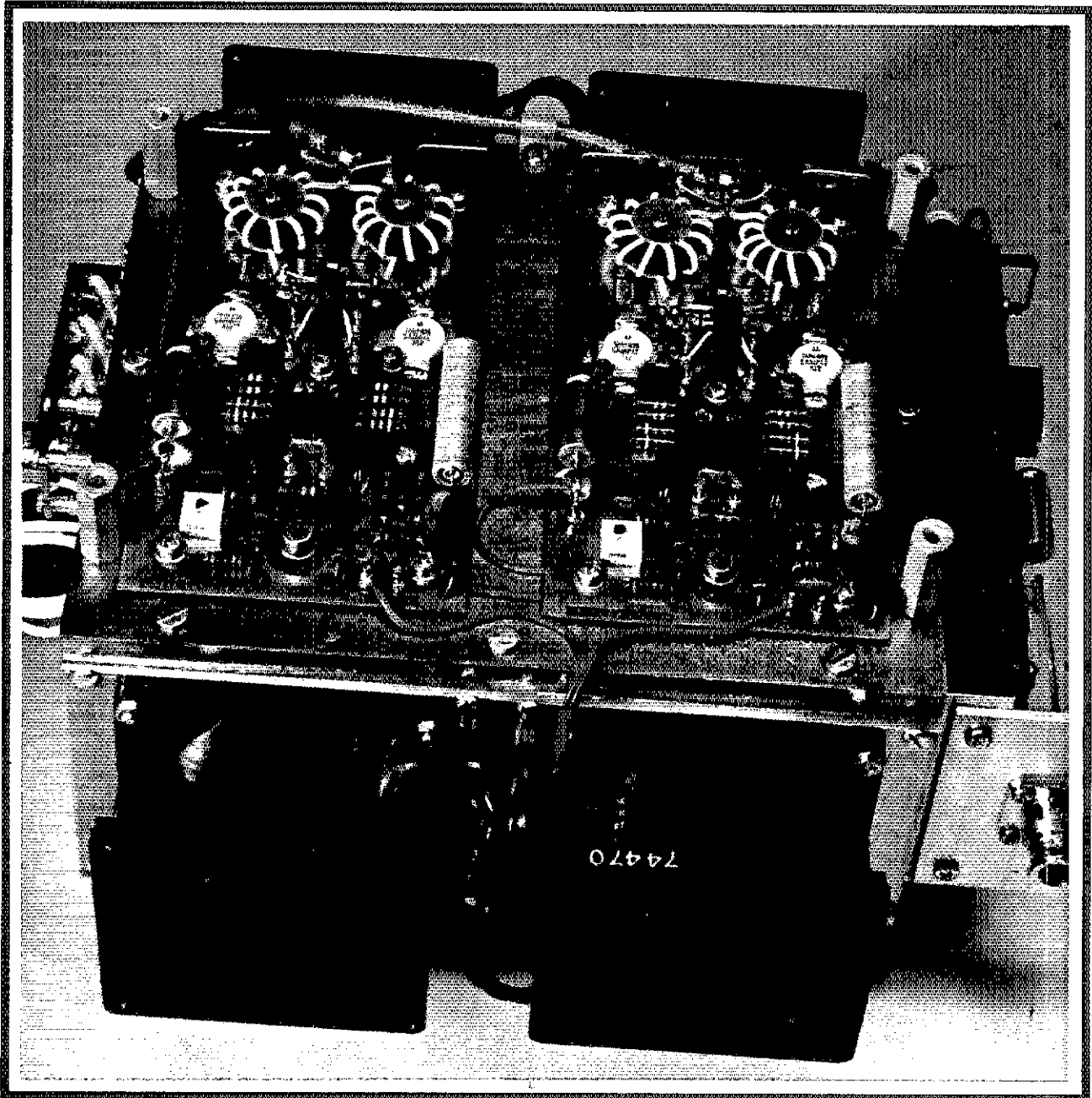


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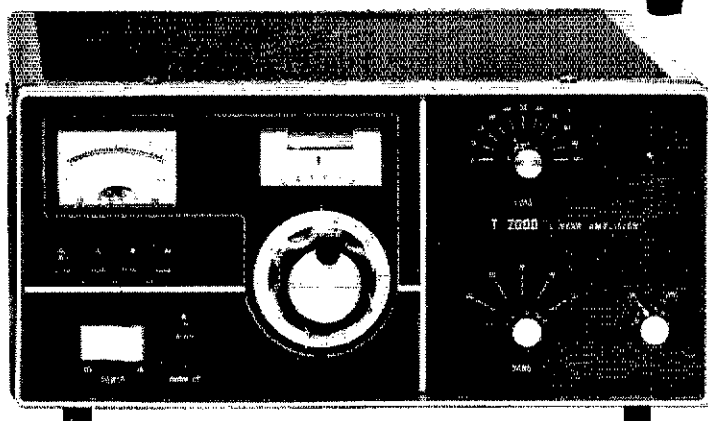
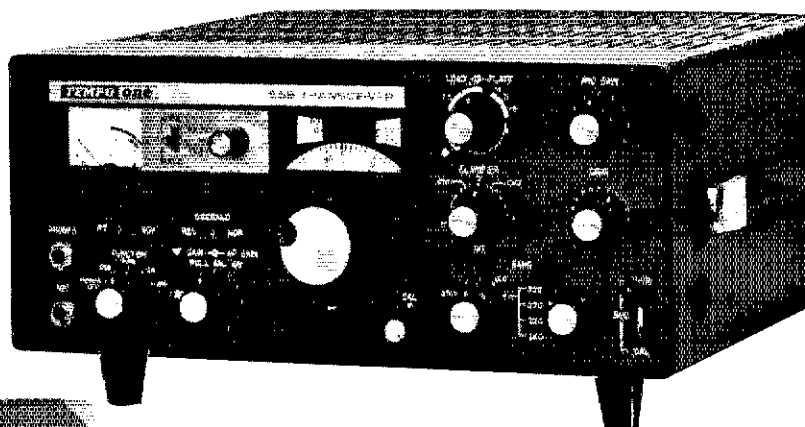
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**Amateurs act fast in
Guatemala emergency.**



the
hottest pair
on the
air



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The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. Completely wired and ready for operation . . . only \$795.00

The Tempo ONE is available at Tempo dealers throughout the U.S.. Also available is the Tempo CL-146A, CL-220, DFD/ONE, DFD/K, FMH, RBF-1 and TDC. Please call or write for specifications and prices.

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. . . a proven name, a proven value. Look at the specifications, look at the price tag, ask any of the thousands of Tempo ONE owners about its reliability . . . and the reason for its unparalleled popularity will be obvious.

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AGC: Fast attack slow decay for SSB and CW.
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IMAGE REJECTION: More than 50 dB.
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TEMPO "ONE" TRANSCEIVER	\$399.00
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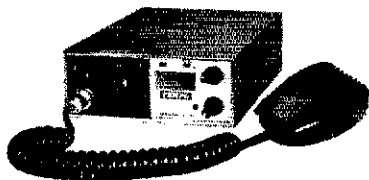


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"The trend setter..the hottest little rig on the air." You have heard it on every band..Kenwood's go-every-where/do-everything transceiver. SSB & CW on 80 thru 10 meters, built-in AC & 12VDC power supply, VOX, RIT, noise blanker and all the other features you want. The 520's low price...\$629. Write for full description on the 520 as well as Kenwood's new TS-700A 2-meter transceiver and the R-599D/T-599D "twins."

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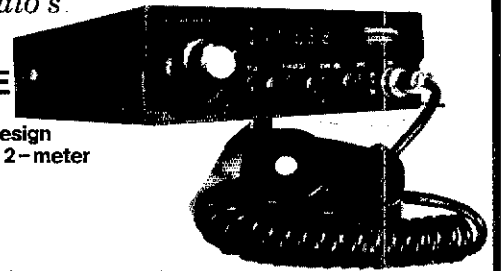
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Solid state power amplifiers for use in most land mobile applications. Increase the range, clarity, reliability and speed of two way communications.

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An advanced design synthesized 2-meter transceiver

Full phase lock synthesized (PLL) so no channel crystals are required • Solid-state • 5 digit LED receive frequency display • Full 2-meter band coverage (144 to 148MHz) for transmit and receive • Automatic repeater split (selectable up or down) • 2 built-in programmable channels • \$495.00.

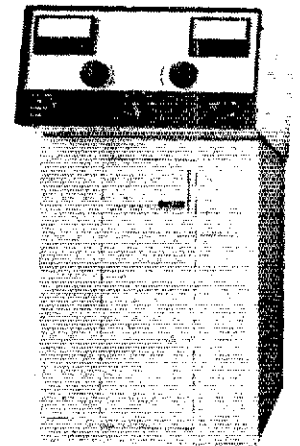
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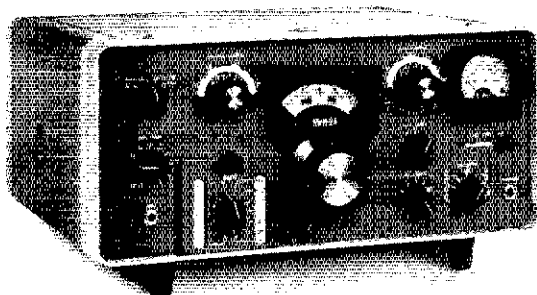
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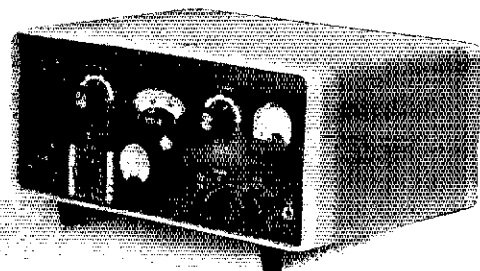
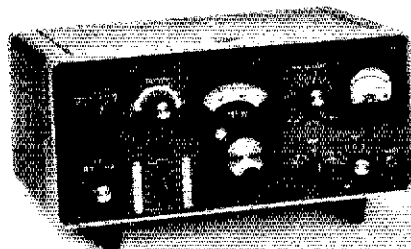
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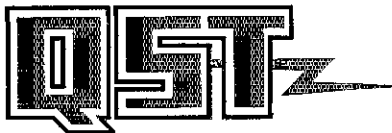
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April 1976
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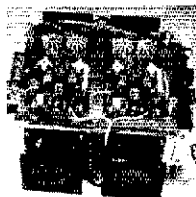
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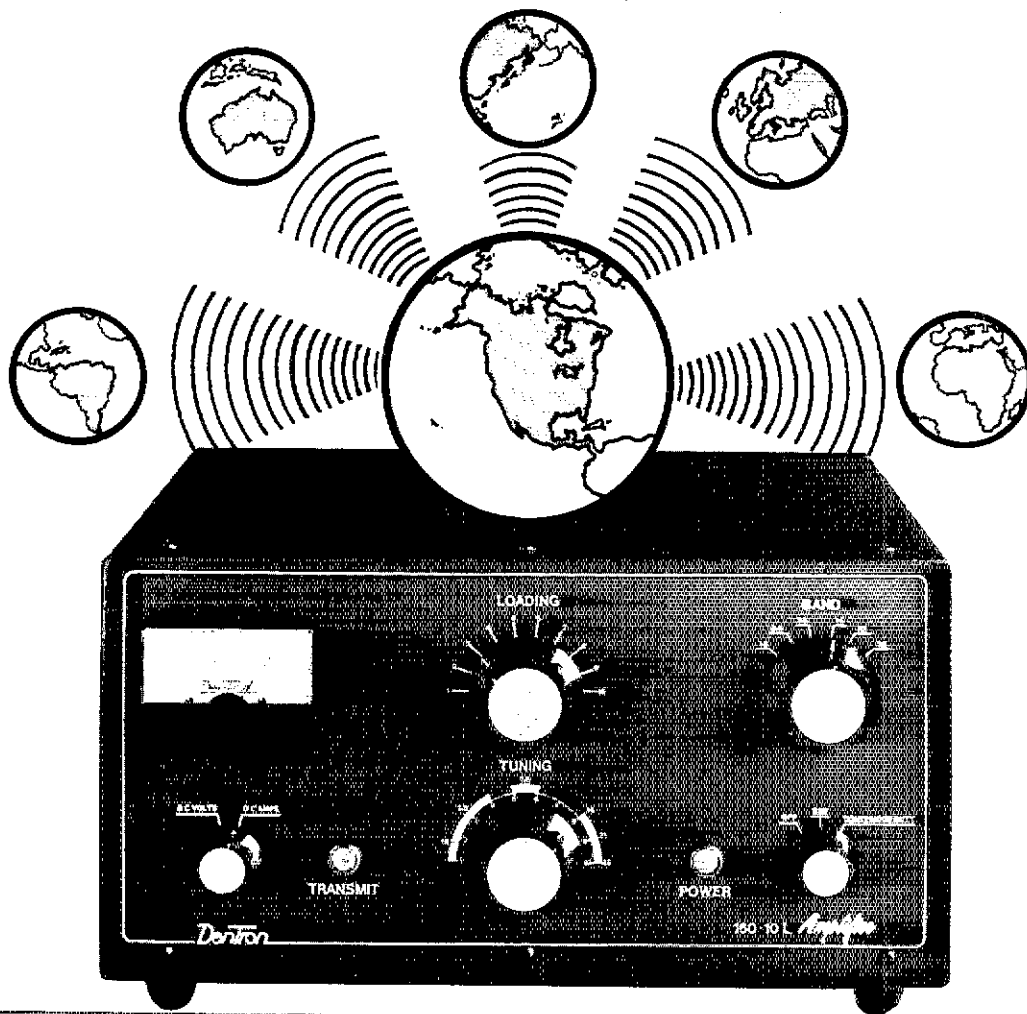
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Dentron Amplifies America

We took the most desirable and important features and engineered them into the all new Dentron Continuous Duty 160-10 meter amplifier.



160-10L Specifications

Size: 7¼" H x 14½" W x 14" D

Weight: 43 lbs.

Frequency Range: 1.8 MHz (1.8-2.5) 3.5 MHz (3.4-4.6)
7 MHz (6.0-9.0) 14 MHz (11.0-16.0)
21 MHz (16.0-22.0) 28 MHz (28.0-30.0)

Power Input: SSB 1200 P.E.P. Continuous
CW 1000 watt DC Continuous
SSTV 1000 watt DC input 25 minute continuous
RTTY 1000 watt DC input 25 minute continuous
TUNE 1000 watt DC input 15 minute continuous

Output impedance: 50-75 ohms Pi network wide range
VSWR not to exceed 2 to 1

Third-order Distortion: Down at least 30 db

Meter Selector Switch-plate, voltage, Plate Current
Built-in Antenna change over relay
Dual-speed Cooling System
AC Input Source 110V or 220V AC, 50-60 Hz
Automatic Circuit Breaker Protection

160-10L Features

- 160 thru 10 meters
- 1200 watts P.E.P. on SSB continuous
- 1000 watts DC on CW, RTTY or SSTV
- "On demand" Variable forced air cooling system
- Self contained continuous duty power supply
- 4-811A Triodes in Grounded Grid mounted in cooling chamber
- Compact, low profile, solid, one-piece cabinet, tube cooling chamber eliminates need for perforated cabinet.
- Covers MARS Frequencies without modifications
- Broadbanded input and output circuit
- 70 watt drive for maximum legal input

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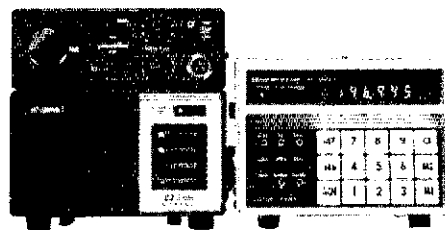
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the little surprise

The IC-22A has caused some pretty big surprises since it first started making waves in VHF-FM. Veteran operators have been delightfully surprised by its sophisticated styling and ease of operation; FM beginners, by its versatility, large number of possible channels, and its great value as a starter unit for FM transceiving; and all owners, by its unexcelled high quality construction and low maintenance problem record, ICOM traditions. The competition was in for a big surprise as it raced past everything in its field to become the most popular two meter crystal controlled radio on the market. Surprise. Surprise.

But the IC-22A's best surprise is the little surprise, its price. surprise. The little radio with all the big surprises is also the best FM transceiver value available. Engineered for versatility and sophistication: priced within the reach of the most modest beginner. Whether the IC-22A is your first FM or your last, you're in for a little surprise.



SEMICONDUCTORS	22
TRANSISTORS	4
FET	3
IC	16
DIODES	
FREQUENCY RANGE	146-148MHz
CHANNELS	22
MODULATION	Phase, F3
VOLTAGE	13.8 (15%)
SIZE	58x156x230S (dim in MM)
WEIGHT	1.7 kilos

POWER OUTPUT
BANDWIDTH (TRANSMITTED)
MICROPHONE
SENSITIVITY

INTERMEDIATE FREQUENCIES

MODULATION ACCEPTANCE
RECEIVER BANDWIDTH

AUDIO POWER

HI 10 Watts, LO 1 Watt
15KHz with 5KHz deviation
DYNAMIC 500 Ohms.
.4 microvolts for 20DB SINAD
.3 microvolts for 12DB SINAD
10.7MHz First I.F.
455KHz Second I.F.
7KHz peak dev. freq. less than 3KHz
+/- 13KHz more than -6DB
+/- 23KHz more than -60DB
1 Watt into 8 Ohms

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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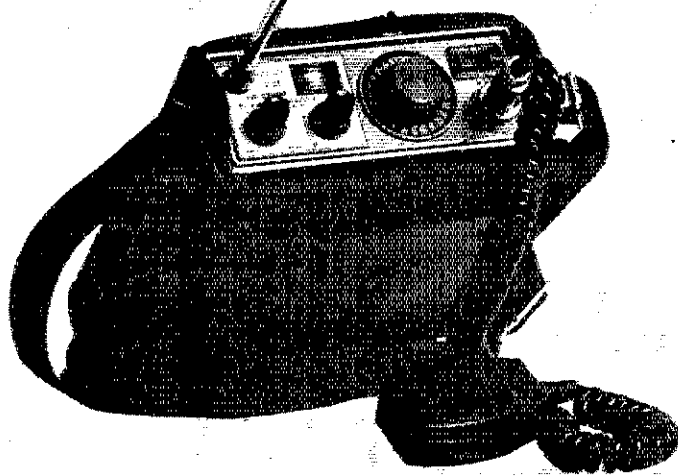
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the TR-2200A

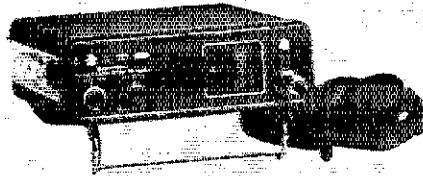
Kenwood's high performance portable 2-meter FM transceiver... completely transistorized, rugged and compact.

12 channel capacity. Built in telescoping antenna can be easily replaced, or stored in carrying case. Connector for external antenna also. External 12 VDC or internal ni-cad batteries, complete with 120 VAC battery charger. 146-148 MHz frequency coverage. 12 channels, 6 supplied. Battery saving "light off" position. Hi-Lo power switch (2 watts - 400 mW). Sensitivity: 0.5 uV or less / 26 dB S+N/N. Built-in speaker. Size: 5-3/8" x 2-5/16" x 7-1/8", 3-3/4 lbs. Complete with Dynamic mike, O-T-S carrying case, all cables, speaker/headphone plug and 10 Ni-Cad batteries. Amateur net... \$229.00.



the TR-7200A

Kenwood's superb 2-meter FM mobile transceiver. Designed to withstand the most severe punishment while providing consistently excellent performance.



Packed with features like the PRIORITY function... Put your favorite crystals in channel 7, and the

7200A automatically returns to that frequency when it senses activity there. 146-148 MHz coverage. 12 channels, 6 supplied. Completely solid state. Voltage required: 13.8 VDC. Antenna impedance: 50 ohms. Frequency adjusting trimmers on every crystal. Output power: 10 watts (or 1 watt at low power). Adjustable frequency deviation (factory set at ± 5 kHz). Automatic VSWR protection. Receiver sensitivity less than .5 uV for 27 dB. Selectivity: 12 kHz -6 dB and 24 kHz / -70 dB. Size: 7-1/16" W x 2-3/8" H x 9-7/16" D. 5-1/2 lbs.

Complete with dynamic mike, DC power cord, mobile mount, mike hanger, auxiliary connector and external speaker plug. Amateur net... \$249.00.

The perfect companion to the TR-7200A is the PS-5 AC/DC power supply. Together they provide an efficient and handsome base station. The PS-5 is complete with a digital clock and automatic timer control feature built in. Amateur net... \$79.00.

for the experimenter!

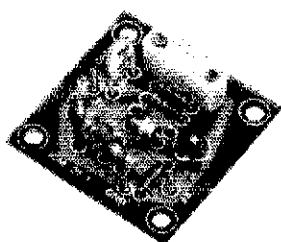
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OX OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
 Specify when ordering.

Price \$3.95 ea.



OF-1 OSCILLATOR

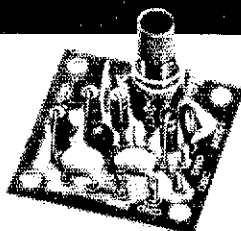
Crystal controlled transistor type. 3 to 20 MHz, OF-1, Lo, Cat. No. 035108. 20 to 60 MHz, OF-1, Hi, Cat. No. 035109
 Specify when ordering.

Price \$3.25 ea.



EX CRYSTALS (HC 6/U HOLDER)

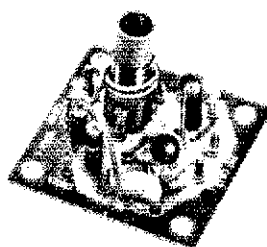
Cat. No.	Specifications
031080	3 to 20 MHz — For use in OX OSC Lo Specify when ordering \$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi Specify when ordering \$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC Specify when ordering \$4.25 ea.
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MX-1 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
 Specify when ordering.

Price. \$4.50 ea.

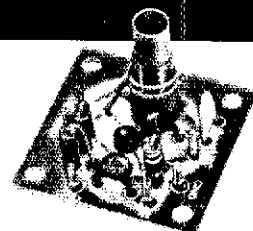


SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103
 Specify when ordering.

Price \$4.50 ea.

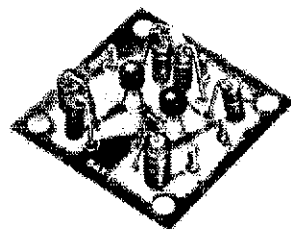
Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
 M/S Dept., P.O. Box 32497, Oklahoma City, Oklahoma 73132.



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
 Specify when ordering.

Price \$4.75 ea.



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General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107
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Reports Invited: All amateurs, especially League members, are invited to report station activities on the first of each month (or preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. Novices are eligible for ORS - II. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

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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 prerequisites, 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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Another Look at CB

Interesting things are happening in the citizens band these days, and it may be time to take another look at the CBers and what we can offer each other.

CB has gotten a great deal of publicity in the past year or so, partly because of their sky-rocketing numbers, partly because of wide-spread television and rf interference, partly because they have done some fine public service, and partly because some groups of them have been quite publicity conscious.

Perhaps we first ought to consider whether the CBer of today is typical of the CBer of four or five years ago. This writer thinks not. The CBer of several years ago was interested in radio for radio's sake. He was, if you'll pardon the expression, a frustrated amateur. He wanted to be on the air, communicating, but did not want to hurdle the code barrier. He fiddled with his station in various ways, by adding amplifiers, by erecting big antennas, and by joyously responding to the excitement of DX via skip, and he topped all of this off like the typical amateur by exchanging "QSL" cards. The important thing to remember is that he played with CB because it was *radio*; it was his hobby.

But now there's a new breed of CBer, brought to life in the wake of the blossoming interest of truckers in the use of radio. The *use* of radio, that's the key. The new breed of CBer is interested in CB because it's another way to talk with someone; it's a mobile extension of the telephone. The truckers are probably a good example. They could care less about CB as *radio*, or whether their receivers have transistors or tubes, or any other technical aspect. CB is a way to *talk*, to relieve the boredom of long-haul trips, to keep posted on traffic conditions.

CB sets are now being merchandised like any other consumer appliance. You can buy a CB set at Sears, at appliance stores, even in some drug stores. CB sets are now standard options with various car manufacturers.

The response of the public to this new use of CB, to the new method of merchandising, has been nothing short of overwhelming. CB transceivers are coming into the states from Japan by the zillion. The Commission is receiving some 500,000 CB license applications

per month! Everyone involved in any way with the marketing or licensing of CB is hardput to keep up with the flood.

Interestingly enough, it appears that there will be some beneficial fallout for amateur radio. Here at League Hq. for several months now, we have been receiving calls from dealers and clubs around the country, reporting on the increased sale of ARRL beginner publications and the increased interest in amateur licensing classes. Almost without exception, our callers tell us that the increase is being caused by CBers who have gotten disenchanted with operating on the CB channels and who want to partake of the increased privileges of amateur radio.

Great! We're ready for them, perhaps. Why perhaps? Because the last time we suggested that amateur clubs make an effort to recruit CBers into amateur radio, the roof fell in on us. The response from individuals and clubs was something less than enthusiastic. Frankly, three or four years ago, amateurs were just not ready to extend a welcoming hand to CBers.

If you read *QST's* March editorial, you know that we have a new training/licensing program in the works that may well revolutionize growth in amateur radio. It is the sort of program that is, we think, ideal for helping those CBers who'd like to advance into amateur radio.

There will, of course, be some who will be concerned about the poor operating techniques and practices that might be carried over into amateur radio by former CB operators. But we think that that sort of problem can largely be controlled because of the fact that the would-be amateur, former CBer or not, will be under the guidance of an amateur radio club during his amateur license training period, and there certainly ought to be plenty of opportunity to indoctrinate him in the different approaches to operating that exist in amateur radio.

All the indications are that we have out there a sizeable number of CBers who'd like to become amateur radio operators. We suggest that you encourage and welcome them to the training programs that your club will be offering in the months ahead. — W1RU

League Lines...

Senator Barry Goldwater, K7UGA, has introduced radio-frequency interference legislation into the U.S. Senate. The bill, S. 3033, is virtually identical to H.R. 7052, introduced in the House last year. The Goldwater bill has been referred to the Senate Commerce Committee. Comments on the bill may be directed to The Honorable John O. Pastore, Chairman, Communications Subcommittee, Senate Commerce Committee, United States Senate, Washington, DC 20510, or to your own senators. Correspondence should mention that similar legislation is awaiting action in the House. See QST, September 1975, page 76, for the text of H.R. 7052.

The ARRL Foundation has a new president: W.W. Eitel, W6UF/WA7LRU, who was elected at the Foundation's Annual Meeting Feb. 28. Bill will be spearheading a major fundraising effort in support of WARC preparation, which you'll be hearing more about in the coming months. At the same meeting the Foundation Board renewed its commitment to the amateur satellite program, voting to support Amsat's funding request for calendar year 1976.

Mysterious pulse signals which appeared in the cw and voice sub-bands of 80 meters early in February turned out to be a stepped ionospheric sounder being tested under Navy auspices in the Norfolk, VA area. The device radiates a signal at various frequencies in the hf spectrum which showed up in our band as a strong double click at about 40 seconds past the minute, every minute. As a result of numerous complaints to FCC, changes are being made to eliminate radiations in the 3.5 - 4.0 MHz band.

FCC has waived Section 97.61(c) with respect to fast-scan ATV repeater stations for a one-year period beginning February 27, 1976. The waiver permits ATV repeater stations to continue experimentation begun by WR4AAG (QST for October 1975, page 98.)

"Happenings" this month highlights the controversial FCC proposal to make the use of, for example, "portable-6" by a W1 operating in California optional at the discretion of the user (Docket 20686). Early input from members indicates strong feelings on both sides of the issue. The new deadline for comments filed with FCC is April 30; Hq. will be working this month to take feelings expressed by the members, both directly to us and through your Directors, and distill them into the official League filing. It's not too late for you to let us know how you feel!

Some bad news, also in "Happenings": we won't be getting the additional locations for amateur examinations which would have resulted from the Civil Service Commission taking over the exam function. Budgetary considerations at the FCC appear to be the culprit.

We've been concerned for months that the growing problem of unlicensed stations operating ssb in between the 11 meter CB and the 10 meter ham band might spill over onto amateur frequencies, but so far the illegal operators generally have shown good sense in not sparking a direct confrontation. If you hear such operation in a ham band, tell us about it, including date, time, frequency, any identification used, and any evidence of station location or mailing address. Just as eternal vigilance is the price of democracy, it is also the price of having uncluttered ham bands.

The article on amateur involvement in the Guatemala relief effort beginning on page 37 is based on early, incomplete reports of participation. We need more reports, so the record will be as complete as possible.

Once again, hams' names and callsigns are showing up on chain letter mailings. The recipient is asked to send a dollar to a person listed at the bottom of the letter, then sit back and await the great riches to come. Problem is, the whole concept is fraudulent and is in violation of Postal Service regulations. The best thing you can do if you receive one is to turn it over to the postal authorities.

A reminder -- reciprocal licensees operating in the U.S. must observe the U.S. phone sub-allocations, as well as other FCC regulations pertaining to amateur radio. The converse is also true: FCC licensees operating in other countries must abide by the regulations of the host government which issues them operating permission.

One KW—Solid-State Style

Part 1: The state of the art in rf power blocks comes to amateur radio. Go ssb or cw with 1 kW! Here's the recipe.

By H. O. Granberg,* WB2BHX/OH2ZE/7

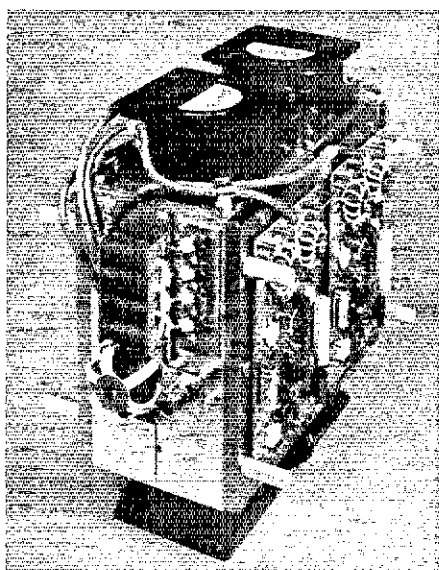
Push-pull power blocks of the 50- and 300-watt class are combined in this example to provide a 1.8- to 30-MHz linear solid-state amplifier. Wide frequency response is assured through the use of broadband transformers. Bias regulators and chip-style capacitors are used to make the design easy to duplicate. Total power gain for the system is 34 dB, and four 300-W modules are combined to provide up to 1.2 kW of output on ssb (PEP) or cw.

Although the transistors employed (MRF427A and MRF428A) are tested to withstand 10:1 load mismatches, the total dissipation ratings may well be exceeded in a multidevice design, should a slight imbalance occur. Therefore, it is possible to have a failure in one of the modules under certain load-mismatch conditions. It is recommended, therefore, that some type of VSWR-based protective circuitry be adapted in the design. Also, separate dc regulators with appropriate current limits should be provided for each module.

The MRF427A is a single-chip device which is rated at 25 W PEP or cw. The MRF428A is also a single-chip unit and can deliver 150 W of PEP or cw output. Both transistors are emitter ballasted to ensure an even current sharing between each internal cell. This feature improves the device's ruggedness with respect to load mismatch. Both transistor types are operated in Class A service and draw 40 and 150 mA of idling current, respectively. Operating voltage is 50.

General Design Considerations

A compact assembly is realized through the use of ceramic chip capacitors, most of which are placed on the lower side of the circuit board. The board layouts are similar for all modules. Short leads are used to minimize unwanted parasitic inductances,



aiding uniformity of performance of the blocks.

Loops are provided in the collector-current paths to allow monitoring of individual collector currents by means of a clip-on current meter, such as the HP-428B. This is an easy way to check device balance in a push-pull circuit and to monitor the balance between each module of the system. The power gain of each block should not vary more than 0.25 dB from the others. Provisions are made for an input pi attenuator to assure uniformity of gain among the modules, should the individual transistor gains vary. The circuit shown here does not have the attenuators included, as eight closely matched devices were selected for the project.

Bias-Voltage Source

Fig. 1 shows the bias-voltage source used with each 300-watt module, and with the preamplifier block. The basic components are U1 (IC regulator), the current-boost transistor, Q3, and the

temperature-sensing diode, CR1. This circuit features line-voltage regulation, adjustable current limiting, and low standby-current drain. R2 is the voltage adjust control. VR1 and R1 reduce the supply voltage to below 40, which is the maximum safe level of the regulator input voltage.

CR1 is the base-emitter junction of a 2N5190. It has a plastic case and is used as a circuit-board standoff. This couples it automatically to the heat sink and provides temperature tracking.

The temperature compensation has a slight negative coefficient. When the collector idling current is adjusted to 300 mA at 25° C, the current will decrease to a nominal 250 mA when the sink temperature rises to 60° C. The rate of change is approximately 1.15 to 1.7 mA per degree C.

R3 of Fig. 1 sets the current limiting to approximately 0.65 A, which is sufficient for devices with a minimum h_{FE} of 17 ($I_b = I_c \div h_{FE}$) when the maximum average I_c is 10.9 A. Typically, the Motorola MRF428A has an h_{FE} in the 30s. Measured output-voltage variations of the bias source (0 to 600 mA) are ± 5 to 7 mV. This amounts to a source impedance of roughly 20 milliohms.

300-Watt Amplifier

The MRF428A series base impedance is as low as 0.88, ± 0.8 ohm at 30 MHz. In a push-pull circuit a 16:1 input transformer would provide the best match from a 50-ohm source. But, this would result in a high SWR at 2 MHz, making it difficult to use the gain-correction network. Therefore, a 9:1 transformer (better at low frequencies) was chosen. It represents a 5.5-ohm base-to-base source impedance.

If the transistors are balanced, it is not necessary to use a center tap on the input transformer secondary. The base-current return path is through the

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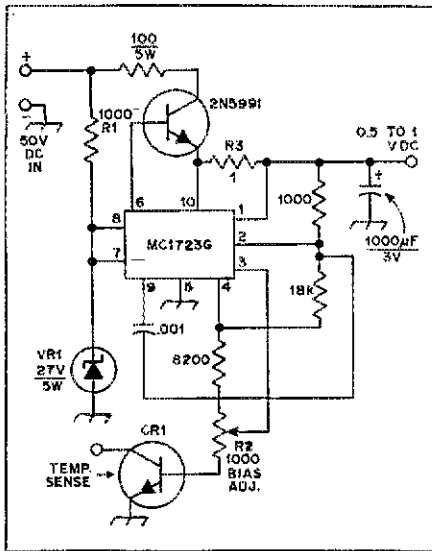


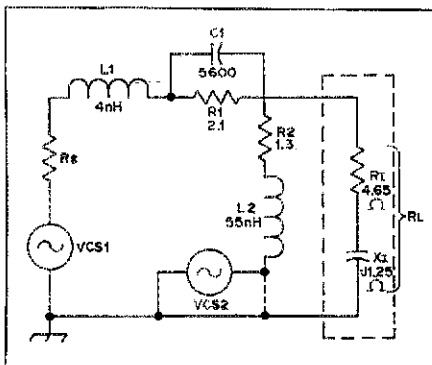
Fig. 1 — Diagram of the bias supply for the amplifier modules. Some components are numbered for text discussion.

forward-biased base-emitter junction of the nonconducting transistor. This junction acts as a clamping diode, and the power gain is somewhat dependent upon the amount of bias current. The equivalent input circuit (Fig. 2) represents one half of the push-pull circuit, and for calculations R_s equals the total source impedance (R_s') divided by 2.

A design goal is to maintain an input SWR of 2:1 or less, and a maximum gain variation of ± 1.5 dB from 2 to 30 MHz. Calculations show that these requirements can be met with an RC compensating network in conjunction with negative collector-to-base feedback. Fig. 2 shows this network for one device. L1 and L2 represent lead lengths (fixed value). Feedback is through R2 and L2. Since the calculations were done without feedback, this branch is grounded to simulate operating conditions.

The average power-gain variation of the MRF428 from 2 to 30 MHz is 13 dB. Due to phase errors, a large amount of negative feedback in an rf amplifier decreases the linearity, or may result in

Fig. 2 — Representative circuit for one half of the amplifier input network.



instabilities. Approximately 5-6 dB of feedback can be tolerated without noticeable effects in linearity or stability, depending upon circuit layout. If the amount of feedback is 5 dB, 8 dB will have to be absorbed by the input network at 2 MHz.

Omitting the reactive components, L1, L2, C1, and the phase angle of X1 which have a negligible effect at 2 MHz, a simple L pad was calculated with $R_S = 2.77\Omega$ and $R_L = \sqrt{4.65^2 + 1.25^2} = 4.81\Omega$. From the device data sheet we find the G_{PFE} at 2 MHz is about 28 dB, which means that 0.24 W at R_L will produce an output power of 150 W, and the required power at $R_S = 0.24 \text{ W} + 8 \text{ dB} = 1.51 \text{ W}$. When calculating the currents and voltages in various branches, we get: $R1 = 1.67\Omega$ and $R2 = 1.44\Omega$.

The calculated values of R1 and R2 (along with other known values and the device input data at four frequencies) were used to simulate the network in a computer program. The targets were: (A) VCS2 (negative feedback voltage) and R2 for a transducer loss of 13 dB at 2 MHz, and minimum loss at 30 MHz; (B) R1 and C1 for input SWR of <1.1:1 and <2:1 respectively. The optimized values are obtained as: $C1 = 5850 \text{ pF}$, $R2 = 1.3\Omega$, $R1 = 2.1\Omega$, and $VCS2 = 1.5 \text{ V}$.

The minimum obtainable transducer loss at 30 MHz was 2.3 dB, which is partly caused by the highest reflected power at this frequency and can be reduced by "overcompensation" of the input transformer. This means, that at the higher frequencies, the source impedance (R_S) is effectively decreased, which leaves the input SWR highest at around 15 MHz.

In the practical circuit the value of C1 (and C2) was rounded to 5600 pF. For each half cycle of operation R2 and R4 are in series, and the value of each should be $1.3\Omega \div 2$ for $VCS2 = 1.5 \text{ V}$. Since the voltage across ac and bd = V_{ce} , a turns ratio of 32:1 would be required. It appears that if the feedback voltage on the bases remains unchanged, the ratio of the voltage across L5 (VCS2) and R2/R4 can be varied with only a small effect to the overall input SWR. To minimize the resistive losses in the bifilar winding of T2 (Fig. 3), the highest practical turns ratio should not be much higher than that required for the minimum inductance, which is $4R \div 2\pi f = 50 \div 12.5 = 4\mu\text{H}$, where $R =$ collector-to-collector impedance = 12.5Ω and $f = 2 \text{ MHz}$. Therefore, ac or bd will be $1\mu\text{H}$, which amounts to 5 turns (see details on T2), and 25% over this represents a 7:1 ratio setting VCS2 to 6.9 V.

In addition to providing a source for the negative feedback, T2 supplies the dc voltage to the collectors and functions as a center tap for output trans-

former T3. The currents for each half cycle are in opposite phase in ac and bd, and depending upon the coupling factor between the windings, the even harmonic components will see a much lower impedance than the fundamental will. The optimum line impedance for ac and bd would equal the collector-to-collector impedance, but experiments have shown that increasing this number by a factor of 2-3 affects the 2nd and 4th harmonic amplitudes by only 1 to 2 dB.

Components C5 and L5 form a parallel-resonant circuit with a Q of approximately 1.5. This circuit increases the shunting impedance across the bases and disturbs the 180° phase difference between the input signal and the feedback voltage at the higher frequencies. This reduces the gain loss of 3.8 dB, of which 1.4 dB is caused by the feedback at 30 MHz. The amount depends upon the resonant frequency of C5L5, which should be above the highest operating frequency to avoid instabilities.

The 1.4-dB feedback means that the feedback voltage is 16% of the input voltage at the bases. By the aid of vectors, we can calculate that the 78° phase shift and the increased impedance reduce this to 4%, which amounts to 0.35 dB. These numbers were verified in a computer program with $VCS2 = 6.9 \text{ V}$, and including C5. New values for R1 and R2 were obtained as 1.95Ω and 6.8Ω, respectively. Although omitted from the preliminary calculations, the $2 \times 5\text{nH}$ inductances, comprising of lead length, were included in the program.

The Transformers

The 9:1 input transformer uses a TV balun type of ferrite core of high permeability. The low-Z winding has one turn of 1/8-inch copper braid. The sections going through the openings in the ferrite core are rounded to resemble two pieces of tubing, electrically. The primary consists of AWG No. 22 TFE insulated wire, threaded through the rounded sections of braid, placing the primary and secondary leads in opposite ends of the core.^{1,2} The saturation flux density is about 60 gauss — well below the limits for this core. For calculation data see the discussion about the output transformer. This arrangement provides tight coupling and reduces the amount of leakage flux at high frequencies. The wire gauge, insulation thickness, and number of strands have minimal effect on the performance except at very high impedance ratios, such as 25:1 and up. The transformer configuration is shown in Fig. 4.

Some practical experiments were done with moving the resonance of C5L5 (Fig. 3) lower to see if instabilities

¹This and all subsequent footnotes will appear at the end of this article.

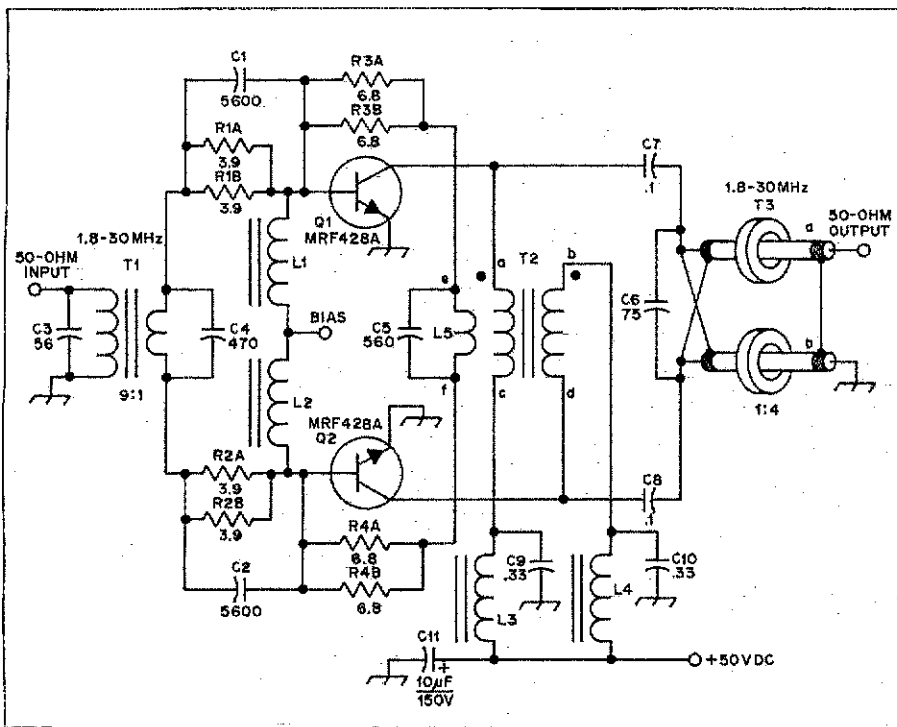


Fig. 3 - Schematic diagram of the 300-W amplifier. Resistors are 1/2-W composition unless noted otherwise. Chip capacitors are used except where polarity is indicated to signify electrolytic. C9 and C10 are tubular capacitors. Numbered components are given for text discussion and component layout on the pc-board pattern.

- L1, L2 - Rf choke (Ferroxcube VK200-19/4B or equiv.)
- L3, L4 - Rf choke (Ferroxcube 56-590-65/3B or equiv.)
- T1 - Broadband 9:1 transformer on ferrite core (Stackpole 57-1845-24B or Fair-Rite Prod. 2973000201, or equiv. See text).
- T2 - 7 bifilar turns of No. 20 enam wire on

- Stackpole 57-9322 or Indiana General F627-801 toroid core.
- T3 - 14 turns Microdot 260-4118-000 25-ohm submin. coax cable (or equiv.) wound on each of two toroid cores. Cores are Stackpole 57-9074 or Indiana General F624-19Q1, or equiv.

would occur in a practical circuit. When the resonance was equal to the test frequency, a slight break-up was noticed in the peaks of two-tone pattern. It was then decided to adjust the resonance to 31 MHz, where $C5 = 560$ pF, and the phase angle at 30 MHz increases to 87° . The transducer loss is further reduced by about 0.2 dB.

Several types of output transformer configurations were considered. The 12.5Ω collector-to-collector impedance, estimated earlier, would require a 4:1 transformer for a 50- Ω output. The type used here as the input transformer exhibits good broadband characteristics with a convenient physical design. However, according to the low frequency minimum-inductance formula presented earlier in connection with T2, the initial permeability required would be nearly 3000, with the largest standard core size available. High permeability ferrites are almost exclusively of nickel-manganese composition, and are lossy at radio frequencies. Although their curie points are higher than those of lower permeability nickel-zinc ferrites, the core losses would degrade the amplifier

performance. Since the core losses are a function of the power level, these rules can be sometimes disregarded in low-power applications.

Since the transmission line type of transformers is theoretically ideal for rf applications, especially in the 4:1 impedance ratio, a coaxial cable version was adapted for this design. A balanced-to-unbalanced function would normally require three separate transmission lines, including a balun.^{2,3} It appears that the third line can be omitted, if lines *a* and *b* (Fig. 3) are wound on separate magnetic cores, and the physical length of the lines is sufficient to provide the necessary isolation between the collectors and the load. The minimum line length required at 2 MHz, employing Stackpole 57-9074 or equivalent ferrite toroids, is 4.2 inches, and the maximum permissible length at 30 MHz would be approximately 20 inches, according to formulae.⁴ The 4.2 inches amount to four turns on the toroid, and measure 1 μ H, which in series with the second line is sufficient at 2 MHz. Increasing the minimum required line length by a factor of 4 is still within the calculated

limits, and in practical measurements the isolation has been found to be over 30 dB across the band. The main advantage with this arrangement is a simplified electrical and physical layout.

Flux Density

The maximum flux density of the toroids is approximately 200 gauss,⁵ and the number of turns has been increased beyond the point where the flux density of the magnetic core is the power-limiting factor. It appears that the 1:4 output transformer is not optimum in this case, but it is the closest practical one at these power levels. Optimum power output with 50 V and a 50- Ω load is:

$$V_{rms} = 4 \times (V_{cc} - V_{ce\text{sat.}}) \times 0.707 = 135.75 \text{ V,}$$

$$\text{when } V_{ce\text{sat.}} = 2 \text{ V and } I = 135.75 \div 50 = 2.715 \text{ A.}$$

$$P_{out} = 2.715 \times 135.75 = 368.5 \text{ W.}$$

The optimum V_{cc} at $P_{out} = 300$ W would be:

$$V_{cc} = V_{ce\text{sat.}} + (\sqrt{R_{in} \times 2P_{out}}) = 2 \times (\sqrt{6.25 \times 300}) = 45.3 \text{ V.}$$

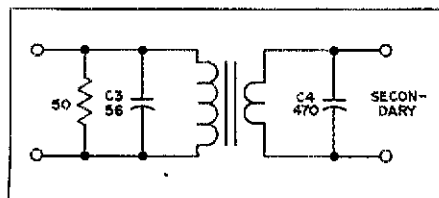
This indicates that the amplifier sees a lower load line, and the collector efficiency will be lowered by 1 to 2%. The linearity at high power levels is not affected if the device h_{FE} is maintained at the increased collector currents. The linearity at low power levels may be slightly decreased due to the larger mismatch of the output circuit.

The required characteristic line impedance (*a* and *b*, Fig. 3) for a 1:4 transformer is: $\sqrt{R_{in} R_L} = \sqrt{12.5 \times 50} = 25 \Omega$, which enables us to use standard miniature 25- Ω coaxial cable, such as Microdot 260-4118-000, for the transmission lines. The losses in this particular cable at 30 MHz are .03 dB/ft. When the total line length is 2×16.8 inches, the loss becomes 5.74 W.

For ferrite, one can use Stackpole grade 11 (or Indiana General Q1). The manufacturer's data are insufficient for accurate core-loss calculations³, but the B_H curves indicate that 100 to 150 gauss is well into the linear region.

The toroids measure $0.87 \times 0.54 \times 0.25$ inch, and the 16.8-inch line length amounts to 16 turns if tightly wound, or 12 to 14 turns if wound loosely. The

Fig. 4 - Details of how the broadband transformer is configured.



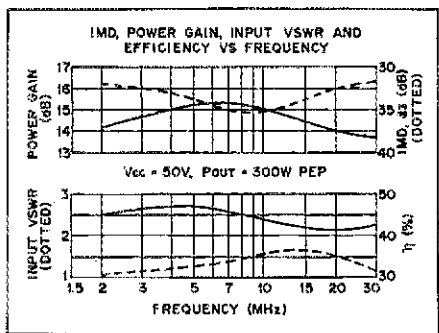


Fig. 5 — Curves showing IMD, power gain, input SWR, and efficiency versus frequency for a 300-W module.

flux density can then be calculated as:

$$B_{max} = \frac{V_{max} \times 102}{2 \pi f n A}$$

where f = frequency in MHz, n = total turns, A = cross-sectional area of toroid in cm^2 , and V = peak voltage across the $50\text{-}\Omega$ load (173 V). To determine B_{max} for each toroid:

$$B_{max} \text{ (for each toroid)} = \frac{86.5 \times 10^2}{6.28 \times 2 \times 28 \times 0.25} = 98.3 \text{ gauss}$$

Practical measurements showed the core losses to be negligible compared to the line losses at 2 MHz and 30 MHz. However, the losses increase as the square of B_{max} at low frequencies.

Since the amount of hf compensation is quite dependent upon circuit layout and the exact transformer construction, no calculations were made on this aspect for the input or output transformers. C3, C4, and C6 were

selected by employing adjustable capacitors on a prototype. The optimum values were then measured.

Circuit-board patterns will be offered in Part 2 of this article. Part 2 will appear in a subsequent issue of *QST*.

Footnotes

- Granberg, "Get 300 Watts PEP Linear Across 2 to 30 MHz from this Push-Pull Amplifier," *Motorola Semiconductor Products, Inc. EB-27*.
- Granberg, "Broadband Transformers and Power Combining Techniques for RF," *Motorola Semiconductor Products, Inc. AN-749*.
- Hilbers, "Design of HF Wideband Power Transformer Techniques," *Phillips Application Information No. 530*.
- Pitzalis and Couse, "Broadband Transformer Design for RF Transistor Amplifiers," *ECOM-2989*, U.S. Army Electronics Command, Ft. Monmouth, NJ.
- Granberg, "Broadband Linear Power Amplifiers Using Push-Pull Transistors," *Motorola Semiconductor Products, Inc. AN-593*.

Strays

□ The market or "ticker" symbol for the stock "Communications Satellite" — sometimes called COMSAT — is "CQ" writes WØKE.

□ The GSARA WAS contest for most confirmed QSL contacts within specified time allotted has been won by Tony Cromwell, WA1SND. Placing second and third respectively were: Bob Santee, WA100Y and Vern Townsend, WA1SCF. Top Novice scorer was John Carcano, WN1UHE. States were worked in order of their admission to the Union.

□ When an avalanche buried two members of a mountain climbing party in the St. Elias range in 1974, W1RLV was in contact with expedition radio operator SP9PT/VE8 throughout. On a recent visit to Pybnik, Poland, Ted got to personally shake hands with Wojciech, when the two met.

□ Paul O'Brien, K1OJQ, PRA, writes a monthly feature on amateur radio for the Boston Globe. He needs ideas and stories to expand this to a twice-monthly event. Send your suggestions and descriptions of amateur radio events to K1OJQ at 96 Alton Road, Quincy, MA 02169.

□ All IBEW amateur radio operators who wish to be included in the updated operators' list to appear in a future issue of the *IBEW Journal* should send: Name, call sign, local union number, address and if you are a member of AREC (Amateur Radio Emergency Corps) to Edward O. Page, WA2GDE, RD 2 Box 469, Newark Valley, NY 13811.

□ The NYC Police Dept. has an appropriate call sign — KOP 911 according to W1JTB. W1HDQ adds that, if memory serves rightly, this is not a "first." Wasn't the first KOP the Detroit Police?

□ The Central Georgia Amateur Radio Club set up an exhibit at the Houston County Fair. A raffle raised \$350 for the club and two films were shown: one on ham radio and one on weather. The prizes were a Bearcat III Scanner, a 12-gauge shotgun, and a smoked ham. Club members also relayed messages for MARS and worked teletype. These hams contributed and worked the booth: Clyde Mathe, WB4BDP; Eileen Mathe, WA4UNV; Jim Fodor, K8JAD; John Burdge, WB4PSL; James Worsham, WN4KXY; Bobby Fay, WN4BDM; Jeff Card, K1RCH; Bob Morgan, WB2OTV; Don Brown, WB4UFY and Andy Anderson, K4AAK.

□ Because of the Canadian postal strike, the Calgary Amateur Radio Assn. will accept applications for the Century Calgary Award for at least six months following resumption of full mail service.

□ The West Coast Qualifying Runs have been an almost perfect example of one ham's dedication to amateur radio for over a quarter of a century. W6OWP's January schedule completed 28 years of Rock-of-Gibraltar code proficiency certification opportunities. Bart says this represents 63,480 feet (19,457 meters!) of punched tape. Actually the tape has not been used directly for the transmissions for some years. Instead, it is run through a Boehme keyer for the timing sequence and the output is recorded on magnetic tape. The magnetic tape is used to key the transmitters, resulting in a smoother transmission (especially during speed transitions). That handsome feline is named Webster and apparently preheats the issues of *QST*. Almost everybody has a different "Elmer," but we all share the west coast version. W6OWP.



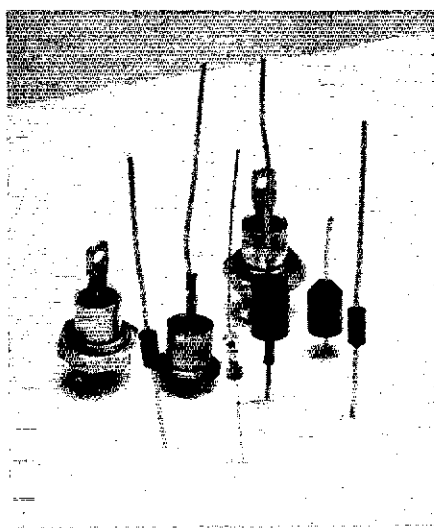
How To Use Zener Diodes

If you've been confused about Zener-diode regulators and how to choose the right one for a specific job, this article is for you.

By Doug DeMaw,* W1CER

Perhaps one of the least understood but often used semiconductor devices is the Zener diode. Wordsworth may have described the situation in capsule form when he said, *As if his whole vocation Were endless imitation*. Certainly those words define the roles many of us have played at some time or another when working with Zener diodes — we simply tried to duplicate the circuits of others without thought to proper electrical parameters. The “catch as catch can” approach may often bring the desired result, but at other times the circuit performance ends up tainted and mediocre at best. A worst-case regulator or limiter is often worse than no regulator or limiter at all!

A Zener diode is known also as an *avalanche* diode. It is similar in construction to a junction rectifier, but the primary characteristic for its intended purpose is the reverse-breakdown profile. In simple terms, positive voltage is applied to the cathode of the diode rather than to the anode. As this reverse voltage amount is made higher, the leakage current in the diode stays fairly constant until a critical plateau is reached. This point is known as the *breakdown voltage*. There is a marked contrast between the end results of the breakdown points of a Zener diode and a conventional rectifier diode. With the latter, it is essential to operate the diode well *below* the breakdown or PRV (peak reverse voltage) to avoid damaging it. When the breakdown point of a diode is reached, copious amounts of current flow through the diode junction, and in the case of Zener diodes this area is known as the *Zener current*. At breakdown the normal high back resistance of the diode drops to a very low amount and, therefore, the current increases rapidly. The amount of current is, however, limited by the series resistance between the Zener diode and the voltage



source. The rated breakdown value of a Zener diode is that level for which the semiconductor is designed. Typically, the plateaus range from 3.9 to as high as 200 volts. The amount of safe sustained Zener current is determined by the wattage rating of the component, and values run from 150 mW to 50 watts at present.

Because of the characteristics we have just described, it can be seen that a Zener diode will serve nicely as a voltage regulator, sine-wave clipper at some specified peak voltage, or as a series gate element. The diode performance is not in the least unlike that of the gaseous regulator tube we used for so many years — VR-90, VR-105, and VR-150 types. The latter would draw heavy current at the point where the gas became ionized by the applied voltage. Different kinds of gasses had specific voltage points at which they fired, and that determined the VR rating of the tube. It can be seen from the analogy that with both devices we're concerned mainly with two characteristics — breakdown voltage and regulator current.

Voltage regulation is made possible

by virtue of the high current which flows at conduction. The regulator current must always be considerably greater than that which is drawn by the circuit to which regulated voltage is applied. In that manner the *significant current* which flows through the series dropping resistor is that of the diode, and small changes in input voltage or circuit load current are disguised by the diode current and associated resistor by means of the $E = I \times R$ rule.

Some Applications

The examples given in Fig. 1 are but a few which indicate the usefulness of Zener diodes. A classic shunt-regulator circuit is shown at A. A 9.1-V diode is used to secure 9.1 volts regulated for a low-current VFO. The circuit at B illustrates how a Zener diode can be used as a voltage gate/regulator. Voltage will not pass through the diode junction until the conduction point of 5.6 V is reached. This circuit is handy for control applications.

Fig. 1D shows how a Zener diode can be used to establish a fixed value of bias for a transistor amplifier. VR1 replaces the emitter-bias resistor that would otherwise be used. At D is the circuit for a shunt regulator which can provide various output voltages. E1 will be the sum of the three Zener-diode voltages. E2 will be the sum of VR2 and VR3, and the voltage at E3 will be that of the VR3 conduction voltage.

A familiar use of the Zener diode is seen at C of Fig. 1, where VR1 functions as a reference element in a power-supply regulator. E_{out} will be the Zener-diode voltage minus the barrier voltage of the transistor junction. For a silicon pass transistor this will be 0.5 to 0.7 volt. Therefore, if a 9.1-V diode is used with a silicon transistor, the output voltage (E_{out}) will be on the order of 8.5.

Mobile radio equipment can be protected from spikes on the supply line by

*Technical Editor, QST

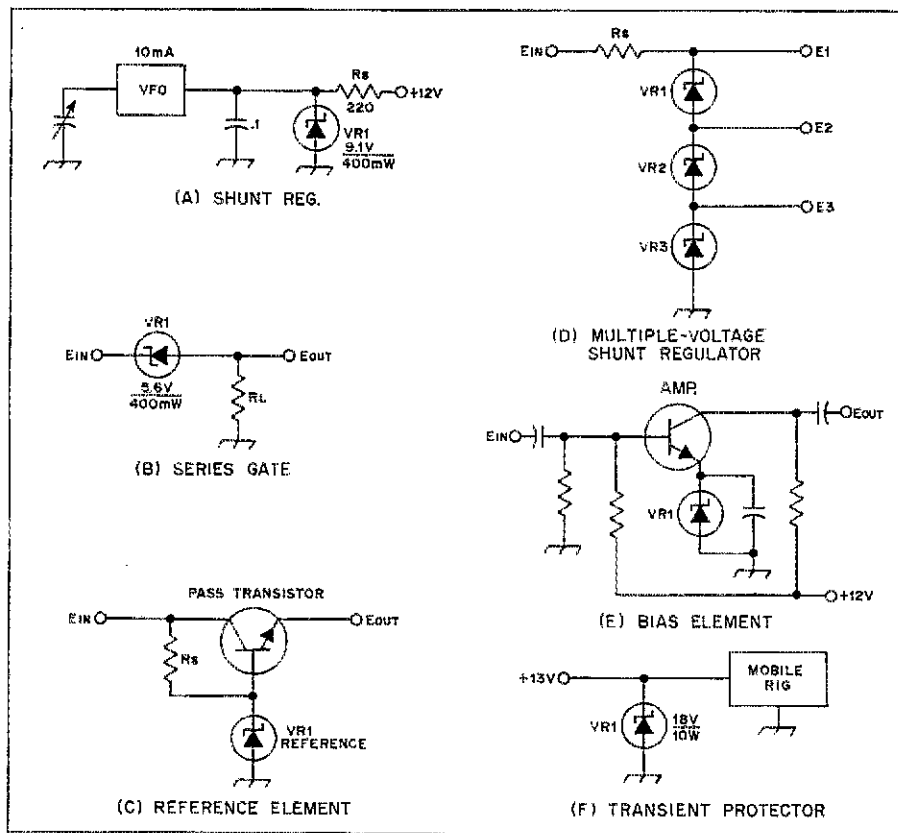


Fig. 1 — Examples of how Zener diodes can be used in amateur radio circuits.

bridging a Zener diode from the 13-volt line to ground. Under normal circumstances the diode will not conduct, but when a transient occurs, it will clip at 18 volts and higher to protect the equipment.

Some Unique Circuits

We depart somewhat from the ordinary with the circuits of Fig. 2. At A we have drawn a diagram of a 1.4-volt regulated supply which is suitable as a flashlight-battery eliminator. In illustration B we have a simple regulator which utilizes the four Zener diodes as rectifiers to provide a regulated 6-volt output. The circuit at C can be used to secure regulated filament voltage for two 12AU7A tubes. The value of C1 can be obtained by first calculating the required ohmic value of R_s , then making C1 equal in reactance at the line frequency to the value of R_s . In this example C1 is used in place of R_s . Of course the circuit can be connected directly to a 117-volt ac outlet without using T1, but if that is done *safety precautions* against shock should be exercised.

Still More Circuits

Elimination of a separate bias supply can be realized by using Zener diodes as bias elements. Fig. 3A shows how this can be done in the case of a grounded-

grid sweep-tube amplifier. VR1 is chosen to provide positive cathode voltage equal to the required negative grid voltage for establishing the intended class of operation — AB, B, or C. The power rating of VR1 must be such that it can safely pass the *total* cathode current of the tube or tubes used. For example, assume the tube has a cathode current at peak drive periods of 200 mA. VR1 is a 6.8-volt diode. Since power equals $E \times I$ (watts), $0.2 \times 6.8 = 1.36$ W, where E is in volts and I is in amperes. The power rating of the Zener diode must be considerably greater than 1.36 watts if damage is not to occur, but we'll get into that discussion a bit later on.

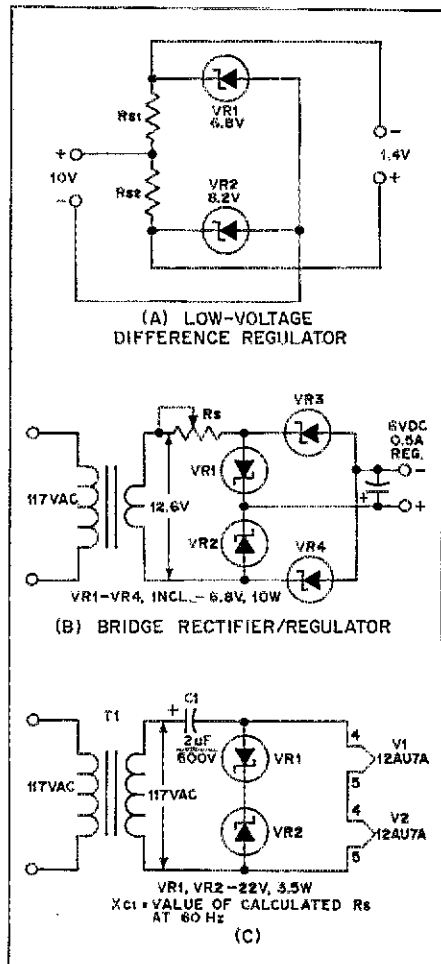
Fig. 3B shows the same principle as applied to tubes with directly heated filaments. In this example we can assume that the tube is an 811A, 572-B, or similar.

A transistor-protection circuit is illustrated in Fig. 3C. VR1 is placed between collector and ground. Under normal conditions the peak collector swing will not exceed 26 volts (except when the stage is amplitude modulated) with drive applied. Therefore, the 36-V Zener diode does not conduct. However, if the stage breaks into self-oscillation, or when the load is other than the design value, say, 50 ohms, the peak collector voltage can soar very high. At

such times it can exceed the safe ratings of the transistor in voltage and/or current. An event of that kind could cause destruction of the transistor. By including VR1 in the circuit, positive voltage levels (dc and rf) of 36 and greater are clamped by the diode and the transistor is protected. Since under ordinary circumstances VR1 is not conducting, it does not impair circuit performance.

Fig. 3D presents a simple circuit for regulating a dc voltage to a tube filament. VFOs and receiver oscillators will sometimes give better performance (reduced hum and improved stability) if a regulated dc voltage is used in place of an unregulated ac one. In fact, the tube can be kept turned on around the clock to reduce warm-up drift, and this circuit is ideal for the purpose. Since the 6AU6A in this example needs 6.3 volts nominal, we have placed a silicon-rectifier diode (CR2) in series with VR1 to obtain that value. The nearest voltage of available Zener diodes is 5.6 or 6.8, so we chose the 5.6-V figure for VR1. The 0.7-V barrier voltage of CR2 plus the 5.6-V value of VR1 gives us 6.3

Fig. 2 — Some unique ways that Zener diodes can be used.



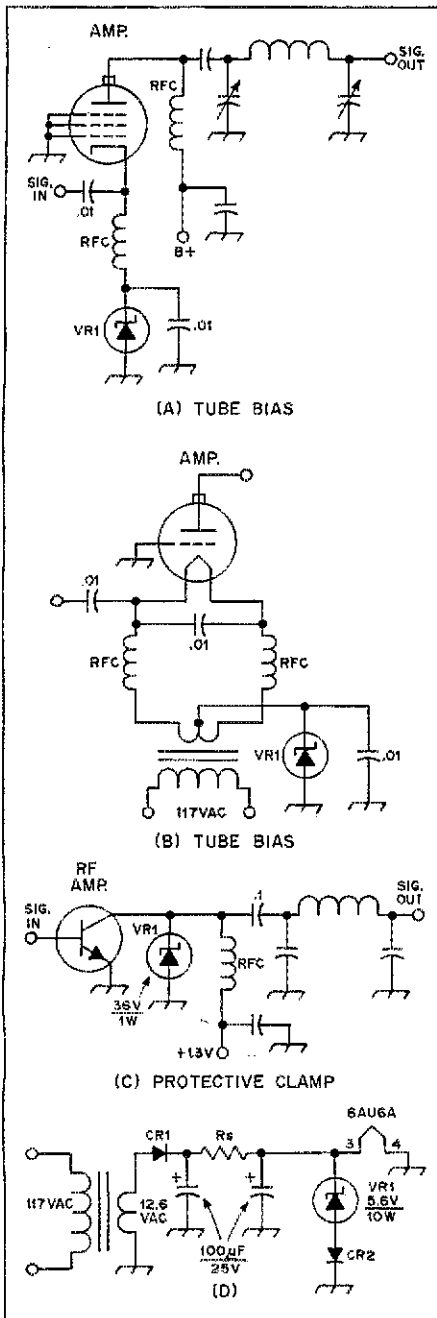


Fig. 3 — Zener diodes can be used as bias elements, protective clamps, and as regulators, for tube filaments.

volts. In fact, when tube-bias amounts of less than 5.6 volts are required, as may be the case in Fig. 3A and 3B, silicon power diodes can be stacked in place of VR1 to obtain the desired bias amount, allowing approximately 0.7 V per diode. Silicon diodes can also be used as low-voltage regulators in many circuits.

Some Calculations

If you are a person who shrieks with despair when you see an equation, you've progressed as far as you should with this treatise. We're going to introduce some simple grade-school algebra next, and without it there is no correct

way to apply Zener diodes as regulators. There is a right and wrong way to design any circuit. The right way is with the aid of formulas!

There are three sets of conditions common to regulator circuits: Variable load current and constant supply voltage, constant load current and variable supply voltage, and variable load current and supply voltage. A slightly different formula applies to each case.

A rule of thumb can be applied with respect to the ratio of minimum Zener-diode current ($E_{VR(min)}$) and load current (I_L). For best regulation the ratio should be 10:1. That is, the minimum Zener-diode current should be approximately 10 percent of the load current.

Fig. 4 shows a typical shunt regulator which provides 9.1 volts regulated to a VFO which has a constant load current of 10 mA (.01 A). The 10:1 current ratio does not result from the values given, but the figure is close enough for most amateur work. Had a lower value of Zener-diode voltage been chosen, the ratio would have been closer to the ideal one.

In the mathematical example at A of Fig. 4, series-resistance value of 173 ohms results. The nearest standard value is 180 ohms, and that will be adequate.

The equation at B of Fig. 4 determines that the maximum Zener-diode power dissipation in watts is 0.167. A good rule of thumb for choosing a suitable wattage rating for the diode is a 5-times factor. This will minimize internal heating. Since we determined that VR1 will dissipate 0.167 watt, a 5-times value will be 0.8 watt. Therefore, the closest safe standard power value is a 1-watt diode.

Finally, we must calculate the wattage rating of the series resistor. Fig. 4C gives an equation for determining the power that R_s must dissipate at maximum E_{in} . The power dissipated by VR1 is added to the load current of the VFO to obtain maximum R_s dissipation. The answer is 0.258 W. Again, we will apply the 5-times rule, which gives us a watt-

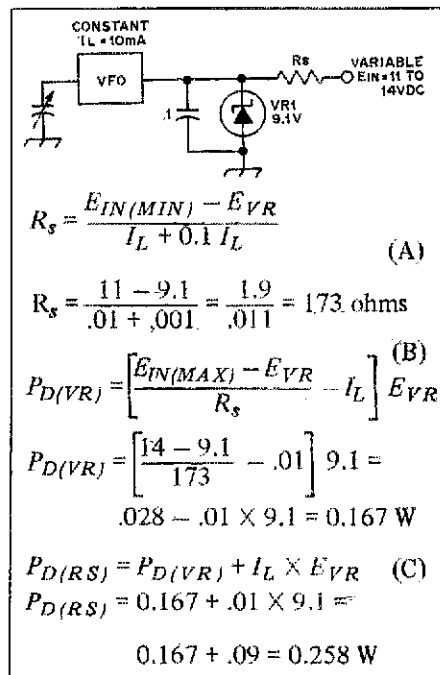


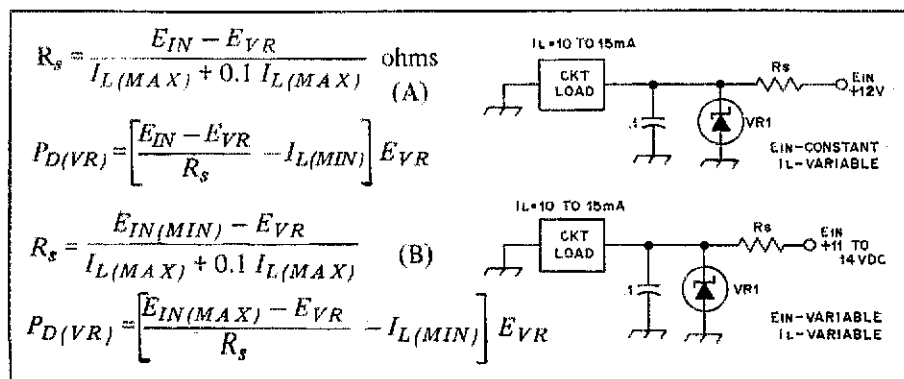
Fig. 4 — Practical example of a Zener-diode regulator. Equations and their solutions are provided for a case where the load current is constant, but the supply voltage may vary.

age rating of 1.3. In practice, a 1-watt resistor will suffice, as that is the nearest standard value.

In the example we gave at A in Fig. 3, where VR1 is used to obtain 6.8 volts of bias with 200 mA of cathode current flowing, the $P_{D(max)}$ of the diode is 1.36 watts. Five-times that power is 6.8 watts. A 10-watt stud-mount Zener diode is the next appropriate value available, so it should be used. It should be affixed to a heat sink and be bonded thermally to the sink by means of silicone heat-sink compound.

Fig. 5 gives information on resistance and power calculations for variable current and constant voltage, and for a situation where both the current and voltage are variable. To calculate the maximum dissipation of R_s use the same procedure set forth in Fig. 4. QST

Fig. 5 — Examples of circuits where the load current or both the supply voltage and load current vary. Equations for these conditions are given.



Learning to Work with Integrated Circuits

Part 4: We've learned to see numbers by the light of a diode and count by twos. Now let's discover how ICs can make it all happen.†

By Jerry Hall,* K1PLP and Charles Watts,** WA6GVC/1

An electronic frequency counter as a piece of test equipment for the ham shack? Sure, why not! With the rapid advance of electronic technology over the past several years, it isn't at all unusual for an amateur to possess such an instrument, whether it be commercially manufactured or built at home. But it hasn't always been this way. Two decades ago, it was either a rather wealthy or else a very fortunate amateur who could boast that he was the proud owner of his own, personal, frequency counter. Was it home built? Hardly! It was most likely a commercially manufactured one, probably obtained as surplus.

The counter of yesteryear contained a minimum of 25 or 30 vacuum tubes, and was mounted in a cabinet which was at least a foot high, and wide enough to accommodate 19-inch panels which were used as the face of the instrument. As it counted, an array of neon-lamp indicators would become a blur of lights during the count interval — runup, this was called. At the end of each count interval, the blur would settle down to just a few lamps which remained lit, while all others were extinguished. You had to read the decimal numbers screen-painted on the front panel associated with each lamp rather quickly to know what the count actually was. This is because, after a brief period of display time, the display would be reset to zero and the runup would begin again. Oh, there was a control to adjust the display time, but usually you set the time to be as short as would allow you to determine the count, for you wanted to "track" the drift of whatever signal you were measuring. (*Everything* seemed to drift in those days.) You think those

were the good old days? Yeah, sure!

Think for a moment about today's modern solid-state frequency counters, manufactured or made at home. They'll fit inside a shoe box and will run on less power than was required for the cathode heaters alone in those old tube jobs. Runup has been eliminated, so you get a continuous display of the counted frequency. And modern readouts let you see decimal numbers directly, instead of your having to search for printed numbers next to illuminated lamps.

It's What's Inside That Counts

Just exactly how does a frequency counter operate? What's its secret for telling you how many "hertz" there are in the signal you pipe into its input? Well, it'd be worth our while to consider these questions, for basically the project we're engaged in for this series of articles is a frequency counter. Oh, yes, it certainly functions as a digital voltmeter too, but it does that simply by taking the unknown input voltage and converting it to an audio frequency. Then we count the frequency. The design has been worked out so the display gives us a direct indication of the voltage, but that doesn't change the fact that it is really showing a frequency which was counted.

This type of frequency counter has often been called an EPUT meter — events per unit time. See the block diagram of Fig. 8. The input signal is fed first to a wave-shaping circuit, converting the signal to a train of pulses — one pulse for every cycle of input frequency. You may remember, in an earlier part of this series, we discussed digital IC threshold levels. It also bears mention that *how fast* a signal moves across the threshold is a factor in the switching of IC states. It so happens that such switching is more decisive with signals that change levels rapidly, such as with pulses

or square waves. So, in effect, we *square up* the input signal in that first block.

Remember, there is a continuous train of pulses coming out of the shaping circuits, one pulse for each cycle of input frequency. These pulses are fed to a gate circuit. This is a very appropriate name, because the gate opens to let some pulses pass through into the totalizer section, and then it closes. Just like out on the ranch, where you might open the gate to let a few cattle into the pen, and then close it! Once you've got 'em in there, you just count how many there are. How does this gate do its thing? Well, in Part 3 we talked about NAND gates, and we mentioned that we'd want to remember they could be used to provide an output when two input signals occur in time coincidence, right? That's just exactly what we do here. A count-gate signal is applied to one input, and the pulse train of the unknown frequency at the other. When *both* are present, an inverted pulse will appear at the output of the gate. If either the pulse or the gate goes away, no output. What this really means is that for every input pulse there is an inverted output pulse, *but only* during the time the count-gate signal is present. The count-gate signal itself is formed in a string of time-base dividers, from some reference frequency.

Say that we use the 60-Hz power-line frequency as our reference. If we divide this frequency by 60, we'll end up with a time period which is one second in duration. This divided-down output from the time-base section can be used as the count-gate signal. So it works like this. If on the ranch we opened the gate for one minute, and if 27 head of cattle went into the pen, that'd be 27 cattle per minute. And in our counter circuit, if we open the gate for one second and 27 pulses went into the totalizer, that'd be 27 pulses per second. And since each

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†Parts 1 through 3 appeared in QST for January through March, 1976.

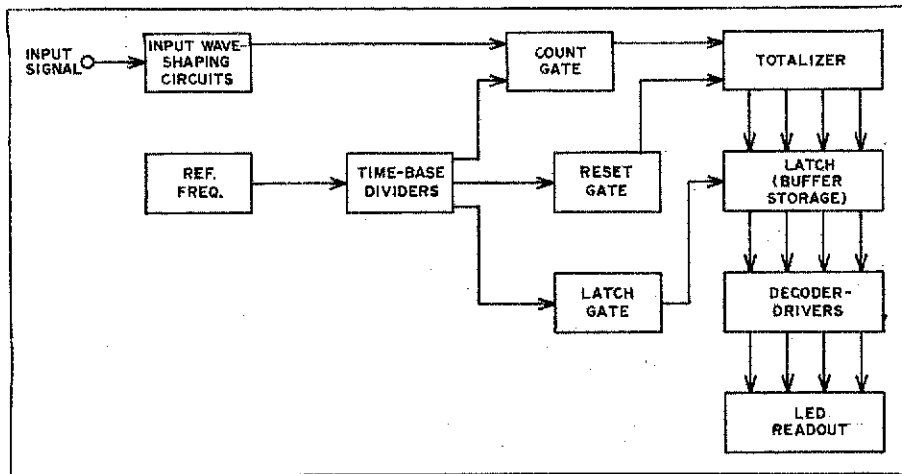


Fig. 8 — Simplified block diagram of frequency counter which measures events per unit time (EPUT meter).

pulse is derived from one cycle of input frequency, that's 27 cycles per second. Cycles per second is the same as hertz . . . we all know that. Not too complicated so far, right?

The totalizer section of the counter is a sort of an electronic adding machine. For our project it has four decade counting units, one for each digit of the display. Prior to each opening of the count gate, the totalizer is reset to zero. During a counting interval, the totalizer adds in much the same way that we would manually add a column of figures with pencil and paper. The input or units decade counts every individual pulse which passes through the gate. For every ten pulses counted, it, in turn, passes a "carry" pulse to the tens decade. For every ten pulses counted in the tens decade, a "carry" pulse is passed to the hundreds decade, and so on for the duration of the counting interval. At the end of the counting period, the input counting decade may have recycled hundreds or even thousands of times from 0 through 9 and back to 0, but the remaining decades have tallied the recycle times. In this manner, the sum of all the pulses counted is contained in decimal form in the decade counting units — actually in BCD form. Because the input or units decade must operate at frequencies much greater than the other decades, in many counters it will be a somewhat different circuit than the decades which follow it.

The latch or buffer-storage section is the one which allows the counter to display the counted frequency continuously, rather than permitting it to run up each time the frequency is counted. There is one storage element for each significant digit of the display, a total of four ICs in our counter. Each latch is a type of circuit known as a *flip-flop*. We'll learn in more detail about flip-flops later, but this particular type

ignores information coming from the totalizer section except during the time a latch command pulse is received. Thus, the changing BCD information from the totalizer during its reset to zero and runup is disregarded. In effect, the latch says to the totalizer, "You can do any darned thing you want, but I'm not paying any attention to you." So the totalizer goes merrily on its way, resetting to zero and running up its count. After the count gate has been closed, the totalizer BCD output information stays constant. Just like the 27 cattle in the pen — they can't get out, and no more can get in. At this time a latch pulse is formed from the time-base section, saying to the latches, "Pay attention to the totalizer!" What more can the latches do but say, "Yes, sir!" because the time base is boss over the whole operation of the counter. (Sometimes the time-base section is called a *clock*, because it tells all the other circuits when it's time for them to do their work.) So the latches take the BCD information from the totalizer and present it at their outputs to the decoder-drivers. The decoder-drivers accept this BCD information and convert it to the necessary voltage levels to illuminate the proper decimal digits on the LED readouts, as we learned in Part 3 of this series. The latch pulse ends, in effect telling the latches they should again disregard the totalizer. But the output information from the latches remains as before. If the count changes from one count interval to the next, this will show up as an abrupt, instantaneous change in the value displayed. For a drifting signal being measured, the display will change with each latch pulse, somewhat less than once each second if the instrument is counting hertz. (Some brief amount of time is needed between the successive times when the count gate is open for the latches to do their job and for the totalizer to be reset to zero before the

next count period begins.) After the latch pulse ends, then a reset pulse is formed from the time base, resetting the totalizer to zero. This might be compared to loading our 27 head of cattle into a truck and driving off with them. After they're gone, they are no longer of direct concern to us. We're now ready to open the gate again and let some more cattle into the pen.

Overall Block Diagram

So you see, operation of the frequency counter isn't that complex now, is it? More than one integrated circuit may be required to do the job represented by one block on the simplified diagram, Fig. 8, but that shouldn't complicate things greatly for us. Let's see what will really be inside our overall voltmeter/counter when it's completed. Park your peepers now on Fig. 9. In some respects this is still a simplified block diagram, for it doesn't show every individual logic element in the instrument, but it does show in detail every function being performed when the instrument measures dc voltages. For the moment disregard the row of four blocks across the top of Fig. 9. Below them, three ICs form the time-base dividers. In the economy version of this instrument, we'll use the 60-Hz power-line frequency as our reference. (Later, at the option of the builder, we'll exchange a crystal-controlled time-base section for the one shown here.) The 74121 IC is a wave shaper, squaring the 60-Hz waveform. Together, the 7492 and 7493 ICs divide by 72, providing one latch pulse and one reset pulse for every 72 cycles of line frequency. The count-gate signal is formed from 60 of those 72 cycles. The sequence goes like this: Count for 60 cycles, latch during a part of the time for the next 6 cycles, and reset during a part of the time for the remaining 6 cycles. Repeat *ad infinitum*. In this way, the complete count/latch/reset cycle takes place in 1.2 seconds, or 10 times every 12 seconds. Four decade counters are indicated on the next row, an 82S90 and three 7490 ICs. The first is different from the others so our counter can function on rf signals through the 6-meter band. (The 7490s are not guaranteed to operate at frequencies higher than 15 MHz.) For each of the four digits there is a 7475 latch, a 7447 decoder-driver, and a readout display LED.

On the diagram in Fig. 9, the unknown input signal enters the upper left corner, shown as IN. To keep from cluttering the diagram, not all of the switching functions are shown, but this input signal can be routed directly to the count gate, whereby its frequency is counted and displayed. Suitable shaping

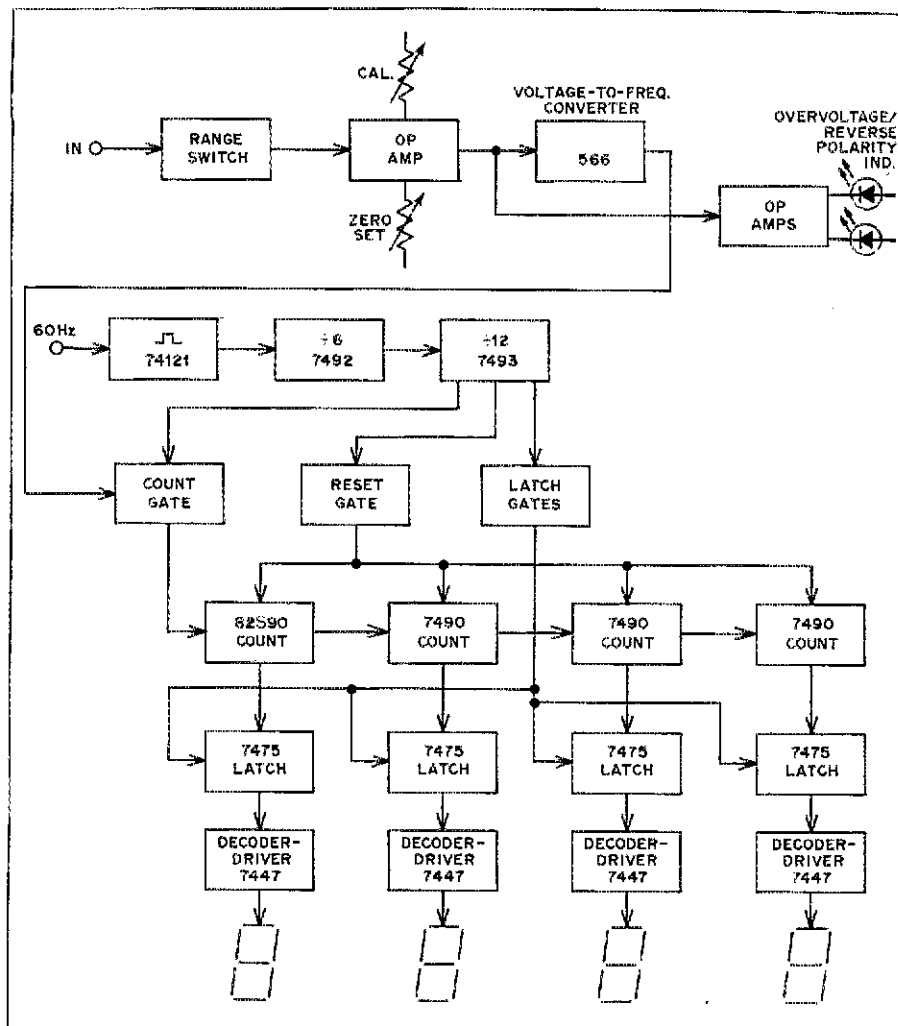


Fig. 9 - Overall block diagram of the digital voltmeter as switched to measure dc voltage. To avoid cluttering the diagram, other switch-selected functions are not shown.

of the input waveform may be required in auxiliary circuits. (This information will be discussed in more detail under circuit options in a later part of this series.) As shown in Fig. 9, the circuit is switched to handle an unknown dc input voltage. Unknown ac signals can also be handled, through a simple rectifier and filter circuit which is wired in connection with a function switch, omitted from this block diagram. The dc voltage is fed to an operational-amplifier circuit which offsets the dc level in a way to properly control the 566 stage which follows. The 566 IC is a voltage-controlled oscillator, wired with discrete parts to operate in the audio range. As the control voltage from the op amp changes, so does the frequency of oscillation. This frequency is passed along to the frequency-counter section, which we've already discussed in detail. As we mentioned earlier, the design of the circuit is such that the display gives a direct indication of the input dc (or ac) voltage.

Another op-amp section is used to provide an indication of a reverse-

polarity connection at the input. The input circuit is wired so that the voltage applied to the range switch must be positive with respect to the "common" connection of the instrument. Negative voltages may be measured simply by reversing the leads. If the polarity of the measured voltage is unknown and it turns out to be negative, the reverse-polarity indicator, a simple LED, illuminates to let you know about it. Yet another op-amp section and an LED work to tell you when a voltage going into the input circuitry is higher than the basic range of the instrument. Such a condition would occur if you were trying to measure 50 volts dc with the range switch in the 10-volt position. This indicator says to you, "Change the range switch, friend." (Of course, it's always a wise precaution to measure unknown voltages on the highest setting of the range switch anyway, to get an idea of their potential. This will avoid the possibility of damage to the instrument. A potential of just a few volts more than the range-switch setting will not damage the instrument, but the

indicated reading is no longer reliable.) Both of these op-amp sections operate from the same input voltage which controls the 566 oscillator.

60 Hz - To Be or Not To Be

In an EPUI meter of this type the accuracy of measurement is directly proportional to the accuracy of the time-base reference frequency. Earlier we mentioned that for economy we'd use the 60-Hz power-line frequency for reference but could exchange it with a crystal oscillator at a later time. To that we'll bet you asked, "Why? What's wrong with the line frequency?" Well, the power company isn't any WWV, and that's for sure! "But," you say, "my electric wall clock keeps time okay." Sure it does. If you set your clock today to the exact second against WWV, and if you check it a week from today, you'll probably find (barring power failures) that it agrees within a couple of seconds or better. Accuracy over such a period of time can be considered long-term. Nearly all commercial power systems, worldwide, have excellent long-term accuracy. But this has nothing to do with an electronic counter, unless you want it to count continuously for a week without stopping to latch and reset.

In a frequency counter of this sort, we're concerned with short-term accuracy . . . in other words, how close to being precisely one second is the line frequency divided by 60? The answer - not very! Seldom is the line frequency 60.000000 Hz, at least in all the power distribution systems we've encountered. "Okay," you say, "so it wanders a little bit above and below 60 Hz. Big deal!" You bet it's a big deal, especially when you consider the error in parts per million! To obtain information on how the line frequency does wander, we built up a special type of frequency counter. A very stable high-accuracy 15-MHz oscillator is the standard for our measurement. Its frequency is divided down to provide a train of pulses, each separated from the next by 1 microsecond, or 1 million pulses per second. The counter measures how many of these pulses occur during 60 cycles of line frequency. "So why bother," you're thinking. "It'll be within a few counts of a million." You'd be surprised. Seldom was the count closer than 30 or 40 pulses of being a million, and most of the time it was off by a few hundred pulses. On five occasions in a one-month period, the error reached or exceeded 1000 pulses. Would you believe that represents a frequency error of 0.1%, 1000 parts per million, or 1 kHz per megahertz? You'd better believe it! Such error is ordinarily acceptable at audio frequencies, though. Say we were to count a frequency of 10,000 Hz, or

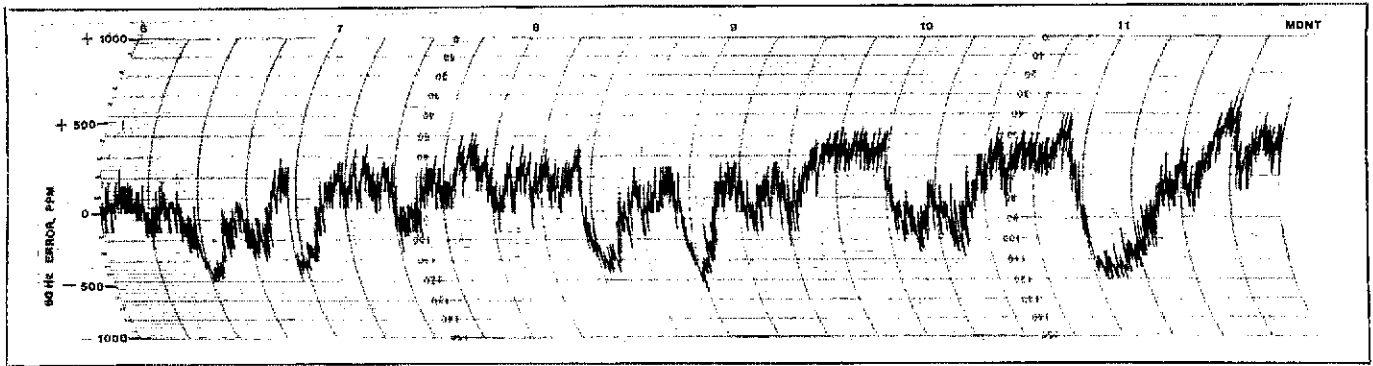


Fig. 10 — Chart recording of power-line frequency in Newington, CT, for the period from 6 P.M. to midnight EST for Tuesday, January 13, 1976. The frequency reference for these measurements was a stable, high-accuracy 15-MHz crystal oscillator. The calibration scale at the left shows the departure from 60.000000 Hz

in parts per million (ppm). Note the sudden shift in frequency from +500 to -450 ppm over an approximate 8-minute period at 11:00 P.M. Such shifts seem to be typical during the late evening hours in this area. (The printed information which is upside down on the chart has no significance.)

10 kHz. With such a frequency reference our measurement could be off by as much as 10 Hz . . . tolerable for most work. But consider radio frequencies, where the story is quite different. If we were to use such a frequency reference and measure a 21-MHz signal, for example, we could be wrong by as much as 21 kilohertz! Wow! If you used this counter to set your transmitter on a frequency 10 kHz *inside* the 15-meter band (or subband), you could end up being as much as 11 kHz *outside* the band (or subband).

"The line frequency *can't* be that bad," you're saying. You think not? Take a look at Fig. 10. We weren't about to sit there days, nights, and weekends jotting down numbers from the display of our special counter. Instead we recorded the error on a continuously running chart recorder. Fig. 10 shows you a portion of the yards and yards of recordings we made. This portion was selected as typical of those conditions encountered during the evening hours when an amateur might be at home using his test equipment. The calibration for the recorded error in parts per million is shown on the left in Fig. 10. The most surprising discovery during the operation of this test setup was that the number of counts would usually vary markedly from one second to the next, rather than to hold relatively constant. This is shown on the chart by the swing of the recording pen to produce a rather broad, jagged-looking trace. We didn't contact local power company officials to inquire about their methods of frequency control, but we feel the Newington/Hartford area of Connecticut is no better nor no worse than any other part of the U.S. or Canada in short-term line-frequency accuracy. This statement is based on the experience of the authors, both of whom have lived in many areas of the U.S. (and abroad). We're not aware of any power-

generating system which comes close to having the short-term accuracy or stability of even the most unstable of crystal oscillators (typically .001%). In short, then, the 60-Hz line frequency is okay for audio work and for the DVM function of our project. But if you want to use this counter for measuring rf signals, you'd do well to consider going to to crystal control later.

Monostable Multivibrator with Schmitt-Trigger Input — the 74121

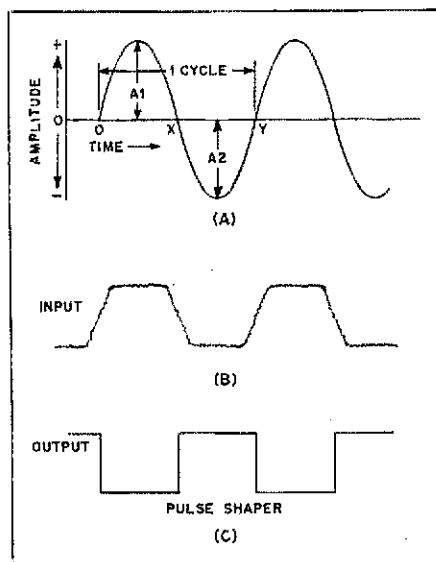
So much for the block diagrams and reference frequencies. Up to this point, we haven't said much about waveforms. But proper wave shapes are important, and a brief discussion is in order before we delve further into this IC business. Refer to the waveforms in Fig. 11. The waveform shown at A is a representation of one cycle of the 60-Hz ac power-line frequency, the standard alternating current frequency for power distribution in

the U.S. "Now what does this have to do with integrated circuits?" you ask. Well, the T²L ICs used in the frequency counter will not function if the input signal is in the form of a low-frequency sine wave. If that's the case, then how are we going to use the ac power-line frequency for our clock/reference frequency? We have to provide a square-wave signal to the input circuits of the 7492 and 7493 ICs used in the clock or time-base circuit. The 74121 IC will provide the proper output information (T²L compatible) for use with these ICs. There are two sections or circuits within the 74121 — a *Schmitt-trigger* gate and a *monostable multivibrator*. "Wait a minute! You're moving too fast! What's a Schmitt trigger, and what's a monostable multivibrator?"

Okay, here is the "inside" dope on the 74121. The Schmitt trigger is a regenerative bistable circuit (a logic circuit with two well-defined states) whose logic state depends on the amplitude of the input voltage. For this reason, it can be used for waveform restoration, signal level shifting, squaring sinusoidal (our trusty sine wave) and nonrectangular inputs. This sounds like the circuit that will do the trick for us! And to help the Schmitt-trigger circuit do its job, we can reshape the sine-wave input signal, as shown in Fig. 11B, by clipping off some of the top portion in the sine wave. Zener diode VRI was placed across the input of the 74121, limiting the positive-going excursion of the sine wave at 5.1 volts. A diode is present on the 74121 chip already, to provide clipping of the sine wave in the negative-going portion of the cycle. The output from the Schmitt-trigger circuit will resemble the waveform of Fig 11C.

Now we have an almost square wave going into the other section of the 74121, the monostable multivibrator. This logic circuit has two logic states, one of which is stable and the other transitory or temporary. Once the cir-

Fig. 11 — At A, B, and C, the waveforms obtained in the shaping process of the 74121 IC to obtain a pulse from a sine wave.



circuit is *triggered* (initiated into operation) into the transitory state, it remains there for an amount of time determined by external timing components (a resistor and a capacitor). Then it returns to the stable state. The output from this section of the 74121 is a square-wave pulse — exactly what we need to operate the remaining ICs in the clock circuit of Fig. 12.

The actual circuit description of the Schmitt trigger is a bit too complex for discussion in this series. But an excellent presentation of the workings of the Schmitt trigger, and why T²L devices must have input information in the form of square waves, can be found in the reference material listed at the end of this part of the series.

Flip-Flop — Divide and Count

Now that we've solved the square-wave problem, we can give some thought to the next group of ICs we will be discussing — 4-bit binary and decade-counter ICs. In particular, we will go over the operation of two counter ICs, the 7492 and 7493. But first let's talk about the basic circuit of the counters, the flip-flop. The flip-flop is a digital circuit that can store information. The flip-flop is a bistable multivibrator, and as we said before, has two stable states: High (1), or low (0). When the flip-flop is in a given state it will stay there until a trigger pulse or initiate signal is applied to the input circuit, causing the state to change. There are several types of flip-flops, the most common of which are delay (D), gating (J-K), and toggle (T) flip-flops.

The 7492 is a monolithic 4-bit binary counter which uses four flip-flops called *master-slave*. This type of flip-flop stores information in a portion of the circuit called the master section on one clock level and transfers it to the slave section at the next negative-going

clock pulse. The outputs of the flip-flop come from the slave section. Three of the four master-slave flip-flops in the 7492 are internally connected so they will provide frequency division by six. The fourth flip-flop divides by two. The two sections may be wired in cascade for divide-by-12 operation. What do we mean by frequency division? When we say "divide by two" we mean that for every two input pulses, one output pulse results. And divide by six means that for every six input pulses, one output pulse occurs. In a divide-by-10 or decade divider circuit, one output pulse appears for every ten input pulses. This output pulse is the "carry" pulse we talked about earlier. We will be using the 7492 as a divide-by-six counter. To do this, the IC is wired as shown in Fig. 12. The 7492 is U8. The output pulses from the 74121 (pin 6) are connected to input BC of the 7492 (pin 1). In this configuration, frequency divisions by 3 and by 6 are present simultaneously at the C and D outputs, respectively. We use the D output.

The 7493 is also a monolithic 4-bit binary counter consisting of four master-slave flip-flops. However, these flip-flops are wired internally to provide a divide-by-two and a divide-by-eight counter. If we connect the output of flip-flop A into the input of flip-flop B, the result at output D will be a divide-by-16 circuit. But we don't want to divide by 16, we want to have a divide-by-12 counter (for a total division in the 7492 and 7493 stages of $6 \times 12 = 72$). "How do we make a divide-by-16 IC perform division by 12?" you want to know. Easy! There is a reset line which is connected internally to all of the flip-flops. This reset line comes from the output of an internal NAND gate. If we apply a logic 1 to both inputs of this gate, Ro(1) and Ro(2), the count inputs of the flip-flops are inhibited and the

four outputs are reset to logic 0. By examining the truth table for the 7493, we find that there are two logic 1 outputs available when the counter reaches the number 12. These outputs are at C and D of the IC. (The truth table for the 7493 is identical to the left half of the truth table for the 7447 IC. See Table 1, Part 3 of this series. The letters D, C, B, and A correspond respectively to the 8, 4, 2, and 1 outputs of the 7493.) By wiring the D and C outputs to the Ro(1) and Ro(2) inputs, we now have a divide-by-12 counter. In a future discussion we'll see how the various counter outputs of this clock circuit tell other circuits of the frequency counter what to do and when to do it.

Building and Checking It

There's little that needs to be said about the construction of the time-base board of the counter, other than with regard to the soldering techniques mentioned in Part 1. The circuit diagram has already been discussed, and Fig. 13 shows where the parts go on the circuit board. As we mentioned earlier, sockets are recommended for the integrated circuits. Only three wires for external connections to the board are needed at this time — +5 V, common, and 60 Hz. The A, B, D, and CL (clock) pads may be left unsoldered.

After you've soldered the discrete parts and the IC sockets in place, check to be sure there are no solder bridges on the board. If everything looks okay, insert the ICs in the sockets and connect the board to the 5-V power supply. Temporarily make no connection for the 60-Hz input. With your trusty dc voltmeter (borrowed or otherwise), measure the voltage at pin 6 of U7, the output pin of the 74121. With either a VOM or an electronic voltmeter, it should read approximately +0.14 V. Now connect the 60-Hz input wire to one side of the secondary of T1 — it doesn't make any difference which side. The reading at pin 6 of U7 should increase to approximately 0.7 V. Now switch your meter to read ac. With a VOM of 20 k Ω per volt on the 2.5-V range, you should see about the same, 0.7 V. With a high-impedance electronic voltmeter, it'll be more like 0.9 to 1.0 volt ac. These checks will tell you if the 74121 is working okay.

Now switch your meter back for dc measurements and check the voltage at the D output pad of the board. The voltage should momentarily flick positive to nearly 5 V every 1.2 seconds, or 10 times every 12 seconds. This is the same as 50 times every minute. If this happens, your time-base board is working as it should. (Congratulations!) If not, go back one stage and measure the dc voltage at pin 8 of U8. It should

Fig. 12 — Circuit diagram of the 60-Hz clock. No connections are made to pin numbers not shown on the ICs. On the basing diagram for the ICs, left, the dot on the case indicates pin 1, and pins are numbered consecutively in a counterclockwise direction. Parts required are listed below.

U7 — TTL monostable multivibrator, type 74121.

U8 — TTL divide-by-12 counter, type 7492.

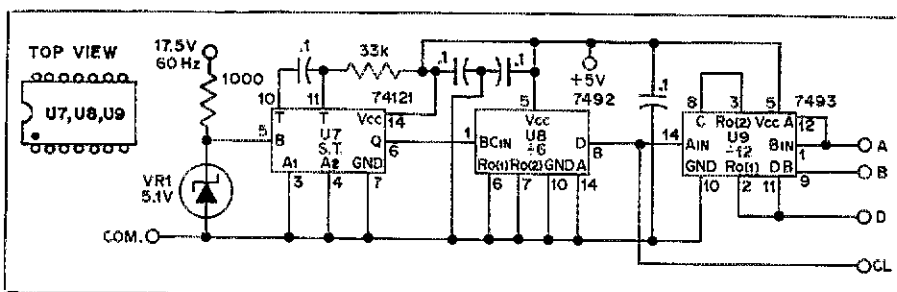
U9 — TTL 4-bit binary counter, type 7493.

VR1 — Zener diode, 5.1 V, 1 W, 1N4733 or Motorola HEP Z0406 or equiv.

Composition resistors, 1/4 or 1/2 W; 1 — 1000 Ω ; 1 — 33 k Ω .

Disk ceramic capacitors, 0.1 μ F, 50 V (4 req'd).

IC sockets for 14-pin dual in-line IC packages (3 req'd).



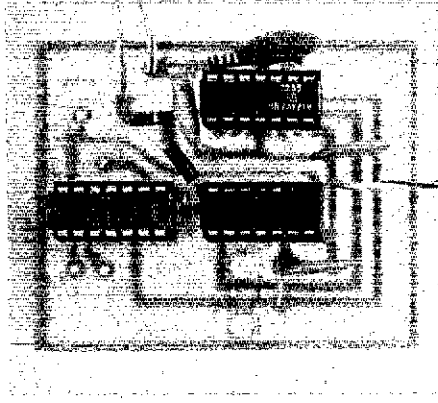
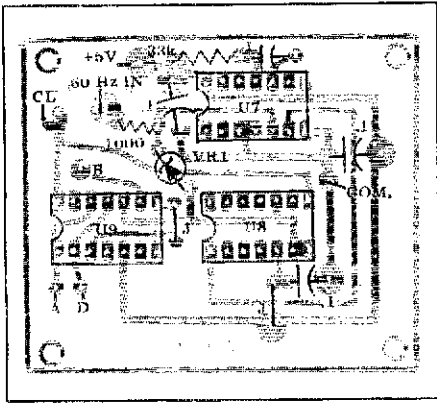


Fig. 13 — Parts placement guide for the 60-Hz clock board, not shown at actual size. These views show the component side of the board. J = wire jumper. See list of suppliers of ready-made boards at the end of Part 2.

be in the order of +2 volts, and you'll notice a fast jiggle of the meter needle if U8 is working okay. (The meter is really reading 10 dc pulses per second.) If you have problems, the above information should help you find them. In doing

your detective work, it may help when checking the output of one stage to remove the IC which it drives, as a shorted input section on one IC can load down the output of the previous stage and give confusing symptoms.

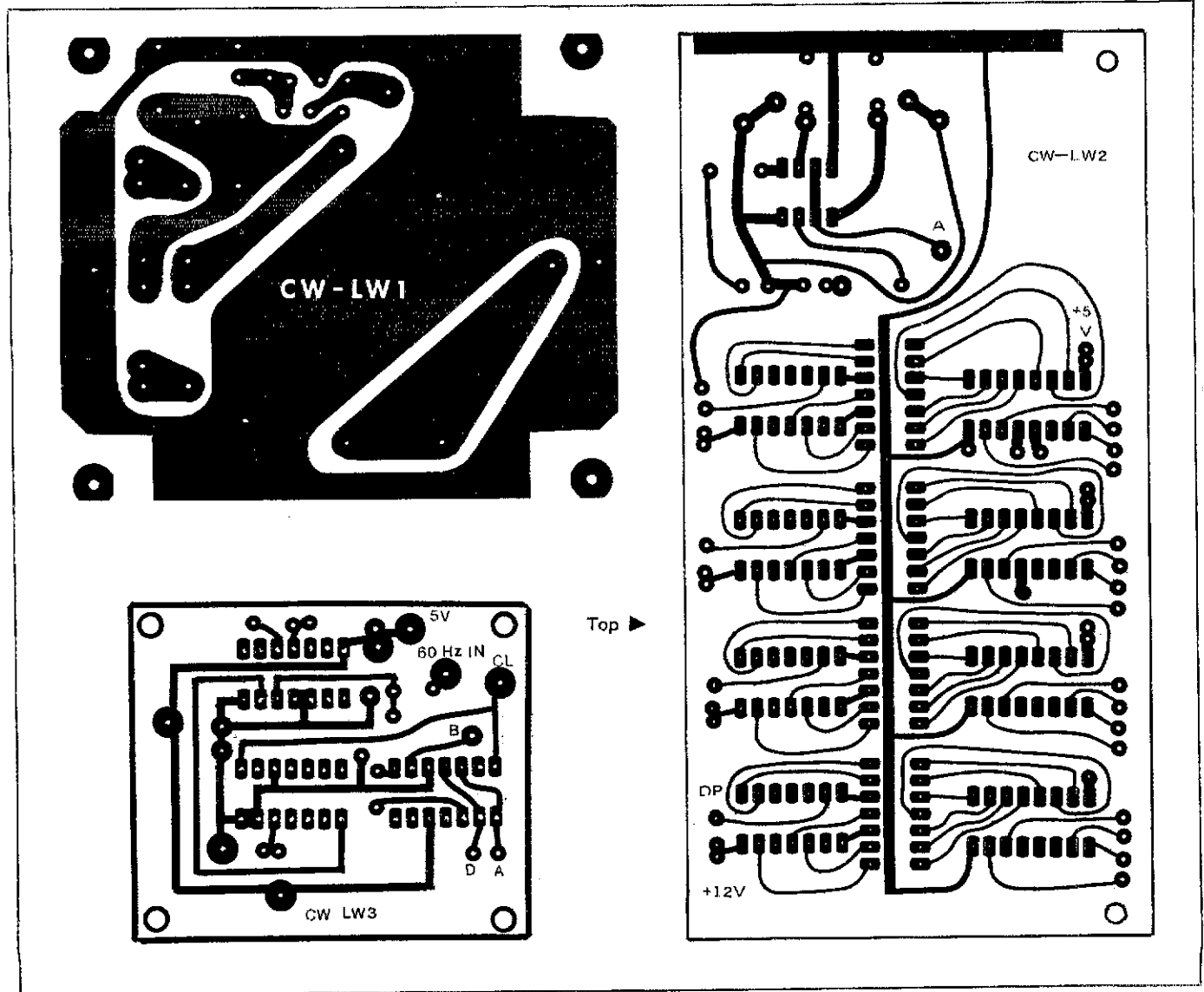
Because of the very large number of requests for DVM/frequency-counter circuit-board patterns, they will appear in *QST*. If you've sent your dollar for templates to ARRL Hq, it will be returned. The patterns below are for the power supply (CW-LW1), the display (CW-LW2), and the 60-Hz clock (CW-LW3). These patterns are shown at actual size from the foil side of the board; black represents copper.

In Part 5 of this series, we'll build and check out the gates for forming the count, latch, and reset pulses. To do this we'll use the CL, A, B, and D outputs from the board we've just tested. Also in Part 5, we'll build and test the totalizer or counter portion of this project. At that point we'll actually be able to count frequencies! Part 5 will appear in a subsequent issue of *QST*.

Bibliography References

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- Signetics Digital — Linear — MOS Integrated Circuits Data Book, Signetics Corp., P.O. Box 3004, Menlo Park, California, 1974.

QST



An ITV Cure for 6 Meters

Let a coaxial notch filter keep the television signals out of your 6-meter receiver. Make them stay where they belong, on the "boob tube."

By Dick Jansson,* WA1QLI

Interfering television (ITV) has plagued many a vhf'er. It's a toss-up as to where the problem is worse — on 220 MHz or on 6 meters. The author found the interference unbearable, but the prospect of not being able to operate on his favorite band was even more so. Therefore, he did something about it. Read on and take heart.

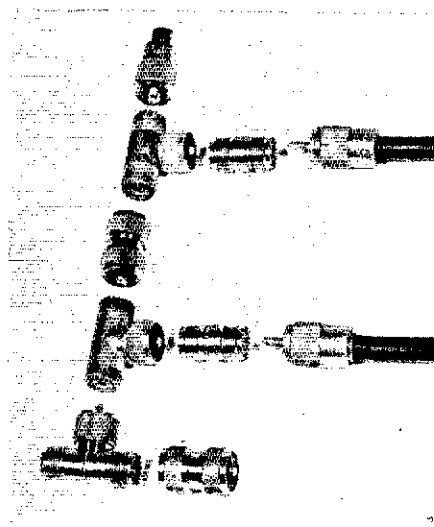
Very shortly after my entrance into 2-meter mobile fm operations, I was introduced to the "intermod alley" that W1CT described.¹ It took but very few inquiries to find George and an answer to the problem. The results have given faultless operation since the construction of my own version of his filter.

My being an avid 6-meter ssb and a-m operator has highlighted another set of intermodulation problems in this area of Eastern Massachusetts. Only a few miles south of "intermod alley" is an area called "TV alley" wherein reside the major TV towers for the area. All three towers are between 1-1/2 and 3 miles from this QTH and emit TV channels 2, 4, 5, 7, 38, 44, and 56. Also radiating from these towers are a half-dozen fm broadcast signals and other commercial services. In a nearby dump there is even a powerful a-m broadcast station.

The rf "racket" incident to the front end of a vhf receiver is almost unbelievable. With an unprotected receiver we have witnessed massive intermodulation, vestigial (in-band) channel-2 video side-

*6 Pine St., Wellesley Hills, MA 02181

¹Downs, "A Cure for Intermod Alley," *QST* for March, 1976.

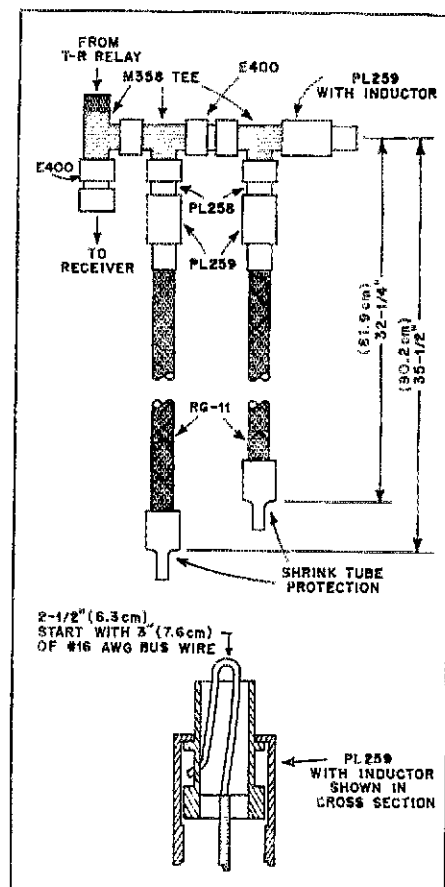


Putting it all together is made easier if you have a good assortment of fittings, as shown here.

bands every 15.75 kHz, in-band image of channel-2 audio subcarrier at 50.75 MHz, heterodyne products of the a-m station with channel 2 at 50.16 MHz, and, in general, a fantastic amount of man-made QRM. A majority of this energy can be prevented from reaching the receiver through the use of a high-Q band-pass filter. A search, followed by the judicious purchase of some old *QSTs*, found such a filter as the cover feature of the October, 1964, issue of *QST*. A 42-inch high coaxial-tank filter made from six standard large fruit-juice cans, was described. With little inducement, my family's fruit-juice diet was

modified from the frozen types to the canned varieties, thus making available

Fig. 1 — Cable lengths and component designations for the trap assembly.



the basic stock for the filter.

Performance of the coaxial filter in the receiver antenna line was just short of miraculous even though the in-band component of the channel-2 vestigial sideband was still present every 15.75 kHz. Some of these blips were noted to be peak tunable with the coaxial filter along with the 6-meter signals while some others were noted to be stronger as the filter was tuned to higher frequencies. The conclusion here was that some of the energy was getting past the filter. It even caused a strong amateur station to be heterodyned and heard every 15.75 kHz up and down the band for some distance.

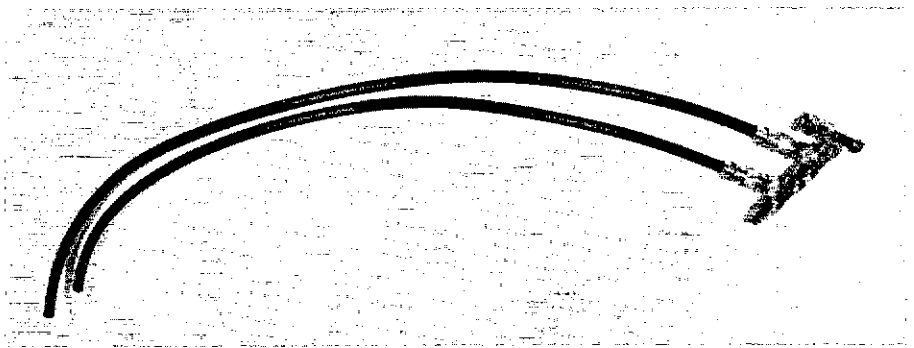
Onto the scene came the WICT filter with its 2-meter fm success. The instant idea was to construct a trap to be used in conjunction with the coaxial-tank filter. It was decided to provide a tuned notch for the channel-2 picture carrier at 55.25 MHz, while providing a pass-band for (at least) the lowest 1-1/2 MHz of the 6-meter band. As an additional experiment, a second tuned notch was inserted for the audio subcarrier at 59.75 MHz. In retrospect this second filter is probably not needed, but if one is to carry the idea further, it might be interesting to add a third tuned notch for the color subcarrier at 58.83 MHz.

According to WICT's concepts, a pair of notch traps with a corrective bandpass inductance were assembled of uhf coaxial tees, double male couplers, double female adapters, cable connectors, and RG-11 coaxial cable, as shown in Fig. 1 and the photographs. Be sure to start with the cable sections longer than shown so that variations in velocity constant can be compensated for. Tuning the traps and the inductor is not difficult; it just takes time and a methodical approach as noted by WICT. After tuning, the ends of the RG-11 traps were protected with some heat-shrinkable tubing. Making the corrective inductor was somewhat easier than for the 2-meter version, as this one is a hairpin loop of No. 16 AWG copper wire. The characteristics of the finished filter are shown in Fig. 2, illustrating that the 1-dB points are just at the edges of the 50- to 51.5-MHz region and the notches are near to the desired frequencies.

When installed in series with the coaxial tank filter in the receiver antenna line, the new filter eliminated the out-of-band rf components previously seen and reduced the in-band blips. This performance allows the reception of weak signals despite the channel 2 operation nearby.

The merits of this channel-2 filter in an area that has weak TV signals (to prevent 6-meter TVI) are not known, as it has not been tried. In transmitter service the power losses of approximate-

Two lengths of cable are used in this coaxial trap assembly. One is to attenuate the channel-2 video signal, the other the aural carrier. The author makes reference to a coaxial cavity type of filter, and it should be pointed out that these coaxial stubs are not a substitute for, but rather an adjunct to, the tuned cavity. Only in mild cases of ITV would the coaxial stubs perform well enough alone.



ly 0.5 dB (insertion loss) can cause some noticeable heating of the filter when used at output power levels of 200 watts. The loss is about 11% or 22 watts. This trap definitely should not be used in high-power service as it will get

smoked, but if used for 10- to 30-watt transmissions, it would cause no heating problems. For my purpose, in ITV service in a receiver antenna line, there is no measurable heating and the insertion loss is of no consequence. QST

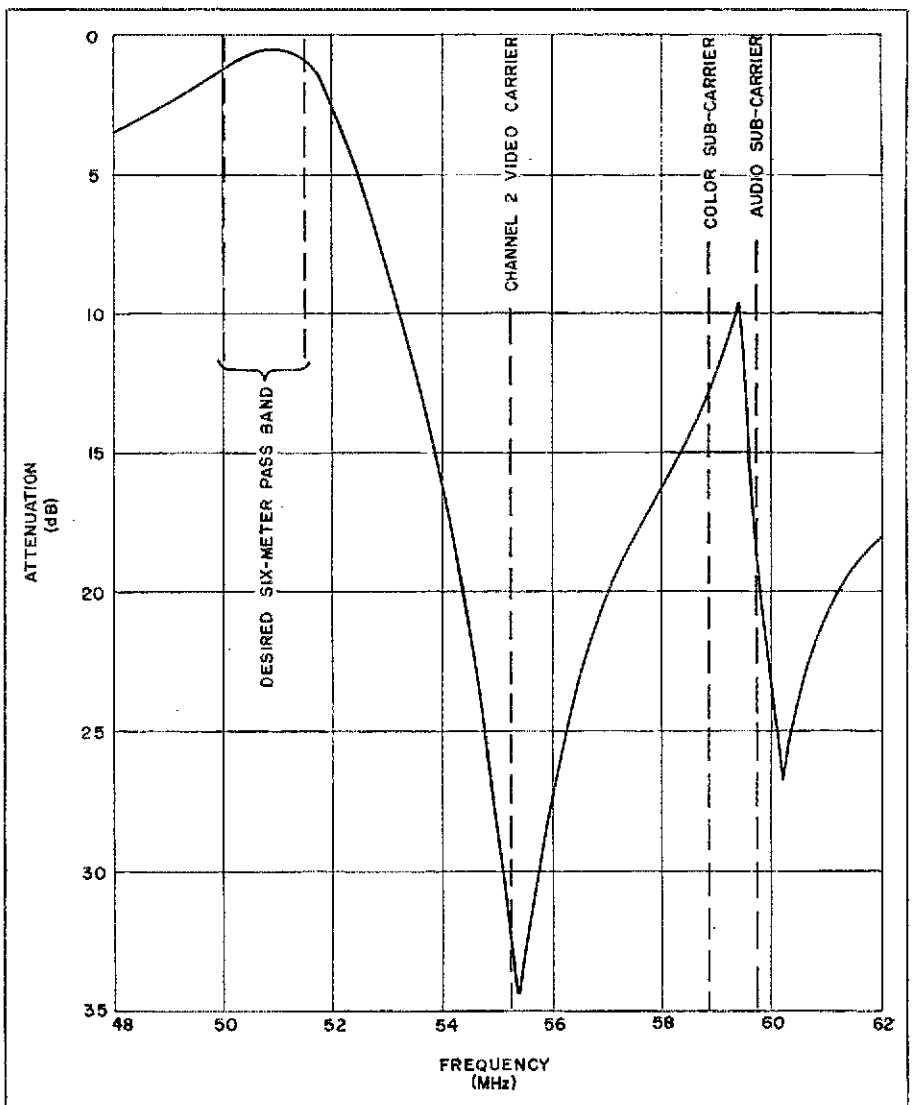


Fig. 2 -- Attenuation characteristics of the filter used by the author. Trimming procedure follows that given by WICT in March, 1976, QST.

Propagation - Past and Prospects

One frosty morning in January, a local weather service predicted a warming trend for the next day: Snow turning to rain, temperature rising to the 40s. But dawn broke clear and cold, and the day got colder before sunset. After one more day the warming started. The January thaw arrived three days late!

The propagation seer's crystal ball was equally clouded at this time. A major aurora arrived unheralded January 10, with an intensity rarely seen in low-sunspot years.

With all our knowledge of radio and weather phenomena, how can there still be such upsets in both fields? Obviously, we still have much to learn about the sun — the dominant factor in all life on earth. Forecasting can be done rather well by computer, but we still don't have all the right numbers for the machine. To be on top of the propagation situation, your best bets are intelligent use of *current* information on the sun's condition and a sense of what is "normal" for time and season on the frequencies you're interested in.

Some Propagation Surprises

Consider the ARRL Sweepstakes phone weekend, Nov. 22-23. The 27-day intervals before the contest dates showed no major disturbances in over a year of detailed records. With the solar flux and sunspot number both running low in September and October, a safe bet seemed to be that the 75-meter band would play a major role in SS scoring. But for contestants in northeastern USA and adjacent Canada, it didn't work out that way.

There had been some warnings, largely ignored except in retrospect. Starting at 71 on Nov. 1, the solar flux rose steadily, reaching 96 Nov. 18. In the same interval three large sunspot groups, plainly visible with simple projection methods, moved across the sun.

Disruption was not serious on higher frequencies. Even 7 MHz worked pretty well for the better-equipped stations, but 75 was a disaster for most 1s, 2s, 3s and 8s, at least. People who keep records were looking for a repeat performance 27 days later, but none came.

The aurora of Jan. 10-11 was a surprise too, although perhaps it should not have been. There are barely perceptible bumps in the A-index curves

many months back from this one, and in July and August there were fair-sized peaks. But between Jan. 1 and 10 little could be seen on the sun, despite several clear days and improved projection facilities now in use by the writer. By conventional indicators it did not look like time for the most intense auroral disturbance in 18 months.

Though we've had a hunch for years that transatlantic communication should be possible on 28 or even 50 MHz during some major auroras, the many contacts between northeastern USA and northern Europe on Jan. 10 are our first solid evidence that it can happen on 10. (We've had isolated examples of 2500-mile 6-meter work over land during auroras, but only in high solar-activity years.)

Solar Flux Update

The solar flux chart shown in January *QST* gave 1975 data only through October, so figures for November and December, 1975, and January, 1976, are given below.

The nature of protracted low periods of solar activity may be significant, so the consecutive 10 days of lowest overall solar flux level each month were examined. Whatever they may indicate for the long pull ahead, they show that the last six months of 1975 had higher overall solar activity than the first six. And though January, 1976, slid lower than any month since June, 1975, it is still above any early 1975 month except its counterpart a year ago, in all categories. What this could be telling us is that overall radiation from the sun is already on the rise, but that it is not concentrated in specific areas much of the time.

There are many ways of looking at solar activity. Cohen and Jacobs recently summarized them in a comprehensive way that need not be repeated here.¹ They mention planetary configurations in the solar system, but suggest that theories about this are suspect. Users of such information on planetary effects as has been published, mainly the extensive work of Nelson², will tend to agree that though the method shows promise it is not inherently a high-reliability system.

Cohen and Jacobs project the Cycle 20 minimum as still several months away. They also take the common view that we may be entering an era of

generally low solar activity, likely to last beyond most of our lifetimes.

Gribbin and Plagemann, discussing earthquake prediction,³ take a very different stance. They see a causal relationship between interplanetary gravitational forces and concentrations of solar activity, of which sunspots are visible evidence. Using a rare planetary alignment associated with a 1982 eclipse, they project a record sunspot-earthquake peak for that year.

You can take your choice of these very different prospects for the next solar maximum and wait for 1982 to see who is right, unless you happen to live along the San Andreas Fault, but this writer feels that the Nelson planetary alignment proposition is worth looking into.

This brings us back to that rise in solar flux last November. There was an eminently visible sun-earth-moon alignment (total lunar eclipse) the day that the rise topped off, Nov. 18. The disturbance that wrought havoc with the Sweepstakes activity began Nov. 20, the right time delay for particle radiation to reach the earth's ionosphere. Other planet positions in the solar system are not unlike examples of disturbed days cited by Nelson back more than 25 years ago.

Meanwhile, don't overlook the spring sporadic-E season, just getting underway as this issue reaches readers' hands. This mode suffers some disdain because of its popular name, "short skip," but it opened 10 and 15 across the Atlantic several times in late spring and early summer, 1974 and 1975. — *WJHDQ*

References

- ¹ Cohen and Jacobs, "Solar Activity Update, The Transition Years," *CQ*, January, 1976.
- ² Nelson, "Shortwave Radio Propagation Correlation with Planetary Positions," *RCA Review*, March, 1951. Also of interest by same author, with Arzinger and Hallborg, "Sunspots and Radio Weather," *RCA Review*, June, 1948.
- ³ Gribbin and Plagemann, "The Jupiter Effect," Walker & Co., 720 Fifth Avenue, NYC 10019.

Table 1
Solar flux update through January, 1976

MONTH	HIGH	LOW	10-DAY	
			AVG.	LOW
Nov.	96	72	81.1	77
Dec.	80	71	74.6	72.2
1975	125	66	76.15	66.1
Jan. '76	86	69	74.8	70.6

360°-Steerable Vertical Phased Arrays

Microwave power-splitting and phasing techniques were applied to the design of this 80-meter array. It has established an outstanding record for performance on long and difficult paths.

By Dana W. Atchley, Jr.,* W1CF, Harold E. Stinehelfer,* ex-W2ZRS and Joseph F. White, PhD*

The three authors have worked together at Microwave Associates, Inc. for the past decade.

Dana W. Atchley, Jr., W1CF, was first licensed in 1933, as W1HKK. He currently holds Amateur Extra Class and First Class Radiotelephone licenses. He graduated from Harvard in 1940 and was a naval officer in World War II. He has been employed by Hygrade-Sylvania, Tracerlab, Inc., American Broadcasting Corporation-Paramount Theaters, and, since 1952, by Microwave Associates, as president, and more recently chairman of the board. This is his fifth QST article, the first having appeared in 1947. In addition to his long-time interest in amateur radio, Dana is an ardent yacht racer and rarely misses a weekend afloat.

Harold E. Stinehelfer is manager of the Computer Science Department of Microwave Associates. He held the call W2ZRS from 1955 to 1966, and until recently was active as W1HUU. While at Bell Laboratories he was a design engineer associated with several large phased-array systems for the military. Since joining Microwave Associates 10 years ago, he has managed the development of automated test equipment and analysis programs for simulating microwave networks and components. He holds several patents, is a registered professional engineer and a graduate (BEE and MEE) of Brooklyn Polytechnic Institute.

Joseph F. White, though not an amateur, must be considered "guilty by association." He received his BSEE from Case, MSEE from Northeastern, and PhD in electrophysics from Rensselaer Polytechnic Institute. For

the past 15 years, except when absent for acquisition of advanced degrees, he has been with Microwave Associates, and he is currently Technical Director of their Microwave Devices Group. Dr. White is credited with many devices associated with phased-array programs and solid-state physics. He is author of "Introduction to Microwave Semiconductor Control," soon to be published by Artech House.

The possibility of providing effective 360-degree horizontal coverage with an array switched electrically, rather than rotated mechanically, has long intrigued many designers. Such a solution to the directional antenna problem is of particular interest to amateurs operating on the lower frequencies, where any mechanical rotation system is difficult and expensive to build. One of the authors, now W1CF, writing under his old call, W1HKK, described an 80-meter switchable phased array of four quarter-wave in-line elements more than ten years ago.¹ The present article describes several novel array designs, using 1976 technology, which provide greatly improved operation. Also covered are techniques used for effective power division, the beam-forming phasing system, switching, and impedance matching. Ground radials, cable and connector selection, and dc continuity testing are discussed.

One of these arrays recently constructed for 80-meter use has a single 97-degree lobe with a gain over a single vertical of approximately 7 dB at low angles. Its front-to-back ratio is 25 dB, and its front-to-side ratio is more than

12 dB, over the whole 80-meter band. It is switchable over 360 degrees in four 90-degree steps.

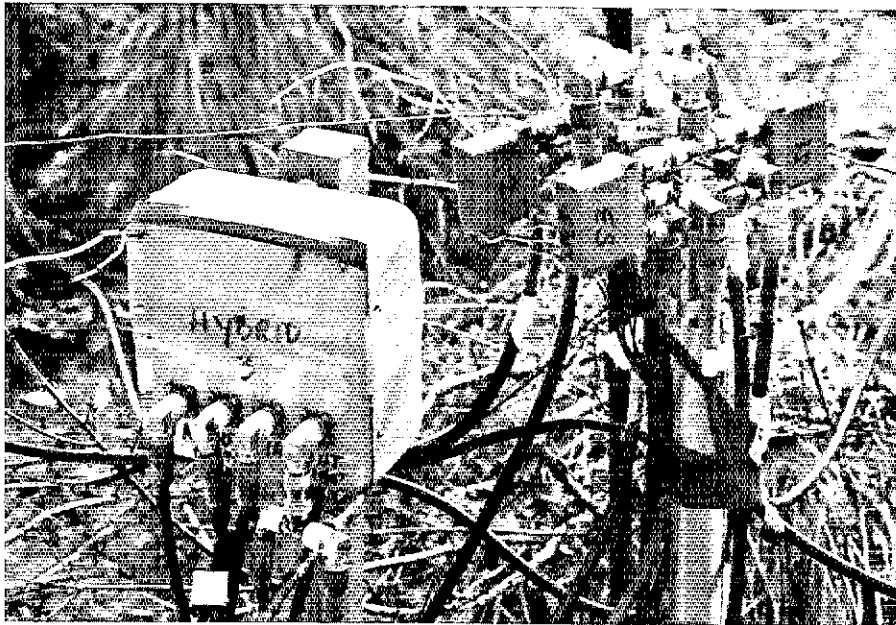
Computer-Modeled Arrays and Patterns

In the spring of 1975, while sitting over a cup of coffee, the three authors discussed the possibility of rebuilding the 1965 4-element array, using many improvements in technology that have evolved in the last ten years. Dr. Joseph White accelerated the effort by coming up with a computer program written in Fortran IV, called ARRAY, which allows the user to plot patterns of arrays of from 2 to 99 elements in various spacings and combinations of phase and power, without ever leaving the computer terminal. Over 30 iterations using four elements were explored, and the computer-printed polar plots and other gain data analyzed, before we arrived at a configuration which provided good forward gain over a broad beamwidth, with no measurable unwanted lobes.

The configuration selected has four quarter-wavelength vertical elements in a square, with quarter-wave spacing between adjacent elements, as shown, with its predicted pattern, in Fig. 1. All elements are fed with equal amplitudes, the rear element at 0°, the two side elements at -90° and the lead element at -180°. The beam is transmitted along the diagonal from the rear to lead element. Gain due to horizontal beam formation alone is about 5.3 dB over a single vertical element. Front-to-back ratio is 25 dB. Front-to-side ratio is 12 dB, at 90° either side, increasing to much higher levels at 135° either side. Since most of the vertical energy is concentrated at low angles by the array, as much as 4 dB of gain additional to the predicted 5.3 dB in the horizontal plane can be achieved in theory, with perfectly conducting ground. The

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¹This and all subsequent footnotes will appear at the end of this article.

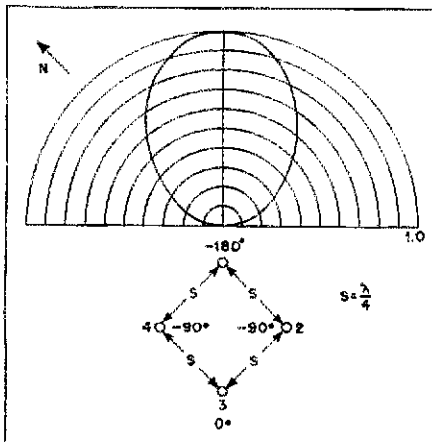


Terminations and switching relays at the center of WICF array.

authors estimate that a good radial system and less-than-perfect ground yield an additional gain of 2 dB, or a total gain just over 7 dB for the system described.

The computer predicts a half-power beamwidth of 97° , so a suitable switching matrix can be used to direct the beam to four different quadrants, with only a slight loss of forward gain at the cross-over points, and virtually no deterioration of the front-to-back and front-to-side suppression. A computer study of the effect of variations in element spacing on forward-gain to maximum side-lobe level, plotted in Fig. 2, led to selection of $\lambda/4$ spacing of the corners of the square array. The 80-meter beam erected according to the computer-synthesized array design has

Fig. 1 — Polar plot of relative power, and planar view of the 4-element diamond array showing the pattern obtained with no dc voltage on the switching relays, as in Fig. 3. Minor lobes are too far down to show on this scale.



proven to be remarkably successful. On-the-air results clearly approximate the performance anticipated by the program.

RF Power Dividers

Good power splitters are essential to the operation of phased arrays. Two-way and three-way power dividers will be discussed. Amateurs in broadcasting are well aware that tapped coils are the mainstay for power division in their industry. This reactive technique presents many problems.² The authors, being more versed in microwave techniques, thought it logical to scale up in wavelength the methods of power division used most successfully in the microwave region, particularly what is now known as the Wilkinson Power Divider,³ shown in Fig. 3. Power from the transmitter is fed through a 50-ohm line of any length to a coaxial T, feeding two quarter-wavelength 70-ohm lines, W1 and W2. The two inner conductors of the 70-ohm lines are connected through a 100-ohm noninductive resistor, R1. This type of divider gives an equal power split, matches to 50-ohm loads at the two outputs, and has the unique property that any energy returning to the two outputs out of phase, due to mismatches or mutuals, is absorbed in the 100-ohm resistor.

The 90-degree phase-delay cable (DL) used in one side of each of the three power-splitting hybrids serves to assure that equal power reflections from the antennae are absorbed. Theoretically the resistors absorb none of the forward power. This technique provides approximately 30 dB of isolation from one output terminal to the other, to unwanted energy.

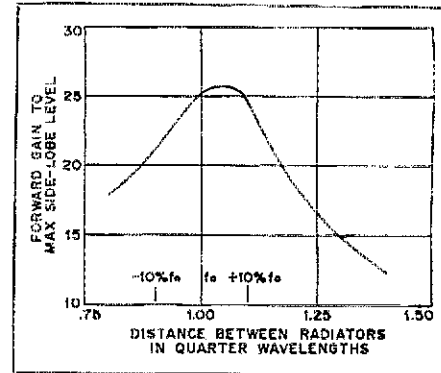


Fig. 2 — Bandwidth and side-lobe study of the 4-element diamond array.

Reference is made in the 1965 article to difficulty in adjusting a phased array, because of element interaction due to mutual impedances between elements. The Wilkinson Power Divider, when used to feed phased arrays, reduces these problems and those resulting from imperfect match at the antenna inputs, and contributes to the realization of the predicted patterns. The "Wilkinson" is a remarkably simple and uncritical solution to the problem of power division. The 3-element vertical array described later uses a three-way "Wilkinson," shown in Fig. 5. It is constructed by splitting the 50-ohm input three ways, into three quarter-wave lengths of 93-ohm coaxial cable. The center conductors are connected together through 150-ohm noninductive resistors. An alternative approach is to return each center conductor to ground through a 50-ohm noninductive resistor.

Feeding, Switching and Phasing

The 4-element diamond array erected at WICF uses three Wilkinson 2-way power dividers, as shown in Fig. 3. Phasing is accomplished with three 90-degree sections of RG-8/U cable, DL1, DL2, DL3. The four outputs are at 0° , -90° , 90° , and -180° respectively in phase relationship, with power from the transmitter divided into four equal parts. Every effort was made to preserve symmetry throughout the system, in the hybrids, phase shifters, rf switching, feeds, and antenna placement, in order to have the array perform uniformly as it is switched between the four headings.

The switching can be done with six spdt coaxial relays, as in Fig. 3, or with one transfer relay and four spdt relays. With no voltage on the relay coils, the arms are in the positions shown in Fig. 3, giving northeasterly directivity (57° true, on Paris) the heading used most of the time at WICF. The array is about 500 feet from the transmitter, necessitating use of remote relays. A prospective user should consider the tradeoff

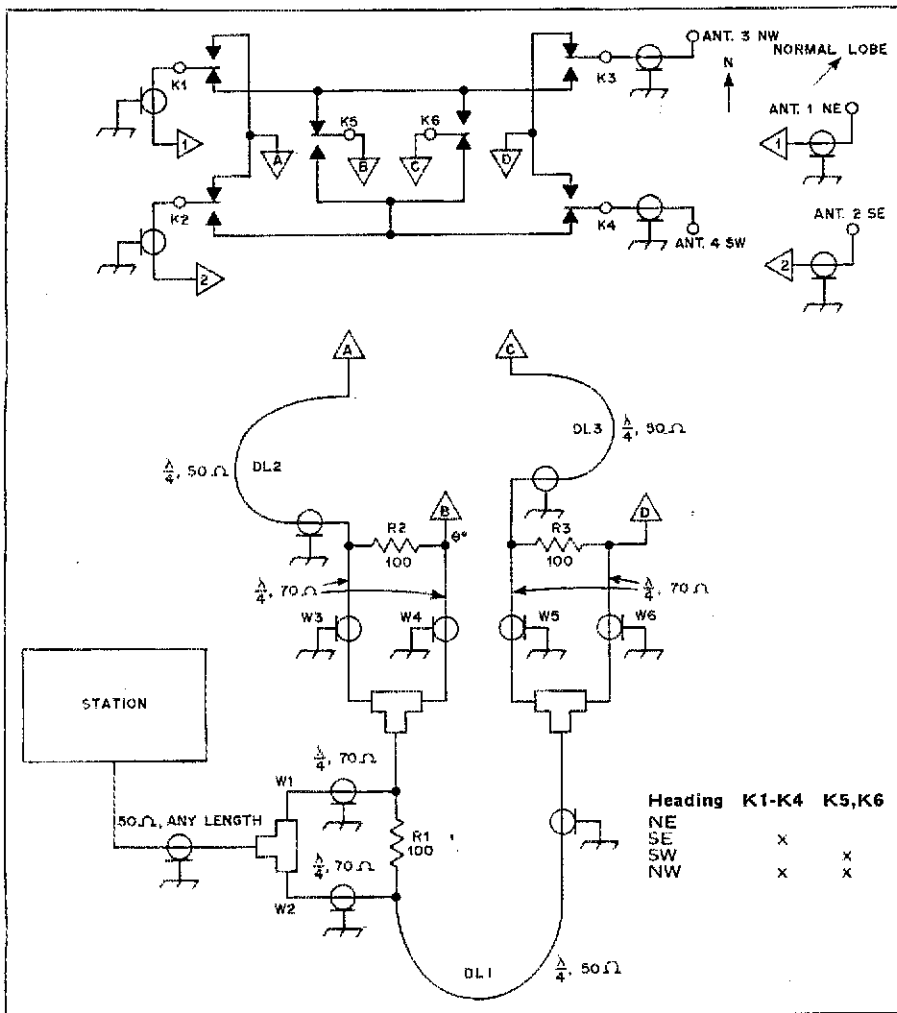


Fig. 3 — Schematic diagram of the Wilkinson Power Dividers, phasing lines, and switching relays (rf connections) for the 4-element array. Dc switching commands for the four pattern headings are given at the lower right.

between cable and relay costs. If the array is close to the station, four equal lengths of 50-ohm line can be brought into the station, and the switching done with a 4-position switch.

The long run of line here was dictated by the desire to take advantage of ground qualities and concealment afforded by swampland 500 feet from the house. Not wanting to be electrocuted, we used 28-volts dc for operation of the switching relays. By judicious use of binary arithmetic, the switching commands require only three wires. Selection of the four beam headings is done at the operating position with a 4-wafer 4-position switch. Relays should be selected for reliability and ease of weatherproofing. The cluster of relays and terminations shown in the photograph is at the geometrical center of the WICF array. The connectors are protected against moisture by 3/4-inch heat-shrink tubing, which should extend from the bottom half inch of the connector two inches down the cable. In addition, wide plastic wastebaskets are used to protect these components. The

extensive precautions were taken as the result of hard experience with moisture in the cables and connectors in the 1965 array.

Radiators and Radials

Relays K1 through K4 (Fig. 3) connect to their respective radiators through equal lengths of 50-ohm line, with no special attempt made for matching. The radiators are 57.5 feet (17.53 meters) tall, above the base insulators. Constructional details follow the 1965 article, except as outlined below. Base insulators are 2-inch ID PVC pipe, 1/4-inch wall, 18 inches long, affixed to the aluminum with PVC cement and self-tapping screws. Each radiator is guyed at three levels with 3/16-inch galvanized cable, broken every 30 feet (9.1 meters) with egg insulators.

Though 120 radials are considered to be the optimum number, only 40 per element are used here. Most are 65 feet (19.8 meters) long, No. 12 galvanized wire, lying directly on the ground. This presents no hazard, as there is no foot traffic through the swamp area. The

center radials are interconnected to two common busses in the central region, as recommended in reference 2. The authors feel intuitively that the square geometry of the array, in addition to providing considerable symmetry of the mutuals, allows a higher packing density for the radials, reducing ground losses.

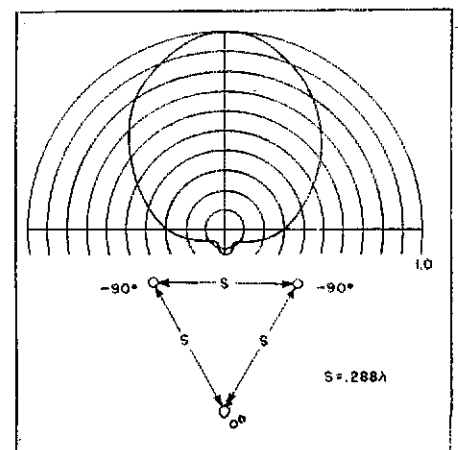
Though the array has quarter-wavelength elements, all the feedpoints are at 50 ohms, and any type of vertical element can be used provided an effort is made to match the inputs, and networks used for matching are the same for all four elements. Obviously, a height of 5/8 wavelength would be desirable, particularly for arrays built for higher frequencies. An indication of match would be to put rf voltmeters across the 100-ohm resistors, and tune the matching networks simultaneously for minimum voltage across the resistors. A nice thing about the $\lambda/4$ case is that the match is close enough that this step has not been necessary.

Testing

Before the array is fired up somebody should go to each element and short the input, while another person watches an ohmmeter placed across the main line at the station end. Make sure that a very low dc resistance is measured. Then, with the array in the normal position, as in Fig. 3, make sure that the resistance across the input is high. If it is low, check for moisture in the cables or connectors or for other leakage resistance. Silicone grease in the connectors is a good moisture preventive measure. It is recommended that these resistance checks be repeated periodically to be sure that all is well.

When the array is ready for use, go easy at first, as any reflected energy will be dissipated in the 100-ohm resistors. If they become hot, better matching is necessary, and if they blow up, perhaps higher-wattage resistors are needed. At

Fig. 4 — Polar plot of relative power, and planar view of the 3-element triangular array.



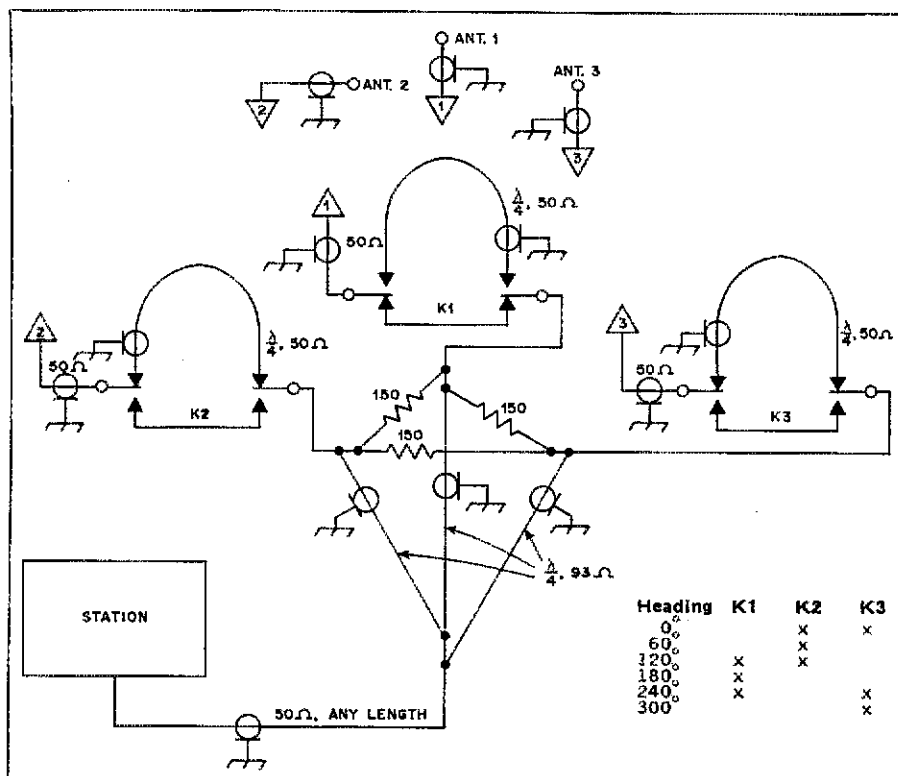


Fig. 5 - Schematic diagram of a 3-element vertical array and its directivity switching and power dividing circuitry. Interconnecting leads should be as short and symmetrical as possible. The 50-ohm lines between the relays and antenna elements should be all the same length.

WICF, resistor banks were made up of 6, 20-watt 150-ohm surplus resistors in series-parallel to give 100 ohms. These handle the dissipated power when the system is driven from a 4CX1000A amplifier, and after a month of operation there was no evidence of resistor damage. No attempt should be made to hot-switch the directivity. This was done inadvertently, and the result was the need for extensive emergency repairs, in midwinter.

Performance

In the short time that the array has been in use, all continents have been worked on 80-meter phone, including several stations in Japan and India, tough paths from New England. Gain and side and back rejection on all signals except those arriving from very high angles are just what the computer program predicted.

In receiving in the "search" mode, one hand tunes the receiver while the other operates the lobe selector switch, to see which position "listens" best. The big WICF rotary array for 10, 15, and 20 takes 45 seconds to rotate 360°, which tends to discourage frequent directional checks. With the phased array a complete scan takes but a few seconds. The high front and side rejection eliminates most of the interference from signals in unwanted directions, and

in transmitting the clean patterns help to prevent ruffled feathers.

A surprising by-product has been the reduced atmospheric noise pickup from unwanted directions. In particular, when listening toward Europe atmospheric noise coming from electrical storms in the southwest is greatly reduced, improving the signal-to-noise ratio on signals arriving from across the pond. The array is an order of magnitude better on both transmitting and receiving than any antenna previously used on 80 at WICF. It has more than held its own with the competition, in all four quadrants. Of special interest to operators who like to use both phone and cw on 80 is the fact that the SWR is close to unity, from 3.5 to 4 MHz.

Triangle 3-Element Array

Anticipating that some amateurs may wish to use three rather than four elements, the ARRAY program was used to explore equilateral triangle configurations. Though it was not reduced to practice, a 3-element vertical array with 0.288λ spacing between adjacent radiators looks promising. The lead element is driven at 0° and the two side elements at 90°. The forward lobe is 135° wide, with a gain of close to 5.5 dB, including an estimated 1 dB contributed by vertical focusing. Front-to-back ratio is 12 dB. With suitable switching,

the pattern can be aimed in 6 different directions, again providing 360-degree coverage. The 3-way Wilkinson mentioned earlier must be used with three 90-degree sections of 50-ohm line, to provide the proper phase relationships. Several other configurations appear promising, but involve more complex switching and power-dividing circuitry.

Applications for Other Frequencies

The diamond and triangle antenna configurations may find uses at other frequencies, as was done with the 1965 design.⁴ Formulae are given below for determining the line lengths and element spacings. A 2-meter phased array can be mounted on the roof of a car and wafer-switched to the desired directions. For people who like to experiment with logic and rf switching with semi-conductors, circuits can be devised so that the receiver can scan periodically, and the antenna steered to the desired signal.

The authors wish to thank the many people who have contributed to the success of this project, including W1FRR, K1GXT, W1HMY, W1FXT, K1CCK, M. E. Hines, F. Howe, H. Wells, R. Rearwin, H. P. Scott, and many others. We also wish to thank Microwaves Associates, Inc., for the use of their superb computer facilities.

Formulae for length of quarter-wave (90°) phasing lines, and spacing of radiators, are given below:

Electrical λ/4, solid-dielectric coaxial line, 50 or 70 ohms (RG8, 11, 58, 59):

$$L_{ft} = \frac{162.36}{f_{MHz}}$$

Electrical λ/4, solid-dielectric coaxial line, 93 ohms (RG62, 71):

$$L_{ft} = \frac{206.64}{f_{MHz}}$$

300-ohm Twin-Lead - parallel three λ/4 sections to approximate 93-ohm cable (requires 1 input and 3 output 1:1 baluns):

$$L_{ft} = \frac{201.72}{f_{MHz}}$$

Radiator spacing, diamond array:

$$S_{ft} = \frac{246}{f_{MHz}} \geq 0.25 \lambda$$

Radiator spacing, triangular array:

$$S_{ft} = \frac{283.4}{f_{MHz}} \geq 0.288 \lambda$$

Footnotes

- Atchley, "Switchable 4-Element 80-Meter Phased Array," *QST*, March, 1965
- National Association of Broadcasters, *Engineering Handbook*, 6th Edition.
- Wilkinson, "An N-Way Hybrid Power Divider," *IRE Transactions on Microwave Theory and Techniques*, January, 1960.
- Botts, "A Four-Element Vertical Beam for 40/15 Meters," *QST*, June, 1975.

Product Review

Heath HW-8 QRP Transceiver

QRP enthusiasts, take note! Borne on the winds of success relevant to the HW-7 QRP transceiver (*QST* for Jan., 1973), a new and vastly improved version of Heath's first entry into the low-power field has been placed on the market. The HW-8 is a look-alike to its brother, but the changes are more than subtle!

Of course, the price has risen markedly, but what hasn't spurred upward in cost since 1973? The burning question in your minds is probably, "What's the performance like?" You may be wondering also if the receiver shortcomings (hum, microphonics, and cross modulation) have been resolved in the current model. For the most part, the answer is yes.

A direct-conversion receiver is still the order of the day for the HW-series QRP box, but now there is an rf amplifier (JFET), doubly balanced IC product detector, and an RC-active cw audio filter with two selectable levels of bandwidth. Those changes are quite similar to the ones described by the reviewer for the HW-7 (*QST* for Jan., 1974).

Apart from the much needed receiver redesign, even though Heath didn't grasp the opportunity to go to a superheterodyne configuration (shucks), a heterodyne type of frequency generation scheme is used for the transmitter section. The same chain is used for local-oscillator injection of the IC product detector. In the HW-7 version a direct-frequency generation method was used, wherein on 40 meters the VFO operated on 3.5 MHz and was fed to a frequency multiplier. For 20 and 15 meters, the VFO functioned on 7 MHz, then supplied energy to a doubler/tripler stage. Even though the VFO was always one or more octaves below the operating frequency, chirpy cw notes were common on 20 and 15 meters.

With the heterodyne system of the HW-8, 5-MHz VFO output is mixed with the outputs of crystal-controlled oscillators to provide the desired fundamental frequencies of the various bands covered — which, by the way, are 80, 40, 20, and 15 meters. Yes, the 80-meter band has been added, and bravo for that useful feature!

Power-output measurements indicate a minimum of 2 watts for each band. The maximum observed was 2.3 watts. A very wholesome sine wave was seen at the transmitter output on all four bands while using a 50-MHz scope.

Heathkit HW-8 Transceiver

Dimensions (HWD) and weight: 4-1/4 x 9-1/4 x 8-1/2 inches, 4 pounds, 8 ounces.

Power requirements: 13 V dc, 450 mA. Ac supply available.

Receiver sensitivity: 0.1 μ V plainly audible on each band.

Price class: \$130.

Manufacturer: Heath Company, Benton Harbor, MI 49022.

An rf gain-control has been added to the receiver section. It is used as a resistive divider at the antenna input to the rf amplifier and is adjustable from the front panel. This is a great help when strong local signals are present on the band of use.

Heath is to be commended for having supplied the ARRL with one of 16 pre-production models of the HW-8 several months before the final design was completed. This gave us a chance to field test the product, recommend certain circuit changes and improvements, and be a part of the team. Rigorous testing took place during October of 1975. The "preprod" was taken to Barbados and put through its paces under the call of 8P6EU. The extreme heat and humidity turned up a few design faults which were soon corrected by the Heath engineers. Despite the problems encountered, stations around the world were worked on 40, 20, and 15 meters. Two dipoles were used — one for 20 and another for 40, sloped down over the ocean shore. The 40-meter dipole was used also on 15 meters. The final product performs in first-class fashion.

There is no evidence of chirp, no hum problems thus far, and only a hint of receiver microphonics on 15 meters. Frequency stability is very good, and the dial calibration is adequate for all but the most demanding of needs.

One of the more interesting features of the circuit is the extensive application of switching diodes in the low-level rf and dc sections of the transceiver. The technique greatly reduces lead lengths, which in turn helps preserve tuned-circuit *Q*. It also minimizes the occasion for instability and spurious responses.

The plug-in amplifiers described by WICER in *QST* for December, 1975, are suitable for use with the HW-8 if a 20-watt output power is desired. The option is worthwhile for times when the going gets rough. We hope that Heath is meditating about the design of a compatible four-band amplifier for the HW-8. It should be a popular product with QRPers.

Superficially, the HW-8 looks like the HW-7. The same cabinet size is used, and the color scheme (two-tone green) prevails. The product of considerable interest. The primary key to success when operating at the QRP

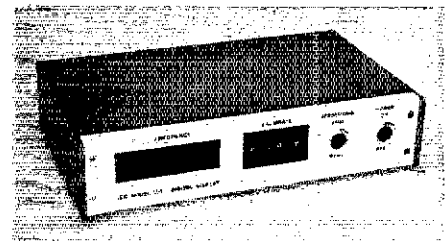
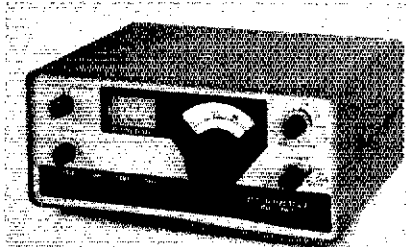
level is a good antenna, even if it's only a dipole. DX is not hard to garner if a modicum of patience, operating skill, and good luck is part of the picture. — WICER

CES MODEL 100 DIGITAL DISPLAY

Communications Electronics Specialties, Inc. (CES), now offers a digital frequency display that may be used in conjunction with almost any receiver, commercially manufactured or home built, to give a direct indication of the received frequency. And to do this, it needs only one connection to the receiver. The instrument requires a sampling of the receiver's variable local oscillator (LO) output, sometimes called a VFO in communications receivers. A cable is included with the display to make the necessary interconnection, and instructions tell where and how in your receiver to obtain the sample, if an LO or VFO output jack does not already exist.

The description of the counter circuit gives a hint as to the technique it uses: A presettable up/down counter. Six thumb-wheel switches are provided on the front panel to preset the appropriate frequency offset for the receiver LO. For example, say your receiver's LO operated at 455 kHz above the received signal frequency. You'd set the thumb-wheel switches for a preset reading of —455 kHz (switches set at 999545 kHz). With the up/down count switch in the up position, the counter begins at 999545 and counts up. If, say, your receiver was tuned to 1260 kHz on the broadcast-band dial, the LO would be operating at 1715 kHz (1260 + 455 kHz). The counter would display 999545 + 1715 or 001260 kHz as the received frequency. (There would be an additional 1 displayed at the left if the display showed seven digits but only six are used, so the 1 overflows and is not displayed.) Leading zeros on the display are not blanked or suppressed.

The technique is the same whether your receiver be double or triple conversion, and whether the LO or VFO goes higher or lower in frequency as you tune the receiver higher in frequency. In fact, you don't even need to know the LO frequency range or in which direction its frequency goes as you tune



higher in frequency. You can set up the display for operation on any band easily, if you have one signal of known frequency in the band. (This may be a broadcast station, WWV, a marker from a frequency calibrator, or whatever.) To do this, after interconnecting the display and the receiver, you merely energize both and note the display reading. Then tune the receiver higher in frequency. If the display reading goes down, simply flip the up/down count switch to its opposite position. Then tune the receiver to the signal of known frequency and set the thumb-wheel switches to make the display indicate the frequency of the signal. From there on, you're all set for that receiver band. You'll have to repeat this simple procedure for each band the receiver covers, but once you find the correct preset information it is easy enough to make up a small chart so you can "band switch" the display right along with your receiver. Receiver dial-tracking errors, poor dial calibration, or LO drift are of no serious consequence in knowing your received frequency with the CES 100 in use.

The CES 100 may also be used as a straightforward frequency counter by pre-setting the thumb wheels to zero and placing the up/down count switch in the up position. It counts to frequencies greater than 40 MHz, with an input sensitivity of 100 mV. A 2-position front-panel resolution switch provides for displaying the counted or received frequency to either the nearest kilohertz or to the nearest 100 hertz (0.1 kHz). Being meant for use at mf and hf, the instrument is not intended for measurement of audio frequencies. A 1-MHz crystal controlled oscillator is used as the frequency reference for the instrument, and provision is included for trimming the oscillator to frequency. Instruction sheets for the CES 100 give complete schematic diagrams, detailed instructions on installation and operation, and a section on theory of operation. Its "form factor" is such that it will nestle neatly atop its companion receiver. — *KIPLP*

CES Model 100 Digital Frequency Display

Dimensions (HWD): 2-3/4 x 12 x 8 inches overall.

Weight: 5 pounds.

Power requirements: 115 V ac, 12 watts.

Input sensitivity: 100 mV.

Display: 6 LED readouts.

Display height: 0.3 inch.

Resolution: Switch selected, 1 or 0.1 kHz.

Frequency range: 0.1 to 40 MHz.

Accuracy: ±1 count.

Time base: 1-MHz crystal.

Counting mode: Switch selected, up or down.

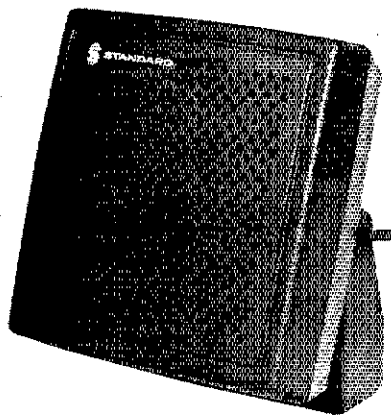
Presettability: 000000 through 999999 with six thumb-wheel switches.

Price class: \$300.

Manufacturer: Communications Electronics Specialties, Inc., 814 Orwell Ave., Orlando, FL 32809.

COMMUNICATIONS SPEAKER

Standard Communications is marketing a communications type of loudspeaker which may be of interest to amateurs. It is the model 201S and is housed in a high-impact plastic case. The speaker and cord are contained in a permanently enclosed package.



This feature was adopted to eliminate vibration of the enclosure and to improve audio quality in the process. The response is tailored to voice frequencies.

The assembly is provided with a high-impact plastic mounting bracket, two thumb-screws, two rubber washers, and three mounting screws. Fixed-station or mobile applications are suggested for the 201S. It uses a 5-inch PM pincushion speaker with a 4-ohm voice coil. Maximum voice power is rated at 15 watts. Dimensions are (HWD) 5-1/8 x 5-1/8 x 2-3/4 inches. Price class is \$19. Manufacturer is Standard Communications, Carson, CA 90248.

SUBMINIATURE LEDs

Hewlett Packard is producing a new style of LED with radial leads. The component is contained in a subminiature epoxy package. The colors are red, yellow, green and high-efficiency red. The LEDs can be stacked (assembled as arrays) on 2.21-mm (.087-inch) centers for compact applications. A tinted, diffused lens for each color provides high off-on contrast with a wide viewing angle.

With a forward current of 10 mA, the red LED has an axial luminous intensity of 0.7 millicandella (model 5082-4100). Forward voltage is 1.6. The other LEDs have higher millicandella ratings and slightly different forward voltage values. The leads for the lamps are bent for axial (90-degree) mounting. Further data can be obtained by contacting: Inquiries Manager, Hewlett-Packard Co., Palo Alto, CA 94304.

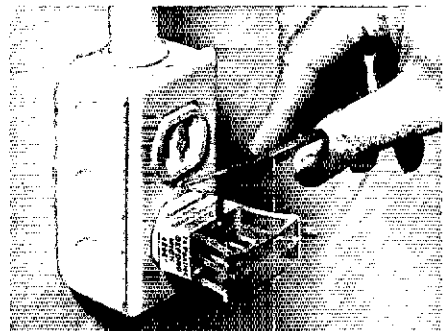
NEW PLUG-IN HOUSINGS

For amateurs who desire modular equipment, the product line treated here should be of considerable interest. Keystone Electronics Corp. announces a wide selection of plastic and aluminum plug-in housings which should be ideal for many amateur applications. The plastic enclosures are available in nylon, polystyrene, and butyrate materials, offering good chemical immunity and water resistance. Headers for the housings are available to fit standard sockets and are molded from black phenolic. All socket pins are made of nickel-plated brass. For further details write to Keystone Electronics Corp., 49 Bleeker St., New York, NY 10012.

BUTRICK GROUND TESTER

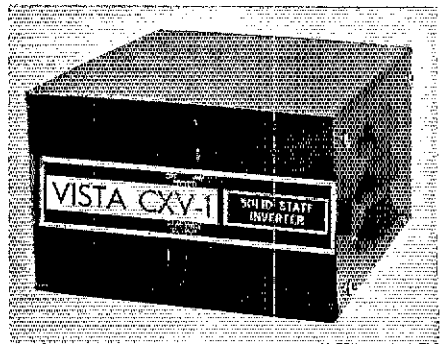
Need to check for ungrounded electrical equipment and wall outlets? Safety first should be everyone's watchword with respect to shock hazards. Butrick Mfg. Co. has announced the availability of its model 317 ground tester. It can be used to check the ground on a three-wire outlet, and for testing grounding of two- or three-wire tools, 2/3-wire adapters, and two-wire outlets.

Operation is simple: Plug the tester into an outlet, use the ground probe, and observe which of the three indicator lamps illuminates. Ten different tests can be performed, and 29 indications can be had for precise troubleshooting. Price class is \$8. Butrick Mfg. Co., 74 Pontiac St., Oxford, MI 48051.



12-V DC to 117-V AC INVERTER

New from Clifford Industries is the model CXV-1 solid-state power inverter. The assembly converts 12-volts dc to 117-volts ac at 100-watts continuous power. It is readily adaptable to cigarette-lighter sockets in vehicles (lighter plugs are optional). Dimensions are 5 x 4-1/2 x 8 inches, and shipping weight is 4 pounds. Price class is \$40. The company also has a 400-W, a 200-W, and 40-W version of the inverter. For details write to Clifford Industries, Box 436, Camarillo, CA 93010.



INLINE INSTRUMENTS COAXIAL RELAYS AND COUPLERS

An Inline Instruments type 101PRL or 101PRH coaxial relay in conjunction with a type 100L or 100H coaxial coupler, allows the remote selection of input to a single run of cable by applying a control voltage to the same cable. Several uses for these devices come to mind — selection of either vertically

or horizontally polarized beams, selection between antennas for different bands, switching an antenna-mounted preamplifier in and out of the circuit — and so on.

Two type 100 couplers can be used to feed dc to a remotely located preamplifier, with the preamplifier output coming down the same cable that carries the operating voltage. This arrangement has been used by vhf weak-signal enthusiasts in recent months, with the purpose of decreasing the effect of a long run of coaxial cable between the antenna and the preamplifier or converter. Suitable couplers have not been available outside the laboratory (where they sometimes hide behind the nomenclature of bias tee).

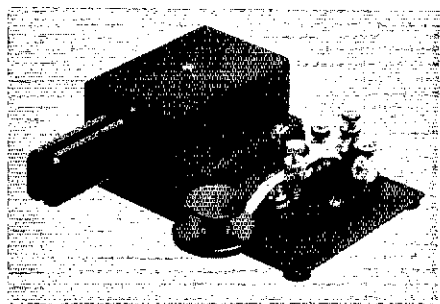
Control voltage for the relays can be in the range of 10 to 20 V dc, and the relays are available that will accept either positive or negative polarity. This feature allows a pair of relays to be activated individually by reversing the control-voltage polarity at the coupler. Insertion loss for relay is less than 0.1 dB. SWR is less than 1.1 at the low end of the range, increasing to 1.5 at 1.5 GHz. The L suffix denotes a frequency range of 1.7 to 60 MHz, while the H model is for 50 to 550 MHz. Power handling capability is 150 watts of rf.

Frequency ranges are the same for the type 100 couplers, also indicated by the L or H suffix. Power rating is 250 watts of rf. Insertion loss is also less than 0.1 dB, and the SWR is 1.05 at the low-frequency end, increasing to 1.5 at 1.5 GHz. While the top rating for the 100H is 550 MHz, it is usable to 1 GHz.

Prices range from \$25.50 to \$28.50 for the relays, and from \$12.50 to \$13.50 for the couplers. Available from Inline Instruments, Inc., Box 473, Hooksett, NH 03106. — *WISL*

NYE SSK-3 KEYER-PADDLE

The new "Super Squeeze Key" from William M. Nye Company has an unusual appearance compared to other keyer-paddles on the amateur market. With extra-long, form-fitting molded paddles and featuring adjustable spring tension and contact spacing, the key takes a little getting use to. But after the



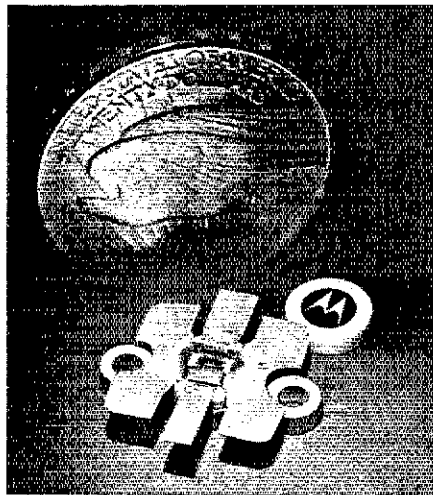
initial period has passed, the keyer-paddle has a nice "feel" and is a pleasure to operate. Mounted on a heavy die-cast base with non-skid feet, the key doesn't tend to "walk around" on the operating table while in use. The model SSK-1, squeeze key only, is priced at \$23.95. In the photograph the model SSK-3 is shown with a model 114-320-002 straight key mounted on a special subbase which is drilled and tapped to mount any of the Nye Viking straight-keys; price is \$26.95.

More information is available from William M. Nye Company, 1614 Northeast 130th, Bellevue, Washington 98005. — *WA6GVC*

NEW 900-MHZ POWER TRANSISTORS

Motorola has released a new 12.5-volt large-signal power transistor. It was designed specifically for the 900-MHz communication band, but may offer some possibilities for 1215-MHz enthusiasts, perhaps at slightly reduced efficiency.

Designated as MRF835, the transistor is rated at 15 watts, 7-dB gain minimum, and an efficiency of 50% at 900 MHz. Gold metalization is employed to prevent migration of the



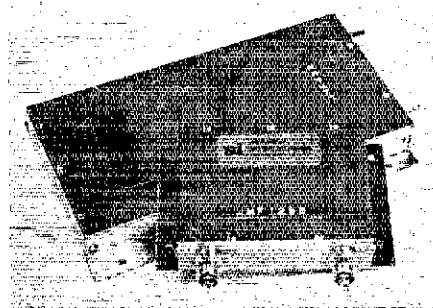
aluminum. A built-in matching network provides broadband performance.

For details on this \$35-price-class device contact: Tech. Information Center, Motorola, Inc., Box 20924, Phoenix, AZ 85036.

SPECTRUM INTERNATIONAL UHF FILTERS

Spectrum crowding in the uhf region has pointed out the need for filters that can be used ahead of sensitive receivers or to clean up the output of transmitting equipment in the same range. There are several types of filtering systems available to do this job: Tuned cavities, comb-line filters, half-wave tuned lines, and interdigital types of filters. Most of these have been illustrated in *QST* and other ARRL publications.

Spectrum International has recognized the need, and their most recent efforts are worthy of consideration. As shown in the photo-



graph, they have a pair of interdigital filters, one for the 432-MHz region and another for use at 1296 MHz.

The accompanying photograph shows a curve for the 1296-MHz version (JMF 1296). The curve is centered on 1300 MHz, and the white "pips" or markers are at 10-MHz intervals. A curve for the 432-MHz model would show similar characteristics.

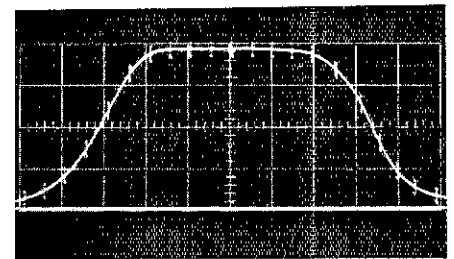
The material used is brass, and the construction is excellent. Specifications for the two filters are:

	JMF 432	JMF 1296
Freq. range	420-450 MHz	1250-1350 MHz
Insertion loss	0.1 dB	0.1 dB
Ripple, peak	0.1 dB	0.1 dB
Impedance	50 ohms	50 ohms
Connectors	BNC	TNC*
Price Class	\$35	\$33**

*Others can be supplied

**Plus \$1 postage

This writer has found the filters useful in clearing away intermodulation products caused by uhf television energy, and in "deleting" unwanted harmonics in a frequency-multiplier chain. — *WISL*



LARSEN "JM" MOBILE ANTENNA MOUNT

This new Larsen Electronics mobile antenna mount offers reduced installation time, full weatherproofing and fewer parts for simplified installation. The mount requires only a 3/8-inch hole and is ideally suited for "blind" (one side open) installation. The Larsen "JM" mount is compatible with most mobile antennas in the hf and vhf range that adapt to a 5/16-24 stud. Larsen offers a complete line of antennas that are compatible with the mount. The model LA/JM-150 combination was installed in this writer's 220-MHz, motorcycle-mobile installation and performed well. For price and other details write to Larsen Electronics, Inc., 11611 N. E. 50th Avenue, P. O. Box 1686, Vancouver, WA 98663. — *WA6GVC*



Hints and Kinks

GET THE BUGS OUT

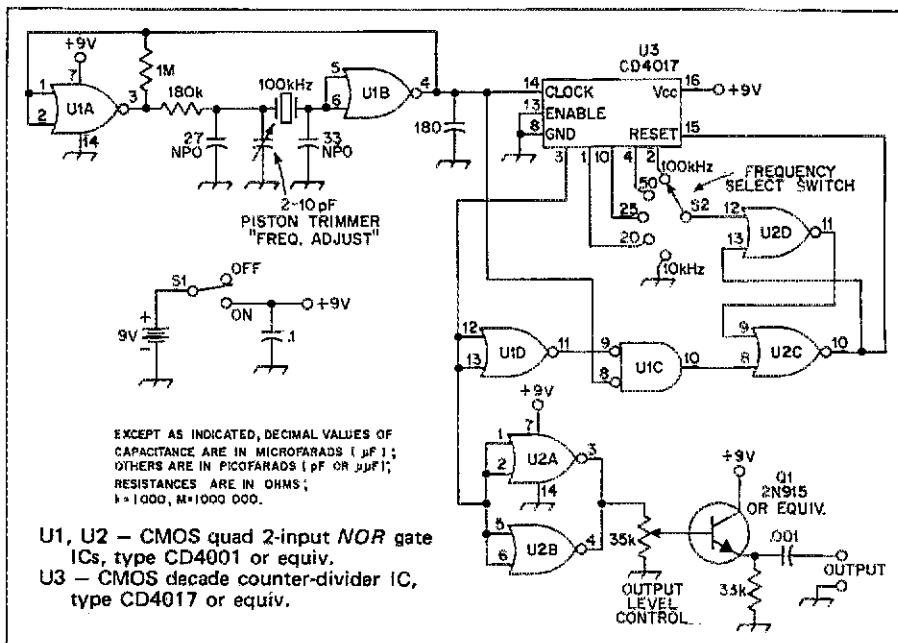
When I am bothered by roaches around the shack, or around food or other places where I don't want to risk using a poisonous insect spray, I dispatch the roaches with component-cooler spray. It freezes them solid in seconds! The long thin applicator tube makes it easy to pinpoint-spray the roaches, and apparently the tube is so small it does not alarm the roaches. The most effective way is to hold the end of the tube just over the roach and barely "crack" the valve, allowing the cold spray while still in liquid form to drop onto the roach. After the roach is frozen, the moisture in the air will freeze on the roach to give him a nice clean white frosty appearance. — Jim Milburn, WBSBYK

USING 75-OHM LINE IN A 50-OHM SYSTEM

It is not uncommon these days to find bargain-priced 75-ohm coaxial line. Much of this coax is the type used in CATV installations, with foamed-polyethylene dielectric, aluminum or "hard-line" jacket, and acceptable loss figures even for rather lengthy runs at 220 MHz. Many amateurs pass up a potential bargain because they hesitate to install 75-ohm line in an existing or planned 50-ohm system.

For fixed-frequency operation, such as at a repeater installation, stub matching can be used. The SWR will then be 1 to 1 in the 75-ohm line, and yet the input and output impedances will remain 50-ohms resistive. The stub matching scheme is shown in Fig. 1. To avoid the making up of multiple connectors for the 75-ohm portion (hard line can be difficult to work with), all stubbing is done with 50-ohm line. Great for running the bargain-priced stuff up a tall tower, eh?

It should be mentioned that this is not a lossless method of matching. With the SWR theoretically being infinite in the stub sections, there will be inherent losses when the matching sections are installed. If the 75-ohm line is of quite low loss in the first place, the total losses resulting from using it in a 50-ohm system may be less than those of the stub-matched arrangement. You can determine the trade-offs yourself, by comparing perfor-



mance with the stubs connected *versus* with them removed. Of course you'll have to readjust the transmitter tuning and loading for the different conditions. — K1PLP

VHF SECONDARY FREQUENCY STANDARD IS INEXPENSIVE AND BATTERY OPERATED

The secondary frequency standard shown here provides accurate calibration markers for vhf fm channels in the 144- to 225-MHz bands. Battery operation and low cost are achieved by using CMOS integrated circuits and a minimum number of components.

Fm receivers and transmitters operating in the vhf range are typically crystal controlled, and they use a small value trimmer capacitor to "net" the unit on the specified channel. Without a frequency counter, it is difficult to accomplish this to any degree of accuracy. By using a secondary frequency standard with switch-selectable outputs every 100, 50, 25, 20, and 10 kHz, it is possible to set the

transmitter or receiver on frequency quickly.

The frequency standard uses two CMOS quad 2-input NOR gates and a 100-kHz crystal oscillator. The CD4017 counter is wired in a divide-by-X configuration by connecting two NOR gates as an RS flip-flop to reset the counter after X counts. The output level of the 10-kHz markers is on the order of 15 to 30 μV at 150 MHz. — Alan D. Wilcox, W3DVK/WB4KRE

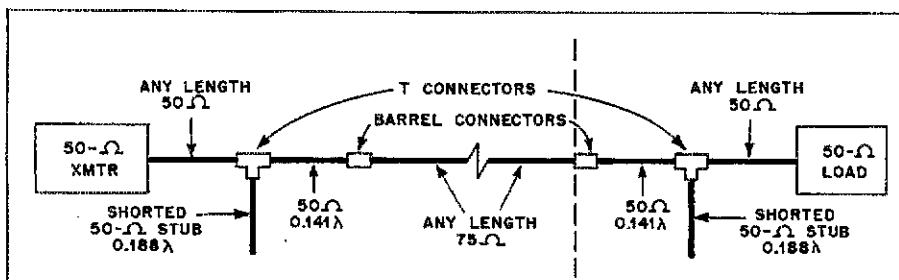
ANTENNA FEEDTHROUGH PANEL

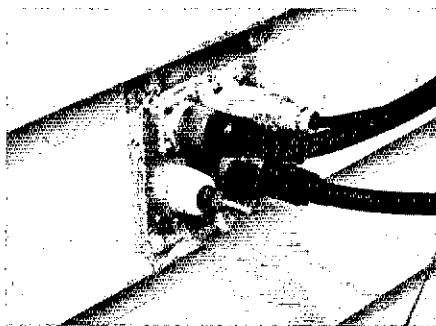
It is not always convenient nor desirable to bring antenna feeders into the shack by routing them under a window, to which an insert strip has been added for that purpose. The under-window method makes it difficult to seal against weather, and insects have a way of finding the smallest of cracks through which to gain entry to the house.

Homeowner-hams who aren't afraid to cut into the siding may fare better by using the technique described here. A saber saw is used to cut a square or rectangular hole in the wall of the house, after first using a stud locator or similar device to make sure the hole will be cut in a clear area of the wall. The hole should be approximately 1/2-inch smaller in vertical and horizontal diameter than the jack plate that will mount over it. This will provide ample "shoulder area" for screwing the plate to the wall, and will permit adding a gasket of cork or rubber for the purpose of weather-proofing the area.

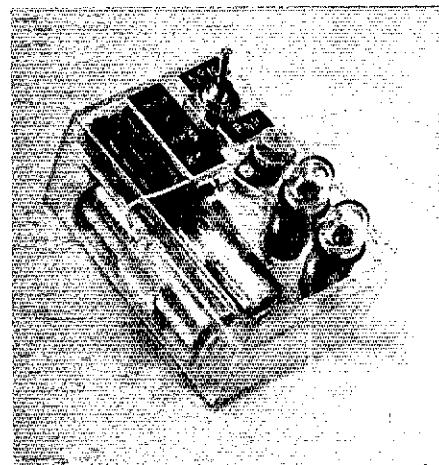
After the hole is cut on the inner or outer house wall, find the approximate center of the hole by inserting a screw driver or other long tool into the hole, bringing the tip to rest on the wall surface in which the mating hole will be cut. A level can be placed on the screw driver blade to assure reasonable accuracy in finding dead center on the opposite wall

Fig. 1 — Stub-matching arrangement for intermediate run of 75-ohm line in a 50-ohm system. Dimensions shown in wavelengths are electrical lengths for the frequency of operation; the velocity factor of the line must be taken into account when calculating the physical length. See text. The portion drawn to the right of the vertical broken line may be replaced with a 75-ohm load.





part of a tower leg, as close as possible to the full-size part of the leg on the adjacent tower section and tighten securely. Then, with the tower lying with two of its legs on the ground, grab the third leg near the joint to be taken apart and lift. That joint will pull apart slightly. While holding the tower in the raised position, loosen the hose clamp on that leg and slide it down against the full-size part of the tower leg and retighten it. Roll the tower over so that the leg which you just loosened is now on the ground, and repeat the process. Continue with the third leg, and so on. I found that I could get from a quarter to a half inch of movement each time I did this, and after a few tries on each leg the sections came apart easily. — H. H. Hunter, W8TYX



surface. Mark that spot with a pencil; then with a long drill bit, bore a hole through the uncut wall. Use the hole to establish the center when laying out the borders of the second hole.

The jack plates (two) should have the coax fittings, steatite feedthrough bushings, ground terminal, and whatever placed in a symmetrical manner, remembering that one plate will be the mirror image of the other. Mount the antenna fittings on both plates, and add coax-cable and wire extensions to the fittings on one plate. Allow three inches more lead length than the wall thickness. Attach one plate to the wall. Bring the leads through the wall and solder them to the mating jacks on the remaining plate. Attach the second plate to the wall.

If a feedthrough bushing is used to provide access to an end-fed wire, make sure the insulation on the wire is capable of handling high rf voltages. The writer uses teflon-insulated No. 16 wire for the purpose, but the inner conductor and polyethylene insulation from a piece of RG-8/U coax cable can be used as a substitute.

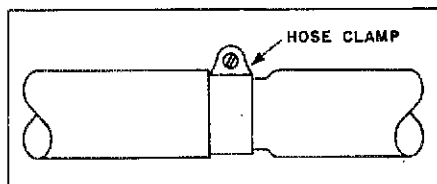
SWR checks were made to see how much reactance was presented by the wall panel. A 50-ohm dummy load was connected to one side of the feedthrough assembly, and an SWR indicator and transmitter to the other. From 160 through 10 meters there was no indication of SWR. However, the jack panel may cause a "bump" in line impedance in the vhf. spectrum. The vhf/uhf builder may want to mock up a set of plates and fittings and check them for SWR *before* cutting merrily away with a saber saw!

The accompanying photograph shows the author's feedthrough panel (outside the house) on which three coax fittings, one single-wire bushing, and one ground terminal have been mounted. GE Silastic compound was used to seal the edges of the plate and wall against weather, dust and insects. — WICER

DISASSEMBLY OF TOWER SECTIONS

Recently, I took down my aluminum tower and needed to take apart the tower sections. When I removed the bolts, I found that I could not just *pull* the sections apart. After the tower had been standing for five or six years, the tubing of the three legs was rather firmly "jammed" together. After some blood, sweat and tears, I devised a disassembly method which worked just fine. The only tools required are three hose clamps of the type which tighten like a collet.

This drawing shows how the hose clamps are attached, one on each leg of the tower section. Put each clamp on the necked-down



ETC ETCETERA

Easy Transistor Checker Evaluating Transistors for Every Radio Amateur.

Now, with that out of the way, here are the "specs". . . ETC can not compete with a Tektronix 576 Curve Tracer but it will do the following:

- 1) Indicate the type of transistor (pnp or npn).
- 2) Show whether the transistor is open or shorted.
- 3) Indicate the approximate gain.

S1 is positioned to pnp or npn, both positions to be tried if the transistor type is unknown. Actuating S2 (Ref) checks the battery supply and lights I1, giving a visual

degree of illumination for comparison with I2. S3 (X1), S4 (X10), and S5 (X100) are actuated sequentially — the gain of the transistor overcoming the biasing of R1, R2 and R3 to illuminate I2. Depending on the characteristics of the transistor, if I2 lights to one-half the brilliance of I1 when S4 (X10) is pressed, it is a good transistor. If I2 lights above a dim glow when S5 (X100) is pressed, the transistor is exceptionally good. If I2 lights *without* actuating S3, S4 or S5, the transistor is shorted. If I2 does not light when pressing S3 (X1), the transistor is open.

R3 was selected to give a dim glow with an average good transistor, when S5 is actuated. S2 through S5 should be pressed with the tip of your fingernail.

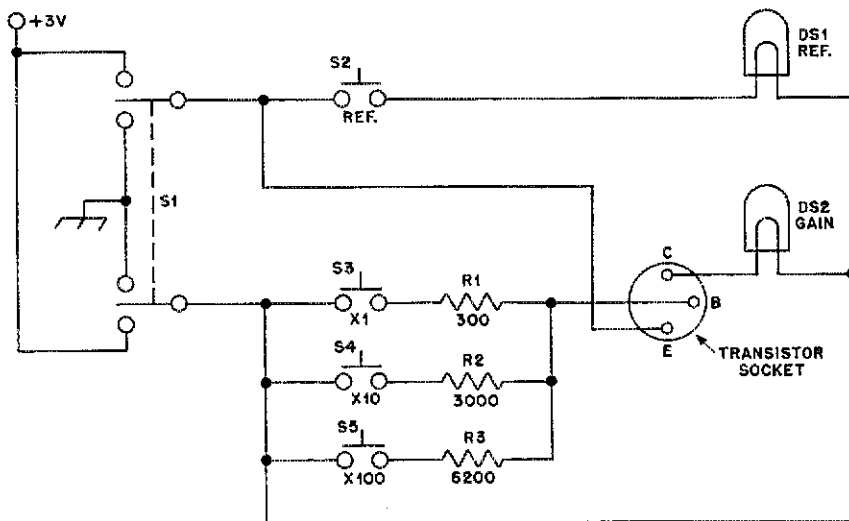
I claim no originality for the circuit, as a variety of these have appeared from time to time. I just wanted something compact, reliable, and quick, etc. — Howard L. Findlay, KØBYC

QST

BT1, BT2 — Pen-light cells, type EV 915 or equiv.
 DS1, DS2 — Panel lamp, type GE 338 or equiv.
 S1 — DP3T (center off) miniature toggle switch, Raytheon type MST205P or equiv.

S2-S5, incl. — Momentary contact micro-switch, any type suitable for this application.

Delco 137-8864-9-512 lamp holder and Keystone battery holder, type for holding two pen-light cells, and a suitable chassis are recommended.



CW Super-Selectivity

Those who employ this device will eliminate their cw reception problems — for good!

By Tinh Ehres,* WHØOP

This article describes a method of achieving a degree of cw selectivity heretofore deemed completely impossible. In fact, total elimination of a cw signal only 5- or 10-hertz distant from the desired signal is possible with the unique new system employed by the author.

As will be seen in the accompanying illustration, the normal headphone diaphragm has been replaced by a non-magnetic diaphragm featuring a small metallic reed inserted in a cutout at the center of the diaphragm. The reed employed is, however, magnetic and is dimensioned to vibrate at 440 hertz. Frequencies other than 440 hertz will produce no response from the reed.

The author selected the 440-hertz frequency so that WWV would cause a response in the redesigned headset, allowing the user to avail himself of that station's standard time and frequency transmissions when necessary. The 440-hertz frequency also provides a "comfortable" tone for cw reception.

Those readers familiar with the spectrum employed in the world of music will recognize 440 hertz as "A above middle C." Fortunately, the necessary pair of reeds can be obtained through the simple device of purchasing two small harmonicas. The buyer need only assure himself that the reeds employed are fabricated of steel, thus ensuring their response to the headset's magnetic field.


To locate the "A above middle C" reed, tune in WWV's 440-hertz audio; then use a common drinking straw to blow into each opening of the harmonica. When the two notes coincide — evidenced by a slow "beat" — you have located A above middle C. The reed is normally about dead center along the length of the harmonica.

To construct the superselective diaphragms, simply remove the present diaphragms from your headset and use them as templates to cut out a pair of aluminum disks. Aluminum sheet of a thickness similar to that of your present diaphragms should be used. Next, using a "nibbler" tool, cut a rectangular opening in the center of each of the aluminum diaphragms. To allow for mounting, this hole should be dimensioned slightly shorter than the length of the harmonica reeds employed. Drill a small hole adjacent to one end of the opening and rivet the reeds in place, as shown in the illustration. Care should be exercised to ensure that the portion free to vibrate is of exactly the same length as that portion free to vibrate in the harmonica. This will assure correct frequency response. Make sure, too, that the mounted reeds clear the opening on all sides, in order to allow free movement in the presence of the 440-hertz signal.

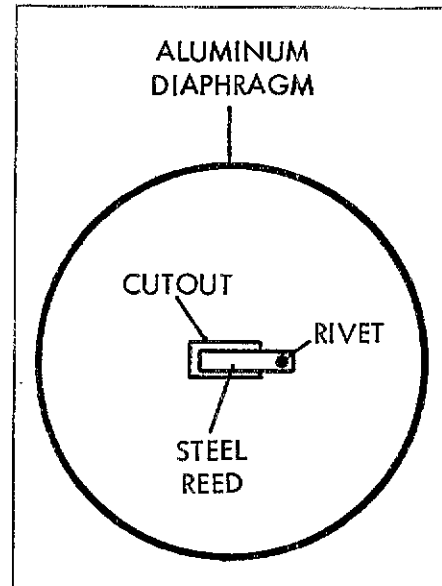
Tuning across the cw band for the first time with your superselective headset will be a unique experience. All will be silence until you encounter a signal with which your BFO tuning produces a beat of exactly 440 hertz. As you tune,

each signal will "pop out" at you!

Should you desire to return to the world of ssb, simply replace your new diaphragms with the ones originally removed. Or, you may wish to do as the author does: Retain one half of your headset in its normal configuration and employ the other half for cw superselectivity. In this case, simply slide the desired half over one ear, leaving the other half forward on your head.

Good luck, and happy cwing! 

Superselective Headset Diaphragm (one of a pair).



*Box 188, Rockledge, FL 32955.

The Guatemalan Earthquakes- February 1976

In one of the Western Hemisphere's worst natural disasters, radio amateurs have once again demonstrated their readiness to provide desperately needed communications.

By Don Waters*

Within two hours after the first severe earthquake (7.5 Richter) struck the Central American republic of Guatemala at about 4 A.M. on Wednesday, February 4, 1976, amateur radio operators in the Miami, Florida, area were receiving and retransmitting emergency messages from stunned officials and others in Guatemala City. Even earlier, TG9CP interrupted a QSO between K7PPQ/5 and W8HXP with first news of the disaster. By midday, amateurs in dozens of other areas of the U.S. had swung into action.

Other quakes followed the first for several days, compounding both the relief effort and communications. Later, estimates were that at least 60% of the central communications facilities had been put out of action. Unlike the Nicaraguan earthquake where the disaster was confined to the city of Managua, the Guatemalan series of quakes wrecked havoc not only in Guatemala City but in dozens of large and small communities throughout the mountainous country. A number of towns were completely destroyed, with total death estimates reaching as high as 25,000 and 1,000,000 homeless in the cold winter weather. It was days before accurate reports began to filter in from out-lying areas of the country. One of the first requests to reach IARU headquarters was for 2-meter fm equipment in quantity to provide local communications facilities supplementing hf. U.S. amateur, Rafael Estevez, WA4ZZG, flew into Guatemala on Friday to survey needs on the spot. On the basis of his reports, a massive effort was launched at ARRL headquarters to assemble equipment and collect it in the Miami area for immediate shipment to Guatemala. U.S. manufacturers supplied equipment, including the R. L. Drake Company, who sent a complete hf station to the Guatemalan Red Cross. The Panamanian

*Public Relations Consultant, ARRL

Radio Club provided a repeater.

First reports on Wednesday out of the stricken area came from TG9LW, TG9GF, KZ5ZK, and W4AD/TI2. Also active were TG9HS and her husband TG9MH.

With the number of amateur stations operating on hf in Guatemala severely limited — at one point only five stations were on the air — a massive log jam in message traffic soon developed. At the instigation first of South Florida EC, W4IYT, and former Southeastern division director, K4KQ, arrangements were made with Pan American Airways to receive bulk messages in Miami for transshipment to Guatemala for distribution there by officials. Six amateur stations were activated on a round-the-

clock basis in Miami to receive and handle traffic on 20 meters. Similar arrangements were instituted in New York, Dallas, Los Angeles and other areas.

In addition to WA4ZZG of the Sociedad Internacional de Radio Aficionados who flew to Guatemala, other Spanish-speaking members of the international Miami-based organization provided vital bi-lingual communications, among them: WB4RSE, WA4FIV, WN4TLE and HK3CJD.

Within hours after the first quake, Miami reported at least three emergency nets on 20 meters with W4s and W5s represented in large numbers.

Meanwhile, in New York City, the Hall of Science Radio Club station,

The President of the Republic of Guatemala, K. Eugenio Laugerud (right) greets special station TG9SIRA operators (left to right) WN4TLE, TG9KW and TG9CC president of the Radio Club of Guatemala. (WB4SNC photo)





Three-story building in downtown Guatemala City bears mute testimony to the giant force that struck the city. (UPI photo)



In San Pedro, a village northwest of Guatemala City, survivors pick their way through rubble the day after the quake struck. (UPI photo)



Guatemalan inquiry for handling via Pan American Airways is processed at Hall of Science Club station WB2JSM. (Jim Jaffe, WB2VOS, photo)



Message to Guatemala is aired at Hall of Science (New York City) Radio Club station WB2JSM. (Jim Jaffe, WB2VOS, photo)

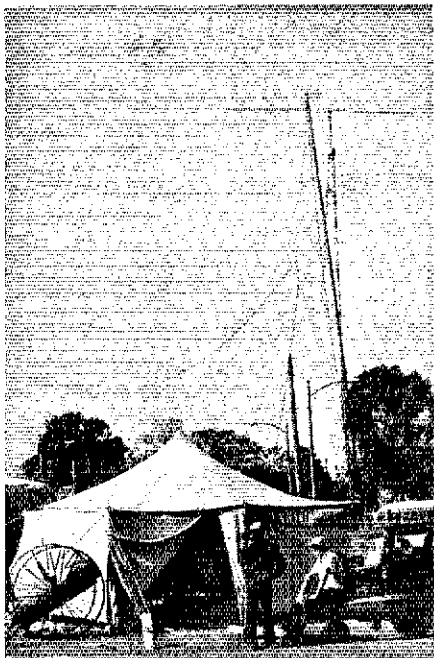
WB2JSM, checked into the Florida nets offering assistance from the New York metropolitan area. Traffic quickly swelled and was aggravated by local TV news coverage. The station was soon deluged with calls from Guatemalans and other residents in the New York area with friends and relatives in the stricken country. Five amateurs manned telephones until midnight to take the calls and the station was placed on 24-hour, round-the-clock status. The message traffic volume built up to between 75 and 100 per day handled on the air with Guatemala which achieved

an impressive 75% response, plus between 600 and 800 messages daily which were distributed via Pan American to Guatemala where message delivery was handled by local Red Cross members. A key contact in Guatemala was a young California YL, Joanne Smith, K6GSW/TG9, operating portable through K4IWT at the Red Cross in Miami.

In Los Angeles the Palisades Amateur Radio Club set up a 2-meter net and a central telephone station manned by bi-lingual volunteers which received some 3500 names to process for infor-

mation. Those which could not be handled on the air were channeled to Guatemala via Pan American. This report does not begin to touch upon the hundreds of amateurs whose long hours of effort once again reflect so well on the tradition of emergency communication service exemplified in the Guatemalan disaster.

One development growing out of the Guatemalan experience is a decision by ARRL to maintain emergency communications gear in readiness for fast deployment to disaster sites in the future. S.I.R.A. has launched a local



Amateur radio communications center in Guatemala was this Radio Club of Guatemala tent. (WB4SNC photo)



Operator John Barriera, WA6HQL, accepts message for Guatemala, at Palisades ARC portable station set up for the emergency at Los Angeles International Airport. (Bill Pasternak, WA6ITF, photo)



On the scene in Guatemala — TG9MP (left) and WA4ZZG operating the specially-designated station TG9SIRA. (WB4SNC photo)



Club station WB2JSM at New York City's Hall of Science was manned on a round-the-clock basis, to process Guatemalan traffic for Metropolitan area friends and relatives. Here WA2PCY takes messages for operator WA2PCY. (Jim Jaffe, WB2VOS, photo)

Miami fund drive to establish a similar capability.

Press and broadcast media coverage of amateur activity in connection with Guatemala has been notable, in part at least as a result of efforts by League Public Relations Assistants such as

W4IYT, WB2FHN, W6NAZ, K8ONA and WA0JOG. The television networks all carried news broadcasts originating in Miami and New York. Newspapers in New York, Miami, Los Angeles and many other cities carried features on amateur participation, news reports and

human interest items with photos. Many radio interviews were made with amateurs in cities across the country. The record is far from complete at this writing, but it is clear that the services of amateurs in this emergency have received wide coverage. QST

50 Years Ago

April, 1926

- The first installment of a new series, "Breaking Into Amateur Transmission," describes a rig which can be built for \$24.50 — including \$8 for the 210 tube. A pair of Xmas tree lamps is used to get a filament center-tap.
- Division managers are no more; the Traffic Department now becomes the ARRL Communications Department

25 Years Ago

April, 1951

- The controversial Docket 9295 has been officially closed by FCC decisions on rules changes, but the League is still thoroughly unhappy at the prospect that amateurs wishing to continue 75- and 20-meter phone operation will have to pass the new Extra Class exam, and so files a petition vigorously seeking reconsideration.

and a new post of Section Communications Manager is established, with nominations solicited. F. E. Handy, WIBDI, takes over the department from Fred Schnell who has taken a job with Burgess (batteries).

- Audio peaking is one good way to get c.w. selectivity, so Technical Editor Kruse discusses some of the fundamentals of design, and evaluates a few of the products on the market.

□ Wow! The roof fell in when *QST* announced discontinuance of the "Calls Heard" column, so it is back this month in full force.

□ Use a 10-meter beam simultaneously for ham transmission and TV reception? Impossible, certainly, but W1DBM shows how he does it. Technical Director Grammer separately adds much to our practical knowledge of by-passing for harmonic reduction.

□ The national high scores are played down to give more attention to section competition, but still can't hide the fact that the top Sweepstakes scorer is — who else? — W4KFC.

□ PF103A dynamotors are very big in surplus, and W2QFR fills the gap of technical knowledge on how best to use

□ 8GZ replaced his transmitting tube with, successively, a 201A, a WD12, and finally a UV199 "peanut tube," and still worked Australia and South Africa with fractions of a watt input.

□ The new Mu-Rad receiver is for broadcast reception, but is described here for its novel ideas on gang tuning and single control.

□ Amateurs generally are cooperating in extensive tests by the General Electric Company concerning transmission phenomena.

□ League membership dues are raised from \$2 to \$2.50.

the things for mobile rigs.

□ Civil defense is still a matter of great concern, and W5PKI outlines for us some of the principles of radiological monitoring.

□ "Overtone" crystals are becoming more available and W1HDQ shows some of the techniques to replace a long line of frequency multipliers in v.h.f. rigs.

□ Not just volt/ammeters, but more elaborate gear such as capacitance checkers and modulation monitors are among the items W2JIO has revamped for easy and safe use by blind amateurs. — *WIRW*

The Art of QSLing

Bicentennial WAS, DXCC, WAC — these are only three of the many popular awards for which QSLs must be submitted as proof of contact. It is said, "A QSL is the final courtesy of a QSO." Before you send your next card, read on, and be sure your card does its job.

In order to be counted as a *confirmation*, a QSL must contain the following information:

1) Your call. If you were portable or mobile during the contact, this fact should be indicated on the card.

2) The geographical location of your station. Again, mobiles and portables should indicate where they were during the contact.

3) Your mailing address, including your last name. The Post Office has enough problems; don't add to them.

4) The call of the station you worked. This isn't as simple as it sounds. Errors here are very common. It doesn't matter if the card is addressed properly. If it doesn't specifically indicate the correct call of the station worked, it's

no good. Double-check this item.

5) Date and time of the contact. Don't be lazy; use UTC for both, and be sure you convert properly. Some early Bicentennial WAS cards are invalid because the operator wrote "1975" instead of "1976" when the QSO occurred. It is best to write out the date: May 14, 1976.

6) Frequency. The band in wavelength (meters) or approximate frequency are all that's required. Your contact may be applying for 5BWAS, or some other award endorsed for a single band, so this information is vital.

7) The mode of operation. Use accepted abbreviations, but be specific. In the case of sideband contacts, "ssb" is preferable to "A3" which also means "a-m." Many cards have both listed: Be sure you circle or underline the right one.

Using "Confirming QSO with" before the other station's call, or "2 way," or "2X" before the mode, will leave no doubt that the card confirms a two-way contact. Other items, like your rig,

antenna and so on, are optional. They liven up the card, but they don't confirm anything, so they aren't required.

There is no rule saying a QSL has to be in card format. The information may be contained in a letter, written on a candy wrapper — anything, so long as all the information needed to confirm the contact is included. However, the 3.5-by 5.5-inch (6 by 8 cm) size card is preferred by all for easier handling, and a printed card with the proper spaces for the confirming information makes an error less likely. In their quest for an award, some stations are sending "reply QSLs," with all the information filled in, to the stations they need confirmations from. All the recipient has to do is sign the reply slip, put it in the s.a.s.e. supplied, and drop it in the mail. When properly executed, this is a perfectly valid confirmation.

As long as you're sending a QSL, take the few extra moments needed to be sure you filled it out completely and accurately. The people you work will appreciate your "final courtesy." — *WB2EDW*



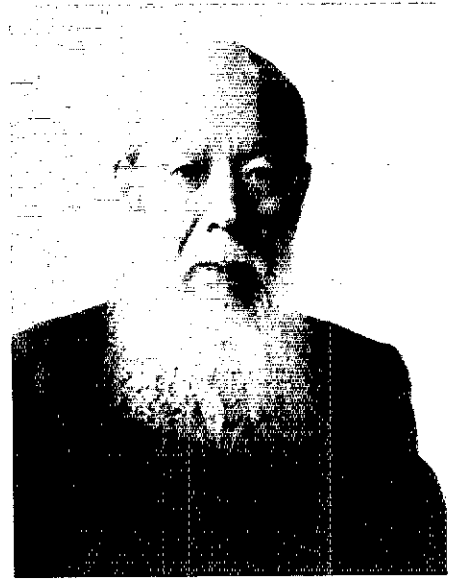
Hidetsugu Yagi, 1886 - 1976

Many antenna designs bear the names of their developers, but few names have become so thoroughly a part of radio language as "Yagi." Perhaps the ultimate tribute to the man who probably was the first to use parasitic elements in directive arrays is that his invention is often spelled "yagi," now essentially a generic term in the antenna dictionary. Professor Yagi, a quiet man who gave much of the credit for practical development of his ideas to his assistants, Uda and Okabe, died of heart complications in Tokyo, January 19, at the age of 89.

Though the Yagi-Uda work with parasitic arrays was done in the early 1920s, it appeared to have received little notice in this country until 1928, when Yagi visited the United States and presented papers before meetings of the Institute of Radio Engineers in New York, Boston, and Hartford. It may come as a surprise to modern amateur

antenna experimenters to learn that development of parasitic arrays was only part of Professor Yagi's extensive research and development program, carried out on the ultrahigh frequencies at the College of Engineering of the Imperial University, Sendai, Japan, in 1926 and earlier. While Uda worked on antennas, Okabe was busy on the development of means for generating power on frequencies as high as 2500 MHz. They had split-anode magnetrons working on wavelengths from 200 cm to 12 cm, and much of the antenna work was done around 40 cm.

The Yagi papers, *IRE Proceedings*, June, 1928, remarkably complete and advanced for their time, still make interesting reading. They were given fulsome praise by the late Dr. J. H. Dellinger, long-time chief of the Radio Division of the U. S. Bureau of Standards, himself one of America's distinguished pioneer radio physicists: "Never have I listened to a paper that I felt so sure was



destined to become a classic." — *WIHDQ*

Silent Keys

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

K1DBW, Laurence D. Trefry, Burlington, VT
 W1GJY, Hiram A. Gratrix, North Windham, ME
 W1JNA, Albert D. Sear, Worcester, MA
 W1NIS, Gustave E. Anderson, South Dennis, MA
 W1QQO, Henry S. Swenson, Morningdale, MA
 W1YEU, Frank L. Shipman, South Yarmouth, MA
 W1YYW, Robert R. Beaulieu, Livermore Falls, ME
 WA2DVQ, Charles V. Rusling, Verona, NJ
 W2HDA, Albert Yodakis, Cranbury, NJ
 K2HEE, William F. Powers, Irvington, NY
 W2ISK, Paul G. Ruckdeschel, Westwood, NJ
 W2JIL, E. Frank Huberman, Island Park, NY
 W2JRR, Roy Molendyke, Haledon, NJ
 W2KLM, Theodore C. Swartz, Glens Falls, NY
 WA2NLL, Henry Levow, Flushing, NY
 K2OKD, Arthur Jacob, Brooklyn, NY
 W2PEV, Hillard "Yotts" Drake, Succasunna, NJ
 W2PFN, Anthony J. Strauss, Yonkers, NY
 W2SAS, Carleton H. Thrasher, Pleasantville, NJ
 W2WWM, Donald H. Hickman, Somerville, NJ
 WA2YBZ, Julian Bornheim, Fort Lee, NJ
 WA2YSR, Ivan J. Watson, Stockton, NJ
 W3BVP, Harold M. Falkner, Sharon, PA
 K3CB, Homer J. Ellis, North East, PA
 W3DYD, Daniel Farkas, Levittown, PA
 W4ANE, Calvin J. Desportes, Columbus, GA
 WB4AUO, Herbert E. Garren, Duluth, GA
 W4AWE, Cyrus Washburn, Jacksonville, FL
 K4DE, Mark M. Bowelle, Oak Ridge, TN
 K4EBZ, Melville C. Wrobbel, Lake Worth, FL
 W4FZD, William O. Neal, Huntsville, AL
 W4HDR, Travis R. "Tex" Leverett, Columbia, SC
 K4LPS, Claude A. Conklin, Leesburg, FL
 WA4MGC, James M. Farris, Jr., Birmingham, AL

K4MMC, Charles P. Lee, Louisville, KY
 W4NT, Lloyd O. Seay, Marietta, GA
 W4PAF, James B. Carson, Jr., Oneida, TN
 W4SCC, William P. Aquino, Hickman, KY
 K4YTA, Dr. Bob L. Smith, Huntsville, AL
 WBSANE, Alanson W. Moore, Bassier City, LA
 W5GLX, Stanley W. Preston, Baton Rouge, LA
 W5JNH, Robert W. Kosik, Mereta, TX
 W5OKL, John G. Seitzinger, Pharr, TX
 W5SPX, Dovel Boles, Biloxi, MS
 K5TAX, Paul Bozeman, Jr., Groves, TX
 W6ASI, Victor E. Byrd, Sacramento, CA
 K6EOL, Donald L. Gillum, Glendale, CA
 W6ET, Alan N. Cormack, San Anselmo, CA
 K6EW, Roy J. Shively, Huntington Beach, CA
 WB6GZN, Glenn Osborn, Long Beach, CA
 WB6IVH, Edward A. Mauthie, El Segundo, CA
 W6JSR, Virgil L. Page, Menlo Park, CA
 WB6KHH, Eugene Mueller, Arcadia, CA
 W6MDQ, George H. Leber, Hawthorne, CA
 W6POL, Charles F. Beck, Downey, CA
 WA6QPJ, Theodore F. Steinbruner, Castroville, CA
 WAGRYP, John Kushner, Riverside, CA
 WA6SUN, Merrill H. Roberts, Sun Valley, CA
 WB6TAO, George R. Wagner, Oakland, CA
 WA6UBP, Harry J. Verburg, Santa Ana, CA
 K6UIM, Gary A. Parks, Sacramento, CA
 W6US, Butler J. Osborne, Sonoma, CA
 K6YVB, Ernest L. Palmer, Anderson, GA
 W7AEJ, Col. J. V. Nicholas, Portland, OR
 W7AG, Horace W. Doe, Suquamish, WA
 K7HFN, Edwin A. "Ned" Mudge, Bainbridge Island, WA
 W8BOB, Howard E. Bowles, Westlake, OH
 W8MHZ, Paul C. Wiese, Columbus, OH
 W8NRX, William J. Grove, Bangor, MI
 WA8OLA, Earl F. Dickinson, Albans, WV
 W8QOB, Donald L. Dean, Colliers, WV

W8UBI, Everett E. Sealy, Findlay, OH
 W8VFS, Wayne N. Cook, Bloomfield Hills, MI
 K8YEU, William H. Rumbaugh, Huntington, WV
 K9GEO, Sidney N. Vinje, Monona, WI
 WA9JSF, Charles E. Nickselsen, Princeton, IL
 W9OWA, James D. Selsdorf, Evanston, IL
 W0AYF, John G. Disburg, Marshalltown, IA
 W0BF, Wilfred N. Rova, Bismark, ND
 K0BSI, Everett C. Mayfield, Dodge City, KS
 W0BXI, Jack Allen, Noel, MO
 W0EQI, Frank R. Denney, Fowler, CO
 W0GDC, Charles L. "Slim" Paterson, Fruita, CO
 W0KFA, Clair R. Miller, Cedar Rapids, IA
 WA0KKL, Forrest O. Rozell, Hermitage, MO
 W0KTU, Jack N. Austin, Wichita, KS
 W0KY, Frank L. Murphy Sr., Webster Groves, MO
 WN0MKQ, Leslie C. Clark, Wichita, KS
 W0NMV, Arthur C. Nelson, Page, ND
 W0SQB, Rev. Matthew Heymann, Springfield, MO
 WA0SUU, George E. Perkins, Big Fork, MN
 VE3FSY, Gordon Mitchell, Toronto, ON
 VE5BL, Jack Robinson, Regina, SK
 VE6AFF, Walter F. "Bud" Riches, Edmonton, AB
 VE6MC, Brian B. Wilson, Edmonton, AB
 VE7AAA, A. A. Abrahamson, Langley, BC
 VE7AJU, W. J. Jorgensen, Salmon Arm, BC
 VE7OD, Charlie E. Longley, Gibsons, BC
 VE7RD, B. Nixon, New Westminster, BC
 VE7XV, Jack D. Dobeil, Chilliwack, BC
 VK4YJ, J. H. Farrell, Somerset Dam, Queensland
 G3YJS, Maurice Roche, Kent, England
 VP2VBV, Dr. Gerald Gordon, Tortola, BVI

How Much Does Gasoline Cost in Brazil?

Amateur Radio and Education — Partners in Progress. How you can help attract students to Amateur Radio. Not for teachers only.

By Lou Hoekstra,* W1TRB/4

Public service, orderly growth of the Amateur Service and support of education — a powerful combination coming from the mixture of ham radio and the classroom. Many teacher/amateurs use ham-radio examples in physics and math courses, as well as in communications and electronics, but amateur communications can play an important and interesting role in other subject areas as well.

I speak from experience, as my junior high school social studies students had the privilege of talking with more than 100 amateurs from forty states and many foreign countries during the last school year. It is a unique and unforgettable experience for the student to be able to sit in a classroom and converse with amateurs around the world. Their interest and enthusiasm bubble beyond description.

Student teachers, school administrators and other visitors to the classroom often read the mail. They are very much intrigued and excited about this innovative teaching-learning technique.

When most of us old timers (over age 30?) went to school, we were exposed mostly to the expository teaching-learning concept in which the teacher (the purveyor of knowledge) did all the talking, and we (the dumb ones) did all the listening. This method required the student to read, recall, recite — a process of regurgitation. This strategy is still being used to teach social studies today, particularly when transmitting a specific body of knowledge to a large group of students. No wonder many people consider the study of history, geography and civics so boring. But it need not be!

On the other end of the educational continuum is the *inquiry* approach to learning the social studies. It is here that ham radio is especially useful.

For example, my 12-year-old students are studying about Africa. As a classroom teacher my role is that of a guide, not a purveyor of knowledge. I make resource materials, such as films and literature, available to my students. The students form a hypothesis about Africa, based on this research and their own preconceived attitudes and opinions. Perhaps their hypothesis is that Africa is a very hot, desolate place, across the ocean, thinly populated, with the topography mostly desert and jungle. How do we test this hypothesis? By ham radio, of course.

A call to a ZS6 station (hopefully propagated) reveals that Johannesburg is a large metropolitan area with tall buildings and super highways. Now the student forms a new hypothesis based on this new information. A second contact made with a 9G1 station will modify this hypothesis even further. After probing in certain areas of Africa, the student will form new ideas, opinions and attitudes. This experience provides a more meaningful learning experience (and life experience) than merely listening to a lecture on Africa or reading chapter 17 in the often outdated textbook.

A simple question to a PY2 station, "How much does gasoline cost in Brazil?" has considerable educational value. Obviously the student is learning a little about electronics and radio propagation theory in the process but mainly he is learning a foreign language and culture, economics, values and perhaps the metric system.

I recall the truly remarkable lesson on "values" learned by my students when they asked a VP8 station, "Why would anyone want to live that far away anyway?" The VP8's response, "Far away from what?" provided a very stimulating lesson on values for my students. Too often kids look at the United States as the center of the universe with the rest of the world revolving around it.

The experience has produced much favorable publicity for amateur radio, publicity not confined to the school itself. The local major newspaper carried the story, which was picked up by Associated Press Wire Services, and the story subsequently appeared in many papers throughout the country. Also the local television and commercial radio talk shows have shown interest, and several national educational publications carried the idea.

What does this mean to amateur radio besides "favorable publicity"? It means that we all have an excellent opportunity to be classroom teachers (and ambassadors for amateur radio) — right from our own radio shack.

Even if you are in no position to help on the teaching end, you can participate from the other end of the QSO. On the basis of experience over the past year, I feel I can make some suggestions for the future "teacher" ham when he or she is asked questions by a group of adolescent kids.

First, try to relax and enjoy the experience of talking with the group of inquiring teenagers. My experience has shown that even those of us with the Ragchewer's Certificate (with endorsement stickers for many wpm) have on more than one occasion developed mic

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fright in these situations. It's important to realize that they are as apprehensive as we are about the experience.

Keep in mind that these are young teenagers and there's no such thing as a "dumb" question. For many socio-economically deprived kids, this is their only encounter with the outside world. Many of them cannot read. Others have physical defects. Recognize individual differences.

Do not talk in technical terms. *Express* rather than *impress*. Most kids don't understand or care about your duo-diode high-mu triode. But they are very much interested in your geography, history and government. They are also interested in your profession as an important part of their career development training. Their hypothesis is: Who knows better than a plumber the advantages and disadvantages of being a plumber?

Time is critical. Classes in most secondary schools change every 45-60 minutes. When the bell sounds, the kids must go to another classroom. The classroom instructor should tell you the time factor involved in his particular school.

Don't pretend to know all the answers. An honest "I don't know" lends authenticity to the experience. Perhaps a phone patch extension to someone who *does* know would provide a meaningful learning experience. I recall the occasion when my students learned a great deal about California geography and history from a W6 near Sacramento but even more about California state government structure by way of a phone patch to the Capitol building.

We should all remember the obvious fact that we represent our community to these kids. On the days I use my rig in the classroom, the hallways are filled

with comments such as, "I talked to Washington, DC, today," or "You wouldn't believe how much I learned from my conversation with Phoenix, Arizona, today," or "We're going to talk to San Antonio, Texas, fifth period today. I'm so excited." Are *you* Washington, Phoenix or San Antonio?

Oh yes! We realize that amateur radio is still a hobby and not a profession. And we realize that amateur radio has been used in some schools for many years. In fact, I received my initial ticket nearly twenty-five years ago as the result of my exposure in WIBDV's high school science classroom. But the national publicity and reaction to the use of this technique in a social studies classroom require all of us to perform another public service — that of *teaching*. Isn't that what the Amateur Service is all about?

Are you ready?

QST

Strays



□ Stanford Radio Club (CA) members recently celebrated the club's 50th anniversary — they think. Early records of the club (which holds the call, W6YX) are missing but Terry Elass, WB9FUV, secretary-treasurer, puts its beginnings somewhere around 1924-25. In honor of the university club's anniversary, officers attempted to contact as many of the estimated 200 club alumni as possible. Replies returned from 80, the majority of whom are still active hams. Officers assembled a cumulative membership directory with hopes of keeping it updated in the future. The station regularly provides a communications link for the university's geophysicists conducting research in the Antarctic. The club affiliated with ARRL in 1937.

□ During a trip from Los Angeles to Oklahoma City, W5LHO followed WA6IAU mobile as he talked to WA5ZXB. A meeting was then arranged for W5LHO's QTH in Oklahoma City. A new ham, W5LHO received his Novice license at age 71, his General ticket at age 72, and hopes to pass his Advanced test at 73. The five hams brought together by amateur radio are left to right: E. Ray Long, W5TY, Oklahoma city clerk; Bill Black, WA6IAU, Los Angeles, retired government worker; Don Davis, WA5ZXB, Oklahoma City lawyer; Douglas V. Magers, W5LHO, retired Presbyterian minister, and Melvin Bolger, W5AXM, retired oil company worker.

□ Former One Now Four: Matt Blender, ex-W1JWZ, has rejoined ham radio ranks and is trying out his new call,

W4MGX, from his hilltop QTH in Doraville, GA, where he practices law. He thus follows his father, well-known TV newsman and now press secretary for a congressional member, Mort Blender, W4LPZ/ex-W1KGR into fourland. Mort, a member of the Capitol Hill Amateur Radio Society which operates W3USS in the Senate Office Building in Washington, obtained his first ticket in 1929.

□ The Highland Park Amateur Radio Club (HARC) is organizing a 40-meter chess net, open to all amateurs and meeting every Thursday at 8 P.M. and Sunday at 5 P.M. on 7.275 MHz. After checking in, you will be paired off with another player and the game will be played on another frequency. Address inquiries to: HARC c/o Andrew Glassner, WA2YHJ, 263 Lawrence Avenue, Highland Park, NJ 08904.

□ Another Health Hazard: The League should take the initiative in advising all amateurs of a hazardous substance that is probably present in every shack — PCB, poly chlorinated biphenyls. PCB is the major, if not sole, constituent of transformer oil which many of us acquired in one gallon quantities from the local power company to fill a Heathkit Antenna. The hazards are great and include liver damage, lesions from contact, and possibly reproductive failure. Note that capacitors frequently have amounts of PCB in them also.

In order not to create a greater problem, note that the solution to having PCB around the shack is not to dump the stuff in the garbage, down the drain, or in some empty field since

PCB's greatest danger is its accumulation in the environment. The local power company should or will shortly have a way to dispose of the stuff; alternatively, contact the state or federal environment protection agency. As a substitute in the Antenna, mineral oil will do nicely with only a slight loss in power-handling ability. — K4CFG, *Environmental Engineer, P.E.*

I would like to get in touch with . . .

□ amateur operators who are employees of the Singer Company. Send name, call sign, division and home address to: Philip J. Freed, K3LVO, 436 Nimitz Ave, State College, PA 16801.

□ hams interested in starting a Christian fellowship net. WB9QNB.

□ someone, who, back in the 30s, exchanged QSL cards with W9LBU, Art Johannes, Pierre, South Dakota. His widow and son would like one of his old QSL cards. Contact Frank L. Curtis Jr., W0VQC, Virgil, South Dakota 57379.

□ any Chinese amateurs in U.S. or elsewhere in world. C.N. Lau, VE3EWW, 266 Maria Street, Toronto, Ontario, Canada M6P-1W4

□ anyone with a QSL card for station W3GXI, Hobart T. Walker, killed in China in WWII. Contact Laurence C. Walker, Ph.D., 514 Millard Drive, Nacogdoches, TX 75961.

□ a Californian or Texan Novice interested in a sked. James D. Seaman, WN2AJM, 709 Jersey Ave., Maywood, NJ 07607.

□ hams who are members of the Order of DeMolay and who are interested in forming a DeMolay net. Dave Wyatt, WB0ICI, 118 Cherbourg, St. Louis, MO 63129.

Hamfest Calendar

Alabama: The annual Birminghamfest amateur radio convention is May 1 and 2 at the Alabama State Fairgrounds, Birmingham. Headquarters motel: Sheraton downtown (on I-65). Giant two-day indoor/outdoor swap circle, manufacturers' exhibits, forums, displays, family activities and more. Talk-in 34/94 (WR4ADD), 3965 kHz. Info: B.A.R.C., P. O. Box 603, Birmingham, AL 35201. Sheraton reservations: 800-325-3535.

California: The Fresno ARC Hamfest is April 30 - May 2. Details write: Fresno ARC Inc., P. O. Box 783, Fresno, CA 93712.

California: The twenty-first annual West Coast VHF/UHF Conference is May 1, 2 at the Ramada Inn, 2151 Laurelwood Rd., Santa Clara (408-246-5200). State-of-the-art technical meetings start at 9 A.M., Saturday. Pre-registration, \$3 postmarked by April 15, \$4 door. Special room rates, make reservations directly with the motel, advise you are with the conference (\$17 single, \$21 double). A brand-new 220 acre, \$80-million dollar "Martiott's Great America" family amusement park, which opens March 20, is only a short distance from Ramada Inn. The new park has enough rides, shows and restaurants to require 8-10 hrs to see it all. Discount tickets available: \$7.25 for adults and \$6.25 for children, covers rides and shows (must pre-register).

Florida: The St. Petersburg Amateur Radio Club's annual old-fashioned hamfest and family picnic is on May 2 at Lake Maggiore in St. Petersburg. Swap tables available. No commercial activity.

Georgia: The Columbus Amateur Radio Club's annual hamfest is Saturday and Sunday, May 8-9. To be held at the Fine Arts Bldg., Columbus Municipal Fairgrounds, Columbus, GA.

Illinois: The Moultrie Amateur Radio Klub's 15th annual hamfest is at the American Legion Pavilion in Wyman Park, Sullivan, April 25, rain or shine. Advance ticket sales by mail only, \$1.25 or \$1.50 at gate. Write MARK, P. O. Box 327, Mattoon, IL 61938.

Illinois: The Rock River Hamfest is April 25 at Amboy, Lee Co., at the 4-H Center, Rte. 30 and Rte. 52, same place as last year. Tickets \$1 advance, \$2 gate. Write Carl Karlson, W9ECF, Nachusa, IL 61057.

Louisiana: The Baton Rouge Amateur Radio Club's Bicentennial Hamfest is May 1 and 2. The site is the Catholic High in Baton Rouge. Activities for the entire family. Hospitality time begins from 1-4 with refreshments. At 6:30 the buffet banquet has the finest food prepared on site by the Chefs Blade. Sunday activities begin at 9 A.M., swap tables, displays, recreation for the whole family. Talk-in on 28/88 via WR5AFJ or 34/94 and on 3910 kHz, Saturday and Sunday. Write BRARC Hamfest, 16230 Alford, Greenwell Springs, LA 70739.

Maryland: The Potomac Area VHF Society's annual hamfest is Sunday, May 2 from 9 A.M. to 5 P.M. at the Agriculture Center in Westminster. Registration of \$3 includes flea market or tail gate sales. Professional food and beverage catering and unlimited parking available. Talk-in on 146.94 and 146.52. For further info contact K3DUA or WA3NZL.

Massachusetts: Ham Auction is April 17 at 1 P.M. at the VFW Hall, Hull, MA. Sponsored by the South Shore Repeater Assn. Tag all gear, club share 10%. Minimum bids discouraged, but allowed if you insist. (Buy back option at no cost to seller.) If you are planning on bringing equipment and wish a copy of the auction rules, contact WA1QWT, WA1RKT or W1FGL.

Massachusetts: On April 30, a combination CB/ham flea market and auction. Auction 1930 at Main South Post 341, American Legion, Main St., at Webster Sq., Worcester. 15% to club; talk in 37/97 or 52 direct questions. Contact Rene Brodeur, WA1LEA (617-753-7480).

Michigan: The 2nd annual Swap n' Shop is Saturday, April 24, from 9 A.M. to 5 P.M. in the auditorium at Woodland Mall on East 28th St. in Grand Rapids (corner of M11 and M44). Features include ham equipment, electronic parts, monitors and CB. Admission \$1.50. For info write: Grand Rapids REACT Inc., P. O. Box 2402, Grand Rapids, MI 49501.

Missouri: The P.H.D. Amateur Radio Assn., Inc. of Liberty, MO, (Kansas City Area) sponsors the seventh annual Northwest Missouri hamfest on Sunday, May 2, at the Kansas City Trade Mark, Exhibit Hall 3 (Old Municipal Airport Terminal Bldg.). Starts at 9 A.M. Expanding to a new location with unlimited free parking, easy access to all major interstate routes, and a building with 22,000 sq. feet of useable space.

New Jersey: The Raritan Bay Radio Amateur's indoor Electronic Flea Market is Sunday, April 25, from 11 A.M. to 4 P.M. at the Sayreville Civic Center (Old VFW Hall), Dolan Street, Sayreville, NJ 08872. Refreshments, tables available. For info contact: Rick Giacchi, WA2SAJ, 98 Kendall Dr., Parlin NJ 08859 (201-727-7999).

New Jersey: The Delaware Valley Radio Assn.'s (W2ZQ/WR2ADE) annual flea market and auction is Sunday, May 2, at the Pennington Road Fire Company, 1666 Pennington Rd., Ewing Township, Trenton. The flea market begins at 9 A.M. followed by the auction at approximately 1:30 P.M. Registration is \$1.50, tailgating \$2. Indoor flea market tables available. Follow signs from Rte. 1 or I-95. Talk-in W2ZQ on 07/67 and 146.52 MHz. Refreshments available. For further info write: D.V.R.A., W2ZQ, P. O. Box 7024, W. Trenton, NJ 08628, s.a.s.e. please.

New Jersey: The Trenton State Amateur Radio Club announces the first convention of amateur computer hobbyists, Sunday May 2nd, 1976, at Trenton State College, Trenton, New Jersey. Called the "Trenton Computer Festival", it will include a convention of amateur computer clubs, technical talks related to home computing, door prizes,

demonstrations by computer amateurs and groups, program duplication service, manufacturers booths and seminars, and a flea market area for swapping and selling components by amateurs. For more information contact K2UYH.

New Mexico: The Mesilla Valley Radio Club sponsors Whitey's Bean Feed and Swap Fest, Sunday, beginning 10 A.M., April 25th. Located near Las Cruces, NM, at La Mesa with talk-in on 16/76 and 3940 kHz. Fun for the family and the usual beverage truck. Ad included for \$4 for adults and \$1.75 for kids tickets. Eat, drink with Whitey, K5ECQ, a host. Free over-night parking.

New York: The Overlook Mountain Amateur Radio Club's annual banquet is Saturday April 3.

North Carolina: The RARS 1976 annual hamfest is April 11. Write RARS, Box 17124, Raleigh, NC 27609.

Ohio: The 25th Dayton Hamvention is at HARA Arena, April 23, 24, 25. Technical forums, exhibits and huge flea market. Program brochures mailed March 8th to those registered within the past three years. For accommodations or advance flyer write: Hamvention, P. O. Box 44, Dayton, OH 45401.

Ohio: Dayton F.M. Bash is on the Friday night of Dayton Hamvention, April 23, at the Dayton Biltmore Towers (hotel) in the downtown area. The new location will accommodate the ever-increasing crowd and will allow a leisurely social evening, and a live floor show, featuring television personality Rob Reider (WA8GFF) and his group. Admission is free to all hams and their ladies and includes free snacks and a C.O.D. bar. From 9 till midnight. Miami Valley F.M. Assn., Milt Kohl, W8SLY.

Oklahoma: The 30th annual hamfest is the 3-4th of April. For registration info contact: Chuck Crawford, K5BYF.

Ontario: In conclusion to celebrating its 30th year of community activity, the Scarborough ARC will hold its annual social banquet on Saturday, April 10. Write: P. O. Box 1011/Station C/Scarborough, ON Canada M1H 1A0.

Pennsylvania: The Northwestern Pennsylvania Swapfest is May 1, Crawford County Fairgrounds, Meadville. Free admission. \$1 to display. Flea market begins at 10 A.M. Refreshments. Commercial displays welcome. Indoors if rain. Talk-in 04/64 and 146.52 MHz. Details: Crawford Amateur Radio Society, Box 653, Meadville, PA 16335.

Texas: The Brownfield 76 Centennial Swapfest is May 2 in the National Guard Armory, Brownfield. Advanced registration \$1.50 and \$2 at door. Write: Viola Simmonds, W5FBM, 1603 E. Tate St., Brownfield, TX 79316. Social get-together night before in the armory.

Washington: The Skagit Amateur Radio Club of Washington's 23rd hamfest and banquet is at Bryant Grange Hall on April 24. An all-day program is planned with Northwestern Division Director Thurston and other ARRL officials. For more info contact W7LFA.

Coming Conventions

ARRL HAMFEST

April 3-4, 1976, Mobile, Alabama

Saturday, April 3, will bring the Army MARS meeting, hospitality room at the Ramada Inn, and banquet that evening.

Activity on Sunday, April 4, will include eyeball QSOs, swap tables, contests, prizes and box lunches. Southeastern Division Director Larry Price, W4DQD, will be the

speaker at the ARRL Forum.

Talk-in 146.34-94 and 146.22-82 MHz. For information write WB4UNY, Hamfest Chairman, or Mobile ARC, P. O. Box 7232, Mobile, Alabama 36607.

SOUTHWESTERN DIVISION CONVENTION

April 9-11, Tucson, Arizona

The 1976 Southwestern Division ARRL Convention will be held April 9-11 at the Braniff Place Hotel in Tucson, Arizona, just off I-10 on Congress Street.

The featured banquet speaker is Phyll Horne, Chief, Field Operations Bureau, FCC, with the keynote speaker being Major General

Albright, of the U.S. Army Command. Also speaking will be ARRL honorary vice president and retired treasurer, David H. Houghton. Technical sessions include FM, Oscar, Radio Astronomy, Solar and Wind Power, Computers and Microprocessors, Contests for Hams, Microwave, Telephone Interference and Patching, and others. Among the many speakers will be QST Technical Editor Doug DeMaw, W1CER, and Ellen White, W1YL, Deputy Communications Manager. Other highlights of the convention include the ARRL Forum and Wouff Hong Ceremony.

Pre-registration is \$16.00, \$18.50 at the door. Tickets are available without banquet or for banquet only. Tickets for the ladies

luncheon/fashion show are \$5 by pre-registration only. Hotel rates are \$19.00 single, \$24.00 double. Registration information available from ARRL Southwestern Division Convention, P. O. Box 12261, Tucson, Arizona 85732.

NORTH FLORIDA SECTION CONVENTION

April 10-11, 1976, Jacksonville, Florida

The third annual Bold City Hamfest will host the first section convention ever in Florida, April 10-11, 1976, at the Jacksonville Beach Municipal Auditorium.

Highlights include the ARRL Forum with Southeastern Division Director Larry Price, AC4DQD; Chuck Watts, AA6GVC/1 of the Hq. staff; and technical forums on a variety of subjects, including a special free seminar on microprocessors and microcomputers. A 2-meter transmitter hunt and a left-footed code contest are also planned.

The indoor swapshop is among the finest in the country. A gala come-as-you-are dinner party will cap off the first day's activities. Meetings planned, include QCWA, MARS, Florida Repeater Council, and others.

Special motel rates available the week before and after the convention. For further information and reservations contact Doug Jacques, AA4QIM, Hamfest Director, P. O. Box 17259, Jacksonville, Florida 32216 or phone 904-725-5473.

WEST INDIES SECTION CONVENTION

April 23-25, 1976, Guanica, Puerto Rico

The 1976 West Indies Section Convention will be held in the Hotel Compamarina at Guanica, Puerto Rico, April 23-25. The Radio Club de P. R. will host this convention.

The ARRL Forum will be hosted by ARRL President Harry J. Dannals, W2TUK, and Southeastern Division Director Larry E. Price, W4DQD. Flea market and new equipment demonstrations are scheduled for the entire weekend.


On Sunday, April 25, the entrance fee is as follows: Club members, \$4.50; XYLs, \$5.50; kids under 12 years, \$4.50; kids over 12, \$5.50, and guests, \$9.50. There is a 50¢ discount in each case if pre-registration is made.

DELTA DIVISION CONVENTION

April 24-25, 1976, Jackson, Mississippi

The Mississippi Amateur Radio Council, with the Jackson, McComb, Crystal Springs and Vicksburg Amateur Radio Clubs and the Echo Repeater Association, will hold its annual Hamfest/Delta Division Convention on Sunday, April 25, 1976, at the livestock Exposition Building on the Mississippi State Fairgrounds just off I-55 North in Jackson.

The banquet speaker at 8:00 P.M. on Saturday night at the Fairgrounds Ramada Inn, will be Perry F. Williams, W1UED, senior assistant secretary, ARRL Hq. QST Beginner & Novice Editor Jay Rusgrove, WA1LNQ, is also on the program.

Plenty of parking, swap, van and camper space. Reservations require \$8.00 per person. Hamfest, \$1.00 donation. Additional info from the Jackson Radio Club, Box 8371, Jackson, Mississippi 39205. 

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 356

January 14, 1976

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters office of the League at 9:05 A.M., January 14, 1976. Present: President Harry J. Dannals, W2TUK, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Roy L. Albright, W5EYB, Max Arnold, W4WHN, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. A number of other officers, directors and vice directors of the League were also present.

On motion of Mr. Clark, affiliation was unanimously GRANTED to the following societies:

Beach Channel High School ARC, Brooklyn, New York; Boston University ARC, Boston, Massachusetts; Centennial (H.S.) ARC, Champaign, Illinois; Charlotte Amateur Radio Society, Punta Gorda, Florida; Citrus Center ARC, Lakeland, Florida; Eastern Iowa DX Association, Marion, Iowa; Eielson Amateur Radio Club, Anchorage, Alaska; Ellis County ARC, Waxahachie, Texas; Fort Wayne DX Association, Ft. Wayne, Indiana; Georgian Bay ARC, Owen Sound, Ontario, Canada; Gold Coast FM Association, Inc., Boca Raton, Florida; Ham Hocks of G.M.A., Miami, Florida; Hazel Park ARC, Hazel Park, Michigan; Holdrege Area ARC, Holdrege, Nebraska; Hughes El Segundo Employees Association ARC, Los Angeles, California; Jewish Community Center Radio Club, Oak Park, Michigan; Medford High School ARC, Medford, Wisconsin; Los Angeles Area Council of Amateur Radio Clubs, Inc., Sun Valley, California; Mid-Willamette ARC, Scio, Oregon; Missouri Western State College ARC, St. Joseph, Missouri; Moody Jr. High School ARC, Bedford, Ohio; Newark College of Engineering ARC, Newark, New Jersey; 19-79 Repeater Association, Malden, Massachusetts; Nova Scotia VHF Association, Dartmouth, Nova Scotia, Canada; Pentagon Amateur Radio Club, Washington, D.C.; Rho Epsilon Radio Fraternity, Alpha Chapter W-S-U ARC, Pullman, Washington; Rocky Mountain VHF Society, Inc., Boulder, Colorado; Scarsdale High ARC, Scarsdale, New York; South Arkansas ARC, El Dorado, Arkansas; Tennessee Tech Amateur Radio Society, Cookeville, Tennessee; The Radio Amateur Technical Society (RATS), Lansing, Illinois; Tryon Amateur Radio Club, Gloversville, New York; University of Wisconsin-Stevens Point ARC, Stevens Point, Wisconsin; Wellington ARC, Wellington, Kansas.

On motion of Mr. Thurston, unanimously VOTED to grant approval for the holding of a West Indies Section Convention in Dorado, P.R., on April 23-25, 1976, a New York State Convention at Rochester on May 21-23, 1976, and a Roanoke Division Convention in Norfolk, Va., on July 31-August 1, 1976; and, in confirmation of earlier mail approval, for the holding of a Michigan State Convention in Muskegon on March 20, 1976, a Delta Division Convention in Jackson, Mississippi, on April 25, 1976, a Southeastern Division Convention in Atlanta, Ga., on June 11-13, 1976, and a West Virginia State Convention at Jackson's Mill on July 2-4, 1976.

On motion of Mr. Griggs, Life Membership was unanimously GRANTED to the following applicants:

Gary L. Adams, K9EUB; Leland H. Agard, K5LUW; John P. Alexander, K5LZT; Syed R. Ali, WB2AFA; Gar Anderson, W0KE; Stanley T. Andrews, Jr., W6GWQ; Clarence F. Arndt, W6DFG; Terry A. Bachmann, W9HVL;

Charles Baisch, WA4BIM; Harold Balyoz, W6YBP; Perry W. Barker, WA5IKU; Robert M. Bartels, K5MVZ; John Bartemes, KP4BQU; Curt P. Beeman, WB4JFS; Michael M. Benzen, WA0PAO; Kenneth J. Bernacky, WA1QJF; Edward Biedricki, WB2UKX; Joseph M. Black, WB5HWM/1; Norman O. Bledsoe, Jr., WB5NDP; Max G. Bodenhausen, W0ZZQ; Anthony E. Bodo, WA9YOZ; Wesley Bolin, K4APL/7; Gary H. Bort; Myron L. Braun, K8IQB; Joseph J. Breaux, WA5DHL; Monroe M. Broad, WB2SHL; H.P. Brower, K0IUM; Michael H. Bryer, WB5CZV; Clement J. Burke, W5IXR; Gem Burke; Paul E. Burkhardt, WA1GXN; Johnny L. Cadick, WB9GJN; Thomas L. Caldwell, WA3HTS; Donald E. Calmer, WA3SHB/W9YRO; Donald Camery, WA8TSX; Michael C. Carr, WA1QAA; Richard M. Cash, WB4UGM; James P. Cassidy, K7IWD; Brian M. Chesire, WA5PPO; T.W. Christiansen, WA7QZK; George E. Clark, K2KBL; A.J.F. Clement, W6KPC; David Cohen, WB2FUG; Leo F. Coleman, WA6UGU; Bob Collin; Robert V. Compton, K6PZD; Ronald R. Cone, WA9HXD; Arthur J. Corry, Jr., WB2ERG; John H. Cresswell, W8DYC; Spencer L. Cromwell, K6VRS; Joseph V. Crowling, K4CPR; C.A. Cunningham, WA4HVO; Robert C. Daigh, K6ZCN/WB5KVVX; Leonard O. Dansby, W5VE; Charles N. Davis, W1BCV; William A. Davis, WA9QLC; R.C. Deckman, WN5NVS; John R. Demchuk, K3ZRK; Gene Densmore, WA4WCG; Charles A. Dickman, WA1LZK; Roy R. Dietrich, WA6LWI; Joseph F. Domino, WA5KFK; Kenneth L. Doughty; Wray W. Dudley, WA4VXR; William M. Duval, K5UGM; Kenneth A. Ebner, K9GSC; John N. Etwood, W7GAQ; Robert S. Erickson, W0QNH; Kenneth D. Farr, K6TWT; William B. Fizette, K3ZJW; Collier Jack Fountain, WB4XP; Victor A. Francis, WA2ZFN; Polycarp B. Gadegbeku, EL2CI; Kale C. Gentry, W0MPN; James N.S. George, VE3CNS; James L. Getman, WA8MRL; John Gilbert, W0DYK; David C. Goggio, WA0GG; Roy S. Goldsmith, W4ZUR; Carl H. Gottwald, W6TGG; Richard R. Graves, W4TNX; Zeke Green, WB5CVR/KL7IAH; Donald B. Green, WB5FQR; Richard F. Gregorio, K1RAW; Glenwood Grewell, W8FP; Rocco Grillo, WB2MEX; David R. Groen, WB8FXL; Jeffrey E. Groves, WB0CCU; Russell J. Duidry, K5YMY; Donald J. Hager, WB9POX; Steve Hammerberg, WA7IIN; S.M. Hammonds, W0GLZ; Harold B. Hausenfluck, WB4JSP; Elise E. Hawkins; P.P. Heinemann, W1YG; Edward A. Henderson, VE2GS; Edward Henegar, WA4YKD; Noble Hetherington, WA5IMW; Victor M. Higgins, WA6RZJ; Ronald B. Hines, K4LWZ; Henry J. Hively, W3PTV; Stanley K. Hoffman, K3FOB; Erich J. Holzer, WB2WPY; William A. Horger, Jr., WB4DJC; M. Hoshiko, W9CJW; Robert W. Hudson, K7LAY; Harold A. Hultman, WN8SVU; Timothy A. Hunt, WA6TNW; David Israel, K2KTI; Hershel A. Jackson, WA0MBC; P.D. Jacques, K4INY; John J. Jeffrey, W1ZUU; Dwight M. Jester, WB4SJV; Lyle O. Jevons, K6CKO; Samuel H. John, Jr., W3CVF; William F. Johnson, WB9DDF; Richard B. Jones, W4RIC; Gerald M. Judy, W7CCY; Michael A. Kafance, W4TKK; George M. Karolej, K3ZSN; George W. Kashner, WA6ARN; Larry S. Kaufman, WA2MOR; Robert W. Keene, K2QKA; Norman W. Kelley, WA0KQO; Bron T. King, W5KQN; Michael Z. Kiss, WB6JQW; Phillip H. Kitchens, W4HGH; Larry E. Knaim, W6NWS; Andrew D. Koerber, WB8JYO; Stuart M. Kravitz, WA3BSC; John Kuklinski; Mark Kupferschmid, WB9NKP; Harry Ladewig, WB5RAL; Robert L. LaRoche, W7FVD; Chris C. Larson, WB5IHC; Ira A. Leach, K8WNX; Richard W. Leach, WA3HSE; Richard H.

Lennon, W2BLM; Keith B. Lewis, WA4LPX; Melvin L. Lindsey, K6PKF/WA7LGP; Walter A. Linstruth, WA6JPR; Timothy L. Loewenstein, WA0IVW; Douglas L. Lundstedt, W2HPP; Thaddeus D. Marlin, WA8WWS; Emmett F. McCanney, WB4JXS; E.S. McCauley, WA3PFH; Richard B. Mallio, W1VUK; Thomas R. Mangels, WA1JVV; Ira C. Manire, Jr., KSEYL; Dean B. Maples, K4FOQ; Joseph Marshall, K2AU/W3SNA; Stephen J. Marstall, W9MUA; Robert T. Marston, WB2GXW; William E. Vander Meer, WA2AUU; William A. Melanson, W1LID; Stanley Michalek, WB8CBM; Charles F. Milazzo, WB2OZA; Leon J. Milcarek, WB2DLF; Gene H. Miller, WB8RMA/WA0HLI; Lyndell C. Miller, WA0KUH; Richard G. Miller, K3JXO; David Minott, WA2EXP; Robert I. Mobile, WA1OUB; Alan T. Moffet; Karl D. Morris, WB8GDY; Angus T. Morrison, W0HIS; Herbert A. Mulkerin, W8QMT; Daniel J. Murphy, Jr., K7IPZ; Gene R. Myers, K0QVD; Hans F. Napfel, WB2ZZB; Harry M. Neben, W9YVZ; Lee Nelson, K6BTT; Robert J. Newton, WA6YCL; Mildred K. Nickols, K4UMN; Robert M. Norman, K4GRD; John S. Olenkiewicz, Jr., W1FXD/CT2BL; Ronald J. Oliver, K6AYD/KL7IET; Hilary H. Osborn, Jr., K4DYB; Michael E. Osborne, WA6VLY; Harry R. Palmer, WA3MXE; John E. Palmer, K4LSP; Ronald E. Paquette, WN1VPC; David R. Parks, VE3GSA; Richard W. Parks; Theodore Pauck, Jr., K8YRV; Bill L. Pearsall, W7JHD; Robert C. Pederson, K2IEZ; Lenard Persin, WB4HZQ; Forrest D. Pigrim, Jr., WA4HHW; Donald C. Pittman, WB5IOD; Gary L. Portnow, WA2MIS; Thomas A. Price, W8SZL; Robert A. Reff, K2OGT; Charles A. Rhoden, KL7HOV; Hollis Robinson, Jr., WB4AIP; Frank H. Robison, K8GKJ; Henry E. Rock, WB8SYJ/DA1RH; Jesus E. Rodriguez, YV3HR; Delmar W. Rowe, W9BPU/W7EDT; Albert Rozanc, WB2ZYQ; Harold R. Rumer, W3HIW; George H. Russell, W2SJU; Lawrence M. Russo, K3TFU; George O. St. Andre, K1UDP; Roy R. Sanden, WA1DQI; Jeffery C. Sanders, W5LPS/K7JIN; Robert L. Sanford, WB2SUP; Bernie J. Sasek, W0YOY; Vernon D. Seitz, W9HLY; Elwood D. Shipley, W4VI; Robert L. Shifka; C.M. Smith, VE3CHS; Truett L. Smith, WB4WYI; Dennis J. Sommers, WB4ITY; Gerald C. Speidel, Jr., WN6AEP; William K. Springfield, K4IEY; Robert Spurlock, W6SDA; Roger J. Stachour, WB0ODD; Craig A. Stewart, WB6JAX; Charles T. Storm, WB0JLP; Thomas E. Storm, Sr., WA0YIL; Thomas A. Stough, WB0GIX; Howard F. Stuart, Sr., K8SEY; Norman W. Styer, Jr., WA3BZA; Ray Sumruld, WB5CAG; Gary C. Sutcliffe, WB9FRG; Richard T. Takahashi, KG6JAH; William T. Taylor, WB5FXI; Bruce E. Thompson, K9LOF; Philip P. Tomasky, WA1NZG; Clyde B. Tower, WA2MXB; Lawrence A. Townsend, WB8AYW; Thomas R. Troike, WA8VOE; Mamoru Tsukamoto, WB2ZRQ; Ralph E. Vitale, W8GTP; Kenneth J. Vojtik, WA9MKW; Lowell L. Vonada, K0MXJ; John



The Pacific Delegation — Bill Eitel, W6UF/WA7LRU, Vice Director, and Doc Gmelin, W6ZRJ, Director, with PR Consultant Don Waters in the background.

R. Wacker, WN9GSF; Vernon M. Walker, WB8HDO; Albert J. Ward, III, WB5LUA; Richard L. Watson, WA9CSA/WA4LOZ; Frank Wesslak, WB0FCY; Melvyn L. Westcott, WB0ENH; Harry P. Wetzler, WA6HUZ; Joseph S. White, WA4GFC; Michael Whitmore, WB8ONY; Tucker L. Wiard, WB6VWA; Fred P. Wiedemann, CN8HD; Michael A. Will, WN3YEA; Rodney E. Willard, W6MMJ; Roger F. Wise, WA0FPL; William E. Wright, WA6UIF; Joseph A. Wright, Jr., W4UEB; Edward F. Zeiser, WA2OQO; Ralph K. Zimmerman, K4IES; Robert K. Zimmerman, Jr., WA9ZSF; Herbert A. Zimmermann, K2PAT.

The Committee was in receipt of a petition from Gary Stilwell, W6NJU, requesting copies of certain expense accounts of the Pacific Division Director; after discussion, on motion of Mr. Arnold, unanimously VOTED to refer the matter to the General Counsel for an opinion and recommendation.

On motion of Mr. Griggs, after discussion, unanimously VOTED to authorize the General Manager to proceed with the sale of 15 feet of land to a neighbor at the rear of the League property.

On motion of Mr. Arnold, after discussion, unanimously VOTED to confirm the limit of \$6,000 for 1975 reimbursement of certain administrative expenses of the Radio Amateur Satellite Corporation.

On motion of Mr. Clark, unanimously VOTED to request the General Manager to file comment of the League in response to

FCC Docket 20654 relating to ignition interference problems.

During the course of the meeting the Committee discussed, without formal action, the position of the Amateur-Satellite Service as it relates to the basic Amateur Radio Service in preparation for the World Administrative Radio Conference, and the matter of volunteer proctors for amateur license examinations.

There being no further business, the Committee adjourned, at 10:35 A.M.

Respectfully submitted,
JOHN HUNTOON, W1RW,
Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 357
January 16, 1976

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Holiday Inn, Hartford, Conn., at 8:05 P.M., January 16, 1976. Present: President Harry J. Dannels, W2TUK, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Roy L. Albright, W5EYB, Max Arnold, W4WHN, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were Vice President Carl L. Smith, W0BWJ; General Counsel Robert M. Booth, Jr., W3PS; Associate Counsel B. Robert Benson, VE2VW; and Treasurer-elect John Huntoon, W1RW. In addition, all other directors were present, as well as a number of vice directors.

On motion of Mr. Albright, affiliation was unanimously GRANTED to the following societies:

Matawan Regional H.S. Radio Club, Matawan, N.J.; The Medford Sr. H.S. ARC, Medford, Oregon; Phoenix Amateur Radio Technical Society of L.L. Uniondale, N.Y.; Schaumburg Amateur Radio Club, Schaumburg, Ill.; Southern Michigan Amateur Radio Society, Battle Creek, Mich.; Tucson Repeater Association, Inc., Tucson, Ariz.; Wexauke Amateur Radio Association, Cadillac, Mich.

On motion of Mr. Griggs, Family Life Membership was unanimously GRANTED the following applicants:

Hester C. Clark, WA4PAE; Norma Betty Benson, VE2AJV; Florence E. Egbert; Donna Hessler, VE1YX; Caroline Gmelin, K6BGM; Roxanna M. Griggs, K6ELO; Barbara A. Price.

The Committee was in receipt of a petition signed by a number of members in the Pacific Division relating to examination of expense records. After discussion, the General Counsel was directed to make appropriate response.

There being no further business, the Committee adjourned, at 8:55 P.M.

Respectfully submitted,
RICHARD L. BALDWIN, W1RU
Secretary.

Tuned in — George Diehl, W21HA, Vice Director, Hudson Division; Executive Committee member Max Arnold, W4WHN, of the Delta Division; and Dick Egbert, W8ETU, Director from Great Lakes.



Correspondence

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

"SPIRIT OF '76"

□ The bicentennial WAS activity has been fantastic so far this year. I just worked AL7IEH for my 50th state. So far I have 43 confirmed. The QSL return rate here has been over 75 percent — a real credit to my fellow hams. I just can't wait to get my bicentennial WAS certificate and put it on display! — *Jim Sorrells, AA9ABB, Speedway, IN*

□ I was very disappointed during the ARRL International DX contest to hear our American amateurs ignoring the use of commemorative calls. I heard about ten stations using them, and I was sad.

I think it's proper to emphasize to ourselves that hard work has made us a successful, 200-year-old country, and that hard work is required to get us through to 300 years. The use of the commemorative calls for one year will emphasize that fact to us, and share with the other world amateurs the fact that we have the same pride in our country as they do in theirs.

This is not a question of loyalty, but one of happiness in our 200th birth year. — *Henry G. Elwell, Jr., AC2MB, Westwood, NJ*

□ I am somewhat disappointed at the majority of our ham fraternity for not using their bicentennial calls. I feel that it is a special privilege to have this opportunity to participate in our bicentennial celebration this way. A check of the bands shows not a large percentage using their bicentennial calls. I have been and plan to continue enjoying this bicentennial privilege using my "AC" prefix all year and not using my "W" prefix. I don't think I'm any more patriotic because I've chosen to do this. I'm just proud of our privilege.

Some of the fellows that I've QSOed have refused to call me by the "AC" call sign I'm using. Others complain saying it's too much to remember all the new calls. Other say, "Why should I trade a one-letter prefix 'K' for a two-letter prefix 'AD'?" I only wish more of us would get "into the spirit" and with pride become more active in our great bicentennial celebration. — *Sam Whitley, AC5WAX, Muskogee, OK*

QUE LASTIMA

□ With reference to the proposal by Mr. C. J. Harris, WB2CHO, to replace frequency with "Maxwell," we offer this existing definition: The maxwell (symbol Mx) is the unit of magnetic flux in the electromagnetic CGS (Centimeter Gram Second) system of measurement. It appears that Mr. Harris shall have to rewrite his proposal in as much as there would then be two meanings of "Maxwell." — *S. R. Hedges, WB6EMI and W. J. Ross, W6VPN, Pasadena, CA*

"I WISH I HAD KNOWN"

□ In K1BYE's article he failed to mention one important item I wish I had known. The FCC does not make change. Have the correct amount or bring your check book. — *George R. Austin, WN7ZOR, McCleary, WA*

□ Today I arose very early, climbed in my

car, and drove to the FCC District Office in Norfolk to take a crack at the General and Advanced exams. As per K1BYE, I left early, even allowing time for a flat tire. Upon arrival, I had nearly an hour before the exam. I had filled out my application in advance, attached a check and my old ticket, and thus was not bothered with that little detail.

The 20-wpm test was first and was given in the exam room, although the rest of us sat outside and strained to copy for "practice." After grading, each of us was told the result, and those who failed 13 but passed 5 were offered the opportunity to take the written and get a Technician license, even the Novices. Ironically, one Novice who passed 5 wpm refused the chance to take the written. I would strongly recommend that Novices go ahead and shoot for the Technician, since they'll only need code for a General. Otherwise, you must repeat the code and take the written.

The General exam was very heavy on regulations . . . nearly half of the questions. The Advanced had several questions on regs, but leaned most heavily toward the theory with particular emphasis on ssb and a couple of questions on fm. Oscillator and amplifier schematics were of the transistor variety, although there were questions on vacuum tubes.

Here is my advice to prospective Generals: First, you should be able to copy at least 15-wpm solid from W1AW before taking the test. Try for the CP-15 award. I did, and when I passed that, I felt I could pass the 13-wpm test in Norfolk. Turned out I was right. Second, don't just read the Q & A section of the License Manual with regard to regulations — read the entire U.S. Amateur Regulations section right up to where the RACES section starts. I know it's dry reading, but having read it made the regulatory questions a snap. Third, know and understand the two-tone test, PEP to average relationships, theory of superhet receivers, and the block diagram of a filter-type ssb transmitter. Of course, all the basic ac and dc theory, vacuum-tube theory, and the operation of transistor oscillators and amplifiers apply, too. The License Manual has all the subject matter covered. If you don't understand it, read the Handbook and bone up before you take the test or you may be subjected to unnecessary disappointment. The Advanced Class exam is not a snap, unless, of course, you know your theory. For that matter the same is true of the General although it is weighted more heavily toward the regs.

By the way, the Norfolk office people were very courteous and helpful, even giving one young applicant the code test after he arrived late and missed the first run. In fact, they were as nice a group of people as I've seen, and it was obvious that they were aware of their responsibilities and duties yet willing to be courteous and not let the fact that they were "The FCC" cause them to appear brusque and callous. They know their business.

It was raining when I finished my exams, too, but like K1BYE it felt like summer to me, because I, too, had passed! — *Paul H. Bock, Jr., K4MSG, Petersburg, VA*

□ In K1BYE's article, he mentioned a technique in taking the code test where you stop before the five-minute period is up and correct previous mistakes. Beware, however,

because at least at the Boston FCC office, doing this is grounds for unconditional failure. One of my students discovered this, fortunately before he took the exam, but another fellow was not as lucky. After the test period, the examiner deposited this applicant's paper in the waste basket without so much as a cursory glance and dismissed him immediately. This may not be enforced everywhere, but in Boston it is treated the same as cheating. — *Riek Beebe, K1PAD, Billerica, MA*

□ Forty years after first becoming an Extra First Class Amateur, I passed the Extra test. The tests covered much of the same material, except that a few new things had been added. These included: Transistors, integrated circuits, vhf and uhf, FAX, Oscar, agc, grounded-grid circuitry, new antenna and feeder theory, new bands, new laws, baluns, alpha and beta, LEDs, DTL, CMOS, FET, Hz, TVI, SSTV, keyers, LSI, and I could go on and on. Bet I don't let my Extra lapse for another forty years! — *R. J. McMahan, K7CD, Hayden Lake, ID*

LISTEN PLEASE!

□ During the first phone weekend of this year's DX test, I heard several over-anxious souls breaking TG stations trying to pass emergency traffic and trying to get a contest exchange out of them.

Two days ago, while participating in the Novice Roundup, I chanced upon a forty-meter neophyte who called CQ thirty-eight times.

Tonite, when I checked into my section net, an argument broke out over whether or not it is permissible to use MARS call sign on the amateur bands, after a W8 station checked in using his ACS bicentennial prefix.

What does this mean? — *Dave Heil, AB4KTR, Ft. Thomas, KY*

□ During a recent Code Proficiency Qualifying Run, I found it impossible to copy 90 percent of the transmission. Along with the usual QRM and QRN typical of 80 meters, I experienced countless stations that came on frequency and started transmitting "test" or "VVV", and even a guy swishing his VFO by a half-dozen times during the code run!

I believe this could be avoided. It is hard to believe that 3.580 MHz is the only frequency allocated to amateurs. Anyone who gets pleasure out of QRming a code run doesn't belong in amateur radio. — *J. Gayman, WA3WBU, Marysville, PA*

OLDEST CLUB CHALLENGE

□ I have a QSL card from the MIT Radio Society, W1MX, which states the station's establishment came in 1909. I assume this means their club was organized the same year. — *Larry Katz, WB2UAN, West Orange, NJ*

□ The Indianapolis Radio Club was organized on October 28, 1914 in Carl Dean's (9EG) basement, a fact attested to by three charter members in a tape recording made at the fiftieth-anniversary meeting of the club held Sept. 25, 1964.

Harry Silcox, ex-9EE, first licensed in 1912, Hans Geiger call unknown, and Merrill Shield, call unknown, all participated in recalling their experiences in the formation of the club and some of the memories of the early days of wireless.

I hope that qualifies us, at least as being among the O'ers, if not the oldest club in the U.S. — *Jerry Lucas, W9BS, New Augusta, IN*

Will Portable and Mobile ID's Disappear?

"We believe . . . [the rules sections requiring advance notice of portable and mobile operation and special identification of these stations] to be superfluous. Such requirements have never been shown to be of use to the Commission in its regulatory program, and while amateur licensees would in the future, as now, be afforded the option of operating their stations at portable and mobile locations, we perceive no purpose to be served in requiring advance notice to be given the Commission or in requiring that transmissions of stations being operated at portable or mobile locations be identified as such. We would stress, however, that in eliminating these requirements we would not be prohibiting those licensees wishing to do so from continuing to identify their portable and mobile transmissions in the traditional manner. We would simply no longer require it. . . ."

Thus goes the Notice of Proposed Rule-making in Docket 20686, released by the Federal Communications Commission in late January. Already, from amateur reaction to the WIAW bulletin (No. 574, January 29, 1976), we know that *this* piece of proposed deregulation is going to have both proponents and opponents in the amateur ranks. Accordingly, ARRL has received an extension of time in which to comment. The original deadlines were February 27 for original comments and March 8 for replies; the new deadlines are April 30 and May 7, for original and reply comments, respectively.

The Commission went on to pose some possible objections and then to answer them:

" . . . In proposing that the portable operation station identification become optional, we recognize the probable impact on certain amateur operating practices and operating award programs neither regulated nor

sponsored by the Commission. For instance, under the proposed rules, the control operator of a station in portable operation at a location outside its fixed operation call sign area would no longer be in violation of the Commission's Rules should he choose not to include the portable designator when identifying the station. In these instances, listeners would not be able to determine from the identification that the station was located outside the fixed operation call area. Call areas would, in a de facto sense, be partially eliminated. For this reason, we particularly wish to receive comments on the issue of whether those amateur operators who would otherwise not elect to identify their stations as being in portable operation should be inconvenienced in order to eliminate any impact upon ongoing amateur practices and programs. While adoption of this proposal might ultimately cause a substantial dilution of the significance of amateur call sign areas, it would provide the Commission with important indicia of the extent to which the service is capable of self-regulation and the extent to which our deregulatory program is likely to be successful.

"For the reasons cited heretofore we therefore propose to delete in their entirety Sections 97.87 (b) and (c), 97.95 (a) (3) and (b) (3), and 97.97 of the Commission's Rules. The remaining sections of Section 97.87 would be redesignated to reflect the deletions. . . ."

League members having thoughts about the proposals in Docket 20686 should be in touch with Headquarters or their own Division director immediately. And any person wishing to do so may file comments with FCC by April 30, 1976; an original and 11 copies of comments are requested as usual, but even single copies of cogent arguments will be

taken into account by the Commission. Address the Federal Communications Commission, Washington, DC 20554 and include reference to the docket number, 20686.



In March *QST*, we mentioned the retirement of VE3EPP from the Ministry of Transport. His replacement is Frank E. Lay, VE3ZL, who now takes on the duties of director general, Telecommunications and Electronics Bureau. Since 1973, Mr. Lay had been director of Telecommunications and Electronics Air, another step in Government service dating back to 1953. Congratulations to VE3ZL from his fellow amateurs! (*Ministry of Transport photo*)

BEHIND THE DIAMOND

Our spotlight this month shines on *Doug DeMaw, W1CER*, technical editor for *QST*. Doug hails from Michigan where he was born



and raised, attended school (ultimately earning a BS in EE from Lawrence Tech in Detroit), and worked for all but one year until he came to the League in 1965 as assistant technical editor. He was editor of the *ARRL Handbook* for four years, and assumed the post of technical editor in 1971.

Doug brought to ARRL a wide variety of work experience. For three years he was a senior research and development technician at the University of Michigan Willow Run Research Center where he worked on designing the guidance system for the BOMARC missile system. At Cadillac, MI, he spent three years as maintenance engineer for WWTV TV. Then came a stint in San Diego, CA, as a design engineer for Ryan Aeronautical Research Laboratories. He then returned to Cadillac to be the chief engineer of WATT.

But wait! There's more. From Cadillac we go to Traverse City, MI, where Doug was the founder and general manager of Avtronics, Inc., devoted to the design and manufacture

of hf and vhf homing transmitters and receivers for use at civilian and military airports. Then it's over to Ellsworth, MI, where, as founder and general manager of Comaire Electronics, Doug was involved in the manufacture of vhf and uhf amateur radio gear. His interest in vhf led him to become the founder and editor of *VHFER Magazine*. Finally, he broke the bonds with Michigan, came East, obtained a WI call, and joined the Hq. gang.

Through the years Doug has cultivated many interests. Not the least of these interests is his wife Jean who, as W1CCK, shares Doug's devotion to amateur radio. Other interests include fishing, hunting, snorkeling, photography and playing the electronic organ. If you put snorkeling and photography together you get another of Doug's pastimes — underwater photography. Gardening is also one of Doug's pursuits; in fact, he has written several articles for *Organic Gardening and Farming*. It's refreshing to find a technical

person who likes to write about puffball mushrooms during his off hours.

In spite of his many work responsibilities and outside interests, Doug still finds time to pursue his major hobby — ham radio. He's particularly fond of 160 meters and QRP work (either he likes a challenge, or he's masochistic!), although it's a bit disconcerting to watch a grown man building a transmitter inside a tuna fish can. But we suspect that's just another red herring. — *K1FHN*

DEREGULATION CONTINUES: 10-METER REPEATERS . . .

FCC has simplified the procedures involved in operating repeater stations in the 29.5-29.7 MHz subband by deleting that portion of Section 97.61 (c) which formerly required a special showing of need for operation in the ten-meter band. Licensed repeater stations may operate in 29.5-29.7 MHz provided the repeater licensee/trustee possesses operating privileges appropriate to that frequency band.

It will also be permissible to crossband repeaters between ten meters and the vhf/uhf repeater bands; however, FCC reiterates the fact that ". . . Repeating the signals from an amateur station onto frequencies for which the operator's license carries no operating privileges is not permitted." The Order was effective February 11.

. . . AND CLUB STATIONS

No useful purpose is being served, the Commission says, in requiring club stations to furnish copies of their constitutions and bylaws when applying for club station licenses. The requirement is being dropped from FCC Form 610-B.

In connection with this action, FCC has changed two rules sections:

97.3 (h) is amended to read, "*Club Station*. A separate Amateur radio station licensed to an Amateur radio operator acting as a station trustee for a *bona fide* amateur radio organization or society. A *bona fide* Amateur radio organization or society shall be composed of at least two persons, one of whom must be a licensed Amateur operator, and shall have (1) a name, (2) an instrument of organization (e.g., constitution), (3) management, and (4) a primary purpose which is devoted to Amateur radio activities consistent with Section 97.1 and constituting the major portion of the club's activities."

Section 97.39 is amended to read, "*Eligibility of Corporations or organizations to hold station license*. An amateur station license will not be issued to a school, company, corporation, association, or other organization, except that in the case of a *bona fide* amateur radio organization or society meeting the criteria set forth in Section 97.3, a station license may be issued to a licensed amateur operator, other than the holder of a Novice class license, as trustee for such society." The Order was released February 9.

ANTENNA STRUCTURE VICTORY

The amateurs of Maplewood, Minnesota, have won exemption from a local ordinance which

limits the height of "buildings and structures" in a residential zone to 30 feet.

After concentrated effort by the St. Paul Radio Club, Inc., and in particular Marvin A. Mahre, W0MGI, these words were added to the existing ordinance:

"In residential districts the words 'building' and 'structure' shall exclude citizen band towers, amateur radio towers, television antennas and flag poles. . . ." Congratulations to all the hams who helped!

RACES RULES REREGULATED

The Commission has adopted new rules for the Radio Amateur Civil Emergency Service, effective March 23, 1976, essentially as it proposed in Docket 19723 back in June 1974. (page 73, August 1974 *QST*).

In essence, the new rules make it clear that RACES is a specialized part of the Amateur Radio Service, operating under amateur licenses, using only amateur call signs and only with licensed amateurs as control operators using the frequency and mode privileges normally granted to their class of license. All of the authorized frequencies and emissions allocated to the amateur service are also available to the Radio Amateur Civil Emergency Service, on a shared basis, for real emergencies and for bona fide drills not exceeding one hour per week. (Certain frequencies are reserved in advance, as in times past, for continued operation by RACES stations in wartime situations which would likely close down the rest of the amateur service under the President's War Emergency Powers as set out in Section 606 of the Communications Act.)

RACES stations licensed directly to Civil Defense entities will have special call signs beginning with WC prefixes. RACES repeaters will have R as the first letter of the suffix. The stations of individual amateurs who are enrolled in a civil defense organization may also operate in RACES nets for drills and in emergencies.

Since these rules are radically different from the ones they replace, FCC has provided a cushion:

". . . In order to avoid undue hardship, existing RACES stations may continue to operate under their current authorizations and the existing Rules until the expiration date of their licenses. If the expiration date of an existing RACES station license is less than one year and six months from the effective date of these amendments, it may be renewed upon proper application for a period of one year, during which time the existing rules shall continue to apply. All other new and renewed RACES licensees shall comply with the rules as amended. Each new RACES station application shall be submitted on an FCC Form 610-B, with an indication it is a RACES station application. . . ."

Since these rules would take about three *QST* pages and yet are of direct interest only to a small portion of the amateur service, we have decided not to print them in full here. Instead, the complete text of the Report and Order, and of the new regulations, will be available to anyone sending us a self-addressed envelope with two units of postage (currently, 24c) and mentioning Docket 19723.



Fancier rig than usual! Here WB3AGB, WA4UVE/3, K3CHD (SCM of Western Pennsylvania) and WA3IZH take part in a three-hour talk show from WEEP, Pittsburgh, with Buddy Stevenson, back to camera. Emergency preparedness, Christmas traffic handling from the malls, license classes, and Field Day were topics. There was also a demonstration contact from WA3JBO in the studio to WA3TOB and K3BD through WR3AFZ. Quite a few telephone calls from listeners were also handled despite competition from a Steelers game on another broadcast station! (*K3CHD photo*)

EXPERIMENTAL EXAMINATION PROGRAM ENDS

For the past year and a half, the FCC and the Civil Service Commission have been conducting an experimental program in selected areas of the country where the Civil Service Commission conducts FCC radio operator examinations.

The experimental program has been evaluated and it has been determined that FCC will retain this function. Some expansion of examination locations, especially in remote areas such as the Rockies, will be made in order to provide local examination service. For additional information, contact the FCC office having jurisdiction in your area. (FCC Notice, February 18, 1976). QST

The Mecklenburg Amateur Radio Society in November presented a complete set of ARRL publications to the Charlotte-Mecklenburg, N.C., public library. Here, Ariel Stephens, left, accepts the books from club secretary Don Brannan, K4SLC and president John Williams, K4BWS.



10-Meter Repeater

FCC in a recent action (Report No. 1367, Jan. 29, 1976) has amended the amateur rules to permit the operation of repeaters, in a portion of the 10-meter band, 29.5 MHz to 29.7 MHz, without obtaining special authorization from FCC. FCC points out that, while it is possible and permissible to crossband a 10-meter repeater to other repeater bands, it is *not* permissible to repeat the signals from an amateur station onto frequencies for which its operator's license carries no operating privileges. In other words, you could *not* retransmit the signals of a Technician-class license holder onto the 10-meter band. (This means that the trustee or licensee of a repeater that was crossbanded to 10 meters would have to check the license class of *every* user of his machine.) It might be well to restate some FCC ground rules that apply in the operation of repeaters as to responsibilities: In the event of a violation on the part of a repeater user, both the user and trustee (and control operator if other than the licensee) are *equally* responsible. We don't have a

reading at this point as to what would happen if a Tech came on a repeater that was crossbanded to 10 meters and was not aware that he was operating on a crossbanded repeater, and then got cited for being on 10 without his knowledge!! We don't want to cry wolf, but we may see the day when every repeater has to run an announcement along with its identifier that states the machine is crossbanding and to what bands, hi! Maybe the easiest answer in these days of deregulation is to permit Techs to be repeated to 10 and have 10-meter privileges (as ARRL has already petitioned the FCC *and* as FCC itself has proposed in Docket 20282).

We should point out that there are no erp (effective radiated power) limits for 10 meters so the power limit is the regular amateur one-kW input limit. This doesn't mean you can eliminate the filing in your repeater log all the normal filing requirements as to HAAT and erp, but the power limits of other repeater bands do not apply.

There hasn't been time to obtain advice

from the ARRL repeater advisory committee, but some common sense ground rules about 10-meter repeaters should apply. These are *suggestions* at this time and subject to modification. First, and most important, Oscar 6 downlink is 29,450 to 29,550 kHz so for the time being, don't put any repeater inputs or outputs *below* 29,550. Oscar 7 has its upper limit at the repeater band edge (29,500), but Oscar 6 is still working so let's avoid the 29,500 to 29,550 kHz area. Next, and probably most important, while a kW-input limit exists, there is no good reason high power should be used. In fact, low power on 10 should be the rule because intra-community coverage should be adequate. We may have to consider tone access or PL (Private Line) because we certainly don't want signals from DX stations (and we mean overseas DX) triggering our machines! Band Plan? Not at this time. Let's experiment and see what is needed first. There are lots of things we need to know before attempting any standardization.

10-METER BAND PLAN?

We no sooner make a statement that no plans exist for 10 meters than we get one! The Texas VHF Society at its annual winter meeting, put together a tentative 10-meter plan. Here it is for your study:

INPUTS AND UPLINKS	OUTPUTS AND DOWNLINKS
29.515	29.615
29.530	29.630
29.545	29.645
29.560	29.660
29.575	29.675
29.590	29.690
29.600 Direct (simplex).	

This plan has 15-kHz spaced channels with 100-kHz input/output separation. The society suggests that no adjacent channels be coordinated in the same area and no more than three 10-meter repeaters in an area (but they admit they don't have the word "area" defined). The only criticism we have is that the channel spacing assumes using fm. If we used ssb or a-m (Lord forgive us), the spacing could be much tighter.

CODE PRACTICE

Dear Lew:

I would like to inform you and those in the New Jersey, New York, and Eastern Pennsylvania areas of code classes being conducted through the Oakland, New Jersey, repeater, WR2ABN, output frequency 146.70 MHz. At present, they are held on Monday and Wednesday evenings from 9:00 P.M. to 10:00

*VRAC Liaison, ARRL Hq.

P.M. Speeds are generally from 5 through 18 wpm plus some "pure" beginner's material at about 2 words per minute. The speeds to be given each night are announced at the beginning of the session.

The advantages of using a repeater for code practice are obvious. Although an actual count of how many are listening is impossible, it could well be a very large number. We have received considerable mail from people who have used the system to upgrade. You said you were interested in items for the column, and we hope this information is useful. 73, Frank Arvey, W2NR [We sure are interested in this type of item, Frank. It serves to point up a good use for repeaters plus informing people in the area of the service. Keep up the good work. Lew, W1ICP]

LATEST REPEATER COUNT

A check on the latest call-book figures shows the following numbers of repeaters by call areas: W1s, 143; W2s, 205; W3s, 140; W4s, 344; W5s, 223; W6s, 289; W7s, 138; W8s, 189; W9s, 135; W0s, 228. The total number of repeaters for the lower 48 states is 2034.

WHO IS THE DUMMY?

Contrary to popular belief and practice, the National FM Simplex calling channel of 146.52 is not a replacement for a dummy load. Of late, many *testers* have found their way to 52 to test audio, Touchtone pads and transmitter output. It would appear that little attention is given to the established activity on the channel before attempting the test. OM, that type of thing is not permitted on the repeater, *nor is it permitted on any amateur radio frequency.* Use your dummy load for what it was intended, dummy. (Courtesy of Northeast Indiana UHF Assoc. bulletin)



Hams provide First-Line Communications at Fiesta Bowl game between Nebraska and Arizona State Dec. 26. Using both amateur and commercial handie talkies, members of the Arizona Repeater Association had full responsibility for both parade and game communications. Pre-game and half-time events, as well as injury reporting from both benches, and other timely bits of information were handled directly in the press box and CBS-TV trucks. More than 40 amateurs worked street duty at the parade and 10 amateurs were on the field at the game. The photo is of K7VOR in the TV booth.

FM ABROAD?

Taking your two-meter rig abroad this summer? Then you'll probably want a copy of the *International VHF-FM Guide* compiled by G3UHK and G8AUU. The 52-page publication includes details on repeater and simplex operation throughout Europe, Australia, New Zealand, and Canada, including maps and reciprocal licensing information. The price to U.S. and Canadian amateurs is 9 IRC's or \$2.00, including air postage. Order from: Julian Baldwin, G3UHK, 50 Aldbourne Road, Burnham, Slough, SL1 7NJ, England.

Miami Conference Month's Highlight

In honor of the Bicentennial celebration in the United States, the triennial conference of the Union Interamericana de Radioaficionados/IARU Region II is being held in Miami Beach on April 11-15. The conference brings together the representatives of national amateur radio societies throughout North and South America.

The most important item on the agenda is the adoption of a Region II position with respect to World Administrative Radio Conference (WARC) preparation for the amateur radio service. Positions previously have been established in Regions I and III (*QST* for July, 1975, page 86). These positions will guide the IARU member-societies in their respective regions as they enlist the support of their governments for the 1979 WARC. The conference will deal with other matters of mutual concern in the Americas, such as improved procedures for emergency operations by amateurs.

At the conclusion of the Region II conference, a two-day meeting of representatives of the three IARU Regional Divisions will take place at the same site. The purpose of this second meeting is to assure continued close cooperation between the three divisions and IARU headquarters in the critical months ahead. Through the courtesy of the Dade

Radio Club, a special amateur station will be on the air from the site of the conference.

The special-events call sign AI4ARU has been requested from the FCC.



Here are present and past officers of the Radio Society of Bermuda: (l-r) president VP9HL, past president VP9BY, and past vice president VP9GR. (*W1BGD photo*)

BALDWIN NEW IARU SECRETARY

The Constitution of the International Amateur Radio Union provides that key officers of the headquarters society shall hold the identical offices in the IARU unless special arrangements are made. Therefore, upon the retirement of John Huntoon, W1RW, as secretary of the ARRL at the 1976 Annual Meeting of the League, his successor, Richard L. Baldwin, W1RU, became secretary of the IARU as well as of the ARRL.

Dick Baldwin brings a wealth of background and experience in international affairs to the post. As assistant general manager of the League from 1963 to 1975, he was responsible for the development and successful operation of the Intruder Watch in the U.S. He has travelled extensively on behalf of the IARU, primarily to tell telecommunications officials from developing countries of the benefits to be gained from supporting the amateur radio service. For the past three years, Dick has played an active role in domestic WARC preparations in the United States—a role that is expanding as 1979 draws ever closer.

RADIO SOCIETY OF SWAZILAND APPLIES FOR UNION MEMBERSHIP

The newly formed Radio Society of Swaziland (RSS) has applied for membership in the International Amateur Radio Union. The RSS

has a membership of 24, including 19 of the 21 licensed amateurs in the country. Officers are 3D6AX, chairman; 3D6AW, secretary and Mrs. R. Beckerleg, treasurer. The secretary is responsible for IARU liaison, and the chairman is responsible for government liaison.

The RSS has established a QSL bureau. Henceforth, cards for 3D6 amateurs may be sent to the society's headquarters address: P. O. Box 21, Ezulwini, Swaziland.

GERMANS TO HOST INTERNATIONAL HAMFEST

The Deutscher Amateur Radio Club announces that its long-established "Bodensee-Treffen" amateur radio exhibition has changed its location to new, larger facilities at the IBO exhibition grounds in Friedrichshafen, on the northwestern shore of Lake Constance in West Germany. This year's exhibition will take place on June 25-27. Scheduled events include a flea market, manufacturers' exhibits, mobile contests, transmitter hunts, excursions, a children's festival, fireworks display, and international luncheon.

Additional information may be obtained from the DARC, P. O. Box 1155, D-3507 Baunatal 1, F. R. Germany.

UPDATE: NETHERLANDS

In *QST* for February, page 65, we reported that the Netherlands had established a new entry grade of amateur license with very limited vhf privileges in an effort to persuade

illegal operators of 27-MHz equipment to enter amateur radio legitimately. The first examinations for the new D-license were held on November 26, 1975, and 64% of the 1160 applicants passed. The increase of 750 in the number of amateurs in the Netherlands represents a gain of about 23%, to a total of approximately 4000.

Equipment used by D-license holders must be type approved by the Dutch PTT. The VERON, IARU member-society in the Netherlands, is working to have this restriction lifted. — *IARU Region I News* QST

At its annual banquet last October, the Radio Society of Bermuda announced its selection of Amateur of the Year. ARRL General Counsel W3PS presented the trophy to the winner, Ed Kelly, VP9GE, for his work in emergency communications, international goodwill, and club activities.



*Assistant Secretary, ARRL

YL News and Views

Conducted By Louise Moreau,* W3WRE



QRV-YL

HC2YL, W3CUL - full facilities of the YLISSB system have been among those working since the earthquake in Guatemala on February 4, 1976. In Malvern, Pennsylvania, Cathy de Plaza, WA3VEO, had been monitoring the commercial frequencies and relaying the disaster news to Delaware County newspapers before the wire services had released them. Fluent in Spanish, Cathy went on the 20-meter Red Cross net when she began receiving inquiries from people whose families were in Guatemala. So far she has located a number of American tourists, as well as Guatemalan citizens, and reported all safe to their families.

"I have been handling U.S. contacts with five Guatemalan families this week. All are listed safe except for three families for whom I have not been able to obtain information.

"One case, in particular, is a bit special. A father and mother are trying to locate their 22-year-old daughter. After days of attempting to find her - not knowing whether she was in El Salvador, Guatemala, or Honduras - the State Department finally reported her 'safe somewhere.' Her parents have gone to locate her; meantime, I am maintaining contact while they travel."

As so many others, Cathy has been operating six to ten hours a day since the quake occurred. "My family has been most helpful with the house and meals. A friend, former Guatemalan Irene Hernandez de Katz, has assisted me with telephone calls to Spanish speaking people here." Cathy signs her correspondence with American Red Cross in the best YLRL tradition, "WA3VEO, QRV in Delaware County, Pennsylvania."



Kelley Walker, WN3BAC, 8-year-old Novice in Johnstown, PA, has been active on 40 meters since receiving her license. (WA3IMX photo)

VE3 QSL BUREAU COMMITTEE

The Ontario Trilliums have announced the VE3 QSL Bureau Committee will be comprised of VE3DGG, Pam Gorman; VE3BVG, Gail Murray; VE3GSO, Linda Jean France, and hospital station, VE3VPH. All correspondence should be directed to the Bureau, Box 157, Downsview, Ontario, Canada, M3M 3A3.

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

YLRL CONVENTION COMMITTEE

Host club of the 1976 YLRL International Convention, GAYLARK has announced the convention committee chairmen. General chairman, Annie Smith, K5JKV, will co-chair with Frances Smith, WA5MPM; arrangements, Sue Hutton, WA5FVH; prizes, Frances Smith, WA5MPM; registration, Alverda Look, K5MLZ; program, Lillian Beebe, WA5WZF; publicity, Deanna Mercurio, WASKRI and station K5SKF, Harriet Woehst, K5BJU. Program and prizes for OMs who attend are the responsibility of Karl Hutton, WA5ABA.

1975 TRILLIUM WEEKEND CONTEST RESULTS

Top scorer in the annual Trillium Weekend was VE3EES, Doug Lane, winner of the Trillium Plaque. Second and third place certificates went to VE3SBH, Sunnybrook Veterans' Hospital and VE3CMQ, Ralph Miles, respectively. KJ3HIR was claimed top-scoring Trillium member. Winners in the "Lucky Draw" were VE3FUR, VE3QEH and VE4ST.

WASZZA REQUESTS YL TRAFFIC OPERATORS

J. Coe Dixon, WASZZA, has requested that YL operators participate in CAND. She hopes that gals will join her on the new net at 7.250 MHz daily at 1:00 EM.

1976 BUCKEYE BELLE WEEK ANNOUNCED

The Buckeye Belles, Ohio's statewide YL club announce their annual QSO Party will be held April 19 through April 26, 1976. This week of on-the-air operation enables those who are interested in earning the Buckeye Belle certificate to make the necessary contacts. The Buckeye Belles, with the Chix-on-Six, will again be hosting the YL activities at the Dayton Hamvention on April 23 - 25.

NEW YL CALLS

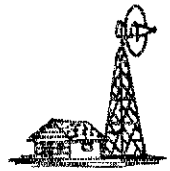
Add two more countries to the list for the YL DX certificate. FP8ML, Sophie Mauduit-Larive, is now active on St. Pierre Island. She will be there for three years. There is another YL active on Miquelon, FP8YL, Marie L. Ihareguy, who speaks French only and is most anxious for contacts. St. Helena's only YL operator is ZD7SS, Sybil Stevens. YL News and Views thanks K9OTB and K4HTY for these additions to the YL picture.

Cathy de Plaza, WA3VEO and her father, K3WAC, active team in AREC operation. Recently, Cathy has been occupied handling Guatemalan earthquake traffic. An Advanced Class licensee, Cathy speaks Spanish fluently. (W3FBF photo)



The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV



The Importance of Hearing From You

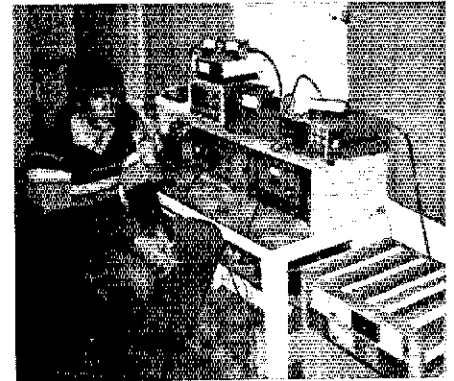
One year has elapsed since the stewardship of this column passed to its present hands. I felt at that time the principal objective of the column should be to promote greater interest in vhf/uhf operation among those with little knowledge of the excitement and thrills that await them in the higher reaches of the spectrum. In addition, the column must serve as a chronicle of events and activities for those who already frequent the bands above 50 MHz. I have made, and will continue to make, an attempt to strike a balance between these two, somewhat conflicting objectives. Simple reproduction of the mail, with long lists of stations worked on every opening, would not, I feel, effect interesting reading nor would it arouse a spirit of exploration among those not presently on the vhf bands. Notwithstanding the desire to make the column as interesting and readable as possible, space limitations prevent the use of every piece of mail received.

Therefore, for those who have written once, or many times, but haven't seen their correspondence mentioned in print, don't get the idea that these operating and writing efforts are not appreciated. Quite the contrary is true. A pleasurable aspect of con-

ing *The World Above 50 MHz* is reading the mail, and I do read all of it. Besides personal satisfaction, this affords me opportunity of obtaining an overall picture of the specific interests of the vhf/uhf gang as well as gaining insight into activity and conditions nationally and internationally. A trap into which any columnist can easily fall is one of reflecting only the picture of his own particular area. Without reports from other sections, it is difficult to do anything else but comment on what is known to be happening nearby.

Mail volume also functions as ammunition for seeking more space in *QST* for *The World Above 50 MHz*. Editors must allocate space on the basis of what they perceive to be the relative interests. *QST* editors are no exception. They are continuously bombarded by devotees of this or that facet of amateur radio, who demand that more of *QST* be donated to their particular interest. The old adage about the squeaky wheel getting the grease definitely applies. So, as the disc jockeys are fond of saying, "keep those cards and letters coming." This goes for OVS reports too. While writing, pass along comments on the column - critical or otherwise. What subjects do you think should be

emphasized: EME, m.s., tropo, 6 meters, microwaves or whatever? What innovative portrayals of vhf operation can attract new converts as well as make *The World Above 50 MHz* more rewarding for those already in the fold?



VK6ZDY near Perth, Australia. Running 400 watts out (the VK limit) on both 6 and 2 meters, Pete has worked all VK states and all JA prefectures on 6. (K5IMS photo)

ON THE BANDS

6 Meters. About the time that reports of low activity and no band openings became the rule, old 6 meters exploded with one of the best winter Es seasons in some years. Some double hop was recorded and the operation of WB2RLK/C6A in the Bahamas around New Year's Day lent some unaccustomed spice to the long, cold winter. As testimony to the condition of the band during January, K7ICW in his OVS report exclaims, "Wow! The first half of January sounded like May!" Al comments that, despite SAROC holding forth in his hometown of Las Vegas and his commitments on 2-meter m.s., he caught 6-meter openings on 6 days during the first half of January. Most were to W5, 7, 0 and VE7, but WBSMAC/4 Pensacola, FL, was also contacted just to prove the winter can produce double hop Es. Al also notes a QSO between W7IUC of his city and K7CAZ of Seattle while both stations were using the new Icom IC 502 portable ssb transceiver, each on its built-in whip antenna. These rigs should provide some interesting times next summer when we can expect six to produce almost daily openings. Another proud owner of a 502, WB9FZU near Milwaukee, WI, called on the answering machine to say that he's having a ball with his recently acquired unit. He has been able to work stations in the Chicago area using his outside 6-meter beam. Not bad for 3-watts output. For those especially interested in 2 meters, the companion IC 202 should also provide some fun.

The OVS report filed by WA0MRH Omaha, NB, tells a story similar to K7ICW's. John observes that during the January Vhf SS Contest, a combination of Es and m.s. provided numerous bursts of up to 10 seconds in length, more than enough time for contest exchanges. As an example of how rough the Pacific Northwest has it when it comes to

some types of vhf propagation, a letter from K7ZCB of Boring, OR, mentions "a short aurora between 0100 and 0145Z Jan. 10 to Washington and British Columbia." This same aurora produced widespread contacts throughout the East and Midwest on all bands from 6 meters through 70 cm. Moral: If you like the buzz mode, don't move to Oregon. An apparent aftermath of the aurora did produce an Es-type opening the next day to New Mexico, Arizona, California, Nevada and Colorado. This was the last opening in January for Dave. Locally, Dave states that he and WA7ECY have started up the SMIRK net again at 1900 local time Mon., Thurs. and Sun. on 50.2. Other local nets keeping 6 meters alive take place 7 days per week in the Milwaukee area on 50.31. All modes are welcome but most check-ins are on a-m. Also, the Milwaukee 6-Meter Interest Club net meets on 50.125 ssb each Thursday at 2000 local time.

From the city of brotherly love, K3EDF writes that daytime local activity is maintained by the "Coffee Pot Net" which meets 7 days per week at 0900 local time on 50.6 MHz. All are welcome, with an attractive certificate available to those checking in 10 times. Speaking of certificates, the South Jersey Radio Association offers one to anyone showing proof of contact with the 13 original states on any vhf band. An s.a.s.e. to the Callbook address of K2AA should bring more details.

This part of the world was not alone in experiencing an above average winter Es season. A note from Hatsuo Yoshida, JA1VOK, says that Japan also had good conditions with widespread openings on Dec. 30 and Jan. 4. On the latter day several unmodulated carriers were received, apparently emanating from Asiatic Russia.

2 Meters. The mailbox has been stuffed this month with accounts of tremendous aurora which occurred on the afternoon and evening of Jan. 10. Due to volume, we just simply cannot devote space to each and every report but will attempt to summarize the goings-on.

The widespread nature of the opening can best be illustrated by the fact that contact reports came in from Europe to the Pacific Northwest. The other outstanding feature about this particular buzz session was its intensity and relative stability of the reflecting surface. The two are probably related. That a number of contacts were made on 1 1/4 and 70 cm attests to the intensity, while the fact that so many 2-meter signals were readable on ssb demonstrates the latter characteristic. In addition to the vhf and uhf contacts made during this aurora, a number of 10-meter QSOs took place including some between North America and Europe. One of these was by W3VXJ near Philadelphia, who worked OH6JW in Finland. This contact took place at about 0130Z on Jan. 11, a rather unusual time to work Europe on 10 meters. Others having similar reports are asked to send them to this column address from which they will be forwarded to those studying such occurrences.

An encouraging aspect of the operating during this aurora session was the activity found above 145 MHz. All too often, aurora operation is restricted to the low end of the band. WA4MMP near Norfolk, VA, cites working WA8HTL, WB8IGY, WA8TPH, and WB8AMI all OH; AC3IOH PA, and WB8NWX MI on ssb. In addition, some brasspounding brought results in the form of contacts with WA8TLZ OH and K1MNS NH. As with many other 2-meter operators, the Jan. 10 aurora boosted Bill's state total to 17, all worked above 145 MHz with 100-watts output to 22 elements at 75 feet. From the Midwest, WB0IUT in Lincoln, NB, files an OVS report stating that W1s, 2s, 3s, 8s, 9s, 0s, and VE3s were all heard in his area. W3KCA of Baltimore, MD, a long-time inhabitant of 2 meters, managed to land one most others have missed by completing a contact with W5CKK in Dallas, TX. With some coaxing, Charlie will admit to having worked 32 states in the 30 years that he has been on the band. A neighbor of W3KCA, WA3NNZ took advan-

*Send reports to Bill Tynan, W3KMV, P. O. Box 117, Burtonsville, MD 10730 or call (301) 384-6736 and record your message.

tage of the aurora to add 2 states to his total, now 18. K3WHC of York, PA, reports having worked 15 stations in 12 states plus VE3 in a period of about 3-1/2 hours. Sid said that he heard, but was unable to work, Missouri and Iowa. Welcome to the club! One who was a little luckier was WB2WK in New Jersey. Steve snagged 32 stations including WA0CHK MO and WB4YIH KY.

K2KTK in Syracuse, NY, was ecstatic in his account of Jan. 10. Dick had been on 2 meters for just two weeks. His first aurora contact, ever, was with W8HAX WV followed by 22 more stations, logging 14 states in all - quite an auspicious beginning on 2 meters. Dick closes his letter by suggesting that another aurora be scheduled soon! Another station making hey on Jan. 10 was WA4GPM in Norfolk, VA. Buzz put 32 stations into the log and added 5 new states to his new total of 25. That's quite a record for having been on the band only since last August. K9UMM of Ft. Wayne, IN, attempting to get a new state, placed a phone call to W4USW SC, but the only station that could be heard in Charleston was WA0CHK MO. Good try anyway Jim!

From southern England G3COJ writes that the aurora produced contacts with stations in Scotland, about 400 to 500 miles to the North, as well as one with SM5BSZ in Sweden and G13RXV in Northern Ireland. Stations heard included SM4AXY, SM7BAE, SP2AOZ (Poland) and PA0OOS in the Netherlands.

A letter from VE2DFO, providing an update on his 2-meter EME status, voices his opposition to changing to 2-1/2 minute sequences, unless sufficient publicity of the switchover will enable everyone changing simultaneously. Don contends that there is enough confusion now without adding more. Bad winter weather and work on a new QTH has kept his activity down, but VE2DFO should be heard more frequently this spring.

There isn't much aurora in New Mexico so W5LO and XYI WA5MFZ must get their states in other ways. During the Quadrantids meteor shower, WA5MFZ completed a contact with W4WNH/8 OH for state number 20 while W5LO made the grade with W4WDH GA for a total of 33.

There has been generally good response to the suggestion that specific times be designated for operation on each band. One of those commenting is WA0DXZ in Iowa City, IA. Bob agrees with 2100 local time as being a good hour to promote 2-meter activity. He further suggests that Tuesday evenings be used as a starter in the Midwest. From the Empire State we have several communiques regarding activity on 2 meters. From W2UZL and WA2EKN comes information that a Western New York group is on every Monday night at 2100 on 144.120 MHz with beams headed east listening on 144.110 for New England stations known to be active at that time. A-m isn't dead in Western New York, according to a note from K2RUM containing a long list of 2-meter a-m stations on both sides of the international border. The gang normally monitors 144.6, 144.9, 145.08 and 145.8 MHz and invites those passing through to give them a shout. The fm camp is not without its adherents also. W4SMU in Erlanger, KY, wants all to know that he has worked 14 states on 2-meter fm simplex.

K4KAE and W4USW of Charleston, SC, feel somewhat off by themselves yet they do not want to miss any openings. Therefore, Jim and Bob request that they be called if it appears that the band might be open in their direction. Call Jim, K4KAE, at (803) 766-3663 or Bob, W4USW, at (803) 766-2018.

70 CM. On Jan. 10, K8UQA of Seven Hills, OH, picked up a new state in the form of K4EJQ TN and went on to work K2LGI NY, W4LXU and W1JAA MA, K1PXE CT, K3MWV PA and K8AXU and W8RQI OH. In addition, Dave heard, but was unable to raise, W1AJR RI, W9ZIH IL and K0DAS IA. Signals on 432 MHz were quite strong. W1JAA, in his report, said that K8UQA was 57A near Boston. Joe also worked K2LGI and K8DEO OH but was unable to hear K4EJQ. Ohio was a new state for W1JAA, making a total of 17 since taking up residence in New England.

The 70-cm EME contingent was busy during January, although strong winter winds in Europe threw some monkey wrenches into

the works in the form of antenna damage. G3LTF's mount was badly damaged and G3LQR's dish was completely destroyed. Despite the high winds which prevented making some schedules, ISMSH had great success during January. A note from I4SN tells of ISMSH contacts with JA1VDV, VK2AMW, W1SL, VE7BBG, VE4JX and F9FT. This came after they had worked PA0SSB, K2UYH, WA6LET and F9FT the month before. On the January QSO with F9FT, signals were particularly good both ways. At the French connection, Franck described the Italian EME signals as "the best I've ever heard off the moon, even better than WA6LET!" Good ssb copy was obtained with information exchanged back and forth. Equipment at ISMSH consists of a K2R1W-type amplifier delivering 400 watts to a 35-foot dish fed by line having about 3 dB of loss. Receiving is accomplished with an antenna mounted preamp exhibiting a NF of 2 to 3 dB and a gain of 28 dB. Phillips bipolar transistors, BFR-91 and BFR-90, are used. The 432- to 28-MHz converter is from the ARRL Handbook, and the receiver is a homebrew solid-state job. Sun noise received is 10 to 13 dB. This fine EME effort is the combined effort of I5TDJ, I5CTE, I5FLN and ISMSH.

In other 70-cm news, W1SL, after many attempts, made the grade with VK3AMW. Signals were good but with deep fades. In addition to VK3AMW and ISMSH, Tom worked W3CCX on a CQ with S-2 signals both ways. As proof of the utility of the Oscar satellite, K2UYH snagged a new 70-cm state in the form of WA7BBM AZ after arranging an EME sked during an Oscar-7, Mode-B contact. This makes the 32nd state and 10th call area for Al. WA7BBM is using eight, 13-element Yagis which seem to be working as John contacted W0YYS and K0TLM the next night. New 70-cm EME stations, understood to be operational, include W4ZXL FL (back on at a new QTH), W8SLUA TX and JA1ATL who is now hearing 9 dB of sun noise with his 20-foot dish.

Not all 70-cm activity is made up of wild auroras and globe-girdling EME contacts. The QVS report of W6PBC mentions continuation of nightly 432.010-MHz schedules between his Roseville QTH and stations in the San Francisco Bay area.

23 CM and Down. The Jan. 10 aurora made news throughout most of the rest of the world above 50 MHz, but it was too bad that no known activity took place on 23 cm and the higher frequency bands. It would be well for all of us to remember that anytime unusual propagation occurs, those known to be operational on these bands should be notified.

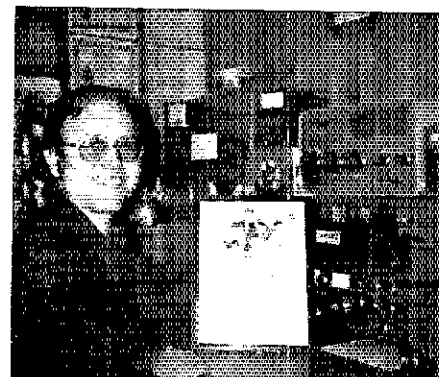
To the surprise of many, there is amateur activity on our microwave bands above 450 MHz. K4WRL writes from Fort Pierce, FL, that he and W4DNM maintain regular ssb and cw activity on the 5650-MHz band. How about some details on the equipment being used, Paul? Anyone else active on the microwave bands please pass along details of activity, equipment and results. Here in the Washington, DC, area, WA3YFU has expressed interest in the 5650 band and wonders if anyone in the area is already active or would like to try it.

QST

Coming Conventions

- April 3-4
ARRL Hamfest, Mobile, AL
- April 9-11
Southwestern Division, Tucson, AZ
- April 10-11
North Florida Section, Jacksonville, FL
- *April 23-25
West Indies Section, Guanica, PR
- April 25
Delta Division, Jackson, MS
- May 21-23
New York State, Rochester, NY
- June 5-6
ARRL Hamfest, Salina, KS
- June 11-13
Southeastern Division, Atlanta, GA
- July 2-4
West Virginia State, Jackson's Mill, WV
- July 9-10
Central Division, Milwaukee, WI
- July 16-18
ARRL National, Denver, CO
- July 24-25
Atlantic Division, Philadelphia, PA
- July 31-August 1
Roanoke Division, Norfolk, VA
- August 7-8
ARRL Hamfest, Concordia, KS
- August 20-22
Maritime Section, Halifax, NS
- September 3-5
Pacific Division, San Jose, CA
- September 10-12
New England Division, Boston, MA
- October 8-10
Midwest Division, Omaha, NE
- November 6-7
South Florida Section, Clearwater, FL
- November 13-14
Hudson Division, McAfee, NJ
- *Indicates change in Puerto Rico convention.

Strays



K4PUZ -- Bicentennial WAS #1 (!)

1-1/4 Meter Standing

Figures are states, call areas and best DX in miles.

K1PXE	16	6	781	WSRCI	10	5	910
WA1MJJ	15	5	450	W5ORH	6	4	1178
W1HDQ	13	5	450	WA5MFT	4	4	1100
K1JIX	12	4	800	WB5AJG	4	2	1050
W1JAA	12	6	2670	W8GNMT	10	6	2950
WA1FFO	11	5	420	W6WSQ	6	4	1178
W1AZK	10	3	375	W7CNK	6	3	923
K1BFA	10	3	225	W7JRG	5	3	959
K2RBA	19	7	2650	K7ICW	4	2	250
W2DWJ	15	5	240	K7HSJ	11	6	400
W2CRS	14	5	600	WBPT	11	2	660
K2RTH	13	5	960	K8HWW	11	6	660
K2DNR	13	5	600	K9HMB	23	10	1816
W2SEU	13	5	325	W0PW	14	5	1600
W3JUG	14	5	460	WA6DLP	4	2	923
W3RUE	11	6	480	VE2YU	8	3	300
K3IUV	11	4	340	VE3HW	9	2	325
W4UCH	9	5	543	VE3AB	7	4	450
K4IXC	5	3	1115	VE3QNT*	16	8	420
K4GL	4	2	485	VE3EMS	10	7	465

*Club station



Newcomers Battle Heavy Odds for '76 DX

Hearing a handful of decent skip signals on 21 MHz, WN9PMC makes haste to switch her attention from 40 to 15 meters. This is no simple trick with our unorthodox layout. You're not yet done after peaking the old 32V3 into a dummy load. (She uses it in 60-watt "tune" status.) There's still a dash upstairs to alligator-clip the indoor wire to 21-MHz dimensions. Everything right on the nose in five minutes or less, great band-changing technique for body tone, wind and circulation. Yechhh and alas — once more Amanda confirms that five minutes is quite long enough for 15 meters to do its patented swoon into the noise level. Just a couple of weeks left hanging in there and she no longer needs Illinois for WAS. So it's back to 40 again, or might as well try 80. DX? Bah.

A real antenna farm would help, to be sure, but even an 8-element quad wouldn't

boost the thinned 21-MHz DX population. Most of the old 15-meter overseas gang have long since followed the sunspot decline to lower frequencies. Oh, contests stir things up periodically but only briefly. No wonder today's WN crowd can hardly believe that a Novice ever qualified for ARRL's DX Century Club. But this did happen. Not just once, five times. During sunspot maxima, natch. But with the handicap of one-year tickets and strictly crystal transmitter control.

KN4RID was historic No. 1 back in 1958. Research at the League's DXCC desk by WICW and WA1VCG shows he confirmed 114 countries as a Novice and soon joined the 300-country Honor Roll elite. KN1IVT settled for an even 100 when he became No. 2 in February, 1960. Third came KN0LTB at 102 confirmed, seven years and a dreary sunspot minimum later. Close fourth was WN8TND in

June of '67. 105 countries QSLd and now en route the 300-mark as a WA8. Last but not least was WN8ZCC in October, 1969, whose 117 confirmed countries still stand certified as the best DX record ever attained by a Novice.

There's little doubt that the next WN DXCC application will be far, far down the log. But when shortwave conditions finally do turn the propagation corner and sufficient sunspots show up to quicken and thicken Mother Nature's big ionospheric repeater, watch out! Neophytes in the DX future will cash in profitably on longer license tenures, VFOs, improved transceivers, hotter antenna designs and a new DX-filled 28-MHz allocation. Meanwhile we salute the first Big Five for operating achievement that supports widespread belief that true DX hounds are horn, not made.

WHAT

We'll turn over a chunk of the "How's" floor to the WN mob this month. So many of 'em don't give up on DX easily, atrocious conditions notwithstanding, and current Novice country totals of 30 to 60 are widely reported. Well earned! . . . My beam is 43 feet above a 1350-foot Hawaiian hillside but there still are mountains between me and the mainland. I'm 29, an X-ray technician at Tripler Hospital, and when working the night shift I get a good crack at 15 meters. Also keep an ear on our new 10-meter range but signals are scarce. I've QSLed about 200 of my first 411 contacts and estimate a 75-percent return. KX6KG has been giving the WN bunch a rare one near 21,108 kHz around 0100 UTC. After working forty Japanese stations, JA6WVR finally came through with my first QSL from that country. (WH6IOZ) . . . Not too bad on 15 with my T50, 2B and

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

WN1UNC recently spent a DXciting six-week vacation in Kenya with his uncle, 5Z4PP, topping off his tour by climbing famed Mount Kilimanjaro. Here Doug and Jim check 14-MHz conditions at the 5Z4PP installation in Nairobi. (W3HNK photo)



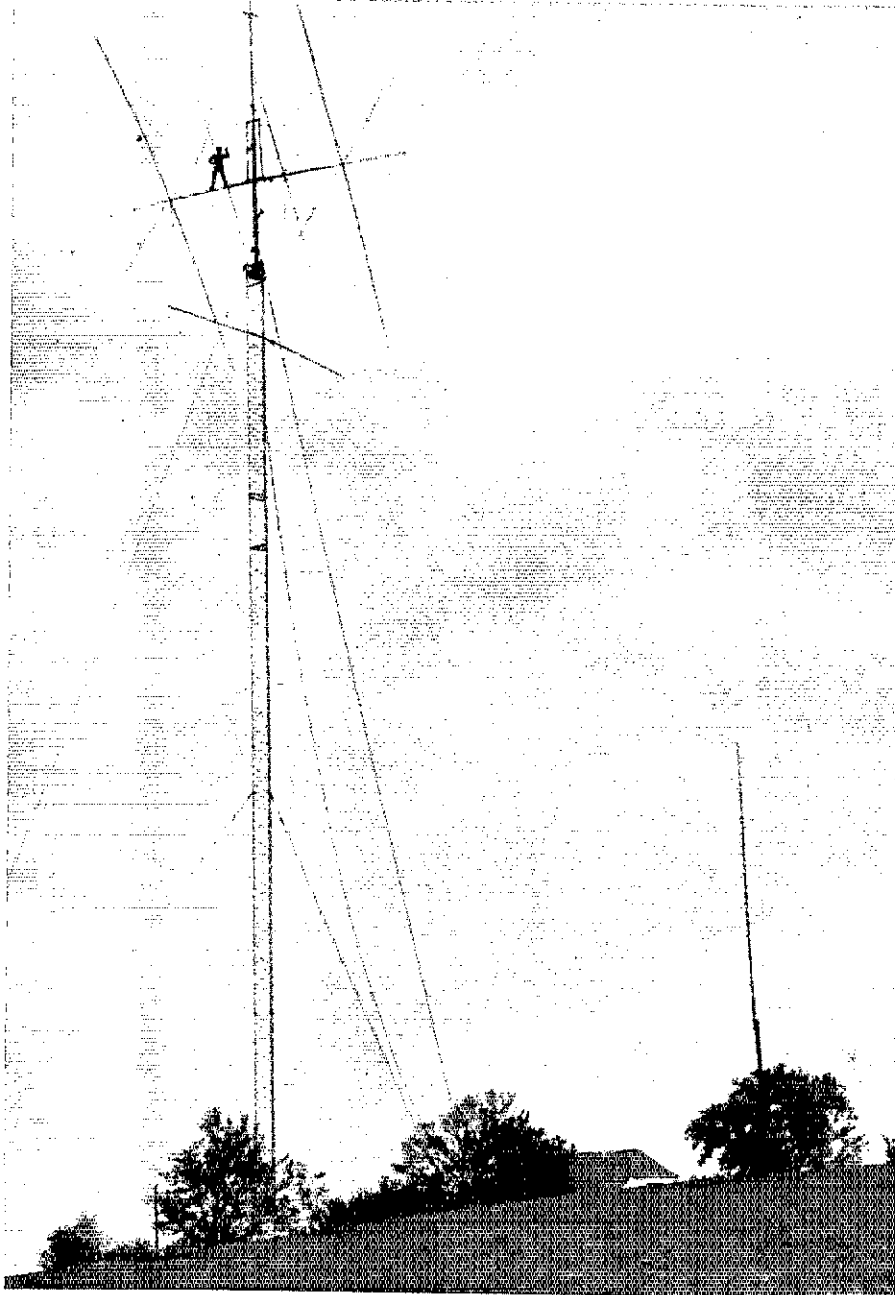
inverted-V dipole, several South Americans and New Zealand. (WN4MJP) . . . Quick QSLs here from K4BR/VP9, KV4IF, VP2LAW and W5ZIS/YV1 for 21-MHz contacts. (WN2TRS) . . . My old but reliable HT40, SX101A, HA5 and 14AVQ surprise me with Pacific catches on 7 MHz. (WN6GKE) . . . YZ3UPI made it 63 countries for me but the prefix stopped me for a while. Been listening on 20 meters where there now seems to be more DX on cw than ssb. (WN2TBQ) . . . Though my two-element beam is fixed more or less southwest, it manages to work Europeans on those rare transatlantic 21-MHz openings. When 10 meters comes alive, you can bet I'll be in there! At night I burn 'em up on 80 with my 720 and HR10. How about more WN-oriented "How's" coverage? (WN1VKN) . . . Answering IS0AEW's "CQ WN" on 15 brought me my first QSO outside North America. I was somewhat shaken when he came back! (WN4TAR) . . . A TS520 and 12-foot-high dipole do well for me on 21 MHz. Fifteen minutes in a huge HK0BKX pileup brought me a new one. I hope to join the ranks of QSL managers one of these days. (WN0QNX) . . . Here's another QSL managerial volunteer for ops at the DX end, the rarer the better. (WN3ANE) . . . Me, too! (WN7ZNB) . . . Great for "How's" to introduce some of amateur radio's generous Elmers. Many more are needed. (WN2WQL) . . . Got my ticket thanks to the Navy's KH6SP club station gang and am now assigned to USS Robert E. Peary. (WH6INU) . . . It seems to me that worsening conditions are causing DX operators to become friendlier and friendlier. South America is still very big on 15 out my way. (WN00ON) . . . North-south 21-MHz skip is okay for my HW16, HG10B and 18AVT/WB vertical, too. (WN5NSR) . . . Delighted to be OX5BW's first Novice QSO, 7102 kHz. Also caught K4BR/VP9 on 40 and 15. With a new General ticket I'll be hot after DXCC. (WN1UAW) . . . From Tenafly High School's WB2ZZM I worked ZD8AA cw to ssb on 21 MHz. (WN2AYY) . . . DX? Well, for right now I'll settle for some ARRL WAS application forms. (WN4UKU) . . . A TenTec keyer gets my vertical lots of comebacks on 15 in Colorado. (WN0QMN) . . . If your housing development prohibits ham antennas, I recommend a sleek "condominium flagpole"

with low-profile base matching network. Mine works fine on 40, and who could be unpatriotic enough to ban flagpoles in '76? (WN7BVS)

The preceding reporters mention scrounging up 21-MHz contacts with A35AE, CX2ED, DL2QB, EA4DX, G4s CUN DZU, HH2WF, H18LC, HKs 5DER 0BKX, IS0AEW, JA1HHK, K4BR/VP9, KV4IF, KX5KG, LUS 1DHE 2DEK 6DJX 7EKA, OA4AOB, OK1MIN, PJ9JR, PYs 2EGM 2FVT 3CLJ 5CKL 6AQJ, TI2WX, VP2LAW, VS6EK, W5ZIS/YV1, WH6s INU 10Z, WP4s EBJ EDT, XEs 1AV 1TI 2GU, YN1FWN, YU3UPI, YVs 3AGT 6AVT, ZD8AA, ZF1WW, ZL2AUS, ZP5s AN EC NP NW, 4X4JV and 8P6FX. Additional 15-meter possibilities are offered by telegraphers Ws 10PJ 7YF 8KAJ, Ks 4DAS 8IQB, WAs 1NRF 2JZK 6ARP 7NWL 8YTL, WBs 2E00 2MBM 4FOT 9NME 0GRJ and VO1KE in recent "How's" mail: A9s KO XU, C6ABC, C9s MAD MEY MIZ, CP6DH, CTs 1HD 1UA 1UM 2BSA 2GSA, CXs 3BH 7AE, D2s AAL AOR

WN5NBY collected WAS and forty countries with this neatly engineered barracks layout at Fort Hood. Noah's next Army assignment will be Korea where he looks forward to enjoying DX status as a delicious HL9.





OZ5KF could almost make wig-wag DXCC from a boom perch on his quad's 50-meter level. This is only a portion of the multiband skywire system at your Roende QTH of the Month. (OZ6MI photo)

AOZ, D4ABS, DFs 2KU.6QC, DJs 4QY 7MI, DK9XR, DM3ZF, EAs 5CS 6BD 7FC 7IL 8CS 8FC 8LK 9EO 9EP 9FD, EIs 3CP 9ONE, FP2SN, Fs 3CX 6ARY, 6CRY, FG7s AT XA XL, FL8PE, FR7AL, Gs 2AA 3FTP 3IAS 3RDC 3XSN 3ZWH 8JH, GB3s LAS MCG, GCs 2FZC 4CHY, GD4AM, GM6RV, GW3MWS, HAs 1KSA 1KSS 2KRZ 5KHC 6KNI 9HW, HBs 9BEC 9NL, HCs 1JL SEE 8GL, HI8s XAW XBB, HK3BED, HP1XIS, HR6SWA, HV3SJ, Is 1QJC 2KD 3YCV 4SRB 9DF 9PNJ 9ZQ, IG9SKO, IS9s FPH UTA, IT9s RKA UAG, IZ2ZGP, JAs 1ANX 8AQN/JD1 8BP 9BZR, JE1MLK, JHs 1VOE 1XHO 3RRA 6IDU, KG4s DS NY, KH6s RS IGC, KL7DYS, KP4UW, KS6s EZ FF, KV4CK, KZ5EK, LUs 1AAQ 1SH 3EX 5DON 8FT, LX1BJ, LZ2s KWR WS, MIs C B D, OAs 2CD 4O, OD5s FZ JT, OH2NB, OJQMA, OK2s BJR PDZ, ONs 6GA 8ZI, OZs 1JK 2UA 5DX 6QV 6XT, PA0s GPI SM, PJ2VD, PT2s 1B ZBS PY9BXC, SM9FKA/ICS, SP8s GUV YA, SVs 1DO 9WTT, 1F3JB, TI2s BEV LA, UA3QG,

UB5GBD, UC2LB, UKs 2BBE 2WWW 3ABB, UL7QS, UM8MAX, UP2PX, UZ4NTB, VKs 5CV 6AG, VPs 1FF 2DA 2GMB 2GTE 2KJ 2JCA 2MEX 5WW 8NT, VQ9s D GP K, VU2LO, WB9OIJ/HP, WH6IPR, WM6EC, YNs 1DW 9JMP, YS1s GMW WPE, YUs 1ELM 1QBC 1VR 2ABW 2BOP 2CBO 2CBV 3EK 3FS 3TAF 4VTU, YV4BV, ZC4RH, ZF1s JH SV WE, ZLs 1BKX 2MH 4IE 4NH, ZSs 1OA 1XR 2AG 2EM 4AG 4AK 6AKJ 6OS 6UE 6WRG 6ZE, 3D2JP, 4M6AW, 4X4FU, 4Z4s HF MY NMB NPG, 5B4YK, 5H3EQ, 5TSZR, 5Z4PP, 6W8EX, 7P8s AG AT, 7Q7RM, 7Xs 4MD 9WW, 8P6s BBS DW, 9G1s GE JX, 9H1s CH DZ EHL, 9J2s BL BO CB CJ CL GJ WR WS and 9X5PT. There's a century's worth in this sampling so our WNs and the Five-Band DXCC chasers still find 21-MHz cw a lucrative challenge.

Great to hear so much action in this year's Novice Round-Up, by the way. Conditions peaked nicely on 15 for the final weekend and a goodly batch of Generals, Advanceds and Extras joined the fun. As this QST gets to

you, 21 MHz, and possibly 28 MHz, should be pepping up considerably as it normally does each early spring and autumn. DX, where is thy sting? The equinox is where it's at!

DXCERPTS & DXTRACTS

JAs 2PIC 3KWI and 9CUV are off on another of their whirlwind DXpeditions in the Pacific. After brief Nauru and Gilberts stops as C21CW, VR1s AJ and AK, they should now be signing a VR8 call from Tuvalu. By the 8th of this month Hatsu, Kazu and Tack expect to undertake three- or four-day operations from Fiji, New Hebrides (YJ8CW), the Solomons (VR4CW) and Nauru once more in that sequence before returning to Japan on the 19th. Most activity will feature cw on 160 through 10 meters 5 or 25 kHz above the lower band edges. Contest voice work is also anticipated on 3775, 7095, 7150, 14,195, 21,300 and 28,600 kHz. They'll be using two transceivers, a beam, multiband vertical and dipoles. QSLs go to JA9CUV. . . . Log entries for this year's 42nd ARRL International DX Competition must be postmarked no later than the 19th of this month to be eligible for QST listings and awards. These events should be thoroughly documented so ship us the results at your end, large or small. . . . DXers who have self-addressed stamped envelopes on file at local ARRL QSL Bureau branches or with other volunteer QSL handlers should take immediate action to bring those s.a.s.e. up to date with the latest Postal Service rate increases. (W6LPJ courtesy WB2CHO) . . . Reader Lynn Coslet of Indiana throws a barb at that *Nemo* voyage mentioned in our January intro. "Sorry, but unless the ship anchored for one year on the date line at the equator she could hardly have existed in two centuries simultaneously. The new century began with the year 1901, not 1900." Shucks. . . . OH2BN comments on a subject of vital interest to all amateurs and DXers in particular: "As an Associate Member of ARRL, I read with concern about preparations the League is making for the upcoming World Administrative Radio Conference, the 1979 meeting of such crucial importance to the future of amateurs. We must all look to ARRL for leadership. Strong action is needed to preserve our bands and drive off intruders who would occupy our frequencies."

"Would-be ZFIs should note that the Grand Caymans government has just doubled the price of tourist hamming privileges to 25 dollars," writes WA9AQN. "I for one will gladly pay the fee on my next trip to those beautiful islands." . . . "This year we hope for an attendance of about 325 of the leading DXers from the west coast and around the world," pens W6EJJ of Southern California DX Club concerning this year's annual Fresno International DX Convention. The spree is slated for May 15-16 at the Hilton and an imposing program is in the works, prospectus available from SCDXC, P. O. Box 73, Altadena, California 91001. . . . K6WMW suggests *Edge of the World: Ross Island, Antarctica* by Charles Neider (Doubleday, 1974) and H. G. R. King's *The Antarctic* (Arco, New York, 1969) for your DX bookshelf. W9JS remarks, "Thanks to your January lead, I've just finished a fascinating book, Quinby's *Ida Was a Tramp*. Got my own commercial tickets in '36 with hope of sea adventure but wound up in airline radio."

. . . Stanch 80-meter supporter W1SWX says the telegraphic 3.5-MHz DX year is off to a whizbang start thanks to CX9BT, FAs 1FD 6DF 9EU, EL2T, FC9VN, FAs 7AH 9CGV/FC, F8RRR, HK0BKX, IS0XBL, JAs 1PMN 1SGX 9BE, JH1JH, IT0GAO, JX2HK, KH6AKX, KL7PL, OX3s DL OO, PJ2KR, TI2PZ, UA9CBM, UD6DFY, U18IZ, UK9AAN, UV9DO, VK5KL, VPs 2EEG 2LAW 5TI, VRs 1AA 1Z 8B, XE2AAU, YB0ABV, ZE2KV, ZD7WT, ZS6ARS, 5B4CO, 9H1BB and 9K2DR, all hugging the low cw edge. Across the pond ON4UN has more than 250 countries worked on 75-meter sideband, his latest being JD1 P29 VX9 VY0 and 9M8. John is anxious to make it 300 on the band. . . . Wallpaper chasers may find some newly available operating achievement certifications of interest. There's a Cairns Centenary Award offered by the Cairns, Australia, Amateur Radio Club for contacting two appropriate VK4s during 1976. Check VK4HM for details. SV1IG can supply scoop

on RAAG's Athens City Award issued in three classes for QSOing 10, 20 or 30 Athens stations since 1972 (Europeans must work 20, 30 and 50). ILBAA, Japan Low-Band Attackers Association, sponsors an interesting diploma in recognition of outstanding country totals on frequencies from 1.8 through 7 MHz, info available from JA2AAQ. . . . Northern California DX Club's venerable California Award, long a favored target of the overseas gang, has now been issued to DXers in one hundred countries. Most recent recipients, Nos. 238 through 256, in order, are OK1FF, KG4CS, ZL1QW, CR4BC, UW9PT, JA1s WVK RUJ, VK4VU, DJ2RE, JAs 1VE 7JW 1JKG, DJ6RX, KP6KR, JA2HGA, UR2QD, 9H4G, JA1GTF and 9QSQR. Countries with most winners are Japan 30, West Germany 21, Australia 14, Asiatic Russia 12 and England 10. NCDXC award manager K6ZM notes that PY2SO and ZE1JE are the only YL qualifiers on the entire list. Three ops have earned the CA distinction twice: VU2KV, VU9KV, DL7AH-7X0AH and VR1L-YJ8BL. That's a flock of Sixland QSOs! . . . WIBB gamely tackles a blizzard of 160-meter DX reports after another lively transoceanic-tests season. DXpeditioners pitched in to raise 1.8-MHz country totals far and wide, most notably HB0NL (HB9NL), HK0BKX (W9UCW), HP1XJB (W2DEO), PJ8CM (K5CM), VP2DX (WA3HRV), VX9A-VY0A (VE3s GMT IAA MB MJ), YN1DW (WSUSM) and 9Y4NB (WA9AIB). EA8CR/EA9 was top-hand country No. 127 for Stew. . . . Just what the doctor ordered, beam antennas based on the principle of parasitically excited radiating elements have been popular DXing tools since the early '30s, miraculously multiplying the effectiveness of modest ham equipment in mediocre radio locations throughout the radio world. Dr. Hidetsugu Yagi, father of the design, passed away in January after a most distinguished scientific, academic and political career. . . . For much of its monthly material "How's" now gladly credits Canadian DX Association *Long Skip* (VE1AL/3), Columbus Amateur Radio Association *CARAScope* (W8ZCQ), *DX Newsheet* (G. Watts, 62 Belmont rd., Norwich, NR7 OPU, England), International Short Wave League *Monitor* (E. Chilvers, 1 Grove rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3KWI-JR3BHW), Long Island DX Association *Bulletin* (WA2RJZ), Newark News Radio Club *Bulletin* (M. Witkowski, Rte. 6, Box 255, Stevens Point, Wisconsin 54481), Northern California DX Club *DXer* (VE3DXV/W6), North Florida DX Association *News* (WA4UFW), Southern California DX Club *Bulletin* (WA6KZL), VERON's *DXpress* (PA0TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloids* (WA7JCB).

DXCC NOTES

Upon recommendation by the DXAC, and acceptance of the recommendation by the Communications Manager, the requirement regarding no cross-mode contacts for the 5BDXCC Award has been eliminated and cross-mode contacts may be used for the 5BDXCC.

Feedback

■ In the February, 1976, issue of *QST* "UHF Antenna Ratiometry," page 24, the last term in Eq. 4 should read

$$\frac{h_2 - h_1}{S_1}$$

■ The December, 1975, *QST* article describing "A Modular Transceiver for 1296 MHz" by WB6BDR/W7WKR has a couple of dimensions missing. On page 33, Fig. 5A,

DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from January 1, through January 31, 1976.

New Members

CW/F

212	161	116	110	107	105	WA4BPM	WA1UEO
JH1VRQ	W9CXD	F6DBX	IT9SDN	JA2PSV	JA6LCJ	103	W3CAZ
167	143	112	WA9WKA	JA8CFR	WA2FUL	DK7GL	100
YU2CBE	JR1JEG	K4BGF	109	PY7BOS	WB9NOZ	VE2DJ	K4ZVS
162	137	W9MYB	JA2ANA	WA9IXF	104	101	W4ZWZ
WA8KBL	JA1CMD	111	JA2RJV	106	WA3UHF	JH1LMG	WB8LDM
		JA8LRG	WB5KWU	K8WSN			XE1PF

Radiotelephone

212	136	118	109	106	105	103	102
JH1VRQ	JR1JEG	WA4KZO	EA7TV	DK8MC	7P8AT	JA1CMD	WA4AKU
180							
XE1YO							

CW

102	101	W4KN	K6EBH
F3AT	JH7BRG	100	WA6MWG
JA2BP	SM6CRH	K4TBN	

5BDXCC

#472	#473	#474
SM2EKM	W1VV	F5VU

Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

CW/F

355	305	280	K0RTH	K9KWK	JA2AIR	WA7OBL	WA9FUD
W7MB	K4RZK	WA5WEY	OE1GHC	K0WKE	W6MTJ	YU3EP	120
350	SM6CVX	W7ETZ	250	WA1NZT	W9PBS	140	K2UPR
OH2NB	300	270	SM3BNV	WA5LMG	W9QEE	OH5MJ	K4HWW
330	K4EWG	HB9RX	VE5NW	W6LV	160	VE3AXQ	VE3FWB
WA2RAU	K5BXG	JA3DWT	WA4LDM	W6NTQ	JA3BSO	WA1PSK	W2NSJ
325	290	W4KN	KL7MF	240	K2HWF	WB2LOF	WA2NPQ
W4DRK	JA2AH	W4KN	JA15JV	K5BZU	K9HKJ	WA3NAF	W4DZZ
320	JA2AN	WA6CXK	VE7BZC	K7PFU	W1RFW	WA4VTB	WB4YFF
OH2BC	JA6GDG	WA0UFS	W6LVN	WA0TKJ	WA4HPE	WB4QGN	
SM6CKS	W3BRB	260	WA6OIU	180	WB4BAU	WB4ZTI	
315	W6USG	JA1JAN	220	DJ8CR	WB5HVV	W5ISF	
WB2YQH			DJ2MN				

Radiotelephone

350	310	W9LAA	JA6GDG	K0WKE	K9KWK	W6LV	VE3AXQ
PY2CK	FG7XL	270	LU1BAR/	KL7MF	WB5HGS	G4DJC	WB4QGI
335	300	K5BXG	W3	W7BKR	W6NTQ	I6ICD	W9VWV
WIHX	WA4GUZ	260	240	W7KQI	W7CUT	JA2UYS	WA9FUD
WA2RAU	WA6WXP	W5SDR	K0IFL	W6PSQ	W8JJK	WB4ZTI	
W9NZM	280	250	K0RTH	W0AUB	180	WB0NHG	
315	K3EH	220	200	I0MBX	120		
W4DRK		JA1JAN	K4FJC	JA1ALX	W5EFA	K6LOP	

CW

120
W3KT
W8ZCQ

stubs E and F should be 0.5 inch long. In Fig. 8, page 34, L1 and L2 should be 0.16 inch wide and 1.45 inches long.

■ On page 59 of January *QST* WN1VTO is standing in the photo of Meriden Square Harvest Festival Fair.

■ The "technical advisor" in the photo on page 49 of February *QST* is Tom Roynan, VESUK, not VESLIK.

■ The circuit board diagram for the sidetone oscillator described by WA3WAE in "Hints and Kinks" (*QST* for February, 1976) has an error. There should be a jumper between the pad where R1 and R2 meet and pin 7 of the NE555 IC. The holes for this jumper are on the diagram.

■ The correct title for the table on page 65, March, *QST* is 70cm Standing.

Strays



STOLEN EQUIPMENT

■ Taken from car on Dec. 9, 1975, in Cleveland, OH. ICMO, Model IC230, Serial No. 2043009. Ferd H. Nye, Jr., WA8NXT, 31497 Hilliard Blvd., Westlake, OH 44145.

■ A Regency HR-2B, Serial No. 49-01930, was taken from car on November 29, in Reading, PA. Circuit board was inscribed with W3WX and soc. security number 150 07 8465. Gerard A. Baldauf, W3WX, 175 Wernersville Blvd., Wernersville, PA 19565.

The Health and Welfare of Traffic Nets

Do you participate in a cw net that unfortunately has more call-ups than stations checking in? Have you been reading *War and Peace* between QNI? If this plague of inactivity has struck your section net, meditate on this. The Colorado Code Net has moved to the Novice band and it has paid off. Stations and traffic have tripled. WØHXB says CCN is "growing like crazy." The Utah Code Net is planning to follow suit, reports WA7MEL, in order to "get more involvement, coverage and trained operators." There are obvious problems to contend with in the Novice segment, but such a move could make the difference between a net's life or death. There are other courses of action: How about this one? Designate one night a week as the net's *slow speed night*. Try to publicize it far and wide, especially above 3900. There are many hams who really want to become active on their cw net, but mistakenly believe that one must be a speed merchant to qualify. The slow net should reassure them and soon they will be QRV for regular net sessions. These possible remedies may seem radical to some, but if your net is sick, it needs some strong medicine. It all depends on whether you want your net to be in the emergency ward or the recovery room. Just tell us where to send the flowers.

After a two-year furlough, 1975 traffic is back over the mega-message mark. The new traffic-counting procedures probably contributed, but let's face it; traffickers must be working harder than ever, since band conditions have been like a cold slap in the face. Traffic handlers deserve a big *thank you*.

A special great big thank you comes from WA4HPF, manager of the ARRL WA4/WB4/WN4 QSL Bureau. Terry was faced with the problem of over one thousand hams who had DX QSLs on file, but no s.a.s.e.s. The local traffic fraternity responded and soon the ARL THIRTY NINEs hit the airwaves. He reports that within only a few days the s.a.s.e.s began rolling in. This is the type of worthwhile routine traffic that keeps nets healthy.

W2FR, director-TCC-eastern, mentioned short-term traffic overloads in a recent letter. During the Hurricane Eloise emergency, the Transcontinental Corps handled traffic directly with the Northern Florida section. Howie states that TCC is "tailormade" for emergencies of that nature. But what, you may ask, about a non-emergency overload situation? With the warm weather approaching, it will be the season for message-handling services at fairs, as well as beaucoup originations from summer camp stations, etc. During these

predictable high volume circumstances, TCC assistance most likely won't be necessary. However, it would be an excellent idea to notify the NTS region-net manager in the region involved, to see if something can be worked out so the traffic overload can be handled as efficiently as possible. If you are the traffic manager for your club's upcoming display booth, why not contact the appropriate NTS region manager: First region - WIQYY WA1SQB, second region - W2MTA WB2EMU, third region - W3NEM WB2FWW/3, fourth region - W4SHJ WA9NEW/4, fifth region - WA5IQU W5KLV, sixth region - W6INH WB6PVH, seventh region - W7KZ VE6FS, eighth region - W8PMJ WA8MCR, ninth region - WB9KPX, WB9NVN, tenth region - KØAEM WBØHOX, eleventh region - VE3AWE, twelfth region - WØHXB W5PNY.

Obviously, one of our functions at Hq. is to try to stimulate traffic (and all other types of public service) activities on the amateur bands. But here's a gripe. Every so often a message comes through with a check of 30 or more. Please read "Keeping It Short" in April, 1975 *QST*, pages 53-54. If someone continually initiates messages with inflated texts, that traffic-person ought to be WRITING *War and Peace* between QNI!

PUBLIC SERVICE DIARY

□ Lincoln, NE - November 20. The Nebraska Emergency AREC net provided current weather information to Civil Defense and Weather Service officials during a blizzard. (WAØASM, SEC NE)

□ Brainerd, MN - November 20. KØMAH phone-patched the Piconet-All-Day-Watch into a local broadcast station to provide listeners with weather reports. (WAØVYT)

□ Sao Paulo, Brazil - December 1. PY2BU and a radio amateur on board the ship *Sea Lion* assisted the vessel in reaching port after her water pumps failed. (W2SVV)

□ Lewisburg, WA - December 24-26. Rain and melting snow caused flooding which swept out a bridge and forced the evacuation of some areas. Eight amateurs provided communications in the affected area. (W7PWP, EC Lewisburg)

□ Denver, CO - December 26-27. Over 30 amateurs provided communications for the Civil Air Patrol and other participants in a search for a downed aircraft. (WAØHLQ, SCM CO)

□ Baja, CA - December 31 - January 7. A light plane was reported missing during a flight to La Paz, Mexico. Several U.S. and Mexican amateurs provided communications during the extensive search. (W6GBF, SEC SDgo)

□ Fremont, NE - January 10. Following an explosion and fire that took at least 18 lives in a downtown hotel, 17 amateurs supplied communications for local agencies. (WAØHAL, EC Fremont)

□ Quito, Ecuador - January 13. HC2EA requested a special antibiotic for a sick child. WA2CFA contacted a pharmaceutical company which arranged shipment. (WA2CFA, WA2NSQ)

*Communications Assistant, ARRL

□ Owensboro, KY - January 13. Winds as high as 76 knots caused severe damage, including knocking out the local repeater. Amateurs were able to use fm simplex to aid police and Civil Defense. (W4OYI)

□ Puyallup, WA - January 24. WA7CJF/mobile reported an overturned car to W7BUN on the Washington Area Traffic System net. WB7AJR called for police and an ambulance and notified relatives of the injured occupants. (W7BUN)

□ Repeater Log According to reports received, repeaters were used to report 39 traffic accidents and related occurrences, two fires, two plane crashes, one power and telephone outage, and assisted in four search-and-rescue operations. The following repeaters were used: WR1s AAC ABP ACT, WR2s AFB AJH, WR3AFO WR4ABR, WR6ACF, WR8ACB, WRØs ACD ADO, XE2SPM.

A total of 34 SECs reported for January, representing 11,733 AREC members. Last year at this time, 41 SECs reported 13,633 members. Sections reporting were: Alaska, Alta, Ariz, Colo, Conn, Del, EBay, EMass, Ind, Kans, Ky, Maine, Mich, Miss, Mont, NLI, NC, NFla, NNJ, Ohio, Okla, Org, Pac, SDgo, SF, SJV, SCV, Sask, SNJ, STex, Utah, Wash, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

We hate to belabor a point, but band conditions have not improved any. As VE6FS says, this is "all part of a traffic man's life." 2RN's 2330 UTC session on 3930 has become permanent. WA9NEW/4 has been appointed manager of 4RND. The following received net certificates: WB2LVC WB2WZL (2RN), W4YZC (4RN), WB6SE (RN6d), KØLGA WB8MFD W8SQO WA8TBL (8RN), WA4AJA K4CNY WB4DJU WB4EKJ WA4FBI W4HFU W4KIX WB4SKI WB5AMN WB5DXB W5EDT WB5FHZ W5GHP WB5HOX WB5IZN WSMJ

WB5OOW WB5QDW W5QU W5RB K5TTC W5UGE W5UJJ WB5ZBJ WASZZA (RN5).

January Reports

1	2	3	4	5	6
EAN	34	1952	57.4	1.109	94.1
DEAN	62	752	12.1	.543	93.5
CAN	31	1204	38.8	1.025	100.0
DCAN	45	179	3.9	.192	86.5
PAN	31	1338	43.2	1.027	98.3
CTN	30	474	15.8	.388	95.0
IRN	61	527	8.6	.382	86.8
1RNd	35	416	11.9	.541	86.0
2RN	85	630	7.4	.516	96.0
2RNd	61	617	10.1	.610	95.4
3RN	56	403	7.2	.369	95.2
3RNd	35	216	6.1	.464	92.4
4RN	62	828	13.3	.456	95.4
4RNd	47	244	5.2	.295	44.7
RN5	62	854	13.7	.441	96.4
RN5d	33	284	8.6	.313	87.8
RN6	61	678	11.1	.398	97.3
RN6d	33	337	10.2	.235	83.2
RN7	53	248	4.6	.371	72.3
RN7d	60	80	1.3	.120	35.0
8RN	60	403	6.7	.306	88.7
8RNd	35	188	5.4	.566	94.3
9RN	57	476	8.3	.371	84.0
9RNd	32	154	4.8	.288	92.2
TEN	60	442	7.3	.311	74.3
DTRN	29	105	3.6	.150	47.0
ECN	67	393	5.8	.345	91.7
TWN	61	615	10.1	.304	96.4
TWNd	24	85	3.5	.142	61.3

TCC Eastern 118¹ 782
TCC Central 89¹ 601
TCC Pacific 121¹ 989
Sections² 3775 20746

Summary 5117 38240 7.4
Record 5620 42106 19.1

¹ TCC functions not counted as net sessions.
² Section and local nets reporting (107):

AENB AEND AENJ AENM AENR AENW (AL), ASN (AK), ATEN HARC (AZ), AMB APN ARN (AR), NCN NEN (CA), CN CPN (CT), DEPN DTN (DE), EAST FMTN EPTN NFPN GFN QFTN (FL), GSNB GSN (GA), IMN (ID-MT), ILN (IL), I75MN TLCN (IA), KPN KSNB KWN QKS (KS), KTN (KY), LAN LSN LTN (LA), MDCTN MDD (MD), NENN WMN WMPN (MA-RI), MACS MNN GMN WSNB (MI), MSN MSPN MASN PAW (MN), MSBN MSN MTN (MS), MON MOSSB (MO), NAN WNN (NE), BARTEN N/JN N/JPN NJSN (NJ), NLI NLPIN NLS NCS (NY), CN CNIN NCSSB PX THEN (NC-SY), BN BNR BRTN OSSBN OSN O6MN (OH), OAN OLZ OPEN OTWN STN (OK), BSN OSN (OR), EPAEP&TN PTTN WPA (PA), TN TPN (TN), TEX TTN (TX), BUN UCN, VN VSNB (VA), WVN (WV), BWN WIN WNN WSNB WSSN (WI), MTN (MB), GBN ODN OPN OSN (ON), WQV/UHF (PQ).

1 - NET 4 - AVG.
2 - SESSIONS 5 - RATE
3 - TRAFFIC 6 - % REP.

Transcontinental Corps

Both TCC-E and TCC-C held extra skeds during the SET. Several of the TCC-C group have been QNI on PAN for Guatemala traffic. W2FR issued annual certificates to W3EML and WA2PJJ and first-timers to WA1STN and WB8ITT.

	1	2	3	4	5
Eastern	129	92.2	2170	782	
Central	96	92.7	1210	601	
Pacific	132	91.7	1983	989	
Summary	357	92.2	5363	2372	

1 - AREA 4 - TRAFFIC
2 - FUNCTIONS 5 - OUT-OF-NET
3 - %SUCCESSFUL TRAFFIC

TCC Roster

The TCC roster (January): Eastern Area (W2FR, Dir.) - W1s NJM QVY, K1s EIR GMW, WA1s MSK STN WEM, W2s FR GKZ, K2H1/VE2, WA2s DSA ICB PJL UWA, WB2s PYM RKK UBW, W3EML, K3MVO, W4UQ, K4KNP, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s GOL SB, Central Area (W5GHP, Dir.) - WB4s DXN SKI, W5s GHP MI RB UGE UJJ, WA5IQU, W9s CXY DND NXG, WA9ED, WB9NOZ, W5s HI INH LCX QMY, K9s AEM CVD, WA8TNN, Pacific Area (K5MAT, Dir.) - W8RE, K5MAT, WB5KSS, W6s BGF EOT MLF TYM VZT, K6HW, WA6EI, WB6s AKR DJP, W7s DZX GHT KZ VSE, K7s IWD NHL QFG, WA7WXY, W8s ETT IW LQ LRN, K8DRL, WA8KKR/7, WB8s HCK QOT, VE7ZK.

Independent Nets (January)

	1	2	3	4
Central Gulf Coast				
Hurricane	31	57	1938	
Clearing House	27	435	587	
Hit & Bounce	31	1269	476	
Hit & Bounce Slow	18	111	175	
IMRA	27	427	1123	
Mike Farad	27	117	225	
North American SSB	27	211	473	
20 Meter ISSB	19	896	203	
7290 Traffic	48	549	2021	

1 - NET 3 - TRAFFIC
2 - SESSIONS 4 - CHECK-INS

Public Service Honor Roll January 1976

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each

message; (9) Serving as net manager for entire month, 5 points.

72	WA2VPA	WB8NCD	WB9KTR
WB5AMN	WA4EPJ	W9MFG	W9NXG
67	WA5RKU	K9ZTV	VE3FGZ
KL7JDO	WA5TQA	K6CVD	VE3GT
	WA5YEA	K6MRI	VE3SB
65	W6RNL	VE3DPO	43
W5KLV	WA8HGH	VE3FRG	WA1MJE
	VE3JGJ	VE3GFN	WB8DL
64	55	48	K9KHI
WB2WRT	WB2FWW/3	WA3QOZ	KH6IQU
WA4FBI	K5MAT	W4WXZ	
WB5LII	WA6TVA	WB9MDS	42
63	53	47	K3KAJ
WB0CZR	WA2WKH	WA3WPY	WA3PZO
WA0GLI	WA6DEI	W2FR	WB5MFQ
62	W7VSE	K4IAF	W5UJJ
KIPAD	W0OTF	WB0QOT	WA5VBM
		VE3GOL	W7LG
61	52	46	WA9QVT
WA1MSK	WB2RUZ	41	
WA2PJJ	W6INH	WA1RUR	
WB2PYM	WB6OYN	WA2NVJ	
WB2VTT	51	WB4DXN	
W5GHP	WA9FMD	K7NTG	
WA5IQU	K5TTC	WB0HCK	
WA5ZZA	50	45	
W7OCX	W1BVR	K2TTG	
WB8JGW	WA2UYK	W3IPX	
WB0HBM	WB2YKG	WA3UKZ	
	K3YHR	WA4BAX	
59	W6RFF	K4YRL	
WB2RKK	WB0OAG	W9MMP/0	
	49	44	
W8IBX	WB2LZN	W1EIH	
WB0HOX	WB2RMK	K3OIO	
57	WA3DUM	WA1SQB	
WB4OXT	WA3OGM	WA4NID	
	WB4EKJ	WB4SKI	
56	WB5KQJ	WB5EKU	
WA2DSA	WA5PRI	WB5FMA	
W2MLC	W7GHT	WB5OOW	
WA2PCF	WA7MEL	WB8WKG	

Brass Pounders League January 1976

BPL Medallions (see December, 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings: WB2SHL WB9NVN

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

Winners of BPL Certificates for Jan. Traffic

	1	2	3	4	5	6
K3NSN	80	2001	1801	0	3882	
W3CUL	411	1251	1541	42	3245	



Hoping your traffic is good traffic: The Central Area Staff of the National Traffic System assembled in Lincoln, Nebraska, on October 17 and 18. From left: WB9KPX (9RN), WB9NVN (D9RN), K0AEM (TEN) W9QLW (member-at-large), WB0HOX (DTRN), W0INH (Chairman), WA5IQU (RN5), WA5ZZA (CTN), W5MI (member-at-large), W5KLV (DRN5). Not in photo - W0HI (CAN).

W0WYX	40	828	287	541	1896
K0ONK	19	578	562	44	1203
W3VR	371	181	423	16	991
K9CPM	1	400	146	299	846
AB0HOX	80	374	336	22	812
K0ZSQ	0	405	0	405	810
W6RSY	5	330	303	13	651
WB2RKK	4	298	275	22	599
WB0QOT	30	230	310	21	591
W5GHP	54	238	251	16	559
W4YZC	179	119	231	10	539
WA4FBI	1	290	234	6	531
K6JZR	24	251	203	48	526
WB4MZO	29	238	225	13	505
AC8PTT	0	246	250	4	500

BPL for 100 or more originations-plus-deliveries

WA3ATQ	173	W9NJP/9	111
K7HLR	157	WA7JRC	107
WA3UYF	147	WA9VWG	106
WA3THT	139	VE3GOL	104
W5TI	127	WA3PZO	102
WB2WRT	123	WA7MEL	100
W5DAD	120	W9UMH	100
W0FIR	114		

1 - CALL 4 - SENT
2 - ORIG. 5 - DEL.
3 - RECD. 6 - TOTAL

Net Managers: June 1 is the deadline for registering PUBLIC SERVICE nets for the upcoming 1976/77 ARRL Net Directory. CD-85, available from Hq. for an s.a.s.e., should be used for this purpose.

NET REGISTRATION

- Net Name: _____
- Net Designation (if any): _____ 3. Freq. _____
- Days per GMT: _____ 5: Starting time(s): _____ GMT
- Net meets 1 hour earlier per GMT during DST? YES NO
- Purpose: Traffic Weather Emergency (specify)
- National Traffic System? YES NO
If yes, check: Local Net Section Net Region Net Area Net
- Direct Coverage: _____
- Liaison(s): _____ 11. Manager's Call: _____
- Date Submitted: 19.... 13. Sender's Call: _____

CD-85(R670) ARRL, 225 Main Street, Newington, Connecticut 06111

New SCM Election Procedures

Those who have studied the minutes of the January Board Meeting (Mar. *QST*) may have noted a motion instructing the headquarters to change SCM election procedures to conform to the system used to elect directors, on a schedule to become effective on or after Jan. 1, 1977.

The complications involved in using the system and procedure that have been used for the past 50 years (exactly) have become a subject of much discussion in recent months. Directors are elected on a standard schedule, the same schedule every two years, half of them each year. Why can't the same procedure be used in electing SCMs? The answer, of course, is that it can, but there are a few considerations involved in electing SCMs that do not exist in electing directors — as, for example, the number of elections and candidates per year.

But whether or not it should be done is no longer a question, so let's get on with it. The solicitation for SCM candidates that appeared on page 72 of the February issue is the last solicitation for new candidates that will appear under the "old" system. The solicitation that appears in this issue is a repeat of those that appeared for the first time in the February issue. Solicitations, if any, in the

June issue will be additional repeats caused by failure to get candidates. After that, no more solicitations until the January '77 issue of *QST*, with which the new system will go into effect.

The changeover from the complicated system we have been using to a simplified system is going to be complicated, because SCMs now holding office were all elected for a two-year term, and they are entitled to serve it out. Term endings will be occurring at irregular intervals throughout the next two years, right into 1978. The object of this little game of date manipulation is to get all terms on a standard schedule so that each section will elect an SCM at the same time every two years. '1

If we adhered strictly to director-election procedures for SCM elections, we'd be holding 37 SCM elections simultaneously each year. This is just not practical, so we have decided to go with a quarterly schedule of three nines and a ten; that is, nine SCMs will be elected each of the first three quarters, and ten SCMs the fourth quarter. This procedure will start on Jan. 1, 1977, and the first nine SCMs elected under it will take office on July 1 of that year. Subsequent to that, SCMs will take office on Oct. 1, Jan. 1 and Apr. 1.

Vacancies occurring between elections will be filled by appointment, but the term "acting" will no longer be used.

The changeover procedure will require that SCMs with term expiration dates under the old procedure be asked to continue to serve until an SCM can be elected under the new procedure. By judicious selection of term-ending dates, we hope to keep these extensions to a minimum. Each SCM will be contacted as his term-end approaches, regarding his willingness to continue. In most cases, this will be for under three months; in some cases, between three and six months. Should an SCM decline to continue, an SCM will be appointed to serve until the next election date arrives.

The principal improvement of this new system is that it will simplify the procedure by letting the members in each section know in exactly which issues of *QST* candidates for their section will be solicited (every two years), what the closing date will be, on what date ballots will be mailed, on what date they will be counted, and on what date the new term of SCM office will begin. These dates will not be the same for all sections, but they will be the same for each section, every two years.

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 are approximate. If you wish to operate you must have your original operator's license with you. Please note that the station will be closed April 16. *Staff:* Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

CODE PRACTICE

Approximate frequencies: 1.805 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 News. 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 MWF
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

*Communications Manager, ARRL.

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 February issue of *QST*.

4/2	It Seems to Us	4/20	Public Service
4/8	Correspondence	4/26	World Above
4/14	League Lines	4/30	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 (1.805 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 M-S	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	2330Z 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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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.

SCM ELECTION NOTICE

To all ARRL members in the sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 P.M. Eastern local time on the closing date specified. In cases where no valid nominating petitions were received in response to previous notices, the closing date was set ahead to the dates given herewith. The complete name, address, zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order. The following nominating form is suggested. (Signers should be sure to give city street address and zip code.)

Communications Manager: ARRL
(Place and date)
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM
Communications Manager

SECTION CLOSING DATE
CURRENT SCM PRESENT TERM ENDS

6K* 4/20/76
P. A. Crosthwaite, VE5RP 4/10/75
S.NJ* 4/20/76
C. E. Travers, W2YPZ 3/4/76
#Q* 4/20/76

L. P. Dobby, VE2YU 6/1/76
WY* 4/20/76
J. P. Ernst, W7VB 6/26/76
MT* 4/20/76
H. A. Roylance, W7RZY 9/9/76
IA* 4/20/76
M. Otto, W0LFF 9/11/76
MS* 4/20/76
W. L. Appleby, WB5DCY 9/11/76
ON* 4/20/76
H. H. Shepherd, VE2OV 9/11/76
Orange* 4/20/76
W. L. Weise, W6CPB 9/11/76
AZ* 4/20/76
M. Lincoln, W7DQS 9/12/76
N. TX* 4/20/76
L. E. Harrison, W5LR 9/15/76
AR* 4/20/76
S. Porkorny, W5UAU 10/12/76
KY* 4/20/76
T. H. Huddle, W4CID 10/30/76

*Repeat Solicitations

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections completing their elections in accordance with applicable rules, each term of office starting on the date given.

ID D. A. Brock, WA7EWW 4/23/76
NYC-LI J. Smale, WB2CHY 7/5/76

Balloting results: In the Ohio Section, Mr. Henry R. Greeb, WBCHT and Mr. Kurt T. Meyers, W8IBX were nominated. Mr. Greeb received 1,196 votes and Mr. Meyers received 714 votes. Mr. Greeb's new term starts April 30, 1976.

January CD Parties

The following are high scores in the January CD Party; scores read (I-) operation. Complete results appear in the April CD Bulletin. Please call sign, score, number of QSOs, number of multipliers, time of request your log sheets for the April Open CD Parties now. — WA1STN

<p>CW AC6RTT 333,850 977-68-20 WA7WXY 333,880 975-68-20 W6DGH(WB6ZVC,op) WA2UOO 324,400 933-69-20 WA1STN(WA35WF,op) 285,120 861-68-20 K1JYN/6 281,180 819-68-20 K9BGL 270,930 816-66-20 K4SKD 261,120 768-68-20 W6RGG(WA6TLV,op) 258,285 765-67-19 W6RGG(WA6TLV,op) 256,020 746-68-20 WA1NNC 235,950 710-66-18 WB5GDW 230,010 692-66-20 W4RTZ 217,600 633-68-20 AC4OZF 213,740 633-67-13 WB5GWX 210,210 634-66-20 AA9NVZ 204,350 606-67-20</p>	<p>WB2PYM 203,840 633-64-15 AB0QOT 203,345 600-67-17 W7TML 194,700 590-66-19 W5PJT 190,615 564-67-12 AB8UKX 179,840 562-64-20 WA3VBM 169,470 532-64-13 AC2FV5 169,000 515-65-14 W2A2O 165,240 528-62-15 K4GXR 163,150 502-65-10 WA6OTU 162,750 519-62-17 W5RE 153,725 466-65-10 W59RSK 147,010 482-61-20 W4UQ 145,530 455-63-14 W5TXA 142,350 430-65-9 WA6VEF 138,000 460-60-18 WB8NUA 130,240 404-64-15 WB8KKI 128,405 416-61-18 WB1NH 127,075 384-65-7 WB8DU(WA3BGE,op) 126,630 397-63-9</p>	<p>WB8WKQ 125,575 400-63-16 WA1WEM(WB2NOM,op) 121,920 373-64-11 AC4NOA 121,800 400-60-9 W5RUB 121,200 400-60-7 W6MAR 119,360 378-62-5 K4VEY 119,070 372-63-10 WB9HAD 114,985 373-61-8 W8HW 114,390 363-62-11 W7GHT 113,400 371-60-9 WB5UFG 112,100 372-59-11 W4QQG 108,170 367-58-9 K3HXS 107,675 361-59-13 W1DAL 107,665 346-61-7 W8IKW 106,950 339-62-16 W6DQX 105,000 369-56-5 WB2RKK 104,100 339-60-4 WA1QNF 103,530 353-58-5 W4KFC 102,610 324-62-9 W12UU/6 100,955 329-61-11</p>	<p>PHONE WB8AYC/8 189,720 554-68-19 WB2RKK 179,860 521-68-17 W6LTF(W8JXS,op) 152,090 451-67-13 W6RGG(WA6VEF,op) 135,630 411-66-18 WA3J5U/L 131,340 390-66-15 K9GXR 117,320 351-64-12 WA4KKP 111,000 365-60-11 WB2WBH 108,580 354-61-16 W8RTT 102,480 331-61-6 K4VEY 100,485 312-63-12 AC4NOA 97,600 299-64-7 WB0DJY(WB0GHV,op) 95,480 308-62-10 K9BGL 89,400 284-63-9 K1JYN/6 71,700 234-60-6 K3HXS 67,750 267-50-9 WB9HAD 67,710 218-61-6 W4WWD 66,120 232-57-11</p>	<p>WA2PJL 63,990 230-54-6 AD4BAI 61,845 210-57-5 AB8NUA 59,160 201-58-9 AB2VTT 58,140 225-51-12 W4JM 54,320 194-56-7 WA2RMZ 51,940 210-49-11 W5HGT 51,765 208-51-6 AB9JOT 51,750 200-50-6 WA1STN 50,000 194-51-3 WA2PCF 50,995 214-47-12 AA7TZO 47,790 172-54-4 W3RRX 46,110 174-53-7 43,850 183-55-3 WB5OAV 42,120 156-54-8 AB8UJK 41,565 163-51-5 W5ARV 40,975 142-55-13 WA3VBM(+WA35WF,op) 111,260 342-64-10 WA1LP1(+WA1RWU) 110,720 341-64-15 K8PVI/5(+WB5GDW) 82,600 280-59-14</p>
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Operating Events

APRIL

- 1: West Coast Qualifying Run (the night of March 31!), W6OWP prime, W6ZRJ alternate, 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC; Z used as a designator), on 3590/7090 kHz. This is 2100 PST the night of March 31. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," e.g. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A legal size addressed stamped envelope would be a helpful enclosure to expedite your award.
- 3: Six-Meter Contest, p. 71 Mar.
- 3-4: "Open" CD Party cw, p. 72 Mar. SP DX Contest, p. 71 Mar.

- 10-11: "Open" CD Party phone, p. 72 Mar. Novice QSO Party, County Hunters SSB Contest, p. 71 Mar.
- 16: WIAW Qualifying Run, 10-35 wpm at 0230 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EST (9:30 P.M. local Eastern time) the night of April 15. Underline one minute of top speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any), complete mailing address and a return stamped and addressed legal size envelope.
- 17-18: Florida QSO Party, p. 71 Mar.
- 17-19: Zero District QSO Party, p. 71 Mar.
- 18: Two-Meter Contest, p. 71 Mar.
- 24-25: Bermuda Contest phone, Triple-Letter QSO Party, PACC Contest, p. 71 Mar. Ten-

Tec QSO Party, (second period the weekend of May 1-2) sponsored by the L.I. AR Soc., full UTC period, any mode on 10 meters. Exchange call, name, QTH, 10-10 number, total of 3 chapter certificates or less and the v-p number (if any). In the case of certificates without numbers, give the chapter name. Log date/time. Score 1 point for each 10-X number received, 1 point for each certificate number and non-numbered award received. Total no. of points is then multiplied by the total no. of v-p numbers received for the total score. (Max. is 4 plus 1 multiplier for each exchange.) Send a legible log to Bob Watson, WA2MHL, 2 Suffolk Ct., Oceanside, NY 11572. If results desired, include an s.a.s.e. Logs must be received by June 30.

26: WIAW Special Evening Qualifying Run, Sunday evening local time. Details same as under the April 16 listing, 9:30 P.M. EST Apr. 25.

MAY

1-2: Ten-Ten QSO Party, second session, see Apr. 24-25 listing. Massachusetts Bicentennial QSO Party, sponsored by the South Shore Repeater Assn. (WRIACT, Scituate, MA), and endorsed by the Massachusetts Bicentennial Commission, full UTC period (no time limit). A station may be worked once per band, cw and phone are considered separate bands. No crossband or repeater QSOs permitted. MA stations may work each other. Exchange RS(T) and county (for MA) and ARRL section (or country) for others. Count 2 points for each completed exchange. Outside stations multiply total points by diff. MA counties worked (total of 14). MA stations multiply total QSO points by different MA counties plus ARRL sections and DXCC countries worked. (Do not include E. Ma. or W. Ma. as sections.) Suggested freqs.: cw, 1810 3560 7060 14060 21060 28060; phone, 1820 3960 7260 14290 21390 28590 50110 146520; Novice, 3720 7120 21120 28120. Distinctive awards and certificate for working all MA counties. Separate awards for vhf bands. Mailing deadline July 15, c/o R. J. Doherty, W1GDB, RFD No. 1, 14 Pine St., Sandwich, MA 02563. Include s.a.s.e. for results and awards. Contest committee decisions final, logs property of WRIACT.

1-3: Connecticut QSO Party, sponsored by the Candlewood Amateur Radio Assn., 2100Z May 1 through 0200Z May 3. Open to all. Exchange QSO no., RS (T), and ARRL section (for non-CT) or county (for CT stations). Stations may be worked once per band and mode. Scoring: Out-of-state stations multiply no. of CT QSOs by the no. of CT counties worked (max. of 8). CT stations multiply total QSOs by the no. of ARRL sections worked (note, DX counts as one additional multiplier). The highest possible multiplier for a CT station is 76 (74 sections, plus the traditional VE8 possibility, DX). Note: W1QI/1 will operate during the contest and will count for 5 QSOs (each band, each mode). Novice QSOs count for 2 points. Suggested freqs.: cw, 40 kHz up from the bottom of the band; phone, 3925 7250 14300 21375 28540; Novice, 3725 7125 21125 28125. Use cw during the odd hours and phone during the even hours. Awards. Logs must include date/time(Z), stations, exchanges, bands, claimed score. A large s.a.s.e. will bring the results. Postmark entries by June 1, and send to the CARA, c/o Charles Paulsen, WA1SCV, 2 Ryders La., Danbury, CT 06810.

5: West Coast Qualifying Run.

8: Frequency Measuring Test, open to all, begins with a callup at 0130 and 0430 UTC May 8 (this is the evening before, local time!). The periods for measurement start at 0137 (20 meters), 0145 (40 meters) and 0153 (80 meters); for the late run, 0437, 0445 and 0453 respectively. Each measuring period lasts five minutes. Submit your averages for each 5-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are: 14078 7096 and 3533 kHz; late-run frequencies 14129 7056 and 3534 kHz. Your entry must be received by May 19 to qualify for the August QST report of the competition. WIAW will start transmitting the official results in a special bulletin May 20.

8-9: Maine Bicentennial QSO Party, sponsored by the Portland Amateur Wireless Assn., open to all. ME stations may work both in and out-of-state stations. Periods: Sat. 1600-2100Z, 2300-0500Z, Sun. 1300-0000Z. Exchange QSO no., RS(T), and county (for ME) or ARRL section. Suggested freqs.: cw, 3560 7060 14060 21060 28060 144080; phone, 3960 7260 14315 21380 28560 144115; Novice, 3715 7160 21115 28115. Scoring: ME stations score 3 points per QSO multiplied by no. of ARRL sections worked. Non-ME stations score 1 point per QSO times the total no. of ME counties worked (max. 16). Stations may be worked once each on cw and on phone bands. A bonus of 10 points will be given to any out-of-state station working a ME portable or mobile. Don't forget about the WAM award, just confirm a QSO with one of each ME counties for this.

Send log, summary check sheets (along with usual gripes/comments) by May 30 to WA1VAL, Portland Amateur Wireless Assn., Box 1605, Portland, ME 04104.

Bermuda Contest cw, p. 71 March.

8-10: Georgia QSO Party, 15th annual, sponsored by the Columbus Amateur Radio Club, Inc. No time or power restrictions and contacts may be made once on phone and once on cw on each band with each station. Exchange QSO no., RS(T) QTH (county for GA stations; state, province or country for others). GA-GA contacts permitted. Each complete QSO counts 2 points. GA stations multiply total QSO points by no. of different states and Canadian provinces worked. DX stations may be worked for QSO points but do not count as multipliers. Out-of-state stations use no. of GA counties worked (possible 159). Awards. Suggested freqs.: cw, 1810 3590 7060 14060 21060 28060; ssb, 3900 3975 7245 14290 21360 28600; Novice, 3718 7125 21110 28110. Try 160 at 0300Z. Try 10 on the hour and 15 on the half hour during daylight hours. Your log should show: Date(time(Z)), stations, exchanges, bands, emission, multipliers claimed. Check lists will be appreciated. Include a signed declaration that all contest rules and operating regulations observed, and mail entry to CARC, c/o John T. Laney III, K4BAI, Box 421, Columbus, GA 31902. Entries should be postmarked no later than June 7. Include a large s.a.s.e. for results. Vermont QSO party, sponsored by the Central Vermont Amateur Radio Club, from 2100Z Sat. May 8 to 0100Z May 10. VT stations score 1 point per contact and multiply by the no. of ARRL sections and countries worked. All others score 3 points per VT station worked and multiply total by the no. of VT counties worked on each band. The same station may be worked once on each band and mode. Mobiles may be worked considering each new county they enter as a new station. Awards. Suggested frequencies (try cw on the odd hour and phone on the even hour UTC): 3560 3909 3932 7060 7265 7290 14060 14290 14325 21060 21375 28160 28600 50260 50360 144-144.5 145.8. Exchange QSO no., RS(T), and county (for VT stations, ARRL section for others). To be eligible for awards, entries with s.a.s.e. must be mailed by June 15 to: Peter Kragh, W1AYK/K2UPD, 170 Summit Ave., Ramsey, NJ 07446. All band/mode activity is urgently needed from the counties of Bennington, Caledonia, Essex, Grand Isle and Orleans. If interested portable or mobile, contact W1AYK.

11: WIAW Qualifying Run.

14-16: YL International SSBers QSO Party, cw and phone, 1901Z May 14 through 1900Z May 16. Two six-hour rest periods in the 48 hours of operating. All bands may be used and the same station may be contacted on different bands for contact points but not for country multiplier. (Use country multiplier only one time.) The event is in 3 categories, (DX/WK teams, YL/OM teams, single operator). Non-members welcome. Send name, RS(T), ssbr no., country, state, partner's call. If non-member send no number. Cw contacts count double. Phone: 2 points for member contact on same continent (4 points cw). Four points for member contact on different continent (8 for cw), one point for non-member contact (2 if on cw). Multipliers DXCC countries, USA states. Awards. Suggested frequencies: cw, 3565 7085 14070 21070; phone, 3873 7273 14333 21373 28673. Log usual info. plus ssbr number, partner's call, rest periods. Full details on teams and reports (to be received by July 15) to Lyle Coleman, W7EOI, 412 Nineteenth Street SW, Great Falls, Montana 59404.

15: Armed Forces Day, info. in the May issue. World Telecommunication Day Contest, sponsored by the Brazilian Ministry of Communications. Phone the full 24-hour UTC period May 15, cw the full period of May 22, 160 through 10 meters. Categories are single operator, multiband, fixed station or mobile maritime operating on 76-90 ITT zones. Groups will be considered as special multiop./multiband participants. Transmit RS(T) plus ITU zone. USA 6 and 7th call areas are on ITU zone 06, 5th call area in zone 07, 1, 2, 3, 4, 8 and 9 in zone 08. VE1, 2, and VO 1, 2,

on 09; VE3 04, VE4/5 03, VE6/7 02; most of VE8 in 02. Scoring: Contacts with station in the same country zero points, in another country in the same ITU zone 40-160 meters 1 point, 80/160 2 points. Contacts in another ITU zone on the same continent, 10/15/20 meters 2 points, 40 meters 3 points, 80 and 160 4 points; with another continent 10/15/20 meters equals 3 points, 40 equals 5 points, 80/160 equals 6 points. Final score equals sum of QSO points multiplied by the no. of ITU zones worked. You can work a station on another band but each ITU zone counts just once in the final multiplier. Awards. Log separately for each mode; usual manner. Postmark entry before June 30 and send to: Minister of Communications, DENTEL, Brasilia, DF, Brazil.

15-17: Michigan QSO Party, sponsored by the Oak Park Amateur Radio Club, from 1800 UTC May 15 through 0200 UTC May 17. Phone and cw are separate contests (but you may enter separate logs for both modes). This year, MI stations may work MI counties for multipliers. A station may be contacted once on each band/mode. Portables/mobiles may be counted as new contacts each time the county changes. Exchange RS(T), QSO no., QTH (county for MI, state or country for others). Multipliers count once only. Scoring: MI stations count 1 point per QSO times the sum of states/countries/MI counties. (KL7, KH6 count as states, VE counts as a country). Non-MI stations QSO points times MI counts. QSO points as follows: 1 point each W/K/WA/WB8 Michigan QSO, 5 points for each WN8 and special events station QSO. (Max. mult = 83). Vhf-only entries; same as above except that multipliers per vhf band are added together for total multipliers. Suggested frequencies: cw, 1810 3540 3725 7035 7123 14035 21035 21125 28035 28125; phone, 1815 3905 7280 14280 21380 28580; vhf 50.125 145.025. Between 1600-1900Z try 15 on the hour, 10 on the half hour. Awards. Submit summary with log, print neatly, usual signed declaration. MI stations include club name for combined club score. Contest committee decisions final. Mailing deadline June 18. Send to: Mark Shaw, WA8EDC, 3810 Woodman, Troy, MI 48084.

22: World Telecommunication Day, cw, see May 15 listing.

22-23: New York State QSO Party, sponsored by the Rensselaer Polytechnic Institute Radio Club, W2SZ, from 1600Z May 22 to 0400Z May 23, and 1200-2359Z May 23. Stations may be contacted once on phone and once on cw on each band. NY stations may work other NY stations. Mobiles/portables changing counties may be reworked by out-of-state stations. Exchange consists of signal report, serial no. (starting with 001), and QTH (county for NY, state, province or country for others). Suggested freqs.: cw, 1810 3560 7060 14060 21060 28060; phone, 3975 7275 14285 21375 28575; Novice, 3725 7125 21125, 28125. Score one point per QSO times the no. of multipliers; state, provinces and countries for NY stations, maximum of 62 counties for others. Number the first contact for each new mult. A check sheet is requested from stations making over 100 contacts. Certificates. Entries should be sent no later than June 30 to John C. Yodis, WA2EAH, 43 Beacon Ave., Albany, NY 12203. Results if an s.a.s.e. is enclosed.

23-24: Wisconsin State QSO Party, Nostalgia Radio Exchange, Russian Contest; details next issue.

JUNE

12-13: VHF QSO Party.
26-27: FIELD DAY.

JULY

24-25: ARRL Bicentennial Celebration.

SEPTEMBER

11-12: VHF QSO Party (note this is a date change).

NOVEMBER

6-7: Sweepstakes, cw.
20-21: Sweepstakes, phone.

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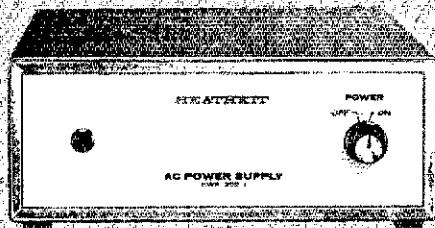
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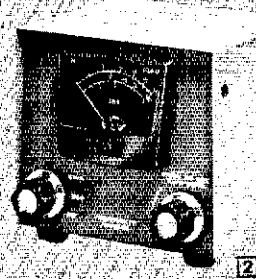
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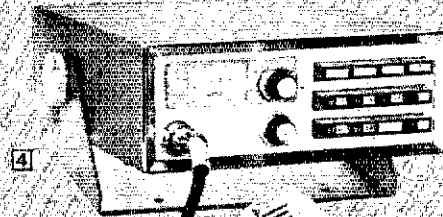
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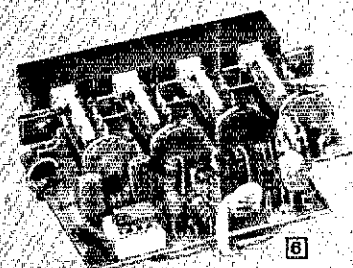
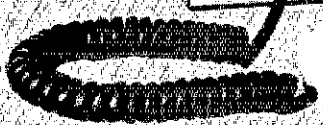
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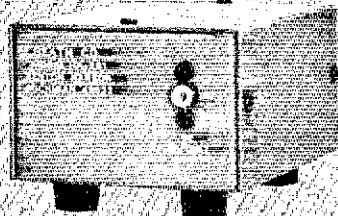
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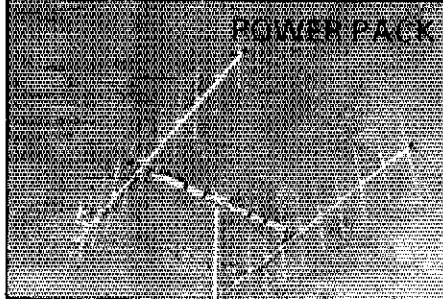
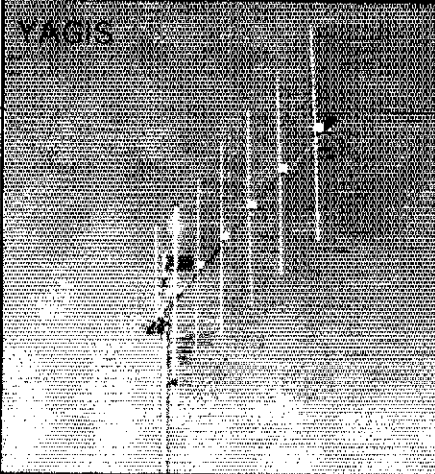
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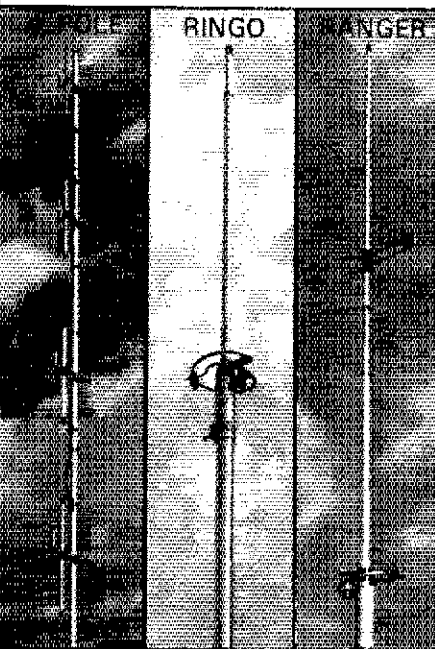
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2, WA3VDQ 2, WA3BJQ 1, WA3BSV 1, K3DZB 1, W3EU 1, W3GMK 1, W3GOA 1, WA3RKH 1, WA3TKU 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — PAM: WA3EOP. RM: W3FZV. NCM W3DD. Net skeys are: MDD on 3643 at 1900 and 2200 MDCN and MDCN on 1700 3920 daily at 1800 local and WR PON 3905 at 1700 local daily except Sun. No PSHR Jan. BFL: WA3UJF. W3MSN having a ball on 160 meters and 450 MHz. WA3SJV holds forth on 14 and 21 MHz. W3MWD fights rotten condx. with ease. W3EQV awaits the coming harvest season. W3CQ winters in FL. W3ZNV caps the AREC year with very big SET. WB3BE would like to see a radio club at his high school. W3FCI back after a long stint as F0BNC. WA3KCY and WA3UVM apply for appts. W5QPX is looking for members to the IARH. WA1VMV/3 was victimized by a super garble. WA3J5Z and W8ZYZ/3 monitor the bands as OPS. WA3UJF was happy to help a K3CEZ newcomer. Sorry to lose WA3POL. K3VNR and WN3TUG Silent Keys. W3HJH was ready for the SET. W3RRX was formerly W6AXX. W3LDD had big trouble with the linear. WA3FYZ goes to work at the VOA. WA3YKK manages to be heard with his indoor antenna. WB3ZY/3 likes that AC prefix. WA3WRN and WA3ZAE are busy with paying jobs. WA3EOP had the MEPTN in a new switch for the SET. WA3PRW cranks the antennas down during wind storms. W3FZV made 19K in the CD Party. W3DFW is a stone's throw from heavy snow. W3BHE is retired and busy, busy, busy. W3JFU is an OT location for Bicentennial. W3ADQ bemoans the crowded condx. WA3UPH got a quick breather between semesters. With the nets: Net/sessions/Tic/QNI average. WR PON/14/60/20. MDCN/15/59/17.3. MEPN/23/96/22.2. MDD/60/307/7.5. MDCN Top Honors to WA3EOP. WA3WRN W3FA WA3IHW and W3LDD. The MEPN lists others as W3ADQ W3JGN and W3LDD. MDD Top Brass W3FA and W3FZV. The Dec. MDD Top Brass were W3FZV WB3ZY/3 K3KAJ and WA3WPV. Traffic: (Jan.) WA3UJF 381, W3FA 220, WB3ZY/3 209, W3FZV 114, WA3EOP 104, WA3SJV 93, W3MWD 86, WA1VMV/3 79, WA3WRN 64, W3LDD 30, W3EQV 27, W3ZNV 17, WA3PRW 16, W3BHE 14, W3YKK 11. (Dec.) WA3UPH 16.

SOUTHERN NEW JERSEY: SCM, Charles E. Travers, W2VPZ — W2UNI appointed as EC for Salem Co. Other appointments include WB2LCC as OPS, O8S and W2HOB as OPS and OVS. Harmonics, the SJRA and W2HOB are two important milestones — first the 90th anniversary of SJRA and 2nd the 56th anniversary of ARRL affiliation. Recent storms have badly crippled amateur station WA2AML. Any assistance offered will be greatly appreciated. Check your OPS, QRS certificate, or whatever, for endorsement. Stations desiring appointments are requested to make such requests as soon as possible. Check with your net mgr. He will give you the proper information and inform you regarding eligibility according to regulations set for OPS and well as QRS and net. These appointments are available to you, request them.

Nets	Manager	QNI	QTC	Sess.
NJ5N	WB2RMK	198	89	39*
NJPN	WB2VTT	647	510	37
NJPN (Su)		166	266	8
NJN EA		463	232	73
NJN Lr	WB2LCV	173	74	
SET*		94	63	17

*Includes special "SET" sessions. Traffic: WA2LCV 274, WB2SFX 13, WA2TRK 12, WB2OSQ 10, W2IU 4.

WESTERN NEW YORK: SCM, Richard Pitzerusa, K2KTK — SEC: WB2EDT, WA2ZJP nearing the completion of his Mavti QRP station, promises not to QNI the nets with it. With conditions the way they are it probably wouldn't matter though! WA2EAJ starting new semester at SUNY Buffalo, also participated in SET. A big welcome to the VYRON becoming a formal part of the National Traffic System. VHF activity a-sprouting all over the place. The Rochester area gang have started an informal net on 2 meters SSB Mon. nights at 2000 EST on 144.120 MHz. K2KTK W25B. K2KIR holding down 2 cw in the K2KTK area. WA2KIN firing up (so to speak) on 5 SSB. With Oscars 6 and 7 afloat, more stations should migrate to the low end for some "simplex" operating after the passes. W25BI looking for NV and HI to complete his Oscar WAS. K2KTK looking for 34 states to complete his 2-meter cw WAS sorry FM is cheating. Too many you-ones send items to me too late for inclusion in the appropriate station activities. Please remember there is an approximate two to three month lead time for something to get from your letter to QST. For instance, by the time you read this ARATS will have held their auction on Mar. 16. ARATS also celebrating its 25th anniversary this bicentennial year. WB2ZVJ at Buffalo, NY, would like to hear from his Buffalo area friends. WA2EAJ new Novice in East Aurora. New officers for the Walton Radio Assn. are: K2E2K, pres.; WB2JOW, veep.; WA2RMI, secy.; W2FMU, treas.; W2TFL, act. chmn. Traffic: WB2UBW 350, W2FR 338, W2RUF 168, WA2UYK 145, WA2ICB 122, W2MTA 120, WA2HSB 116, WB2VND 99, W2PZL 77, WB2VW 63, W2WFK 59, WA2PUJ 49, WB2QIX 47, WA2IPC 41, WA2ZAV 39, WB2IKL 30, WA2ZJP 30, K2KTK 29, W2RQF 29, W2RUT 24, K2DFV 21, W2UYE 20, W2EAF 16, WA2RXO 10, AB2CTR 8, K2IMI 5, WA2EAJ 5.

WESTERN PENNSYLVANIA: SCM, Donald J. Mysowski, K3CHD — SEC: W3ZUH, Asst. SEC: K3SMB, PAM: K3ZNP, RA: T. W3NEM, W3LOS W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 PM local time. Pa. Phone Net meets Mon. thru Fri. on 3960 kHz at 5:00 PM local time. Pa. Traffic Training Net meets daily on 3610 kHz at 7:00 PM local time. Western PA RACES Net meets every Sun. on 3990.5 kHz at 9:00 AM local time. Thanks to W3ZIMB and K3SMB and their staff of ECs and also all those who participated in the SET. A very well run exercise. Welcome to the following new Novices: WN3AZP and WN3AZQ. Thanks to W3TZW and WA3KIR for their help in getting WN3BDF on the air. Note, members of the WPA Section, take a look around you to see if there are interested individuals who need your personal guidance in becoming an amateur. K3VCI has erected a new tower. Greater Pittsburgh VHF Society officers for 1976: K3MOB, pres.; W3IOH, vice-pres.; WA3JBQ, rec. secy. W3RXC, corr. secy. K3QAM, treas. Steel City ARC repeater operational on 147.63/03 MHz. W3IBW acquired a GTX-10, K3VLP an HD-1410 keyer and WA3VNX a TR4. South Hill Brass Pounders & Modulators officers for 1976: WA3SRD, pres.; W3JH, vice-pres.; K3FIV, treas. WA3UE, secy.; K3VXV, W3GNI, W3MML, dir. W3ADB, K3WNZ, W3LTH, trustees.

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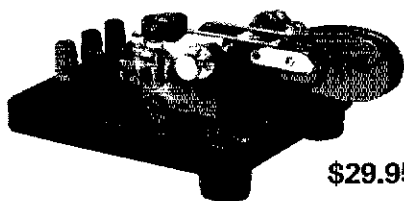
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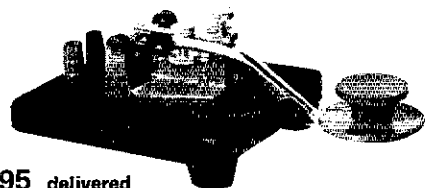


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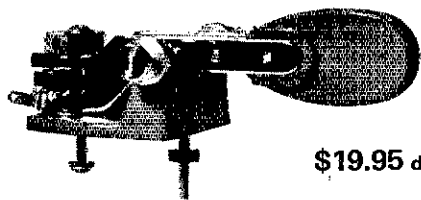


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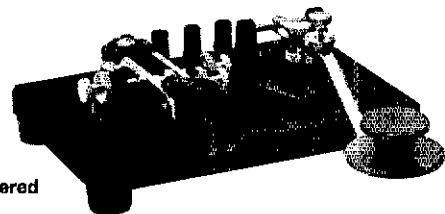
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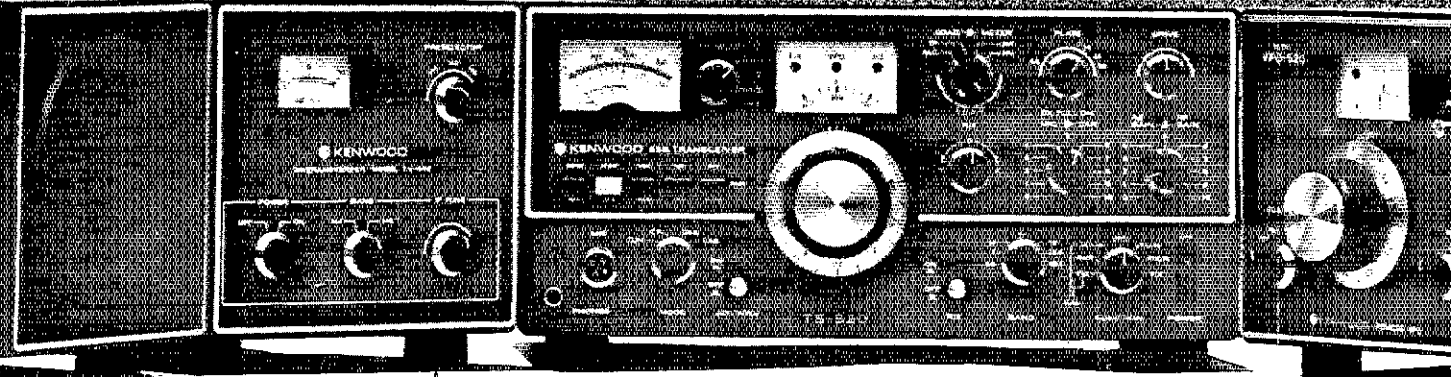
MODES: USB, LSB, CW
 POWER: 200 watts PEP input on SSB, 160 watts DC input on CW
 ANTENNA IMPEDANCE: 50-75 Ohms, unbalanced
 CARRIER SUPPRESSION: Better than -45 dB
 UNWANTED SIDEBAND SUPPRESSION: Better than -40 dB
 HARMONIC RADIATION: Better than -40 dB
 AF RESPONSE: 400 to 2600 Hz (-6 dB)
 AUDIO INPUT SENSITIVITY: 0.25 μ V for 10 dB (S+N)/N
 SELECTIVITY: SSB 2.4 kHz (-6 dB), 4.4 kHz (-60 dB) CW 0.5 kHz (-6 dB), 1.5 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 6146B, 12BY7A), 1 IC, 18 FET, 44 transistors, 84 diodes
 DIMENSIONS: 13.1" W x 5.9" H x 13.2" D
 WEIGHT: 35.2 lbs.
 SUGGESTED PRICE: \$629.00

VFO-520

Provides high stability with precision gearing. Function switch provides any combination with the TS-520. Both are equipped with VFO indicators showing at a glance which VFO is being used. Connects with a single cable and obtains its power from the TS-520. Suggested price: \$115.00.

SP-520

Although the TS-520 has a built-in speaker, the addition of the SP-520 provides improved tonal quality. A perfect match in both design and performance. Suggested price: \$22.95.



TV-502

TRANSMITTING/RECEIVING FREQUENCY: 144.145-7 MHz, 145.0-146.0 MHz (option)
 INPUT/OUTPUT IF FREQUENCY: 28.0-29.7 MHz
 TYPE OF EMISSION: SSB (A3J), CW (A1)
 RATED OUTPUT: 8W (AC operation)
 ANTENNA INPUT/OUTPUT IMPEDANCE: 50 Ω
 UNWANTED RADIATION: Less than -60 dB
 RECEIVING SENSITIVITY: More than 1 μ V at S/N 10 dB
 IMAGE RATIO: More than 60 dB
 IF REJECTION: More than 60 dB
 FREQUENCY STABILITY: Less than \pm 2.5 kHz during 1-60 min after power switch is ON and within 150 Hz (per 30 min) thereafter.
 POWER CONSUMPTION: AC 220/120V, Transmission 50W max., Reception 12W max. DC 13.8V, Transmission 2A max., Reception 0.4A max.
 POWER REQUIREMENT: AC 220/120V, DC 12-16V (standard voltage 13.8V)
 SEMI-CONDUCTOR: FET 5, Transistor 15, Diode 10
 DIMENSIONS: 6 $\frac{1}{2}$ " W x 6" H x 13 $\frac{1}{4}$ " D
 WEIGHT: 11.5 lbs.
 SUGGESTED PRICE: \$249.00

CW-520
 500 Hz CW Crystal Filter: \$45.00

Prices subject to change without notice
 Available at select Kenwood dealers
 throughout the U.S.

Kenwood's TS-520 has sold itself to thousands of amateurs the world over.

The value of its features and specifications are obvious. But just as important is the kind of quality that Kenwood builds in. Hundreds of testimonials on the air attest to its performance and dependability. You probably have heard of some of the same glowing praise.

The TS-520 operates SSB and CW on 80 through 10 meters and features built-in AC and 12VDC power supply.

VOX, RIT, noise blanker, 2-position ALC, and double split frequency controlled operation are only some of its fine features.

Kenwood offers accessories guaranteed to add to the pleasure of owning the TS-520. The TV-502 transverter puts you on 2-meters the easy way. (It's completely compatible with the TS-520.) Simply plug it in and you're on the air. Two more units designed to match the TS-520 are the VFO-520 external VFO and the model SP-520 external speaker. All with Kenwood quality built in.

TRIO-KENWOOD COMMUNICATIONS

When you get tired of compromises...

TS-700A Specifications

TRANSMIT/RECEIVE FREQUENCY RANGE:
144-148 MHz
MODE: SSB, FM, CW, AM
RF OUTPUT: CW, FM: more than 10W output.
AM: more than 3W output, SSB: more
than 20W DC input.
ANTENNA IMPEDANCE: 50Ω (unbalanced)
CARRIER SUPPRESSION: Better than 40 dB
SIDE BAND SUPPRESSION: Better than 40 dB
SPURIOUS RADIATION: Less than -60 dB



KENWOOD'S TS-700A finally fulfills the promise of 2-meters... more channels, more versatility, tunable VFO, SSB-CW and, best of all, the type of quality that has placed the Kenwood name out front.

- Operates all modes: SSB (upper & lower), FM, AM, and CW
- Completely solid state circuitry provides stable, long lasting, trouble-free operation
- AC and DC capability. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater operation. Just dial in your receive frequency and the radio does the rest... Simplex repeater reverse
- Or do the same thing by plugging a single crystal into one of the 11 crystal positions for

- your favorite channel
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive capability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker
- The TS-700A has been thoroughly field-tested. Thousands of units are in operation throughout Japan and Europe

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

MAX. FREQUENCY DEVIATION (FM): ± 5 kHz
REPEATER FREQUENCY SHIFT WIDTH:
600 kHz
TONE BURST TIME: 0.5-1.0 sec.
MODULATION: Balanced modulation for SSB.
Variable reactance frequency shift for FM.
Low power modulation for AM.
MICROPHONE: Dynamic microphone, 500Ω
AUDIO FREQUENCY RESPONSE: 400-2600 Hz,
within ± 9 dB
RECEIVING SYSTEM: SSB, CW, AM: Single-
superheterodyne, FM: Double-
superheterodyne.
INTERMEDIATE FREQUENCY: SSB, CW, AM:
10.7 MHz, FM: 1st IF: 10.7 MHz, 2nd IF:
... 455 kHz.
RECEIVING SENSITIVITY: SSB, CW, S/N = 10
dB or better at 0.25μV, 20 dB noise
quieting = Less than 0.4μV, AM: S/N =
10 dB or better at 1μV.
IMAGE RATIO: Better than 60 dB
IF REJECTION: Better than 60dB
PASS-BANDWIDTH: SSB, CW, AM: More than
2.4 kHz at -6 dB, FM: More than 12 kHz at
-6 dB.
RECEIVER SELECTIVITY: SSB, CW, AM: Less
than 4.8 kHz at -60 dB, FM: Less than
24 kHz at -60 dB.
SQUELCH SENSITIVITY: 0.25μV
AUDIO OUTPUT: More than 2W at 8Ω load
(10% distortion)
RECEIVER LOAD IMPEDANCE: 8Ω
FREQUENCY STABILITY: Within ± 2 kHz during
one hour after one minute of warm-up,
and within 150 Hz during any 30 minute
period thereafter.
POWER CONSUMPTION: Transmit mode: 95W
(AC 120/220V), 4A (DC 13.8V), max.
Receive mode (no signal): 45W (AC 120/
220V), 0.8A (DC 13.8V).
POWER REQUIREMENTS: AC 120/220V,
50/60 Hz, DC 12-16V (13.8V as reference).
DIMENSIONS: 278 (W) x 124 (H) x 320 (D) mm
WEIGHT: 11 kg
SUGGESTED PRICE: \$700.00

Prices subject to change without notice

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- R-4C 160-10m receiver \$599.00
- FL-250 250 Hz filter 52.00
- FL-500 500 Hz filter 52.00
- FL-1500 1.5 KHz filter 52.00
- FL-4000 4 KHz filter 52.00
- FL-6000 6 KHz filter 52.00
- 4-NB Noise blander 70.00
- MS-4 Speaker 24.95
- T-4XC 160-10m transmitter 599.00
- AC-4 AC supply 120.00
- TR-4C 80-10m transceiver 599.95
- 34PNB Noise blander 100.00
- RV-4C Remote VFO/speaker 120.00
- FF-1 Crystal control adaptor 46.95
- DC-4 DC supply 135.00
- MMK-3 Mobile mounting kit 7.00
- L-4B 80-10m 2 KW PEP linear 895.00
- Optional Crystals 5.25
- Fixed frequency crystals 7.85
- 7072 Hand-held microphone 19.00
- 7075 Desk microphone 39.00
- C-4 Station control console 419.00
- MN-4 Matching Network 110.00
- MN-2000 Matching Network 220.00
- W-4 Wattmeter 72.00
- WV-4 VHF Wattmeter 84.00
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- TV-3300-LP 1000w low-pass 19.95
- TV-300-HP High-pass filter 7.95
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- SPR-4 Programmable rcvr 629.00
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- SCC-4 Crystal calibrator 20.00
- TA-4 Transceiver adaptor 35.00
- Plain crystal selector dial 3.00
- Aeronautical overseas xtal kit 36.40
- Amateur bands xtal kit 31.20
- Citizens band xtal kit 5.25
- Marine bands xtal kit 57.20
- MARS bands xtal kit 26.00
- Commercial teletype xtal kit 20.80
- Time & freq std. WWV xtal kit 26.00
- Tropical broadcast xtal kit 15.60
- DSR-2 Digital receiver 2950.00
- TR-72 2m FM Xcvr 320.00
- TR-22C Portable 2m FM xcvr 229.95
- AA-10 10w amplifier 49.95
- MB-22 Deck mount 10.00
- MMK-22 Mobile mount 10.00
- AC-10 AC supply 49.95
- Crystals for TR-22, TR-72 5.00



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Sharon repeater operational on 147.75/15 MHz. W3YRQ homebrewed his own 2-meter synthesizer. K3JOT was busy during the winter months building a new shack in a closet? interested in building a 10-meter repeater? Contact me for details. Now is the time to get ready and start making plans for Field Day in June. Also don't forget to seize every opportunity to promote Amateur radio in the local media. The W3YRQ Traffic CW net was held on Jan. 31, 349 stations check-in, and handled 212 messages. PSHR WA4VBM 46. Traffic: WA3VBM 423, W2KAT/3 188, K3SMB 100, WA3LJW 92, K3CHD 82, WA3OKK 75, K3CJR 69, W3UT 69, W3HHD 61, K3JVS 53, W3KUN 39, WA3SSU 39, K3HCT 38, W3SN 33, WA3PMT 28, K3JCO 11, K3YV 8, WA3UDJ 6, K3HJI 5, K3SIN 5, W3YD 4, W3IDO 3, K3OVB 1.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, AC3PRN - Ast. SCM: Harry S. W9KJL, SEC: WA9ES, PAM: WA9KFK, RM: K9ZTV. Cook County EC: W9HPG.

Net	Freq.	GMT Days	Tfc.
ILN	3650	0300	2300 Dy 456
Ill Phone	3915	---	2245 Dy 320
NCPN	3915	1300	1800 M5 381
LEN	3940	---	1400 Su no rpt.

The Radio Amateur Technical Society (RATS) of Lansing, The Centennial H.S. ARC of Champaign and the Schaumburg Amateur Radio Club of Schaumburg were declared duly affiliated societies of ARRL by the League's Executive Committee. The Rho Psi Ion ARC WA9WJ is active on 2 meters through the SSB and RTTY and 2-meter FM according to W9NLO. The Chicago Suburban Radio Assn. has a 75-meter phone net for general discussion on 3917 MHz on Sun. at 1 PM. W99PHM has a new Yaesu FT-101E and a new call W99SW at Bradley Univ. in Peoria. K9ZVW was omitted in a recent listing of officers of the 6 Meter Club in Chicago. WA9OBP WA9QK and K9K3I received Section Net Certificates. Our sympathy to the families and friends of W9VBM who recently passed away. W9AZQ is a new OBS appointee. K9UDN K9MFY WA9CID and W99AGY are the newly elected officers of the Schaumburg Amateur Radio Club. New notices are W9TDM and W9S2Z. W99PA received his SA in Accounting at the Univ. of IL Chicago Circle Campus. W99PKC is the proud owner of a new Collins S Line. The Grundy County Hams now have a CD station equipped with two meters to help in their RACES program. The Lamone Emergency Amateur Radio Club continues to expand and have received a three KW generator from their CD Dir. The new officers of the Red Covered Bridge ARC of Princeton are WA9KDX W99NTG and WA9RRB. The Chiburban Radio Mobiles Net meets every Sun. 1700 GMT and Wed. 0200 GMT on 1.833 MHz on all nets and the club's 5th annual Hamfest and annual Hamfest will be held Sun. June 13 at Santa F. Park in Willow Springs. The Starved Rock Hamfest will be Sun. June 6 at Princeton with ARRL 1st Vice-pres. Victor Clark, W4KFC as a special guest. W9NMM an FE major at Purdue Univ. is pres. of the club station W9LXY and has a new Reency HT. K9PCN W9QUO W9IWI and W9F3 were elected as officers for the new year for the Metro Amateur Radio Club. W99RFC has passed his Advanced and waiting for his ticket. WA9VGW and W9NJP/9 are BPL recipients for the month. Traffic: W99NVN 487, WA9VGW 435, W9NXC 304, W9NJP/9 257, W99NOZ 194, WA9KFK 139, W9F3 127, W9NLI 120, W9WJL 119, WA9JL 75, W94YL 65, K9KHI 62, W9LNQ 58, W9HPC 51, W9NXC 51, WA9AGN 46, W9KR 36, W9RYU 18, W99GIU 15, W9PRN 14, W99PHM 13, AB9DED 11, W99ELA 3, WA9ULP 3.

INDIANA: SCM, M. P. Hunter, WA9EED - SEC: W9UMH. Congrats to WA9KWA and W99JQV for their new DXcc. W99JQV has received a new license. Congrats to the Ft. Wayne DXcc for receiving ARRL affiliation. Several of the ITN gang have migrated south for the cold months. I received a copy of WAR News via W9IHH/4. He says that activity from that location is good. W99JA/4 will QSY to K9J in June. Reports indicate that SFT activity was good during the month. W9LLI has his antennas again (Murphy doesn't like him). NIJA publishes a good UHF publication crammed full of good info. W99SMW reports he is active and still suffers from the first contact jitters. I'm hearing several complaints of long skip during the evening sessions of the nets - ever call W9Y to 1607? The Ind. DXcc sponsor a DX call on Sat. at 0300Z on 14243 KHz. W99FT reports that their Red Cross Chapter has their mobile communications van ready for the tornado season. W9QLW reported he had a very enjoyable SEI week end - he was playing golf in FL. The first week of Feb. claimed many antennas due to the 17 way in at 344 (Indpls.). K9TKE is NCS for the Warwick Co. ARCC net. Act. at 0000Z on 146.52. Nets ITN 628; Hoos. VHF 107; A9C 10. Traffic: W9UMH 310, W99FOT 215, W99IHR 215, W99KTR 184, WA9QCF 122, W99HCH 117, W99NU 115, W99NAQ 106, W9QLW 104, W99OZW 103, K9DCX 97, W9HUF 97, K9TKE 72, WA9JUS 66, W9LTU 65, W9E1 76, W9IC 72, WA9JXP 71, W9RTH 66, AB9MDS 63, W9KWB 58, W99DIX 57, K9JQY 51, WA9OKK 48, K9YBM 45, WA9DLM 42, K9EQT 40, W9WWI 38, K9C8Y 31, W99FPK 30, W9DZC 27, K9RPZ 21, K9RWQ 19, W99TJ 17, W9PMT 16, W99AJV 16, K9LZN 15, W9IRT 14, W9YB 14, W9KTT 13, K9RFG 11, W9FC 10, W9CMT 8, AA9OKK 8, WA9OHX 7, K9CTJ 6, W9FWH 3, K9HMC 3, W9BDP 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI - SEC: K9PKG. PAMS: W9AYK WA9LRW K9TQ. RMs: W99IHC W9MFG K9LGU K9KSA. Nets, Freq., Tims, QNT, QTC, Mgr.: W9N, 3985, 1245Z M-S, 472, 326, W9AYK, BEN, 3985, 1800Z Dy, 846, 262, WA9LRW; W9N, 3985, 2315Z Dy, 89; W99IHC, W99IHC, 3985, 2330Z Dy, 1105, 239, K9TQ; WIN-E, 3662, 0100Z Dy, 135, W9MFG; WIN-L, 3662, 0400Z Dy, 205, 159, K9LGU; WSSN, 3662, 0330Z M-W-F, 23 0, K9KSA; Expo., 3925, 1801Z M-F, 723, 46, WA9NIX. SSB certificate to W99EAK. ORS to W99IDU. OPS to W9MFG. OPS-D endorsed K9W9C. W99IHC, Winnebago County W9IEM. There are 16 persons taking Nauru class at YTARC. W99SEJ worked WP4 and LU both confirmed. ARRL tapes have promoted Amateur Radio in the Baraboo area very well. OPS ORS RM WIN, WIN-L W99N certificates endorsed K9LGU, EC renewed K9ZTL. W99RCK passed Advanced Class exam. W99PAW passed General Class. Don't forget the WNA picnic July 25 at Baraboo this year. Mark July 9-10 on your calendar for Central Division Convention at Milwaukee. SEI 1976 went well. New EC for Winnebago County WA9JLI, K9CPM made BPL. Considerable activity on 2-meter teletype in the

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\$209⁹⁵



90
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10 Day
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FEATURES

1. 24 Channel Operation
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16. External Speaker Jack
17. Built-in Speaker
18. Dynamic Microphone Included
19. Mobile Mounting Bracket Included
20. Frequency Range 144-148 MHz
21. 6 1/2" W x 2 1/4" H x 9 1/2" D
22. Weight: 5 1/2 lbs.
23. Power Requirements:
 Source: 13.5 VDC \pm 10%
 Receive: .45A
 Transmit: 2.6A (10W), .7A (1W)

SPECIAL INCLUDES:

- A. WILSON "WE-224"
- B. MOBILE MIKE
- C. MOUNTING BRACKET
- D. 146.52/52 SIMPLEX CRYSTALS
- E. TWO PAIR TX/RX CRYSTALS OF YOUR CHOICE.
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2202 SM

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 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 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 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

USES SAME ACCESSORIES AS 1405
INTRODUCTION SPECIAL

\$239⁹⁵

INCLUDES

1. 2202 SM
2. Flex Antenna
3. 223.50 Simplex Installed



4502 SM

FREQUENCY RANGE 420 - 450 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 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 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

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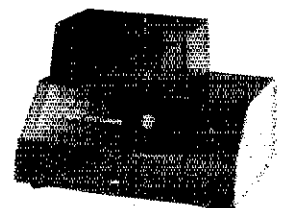
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3. 446.00 Simplex Installed

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BP - NI-CAD BATTERY PACK	10.95
LC1 - 1402 LEATHER CASE	8.50
LC2 - LEATHER CASE FOR 1405, 2202, 4502	8.50
SM2 - SPEAKER MIKE FOR 1402 AND 1405	24.95
TE1 - SUB-AUDIBLE TONE ENCODER INSTALLED	34.95
TTP - TOUCH TONE PAD INSTALLED (With Purchase)	49.95
XF1 - 10.7 MONOLITHIC IF XTAL FILTER INST.	8.95
CRYSTALS: TX OR RX (Common Freq. Only)	3.00



BC - 1
BATTERY CHARGER

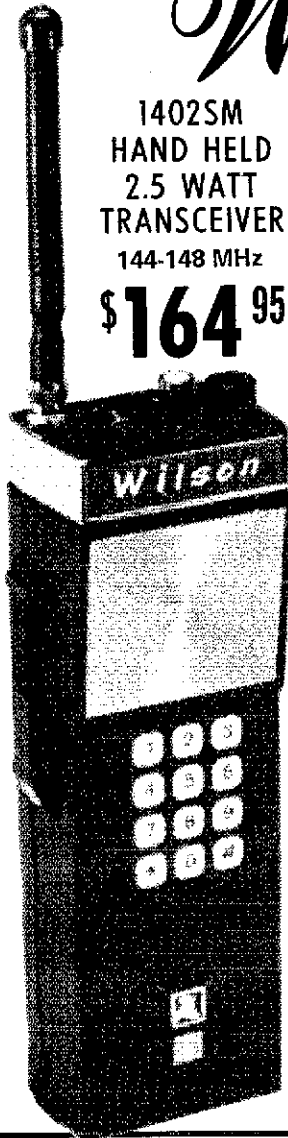
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1402SM
HAND HELD
2.5 WATT
TRANSCEIVER
144-148 MHz

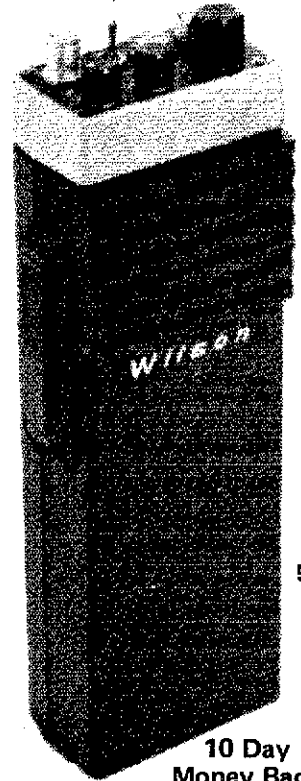
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- | 1402 SM | 1405 SM |
|---|---|
| <ul style="list-style-type: none"> • 6 Channel Operation • Individual Trimmers on all TX/RX Crystals • All Crystals Plug In. • 12 KHz Ceramic Filter • 10.7 IF and 455 KC IF • .3 Microvolt Sensitivity for 20 dB Quieting • Weight: 1 lb. 14 oz. less Battery • S-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 14 MA TX 500 MA • Microswitch Mike Button | <ul style="list-style-type: none"> • 6 Channel Operation • Individual Trimmers on all TX/RX Crystals • All Crystals Plug In • 12 KHz Ceramic Filter • 10.7 and 455 KC IF • .3 Microvolt Sensitivity for 20 dB Quieting • Weight: 1 lb. 14 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 14 MA TX 400 MA (1w) 900 MA (5W) • Microswitch Mike Button • Unbreakable Lexan® Case |

1405SM
HAND HELD
5 WATT
TRANSCEIVER
144-148 MHz

\$ **239⁹⁵**



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EQUIP TRANSCEIVER AS FOLLOWS: XTALS A. _____ B. _____

C. _____ D. _____ E. _____ F. _____

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CARD # _____ EXPIRATION DATE _____

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ADDRESS _____

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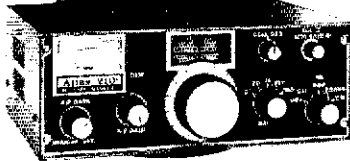


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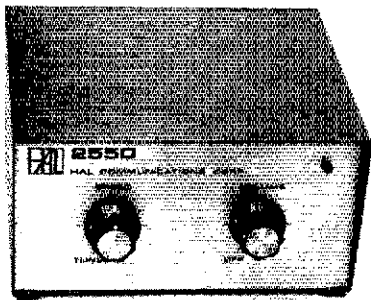
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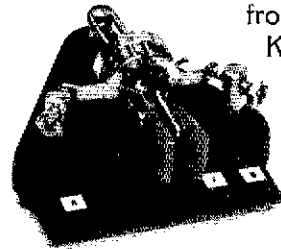
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DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K0ZXE — SEC: WA0QFZ. PAMS: K0ZBI WA0GLI AB9HOX WA0VYT. RMS: K0CVD K0RYU WB0OAG. If you need information on nets and their functions, contact the above. Thanks are extended to retiring MSN2 RN WA0YAH, who has served MN well as a net mgr. for several years. Welcome to WB0OAG, new net mgr. Several MN nets held special sessions during the 1976 SET. MSN1 MSSN PAW MN1N MAWX were active. The net work end of Jan. 24 was particularly busy with traffic handling. Netting activities in Mpls see WA0RLD on the range see K0GNI. The Markato ARC also has a novice program. New Novices this month are WN0RUD and WN0RVH, greetings! FM: WR0ADW now on 147.60/00 TA, WR0AH on 27 floors on 16/76, Honeywell machine on 04/64, St. Cloud WR0AK on 34 MHz Duluth 34/76 now 100W 5 sense. The Twin Cities RTTY Club building an elaborate FM teletype repeater utilizing a micro processor to control access and provide memory storage, which can recall information. This might be the first repeater of its kind in the country and should be operating in four months, the Twin Ports FMC held a public display, originating messages. RTTY club excellent PR with the general public. Communications for Spirit Mountain ski races were also provided. Congrats to new ORS WB0LDO and WB0OAG. K0P1Z enjoying his Tempo, W00IR and W00XN went to Barbados for the Mar. DX contest. Newly elected Officers for ABS are WA0MJJ pres.; WA0WTA, vice-pres.; WA0GKN, secy; WB0AM, mtr. SPL to AB9HOX. Traffic: AB9HOX, 812, K0CVD, 293 WB0OAG 203, WA0GLI 178, WA0VYT 152, K0ZXE 131, W00MY 116, K0CSE 109, WA0YWA 91, WB0EKC 90, K0P1Z 75, WA0TFC 63, WA0URW 53, WB0EKO 51, WB0NGX 49, K0H-LT 47, K0RZD 47, WB0CPC 43, K0E, K0PZ 36, WA0LDW 34, WB0JYT 33, W00XN 32, WA0CLA 28, WB0MEE 28, WA0YAH 27, WA0DA 24, W0HZU 22, WB0OCT 22, W0MAAO 15, K0SRK 10, WA0LW 8, WA0JPR 8, K0GNI 4, WA0TGM 3.

NORTH DAKOTA: SCM, Harold L. Sheets, W0DM - OBS: K0PVG. Radio classes in the area: W0P5J at FOX Club in GR Valley City; K0FRP Park River; W0P5J at GR Valley City, Wampeton. W0P5J passed the code test for Conditional WX Net doing well considering the skip conditions. WA0REW has had perfect attendance for check-ins to that net. K0AAJ has a new Kenwood T5520. W0EFJ getting back to normal with operation on all bands. W0EZO was in the Veteran Hospital. W0EJW a new call in Hettinger. W0VWL spent a couple weeks in Seattle. WA0RWL started a six month cruise with the Merchant Marine. The Forx Amateur Club presented a set of ARRL books to the Valley Jr. High Library. SET went off with small participation as skip conditions were bad. Three sessions held, 48 QNI and 33 QTC. WA0SUF was Net Control. This is my last report as SCM. I have enjoyed doing it and earnestly hope you will give the same support to WA0VWL as you have done for me.

Nets — kHz	CDT/Days	sess.	QNI	QTC
Goose River — 1990.0	0900 Su	4	52	
W0CDO				
RACES — 3996.5	1700 S-S	56	611	256
W0QAI	1800			
WA0SUF				
YL WX — 3996.8	0730 S-S	31	535	556
WA0RWM				
WA0GRX				

Traffic: WA0RWM 973, WA0SUF 191, W0CDO 96, W0VWL 47, W0BGMG 44, W0UD 44, W0MXF 26.

SOUTH DAKOTA: SCM, Ed Gray, WA0CPX — The Sioux Falls ARC and Sioux Valley Repeater Assn. will be hosting the 5D Ham Picnic on June 12 and 13 at the Sioux Empire Farm Camp on Sioux Falls west side, 1/2 mile east of I-29 and the 1st street exit. Activities start Sat. afternoon with an eyeball session; followed by a family style meal that evening. At sunset, a two meter transmitter hunt will begin. For those not in the transmitting hunt a program for all ages will finish the evening. Sun. events will begin with a church service followed by seminars, contests, transmitter hunts, (80 and 2 meters) tests, and prize drawings. Talk in will be on 3950 and 16/76. Sites on the fairgrounds are available for campers and tents with facilities nearby. Net Reports: WX Net: 797 QNI, 493 QTC; NJQ Net: 976 QNI, 56 QTC; 5D Evening Net: 384 QNI, 2 QTC. SDCW remains active; YL Net: 28 QNI, 2 QTC. Traffic: W0GRI 63, WA0YRW 117, WA0LJN 74, W0IG 52, W0DYB 37, W0M2I 25, K0DUR 22, W0BEVQ 20.

DELTA DIVISION

ARKANSAS: SCM, S.M. Pokorny, W5UAU — SEC: W5RXU. PAM: W5POH. RM: W5MYG. Nets: 1412, Time/Day, QNI, QTC, Mgr.: ARN, 394, 0030/DV, 207, 10, W5UAU; OZK, 3760, 0100/DV, W5MYZ; APN, 3927, 1200/M-S, 867, 38, W5POH; M-BIRD, 3922, 2230/M-F, 668, 21, W5ZVZ. The NWAARC and ZEAR are active in SET '76. EC W5SHY reported OZARK has 13 stations participating in SET '76 with mayors of Cotter, Lakeview, Mena, and Horna and Salesville, Baxter Co. Red Cross and Baxter Co. Hospital cooperating in SET. The Baxter Co. to Little Rock link was by radio teletype. The OZARK operation was on 2 meters. New at Russellville W5SAHN WA0MID W5SQEAB W5SRCM. Officers for AR River Valley ARC: W5SQA, pres.; W5BLP, vice-pres.; W5LH, secy-treas. W5BLP holding novice class at ARVAF with 11 students. W5BLP retired from forestry service, W5AJN Danville Mtn on air after 8 month wait for license. New ORS W5DRW. NCX for Ark. Phone Net (APN) K5UEK W5LEA W5FOT W5DY SD K5WPP. Hazorb-back net (ARN) W5BCZR K5DY SD W5SQC W5SQC W5SQC. W5SQC canceled EC appointment and is now in military service. PSHR: W5POH 39, W5BE 25, W5UAU 24, W5SHNN 40. Traffic: W5UAU 129,

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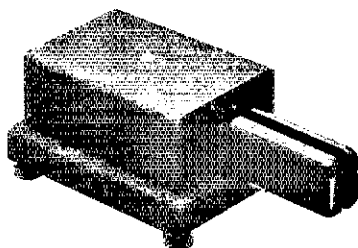
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WA5HNN 124, W5TXA 73, W5POH 26, W5BED 17, W5KLL 4.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NY. SEC: W5TRI. RM: W5APRI. PAM: W5SEKU. VHF PAM: W5SKAX. I regret to report the passing of W5CNG and K5EDE. Walt (K5CQI) was very active in emergency communication and was one of the original founders of the Medical Net of New Orleans. His last activity was with the NO VHF Club during 1976 SET. K5BRL with W5DKD/5 and WA5QVN provided communications for the state police in Monroe after they lost all facilities. The New Orleans VHF Club 16/76 repeater was stolen; a reward of \$1000 has been posted by the club. Any info should be sent to W5SKAX, pres. Officers of the Ruston ARC are WA5YKQ, pres.; W55NIK, vice-pres.; WA5YRM, secy.; K5LVZ, treas. W55CDD editor of the Baton Rouge club paper, and doing an excellent job. LA had a very good SET in Jan. Many thanks to all who participated. WA5ZZA and WA5JQL have been very active with Guatemala emergency traffic, as has been W5KSI, who has arranged an RTTY hookup with T59AD. W5KLV, DRN5 Mer, advises that LA was 100% on that net in Jan. The Calcasieu 2-meter net progressing with a total QNI of 11 in Jan. W5SKQJ net mgr. W5HGT reports the Jonesboro repeater on 28/88 is active.

Net Manager	kHz	Time	QTC	QNI
LAN	3615	7:00 PM Dy	244	405
W5APRI		10:00 PM Dy		
LIN	3910	6:45 PM Dy	310	285
W5TQA				
L5N	3703	8:30 PM M-F	46	163
K5TTC				

MISSISSIPPI: SCM, W. L. Appleby, W55DCY — Asst. SCM: C. E. Gibbs, W5L4. PAM: WA5ZLX. RMs: W55FHA, W55MTQ. Welcome to new amateurs W5Ns HGC RGD RAH, W55RGG. MS Slo Net needs support. W55NJZ now General. Delta Div Conv & Hamfest scheduled for Apr. 24-25 at Jackson. Appointment K5RRG ORS. K5RSE latest Extra class in TARC Jackson Co. ARC now ARRL affiliated, also have 45 students in Code & Theory classes. DRN5 Mgr. reports 96.7% representation from this section during Jan. Includes W55LXX, W55BK, W5EDT, W5QDC. Vicksburg ARC presented ARRL Radio Amateur Book Collection to local libraries. M5ARA 1975 officers are: WA5FMF, pres.; W55FCO, vice-pres.; W55LCW, secy.; WA5MTX, treas.; W55FDP, Act. chmn. Vicksburg ARC has 19 new Novice members, 9 in M5ARA. MTN continues to grow in check-ins and traffic. 13-73 repeater operational Gulfport area, as is AF MARS repeater at Keeler. W5UEP now K3RFQ in MD. W55IRV off high speed cw for a while. I need volunteers and/or recommendations for OEs and a VHF-UHF PAM.

Net - Freq. Time QTC QNI Mgr.
MSBN - 3987.5 2345Z Dy 149 1289 WA5ZLX
MSN - 3733 0000Z MWF 13 66 W55MTQ
MTN - 3685 0045Z Dy 185 282 W55FHA
CSCHN - 3935 0100Z Dy 57 1938 W55LW
Traffic: W55FHA 267, W5EDT 159, WA5YZW 150, W55MTQ 108, W55BK 94, K5OAF 75, W55LXX 66, W55DCY 54, W55MDR 25, W5NGB 20, W55HVY 16, W55DDQ 10, W55B 7, W55OAV 4, W55NJZ 3, W55LAI 2, W5LL 2.

TENNESSEE: SCM, O. D. Keaton, WA4GL5 — SEC: WB4DYJ. PAMS: WB4PRF, K4LSP. RM: WB4DUJ.

Net Manager	Freq.	Time(Z)/Days	Sess.	QNI	QTC
TPN	3980				
WA4EWW		1040 M-F	31	3523	395
W4FFP		1145 M-F			
WB4YPO		0000 M-F	1400	55iH	
		0030 M	5	90	3
TCN - 3980					
ETVHFN	50.4	0000 TThS	12	126	0
W4SGI					
ETVHFN	145.2	0000 WF	8	39	1
WR4DZG					
ETTMMN	28.7	0100 WF			94
WB4NF1					
MTTMMN	28.8	0100 TF	7	62	0
W4EAY					
WTVHFN	146.37	2000 S	8	136	4
WA4VVX	146.97	0130 F			

The FACT club of Lebanon reports an enrollment in their code class of 20. The 1976 KARC-BMRC officers are: WB4NIR, pres.; WA4JVG, vice-pres. KARC, WA4ZAL, vice-pres. BMRC, WA4LDE, secy-treas. KARC, WA4JWE, secy-treas. BMRC, WA4HKU, act. mgr.; WB4FKM, E. Traffic: W4GAG 302, WB4Z5Z 67, W4RUW 65, K4YFC 69, WB4GB 67, WB4PRF 59, K4J5F 43, WA4GL5 38, WB4DDV 30, K4KCK 27, K4WWQ 26, WB4YPO 25, WB4ANX 24, WB4MPJ 19, WB4BKF 15, WB4GZF 14, W41YV 14, W4CYL 10, K4GJY 10, WA4LJW 9, K4AMC 5, WB4FGT 5, K4MZE 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID. SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	341	25	KYN	362	316
MKPN	1188	267	KPON	130	17
KTN	2389	300	8DAREC	96	16
			8DAREC	79	10

The SET week end was quite active as evidenced by the large traffic counts. The annual SET meeting was lightly attended but I guess its tough competing with the Superbowl. WB4TPU worked the bicentennial WAS in 6 hours. WB4FOT, WB4YDX, WA4ERE and WB4BRZ lost antennas in the Jan. storms. Novice classes are being run by the Bluegrass ARC and by the Pinebluff hams. Your SCM's article on Amateur Radio in 66 in the Newspaper, Jan. 23 stirred up a hornet's nest! Lots of comments and calls! W4RHZ has applied as radio operator on a bicentennial sailing ship. The NKY ARC is involved in volume purchases of coax and antenna aluminum in quantity as a substantial savings to members. Good idea for your club? Traffic: W4GQH 403, W4CID 253, W4RHZ 238, WB4ZML 22, K4TXJ 86, WA4AGH 82, WB4EOR 67, WB4AUN 52, K4FLM 52, K4HOE 50, WB4QVS 45, W4CDA 40, WB4NHO 35, K4AVX 23, W4YOK 19, W4ARC 10, WB4LFL 16, WA4FAF 15, W4VWQ 7, WNASAC 5, WB4TPU 3.

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2N4430	2N5918
2N4431	2N5919
2N4933	2N5922
2N5016	2N5923
2N5070	2N5924
2N5071	2N5925
2N5090	2N5941
2N5102	2N5942
2N5108	2N5992
2N5177	2N5993
2N5178	2N5994
2N5589	2N5995
2N5590	2N5996
2N5591	2N6080
2N5635	2N6081
2N5636	2N6082
2N5637	2N6083
2N5641	2N6084
2N5642	2N6094
2N5643	2N6095
2N5644	2N6096
2N5645	2N6097
2N5646	2N6104
2N5687	2N6105
2N5688	2N6136
2N5689	2N6166
2N5690	2N6197
2N5691	2N6198
2N5697	2N6199
2N5698	2N6200
2N5699	2N6201
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2N5704	2N6206
2N5705	2N6207
2N5706	2N6208
2N5707	2N6255
2N5708	2N6256
2N5709	2N6257
2N5711	2N6267
2N5712	2N6268
2N5713	2N6269
2N5714	2N6361
2N5773	2N6362
2N5774	2N6363
2N5775	2N6364
2N5776	2N6369
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2N5848	2N6368
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BLX15	BLY93A
BLX65	BLY94
BLX66	2N3375
BLX67	2N3553
BLX68	2N3632
BLX69	2N3924
BLX92	2N3926
BLX93	2N3927
BLX94	



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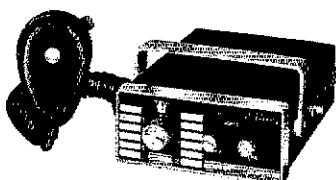
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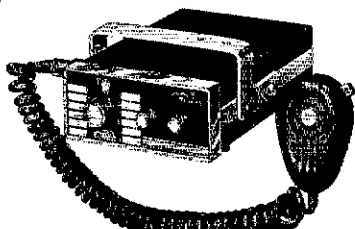
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Net - Freq.	Times	QNI	QTC	Sess.
OSSBN - 3.9725	1530/2100/2345	2924	1511	105
BNR - 3.605	2300	163	262	31
O6N - 50.160	0200	346	154	35
OSN - 3.577	2310	231	159	31
ONN - 3.708	2330	78	41	14
BN - 3.577	2345/0300	435	281	61

Remember, Dayton Hamvention, Apr. 23-25, 1976. Biggest event of the month was Simulated Emergency Test. Reports have been received from more than 20 localities. SEC AABKN reports receiving 214 SET messages, primarily on Jan. 24-26. Sporadic reports of SET activities before and after the National SET. ACBDIL is new mgr. of OSSBN. Milford ARC reports 70 new members during Jan., most of them enrolled in the code & theory classes. AABYV, EC, reports formation of the Ashland County ARC and the Ashland Area Amateur Radio Net 146.52 MHz. ACBQXQ solved TVI problems and is active on BN. ACBJBS is new EC for Allen Co. ADTUT reports sporadic E on 50 MHz on Jan. 1 and aurora on Jan. 10. Moody Jr. HS ARC is newest ARRL affiliate. AABTGA is new Advanced Class licensee. ACBPTT made BPI AK8VL. AABUIN reports regular NCS ONN. Ex-WBJAR is new Extra Class WIHJB in CT. Traffic: ACBPTT 500, AABMCR 404, AARHGH 338, ACBDIL 289, AABRQQ 282, ABBMZ 231, ABBKKI 230, AABKPN 229, ABBOMQ 202, ABBKWD 154, ABBMR 154, ACBIBX 134, ACBLT 127, AABCFX 106, ABBIG 104, ABBIG 98, ACB 96, ACBQZK 87, ACBMOK 82, AABVW 72, ADBLW 73, ADBCKY 71, AABTSX 71, ABBORR 69, AABSS 68, ADBJPF 66, ADBMLO 66, ADBBYR 65, AABSE 62, ABBUIN 59, ABBQXN 56, ACBJD 53, ADBKD 48, AKSTRK 48, AABETX 44, ACBALS 41, AABBOV 34, ACBQE 33, ACBVND 31, AK8VL 29, ABBTEDI 28, ABBGO 22, AABMHQ 24, ADBNTZ 24, ADBQYR 24, ABBX 22, AABNWX 23, ACBGOE 20, ACBQXQ 20, ABBUIN 18, ABBKQJ 16, ABBUJL 16, ABBTYK 14, ACBWE 14, ABBJU 13, ACBKAJ 12, ACBARW 11, ACBDCX 11, ABBKWO 11, ABBPIY 11, ABBLQU 8, AKBUNE 8, ABBWKB 8, ABBAYC 7, ACBHQK 7, ABBONA 7, ABBBNF 6, ABBIG 6, ABBIG 6, ABBYV 6, ABBDWL 5, ACBDFG 5, ACBDFY 4, ACBUQY 4, ACBOU 3, ACBBHL 1, ACBLAU 1.

MICHIGAN: SCM A.L. Baker, W8TZ — SEC: WBMPD. RMs: WBJYA W8YIG K8AMU K8KMG WABRXI. PAMS: K8LNE W8BJX. VHF PAM: WABWVV.

Net - Freq.	Time/Days	QNI	Tfc	Sess
GMN - 3663	2300/0300/Dy	1148	385	90
MACS - 3953	1600/Dy	1195	740	35
BRMEN - 3930	2130/Dy	729	283	31
MNN - 3720	2230/Dy	298	117	32
WBN - 3935	0000/Dy	628	89	31
UPEN - 3922	2230/Dy	110	50	35
MAREC - 3932	2300/5	111	15	4
M16M - 50.7	0000/MS	254	8	27

VHF PAM WABWVV reports local net totals: QNI 364, QTC 9, sessions 21. It appears this year's SET was best ever in MI. Congratulations to SEC WBMPD and thanks to all who participated. I am pleased to announce new appointees WBAAPN and WBD0YI ECs; WBNF and WTKGB ECs. Net amateur of the Month were: Oct. K8DYI; Nov. K8PVN; Dec. W8SDB. K8AMU claims QMN record with 824 QNI in 1975. W8QWN was big winner in Arrow Repeater Club drawing. Saginaw Valley ARA reports election of officers: K8BWC, pres.; W88DIT, vice-pres.; W8BKJU, sec.; W88AVV, treas.; W88WBZ, dir. New year reported at K8VZL 254 W8STZ antenna. K8DTG HW202, K8GXV RAC. New calls: W885 WVG WXU WXT WXY WYB WYC WVN VOD VLT WIM and WBBWYD. Welcome! Motor City RC reports \$5 total of 220,148. L'Anse Creuse and Saginaw Valley reports conspicuous by their absence. Regrettably I report W87ON W87ON and W8JGV are Silent Keys. Almost made the Century mark with this month's traffic reports. Traffic: (Jan.) W8MRM 658, W880KQ 453, W88ITI 414, K8DYI 300, K8LNE 300, W88WQ 233, W88POL 214, K8KMQ 195, W8MO 184, W8CUP 155, W8TZ 106, W8BCE 101, W8NCQ 98, W8KJU 91, W8ARX 79, W8EJY 74, K8CF 7, W8YV 6, W8KJ 6, W8WZ 63, W8UQ 61, W8GLC 58, W8WWM 59, W8VOM 54, W88DJS 51, K8JED 50, W88MTD 50, W88RVG 47, K8WRJ 45, W8VZ 44, K8VOA 44, W8U 42, W8OW 42, W8SDB 41, W8DT 37, W88FBG 37, W85H 35, K8ZJU 35, W88JX 34, W8HKL 33, W88APN 31, W88W 31, W88BR 28, W8V 28, W88NW 27, W8NOH 27, K8GXV 26, W8JUP 26, W88IE 23, W8BNF 22, W88PF 22, W88NII 21, K8TAK 21, W88MDK 19, W8TBP 19, W88LW 17, W8FZL 14, W88VAI 14, W8EU 13, W88EY 11, W8LDS 9, W8WVY 8, W88DV 8, W8LOU 8, W88BE 8, W8WY 8, W88F 8, W88RM 8, W88RQ 8, W88AXF 5, W88UP 5, W88JF 4, W88GFS 4, K8WLE 4, W8JAX 3, W88MTI 3, W88FM 3, K8BZL 2, W88MI 2, W88GK 2, W8LUE 2, W88AWZ 1, W88GKE 1, K8HGA 1, W88VL 1. (Doc.) W88WQ 303, W88H 22, W88LW 21, W88MT 9, W88NF 4, W88FBN 3, W88PF 2, W88ZAV 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, WA2PJL — SEC: W8KGC, Asst. SEC: K2AYQ. RMs: WA2FBI WA2IXW. PAM: W82QFI. Traffic nets: CHN (3:25, 11 PM), MYS (3:27, 7:10 PM), NYPOP (3:15 PM), NYSEEN (8:25, 8 PM). The NYPOP joins the National Traffic System as the phone section net to represent out section and WNY. Wind gusts caught W82IXW's antennas unprepared. There's a new repeater in the Albany area on 04/64 run by W8GTI W82VJB W20DJ and K250Q. W82ZM, EC of Albany Co. has organized the LNY VHF AREC net meeting Mon. and Wed. 9 PM on 50.4 — all are welcome. Congrats to Scarsdale High ARC on their affiliation with the League. Schenectady club reports K2AE operation from the new Emergency Op. Center during SET. Many area stations active in Schenectady traffic — next month, the Upper NY Repeater Council reports 2M FM full in most populated areas in upstate NY. W82EKM reports joining Army MARS. W82VVS reports the "finest job ever seen" regarding Westchester Co. SET repeater coordinating. The job was done by W82VJK (EC), W82VJK (EC) and W82VJK (EC). Also seems to be an interest in delivering traffic via repeater in Westchester. FBI K20YG is reactivating the NYR (RTTY) net. Contact her if you are interested. Times and freq. not firm at this writing. Hope you have all recovered from the phone DX contest week and RMR: K2TTG, W82RUZ and WA2PJL. Net totals: CHN (QNI 587,

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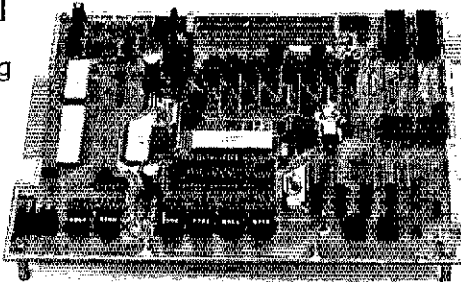
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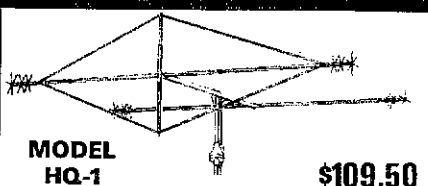
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GSP 435), NYSPTEN (QNI 1119, QSP 177), NYS (QNI 712, QSP 354), Traffic: (Jan.) WA2PUL 322, WB2EMU 244, WB2WZL 202, WB2IW 143, K2ITG 104, WB2LUZ 70, WB2GSL 56, K2OUA 49, WB2EL 43, WA2YBE 32, K2HNV 24, WB2XW 1, WA2PAU 21, WB2VVS 20, WB2EKM 14, WB2CQJ 14, W2WSS 1?, K2OYG 10, WB2DX-10, W2OOJ 9, WA2CJY 7, W2WD 4, (Dec.) WB2XW 74.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, WB2WFJ, SEC: K2HTX. PAM: WB2PYM, RM: WB2LZN. The following are traffic nets in and around the Section:

NLI*	3630 KHz	1900 Dy	WB2LZN Mgr.
NLI Phone*	3928 KHz	2200 Dy	WB2PYM Mgr.
NLS*	3730 KHz	1830 Dy	WB2WRT Mgr.
Clear House	3925 KHz	1100 Dy	WA2DD Mgr.
All SVC	3925 KHz	1300 Su	W2OE Mgr.
MIC FARAD	3925 KHz	1300 MT	W2OE Mgr.
		WTHFS	
ESS	3590 KHz	1800 Dy	K2UIR Mgr.
NYSPEPN	3925 KHz	1800 Dy	W2RSP Mgr.

*Denotes section net, all times are local. Congratulations to WB2PYM, Doug is now our new PAM, has been doing FB job as NLI Mgr. WB2HTM has a new KW linear. Officers for 1976 for the Citibank ARC are WA2ROD, pres.; WA2PHT, vice-pres.; Dick Egbert (ex-WN2RGA), secy-treas. Xavier HS had an open house in Dec., and handled 22 messages for students and faculty. WB2YBE will be moving to NJ and he is also now a Tech. WA2YEI welcomes his brother WN2YED back on the air. Congrats to K1ZNM/2 who has passed his Advanced and is now waiting his 2 area call in Brooklyn. WA2BRF send his station activity report all the way from Denmark. WA2HOP/1 now WA1WKJ. On Jan. 25 members of LIMA RC ATV Tech group gave an on-the-air demonstration of ATV 2 way transmission between W2WLS/2 and W2NIP, also demonstrated was ATV color transmissions, an Oscar Satellite terminal as well as an ARRL exhibit, all this happened at a Hobby Exposition sponsored by the Plainfield Pub. Lib., other groups who joined in were Wantagh RC, Farmingdale RC, IDXA and Amateur radio in Scouting was handled by WB2YV. Congrats to new OPSs WA2USJ and WA2YEI. W2PFF attended SE Div. ARRL Convention in Miami in Jan. Dave saw many old time friends who used to be W2s and are now in FL as W4s, 74 etc. W2HXT now using a TS-50 with a crystal filter. Welcome to newly affiliated Phoenix Radio Technical Society, anyone needing info contact W2QBR in Uniondale, also, please welcome Beach Channel H5 ARC in Brooklyn. WA2ZDQ and WA2LUNA passed their Advanced. WA2KFN passed his Advanced. WA2VOS transmits his OBS sked on 21.150 kHz at 1930 local at 10 wpm for those who want another means besides W1AW for practicing their crystal upgrading. WA2TGN is on the air with the Kenwood twins. This year's HARC convention looks like it should top all previous ones; the location is Great Gorge, NJ (that's the site of the Playboy Club). The dates look like the weekend of Nov. 13th and 14th. I hope you're planning to attend. WA2DRT on crystal upgrading making BPL Traffic: (Jan.) WB2WRT 332, W2C 307, W2GKZ 228, WB2LZN 186, WB2PYM 150, WA2VPA 122, W2MLC 91, WB2YKG 82, WB2HYM 72, WA2WVH 47, WA2JX 43, W2HXT 42, WB2SHL 35, WA2NJY 32, WA2BRF 30, WB2OYV 22, WB2YV 19, WA2ZGR 12, K2ZGR 10, W2PFC 6, WB2ALW 5, WA2ROK 2, WA2KXE 1, (Dec.) WA2YAY 83, WB2CAM 22.

NORTHERN NEW JERSEY: SCM, William S. Keller, III, WB2RKK —

Net — Freq.	Time(PM)/Days	Sess	QNI	QTC
Mgr.				
N.J.N — 3696	7:00/Dy	40	513	232
WB2LCV*				
N.J.N — 3695	10:00/Dy	39	217	87
WB2LCV*				
N.J.P.N — 3950	6:00/Dy	37	647	411
WB2VTT*				
N.J.P.N — 3950	9 AM/Su	8	166	214
WB2VTT*				
N.S.N — 3730	8:15/Dy	39	168	73
WB2RMK*				
N.S.N — 3730	3:00/Su	—	—	—
WB2RMK				
PVTEN — 145.71	8:00/Dy	37	155	34
WA2OPY*				

*Totals include extra SET sessions. 00 reports received from WB2CST, K2EK, WB2TFH, W2TPI, Cranford ARS operating ABCDLW from the Radio Technical Society Mill in Cranford, which is open to the public every Sat. from 9 AM to 5 PM. Their 1976 officers are WA2OKZ, pres.; WA2TQM, vice-pres.; WN2BWP, secy.; WB2VCI, treas.; WB2PBO, act. mgr. 1976 officers for New Providence ARC are WA2RRI, pres.; W2SGO, vice-pres.; W2EME, secy.; K2AGI, treas.; WB2WZX, act. mgr. gave talk on crystal production at their Jan. meeting. The Split Rock Repeater Assn. elected K2IDY, pres.; WA2BBW, vice-pres.; WB2WIK, secy.; WA2UNN, treas. The Wireless Institute of the Northeast still looking for contesters to join. Contact WA2DSA or WB2RKK for further info. NNJ salutes the following: WN2DOE and WN2YAT on receiving their Novice tickets, R2ZC passing the General Class exam; WA2WIV passing Advanced Class exam; W2KBI/4 earning a net certificate while in FL; K2KF receiving the ARRL 30 wpm code proficiency award. We also welcome WB2CAM to our section. W2ODV has a new tuner, WA2QHN, a Mark III FM rig, WA2QZ 7.7R22, WA2RLP fixed his NCK3. On VHF, K2QBW worked LA7, XE1, and OAR. WB2Osc on Oscar 7. The Split Rock Repeater group will have autopatch operational this spring to aid in public service for NNJ. Inquiries may be sent to SARA PO Box 3, Whippany, NJ 07981, or to WB2WIK. WA2QHN and WB2LHV setting up WB2AHV in Sussex Co., report 38 members so far. WB2YGM says the Morris Co. repeater (146.295/895) is available for AREC net work at 5 PM on Sun. WA2SLA now WB4DLT, VA. Going vacationing in a foreign country? Want to visit amateurs in that country? Then maybe you should contact the International Amateur Radio Hosts representative in that country for a list of amateurs who would be willing to host you. For further info, contact W5QPX, 201 Rita Blanca Trail, Amarillo, TX 79108. It is with regret that I report the passing of WB2ROH, W2IH and W2PEV. Congrats to all on FB job in SET, and all are invited to participate in the open CQ parties this month. See the Operating in the Open CQ Traffic: (Jan.) WB2R 899, AB2VT 423, WA2DSA 363, WB2CWL 236, AA2RMZ 197, WA2PCF 169, WB2RMK 128, AK2ASD 110, K2BHL 97, W2SWE 81, WA2WXM 81,

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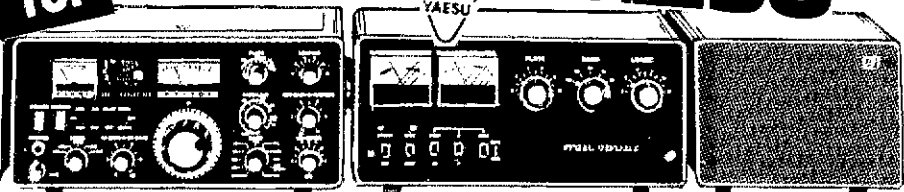
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- MMB1 MTG BKT. 19
- RFP102 Speech Proc. 89
- FL2100B Linear 359
- YC355D Counter. \$ 229
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- FR101 Dig. XCVR. 629
- FC2 40
- FC6. 30
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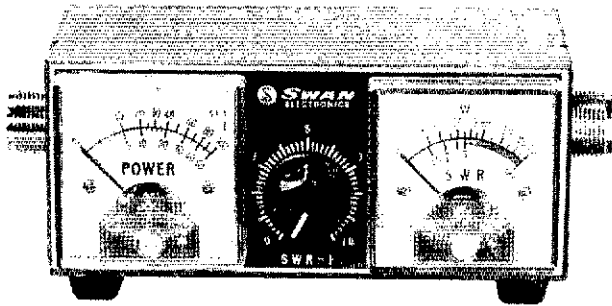
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MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W6LFF — SEC: W0IYW, PAM/HF: WB0AVW, PAM/VHF: K0LKH. Iowa Novice will be active again on 3710 daily at 4:30 P.M. starting Apr. 1 with WB0RWN as mgr. W0IYW is new SEC. He needs an EC for every county. Can you help? W0W0EFN warns us, if 2 kHz inside band on US5 then .5 kHz will be outside. W0Y0Y has life plaque and was active in CD party. W0BX has 113 on 75/80 for SBDXCC. Welcome to W0R0J in Ames, and to W0R0HN and W0EMC in Clinton. Congrats to W0OWV on becoming General. W0DGF got three columns of PR in College paper. Thanks to AK-SAR-BEN ARC for hosting the League official meeting. WA0TVK with Motorola in TX. New appointments: K0SVW OO, WB0RWN ORS. WA0AUX has an ICOM 230 on 2M. WA0PUJ and XYL W0QIG will be in Israel this summer using 4X4 calls. International Amateur Radio Hosts being re-vitalized by W0QPK. K0LUM has new Multi-2000 and beams to go with it. Eastern IA DX Assn. is a duly affiliated society. K0GVB sporting new FT101EX, and is trying to open up 10M. Look for Muscatine Emergency Net on .52 now at 8:30 P.M. Sun. WB0QFQ is new Tech. in Iowa City. 2 club and 21 individual stations reported in SET.

Net - Freq.	Time/Days	QNI	QTC	Sess
Iowa 75 Meter — 3970	1730Z M-S	1873	138	27
WA0VZH Iowa 75 Meter — 3970	2300Z M-S	1088	56	27
WA0ACX Iowa Tall Corn — 3560	2330/0300 Dy	368	87	62

K0AZJ
Traffic: (Jan.) WA0AUX 284, W0UPX 202, WA0KHF 94, K0AZJ 79, W0YLS 74, WB0RWN 46, W0OMV 39, WA0LKM 34, W0LHM 33, W0MOQ 31, WB0JVF 18, WB0AVW 11, W0SOKA 7, WA0TAQ 4. (Dec.) W0MOQ 17, W0JGS 6.

KANSAS: SCM, Robert M. Summers, K0BXF — SEC: K0JMF. RM: K0MRI. PAMS: WA0SEV WB0BCL. VHF-PAM: WA0EDA. Our sympathy is with W0R0B who has been in 3-Land due to the death of his mother. Congratulations on the new MARS appointment: W0GCJ, ex-PAM KS, has been appointed the Air Force SMD for KS. Notes from the membership: Now operating portable out of Bethany College — W0JIX. Going to take the test for General class in Mar. — W0HGG, W0CZR will soon be moving to St. Louis. Many thanks to Curt for the fine cw activity he has brought us since moving to KS. Active only from W0QQQ since Jan. 7, awaiting arrival of new rig WA0MLE. Net reports for Jan. KWN: 31 sessions, QNI 677, QTC 193. KS Phone Net 16 sessions, QNI 165, QTC 10. KSBN: QNI 977, QTC 88 in 31 sessions. QTC 63 sessions. QNI 420, QTC 160. Central States Phone Net QNI 939, QTC 60. K0JUN reports 955 QNI and 93 QTC for all the Zone AEA net activity, 94 sessions in all for the past month. Traffic: WB0HBM 171, W0INH 152, W0FIR 119, W0HI 111, W0CHJ 107, K0MRI 99, WB0CZR 89, WA0SEV 53, WB0LKA 45, W0YVH 45, W0SOKA 40, WA0MLE 30, W0PB 24, WB0KDE 22, W0MCH 16, W0OCK 15, W0GCJ 14, WA0SG 11, K0FPC 10, W0RBO 9, W0ER 7, WA0OWH 7, WB0JX 2, WA0JX 1.

MISSOURI: SCM, B.H. Moschenross, WA0FMD — Asst.: SCM/SEC: G.H. Chamney, K0BIX. New appointments: WB0MTX and W0RTF as QPS. This is my last report as your SCM. Many thanks to all for their support and assistance. Good luck to K0RWL as the new SCM.

Net	QNI	QTC	Net	QTC
MOSSB	1236	96	MON	229
MEN	719	59	MON	298
MSN	310	119	SCEN	65

Several SET messages were received. Seems like there was lots of activity in the SET despite adverse band conditions. Center Place ARA officers for 1976 are WA0UVW, pres.; WA0EMX, vice-pres.; W0LYE, treas.; W0MUN, secy. Jefferson Barracks ARC has lost their club site and are currently meeting at club members' QTHs. 41 clubs report they are having record "license classes". Keep up the good work and amateur radio will prosper. Long time St. Louis County CD director W0KY is a Silent Key. Our sympathy to his family. K0TLM reports increased activity on 2-meter SSB in the KC area, mostly on 145.3 MHz. W0BIM has two new rigs and emergency power. WB0MUI won the PHC ARA Amateur of the Month for the second straight time. W0QPK invites all interested in the International Amateur Radio Hosts to contact him. Traffic: (Jan.) K0ONK 1203, W0HLL 165, W0TFE 115, W0BV 111, W0NUE 100, K0RWL 94, WB0HSP 88, WA0FMD 87, W0LUD 47, WA0EMX 25, W0PH 16, WB0LMM 14, WA0QA 13, WB0NXX 7, W0QBT 3, WB0LGN 2. (Dec.) WA0M0F 10.

NEBRASKA: SCM, Dick Dvax, W0JCP — SEC: WA0ASM. New appointment: WB0IUT OVS. WA0HFH had a novice class of 14 students at Ainsworth. WB0IUT and W0JCP presented the Oscar slide program at Blue Valley RC and also at the Crete ARC. K0RAI and W0FQB co-chmn. Big brothers/big sisters. With 23 assigned to prospective novice candidates. Ak-Sar-Ben RC code and theory class over 100 in attendance.

Net-Freq.	GMT/Days	QNI	QTC	Manager
Feb 11 3657	0100Z/DY	40	8	WB0MNMK
NSN 1 3982	0400Z/DY	50	8	WB0MNYK
NNN 3982	0030Z/DY	1259	49	WA0QV
WNN Wx 3950	1330Z/DY	1349	16	WB0GWR
AREC 3982	1400Z/M-S	475	4	W0NIK
CHN 3980	1430Z/SU	211	4	W0IRZ
SHN Wx 3950	1830Z/DY	1623	73	WA0GHZ
NAN 3980	1930Z/M-S	266	4	WB0JWG
QCWA 3980	2100Z/M-F	471	21	WA0AK
NSN 11 3982	1500Z/S	69	9	W0FQB
	0130Z/DY	306	9	WA0LOY

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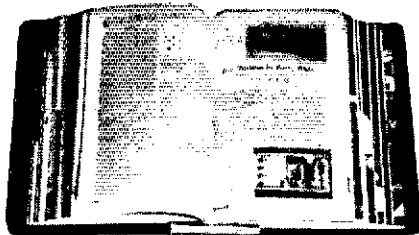
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NEW ENGLAND DIVISION

CONNECTICUT: SCM, John Mc Nassor, W1GVT — SEC: W1DGL, RM: K1EIR, PAM: K1EIC, VHF PAM: WA1ELA.

Net - Freq.	Time/Days	Sess	QNI	QTC
CN - 3640	1900 2200/Dy	69	413	383
CPN - 3965	1800 M-5			
	1000 Su	39	529	350
	2300 Su	34	470	298

VHF-2 — 28/88
High QTC: CN W1CTI, W1EFW & WA1UX, CPN — WA1LP, W1GQ, WA1QB and WA1LYL. VHF-2 High QTC: W1EFW. SEC W1DGL thanks all ECs, AREC/RACES members and MARS stations for the best SET ever! All net operations and local drills during "blizzard of '76" were super. Thanks to K1QGC State RO for his tremendous support. Dir. W1HHR requests clubs assist achieving 50 percent growth for amateur radio by each member getting one person to become an amateur during a 2-year period. '76 SET another "Winter Field Day" generated much needed favorable publicity. Sincere thanks to all Nets, NCSs and members for an outstanding event! Nets are planning for next year! Southington ARA reactivated with great plans. Stamford ARA Repeater on .08 — .65. Valley ARA Repeater open on .38 — .98. VHF-2 Net has another "first" — 28/88 Daily Traffic Net is linked with ICRC 450 Repeater and part of NTS. Hamden "Harascope" Repeater Code of Ethics should be followed by repeater users. SCRAMS: WA1FNT, pres.; W1NTH, vice-pres.; W1NTH, secy.; W1LC, tech. vice-pres. Hamdan ARA: W1EGL, pres.; W1TIL, vice-pres.; W1ALWD, WA1JYO, secy.; W1UKX, treas. Congratulations to: WA1RZA for 1st and 2nd Class Comm. ticket; W1HJB for Extra Class; WA1UGB General; W1NLY, Novice; WA1WEM Brevet; WAS No. 8; W1AS, 2nd Class. Jan. 2. During 1976 QST will be provided Free, to all ARRL members! Traffic: (Jan.) W1EFW 462, AA1RYL 259, W1AW 255, WA1UE 253, AB2SEZ/1 165, WA1HLP 147, WA1SQB 146, WA1GFH 137, WA1UAX 130, WA1WEM 115, WA1RUR 100, W1CTI 88, W1DGL 87, WA1RUF 85, WA1KIN 49, WA1OPE 49, W1UJUN 49, WA1TG 42, W1GVT 35, W1BDN 29, WA1RZA 26, WA1VLT 24, WA1JYP 22, W1KX 22, WA1URA 21, W1LYV 20, W1BBI 17, WA1UOU 16, W1KAM 15, WA1TZK 15, WA1UOB 15, WA1VPE 15, WB2EDW/1 10, W1CUH 6, W1QV 6. (Dec.) WA1RUR 44, WA1RZA 23.

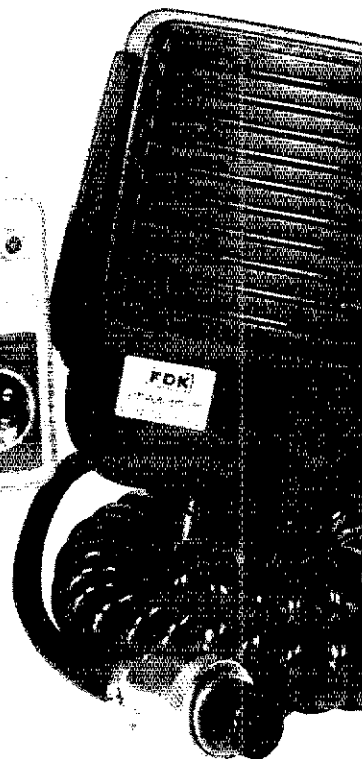
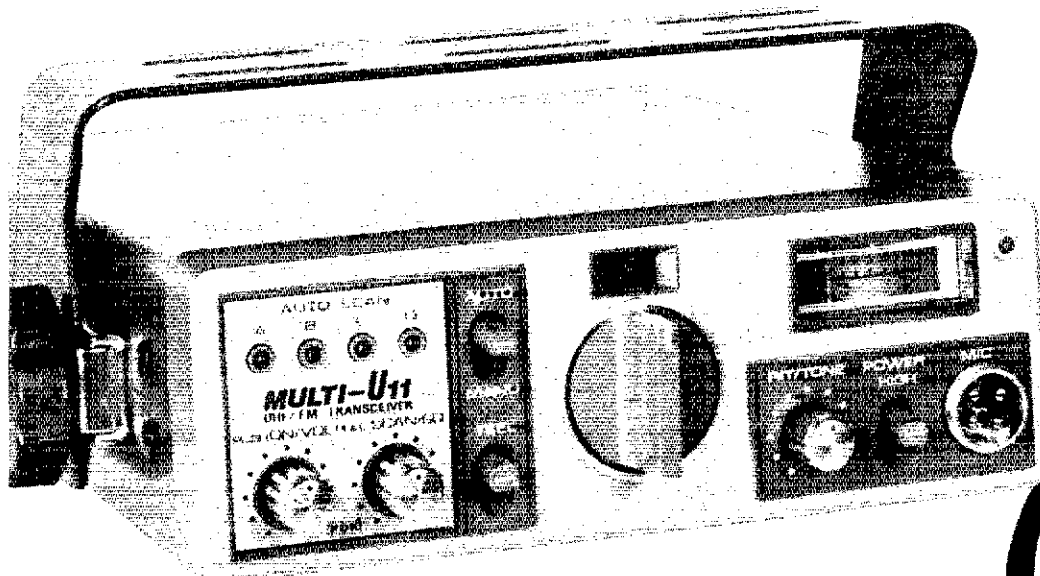
EASTERN MASSACHUSETTS: SCM, Frank Baker, WA1LP — SEC WA1QJ. W1HHR has been cold down. W1L EC report from W1FJT. W1PD WA1KZ. W1PEX, K1LEP EC Dukes Co. has W1MBQ & W1GAY as his asst. ECs. W1FJ has an SB-220. W1IADR going good. WA1FOV has his old call back W1IOA. NEEPN had 71 QNIs, 25 QTC. K1LZY moving to NH. W1FRZ on .85. W1RWGS new in town. EM2MN has 97 QNIs, 51 QTC. South Shore ARC annual auction on Thur. night Apr. 15 at the Viking Club in E. Braintree. South Shore Repeater Assn., W1IACT, Auction on Sat. at 1 PM on Apr. 17 at the VFW Hall in Hull. W1EQH K1DVK gave talk and demo to Boy Scouts. It is now WA1TKD, the AREC group had a set up at Dean Jr College and took Traffic School. AREC holding classes. Heard to WA1EY 0 75 again. WA1IFE back on 6. Two new affiliated clubs: Boston Univ. ARC, WA1VMU, WA1UZE secy. and 19-79 Repeater Assn. K1VUZ secy. WA1TWD waiting for crystal for Oscar 7B transmitter. W1OPK setting up a Club at Massachusetts Academy, license on the way. I received many SET messages. I want to thank everyone for the cards I received while in the hospital and at home. WA1TAM new OPS. W1KTU in Chatham and on all bands. EM2MN has 97 QNIs, 51 QTC, 2 sessions for SET. WA1HON our Lincoln EC says they are holding classes for youths. WA1QOV the same for Weymouth. K1PAD has a new son, also sent out a nice EMRIPN bulletin. WA7ETN/1 NCS on Wad. WA1SXU has the first "Breakfast Award." Wellesley ARS had a "Message Fair" at the Natick Mall and had over 550, a great success. W1ANB, wife & pup on a trip all over the U.S. WA1PE on all bands. WA1SIO, ex-W1LN is a silent key. W1JKF gave a talk on Slo-Scan TV at Quannapowitt RA. W1MD again doing a fine job helping out in the Guatemala quake between there and up in this area. A new organization "PART" Police Amateur Radio Team a project under the direction of the Westford Police Chief, a course is being held with W1ENM, K1TH, WA1QYM, W1HH, WA1QA, are instructors, sounds good. WA1MHJ has Swan 500. WA1MSK sent out a EMRIN bulletin W1CJY & WA1ILN have their pilot's licenses. W1ECK had a rig stolen near Boston Garden. WA1QKD had 47 PSHR in Dec. W1UX says WA2GPT, one of the founders of the Clearing House Net had brain surgery, we wish her luck. New officers of the W1HHR. W1HHR, K1LWP, pres.; W1ECK, vice-pres.; W1KGU, secy.; W1EWP, treas. WA1MSK made BPL. W1N1UGJ has his General. Emrin had 383 QNI, 267 QTC. Traffic: (Jan.) WA1MSK 519, W1PEX 305, K1PAD 236, W1UX 188, W1EQH 179, W1EIH 110, W1N1UGJ 93, W1DMS 79, WA1OWG 72, WA1AC 51, WA1GL 43, W1EWH 36, W1LE 33, WA1UUK/1 32, W1EIE 16, W1EIE 14, WA1TAM 14, WA1PGY 13, W1EMG 12, W1BUF 7, WA1EY 6, K1LCQ 6, WA1TQ 5, WA1FNM 3, WA1PAZ 2. (Dec.) WA1QKD 100, WA1TAM 83, WA1PGY 4.

MAINE: SCM, Ed Bristow, WA1MUX — SEC: W1EEM, PAM: K1EIR, RM: W1MB. W1EIB, W1ERW, W1RWG, QVS: WA1VAI, Renewed ORS: WA1JHT. Nets: NE Barnyard QNI 949, QTC 14; Maine Slow Speed revived 6 PM local time on 3726 kHz, Mon.-Wed.-Fri., WA1UOY Mgr. W1GJK OBS plans RTTY bulletins when 10-70 is regularly operating; Norm has WAS 2 EXCC on RTTY. W4M10G (ex-K1FTR) now at Lynchburg, VA. WA1JOG is permanently located in Charleston Heights, SC. Ellsworth Am. Wireless Assn. being reactivated & club station W1TU was active in SET. W1RWG may already be back on air with a new rig, F-8 OM. During the '76 Flood in Bangor, Pine State ARC (W1IAC) with W1OLG & W1VFB coordinated a joint stand-by with Navy MARS put on alert by WA1MEY (IME area coord.), and the SCM, SEC & PAM on standby on 75

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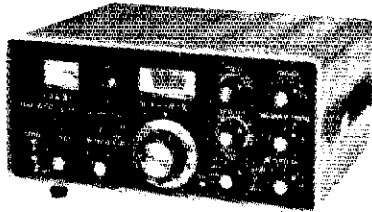
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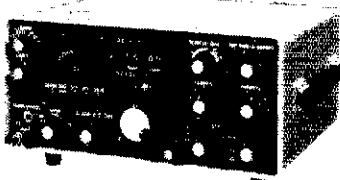
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*FT-101EE (less processor) \$659.



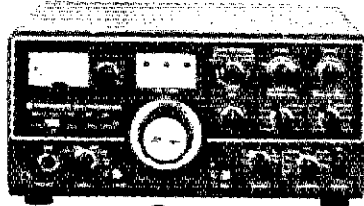
The FT-620B YAESU Transceiver Solid state 6 meters SSB. **\$449.**



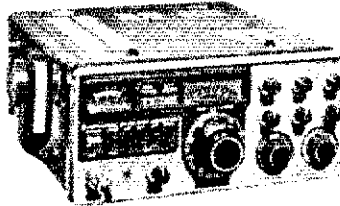
The FT-201 YAESU Transceiver Solid state 80 thru 10 meters. **\$629.**



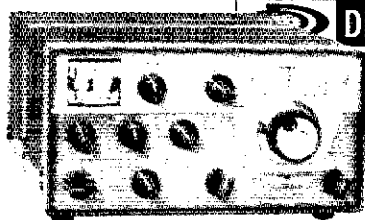
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meters, along with many others. Continuous monitoring & cross-reference between all freqs maintained by several of our staff. All good wishes to the SCM are gratefully acknowledged & your continued support and news items solicited. Traffic: (Jan.) WA1FCM 438, WA1OG 123, WA1MUX 106, W1ERW 96, WA1UOY 87, K1GUP 61, WA1JHT 47, WA1JCN 27, W1RWG 21, KH6IAC/1 18, W1TU 15, W1CTR 10, WA1NMW 9, W1GU 3. (Dec.) WA1NMW 5.

NEW HAMPSHIRE: SCM, Robert G. Mitchell, W1SWX - SEC: K1RSC, RM: WA1GCE, PAM: K1YSD. New appointments: WA1CFT EC: K2SIL/I ORS. Endorsements: WA1GCE W1MHX as ORS. W1UWI has a new HG-10B. K1LMS worked two new ones on the recent REF contest. WA1JMW now KH6IOU and RM for Hawaii. Welcome to new hams: WA1WDS W1WEV W1VSW W1VSW W1VIR W1VIR W1VIR. Then NHEPN had 31 check-ins, 4 sessions, 4 traffic. K1BWB is MARS area coordinator for NH and VT. K1PQV checks into the Early Bird Net on 3715. The recent windstorm did extensive damage to K1LMS tower and quad. W1NTJX on 30 Novice band. W1BYS swapped his special K1YSD for WB4ECP for use in FL. Don't forget the MA Bicentennial QSO Party on May 1 and 2, details from W1GDB. Thanks to all who helped in the recent SET. WA1LNH has a new HT220 plus his new Extra Class ticket. The Portsmouth ARC were very active in the SET. W6MZW/1 worked lots of new ones in the 160 contest. Traffic: (Jan.) K1PQV 47, K1LMS 44, W1BJ 17, W1EHI 15, W1WQM 8, W1SWX 4, W1MHX 2. (Dec.) K2SIL/I 11.

RHODE ISLAND: SCM, Ron Simonton, K1GMW - SEC: K1YDA, RM: WA1POJ, PAM: WA1RFT. There was good activity from the Section during SET. Thanks to all who participated. R1ARRL club meet weekly. Mon. Newport, Tue. W1OP Johnston, Wed. Fidelity, Cranston, Fri. W1AQ Rumford. Check with me for directions and times if you would like to attend a meeting. N. Kingstown High students would like help establishing an ARC at the school. K1YDA and K1GMW attend a recent Fieldy ARC meeting and discussed AREC and other ARRL activities in the Section. K5FPW/1 is looking for operators who can man positions during the Tall Ships event in June. New club presidents, W1AQ, WA1IUR, W1OP, K1JHJ. There has been good activity on the W1AFY phone net at 2100 daily. Section traffic activity has been improving but we still need help on all of the nets. Check the Jan. column for times and frequencies. WA1RFT is working on new Oscar gear. NCRS has started a new code class. W1AQ club is planning a General class soon. Traffic: K1GMW 310, WA1RFT 41, W1FX 6, W1GO 6.

VERMONT: SCM, J. Breakstone, WA1PSK - SEC: W1VSA.

Net Manager	Freq.	Time(Z)	Day	QNI	QTC
Vt SSB	3909	2300	M-S	554	97
WA1PSK		1300	Su		
Vt RFD	3909	2300	Su	61	9
K1BQB					
Carrier	3935	1400	M-S	543	35
W2OSK					
Green Mtn	3932	2230	M-S	473	37
W1JLZ					
Vt Fone	3932	1400	Su	85	5
W1KKM					

Welcome new amateurs WA1WEL (A), WA1WEI (A), W1N1DX, W1N1WF, W1N1QX, W1N1VQ, WA1VSK and W1N1VB. We learn with sorrow of the death of WA1RKH in a plane crash in Burlington, on Feb. 4. Mike was active on Green Mtn and NH VT CW nets. Traffic: K1BQB 124, WA1QOP 22, WA1PSK 17, W1LMO 14.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BVR - SEC: WA1DNB, PAM: WA1MJE, CW: W1DWW, UHF/VHF PAM: W1KZS, 3-Co. UHF/VHF PAM: WA1PLS, WMPN, 28 sessions, QNI 311, t/c. 86, stations 80, W1MN, 31 sessions, QNI 233, t/c. 103, stations 15, W1MEN, 4 sessions, QNI 104 (56 sss, 48 repeaters), t/c. 11, WM AREC Rptr, 22 sessions, QNI 234, t/c. 25, stations 25, Berk, City AREC, 13 sessions, QNI 44, t/c. 25, SE1 reports later, BPLs for Dec. to WA1RLP and WA1MJE. We are slowly getting better times between W1BVR and W1DWW on cw nets. Once again we ask for Worcester Co. coverage on our sss net Mon. thru Fri. at 4:30 PM on 3935. CW coverage is good for southern Worcester Co. W1DWA having great success with code and theory classes. WA1OUZ added 2-meter capability to his cw and sss. Congrats to W1NLB on excellent modulation. CMARA: Guest speaker WSUDK/1; offices: K1COY WA1OAU WA1OLK WA1GZI. HCRA: speaker W1NLB. Sympathy to family of W1VNH. V of L: fine article on winter static. MARC: speaker G3BVU/1. Mt. Tom: new members K1UJ W1SVH WA1WEJ. NOBARC: Spruce Hill now 637.03, Provin Mt.: WA1OF in the Mariner's Quin. Valley ARC: speaker K1JPH. Traffic: AA1MJE 198, W1TM 142, W1BVR 124, W1DWA 103, W1DWW 91, WA1DNB 56, K1ICM 45, WA1OUZ 40, W1KK 30, W1KZS 20, W1DYO 12, WA1PLS 7.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CJ - The SET was a howling success with a real emergency when St. Augustine Island decided to erupt and had all of the area around Homer alerted for possible tidal wave. KL7HMH KL7MHJ are back from an extended vacation in the lower 48. KL7HLC now back on the air. KL7HMU worked KL715 on 2 meters with a home brew sixteen-element collinear using Mt. McKinley as a reflector. KL7HDX dealt with traffic on 75 and a walloping signal. KL7HNQ complains of bad prop conditions. KL7HMK was very active during the SET and helped KL7HOV with the traffic load into Anchorage. The Gov. of AK sent a very nice message to all amateurs in AK on SET operation. SEC KL7JDO had hands-on with traffic on the SET and real emergency. KL7EKL W6PYZ/KL7EKL VE6NFKL7 involved in the emergency. KL7GCH back from CONUS and ready to burn up the bands. Traffic: KL7JDO 64, KL7HMU 24, KL7HMK 17, KL7HDX 5, KL7HLC 3.

IDAHO: SCM, Dale A. Brock, WA7EWV - SEC: W7JMH. PAM: WA7HOS.

Net - Freq.	Time	Sess	QNI	QTC
Manager FARM - 3.935	0200/Dy		29	949
WA7VOH				
IMN - 3.635	0230/M-F		22	223

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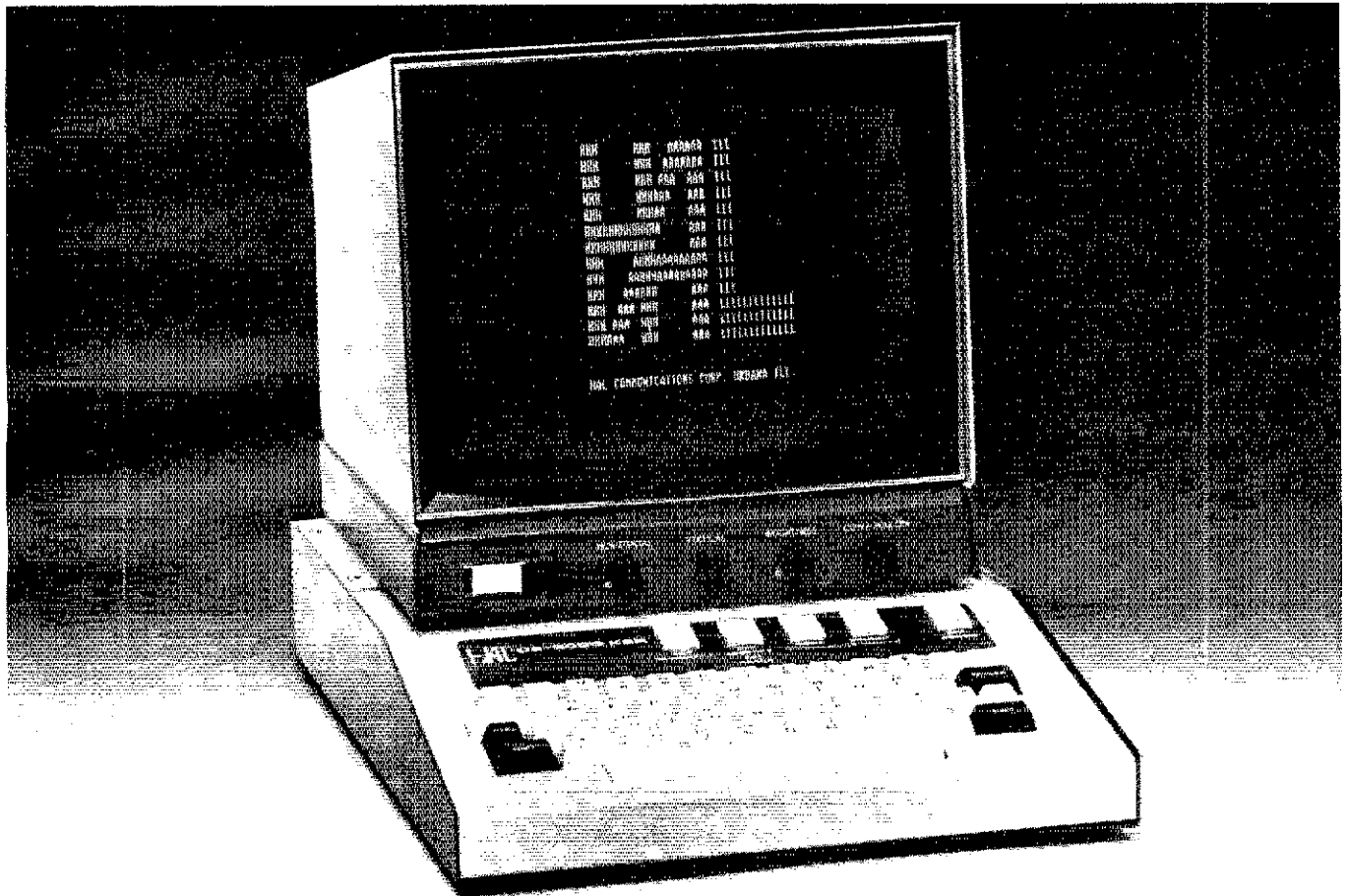
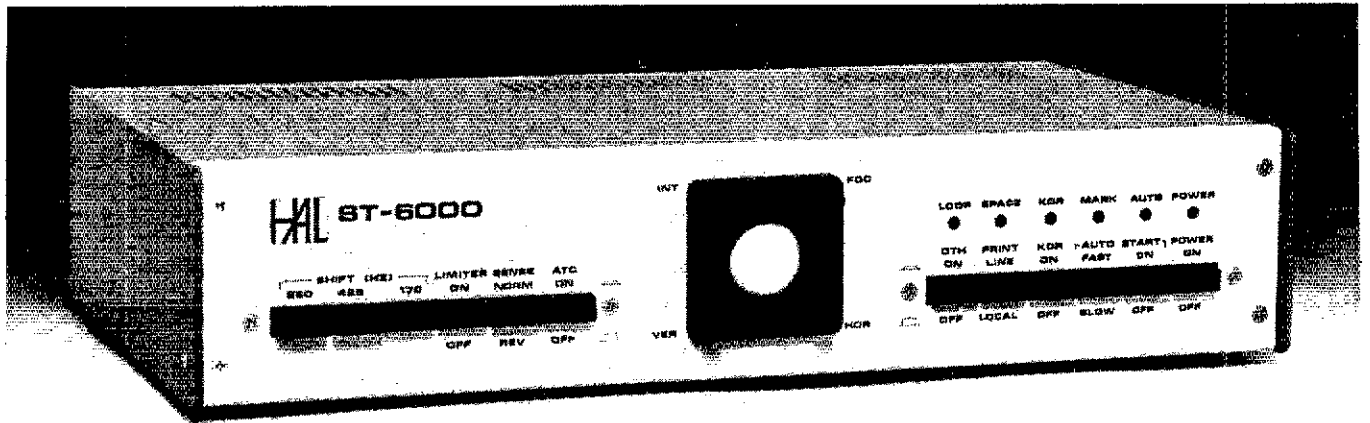
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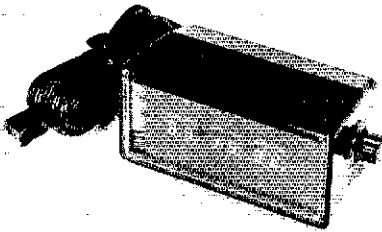


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W7KDB
ID, Silver — 3.93 0100/MWF
W71V

Christmas Day ID lost a fine ham, W7GGH. Known as "Mr. Radio" of Moscow, he was well known for building telemetry tracking equipment for the ID Fish and Game Dept. W7GHT reports an excellent SET exercise. K7UBC and OM are on vacation so W7KDB is new mgr. of RACES. WA7VOH has been elected mgr. for the FARM net. W71V reports 75 is pretty tough for the net. WA7CVX is starting Wed. on RN7. K7NHV is NCS Mon. on PAN. Traffic: W7GHT 358, WA8KKR/7 268, K7NHV 101, WA7WXY 51, W7GBO 32.

OREGON: SCM, Dwight J. Albright, W7HLF — RM: K7OUF. PAM: K7RQZ. Greetings to OR Hams from your new SCM. Your support already appreciated. Let's bring the records up to date, check your appt. and see it is current. I not, think it over. The SET did show up some problems; antennas had to be fixed; generators, etc. but thanks to those who have the "know how". WA7HRG on top of Sexton Mt. had 16 stations supporting. WA7MHP received good cooperation on OSU campus. K7WWR had some difficulty due to band conditions. W7VE kept a running record of the operation in his area. W7GQP, SCM WA exchanged messages with SEC W7HLF OR. WA7TZG was elected pres. of Southern OR Amateur Radio Club in Grants Pass. W7SQ, K7CJB, WA7KMT heard on the W7TAF repeater in QSO with W7HLF. W7BFX returning to good old Walport from sunny CA. WA7MPW from Seattle will be looking for contacts on 20 soon from Central America. K7RQZ trying to figure out repeaters 80 to 2 and vice versa relay? repeat? or patching or crossband? Worried about sunspots you might contact W7QNI Box 841, Redmond and find out what's up or listen to W1AW. We still use our RTTY and X. Let me know about some action. Traffic: W7VSE 178, K7IWD 174, K7QFG 142, WA7MHP 140, K7OUF 98, K7NTS 83, WA7UJO 77, WA7TXV 59, WA7GDC 41, AA7YEU 16.

MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7CHA. SEC: WA7ZR. PAM: WA7PZO. WA7OBH is starting Amateur Radio Classes in Hardin. W7LJ is making up directory of repeater users of WRADY. WA7GPN WB7BLL WA7VXM and K7RRS have their Advanced licenses. What happened to the OMs. Nine new Novices are waiting for Uncle to send them their calls in Butte. Installation of Butte Radio Club was held on the 24th of Jan. A good time was had by all. If interested in the Ham Top Club get in touch with W5GPX. INM had 27 sessions, 223 QNI and 220 QTC. Traffic: K7CHY 11, K7BMF 6.

WASHINGTON: SCM, Mary E. Lewis, W7GQP —

Net — Freq.	Time	QNI	QTC	Sess.
WSN — 3590	19:30	308	120	31
W7LG				
NWSSB — 3945	18:30	801	46	31
W7VDR				
NTN — 3970	11:30	2056	158	31
W7PWP				
WARTS — 3970	17:30	1820	161	31
W7GQP				

SET exercise received excellent participation from both former and new members. I have received newspaper clippings from Clark and Island counties, plus amateurs at the King County American Red Cross received a spot on the 6 PM TV News and in color. Whatcom, Skagit, Pierce and Lewis city operators were out in line. Operating a day the 24th and listening the 25th. I noted some groups sent out messages which needed replies and when the replies were listed with NC no member of the group was on freq. to PU reply. Skagit Hamfest is Apr. 24, same place as in past years and opens the hamfest calendar. Yakima follows the 16th of May. Clark city at Vancouver, WA May 22 and 23. W7AIB has no traffic report due to severe illness. W7BQ in tor surgery at Virginia Mason Hospital, Seattle. Most appointments were renewed so bring your certificates to club meetings or hamfests and I will re-endorse them for you to save postage. Follows, ask your MYL what type of programs or side trips they would like during the ARRL NW Division Convention in Seattle July 29-31, 1977; now is the time for input, also ideas from you fellows. If you didn't make input don't grieve if you don't see it on the program. This is everyone's convention not just Seattle area. COME QNI WITH IDEAS. It will be a family affair at Seattle Civic Center. The place where the World Fair was held plus a monorail ride direct to convention hotel. IDEAS, please. Traffic: W7DXZ 291, W7GQP 290, K7VNI 249, K7QZA 114, WA7EDG 94, W7HAD 64, W7BDD 63, W7APS 57, W7BUN 47, W7BUN 39, W7KEI 34, W7IEU 24, W7IKZ 20, WA7RCR 16, W7LG 14, WA7GV 3.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCM: Ronald D. Martin, W6ZF. SEC: W6BPK. As SEC W6BDS I'll be with great sadness to report W6LGW has become a Silent Key. Congrats to all who made the 1976 SET a success. It won't be long before Armed Forces Day is here. If you or your club is interested in taking part in the operation of NPG, contact W6ZF at once. After a long illness it is good to learn K6PJ is back at chasing DX. Also back after a heart attack is a past SCM W6JWJ. One would like to hear from his old friends and set up some skeds. New officers for the Hayward RC are WA6KGD, pres.; W6BFG, vice-pres.; WA6UGA, secy.; W6PSU, sgt.-at-arms; WA6VPG, treas. The Hayward RC meets on the 2nd and 4th Fri. at the Hayward School District Corp. Yard, 24400 Amador St. Starting time is 8 PM. From the Northern CA Net Bulletin, following are on the 4th quarter Activity Honor Roll list. WA6BMV WA6IPI W6JXK K6JZR K6PMG W6TYM and W6VEF. From CORC the following are new calls in the Section. W6G6 EEO DZR DZV EEA; W6GELB; W6G6 ELU EEM DZW; W6G6FF; W6G6 DY2 EOR EJA — AV; W6G6V; WA6G6; W6G6ND; W6G6D; W6G6EXC W6G6NF W6G6FI and W6G6FV. Hope to see all of you at Skagge Island, NPG on Armed Forces Day. Congrats to K6JZR on making BPL. Traffic: (Jan.) K6JZR 526, K6HW 429, W6TYM 279, WA6IPI 212, WA6BMV 78, W6JXK 76, K6PMG 15. (Dec.) K6JZR 477.

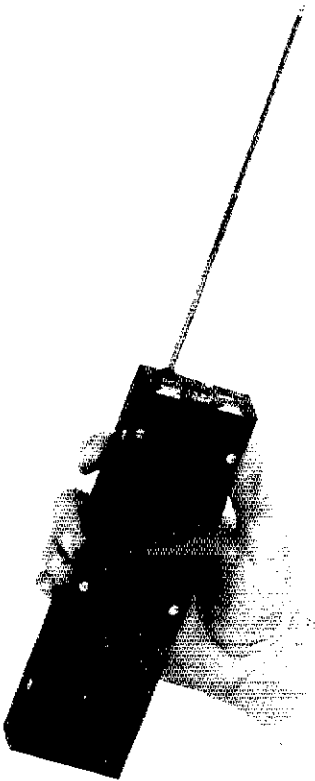
PACIFIC: SCM, Pat Corrigan, KH6GQW — SEC: KH6GMP. EC: KH6CKI. EARC readings news of



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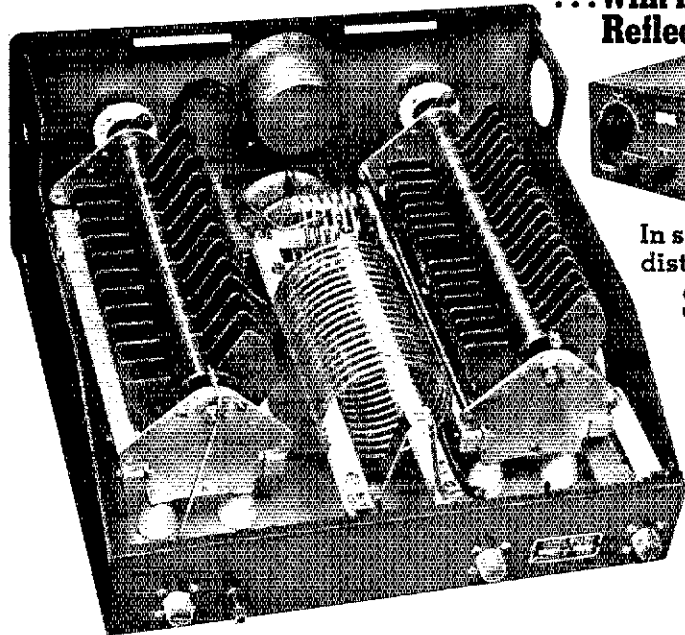
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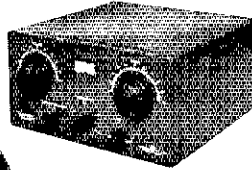
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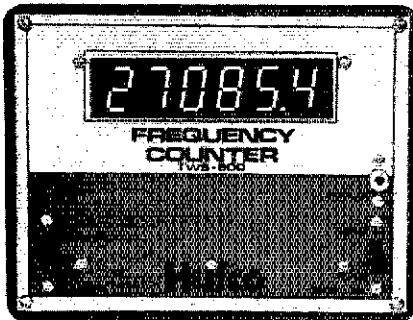
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Interest to Hawaii Amateurs on the State repeater system each Mon. at 8:00 PM. Pac. Novice Trf. Net meets at 0830 UTC Fri. (Sat. on Hawaii time) on 21120 kHz. Net Ctr is W6JFK with WH6INE doing Hawaii honors. Maul ARC participated in Bicentennial display at Kaahumanu Ctr with KH6ILA as chmn. KH6BTH is new pres. of MARC. WA6AHF thru KH6 going West to KCB. W4HAQ here to visit his son KH6IKJ. K9KIC/KH6 on from Aja. EC KH6HGG had good SW program. W6BZF reports new antenna on 2M trying for EME. W1ZPB/KH6 has new MFJ CMOS keyer. He continues to take big traffic load from his Big Isl. QTH. EARC did comm job for Haleiwa Sea Spree cycling race. We will all miss KH6AX whose key has gone silent. Several KH6s active in ARRL DX Fest. Leonard Norman has written a note that SAROC-Hawaii will be back Aug. 27. Oahu amateurs performed well during Waianae floods in Feb. and got good publicity. Still need help on traffic handling for the Section. Please contact KH6IQU or me. Traffic: (Jan.) KH6IQU 535, W1ZPB/KH6 187, K66JAK 122, KC6DK 121, KH6GOW 87, KH6GMP 78, KH6BZF 14. (Dec.) K66JEU 48.

SACRAMENTO VALLEY: SCM, Norman Wilson, AA6JVD - SEC: W6SMU. New officers for the North Hills ARC are K6RLY, pres.; K6SG, vice-pres.; W6BWZ, treas.; K6TWE, secy. The El Dorado ARC meets on the 4th of each month in Room 10 of the Herbert Green School near Placerville. W616KQ is offering a radio class at Butte College. WA6GWH has built a new Accu-Memory keyer. Members of all the Sacramento radio clubs, Red Cross and National Guard participated with K6QIF and the Sac. AREC in a very successful Simulated Emergency Test. Over 100 amateurs participated. The FCC computer cooled and W66ENV is really W6HVU. Grantfather W681L got caught holding the bag full of bad QSLs on that switch. K6RLY and WA6PAY are doing well on 40 meters with quad loops and AA6JVD is trying his luck with a hotball. W6DFP has been originating traffic with the Workshop for the Aging in Auburn. 1976 officers for the Lassen ARC are W6DEE, pres.; W66OSE, secy-treas. The Lassen club has a 146.28/88 repeater (WR6AI W) operating. Traffic: W6DEF 34, WA6OWH 3, W66TWQ 2.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT - The amateur radio tower permit of K6UFT was upheld unanimously by the Novato City Council on Jan. 21. Original objections to the 70-foot crank-up tower came in a 165-signature petition from K6UFT's neighbors. This was countered with a 467-signature petition from amateur and CB enthusiasts. The Petaluma DX and Experimenter Society did FB job handling the QSLs for the recent CRYA K Expedition to Macao. Humboldt ARC has re-elected W66NHF as pres.; W66TFX, vice-pres.; W6GGR, secy-treas. for 1976. 28 Marin ARC members teamed up with the Marin Red Cross, Marin Disaster Center, and ten teams from the Marin CB club to test emergency preparedness during the 1976 SET exercise. W6KGG has been appointed OVS; WA6MGK appointed for Marin Co. Congrats to WA6HPF upon passing his Advanced. K6LRN back on the air with a 178-foot long wire. W66JEO at Terra Linda High School is serving as Wed. liaison between DRNG and DPAN. Traffic: W6RNL 134, W6PL 147, W66UPV 126, K66TP 115, W6NL 47, AA6HPF 16.

SAN JOAQUIN VALLEY: SCM, Ralph Saroyan, W6JPU - The Delta ARC held their annual dinner at the Sampan Restaurant Jan. 10, 1976 to install their new officers. The Turlock ARC held their Annual Dinner on Feb. 6, 1976. K6IXA was the MC. Among those present were W6ZRI, W616HAB and XYLs. WA6CPP and W6YKS received WPX awards. K6AO K6AYA and W6YKS were active in 10-meter contest. WA6CPP W6YKS and K6PBT are playing with RTTY. W6HEZ WA6NGF and W6EOM heard on 34.94 repeater. It is with sadness that I report the passing of K6ZCD. He will be missed. W66FXS WA6FXS a new station in Fresno. W6YLO W66JDC and W6DHT active on 2-meter SSB. W6DPD has a new Atlas 210X. W66EH has a FPM300. WA6VFC running a Heath Amplifier on 2 meters in his VW. WA6SL busy handling traffic. W6ARS and Futura County are participating in SET. A GCNP worked 8R for the last country in the western hemisphere. W66FXL is a new Novice. WA6HAV is on 2 meters FM. W66FXL is a new Novice in Fresno. Don't forget the Fresno Amateur Radio Hamfest to be held in Fresno on May 1, 2, 1976. Mail reservations to FARC P. O. Box 783, Fresno. Traffic: (Jan.) W66RXI 84, W66MGG 4, AA6CPP 2. (Dec.) WA6JDB 76.

SANTA CLARA VALLEY: SCM, Jim Maxwell, K6AQ - SEC: WA6RXB. W6RSY made SPL. W66RF made PSHR. W66JNN reports an explosion of IC200-3W SSB rigs in SCV, including WA6MUG, who worked into Fresno with one! SCV is changing to 145.010 as local standard calling/working frequency. All Bay Area ham clubs are invited to join the Central California Radio Council (CCRC). Write pres. W66VFC for details. WR6ADC, 147.84/24, will be offering daily code practice sessions at 8 PM local. Tired of calling CQ endlessly to move traffic? NCN, the Northern CA Net, will be glad to be of service. Net mgr. W66RF has necessary info, as does NCN secy. K66TP. Congrats to W66LN for her new advanced Class ticket, and to W66FKC, who recently passed the General Exam. AC6MUR has nearly made DXCC already using his new Bicentennial call. More than fifteen stations checked into the Santa Cruz Co. AREC net during the SET, reports K66JZ and W66JNN, including 6 meters. All or most were very effectively using both SSB and FM simplex. W66BWB and W66JNN both heard WA6NRV in Visalia and K62MW in Fresno on 1296, but no two-way resulted. This is thought to be a Santa Cruz Co. first. SCCARA modernizing their hamshack and Red Cross Communication Center in San Jose. Helpers include W6ZM, W66DXP, K66LHU, K66CU, WA6JQC and WA6VKE. Not to be outdone, the WVARA dedicated a new station for the club at the Los Gatos Red Cross bldg. The Palo Alto Radio Assn. meets weekly, Mon. at 8:00 PM on 145.24 AM, 147.45 FM. Don't forget Field Day, June 26-27. Now is not too soon to get cracking with plans! Traffic: W6RSY 63, W6RSY 362, W66RF 162, W66JUC 54, W66NW 10, W66VB 22, W66WCF 21, W66QB 18, W66FLD 12, W66II 11, W66HAD 10, W66EMR 5, W66UOC 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, C.H. Brydges, W4WXZ - SEC: W4EHL. PAM: W4QFO. VHF PAM: K4GHR. Rpt. K4RC. EC: W4GHC. The monthly meeting covering Scotland Co. and if you are in that general area give him your support. The 1976 SET was a big success

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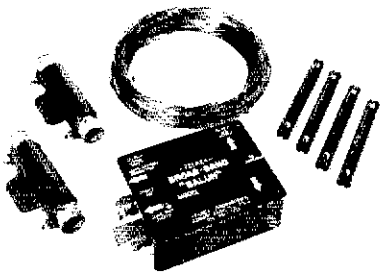
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with much traffic passed and participation from many areas including Asheville, Morganton, Marion, Hendersonville, Murphy, Greensboro, Raleigh, Durham, Fayetteville, Greenville and others too numerous to mention here. Many thanks to those who worked so hard. Reminder: the combined NC & SC Novice Net (CNN) now operates on 3718 kHz at 5:30 EST daily and standings for Jan. were QNI 155, QTC 63, tnx to WN4UKU for report. The Crabtree Valley Mall operation W4DW/4 operated by Gary ARC and Raleigh ARS made BPL in Dec. with 257 orientations. Congrats! An Official Bicentennial Communicator Certificate is available from the NC Bicentennial Commission 109 East Jones Street, Raleigh, 27602 in remembrance of both the NC and U.S. event. New officers for the Alamance ARC are WB45GB, pres.; WB4HBQ, vice-pres.; WB45RC, secy-treas.; W4RWL, chief Eng.; WB4VHE, member-at-large. When these officers were installed W4ACY & W4WXZ spoke at the dinner meeting and presented 17 public service awards in recognition of the Alamance AREC saving two lives in mid 1975. W4AFW, EC of Alamance Co., also received the Certificate of Merit for his organizational efforts of the Alamance AREC. WB4TN continues 00 activities and now has Yasei 400's and Gonsat linear. In the humor department the Cape Fear ARS News reports "WB4BPL Smells A RAT" whereupon power supply investigation found a dead mouse cooked somewhere medium and medium-well. Hi, Sympathy to the family and many participants of W4IYM now a member of Silent Keys. Traffic: (Jan.) WA9NEW/4 204, K4FTB 174, K4MC 125, W4WXZ 120, WB4PZU 10A, WB4MXG 85, K4EZH 73, W4RWL 62, WB4OXT 40, W4EHF 34, WA4CBB 30, W4RCF 25, W4CFO 20, W4FMN 19, WN4SRD 19, W44KSO 17, WB4FF 16, W4HFN 14, K4FV 13, K4AII 9. (Dec.) W4DW/4 257, W4ACY 20, W4EHF 6, WB4CES 5, K4JLW 4.

SOUTH CAROLINA: SCM, R. H. Miller, WA4ECJ — SEC; W4ZMZ, RM; WB4OBZ. We sadly record the passing of W4HDR, one of our most colorful old timers. Tex willed a portion of his estate to establish a scholarship fund for High School Seniors majoring in math, physics, chemistry or related sciences. Those wishing to contribute to the Travis R. Everett memorial fund are requested to get in touch with Henry R. Randall, K4EAR, 7009 Nursery Rd, Columbia 29210. The Hurricane Hunt SEI exercise of Jan 25 had many nets and repeater groups all going at once on several bands. Like a three-ring circus, Juliette was unerringly spotted by numerous participants of Woodford (1 PM) and Elliott (4 PM); the SC Traffic Distribution System includes three Official NTS Section Nets: Carolinas Net, Carolinas Novice Net, and Palmetto Traffic Exchange, plus several local delivery nets. CN — 649 check-ins, 340 traffic; CNN — 157 check-ins, 83 traffic; PX with 100, K4FV 13 traffic. W4EGH and WB4NBK continue unflinching reports in non-traffic activities. Traffic: WB4OBZ 339, W4ANTO 112, WB4ARJ 84, WB4PDQ 78, W4ANK 56, WA4ECJ 41, K4JLM 35, WN4UKU 19, WB4LMS 4, W4LOU 3.

VIRGINIA: SCM, Robert L. Fallmar, W4QDY — SEC; WA4YU, Asst. SEC; W4PBG, 7AM, WB4YKM, V5BN, 3947, RMs; K4IAF VN 3860, WB2VYK/4 V5N 3680 (6:30 PM), W4SHJ 4RN 3567. The ARRL Roanoke Division Convention will be held in Norfolk the weekend of July 31-Aug. 1. All come! SET appears to have been very successful in VA. Thanks to all participants. Net reports: Jan. 1, reg/SET, 385, QTC 180, QTR 836, VFN(6 Mo.), QNI 6,902, total Fone Patches 1,004, CVN Dec. sessions 26, QTC 104, QNI 379. V5N Mgr. (Marty) held a CW demonstration on the V5BN Magazine Section on Feb. 1. The Mag. Sec. is held 1:30 PM each Sun. (3947) and moderated by WA4NEW/4 V5N, available 4:30 PM. The HARRA put on a great show on Jan. 31 in the Military Circle Shopping Mall. It is estimated that over 5K persons viewed the display. Div. Dir. Phil Wicker W4ACY, SCM W4QDY and their ladies, attended the VCC annual Banquet Jan. 23. Nice group. Received papers from the following Clubs, Organizations & Individuals: Lynchburg; Portsmouth, SMRAD; Tidewater S5BN Net; WA4HUB EC; WA4MMP WB4NTV OVS; WB4ZNB EC; K4MSG 00; WA4BUE RO. W4YZC made BPL again this month, congrats Bud! W4UQ FCC station says that biz travel will wipe out 1/2 weeks of F5KAGR has run up a good message total with 59-104 back on the air. W4YU worked so hard on SET plans that he went to CA 1st week of Feb! Rite Bob? K4JM enjoying the AD prefix. K4DHB repaired antennas atop ARC Chapter House. WB4YXN received a DK3MO/V3 card for a Feb. 1972 QSO on new QSL Bureau. (Fine work Sterling!) W4KFC visited ARMDA & Kanawha ARC (W.VA); attended Board Meeting; took part in CW Party & SET. Wonder what Vic does with his spare time? W4DM says his basement shack is mighty cold this weather. WA4MMP 50 MHz open on Jan. 8, 9, 14 with a big skip. A no fantastic Aurora on 144/145 on Jan. 10. We regret to report Silent Keyed W4ZRR, W4KX and XYL took trip to Egypt, "dusty" sez John. W4TMN hand-wound final Pie choke to get his rig back on air. W4UJ has 3043 Counties confirmed! Traffic: (Jan.) W4YZC 539, W4QDY 198, WA4EPJ 243, K4IAF 209, W4UQ 184, K4GR 177, K4KNP 151, WA4YU 143, K4JLM 130, W4MMP 126, W2TPV/4 124, W5VZQ/4 110, K4AII 100, WB4DTG 99, WB4FLT 92, W4SHJ 86, W44KKR 80, W4SUS 75, W44PBG 48, W44JVO 46, W4HFN 44, W4ZNB 44, W4TZC 40, WB2VYK/4 38, WB4YXN 24, W4KFC 23, K4IY 17, W4LXB 10, WA4ANN 9, W4MVK 7, W4DM 5, W44MMP 4, W44RC 3, W4LGM 3, W4LGM 2, K4MSG 1 K4KA 1 (Dec.) WB4YXN 194, K4KJ 152, W44CLK 60, W44AJF 35, K4KA 28, W4WWD 15, W4LGM 8. (Nov.) W4LGM 34. (Oct.) W4LGM 17.

WEST VIRGINIA: SCM, Kay Anderson, WB4UV — WB4XZ back on the air after additional eye surgery; WB4JWX helping out with RM duties while John was in hospital. W4VN maintains high percentage of activity in state skip conditions. 193 stations with 96 messages. W4Fon Novice Net signed up 14 (including 4 YLs); K4GEW has new class in Weirton. Newest club in WV: Stonewall Jackson ARS in Harrison Co. K4BCC, pres.; WB4QZR, vice-pres.; K4L5N secy.; K4VNL, treas. WB4TGW (Princeton) upgraded to General in July '75; State Radio Council meets in Parkersburg Mar. 6 to finalize convention plans. Traffic: WB4JW 126, K4GEW 79, WB4QYN 75,

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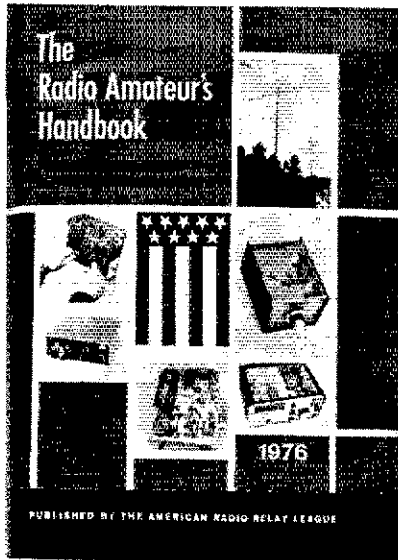
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ROCKY MOUNTAIN DIVISION:

COLORADO: SCM, Clyde C. Penney, WA9HLC — SEC: K9FLQ. RM: W9HCK. PAMS: K9CNV WA9YQ. CD Section SET went very well this year, with more activity than in previous years. Congratulations to W9GMRU W9GOYX and W9GMDI (all formerly WNs, who are now WBS. WA9YNG reports that the CO 3-D chapter now has 60 local and 56 out-of-state members. The Longmont ARC elected the following officers for the year 1976: W9GNF, pres.; W9OSU, vice-pres.; W9GSD, treas.; W9GSM, sacy. Newly elected officers for the Colorado YLs are W9ODUV, pres.; Moe Smeater, vice-pres.; W9HEM, treas.; W9HUC, sacy. The CO YLs are operating a YL net which meets every Thur. at 9:00 PM local time, on WRGADO, 146.07.67. Everyone is invited to check in, including OMs. Net Tfc. for Jan.: Hi-Noon QNI 1229, QTC 29, Informals 124, time 1418 minutes. Columbine QNI 1175, QTC 60, Informals 244, 27 sessions, 1665 minutes. Traffic: (Jan.) W9WVX 1696, K9ZSQ 810, W9QOT 691, K9YFK 460, W9QIBS 242, WA9YNP 208, W9HXB 189, W9GHCK 154, W9MRU 131, W9IW 121, WA9YQ 84, W9LQ 83, W9BNDH 73, W9PVT 71, K9QIX 69, K9FLQ 59, K9WZN 52, K9TIV 50, K9HPE 49, W5SHJ/0 40, WA9TMA 31, W9LAE 26, W9MYB 19, W9LFG 18, K9CNV 16, W9JUM 15, WA9YNG 15, W9GMDI 13, W9GINS 11, W9REX 9, W9KSTX 8, W9DGN 7, WA9VED 7, W9GW 6, W9ALQ 4, W9PLY 3. (Dec.) W9GMTA 665, W9LQ 112, WA9REX 5, K9SPR 4.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. RMs: W5JH K9KPS. PAMS: W5PNY W5DMG. W8TQL of Dayton, Ohio, received his permanent license (he hopes) W5UZU. One of our better traffic handlers, W5SKS has diversified and is now also working some DX. K5HIO is starting a license club at Kirtland AFB. Good luck, Bill. NMRRN, 3940 kHz at 1800 local had 896 check-ins and handled 36 traffic. SWN, 3585 kHz at 1915 local had 264 check-ins and handled 292 messages. W5LRS on a trip to Farmington assisted at three accidents and handled a very severe injury at Farmington for which he was complimented by the doctor and the State Police. A case of first aid training paying off. Traffic: (Jan.) K5KPS 356, W5ENI 267, W5RAD 236, W5JOY 168, WA5YX 134, W5SKS 135, K5MA 119, W5RE 98, W5PNY 84, W5SMY 17, W5YQ 17, W5MSW 13, W5QNR 10, W5DMG 9, W5LRS 2. (Dec.) W5SKS 451.

UTAH: SCM, Ervin Greene, W7EU — SEC: WA7ZBO. RMs: W7OCX, During 1975 BUJN met 370 times with 10,380 check-ins handling 373 messages. Five net certificates were issued. We passed up the opening of W7SLC. Ervis will be greatly missed. K7ED is the proud father of a new boy harmonic starting the new year out on New Years Day. WA7MEL reports very long skip on UCN with W4s checking into the net. WA7RC has a new Heath keyer, K7BE and W7BE still are receiving each others' messages. Maybe a weekly exchange get together would solve the problem. K7CLO reports just finished Bicentennial WAS. Congrats. New officers for the VHF Society are WA7TD, pres.; W7AJU, vice-pres.; W7RQ, sacy.; W7GMO, treas.; FJAO, freq. coord.; WA7ARK, repeater engr. New members are showing up all the time in the RTTY UART .70 activity. The 10-70 repeater with full autostart facilities going through testing phase. Traffic: (Jan.) K7HLR 157, WA7MEL 100, WA7OAU 53, K7ZVT 51, W7OCX 50, WA7JRC 43, K7CLO 23, W7BE 18, W7DKB 13, W7UTM 4, WA7VNG 4. (Dec.) WA7JRC 107, WA7OAU 85.

WYOMING: SCM, Joe Ernst, W7VB — EC W7TVK spearheaded the SET program at the Casper RC Bldg., Jan. 24 & 25 with four hours of operation each day; 55 state contacts were made. Despite the weather Jim had a good turnout of assistants and visitors, better than 30 amateurs are using the 2-meter facilities in Casper. WA7HDB a Silent Key Jan. 4. WA7WXQ now an ORS. Does not work on 75 cw. The Fremont RC net Feb. 10 at the Lander Airport. W7VEW gave an interesting program on moon Oscar six and seven work. Steve has a fantastic KLM antenna for such work. K7MMT of MT gets into the Boyzen Peak repeater quite often with his 600 watts on 2-meters. The WY Hamfest, hosted by the Cody Radio Amateurs is scheduled for July 10 and 11 at the Meadowlark Ski Lodge. Amateurs Radio at the First Baptist Church Huntsville. WB4UHC moving to the VFA Section. Regret to report W4FZD Silent Key. K4BGH spoke to the Huntsville ARC on his homebrew counter. W4KSL spoke and showed slides on some of the work going on at UAH in the Microelectronics field. W4HJU a traffic from K4GLU. Welcome to the following: WN4DFX, DGN, DHC, DKB, DPL, DYP, DVJ, DWH, EAY, W44, DHH, DOD, DXT, and DYW. Appointed W4TXM as PAM; endorsed W4DGH SEC. Traffic: WB4EKJ 315, W4RQS 200, WN4JDM 190, W4DGH 117, K4AGZ 51, W4PAB 51, K4GLU 35, K4JUM 33, WA4NWF 33, W4RCF 26, WN4RND 25, K4JUM 23, W4JMLK 19, K4LYV 17, W4MVM 6, W4TVY 6, K4JMD 6.

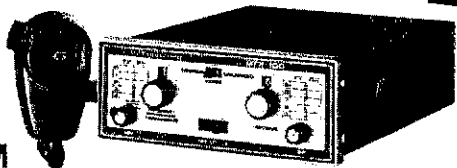
SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Area Hamfests/Conventions coming up: Mobile Apr. 3 & 4; Jacksonville, FL Apr. 10 & 11; Jackson, MS Apr. 24, 25; Birmingham May 1, 2. Contact W5QXP for info on International Amateur Radio Hosts. Elections: Muscle Shoals ARC: WA4EEC, pres.; K4CULU, vice-pres.; WA4JQZ, sacy; treas.: K4ARD, WA4MPA and W4GFC, trustees. Montgomery ARC: K4UJH, pres.; WA4EXC, vice-pres.; K4PRF, sec. treas.; WA4ZC, K4DEL, WA4HMV dir.; K4EGK, CD coord.; WB4BYG, PR dir. WN4CEO organizing MANN (Mobile Area Novice Net), Tue. nights 0100Z, on 710 kHz; all are welcome to QNI, QTC. Thanks to all who participated in SET. W4GYA arranged and coordinated a display of Amateurs Radio at the First Baptist Church Huntsville. WB4UHC moving to the VFA Section. Regret to report W4FZD Silent Key. K4BGH spoke to the Huntsville ARC on his homebrew counter. W4KSL spoke and showed slides on some of the work going on at UAH in the Microelectronics field. W4HJU a traffic from K4GLU. Welcome to the following: WN4DFX, DGN, DHC, DKB, DPL, DYP, DVJ, DWH, EAY, W44, DHH, DOD, DXT, and DYW. Appointed W4TXM as PAM; endorsed W4DGH SEC. Traffic: WB4EKJ 315, W4RQS 200, WN4JDM 190, W4DGH 117, K4AGZ 51, W4PAB 51, K4GLU 35, K4JUM 33, WA4NWF 33, W4RCF 26, WN4RND 25, K4JUM 23, W4JMLK 19, K4LYV 17, W4MVM 6, W4TVY 6, K4JMD 6.

CANAL ZONE: SCM, Roderick J. Isler, K2ZPI — The Annual Crossroads of the World Hamfest will be held Mar. 27, 1976 at the Civic Center, Gamboa, C.Z. The CZARA is planning an even larger event than in past years and all are invited. Various plan committees have

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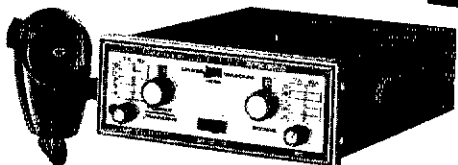


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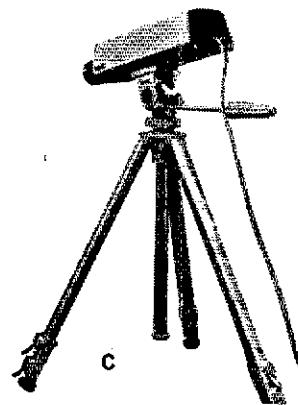
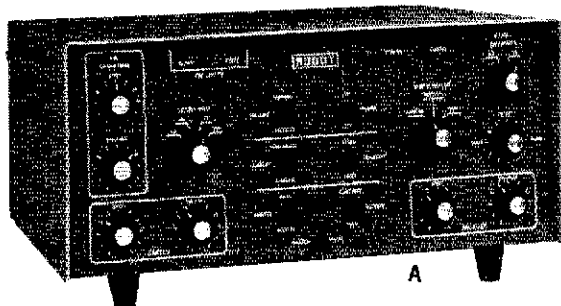
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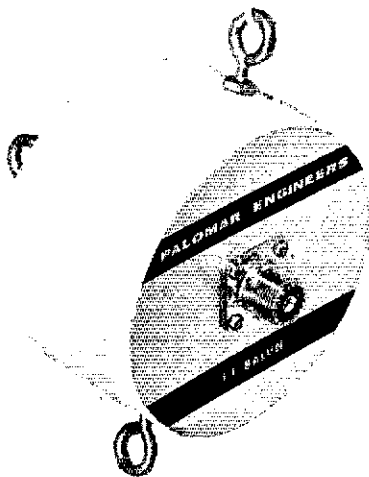
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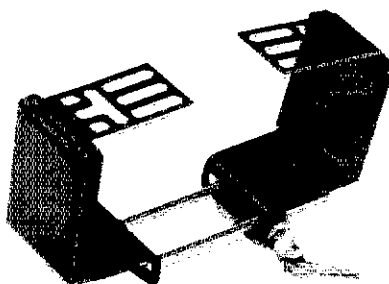
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LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Berastey, W6OYN. RMs: K6UYK W66PKA. EC in charge of AREC W6SPK. Many thanks to Carolyn KY6 of W66IMV for her letter that appeared in the Press Telegram praising the CBers. At last one of my pet efforts is now in operation. We have a nightly traffic net with the Hawaiian Islands. This is something that I have hoped for and its now come to pass. I am hoping to give it a name such as "The Hawaiian Express Net"; many years ago my arm had this inked but it hasn't been too active since. The AREC has been doing this alone for some time. If the net keeps going this good by the time you read this I feel that it will be well established, imagine NY to islands in one day, this has got to become a very active net. W66IPY reports that he activated his base station and his two meter unit for the recent San Fernando Valley March of Dimes Walkathon. He reports that over eight thousand people participated and that a total of 57 amateurs from all local clubs participated in furnishing communications for the Police, National Guard, and the various emergency groups. Twelve members of the San Fernando RC participated putting their AREC net to work. Russ reports that their net came to good use during this event. Estimated pledges for the event were approx 100 thsd dollars. W66ZCQ reports newly formed RTTY group growth has been phenomenal. He reports The Southern CA Amateur Teletype Society is a bona fide organization with a Constitution and a regular monthly schedule of meetings. Affiliation with ARRL and the possibility of participation is under discussion. They also plan installation of a new solid state repeater on 146.10/146.70 MHz. Congrats to the St. Clarita Club on their fine dinner meeting held at the Ranch House Inn. A beautiful crowd and a very fine talk by W6MLZ. New officers G. Strickland;

Dennis Hanley, vice-pres.; A. Ogden, secy.; Don Reinke, treat. The Ham of the Year Award went to Art Edwards teacher at Canyon High. With regrets I inform you members who are also members of the SOWP of the passing of W6PZY, he will be missed on the local nets, was very active on cw and sgb. W6SPK has been very active and now its time to get going with the AREC and their efforts. Recent rains have caused mud slides, so get in touch with Allen and help the Los Angeles Section be one of the best prepared Sections in the area. Traffic men don't forget SCN meets on 3600 kHz 0230Z nightly, we need more people with the advent of the new 50th state starting to bring in messages. Contact Asst. SCM W6OYN for skeds and forums. W66JLJ experimenting with 80-meter antennas, says is having considerable success with improved signal. W66TCH is the new proud owner of a First Class RadioTelephone Operators license, congrats Rich a real accomplishment. W66FEJ is the local DBS with bulletins three times a week, on approx 706 kHz, keep up with the latest news. Traffic: W6INH 250, W6HUJ 240, W6OYN 216, W66PKA 208, W66EO 104, K6UYK 63, AB6AIT 48, W66TKR 42, W66QAE 38, W66TCH 30, W66RO 26, K6CL 22, W66JFD 20, W66NKE 12, W66USY 12, W66KI 9, W66YID 8, W66YD 4.

ORANGE: SCM, William L. Weise, W6CPB — Asst. SCM: Dick Birbeck, K6CID. SEC: W66TVA. RM/PAM: W66AKR. Our thanks to all who participated in the annual SET. A job well done. 1976 officers for Fullerton RC are K6DS, pres.; W66KGN, vice-pres.; W66FS, secy.; K6ATK, treat. K6VNB has moved his QTH from Garden Grove to Santa Barbara to be near his work. W66PHA is putting a series of ARRL prepared Public Service announcements on KDES-FM. Hope you were able to listen in — most informative. Desert Rats drills will continue on the 2nd and 4th of each month. Drills are held each Mon. at 8:00 PM local time. 1976 officers for the Anaheim ARS are W66HKW, pres.; W66UML, vice-pres.; W66LZ, secy.; W66AGD, treat. The Guatemala City earthquake points out our necessity to continue in our emergency communications preparedness. If you are not participating in the drills see your EC or register with your SEC. Note: If you do participate in an actual emergency situation remember to wait your turn, after checking in, with the Net Control. Also remember that the skip conditions may be so that the Net Control cannot hear you. Do not be critical of his operation, he is doing the best he can under the conditions. If the control cannot hear you go through a relay station then continue to monitor and await your call. Traffic: W66EIG 353, W66TVA 124, W66WRJ 84, W66CPB 27, W66QB 11, K6LJA 8.

SAN DIEGO: SCM, Arthur R. Smith W6INI — SEC: W66BF. Guatemala earthquake activity gave Amateur Radio good publicity with TV news and news paper articles highlighting deeds of SEC W66BF and XYL W66HXB. Let's all head for Tucson and the SW Div Convention, Apr. 9-11. "SANDARC", newsletter of San Diego Co. Amateur Radio Council made its debut in Jan. Send names of potential hams to W66GDC (P.O. Box 2323, La Mesa, CA 92041) for mailing list. W66GDC also spearheading survey of all amateurs in San Diego and Imperial counties. New Executive Secy. of National Assn. of Search & Rescue Coordinators is W66MME. Amateurs associated with San Diego Mountain Rescue Team: W66ARQ W66BF W66HXB W66KAU K6MAT W66MME W66ODQ W66PZ W66RZ club officers: ARS 1976: ARYL Cajon, WA6RBP, pres.; WA6WVP, vice-pres.; W66DPO, secy.; WA6HXB, treat. South Bay ARS: W66EHN, pres.; W66BF, vice-pres.; W6ZVA, secy.; WA6JCG, treat. Operation of Palomar Mtn. Repeater (146.13/73) much improved with new Stationmaster antenna. Newest addition to AREC-committed repeaters is W66JA (146.3/3) operated by explorer Post No. 201. W66HCF new QRS. Upgraded to Advanced: W66GZT. Much-needed project for clubs: assist in sponsoring high school radio clubs. Who will be first? Traffic: (Jan.) W66PVH 214, W66HCF 231, W66GF 191, W66PZ 81, W66DE 38, W66LUF 65, W66IK 2 (Dec.) W66PVH 489, W66HCF 167. (Nov.) W66HCF 23.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI — Conejo Valley ARC elected WA6HGF as student rep to encourage young future student hams. Their new VHF is W66ML. W66RML has antennas at the Jan. meeting. The Mike and Key RC bought a TR22 and TR4 for the club station. W66MFY teaching their Novice Class in Camarillo. Central Coast ARC meets in Arroyo Grande, contact pres. WA6ZRA for info. Central Coast Relay Soc. (WR6AZ) elected W66VGC, pres.; W66EAR, vice-pres.; W66FJ, secy.; treat. UCSB W66RFL, secy.; W66WVH, pres.; WA6MWH, vice-pres. Sulphur Mt. Repeater Assn (WR6AEP) elected W66QLQ, pres.; W66TPL, vice-

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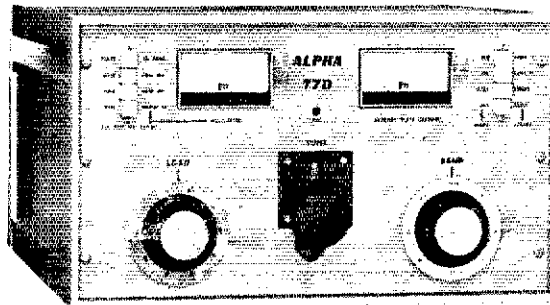
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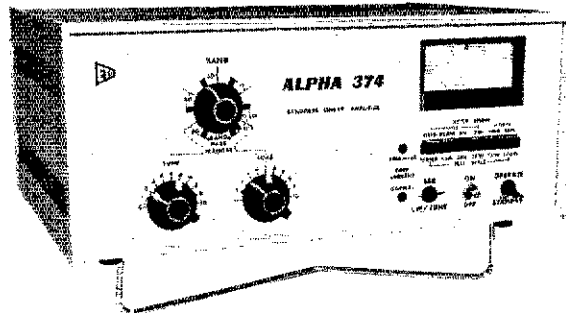
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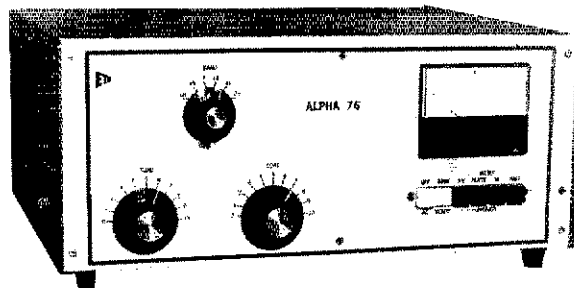
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pres.; K6YLO, secy.; WB6FLI, treas.; K6GYL, board. Poinsettia ARC in Ventura has a new generator for emergencies. K6VFE teaching Novice classes. WA6DEI attended big Hamfest in VA. WA6IJZ has opened C and C Electronics in Ventura. WB6IYW making a new 3191 repeater for SB — they have code practice 4 days a week. WA6SOZ and WA6DEM TX 13355 1930 Wed.) WA6PFF is new member of Society of Wireless Pioneers. WN6HOZ passed his General. New hams in Ventura are WN6FMV WA6EPC and WN6GHB. WB6QDS found WA6MWH and WB6IYN hiding in a beer barrel to win the Dec. 7-Hunt. Novice Net meets each nite on 21147 at 203 with WA6TMO WN6AGX WN6EXP as NCS. The SET went well. Traffic: (Jan.) WA6MBZ 140, WA6DFI 110, WB6MXM 40, W6POU 22, AD6GPH 6, W6SMJ 1. (Dec.) WA6VBS 174, WA6PFF 6.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L.E. Harrison, W5LR — Asst. SCM: Frank E. Sewell, W5IJU, SEC: W5DWL, RM: W5CFL, PAM: W5CFL. No RM yet but still looking. See you in Midland St. Patrick's week end. WB6MOX of LA former Arlington searching for FM Corlette Jr. W5ARV & K5PCW requested OO renewal. W5KFI of TSARC lost his 2-mtr Regency to CBors. He received nice spread in local paper slanted toward Ham gear stolen instead of CB and results FB. Be sure you pay your stamp dues to QSL Bureau. I respectfully remind all that VHF freq-coord. presents small problem but if "We'll think a minute" its no big deal. ARRL is no law enforcing agency. If so then Wouff Hong plus RTTY Snitch is in order. K5ZNF interested in EC work. QTH Argyle K5ZGA. Arlington ARC pres says Christmas at 1000. W5CFL at station. ARC TX bulletin Jan. sez NTS stretched to limit & even beyond by tlc. originated during SET a joint exercise of AREC/NTS plus branches of ARPC to test capability of Ham radio handle comm. emergencies. PAM W5G5N reports new calls WB5PGX & WB6DMF. Irving ARC met Jan. 29. Old Central Fire Stn 2nd & Jefferson. K5RIV of El Paso, in ARCS of West Texas. W5J55 new club in Metroplex area. FB. W5SH, Ft Worth FqShet says OT night Jan. 15 well attended. W5EJ thmn. Plans underway for June FD work. OBS No. 573 points out that approved ARRL Clubs can initiate an extensive training program to promote increased growth of Amateur Radio. Such Clubs will receive techniques and materials for class instruction upon request. It appears that Lesson Plans are now being prepared. K5CBT request for OO appt. has been approved. Your SCM received a request for an OO appointment from a CBER, an ARRL member! W5IJU has complete details. WASZZA recently sent L.O. including packet regarding CWI. Guy Richardson, W5G5T, took shot at George Hart, ARRL Comm Mgr regarding D.K. W5MYA member ARRL Contest Advisory Committee. Congrats OM. Traffic: (Jan.) W5T1 354, W5QU 127, WB5MTN 105, WB5DXB 100, WB5MFG 74, WA5UAC 53, W5LR 4, (Dec.) WB5DXB 173, WB5MFG 164, W5SHN 118, W5G5N 35, WB5GII 5.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — A nice report from Tulsa, showing 20 Weather watches last year averaging 3 hrs each. More than 1500 hrs of amateur participation. Other P.S. activities include the Cross and 5 Fund drive stations. Northfork RC reorganized with W5CCV, pres.; WB5AXH, pres. West Central Club, Weatherford, Muskogee doing some needed remodeling to club station. Enid has raised repeater receiver antenna for more coverage, more improvements on the way. W5REC making good use of PR tapes on several B.C. stations in state. Understand more have been ordered for Okla. City stations. FB. W5WVX looking for AK for WAS on 6M. Yukon has 5 new Novices on air and more coming. Upgrades include WB5P5B, WN5MZZ. WB5AXH new EC for Cluster Co. Woodward Club reorganized with WA5YQQ, pres. All systems go for Ham Holiday 111 Aug. 7-8. AP cover 15. Some new areas heard from, some old faithfuls missing. Traffic: WB5NKO 201, WB5KGP 127, W5REC 102, WA5FSN 93, WB5NKC 67, WB5EIG 63, WB5AZ5 53, WA5JGU 53, WB5KFL 30, WB5EQR 26, W5SQU 26, WB5OYU 23, W5PML 20, WA5OUV 9, WA5QQP 5, W5PVL 6, WB5NMZ 4.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KB — SEC WB5CUR resigned. WB5TQP now W5C for Southern TX Section. RM: W5UGE. PAM: WB5AMN. OCS reports: (K5B) and (Jan.) WA5LTQ W5NGW WB5CIT DVS5 reporting. K5ZMS (Dec. and Jan.). AD5LZJ WB5HRI WB5CIT. ORS WB5QDW, ex-WA3VWJ, having loads of fun with his 5 call. Congratulations to WB5PSC who upgraded to Advanced. OPS WB5GQH and wife, WB5GQI, moving to AR. Head SMIRK K5ZMS reports SMIRK member since Nov 1187, 3 counties 48 stations. W5G5N, OC W5NGW had some trouble with bicentennial calls until he received his Jan. QST. DVS AD5LZJ monitored three Novices for their exams; they now await calls and licenses. OO K5DAE has moved to new house. EC K5UYH sporting new beard. EC W5TFW says code classes going great! Summit; will have more soon in Port Arthur. W5QZW has new triband beam. Galveston Co. Repeater Assn. has new repeater ready for its license; will be on 147.75 in 147.15 unit. Ask ORS WB5IZN about sandstorms! WA5GWT is straight "A" student at Del Mar College. EC WB5GNP announces formation of Laredo International ARC; pres. is W5CZL. W5BSCIT trying for bicentennial WAS on RTTY. OPS WB5CBT worked all states for the Bicentennial WAS in six days; still waiting for 3 states to be confirmed. OPS WB5GVO made the TV news on Channel 5 in Harlingen while he was running phone patches from Guatemala earthquake area. K5DIX in Harlingen ran radio diplomatic traffic during the Guatemala emergency. (Jan.) W5KLV 331, K5HZR 292, W5UJJ 229, W5TQP 205, WA5VBM 203, WB5FMA 187, WA5ZJY 140, WB5QDW 119, WA5ZBJ 117, WB5IZN 112, WA5RKY 108, WB5AMN 102, WB5GVO 102, WA5CYA 97, WB5QOV 65, W5K5R 56, WB5NMU 54, W5QGO 29, W5SGE 27, W5SIR 22, WB5PSC 17, WB5XJ5 15, WB5GQI 14, W5TFW 14, WB5HRI 10, WA5YXS 7, K5ZMS 5, W5CBT 1. (Dec.) WB5QOV 271, WA5VBM 160, WA5ZBJ 114, WB5LII 72, WB5IZN 64, K5ROZ 16, AD5ZMS 3. (Nov.) WB5IZN 16.

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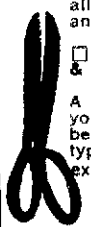
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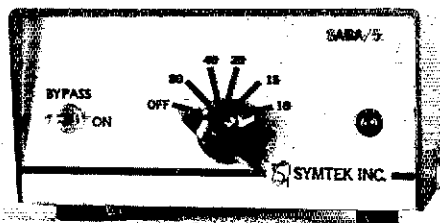
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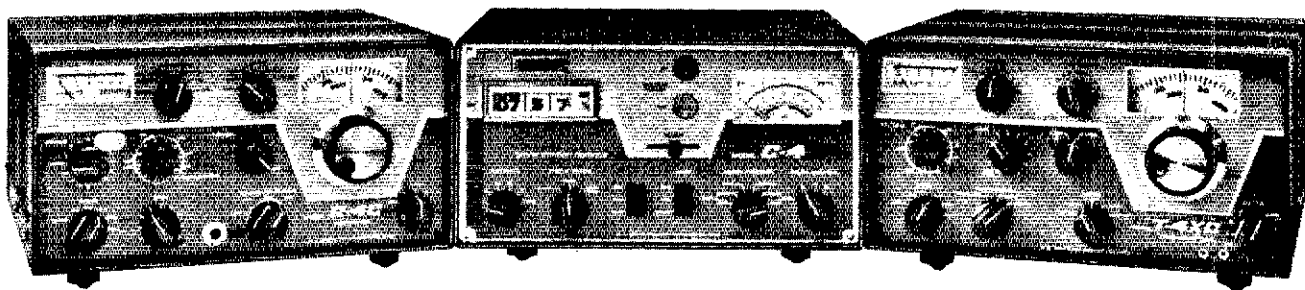
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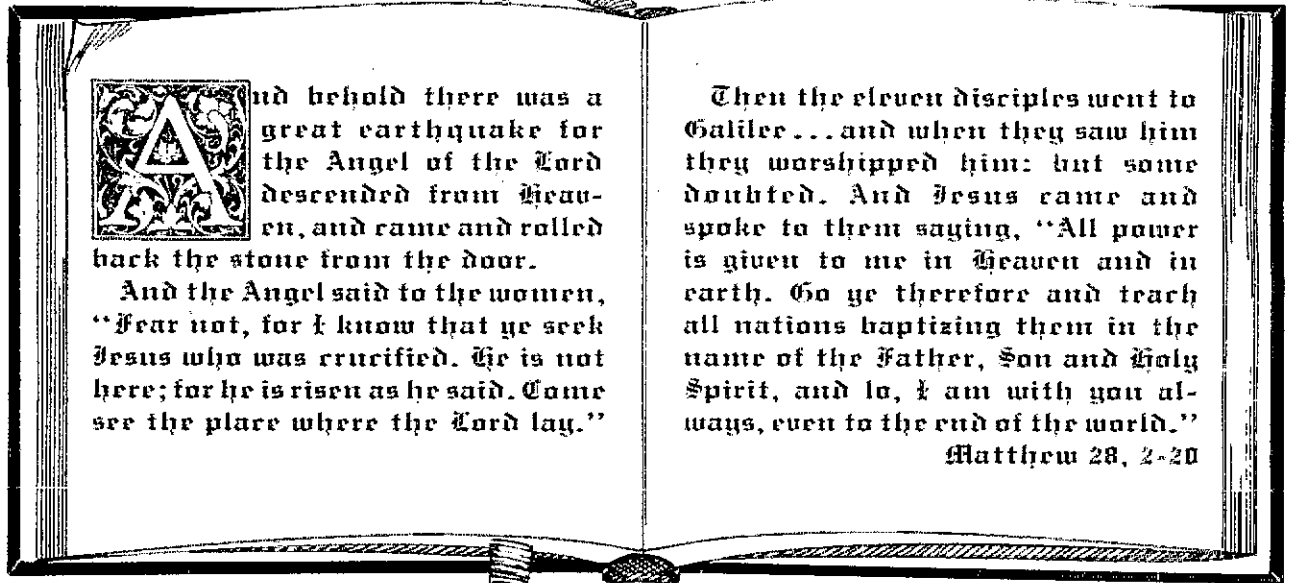
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Matthew 28, 2-20

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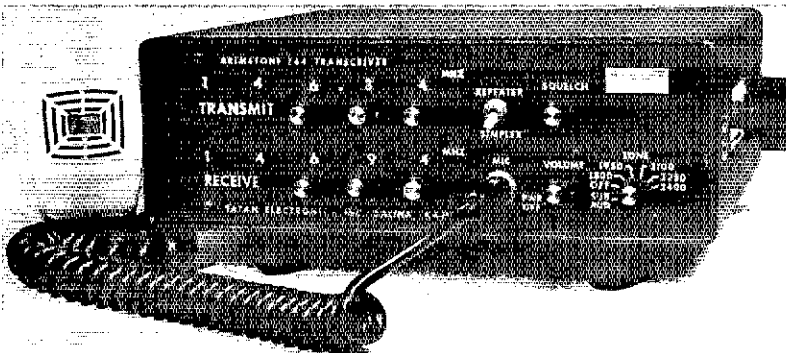
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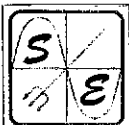
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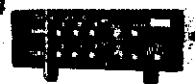
BRIMSTONE 144

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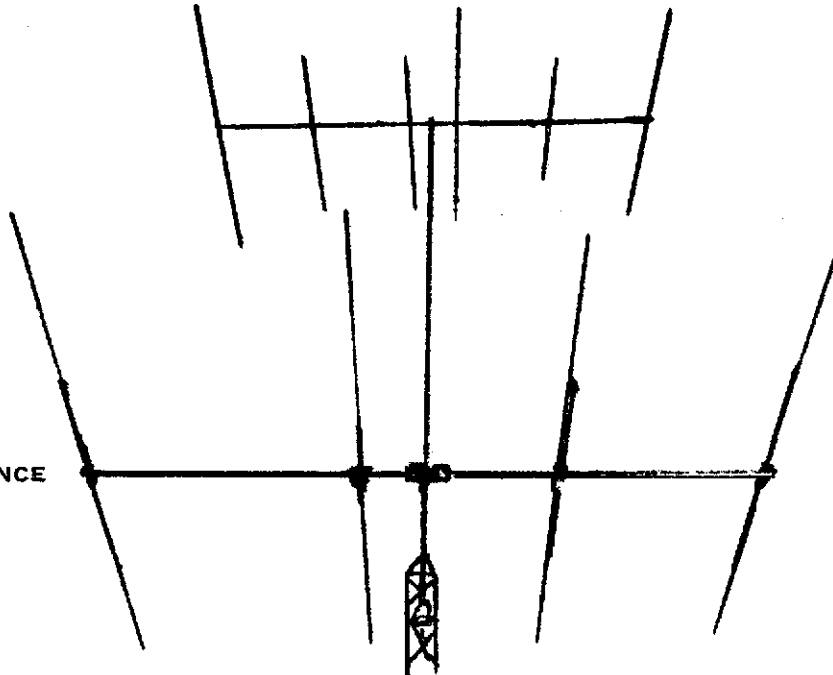
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Wilson Electronics Corp.



WILSON 204 MONOBANDER PLUS DB33

REAL
MONO
PERFORMANCE
ON
10-15-20



The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom plus a Gamma Match (no balun required) make for high performance on CW & phone across the entire 20 meter band. The 204 Monobander is built rugged at the high stress points. Using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading.

The DB33 is the newest addition to the Wilson line of antennas. Designed for the amateur who wants a lightweight, economical antenna package, the DB33 compliments the M204 for an excellent DXers combination.

All Wilson Monoband and Duoband beams have the following common features:

- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- 2" or 3" Aluminum Booms
- Adjustable 52 Ω Gamma Match
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

WILSON AMATEUR ANTENNA SPECIFICATIONS

	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M240	30	2	73'0"	39'6"	10.0	250	60	63	\$299.00
M520	40	5	36'4"	27'0"	5.0	125	90	96	269.00
M204	26	4	36'4"	22'6"	3.9	100	46	49	139.00
M155	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	40	5	36'4"	27'0"	7.9	198	105	119	299.00
(15)		4	24'3"						
DB43(15)	19	4	24'3"	15'8"	4.3	108	36	38	119.00
(10)		3	18'0"						
DB33(15)	17	3	24'3"	12'2"	3.8	95	31	33	89.00
(10)		3	18'0"						

All Wilson Antennas are FACTORY DIRECT ONLY! The low prices are possible by eliminating the dealer's discount. Most antennas in stock. If you order any antenna, you may purchase a CDR Ham II for \$124.95 or a CDR CD44 for \$85.95. Send check or money order, or phone in BankAmericard or Master Charge. All 2" Boom antennas shipped UPS, 3" by truck.

Wilson Electronics Corporation

4288 S. Polaris Avenue, Las Vegas, Nevada 89103

702-739-1931

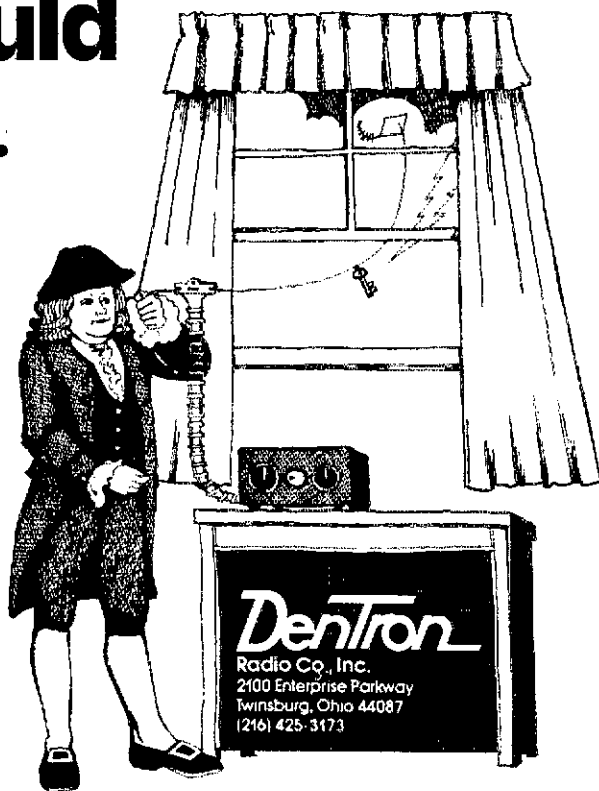
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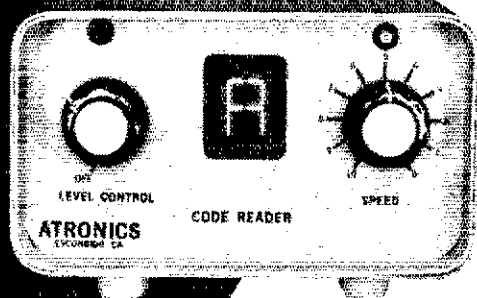
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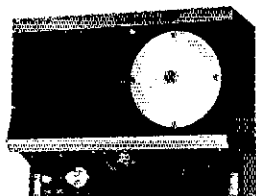
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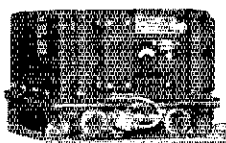
490-T Ant. Tuning Unit
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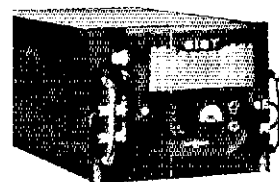
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R1051 or T827



ARC-51 Transceiver



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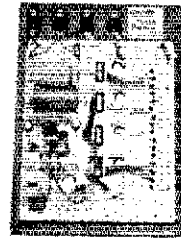
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Evenings (201) 998-6475

5 WAYS TO STOP WASTING TIME IN ELECTRONICS.

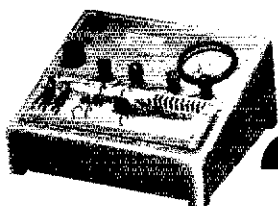
1. Stop wasting your time soldering. Save hours of soldering, desoldering, re-soldering with QT sockets and bus strips. Connect and disconnect resistors, capacitors, transistors, IC's etc., literally as fast as you can push in—or pull out—a lead. Make instant interconnections with short lengths of wire. And interlock sockets and bus strips for infinite expandability on bench, chassis, plug-in cards, etc. At \$2.00-12.50*, you'll wonder how you've done without them!



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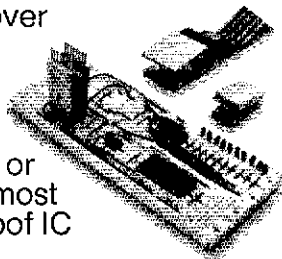


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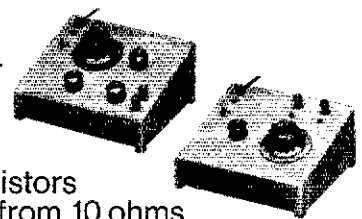
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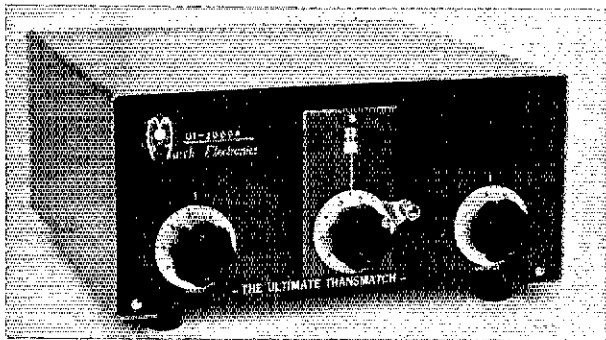


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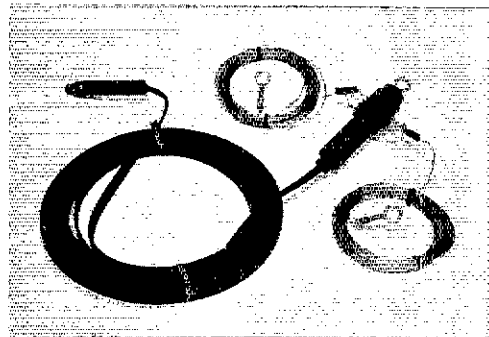
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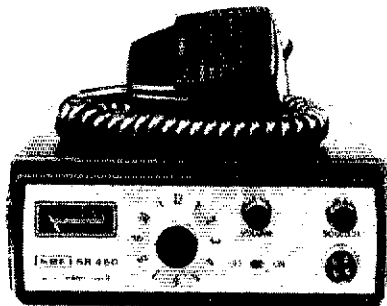
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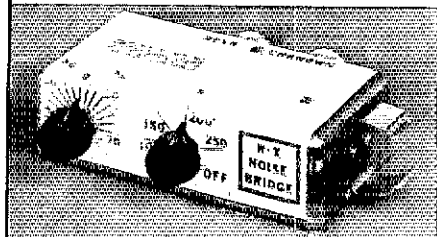
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The AS-1729/VRC is built to MIL-A-55288B (EL) specifications. It is fully compatible with all military radios in a 10-band spectrum from 30 to 76 MHz and with all previously manufactured AS-1729 equipment.

Band switching is automatic when the antenna is connected to a transceiver with automatic band switching. When connected to other receivers or transceivers, bands are switched by operating a manual control on the base matching unit.

The AS-1729 is designed for installation on all mobile military equipment, including jeeps, tanks, APC's and weapons carriers, with a minimum of downtime. The base/matching unit interfaces to the vehicle using only four bolts and an included gasket. It is also well-suited for shipboard use.

The AS-1729/VRC consists of three interdependent assemblies: MX-6707/VRC Base Matching Unit with spring cable assembly; AS-1730/VRC Lower Antenna Element; and AT-1095/VRC Upper Antenna Element.

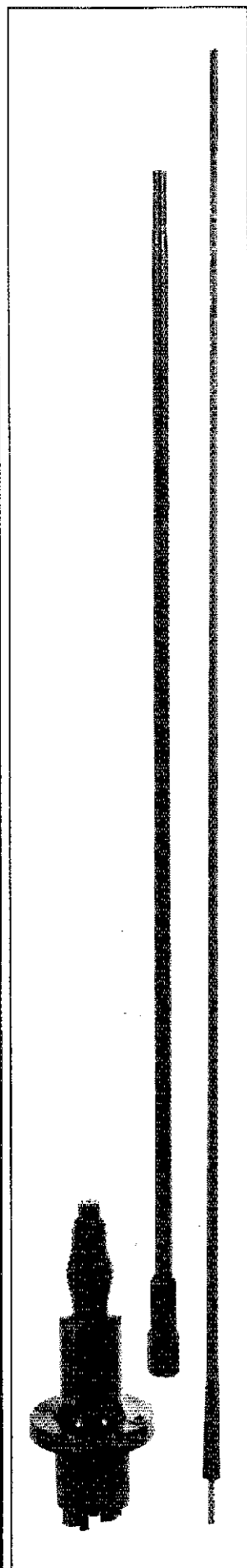
SPECIFICATIONS SUMMARY

AS-1729/VRC, Hy-Gain Model V-4231

Frequency range:	30-76MHz
Power input:	70 watts maximum
Input impedance:	50 ohms
VSWR:	3.4:1 maximum
Operating temperature:	-40F to 150F
Antenna type:	Whip, fiberglass
Band switching capabilities:	Automatic or manual, 10 bands 30-33, 33-37, 37-42, 42-47.5, 47.5-53, 53-56, 56-60, 60-65, 65-70.5, 70.5-76 MHz

The logo for Hy-Gain Electronics Corporation. It features the word "hy-gain" in a bold, lowercase, sans-serif font. To the left of the text are three vertical bars of varying heights, resembling a stylized antenna or signal strength indicator. A registered trademark symbol (®) is located to the upper right of the word "gain".

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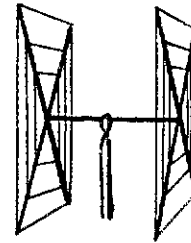
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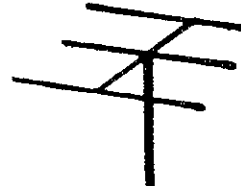
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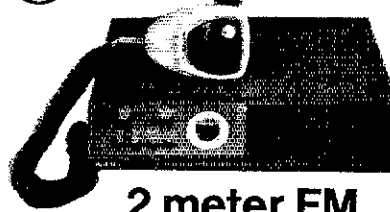


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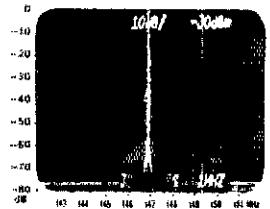
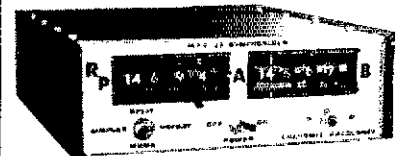
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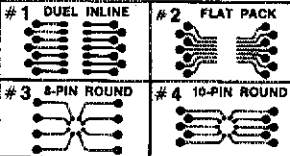
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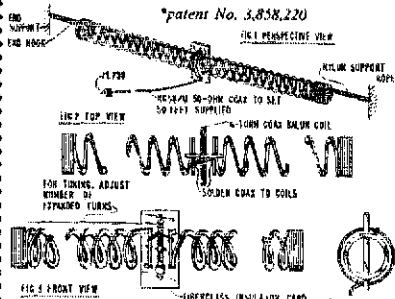
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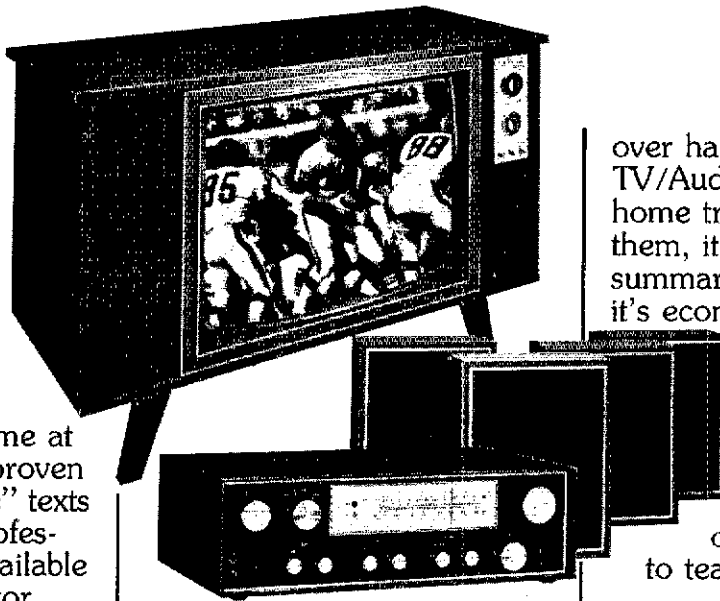
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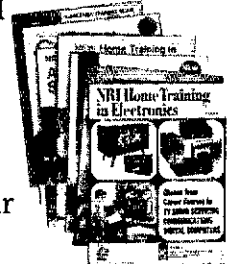
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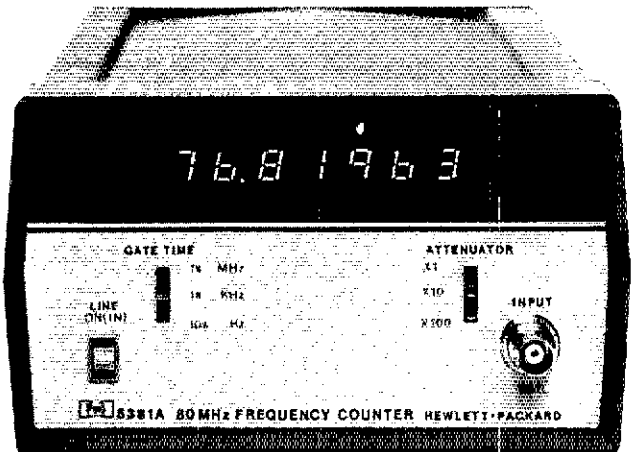
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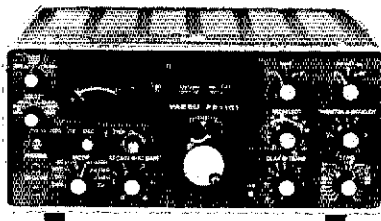
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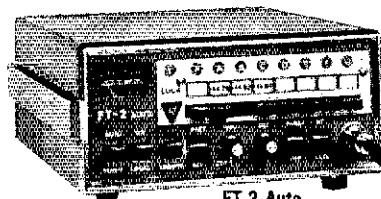


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T-106	135			1.06	1.50
T-80	55			.80	.90
T-58	57	47		.68	.65
T-50	51	40		.50	.56
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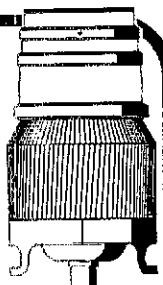
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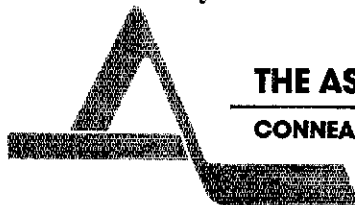
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Technically the Silver Eagle has convenience

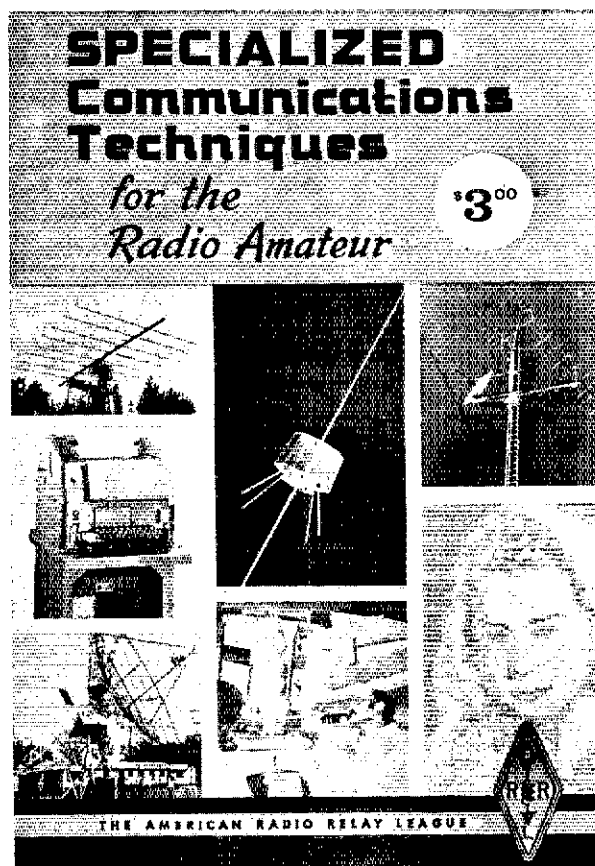
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4 DIGIT ALARM CLOCK

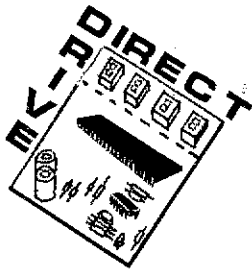
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Kit No. 1 (with PC Board)

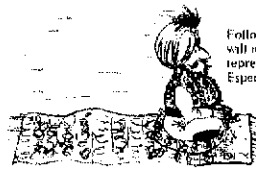
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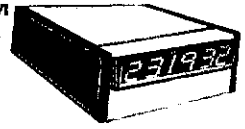
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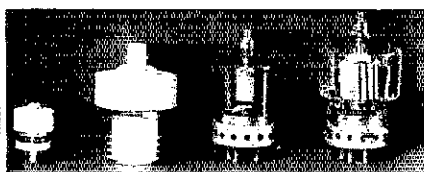
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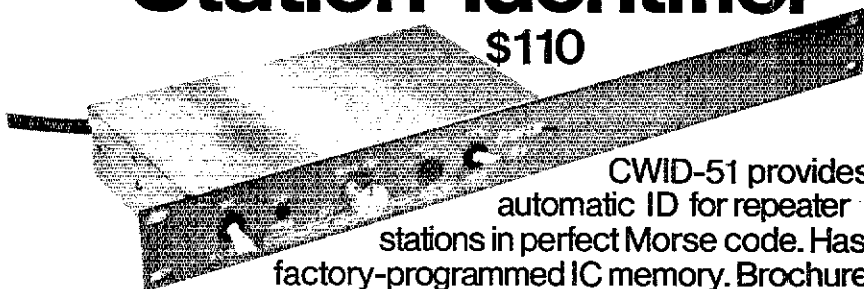
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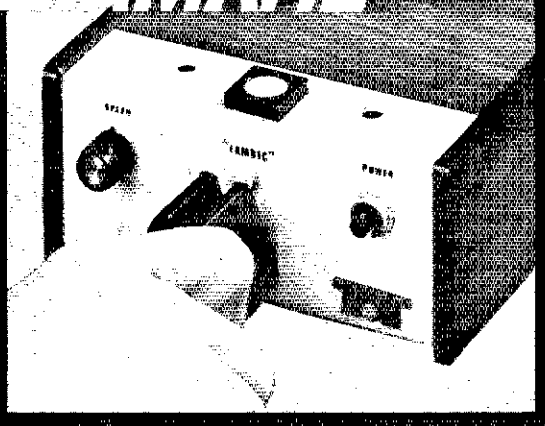
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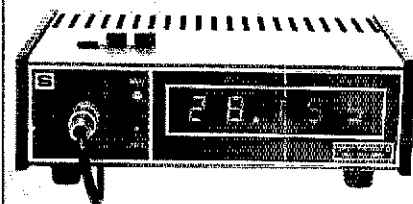
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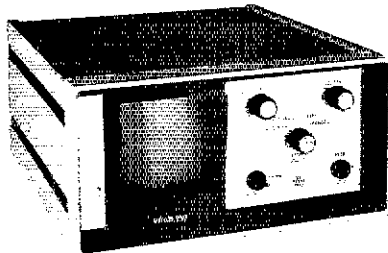
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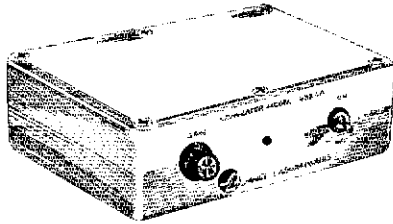
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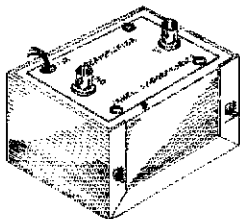
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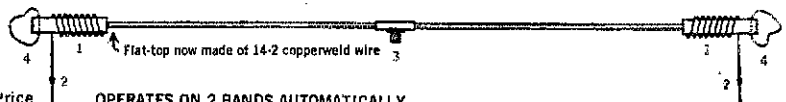
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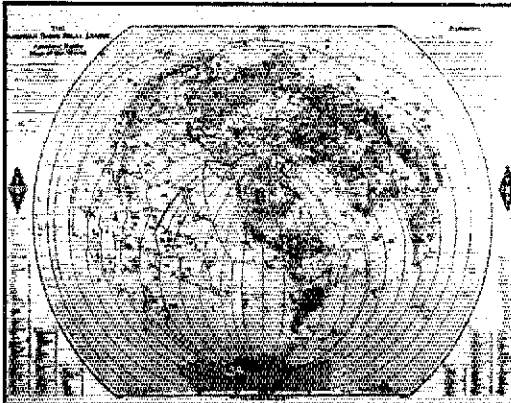


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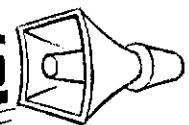
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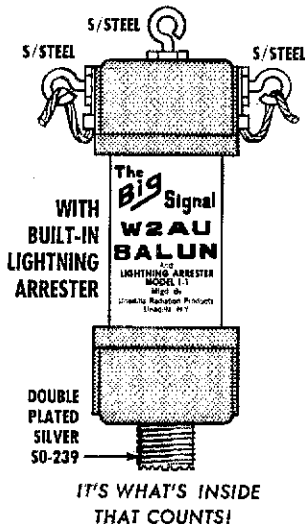
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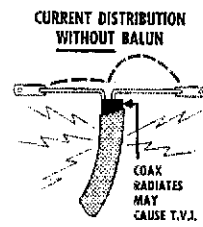
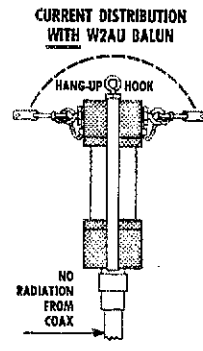
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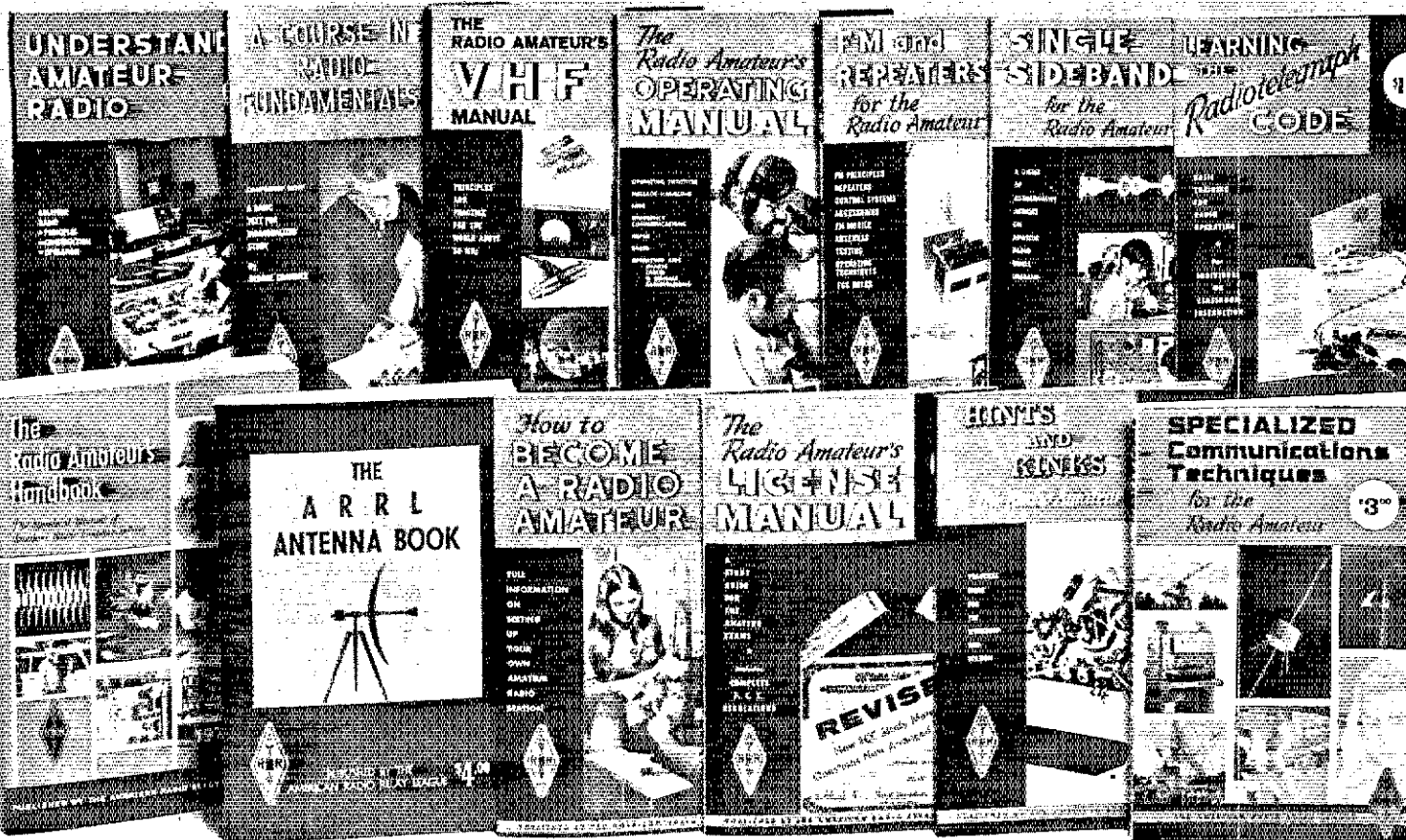


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THE New York Radio Club invites Hams to club meetings, 2nd Monday of each month, 8:00 PM at the Williams Club, 24 E. 39th St., NYC NY 10016. For information, same address.

ROCHESTER Hamfest 1976 combined with the N.Y. State ARRL Convention is Friday thru Sunday, May 21-23. FCC exams. Flea market Saturday only. Your name added to mailing list or information - write Rochester Hamfest, Box 1388, Rochester NY 14603.

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MOULTRIE Amateur Radio Club 15th annual hamfest April 25, Wymat Park, Sullivan, Illinois. Indoor-outdoor market. Advance ticket sales by mail only, \$1.25 or \$1.50 at gate. Write: MARK PO Box 327, Mattoon IL 61938.

NORTHWESTERN Pennsylvania Swapfest, May 1, Crawford County Fairgrounds, Meadville, Free Admission. \$1 to display. Flea market begins at 10: AM. Refreshments. Commercial displays welcome. Indoor if rain. Talk-in 146.04/64 and 146.52 MHz. Details, Crawford Amateur Radio Society, Box 653 Meadville PA 16335.

ROCK RIVER Hamfest - April 25, Amboy, Illinois Lee Co. 4-H Center. Jct. 30 & 52 Same place as last year for further details see hamfest calendar \$1.00 advance gate \$2.00, write Carl Karlson W9ECF, Nachusa IL 61057.

W6LS 11th Burbank California Hamfest, Saturday and Sunday, May 15 & 16. Flea Market, Prizes. 2814 Empire Avenue, Burbank CA 91504.

SAROC Second Hawaiian Convention, Kuilima Hotel, August 28, 1976, exhibits, technical sessions, banquet. SAROC Twelfth annual convention Hotel Sahara, Las Vegas, NV, January 6-9, 1977. Details from SAROC, POB 945, Boulder City NV 89005.

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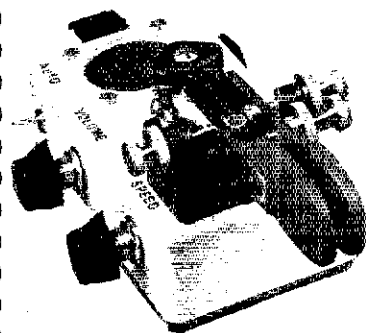
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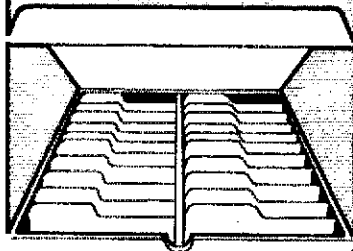
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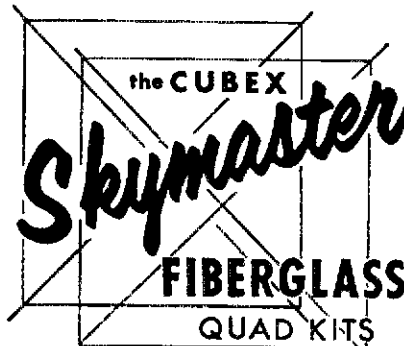
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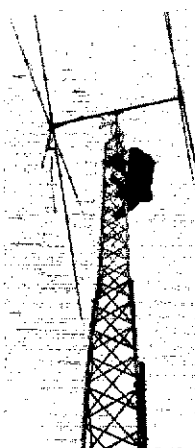
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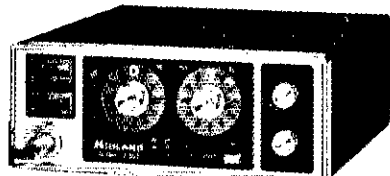
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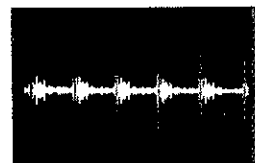


Fig. 1 SSB signal before processing. See the high peaks and the low valleys. Our NCX-3 is putting out only 25 watts average power.

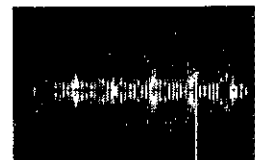


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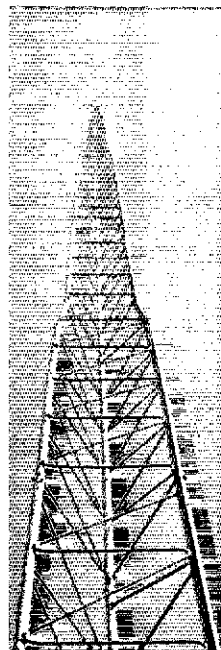


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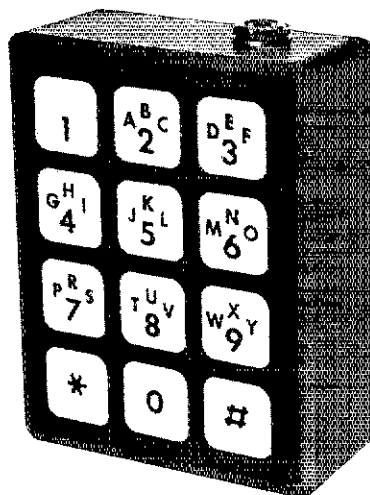
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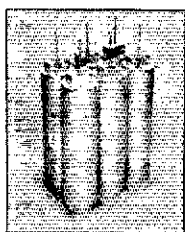
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WANTED Grebe receivers in any condition and Grebe
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ROBOT sstv 80A & 90A less lens — mint first cashiers
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\$250 each unit. You pay shipping. Gary, K1LEM,
Williston VT 05495. (802) 878-2042.

1912-1973 QST in good condition, 98% complete set.
Make offer to Pat Godley Co., 130 Houston Road,
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TEKTRONIX 531 scope with type K plug in — \$450;
LA 545 scope with LA 545-54 B plug in \$575; 531 R
scope with CA dual trace plug in \$600; HP 176 dual
trace scope \$550.00; HT 200 with PL-deck on .22, \$2
\$275, shipped prepaid on receipt of certified check.
D.M. Crouch, 8038 Wurzbach, San Antonio TX
78229.

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WANTED: Will pay top price for Collins or Henry late serial number transceiver and 2 kW PEP linear amplifier. Will consider only late serial numbers and will inspect and pick up within 250 miles Metropolitan New York. Call John Bess - (516) JU-1-1410.

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SB-303/401, all filters, xcvr cables, spare driver and finals, manuals. Almost new, performs well. \$550. Hamlin 2100 Sherwood Lane, Havre de Grace MD 21078.

WANTED: Measurements 80R Signal Generator and HP 410B VTM in perfect working order. Write Guy Black, 12317 Hanger Road., Fairfax VA 22020.

GALAXY: GT-550A, AC-400, SC-550A, unused, mint, in original cartons, \$539. WA2NVB, 11 Berkley Road, Scotia, NY 12302.

WANTED: VX35 Vox and F3 filter for Galaxy 5. Bob, WB6AZK, 123 Henshaw No. 405, Chico CA 95926.

SELL: Drake R4C with 200, 500, 1500 Hz filters and noise blanker; T4XC with AC-4 power supply; MS-4 speaker; MN-2000 matchbox; all for \$1050. I ship, contact Tom Bell, after 1800 EST at (502) 624-4695.

ZENITH Trans-oceanic s/w receiver, absolutely mint. First \$120 certified check or money order. Shipping paid. WB5HTG, 87 Litchfield Ln, Houston TX 77024.

SELLING entire station - R4C - \$400, MS4 - \$20, NB - \$50, filters 5 and L5 - \$70, crystals (15) 160 meters, 10, 1, all sw - \$50, T4XB with 4 extra new finals \$385. All mint. Homebrew 2 kW ultimate transmatch \$85. EV 619 mike - \$10, Heath Patch \$25, Antenna \$5. Copal 24 hour digital clock \$12. David Schwartz, 1183 Southeast St., Amherst MA 01002.

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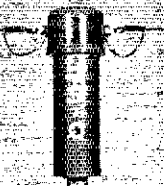
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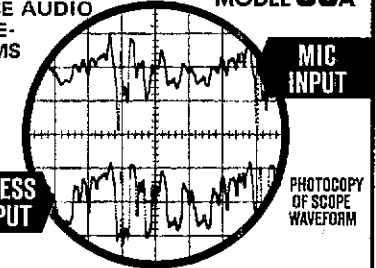
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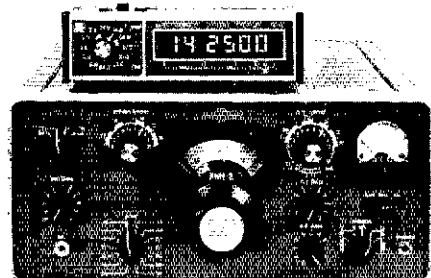
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DESPERATE: Need schematic for RCA s/w rec. model 3-BX-671; ser. U-037395. Mc Alonan 41-21 54st Woodside NY 11377.

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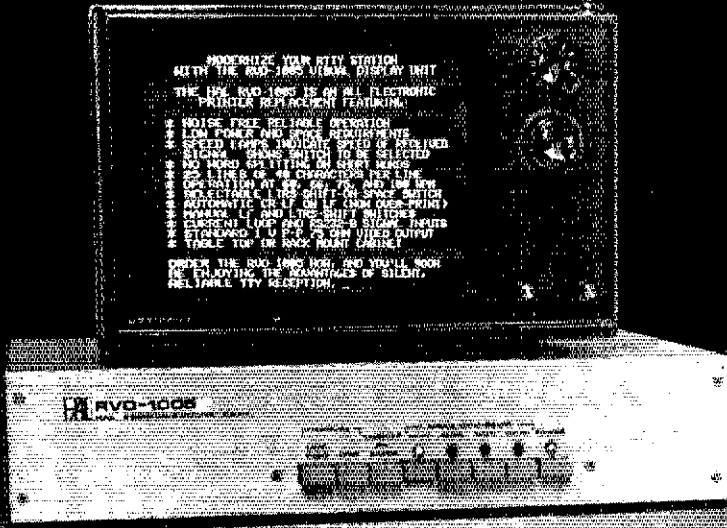
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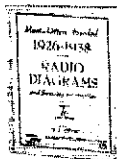
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PRECISION, adjustable, solid state power supply, 515VDC at 1 1/2 amps, regulated simultaneously with 10VDC at 3 amps, unregulated, plus over 900 parts worth \$400. list. Includes 182 transistors, ICs, diodes, and FETs, numerous resistors, capacitors, crystals, inductors, varicaps and delay lines. Components have long leads. Transistors will operate in heatshock TVs. Semiconductor characteristics, circuit diagrams and circuit functions included. New Cartrivision VTR electronics unit. \$19.95 plus \$1.50 shipping. 50c for brochure. Madison Electronics Company, Inc., P.O. Box 369, D66, Madison, Alabama 35758.

WANTED: Vikings Courier linear with manual mint condx. Prefer quote price, condx, how ship. Will answer all letters. Roland Crull 414 Talbot Ave., Winnipeg, Man. Canada R2L0R3.

HOSS-Trader, Ed says "We refuse to be undersold: If you didn't buy it from the HOSS you paid too much, shop around. We have the best price then telephone HOSS list." New Atlas 210 Transceiver, \$519.00; Demo TR-4-C, \$489.; New Display Swan 700-CX, \$539.; Demo 14XC, \$469.; Demo HR-2B, \$179.; New ICOM Model 230 Demonstrator, \$419.00; New Rohn 50 Ft. Foldover Tower Prepaid \$365.; Demo HAM-2 rotator, \$116.95; New Display Atlas 210X, \$659.96; Hoss-Trader Specials T-4, \$395.; R-4C \$489.; New Display L-4-B Linear, \$725.; New Collins at Old prices, factory sealed: make offer. Moory Electronics Company, P.O. Box 506 DeWitt, Arkansas 72042. Tel.: (501) 946-2820.

WANTED: Drake Recvr. R4B or R4C. State price & condition to: K2HWK, 108 Wilsnre Rd., Solvay NY 13209.

WANTED R390A in qud condx. R. Matias APD NY 09210.

DRAKE TR3 transceiver, AC power supply, RV3 remote VFO with 5" speaker, manual, Turner 454 microphone, mint condition — \$395. WA6DZF, 850 Canterbury, San Marino, CA 91108 Phone (213) 792-4036.

WANTED: 4 — .01 mfd 5kv, or larger voltage rating, capacitors. Bob, WB9MRY, Box 874, Ava, MO 65608.

FIRST annual Elmira Hamfest, Sept. 25. For details, write WA2SMM, 320 W. Ave., Elmira NY 14904. Dealer inquiries invited.

SELL HW100 XCVR with HP13 DC Supply, Hmbrw. AC Supply, \$295. — WA9AIV/2, Riddel 303 Carlton Ave., Piscataway, NJ 08854.

SELL: Collins 755-3B: One owner mint. Serial Number 16748. \$625 firm. Cashier or Certified check. Satisfaction guaranteed. Shipped F.O.B. Dr. Jack Schmitt, WA2ZYQ, 1245 Jeff Davis Brentwood, TN 37027. Tel: (615) 383-7971.

ICOM IC-30A 450MHz transceiver \$335 and IC-3PA power supply \$75. Ringo 450 MHz \$15. Ron Perry, WA2CGA (914) 897-5930.

HEATH HW30 "Twin". Have 2 in nice working condition, with mike, xtal and tech. data. \$23.95 each F.O.B. B. Harms, W1JWW/4, 905 Fernald Edgewater, FL 32032.

TUBES, books, everything, antique and modern. Sase for 7 page list. W4BLQ, 6158. Edgewater FL 32032.

DRAKE R-4C, MS-4 perfect \$375. Genave GTX-200, 400-B GLB channelizer (factory wired) Psi-10 ac ps perfect \$375. Vibroplex "presentation" like new \$40. Drake W-4 perfect \$45. you pay shipping. Following pick-up only. CDR Rotor \$65., Cushcraft R-147-22 \$35. Custom A-50-5 30 Hygain 2BDQ 40-80 Doublet \$30. Hygain 64-B \$25., Hygain Ham cat fold over 10-15 & 20M tips, \$40. Mosley TA-33 \$85., Rohn HAX 56' free standing tower hinged base \$175. You take down. Dennis Vaughn, 160 Paul, Ocoito Falls, WI 54154. (414) 846-3386.

SELL: mint Clegg 22'er Mk II 2M AM trncvr \$150 U ship WB8TUS. (408) 268-1825.

WANTED: Drake TC-6 Transmitting converter, Bart. Perrotti WA1BAL, Lakeville CT 06039.

LINEAR — National NCL2000, Ceramic tube, 2kw plus. Excellent condition, cost, originally \$895. Sell for \$300. John Mathis 2412 Pierce 310E Nashville, TN 37212.

WANTED: Collins KWM-1. Must be mint condition and above S/N 860. Also PTO oscillator type 70H13A, W2WCO R. Streeter, 9 Poplar Place, Fanwood, NJ 07023.

BUMPERSTICKERS: "Hams Do it With More Frequencies", 3/81.00 WB7CBy, 4046 East Pinchot. Phoenix AZ 85018.

CIRCUIT Boards — Undrilled, Morse Converter Oct. Nov. Dec. QST, Morse/ASCII \$15, ASCII/TV \$10 postpaid USA. Send stamp for details. Bert Kelley, 2307 S. Clark Ave., Tampa FL 33609.

TRIPOLE (TM) New! 80-6 plus 150 Antenna 80 to 120 feet. Guaranteed. \$54.95 kit. Sase for information. Universal Radio Co. Dept Q2, Box 26041, El Paso TX 79926.

Jobs for Hams

Well-established, growing company has openings in Test Laboratory. Career-minded individuals with a strong engineering background in Antenna Design/Development and RF communications are sought. Openings also exist in our Sales and Advertising Department. Send Resumes in confidence to Cush Craft Corp., 621 Hayward Street, Manchester NH 03103.

HAM Counselor wanted, N.H. boys' summer camp. Drew Friedman, 39 Imperial, Westport CT 06880, (203) 226-0334.

COUNSELORS - Ham radio, electronics, rocketry, auto mechanics childrens camp, NE Penna. Write Corpuel, 633 Barnard Ave, Woodmere NY 11598. (516) 295-5544.

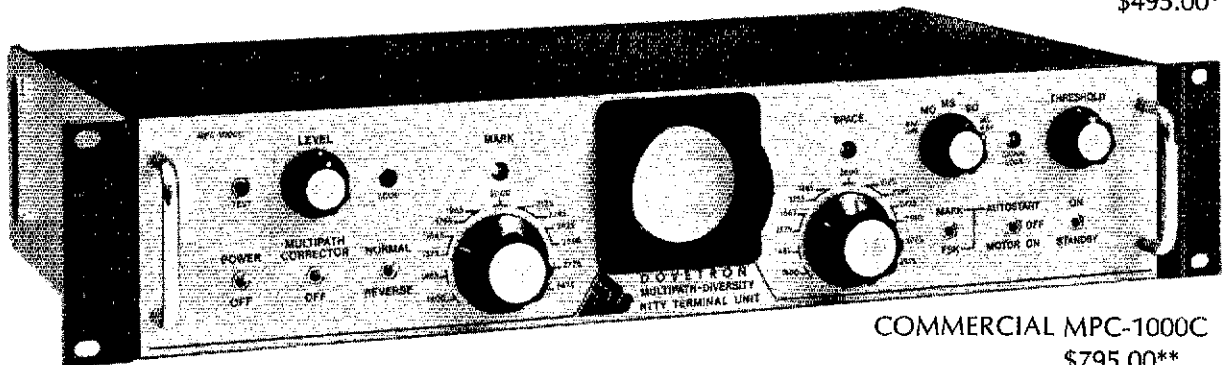
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Deep selective fading of the Mark and Space channels is no longer a plague since each channel is independently detected.

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Signal regeneration and speed conversion are available with the addition of an internal PC card.

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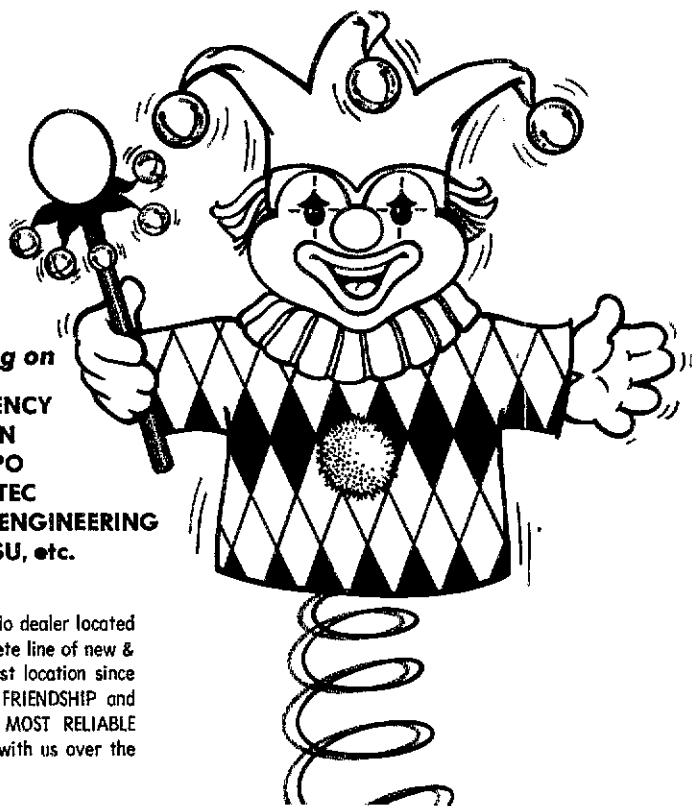
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DEAR OM:

NO FOOLIN'!! There really IS an "Honest-to-Goodness" amateur radio dealer located in Watertown, South Dakota — of all places — offering you a complete line of new & used ham gear. To be sure, we've been here in our central Midwest location since the fall of 1937 building our business on a solid foundation of FRIENDSHIP and PERSONAL SERVICE and earning our reputation as "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER" among the many hams who have dealt with us over the years.

We have always held that there are TWO IMPORTANT FACTORS in any purchase of ham radio equipment — the PRODUCT and the DEALER — or, in other words, WHAT you buy and WHERE or from whom you buy it!! At BURGHARDT AMATEUR CENTER, we stock & sell AND guarantee & service virtually every major quality product in the ham radio field today, but it's not so much WHAT we sell — rather HOW we sell it that's worth your consideration when you're in the market for a new or used piece of equipment.

We won't "pull the wool over your eyes"!! Our prices on both new & used gear squarely reflect the REALISTIC value of the merchandise, and you'll ALWAYS receive our TOP DOLLAR allowance when trading. Our stock of NEW GEAR is as large as possible in order to keep up with current demands and at the same time insure that you will receive "factory-fresh" units when we deliver. When it comes to used equipment, our listings are an ACTUAL & FACTUAL listing of items of DO HAVE on hand, and unless we've got it RIGHT NOW — you won't be led to think otherwise. All used equipment is FULLY RECONDITIONED and ABSOLUTELY GUARANTEED, and we'll accurately describe its condition to you BEFORE you buy. We may be undersold at times, but YOU will never be OVERSOLD!!

Furthermore, when you deal with us, you ALWAYS receive our prompt, PERSONAL ATTENTION and INDIVIDUAL CONCERN — every letter or phone call puts you in INSTANT TOUCH with someone who can give your order or inquiry his undivided attention. We approach each and every transaction with a fresh frame of mind — YOU'll never catch us using any stereotypes — and you'll always find us ready to COOPERATE with you to the limit!!

Now, when it comes to FAST DELIVERY, HONEST DEALING and DEPENDABLE SERVICE, we don't just advertise it — WE GIVE IT!! We do not pretend to be "BIG OPERATORS" or "WHEELER DEALERS" — but choose instead to offer FRIENDSHIP, PERSONAL SERVICE and RELIABILITY to those who realize that there is MORE to a GOOD DEAL than just the lowest price — that in the final analysis the reputation of the dealer standing behind their purchase is worth as much or more than the quality of the product itself.

In short, WE DON'T FOOL AROUND!! Granted, we are making some pretty fancy claims in the above paragraphs — but we want you to be AWARE of our MOST PRECIOUS COMMODITIES — our policies, our terms, our guarantees and our services. These, along with your CONFIDENCE in us are our MOST important assets — and in terms of dollars and cents will NEVER be discounted!!

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Features

- Complete 144-148 MHz coverage in 8 band segments—11 crystal channels per band segment. (11 xtals = 88 crystal controlled channels)
- SSB output 12 watts PEP—FM/CW output 14 watts—AM output 2.5 watts
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- Three way metering: S-meter, power output, and FM discriminator
- Built-in AC & DC power supplies and speaker
- Built-in tone burst—adjustable 1500-2000 Hz

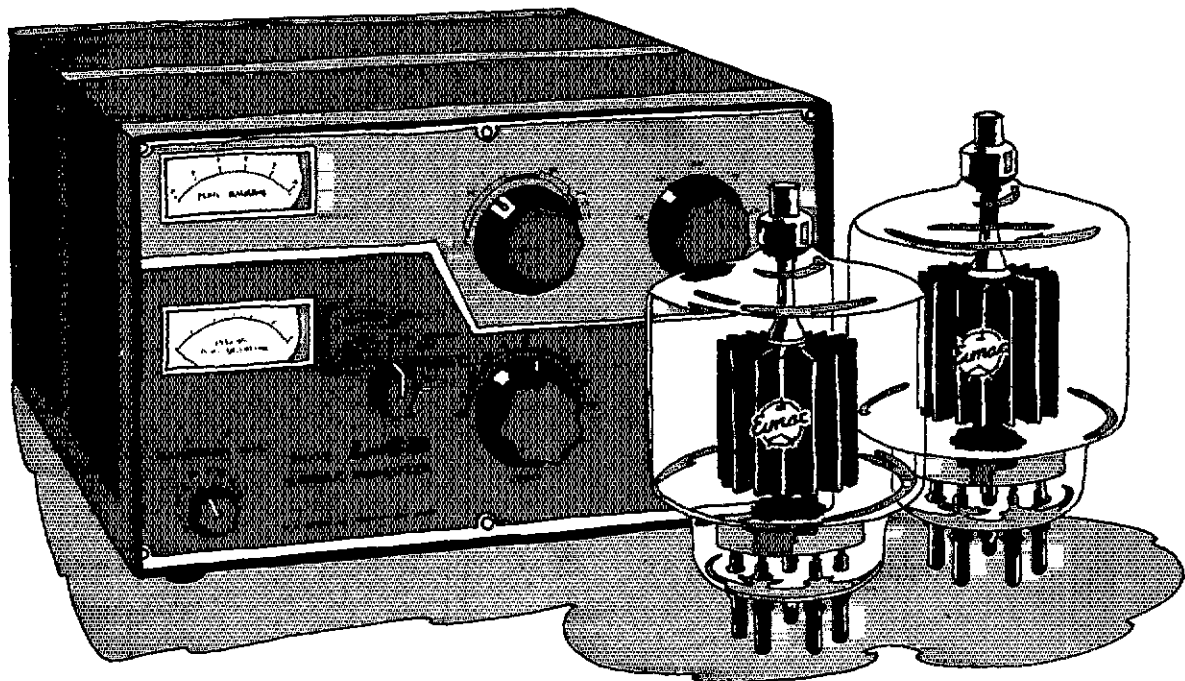
See your Yaesu dealer or write:

Yaesu Musen USA Inc., 7625 E. Rosecrans,
No. 29, Paramount, California 90723

Yaesu Musen USA Inc.,
613 Redna Terrace, Cincinnati, OH 45215
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EIMAC 3-500Z triodes.

The good guys at Drake are proud to tell you about their L-4B linear amplifier. They won't hide the fact that precision design insures continuous operation at one kilowatt power input on CW, AM and RTTY; and two kilowatts PEP on SSB. You won't have to ask twice about the L-4B's features like the transmitting AGC circuit to control exciter gain, the standby switch or the built-in RF directional wattmeter.

Our point? Drake doesn't keep it a secret that the L-4B's high efficiency class B grounded grid circuit uses EIMAC 3-500Z zero bias triodes. EIMAC's performance reputation is a much publicized plus. Use of the 3-500Zs simplifies the circuitry, provides 1,000 watts plate dissipation and turns driving power into maximum output power.

To find out more about the reason Drake's first choice is EIMAC, or to ask about our design flexibility to meet individual applications, drop us a line or call. We have no secrets.

Contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070, (415) 592-1221. Or any of the more than 30 Varian Electron Device Group Sales offices throughout the world.

