moment, and consider these points with us:

The TR-4Cw still uses tubes.

True. While using a combination of transistors and tubes, the TR-4 system makes greater use of tubes. Tubes are easy to change, and with the use of a spares kit, they can be readily replaced from the jungles of the Amazon to the arctic tundra—anytime, anyplace.

Also, the TR-4 system uses a *triple* tube power amplifier. It runs more power *output* than most transceivers run *input*. Serious DX-ers and contesters know the value of power when the going gets rough in heavy QRM. The system is also ideal to drive the various grounded grid linears that require higher drive levels.

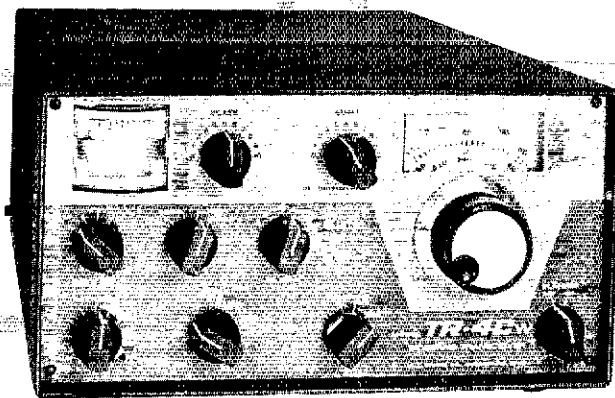
The TR-4 system has been around a long time— what does it offer me today?

True again. The system has been around, and improved, over a 13 year period. It is one of the most "bug-free" systems we know.

Interestingly, the TR-4Cw offers some features still not found on most "new" rigs today. For example, frequency tuning in the TR-4 system is accomplished by the use of a precision permeability tuned oscillator (PTO). This makes use of a slug traveling through a coil instead of the older variable capacitor technique. The PTO gives us extra good frequency stability and dial linearity. Speaking of something old, the variable capacitor technique dates back over 50 years!

The cw filter in the TR-4Cw can be independently switched from the front panel. You're not "locked" in to the cw filter when in cw mode as in most transceivers. Many operators prefer to tune randomly with the wider filter. You can do it with the TR-4Cw.

The optional 34PNB noise blanker works so well, you'll have to try it to believe it! It's a miniature 17 transistor receiver with full noise gating functions. Try it in a side by side test at your dealer's.



And what about service on the TR-4Cw?

We service what we sell, and parts are always available. After nearly 20 years, we are still able to service Drake 1-A receivers, so we know there are many in use today. We've been around since 1943, and we fully intend to serve radio amateurs for the long haul. Does the other company you may be considering have the same intentions?

We do—and we have the track record to prove it!

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(2) The Ham-Ad rate is 60 cents per word. A special rate of 20 cents per word will apply to individuals who want to dispose of or acquire personal ham gear, on a one-to-one, one-time basis.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising, before their ad can appear.

The publishers of QST are unable to vouch for the integrity or for the grade or character of the products or services advertised except those obviously commercial in character.

Clubs/Hamfests

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., 2012 Rockingham St., McLean VA 22101.

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HAMFEST — Princeton, Illinois, June 5, 1977. Mail S.A.S.E. for information, after April 1, to Starved Rock Radio Club, WRMKS/WRS/AFG, RFD 1, Box 171, Oglesby IL 61348. 815-657-4614.

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A Big THANK YOU to everyone who attended the First Annual Sangamon Valley Radio Club Hamfest at New Berlin, Illinois on September 26, 1976. Your attendance made the event a huge success and we'll be back next year, bigger and better, on Sunday, September 25, 1977. See you there!

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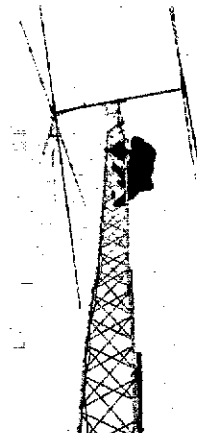
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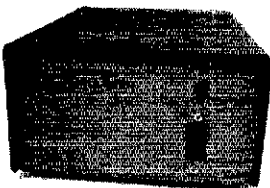
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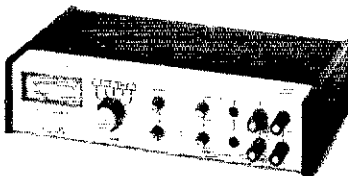
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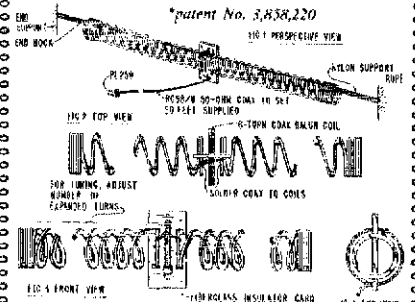
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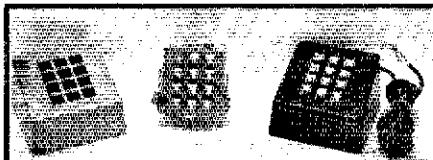
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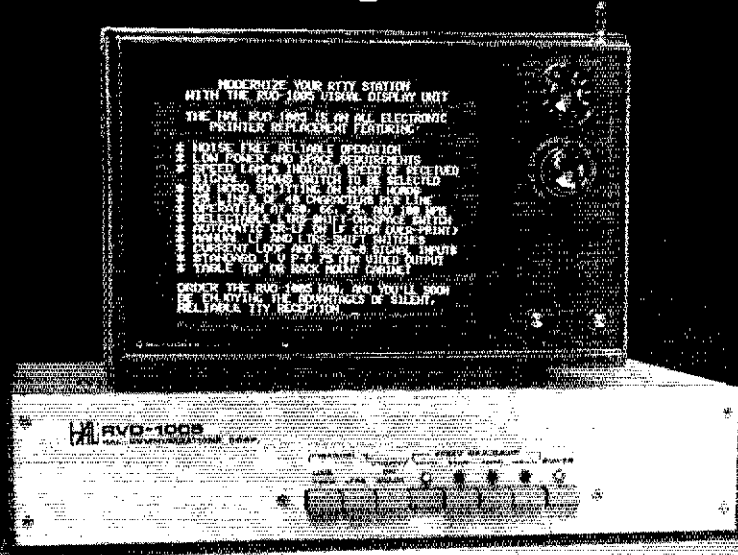
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FOR SALE: Millen Jr. 300 watt Transmatch. Like new. Sac. for \$80. W3GFQ, 6212 Foster Drive, Morrisville PA 19067.

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YAESU FT101B \$450. Heathkit SB-610 \$80. Venus Slow Scan Receiver \$175. Al Walker, WB2DYP 516-368-6482.

WANTED: Allied A-2515 rcvr manual or schematic. Will copy and return. WB9GMV, 5630 Forest Hill Dr. Apt. 102, Clarendon Hills, IL 60514.

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FOR SALE: CX7A, one of the last made, mint inside and out, inspection invited - \$1000. Jack Yeoman, WBVHY, 2824 Yeoman Rd., Washington C.H. OH 43160. 614-335-6297.

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SB-401, SB-301, SB-600 \$470, excellent condition with manuals. John Anderson WA8UNP. 614-457-4163.

FOR SALE: Heathkit HW-202 2-meter transceiver with 6 channels supplied, very good condition, \$165. 12-volt power supply for base use, \$15. Take both, \$175. firm. Mark, WA25HR, 25 Villa Place, Easton-town NJ 07724, 201-542-7053.

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COLLECTOR looking for early radios and parts with special interest in Grebe, Atwater Kent, DeForest and early amateur equipment. W1GWM Box 304, Kennebunk Maine 04043.

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TELEX antennas, parts hardware, rotators, and repairable systems for the hf bands wanted. R. Myers, 221 Long Swamp Rd., Wolcott CT 06716.

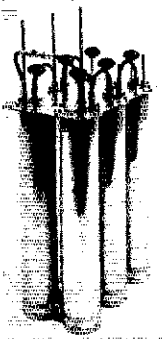
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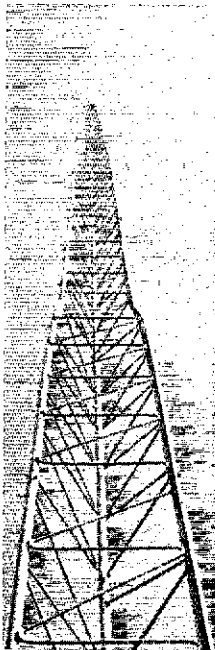
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WANTED: A Round Emblem 30L1. Send offers, condition and description. John Bookout 11040 NW Anderson, Portland OR 97229.

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WANTED: Plug-in elements for model 43 Bird watt meter. WB9JFG, 4421 Boulder Ter., Madison WI 53711 608-271-4334.

NATIONAL NC-183T General coverage receiver with manual. Receives weakly — needs work — \$60. Johnson Oacemaker ssb-a-m-cw transmitter with manual. Real clean — works fine — \$90. Heath DX-60B transmitter mint — ready to go \$70. New tubes & finals in all. Al Allison, Rt. 2 Box 1012 Bonita Springs FL 33923. 813-992-0058.

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SBE-34 solid state 80-15 AC-12V, power mike ac-dc pwr cords, manual; Carl Rissell Jr., 1817 Hickory Bark Lane, Bloomfield Hills MI 48013.

COLLINS 755-3, 326-J, 312B-4, KWM-1, 516F-2, 516E-1 DC power supply plus mobile mount, DX Engineering rf clipper for Collins, Ameco PLF preamp, Symtek preamp, Katsumi 701 Audio compressor all for sale, best offer takes, call Penzick 305-642-2200.

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NATIONAL HRO-500 with matching speaker; two hours air time \$975. Robot 70 sstv receiver \$175. Drake SW-4 programmable receiver \$150. Heath SB-610 Monitor-scope \$75. WA8VFK.

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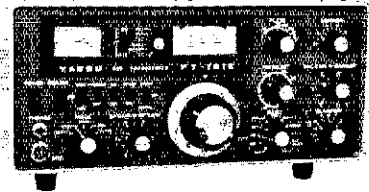
COLLINS mil-specs 300 Hz xtal filter 455KF300. Suitable for any receiver with 455 KHz 1st. Instructions for mounting included. \$60. W4AX, Route 4 Box 71, Glen Allen VA 23060.

WANTED: SB-610, Monitorscope, WA4JAJ, 506 Flamingo, Albany GA 31707, 912-432-7892.

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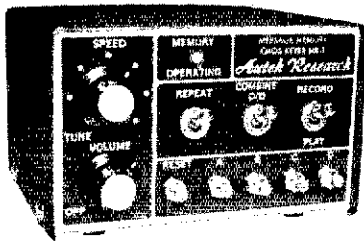
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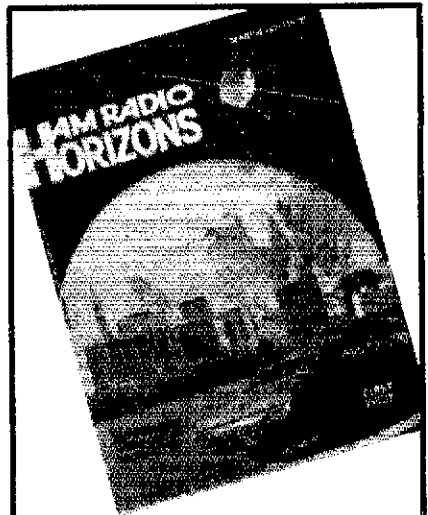
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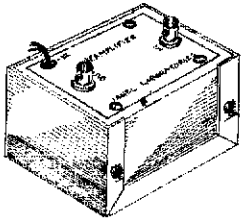
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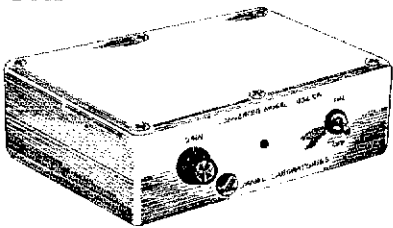


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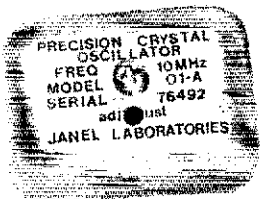
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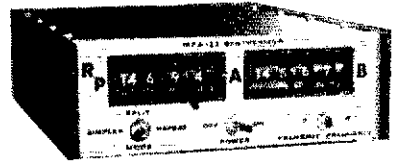
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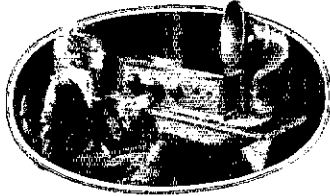
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The variable tone channels are CONTINUOUSLY tuneable from 1200 Hz to 3100 Hz and the front panel VFOs are calibrated at the most commonly used tone frequencies.

An isolated and balanced 600 ohm input is provided for easy interfacing and all system functions are removed to the rear panel.

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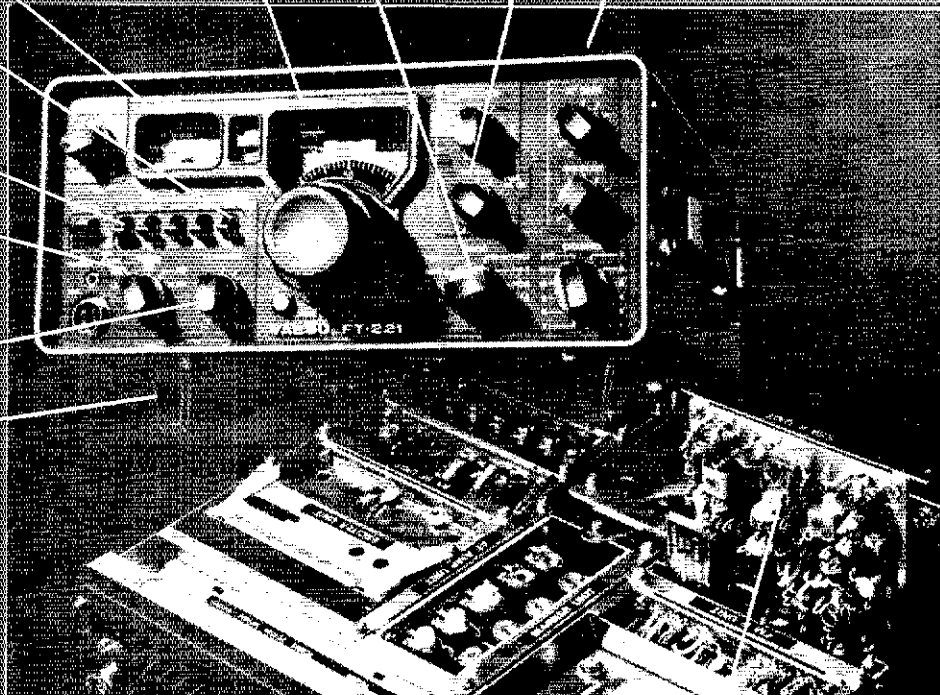
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